

Jurisdictional Wetland Delineation along Sand Creek, Great Sand Dunes National Park, Colorado



By:

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Introduction

Jurisdictional wetlands were identified and delineated during the late summer and fall of 2009 in a series of man-made pits along Sand Creek, on the western flank of the Sangre de Cristo Mountains, in Great Sand Dunes National Park, Colorado (Figure 1). The approach and procedure used is outlined in the US Army Corps of Engineers 1987 wetland delineation manual (Environmental Laboratory 1987 and on line at <http://www.wetlands.com/regs/tlpge02e.htm>), as well as the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys and Coast Region, version 2.0 (April 2008). The land currently is owned by the United States and managed by the National Park Service, but prior to the year 2000 when Great Sand Dunes National Monument became Great Sand Dunes National Park and expanded in size, the land was in private ownership. Thirteen pits were created along Sand Creek prior to the year 2000 by the previous landowner (Figure 2), and the numbering of these pits is used throughout this report. An unknown quantity of sediment from the local Sand Creek floodplain and terraces was excavated and used for road construction and road maintenance in the area. The remaining material was reshaped to form ponds surrounded by dikes and levees to support recreational fishing. Some dikes are relatively small, 3-6 ft high, while a few are substantial, and more than 10 ft high (Graves 2008).

This delineation was performed to identify jurisdictional wetlands that might be affected if the topography and natural hydrologic regime and vegetation are restored. NPS wishes to remove the artificial pits, dikes and levees, fill man-made channels, and restore the natural floodplain hydrologic regime and vegetation. A complete restoration plan is being developed. The Sand Creek channel was apparently not moved or manipulated by the pit construction project. The proposed restoration project would not manipulate Sand Creek or its immediate floodplain. A detailed topographic survey was conducted to determine the size and volume of dikes and depressions, and develop both a sediment

volume calculation and restoration plan. The area has been analyzed previously by Graves et al. (2008) with the Colorado Division of Reclamation, Mining and Safety under contract to the National Park Service.

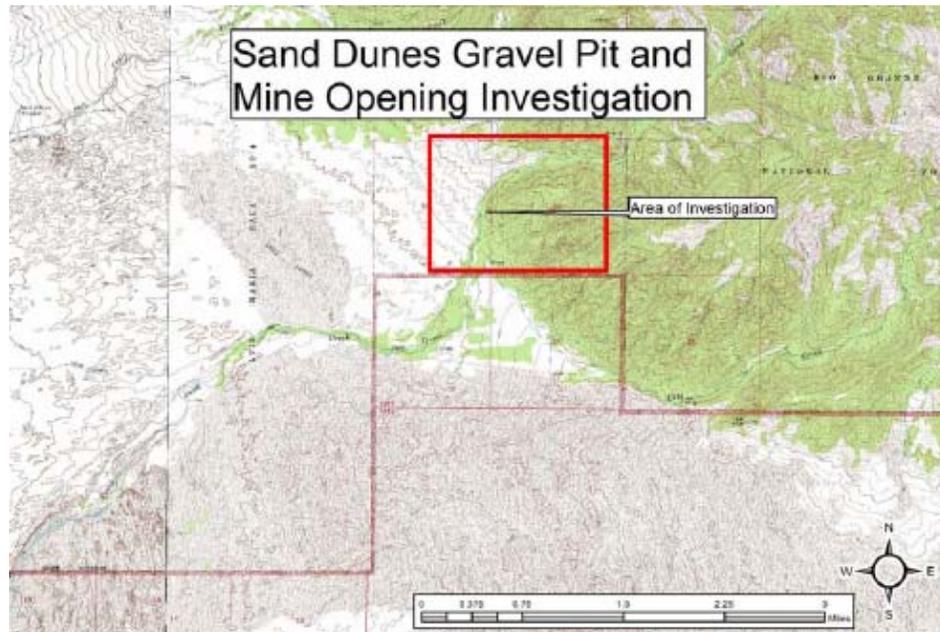


Figure 1. Location of Sand Creek study area located north of the dune field, and just south of the abandoned town-site of Liberty.

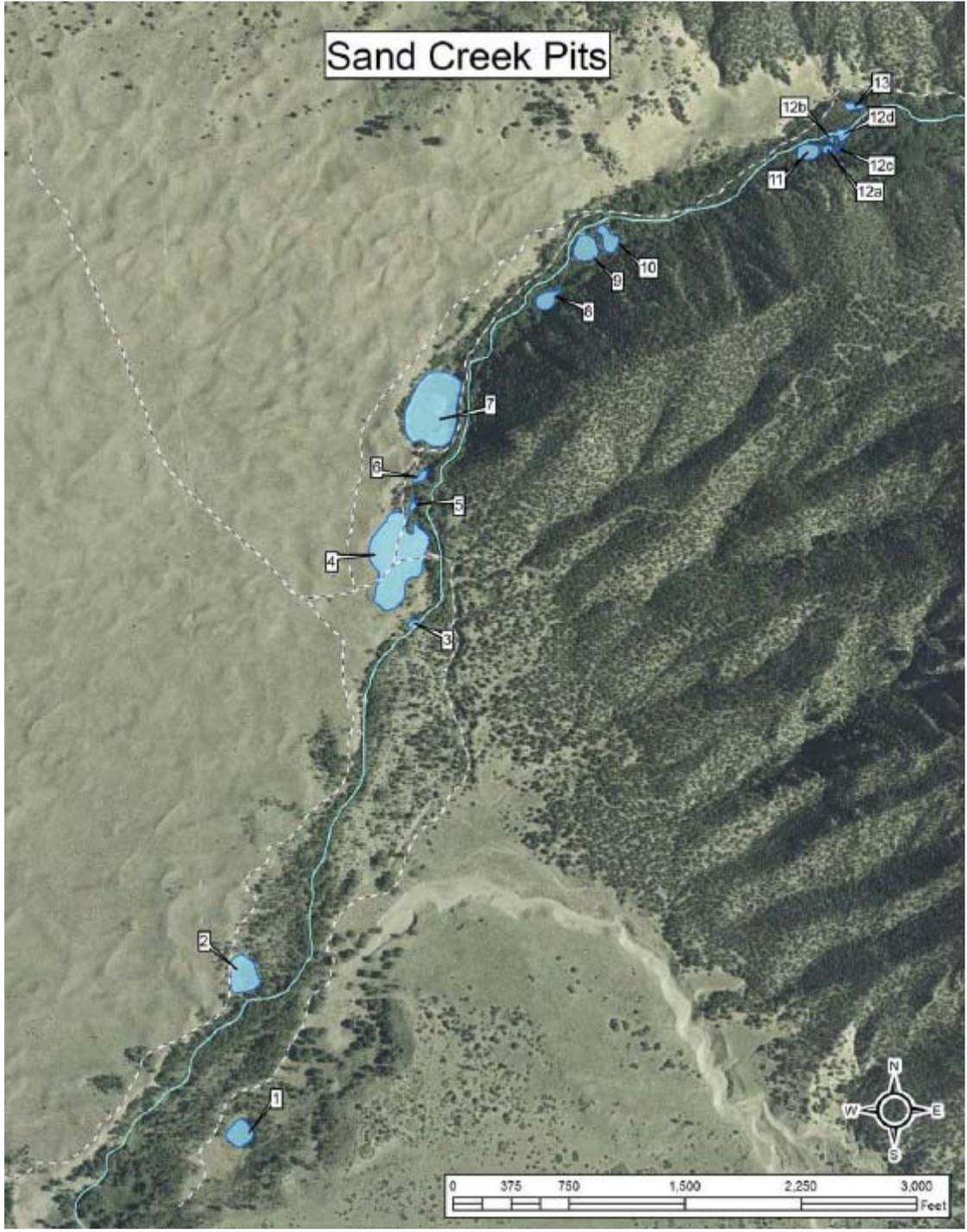


Figure 2. Location of 13 pits identified and discussed in this report. Dotted lines are roads or trails.

Methods

One or more sample plots were established in most pits to identify jurisdictional wetlands. The plots were located in both suspected upland and wetland areas, to help clarify which communities and species could be used to identify the wetland boundary. Jurisdictional wetland boundaries were then identified, pin flags installed in the field at the boundary, and wetland maps created following a topographic survey. A summary table of jurisdictional wetland area by pit is in Table 1. Each basin had seasonally ponded water and a gravel substrate, and the wetland/upland boundary was usually both clear and sharp because the seasonal ponded high water controlled the upper limit of wetland vegetation. Sample plots were 4 yards long and 1 yard wide, with the long dimension parallel with the contour. The plant species composition within each plot was recorded during the late summer of 2009. These data are percent absolute canopy coverage for each vascular plant species present in each plot, and are presented in Table 2. Also on Table 2 are the Region 8 US Fish and Wildlife Service National Wetlands Inventory plant species indicator status for each species, rated as obligate (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU) or upland (UPL). A vegetation prevalence index analysis was calculated and presented in Table 2. This index was calculated by multiplying the cover for each species present in the plot, by the indicator status of that species (1 for obligate, 2 for facultative wetland, 3 for facultative, 4 for facultative upland, and 5 for upland) and summing the totals. The total was then divided by the total canopy cover for the plot. A prevalence index of less than 3 is considered a positive indicator of hydrophytic vegetation, while an index greater than 3 is not.

Ground water depth was measured in an open pit 16 inches deep excavated in October. We recognize that this is long after the seasonal water level high, and so indirect measures of wetland hydrologic regime were also investigated. Standard wetland delineation forms are presented for each

plot. Soils were investigated using a Munsell Color chart and indicators of hydric soil condition. Data from the 13 detailed jurisdictional site analyses are presented at the end of this report.

Results

Vegetation in the pits is highly variable. In the lowest portion of some pits sedges (*Carex lanuginosa* or *C. utriculata*), spikerush (*Eleocharis macrostachya* and *E. acicularis*), bulrush (*Schoenoplectus acutus*) and other obligate wetland plant species were present. These stands all had hydric soils with low chroma and well developed oxidized rhizospheres. Higher zones around the pits were dominated by rush (*Juncus arcticus* - FACW). This community type was a jurisdictional wetland with hydric soils showing low chroma colors, well develops mottles and in some areas oxidized rhizospheres (Figure 3), and good evidence of wetland hydrologic regime. Above these two zones were uplands dominated by narrow leaf cottonwood (*Populus angustifolia* - FACW), the upland grasses sand drop seed (*Sporobolus cryptandrus* –UPL), Indian rice grass (*Oryzopsis hymenoides*), rabbitbrush (*Chrysothamnus nauseosus* – UPL) and many other species. The boundary between wetland and upland was relatively sharp in most locations, and the identification and delineation of wetland communities and the upland/wetland boundary was straightforward.



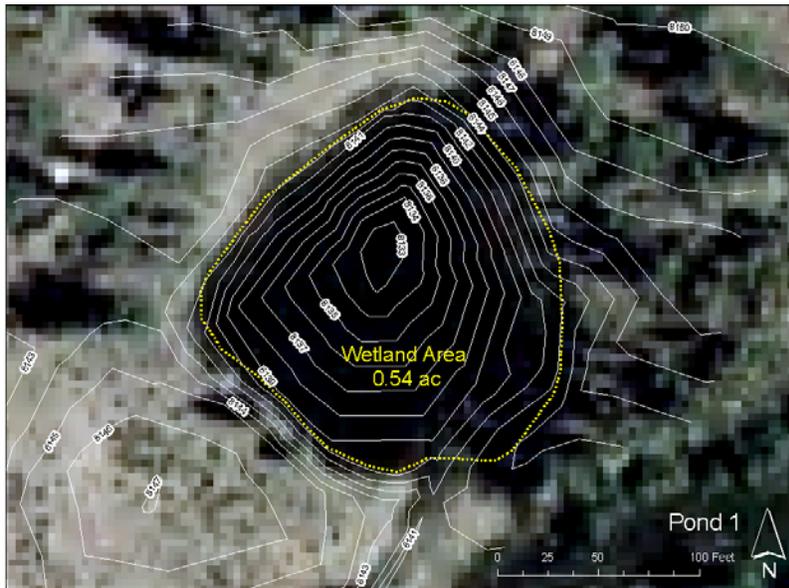
Figure 3. Soil in *Juncus arcticus* stand with well developed mottles in sandy low chroma matrix.

Each pit is discussed separately, and the total jurisdictional wetland area within the zones where restoration could occur is listed in Table 1. Wetland area in each pit ranges from less than 0.10 acre, to 0.91 acre. A total of 3.696 acres of wetland are present. Not all wetland areas would be restored because the logistics of reaching some pits, such as 12, may make their restoration infeasible. However, pits 1, 2, 4 and 7 are relatively large impacts to the natural landscape and environment of the Sand Creek riparian zone and would be priorities for restoration. Jurisdictional wetlands are not present in pits 3 and 4.

Table 1. Jurisdictional wetland area for each pit/pond in the study area. The location of each pit is shown in Figure 2.

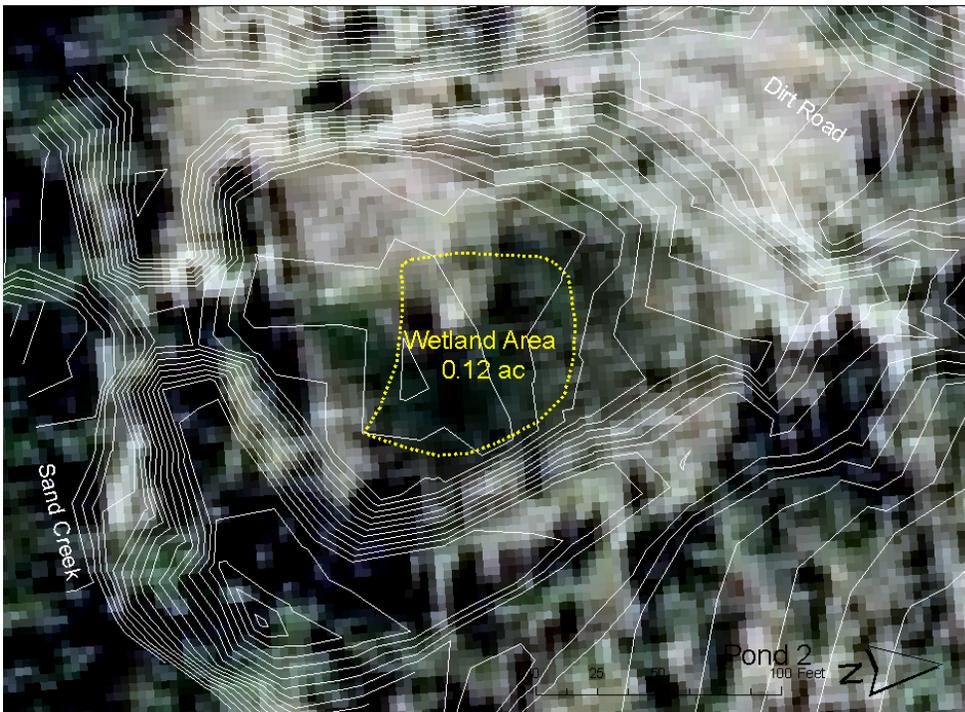
Pond ID	Wetland Area (ac)
1	0.54
2	0.12
5	0.051
6	0.080
7	0.91
8	0.33
9	0.61
10	0.56
11	0.26
12a	0.098
12c	0.038
13	0.099

Pit 1: This pit supports 0.54 acres of jurisdictional wetland. It was created by pushing material to the west to form the pit. The main wetland community is dominated by *Juncus arcticus* and the wetland upland boundary was sharp.



Early winter and summer photos of Pit 1, and jurisdictional wetland map with contours. Numbers on middle photo identify the location of sample plots 1, 2, 3, and 4 (see data sheets).

Pit 2: This pit has a disturbed area of approximately 0.9 acre, and a jurisdictional wetland area of 0.12 acre. The large dike on the South side of this pond apparently breached and the pond holds little water. A small wetland area exists in the pit bottom. The wetland here is dominated by *Carex lanuginosa* (OBL), and *Juncus arcticus*.



Summer photo showing the locations of sample plots 5 and 6, and jurisdictional delineation map of Pit 2.

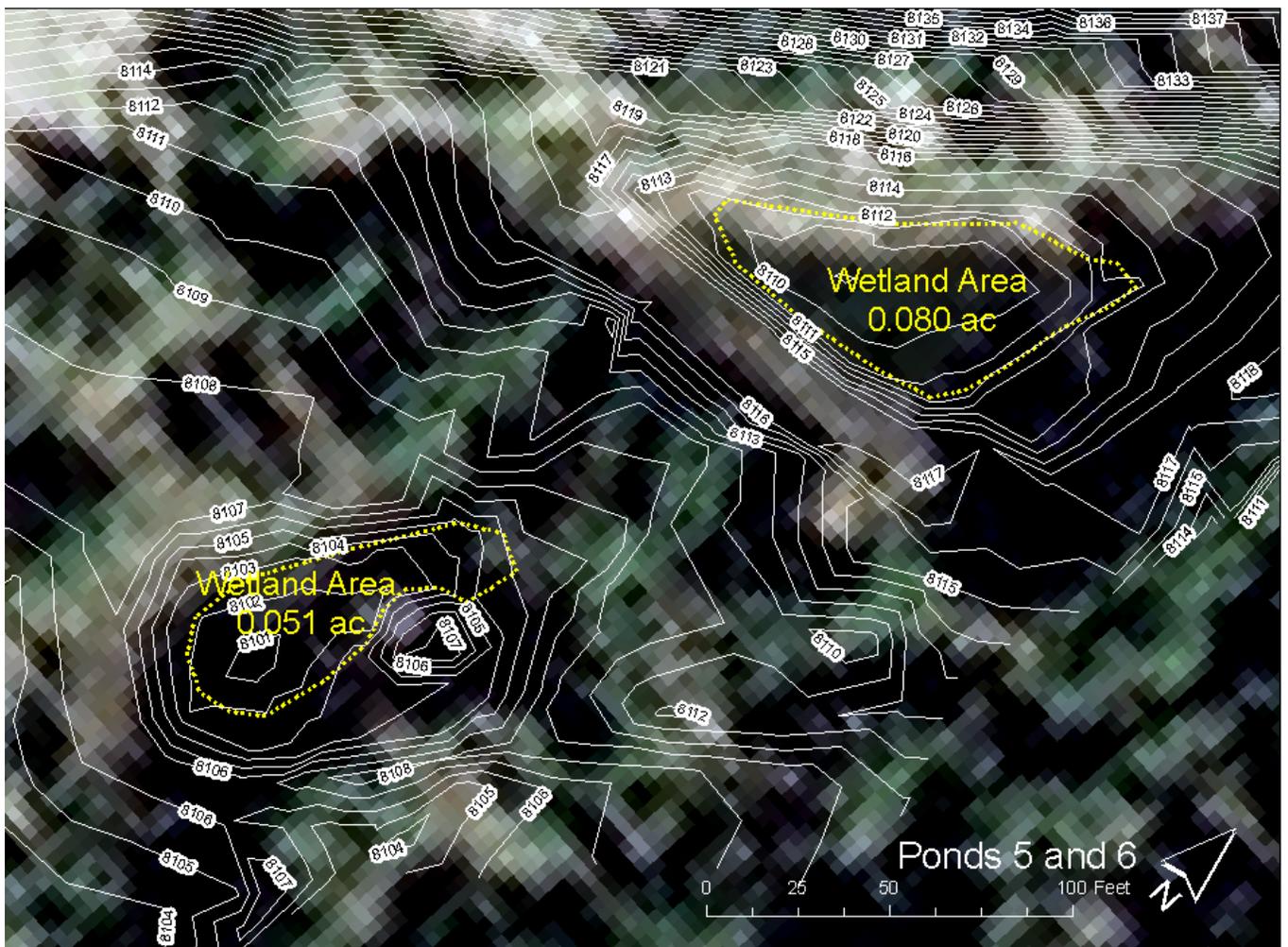
Pit 3: Pit 3, shown below, is a small depression that did not contain jurisdictional wetlands.



Pit 4: This pit, shown below, is a large disturbed area that does not support any jurisdictional wetland, is covered by bare gravel and apparently has a deep water table.



Pit 5: Pit 5 is a small pond area, with 0.051 acre of jurisdictional wetland. The area is poorly vegetated, but supports spike rush (*Eleocharis macrostachya*) and other obligate wetland plants.



Summer photo of Pit 5 showing the location of sample plot 7, and jurisdictional and topographic map of Ponds/Pits 5 & 6.

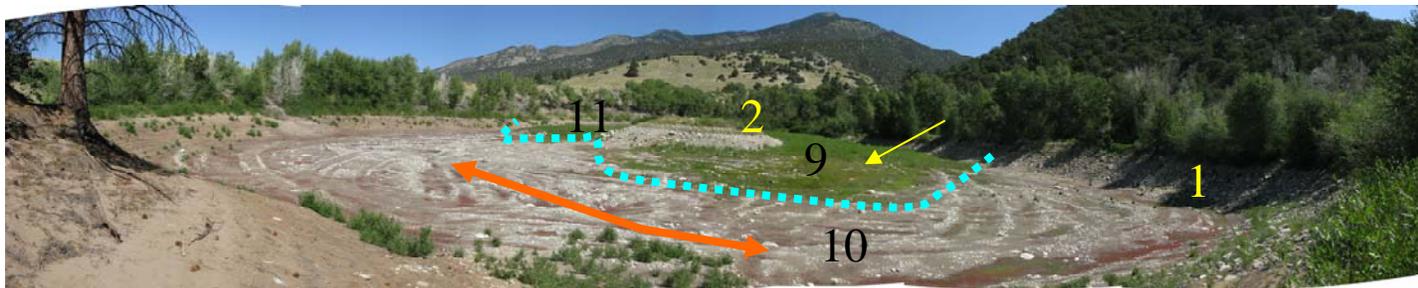
Pit 6: This pit supports 0.080 acre of jurisdictional wetlands at the bottom of the pit. The upper portions of the pit are dry most of the time and support bare gravel and no perennial plants.



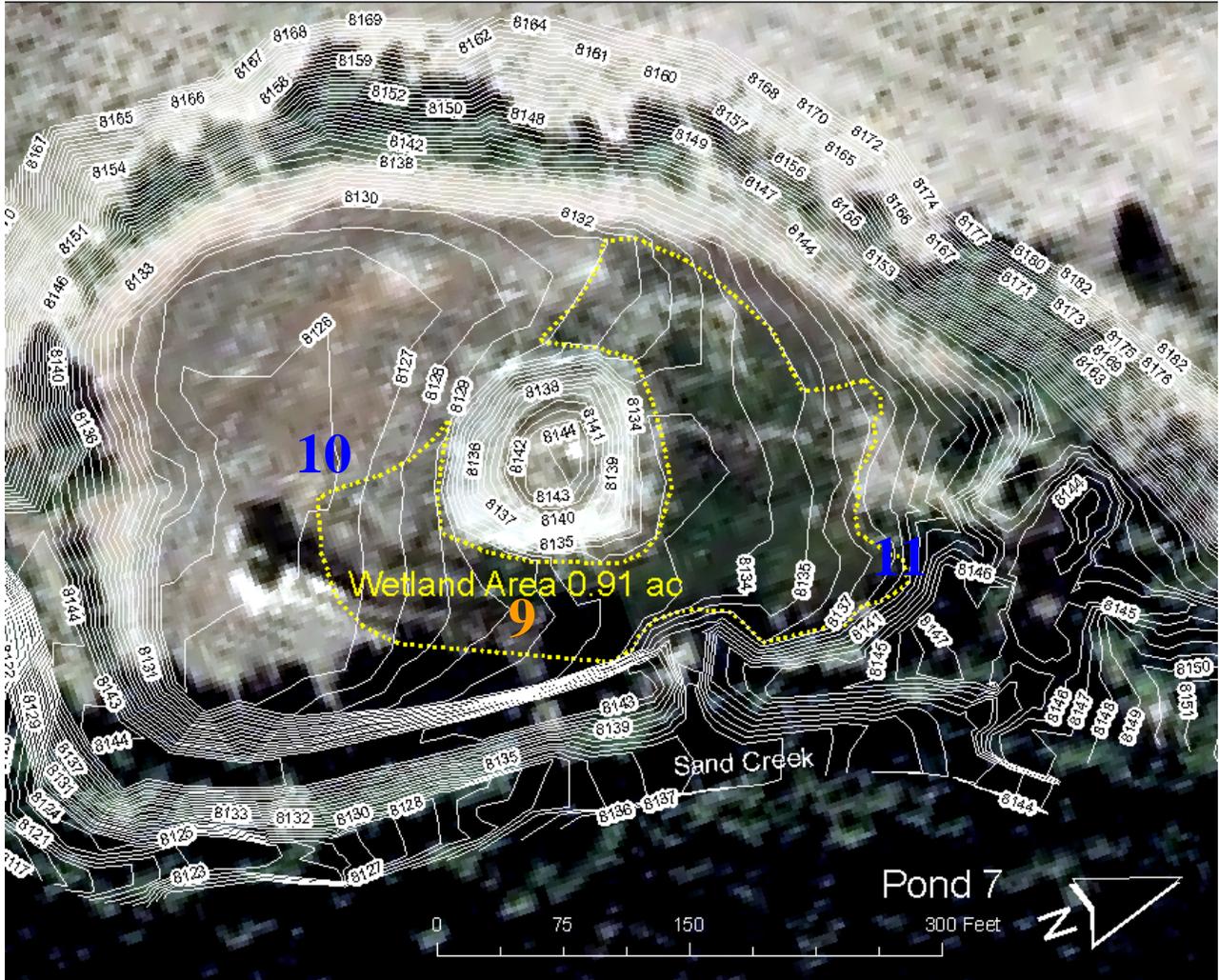
Summer photos of Pit 6 showing small perennial pool with emergent vegetation, and dry gravel slopes within the pit boundary. Top photo shows the location for sample plot 8.

Pit 7: This is by far the largest basin in the study area and has the tallest dikes and levees. This pit was scraped from a terrace of Sand Creek and sediment piled up as dikes on the south and west. The south side material forms a levee against the Sand Creek channel (shown as the cottonwood lined surface at 1), and the western dike, shown in the bottom right corner of the photograph, is essentially a dam 20 feet tall. Water is diverted from Sand Creek (2 on both the photo and the map) flows into the basin from its eastern side and recharges the ground water table as it moves west around the island in the pond center. The area wetted by surface water is jurisdictional wetland, covering 0.91 acre. However, most of the basin is bare gravel dominated by an annual buckwheat (*Polygonum aviculare* UPL) which is an upland plant species and shows up as patches of reddish brown plants on the photo below.

Plant species that have established in the wetland portion of Pit 7 include narrow leaf cottonwood (*Populus angustifolia*), bulrush, and other OBL and FACW plant species. At the time of my data collection, the water table in the wetland (yellow arrow) was within 10 inches of the soil surface, while in the upland area (orange arrow) the water table was much deeper than 16 inches. It appears that the surface diversion from Sand Creek is not functional, and the only water reaching the pit at present is from ground water seepage from Sand Creek under the levee and into the basin.



Looking west across Pit 7. Yellow #1 is the levee, yellow #2 the river inflow channel (now defunct), and the blue line indicates that approximate wetland-upland boundary. Yellow arrow indicates the wetland area, orange arrow indicates the upland area. Reddish patches in upland are *Polygonum aviculare* (UPL). Black numbers 9 (wetland), 10 (upland), 11 (wetland) are the locations of those sample plots.

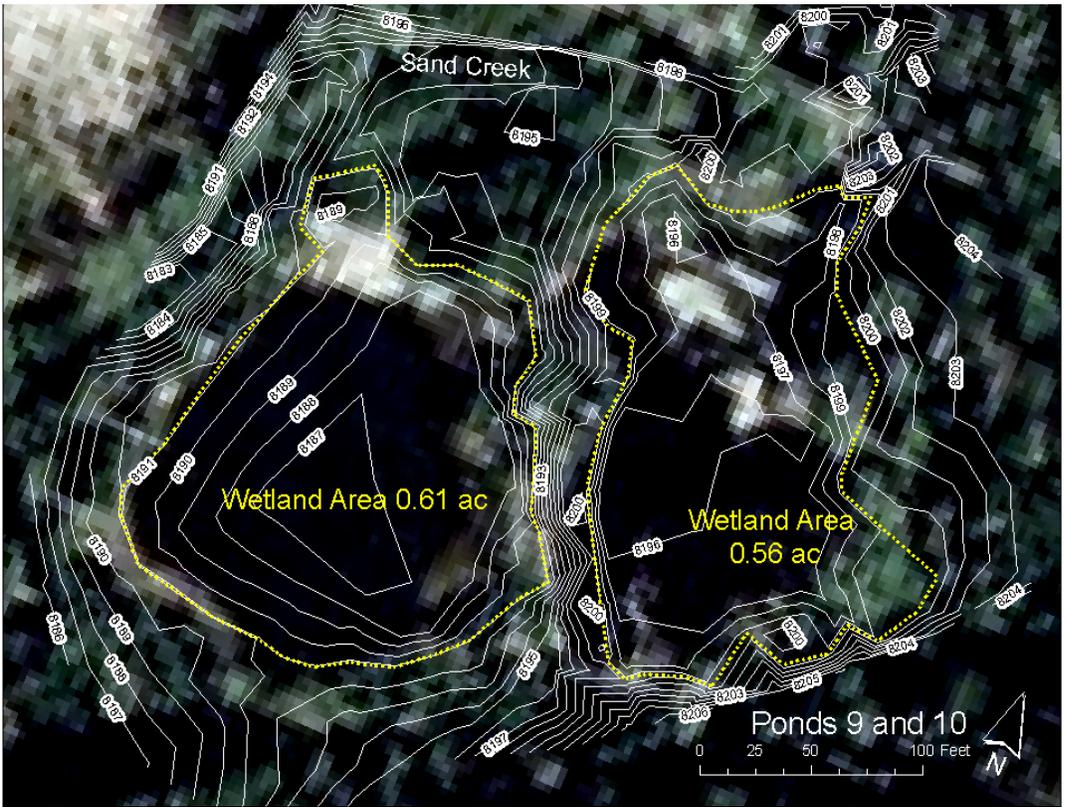
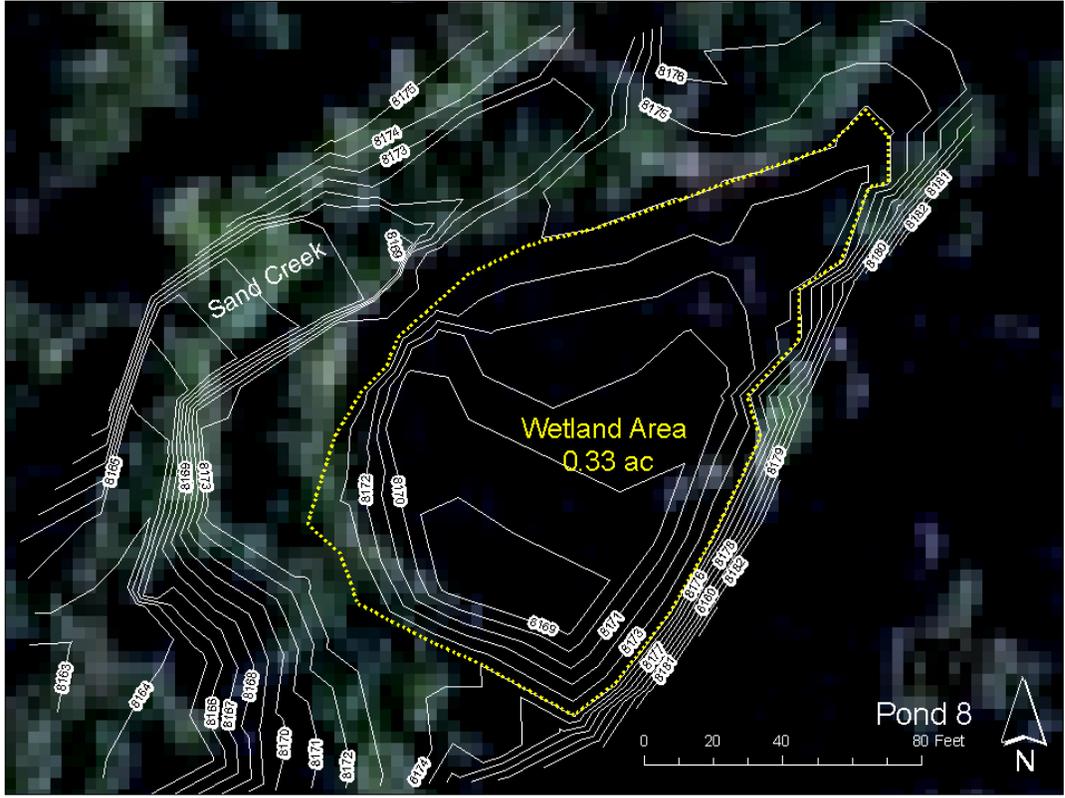


Topographic and jurisdictional wetland map of Pit 7 showing location of plots 9, 10, 11. Lower photo shows levee on south side of Pit 7 showing its artificial contours, height and shape.

Pits 8, 9, 10. These three excavated basins are separated by dikes of pushed gravel material. The pits hold water to near their tops because they are occupied by beavers which have build dams and are actively managing and maintaining the high water levels (see top and bottom left photo below). Each pit was excavated into the Sand Creek floodplain, among mature narrow leaf cottonwood forests (bottom right photo – arrows point to pits). Pit 8 contains 0.33 acre of wetland, mostly open water, with few submerged aquatic plants, and a fringe of cattail (*Typha latifolia*), willows (*Salix exigua*), and alder (*Alnus incana*). Plots were not analyzed in pits 8, 9, and 10 because all wetland sites were inundated, and all uplands were above the apparently static water level, with very sharp boundary between inundated and upland sites. Delineation was based upon the long-term position of the water level.



Pits 9 and 10 contain 0.61 and 0.56 acre each respectively of jurisdictional water, most of which is shallow open water less than 6 feet in depth. These ponds also support a well developed fringe of emergent wetland vegetation, but have little submerged aquatic vegetation. Photo on bottom right shows ponds 9 and 10 located within mature cottonwood forest. Beavers and their dams help maintain the water levels in these ponds.



Topographic and jurisdictional wetland maps of ponds 8, 9 and 10.

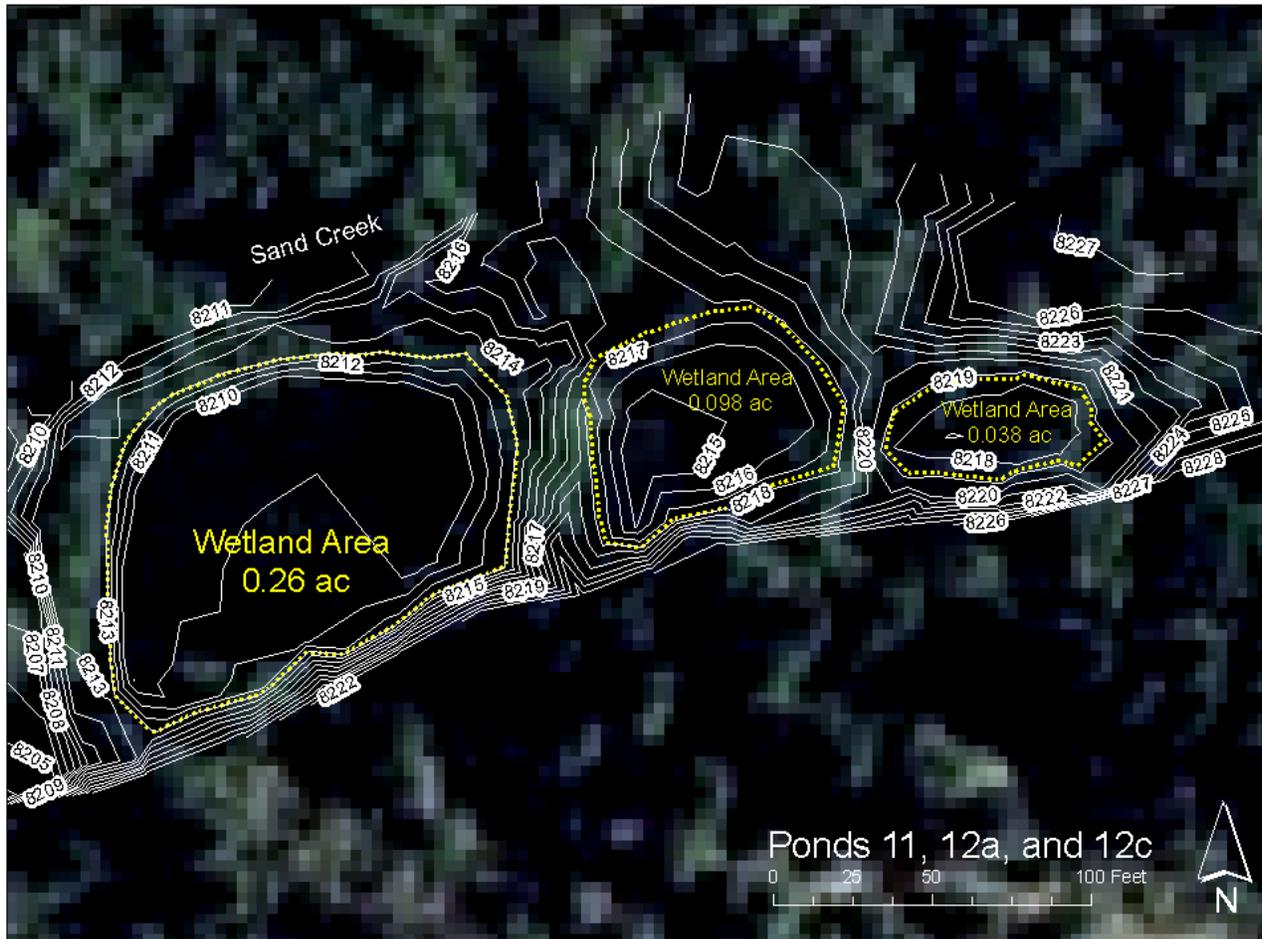


Pit 8, above, has little wetland vegetation.



Pit 10, above, with dike in foreground, and limited wetland vegetation.

Pits 11 and 12: These pits are small, and occur on the south side of Sand Creek in a hard to reach portion of the study area. Pit 11 contains 0.26 acre of open water with fringing emergent vegetation, and pit 12 (broken into two sections by a low dike) supports 0.098 and 0.038 acre of open water and fringing vegetation for a total pit 12 wetland area of 0.136 acre. These pits are very hard to reach, and may not be restored due to the impact restoration would have on vegetation and soils in the area. No plots were analyzed at these sites because wetlands were located within the inundated pond boundary, and the line between wetland and upland was sharp and could be identified as the water surface.

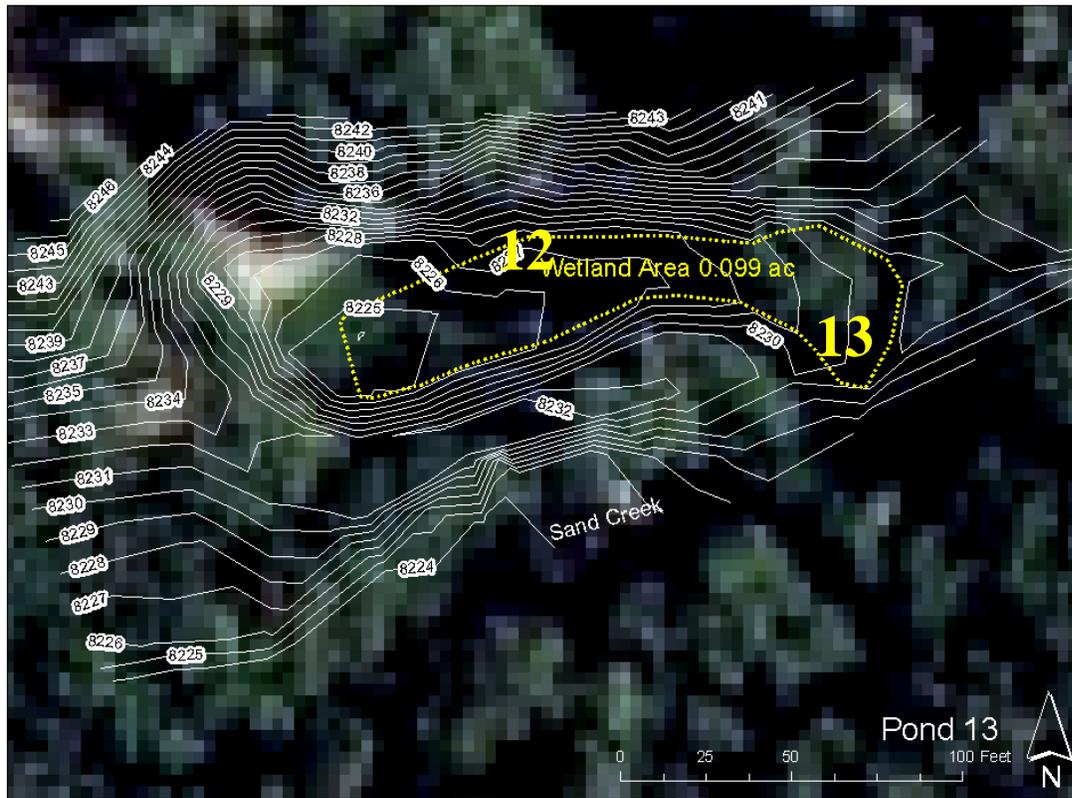


Topographic and jurisdictional wetland map of pits 11, 12a and 12c.

Pit 13. Pit 13 is a shallow depression and has a dysfunctional channel on its eastern side that once connected it with Sand Creek. The pit bottom is populated by *Carex lanuginosa*, and OBL wetland plant, and the soils were hydric with prominent gleying, low chroma color (10YR 3/1, and abundant and well developed oxidized root channels in the top 8 inches, and a water table at 6 inch depth. A total of 0.099 acre of jurisdictional wetland occurs in this pit.



Summer photo of pit 13 showing well developed wetland vegetation in pond bottom, and location of sample plot 12.



Topographic and jurisdictional wetland map of Pit 13 showing location of sample plots 12 and 13.

Literature Cited

U.S. Army Corps of Engineers. 2009. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region. (Version 2.0), Ed by Wakeley, J. S., R. W. Lichvar, C. V. Noble. ERDC/EL TR-09-. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Graves. 2008. Mitchell Ponds Reclamation Plan. (report to NPS)

Species	NWI	NWI Indicator						Plot / Well Number							
		Status	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>
<i>Juncus arcticus</i>	FACW	2	80	0	0	40	0	60	0	0	1	0	0	0	15
<i>Carex lanuginosa</i>	OBL	1	5	0	0	0	80	0	0	0	0	0	0	90	0
<i>Senecio spartioides</i>	UPL	5	2	0	0	0	0	0	0	0	0	0	0	0	0
<i>Populus angustifolia</i>	FACW	2	0	30	0	15	0	0	0	0	20	5	0	0	20
<i>Chrysothamnus nauseosus</i>	UPL	5	0	20	50	10	0	0	0	0	0	0	0	0	0
<i>Oryzopsis hymenoides</i>	UPL	5	0	5	10	5	0	0	0	0	0	0	0	0	0
<i>Sporobolus cryptandrus</i>	UPL	5	0	15	40	0	0	0	0	0	0	0	0	0	0
<i>Juniperus scopulorum</i>	UPL	5	0	1	0	0	0	0	0	0	0	0	0	0	0
<i>Muhlenbergia montana</i>	UPL	5	0	5	0	0	0	0	0	0	0	0	0	0	0
<i>Kochia iranica</i>	UPL	5	0	0	5	0	0	0	0	0	0	0	0	0	0
<i>Pascopyrum smithii</i>	FACU	4	0	0	0	7	0	0	0	0	0	0	0	0	0
<i>Juncus longistylus</i>	FACW	2	0	0	0	0	0	15	0	0	0	0	0	0	0
<i>Hordeum jubatum</i>	FAC	3	0	0	0	0	0	1	0	0	0.1	0	0	0	0
<i>Eleocharis marcrostachya</i>	OBL	1	0	0	0	0	0	5	40	30	5	0	10	0	0
<i>Juncus interior</i>	FAC	3	0	0	0	0	0	3	2	0	0	0	0	0	0
<i>Eleocharis acicularis</i>	OBL	1	0	0	0	0	0	5	15	15	7	0	0	0	0
<i>Juncus saximontanus</i>	OBL	1	0	0	0	0	0	0	3	5	0	0	0	0	0
<i>Mentha arvensis</i>	FACW	2	0	0	0	0	0	0	0	0.1	0	0	0	0	0
<i>Salix exigua</i>	OBL	1	0	0	0	0	0	0	0	0	1	0	0	0	0
<i>Carex nebraskensis</i>	OBL	1	0	0	0	0	0	0	0	0	3	0	0	0	0
<i>Carex utriculata</i>	OBL	1	0	0	0	0	0	0	0	15	0	0	0	0	0
<i>Typha latifolia</i>	OBL	1	0	0	0	0	0	0	0	5	2	0	25	0	0
<i>Polygonum aviculare</i>	UPL	5	0	0	0	0	0	0	0	0	0	5	0	0	0
<i>Alnus incana</i>	FACW	2	0	0	0	0	0	0	0	0	0	0	3	0	30
<i>Poa pratensis</i>	FACU	4	0	0	0	0	0	0	0	0	0	0	0	0	15
<i>Cirsium arvensis</i>	FACU	4	0	0	0	0	0	0	0	0	0	0	0	0	10
<i>Schoenoplectus acutus</i>	OBL	1	0	0	0	0	0	0	0	1	5	0	0	0	0
TOTAL COVER			87	76	105	77	80	89	60	71.1	44.1	10	38	90	90
Cover x Status			175	290	525	213	80	172	64	71.2	65.3	35	41	90	230
PREVALENCE INDEX			2.01	3.82	5	2.77	1	1.93	1.07	1	1.48	3.5	1.08	1	2.56
WETLAND VEGETATION			Y	N	N	N	Y	Y	Y	Y	Y	N	Y	Y	Y

Table 2. Vegetation composition and species canopy cover by plot. Total cover is the sum of all plant cover. Indicator status is for region 8 NWI, with 1 for OBL, 2 for FACW, 3 for FAC, 4 for FACU, and 5 for UPL. Cover x index is the sum of each species cover multiplied by the species indicator status for each plot. Prevalence index (PI) is the cover x status divided by total cover. Plots with a PI < 3 have hydrophytic vegetation.

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 1**
Is the area a potential Problem Area? **No** **Plot ID: #1**

VEGETATION

Dominant Plant Species

1. *Juncus arcticus* (FACW)
2. *Carex lanuginosa* (OBL)
3. *Senecio spartioides* (UPL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **66%**

Remarks: Prevalence Index = 2.01

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

Inundated

Saturated in Upper 12 Inches Water Marks

Drift Lines

Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

Oxidized Root Channels in Upper 12"

Water-Stained Leaves Local Soil Survey Data

FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Remarks: Water table appears to be within 12 inches of the ground surface in the summer.

SOIL

Matrix Color: 10YR 4/2

Mottles present: Yes, strong mottles, 10YR 5/8 at 4" depth

Oxidized Rhizospheres: yes

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes

Hydric Soils Present? Yes

Wetland Hydrology Present? Yes

Is this Sampling Point Within a Wetland? YES

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 1**
Is the area a potential Problem Area? **No** **Plot ID: #2**

VEGETATION

Dominant Plant Species

1. *Populus angustifolia* (FACW)
2. *Chrysothamnus nauseosus* (UPL)
3. *Sporobolus cryptandrus* (UPL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **33%**

Remarks: Prevalence Index = 3.82

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

- Inundated
 Saturated in Upper 12 Inches Water Marks
 Drift Lines
 Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12"
 Water-Stained Leaves Local Soil Survey Data
 FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: >12 " (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Remarks: Water table appears to be deeper than 3 feet in the summer.

SOIL

Matrix Color: 10YR 4/3

Mottles present: No

Oxidized Rhizospheres: No

WETLAND DETERMINATION

Hydrophytic Vegetation Present? No

Hydric Soils Present? No

Wetland Hydrology Present? No

Is this Sampling Point Within a Wetland? NO

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 1**
Is the area a potential Problem Area? **No** **Plot ID: #3**

VEGETATION

Dominant Plant Species

1. *Chrysothamnus nauseosus* (UPL)
2. *Oryzopsis hymenoides* (UPL)
3. *Sporobolus cryptandrus* (UPL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 0%

Remarks: Prevalence Index = 5.0

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

- Inundated
 Saturated in Upper 12 Inches Water Marks
 Drift Lines
 Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12"
 Water-Stained Leaves Local Soil Survey Data
 FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: >12 " (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Remarks: Water table appears to be deeper than 2 feet in the summer.

SOIL

Matrix Color: 10YR 4/3

Mottles present: No

Oxidized Rhizospheres: No

WETLAND DETERMINATION

Hydrophytic Vegetation Present? No

Hydric Soils Present? No

Wetland Hydrology Present? No

Is this Sampling Point Within a Wetland? NO

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 1**
Is the area a potential Problem Area? **No** **Plot ID: #4**

VEGETATION

Dominant Plant Species

1. *Populus angustifolia* (FACW)
2. *Chrysothamnus nauseosus* (UPL)
3. *Juncus arcticus* (FACW)
4. *Pascopyrum smithii* (FACU)
5. *Oryzopsis hymenoides* (UPL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **40%**

Remarks: Prevalence Index = 2.77

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

- Inundated
 Saturated in Upper 12 Inches Water Marks
 Drift Lines
 Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12"
 Water-Stained Leaves Local Soil Survey Data
 FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: >12 " (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Remarks: Water table appears to be deeper than 3 feet in the summer.

SOIL

Matrix Color: 10YR 4/3

Mottles present: No

Oxidized Rhizospheres: No

WETLAND DETERMINATION

Hydrophytic Vegetation Present? No/Yes

Hydric Soils Present? No

Wetland Hydrology Present? No

Is this Sampling Point Within a Wetland? NO

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 2**
Is the area a potential Problem Area? **No** **Plot ID: #5**

VEGETATION

Dominant Plant Species

1. Carex lanuginosa (OBL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **100%**

Remarks: Prevalence Index = 1.0

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

Inundated

Saturated in Upper 12 Inches Water Marks

Drift Lines

Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

Oxidized Root Channels in Upper 12"

Water-Stained Leaves Local Soil Survey Data

FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: >12 " (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Remarks: Algal crusts indicating surface water for long duration.

SOIL

Matrix Color: 10YR 4/2 (meets indicator F3 in regional manual)

Mottles present: No

Oxidized Rhizospheres: Yes, abundant on this years plant roots.

WETLAND DETERMINATION

Hydrophytic Vegetation Present? YES

Hydric Soils Present? YES

Wetland Hydrology Present? YES

Is this Sampling Point Within a Wetland? YES

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 2**
Is the area a potential Problem Area? **No** **Plot ID: #6**

VEGETATION

Dominant Plant Species

1. *Juncus arcticus* (FACW)
2. *Juncus longistylus* (FACW)
3. *Eleocharis macrostachya* (OBL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **100%**

Remarks: Prevalence Index = 1.93

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

- Inundated
 Saturated in Upper 12 Inches Water Marks
 Drift Lines
 Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12"
 Water-Stained Leaves Local Soil Survey Data
 FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: >12 " (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Remarks: algal crusts present indicating surface water in summer.

SOIL

Matrix Color: 10YR 3/2 (F3 indicator)

Mottles present: YES

Oxidized Rhizospheres: Yes

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes

Hydric Soils Present? Yes

Wetland Hydrology Present? Yes

Is this Sampling Point Within a Wetland? YES

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 5**
Is the area a potential Problem Area? **No** **Plot ID: #7**

VEGETATION

Dominant Plant Species

1. *Eleocharis macrostachya* (OBL)
2. *Eleocharis acicularis* (OBL)
3. *Juncus saximontanus* (FACW)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **100%**

Remarks: Prevalence Index = 1.07

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

- Inundated
 Saturated in Upper 12 Inches Water Marks
 Drift Lines
 Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12"
 Water-Stained Leaves Local Soil Survey Data
 FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: >12 " (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Remarks: Water table at 8"

SOIL

Matrix Color: 10YR 3/2

Mottles present: yes, abundant and bright orange

Oxidized Rhizospheres: Yes

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes

Hydric Soils Present? Yes

Wetland Hydrology Present? Yes

Is this Sampling Point Within a Wetland? YES

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 6**
Is the area a potential Problem Area? **No** **Plot ID: #8**

VEGETATION

Dominant Plant Species

1. *Carex utriculata* (OBL)
2. *Eleocharis macrostachya* (OBL)
3. *Eleocharis acicularis* (OBL)
4. *Typha latifolia* (OBL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Prevalence Index = 1.0

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

- Inundated
 Saturated in Upper 12 Inches _____ Water Marks
 Drift Lines
____ Sediment Deposits _____ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- ____ Oxidized Root Channels in Upper 12"
____ Water-Stained Leaves _____ Local Soil Survey Data
____ FAC-Neutral Test _____ Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: ____ <12 " _____ (in.)

Depth to Free Water in Pit: _____ (in.)

Depth to Saturated Soil: _____ (in.)

Remarks: Water table within 1 foot of ground in the summer.

SOIL

Matrix Color: SOIL is gravel, and colors are poorly developed

Mottles present: Yes

Oxidized Rhizospheres: No

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes

Hydric Soils Present? Yes

Wetland Hydrology Present? Yes

Is this Sampling Point Within a Wetland? YES

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 7**
Is the area a potential Problem Area? **No** **Plot ID: #9**

VEGETATION

Dominant Plant Species

1. *Populus angustifolia* (FACW)
2. *Scirpus acutus* (OBL)
3. *Eleocharis acicularis* (OBL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 100%

Remarks: Prevalence Index = 1.48

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

Inundated

Saturated in Upper 12 Inches Water Marks

Drift Lines

Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

Oxidized Root Channels in Upper 12"

Water-Stained Leaves Local Soil Survey Data

FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: 10(in.)

Depth to Saturated Soil: _____(in.)

Remarks:

SOIL

Matrix Color: 10YR 3/2

Mottles present: Yes

Oxidized Rhizospheres: Yes

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes

Hydric Soils Present? Yes

Wetland Hydrology Present? Yes

Is this Sampling Point Within a Wetland? YES

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 7**
Is the area a potential Problem Area? **No** **Plot ID: #10**

VEGETATION

Dominant Plant Species

1. *Populus angustifolia* (FACW)
2. *Polygonum aviculare* (UPL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). 50%

Remarks: Prevalence Index = 3.5

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

- Inundated
 Saturated in Upper 12 Inches Water Marks
 Drift Lines
 Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

- Oxidized Root Channels in Upper 12"
 Water-Stained Leaves Local Soil Survey Data
 FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: _____ (in.)

Depth to Free Water in Pit: ____ > 16 (in.)

Depth to Saturated Soil: _____ (in.)

Remarks: Water table appears to be deeper than 2 feet in the summer.

SOIL

Matrix Color: 10YR 4/3

Mottles present: No

Oxidized Rhizospheres: No

WETLAND DETERMINATION

Hydrophytic Vegetation Present? No

Hydric Soils Present? No

Wetland Hydrology Present? No

Is this Sampling Point Within a Wetland? NO

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 7**
Is the area a potential Problem Area? **No** **Plot ID: #11**

VEGETATION

Dominant Plant Species

1. *Typha latifolia* (OBL)
2. *Alnus incana* (FACW)
3. *Eleocharis macrostachya* (OBL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **100%**

Remarks: Prevalence Index = 1.08

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

Inundated

Saturated in Upper 12 Inches Water Marks

Drift Lines

Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

Oxidized Root Channels in Upper 12"

Water-Stained Leaves Local Soil Survey Data

FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: 8 (in.)

Depth to Saturated Soil: _____(in.)

Remarks: Water table within 1 foot in the summer.

SOIL

Matrix Color: 10YR 3/1

Mottles present: No

Oxidized Rhizospheres: Yes

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes

Hydric Soils Present? Yes

Wetland Hydrology Present? Yes

Is this Sampling Point Within a Wetland? YES

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 13**
Is the area a potential Problem Area? **No** **Plot ID: #12**

VEGETATION

Dominant Plant Species

1. Carex lanuginosa (OBL)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **100%**

Remarks: Prevalence Index = 1.0

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

Inundated

Saturated in Upper 12 Inches Water Marks

Drift Lines

Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

Oxidized Root Channels in Upper 12"

Water-Stained Leaves Local Soil Survey Data

FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: 6 (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Remarks:

SOIL

Matrix Color: 10YR 3/1

Mottles present: Yes

Oxidized Rhizospheres: Yes

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes

Hydric Soils Present? Yes

Wetland Hydrology Present? Yes

Is this Sampling Point Within a Wetland? YES

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: Sand Creek, Great Sand Dunes National Park, Colorado Date: 31 October 2009
Applicant/Owner: U.S. National Park Service County: Saguache
Investigator: David J. Cooper State: CO
Do Normal Circumstances Exist on the site? **Yes** Community ID:
Is the site significantly disturbed (Atypical Situation)? **Yes** **PIT: 12**
Is the area a potential Problem Area? **No** **Plot ID: #13**

VEGETATION

Dominant Plant Species

1. *Alnus incana* (FACW)
2. *Populus angustifolia* (FACW)
3. *Juncus arcticus* (FACW)
4. *Cirsium arvense* (FACU)

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). **75%**

Remarks: Prevalence Index = 2.56

HYDROLOGY

No Recorded Data Available

Wetland hydrology Indicators:

Primary Indicators:

Inundated

Saturated in Upper 12 Inches Water Marks

Drift Lines

Sediment Deposits Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):

Oxidized Root Channels in Upper 12"

Water-Stained Leaves Local Soil Survey Data

FAC-Neutral Test Other (Explain in Remarks)

Field Observations:

Depth of Surface Water: 8 (in.)

Depth to Free Water in Pit: (in.)

Depth to Saturated Soil: (in.)

Remarks:

SOIL

Matrix Color: 10YR 3/1

Mottles present: Yes

Oxidized Rhizospheres: Yes

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes

Hydric Soils Present? Yes

Wetland Hydrology Present? Yes

Is this Sampling Point Within a Wetland? YES