



RIPARIAN RESTORATION CONFERENCE
Restoration for the Future: Promoting resilience in our rivers and communities

RiversEdge West
RESTORE + CONNECT + INNOVATE

COTTONWOOD SPONSOR

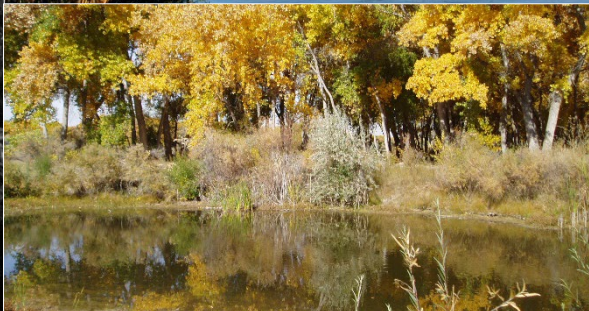
TETRA TECH

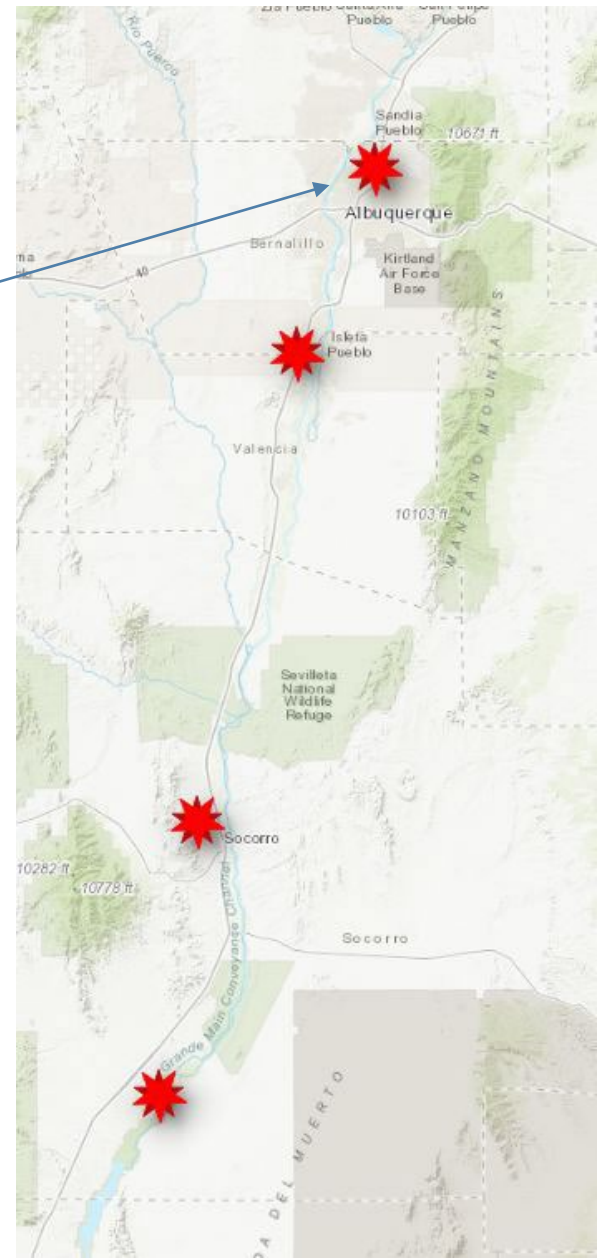
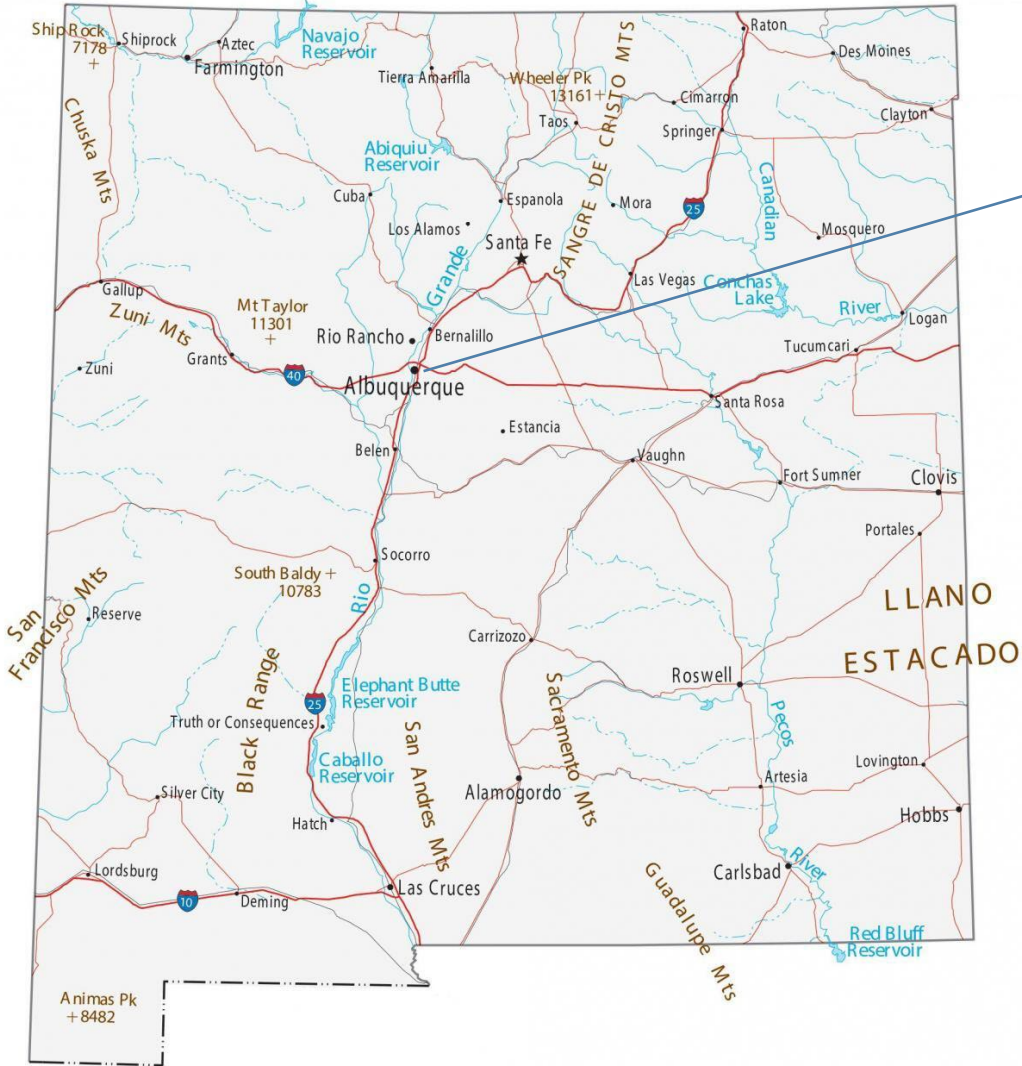
GRAND JUNCTION, CO
MARCH 5-7, 2024

The banner features a scenic background of a river valley at sunset. It includes logos for RiversEdge West, Cottonwood Sponsor, and Tetra Tech, along with the conference title and dates.

Two Decades of Restoration on the Middle Rio Grande

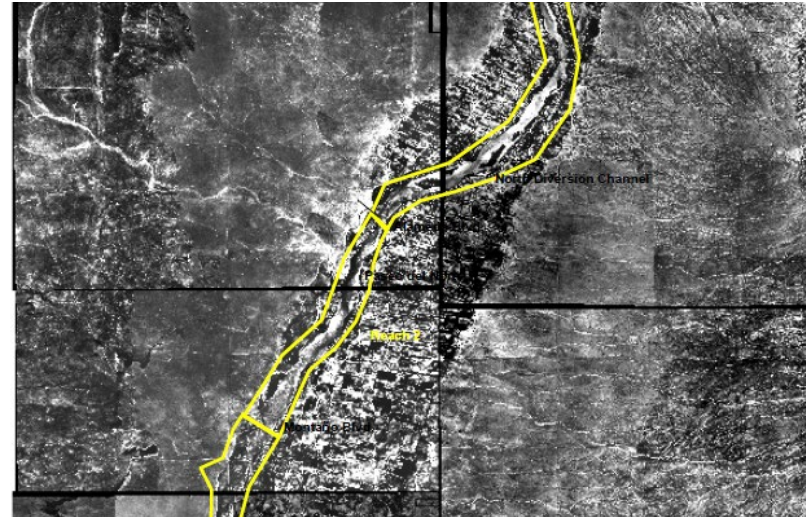
Ondrea Hummel, CERP, Ecology Discipline Lead, Senior Ecologist





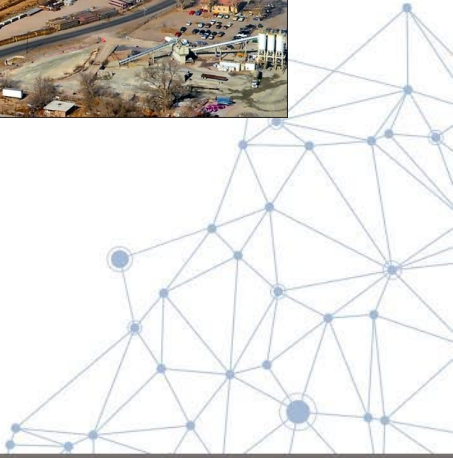
Anthropogenic Changes

- Dams, levees, water delivery infrastructure
- **Resulting in changes to:**
 - Hydrology – quantity, timing, duration; compact delivery
 - Geomorphology
- **Along with**
 - Introduction of non-native vegetation
 - Increase in population
- **Resulting in:**
- **Lack of flooding and floodplain connection**
 - Reduced quantity of average annual flows
 - Infrastructure limitations
 - Reduced floodplain connection when there is enough water



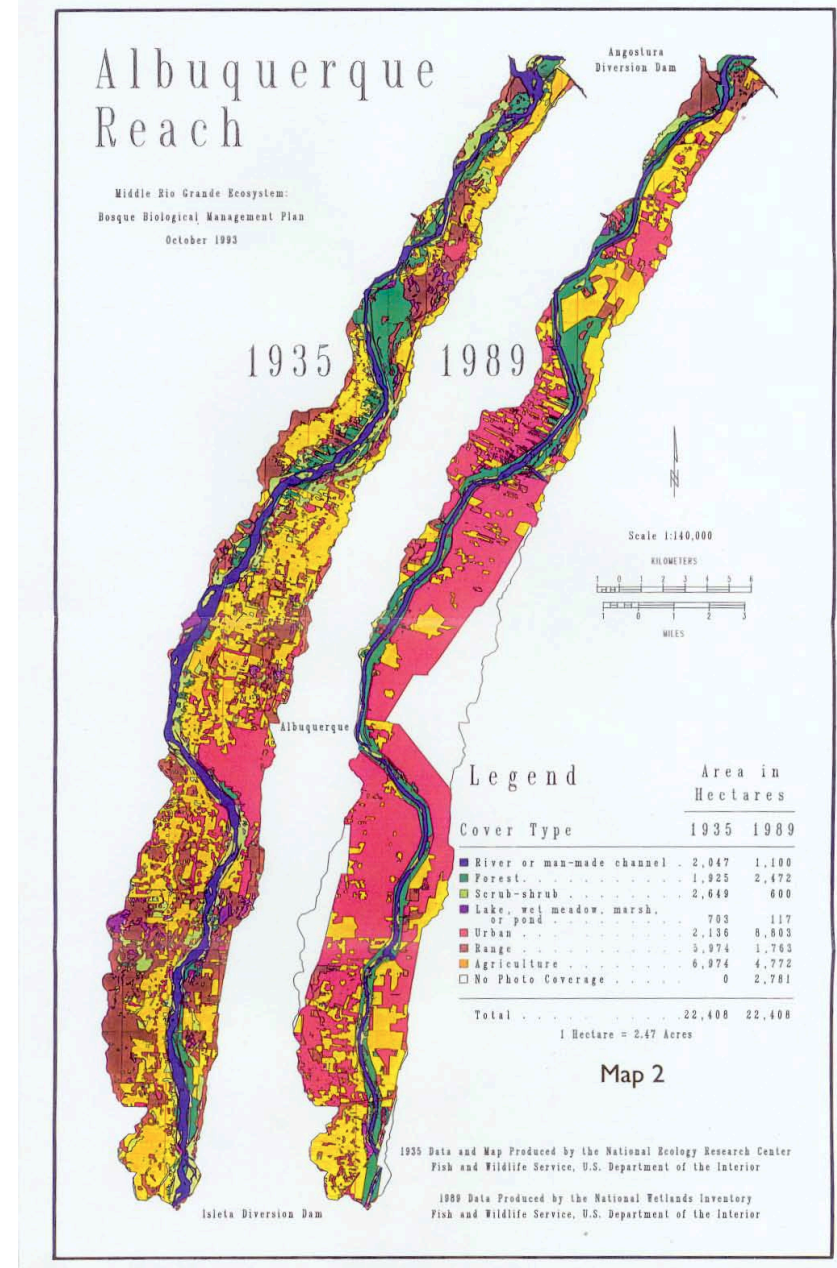
Among the greatest needs of the riparian ecosystem are the preservation of existing wetlands and expansion or creation of additional wetlands (Crawford et al., 1993).





Historic conditions and changes to the river and floodplain

- **1918 (yellow) -1989 channel changes**
 - Albuquerque Levees mid 1950's
 - Jetty Jacks – 1960's
 - Cochiti Reservoir – 1972
 - *Current channel 'locked in'*
 - *Less availability of water to put into the system*



Peak Flows

Date	Flow (cfs)
4-24-1942	25,000
6-23-1949	10,800
5-30-1958	12,700
8-10-1967	13,300
9-15-1972	4,380
8-14-1980	7,600
8-11-1986	5,150
6-7-1993	7,210
8-20-2000	2,040
5-25-2008	5,400
9-13-2013	4,350
6-18-2019	5,720

USGS Rio Grande at Albuquerque



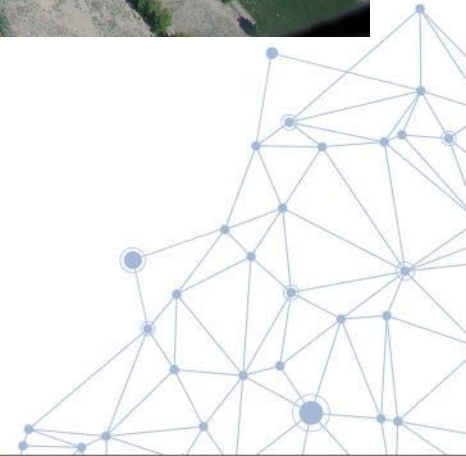
1942 – Downtown Albuquerque

Cochiti Dam closed in 1972

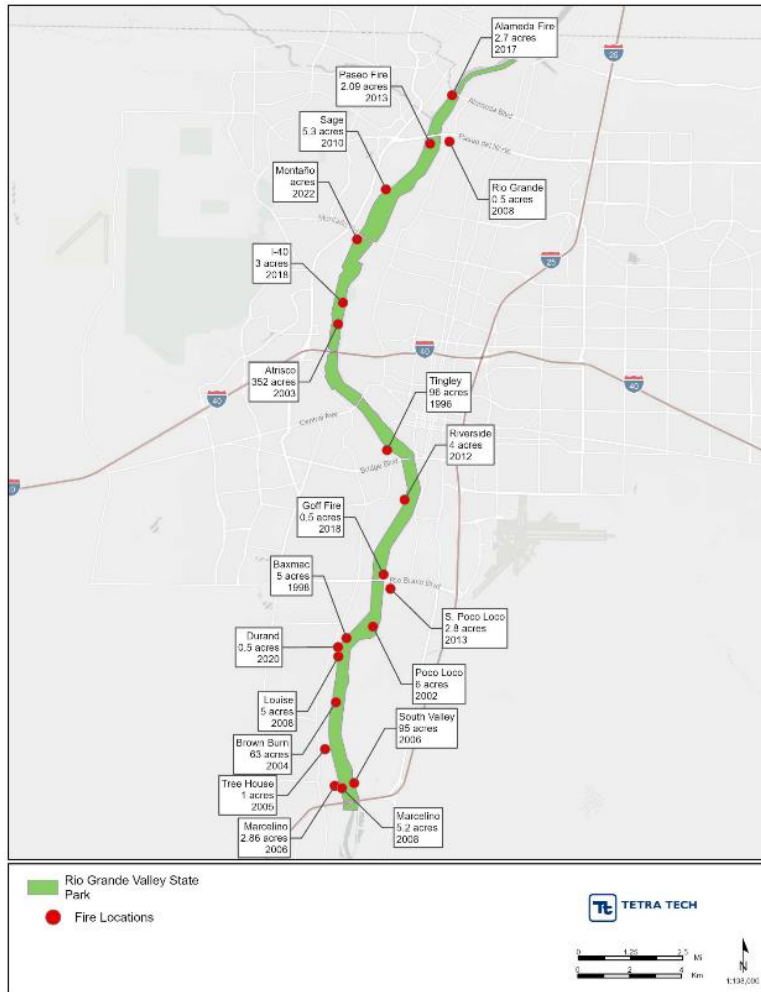


Changes and constraints resulting in

- **Reduced Average Annual Water Flows**
 - Water Quantity, Drought
 - Climate Variability
- **Disconnected floodplain**
- **Non-Native Invasive Species**
- ***FIRE***

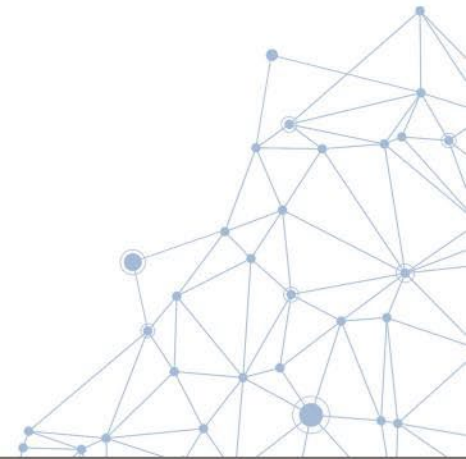


Fires in the ABQ Reach in the past 20 years



Fire Name	Year of Occurrence	Acres Burned
Tingley	1996	98
Baxmac	1998	5
Poco Loco	2002	6
Montaño	2003	113
Atrisco	2003	352
Lavega	2003	0.1
Brown Burn	2004	63
Tree House	2005	1
Squirrel	2005	0.1
Barcelona	2006	0.2
South Valley	2006	95
Marcelino	2006	2.9
Rio Grande	2008	0.5
Louise	2008	5
Marcelino	2008	5.2
Sage	2010	5.3
Riverside	2012	4
Poco Loco	2013	2.9
Paseo Fire	2013	2.09
mm 4.5 Fire	2016	0.25
Alameda Fire	2017	2.7
Goff Fire	2018	0.5
I-40	2018	3
Durand	2020	0.5
Shelly	2020	0.1
Rio Bosque	2021	0.25
Stadium	2021	0
Valley High	2021	0.1
Montaño	2022	30
Total		798.69

Hydrologic Notes from a Restoration Ecologist



Peak flows

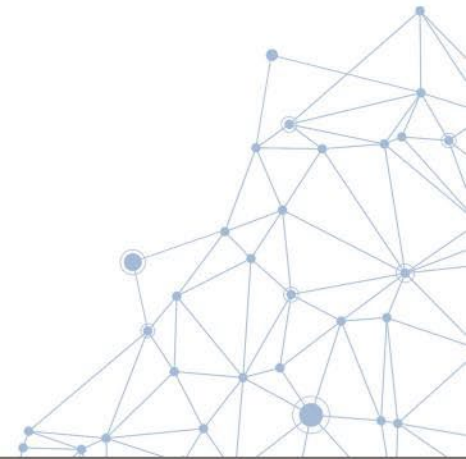
Description	Avg Peak Discharge/Flow	Note
Post-Cochiti Avg Annual Hydrograph	3,770 cfs	~2000-2010
Release capability (Cochiti)	6,000-7,000 cfs (was 10,000)	RR bridge, levee safety Belen Reach
Post-Cochiti Avg Annual Hydrograph	2,000-2,500 cfs	~2010-2015+
Last highest peak flow	6,780 cfs	2005
Max Release/Peak Flow	5080 cfs at Central	2023

USGS Rio Grande at Albuquerque

Don't forget about **duration!**
Work with your hydrologist/hydraulic engineer



RESTORATION – REHABILITATION – ENHANCEMENT - PRESERVATION



‘Restoration’ (Rehabilitation) Techniques/ Goals

- **Fuel reduction/exotic thinning**
 - Balance of vegetation where flooding does not occur anymore
- **Jetty Jack removal**
- **Revegetation - mosaic**
- **‘Bringing the Bosque Back to the River’**
 - High flow channels, backwater channels
 - Bank terracing
 - Willow swales
 - Wetland restoration/recreation
 - Main goal – ‘floodplain connection’

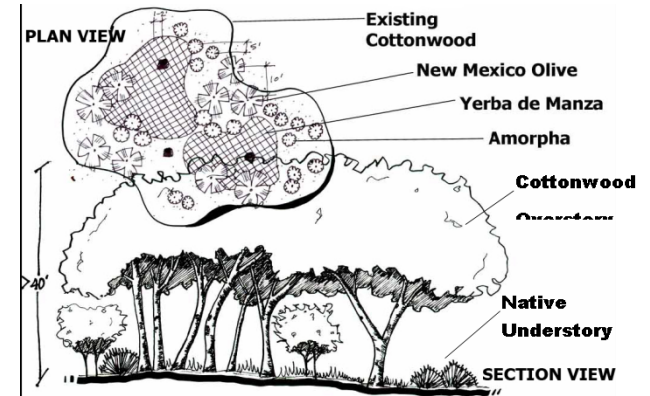
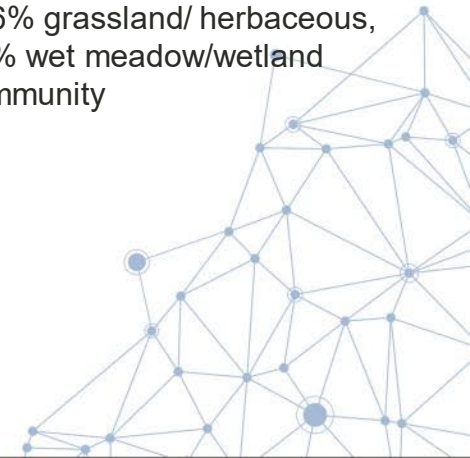


Figure 9. Schematic of a bosque forest



~ 50 % tree community (with 25% tree/grass; 25% tree/shrub),
 ~30% shrub community,
 ~16% grassland/ herbaceous,
 ~4% wet meadow/wetland community



Albuquerque Overbank Project - 1998

*First floodplain connection project,
and with monitoring component*



Let the river do the work!

Bring the bosque to the river

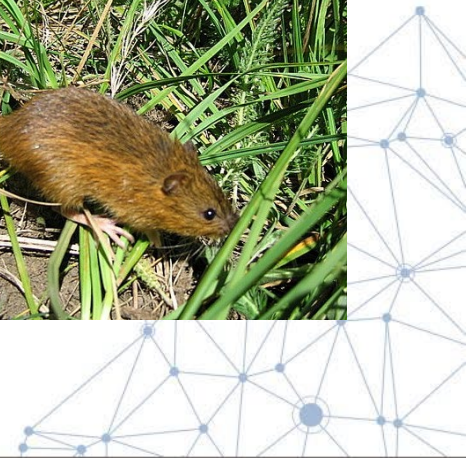


Peak flows: 1998 – 4,060 cfs; 1999 – 4,920
COA Open Space Division, Reclamation, NHPM
Long-term monitoring reporting; Muldavin et al.



Middle Rio Grande Endangered Species Collaborative Program (MRGESCP)

- Established in 2002
- Collaborative forum to support scientific analysis and implementation of adaptive management to benefit listed species within the Program Area
 - 30+ agencies, tribes, non-profits
- Rio Grande silvery minnow
- Southwestern willow flycatcher
- Yellow-billed cuckoo
- New Mexico meadow jumping mouse

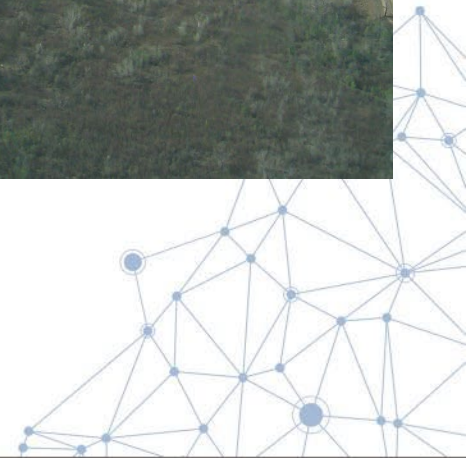


Los Lunas Habitat Restoration Project – 2002-2003

- April 2000 fire
- MRGESCP – Reclamation/USACE leads
- Floodplain connection project
 - Terraces
 - High flow and backwater channels
 - Swales
- Annual monitoring of vegetation, birds, groundwater



2002	2002-09-10	1,770
2003	2003-03-21	1,880
2004	2004-04-03	3,590
2005	2005-06-03	6,780



Lessons Learned, 1998-2008+

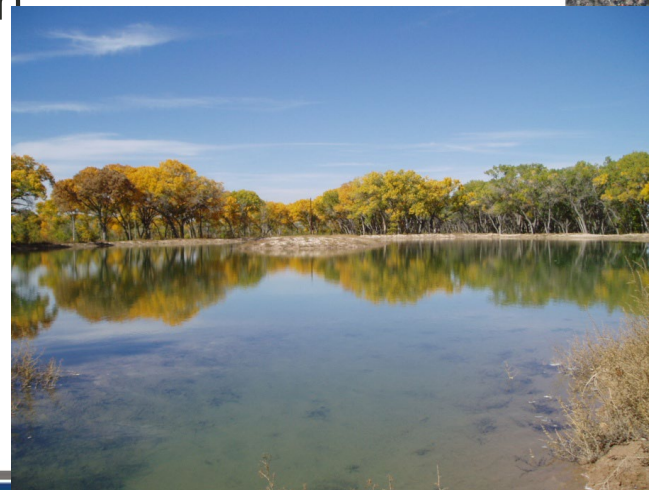
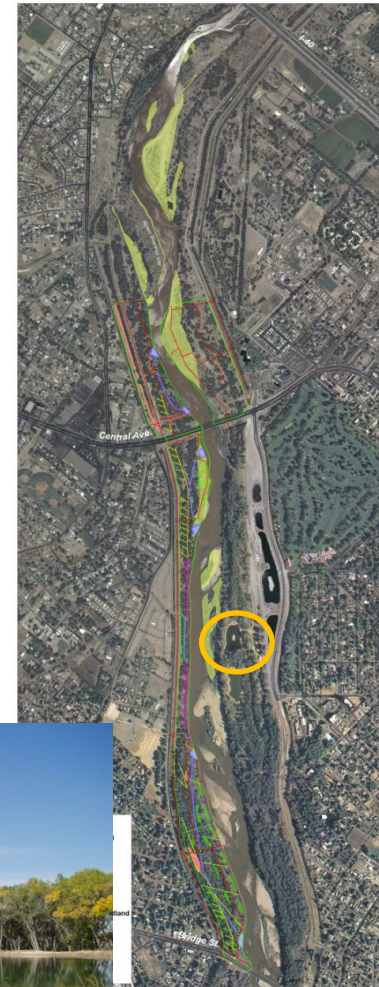
- **High flow channels**
 - Peaks, durations
- **Variable habitat**
- **Floodplain connection
‘gain’ – sediment
removal**
- **Maintenance of native
vegetation**
- **Invasive species
management**

Water Year	Date	Streamflow (cfs)
1997	1997-06-08	6,270
1998	1998-05-09	4,060
1999	1999-05-28	4,920
2000	2000-08-20	2,040
2001	2001-05-22	4,970
2002	2002-09-10	1,770
2003	2003-03-21	1,880
2004	2004-04-03	3,590
2005	2005-06-03	6,780
2006	2006-07-09	4,030
2007	2007-05-21	3,810
2008	2008-05-25	5,400
2009	2009-04-14	4,940
2010	2010-05-22	5,140
2011	2010-12-17	2,710
2012	2012-08-17	2,510
2013	2013-09-13	4,350
2014	2014-08-02	3,770



Ecosystem Revitalization @ RT66 - 2010

- Fuel reduction, exotic thinning
- Jetty jack removal
- Start of Floodplain connection components:
 - High flow channel
 - Willow swale construction
 - (still not as much terracing/bank lowering)
- Native Revegetation



Revitalization @ Route 66 Project

0 0.25 0.5 0.75 1 Miles
 Source: Imagery: Geo-Port Area: 2008 MRCOG
 All Data: 2005 Statewide DOGDC



Finished construction before 2010 high flow



Peak flows:

2010 – 5,140

2011 – 2,710

2012 – 2,510



Lessons Learned, taken into Middle Rio Grande Restoration Project; 2011-2017

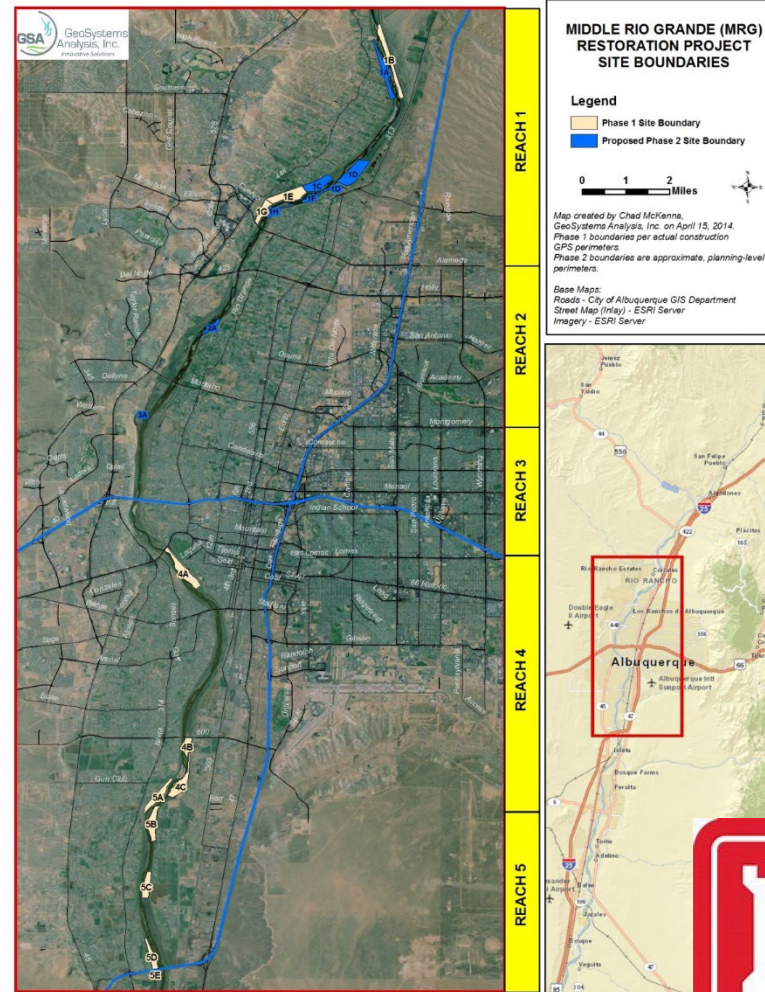
Taking forward design:

- a) Coordination of previous work and design features
- b) Floodplain connection overall 'gain'; options for managing soil removed
- c) Start of designing for lower flows
- d) Native vegetation options



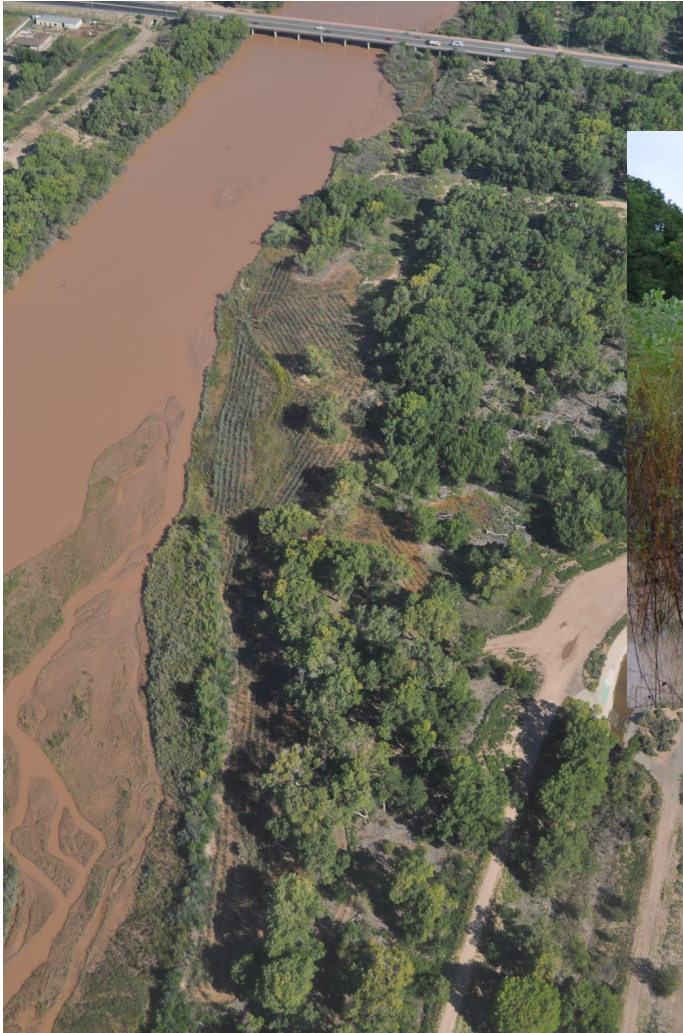
Middle Rio Grande Restoration Project

- 916 acres of restoration – floodplain connection focus; coordination with previous efforts
- Phase 1 (~600 acres) 2011-2014
 - most completed by 2012 (4,350 cfs)
- Phase 2 (~300 acres) 2014-2017
- Project sponsors:
 - Middle Rio Grande Conservancy District (MRGCD), Pueblo of Sandia, City of Albuquerque
- Other project stakeholders:
 - Village of Corrales
 - U.S. Bureau of Reclamation
 - City of Albuquerque Open Space Division
 - Pueblo of Sandia
- 5 years of follow up monitoring

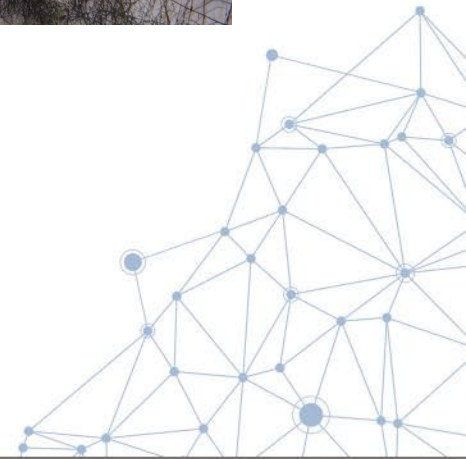


4B – Rio Bravo





Peak flow:
2011 – 2,710,
2012 – 2,510,
2013 – 4,250



5D and





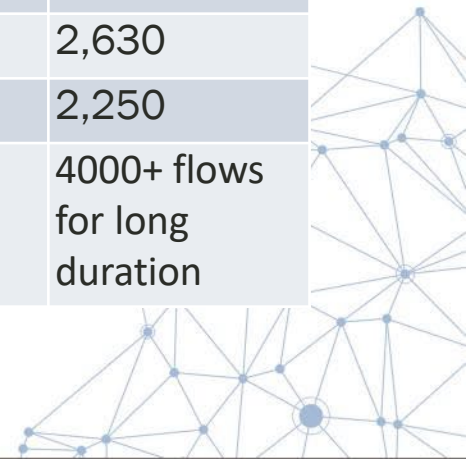
Peak flow:
2011 – 2,710,
2012 – 2,510,
2013 – 4,250



Phase 2 Design

- **Design: 2013-2014**
 - Design flows ~2,500 cfs
- **Implementation: 2014-2017**
- **Sites:**
 - Corrales
 - Pueblo of Sandia
 - San Antonio Oxbow

Water Year	Date	Streamflow (cfs)
2010	2010-05-22	5,140
2011	2010-12-17	2,710
2012	2012-08-17	2,510
2013	2013-09-13	4,350
2014	2014-08-02	3,770
2015	2015-05-27	3,070
2016	2016-06-07	3,950
2017	2017-05-10	5,660
2019	2019-06-18	5,720
2020	2019-22-21	2,630
2021	2021-05-31	2,250
2023		4000+ flows for long duration



Corrales 1A



April 2016 (June 2016 3,950 cfs)
cfs

April 2017 - (May 10, 2016 - 5,660)

Excavation quantity - field design change



MRG Restoration Monitoring

- Avian surveys
- BEMP – Bosque Ecosystem Monitoring Program
- High flow monitoring
- Feature changes – agg/deg; vegetation
- Threatened & Endangered Species:
 - WIFL, RGSM, YBCU
- Vegetation
 - Survival, transects, Hink and Ohmart mapping



MRG: 5-10 yrs
RT66: 3-5 yrs
MRGESCP



Ondrea Hummel

Ondrea.Hummel@tetratech.com

Q&A Discussion



TETRA TECH