

BOSQUE LANDSCAPE ALTERATION WORKSHOP

May 25, 2004

Sponsored by: Utton Transboundary Resources Center

AGENDA

- I. Welcome, Marilyn O'Leary, Director, Utton Transboundary Resources Center, Susan Kelly, Workshop organizer.
- II. Roadmap of the day, Chris Garcia, Facilitator
- III. Presentation of proposal for Bosque Landscape Alteration by Cliff Crawford and Sterling Grogan
- IV. Initial discussion of proposal by all participants
- V. Breakout groups on:
 - Fire reduction (Yasmeen Njami)
 - Water depletion (William Fleming, Ross Coleman)
 - Bosque restoration (Sterling Grogan)
- VI. Breakout groups report back
- VII. Identification of a meaningful set of objectives, requirements and approaches that all present basically agree on and can endorse.

This report contains:

- A summary of Cliff Crawford and Sterling Grogan's presentations of their "Proposal for bosque landscape alteration that will reduce fires and conserve water." The proposal was distributed in hard copy at the Workshop and to most participants electronically in advance.
- The notes from the opening and closing plenary sessions of the Workshop. These were gleaned from the flip-charts and from the very able notes taken by three student reporters, Brian Eagan, Geoff Klise, and Paul Bossert, whose efforts are much appreciated.

These comments, whenever they were made, are grouped by topic under the headings of the Proposal Outline that framed the discussion (See Crawford presentation). Comments received via e-mail in response to the mailing of the first draft of these notes are also included here, identified by an italicized *comment on draft*: Thank all of you who took the time to make these thoughtful observations! Reclamation's comments were received after the final Notes were ready for circulation. These valuable comments have been incorporated in the notes below, but were not available, and therefore not considered, when the Outline was rewritten. However, a number of the Reclamation issues were raised by others and addressed in the revision.
- The notes for the three break-out groups, taken from their flip-charts, reports to the plenary session, and notes taken by the reporters, who each joined one breakout group.

Attached to this e-mail are:

The original Proposal for Bosque Landscape Alteration

The Workshop's Product—"Bosque Landscape Alteration: Revised Outline of Basic Principles," that attempts to incorporate the comments of Workshop participants.

The Utton Center, Cliff Crawford and Sterling Grogan thank all those who spent May 25th making this a Workshop in the real sense of the word, and those who responded to the initial mailing with such rich commentary. We feel the revised outline is an important product with many valuable uses.

NEXT STEPS

In the initial distribution of these notes, recipients were asked if they could endorse the Outline of Basic Principles. The responses to this request were thoughtful and insightful, and have enriched the revised Outline. However, it became apparent that *endorsement* is a political and legal action that involves considerations beyond the scope of this Workshop, which does not seek to achieve any binding agreement, but simply to present a widely-shared view. The Utton Center thanks those who did endorse the Outline, as well as those who identified the changes that would have to be made before they could endorse the document. Workshop sponsors considered all of these comments and attempted to be responsive to them in the revision of the Outline. However, it should not be implied that the revisions answer all of the needs of the commentors.

The revised Outline of Basic Principles will be made available to policy-makers, educators, administrators, and the public as a widely-accepted, though unofficial, statement of the views of professionals regarding bosque landscape alteration policy. The intent is to clarify, enlighten, and inform New Mexico's ongoing bosque policy development. Participants are welcome to use it in this manner as well. The Workshop's product is already being put to use in this fashion:

- At the Workshop, the Corps of Engineers expressed its intention to use the Outline of Basic Principles to help structure its Bosque Revitalization Project.
- The MRGCD intends to use the Outline of Basic Principles as guidelines for its joint management activities with the City of Albuquerque in the Rio Grande Valley State Park.

The Workshop sponsors continue to welcome any discussion of these issues. The revised Workshop notes will be posted on the Utton Center website, <http://uttoncenter.unm.edu> and additional comments will be added from time to time.

I. BOSQUE LANDSCAPE ALTERATION WILL REDUCE FIRES AND CONSERVE WATER: A PROPOSAL

Cliff Crawford, Department of Biology, The University of New Mexico
Sterling Grogan, Middle Rio Grande Conservancy District

Cliff Crawford outlined and illustrated the proposal's objectives, basic requirements for achieving the objectives, and suggested approaches for implementing the basic requirements. This outline became the framework for the day's discussion. The initial outline was:

OBJECTIVES

1. To reorganize the Rio Grande bosque's landscape to resemble, within current constraints, its historical condition.
2. To recreate, by doing this, its former patchy mosaic of native riparian trees and open spaces along the present-day river's narrow active floodplain.
3. To reduce, by having created this mosaic, the frequency and intensity of bosque wildfires, and landscape water depletion by bosque evapotranspiration (ET).

BASIC REQUIREMENTS FOR ACHIEVING THE OBJECTIVES

1. Maintain wet soils at appropriate seasons for native tree recruitment and maintenance.
2. Manage the landscape for habitat diversity: biological diversity will follow.
3. Construct wetlands inside – and where possible outside – the levee system.
4. Ensure a sustained program of bosque research and monitoring.

SUGGESTED APPROACHES FOR IMPLEMENTING THE BASIC REQUIREMENTS

1. Remove dead and down invasive trees to the extent possible.
2. Retain but thin out most native trees, leaving enough standing dead for wildlife.
3. Create uneven-aged stands of native trees by overbank flooding, pole planting, selective watering, landscape lowering, and side-channel construction.
4. Create an irregular and internally thinned woodland patch mosaic with relatively large, interspersed open spaces (native grasslands and shrublands).
5. Encourage use of citizen volunteers to assist with aspects of bosque landscape alteration and with ecosystem monitoring.
6. Manage the operation and its aftermath in an integrated and ecosystem-based manner.
7. Conduct periodic external evaluations of the ecological effects of the entire process.

ROLE OF THE MRGCD

Co-author, Sterling Grogan, Biologist for the Middle Rio Grande Conservancy District, spoke about the role of the Conservancy District in the bosque landscape. He noted that:

- “Restoration” of the bosque = Restoration of ecosystem functions, NOT creation of a particular previous landscape
- Endangered species, urbanization are new challenges for the 70 year-old MRGCD water delivery system
- Most bosque outside the Pueblos is owned by the MRGCD
- Old MRGCD facilities provide valuable services and secondary benefits:
 - Ground water recharge, wildlife habitat
 - Recreation, open space, better quality of life

Grogan contrasted the original mission of the Conservancy District, which was drainage, flood control and irrigation, with today’s Conservancy District:

- Established 1925 under State Conservancy Act¹
- Diverts water at Cochiti, Angostura, Isleta, San Acacia
- Stores water at El Vado dam on Rio Chama
- Manages 1,238 miles of canals and drains
- Serves 11,000 water users on +/- 73,000 acres, including the Pueblos of Cochiti, Santo Domingo, San Felipe, Santa Ana, Sandia, and Isleta
- Manages 20,000+ acres of bosque
- Provides habitat & protection for endangered species
- Preserves farm land and the agricultural economy

Describing the Conservancy’s irrigation system, Grogan cited Reclamation data on the amount of water used by the MRGCD: In 2002 * 70,000 acres were irrigated with water delivered by the

¹ 26 N.M.S.A. 73-14-1 to -5 (Michie 1978) Also see In re Rio Grande Conservancy Dist., No. 14157, N.M. Dist. Ct., August 1925

Conservancy; 369,839 acre-feet or 5.2 af / acre were diverted from the Rio Grande; 208,000 acre-feet or 2.97 af / acre were consumed by crops.

WATERSHED REHABILITATION

His personal view, Grogan said, is that watershed rehabilitation on a landscape scale is the only real source of “new” water². He notes that:

- Watershed rehabilitation is required on federal and state land
- Watershed rehabilitation supports rural economies
- Watershed rehabilitation can be controversial:
 - Chemicals – increasingly less viable
 - Goats – the “new wave”
 - Prescribed fire

And urges that we need a new land management paradigm.

The bosque is the bottom of the watershed, and the MRGCD’s bosque-management consists of:

- Preventing & managing fires;
- Reducing exotic phreatophytes (salt cedar, Russian olive, elm, etc.);
- Expanding native grasses, trees & shrubs to improve wildlife habitat;
- Managing access for research, education, recreation.

THE BOSQUE IS READY TO BURN

Showing photos of the bosque filling in the riparian corridor with dense vegetation between 1960 and 1972, Grogan illustrated that in many areas the dense bosque, loaded with underbrush and dead and down materials, is ready to burn. The Conservancy is engaged in a Fuels Reduction Study covering 450 acres (+ controls) between Albuquerque & Bosque del Apache NWR, as well as a 200 acres controlled study of the impact of goats on fuel reduction and watershed health, and is a cooperator in the Corps of Engineers’ \$10 million/year Bosque Revitalization Project that will eventually extend from Cochiti to Elephant Butte. (<http://www.bosquerevive.com/index.htm>)

CONCLUSIONS

- “Restoration” of the bosque = Restoration of ecosystem functions, NOT creation of a particular previous landscape
- MRGCD is committed to bosque rehabilitation
- The bosque is the low end of the watershed
- All of the watershed, top to bottom, needs rehabilitation to provide:
 - More ground water recharge & increased water yield
 - Wildlife habitat, recreation, open space, better quality of life

The MRGCD’s central role in bosque rehabilitation is determined by its dual goals: healthy agriculture, and a healthy river and bosque.

² Naveh, Z. and A.S. Lieberman. Landscape Ecology. Springer-Verlag 1990

II. COLLECTED NOTES FROM OPENING AND CLOSING PLENARY SESSIONS—FULL GROUP DISCUSSION

OBJECTIVES

- The first Objective says “To reorganize the Rio Grande bosque’s landscape to resemble, within current constraints, its historical condition.” However, we are more interested in restoring the bosque’s *function* than in mimicking its condition (*See revised Objective 1*)
- Wildlife protection/wildlife diversity should be an explicit objective. It is implied, but not called out (*See revised Objective 1*)
- *Comment on Draft:* Reclamation commented, “The Outline of Basic Principles should define the geographical area that is being considered, e.g., the Rio Grande riparian zone between the levees from Cochiti Dam to Elephant Butte Reservoir. It would also be helpful to define what historical period we are striving to emulate.”
- An additional Reclamation comment addressed the first Objective’s limitation to “within current constraints.” The Outline should specifically mention that current infrastructure (drains, laterals, etc.) would remain in place so that this assumption is clear to the reader.”

REDUCE WATER DEPLETIONS

- *Question:* What is ‘new’ water?
Response: That’s a good question. Some don’t think that removing exotics will result in water savings. It is not a given that removing phreatophytes will yield more water.
- The restoration of bosque functions will not necessarily create new water. It depends on what is planted in its place. (High-water-use trees or low-water-use native grass)
- Improving infiltration and establishing grasslands may result in “new” water, but that water may recharge the aquifer rather than augmenting river flows. This is a parallel situation to the increasing trend of capture and interception of water by cisterns for landscaping, reducing the demand on the municipal system, but also perhaps altering return flows and recharge in ways we haven’t foreseen.
- The greatest water savings potential is replacing large trees and shrubs with grassland communities.
- Areas that flood less frequently have less connection between groundwater and surface water.
- The MRGCD is attempting to measure and integrate hydrologic changes before, during and after removal of non-native vegetation. they may capture these changes, if any.
Response: Measurement of river flow involves large error. Therefore, we need to close the water budget on a specific area, before and after treatment, to quantitatively determine how much water is saved or lost.
- *Comment on draft:* The N.M. Interstate Stream Commission sent the following comment on the Workshop’s treatment of water depletions:
“As stated in the State Water Plan (section C.8), the ISC supports the principle of bosque restoration as long as
 - 1) The acquisition and use of water is in accordance with state water law and state water rights administration regulations.

- 2) State Engineer permits are secured for all habitat restoration activities that result in increased depletions of water. And
- 3) New Mexico's ability to meet its obligations under interstate stream compacts is not compromised.

While the staff of the ISC cannot endorse anything on behalf of the Commission, the Outline of Basic Principles can be presented to the Commission for its endorsement. ISC staff believe the outline cannot be favorably recommended to the ISC Director and Commission for endorsement without it being edited to explicitly recognize that bosque alteration may not necessarily reduce landscape water depletions by ET.

Our rationale is as follows: While vegetation thinning would likely reduce plant ET, the thinning would have to be maintained and mulch or native grasses or other groundcover would have to be used to prevent an increase in bare soil evaporation. Second, increased water uses such as maintaining wet soils at appropriate seasons for native tree recruitment, constructing wetlands, creating overbank flooding and constructing side-channels will result in increased depletions. Third, landscape lowering will likely increase depletions through increased soil evaporation.”

The revision of the Outline of Basic Principles includes a new bullet under “Requirements” to address this concern (*See revised Requirements 7*)

- “7 Maintain the altered bosque landscape with measures that reduce evaporation from soil surfaces, minimize depletions and provide for overall reductions in the consumptive use of the riparian ecosystem.”
- *Comment on draft:* Reclamation similarly commented: “In order to achieve the greatest success in implementing the principles, the availability of water, as well as the water requirements of the proposed alterations, needs to be addressed throughout the process. Also, stakeholders need to be kept informed as to any impacts on water supply.” And also: “We recommend that Objective 2 be reworded to emphasize the need for managing exotic vegetation. As a suggestion, Objective 2 could be changed to read: ‘To improve the bosque’s vegetative condition by managing exotic and invasive species while creating a viable ecosystem containing a patchy mosaic of native trees and open spaces.’”

FIRE CONTROL AND FUEL-MANAGEMENT

- Two distinct fire and fuel management plans are needed: One for the urban/wildland interface; and a different plan for the rural/wildland areas (*See revised Objective 3*).
 - A plan approved by the Western Governors Association includes information on watershed management and urban/wildland fires. (Perhaps the August 2001 Collaborative Strategy for Reducing Wildland Fire Risks to Communities and the Environment (see page 10) http://www.westgov.org/wga/initiatives/fire/final_fire_rpt.pdf ?)
- Urban/wildland fires are burning hotter now than in the past, so that larger firebreaks are needed; California has revised its fire and fuel management plan recently as a result. This gives us away of looking at the big picture.
- *Comment on draft:* From a Senior Research Engineer in Strategic Programs at N.M. Tech’s Institute for Engineering & Research Applications (IERA) on fire and fuel management:

“From the Fire and Fuel Management and the Bosque Restoration perspective I agree with the use of historical records and historical records converted to digital images to further support our work and this in my opinion should also include the following:

1. Removal of the non-native species and creating transition zones of grassland, shrubs and other vegetation that creates a lower fuel loading (≤ 10 tons/acre) around the areas of denser fuel loading (>10 tons/acre). This would also help address the issue that the non-native species burn more intensely in the case of a fire. In the interests of safety and protection of life, property, infrastructure and other assets at risk, I request that the wildlife habitat protection specialists take a look at these areas based upon the presence or the potential for the return of the protected wildlife's habitat in the past and the present. As an example I researched the presence of the "flycatcher" by actual sighting in the Albuquerque Area Bosque and had trouble finding any? Does anybody have information on actual "flycatcher" sightings within the approximately 19 or 20 mile stretch of the Albuquerque Area Bosque?
2. Removing ladder fuels that can help reduce the potential for crown fires. As the fire folks know, crown fires are harder to control and tend to spread faster by at least an order of magnitude.
3. As I mentioned at our meeting at the Utton Center and my presentation last week, The Bosque within the Albuquerque Area is a "Wildland Urban Interface/Intermix"* area and needs to be treated differently than the other areas of the Bosque that have more of the Wildland characteristics including a purely Wildland Fire Potential.

*(Just to help those that are not familiar with this issue, according to the National Fire Protection Agency (NFPA) 299, Standard for Protection of Life and Property from Wildfire, the Wildland/Urban interface is defined as "an area where development and wildland fuels meet at a well defined boundary". Whereas a Wildland/Urban Intermix is "an area where development and wildland fuels meet with no clear boundary")."

- *Comments on draft:* Reclamation also commented on Objective 3: “We can endorse Objective 3 as long as the intent is to reduce the current, unnaturally high, intensity of bosque wildfires and evapotranspiration rates to levels that are consistent with historical processes.”

REQUIREMENTS FOR ACHIEVING THE OBJECTIVES

- One requirement for achieving the objectives is to understand current constraints and conditions. We need clear goals (perhaps different goals in different locations), and we need to know where we are starting from. There is a good deal of data available, and more to come with the Corps' bosque project; but this should be specifically mentioned as a requirement. (*See revised Requirements 1*)

PERIODIC FLOODING

- Neither the Objectives, Requirements nor the Approaches sections mention flooding. Flooding will be needed, and water for flooding will be needed, and those considering landscape alteration should be made aware of this. What “flooding” means will differ from reach to reach. (*See revised Requirements 2*)

- The term “flooding” implies disturbance (in contrast to the term “moisture”), which is an important part of the concept. Floods, historically, have been the disturbance that drives change in the bosque system. Now that we no longer have floods, fire is the disturbance that drives change. (*See revised Requirements 3*)
- This can also be put as “mimicking the natural hydrograph” – we need to reduce river bank levels to create wet soils and overbank flooding. (*See revised Requirements 2*)
- To some extent the natural disturbance (spring flood) can be replaced with human disturbances (land scrapers). These will need to be properly timed for best impact.
- Idea of “mini-river” partially replacing disturbance regime by mechanical means.
- Some areas can be managed as dry terraces, given that the big 10,000 cfs flood is no longer possible in many reaches.
- Timing – maximizing system benefits of either flooding/fires. E.g. overbank flooding. Is there something in the “basic requirements” to indicate that this is required? Are we saying we need to have mechanical means to help river or floods. (*See revised Requirements 3*)
- Wetting the soil at seasonable times mimics old floods, but doesn’t move salts out.
- How does mimicking the historic hydrograph impact consumptive use?

THE RIVER ITSELF:

- The proposal for landscape alteration is explicitly about *landscape*. There is not much said here about alteration of the all-important river itself. (*See revised Requirements 4*)
Response: Much of the proposal itself is about the river rather than the bosque.
- Once the river questions are raised, all kinds of conditions on water must be discussed elaborately; this is why this focuses on the riparian lands. However, we are talking about the bosque and riverine landscape. (*See revised Requirements 4*)
- We might want to look at Dallas’ plans to re-meander the Trinity River. How it is done with regard to historical condition and levees. <http://www.trinityrivercorridor.org/>
- *Comment on draft:* Rio Grande Restoration sent the following comment: “The perennial problem of managing the river hydrograph seems to have gotten short shrift in the discussions, perhaps due to the very contentious nature of water reallocation issues. My view is that the bosque ecosystem evolved with a particular flow regime and so many of the most obvious component species are reliant on spring flooding and accessible water tables. The restoration project's ability to foster a self-sustaining vegetative matrix is contingent upon maximizing our management ability to provide flows. In fact, the river-floodplain hydrology piece is so governing that we must forthrightly struggle with both the complex science of it and also with the messy politics of it. At stake is whether this is to be a "bosque gardening" project or a "restoration". My recommendation is that the report acknowledge the importance and the difficulties of providing improved hydrology, and continue to work toward resolution of this issue. What governs the eventual restoration hydrograph is our desired condition or our agreed definition of what the 21st century bosque should look like.”

The team revising the Outline of Basic Principles had intended the second item of the Requirements section to address this issue, and restructured that bullet to draw attention to the management of the hydrograph:

“2. Develop flexible hydrological management options, including the ability to mimic the

natural hydrograph, in order to maintain wet soils at appropriate seasons for native tree recruitment and maintenance.”

- *Comment on Draft:* Reclamation commented, “There are places in the Middle Rio Grande valley, downstream of Arroyo de Las Canas, in the Belen reach upstream of the Rio Puerco, and in the Albuquerque reach, where opportunities exist within current constraints, to widen and/or expand the river’s floodplain. We recommend adding a suggested approach to take advantage of these opportunities.”

SEDIMENT:

- The Rio Grande is a more of a wild river below the undammed Rios Salado and Puerco, since the main river channel can still be impacted by large flood flows (it rarely happens, but flash floods can and do occur). We need to look at the upriver connections, where bosque land is more constrained by urbanization – what’s most important is getting sediment north of Isleta. We need to connect arroyo mouths with the river and get rid of non-natives. (*The helpful discussion below was requested of, and provided by, Paul Tashjian to clarify the sediment issue.*)

“This is already happening with the Jemez River at Santa Ana Pueblo, the Galisteo River at Santo Domingo Pueblo and along arroyo mouths within the Socorro Reach (Save Our Bosque Task Force).

The benefits of doing this are multi-faceted: a) improved sediment supply to the Rio Grande, b) improved surface and subsurface flows to the river through the clearing of non-native vegetation, c) acts as a fire break when done where arroyo mouths are connected to the floodplain (where they haven’t been diverted into the sediment collection basins).

It appears that it will not take much to restore the sediment balance in the Middle Rio Grande. We do not need the historical sediment balance, since we no longer have the peak flows to move the historical sediment. We also do not want to return to the aggradation of the Rio Grande that occurred in the first half of the 20th century. This effort should be done in a stepped format: first open Galisteo and Jemez and then work down river in subsequent years, allowing time to see how the channel has adjusted.

Without restoring some sediment to the Rio Grande (especially north of Isleta Diversion), the channel will continue to evolve to an incised single thread that is largely disconnected from its floodplain and will be unable to create a newer floodplain. This situation would eliminate the potential for the river to naturally create new, young cottonwood-willow cohorts.”

In the first draft of the Outline of Basic Principles circulated for comment, the following item regarding sediment was included in the “Requirements” section:

- “3 Develop sources of sediment by clearing non-native vegetation thickets in tributaries and reconnecting arroyo sediment supplies to the mainstem.”

Comment on draft: However, the sediment issue is complex. Among the responses (some were oral) was the following e-mailed comment from a staff member at Isleta Pueblo:

“Regarding the outline of basic principles, requirements for achieving the objectives, # 3, The Pueblo of Isleta does not want any more sediment in the river within the exterior boundaries of the reservation. There is already too much sediment in this reach of the river. The Los Lunas reach has so much sediment in it that in a couple of years you will be able to walk off the bridge right onto the floodplain. The bed load of the river from Cochiti to Sandia has been displaced to the Isleta/Los Lunas reach since the gates were closed on the dam in 1972-73. That reach of the river may need sediment but keeping it there is the big problem. In fact, there is too much

sediment in the river from Isleta to the San Acacia diversion, coming from degradation of the bed from Cochiti, the Rio Salado and the Rio Puerco. How you incorporate these comments into the objectives I'm not sure of but the Pueblo of Isleta does not support adding sediment to the river within the boundaries of the reservation or upriver if it will be deposited within the reservation.”

Therefore, while acknowledging that sediment is an important consideration in the bosque/Rio Grande system, the compilers of the Outline of Basic Principles felt the question is too complex to be addressed in a bulleted list, and removed item #3 from the Requirements bullets.

AGRICULTURE/WILDLANDS INTERFACE

- The Wildfarm Alliance has published a book called ‘Farming With the Wild: Enhancing Biodiversity on Farms and Ranches (Daniel Imhoff, Sierra Club Books, 2003), regarding means of making agriculture compatible with wild nature. www.wildfarmalliance.org. (*Possible connection with revised Requirements 8*).

WETLANDS

- *Question:* Have you thought about moist soil management, wetlands?
Response: Not outside the levees, but inside the levees. The OSE has nothing as yet in their rules and regulations to deal with establishing and maintaining wetlands. (*See revised Requirements 8*).

MONITORING AND MAINTENANCE

- *Comments on Draft:* Reclamation commented: We recommend that basic requirement 7 have some additional language added to clarify the purpose of the monitoring activities. We suggest: “Ensure a sustained program of bosque research and monitoring to determine if the desired objectives are being reached.” The desired objectives should be well defined, measurable, and achievable.” (*see revised Requirement 5*).
- *Reclamation also commented:* Ongoing maintenance will be needed to sustain the bosque as a viable ecosystem. This should be listed as an additional basic requirement. (*see revised Requirement 7*).

SUGGESTED APPROACHES FOR IMPLEMENTING THE BASIC REQUIREMENTS

- *Question:* Are we only removing dead and down exotics?
Response: No. Change *Approach 1* to read “dead and down **and** invasive trees.”

MANAGING THE MOSAIC

- Is there room for dense stands of trees in the mosaic? (*See revised Approaches 1, 2,4*)
- Do we need criteria for the ‘patchy mosaic’? E.g. Bruce Milne’s fractal geometry. Without criteria, it will be largely controlled by on-site actions, or poor planning actions. (*See revised Requirements 5*)
Response: There are 35 agencies and at least five levels of government that claim interest in the bosque. It will be challenging to set criteria; we might begin loosely.

- As a landscape architect, I often hear that the landscape should look “natural.” But what is natural? It’s best to focus on the function, rather than what it looks like. (*See revised Objective 1*).
- We need to keep maintenance in mind; society does a poor job of maintaining things once they are established.
- *Question:* Are we thinning out *most* trees? How many trees are we talking here? Are we talking about cottonwoods? What are the criteria for the mosaic?
Response: In Cliff Crawford’s opinion, the bosque is twice as dense as it should be, so 50% of the cottonwoods need to be removed. (*See revised Requirements 5 and revised Approach 4, “varying density”*)
- There are issues of density, and also issues of how much space in the mosaic—Internal stand structure vs. patch structure. (*See revised Approach 4*).
- Must be careful to ensure habitat for flycatcher is intact. There needs to be both diversity in patches and diversity within patches. (*See revised Approaches 2 and 4*)
- Steve Harris of Rio Grande Restoration sent the following comment regarding biological criteria: “In the S. Florida Ecosystem Restoration Project, a sort of index of biological indicators was woven into the project to provide some measure of the ecosystem response. A suite of terrestrial and aquatic plants and animals were included. I believe that such measures would be valuable to the bosque restoration effort also. Cliff Dahm might be able to provide some guidance in this regard.” (*See revised Requirements 5*)
- *Comment on draft:* Several comments on the need for some dense stands for habitat were received in response to the circulation of the first draft for comment:
From the Fish and Wildlife Service: “In looking over the Principles, I note there is no clear provision for retaining/creating some dense native cottonwood/willow areas for use by the Southwestern willow flycatcher -- Per USGS research findings. Thinning out cottonwoods may be appropriate in some places, but some dense cottonwood stands with willow are also needed, since the thinned cottonwood stands won't support this endangered bird.
The patchwork approach is a good one -- Old photographs (1800s) of Southwest riparian areas show patches of grasses with groupings of cottonwoods, so the idea of a continuous ribbon of cottonwoods along the riparian areas doesn't match with historic reality--at least in some/many places.”
Comment on draft: From the Bosque del Apache National Wildlife Refuge:
”Much of the discussion included in the proposal, outline, and report focus on thinning and creating a more open riparian vegetative environment whether mesic or xeric. In our zeal to reduce fire threats through exotic removal and native thinning, we should remember that dense young-growth native forest patches are still important for a variety of wildlife species, particularly birds. Dense native young-growth also provides competition to similar aged exotic growth. It may be taken for granted that this growth is important, but I did not see this reflected, particularly in the proposal document.

This would be the most appropriate place to put a statement that recognizes that there will be some dense stands of native vegetation, particularly monotypic, even age stands of willow species and young dense cottonwood, willow mixed stands. These habitat patches represent the "uneven aged stands" that are presented but deserve to be clearly envisioned. Understandably, such patches should not dominate the landscape, but still should be highlighted as important.

Thinning in these areas should be adaptive and based on competition intensity (both inter- and intra-specific), and stand vigor. The suggested placement of a statement to reflect this is included below:

Here is our suggested approach, much of which we have alluded to above. First, we feel it essential to recognize the following four essential components of the proposed reorganization process, and note that some are already part of ongoing or planned restoration activities along the Middle Rio Grande: The four components are (1) removal of most standing and down dead wood of any species, other than small numbers of large cottonwood snags for use mainly by birds; (2) retention but occasional thinning of most native trees; (3) creation of uneven-aged stands of native trees to ensure their long-term sustainable replacement (such stands can be established by combinations of well-timed overbank flooding, pole planting, watering cleared and often lowered areas in late spring with pumped groundwater and/or drainwater, and constructing side channels from the river or drains into partially cleared forest; dense stands would be present when newly established and for a some time following to provide important habitat especially for birds and to provide competition for exotic species then thinned when mature as needed); (4) creation of an irregular and internally thinned mosaic of woodland patches separated by relatively large open spaces.

The statement in the proposal "Implementation of the proposed solution will involve selective removal of large numbers of bosque trees so that ET depletions and fire probability are reduced to acceptable levels" would require an organized process for determining what "acceptable levels" are - this might not be consistent for the entire Middle Rio Grande because of the different physical characteristics in different reaches and the opportunities to reestablish different plant communities. I would like to see some follow up description as to how these levels would be arrived at - agreed upon - and updated as new information is gathered. This could be included in the Outline in the section on basic requirements for achieving the objectives under:

1) Become familiar with the present condition of the bosque landscape, including the existing water use and fire danger in different reaches, and the management practices that affect it, and a new 5) Develop criteria for evaluating the desired water use and fuel loads for different reaches of river to achieve the greatest diversity of habitats using the most appropriate techniques.”

Authors of the proposal appreciate the comments on its text, and intend to work with Bosque del Apache staff in proposal revision. The Outline changes proposed were incorporated, except that “evapotranspiration rates” was substituted for “water use” to clarify that the requirements did not refer to the exercise of water rights. In addition, in order to make explicit the intent to incorporate areas of dense vegetation for habitat, the second item in Approaches was revised to read:

- “2 Thin out stands of native trees, while retaining sufficient dense young-growth native forest patches for habitat, and leaving enough standing dead for wildlife.”
- *Comment on Draft:* Reclamation also commented: We believe an additional suggested approach should be listed to “Create stands of native vegetation with variable density. To accommodate the widest possible biological diversity, these stands should include some areas of dense understory where hydrologic connectivity exists between the river and the riparian forest. In order to maximize benefits to species, an attempt should be made to limit human and grazing activity in these areas to the extent possible.” (see *revised Approach 2*)

EXOTIC VEGETATION

- Some species, such as the flicker, have adapted to non-native vegetation, and will come down from the Sandias to use the Russian olive trees. What will happen to these adapted animals if we get rid of exotics? (*See revised Objective 2, Approaches 2, 4, 7*)
Response #1: MRGCD has begun developing a proposal to compete for a project under a federal funding initiative that will provide \$50 million dollars for several years of \$7 million/yr projects. One part of such a proposal might be to use the upper end of the Elephant Butte Reservoir as a study area regarding the Southwestern willow flycatcher's relation to saltcedar. The jury is still out with respect to flycatcher dependence on saltcedar. MRGCD wants to figure out how to convert the trees without harming the flycatcher. Any interested persons are welcome to attend meetings on this proposal; contact Sterling Grogan.
Response #2: Exotic species will be contained, not eradicated. They are part of the diversity. (*See revised Objective 2*)

CITIZEN VOLUNTEERS

- Albuquerque's Open Space division uses volunteers, and so does the New Mexico Youth Conservation Core. But the use of citizen volunteers raises the question of managing people. Work in the bosque is difficult. Careful thought should go into who will train and supervise these volunteers. Most agencies have problems just supervising the professional contractors they hire, who have more skills and experience than the average citizen volunteer. (*See revised Approach 5*)
- A model for training and supervising citizen volunteers might be the Indo-Hispano Academy of the South Valley, which is doing training with different tiers of volunteers—beginning, intermediate, and supervisory. Amigos Bravos helped initiate a collaborative partnership that includes the Rio Grande Community Development Center, the UNM Department of Community Planning, the Middle Rio Grande Bosque Initiative/U.S. Fish and Wildlife Service, New Mexico Voces, and Rio Grande Restoration. The Academy plans to expand learning opportunities in the rural South Valley through science, technology and skills training to protect and promote the care of the Rio Grande and the Bosque. It is designing a Physical Sciences Technician program for Isleta and South Valley youth, which will initially focus on a five-mile stretch of the Rio Grande, Bosque floodplains and wetlands and acequia habitat. A Restoration Management track will include damage assessment, comprehensive environmental response and compensation and liability. For information, Contact Cynthia Gomez of Amigos Bravos 255-0790 or Felix Mauro Torres of the Academy 247-0862.
- Since it is apparent that there is presently extensive use of citizen volunteers, we should say “expand” the use of citizen volunteers rather than “encourage” the use of citizen volunteers. (*See revised Approach 5*)

INFORMING POLICY

- State Senator Dede Feldman – these conferences help policy makers make decisions, as a consensus opinion develops. We need to make sure that the money being provided in times of crisis is being spent on effective programs that achieve real results. Consensus among scientists and practitioners can replace “conventional wisdom,” improving decision making by policy makers. (*See revised Approach 9*)

- Because legislators are one of the audiences for this document, we should try to make sure activities are not too narrowly focused. There is a need to avoid legislation that is too narrow to fit with in the broad scope of our objectives. Programs need to be not just for one fish and one bird, but rather than for the restoration of the entire ecosystem. (*See revised Approach 7,9*)
- An outreach program to inform decision makers is a basic approach that should be itemized in “suggested approaches.” (*See revised Approach 9*).

ORGANIZATION AND COMMUNICATION

- A team approach is preferred to establishing a super-agency on the bosque. (*See revised Approach 8*)
- Communication levels – how can there be improvement on all levels of communication between agencies, groups, etc.? (*See revised Approach 8*)
Several databases are being developed on all projects that have been or are being done on the Rio Grande. One spreadsheet table for one such database will be distributed to participants, who are asked to review it and correct errors or change items that are out-of-date. World Wildlife Fund has submitted a map that has 50 project on the Middle Rio Grande (Cochiti to Caballo). In two weeks (early June) – the Corps will start a \$2 million study on what to do to improve the bosque. There is a lot of money for public process. This is a feasibility study. Please share your information with the Corps. The Study will result in a recommendation to Congress on how to specifically restore the Albuquerque Bosque (North AMAFCA Diversion Channel to South AMAFCA Diversion Channel), with application to the entire middle Rio Grande (Cochiti to Caballo.)

HUMANS AND THE BOSQUE

- Planning must include how humans will be integrated into the bosque. E.g., recreation paths integrated with fire breaks; dense patches in the mosaic to constrain people wandering out of areas designated for people.
- Cochiti is using federal money to save willows and cottonwood; we also need to save the people. So we ask the Pueblo elders “What plants were here historically? What plants attract the birds that provide the scared feathers? What plants are needed for arts and crafts, and medicine?” Pueblo peoples have lived on the river for centuries.
Response: Pueblo people are our best source of information on historic conditions. Biologists have not spent enough time with them.
- On July 13,14, 15, 2004 – San Juan Pueblo will be having a free three-day bosque restoration workshop, at which there will be a session “Asking the Elders,” in which elders describe the historic bosque of the pueblo. A brochure with workshop information can be found at <http://www.fs.fed.us/r3/spf/riparian.pdf>

ISSUES NOT ADDRESSED IN THE OUTLINE

SCALE

- Is this a landscape-scale approach that might be reach-limited? Or, can it be bigger and grander? Beyond Cochiti? This is important because many efforts are already completed and underway.

- I see this approach as a landscape approach. How does this fit in to existing projects that are shorter in scope (the Albuquerque reach) – or do we need to be on a broader scale? How do we fit the existing planning into it?

UPLANDS WATERSHEDS

- *Question:* Watershed rehabilitation begins in the uplands; where does this fit into this proposal?
Response: There are presently activities at federal and state level to change the way federal and state lands are managed. Sterling does not see the MRGCD actively working in the uplands, but it will support legislation and actions of private landowners. Uplands should be managed for a sustainable water yield and sustainable ecosystem; we can't manage for a single use.

URBAN WATERSHEDS

- Looking at efforts by City of Albuquerque as an 'urban watershed'. How do you capture runoff from roofs to irrigate parks and ballfields instead of polluting the river. There are tradeoffs because we've paved our urban watershed.
- Look at Larry Shore's urban watershed work with Comanche Elementary School creating native gardens, watered with school roof water

ORGANIZATION OF THE OUTLINE

- *Comment on draft:* Reclamation commented: This outline mixes biological and administrative/management approaches. We recommend that these approaches be separated into two different sections for clarity.

WATER DEPLETIONS GROUP

Group leaders, Bill Fleming, UNM Community and Regional Planning Department, and Ross Coleman, HydraAquatic, Inc. (Thank you, Ross for your careful reading of the draft).

The pair of group leaders reflects their desire to emphasize the relationship between hydrology and ecology.

Let's look at the big questions: What do we know? What don't we know?

We want to look at grass and tree species and their water uptakes, as well as the conditions that determine whether one species can be substituted for another. If you remove saltcedar, water depth may be too great to grow saltgrass, which prefers moist soil within three feet or so of the soil surface.

KNOWN:

- Salt grass needs water table at 2.5 feet or less; once established, it can root down even further if water depth drops.
- Cottonwood dies off at an average depth to water table greater than 3.6 meters.
- ET correlation to groundwater depth: At the Belen site no difference was seen in ET rates for flooded cottonwood and nonflooded cottonwood. Flooded saltcedar does have higher ET.
- Dense stands of natives and exotics have similar ET rates; stands of natives and exotics with 50% of the vegetation density of dense stands also have similar ET rates;
- Leaf density and ET are related, so removing vegetation does reduce ET.
- If leaf area index is reduced 50%, you will get a 25% savings. Not 50% reduction because leaves shade each other. Denser, you get even more shading.

- Increased nitrates in the groundwater leads to increased leaf areas. (Higher nitrates south of the wastewater treatment plant might contribute to growth of plants.)
- Possible ET “savings” for restored bosque range from 0.6 meters to –0.5 meters.
- Combined saltcedar and saltgrass site consistently has lowest ET (crop coefficient at 0.5, vs. 1.3 meters.) This suggests that salt grass must have very low ET.
- Saltgrass grows quickly from plugs and can prevent establishment of saltcedar.
- As long as drains in MRGCD are running and Albuquerque uses water, the cottonwoods will survive. They have maintained themselves since the last flood event.
- All the pressures on river are going to lower the water table in riparian zone—it appears we will end up with a mini-river. Why not make the landscape a lot lower?

UNKNOWNNS:

- What’s the effect of urbanization on runoff? Infiltration?
- How big should we build the copses?
- What will the edge effects be?
- What will be the effects on the remaining stands if we open up the edges?
- How best prevent reestablishment of exotics, especially Russian olives?
- Why are there no native box elders, choke cherries, oaks, ash or other hardwoods in the Albuquerque reach?
- How does saved ET return to surface water? Does it recharge the deep aquifer?
- How does understory vegetation effect ET?
- Over a long period of time, how do you deal with other species competing?
- Do we know which species require high-density vegetation? How much coverage is needed for those that do? How big should patch sizes be? And how much water needs to be moving by to support the willows (and the birds)?
- We need to ensure that there are no new depletions (is that possible?).

STRATEGIES

- What’s the best way to reduce vegetation by half? (this is a site-specific answer, which may range from 0 to nearly all of the woody species).
- How to make the restored area self-sustaining?
- What will the impacts of Albuquerque’s plan to divert its San Juan-Chama water? Of treating and re-use of waste water?
- Heated surface of sandy soil prevents ET from water trapped beneath the sand. There is ET from clay soils through capillary action.
- How do you manage the understory if it gets too thick in a short period of time? Goats may be good.
- Is this reduction of vegetative density really going to be worth it to conserve water?
Response: James’ work is pretty conservative compared to other work that uses different approaches.

- Questions about mixture of phreatophytes – can they be established and diverse enough to manage themselves?
- Can we pump from the irrigation drains to help start natives?
- Dense canopy cover of native species can prevent saltcedar from even growing. Some non-natives provide great habitat for some animals and prevent saltcedar from growing.
- Can Coyote willow, cottonwood and black willow forests maintain themselves during low-water regimes?
- How can a true water savings be demonstrated? Stream gages are not always accurate on the scale of restoration projects. How do you reconcile potential savings of 25% and gaging error of around 15% or so.
- How do you deal with the fact the Rio Grande is a losing reach? (This refers to groundwater getting deeper as you get further away from the river.) Can you measure water savings, say at Elephant Butte, if water saved is just dropping to the deeper aquifer.
- Can we show it in the water budget? By rises in groundwater? Piezometers?
- An even bigger challenge than measuring savings is to show that vegetative alteration can be done and MAINTAINED.
- Maybe one of the goals should be to create a more xeric grassland/shrub landscape vs. bosque since it's likely we're going into drier times.
- The "flatness" of the river floodplain can be modified cheaply without adding new sediment. Put river sediment in upland areas, might help ET in moist soil areas.

FIRE REDUCTION GROUP

Group leader, Yasmeen Najmi, Middle Rio Grande Conservancy District

Question 1: How extensive and abundant will grasslands/shrublands need to be in order for them to become effective firebreaks in the proposed altered bosque landscape?

Successful reduction of the mid-level exotic canopy component of the fuel ladder will not *eliminate* fires, but will make for *more manageable* fires.

Question: Are we looking at removal of cottonwoods for fire management?

Response: No, cottonwoods don't support fires, so that would have no effect.

- Can we design for the worst case? Without obliterating the bosque? The bosque will not be fireproof. We should create defensible space, but not to the extent of eliminating wildlife habitat or the function of the bosque.
- This is the first opportunity to design the bosque. We can't really design a fireproof bosque. This is a model for *managing* fires.
- Forest Management has distributed "bosque in a box": a mix of native plants
- It needs support to take hold; you can't plant it and forget about it—By seed is better where no supplemental water is available.
- Altering vegetation will not eliminate fires; it will reduce their intensity and size, but not their frequency. Grass and shrublands, as well as treating dead and down fuels, will help reduce intensity.
- How safe is safe enough?
- It is insufficient to just reduce fuel also need to look at:

- alignment of fuel breaks;
- + escape routes;
- Fuel loads and types adjacent to fuel breaks
- safety zones
- = defensible polygons
- It is important to design space for access points, and to look at the distance between access points.

DATA, MODELING AND MAPPING

- Firefighters now use GIS-enabled maps. The Albuquerque bosque is GIS-mapped into 50 polygons, each defined from a fire-suppression perspective, based on fuel type/density, likely rate of spread, water sources, etc.
- Useful as GIS layer with fire transportation zones.
- Monitoring changes in wildland urban interface areas—need fire preparedness.
- Modeling is unreliable per design, input data, topography
- Army Corps is attempting to create a good GIS model of the bosque. Rocky Mountain Research Station also has useful information.
- Residential – how to give fire responders time?
 - \$8 million is available for fire reduction
 - \$2 million is available for restoration
 - None is permanently available
- Results from previous fires = lab for feasibility study
- actual data v. modeling
- Can't study forever – make decisions and implement and revise
- Action keeps the money flowing

Firefighting Directly

- “Fuel break” areas should be designed to allow direct attack (flame lengths up to 8 feet) using ground crews and heavy equipment.
- Flames up to 3ft high can be fought w/ firefighters
- " up to 8ft - can be fought w/ bulldozers
- " over 8ft - cannot be fought directly

Fighting Fires Indirectly:

- Pretreat fuel (foam a large area)
- Burn out (but that means sacrificing a lot of area).
- At Montañito in the 2003 Albuquerque bosque fire there were 100ft flames
- It's better to be able to fight a fire directly.
- Certain conditions (i.e., humidity = 0), times of year, cause fuels to act in unique unpredictable ways.

FIRE MANAGEMENT STRATEGIES

- These strategies assume the need for access by defenders:
i.e. brakes + access = defensible

Fuel Breaks

- Past failures become today's firebreaks – can focus first efforts on creating “patches” using burned areas.
- Grasslands and shrublands are not fuel *breaks* per se; they are fuel *reductions*; grasslands do not reduce the frequency of fires, but they burn more manageably.
- Define fuel break—perhaps a “fuel break” is self-defending (impervious to fire), while “fuel reduction” supports defensible space—a space the fire department can work with.
- Fuel break defined: fuel has been reduced (if not eliminated)
- Fuel break system: large interconnected areas with breaks
- Fuel breaks facilitate direct and indirect firefighting
- Burn out is not a feasible firefighting strategy in urban areas

Cochiti Pueblo: 5-mile stretch of urban interface

Fuel breaks every 3 miles

Access points every 3 acres

Breaks are 1 – 60 acres in size

Breaks are cleared of exotic plants

(haven't eliminated cottonwoods but plan to)

Also clearing juniper encroachment

Breaks along the southern boundary, near Peña Blanca

- Defensibility of fuel breaks depends not just on their area, but on adjacent fuels and other factors, i.e. winds, behavior of fuel type, proximity of residential areas, trunk-to-trunk measurements. Generally, the width of a fuel break must be, at a minimum, 1 ½ times the height of adjacent fuel.
- Rearranging fuel depths is important to fire suppression.
- Parameters for fuel breaks:
 - Near residential areas with flammable roofs, 100-ft break is needed (per California)
 - How much to clear around bridges, I-40?
 - How to clear around other infrastructure (gas lines, power lines,etc.)?—California is doing 500ft, but has different fuel types, conditions.
 - Keyed to likely fire temperature

Feathering

- "Feathering" fuels near the break (progressively reducing fuel toward the break) – makes the break functionally wider. But for wildlife management we may need density at the edges. We might make the edge meander. With the right plant species (New Mexico Olive), the edge works for wildlife and fuel reduction.

Feathering specifics?

- Focus on reducing dead and down fuels
- Dead fuel moisture is important
- Reducing dead fuel has little visual impact

Flooding

- Either floods or fire can be the driver of the system.

- Flooding is a strategy for fire prevention and suppression (such as pumping from the drain). Flooded areas can be combined with fuel breaks.
- Flooding needs to be in the equation to help maintain new communities.
- More wetlands/moist soil areas are needed.
- Differential flooding as fire suppression: is it cost effective?
- Inflatable diversions can be used to deliver water.
- Flooding as fire prevention –
 - Increase soil moisture and humidity
 - Downstream effects? Is levee adequate?
 - Flood breaks? or fuel areas?
 - Flood promotes rot, therefore less flammable
- Develop side channels from the river into fuel breaks to bring water on to site
- Channelize fuel; leaves breaks as access paths
- Maintain fuel breaks!
- Flooding is not feasible throughout the bosque, i.e. high traffic areas and channel incision.

Rehabilitation

- Post-fire rehabilitation policies could affect future bosque conditions significantly. Burnt-out areas often appear, three years later, as the highest-hazard areas of the bosque.
- How to get long-term commitments to maintain restoration work?

Open vs. Closed canopy

- A closed canopy is preferable from the fire standpoint, to minimize the understory shrub component, but it can suppress native shrubs. It is not a universal solution because it can limit diversity in age structure and vegetative structure.
- Thinning the cottonwood canopy can promote understory species such as saltcedar, but also dense natives.

Diverse patches

- Create caps on the size of untreated areas, but retain some as long as the placement or location is not an immediate public safety risk.

Question 2: What spatial and temporal changes in the distribution of woodlands in the altered landscape will best reduce the frequency and intensity of bosque wildfires?

- See fire break discussion above
- Woodlands in particular – spacing, understory
- Shrublands/grasslands: there will be fires
- Fuel manipulation will reduce size, intensity but not frequency
- Altering vegetation = more grass, shrubs; less phreatophytes
- Thinning of cottonwoods?
- Be careful – cottonwood canopy prevents understory buildup (exotic and native)—But cottonwoods can be too close
- Define "functional"
- We're discussing long term, heavy maintenance

- Flooding would be more self-maintaining
- The Save Our Bosque plan is a good example of planning for the long term
- Create wetlands = moist soil
- Wetlands outside levees? Use ditches; no real fire prevention effect
- What about disease/mosquitoes? Not necessarily an issue due to natural processes, like algae and predators; storm drains are worse
- What would a woodland mosaic look like?
Like near the Bosque School – clumps of cottonwoods w/ meadows between
- How to design as defensible area?
 - Surround indefensible areas w/ defensible areas
 - Cap the size of dense, indefensible spaces
 - Leave some dense areas as they are now: "relic" spaces
- Closed canopy is preventive for mature stands
 - Minimizes understory (desirable?).
 - Native understory can exist.
 - Reduce overlacing (too dense canopy).
 - Plan for best density with young stands.
 - Closed canopy discourages cottonwood and exotic (even Russian olive) reproduction.
 - Good conditions for fire management are not necessarily good conditions for diversity.
 - Seasonally wetted open soil areas are critical to cottonwood reproduction.
 - Temporal patches = old stands, young stands, no mixing.
- Cochiti has only mature stands and seedlings. Why?
Grazing; climate – events that cause a burst of reproduction; variations in local conditions
- Educate the public: There will be fires

Q3 What changes in management will be needed to reduce wildfires and possibly to use controlled fires, in the proposed mosaic of native woodlands interspersed with native grasslands/shrublands?

- Recreation? integrate recreation facilities and high access areas with fire break strategy
- Dense edges discourage humans leaving trails
- Trail system can double as fire-response access
- Fire/Recreation funds can serve double purpose
- Albuquerque is working to improve bosque fire mgmt/suppression
- The urban interface extends beyond Albuquerque
- Bernalillo County needs fire preparedness
- Flooding is integral to the riparian ecosystem, as fire is to the mountain ecosystem
- Cochiti has 41,000 acres of piñon damaged/dead from beetles and 1 ½ - 2 hours fire response time
- BIA wants Cochiti to clear 200 acres/year, but has no money for maintaining cleared areas. Even a little maintenance money can help a lot.
- Too much puffing: "the heart has been burned out of Albuquerque"

BOSQUE RESTORATION GROUP

Group Leader, Sterling Grogan, Middle Rio Grande Conservancy District

INITIAL CONSIDERATIONS

- Need to plan bosque work in the context of the whole watershed, of which the bosque is part of the lower end.
- Restoration should start by understanding current conditions and current constraints.
- Existing conditions largely dictate what's possible.
- Creation of wetlands "requires" a water right. What water is available?

GEOGRAPHIC SCOPE

- Upstream actions (or processes, either controlled or uncontrolled) influence downstream actions, and also what is possible downstream.
- There is a limited amount of work so far on the tributaries, except for Galisteo Creek (both Santo Domingo Pueblo and the watershed group) and some projects along the Puerco.
- Patch diversity, as well as diversity within patches, is intended to extend throughout the middle Rio Grande

ECOSYSTEM MANAGEMENT

- We want patch diversity, as well as diversity within patches.
- Updated Bosque Biological Management Plan is due to be published at the end of summer 2004.
- Endangered species aren't the only species of concern We also need guidelines for other species of concern in the bosque.
- Floods historically provided the disturbance that repeatedly re-created the bosque; now, without regular disturbance, the bosque isn't sustainable unless some ways can be found to provide regular disturbance.
- The big picture includes geomorphic processes that must inform restoration, because to some extent they can produce, or facilitate, regular disturbance.
- Sediment is a big issue, often ignored in planning.
- Fire is another form of disturbance. Following fire, we don't need to remove live cottonwoods to create meadows. But we do need lots more experience creating saltgrass (or other spp.) meadows following fire
- Albuquerque's riverbed is not incised yet, but the banks have risen and Cochiti effects have caused channel degradation.
- Shrubs: low areas will support diverse stands at several kinds of sites.
- Tree mortality—what are the causes?
- Water quality needs further investigation. What is needed?

PLANNING

- Range of perspectives among agencies makes common ground hard to achieve, complex, but not impossible.
- Coordination and communication among agencies working in the bosque is better, but not yet perfect.

- Plans, guidance, design: How do they get translated into policy and work on the ground? With money.
- We need top-down, bottom-up and lateral communications.
- Planning at the landscape scale in any reach can inform plans in other reaches eg. Socorro Save Our Bosque TF Conceptual Restoration Plan. Ad hoc results can be incorporated into planning.
- Must consider the “Politics of disturbance vs. Disturbance of politics” (the latter is ‘spend more faster’).
- Need an adaptive and experimental approach because there is still a great deal we do not know about the bosque.
- There is always tension between too much and not enough planning; regular teamwork and planning are essential.
- The U.S. Fish & Wildlife Service Bosque Improvement Group (BIG) is a good model for bosque planning and actions, but BIG is being cut, just as the diversity of applicants is increasing.
- We need management, communications, and coordination. We can tolerate some chaos if we exercise respect and trust.

BOSQUE LANDSCAPE ALTERATION OUTLINE OF BASIC PRINCIPLES

OBJECTIVES

- 1 To reorganize the Rio Grande bosque’s landscape to retain, within current constraints, its historical processes and wildlife communities.
- 2 To recreate, by doing this, its former patchy mosaic of native trees and open spaces along the present-day river’s narrow floodplain, while containing the distribution of invasive species.
- 3 To reduce, by having created this mosaic, the intensity of bosque wildfires both at the wildland-urban interface and within the rest of the bosque, and the landscape water depletion by bosque evapotranspiration.

BASIC REQUIREMENTS

- 1 Become familiar with the present condition of the bosque landscape, including the existing evapotranspiration rates and fire danger in different reaches, and with the management practices that affect it.
- 2 Develop flexible hydrological management options, including the ability to mimic the natural hydrograph, in order to maintain wet soils at appropriate seasons for native tree recruitment and maintenance.
- 3 Recognize that historical flooding is being replaced by wildfire as the driving force behind current bosque landscape dynamics, and implement flexible responses to both flood and fire to maximize the benefits/minimize the damages of these disturbances.
- 4 Manage the river and the anticipated patchy riparian mosaic for habitat diversity: biological diversity will follow.
- 5 Develop criteria for evaluating the desired evapotranspiration rates and fuel loads for different reaches of river to achieve the greatest diversity of habitats using the most appropriate techniques.
- 6 Construct wetlands inside – and where possible outside – the levee system, with reference to available wetland models.

- 7 Maintain the altered bosque landscape with measures that reduce evaporation from soil surfaces, minimize depletions and provide for overall reductions in the consumptive use of the riparian ecosystem.
- 8 Ensure a sustained program of bosque research and monitoring.

SUGGESTED APPROACHES

- 1 Remove dead and down and invasive trees to the extent possible within protocol for variable densities.
- 2 Thin out stands of native trees, while retaining sufficient dense young-growth native forest patches for habitat, and leaving enough standing dead for wildlife.
- 3 Create uneven-aged stands of native trees by overbank flooding, pole planting, selective watering, landscape lowering, and side-channel construction.
- 4 Create an irregular and internally thinned woodland patch mosaic of varying density with relatively large, interspersed open spaces (native grasslands and shrublands).
- 5 Expand the use of citizen volunteers by using appropriate sources of training, supervision and management, to assist with various aspects of bosque landscape alteration.
- 6 Do the same with ecosystem monitoring by using ongoing and anticipated monitoring programs and protocols.
- 7 Adaptively manage the bosque landscape, in an ecosystem-based manner that integrates recreation uses with fire protection and the other objectives stated above.
- 8 Create communication and teamwork opportunities among the many groups working on the bosque – top-down, bottom-up, and lateral.
- 9 Develop outreach programs that will enhance decision-makers' understanding of bosque processes.
- 10 Conduct periodic external evaluations of the ecological outcomes of bosque landscape alteration.