IBWC – Caballo to American's Dam
Stakeholder's Meeting No. 2
2007-07-13

Objectives – Tony Apodaca

- Present Draft of Existing Field Conditions to Stakeholders
- Gather from attendees as to:
    - What they desire to see come out of the study
    - What ideas they have regarding the 2003 Environmental Impact Statement [EIS] by Parsons
    - What problems they have regarding the 2003 EIS by Parsons
        - Ex. Proposed alternatives
- Elephant Butte Irrigation District [EBID] contact the Corps for new proposals
    - Corps gathered the primary ideas at the first stakeholder's meeting
    - Today's meeting
    - One more meeting in the Fall

- Danny Borunda – attendee
    - No Record of Decision [ROD] has been done for the EIS

- Four points were made at the First Stakeholder's Meeting
    - Recommend Flood Damage Reduction, Environmental Restoration and Irrigation be fully integrated
    - Balanced study / proposals / solutions
    - Complete the 1999 NEPA process [the EIS]
        - This has to be done by Summer 2008
    - Include any other overlooked initiatives that haven't been included up to this point

Hydraulics and Hydrology – Steve Boberg

- Introduction of Bob Mussetter and Jim O'Brien who will present their draft report results
- Some comments have already been received
- We are looking for attendees comments

Bob Mussetter – Sediments, geomorphology of this reach of the Rio Grande, and hydrology baseline presentation

Project was broken up into primary sub-reaches

- Upper – Percha to Leesburg
    - 7 smaller sub-reaches
- Middle – Leesburg to Mesilla
    - 2 smaller sub-reaches
- Lower – Mesilla to America's Dam
    - 4 smaller sub-reaches

- The sub-divisions were determined by IBWC management units at physical controls
- 13 total sub-reaches within the 3 primary sub-reaches

Hydrology of the system

- 2 primary categories done on a water year basis
  - 1 – range of typical sustained flows based on mean daily flows
    - Most important for ecology issues
  - 2 – annual run-off and seasonal variability
  - Ex. Average 100,000 acre feet per year at El Paso
    - Low during the fall and winter
    - Higher during the irrigation season
    - This is true for either end of the full reach

❖ Phil King – attendee

- Explained how / why flows increase and decrease during the irrigation season
- Beth Bardwell asked for this explanation
- Ex. Drought, monsoon seasons, cotton runs,
- No such thing as a typical or average year

Day Plots

- Data points are middle points of 80 years worth of data [mean instead of average]

Data for analysis came from 1975 - 2006

- Long term gauge records and a data set from Phil King to make consistent analyses that give examples of how the flows vary
- 8 gauges on the mainstem
  - 6 don't have complete records
- 3 primary diversion points on the mainstem
  - Percha, Leesburg and Mesilla
- Variability [ex. Low flows] due to missing / unknown elements

Question posed by Mussetter and O'Brian – If we take the data from years 1975 – 2006, how accurate does it represent the years 1938 – 2006?

- % time flow = or greater than the longer period
- 1975 – 2006 has slightly more water but the patterns are similar

Data was filled in using statistical techniques at the 6 gauges with the missing records

- Then the results can be used
- Named 6 gauges

Showed diversion patterns at Percha, Leesburg and Mesilla

- How much water pulled out of the Rio Grande
  - Mean daily flow

Mean Daily Flow Duration Curves

- On average annual basis

- Discharge [cfs] by % time = or exceeded

❖ *Leticia Segovia – attendee*
  - *Does 1% = 100 year flows in this particular analysis?*
- *Bob*
  - *No.*

❖ *Dr. John Hernandez – attendee*
  - *Pointed out that graph lumps dry season with irrigation season*

These curves are easy to redo to split the dry and irrigation seasons
100-Year Peak Profile
- 100-year peak discharge [cfs] by river mile at certain points of the reach

Flood Frequency Curves
- Discharge [cfs] by Exceedance Probability at the El Paso gauge
- This gauge was the only gauge that had enough data for analysis

Geomorphology

Plan Formulation Characteristics
Profiles and Gradients
Sediment Characteristics
- Ex. Bank material, bed material

Controls within the system
- Natural related to geology
- Man-made
  - Dams, siphons, bridges, etc.

Geology

3 major reaches
- Rincon Valley – wide, flat river valley
- Seldon Canyon area – narrow, constricted channel
- Mesilla Valley – broad, flat river valley

Human Impacts

Irrigations, flood control, water delivery [pre-canalization]
Upstream water development

Canalization
- These impacts are why we are here

❖ *Gary Esslinger – attendee*
  - *The dams below Caballo need to be included as human impacts*
    - *Those that came after the canals*
- *Bob*
  - *Water inflow during monsoons and sediments from the dams and tributaries are important*

Canalization Project

Levees straightened the reach
Design reports from IBWC show what the Rio Grande and Valley looked like at that time
- Mid-1930's
- Flood Control, water delivery efforts in river bottom
  - Not natural

Longitudinal Profile
- Fairly uniform in this reach
- Pre- and Post-canal topos compared and existing to see what happened vertically
- Shows degradation after canals downstream of the siphons
- Reach can carry more sediment that is currently passing through
  - There are some exceptions at the mouths of some of the tributaries

❖ *Beth Bardwell – attendee*
  - *Equilibrium has been reached or will it continue to degrade?*
- *Bob*
  - *The upper reach is still degrading, the middle section is close to equilibrium and the lower reach is aggrading.*

Channel Characteristics

Discharge Capabilities
Average Gradient
Channel Width of Main Channel [not the overbank between the levees]
Average Bankfull Capacity [again, not the overbank between the levees]

What's bankfull capacity of the existing Rio Grande?
- Variable in sub-reach #1

- Sub-reaches 2 – 5 have a capacity of approximately 4,000 cfs
- From their to Mesilla, it's less than 2,500 cfs

Bed Materials

- Medium size and larger above the Hatch Siphon
- Changes to smaller sizes / sand bed below

Tributary Confluences

- Only source of sediments to the Rio Grande now
- Size and quantity of materials
- What's happening on the opposite bank?

Tributary Sand and Gravel Yield

- Cumulative Sediment Yield x Distribution Upstream from American's Dam
- Average Annual Yield
- Can vary wildly in some years
    - Ex. 100-year event vs. 2-year event

Man mad structures affect sediment movement

- Diversion Dams
- Siphons
- Bridges
    - Lateral controls and affect hydraulics

Representative Bed Material Gradations

- Upper reach is gravel and cobble
- Lower reach is sand

What does it take to move sediments in the upper reach?

- Current flow regimes can't move sediment

What does it take to move sediments in the lower reach?

How much sediment can the lower reach carry? [By sub-reaches]

- It can carry more sediment than is currently being moved with the current flow regime.

Annual Aggradation / Degradation Trends

- Ex. Reach 2 can carry more than it gets

❖ *Dr. Hernandez – attendee*
    - *If unit was changed to yards, how much would it increase the numbers?*
- *Bob*
    - *The average would be about 15,000 yards*
- *Dr. Hernandez*
    - *Are these sediments a hazard? Are they hard to move?*
- *Bob*
    - *The study didn't include testing for contaminants, but we didn't see any indications of contaminants.*
- *Dr. Hernandez*
    - *Could the sediments be dredged and then put on top of the levees?*
- *Bob*

- *We can't make that call.*

❖ *Beth Bardwell – attendee*
- *Is there any impact on the 100-year event / threat to the levees per these trends?*

- *Bob*
  - *In the lower reach, aggradation has caused the loss of some channel capacity*
  - *With exceptions to very certain areas, sediment aggradation isn't causing a problem to flood capacities*

❖ *Dr. Hernandez – attendee*
- *Including bridges?*

- *Jimmy O'Brien*
  - *Capacity loss between the levees is very minimal*

Effective Discharge Analysis
- Sediment is moved by differing cfs over time
- Upper Reach – approximately 1,500 – 2,000 cfs needed to move sediment
- Lower Reach – approximately 800 – 1,000 cfs
- If changes were made to include overbank flooding, there would be little effect and wouldn't change this curve much

❖ *Beth Bardwell – attendee*
- *If we get 1,000 cfs in the lower reach and 1,500 cfs in the upper reach, is that enough flow to move sediment through the system?*

- *Bob*
  - *Flows that move the most sediment through the current regime are not those that are bank full.*

❖ *Leticia Segovia – attendee*
- *How does this explain floods?*

- *Bob*
  - *Current flows are moving sediments*

❖ *Conrad Keyes, Jr. – attendee*
- *If we were to remove the high flows from the 1980's data, would the curve change?*

- *Bob*
  - *It may change it some.*

❖ *Beth Bardwell – attendee*
- *At the end of the irrigation season, flows drop and the islands form?*

- *Bob*
  - *Flows of 1,500 – 2,000 cfs move sediments throughout the system during the irrigations system such that when the flows drop after the irrigation system, the water level drops and the islands and bars can then be seen*
- *Beth*
  - *Do the islands move when the irrigating starts again?*
- *Bob*
  - *Movement, shape, and location depend on many factors; river shape, bridges, etc.*
- *Beth*
  - *What happens when bars become vegetated?*
- *Bob*
  - *It takes higher flows to mobilize those sediments and does cut conveyance capacity by some amount.*
  - *Bars in the lower reach are likely be mobilize yearly*

❖ *Gene Adkins – attendee*
  - *There are many tributaries in areas without levees and these areas are critical to watch.*
- *Jimmy*
  - *We can look at tributaries where restoration is possible and look at primary changes and whether levee capacity would be affected.*
  - *We suspect that the effect would be marginal.*

❖ *James Salopek – attendee*
  - *Does the study look at whether restoration or existing plants affect the ditches and levee's structural integrity?*
- *Jimmy*
  - *Our study looked at the roughness and levee structure soundness*
  - *We looked at flows over 20,000 cfs*

❖ *Leticia – attendee*
  - *FEMA looked at levee to levee and got different results than the Corps*
  - *It's confusing when to government agencies don't coordinate their efforts / studies and use differing methods*
  - *FEMA may restudy water height and flood frequency analysis*
  - *The Corps and FEMA should be sharing data*
- *Bob*
  - *What happening in bank and out-of-bank in the lower reach*
  - *FEMA could use some of this, but most of this isn't useful to what they are doing*
- *Leticia*
  - *What FEMA's giving Doña Ana county is really sufficient*
- *Jimmy*

  - *The sponsor's responsibility is to make sure that FEMA uses the best available information*
- *Leticia*
  - *We've tried*

❖ *Steve Smullen – attendee*
  - *Do the sediment upstream or downstream affect irrigation deliveries and how?*
- *Bob*
  - *We are getting the sense that most spots away from the tributaries are not much affected.*
- *Jimmy*
  - *Backwaters contain minimal storage which would eventually move downstream anyway.*

❖ *Dr. Hernandez – attendee*
  - *We need to worry about in-channel restoration and how it would affect the flood control abilities of the levees*
- *Bob*
  - *We agree*
  - *We have tools to see exactly what any impacts would be*

❖ *Leticia Segovia – attendee*
  - *We also need to look at the affect on velocities and erosion*
- *Bob*
  - *There are positive and negative aspects to the process of all alternatives*

❖ *Henry Magallenas – attendee*
  - *Mesilla operations have changed due to drought*
  - *Not sluicing like we use to in order to move bed load*
  - *This has an impact*

❖ *Mike Landis – attendee*
  - *Initial delivery to wet the system was slower this year after last year's flood and at lower flows*
    - *Took more time to get downstream*
- *Jimmy*
  - *Did this increase or decrease deplete?*
- *Dr. King – attendee*
  - *More depletion than was anticipated*
- *Jimmy*
  - *Not to decrease water, but the water is going somewhere*
    - *Ex. Evaporation, groundwater recharging, etc.*
- *Dr. King*

- *Water was hung up at Seldon Canyon and then was slower than average moving from Mesilla to El Paso*

Average time for water to move through the system during initial delivery for wetting the system

- 18 hours to Broad Canyon
- 36 – 40 hours to El Paso

Peak is arriving slower at lower cfs

- Similar to 2004 after the 2003 drought

❖ *Dr. Hernandez – attendee*
- *Ecosystem restoration would impede flood waters and increase water losses?*

- *Jimmy*
  - *We are studying this in order to answer those types of questions*
- *Beth Bardwell – attendee*
  - *We need to look at the tradeoffs between flood risk management, ecosystem restoration, irrigation and compact deliveries, etc.*

❖ *Kevin Bixby – attendee*
- *Is the channel capacity in the upper reach great now?*

- *Bob*
  - *The in-channel / bank-to-bank capacity is greater*
  - *We don't know about the levee to levee capacities*

Jimmy O'Brien – FLO-2D

FLO-2D has been refined and several modeling runs were made for this study
Did a re-analysis of the original URGWOM study at 3,500 cfs
For this study, evaluated restoration impacts for every 250 feet of channel every 10 seconds

- Can include the levee to levee area
- Caballo to America's Dam
- The model doesn't take irrigation water returns into account
- Modeled with and without water diversion

Took DOÑA ANA COUNTY Lidar data and ran it through Grid Development software to show inundation and water surface elevation

❖ *Robert Faubion – attendee*
- *Do you have Lidar upstream of the DOÑA ANA COUNTY?*

- *Jimmy*

- *We surveyed all cross sections within the DOÑA ANA COUNTY and used Corps dtms for upstream of the DOÑA ANA COUNTY*

❖ *Mike Landis – attendee*
- *Does it show precipitation flows on the outside of the levees?*

- *Jimmy*
  - *We've only ran the restoration flows out of Caballo Dam*
  - *Flood flows can be done and are rerouting 2006 flows for recalibration*

❖ *Dr. King – attendee*
- *Did you model the 1997 floods, the Black Range*

- *Jimmy*
  - *We can't specifically say which year floods were used*

Area of Inundations Maps
- ArcGIS shape files
- Below Benton Bridge at less than 3,000 cfs is overbanking [water is coming out of the channel bed and into the area between levees]

Overbanking is limited to certain places within the project area
For flows less than 3,000 cfs at Caballo with diversions, only the area below New Anthony Dam had overbanking

Potential Analyses
- Ecosystem function of projects at various flows
- Flood hazard mitigation assessments
- Levee freeboard

Ecosystem Restoration Issues, etc.
- Flow magnitudes
- Duration
- Timing
- Frequency

Look at integrating ecosystem restoration projects into irrigation and compact deliveries, flood risk management
- All at once
- With habitat changes only
- With channel changes only
- With drought, fire reduction and flood risk planning
- The Lyte Reduction Plan only, etc.

❖ *Sam Fernald – attendee*

  - *Did you include bank storage in the model?*
- *Jimmy*
  - *We ran evaporation in the channel and the overbank, infiltration*
  - *The model is doing a pretty good job of this*

Ecosystem Restoration

William DeRagon, Corps Biologist

Our objective was to study
- Existing vegetative conditions
- Types of possible restoration techniques
- Potential opportunities for restoration

Historically
- The Rio Grande was very sinuous, convoluted, meandering, with higher flows that created oxbows
- Riparian woodland [cottonwood-willow, tornillo] in strings and patches interspersed with grassland
  - No necessarily connected
  - Wide distribution across the valley
- Lakes [esteros] common in cut-off oxbows
  - Ponds
  - Some wet above ground water
  - Some drier with moist soils
- Marshes [cienegas] in cut-off oxbows and adjacent to channel

Extent of riparian and wetland communities has decreases [in acres]
- Agricultural and residential development within the floodplain
- Flow regulation by dams & diversion
  - Includes check dams on the tributaries
- Drains [lowering local water tables]
- Canalization about 1940
- Invasive plant species [salt cedar in particular but also other weed species]
- Mowing

Slides were presented demonstrating the different plant communities & their values to wildlife.
- Trends from the Parson Report
- Parson identified some sites for ecosystem restoration, but this study isn't limited to them
  - They will be evaluated as potential ecosystem restoration sites, but may be modified or excluded for others.

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Ecosystem Restoration Slides

River banks throughout the project area – salt cedar or willow

- 80 – 90% have bank shrubs
- These bands stretch away from the river in narrow bands of 10 – 20' and are limited to the banks.

Upland Community – Salt cedar [re-sprouting]

- Exposed soils
  - Sparse vegetation
- Salt cedar, Wolf berry, Aster, Ephedra, Tumble weed, Kochia

Upland Community – Sparse vegetation

- Remnant cottonwoods
- Pluchia, Arrowwood, Seep willow
- Old meanders

Upland Community – Herbaceous

- Primarily Salt grass
- Remnant cottonwood

At site above the Hatch Siphon

- Same meander near the bank
- Increase numbers of plant and wildlife species
- Example of good riparian grassland

Pichacho Bridge

- Pole plantings of Black willow & Cottonwood
- Some remnant Cottonwood
- Used to be a recreational use area
  - Found a gravel path
  - Has been a no-mow area since 1999

General Restoration Objectives

- Partial restoration / renewal of historical structure & ecological function
  - Riparian shrubland
    - Fairly moist & occasionally flooding
    - Including dense willow stands for the Southwestern Willow Flycatcher, migrating birds
    - NOTE: The Rio Grande Flyway has the highest number of species of migratory birds
  - Riparian woodland
    - Cottonwood – willow mix
  - Emergent marsh / meadow
  - Aquatic habitat [not focused on aquatic animal species, but of plant species]

Restoration Techniques and Potential

- Basic premise: to increase inundation, decrease water surface –to-bank distance
- To increase inundation, have to lower bank height to the water's elevation

1. Increase water surface elevation
    - Increased releases from Caballo
    - Grade control in channel
        - Hatch & Rincon siphons act as this already
        - Simple rock structures
        - Inflatable dams
            - Would have to have fish passages
2. Lower the overbank ground elevations
    - Bank lowering [shave down]
    - Ex. Scrape ~1.5' of soil would cause inundation at lower flows
    - Median annual mean daily flows determine how much to shave down
    - 3 – 5 year flows are the best for riparian vegetation
        - Ex. Dense shrubs may be inundated up to 30 days / year [more than that kills woody vegetation]
    - Flow-through side channels
        - Make use of old meanders
    - Vegetated back-water areas
        - Make use of old oxbows
    - Depressions within the overbank isolated from channel flows [groundwater swales]
3. Other water sources
    - Waste ways
    - Drain returns
    - Diversion from drains [special circumstances]
        - Ex. Above Mesilla & Sunland Park, drains are higher than the river
4. Vegetation management & planting
    - Release from mowing &/or grazing
    - Natural succession can provide new vegetation for almost free
    - Planting [alone or in combination]
        - Poles [cottonwood, black willow, peachleaf willow]
        - Whips [willows]
        - Tall-pot containers [shrubs]
        - Riparian grasses & forbs
        - Wetland seedling containers
        - Many are tried & true as well as economical

Considerations & Trade-offs

- Channel conveyance
- Flood control capacity
    - Ecosystem designs should not impinge on this
- Water use

    - Human water users
    - Vegetative water users
- Land ownership
    - IBWC is the primary land owner
- Recreation
    - Primarily found in urban areas within the project study area
    - Primarily passive use
- Nuisance / Attractiveness / Aesthetics
    - Fire risk?
    - Illegal alien & homeless use?
- Invasive species
    - Salt cedar
    - Tumbleweed
    - Cockle burrs
- Maintenance
    - Design system that will eventually perpetuate itself
    - Periodic maintenance for exotic vegetation control
- Water quality [added by Dr. Hernandez – an attendee]
    - Salinity
    - E-coli [not currently in compliance]

❖ *Kevin Bixby – attendee*
    - *The total area [in acres] within the project area has been computed at over 8,000 acres; where are the missing 3,000?*
- *William*
    - *We subtracted the smaller communities which may be considered 'upland' at this time*

❖ *Beth Bardwell – attendee*
    - *How do the existing condition compare with what was there historically? Habitat value?*
- *William*
    - *The types of native species present haven't changed*
    - *The invasive plant species are relatively new*
    - *We don't have much in the way of historical mapping; just bits and pieces from before canalization*
    - *1935 mapping could be use but not accurately*
- *Beth*
    - *There are several literature sources with descriptions*
    - *There are also 1918 surveys of the area with plant species*
- *William*
    - *The base dominant species probably have changed much*
- *Beth*

  - *We need to pay attention to age class for ecosystem values*
- *William*
  - *Community composition is probably more important*

❖ *Kevin Bixby – attendee*
  - *Why aren't we looking at aquatic habitat? We need to focus here.*
- *William*
  - *The basic premise of our study was to emphasize terrestrial ecosystem restoration.*
- *Kevin*
  - *The aquatic habitat connects the upper and lower reach.*
  - *There has been loss of native fish species*

❖ *Beth Bardwell – attendee*
  - *Inundation varies by habitat type? Can you talk to timing of overbanking, frequency, duration, etc?*
- *William*
  - *Gave short talk on: plant communities & the water regime necessary for their survival and propagation.*

❖ *Dr. Hernandez – attendee*
  - *How far from the channel for shaving banks would be necessary?*
- *William*
  - *Could be anywhere from 2 – 10 acres*
  - *Approximately 200 feet from the bank and 2.5 feet in depth*
  - *Depends on localized topography and channel conditions*
- *Dr. Hernandez*
  - *How much material?*
- *William*
  - *Ex. 2 feet x 200 acres = 400 acre feet*
- *Dr. Hernandez*
  - *Can it be disposed of on the levees?*
- *William*
  - *Some sites were identified within and outside of the levees*
  - *Soils would have to be tested for suitability before they could be use on the levees themselves*
- *Dr. Hernandez*
  - *What kinds of materials are in the overbank areas? Saline?*
- *William*
  - *Those soils could be more saline than that in the bed*
  - *This can be easily determined and planned for accordingly*
- *Dr. Hernandez*
  - *Have water quality standards been taking into account?*
- *William*

- *Not yet, but definitely will be before anything is actually done*

❖ *Dr. S.D. Schemnitz – attendee*
- *Livestock grazing and mowing frequency needs to be taken into account*
- *What about mowing in lines instead of blanket mowing?*

❖ *Leticia Segovia – attendee*
- *Are we looking at constructing flood control structures to protect the ecosystem restoration projects?*

- *William*
  - *Not generally for ecosystem restoration projects alone*
  - *Gates and check dams, yes*

Evaporation and evapotranspiration uses by communities
- Ex. Woody vegetation uses approximately 3 – 5 feet per acre per year

❖ *Kevin Bixby – attendee*
- *Ecosystem restoration can increase water quality benefits*

❖ *Gary Esslinger – attendee*
- *We need to take Homeland Security into account*

❖ *Mike Landis – attendee*
- *Remember that El Paso drinks what comes down the river*

EBID Presentation

Valerie
- Gave a PowerPoint demonstration on the EBID website

James
- Demonstrated the river and gauge data that can be found on the EBID website
- 250 RTUs
- Updated every 15 minutes

Dr. Hernandez
- Gave a talk on the EBID proposal for ecosystem restoration activities within the project area for maintaining surface and ground water quality
- EBID welcomes the participation of other in these activities

Other

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Jimmy O'Brien

- Showed maps generated at difference releases [cfs] from Caballo Dam

❖ *Leticia Segovia – attendee*
  - o *Doña Ana County has new aerial photography and Lidar that can be used for the FLO-2D modeling.*

Question: Has the 2006 Sunland Park flood been modeled?
Answer: Jimmy – No, but it can be.

Question: Why were our levees de-certified?

❖ *Dr. Hernandez - attendee*
  - o *Suggested that activities lowering flood insurance costs be made a higher priority than ecosystem restoration.*

❖ *Kevin Bixby - attendee*
  - o *There was more vegetation throughout the reach, in general, when the Water Compact was initially started than there is now.*

❖ *Daniel Borunda - attendee*
  - o *The purpose of this study was to identify management measures to form a new proposed alternative for the Record of Decision dated 1999.*

❖ *Beth Bardwell - attendee*
  - o *We can identify future analyses in addition to coming up with a proposed alternative.*

Goals and Objectives

1. Move sediments through the reach
2. Mike Landis – Add a signing statement to the R.O.D.
   a. Go ahead and sign the R.O.D. and then go ahead with additional management measures that come up through additional future analyses.
3. Mike Landis – The Nickel Plan – Purchase 5% of irrigation water throughout the Rio Grande reach [Colorado to the Gulf of Mexico] for ecosystem restoration
   a. Or just the water in the Rio Grande project area
4. Robert Faubion – Attendee, Farmer and EBID Board Member
   a. There's an issue with vegetated islands. This may be a psychological perception of farmers who have been in the area for years.

<u>General</u>

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1. Take flood control impacts from ecosystem restoration projects [all reaches] into account
2. Take water delivery impacts from ecosystem restoration projects [all reaches] into account
3. Identify conditions under which restoration projects can take place, no matter the location, that is compatible with EBID's mission
4. What in EBID's operation & maintenance processes can be modified that will still meet mission but will promote restoration?
    a. Ex. Mowing vs. other forms of invasive plant species controls [manual removal, beetles, etc.]
    b. Seasonality of EBID practices
    c. No one answer for all areas
5. Plan flexibility
6. Share study information between FEMA & corps
7. Restoration projects spaced according to animal species movements
    a. "String of Pearls"
8. Maximize biodiversity
9. Keep vegetation a certain distance from levees
10. Minimize fire dangers
11. Take the criminal element into account
    a. Need additional law enforcement patrols?
12. Concentrate on Best Management Practices
    a. Identify the tools that will be used in the future
13. Reduce future flood damages
14. Rewrite the preferred alternative in the 1999 EIS or in the verbiage of the R.O.D.
15. Throw out the current alternatives in the 1999 EIS or in the verbiage of the R.O.D.
16. Reconnect the river to the flood plain
17. Improve water quality
18. Identify & increase restoration flows [timing, duration, etc.]
19. Identify site specific ecosystem restoration projects
20. Make recommendation for or against future residential & / or commercial development
21. Strengthen and / or improve the levee system
22. Shave downs
23. Analyze no mowing throughout the study reach on a project wide basis
    a. In conjunction with:
        i. Invasive species removal
        ii. Periodic controlled burns
        iii. Mimicking the natural hydrograph
        iv. Revegetation with native species
24. Vary the ways of removing invasive species
    a. All, some, none within individual areas
    b. Chemical, manual, overshadowing by canopy
25. Focus on plant community diversity
    a. Including plant species diversity

26. Control carp, cattails, etc. with conveyance structures
27. Get rid of vegetated bars & islands to increase the amount the water to downstream users
28. Improve fisheries
29. Maintain reservoir sediment capacities
30. Formulate decision making guidelines for channel maintenance activities by criteria or subgroup
31. Sign the R.O.D without doing anything

Goals for the Upper Reach

1. Below Sibley Arroyo on the west side of the Rio Grande
    a. Take local infrastructure into account
        i. Synergy with existing improvements
    b. Groins
2. Arroyo confluence sediment fans stay intact
    a. Good habitat
    b. Stabilize the levees
    c. Widen river channel
3. Crow Canyon and other old meanders
    a. To be flooded again
4. Percha to Tipton Arroyo
    a. Restore old hydraulics
        i. Oxbows, meanders, etc.
5. Allows localized channel migration / meanders to happen again
6. Shave downs
7. Seldon Canyon [no levees] – area of intense focus
    a. ESA component for operations & maintenance processes that benefit threatened & endangered species
    b. Flexibility if endangered species move in after restoration
    c. SWWFL already there

Management Measures

1. Adaptive management
2. Mowing
3. Not mowing
4. Channel dredging
5. Limited dredging
6. Bank armoring
7. Removing any existing bank armoring
8. Changing operation at dams, siphons, etc.
9. Flowage easement
10. Grazing leases
11. No grazing

12. Revegetation [ex. Pole plantings, whips, containers, etc.]
13. Natural succession
14. Add meandering, ex. Groins
15. Move levees
16. Mr. Cristo Rey conveyance
17. Bank shaving
18. Add, modify existing, or remove structures

Recommended Sites for Ecosystem Restoration
Our "String of Pearls"

1. Sunland Park
    a. And, Recreation [trails, nature watching, fishing]
2. Sunland Park [the area that flooded in 2006 outside of the existing levees]
    a. And, Flood overflow
    b. And, Levee setbacks
3. Mesilla to Shalem
4. Seldon Canyon
5. Upstream of the Mesilla Valley Bosque State Park
6. El Paso Water Utility property
    a. Canutillo well fields
7. Mesilla Dam project
8. Robledo Mountain Base
9. Vado / Mesquite Area
10. Placitas Arroyo
    a. And, Flood damage reduction
11. Those sites identified in the EIS

Comment Card Comments / Questions

- Focus restoration on old meanders and oxbows
- Restoration wetlands need provision for water control structures to allow periodic drainage to control nuisance fish [e.g. Carp] and plants [e.g. Pure, dense cattails]
- Woody vegetation on restoration areas [e.g. cottonwoods] needs mesh wire guards to protect from beaver
- Corps of Engineers needs input from wildlife habitat managers
- Don't islands at vegetation along the river act as seed banks for undesirable weeds that end up growing along ditch banks and in fields?
- With restoration projects, can we expect flood insurance rates to increase even more?
- I would like the opportunity to submit additional sites and comments to supplement today's meeting. I need to review some documents back at my office. Thanks.
- Will siltation fill in the shave downs during flood events, both natural and releases from dam?

- What release rate gives the regular inundation necessary for the amount of restoration asked for?
- What percentage of the reach is suitable for wetlands [seasonal flooding] at each cfs level?
- Put additional layers on the ArcMap which eliminates areas that can't be restored
- Source of E-coli? In river water?
- E-coli source partially from grazing on floodway? Livestock feed lots?
- Evapotranspiration of current mowed floodway, and bare ground exposed to sun and wind, compared to water use by restored shrub and cottonwood woodland over shaded ground surface?
- Acquire / place conservation easement on El Paso Water Utilities land in valley adjacent to levee
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