Middle Rio Grande Restoration Projects in the Albuquerque Reach: Overview and Lessons Learned

January 2015

Chad McKenna

chad@gsanalysis.com

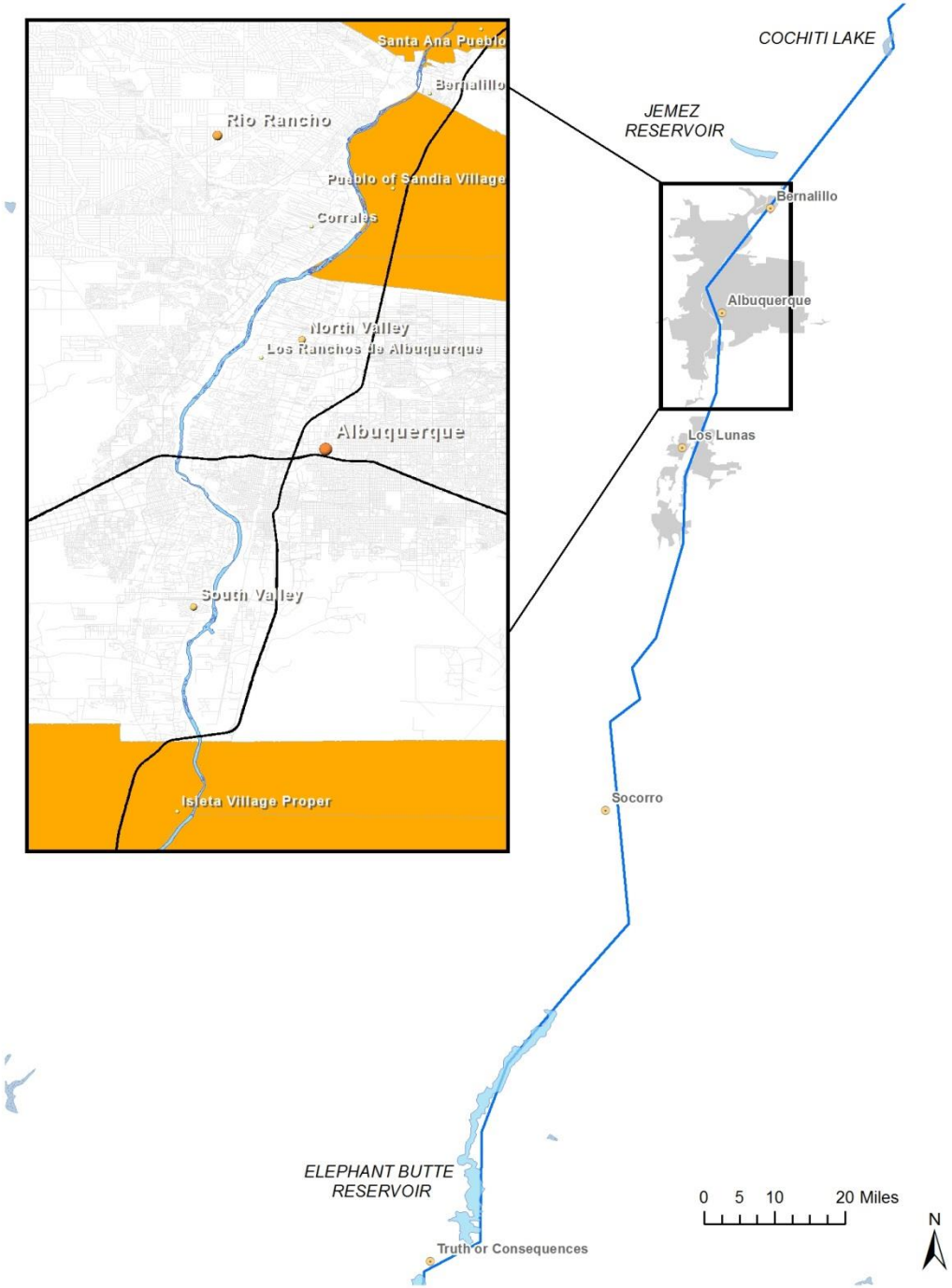
(505) 274-0126

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Middle Rio Grande

- Extends 120 miles between Cochiti Dam and Elephant Butte Reservoir

- Albuquerque Reach
  - 23 miles
  - ~4,500 acres
  - Several managing agencies



GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Projects

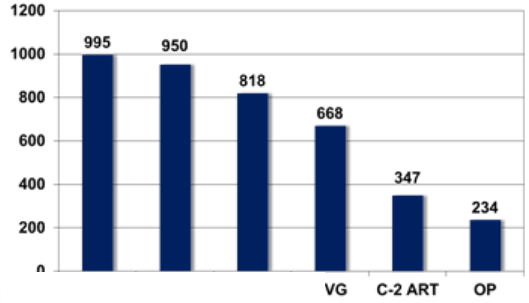
- Bosque Wildfire (2003-2006)
- Route 66 Habitat Revitalization (2006-2010)
- Middle Rio Grande Restoration (2011-present)

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

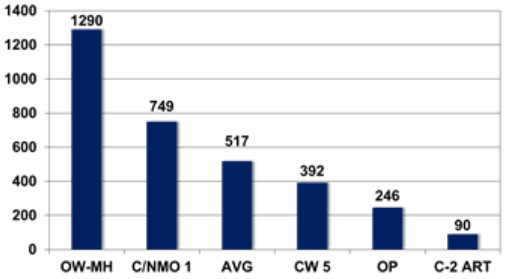
"Restoration" Project Evolution

- Shifted in focus
- Perceptions of habitat value exotic species change
- Promote overbank flood inundation, repairing processes
- More intensive documentation and monitoring

Summer Avian Density (2002-2012)



Winter Avian Density (2002-2012)



GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Bosque Wildfire Project (2003-2006)

In response to several major wildfires in Albuquerque bosque

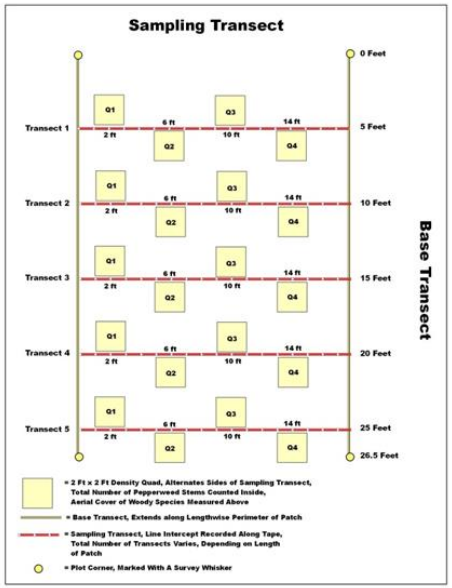
Primary goals:

- Reduce threat of catastrophic wildfire (~2,000 acres)
- Control exotic phreatophytes
- Revegetation of select sites with native tree and shrub species
- Pilot willow swale construction

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Lessons Learned from Bosque Wildfire Project

- Scale of thinning
- Mulch depth, fuel reduction??
- Physical alterations, competition
- More noxious herbaceous weeds, shift in dominant phreatophytes
- Pilot studies, treatment effectiveness
- Willow growth



GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Route 66 Habitat Revitalization Project

- Fuels reduction
- More selective and successful treatments
- Heavier revegetation
- High flow channels and willow swales
- Overbank flooding

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Lessons Learned from Route 66 Project

- Improve pre-project planning
- Define success criteria
- More specific construction “specs”
- Annual weeds
- Formal Adaptive Management Plan
- Agency maintenance responsibilities

Ravenna grass (*Saccharum ravennae*)

- Introduced to NM in 1980's
- First documented along the Rio Grande in 1990
- Aggressively spreading into willow wetland habitats in Rio Grande, including constructed willow swales
- Converts structure
- Germination safe sites
- Very little information on successful control techniques
- Not listed as "noxious"

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Actions implemented

- Successfully petitioned to add Ravenna grass to NM noxious weed list
- Began mapping infestations through city bosque

Middle Rio Grande Restoration Project

- $25M
- Areas previously cleared
- Applied monitoring results previous projects
- Herbaceous noxious weed treatment
- Heavy active revegetation
- Promote overbank flooding on large-scale
- Restoring processes, self adapting

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Moist Soil Features

- Backwater channel
- Bankline scallop
- Bankline grading
- Bankline terrace
- High-flow channel
- Willow bankline
- Willow swale

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Summary of Phase I Sites

Project Site		Restoraton Treatment											
		"Wet" Habitat Restoration Techniques											
		Constructed Backwater	Constructed Bank Scallop	Constructed Bankline Grading	Constructed Bankline Terrace	Constructed High Flow Channel	Constructed Willow Bankline	Constructed Willow Swale	Constructed Wet Meadow	Fuels Reduction With Revegetation	Revegetation Only	ALL TREATMENTS	REACH TOTAL
Reach 1	1B	0.42	0.32		4.29					92.92		97.95	
	1E						7.52	6.14		54.01		67.67	
	1G	0.20						4.29		17.63	15.96	38.08	203.70
Reach 4	4A								0.33	103.04		103.36	
	4B				1.17			4.69		32.41		38.28	
	4C	0.22			0.85	0.87		4.45		76.09		82.49	224.13
Reach 5	5A	0.35				0.39		1.67		63.84		66.25	
	5B				1.42			4.22		71.26		76.91	
	5C			2.35		0.87		3.83		47.89		54.95	
	5D							9.16		34.49		43.65	
	5E							8.06		9.11		17.17	258.93
Acreage Sub-Total		1.19	0.32	2.35	7.73	2.13	7.52	46.52	0.33	602.69	15.96		
Total Acres		68.11								618.65		686.76	686.76

Planting Area	Plant Material	Plant Species	MRG Restoration Site											
			1B	1E	1G	4A	4B	4C	5A	5B	5C	5D	5E	TOTAL
OUTSIDE EXCAVATED RESTORATION FEATURES	Potted Shrubs	Seep willow	7,371	2,052	1,188	1,485	459	810	594	1,188	4,212	1,944	27	21,330
		False indigobush	972	2,133	675	1,998	1,134	1,998	1,350	2,349	297			12,906
		Golden currant	945	1,728	675	756	1,161	1,215	1,080	2,349	270	324	135	10,638
		New Mexico olive	4,050	1,377	2,025	2,322	945	1,350	1,863	2,349	378	567	54	17,280
		Silverleaf buffaloberry	2,322	1,269	1,620	1,377	459	837	486	1,782	891	945		11,988
		Threeleaf sumac	1,134	540	675	1,053	459	1,107	810	1,782	270	918		8,748
		TOTAL SHRUBS	**16,794**	**9,099**	**6,858**	**8,991**	**4,617**	**7,317**	**6,183**	**11,799**	**6,318**	**4,698**	**216**	**82,890**
	Tree Poles	Rio Grande Cottonwood	210	10	60	70	25	40		80	145	65	50	755
		Tree Willow	495	25	110	120	60	90		170	60	145	70	1,345
		TOTAL TREES	**705**	**35**	**170**	**190**	**85**	**130**		**250**	**205**	**210**	**120**	**2,100**
WITHIN EXCAVATED RESTORATION FEATURES	Potted Shrubs	Seep willow	783	1,530	369		340	1,240	333	390	432	666	801	6,884
	Shrub Cuttings	Coyote willow (cuttings)	14,000	62,292	18,735	-	26,542	28,919	6,979	27,830	22,455	35,000	41,461	284,213
	Tree Poles	Rio Grande Cottonwood	20	140	125		150	220	50	180	180	275	230	1,570
		Tree Willow	150	275	240		305	450	90	355	410	575	475	3,325
		TOTAL TREES	**170**	**415**	**365**		**455**	**670**	**140**	**535**	**590**	**850**	**705**	**4,895**
GRAND TOTAL		**TOTAL POTTED SHRUBS**	17,577	10,629	7,227	8,991	4,957	8,557	6,516	12,189	6,750	5,364	1,017	**89,774**
		TOTAL WILLOW CUTTINGS	14,000	62,292	18,735	-	26,542	28,919	6,979	27,830	22,455	35,000	41,461	**284,213**
		OTAL TREE POLES	875	450	535	190	540	800	140	785	795	1,060	825	**6,995**
		OTAL PLANT SPECIES	**32,452**	**73,371**	**26,497**	**9,181**	**32,039**	**38,276**	**13,635**	**40,804**	**30,000**	**41,424**	**43,303**	**380,982**

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Successes

- Scale and efficiency
- As-built documentation
- Willow/tree survival and vigor
- High potted shrub survival at most sites
- Natural recruitment
- Overbank flooding

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

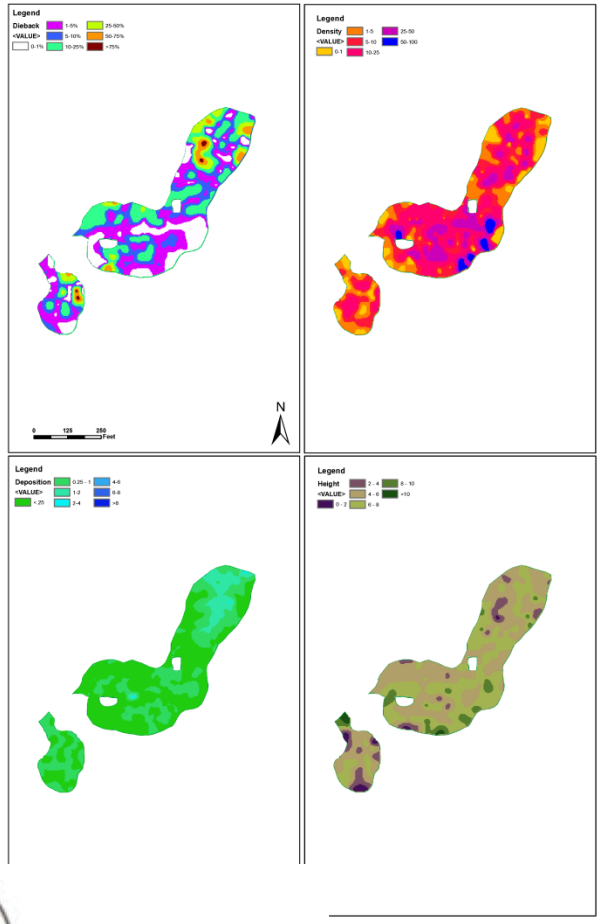
GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Challenges

- Water
- Variable success with upland seeding
- Fire
- Drought
- Unpredictable vegetation response

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Future Research



- Coyote willow research
- Potted shrub planting and irrigation techniques
- Grass seeding techniques
- Ravenna grass treatments

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Long-term Monitoring

- Piezometers
- Soil moisture
- Inundation
- Effectiveness assessments
- Benefits to wildlife
- Benefits to endangered species
- Maintenance and adaptive management triggers

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology

Thanks!

US Army Corps of Engineers®
Albuquerque District

MIDDLE RIO GRANDE CONSERVANCY DISTRICT

1984 City of Albuquerque OPEN SPACE 2014
Preserving Our Nature & Heritage For 30 Years!

PUEBLO OF SANDIA

Village of Corrales

RECLAMATION
Managing Water in the West

GSA GeoSystems Analysis, Inc.
Innovations in Hydrology