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September 27, 2013

Ms. Amy Markstein
Assistant Planner – SPRNCA RMP
BLM Tucson Field Office
3201 E. Universal Way
Tucson, AZ 85756

RE: San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan (RMP) Scoping Comments

Dear Ms. Markstein:

The Arizona Game and Fish Department (Department) reviewed the Bureau of Land Management's (BLM) Notice of Intent to Prepare a Resource Management Plan for the San Pedro Riparian National Conservation Area and Associated Environmental Impact Statement. The Department offers the following preliminary comments regarding these planning efforts, and look forward to participating as a Cooperating Agency throughout the entire planning process.

Many of the species in the planning area would benefit from active monitoring, proactive management, and habitat enhancement. In our efforts to conserve and enhance wildlife resources and provide wildlife-related recreational opportunities within the planning areas, the Department must continue to have the ability to implement necessary management actions that support existing, reintroduced, supplemented, or expanded populations of wildlife.

Necessary management actions may include releases of wildlife into currently unoccupied habitats, maintenance of existing wildlife water developments, construction of new wildlife water (or other) developments, and implementation of various wildlife habitat improvement projects, including development of cooperative agreements and projects with land management agencies and adjacent landowners in order to maintain open space and travel corridors necessary for wildlife movement, forage, breeding, and genetic exchange, and any necessary wildlife management activities consistent with the wildlife-related purposes for which the area was designated as a National Conservation Area.

Wildlife management activities, as those mentioned above, must continue to be considered authorized administrative activities under those actions that address protection of the natural resources. It is important that our agency be directly involved during the route planning and designating process as a member of the planning team to identify important areas for fish and wildlife resources and to ensure necessary access for management and reasonable public access

for wildlife-related recreation. In addition, the Department has provided the attached comments to further specify some of our preliminary wildlife management concerns.

Department staff and BLM staff have already been working cooperatively on implementation-level projects. We look forward to continuing this level of involvement, as well as working with you to review RMP and site-level decisions to develop appropriate management guidelines and alternatives for wildlife, and to assist in the development of Desired Ecological Conditions for wildlife and wildlife-habitat within the planning areas.

The Department appreciates the opportunity to participate in this planning process as a Cooperating Agency for ongoing and future planning efforts. Our Regional Habitat Specialist, Kristin Terpening, will be the Department lead for this planning effort. Please contact Kristin at (520) 388-4447 if you have any questions regarding this letter.

Sincerely,

John Windes
Habitat Program Manager, Region V

JDW:kt

Attachment: Enumerated Comments

cc: Kristin Terpening, Habitat Specialist, Region V
Laura Canaca, Project Evaluation Program Supervisor

Arizona Game and Fish Department Scoping Comments for San Pedro Riparian NCA RMP

1. Adaptive management and monitoring are important planning elements and should be included within the RMP to allow agencies to respond to unforeseen conditions including drought, decline in habitat conditions, invasive species, fire, etc.

2. The RMP should consider all potential management actions which may be necessary for wildlife and habitat management purposes and include those actions in the plan to avoid unnecessary compliance documentation in the future. Specifically, maintenance and enhancement of native systems such as stream restoration and grassland restoration activities should be addressed. The Biological Assessment should seek Migratory Bird Treaty Act exemption similar to the Las Cienegas NCA for actions in accordance with the RMP.

3. Historically, the San Pedro River contained 14 species of native fish. Today, these have been largely replaced by introduced species such as the common carp, black bullhead and mosquitofish. Only the longfin dace and desert sucker remain from the original San Pedro populations. The RMP should evaluate and consider conservation activities which actively promote reintroduction and management for native fishes, including native big river fishes historically present in the river but now extirpated, such as the Colorado pikeminnow as appropriate. Specifically, the BLM should address the needs for reintroduction, intensive management, sportfish management, and in-situ rearing facilities for native fishes to achieve conservation goals for restoration of these fishes to the river. The BLM should consider opportunities to cooperate with the Department on such management activities and facilities.

4. The Department supports the development of a travel plan, with travel generally limited to inventoried/designated routes as prescribed in the legislation creating the NCA. The BLM should consider the needs of the Department to actively manage wildlife, including wildlife harvest objectives, in designation of routes and administratively allowed uses off of designated routes.

5. The Department supports managing all waters to be 'wildlife friendly'. All waters should be inventoried for wildlife needs. Waters should be available to wildlife year round. Water inventory data should be shared between agencies so that areas deficient in available water may be evaluated for future development. The full range of species that benefit from water should be considered when evaluating waters.

6. The Department supports fencing to control use by livestock of essential riparian areas and waters. Riparian areas should be managed to ensure recruitment of riparian vegetation such as cottonwood and willow seedlings. The Department supports maintaining all fences as 'wildlife friendly' and can provide wildlife compatible fencing guidelines.

7. The Department supports the monitoring of browse use by livestock and wildlife. This monitoring should ensure that high quality browse is available to deer throughout the year, especially during critical dry months such as pre-monsoon.

8. Livestock forage should be monitored to ensure that preferred species are not declining in frequency or abundance. All allotments should be on a rest-rotation plan. Drought should be taken into account and less utilization should be allowed during drought. Adaptive management language should be included in all allotment plans.

9. Fawning cover should be monitored in areas where deer and pronghorn declines are an issue.

10. Public access needs should be evaluated. The Department is especially interested in maintaining and enhancing hunter opportunity per executive order 13443.

11. Executive Order 13443 requires the BLM to "ensure that agency plans and actions consider programs and recommendations of comprehensive planning efforts such as State Wildlife Action Plans (SWAP), the North American Waterfowl Management Plan, and other range-wide management plans for big game and upland game birds". The Department urges the BLM to utilize the SWAP and the species lists therein.

12. Per Commission policy, the Department recognizes the SPRNCA riparian habitat as an area of critical environmental importance to wildlife and fisheries. The Department actively encourages management practices that will result in maintenance of current riparian habitat, and restoration of past or deteriorated riparian habitat. The Department actively encourages the maintenance, restoration, and protection of instream flows at the SPRNCA, which are essential to maintaining riparian habitat.

13. Arizona Revised Statue §17-102, provides that "wildlife, both resident and migratory, native or introduced, found in this state, except fish and bullfrogs impounded in private ponds or tanks or wildlife and birds reared or held in captivity under permit or license from the commission, are property of the state and may be taken at such times, in such places, in such manner and with such devices as provided by law or rule of the commission." Any regulations pertaining to taking of wildlife, including method of take, should be coordinated with the Department and approved by the Arizona Game and Fish Commission so that those regulations may be enforced under state law. Likewise any areas closed to take of wildlife or discharge of firearms should be done so in consultation with the Department and by consent of the Commission to ensure state peace officers may conduct compliance enforcement. The BLM may consider incorporating the NCA as a State Wildlife Area under state law to easily facilitate the designation of regulations pertinent to the NCA enforceable by state officers.

14. The BLM should reevaluate current restrictions on firearm possession and use and develop policy and regulation that ensures compliance with state and federal law and ensures that firearm use is not unnecessarily restricted where such use does not conflict

with the purposes of the NCA. The Department would like to work closely with the BLM to determine the necessity of current and future closures.

15. The BLM should establish a monitoring program that monitors biological metrics of the aquatic and riparian ecosystem health separate and apart from Proper Functioning Condition which is not designed for this purpose.

16. The RMP should address any potential for the introduction of noxious weeds, pathogenic fungi (chytridiomycota), and other organisms which may cause disease or alteration to ecological functions.

17. The BLM should consider climate change, groundwater depletion, and the importance of upland health in the watershed in evaluating future water supply needs for the river. The BLM should identify where mesquite removal is appropriate (such as grassland restoration projects) to achieve habitat goals and objectives and where mesquite removal is inappropriate (such as native bosque habitats.)

18. The BLM should identify what upland health conditions that affect riparian and aquatic health should be improved. The BLM should identify what federal programs through which agencies could be applied to benefit upland health conditions and make recommendations for prioritization of funding of those programs in the watershed.

19. The BLM should identify how the Department can assist the in enhancing and restoring wildlife and habitat in the NCA and determine if a Habitat Management Plan should be developed separately or incorporated into the RMP.

20. The BLM should ensure that take of wildlife under special license by the Department (such as for scientific collecting purposes) is not unnecessarily restricted on the NCA where it does not conflict with the purposes of the NCA.

TFO_SPRNCA_RMP, BLM_AZ <blm_az_tfo_sprnca_rmp@blm.gov>

San Pedro Riparian National Conservation Area Resource Management Plan

1 message

Peter Steere <Peter.Steere@tonation-nsn.gov> Mon, Sep 23, 2013 at 2:13 PM
To: "blm_az_tfo_sprnca_rmp@blm.gov" <blm_az_tfo_sprnca_rmp@blm.gov>

MEMORANDUM

DATE: September 23, 2013

TO: Amy Markstein, BLM, Tucson Field Office

3201 Universal Way, Tucson, Arizona 85634

FROM: Peter L. Steere, Tribal Historic Preservation Officer

Tohono O'odham Nation

P.O. Box 837

Sells, Arizona 85634

RE: San Pedro Riparian National Conservation Area Resource Management Plan

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Thank you for consulting with the Tohono O'odham Nation during this scoping period for the San Pedro Riparian National Conservation Area Resource Management Plan.

The Tohono O'odham Nation regards the lands of the San Pedro National Conservation Area Resource Management Plan as part of the Traditional-Use Lands of the Tohono O'odham nation.

The Tohono O'odham Nation considers the preservation and protection of cultural sites in the San Pedro National Conservation Area of utmost importance.

The Tohono O'odham Nation considers the preservation and protection of the traditional cultural and natural landscapes of high importance.

There is needs to be a strong effort in a new management plan to address the identification and protection of such sites.

The use of Off-Road vehicles should be eliminated in areas of cultural sensitivity.

There needs to be a contingency plan developed in the event of inadvertent discoveries of cultural sites in the San Pedro Riparian National Conservation Area.

Many significant discoveries of often deeply buried cultural sites has occurred in the San Pedro river Valley over the past 75+ years, frequently due to some erosional event that has exposed a deeply buried cultural site.

Please keep the Tohono O'odham Nation informed of the developments of this new management plan.

Audubon ARIZONA

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Amy Markstein
SPRNCA RMP Coordinator
Bureau of Land Management
1763 Paseo San Luis
Sierra Vista, Arizona 85635

September 25, 2013

Re: San Pedro Riparian National Conservation Area (SPRNCA) RMP Scoping

Audubon Arizona and the Appleton-Whittell Audubon Research Ranch offer our combined comments concerning the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan (RMP) Scoping phase.

We commend the BLM for scheduling the excellent series of public education workshops. The content was extremely valuable in aiding the thoughtful development of scoping comments.

Our specific scoping comments follow.

1. Establish a National Conservation Area Advisory Committee for SPRNCA based on the model of the Biological Planning team currently in place at the Las Cienegas NCA. This group meets at least twice a year, is open to all stakeholders, and provides a venue for interested publics to voice concerns and to be part of the advisory process. Sub-committees meet more frequently and report to the team on subjects similar to those posed by our following comments.

2. Implement a strategy to evaluate progress toward desired future conditions within the floodplain and adjacent terraces of the San Pedro River.

We recommend utilizing the Stromberg Riparian Condition Class system and integrating the extensive hydrological and geomorphologic information that has been assembled for the Sierra Vista sub-watershed over the years. Proper Function Condition (PFC) for each of the 14 segments needs to reflect the depth of scientific information available for the watershed and that each segment should be evaluated in the context of the geomorphologic and known hydrologic potentials for the segment. Most importantly, the PFC analysis should minimize the use of best professional opinion and substitute available data and other objective information wherever possible. The PFC process should include the development of concise metrics for assessment of trend and what specific data should be collected to ascertain trends and segment objectives. We believe

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that the 14 segments of the river will have differing potentials for cottonwood and willow riparian, cienega, sacaton grass and mesquite bosque habitats. Close attention should be given to the analysis of soils, hydrology, and other geomorphic considerations when developing the site descriptions for desired future conditions.

Kreuper, et al.2003 reported that removal of cattle led to rapid and substantial recovery of riparian and mesquite bosque vegetation and bird populations. Resuming cattle grazing within these vegetation communities is not recommended, and if done should be approached with great caution.

3. Establish long-term hydrologic monitoring of depth to groundwater for the 14 identified river segments.

We support the continued funding of USGS professionals to collect the groundwater well and surface flow data.

4. Develop citizen science and student naturalist programs to help collect field data.

The Las Cienegas NCA has excellent examples of successful programs. We believe there is great opportunity to take advantage of the various programs that encourage engagement of youth in the outdoors to help fund and organize a volunteer and student internship network. We would suggest considering including the Audubon Arizona and BLM Phoenix District developed program River Pathways as a specific youth initiative under Action 3. This program involves a one week curriculum about riparian systems and engages students in hands on outdoor experiences.

5. Assurance of San Pedro Subwatershed adjudicated surface water quantity being sufficient to meet the purposes of SPRNCA.

We support the commitment and stress the importance of collecting good data to provide the scientifically sound justification for the statement of sufficiency of water. We recommend continued work with the Decision Support System for Resolving Conflict on the Upper San Pedro River (DSS).

We also support taking whatever legal steps are necessary to protect the federal water rights.

6. Develop avian monitoring metrics that support the avian models developed by Brand, *et al* (2011) linking avian abundance for key species to depth to groundwater and surface water flows.

Establish avian surveys protocols that will inform the DSS modeling. Identified bird species that are sensitive to changes in available surface water and indirectly the depth to groundwater include Western yellow-billed cuckoo, yellow warbler, lesser goldfinch,

song sparrow, and common yellow-throat. Consider other species based upon professional recommendations and research. Kirkpatrick (2008) detected a positive association between total bird relative abundance and the presence and extent of surface water ≤50 m from bird survey points. Kirkpatrick (2008) detected positive associations between surface water and relative abundance for 4 bird species: Black Phoebe, Vermillion Flycatcher, Northern Beardless Tyrannulet, and White-winged Dove. Yellow-billed Cuckoo, Great Blue Heron, Mallard (Mexican type), Killdeer, and Black Phoebe respond strongly to both vegetation and surface water availability (Brand *et al.*, 2008). Common Yellowthroats are highly associated with cottonwood/willow vegetative structure adjacent to surface water. (Brand, *et al.*, 2011). Consider formally designating Gray Hawk, Yellow-billed Cuckoo, Common Yellowthroat, and Yellow Warbler as indicator species for the cottonwood/willow gallery forest habitats. Densities of cuckoos in prime cottonwood-willow riparian habitat varied from 3.8 individuals per 40 ha in the summer of 1986 to 6.5 individuals per 40ha in the summer of 1987 (Laymon and Halterman.1989). Surveys conducted between 2001 and 2006 on the San Pedro Riparian National Conservation Area, Arizona found an estimated 60-100 pairs of cuckoos (M. Halterman unpublished data).

- Habitat criteria recommended by Johnson (2009) for the Yellow-billed Cuckoo include large patches of continuous cottonwood and willow trees that are tall along stream courses and surrounded by mesquite bosque, sparse understory shrub layer, and proximity to water (stream, cienega, stock pond, backwater).

- The Gray Hawk will respond favorably to habitat guidelines for the Western Yellow-billed Cuckoo. For both birds avoid livestock grazing during the growing season and nest disturbance should be avoided during the breeding season of March-July for the hawk and July-September for the cuckoo.

- Yellow Warblers are both an abundant canopy nesting species and migrant that will serve as an indicator for that vegetative structure.

- Common Yellowthroat requires streamside, cienega, or backwater vegetation and a dense understory vegetative structure within a few meters of water. They use rushes, reeds, young willow and seep willow.

7. Identify, preserve and manage mesquite bosque habitats with an understory of native bunchgrasses and sacaton.

Recent research on gray hawk is reaffirming the importance of mesquite bosques for that species. Also, the global significance of the SPRNCA as an Important Bird Area is based in part on the presence of Bell's Vireo that selects for mesquite bosque habitat for breeding. The continentally significant Lucy's Warbler is a mesquite bosque obligate

breeding bird. In summary, an important element of the RMP will be mapping the areas that should be maintained or managed for mesquite bosque. Monitor the status of these key bird species. Consider formally designating Lucy's Warbler, Bell's Vireo, Gray Hawk, Yellow-billed Cuckoo, and Vermilion Flycatcher as indicator species for the mesquite bosque habitats.

- Lucy Warbler is a cavity nesting bird that builds a nest behind large bark shards of mature mesquites. Conserve large patches of mesquite bosques, especially near tributary confluences. Keep groundwater levels no deeper than 49 feet (15 meters).
- Bell's Vireo is a mid-story nester that prefers a dense shrub layer 0.6–3.0 m above ground. Maintain mesquite bosques and mid-story shrubs in the riparian zone. Bell's Vireo is not dependent on flowing water.

8. Conserve and , if possible, expand the extent of sacaton grasslands in the flood channels and upper terraces within the San Pedro River floodplain. A bird that is an indicator for this habitat and the bunchgrass community is the Botteri's Sparrow.

- Botteri's sparrows are late summer nesters. Highest nesting densities on SPRNCA are in riparian bunchgrass vegetation (Kreuper, *et al.* 2003). Conserve and manage for dense patches of giant sacaton and bunchgrass swales within seasonally wet areas. Avoid grazing these habitats from June-September

9. Manage the upland grasslands to protect and enhance native plant communities. Where cattle are allowed under current grazing leases, coordinated resource management teams should be charged with developing appropriate standards for each least and BLM should consider eliminating the lease on any parcel that does not meet the standard developed. In some cases, this may mean installation of new fences and/or waterers and may involve vegetation management actions..

Birds that are indicators for healthy grasslands are Cassin's Sparrow, Rufous-winged Sparrow, Grasshopper Sparrow, Lilian's Eastern Meadowlark, Scaled Quail, and wintering longspurs (McGowan's and Chestnut Collared) and sparrows (Brewer's and Baird's).

Cassin's Sparrows are later summer nesters in upland bunchgrass habitats with some woody shrubs. Maintain a tall grass community and prohibit intensive grazing practices.

Rufous-winged Sparrows favor desert grassland habitats with cactus and woody shrubs. Maintain an understory bunchgrass community and prohibit intensive grazing practices.

10. Use beavers as a natural technique for restoring the stream channel and increasing bank recharge where appropriate.

11. Use a thorough coordinated resources planning process for development of this RMP, similar to that used for the Las Cienegas RMP.

12. Continue the MAPS (Monitoring Avian Productivity and Survivorship) bird banding stations. These sites are important contributors to a hemispheric network. Information from the banding stations provides data about the age structure and physiological condition of migratory and some breeding birds in the SPRNCA.

Again, we thank you for this opportunity to provide our input.

Sincerely yours,

Vashti "Tice" Supplee *Linda Kennedy*

Vashti "Tice" Supplee, Director of Bird Conservation
Linda Kennedy, PhD., Director Appleton-Whittell NAS Research Ranch

REFERENCES for AVIAN RESOURCES

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To: Bureau of Land Management staff
Subject: Public input on SPRNCA Resource Management Plan scoping

The Friends of the San Pedro River is a volunteer, non-profit environmental organization in southeastern Arizona. The Friends aim to conserve, protect, and enhance the natural and cultural resources of the San Pedro River. We are the only organization whose sole mission is protection of this special desert river through advocacy, education, and interpretation. Most of our 280 members are residents of the Upper San Pedro River Valley. Our 86 volunteers staff two visitor contact stations and lead over 200 walks, tours, school visits, and special events each year. They are the face of the river for over 30,000 visitors to San Pedro House and Fairbank Schoolhouse each year.

The San Pedro River at the bottom of the valley is home to diverse wildlife and represents the last, best riparian habitat in Arizona. The riparian ecosystem of the San Pedro River is vital to the survival of millions of migratory and resident birds and other wildlife, particularly in the face of many threats. Among the threats to these native species are non-native species like bullfrogs, mining and gas exploration and extraction, real estate development and sprawling communities, and irresponsible recreational shooting in areas where it is prohibited within SPRNCA, among others. Despite these threats, the SPRNCA also has many areas with wilderness characteristics that should be preserved to the maximum extent possible. In addition, some 44 miles of the river could be designated "Recreational" status under the Wild & Scenic Rivers Act. BLM should pursue this designation. Furthermore, areas of critical environmental concern should be identified and protected.

The SPRNCA is an incredible recreational and educational resource, right on the doorstep of Sierra Vista, Bisbee, Tombstone, and other local communities. The SPRNCA is an asset to the local economy given the income associated with eco-tourism, which is a low-impact, renewable source of revenue for businesses throughout the San Pedro Valley. According to the Tucson Audubon Society in their July-September 2013 Vermilion Flycatcher newsletter, "An estimated 44,000 people a year visit the San Pedro River, and Cochise County benefits to the tune of $24 million a year from wildlife watchers according to a new survey." That survey "shows the total economic effect from 2011 watchable wildlife activities in Arizona to be $1.4 billion." Southwick Associates produced that survey which uses Arizona data from the U.S Fish and Wildlife Service (FWS). These values should be reflected in the management alternatives that the BLM analyzes.

In considering management alternatives for the SPRNCA, BLM should promote above all else the protection of the cottonwood/willow gallery forest, mesquite bosques, and other sensitive riparian habitats essential to birds and other wildlife, managing for a range of natural variability. Ultimately, BLM needs to ensure base flows in the river for these habitats. It can do that by expanding the scope of the RMP to include the entire Sierra Vista/Upper San Pedro Valley watershed. This

alternative is in harmony with the enabling legislation for the SPRNCA, so it should be a high priority. Furthermore, BLM should manage for a range of natural variability as distinguished from a desired future condition, since there is great uncertainty in future environmental circumstances given climate change and alterations to the natural environment of the valley as a whole. We encourage the BLM to make use of the best available science to guide management alternatives for the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan (RMP). Following BLM's 15-year Strategic Plan, the 3-year Arizona Strategy, and the Secretarial Order, BLM must put conservation first in management decisions.

One way that BLM can protect riparian habitat and other sensitive areas is to prohibit cattle grazing in the river channel itself and to restrict it elsewhere to existing grandfathered grazing allotments in the SPRNCA. Nevertheless, BLM should partner with ranchers to encourage sustainable grazing as a continued land use adjacent to the SPRNCA and in grandfathered allotments in SPRNCA. The goal here is to limit encroachment of residential sprawl near the river thereby protecting the aquifer that feeds the river's base flow. Meanwhile, BLM should continue to prohibit off-road motor vehicle use, especially in the river channel itself or anywhere that is not on designated, paved roads and highways in the SPRNCA. Habitat for sensitive or at-risk species like Yellow-billed Cuckoo must be protected. Likewise, to limit damage to sensitive habitats BLM should seek an inter-agency agreement with Border Patrol. Patrol activities, including off-road and helicopter patrols and pursuit of illegal migrants, recently have increased significantly as has resultant environmental damage. Such an agreement should address noise reduction and address other impacts like high-intensity lighting within SPRNCA and damage to cultural and pre-historic sites. BLM should prohibit removal of artifacts in sensitive pre-historic and historic sites like Murray Springs and Presidio Santa Cruz de Terrenate. Finally, BLM should continue restrictions on use of firearms (e.g. target shooting), particularly for public safety in heavily visited places like San Pedro House and Fairbank Schoolhouse.

The SPRNCA, a jewel among our National Conservation Lands, deserves an RMP that reflects that. Thank you for your consideration.

The Board of Directors of the Friends of the San Pedro River:

Ron Serviss, President
Ron Stewart, Vice President
Renell Stewart, Treasurer
Sally Rosén
Tom Clancy
Tom Wood
Steve Ogle

Robert Weissler, Executive Director

Ms. Amy Markstein
Resource Management Plan Coordinator
Bureau of Land Management
3201 E. Universal Way
Tucson, AZ 85656

September 15, 2013

To: Ms. Markstein and Bureau of Land Management Tucson Field Office Staff
Subject: Friends of the San Pedro River input on SPRNCA RMP scoping

The Friends of the San Pedro River (FSPR) Board of Directors has authored and signed scoping comments for the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan (RMP) process. An overall scoping letter accompanies this cover letter. In addition, scoping letters focused on individual topics supplement the overall scoping letter as appendices. These topics include water quality and quantity; recreation, wilderness designation and Wild & Scenic Rivers; hunting, firearms, and recreational shooting; cultural resources; law enforcement; land acquisition; endangered species and critical habitat, habitat restoration, and non-native species; border patrol, motor vehicle access and transportation; and grazing, mining, energy, and land-use conflicts.

We decided to submit all of these scoping comments from the FSPR Board in one package to make it easier for BLM to understand each of the scoping letters in context.

If you or anyone at the BLM has any questions about any of these comments or the FSPR scoping comment package as a whole, please let me know.

Kindest regards,

Robert Weissler
Executive Director, Friends of the San Pedro River

Friends of the San Pedro River
4070 S Avenida Saracino, Hereford, AZ 85615
Dedicated to the conservation and restoration of the river through advocacy, education, and interpretation
fspr@sanpedroriver.org facebook.com/fspraz www.sanpedroriver.org

To: Bureau of Land Management staff
Subject: Public input on SPRNCA Resource Management Plan scoping

The Friends of the San Pedro River is a volunteer, non-profit environmental organization in southeastern Arizona. The Friends aim to conserve, protect, and enhance the natural and cultural resources of the San Pedro River. We are the only organization whose sole mission is protection of this special desert river through advocacy, education, and interpretation. Most of our 280 members are residents of the Upper San Pedro River Valley. Our 86 volunteers staff two visitor contact stations and lead over 200 walks, tours, school visits, and special events each year. They are the face of the river for over 30,000 visitors to San Pedro House and Fairbank Schoolhouse each year.

The San Pedro River at the bottom of the valley is home to diverse wildlife and represents the last, best riparian habitat in Arizona. The riparian ecosystem of the San Pedro River is vital to the survival of millions of migratory and resident birds and other wildlife, particularly in the face of many threats. Among the threats to these native species are non-native species like bullfrogs, mining and gas exploration and extraction, real estate development and sprawling communities, and irresponsible recreational shooting in areas where it is prohibited within SPRNCA, among others. Despite these threats, the SPRNCA also has many areas with wilderness characteristics that should be preserved to the maximum extent possible. In addition, some 44 miles of the river could be designated "Recreational" status under the Wild & Scenic Rivers Act. BLM should pursue this designation. Furthermore, areas of critical environmental concern should be identified and protected.

The Federal Land Policy and Management Act (FLPMA) requires the BLM to inventory and consider lands with wilderness characteristics during the land use planning process. 43 U.S.C. § 1711(a); *see also Ore. Natural Desert Ass'n v. BLM,* 625 F.3d 1092, 1122 (9th Cir. 2010). IM 2011-154 and Manuals 6310 and 6320 contain mandatory guidance on implementing that requirement. The IM directs BLM to "conduct and maintain inventories regarding the presence or absence of wilderness characteristics, and to consider identified lands with wilderness characteristics in land use plans and when analyzing projects under [NEPA]." Manual 6320 requires BLM to consider lands with wilderness characteristics in land use planning, both in evaluating the impacts of management alternatives on lands with wilderness characteristics and in evaluating alternatives that would protect those values.

The Federal Land Policy and Management Act (FLPMA) obligates the BLM to "give priority to the designation and protection of areas of critical environmental concern [ACECs]." 43 U.S.C. § 1712(c)(3). ACECs are areas "where special management is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes." 43 U.S.C. § 1702(a).

The SPRNCA is an incredible recreational and educational resource, right on the doorstep of Sierra Vista, Bisbee, Tombstone, and other local communities. The SPRNCA is an asset to the local economy given the income associated with eco-tourism, which is a low-impact, renewable source of revenue for businesses throughout the San Pedro Valley. According to the Tucson Audubon Society in their July-September 2013 Vermilion Flycatcher newsletter, "An estimated 44,000 people a year visit the San Pedro River, and Cochise County benefits to the tune of $24 million a year from wildlife watchers according to a new survey." That survey "shows the total economic effect from 2011 watchable wildlife activities in Arizona to be $1.4 billion." Southwick Associates produced that survey which uses Arizona data from the U.S Fish and Wildlife Service (FWS). These values should be reflected in the management alternatives that the BLM analyzes.

In considering management alternatives for the SPRNCA, BLM should promote above all else the protection of the cottonwood/willow gallery forest, mesquite bosques, and other sensitive riparian habitats essential to birds and other wildlife, managing for a range of natural variability. Ultimately, BLM needs to ensure base flows in the river for these habitats. It can do that by expanding the scope of the RMP to include the entire Sierra Vista/Upper San Pedro Valley watershed. This alternative is in harmony with the enabling legislation for the SPRNCA, so it should be a high priority. The 15-Year Strategy for the National Conservation Lands states that BLM should "emphasize an ecosystem-based approach to manage the [Conservation Lands] in the context of the surrounding landscape." Thus, BLM should be looking at the bigger picture here, including connecting the important riparian habitat of the SPRNCA with adjacent resources.

Furthermore, BLM should manage for a range of natural variability as distinguished from a desired future condition, since there is great uncertainty in future environmental circumstances given climate change and alterations to the natural environment of the valley as a whole. We encourage the BLM to make use of the best available science to guide management alternatives for the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan (RMP). Following BLM's 15-year Strategic Plan, the 3-year Arizona Strategy, and the Secretarial Order, BLM must put conservation first in management decisions.

One way that BLM can protect riparian habitat and other sensitive areas is to prohibit cattle grazing in the river channel itself and to restrict it elsewhere to existing grandfathered grazing allotments in the SPRNCA. Nevertheless, BLM should partner with ranchers to encourage sustainable grazing as a continued land use adjacent to the SPRNCA and in grandfathered allotments in SPRNCA. The goal here is to limit encroachment of residential sprawl near the river thereby protecting the aquifer that feeds the river's base flow. Meanwhile, BLM should continue to prohibit off-road motor vehicle use, especially in the river channel itself or anywhere that is not on designated, paved roads and highways in the SPRNCA. Habitat for sensitive or at-risk species like Yellow-billed Cuckoo must be protected. Likewise, to limit damage to sensitive habitats BLM should seek an inter-agency agreement with Border Patrol. Patrol activities, including off-road and

helicopter patrols and pursuit of illegal migrants, recently have increased significantly as has resultant environmental damage. Such an agreement should address noise reduction and address other impacts like high-intensity lighting within SPRNCA and damage to cultural and pre-historic sites. BLM should prohibit removal of artifacts in sensitive pre-historic and historic sites like Murray Springs and Presidio Santa Cruz de Terrenate. Finally, BLM should continue restrictions on use of firearms (e.g. target shooting), particularly for public safety in heavily visited places like San Pedro House and Fairbank Schoolhouse.

The SPRNCA, a jewel among our National Conservation Lands, deserves an RMP that reflects that. Thank you for your consideration.

The Board of Directors of the Friends of the San Pedro River:

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Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Water Quality and Quantity

The Friends of the San Pedro River (FSPR) mission includes conservation and restoration of the river through advocacy and education. This scoping letter focuses on comments and suggestions related to management alternatives that enhance water quality and protect sufficient groundwater resources to sustain base flow in the river.

In order to slow, stop and even reverse the annual groundwater deficit, BLM must expand the planning area to include the entire Sierra Vista Subwatershed and possibly additional adjacent areas of the middle San Pedro River near Benson. If local mining activities in the watershed resume, there could be significant groundwater withdrawals that would impact the river. Only working with partners in City of Sierra Vista and Cochise County will there be influence over land use planning in the watershed that can protect the aquifer. Ultimately, BLM should promote adoption of a balanced water budget by the city, county and other members of the Upper San Pedro Partnership (USPP) in the watershed.

Given federal budget austerity and budget cuts that BLM faces, BLM should encourage its partners in the USPP to combine resources to implement both effluent and stormwater recharge basins and detention structures in strategic locations in the watershed, including in the SPRNCA. BLM must address water quality issues in the same fashion. Currently, E-coli and pharmaceutical drugs pose challenges to improving water quality because there are many potential sources in the valley: cattle, wastewater treatment facilities, and evaporative fields at residences. The daylighting of treated water from the Sierra Vista Environmental Operations Park also has more direct impact by undermining the excavation sites at the Murray Springs National Historic Landmark.

BLM cannot handle these water issues by itself, so it must engage in collaborative efforts with the USPP, while continuing to assert the federal reserve water right that Congress gave the SPRNCA back in 1988. We encourage BLM to persevere in water rights litigation and the protracted Gila River adjudication process. The SPRNCA is a unique resource that is a high priority for BLM and for all of us who value it.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Recreation

The Friends of the San Pedro River (FSPR) mission includes recreation and education among its key ways to promote appreciation and protection of the San Pedro River. This scoping letter focuses on comments and suggestions related to recreation including management alternatives that promote multiple recreational uses that do not negatively impact essential natural and cultural resources in the SPRNCA.

Given federal budget austerity and budget cuts that BLM faces, BLM should value its partners and volunteers more than ever. BLM can take advantage of FSPR volunteers to maintain trails more effectively for public safety, particularly during the monsoon and its aftermath in late summer. Trails should be trimmed of tall vegetation encroaching or obstructing designated trails and other paths in heavily visited areas like San Pedro House, Kingfisher Pond, Hereford and Palominas trailheads, and Fairbank. In addition, trails should be clearly marked, while SPRNCA maps and guides should be annotated to note their location and promotional materials should publicize their availability.

Currently, some for-profit tour operators obtain the necessary Special Recreation Permit (SRP) and submit fees required to bring tour groups into the SPRNCA as part of an advertised tour itinerary, while other operators do not, but proceed into SPRNCA anyway. The same situation might occur with photography workshops and similar events. Since enforcement is problematical, BLM should consider streamlining the permit process. One means to do so is to develop a generic nature tour SRP posted at San Pedro House or Fairbank Schoolhouse. A tour operator could read and sign the SRP for the tour company, pay the fee at the visitor contact station at each location during normal business hours or leave it in the donation box outside at other times. Posting this requirement prominently in these locations and on the BLM and FSPR websites would help get the word out. Such measures could increase compliance and fees collected by making the process faster and simpler (day-of event instead of weeks in advance).

For multiple non-motorized means of travel, like mountain biking, equestrian rides, hiking, birding, and picnicking, BLM should consider use restrictions in sensitive places like Fairbank Cemetery and Murray Springs and in crowded places like San Pedro House and Fairbank. For example, no (mountain) biking or horses in the cemetery itself. Another restriction to consider is to allow biking only on designated/signed roads or paths. Such restrictions would protect public safety in crowded areas, conserve and enhance habitat in sensitive riparian zones, and protect fragile historic sites and structures.

Meanwhile, motorized vehicle access should be limited, as it currently is, to existing designated roads and highways that provide access to visitor contact stations and trailheads. BLM should continue to prohibit off-road motor vehicle use, especially in

the river channel itself. BLM should seek an inter-agency agreement with Border Patrol to limit activities, including off-road patrols and pursuit of illegal migrants; the increased presence, staffing and activities of Border Patrol can cause significant environmental damage. Such an agreement should address damage to cultural and pre-historic sites too. Finally, BLM must find a way to accommodate handicap and wheel-chair access including low-horsepower, single-person conveyances to satisfy requirements of the Americans With Disabilities Act at the most popular visitor sites.

There is considerable interest in improved trails, in terms of both condition and connections the length of the river. One particularly interesting trail concept is a rail-trail on the right-of-way of the old railroad currently owned by Union Pacific. However, even if BLM can negotiate such a lease arrangement with Union Pacific, the condition of the right-of-way would require significant remediation for public safety.

Another set of recreational uses of SPRNCA is for both day uses like picnics and for overnight camping. The current Miller primitive site is miles of hiking from any trailhead. Locating camping sites close to trailheads and trail access points would provide options for valley residents and visitors who currently only have the campsites up on Carr Reef accessed by narrow, winding roads unsuitable for many recreational vehicles.

Some recreational uses are too damaging or intrusive to allow in the SPRNCA. For example, paint ball or air soft gun games require considerable space away from trails and visitor sites, but SPRNCA is narrow by its nature. The cleanup after such events is problematical to complete quickly and cost-effectively. The quality of view sheds would be diminished. Similarly, bow hunting and recreational shooting and other uses of firearms cannot be done safely near heavily visited places like San Pedro House and Fairbank Schoolhouse, nor near trails, since it is often difficult to see through thick vegetation whether or not a trail is occupied. Another example is geo-caching. Without supervision, geocache enthusiasts already have placed caches in many sensitive sites like Murray Springs, Lehner Mammoth Kill Site, or Fairbank Cemetery. In this case, it might be helpful to promote a geo-cache event to educate enthusiasts and the public to the right and wrong ways it is done in SPRNCA. Geo-caching encourages removal of objects, which might encourage behavior contrary to prohibitions on removal of artifacts in sensitive pre-historic and historic sites like Murray Springs and Presidio Santa Cruz de Terrenate.

In general, we want to encourage recreation in all of our National Conservation Lands, including the SPRNCA, as long as it does not diminish essential values and irreplaceable resources.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Cultural Resources

The SPRNCA was created to protect both its natural and cultural resources. The upper San Pedro River valley contains archeological and historical sites that date back over 12,000 years. Unique cultural resources within the SPRNCA include: Murray Springs, the nation's premiere Clovis Paleo-Indian mammoth kill site, recently designated a National Historic Site; the Presidio Santa Cruz de Terrenate, a military outpost of the Spanish Empire dating to the 1770s; the town site of Fairbank which includes perhaps the largest Hohokam village in Cochise County, remnants of three railroad depots and a Tombstone silver-boom era ghost town; silver mills that supported historic Tombstone; historic ranch houses; Indian rock art sites; and, two other 19th century ghost towns, Charleston and Hereford.

Our overall recommendation is that a Cultural Resource Management (CRM) Plan should be developed that outlines a comprehensive plan for the protection, preservation, interpretation and research regarding the precious cultural resources located in the SPRNCA.

The FSPR is committed to the protection of the cultural heritage sites in the SPRNCA. In developing the SPRNCA RMP, we would like to see these points addressed:

- An accurate catalog of at-risk cultural sites should be developed and used as the basis for an active law enforcement presence designed to protect these sites from vandalism and looting.
- Adequate law-enforcement personnel should be scheduled, to include back-country patrol of these sites.
- Volunteer groups such as the Arizona Site Stewards program should be enlisted and encouraged to supplement professional law enforcement patrols.
- We recommend attention to these sites as high profile targets that are especially vulnerable: Charleston, Grand Central Mill, Millville, Contention City (both sites), Terrenate, Murray Springs, the Lehner Ranch site, Bead Hill, Hereford townsite, Brunckow's cabin, Green corrals at the border crossing and the Clanton Ranch site.
- Horseback riding, hunting (of any kind), motorized vehicles and bicycles should be banned from these sites.

We also support the preservation of the cultural resources in the SPRNCA. Many sites are adobe structures that are rapidly dissolving. Other structures are made of wood that is deteriorating and requires stabilization or they will cease to exist. We ask that these measures be taken:

- Develop a cultural resource inventory (part of the CRM Plan) for the SPRNCA that assesses each site's integrity and prescribes the actions that will be taken to preserve it.
- Budget adequate funds to support these activities and assign these actions as part of a multi-year work plan.
- Focus attention on these sites that are especially vulnerable at this time: Terrenate, Brunckow's Cabin, Charleston, Contention City, the Hereford School, the Clanton Ranch and the Green Ranch house.
- Continue efforts to preserve and restore the Fairbank townsite. These specific actions should be performed:
    - Stabilize the exterior of the "teacher's house" and restore it to its historic appearance.
    - Finish efforts to stabilize the exterior of the Mercantile.
    - Remove the site host trailer and relocate it to a less obtrusive location.
    - Stabilize the slopes on the south and west sides of the cemetery.
- The BLM should work with the City of Sierra Vista to reroute the discharge of effluent from the Environmental Operations Park away from Curry Draw in order to protect the integrity of Murray Springs.
- All sites should undergo periodic review to determine their research value, current state and threats impacting them. This information should be used to maintain and review the CRM Plan.

Interpretation of the cultural resources of the SPRNCA will help foster an appreciation of the history of the area and increase visitation. We believe that encouraging appreciative visitation actually helps protect these sites. The SPRNCA is one of the few places in the Sierra Vista area in which the public can learn about the history of their area. We recommend these actions be taken:

- Develop or update a comprehensive interpretive master plan that selects the sites to be interpreted, the messages to be conveyed at each site and the physical infrastructure that will be provided at each.
- Fund this plan and assign it for action to the BLM staff in the Tucson Field Office.
- We recommend these sites be selected for interpretation to the public. Many of these have already been developed for visitation. Where that is true, steps should be taken to maintain and update these facilities. We are leaving off sites that are not well known or vulnerable to damage. Site list:
    - Murray Springs mammoth kill site.
    - Lehner Ranch mammoth kill site.
    - Presidio Santa Cruz de Terrenate.
    - Fairbank townsite.
    - Fairbank cemetery.
    - Grand Central Mill site.

  - Railroad bridges near Fairbank (Walnut Gulch, San Pedro).
  - Millville foundations and rock art.
  - Charleston.
  - Boston Mill.
  - Hereford town site.
  - San Pedro House/Wolf Ranch.
  - Clanton Ranch.
  - The Southern Immigrant Trail (Cooke's Wagon Road, Mormon Battalion Road).
- Update the interpretive faculties that exist now, or add new ones, including these actions:
  - Improve the heating and cooling in the Schoolhouse.
  - Replace the aging and fading signs at all locations.
  - Create a shelter resembling the original warehouse on the foundation next to the Schoolhouse at Fairbank.
  - Add an interpretive sign on BLM land at the Charleston Bridge.

Finally, we believe that archeological and historical research in the SPRNCA should be encouraged. Although cultural resources are non-renewable, we believe that careful research using non-destructive methods or involving excavation of portions of sites should be encouraged. We recommend these actions by the BLM:

- Consult with known experts on area archeology and history to set research objectives and identifies the sites at which research can meet these objectives.
- We recommend that the BLM consult regional archeological and historical groups and institutions to develop a research agenda for the SPRNCA.
- Academic and other research organizations should be encouraged by the BLM to seek grants to pursue these topics. The BLM should view granting permits to such projects as an important aspect of the job as manager of the SPRNCA.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Law Enforcement

The FSPR is vitally concerned with the protection of the facilities, natural resources and cultural heritage sites within the SPRNCA. We also want to ensure that our volunteers and employees working at Fairbank, the San Pedro House or in the backcountry areas are secure. All of this requires the presence of professional law enforcement personnel assigned to the SPRNCA available to patrol the area and rapidly respond to issues.

We would like to suggest the following plan of action regarding law enforcement activities in the SPRNCA:

- The BLM should have a BLM law enforcement ranger stationed at the SPRNCA. When this is not possible, they should ensure that the Cochise County Sheriff's office is available to respond rapidly to incidents.
- A schedule of backcountry patrols should be developed and maintained to protect sensitive areas.
- BLM law enforcement personnel should reach out to the Border Patrol to leverage their presence in the area as extra eyes and ears. This could also provide an avenue for the BLM to express areas of concern, such as ecologically sensitive areas, to their peers in the Border Patrol.
- BLM law enforcement should focus on patrolling the visitor facilities within the SPRNCA, especially the Fairbank Schoolhouse and the San Pedro House, both after hours and during operation; the goal being to establish an effective law enforcement presence.
- Maintain Site Hosts at Fairbank and San Pedro House to serve as a deterrent to vandalism.
- Consideration should be given to the formation of a trained group of citizens to help the BLM with maintaining watch over the SPRNCA – a "citizen's watch" group that would help provide scarce law enforcement personnel with better knowledge of what is going on in the SPRNCA, especially away from roads.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Land Acquisition

The acquisition of land adjacent to the SPRNCA or purchase of development rights in these areas could be an important tool for protecting the area. The FSPR would like to recommend these actions be taken in this regard:

- The BLM should seek partnership with the Nature Conservancy and other organizations with funding and administrative infrastructure to perform this action.
- Sensitive areas should be identified and targeted for acquisition.
- The BLM should coordinate with other Government entities to cooperate on the designation of sensitive areas, for example with Cochise County to zone lands adjacent to the SPRNCA for low density, non-industrial usage.
- The BLM should maintain awareness of lands that become available in sensitive areas and work towards acquisition. As an example, a number of derelict residences have recently become vacant in the Palominas area in highly visible areas along the border of the SPRNCA in that area.

Supplemental Scoping Letter
SPRNCA RMP scoping: Endangered species, habitat restoration, invasive species

The National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA) already provide specific requirements concerning consideration of the impact of management on listed species. This would include surveys for Southwestern Willow Flycatcher, Yellow-billed Cuckoo and Huachuca Water Umbel before any construction or management action to determine if any such action might impact the species. Particular care should be exercised during nesting and migration periods for listed birds. We believe that the enabling legislation for the SPRNCA also mandates a broader, ecosystem approach to management that addresses the spirit of the laws as well as the letter. By protecting and enhancing the rare habitats found along the San Pedro River, the BLM can impact an entire suite of species found there. Species that are listed as Endangered, Threatened or as candidate species, from the Huachuca Water Umbel, Southwestern Willow Flycatcher, Northern Mexican Garter Snake benefit from management for a healthy riparian ecosystem. In addition, a host of other species that are not endangered throughout their range but occur in a restricted region of the U.S. from Elegant Trogons, Green Kingfishers, White-nosed Coatis and perhaps others use the river as a migration corridor. Regular surveys and monitoring of the SPRNCA for sensitive species should be conducted. Monitoring with remote cameras would allow the BLM to document the use of the river by other species. Recognizing that restoration to a pre-European contact condition is unrealistic given changes beyond our control, the BLM should strive to manage for a range of natural variability. Ultimately the health of the willow/cottonwood riparian forest and mesquite bosque habitat depend on the assurance of an adequate water supply. Management decisions should be science-driven with the goal of promoting, protecting and enhancing a healthy riparian ecosystem.

Restoration of upland habitat to enhance the aquifer and provide habitat for grassland species is a complicated endeavor. Driven by the best science possible, restoration efforts involving upland mesquite removal as well as prescribed fire should proceed cautiously, with pilot projects closely monitored to avoid unintended consequences. Environmental impact studies should be conducted before any large-scale management or restoration project.

Despite the seemingly hopeless nature of bullfrog and tamarisk removal efforts, they should be continued to reduce the population as much as feasible. Volunteer help can assist with the removal of these and other invasive species as the need arises.

With the success of the beaver re-introduction, consideration should be given to the restoration of some of the native fish species once found in the San Pedro. Since the river itself is constantly restocked with exotics from elsewhere in the watershed, this may require the construction and management of a separate wetlands area, away from the main stem of the river. This newly constructed wetland could provide habitat for Chiricahua Leopard Frogs as well as native fish.

Supplemental Scoping Letter

Public input on SPRNCA RMP scoping: Hunting, Firearms, and Recreational Shooting

The Friends of the San Pedro River (FSPR) is concerned about the risk to the safety of our volunteers and the general visiting public that the use of firearms within the SPRNCA creates. In general terms, we support continuation of current restrictions and would like to suggest that further controls be put in place.

The current restriction on possession and discharge of firearms for hunting or any other purpose between Charleston Road and Highway 92 during the entire year should continue. However, existing signs are inadequate to properly inform the public about these restrictions. FSPR docents leading walks and volunteers working at the San Pedro House have often encountered visitors carrying guns who are just not aware that firearms are restricted. BLM should place appropriate signage at all facilities and marked trails within this area. This would include:

- Charleston Road parking area south of Charleston Road
- Escapule Road parking area
- Murray Springs parking area
- San Pedro House
- Hereford Bridge parking area
- Lehner Mammoth Kill Site parking area

Current regulations allow hunting during established Arizona state seasons north of Charleston Road and south of Highway 92, except for areas within one-quarter mile of developed facilities. BLM should identify "developed facilities" for clarity. We recommend that they include:

- Palominas parking area/trailhead
- Millville parking area/trailhead
- Little Boquillas Ranch and trailhead
- Fairbank Historic Townsite
- Presidio Santa Cruz de Terrenate
- St. David Cienega parking area/trailhead

For the purpose of public safety, BLM should expand the existing restriction to also include popular marked, designated trails. Visitors could be walking on these trails at any time and should not have to be concerned about their personal safety during hunting seasons. Non-hunters are often not even aware of the timing of hunting seasons. These trails include:

- Millville Historic Townsite/Rock Art Discovery Trail
- Little Boquillas Ranch - trailhead parking area to the Ranch site
- Fairbank loop trail including trail to cemetery
- Presidio Santa Cruz de Terrenate – trailhead on InBalance Road to Presidio
- St. David Cienega trail

And again, proper signage is essential to inform the public of these restrictions. Given the range of firearms today and to ensure public safety, BLM should increase

the exclusion zone around trails and developed facilities from one-quarter mile to one-half mile.

Bowhunting is currently permitted throughout the SPRNCA during all established Arizona seasons, except within one-quarter mile of developed facilities. For public safety BLM should increase this restriction to one-half mile.

BLM should maintain the restriction on target shooting and "plinking" throughout the SPRNCA. There are numerous nearby areas where the public can legally engage in these hobbies. Law enforcement should be increased to ensure that target shooting and plinking is not occurring.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Grazing

FSPR recognizes the long history of cattle ranching in the San Pedro River basin and is not opposed to responsible cattle grazing outside the riparian areas. We would like to see BLM enforce the removal of illegal cattle within the riparian areas and where there are no existing grazing allotments; and to penalize those ranchers who consistently break the law.

We were with the National Riparian Service Team when they walked the river last year and they noted the negative impacts of illegal cattle grazing on young cottonwood trees, particularly in the St. David-Benson area. There were numerous examples of the main shoots being chewed off, preventing the young sprouts from maturing. Cottonwoods, which provide shade, habitat, and nutrients, play a vital role in a healthy riparian ecosystem; illegal cattle grazing should not be tolerated.

Mining

While we are not aware of any significant mining activities currently taking place within the watershed, we do recognize that there is a potential threat. One example is the possible resumption of mining activities in Bisbee. Given the huge amounts of water required to conduct the mining and refining activities and potential for pollution of the aquifer, we would encourage the BLM to participate in any discussions with appropriate agencies related to the resumption of local mining activities.

BLM should also stay informed about mining developments in Mexico, particularly in the Cananea area, and initiate dialogue with stakeholders south of the border, including measures to protect the regional aquifer.

With respect to mining, NCA land should be

- Recommended for withdrawal from mineral entry.
- Closed to mineral leasing or allow leasing only with no surface occupancy with no exceptions, waivers, or modifications.
- Closed to mineral material sales.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Energy

FSPR supports the development of clean, renewable energy sources, but believes that the potential development of any solar arrays or wind turbine farms within or near the SPRNCA must take into account the visual resources of the SPRNCA. The threat to birds and bats from wind turbines has been well documented; BLM should be mindful of its primary responsibility to protect the riparian habitat and the internationally important flyway for migratory birds along the river.

As with mining, we are not aware of any immediate threats to the San Pedro River watershed, but we do know of the interest by some in the potential for the extraction of shale oil (often referred to as "fracking") in southeast Arizona. There have been attempts to purchase oil rights from landowners in the Sulphur Springs Valley, adjacent to the San Pedro River watershed. Again, given the large amounts of water required for this activity and the potential for pollution of the aquifer, we encourage BLM to be active in any discussions or planning sessions with appropriate agencies.

NCA land should be closed to renewable energy development.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Land-Use Conflicts

We whole-heartedly support the BLM's opposition to the issuing of a Certificate of Assured Water Supply to Pueblo Del Sol Water Company. We do not want BLM to abandon this opposition; rather, we encourage BLM to carry it as far as needed. We believe this is absolutely required for the long-term viability of the SPRNCA.

Exclude all new rights-of-way including transmission, except for already approved transmission corridors.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Wilderness Characteristics

The areas within the SPRNCA (and other lands this RMP may apply to) that have wilderness characteristics as defined by BLM should be managed accordingly.

a. Roadless Areas: Motorized vehicles should be allowed only on designated paved highways, roads and access roads to trailhead parking areas, visitor contact stations, and other signed facilities. This guidance will help preserve roadless areas with wildnerness characteristics. Any roadless area should be considered for inclusion in "lands with wilderness characteristics" if it meets the size requirements. No Border Patrol vehicles should be allowed on such parcels. Border Patrol activity should be minimal and performed on foot or horseback.

b. Naturalness: Human activity in these areas should be mostly unnoticeable. Trails should be kept to a minimum and marked in the current, nonintrusive fashion. Fences should be allowed so as to keep livestock out of the area. No development or utility corridors should be allowed. Landscape modifications should be limited to fire management (controlled burn), eradication of invasive species, and drought mitigation. Overnight camping should be by permit only.

c. Outstanding Opportunities for Solitude: Currently, the greatest interruption to solitude along the river is caused by Border Patrol helicopters and vehicles once an individual is hiking in a remote area and hunters creating unease. BLM should work with Border Patrol so that agents don't overreact to peaceful hikers or a prearranged cleanup activity, use helicopters sparingly and judiciously, and treat the public respectfully. Hunting should not be allowed within areas with wilderness characteristics. BLM should pursue MOAs with the county/private landowners to manage adjacent lands compatibly The NCA itself is so narrow, the public can still feel unsafe if hunting and target shooting activities happen just outside the NCA boundary.

d. Supplemental Values: BLM should continue to protect features of scientific, educational, scenic, and historical value within the SPRNCA and the RMP boundary. BLM should designate these areas as Visual Resource Management Class I or II.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Wild & Scenic Rivers

Forty-four miles of the San Pedro River have been identified as Suitable for Wild & Scenic designation in the Recreational category. BLM should protect the free-flowing condition, water quality, and outstandingly remarkable values of those sections. In addition, BLM should inventory possible sections for Scenic and Wild designation and manage those sections accordingly while waiting for Congress to act.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Motorized Vehicles on the SPRNCA

We want to express our concern about allowing ATVs, UTVs and motorized trail bikes access to the SPRNCA because they will harm the natural environment by destroying established trails and washes. These vehicles will also do great harm to the ambience of the SPRNCA.

Most of our Docents, who lead birding and nature walks, are well aware that their visitors appreciate the natural beauty of our very special wilderness. One Docent always says to his groups, "Do you hear it?" The visitors' response is , "Hear what?" The Docent says, "Silence." Someone will usually say, "Oh, you're right!" Others will comment about how nice it is to be in a quiet environment, or that they envy the people that live near the SPRNCA. Many of our visitors are from urban areas with lots of noise, so it's a pleasure to see their reactions to the beauty and peace of this very special place.

We strongly urge BLM to ban the use of ATVs, UTVs and motorized trail bikes in the SPRNCA in order to maintain the reputation we have as a source of wholesome and relaxing recreation for our visitors who come from North America and Europe.

Supplemental Scoping Letter
Public input on SPRNCA RMP scoping: Border Patrol
Regarding: Request to Convert Unmaintained Road to All-Weather Road

The Border Patrol wants BLM to make the road that runs parallel to the San Pedro River an all-weather road. This road goes from Highway 92 to the border and isn't a maintained road. The Border Patrol claims that this road would give them better access to the river, and, therefore, enable them to more effectively pursue illegal crossers.

There are, however, two well maintained roads. One is east of the river (Paloma Road), and one is west of the river (Smith Road). Both roads provide easy pursuit of illegal crossers.

The all-weather river corridor proposed by the Border Patrol would have a severe negative effect on this area. Traffic would be greatly increased, and would disrupt wildlife that use this river corridor.

In keeping with the concept that "less is better," the Friends of the San Pedro River strongly recommend that this road not be improved.

batcon.org
BAT CONSERVATION
INTERNATIONAL

Daniel Taylor
Public Lands Program
Bat Conservation International
4579 Louisiana Street
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Amy Markstein
BLM Tucson Field Office
3201 E. Universal Way
Tucson, AZ. 85756

September 27, 2013

Dear Ms. Markstein,

Bat Conservation International (BCI) appreciates the opportunity to provide input during the initial scoping period for the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan /EIS. BCI's mission is to conserve the world's bats and their ecosystems to ensure a healthy planet, and the SPRNCA provides habitat for nearly half of the 45 bat species known from the U.S. and Canada, and comprises more than 20% of Arizona's mammal flora. BCI has had an active national Memorandum of Understanding with the Bureau of Land Management for almost two decades, and we continue to work with the BLM's National Office and State and Field Offices across the west to integrate bat conservation and BLM resource stewardship goals. We've also had a long-term presence in southern Arizona, working with the BLM, Forest Service, and Arizona Game & Fish Department, and multiple other partners on the conservation and management of bat habitat, including caves, abandoned mines, riparian areas, forests, and water resources.

While we were unable to attend any of the educational and scoping forums in public, we were able to review the presentation material online and we commend the BLM on the overall quality and thoroughness of the material. BCI has a biologist based in Tucson, and another in San Diego, both of whom are familiar with the SPRNCA and adjacent lands.

The issues or potential issues facing the 20 species of bats known or expected to occur in the SPRNCA are without a doubt the conservation and maintenance of robust and diverse riparian vegetation, the ground water that sustains it, and the availability of associated surface water. Riparian vegetation has been documented as the most important foraging habitat for bats in Arizona and other arid environments as it supports an abundance of bat's insect prey.[1,2,3] Mature riparian trees such as cottonwoods and some willows also provide roosting habitat for foliage, cavity, and bark crevice roosting bats, both in live trees and snags[4,5]. And while roost availability is assumed to limit bat populations in many environments, the availability of pooled surface water for drinking, especially during the spring and early summer reproductive period, is likely the most limiting factor in the desert southwest[6,7].

Because the founding legislation and objective for the creation of the SPRNCA specifically included "*...to conserve, protect and enhance the riparian area and the aquatic, wildlife, ...*" we feel confident that most of our issues and concerns have or will be brought forward, however,

the following bullets provide a summary of the issues and actions that should be considered when addressing the conservation of bats in the SPRNCA:

- Actions will be taken within the SPRNCA and on adjacent jurisdictions where possible and appropriate to maintain, improve, and ensure **adequate ground water levels** to sustain robust riparian vegetation communities (including phreatyophytes) in the SPRNCA that would be expected to occur along the length of the San Pedro River and its tributaries within the natural range of variability.

- Because of their unique physiology, bats are particularly prone to water loss, sometimes losing up to 30% of their body weight to evaporative water loss in a 12 hour period. Pooled surface water is therefore essential for bats, and they must drink nightly during the hottest and driest times of the year, especially reproductive females. Any appropriate **management actions that maintain or increase surface water flow** in the San Pedro during these times are desirable.

- We are not opposed to grazing on the portions of the SPRNCA where this use is still permitted, however we feels strongly that **protecting and maintaining riparian values will be dependent on the proper (seasonal) timing and duration of use as well as the stocking rate**.

- Efforts should be made to **maintain the viability of beaver populations** in the SPRNCA. In addition to the known benefits of beaver to riparian systems such as raising water tables and improving water storage, they are also highly beneficial to bat populations due to their contribution to the persistence of pooled water for drinking, their creation of wetland riparian wetland habitat, the increase in aquatic emergent insect prey for bats from beaver dam pools, and in some cases the creation of snags for roosting as mature trees are killed by rising water levels.

- **The effects of climate change**, specifically the decrease in available ground and surface water and the associated effects on riparian habitat **needs to be considered for all future management actions in the SPRNCA**. This should include climate envelope modelling and adaptation and mitigation planning.

Thank you again for the opportunity to provide input during the initial scoping period for the SPRNCA/EIS. As evidenced by the educational forums, we know that the BLM has already taken advantage of the incredible expertise and long-term research available for the SPRNCA through its university, agency, non-government, and other partners. We are confident that this will result in a thorough and productive process and planning product, and we look forward to continued involvement.

Sincerely,

Daniel Taylor
Bat Conservation International

FOOTNOTES

1 Racey, P.A., 1998. Ecology of European bats in relation to their conservation. In: Kunz, T. H., Racey, P.A., (Eds.), Bat biology and conservation. Smithsonian Institution Press, Washington, pp. 249-260.

2 Grindal, S. D., Morissette, J. L., Barclay, R. M. R., 1999. Concentrations of bat activity in riparian habitats over an elevational gradient. Canadian Journal of Zoology, 77, 972-977.

3 Holloway, G. L. and R. M. R. Barclay. 2000. Importance of prairie riparian zones to bats in southeastern Alberta. Ecoscience 7(2):115

4 Genoways, H.H., and R.J. Baker. 1988. Lasiurus blossevillii (Chiroptera: Vespertilionidae) in Texas. Texas J. Sci. 40:111-113.

5 Callahan, E.V., R.D. Drobney, and R.L. Clawson. 1997. Selection of summer roosting sites by Indiana bats (*Myotis sodalis*) in Missouri. Journal of Mammalogy 78:818-825.

6 Carpenter, R.E. (1969) Structure and function of the kidney and the water balance of desert bats. *Physiological Zoology*, **42**, 288–302.

7 Adams, R.A. Bat reproduction declines when conditions mimic climate change projections for western North America Ecology, 91(8), 2010, pp. 2437–2445

September 26, 2013

USDI, Bureau of Land Management
Attn: Amy Markstein
Tucson Field Office
3201 E. Universal Way
Tucson, AZ 85756
Submitted by Email to: blm_az_tfo_sprnca_rmp@blm.gov

RE: Cochise County and City of Sierra Vista Scoping Comments for the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan and Environmental Impact Statement (RMP/EIS)

Dear Ms. Markstein:

The following comments are submitted on behalf of Cochise County and the City of Sierra Vista in response to the U.S. Department of Interior, Bureau of Land Management (BLM) request for scoping issues as BLM begins to develop the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan and Environmental Impact Statement (RMP/EIS). Thank you for the opportunity to be involved as cooperating agencies. We look forward to working with you as the process goes forward.

1. **Planning Area**

    - Cochise County recommends BLM use the existing SPRNCA boundary for planning purposes. This will clarify the scope, goals, alternatives and analysis.

2. **Water Quality, Quantity and /or Timing**

    - The Upper San Pedro River (USPR) watershed has significant water quality and quantity reductions caused by water use in Mexico, outside the control of the BLM SPRNCA RMP process.
    - The RMP needs to bring forward all viable alternatives to address water quality, quantity and timing issues.
    - Purchase of CAP water by BLM needs to be addressed as an option.
    - All alternatives need to protect valid existing water rights.

- Sufficient water for sustainable human use throughout Cochise County needs to be included as an issue.

3. Water and Riparian Interrelated Issues

- "Riparian evapotranspiration (ET) is a major component of the surface and subsurface water balance in many semiarid watersheds." (Scott, et al., 2010)
- At the San Pedro River, the volume of riparian vegetation has increased significantly within the SPRNCA since its establishment (doubling to tripling, depending on the species evaluated).
- The active channel of the river has decreased significantly (from 423 ha in 1955 to 203 ha in 2003), while the floodplain area has increased by 14% (Stromberg, et al., 2010).
- During summer months, ET from riparian vegetation in the SPRNCA exceeds precipitation; therefore, the riparian vegetation in the SPRNCA is intercepting and utilizing groundwater that would normal reach the active channel.
- In the SVS, total riparian groundwater use ranged from 11,431 to 13,377 acre-feet per year from 2001 to 2005 (Scott, et al., 2008).
- The RMP needs to address the issue of how BLM plans to balance the volume of riparian vegetation with flow in the San Pedro River to ensure that enhancement of one resource does not impact the enhancement of another resource.
- The statement is frequently made that the trees in the SPRNCA shade the river and thus reduce the evaporation from surface water; however, no applicable peer-reviewed scientific publications are cited for this statement.
- The RMP needs to consider the issue of whether or not the increase in ET from the increasing riparian vegetation can be offset by a decrease in evaporation from shaded surface water and should quantify the delta.
- This issue needs to be evaluated using only peer-reviewed scientific data.

4. Riparian Habitat

- The issue of how to manage for a wide diversity of native riparian vegetation while allowing for recreation, wildlife management, and cultural resources needs to be addressed.
- Areas of high bird watching use within riparian habitat should address the number of trails including loop trails with one-way traffic.
- Options to install wildlife blinds for viewers and photographers should be considered to increase public enjoyment within riparian areas while decreasing disturbance to wildlife.

- Reservation-only riparian bird nesting area visitation at certain times of year should be considered.
- A variety of easy and more difficult trails should be established through riparian corridors to spread out visitors and increase visitor enjoyment.
- A number of parking options to facilitate group, individual and handicapped opportunities close to riparian areas need to be considered.
- To assure that recreational users do not cause water pollution, additional rest room facilities should be placed throughout SPRNCA, especially at all access points.
- The value of kiosks, boardwalks, signs and other educational tools in riparian areas should be addressed.
- BLM has introduced beaver which have spread throughout the length of the SPRNCA. The issue of beaver management and its impacts on riparian vegetation needs to be evaluated in the RMP so that appropriate management decisions can be made.
- BLM has failed to manage non-native grasses (especially Johnson grass and bermuda grass) within riparian areas of the SPRNCA. (It should be noted that these grasses are spreading beyond the SPRNCA due to lack of active management by BLM in spite of efforts of others to control them.) Though we realize that it may be impossible to eradicate these nonnative plants, BLM should stop the spread of nonnatives to adjacent lands outside SPRNCA.
- While there may be advantages to the presence of these species, they appear to be out-competing the Huachuca water umbel within its critical habitat on the SPRNCA.
- The RMP needs to consider the issue of management of critical habitat for the HWU versus non-native grasses as well as the impact of failure to manage these non-native grasses on surrounding lands so that appropriate management decisions can be made.

5. Fisheries

- Due to the influx of nonnative fish from Mexico including bass and sunfish and the lack of suitable fish barrier sites on the USPR, BLM should bring forward the issue of managing the USPR as a sports fishing area.
- The opportunity to increase the number of fish for birds and other wildlife should be assessed.
- Bass, sunfish and catfish should be encouraged to provide a diversity of recreation including managing for fish-eating birds and mammals.
- AGFD fisheries biologists should be included on a team to enhance the sports fishery in the USPR.
- Benefits to birds and mammals as well as fishermen should be addressed.

- Introduction of threatened or endangered native minnow species within the SPRNCA should be thoroughly evaluated based on the ongoing presence and influx of non-native minnow-eating fish and other species that prey on minnows.
- Management decisions need to be made on the practicality and potential success rate of introductions in the San Pedro River.

6. Wildlife

- A healthy balance of birds, mammals, reptiles, amphibians and insects should be included in the management plan.
- No single species should be managed to the detriment of other animals.
- A non-threatened or non-endangered species or invasive species should not be managed to the detriment of a T&E species, especially in that species' critical habitat.
- Assure that SPRNCA remains open to hunting.
- Due to recreational objectives, the issue of predator management needs to be addressed. Public safety is a concern.
- With the restoration of native grasslands, the reintroduction of pronghorn antelope in these grasslands should be considered.
- Mexican wolves are not compatible with other SPRNCA objectives.

7. Transportation/Access

- Concentration of recreationists caused by having too few access points on the SPRNCA needs to be addressed.
- The transportation needs of group, individual, handicapped and dispersed recreational visitors should be addressed.
- BLM should work with adjacent landowners to potentially increase access and/or trails or reach cooperative agreements.

8. Livestock Grazing

- Well managed livestock grazing should be considered to reduce fuel loads in a cost efficient manner, especially in the uplands.
- Native grassland restoration should be managed with the goal of including targeted livestock grazing in these restored areas.

9. Groundwater

- If BLM management decisions, past, present, or future, impact the quantity of groundwater or groundwater baseflow to the river, BLM should plan to mitigate

those impacts. For example, if a decision is made to further enhance riparian vegetation at the expense of increased ET thus reducing groundwater volume, BLM should be responsible for mitigating the impacts to groundwater baseflow to the river.

- Mitigation of BLM impacts to groundwater should be included as an issue. BLM should continue to monitor and reporting for groundwater wells, including ensuring sufficient funding is received for this monitoring and reporting.
- Purchase of water rights, conservation easements prohibiting development, groundwater infiltration areas, CAP water, urban enhanced run-off and stormwater recharge, and other supplemental groundwater augmentation programs should be addressed.
- BLM should be proactive in developing viable funding mechanisms to assure adequate groundwater is available to SPRNCA.
- The RMP should include a discussion of how BLM will work with Congress to fund groundwater augmentation and/or mitigation costs.

10. Sediment/Erosion

- BLM should manage upland vegetation to assure the sediment load in the USPR is in balance.
- Where necessary to maintain ponds for birdlife and other wildlife, dredging of ponds should be considered where benefits outweigh adverse impacts.
- Native grasslands are able to absorb up to an inch per hour in precipitation without significant runoff. Healthy grasslands control erosion and sedimentation.
- Precipitation that travels beyond the root zone of native grasses can be recharged to the aquifer over time.
- Grassland restoration in currently shrub-dominated areas should be evaluated so that proper management decisions can be made.

11. Local Plans

- Compatibility of RMP with local plans, zoning, ordinances and policies is a requirement of federal law and should be a priority.
- As Cooperating Agencies, the County and City have the opportunity to assure the content of their plans, zoning ordinances, policies and other rules and regulations are addressed in the RMP/EIS

12. Vegetative Management

- Consider allowing public to harvest live and dead mesquite and other unwanted trees to use as fuel wood in areas where mesquite removal is determined necessary.

- Furniture size mesquite, oak, walnut and other natural woods should be made available for harvest by the public and/or commercial furniture builders before it is destroyed.
- Removal of invasive shrubby vegetation in areas that were once native grasslands and native grassland restoration in currently shrub-dominated areas should be evaluated so that proper management decisions can be made.
- Where possible, manage areas where invasive shrubs have been removed in ways to encourage native grasses. Every effort should be made to avoid establishment of non-native grasses (Lehman's, Johnson, and bermuda, among others) within the restoration areas.
- Design a balanced vegetative management plan that includes the goal of preventing the spread on nonnative plants outside the SPRNCA to the detriment of existing stands of native grasses on adjacent lands.
- Continue to eradicate tamarisk where found.
- Fire is a natural effect in the region. Appropriate vegetation management through a well-planned and controlled use of fire should be included in the RMP.

13. Border Security

- The international border should be secured within SPRNCA to avoid threats to public safety and resource damage.

14. Socioeconomic/Environmental Justice

- If the BLM decides to include lands outside the SPRNCA for this RMP/EIS planning process, they need to acknowledge the fact that decisions the agency makes on BLM lands have a potential to impact lessees ability to remain economically viable.
- In addition, many areas of the subwatersheds contain populations that are on limited budgets. These issues should be included in the RMP.

15. Fort Huachuca

- Maintaining Fort Huachuca, its customs and culture, as well as its value in protecting our national security should be a priority.
- The BLM should work to find ways to be a good neighbor with the Fort, including ways to assure the Fort continues to have adequate water for its federal purposes.
- Fort Huachuca has expended tens of millions of dollars to mitigate its impacts on Fort-attributable groundwater use both on and off post.

- BLM should identify and fund projects that can also mitigation non-Fort-attributable groundwater use on its lands, including recharge and slow-the-flow projects.
- During the NEPA process for actions undertaken by BLM, BLM should fully consider impacts on national security.
- The electromagnetic spectrum within the San Pedro River Valley is a significant natural resource for the United States that can be damaged by human actions and infrastructure, including actions that may be undertaken by BLM or on BLM lands, including crossing of BLM lands.
- Potential impacts to the electromagnetic spectrum should be evaluated as if the electromagnetic spectrum is a natural resource, not as a "national security" issue.

16. Cultural Resources

- BLM has allowed numerous historic ranching features to deteriorate. The RMP needs to include proper management of these resources, including completion of a comprehensive cultural inventory and request budgeting for this effort.

References:

Department of the Interior (DOI), United States Geological Survey (USGS), 2010. *Quantity and Sources of Base Flow in the San Pedro River near Tombstone, Arizona*, Scientific Investigations Report 2010-5200.

Dixon, M.D., et al., 2009. *Potential effects of climate change on the upper San Pedro riparian ecosystem.* In: Stromberg, J.C., Tellman, B. (eds.), Ecology and Conservation of The San Pedro River. University of Arizona Press, Tucson, Arizona, pages 55 to 72.

Scott, R.L., et al. 2008. *Multiyear riparian evapotranspiration and groundwater use for a semiarid watershed*, Journal of Arid Environments, Volume 72, pages 1232-1246.

Stromberg, Juliet C., et al., 2010. *A century of riparian forest expansion following extreme disturbance: Saptio-temporal change in Populus/Salix/Tamarix forests along the Upper San Pedro River, Arizona, USA*, Forest Ecology and Management, doi: 10.1016/j.foreco.2010.01.005.

Please let us know if you have any questions or would like additional information.

Respectfully submitted by

/s/ Mary E. Darling, MS, JD[1/]

On behalf of Cochise County and the City of Sierra Vista, Arizona

[1/] Acting as a Biologist, not an attorney

DARLING GEOMATICS

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September 27, 2013

Ms. Amy Markstein
BLM Tucson Field Office
3201 E. Universal Way
Tucson, Arizona 85756
Submitted electronically to: blm_az_tfo_sprnca_rmp@blm.gov

Re: Scoping comments on issues and planning criteria related to the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan (RMP) and Associated Environmental Impact Statement (EIS)

Dear Ms. Markstein:

The Sierra Club's Grand Canyon (Arizona) Chapter appreciates the opportunity to participate in the Bureau of Land Management (BLM) planning process and to provide scoping comments to assist BLM in the development of a Resource Management Plan (RMP) and associated Environmental Impact Statement (EIS) for the San Pedro Riparian National Conservation Area (SPRNCA). Current management guidelines for the SPRNCA date back to the Phoenix Resource Management Plan of 1988, the Safford District Resource Management Plan of 1991, and the San Pedro River Riparian Management Plan and Environmental Impact Statement of June 1989. BLM needs to update the RMP/EIS to meet new management challenges of the 21st century in the SPRNCA.

The Sierra Club's mission is "to explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments." The Grand Canyon Chapter has long been committed to protection of Arizona's lands, wildlife, water, and communities. Our members are concerned about the public lands included in this proposal; many enjoy recreational activities in the area, including hiking, wildlife viewing, and more, and value the environmental resources housed by these lands.

The BLM planning process

BLM announced the beginning of the planning process to solicit public comments and to identify issues related to the development of the SPRNCA RMP / EIS in a Notice of Intent to

Prepare a Resource Management Plan for the San Pedro Riparian National Conservation Area and Associated Environmental Impact Statement in the Federal Register [Hereafter "Notice of Intent," *See* Federal Register, Vol. 78, No. 83, April 30, 2013, p. 25299).

The Sierra Club commends BLM for holding an extensive series of public engagement planning meetings, education and scoping forums on specific planning issues and topics, and general scoping meetings in the Summer 2013. The five educational forums on water and riparian resources, watershed and range management, wildlife and threatened and endangered species, cultural and recreation resources, and socioeconomic issues provided a useful framework for the identification of relevant issues and preparation of our scoping comments.

The Notice of Intent stated that BLM will accept comments on issues and planning criteria throughout the SPRNCA RMP / EIS planning process. BLM has made a commitment that all of the public comments received during scoping would be analyzed and summarized in a scoping report which will identify a final set of issues to be carried forward into the next phase of the planning process— alternative development. In public engagement strategy meetings, BLM representatives stated that scoping comments could be submitted to BLM by e-mail or by regular mail and must be received before the scoping comment deadline of September 27, 2013 in order to be considered. Sierra Club has made a timely electronic submittal of our comments by the comment deadline.

The general purpose of this stage of the BLM planning process is to "scope out" or to determine the issues, key resource challenges, planning criteria, and potential management actions and alternatives that BLM should address in the draft SPRNCA RMP / EIS. The general purposes of the draft RMP are to identify the current management situation, desired future conditions to be maintained or achieved within the SPRNCA, and a range of management actions and alternatives that will maintain or achieve desired future conditions. The draft RMP / EIS for the San Pedro National Conservation Area also should identify lands that are open and closed to certain uses such as grazing or certain types of recreation. Finally BLM should identify any special administrative designations such as Areas of Critical Environmental Concern, recommend proposed withdrawals, land tenure zones, and recommend or make findings of suitability for congressional designations (such as designation of the San Pedro River for inclusion in the National Wild and Scenic River System.

Preliminary Planning Criteria

BLM identified preliminary planning criteria in the Notice of Intent and planning documents for the SPRNCA RMP/EIS scoping process. Sierra Club agrees that all of the preliminary planning criteria are relevant, appropriate, and should guide the BLM planning process.

In developing the draft RMP, BLM must comply with applicable federal law and the agency's planning regulations as it develops the SPRMCA RMP /EIS, including the National Environmental Policy Act of 1969 (NEPA), the Federal Land Policy and Management Act of 1976 (FLPMA) and the Arizona–Idaho Conservation Act of 1988 (Public Law 100-696; codified at 16 United States Code 460 et. seq.) and BLM policies in Appendix C of the Land Use Planning Handbook, H-1610-1.

One extremely important preliminary planning criterion is that BLM comply with the requirements of the Arizona-Idaho Conservation Act of 1988 [hereafter "the Act"] in developing the draft RMP. The provisions of the Act are particularly important because the Actt is the federal law that created the SPRNCA, the nation's first Riparian National Conservation Area. Congress established the SPRNCA in 1988 to protect the riparian area and its resource values. When Congress created the SPRNCA, it directed the Secretary of the Interior to manage the conservation area in a manner that "conserves, protects, and enhances the riparian area and the aquatic, wildlife, archaeological, paleontological, scientific, cultural, educational, and recreational resources of the conservation area." This statement of purpose functions as a prime directive for how BLM should manage the SPRNCA and the specific resource values that need to be addressed in the draft RMP. First, the prime directive is that BLM develop a RMP that conserves, protects, and enhances the riparian area within the SPRNCA.

Second, BLM must manage the SPRNCA to conserve, protect, and enhance resource values specifically identified in the Act by Congress. At a minimum, BLM must develop a resource management plan that conserves, protects, and enhances the "aquatic, wildlife, archeological, paleontological, scientific, cultural, educational, and recreational resources of the conservation area" over the next planning horizon of 20 plus years.

Sierra Club supports full implementation of the withdrawal of all federal lands within the SPRNCA from all forms of entry, appropriation, or disposal under the public lands laws. In particular, we support full implementation of the Act's provisions relating to the withdrawal of federal lands from location, entry, and patent under the mining laws of the United States and from disposition under all laws pertaining to mineral and geothermal leasing and all amendments to those laws. BLM should address these withdrawals as an issue for the development of the draft RMP. BLM also should address the relationship and management implications of BLM's recognition of "valid existing rights" (another preliminary planning criterion) and planning criteria related to the federal withdrawals, especially the federal mineral withdrawal applicable to the SPRNCA. For example, the draft RMP should address how BLM will implement the Act's prohibitions against mining location, entry, and patent within the SPRNCA and how BLM will manage mineral leasing on BLM-administered lands outside of the SPRNCA boundaries. For example, the Record of Decision for the San Pedro River Management Plan and Environmental Impact Statement dated August 1989 included a BLM decision that existing sand and gravel operations located outside the riparian area of the SPRNCA would cease at the expiration of the current lease. The draft RMP should address the issues of mineral leasing and the management of sand and gravel mining operations on BLM-administered lands in the San Pedro River watershed.

Sierra Club notes that Congress did not include the protection of socioeconomic values as one of the values to be protected for the SPRNCA nor did BLM identify economic considerations as planning criteria. While socioeconomic impacts are relevant to the development of the draft RMP, they are secondary considerations to the primary goals of conserving the riparian area and protecting and enhancing its resources.

Sierra Club notes that in the Notice of Intent, BLM states that one its preliminary planning criteria is that BLM will <u>not</u> address any National Conservation Area boundary adjustments or proposals to change the Act in the planning process to develop the draft RMP. We interpret this to mean that BLM will not propose any amendments to the Act or propose changes to the map or description of the 56,431 acres of public lands cited in the Act. Only Congress

DRAFT

can amend the Act. However, BLM should clarify in this draft RMP that this preliminary planning criterion does not limit the BLM's authority to acquire lands or interests in lands within the boundaries of the SPRNCA by exchange, purchase, or donation in the future. Land exchanges and easement purchases have allowed BLM to acquire land with special resource values and to consolidate holdings in the SPRNCA. There is one existing right-of-way corridor in the SPRNCA by Charleston. BLM should identify, evaluate, and analyze right-of-way avoidance (limited) and exclusion (no access) areas in the draft RMP.

The Act clearly gives the Secretary of the Interior (and thus BLM) the authority to develop recommendations to Congress on whether additional lands should be included in the conservation area. BLM should clarify that it will not "close the door" on future acquisitions. The draft RMP should address BLM's acquisition strategy and reserve the right to make recommendations to Congress on whether additional lands should be included in the conservation area. For example, BLM may want to acquire private lands or inholdings within the SPRNCA boundaries to better manage and protect the riparian area and its resource values in a more integrated way. BLM may seek to mitigate habitat fragmentation and to improve connectivity between SPRNCA units by acquiring private lands located north of Highway 92 to establish a continuous riparian corridor that extends from the U.S. Mexico Border to the northern boundary of the SPRNCA.

Finally, BLM states that the draft RMP will comply with the Endangered Species Act (ESA), the requirements of BLM Manual 6840 addressing special status species, and that BLM will follow interagency agreements with the U.S. Fish and Wildlife Service regarding consultation under Section 7 of the Endangered Species Act (ESA). Sierra Club fully supports BLM compliance with the ESA and appropriate consultation with the U.S Fish and Wildlife Service to protect threatened, endangered, and special status species and their critical habitats within the SPRNCA.

BLM's Preliminary Issues

The BLM staff developed a preliminary set of issues to initiate the scoping process. BLM identified the following preliminary issues to define the range of environmental analysis to be undertaken for the draft RMP:

1. Geographic extent of the planning area;
2. Desired future conditions for water quantity;
3. Desired future conditions for riparian and upland plant communities;
4. Management of riparian vegetation along the San Pedro River;
5. SPRNCA's designation as a Globally Important Bird Area (GIBA);
6. Determining which areas should be open and closed to grazing;
7. Use restrictions for resource protection; and
8. Management of resources near the urban interface.

Sierra Club notes that BLM did not include in its list of preliminary issues in the Notice of Intent any references to aquatic life, wildlife (other than birds), archeological, paleontological, scientific, cultural, educational, and the recreational resources of the conservation area. However, BLM published a broader list of ten preliminary issues defining key resource challenges for the SPRNCA and posted these preliminary issues on the BLM website. Sierra Club agrees that all ten preliminary issues identified by BLM should be addressed in the draft RMP / EIS. Sierra Club reserves our right to provide more detailed

comments on how BLM resolves these ten issue categories when BLM publishes a draft RMP / EIS later in the planning process.

Geographic extent of the planning area

The BLM states in the Notice of Intent that the planning area boundary (i.e., the geographic extent of the planning area) has not been determined and that this is an issue that must be addressed in the RMP. Sierra Club agrees.

Sierra Club urges the BLM to define the planning area as broadly as possible to include the greatest possible geographic extent of public lands *managed by the BLM* within the upper San Pedro River watershed. At a minimum, the planning area boundary must encompass the entire 56,431 acres of public land located within SPRNCA boundaries that are described in the Act. The planning area also should include public lands *managed by BLM located outside of the SPRNCA boundaries but within the upper San Pedro River watershed*.

BLM has stated that it will not address any SPRNCA boundary adjustments or proposals to change the Arizona-Idaho Conservation Act. Sierra Club does not advocate any SPRNCA boundary adjustments or amendments to the Act in these scoping comments. However, we think BLM should clarify in the draft RMP that the planning criterion which states that BLM will not seek amendments to the Arizona Idaho Conservation Act of 1988 does not preclude future acquisition of real property or interests in land such as water rights or conservation easements to further the general purposes of the SPRNCA. BLM should clarify that the stated planning criteria do not preclude appropriate implementation of an acquisition strategy to conserve, protect, and enhance the SPRNCA riparian area and its resource values.

Water Resources (Surface and Groundwater)

BLM has recognized the uniqueness and ecological importance of the San Pedro River as one of the last undammed rivers in the Southwest, where water is an increasingly scarce resource. Adequate water quality and quantity—as well as properly functioning watershed, riparian, and aquatic habitat conditions—are essential to support the riparian ecosystem within the SPRNCA. BLM has acknowledged that it needs to identify desired future conditions for water resources In the draft RMP . Sierra Club wholeheartedly agrees. The BLM must develop a draft RMP that addresses desired future conditions for water quantity to conserve, protect, and enhance the riparian area within the SPRNCA and to provide the scientific grounds for quantification of federal reserved water rights.

When Congress established the SPRNCA, Congress explicitly reserved "a quantity of water sufficient to fulfill the purposes of the San Pedro Riparian National Conservation Area." That is, Congress reserved enough water to conserve, protect, and enhance the riparian area and the resource values specifically listed in the Act, including aquatic life and wildlife. The priority date for these federal reserved water rights is November 18, 1988. Congress further directed the Secretary of the Interior to file a claim for quantification of federal reserved water rights in the appropriate stream adjudication. These statutory directives mean that BLM must address the complex question of how much surface water and ground water is needed to sustain the San Pedro riparian ecosystem in this draft RMP. Since Congress established a federal reserved water right, once BLM figures out how much water is needed

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for conservation of the SPRNCA, BLM must then file a claim for a quantified federal reserved water right.

Stromberg and Tellman, eds. (2009) state in *Ecology and Conservation of the San Pedro River* that we have enough knowledge to answer the question of how much water is needed to conserve and protect the riparian ecosystem within the SPRNCA:

> Do we know how much water is needed to sustain the San Pedro riparian ecosystem? The answer to this is a qualified "yes." Landscape-scale evapotranspiration rates, and the groundwater derived component thereof, have been determined as one index of riparian vegetation needs. Although there is high variance and although values will change given the dynamic nature of riparian ecosystems, it provides a measure of the amount of water that is needed to flow to the river to sustain the current levels of water use by the riparian vegetation. Further, hydrologic thresholds for plant community maintenance have been quantified, thus determining the groundwater levels and stream flow permanence needed to sustain various vegetation types.

The upper San Pedro watershed is one of the most studied watersheds in the United States. BLM has the benefit of multiple studies and a growing body of scientific knowledge to support the quantification of environmental flow requirements within the SPRNCA The draft RMP must fully address the question of water quantity based on ecological considerations and the current body of scientific knowledge. For example, we know that species of aquatic life require perennial surface flow in the San Pedro River channel year round. From wet / dry mapping results and USGS stream gage records, it should be possible to determine how much suface water is needed to sustain perennial surface flow of the San Pedro River within the SPRNCA through the driest time of the year. Similarly, there is a growing body of scientific information on the interactions between riparian vegetation and groundwater hydrology that provide a scientific basis for determining desired future conditions for groundwater availability within the SPRNCA:

> Riparian vegetation intercepts surface and subsurface water flowing from drainage basins and forms a functionally important interface between terrrestial and aquatic ecosystems. The influence of riparian vegetation on hydrological processes…and, conversely, the impact of hydrological processes on riparian vegetation…have been the focus of considerable scientific investigation. Through such investigations, ecologists and hydrologists have formed productive, collaborative relationships and together have generated broad conceptual understanding of hydrological factors controlling riparian ecosystem structure and function and associated feedbacks with stream hydrology and geomorphology….[citations omitted].
>
> Juliet C. Stromberg and BarbaraTellman, eds.
> *Ecology and Conservation of the San Pedro River*, p. 37

BLM should address both surface water and groundwater availability in the draft RMP and ground its draft management actions and alternatives on the current broad conceptual understanding of the relationship between hydrology and the riparian ecosystem of the San Pedro River.

The draft RMP also must evaluate how BLM will address issues related to adequate surface water flow monitoring of the San Pedro River within the SPRNCA. The draft RMP must evaluate how BLM will maintain and fund USGS stream gages located along the San Pedro

River and how BLM will support annual wet/dry mapping of the San Pedro River. USGS stream gage measurements clearly show diminished San Pedro River flows over a sustained period of time. Decreased flows in the river may be the result of reduced groundwater discharge to the river channel, long-term drought, or a combination of both (NRST. 2012, Riparian Conditions Along the San Pedro River, p. 44]. BLM also should include management actions and alternatives to monitor the flow of groundwater to the river within the Sierra Vista subwatershed.

The draft RMP must consider and address larger issues of groundwater pumping in the Sierra Vista subwatershed

Groundwater is the lifeblood of the San Pedro River and groundwater pumping from the regional aquifer in the Sierra Vista sub-watershed threatens the very existence of the San Pedro River. The National Riparian Service Team (NRST) found that groundwater pumping posed a significant threat to the long-term sustainability of the San Pedro River [*See Riparian Conditions Along the San Pedro River, Proper Functioning Condition Riparian Assessment Report*, November 2012, p. 2]. The NRST observed that continuing depletion of groundwater sources supporting the baseflow of the San Pedro River will negate all of the positive effects of BLM management of the SPRNCA over the past 25 years. The NRST recognized that the preservation of continued groundwater flow to the river was absolutely essential to its conservation. The NRST concluded that issues related to groundwater overdraft of the regional aquifer must be addressed now while the San Pedro River still has the capacity to take advantage of the water it receives from both surface and groundwater sources for ecosystem recovery. The management of groundwater pumping cannot be limited to groundwater withdrawals within the boundaries of the SPRNCA from public lands administered by BLM. The draft RMP must address the "big picture" to include management plans, actions, and strategies to achieve safe yield in the greater Sierra Vista sub-watershed outside the boundaries of the SPRNCA. If BLM cannot effect a management strategy that achieves a balance between groundwater withdrawals and recharge in the uplands of the Sierra Vista sub-watershed, the San Pedro River and its riparian habitats will be seriously impaired or lost. The failure to address this issue in this draft RMP will mean that BLM will ultimately fail in its core mission to manage the SPRNCA in a manner that conserves, protects, and enhances the San Pedro riparian area and its resource values.

BLM also must address how to implement a long-term groundwater monitoring strategy to monitor groundwater availability and changes in groundwater flowpaths to the river. The NRST recommended that groundwater levels be monitored with priority given to 1) wells in areas close to the San Pedro River, and (2) wells in areas of high groundwater pumping where models predict the expansion of cones of depression. The NRST concluded that information on changes in groundwater flows was essential to ensuring the sustainability of the San Pedro River within the SPRNCA. Sierra Club agrees and we strongly urge the BLM to address how it will implement a comprehensive groundwater monitoring plan to provide critical information and data on groundwater overdraft of the regional aquifer and groundwater flows to the river. This information on groundwater hydrology is critically important to the management of the SPRNCA and the preservation of the baseflow of the San Pedro River. The draft RMP must address this issue and include a plan for what actions BLM will take to maintain and protect the SPRNCA as Congress has mandated.

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Land Health (Upland Plant Communities and Watershed Function)

BLM has properly identified proper watershed function in the uplands as being imperative to the proper functioning condition of the San Pedro River and an issue that must be addressed in draft RMP. A healthy cover of vegetation stabilizes the soil, increases infiltration of precipitation, slows surface runoff, prevents erosion, provides clean water to adjacent streams, increases natural groundwater recharge, and enhances the visual quality of public land.

The San Pedro riparian corridor has exceptionally high plant diversity with over 750 vascular plant species identified within the San Pedro riparian corridor and bordering uplands, including two endangered plant species (Stromberg and Tellman, 2009 at p. 90) The draft RMP must address how BLM plans to conserve, protect, and enhance this exceptional plant biodiversity, especially the existing Fremont cottonwood (*Populus freemontii*) / Gooding's willow (*Salix gooddinggii*) gallery forest that is the signature woodland habitat type within the SPRNCA.

The RMP / EIS also must address how BLM plans to manage invasive plant species within the SPRNCA such as tamarisk (*Tamarix chinensis, T. ramosissima*, or hybrids) and Johnson grass The RMP must address management and alternatives for restoration of desired native plant communities in the uplands and riparian areas of the SPRNCA. For example, the draft RMP / EIS should assess and evaluate losses of sacaton grassland habitats on the San Pedro River terraces and develop management plans and actions to restore sacaton grassland communities where feasible

Sacaton grasslands

Stromberg and Tellman(2009) report that riparian grasslands vegetated by big sacaton (*Soorobulus wrightii*), alkali sacaton (S. airoides), vine mesquite (*Panicum obtusum*), and tobosa grass (*Pleuraphis mutica*) historically occupied millions of acres of the semi-desert grassland biome of the southwestern United States. Today, these riparian grasslands occupy only a small percentage of their original area and many locations that once were vegetated by sacaton grasslands now support mesquite forests or sacaton-mesquire savannahs

Stromberg and Tellman also reported that sacaton grasslands were historically abundant over the entire San Pedro River valley but now are in a pattern of decline. Despite this decline, there are opportunities to restore sacaton grasslands within the SPRNCA, particularly on river terraces of the upper San Pedro. The RMP should include management actions and alternatives to identify potential sacaton grassland restoration sites within the SPRNCA. In particular, opportunities for active management and restoration of sacaton grasslands on abandoned agricultural fields within the SPRNCA should be addressed in the draft RMP.

Riparian Areas, Floodplains, Wetlands, Aquatic Habitats

BLM acknowledges that the scarcity and importance of riparian/aquatic habitats in the Southwest make their conservation a priority management area for BLM in the SPRNCA. The BLM is mandated to manage the SPRNCA for the protection of these habitats. Healthy riparian areas and wetlands stabilize soil, store and gradually release water throughout the year, prevent erosion, and improve water quality. In the draft RMP, BLM will need to:

identify priority riparian/aquatic species and desired habitat, identify areas for reintroduction of native species, and limited habitats for special status species.

Restoration of cienega wetlands and protection of riverine marshes

J. Stromberg and B. Tellman (2009)define a cienega as a warm temperate wetland of the Southwest that occurs along small, low-energy rivers. Historically, wide expanses of cienegas once bordered the San Pedro River. Today, cienega wetlands are much reduced in size and occurrence. Most of the cienega wetland habitat along the San Pedro River was destroyed at the turn of the 19th century during a period of river entrenchment. Stromberg and Tellman report that today cienega wetlands habitats occur in or near the SPRNCA primarily along the Babocomari River and at the St. David CienegaBecause of the decreasing trend in cienega wetland habitat within the SPRNCA, the draft RMP should include management actions and alternatives designed to identify, preserve, and protect the remaining cienega wetlands habitat within the SPRNCA. The draft RMP also should identify opportunities to expand and enhance cienega habitat within the SPRNCA

Fremont cottonwood / Gooding's willow gallery forest

The San Pedro River supports long stretches of Fremont cottonwood and Goodding's willow gallery forest. AS BLM is aware, cottonwood / willow riparian forest is one of the rarest riparian woodland habitat types in North America. The National Riparian Service Team that assessed riparian conditions along the San Pedro River in 2012 found that cottonwoods and other trees were essential to the recovery of the San Pedro River channel both as living trees and as a source woody debris. Cottonwood trees provide bank stabilization that, in turn, provides stable sites for other riparian vegetation The draft RMP must address how BLM will conserve, protect, and enhance existing cottonwood / willow Gallery forests. An important objective for BLM management for the SPRNCA should be the continued maintenance and preservation of the continuous cottonwood / willow gallery forest that now exists on both banks of the San Pedro River within the SPRNCA. The draft RMP should include management actions to conserve this ribbon of green that is the defining visual element of the San Pedro RNCA. The preservation and protection of existing cottonwood galleries should be part of the vegetation management plan of the draft RMP as recommended by the NRST. The protection of cottonwood trees is particularly important in those reaches of the San Pedro River rated as Functioning At Risk (FAR) by the NRST team.

The NRST found that the risk of major, high-intensity wildfire within the SPRNCA was high given the observed fuel loadings and the types of available fuels. The draft RMP must include a fire management plan for managing existing fuel loads and vegetation within and near the SPRNCA. Priority should be given to the protection of the existing cottonwood / willow gallery forest from catastrophic wildfire. The draft RMP should include an updated fire management plan which contains an analysis of opportunities to utilize managed fire to restore the native grassland habitats on the pre-entrenchment terraces of the San Pedro River, including the use prescribed burns on old agricultural fields. Restoring fire in these grassland areas can reduce fuel loads and the risk of high-intensity wildfire moving into the cottonwood / gallery forest and would improve the health of existing grassland areas and overall watershed health and the health of the populations of grassland species.

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Tamarisk

Tamarisk or salt cedar is a non-native plant species originally introduced to North America for purposes of soil stabilization and erosion control and it has increased along Western rivers over the past century, including the San Pedro River [Stromberg and Tellman. 2009 at p. 18]. Tamarisk is a relative newcomer along the San Pedro River. Stromberg and Tellman report that the oldest documented tamarisk on the San Pedro River dates back to the 1950s [Stromberg and Tellman, eds. 2009 at p. 18]. Stromberg and Tellman report that in parts of the upper San Pedro subbasin (which includes the SPRNCA), tamarisk has increased in abundance in recent decades, perhaps because of changing stream flow conditions [Stromberg and Tellman, eds. 2009 at p. 19].

According to the NRST, tamarisk is found throughout the San Pedro River riparian corridor with increasing abundance and density of tamarisk in the northern reaches of the San Pedro River within the SPRNCA near St. David. The NRST also found that tamarisk was less abundant in the southern reaches of the San Pedro River closer to the U.S. Mexico border because of aggressive control efforts by BLM. The NRST supports and endorses the existing SPRNCA tamarisk management plan.

The draft RMP should address how BLM plans to reduce tamarisk along the San Pedro River and control its spread within the SPRNCA. The RMP should describe how BLM plans to continue aggressive tamarisk control efforts in the northern region of the SPRNCA near St. David.

Fish, Wildlife, and Special Status Species (Plants and Wildlife)

The San Pedro watershed supports approximately 400 species of birds, approximately 80 mammal species, more than 60 species of reptiles and amphibians and 4 native fish. All four native fish species in the planning area are special status species. Each wildlife species contributes to biological diversity and ecosystem function. The San Pedro watershed is home to approximately 50 special status species including federally listed, candidate, state listed, and BLM sensitive species. In the draft RMP, the BLM will have to identify and designate priority species and habitats, as well as identify desired future conditions for habitat conditions for habitat types that support a wide variety of game, non-game, and migratory bird species.

Fishes

According to Stromberg and Tellman (2009), the San Pedro River has experienced a "staggering" loss of its once-rich native fish fauna. Of the original 13 native fish species endemic to the San Pedro, all but two species have been replaced by non-native fishes in the main stem of the river. Disturbances in the watershed and channels and declining stream flows have contributed to the loss of native fish. However, it is the expanding presence of non-native fishes that "preclude hope for recovery of the native fauna." Stromberg and Tellman report that tributary streams to the San Pedro River still retain 9 native fish species, but these remaining populations are vulnerable to invasion by non-native fishes and are experiencing declines in the number of native fish species present. Stromberg and Tellman conclude that conservation actions by themselves would be insufficient to recover native fish oopulations. The presence of non-native fishes in the main stem of the river, tributaries, ponds, and stock tanks may prevent the persistence of remaining native fish fauna and rule

out the likelihood of the re-establishment of extirpated native species. Stromberg and Tellman state that the most urgent conservation need of native San Pedro River basin fishes is the control or elimination of non-native fishes. For this reason, the draft RMP should include native fishery management goals and objectives and a recovery plan that, over the long term, will result in the restoration of the native fish fauna of the San Pedro River where feasible. The draft RMP should include conservation actions to benefit recovery of native fishes, especially management actions to control or eliminate non-native fish species. At a minimum, the draft RMP should prohibit the continued stocking of non-native game fish in the San Pedro within the SPRNCA. The BLM should include management actions to create or protect refugia for the few remaining native fish species in tributaries to the San Pedro River.

Birds (Management of the SPRNCA as a Globally Important Bird Area)

The San Pedro riparian corridor supports a diverse and abundant community of breeding and migrating birds. This avian diversity and abundance is, in part, attributable to the existence of high quality, desert riparian woodland habitat within the San Pedro River Valley, including the SPRNCA. Desert riparian woodland habitat is one of the rarest habitat types in North America, covering less than one percent of land area in the southwestern United States. [Stromberg and Tellman, eds. 2009 at p. 153]. Despite the extremely small percentage of the landscape occupied by desert riparian woodland habitat, the "…desert riparian forest supports some of the highest species richness and abundance totals of terrestrial vertebrates in North America [citations omitted]. Approximately 75 percent of the breeding bird species in the Southwest are classified as facultative riparian and over 50 percent as obligate riparian" [Stromberg and Tellman, eds. 2009 at p. 153]. Over 200 species use the San Pedro river corridor to move between their breeding and wintering grounds. This makes the San Pedro river corridor one of the most important corridors for migrating birds in North America.

Species richness estimates during the breeding season on the upper San Pedro are about two times higher than reported estimates from other southwestern rivers. The San Pedro River hosts over 100 species that breed in the riparian corridor from May to August. Bird density and richness are highest in the cottonwood / willow forests of the San Pedro.
The draft RMP should include management plans and alternatives to maintain and enhance the diversity of the main vegetation types within the SPRNCA including the cottonwood / willow forests, mesquite bosques, sacaton grasslands, and cienega wetlands. By protecting the biodiversity of the riparian plant communities and major vegetation types, the BLM also will maintain and protect a diverse assemblage of bird species that makes the SPRNCA a globally important bird area. BLM should place a particularly high priority on maintaining the cottonwood / willow habitat within the SPRNCA.

Mammals

"The San Pedro watershed is recognized as a national "hotspot" for mammals, hosting one of the richest assemblages of mammal species in the United States." [Stromberg and Tellman, eds. 2009 at p.107] Estimates of mammalian species richness in the watershed range from 61 to 87 mammals, making it one of the richest habitats for mammalian species located within a semi-arid landscape on the entire planet Mammal species documented by capture, observation, and occurrence records include bear, wolves, foxes, bobcat, ocelot, opossums, porcupine, peccary, skunk, deer, pronghorn, ringtail, coati, raccoon, beaver, bats, rabbits, squirrels, prairie dog, gopher, shrew, and multiple species of rat and mice See Table 6.1. Mammal Species of the San Pedro River in Stromberg and B. Tellman 2009 at p. 110-112.

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The draft RMP should include plans for continued research on mammalian species richness to recommend future management actions and alternatives to maintain the San Pedro as a mammalian "hotspot." In particular, BLM should investigate management of the impact of human activities on the mammals of the San Pedro watershed. People influence mammals directly (i.e., hunting and road kill) and indirectly through habitat modification.

Threatened, endangered, and other special status species

The San Pedro watershed is home to approximately 50 special status species including federally listed, candidate, state listed, and BLM sensitive species. BLM should address and designate priority species and habitats for significant special status species.and identify desired future conditions using BLM strategic plans, state agency strategic plans, and other similar sources. The draft RMP address desired habitat conditions and/or populations for major habitat types that support a wide variety of game, non-game, and migratory bird species. The draft RMP should identify actions and use restrictions needed to achieve desired population and habitat conditions.

BLM is required by the Endangered Species Act to conserve threatened or endangered species. It is BLM stated policy to conserve all special status species, therefore the draft RMP should identify desired outcomes, strategies, restoration opportunities, use restrictions, and management actions to conserve and recover special status species.

The draft RMP should address how BLM will accomplish required consultations under Section 7 of the Endangered Species Act: Consultation with the United States Fish and Wildlife Service is required by §7 of the Endangered Species Act for actions that may affect listed species and designated critical habitat. Section 7 consultation is needed if actions are likely to jeopardize the continued existence of a proposed species, or result in the destruction or adverse modification of proposed critical habitat

Cultural/Paleontological Resources

The cultural resources in the SPRNCA represent an internationally significant array of site types, cultures, and time periods. In the RMP, BLM will need to allocate cultural properties to specific uses. The RMP will provide background and detail regarding traditional cultural uses or values, and the development of appropriate management tools to consult with tribal groups and protect, preserve and enhance those values. Paleontological resources will be addressed in accordance with the current policy issued in Washington Office Instruction Memoranda on the Potential Fossil Yield Classification system. The BLM's objectives are to manage paleontological and cultural resources for scientific, conservation, traditional, public, and experimental use.

Special Designations

There are currently three Areas of Critical Environmental Concern (ACEC) in the SPRNCA totaling close to 5,420 acres. Some of these are also considered Research Natural Areas (San Rafael, San Pedro River and St. David Cienega). Current and potential areas for ACEC designation should be addressed in the draft RMP.

Livestock Grazing

BLM has stated that compatibility of grazing on the SPRNCA with the area's conservation values will be analyzed and evaluated in the draft RMP. The majority of the SPRNCA has been closed to grazing since 1989. The BLM acquired the SPRNCA in order to protect and enhance the riparian ecosystem along the Upper San Pedro River. Subsequently a decision was made to prohibit livestock grazing for the 15 year lifespan of the San Pedro River Riparian Management Plan (1989) with the exception of 6,521 acres that were acquired after the original designation. This decision will be revisited in the upcoming RMP. The Sierra Club recommends that BLM continue the existing moratorium on livestock grazing and extend it to include the 6, 521 acres acquired after the original designation in 1988.

BLM should include stronger provisions in the draft RMP to address the problem of trespass livestock grazing within the SPRNCA. The National Riparian Service Team (NRST) assessed riparian conditions along the San Pedro. The NRST reported their findings in a *Proper Functioning Condition Riparian Assessment Report* dated November 2012. The NRST assessment findings provided evidence that the physical function and ecological health of the San Pedro River through the SPRNCA had improved dramatically since establishment of the SPRNCA in 1988, *largely due to BLM's 1989 decision to end permitted livestock grazing within the SPRNCA*.

A key finding of the NRST assessment report was that while BLM had made commendable efforts to eliminate livestock grazing in the SPRNCA, more work needed to be done. The NRST found evidence of unauthorized grazing all along the San Pedro River and determined that livestock grazing was found to be retarding recovery of sections of the river. The NRST concluded that trespass livestock grazing in the river corridor must be eliminated to provide the maximum opportunity for continued improvement and evolution of the San Pedro River. The NRST also concluded that the PFC assessment findings indicated that the riparian corridor was not yet to a point that livestock grazing could be permitted along the San Pedro River without slowing improvement or causing more impairment [See National Riparian Service Team. November 2012. Riparian Conditions Along the San Pedro River, Proper Functioning Condition Riparian Assessment Report, pp. 58-59].

Recreation

According to the BLM website, the SPRNCA attracts over 100,000 visitors annually who engage in a variety of recreational activities, especially birding. The SPRNCA draws birders from all over the world. It is a globally important birding area with an abundance of neotropical migrants in the spring and fall. Other recreation activities in the SPRNCA include camping, wildlife viewing, viewing of cultural sites, hiking, mountain biking, hunting, horseback riding, kayaking, and geocaching. The draft RMP should evaluate and analyze recreation designations.

The protection of public safety is an important element of the analysis of recreation issues that should be addressed in the draft RMP. BLM promulgated supplementary rules to close the area between Charleston Road and Highway 92 to firearms use to protect public safety. Target shooting and "plinking" also were prohibited. BLM allows the discharge of firearms within the SPRNCA north of Charleston Road and south of Arizona Highway 92 to the U.S. Mexico border from September 1st to March 31st. Firearms use is allowed for the purpose of hunting as authorized by the State of Arizona and the Arizona Game and Fish Department.

BLM should continue the current closure and prohibitions against firearms use and consider ther they should be extended to include other areas within the SPRNCA (i.e. north of Charleston Road to the northern boundary of the SPRNCA and south of Arizona Highway 92 to the U.S. –Mexico border to protect public safety.

Another important issue that should be addressed in the draft RMP is travel management and off road vehicle use in the SPRNCA. Congress limited the use of motorized vehicles in the SPRNCA stating that "motorized vehicles in the conservation area shall only be allowed on roads specifically designated for such use as part of the management plan." [See Title 16 United States Code, Chapter 1, Subchapter CIX, Section 460xx-1(b)]. In 1989, BLM limited off road vehicle use to designated roads within the SPRNCA [*See Off-Road Vehicle Designation, Livestock Grazing Notice and Establishment of Supplementary Rules for the San Pedro Riparian National Conservation Area, Arizona* in Federal Register, Vol. 54, No. 168, August 31, 1989]. BLM limited licensed motorized and mechanized vehicles, including mountain bikes, to designated roads only. Sierra Club strongly supports the BLM decision to limit off-road vehicle (ORV) use to licensed vehicles on designated roads within the SPRNCA. BLM has also prohibited the use of unlicensed motor vehicles within the SPRNCA. Sierra Club agrees with this prohibition and recommends that it be included in the draft RMP.

In 2012, the NRST found that because riparian recovery was weakly developed in many areas of the SPRNCA and that small disturbances could have profound effects by retarding recovery or reversing earlier trends in recovery of riparian areas.The NSRT recommended that ORV use be limited for that reason. The NRST assessment findings indicated that unauthorized ORV traffic had compacted soil, trampled and destroyed riparian vegetation, altered stream banks, and increased channel erosion. These NRST findings support greater BLM efforts in the draft RMP to reduce the adverse impacts from unauthorized ORV use. The draft RMP should continue the current prohibition against the use of unlicensed ORVs within the SPRNCA and the current limitation of ORV use to designated roads within the SPRNCA. BLM should address how the agency will enforce compliance with current prohibitions and limits on ORV use within the SPNCA in the draft RMP

Visual Resources

BLM should address visual resource values in the SPRNCA, including the overall scenic quality of the area in the development of the draft RMP. The potential effects of energy projects such as transmission lines, road development, and test ranges for UAS/drone development may impact the visual values of the SPRNCA. Visual Resource Management (VRM) classifications will be designated as part of the draft RMP.

Mining

When Congress created the SPRNCA, Congress withdrew all federal lands within the SPNCA from all forms of entry, appropriation, or disposal under the public land law; from location, entry, and patent under the United States mining laws; and from disposition under all laws pertaining to mineral and geothermal leasing…." The draft RMP should include management plans and actions consistent with this federal mineral withdrawal. BLM also should clarify whether there are any existing mineral claims or patents within the SPRNCA and how BLM will address them under the draft RMP.

Alternatives

Under the National Environmental Policy Act (NEPA) and the regulations promulgated to implement the act (42 U.S.C. § 4321, *et seq*., 40 CFR § 1500.1, *et seq*.), the BLM must assess and evaluate the environmental impacts of the reasonable alternatives (42 U.S.C. § 4332 102 C). The range of alternatives must include a no action alternative. The BLM, as the lead agency for this project, must consider cumulative impacts as well as direct and indirect impacts (40 CFR ~ 1508.7).

BLM must develop a range of alternatives to address the final set of planning issues in the draft RMP. Each alternative represents a different management plan that addresses and/or resolves the identified planning issues in different ways. The alternatives will reflect the variety of issues and guidance applicable to the resource uses. One alternative will consist of the current management decisions (from existing plans and documents) called the No Action Alternative. Each alternative will include a different suite of potential planning decisions to address the issues. Once the alternatives have been formulated BLM must analyze the effects of the alternatives and select a preferred alternative. All of the different alternatives, the preferred alternative, and the effects of the alternatives will be released as the draft RMP/EIS.

No Action Alternative

A no action alternative would continue management of the SPRNCA according to the management guidelines and prescriptions of the Phoenix Resource Management Plan of 1988 and the Safford District Resource Management Plan of 1991. While Sierra Club understands that BLM must include the no action alternative in the draft RMP, we do not support continued management of the SPRNCA under outdated management plans going back to the late 1980s and early 1990s.The no action alternative is unreasonable given all the changes in the San Pedro watershed over the last quarter century and the mandate to conserve the area's plants and animals.

Management alternatives to conserve, protect, and enhance the SPRNCA

BLM is responsible for developing a range of management alternatives in the draft RMP. The Sierra Club suggests that BLM develop at least two alternatives corresponding to the federal mandate to conserve, protect, and enhance the SPRNCA. These alternatives would be in addition to the required no action alternative. One set of management alternatives would be designed to conserve and protect the SPRNCA to prevent degradation of the SPRNCA riparian area and its resource values. In other words to maintain and protect the existing baseline conditions within the conservation area.The second alternative would be to design a set of more active management actions, strategies, and plans to enhance the San Pedro riparian area and its resource values.

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Thank you for the opportunity to submit these scoping comments. We look forward to continuing to work with BLM and our continued participation in the planning process as BLM moves forward with the development of the draft SPRNCA RMP / EIS.

Sincerely,

Steve Pawlowski
Water Sentinels Program Coordinator
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202 E. McDowell Road, Suite 277
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USGS comments regarding scoping for the BLM SPRNCA Resource Management Plan

Effective resource management requires information about the status and trends of the resource's condition – you can't manage what you don't measure. The San Pedro Riparian National Conservation Area (SPRNCA) is comprised of natural resources that are inexorably tied to the water resources that support both the base flow in the river and the accompanying riparian ecosystem. The BLM is fortunate that through the years, and especially after 2000, funding has been made available to collect and report on a broad suite of hydrologic data from the SPRNCA and adjacent areas of the Subwatershed, ranging from groundwater levels to streamflow to aquifer storage change. These data provide the framework needed to manage the natural resources of the SPRNCA, but can only be effective for management if data continue to be collected. Because the funding necessary to support basic data collection and analysis can be inconsistent and fleeting, the USGS recommends that part of the discussion regarding the SPRNCA's Resource Management Plan address the long-term data needs for resource management and the funding to support it. An ideal data plan would include both representative groundwater monitoring at existing SPRNCA wells, streamflow monitoring at sites with established records, and aquifer storage monitoring across the Subwatershed (to assess groundwater available to sustain the San Pedro riparian system and base flow in the river itself).

To: BLM staff

Subject: Agency comment regarding SPRNCA Resource Management Plan

The State of Arizona's primary provider of transportation services is the Department of Transportation (ADOT). ADOT has served the people of Cochise County and the San Pedro Valley since early statehood; in early times as the Highway Department and more recently as a multi-modal and multi-faceted organization. One of the nation's earliest east-west routes, US 80 now as SR 80 pass through Benson and Tombstone on the route to Bisbee, all important economic centers and historic resources to the SPRNCA. In more recent times designations have changed and roadways have been added and upgraded for efficiency and safety. Four state routes now exist within the very near vicinity of SPRNCA and of these two are within the planning area. Routes within the SPRNCA are 82 and 90, while 80 and 92 are also of interest in providing access to the area. Another major local highway, operated by Cochise County within SPRNCA, is Charleston Road. This is not within ADOT jurisdiction though an important and needed resource nonetheless.

In considering travel and access management alternatives for the SPRNCA, the planners should recognize the importance of partnering with the transportation agencies to maintain a safe, efficient and effective system especially with regard to the State Highways. Additional vehicular access should not be granted from new locations along the state routes. The access as provided should be sufficient to meet the needs of the area for both user benefit and maintenance purposes. If for management purposes some access may be relocated, abandoned or changed-use this should be undertaken through the ADOT encroachment permit process and consultation with the district permitting staff and regional traffic engineer. We further request that the existing easements be retained and not reduced in size or number to ensure adequate space for safe roadway operations.

The RMP should acknowledge the existence of the Four Agency Partnering agreement in regard to planning activities that may affect the ADOT highway easements should be assessed in conformance with this agreement. The RMP should also recognize the possibility of future regional travel demand growth and the potential need to improve the highways for greater capacity and potentially for added turning lanes. This consideration at some point may arise on SR 90 but at present is not a consideration in the planning horizon.

BLM and visitors should consider the possibility of adverse traffic impacts arising from planning special events that may use the existing conservation area access locations. In such cases the special event permit process will be required of the event planner.

BLM should partner with ADOT in planning, design and implementation of physical structures in or adjacent to the highway easement well in advance of any actual construction. Such planning level evaluations should be performed in concert with the ADOT encroachment permit process.

Thank you for considering these comments in the plan.

United States Department of Agriculture

Research, Education, and Economics
Agricultural Research Service

Ms. Amy Markstein
BLM Tucson Field Office
3201 E. Universal Way
Tucson, AZ 85756

9/27/2013,

Dear Amy,

This comment for the San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan (RMP) is motivated by the statement "The planning effort encompasses all public lands within the SPRNCA and possibly additional lands within the watershed identified through scoping and considered during the planning process." It is my understanding that consideration is being given to retiring the grazing permit for the BLM's Babocomari (Hayhurst) allotment [#52080]. The purpose of this comment is to provide evidence that the grazing allotment is managed in a way that should reduce runoff, and protect the San Pedro, so that the permit should not be retired.

I first met Mr. Hayhurst about a dozen years ago doing fieldwork while working on a NASA funded remote sensing project to quantify rangeland vegetation. We collected cover, height and biomass data on Mr. Hayhurst's ranch because he had done a brush treatment, just north of Highway 82, and we could collect data from adjacent areas with brush and grass communities on the same soil. Since then, Mr. Hayhurst has demonstrated over a number of years his interest in increasing grass cover on his allotment by brush conversion. If his grazing allotment were to be retired, this process would stop. It is unlikely that more brush would revert to grass simply by removing grazing, given the limy soils. I do not know the specific management objectives in the RMP that would be affected by this allotment. However, if Mr. Hayhurst can continue to increase (grass) cover on this allotment, that would serve to reduce runoff and erosion on the allotment, as well as to reduce peak runoff and sediment yields going into Babocomari Creek and ultimately into the San Pedro River.

In addition, I would like to present some information that resulted from the previously mentioned fieldwork on Mr. Hayhurst's allotment. This work is documented in a recently published paper by Hagan et al. (2012, full citation at end). The gist of this information is that in spite of the prolonged recent drought, Mr. Hayhurst has been able to improve conditions over time on his ranch. He is now getting more vegetation cover, given climatic inputs, than was the case in earlier years.

Southwest Watershed Research Center
2000 E. Allen Rd., Tucson, AZ 85719-1520
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USDA is an Equal Opportunity Employer

An aerial photo taken from Google Earth shows the layout of the allotment in Figure 1. In the image, the landfill and road leading to it are inside the boundary, perhaps because of a change in the Coordinate Reference System I made to the allotment's shapefile. For the analysis that follows the allotment boundary was shifted 300m to the east, so that no part of landfill or road to it are inside the allotment boundary.

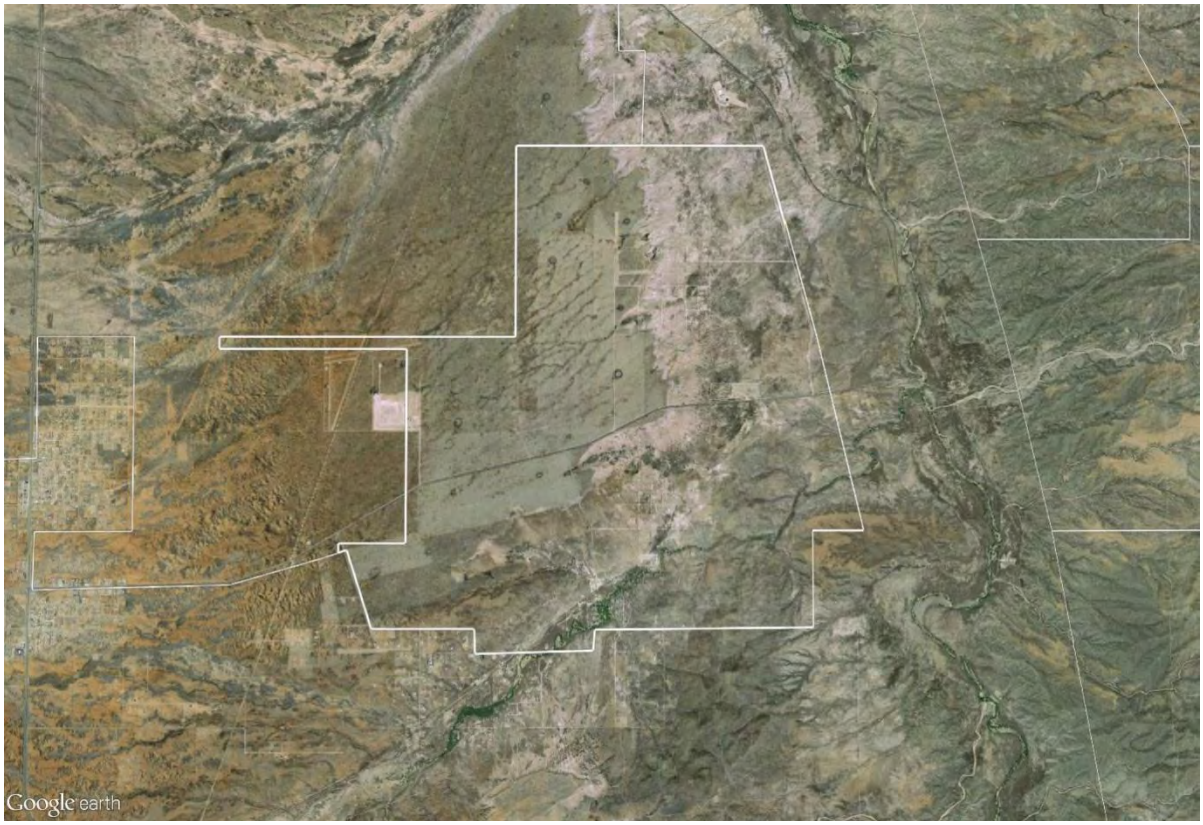

Figure 1

The information presented below has a number of weaknesses. A more detailed analysis of the vegetation states in each ecological site should be undertaken to define a desired state, and compare the existing state to the desired state. Further, there has been no incorporation of additional field monitored data nor a field assessment on my part since the trip mentioned earlier. Nevertheless, with the results presented below it is possible to see, in a gross sense, the long-term improvement in total vegetation cover, as estimated by a remotely sensed measure that combines of green and senescent foliar cover. The estimates are for the May-June timeframe of each year, when cover is at its minimum and the soil is most vulnerable to intense monsoon rains. The cover estimates were made from Landsat imagery at 30 meter resolution between 1984 and 2011. A summary plot of the average cover across the 28 years can be seen in Figure 2 below.

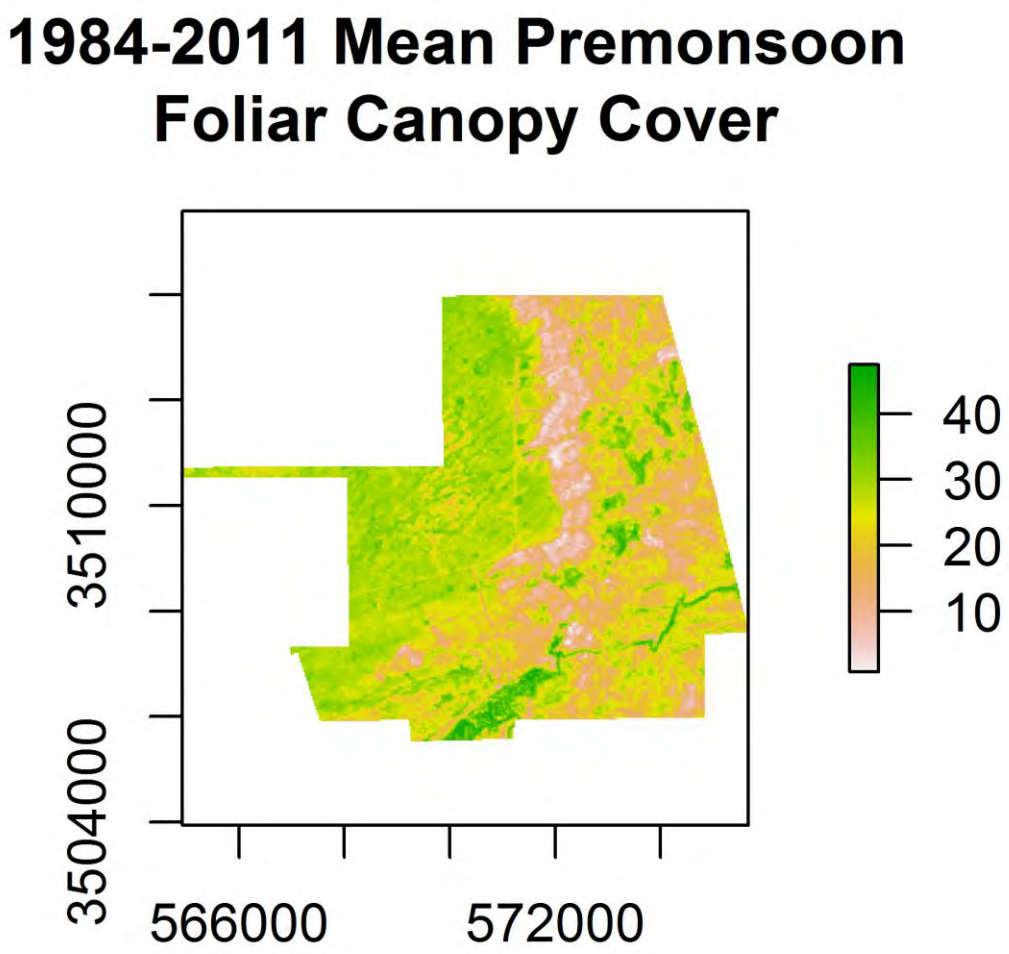

Figure 2

The annual estimates for each year used in the later analysis can be seen in the Figure 3 below:

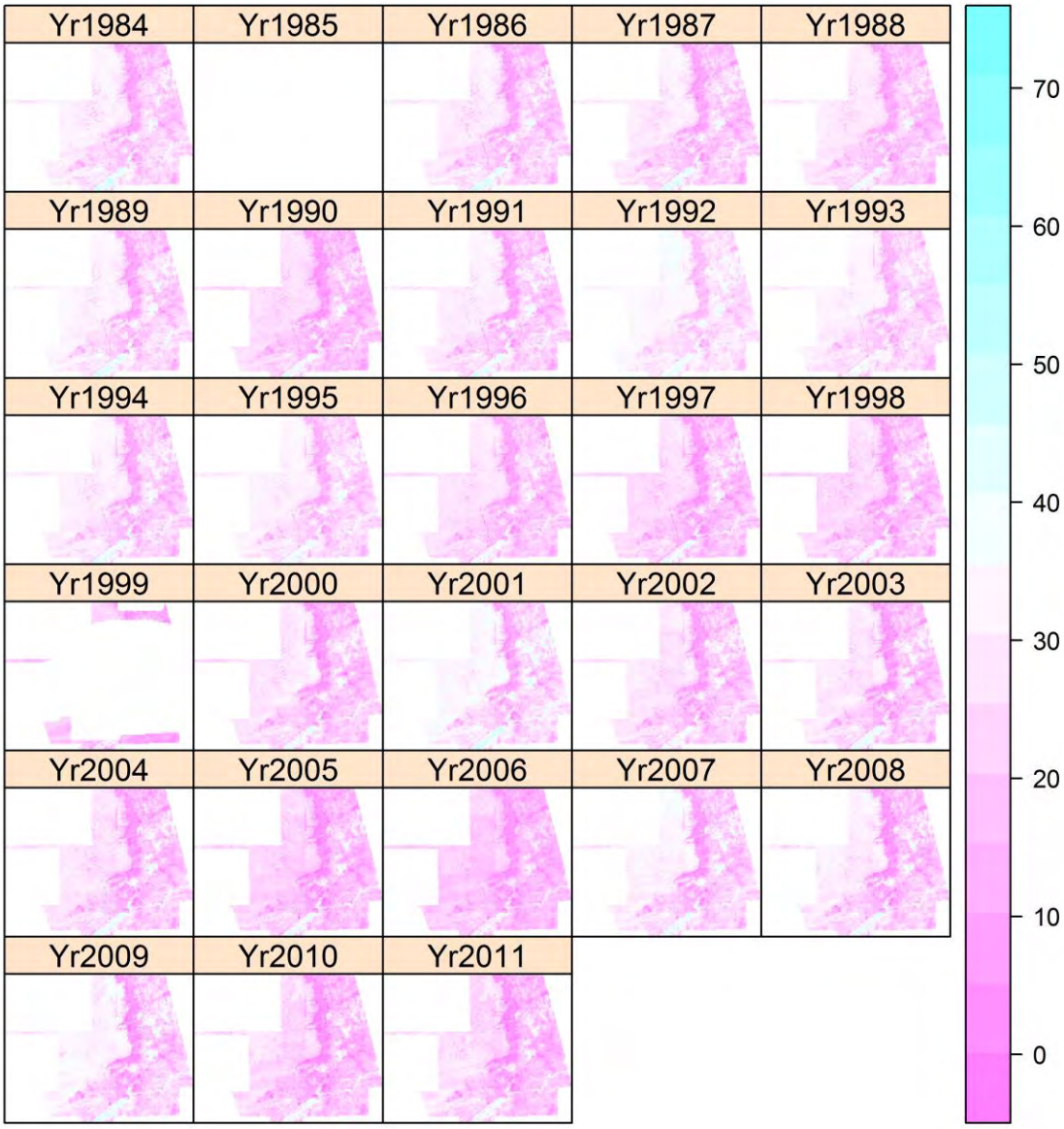

Figure 3

To see the influence of management separate from the influence of climate both need to be considered together. On the next page, one can see estimates of annual precipitation and temperature taken from the 4 km PRISM data sets, resampled to the Landsat scale and averaged from July through June for the allotment (Figures 4 and 5). No attempt has been made to collect precipitation data directly from a rain gauge on or near the allotment. The PRISM data sets do not capture the spatial variability of summer thunderstorms. They do however, capture in a general sense wet and dry years. Unfortunately for Mr. Hayhurst, according to this data set, the trend has been for dryer and warmer conditions. The blue line is a loess fit and the grey area shows the standard error. One would expect production from the allotment to be declining significantly.

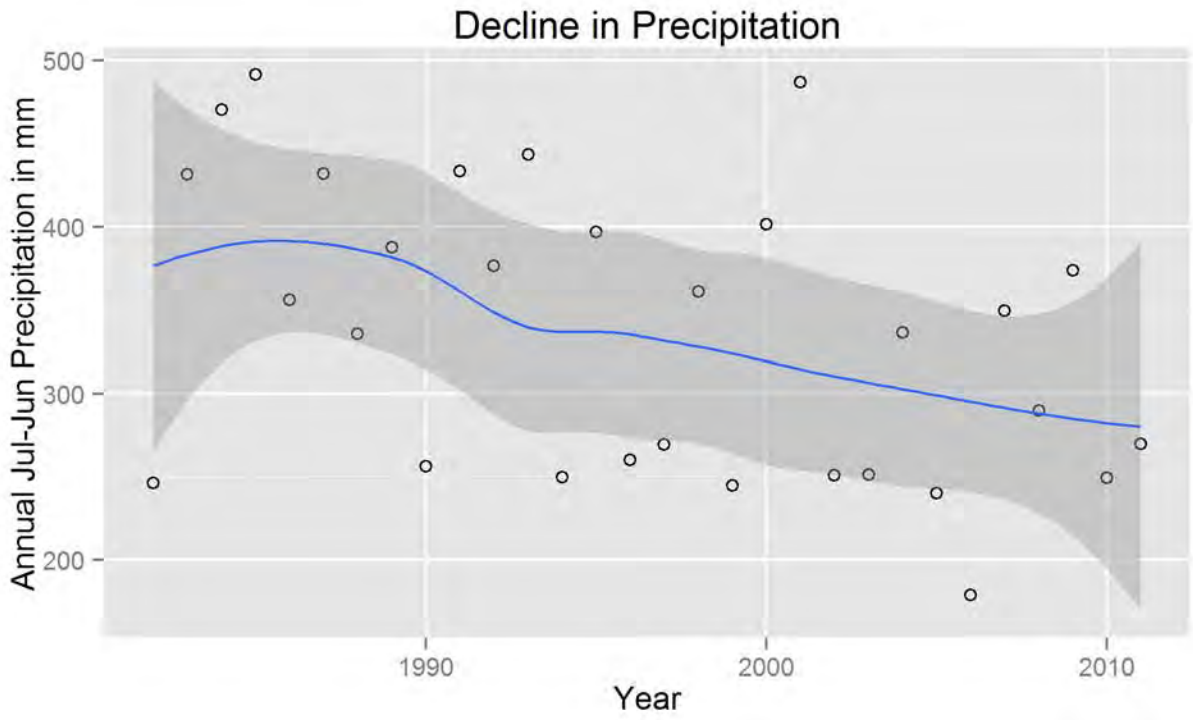

Figure 4

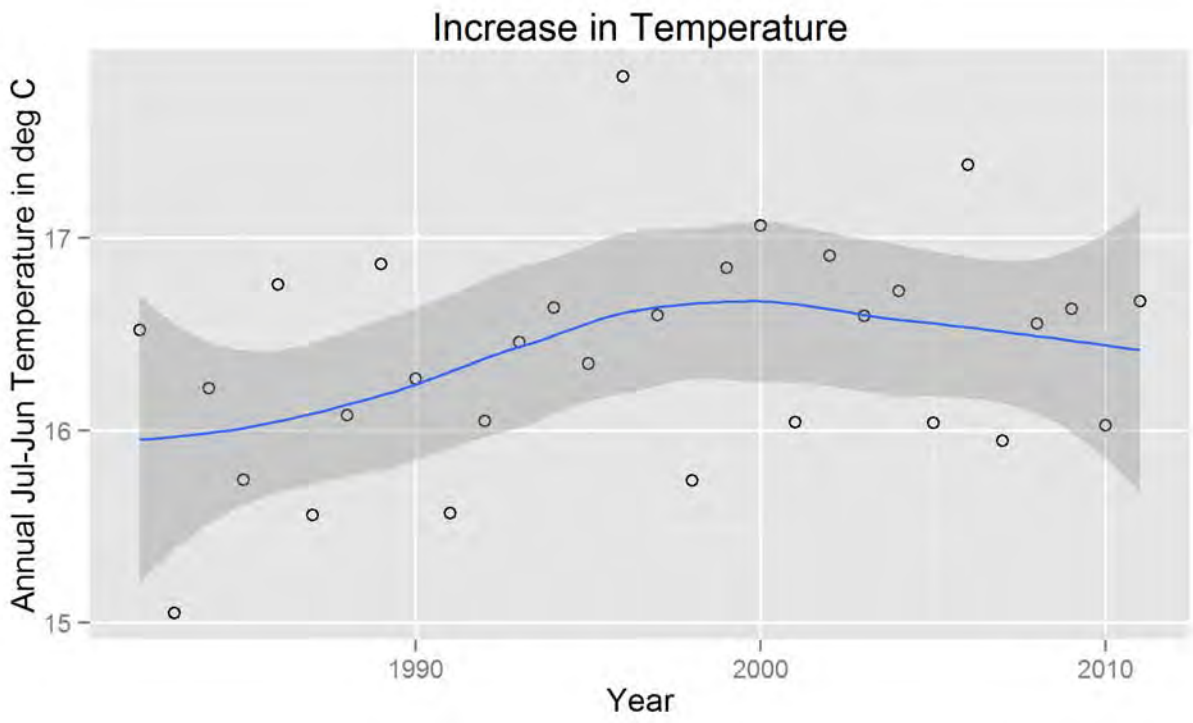

Figure 5

A very simple linear regression model was built to estimate canopy cover for each pixel in each year based on previous three years' summer and winter precipitation and temperature from PRISM. Below is the graph where the estimated mean cover for each year across the entire allotment is plotted against the measured cover. Because there is so much variability across this allotment much more could be done to improve this relationship, which is not particularly strong on a pixel to pixel level (R squared = 0.15), but is stronger for the averaged values (adjusted R squared = 0.69). The slope of the averaged cover values is not significantly different from one.

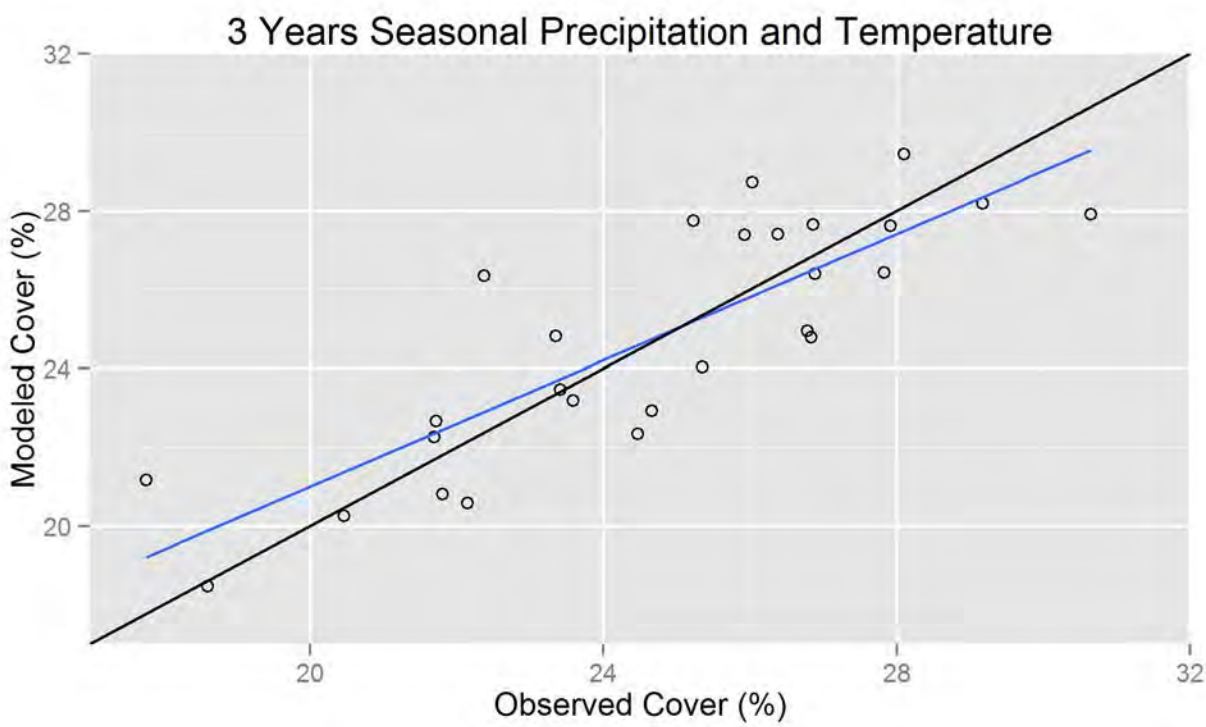

Figure 6

Finally, one can compare the trend in observed canopy cover versus what is expected given the precipitation and temperature inputs as in Figure 7. Again, this analysis could be strengthened in a number of ways, but the results appear to be robustly indicating that in the 1980s the predicted cover was much higher in the observed, while in later years, the observed is higher than the predicted. My interpretation of these trends is that although the recent climate has not been favorable, because of Mr. Hayhurst's management, he is now able to convert more precipitation into vegetation than was the case three decades ago. That improvement, particularly combined with the evidence of the active management to convert brush to grass, would lead me to think, in the absence of contrary evidence, that this allotment can continue to be grazed in a way that is consistent with a healthy San Pedro watershed.

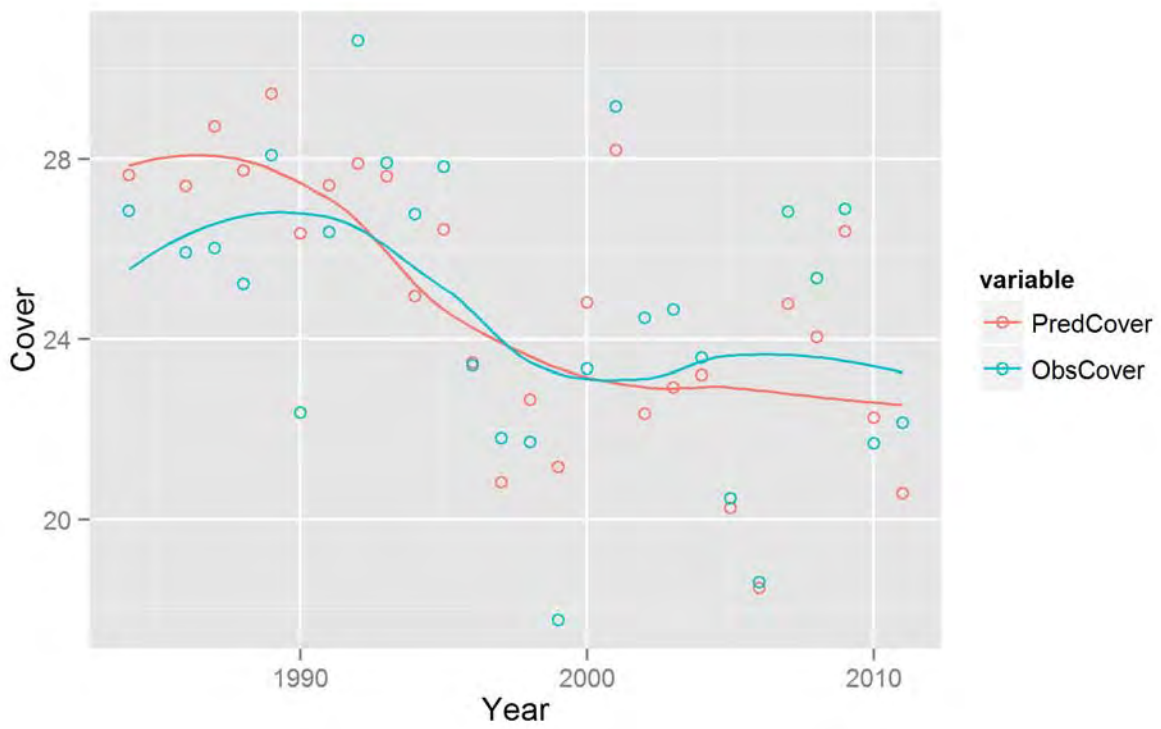

Figure 7

References:

Hagen, S.C., Heilman, P., Marsett, R., Torbick, N., Salas, W., Ravensway, J., Qi, J. 2012. Mapping Total Vegetation Cover Across Western Rangelands With Moderate-Resolution Imaging Spectroradiometer Data. Rangeland Ecology & Management. 65(5): 456–467.

PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu, created 4 Feb 2004.

Please contact me if you have any questions. Thank you,

Philip Heilman

CENTER for BIOLOGICAL DIVERSITY
Because life is good.

September 26, 2013

Ms. Amy Markstein
Resource Management Plan Coordinator
Bureau of Land Management
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Dear Ms. Markstein,

RE: San Pedro Riparian National Conservation Area Resource Management Plan
SCOPING COMMENTS

The Center for Biological Diversity ("Center") is a non-profit, public interest, conservation organization whose mission is to conserve imperiled native species and their threatened habitat and to fulfill the continuing educational goals of our membership and the general public in the process. Center founders and members have participated actively in preservation of the San Pedro River and the San Pedro Riparian National Conservation Area (SPRNCA) for more than two decades. On behalf of our more than 625,000 supporters and online activists, and more than 48,000 members throughout the United States and the world, we submit Resource Management Plan scoping comments.

The San Pedro River is the last surviving, undammed desert river in the Southwest.[1] In 1988, the U.S. Congress created the San Pedro Riparian National Conservation Area (SPRNCA) within the Sierra Vista Sub-basin.[2] The U.S. Congress created SPRNCA in recognition of the fact that the San Pedro River, specifically within the Sierra Vista Sub-basin, is one of Arizona's,

[1] *See Assessment of Water Conditions and Management Opportunities in Support of Riparian Values*, BLM, 1987.; *Arizona Riparian Inventory and Mapping Project*, Arizona Game and Fish Department, Phoenix, December 1, 1993.; *American Birding Association, Inc., "Winging It"*, Volume 7, Number 10, October 1995.; *"Ribbon of Life, An Agenda for Preserving Transboundary Migratory Bird Habitat On the Upper San Pedro River, Commission For Environmental Cooperation*, 1999.; *Desertification of the United States*, David Sheridan, Council on Environmental Quality 1981.; *"A Special Place, The Patience of a Saint San Pedro River," Barbara Kingsolver, National Geographic*, April 2000.; and *In Arizona Desert, a Desert Oasis in Peril*, Jon Christensen, New York Times, May 4, 1999.
[2] *See Arizona-Idaho Conservation Act, 16 U.S.C. § 460xx(a)*, November 18, 1988.

the Nation's, and the World's environmental crown jewels.[3] The U.S. Congress created the SPRNCA "in order to protect the riparian area and the aquatic, wildlife, archeological, paleontological, scientific, cultural, educational, and recreational resources of the public lands surrounding the San Pedro River."[4]

The 1989 San Pedro River Riparian Management Plan and Final Environmental Impact Statement (FEIS) prepared by the Bureau of Land Management codified an already approved "plan to protect and enhance the riparian ecosystem and the area's historic and prehistoric values." The FEIS "emphasizes actions to protect or enhance vegetation, wildlife habitat, water and cultural/paleontological resources." Management practices already approved include:

> "…Fence property boundaries to establish visual identification of the land ownership and reduce the probability of unauthorized use…
>
> Prohibit off-road use by any type of vehicle…
>
> Plan activities to maintain existing surface and groundwater conditions. BLM will continuously monitor river flow and fluctuations of the groundwater table to determine if changes occur in the floodplain and regional aquifers. Water quality monitoring will be an ongoing process.
>
> Follow all available legal avenues to protect rights to surface and groundwater. This includes the protection of the Bureau's pending application for instream flow rights, those rights of the St. David Irrigation Company for the San Pedro River, and groundwater rights under a potential active management area designation…

---

[3] *See* "*Unique Wildlife Ecosystems, Arizona, Proposed Unique Ecosystem*, Nationally Significant, San Pedro River," U.S. Fish and Wildlife Service, U.S. Department of the Interior, Washington, D.C., November 6, 1978.; *Assessment of Water Conditions and Management Opportunities in Support of Riparian Values, BLM*, 1987.; *Arizona Riparian Inventory and Mapping Project*, Arizona Game and Fish Department, Phoenix, December 1, 1993.; *This Land Is Our Land, America's Last Great Places – and How They Might Be Saved Forever*," Life Magazine, October 1993.; *American Birding Association, Inc.*, "*Winging It*", Volume 7, Number 10, October 1995.; "*Rio San Pedro, One of the last great places*," Robert C. Dyer, Arizona Highways Magazine, May 1996.; *Ribbon of Life, An Agenda for Preserving Transboundary Migratory Bird Habitat On the Upper San Pedro River*, Commission For Environmental Cooperation, 1999.; "*In Arizona Desert, a Desert Oasis in Peril*," Jon Christensen, New York Times, May 4, 1999.; *A Special Place, The Patience of a Saint San Pedro River*, Barbara Kingsolver, National Geographic, April 2000.; *Arizona-Idaho Conservation Act*, U.S. Congress 1988 (S. 2840), 16 U.S.C. § 460xx(a), U.S. Congress, November 18, 1988.; and "*Arizona Riparian Protection Program Legislative Report,*" *ADWR*, July 1994. *Also, see*: "*U.S. Senate Committee on Energy and Natural Resources, San Pedro Riparian National Conservation Area Report*, No. 100-525, 100th Cong., 2d sess., Sep. 7, 1988.; "*The Ageless Waters of the San Pedro River*," Roseann Beggy Hanson, Arizona Highways Magazine, November 1998.; "*San Pedro Riparian Area*," Sam Negri, Arizona Highways Magazine, April 1989.; "*If National Geographic can see the San Pedro as a jewel, can't those of us living here?*" Editorial, Sierra Vista Herald, April 25, 2000.; "*Siphoning the San Pedro*," Editorial, Arizona Daily Star, May 26, 2002.; "*Growth and the San Pedro*," Editorial, Arizona Daily Star, May 18, 2003.; "Riparian *rip-off, A silly rider has popped up in Congress, again – and should die again*," Editorial, Arizona Republic, May 21, 2003.; "*A treasure at risk, Bill threatens San Pedro River*," Editorial, Arizona Republic, May 23, 2002.; "*Last Great Places, San Pedro River, Miracle in the Desert*, The Nature Conservancy Website, August 20, 2002.; and "*A river to save, the fate of the San Pedro will rest on McCain's shoulders*," Editorial, Arizona Republic, September 2, 2003.

[4] *See Arizona-Idaho Conservation Act*, U.S. Congress 1988 (S. 2840), 16 U.S.C. § 460xx(a), U.S. Congress, November 18, 1988.

Manage terrestrial wildlife habitat to provide the best habitat tor existing population levels of wildlife…

Establish mitigation procedures to reduce impacts to wildlife and wildlife habitat…

Prohibit firewood cutting (including the gathering of down and dead wood) within the San Pedro EIS area...

Withdraw the San Pedro property from mineral entry and mineral leasing laws…

Preserve or enhance cultural resource values through management actions and the control of land uses. Management actions include patrol, stabilization of ruins and control of access...

Manage all paleontological sites to preserve their scientific values and potential public use values…

Preferred Alternative…Theme Statement…The theme of the *Preferred Alternative* is to balance the resource protection and public use activities in the San Pedro EIS area. Protection and/or enhancement of wildlife, cultural, paleontological, vegetation and water resources is emphasized. Public use is allowed where natural resources are not significantly impacted…

Designate the entire EIS area under the ORV management regulations as "Limited to Designated Roads". Allow public vehicle and mountain bike use on the designated roads…Close all public lands in that portion of the EIS area between Charleston Road and the Hereford area…, and all public lands within one-quarter mile of developed facilities to the discharge of firearms at anytime during the year…

Restrict campfires to designated locations…

Do not allow trapping in the EIS area except in cases that are determined in consultation with APHIS or AGFD for administrative purposes…

Provide for the reintroduction of native wildlife species, including Threatened and Endangered species. Use habitat improvements to optimize habitat availability…

Use prescribed fires to improve terrestrial habitat. Develop ponds and marshes for aquatic and terrestrial wildlife…

Plant native trees (seedlings and poles) along the riparian corridor and other areas where desirable to enhance wildlife habitat…

Consider plans for the removal of exotic fish from existing ponds in cooperation with the AGFD…

Maintain and enhance the vegetation communities in the EIS area…

Maintain and enhance the soils/watershed resources of the EIS area to reduce future soil erosion…

Remove the dikes or berms along the east and west sides of the abandoned farm fields and allow preexisting drainages to re-establish…

Maintain and enhance the soils/watershed resources of the EIS area to reduce future soil erosion…

Control wildfires threatening natural resources and structures and reduce the acreage burned… Suppress wildfires on a high priority basis. All wildfires on or threatening to burn into the EIS area will receive full and sustained suppression action…

Reduce the potential for damage to resources and structures within the EIS area and to adjacent land owner's properties. Do this by using fire breaks, both natural and constructed, as determined by resource and fire objectives. Emphasize the following areas: the southwest portion of the EIS area, where extensive fuels are within one mile of private dwellings; in the vicinity of the El Paso Natural Gas pipeline; and near any structures within the property...

Preserve and enhance the scientific and potential public use values of paleontological resources to increase the knowledge of the San Pedro EIS area's natural history…

Check known sites periodically (every 3·5 years) and collect exposed fossils…Check high potential areas periodically…

Protect significant paleontological resources by controlling other resources and land uses through avoidance, mitigation and other measures…Collect significant fossils threatened by natural and human disturbance…

Keep mineral activities out of the sensitive portions of the EIS area…Prohibit gravel extraction operations in the riparian area…

Manage the EIS area's visual resources to preserve the outstanding scenery and to enhance areas impaired by human disturbance…

Preserve and enhance the identified special values of the EIS area…Recommend designation in the Safford RMP of the entire EIS area as the San Pedro Riparian ACEC [Areas of Critical Environmental Concern]. Accomplish management of the ACEC by applying the management guidelines of the *Preferred Alternative*.…Recommend the designation in the Safford RMP of three research natural areas (RNA) within this ACEC - St. David Cienega, 350 acres; San Pedro River, 1,340 acres; and San Rafael, 370 acres…Apply the following management to these areas: prohibit developments and new rights·of·way; prohibit overnight camping and campfires; encourage avoidance by recreation users; preserve and enhance vegetation communities; place signs where needed aJong the boundaries; control exotic vegetation; prohibit the introduction of non-native species; and preclude public vehicular access…"

These already approved objectives should be included in any updated RMP.

The 1993 San Pedro Riparian National Conservation Area Habitat Management Plan Planj prepared by the Bureau of Land Management (BLM) and the Arizona Game and Fish Department (AGFD) includes specific already approved management objectives:

"Objective 1: Riparian obligate Bird Habitat

Improve and increase the San Pedro cottonwood/willow riparian community from 2,930 acres to 3,142 acres to increase riparian obligate bird numbers by 7% and increase densities by 3% by 2005.

Objective 2: Aquatic Habitat Improvement

Increase aquatic habitat diversity, attain streambank cover of 70%, and reduce streambank soil alteration to lengthen the period of higher base flows by 2005.

Objective 3: Restoration of Native Floodplain Habitat

Restore 2,000 acres of fallow fields to attain a desired native plant community of mixed mesquite-mixed scrub and sacaton-mixed scrub by 1998. Improve habitat quality for native bird, mammal, and reptile species.

Objective 4: Special Status Raptors

Increase breeding use of NCA to 20 pairs of gray hawks and 5 pairs of Swainson's hawks by 2020.

Objective 5: Re-establishment of Extirpated Species

Improve the biological diversity of the NCA b y following standard procedures to re-establish extirpated plant, bird, mammal, and fish species by 2000.

Objective 6: Wildlife Water Development

Improve upland water sources to improve big game and upland game distribution by 1997.

Objective 7: Wetland Improvement

Manage existing wetland habitat at four locations for a desired aquatic wetland plant community containing beneficial aquatic plants by 1999."

These already approved objectives should be included in any updated RMP.

In addition to continuing the above already approved and committed actions, we suggest:

- No cattle grazing with the SPRNCA. Better vigilance for and removal of trespass cattle.
- Participation in the administrative process in all federal and state grazing allotments in the proximity of SPRNCA to prevent the erosion and increased sedimentation resulting from the nearby grazing.
- Oppose continued attempts by Department of Homeland Security to destroy SPRNCA values. This should include prohibition of the proposed all-weather roads.
- Monitoring of beaver as already committed.
- Continued protection for and promotion towards designation of the San Pedro as Wild and Scenic.
- An explanation for the necessity to create a new RMP.

Thank you for this opportunity to comment. Please keep us apprised of any new developments regarding this RMP process. Our contact information includes; MAIL: Dr. Robin Silver, Center for Biological Diversity, PO Box 1178, Flagstaff, AZ 86002; PHONE: (602) 799-3275; or EMAIL: rsilver@biologicaldiversity.org.

Sincerely,

Robin Silver, M.D.
Co-Founder and Board Member

To: Bureau of Land Management staff
Subject: Public input on SPRNCA Resource Management Plan

We appreciate the opportunity to participate in the process of updating the Bureau of Land Management's Resource Management Plan for the San Pedro Riparian National Conservation Area. As environmental educators, we have the privilege of sharing our love for the San Pedro River with visitors from around the country who are amazed and gratified to learn that one of their public lands agencies protects and manages this spectacular oasis in the desert.

The Southeastern Arizona Bird Observatory is a non-profit conservation and educational organization with over 400 members and donors from around the country, dedicated to the conservation of the birds of southeastern Arizona, their habitats and the diversity of species that share those habitats through research, monitoring and public education. SABO has a long history of involvement on the San Pedro Riparian National Conservation Area and has had a Memorandum of Understanding with the Bureau of Land Management since 1996. We have been conducting guided bird walks and hummingbird banding research and education on the river for 18 years.

Over the last 18 years, our hummingbird monitoring project has banded over 8000 hummingbirds of 11 species and documented the importance of the San Pedro River to these charismatic and widely misunderstood birds. Our banding data are submitted to the Bird Banding Laboratory, a federal agency, and are available to government agencies and fellow researchers. We have documented the use of the river for multiple nesting cycles in the same year for the most common species, the Black-chinned Hummingbird, and also documented nesting on the river for the uncommon Broad-billed Hummingbird and rare Violet-crowned Hummingbird (ranked as a Wildlife Species of Concern by the Arizona Game and Fish Department). Individuals banded in our study have set longevity records, including a female Black-chinned Hummingbird banded at the San Pedro House and recaptured there nine years later, and a male banded at the same site in 2000 and recaptured by another hummingbird researcher in Montana in 2009. The latter record also demonstrated the importance of the San Pedro River as a migratory corridor to birds nesting throughout western North America. Data collected on pollen deposits, fat loads, and ectoparasite populations document the importance of the river as a stopover refueling area for southbound migrants and a refuge from drought, fire, and other environmental hardships. Only a public lands site can support such long-term research, which can provide information about the effects of management practices as well as climate change and other landscape-scale phenomena.

Data and photographs taken during the study have contributed greatly to advancing our understanding of hummingbird identification through SABO's educational efforts and publication of *A Field Guide to Hummingbirds of North America* (Peterson Field Guide Series 2002), written by SABO director Sheri L. Williamson. Our banding sessions at the San Pedro House, which are open to the public and free of charge, have provided a valuable educational experience for over 10,000 visitors to SPRNCA. Our bird walks, offered twice a week during spring migration, provide opportunities for the public to view one of the great wildlife spectacles of the continent, the stream of neotropical migrant birds utilizing the shelter food and water provided by the riparian corridor. Thousands of walk participants from across the U.S and the world have marveled at the abundance and diversity of life supported by our river. Again,

only a public lands site can support public outreach on such a large scale.

We have been impressed with the management of SPRNCA by the Bureau of Land Management and would like to see no major changes in that management. Even in a state with an abundance of public lands, a management area that limits the disturbance of mechanized vehicles and grazing, where the preservation and enhancement of natural habitats are paramount, is a rare thing. The San Pedro River is a precious and imperiled resource that belongs to and benefits all the people of the United States and should be protected and managed as such. It also enhances the local quality of life and economy. In addition to providing recreational opportunities for local residents, SPRNCA is one of the crown jewels in the $30 million nature-based tourism industry in Cochise County. Some may see the lack of development and exploitation of the habitat as a missed opportunity, but that is exactly why the San Pedro Riparian National Conservation Area is so special.

Our primary recommendation is that the SPRNCA be managed in such a way as to maintain a healthy, functioning riparian ecosystem. Fundamental to this purpose is the protection of perennial flow. To this end, we support the vigorous defense of the BLM's reserved water rights to protect the aquifer. This also requires the consideration of the entire watershed and active engagement beyond the boundaries of the conservation area. Restoration and management, including reintroduction of native species, control of invasive species, prescribed fire, and monitoring of habitats and wildlife, should continue based on best the available science. BLM has done an excellent job of providing recreational access, protecting and restoring cultural and historic resources, and working with partner organizations to provide educational and recreational opportunities, and we hope this will also continue.

Thank you for the opportunity for input on the RMP process. We have greatly valued our relationship with BLM through the years and look forward to working with the agency in the future.

Sheri L. Williamson, Director

Tom Wood, Director

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The Nature Conservancy
Protecting nature. Preserving life.™

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September 26, 2013

BLM Tucson Field Office
3201 E. Universal Way
Tucson, AZ 85756
Attn: Amy Markstein

Re: Scoping comments for San Pedro Riparian National Conservation Area Resource Management Plan

The Nature Conservancy appreciates the opportunity to comment on the Resource Management Plan for the San Pedro Riparian National Conservation Area (SPRNCA), during the initial scoping period. The San Pedro River watershed has been a priority conservation area for the Arizona Chapter of The Nature Conservancy for over 25 years. Our organization has made significant conservation investments, in collaboration with a wide array of conservation partners, along the entire length of the river in both the U.S., and Mexico, as well as many of its major tributaries.

In this letter, we present comments addressing the following broad areas: adaptive management of land and water resources, the need to leverage resources through effective partnerships, and delineation of the appropriate geographic scope for the RMP.

Adaptive Management of Lands

TNC supports land management plans whose goals are based on desired resource conditions, with the adjustment of allowable uses to meet those resource condition goals. Successful implementation of such adaptive management plans relies on tracking the ongoing status and trend of resource conditions, and the feedback of results into subsequent management decisions. The involvement of stakeholders in this ongoing "monitoring toward effective management" process, and the discussion and understanding of the implications of this information is imperative. Utilization of strong science to guide management can only effectively occur when the primary stakeholders involved are fully engaged.

BLM has established an effective model for such a process at Las Cienegas National Conservation Area. We propose that the SPRNCA RMP establish a similar mechanism for the feedback of relevant information regarding resource condition back into decision-making in an open and transparent forum, by establishing a stakeholder group that participates in periodic adaptive management planning meetings. Such planning meetings allow for the reporting of monitoring results of resource condition, evaluating the implications of this information, and helping BLM to produce periodic reports that allow the agency to respond to changing conditions. Subsequently, it will be imperative to set up mechanisms that can ensure that the decisions made are actually implemented (e.g., monitoring is conducted, and used to document trends relative to desired conditions, the subsequent decisions that are designed to achieve those conditions are actually carried through). We offer our services as a partner in the development and application of such an adaptive management regime.

The Conservancy is well aware that there is strong public interest in many aspects of the management of the SPRNCA's lands and water, therefore engagement of stakeholders is even more critical there than in many other locations. We suggest that a collaborative process populate the following details of the following watershed and rangeland management decisions:

- Desired conditions for watersheds and rangelands.
    - Use existing condition and trend data for uplands, including both active grazing allotments and areas not permitted for grazing, to describe the affected environment in the RMP NEPA document (for example, percent bare ground over time in grasslands). Descriptions of vegetation, soils, and erosion dynamics are essential.
    - Use the decision key from the DOI Adaptive Management Technical Guide, to determine which decisions can most benefit from adaptive management.
    - Consider the potential impacts of intensive and extended drought. Analyze management options to prepare for droughts, and describe contingency plans for responding to drought.

- Specific watersheds, soils, and areas of ecological importance needing protection.
    - The RMP should address management and restoration of upland condition throughout the SPRNCA to benefit of riparian health, but especially in the contributing watersheds of the NRST "functional-at-risk" reaches.

- Actions and use restrictions to achieve desired vegetative conditions.
    - We encourage proactive fire planning for both uplands and the riparian woodland, including the implementation of prescribed burns to decrease woody species in grasslands. The US Fish & Wildlife Service is working to develop

guidelines for riparian fire management in the desert Southwest, and should probably be engaged in this planning process.

- BLM should continue to support the establishment of a stable beaver population within the SPRNCA as an important part of the ecosystem, along with monitoring their population size and effects on vegetation and other wildlife.
- Abandoned agricultural fields have unique restoration needs and opportunities that we would like to see evaluated. There is a need to restore natural sheetflows across these fields as a key part of restoring their ecological functions and native vegetation by removing upland berms. Also allow for ephemeral flows and sediment transport from the tributary drainages where fields are blocked by berms, dikes and diversions. Describe desired conditions for these areas and consider additional restoration tools such as erosion control, prescribed fire, re-seeding, and prescribed grazing as appropriate to meet desired conditions for each site.
- We encourage continued prohibition of off-road driving in SPRNCA, along with improved barriers and signage. Particular attention should be paid to gaps in fencing around the north end.

- Measures to ensure healthy riparian and upland systems. These measures should include clear indicators of how well resource condition goals are getting met, should be practical to collect and interpret, and need to be most directly relevant to informing key management decisions.
    - For assessment of riparian condition we recommend the work of Juliet Stromberg and colleagues in the USGS Scientific Investigations Report 2005-5163. Unlike the PFC assessment, Stromberg's study was quantitative, repeatable, and extensively peer-reviewed. We recommend use of Stromberg's data as a baseline for status of the vegetation community, and her methods for repeat monitoring of status and trend.
    - Existing and proposed vegetation and ecological monitoring programs should be analyzed for their statistical power to detect trends, and inefficient programs should be modified or abandoned. Monitoring plans should include staff time to analyze data and report results on a regular basis to partners and stakeholders, including collaborative stakeholder forum(s).

- Delineation of lands available and not available for grazing.
    - Use a collaborative process to set incentives, and create ongoing rewards for permitees who succeed at meeting range condition objectives, and, conversely, consistent deterrents for trespass grazers.

- Amount of forage available on grazing lands.
    - Utilize an adaptive management approach for uplands to modify rotations and stocking rates in response to available forage, as opposed to establishing less flexible standards, in order to sustain or increase basal area of native grasses and protective cover.

- Plan for management of rangelands for productivity and sustainability.
    - Analyze ways to improve upland vegetation conditions using the most effective combination of tools, including fire, mechanical treatment, and prescribed grazing.
    - Unmanaged trespass grazing in SPRNCA is problematic for riparian habitat conditions. The RMP should address ways to improve controls on trespass grazing, especially in the riparian zone. We suggest identifying areas where it is the greatest problem, evaluate strategies to address the issue, and identify ways to monitor effectiveness of those strategies.

Adaptive Management for Water Resources

The consistent collection of long-term hydrologic data provides an essential foundation for understanding the complex hydrologic system associated with the San Pedro River and its associated groundwater aquifer, and for the effective adaptive management of these water resources over the long-term. The Upper San Pedro Partnership has provided a venue for collaboration and integration of regional hydrologic monitoring efforts within the Sierra Vista Subwatershed since 1998. The primary agencies that have made contributions to these monitoring programs, in addition to the BLM, include the USGS, ARS, ADWR, Cochise County, and DoD. The Nature Conservancy has also served as the lead coordinator of the wet/dry mapping project each year to quantify the length of perennial surfaceflows within the entire bi-national San Pedro River Basin.

- The BLM should continue to collaborate with the agencies listed above, toward a regional hydrologic monitoring program, and evaluate and prioritize current and potential monitoring activities, focusing on predictive indicators, including groundwater monitoring beyond the SPRNCA boundaries, to detect regional trends.

- As additional groundwater management measures are implemented, it will be especially important to determine their effectiveness and performance through hydrologic monitoring, including assessment of aquifer recharge facilities.

- Desired future conditions in terms of water quantity should be clarified as part of the RMP, so that ongoing collaborative regional water management efforts, such as aquifer

recharge projects, can contribute toward these specific goals. The water needs of the cottonwood-willow, mesquite, and sacaton riparian communities in the SPRNCA have been well documented in the USGS Scientific Investigations Report 2005-5163.

- Both existing condition and trend data should be used to characterize hydrology, and to describe the affected environment in the RMP NEPA document. We recommend BLM utilize the suite of indicators from the USGS report on sustainable yield of groundwater expected to be published by the end of 2013 for their hydrologic monitoring framework. This report draws on the collaborative interagency hydrologic monitoring efforts over the past 13 years in the Sierra Vista Subwatershed.

- Existing and proposed hydrologic monitoring programs should be analyzed for their statistical power to detect trends, and ability to anticipate any subsequent adverse impacts to resources, and inefficient programs should be modified or abandoned. Monitoring plans should include staff time to analyze data and report results on a regular basis to partners and stakeholders, including the Upper San Pedro Partnership.

- Mechanisms to ensure that consistent BLM staff resources are available to meet these ongoing hydrological monitoring needs are important. There has been a lack of adequate staff to consistently fulfill these functions in the past. An analysis of staffing needs and options to ensure that monitoring and management needs are met, regardless of fluctuations in annual budgets, will be essential.

Leveraging Resources Through Effective Partnerships

A number of partnership efforts have made tremendous progress over the years along the Upper San Pedro River. However, for these partnerships to best support BLM's management of the SPRNCA, additional BLM staff engagement will be critical to ensure that these efforts complement and support those of BLM. Additional opportunities for using creative partnerships to solve problems, stretch budgets, and deliver benefits to multiple parties also exist. Specifically:

- A collaborative effort between Fort Huachuca, The Nature Conservancy, and Cochise County, has recently resulted in the acquisition of 5,000 acres of lands near or adjacent to the SPRNCA's boundaries along 25 miles of the river within the Sierra Vista Subwatershed. These parcels were selected for their ability to sustain or enhance the river's baseflows through the development of aquifer recharge facilities, based on previous modeling simulations using the USGS groundwater model. Purchase of the land was funded primarily by the U.S. Army Compatible Use (ACUB) Program, and the site assessments and engineering designs for the recharge facilities has initially been funded

through the Walton Family Foundation, Cochise County, and the Upper San Pedro Partnership. The transfer of these parcels to Cochise County for the long-term operation of recharge facilities is planned. However, in the future, it will be essential that the BLM also engages as an active and supportive player in the establishment of these recharge facilities to protect and enhance the river's precious flows, especially in terms of helping partners secure the required funding for the construction of recharge facilities.

- Increased BLM engagement and support are needed for the ongoing collaborative efforts of the Upper San Pedro Partnership, involving 22 local, state, and federal member agencies and organizations, to continue to develop an integrated approach toward regional water management across the Sierra Vista Subwatershed that will help to sustain river flows within the SPRNCA.

- The BLM should explore additional ways to engage the technical resources and expertise of other agencies within the Upper San Pedro Partnership for the SPRNCA in the future, including hydrological monitoring activities by the U.S. Geological Survey, ARS, and ADWR; and, the potential for engineering design assistance for aquifer recharge facilities by the U.S. Bureau of Reclamation.

- The BLM should continue to provide logistical support for the annual citizen science wet/dry mapping project within the SPRNCA, to track the long-term trends in spatial surfacewater patterns during the low flow periods in early summer.

- The BLM should provide additional support for the efforts of the Friends of San Pedro, enabling them to better inform the public about water issues, and contribute toward hydrologic monitoring activities.

- The BLM should explore opportunities to share staff or other resources with the USFS or local fire districts to implement prescribed fires that accomplish ecological restoration goals, reduce hazardous fuel loads at wildland/urban interface, and provide training opportunities.

- As was previously described under adaptive land management, a new collaborative stakeholder forum should be explored to address ongoing land management and monitoring issues for the SPRNCA.

- The BLM should explore use of collaborative or contract arrangements with non-federal partners in the region as a way to optimize budgets. These could include local private or public partners for upland vegetation management.

Geographic scope for the RMP

The SPRNCA was designated by Congress in 1988 as the nation's first Riparian National Conservation Area, and the geographic boundaries of the SPRNCA that encompass its 56,431 acres are defined by land survey. However, BLM lands located outside the SPRNCA boundaries should be analyzed for their current or potential contributions to resource values and management of SPRNCA. These include their importance as tributary surface water drainages, contributors of excess sediment, value as wildlife movement corridors, potential for hydrologic monitoring locations or groundwater recharge sites, and value as buffer areas against incompatible land uses.

Further, the surrounding groundwater aquifer is inextricably linked to the riparian and aquatic resources within the SPRNCA, and that same aquifer also provides water for the consumptive water uses that sustain regional communities and economies. The scope of the RMP needs to address the adaptive management of groundwater and surfacewater beyond the terrestrial boundaries of the SPRNCA, working closely with local partners, to effectively address the needs of the larger hydrologic system over the long-term.

Conclusion

Effective land and water management to sustain the San Pedro riparian corridor, and its surrounding watershed, presents a significant challenge during this time of limited agency budgets, extended drought, and increasing demands and multiple uses of both land and water. However, the SPRNCA enjoys a broad base of support by a wide array of local, state and federal agencies, as well as private non-profit organizations, foundations, and volunteers. We appreciate the interactive approach used by BLM during this scoping process. In the future, we look forward to a more integrated approach across the public and private sector for the long-term management of the SPRNCA. By working more closely together additional resources can be leveraged and better aligned with one another toward a common vision of success for this very special river system, which will be more sustainable over the long-term. We look forward to working collaboratively with BLM staff and other stakeholders to help fill out the details of the Resource Management Plan.

Sincerely,

Holly Richter

Holly E. Richter, Ph.D.
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Working to protect and restore Western Watersheds and Wildlife

September 17, 2013

Bureau of Land Management
Tucson Field Office
3201 East Universal Way
Tucson, Arizona 85756
Submitted via hard copy and email blm_az_tfo_sprnca_rmp@blm.gov

Scoping comments for the Resource Management Plan and associated Environmental Impact Statement for the San Pedro Riparian National Conservation Area

To Whom It May Concern:

The following scoping comments on the forthcoming Resource Management Plan (RMP) and Environmental Impact Statement (EIS) for the San Pedro Riparian National Conservation Area (SPRNCA) are submitted on behalf of the staff and members of Western Watersheds Project, a conservation organization committed to restoring and protecting western watersheds for wildlife.

There are several areas that are of concern to Western Watersheds Project members in the planning, foremost among these the ways that the Bureau of Land Management (BLM) addresses the direct and indirect impacts of livestock grazing within the boundaries of the SPRNCA and within the watershed. Because the health of the SPRNCA and the river itself is integrally tied to the health of the watershed in which it is situated, BLM should consider the planning boundaries for the SPRNCA plan to include the entire Upper San Pedro River watershed south of Interstate 10, since management of these public lands affects the hydrology and health of the river system. Limiting the planning area boundary to the NCA improperly limits the extent to which BLM could be conserving, protecting, and enhancing "the riparian area and the aquatic, wildlife, archeological, paleotonological, scientific, cultural, educational, and recreational resources of the conservation area." Pub. L. 100-696. Each BLM-administered parcel in the watershed should be considered a part of the whole picture towards managing the SPRNCA. The recent Biological Opinion for the Gila District emphasizes the necessity of managing upland health within the watershed for the benefit of riparian obligate species.

Effects of livestock grazing within the watershed include impacts to the water quality and water quantity issues that the BLM must confront in the SPRNCA. For example, the BLM continues to allow unlimited and unknown quantities of surface and groundwater to be retained in stockponds, diverted to stock tanks, pumped, muddied, contaminated, evaporated, and otherwise converted from its ecological role in sustaining the San Pedro River and the associated riparian and xeroriparian areas into water for livestock. Because the BLM is tasked with conserving, protecting, and enhancing the resources of the SPRNCA, it must consider whether permitting impacts to the critical ecological element – water – in the uplands of the watershed is a benefit to the conservation and protection of the river.

In addition to livestock grazing within the watershed, BLM continues to authorize grazing in the SPRNCA. There are currently four active allotments in the SPRNCA: Three Brothers (5232), Brunchow Hill (5251),

Babocomari (5208), and Lucky Hills (5252). Despite having never analyzed the environmental impacts of allowing livestock grazing to occur on these lands (since they were acquired from the Arizona State Land Department after the previous RMP/EIS was written), the BLM has continued to allow this use to occur. Using a congressional rider, the agency has been renewing the grazing permits of the SPRNCA.

The BLM apparently began using the Rescissions Act to renew the permits on the SPRNCA in 2002 on the Brunchow Hill allotment (7 cattle from 3/1/2002 to 2/28/2012), under Section 114 of the Department of Interior Appropriations Act to 1976. On the Three Brothers allotment, the BLM reissued the expired grazing permit shortly after we submitted comments (68 cattle from 7/30/2009 until 2/28/2016; the unusual term length permits indicative of a lapsed authorization) using the 2004 Appropriations Act. The Babocomari permit was renewed from 3/1/2010 to 2/28/2020 (15 cattle) using Section 416, P.L. 111-88, and Lucky Hills was renewed (90 cattle from 3/1/2009 to 2/28/2019) under Section 150 of P.L. 110-329. In each case, the permit states that the lease retains the mandatory terms and conditions as the expiring lease, but none explicitly identifies what those are and FOIA requests thus far have not revealed the original leases when the permits transferred from ASLD to BLM.

The BLM initiated Rangeland Health Evaluations (RHE) on the SPRNCA allotments in anticipation of NEPA analyses to reissue permits. Western Watersheds Project submitted comments on the Brunchow Hill and Three Brothers allotments in May 2009 and on the Lucky Hills allotment in June 2009. In each case, we reminded the BLM that it had no authority to renew the permits under the existing management plan; BLM simply renewed the permit without analysis. The RHEs for the three allotments provide extremely limited information on which to base management decisions. For example:

- The Brunchow Hill allotment RHE contains no quantitative monitoring data;
- The BLM's Proper Functioning Condition rates the portion of the river in the Brunchow allotment as functional-at-risk with a downward trend due, in part, to livestock grazing. Despite this, the allotment was found to be meeting Standard #2.

The recent Biological Opinion for the Gila District requires the BLM to work with private landowners in the Brunchow Hill allotment to exclude livestock from BLM-administered lands in the allotment within the riparian zone of the RNCA for the benefit of federally listed species' habitat. "Work with private landowners" is not defined, but it should be clarified in the RMP/EIS that BLM has the authority to exclude livestock from federal lands with or without the neighbors consent.

There is repeated trespass livestock grazing within the SPRNCA. Because of this, it is unknown how many livestock are affected SPRNCA riparian and aquatic resources, but it is certain impacts are occurring. There are continuous and consistent report that livestock are in the river and it is unclear if these are permitted livestock, unauthorized use by permitted livestock, or trespass livestock. The National Riparian Service Team (NRST) conducted SPRNCA-wide riparian surveys in April 2012 and presented its findings in the *Riparian Conditions along the San Pedro River: Proper Functioning Condition (PFC) Riparian Assessment Report*. The NRST report identified *unauthorized* livestock grazing as having a detrimental impact on the riparian health of the SPRNCA in two reaches of the river. The NRST did not address the effects of *authorized* livestock grazing, though the locations of the nonfunctioning reaches overlap with authorized livestock allotments in the vicinity of the Brunchow Hill allotment. The forthcoming EIS should take a hard look at the evidence provided by the NRST and incorporate management changes to livestock grazing allotments that would <u>conserve, protect, and enhance</u> the SPRNCA values.

Secretarial Order 3308 also requires the incorporation of science into the decision-making process for the NLCS, stating, "[S]cience shall be integrated into management decisions concerning NLCS components in order to enhance land and resource stewardship and promote greater understanding of lands and resources through research and education." BLM's 15-Year Strategy for the Conservation Lands reiterates this commitment to science by stating that BLM will "provide a scientific foundation for decision-making." Unless BLM can

scrounge up some range "science" that purports to show that livestock grazing conserves, protects, and enhances the aquatic, wildlife, archeological, paleontological, scientific, cultural, educational, and recreational resources of the public lands, it cannot consider introducing or continuing to allow livestock grazing in the SPRNCA. Instead, the vast majority of site-specific science from the SPRNCA shows the benefit of livestock exclusion on ecological and biological health.

The SPRNCA is not to be managed primarily for multiple uses. FLPMA contains an exception to this overarching prescription for BLM lands: Multiple-use management applies, except "…where a tract of such public land has been dedicated to specific uses according to any other provisions of law it shall be managed in accordance with such law" (FLPMA, as amended, Public Law No. 94-579, Title III, Sec. 302(a)). The BLM should not analyze alternatives or proposals for allowing "multiple uses" that are not scientifically and demonstrably supportive of the primary reasons the SPRNCA was specially designated. The range of alternatives should be constrained to those that meet the general direction of the land's designation, and management direction in the watershed should be geared towards *enhancing* SPRNCA conditions.

There is abundant scientific evidence of the value of livestock exclusion in the SPRNCA, including beneficial impacts to the vegetation, avian communities, and regional economy. There is no evidence that allowing livestock grazing to continue on these four allotments benefits anyone except the permittees. Whereas one of the permittees threatened in a recent public meeting, "Think twice before you cut [grazing] off [because the subsequent] changes will be catastrophic," and intimated that without the federal grazing permit, he would be forced to sell his private land to subdivisions which would drain the river, the BLM must not be "cowed" by such claims. Without a formal guarantee through land exchange or easement that the private lands will never be subdivided or groundwater withdrawn, the BLM gets nothing out of bowing to such threats. Private land tends to sell when the price is right or when the estate passes to a non-ranching interest. The BLM must look at the near-term management of the last free-flowing perennial river in the southwest and manage for the impacts it can control: livestock grazing affects to water quality and quantity, vegetation conditions, non-native weed infestations and invasions, flammability, wildlife habitat, and recreational and scenic enjoyment.

Moreover, the intensive management that is occurring on some of the allotments should be revealed in context of any monitoring data or overarching conclusions about grazing impacts. For example, the Babocomari allotment is under an intensive rotation/exclusion schedule. The expense and feasibility of implementing such programs for the remaining SPRNCA grazing allotments should be disclosed. The EIS/RMP should require that any future monitoring of grazing on the SPRNCA use weight-based utilization measurements and the planning should specify monitoring intervals that must be met or grazing will be suspended. Any estimate of forage tied to an Animal Unit Month (AUM) should provide a realistic cattle weight-to-forage ratio for consumption.

Any consideration of livestock grazing impacts must occur within the context of increasing aridity and temperatures in the southwest. The best climate models predict hotter and drier weather for the project area, and any anthropogenic impacts in the SPRNCA must be addressed as cumulative stressors on the plants, animals, and ecosystems found there.

Thank you for considering our scoping comments and issues identification. Please keep us apprised of all future planning efforts.

Sincerely,

Greta Anderson, Deputy Director
Western Watersheds Project

September 22, 2013

Huachuca Hiking Club
4024 S. Paiute Way
Sierra Vista, AZ 85650

Amy Markstein
BLM Tucson Field Office
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Tucson, AZ 85756

Re: Scoping Comments for San Pedro Riparian National Conservation Area (SPRNCA) Resource Management Plan (RMP)

Dear Amy:

On behalf of the Huachuca Hiking Club, I wish to provide scoping comments for consideration during the development of the SPRNCA RMP. The SPRNCA has been one of our favorite hiking destinations in the cooler months. We enjoy day hiking various portions of the San Pedro Trail system and have used the Fairbank picnic site for our annual potluck luncheon and hike in December. The SPRNCA is truly a great asset for a wide variety of outdoor enthusiasts.

We have attended most of the education and scoping forums that were conducted in recent months. These forums were very informative and helpful. Based on our perspective as hikers and recreational users, we are focusing our comments primarily on issues dealing with recreation, trails, and public access. While there has been great progress over the years in developing recreational opportunities in the SPRNCA, we believe that the RMP should consider options to improve public enjoyment of the area. By improving opportunities for public enjoyment, the BLM can help foster broader and stronger community support and appreciation for the SPRNCA.

Our comments and suggestions are as follows:

1. Trails. We strongly support the San Pedro Trail system and recommend its role and importance be highlighted in the RMP. It serves as a backbone for visitors to enjoy hiking and exploring various portions of the SPRNCA. We believe it should receive priority attention for continued maintenance and development. However, we would like to offer some ideas for enhancing trail opportunities.

a. Conceptual Trail from Fairbank to Schieffelin Monument (see map at enclosure 1). There is an abandoned railroad grade that goes from Fairbank to Tombstone. It could form the basis for a spur trail from Fairbank to Schieffelin Monument. This route is currently used informally by hikers but an improved trail would greatly enhance hiker safety and enjoyment. Perhaps a right-of-way could be acquired to use the old railroad grade outside of the SPRNCA boundary.

b. Conceptual Trail from Fairbank to and along the Babocomari River (see map at enclosure 2). There is an abandoned railroad grade that goes from Fairbank to and along the Babocomari River west of the San Pedro River. It could form the basis for a spur trail from Fairbank to and along the Babocomari River inside of the SPRNCA boundary. We note that the existing SPRNCA RMP includes in the Preferred Alternative a planned action to develop a trail along the Babocomari River using the old railroad grade. We believe this action should again be considered as the new RMP is developed.

c. Conceptual Trail from the City of Sierra Vista Environmental Operations Park (EOP) to the Murray Springs Trailhead (see map at enclosure 3). There is an abandoned railroad grade that goes west from the Murray Springs Trailhead to an area just north of the EOP. Perhaps a BLM and City of Sierra Vista partnership could examine the mutual benefit and feasibility of developing a connector trail between the EOP and Murray Springs Trailhead using the old railroad grade. We believe that ultimately the City of Sierra Vista will extend their multi-use path trail system to the EOP which would further enhance the benefit of this proposed connector trail.

d. Rail-to-Trail Conversion within the SPRNCA. We urge BLM to monitor the planned use of the north-south rail line within the SPRNCA and to seek a rail-to-trail conversion if and when the line is abandoned, or to file for interim trail use as the opportunity arises.

2. Campgrounds. We believe the BLM should consider developing one or more campgrounds within the SPRNCA to better accommodate visitors from outside the area. A developed campground could also provide a family friendly setting to help introduce youth to outdoor activities, including a camping venue for Boy and Girl Scout troops. Our club enjoys car camping at various locations in Arizona where hiking trails are located and we believe a developed campground would be very compatible with the recreational attractions within the SPRNCA. It should be noted that the existing SPRNCA RMP includes a planned action to develop a campground in the area around the San Pedro House. We believe that action should be considered again in this new RMP.

3. Back Country Byways. We believe the BLM should consider providing opportunities for the public to access interior portions of the SPRNCA via back country byways. As an example, visitors to the Gila Box Riparian National Conservation Area are able to enjoy touring the Black Hills Back Country Byway which is located in the uplands above the NCA. In the existing SPRNCA RMP, the

Preferred Alternative includes a planned action to rebuild the San Rafael del Valle road to use as a motorized interpretive route. We believe that action should be considered again in this new RMP. See map at enclosure 4 to view a conceptual route for this action. It would open up additional areas for hiking, birding, picnicking, etc. and would enhance visitor enjoyment of the area. In addition, there is a section of road that goes north-south along the east boundary of the SPRNCA between Charleston Road and Hwy 82 that should be considered for use as a back country byway (see map at enclosure 5). While this road is more primitive, it offers great views of the area and provides visitors a more remote experience for exploring the back country east of the riparian zone. It also offers improved opportunities for loop hikes in conjunction with the San Pedro Trail. We recommend this route be considered for designation as a back country byway or motorized interpretive route in the new RMP.

4. Planning Area. We understand that BLM is considering whether to expand the planning area beyond the SPRNCA boundary where it makes sense. As the health of the SPRNCA depends to some extent on conditions in the watershed, it would seem that the planning area should include nearby BLM lands in the watershed that are located both east and west of the SPRNCA. From a recreation perspective, we believe that BLM should consider including BLM lands located in the area between the SPRNCA and the town of Tombstone (both north and south of Charleston Road). See SPRNCA map section at enclosure 6. The reasons for this are twofold. One, there is good recreation potential for designating a multi-use trail system east of the SPRNCA for mountain bikes and off-highway vehicles (OHVs). This could provide some benefits in dispersing mountain bike and OHV use away from the riparian area. Secondly, there is an existing informal target shooting area on BLM land just east of the SPRNCA boundary and north of the Charleston Lead Mine. By including this BLM land in the planning area, BLM could consider designating an appropriate location for target shooting (where it is done now or possibly a more suitable location) outside of the SPRNCA boundary. We expect that target shooting will be prohibited within the SPRNCA, so having an appropriate location outside of the SPRNCA boundary could mitigate concerns over loss of this recreational use.

Thank you for the opportunity to provide these comments. We look forward to working with you as the RMP process continues. Please let us know if it would be helpful to meet with you and other members of the BLM planning team to discuss our suggestions in more depth.

Sincerely,
//signed//
Steve Scheumann
HHC President

Enclosures:
1. Map - Fairbank to Schieffelin Monument Trail
2. Map - Fairbank to Babocomari River Trail

3. Map - EOP to Murray Springs Trail
4. Map - San Rafael del Valle Road
5. Map - SPRNCA East Road
6. SPRNCA Map Section

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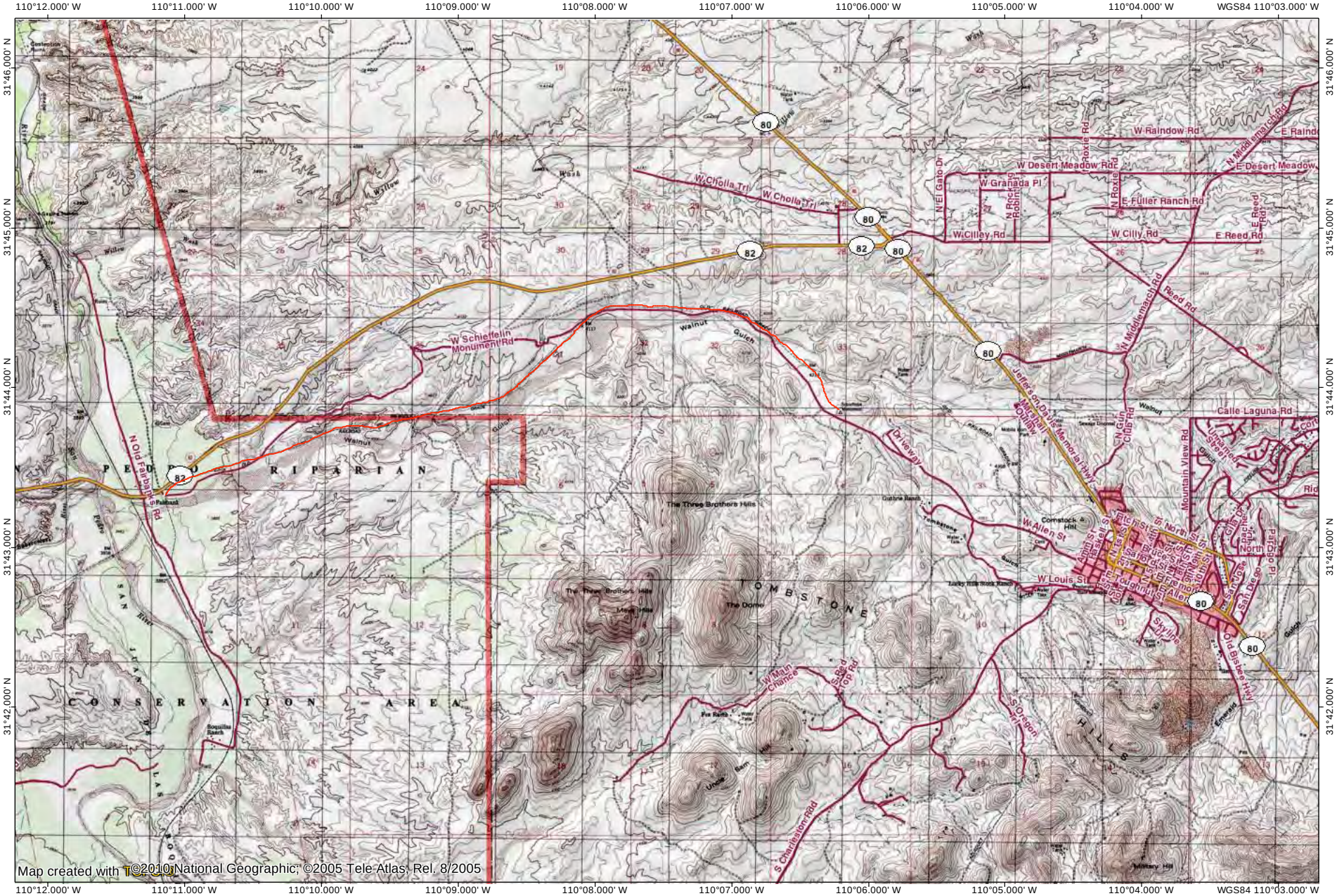

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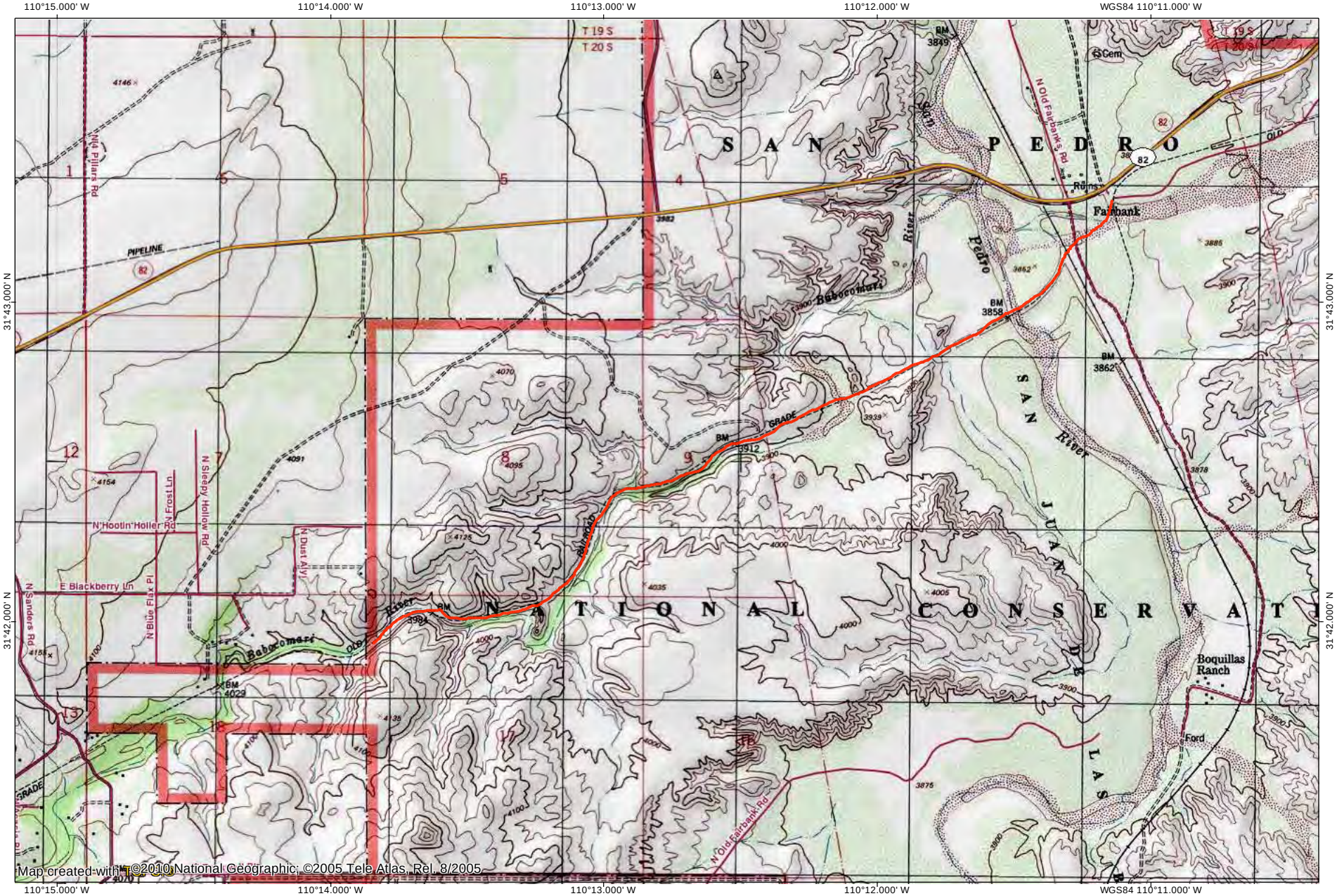

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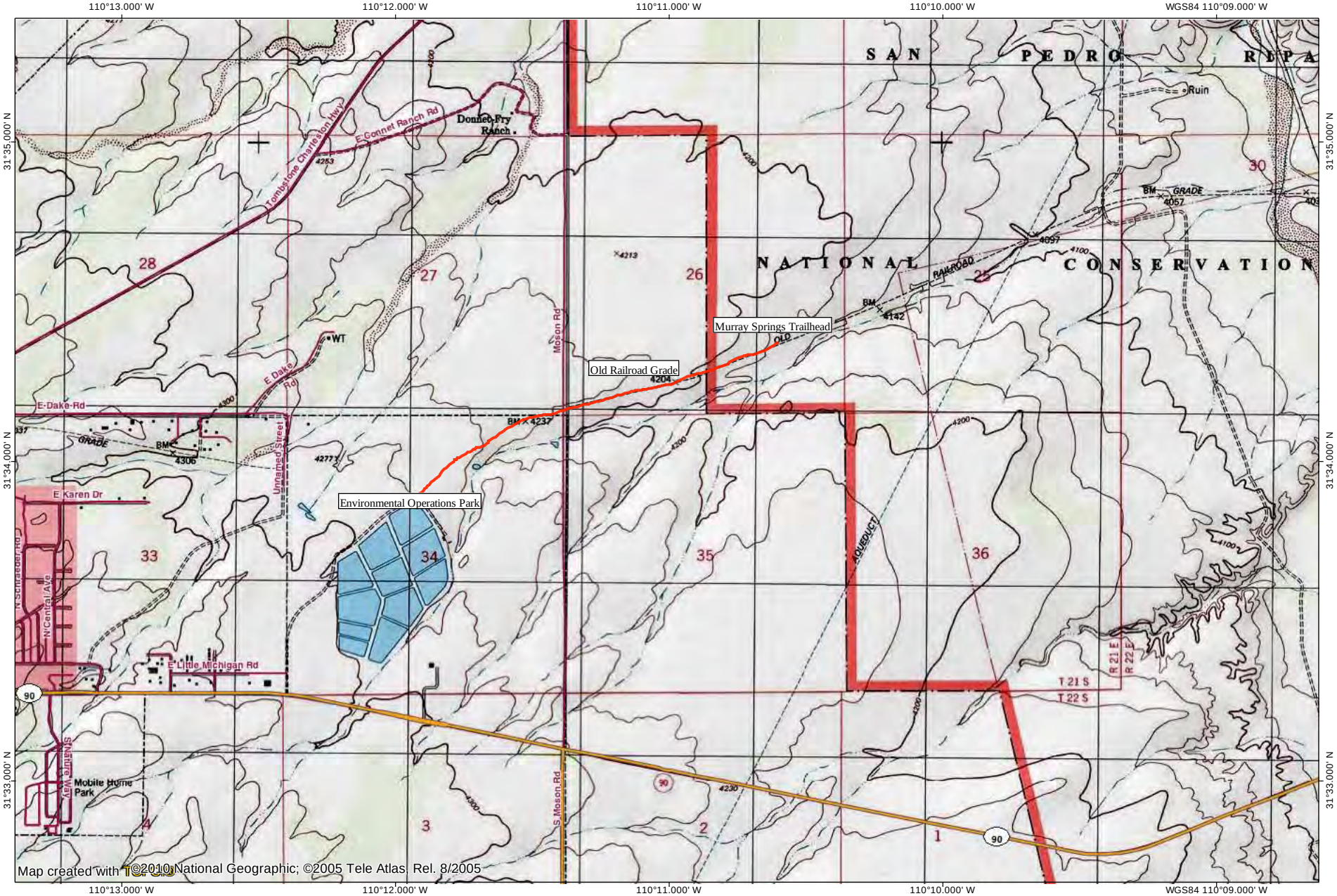

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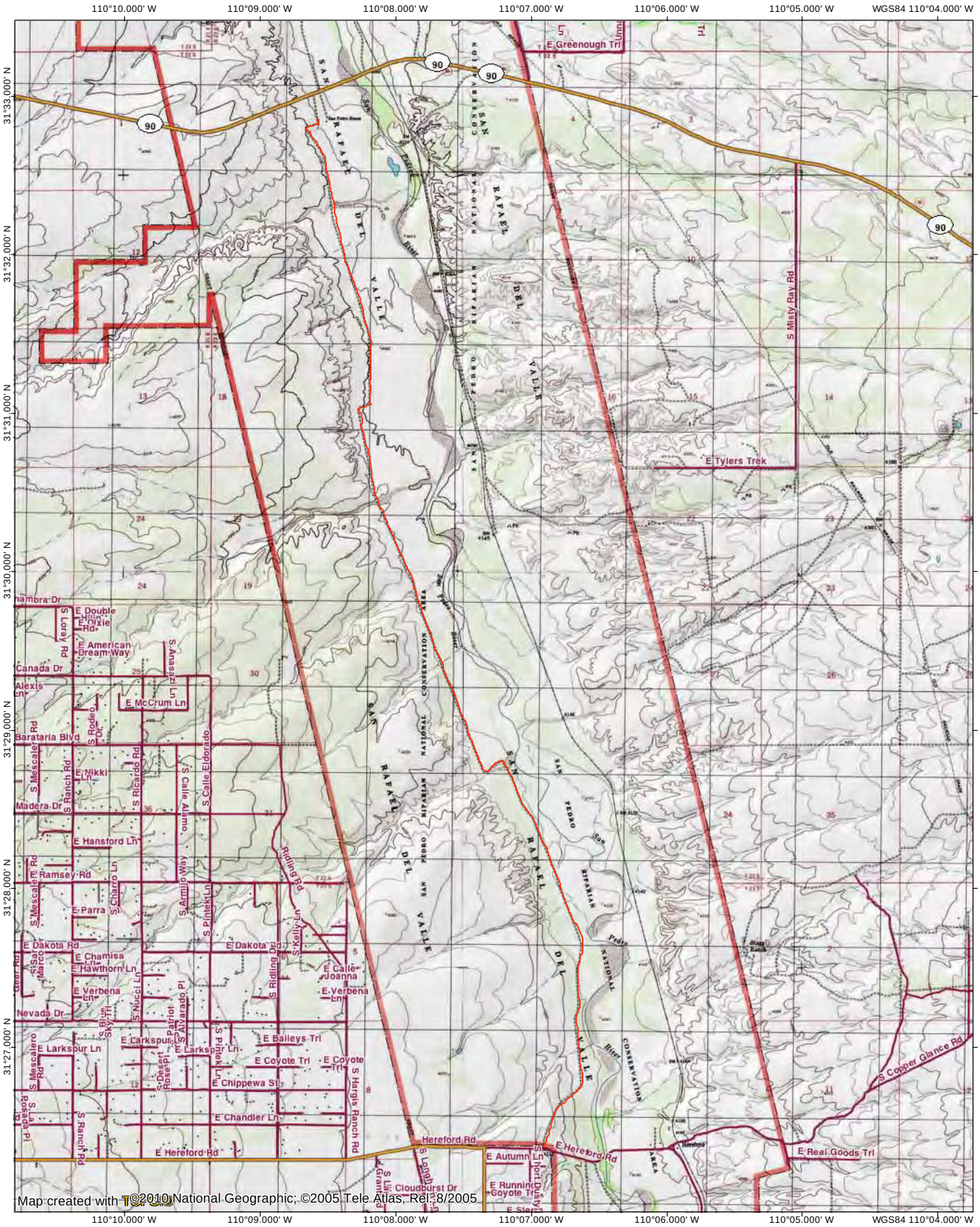

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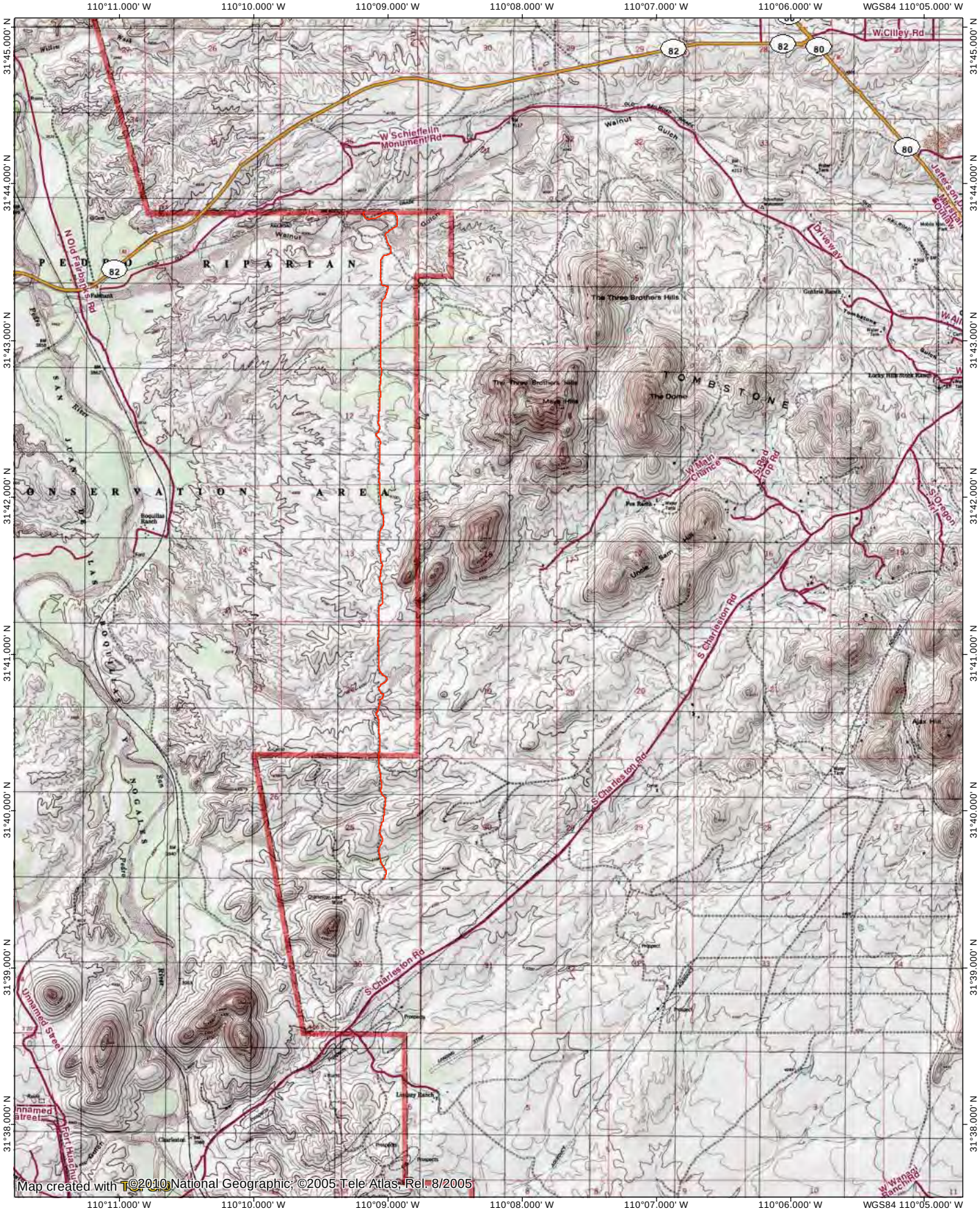

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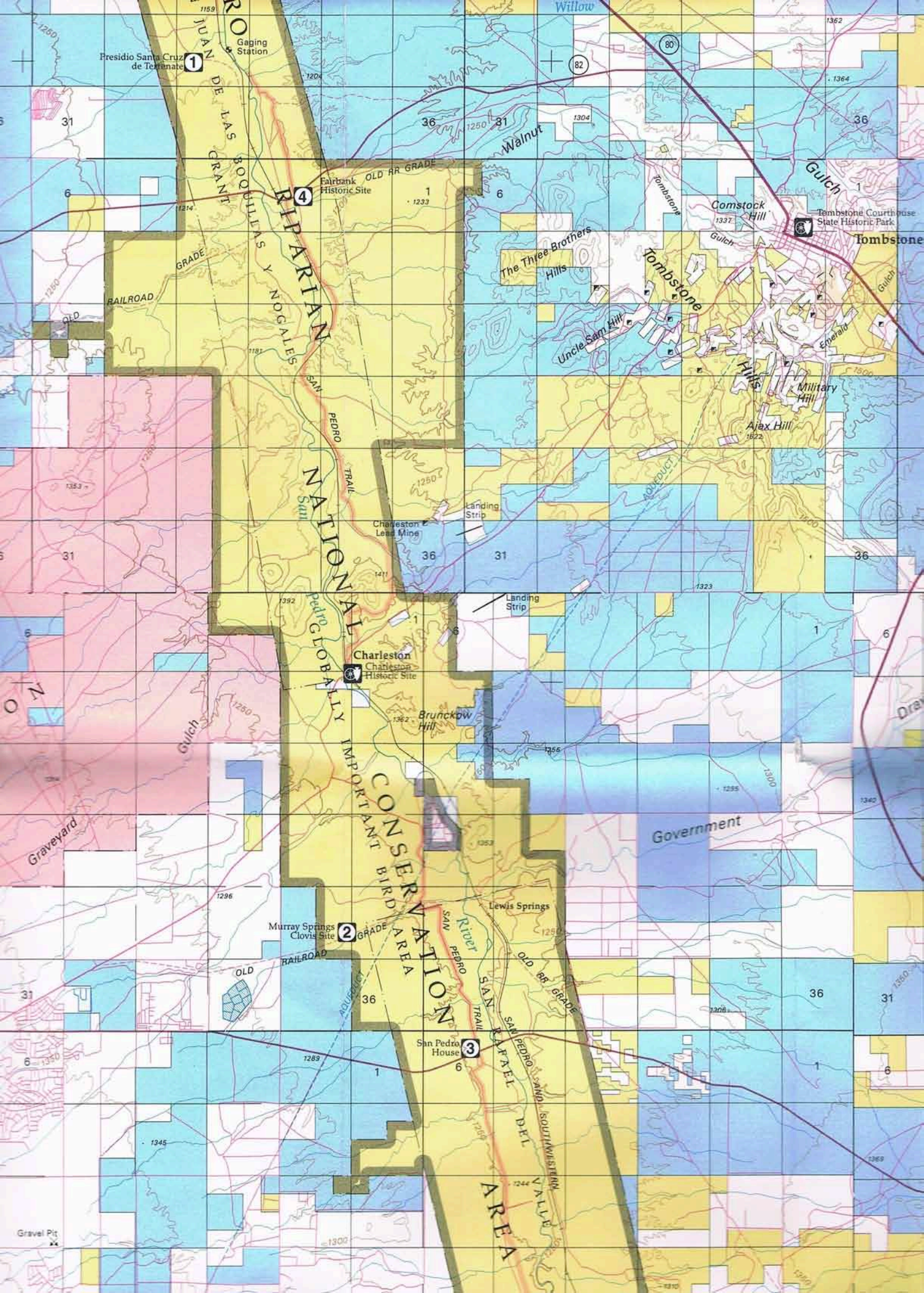
Presidio Santa Cruz de Terrenate
1
Gaging Station
JUAN DE LAS BOQUILLAS Y NOGALES GRANT
Fairbank Historic Site
4
OLD RR GRADE
RIPARIAN
NATIONAL
CONSERVATION
AREA
GLOBALLY IMPORTANT BIRD AREA
OLD RAILROAD GRADE
SAN PEDRO TRAIL
Willow
Walnut
Gulch
Tombstone
Comstock Hill
Tombstone Courthouse State Historic Park
Tombstone
The Three Brothers
Hills
Tombstone
Hills
Uncle Sam Hill
Emerald
Military Hill
Ajax Hill
AQUEDUCT
Landing Strip
Charleston Lead Mine
Landing Strip
Charleston
Charleston Historic Site
Brunckow Hill
Gulch
Graveyard
Government
Lewis Springs
Murray Springs Clovis Site
2
SAN PEDRO RIVER
SAN RAFAEL DEL VALLE
SAN PEDRO AND SOUTHWESTERN
San Pedro House
3
Gravel Pit

COMMUNITY WATERSHED ALLIANCE

September 26th, 2013

Scoping Comments for the San Pedro Riparian National Conservation Resource Management Plan ending September 30, 2013

For several years, the Community Watershed Alliance in Benson, Arizona, has worked diligently with varied parties to bring attention to two resources designated as Areas of Critical Environmental Concern within the northern portion of the SPRNCA: the San Pedro River Research Natural Area and the St. David Cienega (Appendix 13 pages 370-371, San Pedro River Riparian Management Plan and Environmental Impact Statement June 1989). These two areas are valuable resources and should retain their special designation.

The FY 2010 Manager's Annual Report references the Safford Resource Management Plan which in turn references these Research Natural Areas of Environmental Concern. The paragraph also added that management plans would be prepared for each area. (Safford Resource Management Plan, page 19). Management plans specific to these two areas have not been located. Little awareness of these resources and the continued deterioration of these two areas indicate the lack of a systematic management approach.

The National Riparian Service Team has visited both areas and has provided specific information that should be incorporated in the development of the new plan. The locale of the first Area of Critical Environmental Concern listed above is discussed in their Proper Function Condition (PFC) Riparian Assessment Report, San Pedro River, San Pedro National Conservation Area, Az. The team provides specifics for Reaches G-J of the river in the Benson Subwatershed. Historical records indicate four water sources and two springs within this northern portion. Although the Team identified Reaches G through J as primarily losing reaches, short intervals within Reach I (Critical Area - roughly 800 acres) contains obligate wetland and facultative wetland riparian plants that suggest "they might have the potential for perennial flow (Fogg et al.2012). This area known to the locals as Summers, is primarily wet during the June Wet-Dry data collection. This area has evidence of Grey Hawk nesting and may have the potential to be a significant or world-class birding site with reasonable access.

Although NRST has designated Reach J as NA because it is compromised by "diversion of surface water", we would be interested in reviewing official reports from the St. David Irrigation District since locals are aware that surface water has not been diverted for many years…...irrigation water is pumped from groundwater wells; hence the diversion dam has been functioning as a detention pond…..of merit to migrating water fowl. According to Arizona State BLM Land Health Standards, limiting factors beyond BLM's control does not justify "no action", in fact, it specifically states "if limiting factors are outside BLM's control, then coordination with other land owners and the public is necessary to address the issues". (Page 20) Conversations need to happen.

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NRST visited the second Area of Critical Environmental Concern, the St. David Cienega during their visit but details were not incorporated within their report mentioned earlier. Before reviewing the comments made by NRST, we are providing a brief review of key pages from the BLM Final Environmental Impact Statement to illustrate the scope of historical documentation regarding this incredible 350 acre resource that is a remnant of what much of the San Pedro River Valley used to look like. The marsh-like cienega has a vegetation type dominated by reeds and sedges, an encroaching mesquite and tamarisk bosque, a grassland area seasonally impacted by water, and small areas of Chihuahuan Desert scrub vegetation. See Appendix A.

Inventoried water sources within the cienega boundaries as of June 1989 indicate four usable/good water sources, with flow, ph, and conductivity noted. Management to present has not continued with specificity of documentation of these sources. See the attached map 3-2 which is missing from the document published on the web. See Appendix B

We are attaching 2 historical studies where the Saint David Cienega is specifically mentioned since inquiries to obtain BLM documentation has proven to be nonexistent or unavailable: Pollen Analysis 1994 and the Transformation of Sonoran Desert Wetlands following decrease of historic burning. Does fire have prescriptive benefit at a lesser frequency than used in the study versus the current strategy of stubbing out tamarisk and coating the stump with herbicide? New distressed growth sprouts randomly from the stumps frequently increasing the woody density. In the area where the tamarisk was removed, a bog has developed making access further into the Cienega extremely hazardous. As the water increases, it then drains to the west rather than into the Cienega itself.

Dr. Larry Stevens visited the site on 11/2/2012 and 11202012. to conduct a Springs Ecosystem Assessment Protocol (SEAP). NRST reviewed the SEAP data and stated that the data was sufficient to address 13 of the 20 attributes and processes of the PFC assessment. Seven remaining items were not addressed due to insufficient information or apparent "contradictions or ambiguities as to how to interpret the data". According to NRST, SEAP generated numbers or scores without adequate documenting site potential or interpreting the numbers within any ecological context. The NRST felt that both the short term and long term recommendations were appropriate but included a list of additional recommended work.

We strongly support the management recommendations made below:

MANAGEMENT RECOMMENDATIONS

SHORT TERM:

1. Block south end culvert to prevent further loss of flow, and to return flow to the cienega.
2. Develop BLM-stakeholder steering committee to evaluate options for conservation of SDC.
3. Explore funding opportunities for SDC conservation within and outside the BLM.
4. Install piezometers at upstream, mid-wetlands, and lower wetlands locations to monitor groundwater stage elevations.
5. Investigate the extend of groundwater withdrawal upslope of SDC on the Whetstone Mountains east bajada.
6. Map and evaluate extend of downcutting in the adjacent upland tributaries feeding groundwater into the cienega. Initiate a more thorough inventory of biological and socio-cultural-historical resources. See Photo Gallery Part 1.
7. Remove trespass livestock.
8. Assess hunting and other recreation impacts on the cienega.
9. Clarify water rights for SDC.

LONG TERM:

1. Use adaptive management approach to plan and implement longer-term management actions.
2. If short-term recommendation 5 indicates that downcutting is responsible for SDC dewatering, consider installing gabions (perhaps using the abundant, left over railroad bed gravels) to backfill incised channels with sediment.
3. Develop a SDC-specific groundwater model, informed by the piezometer data.
4. Expand biological inventory and monitoring of the site, with feedback to the community.
5. Expand the outreach program for SDC.

ADDITIONAL RECOMMENDED WORK:

1. Detailed mapping of the potential plant communities and wetland extend with a more detailed soil survey.
2. A geomorphic and hydrologic investigation of the channel stability and the surface-and groundwater response in the channel that drains south of SDC to the San Pedro River.
   determine if surface water or perched groundwater is diverted from the SDC.
   See Photo Gallery Part 2.

Additional Recommended Work Continued:

3. A geomorphic and hydrologic investigation of the effects of railroad beds, roads, berms, and pipeline corridors on surface-and ground-water flow to the SDC. See Photo Gallery 3
4. A geomorphic, soil, and hydrologic investigation of the incised channels west of the SDC to determine if surface water or perched groundwater is diverted from the SDC.
5. A geomorphic, soil, and hydrologic investigation of the channel (polygon G) that drains north of SDC to determine if it is capturing groundwater and dewatering the SDC. See Photo Gallery 4
6. A geohydrologic investigation to determine the source(s) of water for SDC – true cienega is groundwater dependent.

CWA requests BLM review the NRST Analysis or our following side by side review that summarizes NRST concerns regarding the information in the SEAP. All language is from NRST report. During this scoping period it is essential that BLM consider notable data gaps or problems with any data collected or its interpretation. We bring attention to the last column where NRST suggests additional actions /or data needed.

SEAP	NRST Relevant Comments	Suggested Action/ Needed Data
1. Makes visual estimates of ground cover and recording the data by species – makes good inventory	Absence of site map with location of transects or plots where vegetation data were collected limits ability to make broader inferences about the SDC and the distribution of plant communities.	Detailed mapping of the potential plant communities and wetland extent with a detailed soil survey. Would refine vegetation mapping and permit investigators to determine potential plant communities at the various polygons mapped in and around the SDC.
2. Collects enough information and provided adequate detail to answer 13 of 20 items in the PFC protocol	Professional judgment, SEAP lacks specific information or data, particularly soil, climate, and hydrologic data.	
3. Alteration from grazing, channel incision, and hunting3.	Difficult to assess with evidence provided. There is not enough detail or documentation of the nature of these trampling and grazing signs for us to determine if there is a negative effect on vigor. Sporadic or infrequent episodes of livestock trampling and grazing generally do not affect vigor of riparian plants, especially if the browse period occurs when vegetation is dormant. When these activities do impact plant vigor, it is usually the result of chronic, long-term trampling and overgrazing. The degree, extent, frequency, and duration of these impacts are not discussed; therefore, we cannot be certain what their impacts are.	Greater documentation and description of these impacts are needed to guide management actions beyond those needed for hydrologic impacts from berms, , roads, railroads, etc.

4. Indicates rapid drying of the SDC – mud cracks and dead hydric vegetation evidence of rapid drying.	Soil and climate data suggest alternate interpretations of same features: a. Different potential for the polygons b. Water level is being maintained as suggested by vigorous growth of hydric, obligate wetland plants in polygons E,F,G c. The observed die-back and mud-cracking was typical of natural senescence at the end of the growing season and drying of clay-rich, surface soil horizons following the monsoon season. Much of the riparian vegetation in seasonal wetlands has typically senesced by Nov. in this part of Az. The fact that hydric species (never mind that they have senesced) were present and "dense" is evidence of a seasonally high water table within reach of hydric plants; and it cannot be used to prove rapid desiccation for the Saline Bottoms ecological site, which has a different potential than polygon A. d. Polygon A still had live vegetation because it has a naturally higher water table than surrounding polygons.	116 Year Palmer Drought Index and Soil survey information support NRST contention that the water level and vegetation composition and distribution respond to and fluctuate to changes in precipitation and drought strength in all but polygons A and H. Plant data in Tables 2 and 3 suggest maintenance of wetland or riparian vegetation in polygons A,C,D,E,F,G, and H.
5. Report concludes that the existing vegetation in polygons E,F,G are evidence of drying because they do not contain more hydric plants.	Soil map and ecological site description indicate that many of the polygons E,F, G mapped during the SEAP process are in soil types and under a hydrologic regime that favors an alkali sacaton (a facultative plan) community. Strongly question this conclusion in light of site-specific soil mapping and documented climatic fluctuations.	
6. Sequence of repeat photography from 1987 to 2012 used as evidence of drying.	By studying climate data for the area, it is quite possible that hydrologic conditions in some polygons are not entirely dependent on ground water sources but on meteoric (precipitation) sources too.	
7. Statement is conjectural and not supported by any data within report. Flow measured through one culvert at the margin of the cienega is not being evaluated in terms of total spring discharge into SDC.	ADWR- nearest artesian aquifers are still free flowing at the surface with no measureable decline in water level; surrounding area has very few active wells that could diminish groundwater in the SDC. The nearest recorded active water wells on the west side of the San Pedro River are few and 7 miles or more away from SDC. A geomorphic and hydrologic investigation of the effects of railroad beds, roads, berms, pipeline corridors on surface-and ground-water flow to the SDC.	

9. Discusses the potential degradation of the cienega resulting from gully erosion west of SDC.	Unfortunately, there is no description of these gullies, their soils, associated redosimorphic evidence, or breached aquitards to determine if gully incision has any effect on groundwater levels in SDC.	Raises questions regarding source of water. Impacts from gully erosion implies an unconfined aquifer, "artesian water emerging from standpipe in middle of southern lobe: suggests a confined aquifer. Historic photo-documentation at the lower end of polygon A and polygons E and F, may need to determine the role of rainfall-derived water in supporting all polygons except A and H. Information about redoximorphic features and organic matter content in the soil might help in assessing this. Recommends a geomorphic, soil, and hydrologic investigation of the incised channels west of the SDC to determine if surface water or perched groundwater is diverted from the SDC.
10. Provides management recommendations	Are generally sound in guiding BLM through broad management actions and monitoring needs	
10a Block south culvert	Will further pond water over the pipeline road.	Do survey to understand elevation changes near the pipeline/road. Road may need to be raised and fortified to ensure project success, requiring coordination with pipeline company. Do geomorphic and hydrologic investigation of the channel stability and the surface-and groundwater response in the channel that drains south of SDC to the San Pedro River.
10b Ensure all ephemeral tributaries that should discharge into the SDC are functioning and possibly backfilling of incised channels inside and outside the cienega.	Takes considerable analysis and coordination with ROW holders. Cautious, if not skeptical, of using gravel from railroad bed to plug gullies and incised channels – potential contaminant transport from railroad ballast and the legal implications of using material from a legal ROW – hydrologic reality that gravel is not a suitable material for plugging or impeding water flow	
10c Develop a SDC-specific groundwater model, informed by the piezometer data.		A geohydrologic investigation to determine the source(s) of water for the SDC. Expand to include detailed inventory and evaluation of all berms, railroads, roads, culverts, old ditches, and other structures that can or could alter surface hydrology. Work with Ben Lomeli, or Bill Wells to design a 3-dimensional monitoring grid. .

		If possible install a local meteorological station to determine the degree to which meteoric waters augment groundwater contributions to the SDC. Need for detailed soil inspection to determine the extent, sources, fluxes, and variability of groundwater in and around the SDC. Contact NRCS to see if draft version of Loamy Cienega Ecological Site Description is available to improve interpretation of existing and potential conditions
11. SEAP is more quantitative – provides condition and risk scores from springs discharge, habitat isolation, and habitat patch size.	Quantified data are of limited value to management. These measurements are scale-dependent – a measurement that cannot be equated in a regional aquifer-fed, basin-floor spring to a headwater spring. Many of the SEAP condition and risk scores are based on departure from potential; however, given the absence of site-specific information and the nearly complete absence of any soil data, it is difficult to ascertain how potential is being determined using the SEAP. The SEAP does not synthesize site-specific information about the interaction of soil, water, and vegetation that we believe is essential to understanding physical processes in a fully integrated, interdisciplinary fashion. The interaction of physical attributes and processes are the foundation for providing biologic values. An examination of biologic values without understanding physical function limits the capacity to interpret and understand the condition and trend of natural resources.	

Members of the St. David Cienega Working Group of the Community Watershed Alliance are continuing their commitment to assist BLM to develop meaningful goals and objectives to guide management of the SPRNCA for years to come. A continued hands off approach in the northern area of the SPRNCA can only increase the negative consequences to the remaining function of two important Areas of Critical Environmental Concern.

Sincerely,

Mary McCool, Executive Director
Community Watershed Alliance

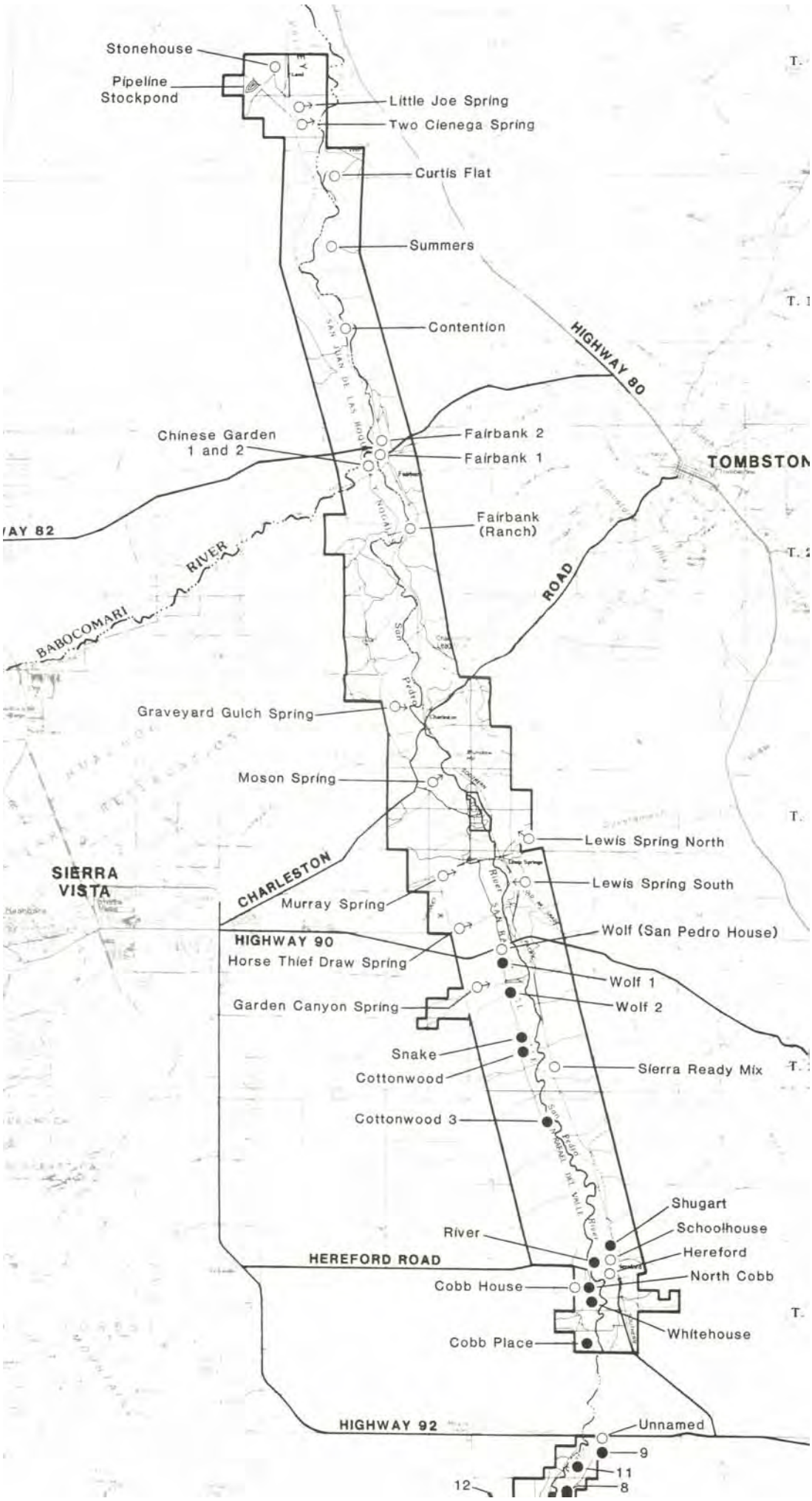

Stonehouse
Pipeline Stockpond
Little Joe Spring
Two Cienega Spring
Curtis Flat
Summers
Contention
HIGHWAY 80
Chinese Garden 1 and 2
Fairbank 2
Fairbank 1
TOMBSTON
Fairbank (Ranch)
ROAD
RIVER
BABOCOMARI
Graveyard Gulch Spring
Moson Spring
Lewis Spring North
Lewis Spring South
SIERRA VISTA
CHARLESTON
Murray Spring
HIGHWAY 90
Horse Thief Draw Spring
Wolf (San Pedro House)
Wolf 1
Wolf 2
Garden Canyon Spring
Snake
Cottonwood
Sierra Ready Mix
Cottonwood 3
Shugart
Schoolhouse
River
Hereford
HEREFORD ROAD
North Cobb
Cobb House
Whitehouse
Cobb Place
HIGHWAY 92
Unnamed
9
11
12
8

PHOTO GALLERY
PUBLIC SCOPING COMMENTS
SPRNCA-RMP

PART 1: Downcutting in the uplands

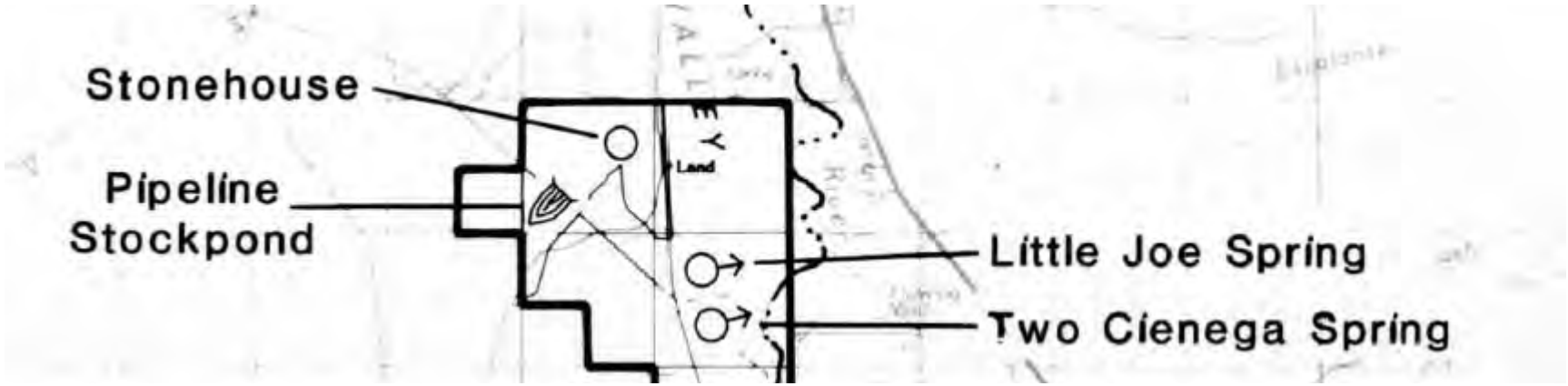
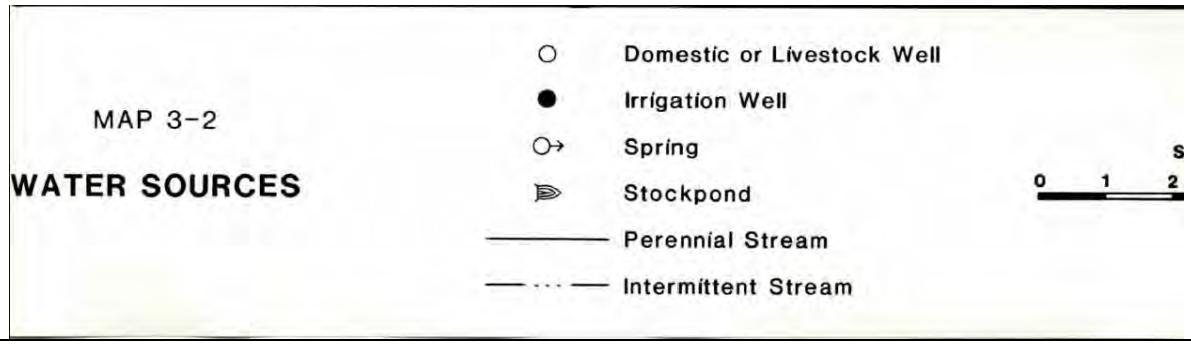
Photo Gallery continued
Public Scoping Comments
SPRNCA-RMP

PART 2: Southern Culvert - photo by Dr. Larry Stevens-SEAP

PART 3: Railroad berms

REVIEW OF BLM FINAL ENVIORONMENTAL IMPACT STATEMENT
RE: ST. DAVID CIENEGA

NEED TO SEE RECORD OF DECISION ISSUED 30 DAYS AFTER 30-DAY REVIEW PERIOD ON FEIS.

Page 10	**Preservation Alternative - St. David Cienega 350 acres – proposed as Class I Preservation area – 1 of 3 Research Natural Areas**
Page 14	**Utilization Alternative – St. David Cienega 130 acres - RNA**
Page 26	**Preferred Alternative – St. David Cienga 350 acres - RNA**
Page 33	**Nomination of SDC as RNA - The potential RNA at the cienega is a remnant of what muc of the San Pedro River Valley used to look like. The marsh-like cienga has a vegetation type dominated by reeds and sedges. Also in this potential RNA are a small mesquite bosque, a grassland area seasonally impacted by water, and small areas of Chihuahuan Desert scrub vegetation.**
Page 38 Missing in Elect. Version	
Legend from P 38	

Page 337

duce the artesian conditions. Further north, in the St. David area, artesian conditions exist over a larger area. In this area, there are actually two artesian zones. One zone is about 250 feet deep, and the other about 500 to 1,400 feet deep. The study area is primarily under unconfined (water table) conditions, and water freely moves into, or out of the San Pedro River, depending on the water level within the flood plain aquifer.

Page 348

ATTACHMENT 3 (contd.)
San Pedro River Water Quality Analysis, 1987
Safford District

Dates	01/15	01/15	10/15	10/14	10/14	10/14	10/14	10/14	
Sample type	Diversion Dam	Little Joe Spring	Summer Well	Fairbank Bridge	Charleston Bridge	Hgwy. 90	Hereford Bridge	Hgwy. 92	Standard
Flow, CFS	—	—	1.2	4.6	7.4	3.3	2.4	0.1	—
pH Field	8.7	7.7	8.0	8.5	8.5	8.4	8.0	8.0	—
Turbidity Hardness (Hach Kit)	180	260	—	—	—	—	—	—	—
Conductivity Field	500	920	500	450	420	510	560	590	—
Alkalinity (Hach Kit)	180	140	—	—	—	—	—	—	—
Dissolved Oxygen (Hach Kit)	9	—	—	—	—	—	—	—	—

ND - Not Detected
*MPN/100 ml

Lab Analysis performed by American Analytical Laboratories, Tucson, Arizona. All measurements taken on San Pedro River except Babocomari and springs.

Page 348

ATTACHMENT 3 (contd.)
San Pedro River Water Quality Analysis, 1987
Safford District

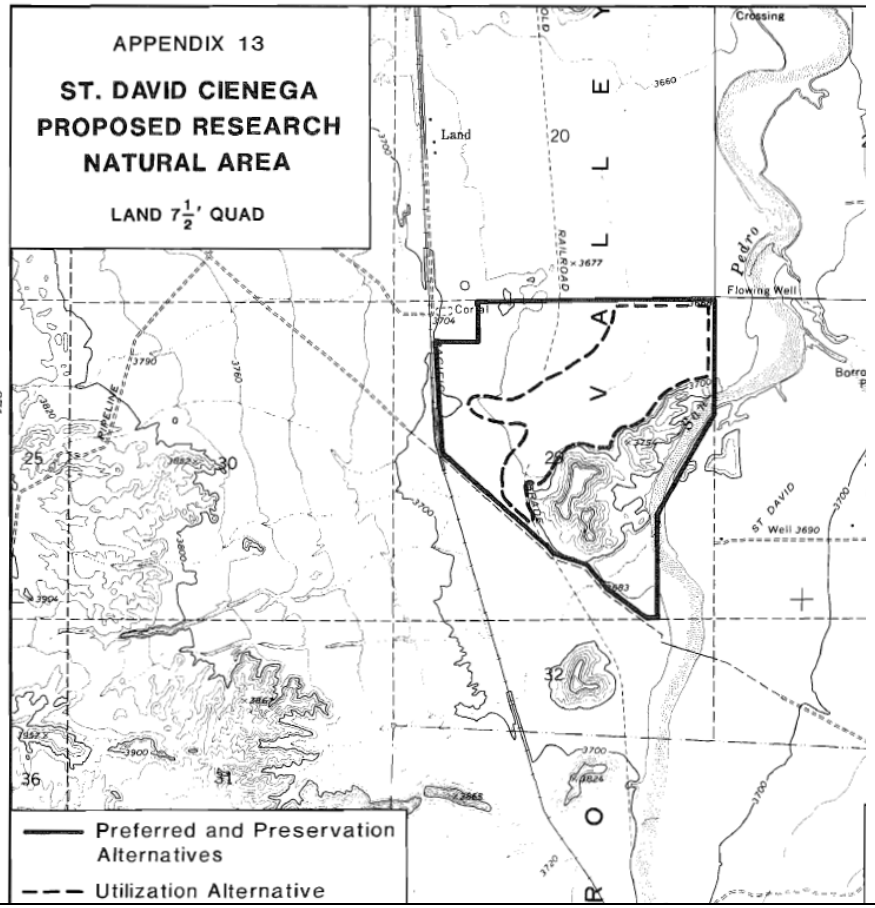
Dates	10/14	11/02	11/02	11/13	11/13
Sites Sample Type	Babocomari River	Lewis Spring (S)	Lewis Spring (N)	2 Cienega Spring	Little Joe Spring
Flow, CFS	0.1	0.1	0.6	0.1	0.1
pH Field	8.7	7.6	5.3	8.0	7.4
Conductivity Field	450	630	600	910	1000

Page 368

Appendix 12

Inventoried Water Sources on Acquired Lands

Source Name	Legal Description ½½, Sec.,	T.S.,	R.E.	Use	Condition
Stonehouse Well	SWNE 19	18	21	Livestock	Usable
Pipeline Tank	NWSW 19	18	21	Livestock	Good
Little Joe Spring	SWNE 19	18	21		Good
Two Cienega Spring	NESW 19	18	21		Good

Appendix 13	
376	**Glossary - RESEARCH NATURAL AREA. A natural area established and maintained for research and education, that may include: (1) typical or unusual plant or animal types, or associations or other biotic phenomena or (2) characteristic or outstanding geologic, soil, or aquatic features or processes. The public may be excluded or restricted from such areas to protect studies.**

AZTNC
SCIENCE FILE

POLLEN ANALYSIS OF BORDERLAND CIENEGAS

Contract Number HQ/AZ-920815-1
KOSE Grant K91WRO8

Submitted to
Richard P. Young
National Stewardship Ecologist

and

David F. Gori
Stewardship Ecologist

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October 5, 1994

TABLE OF CONTENTS

SUMMARY 1

RESEARCH GOALS 2

INTRODUCTION 3
- NATURAL SETTING 3
- PREVIOUS PALYNOLOGICAL RESEARCH 8

RESEARCH METHODS 13
- CORING AND RADIOCARBON DATING 13
- LABORATORY PROCEEDURES 13

SITE DESCRIPTIONS 15
- SARACACHE CIENEGA 15
- LOS FRESNOS CIENEGA 17
- ANIMAS CREEK CIENEGA 21
- SONOITA CREEK CIENEGA 23
- ST. DAVID CIENEGA 28
- BINGHAM CIENEGA 30
- COOKS LAKE 32

THE HISTORY OF WETLAND VEGETATION 33
- PREHISTORIC WETLAND CHANGE 33
- HISTORIC WETLAND CHANGE 35
- THE HISTORY OF FIRE IN THE WETLANDS 39

THE HISTORY OF UPLAND VEGETATION 41

PREHISTORIC HUMAN DISTURBANCE OF THE WETLANDS 44

LITERATURE CITED 45

APPENDIX I: RADIOCARBON DATES 48
APPENDIX II: SARACACHE POLLEN 49
APPENDIX III: LOS FRESNOS POLLEN 55
APPENDIX IV: ANIMAS CREEK POLLEN 63
APPENDIX V: SONOITA CREEK POLLEN 73
APPENDIX VI: ST. DAVID POLLEN 81
APPENDIX VII: BINGHAM POLLEN 89
APPENDIX VIII: COOKS LAKE POLLEN 95
APPENDIX IX: LOS FRESNOS MACROFOSSILS 101
APPENDIX X: ANIMAS CREEK MACROFOSSILS 102
APPENDIX XI: SONOITA CREEK MACROFOSSILS 103

To Don Cresencio Palafox,
who knew the Borderland and taught
others about it.

SUMMARY

Pollen analysis, macrofossil analysis, and radiometric dating of 7 cienegas in southern Arizona, southern New Mexico, and northern Sonora provide a detailed record of environmental change spanning the introduction of livestock and exotic plants, and 8000 years of prehistoric vegetation change. All 7 cienegas have experienced marked expansion of wetland taxa, both woody and herbaceous, during the historic period; and at each site these expansions are accompanied by decreased charcoal percentages. The presence of charred seeds and fruits of wetland plants prior to the historic period proves that the cienega vegetation itself burned. The increased charcoal follows the first occurrence of the pollen exotic taxa, and is accompanied by increased organic matter accumulation as shown by the transition to from silts to peat and by increased percentages of fungal spores, including those of decay fungi. Prior to the historic period, burning was frequent enough to prevent woody plants and bulrush from reaching maturity, and intense enough to eliminate the build-up of dead plant tissue.

The most consistent wetland increasers are Cyperaceae, *Salix*, and *Rorippa*. The increase of *Scirpus* macrofossils parallels the Cyperaceae curve, suggesting that bulrush expansion is common in the historic period. Historic disturbance of upland taxa is also recorded at all 7 cienegas, but the taxa vary among sites. The most consistent upland increasers are juniper, *Quercus*, *Larrea*, and *Prosopis*, as well as many weeds. Prehistoric human disturbance of the cienegas is demonstrated by the presence of corn (*Zea*) and pre-Columbian weeds.

RESEARCH GOALS

The Borderland palynological study was designed to determine the natural (pre-settlement) vegetation of wetlands along the United States -- Mexico border. It was a two-phase program to (1) identify the cienegas with the greatest research potential, and (2) intensively study the best sites.

Phase 1 was completed December 1992. Twelve pollen samples were counted from 4 cienegas. The phase 1 recommendations (Davis, 1992b) were to continue analysis of St. David, Bingham, and Animas Creek cienegas, but to replace Clanton Cienega, which had poor pollen preservation. In phase 2, 4 cienegas were to be studied intensively. The intensive phase of the project was to include 120 pollen samples, 50 charcoal analyses, and 30 radiocarbon dates (Davis, 1992a).

In 1993, sediment of 3 cienegas were sampled: Saracache and Los Fresnos Cienegas in Sonora, Mexico, and Cooks Lake in the San Pedro River Valley of Arizona. Also in 1993, Sonoita-Creek Cienega, which had been cored previously, was added to the Borderland project. Each of these 7 sites appeared to have excellent pollen preservation; and as analyses proceeded, it became evident that the pollen and macrofossil records of the 7 sites bore consistent similarities and important differences. Furthermore, the 100-fold change in charcoal frequency obviated the need for detailed charcoal analyses. Therefore, detailed palynological analysis proceed on 7 sites instead of 4, as had been originally proposed. Consequently, 223 pollen samples were extracted and counted, 22 radiocarbon dates were obtained and 36 plant macrofossil samples were processed.

The primary goal of establishing the pre-settlement vegetation of wetlands contains, within it, several specific elements:

- the history of upland and wetland vegetation

- the history of climatic change, particularly moisture

- the fire history of the wetlands

- the history of human disturbance of the wetlands

INTRODUCTION

NATURAL SETTING

The "Borderland" area of the present study stretches from the continental divide in New Mexico westward to the San Pedro River Valley of Arizona, and from the Sierra Madre highlands near Cucurpe, Sonora, Mexico, to the Lower San Pedro River of Arizona. The Borderland primarily are in the Basin and Range physiographic province. Regional elevation gradually decreases from the southeast toward the northwest. The major drainages of the region -- the San Pedro and Santa Cruz rivers -- drain toward the northwest.

The Chihuahuan and Sonoran deserts are the natural vegetation of the lowlands of the region, intermediate elevations contain desert grassland, and upper slopes are covered by evergreen oak woodland. Pine forests and spruce-fir forests are restricted to the highest elevations (Fig. 1). The 7 cienegas included in this study are in the desert grassland and Sonoran upland vegetation zones (Fig. 1).

The climate of the Borderland area is heavily influenced by monsoonal (summer) precipitation. The summer (July, August) precipitation maximum is most pronounced in the Sierra Madrean highlands, and declines in magnitude northwestward (Fig. 2).

The historic record indicates greater precipitation from 1925-1935 and from 1975-1985 with drought from 1950-55 (Fig. 3). Annual streamflow for the Santa Cruz River and Whitewater Draw generally follows the precipitation trend for Nogales and Douglas, Arizona, particularly for peak discharges (Fig. 3). Streamflow for the Santa Cruz generally increased from 1950 - 1990, but streamflow in the smaller Whitewater Draw has steadily declined due to diversion. The 7 cienegas studied herein occupy settings that are sensitive to the precipitation and streamflow changes shown in Figure 3. The availability of moisture in these spring-fed, valley bottom habitats probably was low in the 1950's, and was greater in the early 1980's.

Tree ring studies near the Borderland reflect longer-term variability (Fig. 4). The Tres Rios chronology (Stokes et al., N.D.) contains low ring width indices in the early 1950's, likely reflecting the low precipitation recorded in the historic record (Fig. 3). The ring indices are generally high around the turn of the century and in the mid-1600's with generally low values intervening. Greater moisture availability for the Borderland cienegas might be expected for

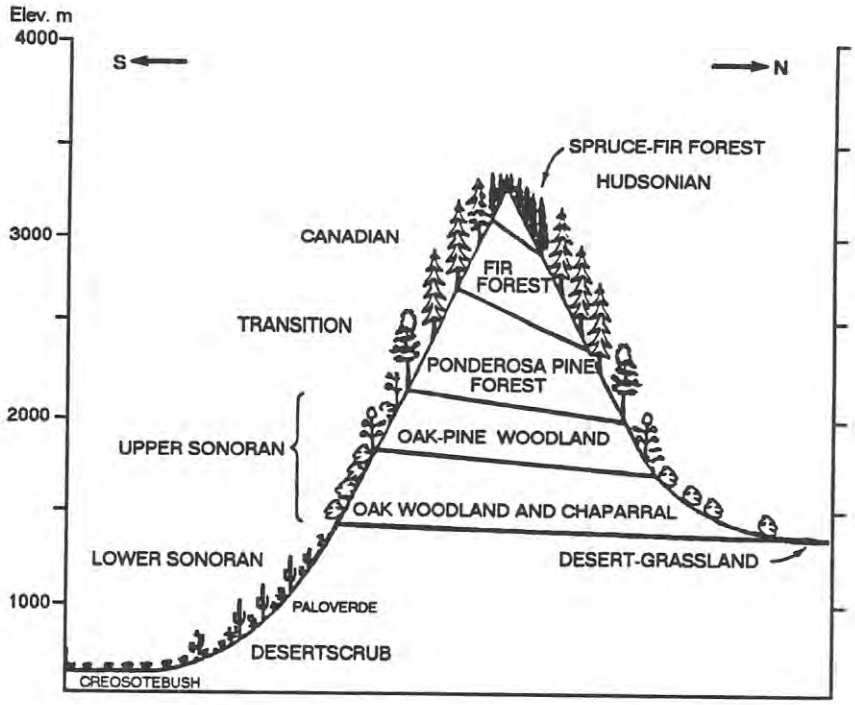


Figure 1. Vegetation zonation of the Borderlands region (After Lowe, 1964), showing effects of aspect and elevation on vegetation patterns. The 7 cienegas studied in this report are in the desert grassland and upper desertscrub zones.

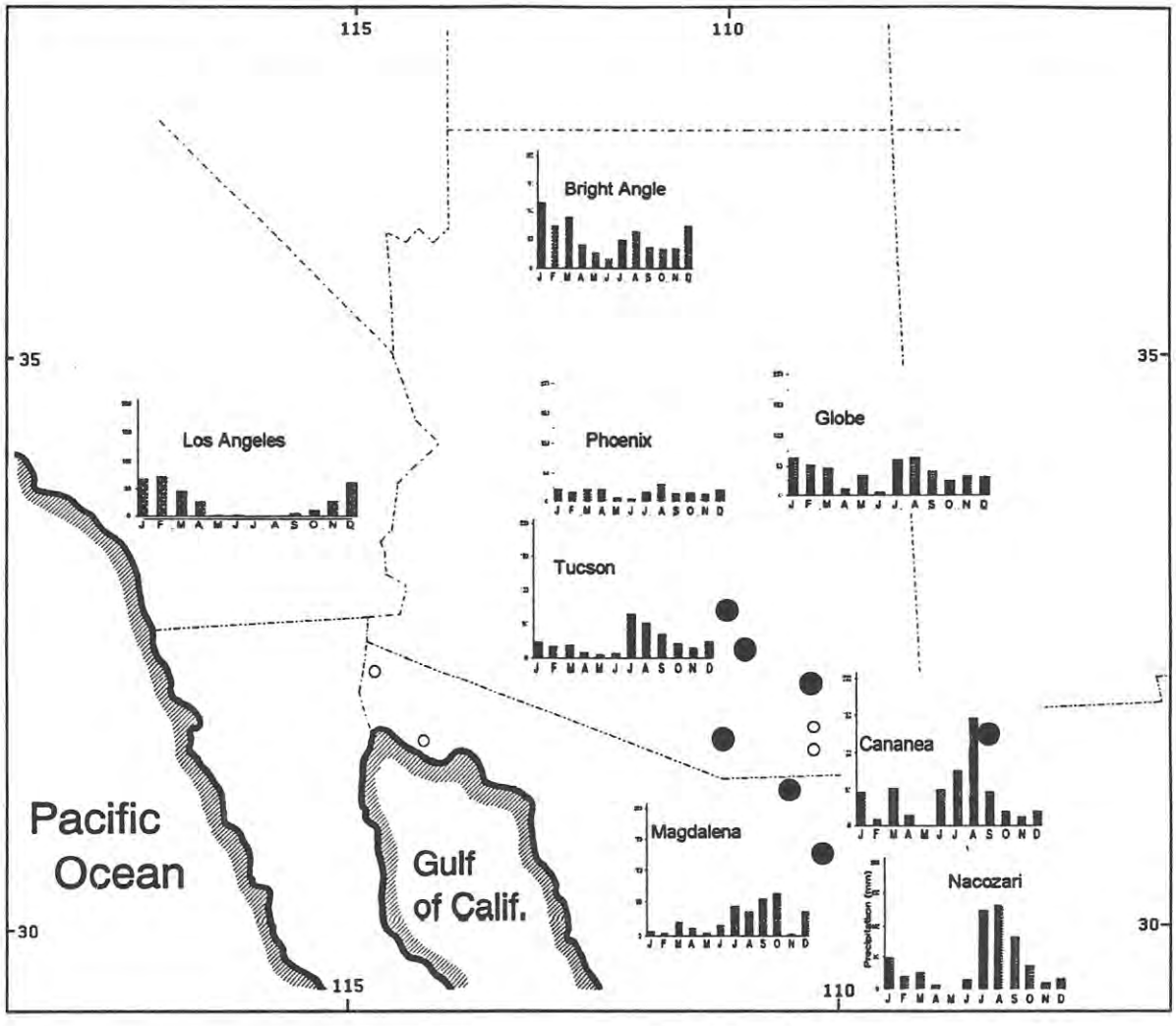


Figure 2. Map of the American Southwest showing average annual monthly precipitation (mm) for a transect of stations from the Mexican Sierra Madre Occidental to northern Arizona. Note the progressive decline in the importance of summer monsoonal (July and August) precipitation from southeast to northwest. Filled circles are locations of 7 cienegas of this report.

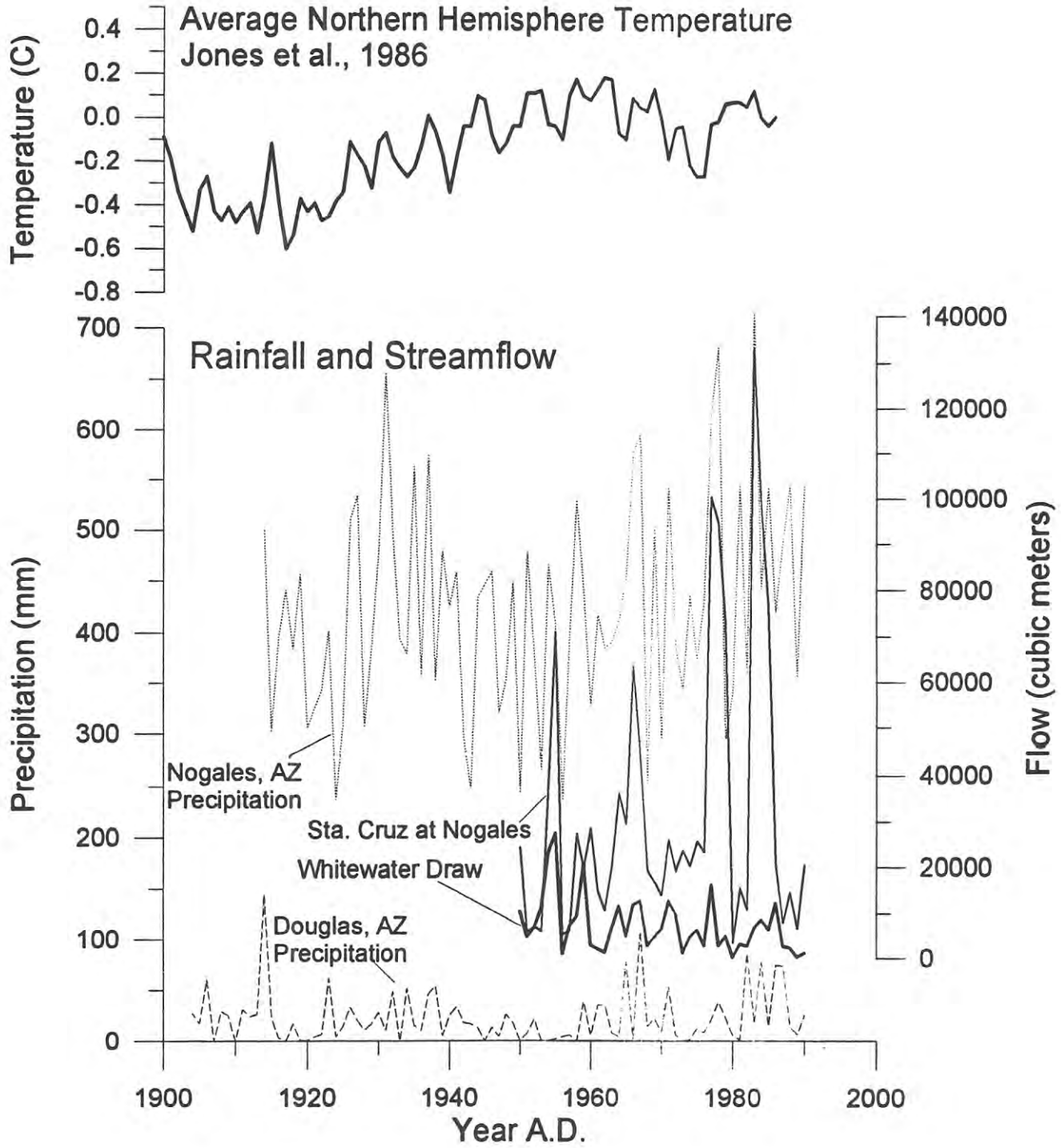


Figure 3. Comparison of streamflow for Whitewater Draw and the Santa Cruz River at U.S.A. gaging stations with annual precipitation for nearby weather stations at Douglas, Arizona, and Nogales, Arizona. Note the correspondence of streamflow with local precipitation, particularly for peak discharges.

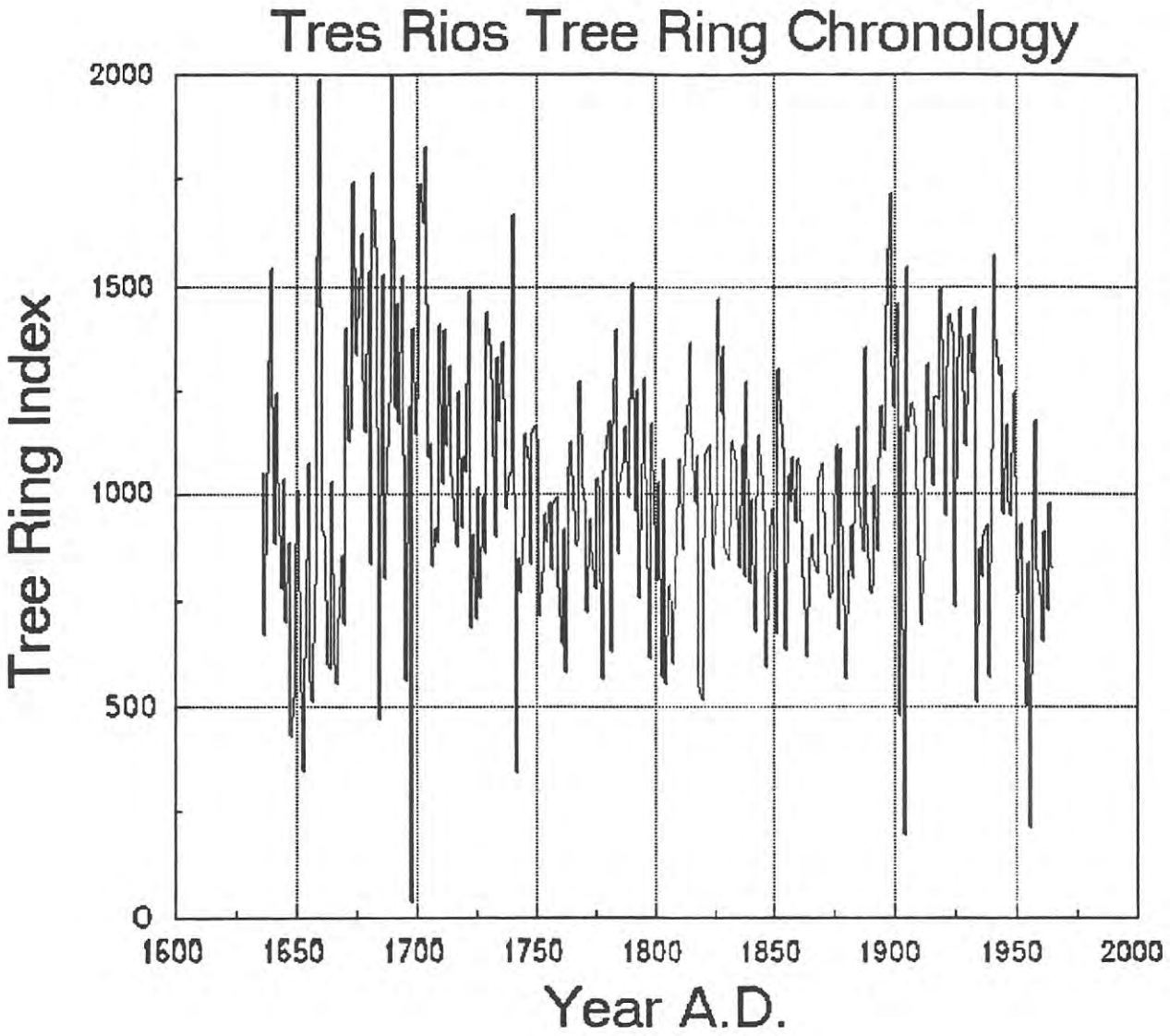


Figure 4. Tree ring chronology for Tres Rios, 2347 m, 30° 20' N 108° 30' W, Sierra Madre, Chihuahua, Mexico (Stokes et al., N.D.). Note the generally high values in the early 1900's and the mid-1600's.

the two intervals of greater ring width indices (Fig. 4).

PREVIOUS PALYNOLOGICAL RESEARCH

Pioneering palynology of the Borderland region was conducted by P.S. Martin and his associates in the 1960's (Martin, 1963b). Sediments of many different ages and types were investigated, ranging from late-Holocene to full Glacial, and from stream deposits to archeological sites. An important theme of Martin's palynological research was that of mid-Holocene moisture. In part, this concept grew out of the controversy surrounding the Double Adobe archeological site (Martin, 1963a). Geological study by the renowned Ernst Antevs demonstrated that the bones of extinct megafauna did not occur above the "Altithermal Soil." Antevs concluded that mid-Holocene aridity (i.e. the Altithermal, 7000 - 4500 yr B.P.) may have been responsible for the animal's demise. Martin (1963a) countered that the mid-Holocene in the Borderland may have been wetter than today, rather than drier as proposed by Antevs.

Subsequent research has demonstrated that the extinction event was much earlier than realized during the Antevs-Martin controversy (10,750; Haynes, 1991). However, the concept of a wet mid-Holocene has lived on. It became a cornerstone of packrat midden research in the Southwest, and has resulted in various authors individually defining the age of the mid-Holocene in order to support or refute the moist mid-Holocene (Betancourt et al., 1990).

Recent palynological study of a well-dated, complete, Holocene sedimentary sequence at Montezuma well, elev. 1125 m, central Arizona (Davis and Shafer, 1992) demonstrates mid-Holocene (4000-5000 yr B.P.) aridity rather than moistness. Nonetheless, Anderson (1993) postulates that sub-Mogollon Arizona (including the Borderland) experienced a mid-Holocene climate moisture than today; with the reason for the geographical discrepancy "unknown."

In fact, the published pollen diagrams from the 3 sites closest to the heart of the Borderland (Fig. 5), Lehner Arroyo (Mehringer and Haynes, 1965), Murray Springs (Mehringer et al., 1967) and Double Adobe Arroyo (Martin, 1963a) may support mid-Holocene aridity. Contemporary pollen samples at all three sites are dominated by chenopods (Chenopodiaceae-*Amaranthus*) and grasses (Fig. 6), but in the middle of each diagram, ragweed-bursage (*Ambrosia*, an indicator of aridity) dominates. The pollen of wet-ground

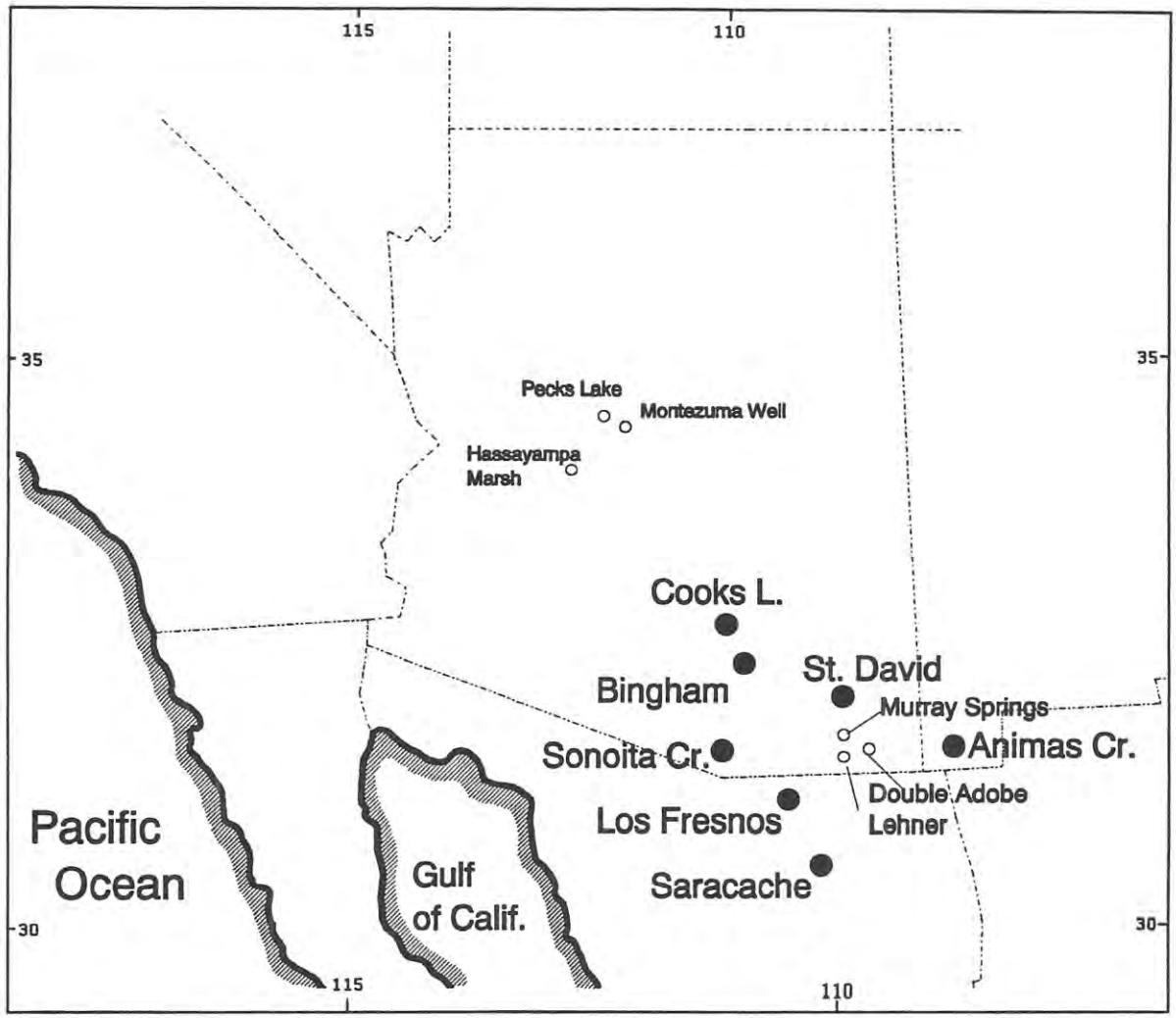
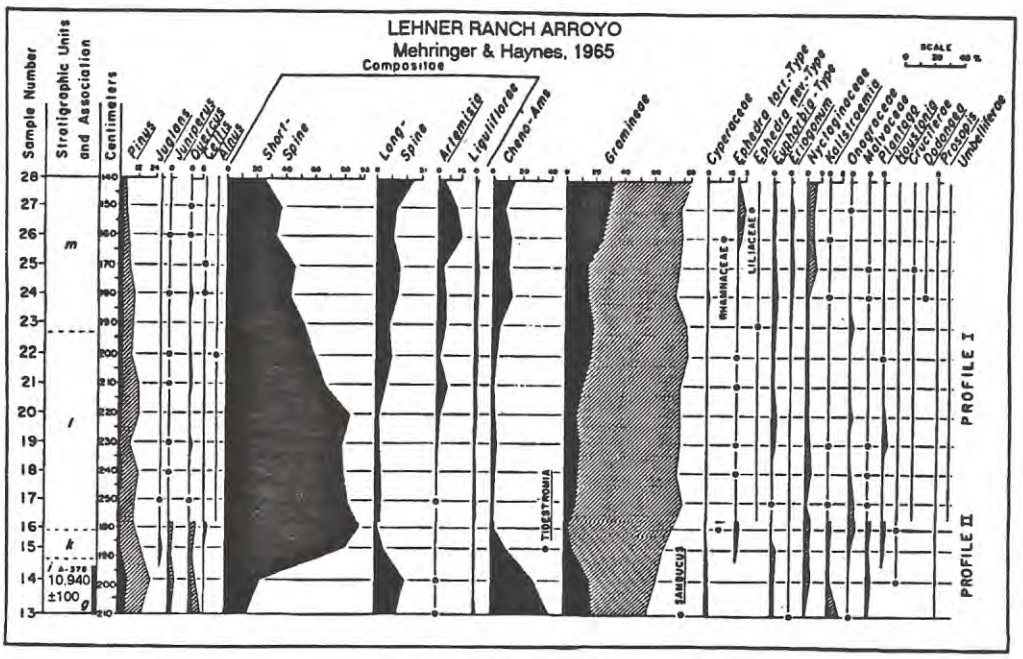


Figure 5. Map of the American Southwest showing the locations of 7 cienegas of this report (large filled circles) and of other sites mentioned in the text (smaller filled circles).



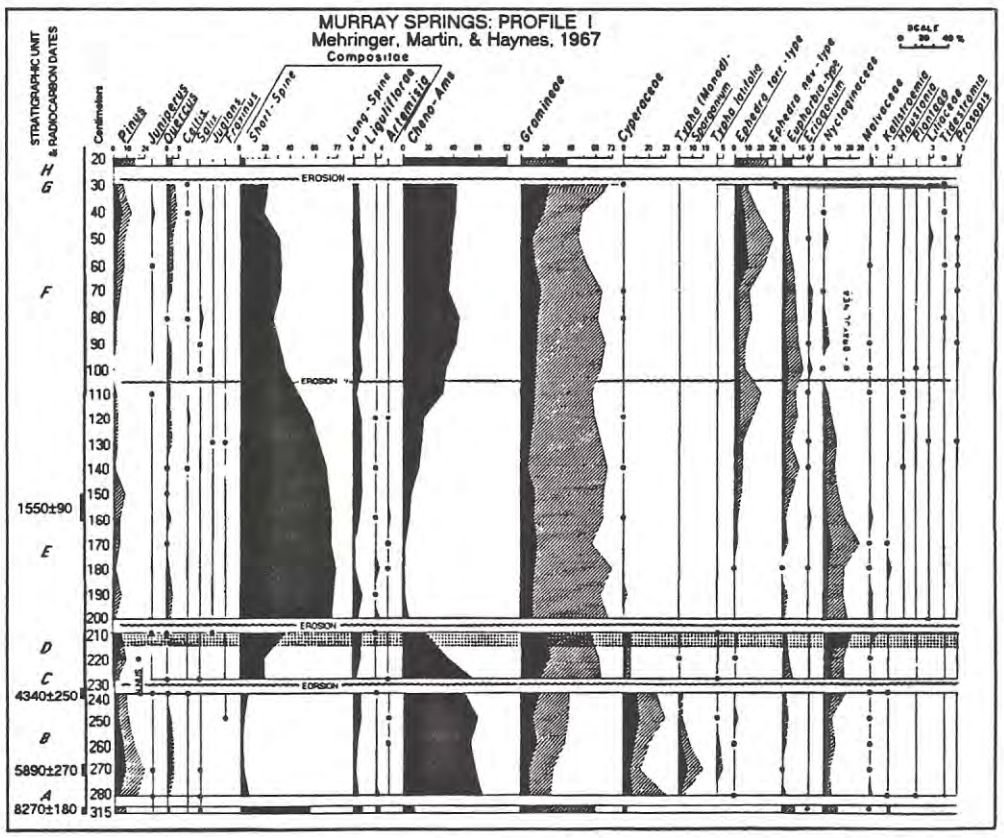


Figure 6. Pollen diagrams for Lehner Ranch Arroyo and Murray Springs, two previously published diagrams (Mehringer and Haynes, 1965; Mehringer et al., 1967) from sites in the Borderland showing Holocene vegetation change. See Figure 5 for locations.

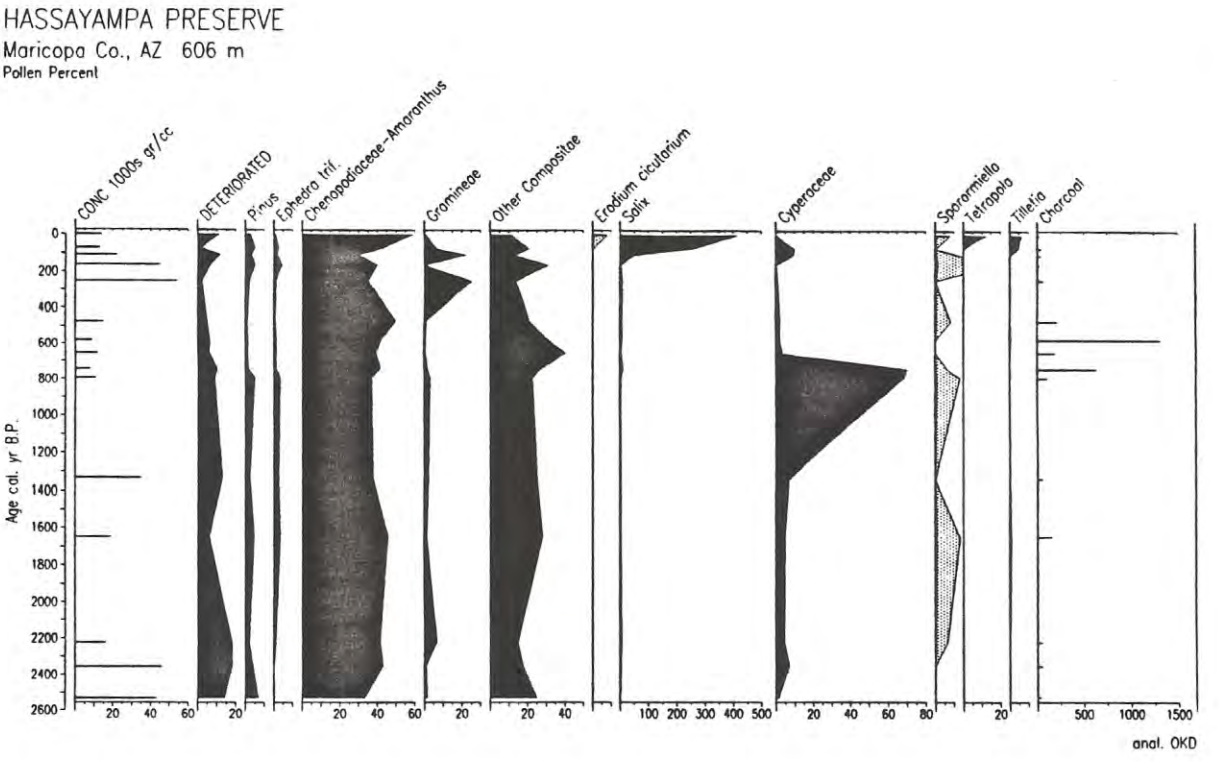
plants is most abundant in basal sediments, which are dominated by chenopod pollen. Unfortunately, each diagram has a different radiocarbon chronology. The upper transition from ragweed to chenopod dominance is dated at 7910±200 yr B.P. at Double Adobe, but at less than 1550±90 yr B.P. at Murray Springs. The lower transition from chenopods to *Ambrosia* is dated 10,940±100 yr B.P. at Lehner, but less than 4390±250 yr B.P. at Murray Springs, and at more than 8000±140 yr B.P. at Double Adobe.

Either the same palynological sequence has three different ages for 3 sites within a 20 km radius, or the radiocarbon dating of at least 2 of the sites is wrong. The discrepancy is of interest to the present study, because the longevity and continuity of Borderland wetlands would be shortened by a mid-Holocene drought.

Regardless of the radiocarbon dating problems, the three arroyo pollen diagrams (Lehner, Murray Springs, and Double Adobe) do not contain pollen of historic age (other than surface samples). The first investigation focusing on the effects of European settlement of the Borderland is that of Davis and Turner (1987). At Pecks Lake (Fig. 5), coincident with the first appearance of exotic weeds, the pollen percentages of creosote bush (*Larrea*), mesquite (*Prosopis*), and juniper (*Juniperus*) increase. The effects of historic settlement on the wetland vegetation at Pecks Lake are profound: the marsh was artificially flooded to a depth of 2 m.

A clear post-settlement impact on wetland vegetation is evident from pollen analysis of Hassayampa marsh (Davis, 1990; Fig. 7). There, willow (*Salix*) pollen percentages increase from 5% to over 345% of upland pollen after the first appearance of pollen of exotic plants. The modern vegetation of the marsh is dominated by *Salix goodingii*, which is a historic development. An important result of this investigation is that the increased percentages of *Salix* are accompanied by a decline in charcoal from over 2000% (percent of upland pollen) to 126% at the surface (Fig. 7). Prehistoric human activity is demonstrated by the presence of corn (*Zea*) pollen at 104 cm (580 yr B.P.). Human action may have been responsible for the greater fire frequency in prehistoric time.

The negative correlation of charcoal and wetland plants has been duplicated in coastal California (Fig. 7) at Bonita Creek marsh, where increases in the aquatic plants -- alder (*Alnus*), sedge (Cyperaceae), *Salix*, and cattail (*Typha-Sparganium*) -- are matched by a decrease in charcoal from 968% to 177% *after* the first occurrence of exotics (*Eucalyptus*, Fig. 7). At both areas, the historic transformation of the wetland vegetation is accompanied by



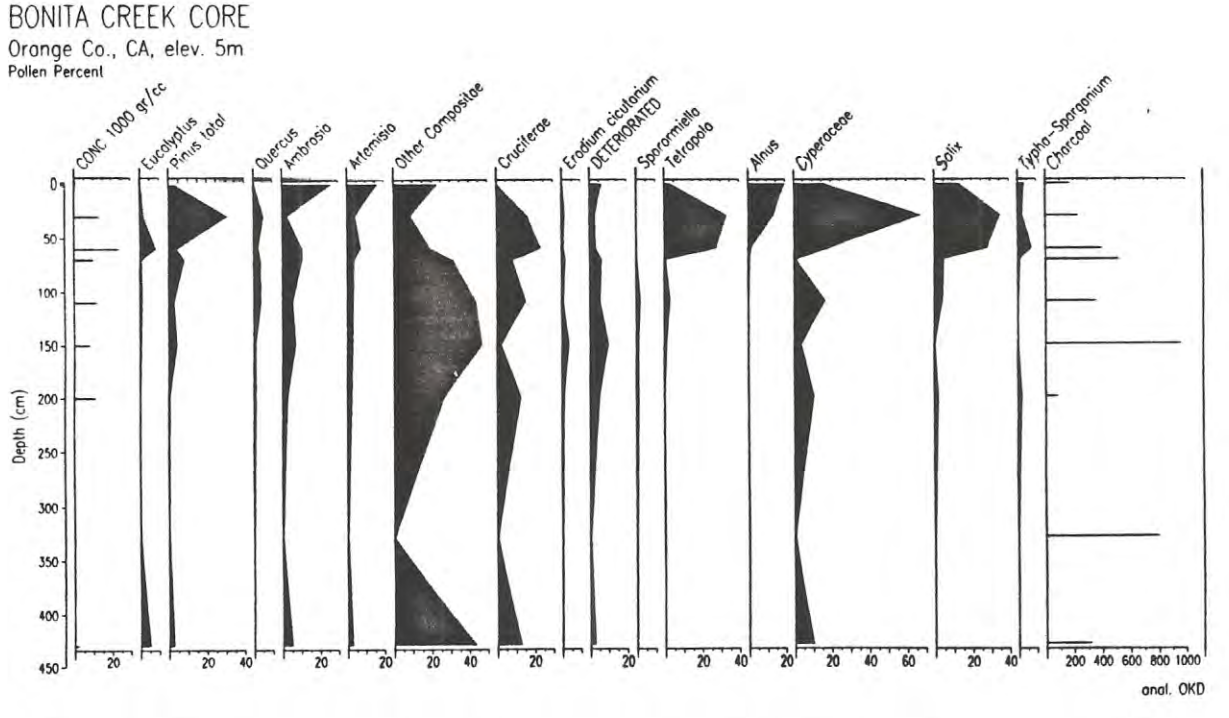


Figure 7. Pollen diagrams from Hassayampa Preserve (see Fig. 5), Arizona, and Bonita Creek, California, showing the historic expansion of the pollen of wetland plants, coincident with a decline of charcoal percentages. Both wetland plants and charcoal % is calculated as the percentage of upland pollen grains.

a decrease in charcoal, *vis*. decreased burning of the wetland.

RESEARCH METHODS

The 7 cienegas of this study present an excellent opportunity to obtain high-quality pollen profiles. Two aspects make the cienega sediment superior to the arroyo-wall sediments which have been previously investigated in the Borderland. First, the saturation of the sediments promotes pollen preservation, because wetting and drying cycles destroy pollen (Campbell, 1991). Second, dry sediments are susceptible to animal burrowing, which mixes sediment of different ages.

CORING AND RADIOCARBON DATING

Each cienega was probed with rods to locate the deepest sediments. Usually, this was in the center of the wetland vegetation, typically in a stand of bulrush or cattail. Sediment cores were taken from the 7 cienegas using hand-operated coring devices: a square-rod (100 x 5 cm) and a Dachnowski (50 x 5 cm) corer. Notes were kept on the location, depth, and sediment type of each core segment. Duplicate, overlapping cores were taken where possible. The sediments were wrapped in plastic wrap and aluminum foil, labeled, and placed in wooden boxes for transport to the laboratory, where they were stored at 1 ^{o}C.

LABORATORY PROCEDURES

The cores were opened and sampled in the Pollen Laboratory at the University of Arizona. One-cm^3 samples were taken for pollen analysis at uniform (e.g., 10 cm) intervals, and 100 cm^3 samples of sediment were taken for macrofossil analysis and radiocarbon dating. Cores which had compacted during coring were assumed to have undergone uniform compression; e.g., a 80 cm core taken with a 100 cm device was sampled at 8-cm intervals of the core, assumed to represent 10-cm intervals in the sediment.

Pollen was extracted by standard acid digestion (Table 1). Carbonates and silicate mineral grains were removed with hydrochloric and hydrofluoric acids. Organic compounds were removed with acetolysis solution and 10% potassium hydroxide. The residue was

TABLE 1. POLLEN LABORATORY EXTRACTION PROCEDURE.

a. clean core surface and take 1 cm^3 of sediment
b. place sample in plastic vial with 20 ml 10% sodium pyrophosphate, agitate 1 hr.
c. screen (200 μm) into 50 ml nalgene test tubes and centrifuge
d. add 2 tablets *Lycopodium* tracers (13,911 spores/tablet)
e. 40 ml HF overnight and 1 hr in boiling water bath
    centrifuge, decant, water rinse, transfer to 15 ml centrifuge tubes
f. Acetolysis*
h. 10 ml 10% KOH 2 minutes in boiling water bath
    centrifuge, decant, rinse with hot water until clear
i. stain with safranin "O"
j. transfer to labeled 1 dram shell vials
k. few drops of glycerin added, mixed thoroughly, desiccated over anhydrous $CaSO_4$

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*Acetolysis

a. 5 ml glacial acetic acid centrifuge and decant
b. stir sample, add 5 ml acetic anhydride (volumetric dispenser)
c. add 0.55 ml H_2SO_4 to acetic anhydride solution (volumetric pipet), mix, centrifuge,
    decant into glacial acetic acid
d. 5 ml glacial acetic acid centrifuge and decant

stained, mixed with glycerine, and desiccated. Mounted on a microscope slide, the pollen was counted at 40X and 100X magnification.

All pollen percentages were calculated by dividing by the upland pollen sum. Usually, 300 grains of upland plants were counted per sample. The pollen concentration is calculated from the upland pollen sum and the number of *Lycopodium* spores (tracers) counted. These are added to each sample during the first step of processing (Table 1).

Radiocarbon dates were obtained from the University of Georgia Radiocarbon Laboratory, courtesy of Dr. Robert M. Kalin. Additional samples were obtained from the University of Arizona Tandem-Accelerator-Mass-Spectrometer Laboratory.

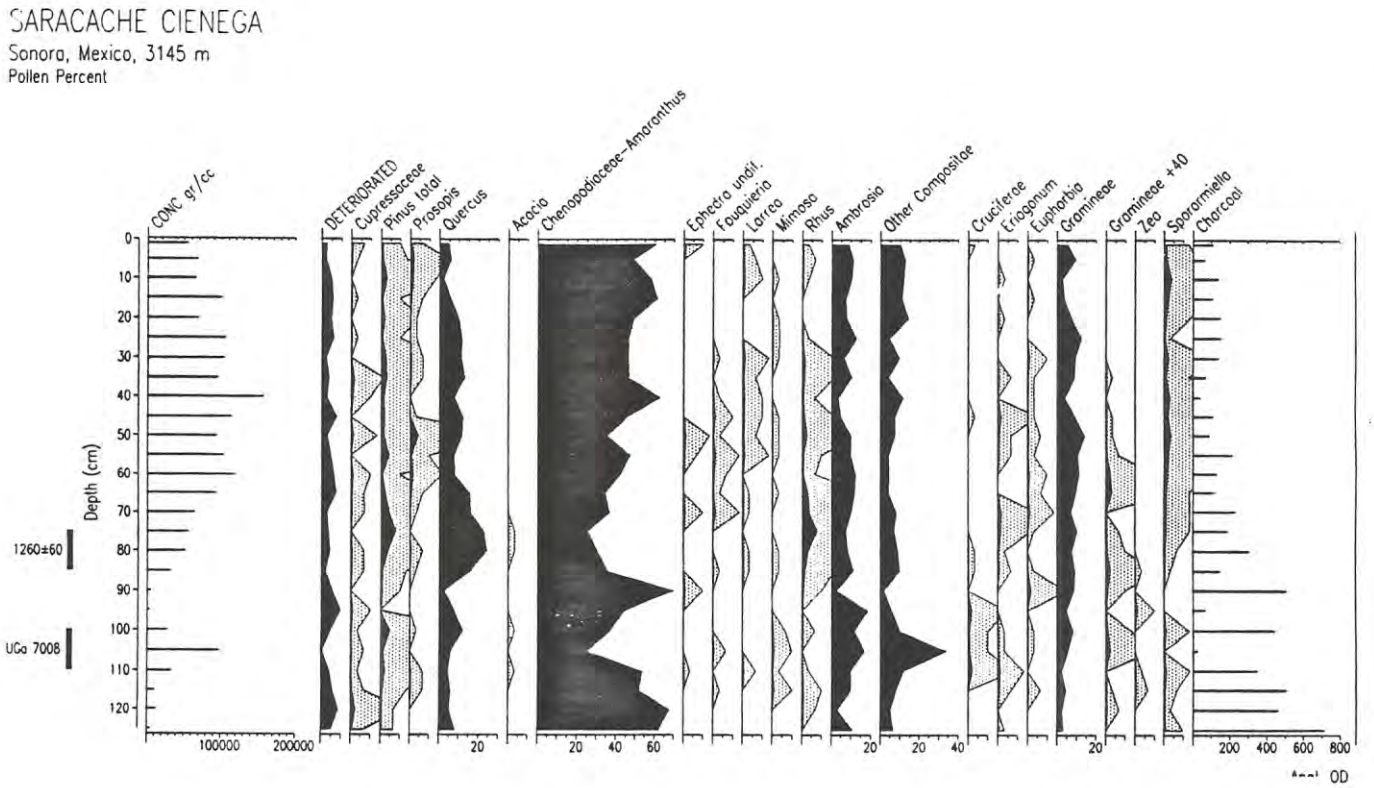
SITE DESCRIPTIONS

The setting and sedimentary sequence of the seven cienegas are described from the Sierra Madre northward.

SARACACHE CIENEGA

Saracache Cienega is a spring-fed complex of channels and pools on the west bank of the Saracache River near its confluence with Arroyo Santo Domingo. It is near the small community of Agua Fria (30°28' N, 110°32'W, 3145 m elev.), about 50 km east of Cucurpe, Sonora, Mexico. The sediments were probed in several places and proved to have a uniform thickness of ca. 150 cm over well-sorted sand. The marsh has a dense overstory of poplar (*Populus*), ash (*Fraxinus*), willow, and netleaf hackberry (*Celtis reticulata*). The uplands adjacent to the cienega are covered with a dense stand of mesquite (*Prosopis*) and hackberry. At higher elevation, mesquite is replaced in importance by oak.

The cienega was cored July 14, 1993. The sediments are uniform black clay from 0 to 85 cm with sand layers from 85-100 and 110-150 cm surrounding a layer of black organic silt from 100-110 cm (Fig. 8). Charcoal, fungal spores, and Cyperaceae pollen are abundant in the basal silt and sand layers. As charcoal declines from over 400% to 100%, percentages of woody riparian taxa, particularly *Populus*, increase (Fig. 8, Appendix 2). Radiocarbon



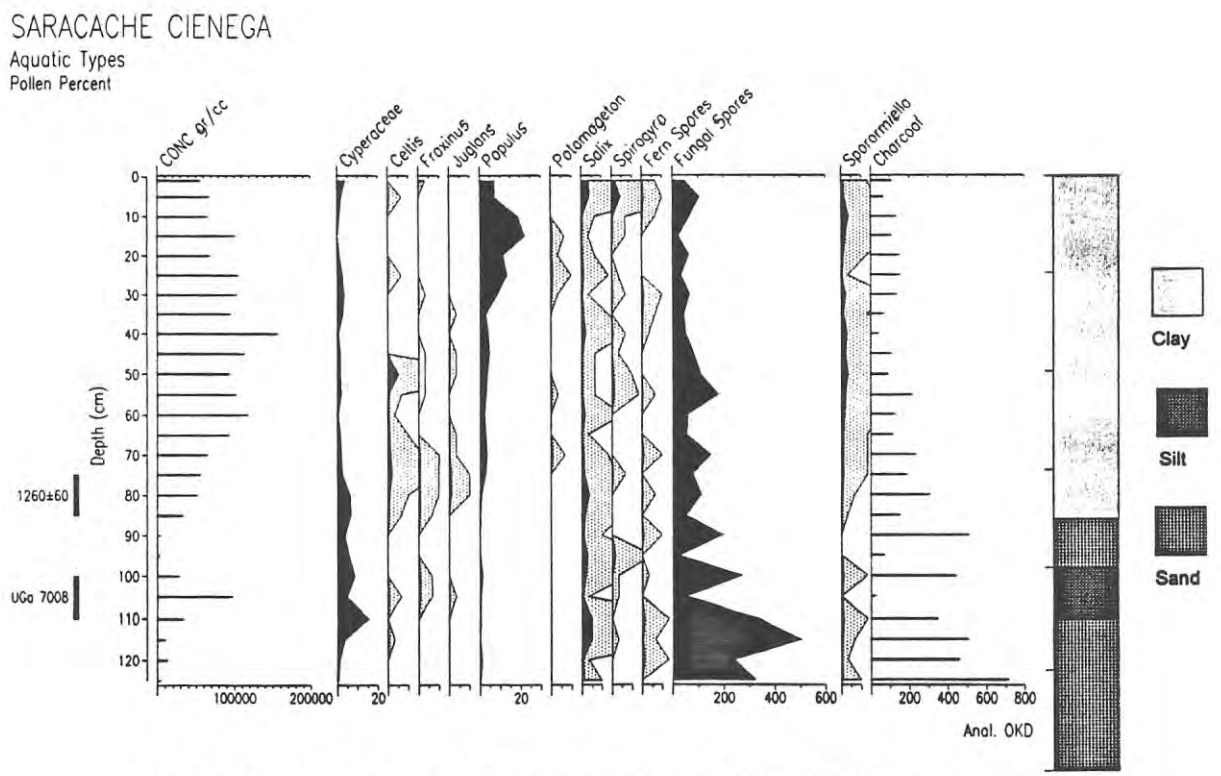


Figure 8. Percentage pollen diagram for Saracache Cienega, Mexico.

dates of 1260 ± 60 (75-85 cm) and UGa 7008 (100-110 cm) bracket the transition from silt and sand to clay. The pollen concentration is very low in the sandy units, so they probably were deposited during floods.

The transition from prehistoric to historic disturbance is difficult to pinpoint at Saracache Cienega. Either the radiocarbon dates are wrong, or the reciprocal relationship of charcoal (burning) to woody wetland plants begins a thousand years earlier than at other Borderland cienegas. The elevated mustard (Cruciferae) percentages, coincident with the silt layer may represent the earliest disturbance of the cienega. The only weedy exotic, *Polygonum* sp. occurs above 5 cm (Appendix 2), and *Salix* increases above 10 cm. An historic age for the upper 10 cm is consistent with the radiocarbon ages, but implies a long record of disturbance of the area.

Alternatively, the coincident increase of disturbance indicators (*Prosopis* and *Sporormiella*) with declining charcoal percentages is consistent with the other Borderland cienegas, and suggest that Saracache Cienega diagram is entirely of historic age. If so, the radiocarbon dates are far too old. *Sporormiella* is a dung fungus, specific to herbivore dung, that routinely increases after the historic introduction of grazing animals (Davis, 1987; Davis and Shafer, in press). If the radiocarbon dates are correct, then the *Sporormiella* abundance is due to herbivores other than livestock.

LOS FRESNOS CIENEGA

Los Fresnos is one of several small spring-fed cienegas at the headwaters of whitewater draw, southwest of the Huachuca Mountains. It is near the center of the valley floor, ca. 2 km south of the international border (31°18' N, 110°20'W, 1510 m elev.), 50 km north of Cananea, Sonora, Mexico. The cienega vegetation is herbaceous, dominated by bulrush (*Scirpus validus* or *S. acutus*). The upland vegetation is desert grassland with scattered oaks, heavily impacted by cattle and horses. Livestock have trampled the marsh margin, but its center is too soft to support their weight and it is relatively undisturbed.

The cienega was cored July 13, 1993. The uppermost 33 cm of sediment is fibrous peat. From 33 - 330 cm the sediment is uniform black, organic silt. The basal few cm of core are sandy gravel (Fig. 9). The peat layer appears to coincide with the post settlement

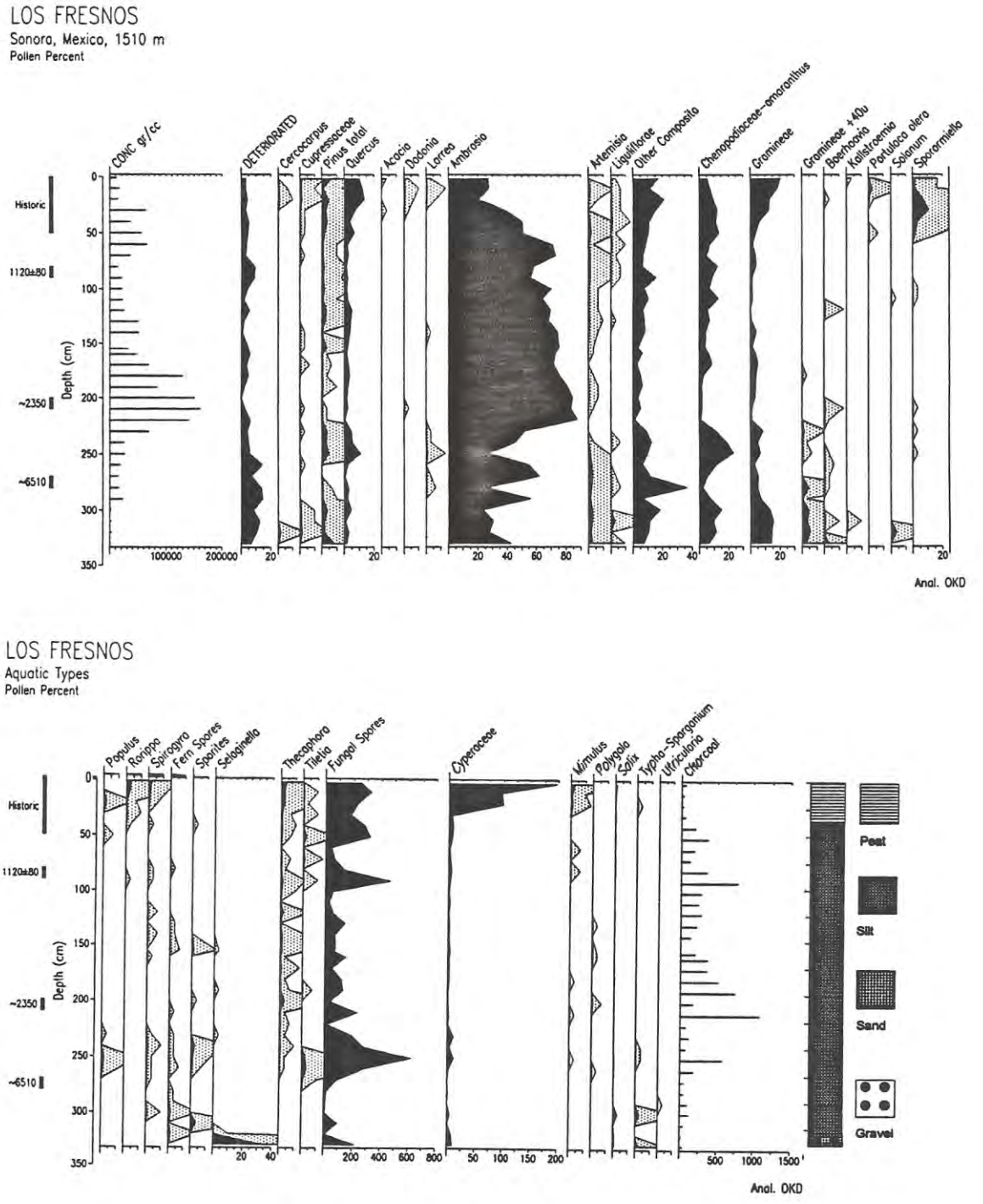


Figure 9. Percentage pollen diagram for Los Fresnos Cienega, Mexico.

period. Juniper (plotted as Cupressaceae, Fig. 9), oak, and creosote bush (*Larrea*) increase above 33 cm, as do the weed purslane (*Portulaca olearceae*) and the dung fungus *Sporormiella*. The pollen of Cyperaceae, *Rorippa*, and *Mimulus* (*guttatus*-type) increase during this interval as do *Spirogyra* spores (an algal indicator of standing water). Charcoal percentages decline from 500% at 50 cm to less than 100 % at the surface (Fig. 9, Appendix 3).

The prehistoric portion of the diagram is very similar to the Lehner and Murray Springs profiles (Fig. 6), with a radiocarbon sequence similar to that of Murray Springs. The upper Ambrosia - chenopod transition is dated 1120±80 (cf. 1550±90 at Murray Springs) and the lower chenopod - *Ambrosia* is dated between 2390 and 6510 yr B.P. (cf. 4340±250 at Murray Springs). Peaks in *Ambrosia* percentages at 60 and 220 cm coincide with peaks of pollen concentration, and the *Ambrosia* maximum at 220 cm coincides with the highest charcoal percentages in the core. Below 230 cm, *Ambrosia* percentages decrease as "Other Compositae," Gramineae, and Chenopodiaceae-Amaranthus percentages decline. Charcoal percentages are low below 230 cm, and pollen of wetland plants (*Spirogyra*, Fern Spores, Salix, and *Typha-Sparganium*) is sporadically present.

Macrofossils were processed for the upper 75 cm of Animas Creek sediment (Fig. 10, Appendix 9). *Ambrosia aptera* fruits are present, suggesting a weedy origin for at least part of the *Ambrosia* pollen curve (Fig. 9). Seeds of *Epilobium* are abundant at the surface even though Onagraceae pollen is rare (Appendix 3). *Portulaca oleracea* macrofossils (Fig. 10) match the *Portulaca oleracea* pollen curve, but the diverse macrofossil assemblage surpasses the pollen in recording a complex weed flora including *Euphorbia*, grasses, *Melilotus*, *Mollugo verticilata*, *Polygonum* cf. *persicaria*, *Potentilla*, *Rumex*, and *Verbena hastata*.

Many different taxa of aquatic plants are present as macrofossils, including 3 kinds of sedges (Appendix 9). The *Scirpus* macrofossil abundance parallels that of the Cyperaceae pollen curve. Because *Scirpus* macrofossil replace the two *Carex* taxa above 25 cm, the pollen curve must reflect the increased *Scirpus* (probably bulrush) abundance. Likewise the 2 different *Rorippa* seeds (Appendix 9) indicate that the *Rorippa* pollen curve is made up of 2 taxa that increase in uppermost sediment. The abundant *Chara* oospores indicate the presence of an alga unrecorded in the pollen record.

Most of the macrofossils of upland and aquatic taxa below 50 cm depth are

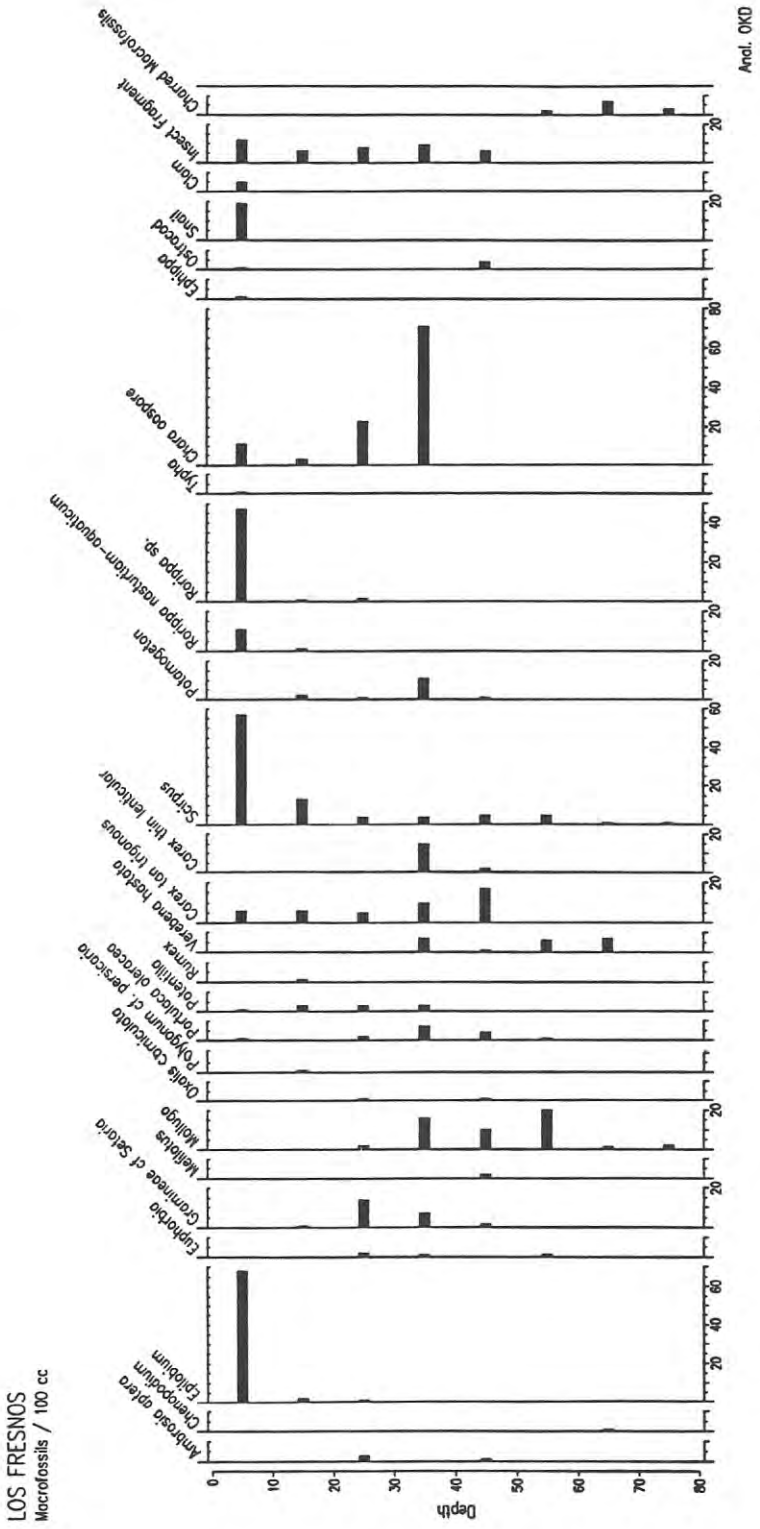


Figure 10. Plant macrofossil concentration diagram for the uppermost 75 cm of sediment of the core from Los Fresnos Cienega, Mexico.

carbonized, indicating frequent burning of the cienega and upland before the historic period.

ANIMAS CREEK CIENEGA

Animas Creek Cienega is near the former headquarters of The Nature Conservancy, Gray Ranch, Hidalgo, Co., New Mexico (31° 31' N, 108° 53' W, elev. 1529 m), 31 km north of the international boundary. A 460 cm core was obtained from a cienega ca. 1 km southeast of the ranch headquarters, in the center of the Animas Creek valley, near the ranch foreman's house. The east side of the valley is occupied by the modern channel of Animas Creek, the west side by artificial ponds. This cienega is fed by springs, supplemented by well water and the septic tank drain field of the foreman's house. The core was taken near the center of a bulrush (*Scirpus validus* or *S. acutus*) marsh ringed by willows. Cottonwoods and willows are common along Animas Creek. The upland vegetation is semidesert grassland, with oak woodland and juniper woodland at higher elevation (Brown and Lowe, 1980; Brown, 1982).

The cienega was cored Sept. 4, 1993. The sediment consists of 60 cm of fibrous, rooty, peat over 240 cm of black clay (60-300 cm). Silty sediments from 300 - 365 and 440 - 455 cm bracket a layer of sand from 365 - 440 cm (Fig. 11). The general sedimentary sequence and chronology and radiocarbon dates are similar to Los Fresnos (Fig. 9), and the upper peat layer coincides with palynological indications of disturbance: the weeds dock *(Rumex)* and *Portulaca oleracea*, and the dung fungus *Sporormiella*. The pollen of wetland taxa (Cyperaceae, watercress [*Rorippa*], and *Salix*) dramatically increase in the top 30 cm of peat, and charcoal percentages decline from 2400% at 50 cm to 260% at the surface (Appendix 4). This historic interval at Animas Creek Cienega has elevated percentages of *Tetrapola*, a decay fungus, probably living on the decaying marsh vegetation that accumulated after the marsh was no longer burned. The historic interval is characterized by pollen of the weeds plantain (*Plantago lanceolata*), purslane (*Portulaca oleracea*), and *dock (Rumex)*.

An abrupt transition from sunflower (Other Compositae) percentages above, to Chenopodiaceae-*Amaranthus* dominance (below) occurs at 100 cm. Below 100 cm, Chenopodiaceae-*Amaranthus* gradually increase to a peak of 58% at 380 cm. Pollen

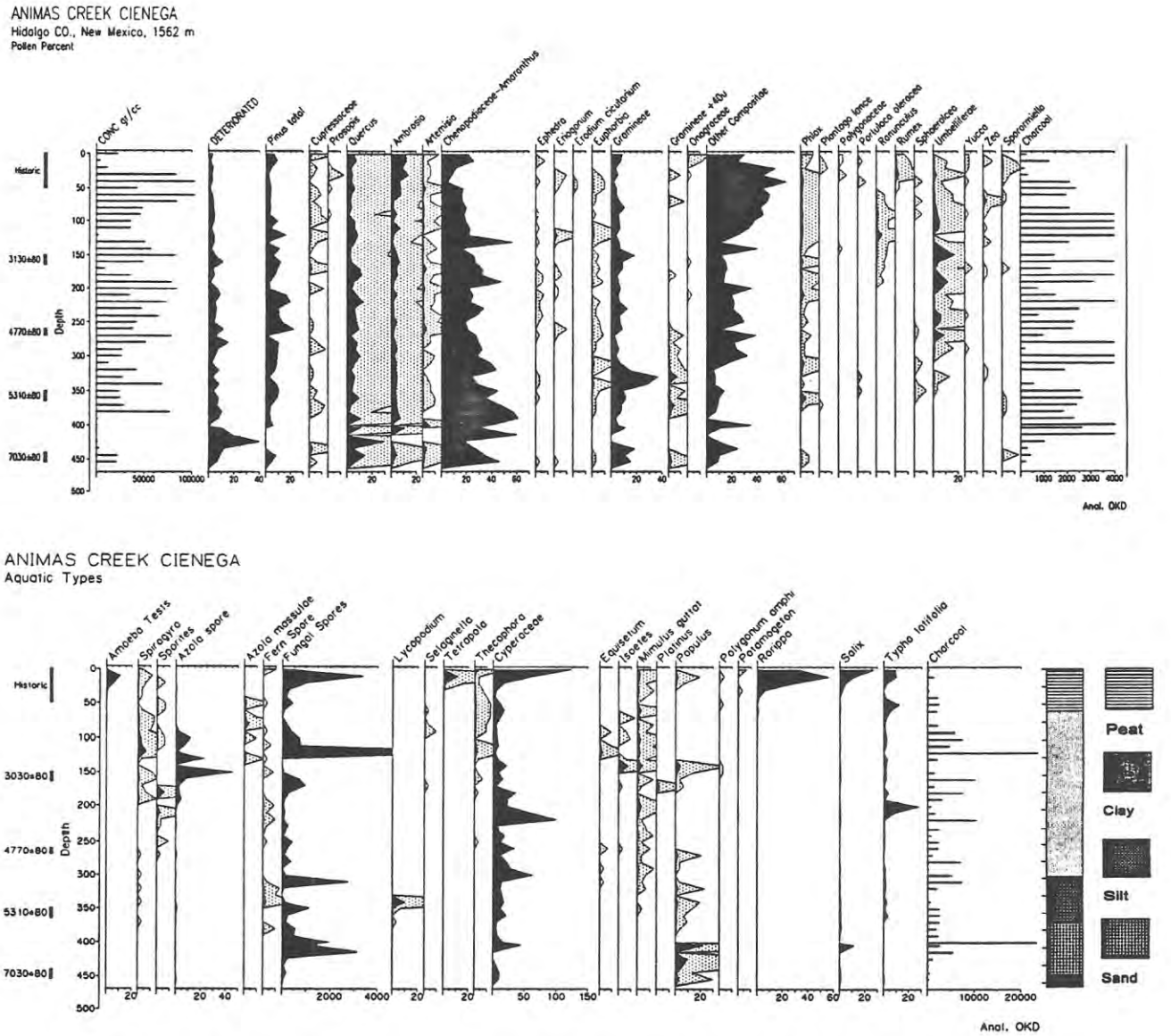


Figure 11. Percentage pollen diagram for Animas Creek Cienega, Mexico.

concentration is very low in the sandy sediment from 365 - 440 cm; possibly, this unit was deposited during a flood.

Animas Creek Cienega contains an extremely diverse upland and wetland flora. Palynological indications of standing, permanent water from 200 - 100 cm (3722-1929 yr B.P.) include Spirogyra spores, Azola spores (an aquatic fern), horsetail (*Equisetum*) spores, quillwort (*Isoetes*) spores. From 360-380 cm spores of clubmoss (Lycopodium) are present.

Plant macrofossils, picked from the uppermost 55 cm of the core are dominated by the seeds and fruits of wetland plants and weeds. The increase of Cyperaceae, *Rorippa*, and *Salix* pollen (Fig. 11) is also present in the macrofossil record (Fig. 12, Appendix 10). The taxa involved in the increase are *Scirpus* (cf. *Scirpus validus*, bulrush), *Rorippa nasturtium-aquaticum*, and *Salix* sp.). *Typha* macrofossils and pollen have different trends. *Typha* macrofossils are very abundant below 35 cm; whereas *Typha* pollen is abundant at the surface, declines at 30 cm, and increases below (Fig. 11). *Ambrosia aptera* fruits are present, suggesting a weedy origin for at least part of the increased *Ambrosia* pollen percentages above 50 cm (Fig. 11)

The weed flora portrays an transition at 30 cm; below which charred macrofossils are present. Above 30 cm, *Epilobium* cf. *angustifolium* seeds are the only abundant weed macrofossil. Below 30 cm, several weedy taxa are present. The most abundant are *Chenopodium* sp., *Mollugo verticilata*, *Polygonum lapathulifolium*, and *Portulaca oleracea*. Cone flower (*Rudbeckia*) and pink (*Phlox*) are upland plants not strictly known as weeds, who are more common below 30 cm, in the sediments containing charred macrofossils (Fig. 12).

SONOITA CREEK CIENEGA

Sonoita Creek Cienega is fed by a large spring in The Nature Conservancy Pategonia - Sonoita Creek Preserve (32° N, 110° 46' W, elev. 1220 m), 5 km southwest of Pategonia, Santa Cruz Co., Arizona. The cienega is in a wooded area dominated by cottonwood (*Populus*). A dense stand of mesquite covers the valley bottom to the northeast. The upland vegetation is desert scrub.

The cienega was cored November 20, 1992. The sediments consist of a thin (10 cm) layer of woody peat over a dark silt (10-118 cm), sand (118-310 cm) and gravel (310 - 350

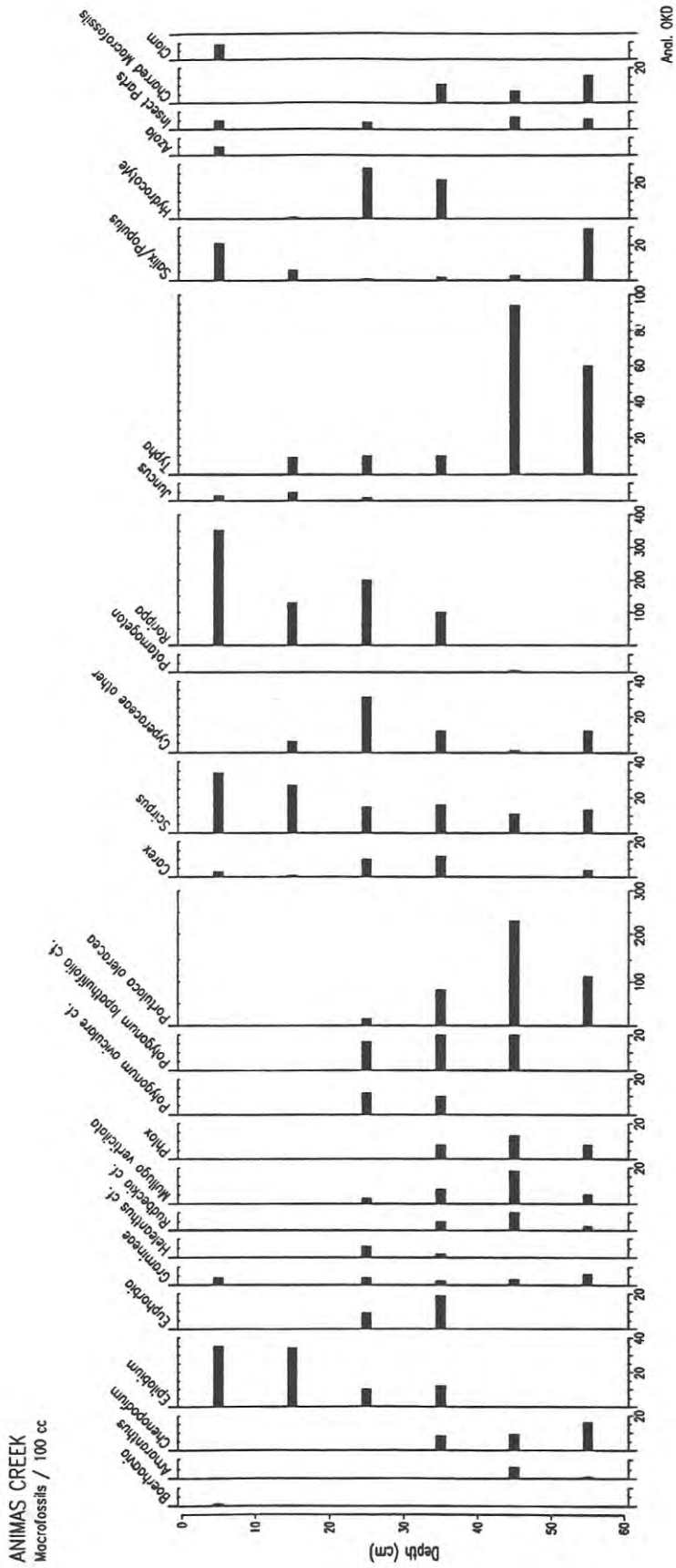
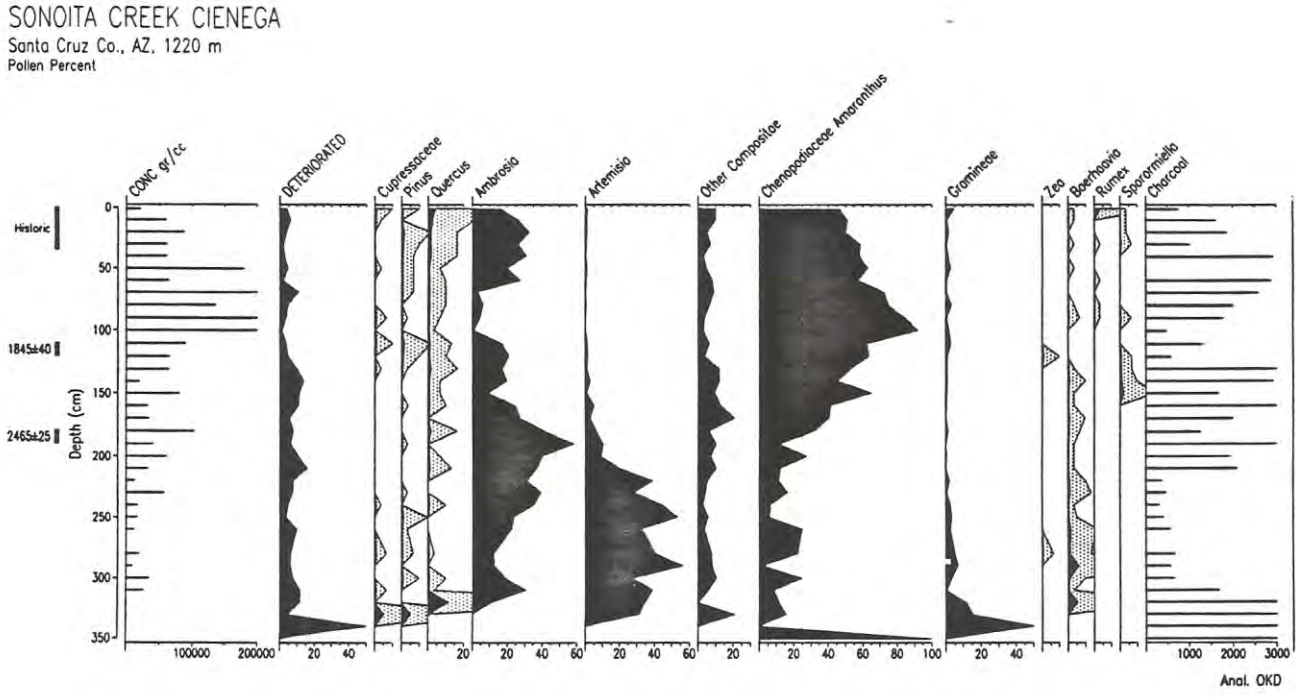


Figure 12. Plant macrofossil concentration diagram for the uppermost 55 cm of sediment of the core from Animas Creek, Mexico.

cm). Within the peat layer, *Rumex* (a weed) and *Sporormiella* percentages are elevated. Salix percentages increase from 12% at 20 cm to 110% at the surface, *Populus* reaches 18%, and *Rorippa* increases from 1% at 20 cm to 14% at the surface. Concurrently, charcoal declines from 1875% at 30 cm to 760% at the surface (Fig. 13, Appendix 5).

The pollen stratigraphy below the historic period is problematic. The chenopod curve, reaching a maximum at 90 cm, appears to match the chenopod curve of Animas Creek Cienega (Fig. 11), which would make the upper 100 cm of the core at least 5000 years old. Furthermore, the base of the Sonoita Creek profile could be of pre-Holocene age because sagebrush (*Artemisia*) dominates below 200 cm (Fig. 13). In contrast, the radiocarbon dates indicate an age of 1845±40 yr B.P. for the chenopod maximum rather than the age of 5320±80 yr B.P. for the maximum at Animas Creek. Contamination of the sediments by rootlets (which would leave younger carbon when they died) is possible; i.e., the Sonoita Creek ^{14}C dates could be thousands of years too young.

The plant macrofossil data (Fig. 14, Appendix 11) complement the pollen data. The steady increase of termite feces in near-surface sediment indicates an increase of woody vegetation that is mirrored in the gradual increase of *Salix* and *Populus* pollen. Macrofossil and pollen values also coincide for the historic increase in *Rubus*, *Rumex* and *Rorippa*. The Chenopodium (macrofossils) match the Chenopodiaceae-*Amaranthus* maximum percentages above 200 cm. However, macrofossils of elderberry (*Sambucus*) are present, but pollen of this plant is missing; and macrofossils of the weeds *Mollugo verticilata*, *Polygonum persicaria*, and *Portulaca oleracea*, are present from 75 - 165 cm even though their pollen is not. Deteriorated pollen percentages in this sediment interval reach 14%, so the missing weed pollen may have been degraded and overlooked. The weed macrofossils are consistent with human disturbance, lending credence to the late-Holocene radiocarbon dates for the sediment.



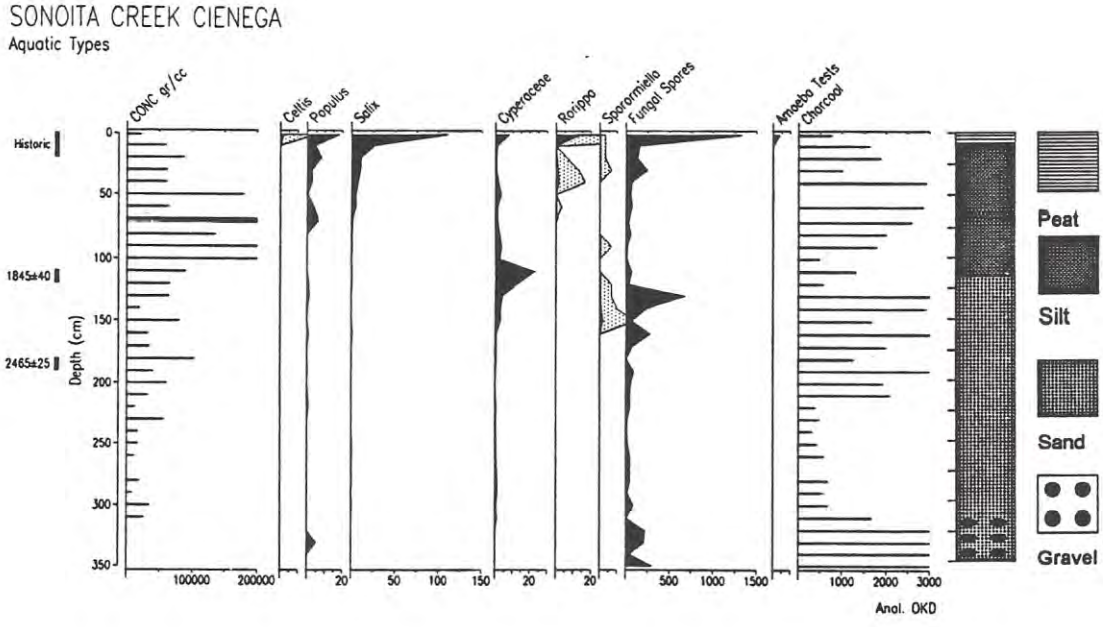


Figure 13. Percentage pollen diagram for Sonoita Creek Cienega, Mexico.

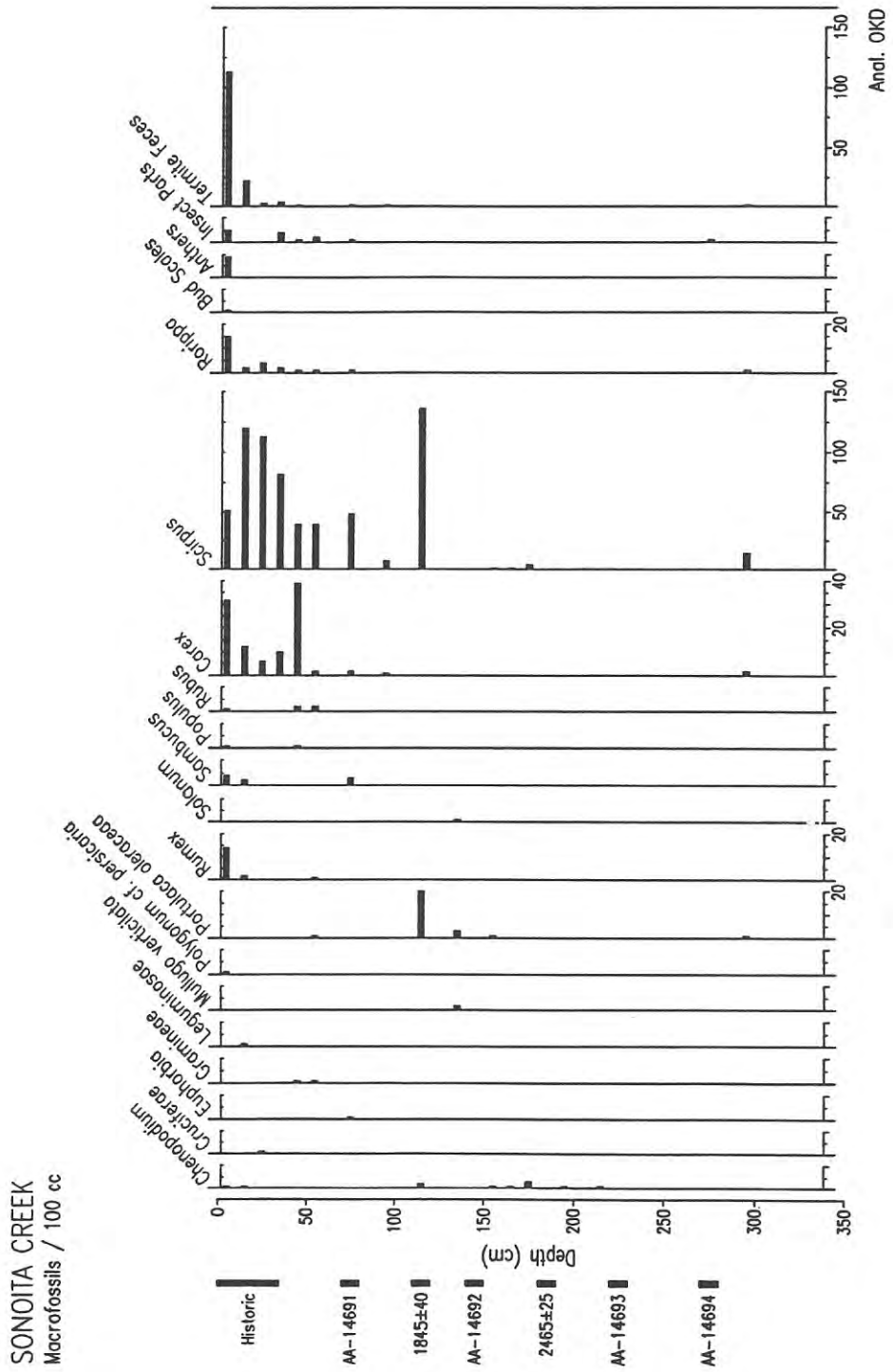


Figure 14. Plant macrofossil concentration diagram for Sonoita Creek Cienega.

ST. DAVID CIENEGA

St. David Cienega is a large (4.5 x 0.5 km) bulrush-dominated cienega (37° 51' N, 110° 31' W, elev. 1125 m) 7.5 km south of St. David, Cochise Co., Arizona. It is elongated north-south parallel to the San Pedro River channel, which is about 0.5 km to the west. This position and morphology probably indicate that the cienega's basin is a former channel of the San Pedro River, now ca. 5 m above the modern one. The wetter portions of the marsh are dominated by bulrush (*Scirpus americanus* or *S. olneyi)*, and cattail (*Typha domingensis*) grows in the springs. Cottonwood (*Populus fremontii*) and willow (*Salix* spp.) are sparsely scattered throughout the cienega, and mesquite (*Prosopis velutina*) and hackberry (*Celtis reticulata*) occur in groves west of the cienega. When cored, the cienega was surrounded by a dense stand of sunflowers (*Helianthus annuus*). Upland vegetation near the marsh is a mosaic of Chihuahuan Desert and semidesert grassland (Brown and Lowe, 1980; Brown, 1982).

The springs supplying water to the marsh may be fed by shallow aquifers of buried sands and gravels deposited by the washes draining the Whetstone Mountains 3 km west of the Cienega. If so, the moisture status of the marsh should be very sensitive to droughts. An abandoned railroad grade that crosses the cienega north-south dams the southernmost portion of the cienega. A large (10 x 10 m) pit or well, filled with over 2 m of water, appears to be the primary source of water to this portion of the Cienega.

St. David Cienega was cored on November 7, 1992 to a depth of 400 cm, ca 20 m east of the "well," in the southernmost part of the cienega. The sediment consists of clayey peat from 0 - 25 cm, with alternating layers of red and green clay to the base of the core at 400 cm. Two bands of sand are present at 388 and 397 cm (Fig. 15). Pollen preservation is poor below 250 cm, and the sediments below 300 cm are virtually barren (Appendix 6). Three radiocarbon dates on the sediment, at 75-90, 140-150, and 225-240 cm, are problematic because the lowest sample has the youngest ^{14}C age (Fig. 15, Appendix 1).

The pollen percentages of aquatic plants (Cyperaceae, *Rorippa*, *Salix*, and *Typha-Sparganium*) are highest in the peat, and charcoal declines from 2247% at 30 cm to 42% at the surface. The pollen of trees -- *Quercus*, *Prosopis*, and *Juniperus* -- increase above 30 cm (Fig. 15). The only certain exotic, *Cannabis* occurs above 30 cm (Appendix 6). Thus, the

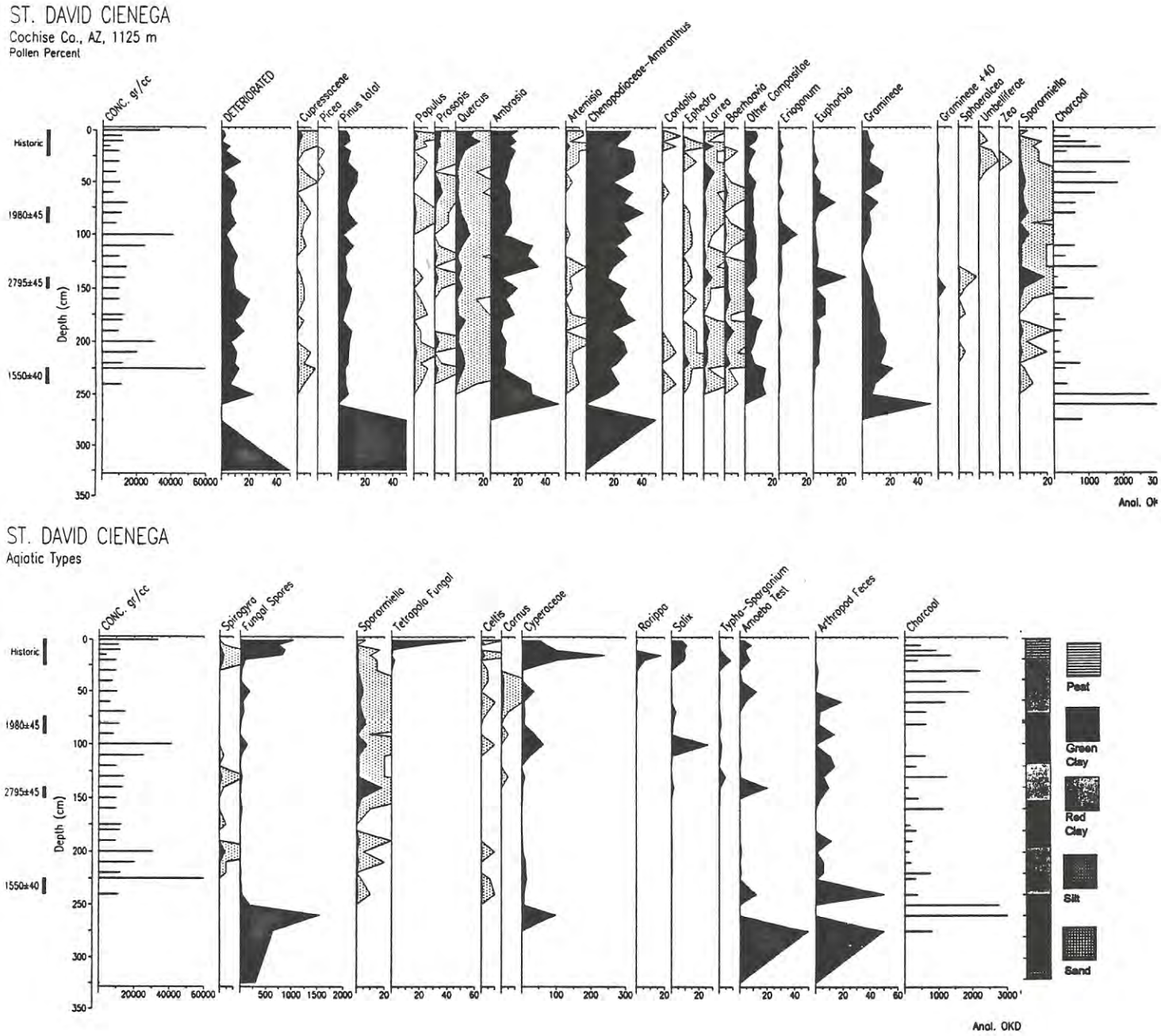


Figure 15. Percentage pollen diagram for St. David Creek Cienega, Mexico.

upper 30 cm of St. David Cienega is clearly of historic age.

Indications of vegetation disturbance also are common below 30 cm. Cupressaceae, *Prosopis*, and *Larrea* percentages increase toward the top of the diagram, and the weeds spiderling (*Boerhaavia*), buckwheat (*Eriogonum*), and spurge (*Euphorbia*) are consistently present. The dung fungus *Sporormiella* is most abundant at 140 cm and decreases above 30 cm. Thus, all 3 ^{14}C dates may be wrong, and the historic period at St. David Cienega may include most of the diagram (Fig. 15).

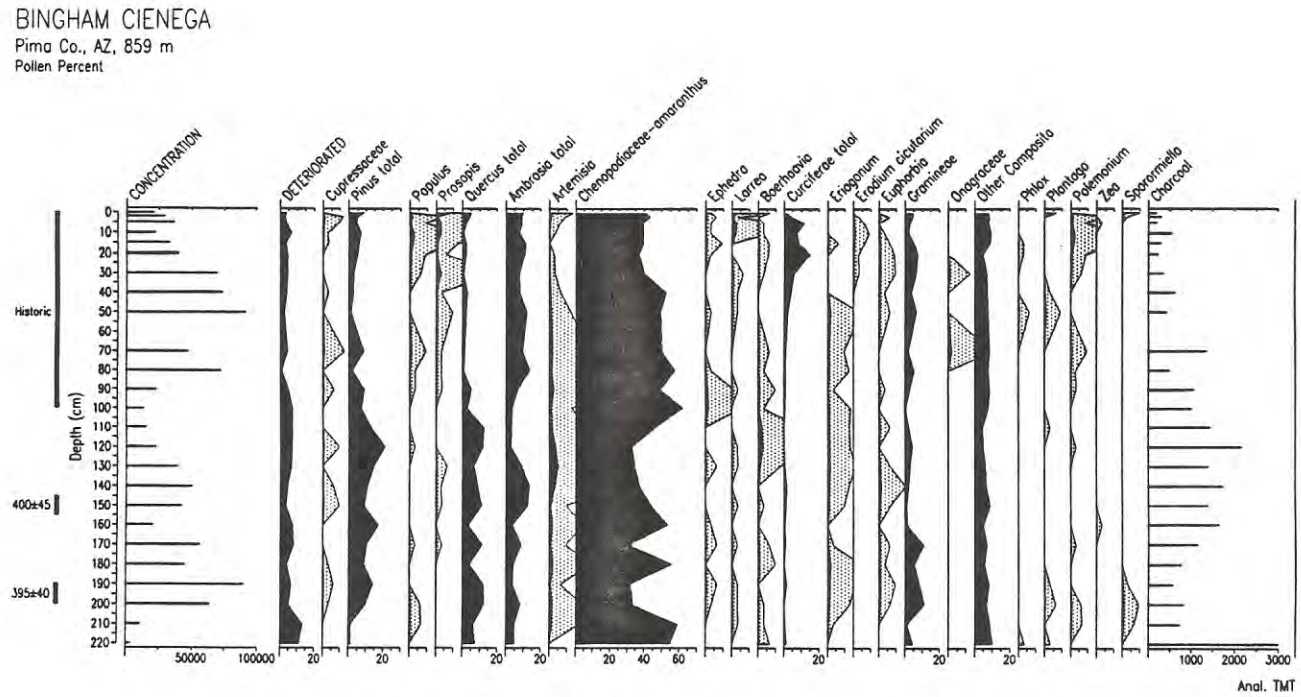
BINGHAM CIENEGA

Bingham Cienega is a complex of bulrush- and tree-dominated cienegas (32° 21' N, 110° 29' W, elev. 859 m), 18 km north of Redington, Pima Co., Arizona. The Cienega is on the west side of the San Pedro River Valley, just north of the mouth of Edgar Canyon which drains the Santa Catalina Mountains. Buried sands and gravels deposited by Edgar Canyon wash may supply water to the springs in Bingham Cienega. If so, the large drainage area of Edgar Canyon may provide a relatively permanent water supply to the cienega.

The wooded portion of cienega consists of a dense stand of ash (*Fraxinus velutina*), buttonbush (*Cephalanthus occidentalis*), hackberry, willow, and cottonwood. Large grape (*Vitis arizonica*) vines are common in the wooded area. The bulrush and cattail portion of the cienega consist of abandoned fields that are watered by surface flow from the springs. The upland vegetation near the cienega is Sonoran desert scrub dominated by creosote bush (*Larrea divaricata*), paloverde (*Cercidium microphyllum*), acacia (*Acacia constricta, A. greggii*) and mesquite.

Bingham Cienega was cored on November 8, 1992, to a depth of 250 cm, in a densely-wooded area 200 - 300 m north of the Jack and Lois Kelly ranch house. The sediments are black clay from 0 - 33 cm, gray clay from 33 - 73 cm, and alternating silt and sand layers from 73 - 250 cm (Fig. 16).

Pollen percentages of several wetland taxa increase in the black clay: button bush (*Cephalanthus*), *Fraxinus*, *Rorippa*, *Salix*, and *Typha-Sparganium*. *Prosopis*, and *Larrea* pollen increases in this unit, as do the weeds Cruciferae and filaree (*Erodium cicutarium*). However, the decline of charcoal percentages begins between 80 and 70 cm, at the base of the gray



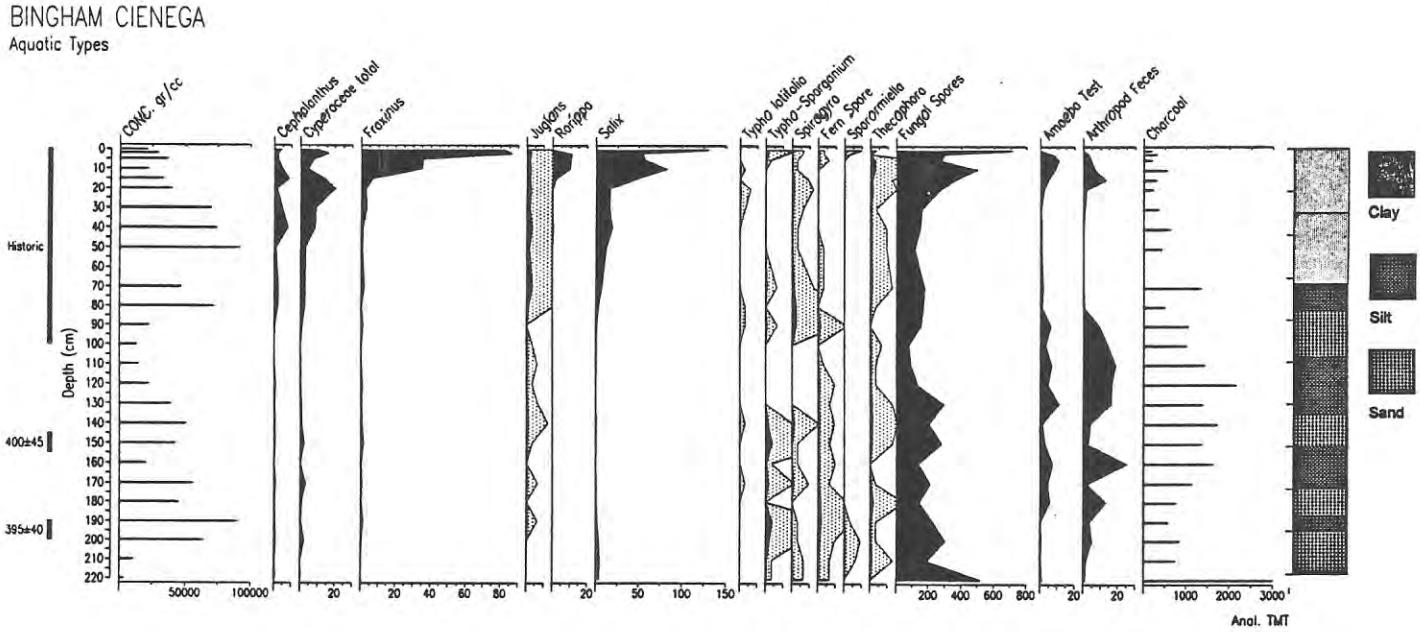


Figure 16. Percentage pollen diagram for Bingham Creek Cienega, Mexico.

clay, and the increase in wetland types begins, albeit gradually, at that depth (Fig. 16, Appendix 7). Thus, the historic period of the profile (Fig. 16) consists of an early period when charcoal declines and *Prosopis*, *Ambrosia*, Cyperaceae and walnut (*Juglans*) increase, and a later period when woody cienega vegetation expands.

The radiocarbon dates for the lower sediments are entirely consistent with palynological indications of disturbance and the introduction of exotic taxa (*Erodium cicutarium*). Bingham Cienega provides an excellent record of the post-settlement upland and wetland vegetation change.

COOKS LAKE

Cooks Lake is a large cienega consisting of open water and wooded and herbaceous vegetation on the east side the San Pedro River Valley, below its confluence with Aravaipa Creek. Water for the cienega comes as spring flow ultimately supplied by Aravaipa Creek (Watt, 1992). The cienega is on the grounds of Camp Grant, established in 1860, under the command of Lieutenant J.R. Cooke (Muffley, 1938).

The core was taken November 18, 1993, in an open portion of the Cienega, upstream (south) of a dike (Watt, 1992) across the cienega. Vegetation in this opening is bulrush, other sedges, and occasional cattail. The surrounding trees are *Populus*, *Fraxinus*, *Salix*, and *Cephalanthus*. The nearby upland vegetation is Sonoran desert scrub dominated by creosote bush (*Larrea divaricata*), paloverde (*Cercidium microphyllum*), acacia (*Acacia constricta, A. greggii*) and mesquite. Fields encroach on the cienega to the east and south, and portions of the marsh north of the coring site have been cleared.

The sediments are alternating silts and peats, with peat units from 0-33 cm, 52-68 cm, and 134-160 cm. The general features of the pollen stratigraphy are very similar to Bingham Cienega, and the radiocarbon dates are concordant (Fig. 16). Charcoal is abundant at the base of the diagram, dropping from 3976% at 120 cm to 104% at 100 cm. Above 120 cm the pollen of juniper, *Larrea*, and *Prosopis* increase, and the dung fungus *Sporormiella* is present. Weedy types such as Cruciferae *Euphorbia*, and *Rumex* are sporadically present above 120 cm.

The pollen of wetland plants has a complex history with peak values for several types

in the silt layer from 68-134 cm. These include the planktonic algae *Botryococcus* and *Pediastrum*, *Azola* spores, and *Spirogyra*, which indicate standing water, probably a "lake" during Camp Grant time. The "lake" was surrounded by cattail (*Typha latifolia* and other *Typha* species) and buttonbush (*Cephalanthus*), whose pollen is very abundant in the "silt layer" (Fig. 17, Appendix 8).

In the overlying peat layer (52-68 cm), the indicators of open water decline and *Salix* pollen reaches 170% as the lake filled or dried and willows occupied the site. The silt layer (52-33 cm) may represent flood deposits, or possibly the construction of the dike downstream from the coring site. Construction of the dike could explain the decline of willow, due to flooding, and the brief increase in *Spirogyra* and *Azola* spores (standing water indicators) after the decline of *Salix*.

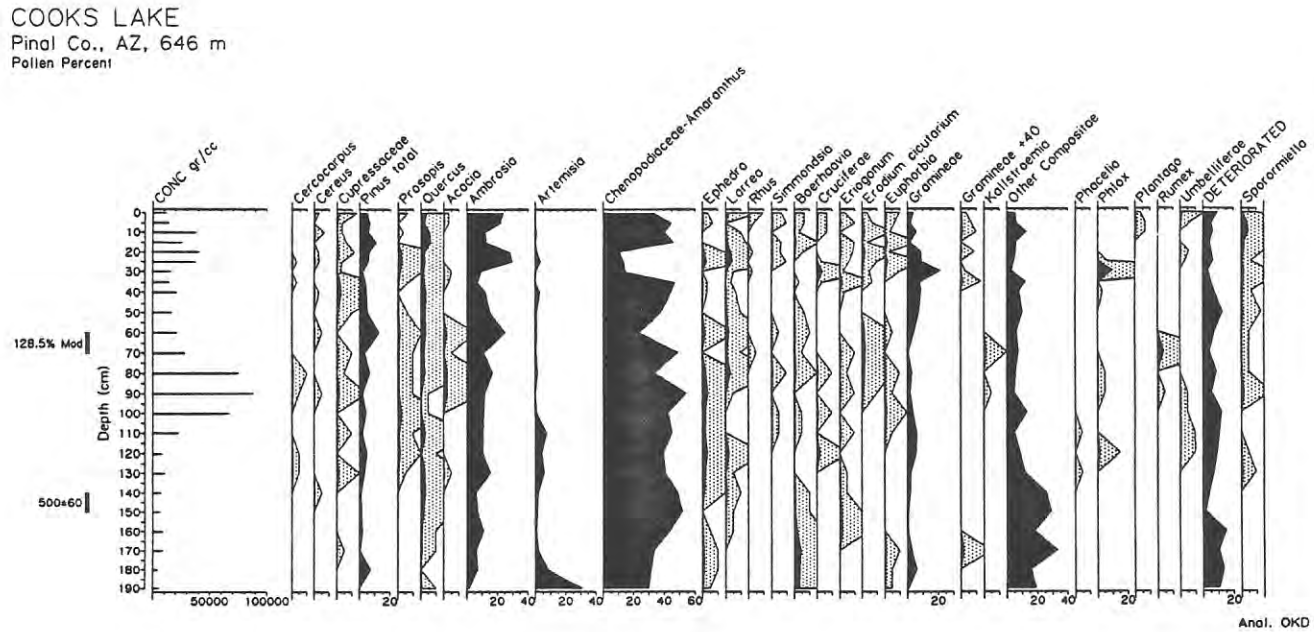
THE HISTORY OF WETLAND VEGETATION

All 7 cienegas have experienced marked expansion of wetland taxa, both woody and herbaceous, during the historic period, and in all instances these expansions are accompanied by decreased charcoal percentages. The history of post-Columbian vegetation change in the wetlands appears to be closely linked with fire history, but the cause of changes in fire history - human and climatic - is not clear from the fossil record. Evidence for human use of the cienegas will be discussed in a separate section. Prehistoric change in the wetland vegetation also is evident, but its timing and intensity vary among sites.

PREHISTORIC WETLAND CHANGE

The 7 cienegas vary in their antiquity from millennia to centuries. With the possible exception of Saracache Cienega, the historic increase is the greatest change of wetland vegetation recorded. Earlier expansions of aquatic vegetation (higher pollen percentages) occur at 300-500 yr B.P., ca, 1400-1800 yr B.P., and ca. 3000 yr. B.P.; with drying ca. 5300 yr. B.P. These events show no systematic relationship to decreased or increased charcoal percentages.

An expansion of aquatic vegetation can be seen at Saracache Cienega (Fig. 8) in the



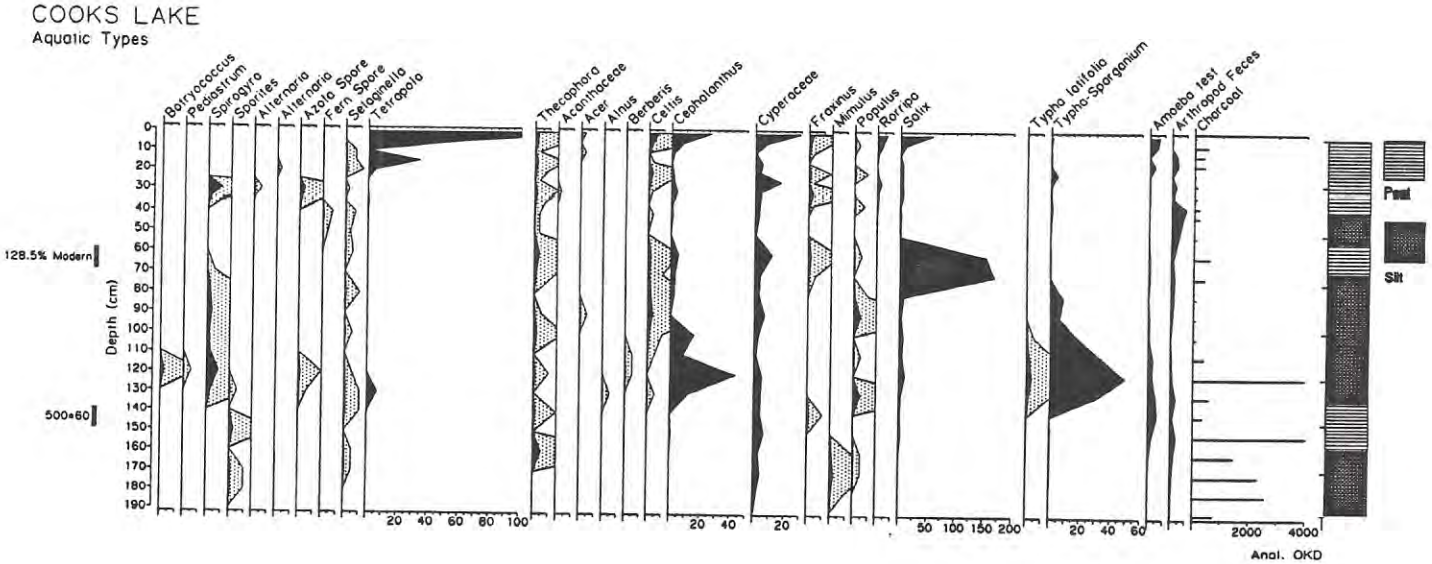


Figure 17. Percentage pollen diagram for Cooks Lake Cienega, Mexico.

maximum of *Populus* percentages immediately below the historic period (ca. 300 yr B.P.), in the increases of Celtis, Fraxinus and Juglans at 80 cm (1260±60 yr B.P.), and in higher percentages of Cyperaceae and Salix at 110 cm (UGa 7008). Late pre-historic (400±45 yr B.P.) wetland expansion also is reflected in the higher *Typha-Sparganium* and *Spirogyra* percentages at Bingham Cienega (Fig. 16); and in the dramatic expansion of *Cephalanthus*, *Typha latifolia* and *Typha-Sparganium* above the date of 500±60 yr B.P. at Cooks Lake (Fig. 17). Given the potential problems with radiocarbon dates, these events could be coincident at the 3 sites.

Animas Creek Cienega has a long record of abundant aquatic vegetation that varies through time. The minute aquatic fern, *Azola* is abundant from 200 - 100 cm (above a date of 3130±80 yr B.P.), coincident with the presence of horsetail (*Equisetum*), and *Isoetes*. None of these taxa are represented in sediments of historic age, nor is *Lycopodium*, present from 340-360 cm. *Populus* becomes relatively abundant at the base of the diagram (7030±80 yr B.P., Fig. 11), but this is in the sand with very low pollen concentration -- possibly a flood deposit. At ca. 400 cm (5310±80 - 7030±80 yr B.P.) deteriorated pollen and fungal spore percentages are high, suggesting desiccation, a similar event also appears at Los Fresnos (Fig. 9), bracketed by dates of 2350 and 6510 yr B.P.

Sonoita Creek Cienega exhibits (Fig. 13) a gradual increase of the pollen of wetland plants preceding the historic period, and an interval of elevated Cyperaceae pollen from 130 - 100 cm (1845±40 yr B.P.). Expansion of Cyperaceae and *Salix* at St. David Cienega (Fig. 15) may be slightly older (1980±45 yr B.P.).

HISTORIC WETLAND CHANGE

In comparison to the variable timing and magnitude of prehistoric changes, the historic shift of wetland vegetation is highly similar among all 7 cienegas. All diagrams (Fig. 18) record an expansion of sedge (Cyperaceae) pollen in the uppermost samples from 3% prior to expansion to a high of 238% of upland pollen at St. David Cienega (Table 2, Fig. 18). At Saracache and Los Fresnos, the Cyperaceae increase is a monotonic, but in the other cienegas the percentages fluctuate.

During the historic period, the pollen of woody plants increases at most sites (Fig. 18).

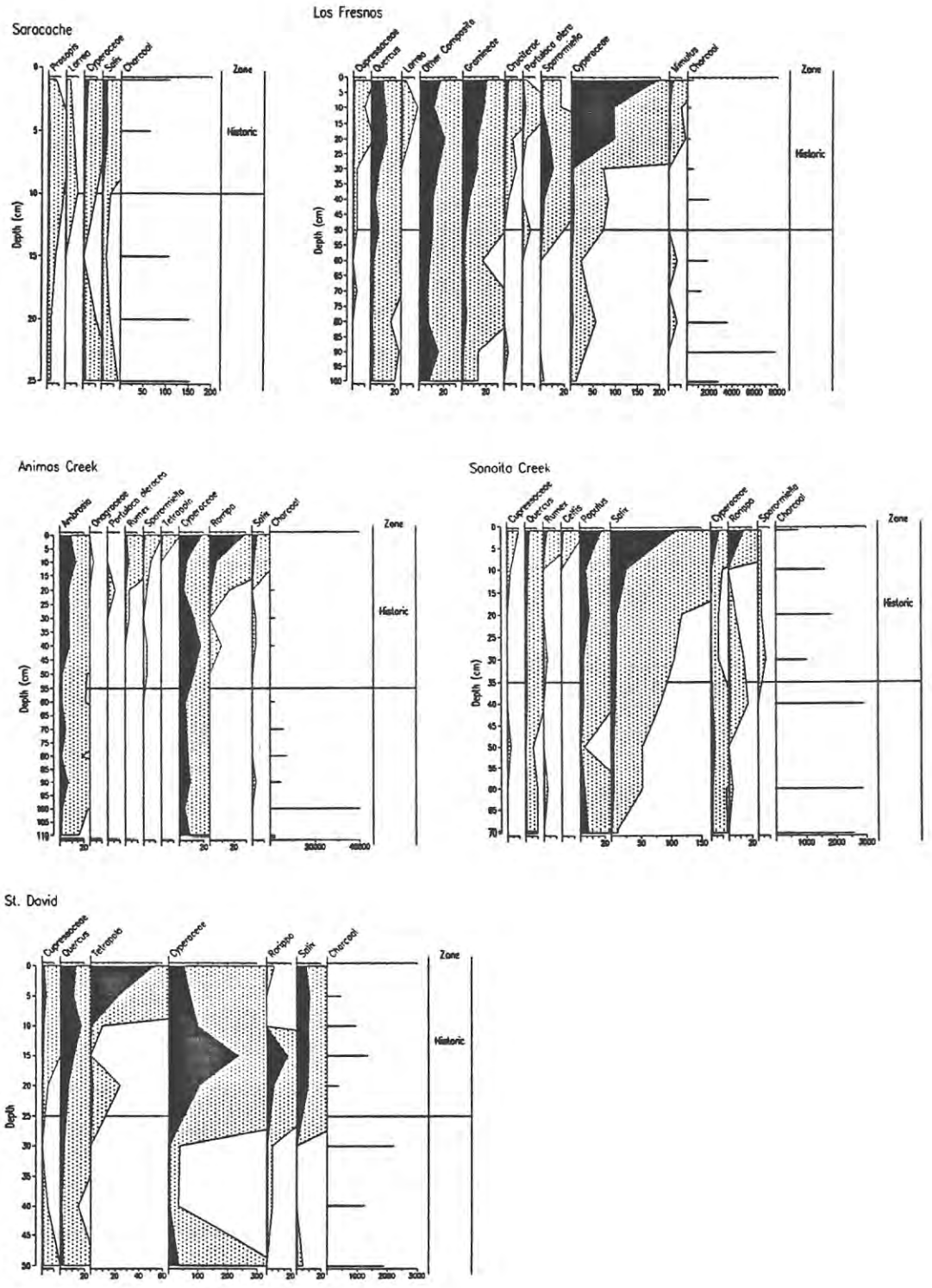
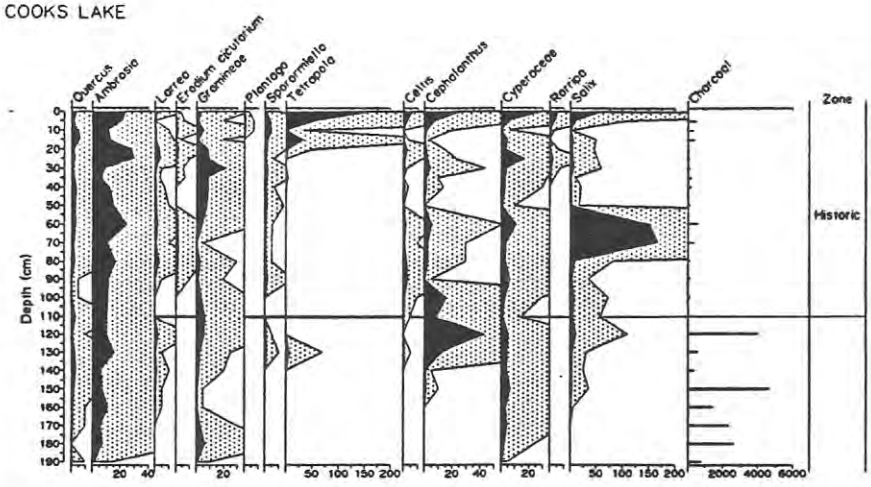


Figure 18. Percentage pollen diagrams for Borderland cienegas showing historic vegetation change in selected upland and wetland pollen types.

COOKS LAKE



BINGHAM CIENEGA

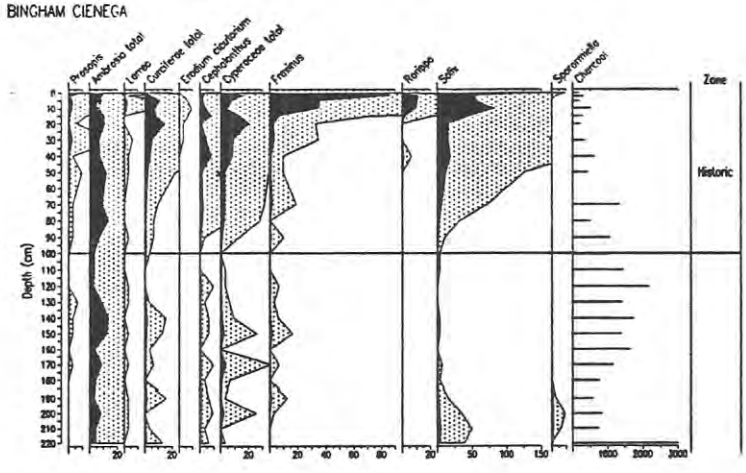


Figure 18 (continued).

TABLE 2. WETLAND TAXA INCREASING DURING THE HISTORIC PERIOD.

	Site	Transition Depth (cm)	Pre-Hist %	Historic Max %
Celtis				
	Sonoita Creek	35	0	2
	Cooks	110	1	7
Cephalanthus				
	Bingham	100	1	9
	Cooks	110	1	27
Fraxinus				
	Bingham	100	1	81
Populus				
	Sonoita Creek	35	3	18
Salix				
	Saracache	10	1	4
	Animas Creek	55	2	27
	Sonoita Creek	35	8	110
	St. David	25	1	11
	Bingham	100	1	129
	Cooks	110	4	59
Cyperaceae				
	Saracache	10	1	4
	Los Fresnos	50	8	193
	Animas Creek	55	13	123
	Sonoita Creek	35	2	8
	St. David	25	3	238
	Bingham	100	1	23
	Cooks	110	1	30
Mimulus				
	Los Fresnos	50	0	3
Rorippa				
	Animas Creek	55	1	34
	Los Fresnos	50	0	3
	Sonoita Creek	35	2	14
	St. David	25	0	18
	Bingham	100	0	11
	Cooks	110	1	6

The expansion of *Salix* is most frequent, it increases (up to 129% at Bingham Cienega) in 6 of the 7 cienegas. Hackberry (*Celtis*) and buttonbush (*Cephalanthus*) increase in the pollen diagrams of 3 cienegas, and *Fraxinus* and *Populus* pollen increase at 2 (Fig. 18). Watercress (*Rorippa*) is the most common (after Cyperaceae) herb to expand, it increases at 5 sites (reaching 34% at Animas Creek). Both native and introduced species of *Rorippa* are found in Arizona, and the seeds of the introduced *Rorippa nasturtium-aquaticum* L. and one other *Rorippa* species are found as macrofossils (Figs. 10, 12, 14).

The increase in aquatic vegetation appears to have been accompanied by an increase in the biomass of decaying vegetation. Percentages of fungal spores increase at all cienegas, in some cases dramatically (Table 3). Identification of fungal spores is difficult, and fungi have many different ecological roles. However, the spores of the saprobe (living on decaying plant tissue) *Tetrapola* are distinctive, and it increases during the historic period at 3 cienegas (Table 3, Fig. 18).

During the historic period, the dung fungus *Sporormiella* shows moderate increases in 5 cienegas, indicating that grazing impacted those cienegas. The low percentages of *Sporormiella* at Bingham Cienega are difficult to explain. Cattle are excluded from the area today, but it is unlikely that they have been absent throughout the historic. The abundance of *Sporormiella* in prehistoric sediments at Saracache (Fig. 8) and St. David (Fig. 15) cienegas is problematic because its initial increase occurs in sediments dated greater than 1000 yr B.P. In both cienegas, the *Sporormiella* increase coincides with declining charcoal percentages. Possibly, the radiocarbon dates for both sites are wrong.

THE HISTORY OF FIRE IN THE WETLANDS

Four lines of evidence indicate that fire frequency is causally associated with the historic transformation of wetland vegetation in the Borderland. First, in all sites the historic increase of the pollen of various wetland plants coincides with the decrease in the presence of microscopic charcoal (Figs. 8-18). In most cases the decrease is 100-fold (Table 3). Prior to the historic decline, charcoal is the most abundant particle in the pollen preparation. After the decline, its abundance is approximately equal to that of the pollen. Second, the surface sediments at all cienegas generally contain much more organic material (peat) than lower

TABLE 3. CHANGE IN CHARCOAL AND FUNGAL SPORE PERCENTAGES DURING THE HISTORIC PERIOD.

	Site	Transition Depth (cm)	Pre-Hist %	Historic Max %
CHARCOAL				
	Saracache	10	136	109
	Los Fresnos	50	3659	563
	Animas Creek	55	2031	260
	Sonoita Creek	35	2930	760
	St. David	25	2247	42
	Bingham	100	1452	192
	Cooks	110	3976	33
Sporormiella				
	Los Fresnos	50	0	11
	Animas Creek	55	1	2
	Sonoita Creek	35	0	1
	Bingham	100	0	1
	Cooks	110	1	5
Tetrapola				
	St. David	25	0	54
	Animas Creek	55	0	30
	Cooks	110	0	161
Total Fungal Spores				
	Saracache	10	27	109
	Los Fresnos	50	284	330
	Animas Creek	55	89	2946
	Sonoita Creek	35	58	1327
	St. David	25	252	10922
	Bingham	100	146	701
	Cooks	110	71	481

sediments (Figs. 8-18). This implies that the cessation of burning resulted in the build-up of senescent vegetation. Post-depositional decay might reduce the organic matter content in deeper sediment and produce the same trend, but the fungal spore percentages indicate otherwise. Third, the historic increase of fungal spores, including the saprobe *Tetrapola*, indicates an increase of senescent vegetation. These fungal spores are more resistant than the ordinary plant tissue comprising the peat, so their increase cannot be attributed to post-burial decay. The fungal spore increase confirms the sedimentary indication of the build up of dead plant tissue. Finally, at Los Fresnos and Sonoita Creek, carbonized macrofossils of aquatic plants are common before the historic period (Figs. 10, 12), proving that wetland plants burned.

Without calibration studies, the frequency of burning cannot be estimated from the charcoal frequency alone. However, based on the post-burning release, burning must have been frequent enough to prevent woody plants and bulrush from completing their life cycle, and intense enough to eliminate the build-up of dead plant tissue. Annual burning is likely.

THE HISTORY OF UPLAND VEGETATION

Historic vegetation change is evident at all 7 cienegas, but the taxa involved vary among sites. Primarily, the native taxa that increase are those noted in previous studies of historic vegetation change (Davis and Turner, 1987; Davis, 1990): juniper, *Larrea*, *and Prosopis* (Table 4). However, oak (*Quercus*) can be added to this list for 4 of the sites. The expansion of oak, coincident with the decline of charcoal, suggests a causal connection and an alternative explanation to historic vegetation change recorded photographically for "the changing mile" (Hastings and Turner, 1965) of desert grassland vegetation.

Of the several alternate explanations for historic vegetation change discussed by Hastings and Turner (1965), changing fire frequency was dismissed because there was "no quantitative evidence that either natural or man-induced burning occurred often enough or over wide enough areas" (Hastings and Turner, 1965, p. 286). The sedimentary changes, charred macrofossils, and charcoal percentages of the 7 cienegas (Figs 8-18) are proof of frequent burning that declined significantly from prehistoric levels. Possibly, the desert grassland owes its existence to pre-Columbian fires, and its historic invasion by woody

TABLE 4. UPLAND TAXA INCREASING DURING THE HISTORIC PERIOD.

	Site	Transition Depth (cm)	Pre-Hist %	Historic Max %
Cupressaceae				
	Los Fresnos	50	1	2
	Sonoita Creek	35	0	1
	St. David	25	0	4
Quercus				
	Los Fresnos	50	4	10
	Sonoita Creek	35	2	4
	St. David	25	2	14
	Cooks	110	1	7
Larrea				
	Saracache	10	0	1
	Los Fresnos	50	0	1
	Bingham	100	1	3
	Cooks	110	1	5
Prosopis				
	Saracache	10	1	2
	Bingham	100	1	9
Erodium cicutarium				
	Bingham	100	0	1
	Cooks	110	0	3
Portulaca oleracea				
	Los Fresnos	50	0	3
	Animas Creek	55	0	1
Plantago				
	Cooks	110	0	1
Rumex				
	Animas Creek	55	0	3
	Sonoita Creek	35	0	4
Ambrosia				
	Animas Creek	55	2	12
	Bingham	100	4	10
	Cooks	110	8	33
Other Compositae				
	Los Fresnos	50	11	17
Gramineae				
	Los Fresnos	50	6	20
	Cooks	110	2	28
Cruciferae				
	Los Fresnos	50	1	9
	Bingham	100	1	17
Onagraceae				
	Animas Creek	55	0	2

species may result from decreased fire frequency.

The pollen and macrofossils of many herbaceous taxa increase during the historic period. *Erodium cicutarium* and *Portulaca oleracea* are present in the pollen record (Table 4), as are 7 other genera and families that contain many introduced weeds. The plant macrofossil data expand the list of weeds to include *Euphorbia*, *Melilotus*, *Mollugo verticilata*, *Polygonum cf. persicaria*, *Polygonum cf. aviculare*, *Portulaca oleracea*, *Potentilla*, *Rumex*, and *Verbena hastata*. These weeds have changed the nature of wetland and upland vegetation during the historic period. Their declined abundance in surface sediment at several sites, attest to the effects of reduced disturbance, indluding burning, in recent years.

In addition to changing fire frequency and invading exotics, the pollen record reflects the increased herbivore pressure in the increased *Sporormiella* percentages. Significantly, 3 cienegas record elevated percentages of *Sporormiella* during the prehistoric -- Saracache, Sonoita Creek, and St. David (Fig. 18). These elevated percentages may attest to the importance of Borderland cienegas as wildlife habitat, or to ^{14}C errors.

Substantial prehistoric change in the upland vegetation is recorded for Los Fresnos, Animas Creek, and Sonoita Creek Cienegas. At Sonoita Creek, the interpretation is made uncertain by the radiocarbon dating. However, the Los Fresnos, Animas Creek diagrams (Figs. 10, 12) provide a valuable additions to the understanding of Holocene vegetation change in the Borderland. The Los Fresnos diagram is similar to the records at Lehner Arroyo (Mehringer and Haynes, 1965), Murray Springs (Mehringer et al., 1967) and Double Adobe Arroyo (Martin, 1963a). Although the pollen sequence at these three is internally consistent, their radiocarbon chronologies are different.

The Los Fresnos chronology matches that of Double Adobe Arroyo for the mid-Holocene; i.e., peak *Ambrosia* percentages at ca. 5000 yr B.P. However, due to its environmental setting, Los Fresnos has not dried periodically like Lehner, Murray Springs, and Double Adobe. Hence, its pollen preservation is better and is record more continuous than those sites. The Los Fresnos diagram (Fig. 10) shows a gradual increase of aquatic pollen types and a decline in *Ambrosia* percentages above 230 cm, bracketed by dates of 2350 and 6510 (Appendix 1).

A date of 5310±80 marks similar events in the Animas Creek core (Fig. 11): maximum Chenopodiaceae-*Amaranthus* percentages, and the beginning a gradual but continuous

increase in the pollen percentages of wetland plants. In general, the dominant type (*Ambrosia* for Los Fresnos and Chenopodiaceae-*Amaranthus* for Animas Creek) are xeric indicators for the respective elevations of these sites. Thus, the trends of upland and wetland vegetation at Los Fresnos and Animas Creek support a maximum of mid-Holocene aridity about 5000 yr B.P.

PREHISTORIC HUMAN DISTURBANCE OF THE WETLANDS

The effect of changing fire frequency on wetland vegetation seems certain, and the correspondence of declining charcoal frequency with the expansion of woody vegetation suggests a causal connection of fire to upland vegetation change, as well. However, the reason for changing fire (i.e. charcoal) frequency cannot be assessed directly. Historic records indicate frequent burning by indians, and they mention deliberate and accidental burning of valley vegetation by European settlers (Davis, 1982).

One pollen type, corn (*Zea*), provides an indication of long-term human involvement with the Cienegas. *Zea* occurs at 5 of the 7 cienegas, the oldest *Zea* pollen dated ca. 3400 yr B.P. at Animas Creek. The presence of *Zea* pollen in cienega sediment also has been reported at Hassayampa preserve (Davis, 1990), and at Babocomari, in the San Pedro River Drainage (Davis, 1990).

There is no ethnographic evidence for the cultivation of corn in cienegas, but the *chiapas* (artificial, floating islands) of Mexico had saturated soil at depth, so some races of prehistoric *Zea* would have been able to grow in cienegas.

Indians had many reasons for burning, among them was landscape management. If cienega margins were important for corn cultivation, burning may have been a means for clearing senescent plant growth, eliminating competing plants, and releasing nutrients.

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APPENDIX I. RADIOCARBON DATES

ST. DAVID CIENEGA 37° 51′ N, 110° 31′ W, elev. 1125 m, 7.5 km south of St. David, Cochise Co., Arizona.

75-90 cm	UGa 6848	1980 ± 45	-16.156
140-150 cm	UGa 6849	2795 ± 45	-13.228
225-240 cm	UGa 6850	1550 ± 40	-13.264 (700 mg)

BINGHAM CIENEGA 32° 21′ N, 110° 29′ W, elev. 859 m, 18 km north of Redington, Pima Co., Arizona.

145-155 cm	UGa 6852	400 ± 45	-25.111
190-200 cm	UGa 6853	395 ± 40	-23.168

SONOITA CR. CIENEGA 32° N, 110° 46′ W, elev. 1220 m, 5 km southwest of Pategonia, Santa Cruz Co., Arizona.

70-80 cm	AA-14691		
110-120 cm	UGa 6854	1845 ± 40	-26.078
140-150 cm	AA-14692		
180-190 cm	UGa 6855	2465 ± 25	-23.830
220-230 cm	AA-14693		
270-280 cm	AA-14694		

LOS FRESNOS CIENEGA 31°18′ N, 110°20′W, 1510 m elev., 50 km north of Cananea, Sonora, Mexico.

80-90 cm	UGa 7010	1120 ± 80
200-210 cm	UGa 7009	2350 ± ??
270-280 cm	UGa 7011	6510 ± ??.

SARACACHE CIENEGA 30°28′ N, 110°32′W, 3145 m elev., 50 km east of Cucurpe, Sonora, Mexico

75-85 cm	UGa 7007	1260 ± 60
100-110 cm	UGa 7008	

ANIMAS CR. CIENEGA 31°31′ N, 108°55′W, 1562 m elev., 40 km south of Animas, Hidalgo Co., New Mexico.

150-165 cm	UGa 7034	3030 ± 80
260-270 cm	UGa 7033	4770 ± 80
350-365 cm	UGa 7035	5310 ± 80
440-455 cm	UGa 7036	7030 ± 80

COOKS LAKE 32° 51′ N, 110° 42′ W, elev. 646 m, 16 km south of Winkelman, Pima Co., Arizona.

60-70 cm	UGa 7044	128.5 ± 0.5 pMC Modern
140-150 cm	UGa 7045	500 ± 60