LMS/NAP/S07050

Monitoring Report for Wetland Area near the Naturita, Colorado, Processing Site

September 2010

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1.0 Introduction

In early April 2010, the U.S. Department of Energy (DOE) completed a wetland backfill project at a private property located 2 miles northwest of the town of Naturita, near the Naturita, Colorado, Processing Site. The purpose of the project was to reduce or eliminate wildlife and livestock exposure to emerging contaminated groundwater within a small wetland area. The work was authorized under a Nationwide Permit #38 (Cleanup of Hazardous and Toxic Waste) by the U.S. Army Corps of Engineers (USACE) on February 16, 2010 (Identification Number SPK-2009-01681). Approximately 324 cubic yards of clean cobbles, sand, and gravel were placed within 0.08 acre of wetland at an elevation that would prevent surface water access most of the year while preserving the area as a wetland. On April 13, 2010, the disturbed area was planted with an approved wetland seed mix and with 300 live local willow and cottonwood cuttings salvaged during construction (Photos 1-2). This monitoring report includes a summary of vegetation within the reclaimed wetland on September 16, 2010, one growing season after restoration. Because the disturbed wetland is smaller than 0.1 acre, extended monitoring is not required. Unless specified otherwise, photographs in this report were taken on September 16, 2010.

2.0 Procedures

Monitoring within the restored wetland consisted of placing 8 representative 1-m^2 quadrats throughout the area and visually estimating absolute foliar cover for each plant species. For comparison, 4 reference quadrats were placed in nearby undisturbed wetlands near the restored area and along the vegetated banks of the San Miguel River. A list of additional species occurring in the restored wetland but not within the sample quadrats was also compiled.

The wetland backfill project was designed to disturb as little riparian area as possible. A single access corridor on the floodplain was used during construction, resulting in disturbance to only 0.01 acre of riparian area. Because of the access corridor's small size, the use of representative quadrats was not feasible, so visual estimates of plant cover were made for the disturbed riparian corridor as a whole.

3.0 Results

Monitoring results for the restored and reference wetlands are presented in Table 1. Photographs 3−9 show the wetland areas at the time of monitoring.

Within the restored wetland sample quadrats, dominant species (as defined by USACE's 50/20 rule) include *Salix exigua* (coyote willow), *Eleocharis palustris* (creeping spikerush), *Shepherdia argentea* (silver buffaloberry), *Verbena bracteata* (prostrate vervain), and *Hordeum brachyantherum* (meadow barley). Sixty percent of these are obligate or facultative wetland plants. A total of 28 plant species were found in the sample quadrats, 19 (68 percent) of which are obligate, facultative wetland, or facultative species. Thirteen additional trace species were observed within the wetland outside the sample quadrats. All of the seeded and planted species were found in the restored wetland area. Only 20 percent of the 41 plant species in the restored wetland area are weedy. Total foliar cover was estimated at 22.4 percent.

Within the reference wetland sample quadrats, dominant species include *Salix exigua*, *Eleocharis palustris,* and *Equisetum arvense* (horsetail), all of which are obligate, facultative wetland, or facultative species. Four additional species were found in the sample quadrats. Of the seven species found in the reference wetland samples, one is weedy. Total foliar cover was estimated at 45 percent.

The most common species within the riparian corridor (Photo 10) were *Salsola tragus* (Russian thistle), *Xanthium strumarium* (cocklebur), and *Chenopodium* sp. (lambsquarters), all non-noxious annual weeds. Fifteen additional species, 11 of which are desirable, and unidentified seedling grasses (likely from the revegetation mix) were observed within this area.

No noxious weeds were growing within the restored or reference wetland areas or the revegetated riparian corridor.

4.0 Conclusions

Although surface water was present in the restored wetland in the spring, when the San Miguel River was at high stage, no surface water was observed during a site visit in late July (Photo 11) or during monitoring in September. This indicates that the project has successfully reduced or eliminated access by wildlife and livestock to the previously exposed contaminated groundwater and improved the quality of the wetland area for wildlife.

After one full growing season, 60 percent of the dominant species in the wetland, as identified by USACE's 50/20 rule, are obligate or facultative wetland plants, and wetland hydrology (inundated and/or saturated soils) was observed from April through July. This indicates that the area has been successfully restored as a wetland.

The monitoring goal for the wetland and riparian corridor was plant cover greater than or equal to 75 percent of the corresponding undisturbed area. Although cover in the restored wetland was short of the target value (50 percent of the reference area), evidence of recent horse grazing was observed in the restored wetland (Photos 12−13), which has reduced the foliar cover. Similar grazing was not apparent in the reference wetlands, probably because livestock preferentially graze younger, tender plants. A secondary goal for restoration success was no noxious weeds present in the restored wetland or riparian corridor at the time of monitoring, and no noxious weeds were observed. With the high diversity and quality of species within the wetland, even after one growing season, the revegetation is successful. Within the riparian corridor, the cover of desirable plant species remains low. However, it presents a minimal siltation hazard to the nearby wetland because of its small size and because the disturbed area was stabilized with appropriate grading and the placement of dead wood and stones. Therefore, the project is considered successful and no further monitoring is planned.

Photo 1. Planting salvaged cottonwood and willow cuttings in wetland, April 13, 2010

Photo 2. Wetland area after seeding on April 13, 2010 showing pole plantings

Photo 3. North end of restored wetland, view north toward straw wattles

Photo 4. View to the south from the former ponded area

Photo 5. Former ponded area, view north

Photo 6. Point of wetland access near the south end of restored wetland, view north

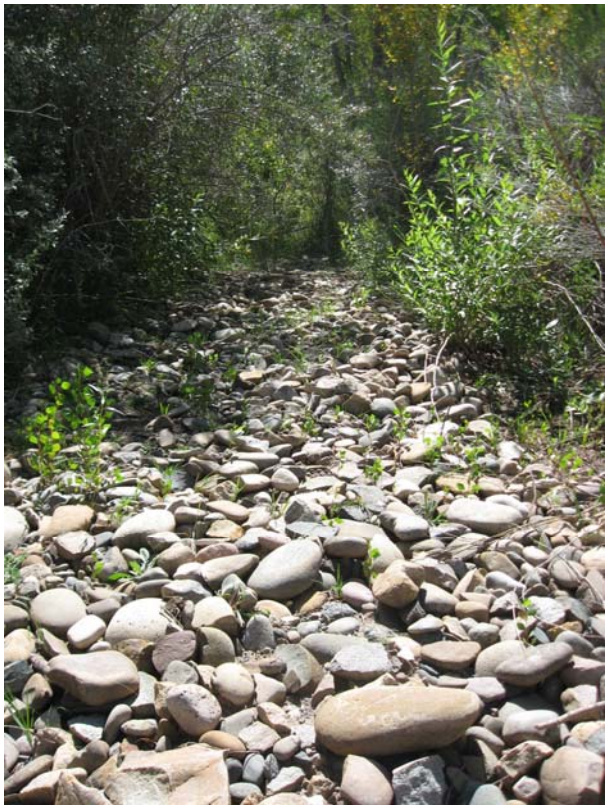

Photo 7. South end of restored wetland, view south

Photo 8. Reference Area 1 along banks of San Miguel River, view north

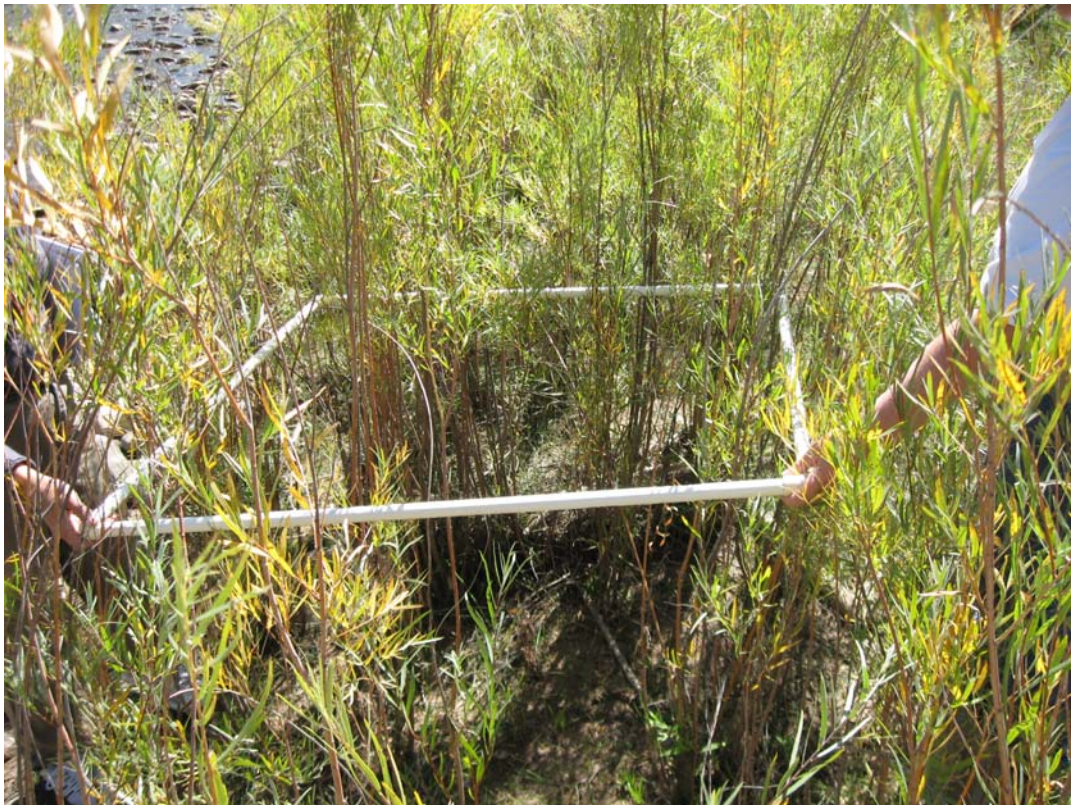

Photo 9. Reference Area 3 along banks of San Miguel River, view south

Photo 10. Riparian corridor, view west from restored wetland

Photo 11. Restored wetland in July 2010

Photo 12. Fresh horse droppings in restored wetland area

Photo 13. Grazed vegetation in restored wetland area

Table 1. Estimated Percent Foliar Cover of Plant Species at Wetlands near Naturita Processing Site

		Restored Wetland Quadrats									Reference Quadrats				
Species	**Indicator[a]**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Mean**	**1**	**2**	**3**	**4**	**Mean**
Ambrosia sp. (ragweed)				1						0.1					
Carex nebrascensis (Nebraska sedge)	OBL									0.0			2	15	4.3
Chenopodium sp. (lambsquarters)			5							0.6					
Deschampsia cespitosa (tufted hairgrass)	FACW	5		1		1				0.9					
Echinochloa crus-galli (barnyard grass)	FACW			5						0.6					
Eleocharis palustris (creeping spikerush)	OBL			10	8	2	2			2.8	25	15			10.0
Equisetum arvense (horsetail)	FAC									0.0	4	10	4	45	15.8
Hordeum brachyantherum (meadow barley)	FACW	2	2	3	1	1	1	1	1	1.5					
Hordeum jubatum (foxtail barley)	FAC		1							0.1					
Juncus arcticus (Baltic rush)	FACW	1			1			1		0.4					
Juncus bufonius (toad rush)	OBL				1					0.1					
Juncus nodosus (knotted rush)	OBL			2			1			0.4					
Juncus torreyi (Torrey's rush)	FACW	1		2	1	1	1			0.8					
Medicago lupulina (black medick)	FAC		1	2						0.4					
Melilotus officinalis (sweetclover)	FACU		1							0.1					
Panicum capillare (witchgrass)	FACU	1			1		4	3		1.1					
Plantago major (common plantain)	FAC	1				3	3			0.9				10	2.5
Polygonum aviculare (knotweed)	UPL		2	1		1				0.5					
Polypogon monspeliensis (rabbitsfoot grass)	FACW		1	1			1		1	0.5					
Populus fremontii (Fremont cottonwood)	FACW				1				1	0.2					
Salix amygdaloides (peachleaf willow)	FACW			1	1	3	1	1	1	1.0					
Salix exigua (coyote willow)	FACW	20	1	3	8	4			1	4.6	3	10	30	5	12.0
Schedonorus phoenix (tall fescue)	FACW			2			1			0.4			1		0.3
Schoenoplectus tabernaemontani (softstem bulrush)	OBL			1	1	1				0.4					
Shepherdia argentea (silver buffaloberry)	UPL								14	1.8					
Typha latifolia (cattail)	OBL					1				0.1					
unidentified forbs				1					1	0.2					
Verbena bracteata (prostrate vervain)	FACU	5			8					1.6					
Veronica anagallis-aquatica (speedwell)	OBL			1		1				0.2			1		0.3
TOTAL		36	14	37	32	19	15	6	20	22.4	32	35	38	75	45.0

[a]Wetland indicator codes: OBL = obligate; FACW = facultative wetland; FAC = facultative; FACU = facultative upland; UPL = upland; NI = not an indicator
Other species observed in the restored wetland include: *Amaranthus blitoides* (prostrate amaranth, FACU), *Aster* sp. (aster), *Carex nebrascensis* (Nebraska sedge, OBL), *Equisetum arvense* (horsetail, FAC), *Erodium cicutarium* (redstem filaree, UPL), *Lolium perenne* (perennial ryegrass, FACU), *Machaeranthera* sp. (purple aster), *Polygonum persicaria* (lady's thumb, FACW), *Plantago lanceolata* (narrowleaf plantain, FACU), *Puccinellia distans* (weeping alkaligrass, OBL), *Schoenoplectus maritimus* (saltmarsh bulrush, NI), *Setaria viridis* (green foxtail, UPL), *Xanthium strumarium* (cocklebur, FAC)

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