



MEMO

To: File

From: Sarah E. Frederick
Sarah E. Frederick

Date: June 21, 2016

Site Name/BRRTS: Kewaunee Marsh Arsenic Spill (02-31-000508)

Re: Field Activities Report for June 15, 2016

August 29, 2016: River Staff Gage amendment by EAN. See Reel: Staff Gage read as 3.79' → actually 3.70' based on photo inspection. See attachment at end. EAN

Who:

Liz Victor, NER R&R Hydrogeologist
Sarah Frederick, NER R&R Hydrogeologist
Cheryl Bougie, NER Water Resource Management Specialist

Purpose of Field Visit:

Site Reconnaissance: evaluate the current conditions of the site; this includes the conditions of the river, surface water across the marsh (ponds, weirs, sloughs, standing water, etc.), and monitoring wells.

GPS Unit Used: Garmin GPS Map 625 S
Operated by Liz Victor

Camera Used: DNR's Canon Powershot SX 210 IS
Operated by Liz Victor

Scope of Work for Field Visit (see section A of the attached "Proposed Field Work 2016"):

- 1) Assess and document the conditions of the river:
 - Geo-locate and document conditions of staff gage just off bridge
 - Determine if there are any other staff gages that should be investigated
 - Collect depth to water from existing staff gage(s)
- 2) Assess and document existing ponds
- 3) Assess and document weirs
- 4) Assess and document sloughs
- 5) Assess and document any other surface water features
- 6) Assess and document monitoring well conditions
 - Determine if all of the wells are present at this time
 - Collect construction/design info and assess conditions of all wells present

Tasks Accomplished and Observations:

Two trails through the marsh were traversed during the field day. Waypoints and observations are shown on the attached map, *Kewaunee Marsh: Waypoints and Tracks from 6/15/16 Visit, 6/22/16*.

Trail 1: Liz and Sarah walked from the Main Gate across the southern edge of the cap to exit the site onto the walking

Field Activities Report for June 15, 2016

trail through the gate nearest the southeastern edge of the fenced area. Along this transect, well MW-11-2 was observed, a change in vegetation from reed canary grass to cattails was noted at WP #46, 3" of standing water was first observed at WP #47, and by WP #48 the standing water had increased to ~6" in depth.

Trail 2: Liz, Sarah, and Cheryl entered the marsh from the Main Gate, crossed the northern edge of the cap, and made a loop back to the Main Gate by way of what were believed to be the locations of Ponds 12, 6, 7, and 11.

River - observations from the bridge:

- The river level appeared to be high. Vegetation (primarily cattails) along the western bank (the site) was flooded.
- It was difficult to identify the mouths of the sloughs from the river. Only one was visible.
- The river staff gage was located on wood pilings off the north side of the bridge, visible from the east end of the bridge. Staff gage reading: ~~3.75'~~ **3.70' (EN)**

Ponds - observed to be very overgrown and perhaps were naturally filled in over the preceding dry years. Use by birds was noted to be unlikely. Specific ponds located:

- Pond #12 was estimated to be approximately 30ft in diameter.
- Pond #6 was slightly larger than Pond #12
- Pond #7 was not visible from MW02-2i
- Pond #11 was estimated to be approximately 37ft in diameter.

Sloughs - previously investigated sloughs were not identified during this visit. Flooded state of the marsh appears to have altered surface hydrology.

- Standing water at MW02-3i appeared to be a small cattail slough draining to the E/NE from the well cluster

Stressed Vegetation - area of standing water with stunted vegetation observed at WP #053. Wet areas most impacted, with the stressed vegetation extending ~123' 2" along a linear SW/NE path. The width of the impacted zone variable from 10-25". Impacted area was dominated by reed canary grass, which was dead to the tips. Cattails were very sparse, and the few present were stunted.



Stressed vegetation observed at WP #053

Surface Water - surface water was present across a majority of the site.

- Standing water was observed on the cap at MW02-3i with deeper flooding on the eastern half as it approaches the river.
- Just off the eastern edge of the cap, at MW02-4i a good 6" of standing water was present.
- The marsh north of the cap was intermittently flooded from the eastern corner of the fenced area to the western edge of the fenced area up to the Main Gate.

Monitoring Wells - monitoring wells identified:

- MW02-3i, standing water
- MW02-4i, good 6" of standing water
- MW02-2i, 5-6" of standing water
- 1.5" unlabeled PVC well, either GW-06 or GW01-2



Remaining Tasks to be Completed:

- Locate ponds outside of the fenced area.
- Assess and document weirs
- Further investigate sloughs. Previously investigated sloughs were not located during this visit due to flooded state of the marsh.
- Locate all monitoring wells, collect construction/design info, and assess the conditions of all wells present.
- Proceed with sampling the surface water and groundwater (see Section B & C of the attached "Proposed Scope of Work").

Findings and Further Questions:

- Vegetation appears to be a good indicator of the location and condition of the cap. Reed canary grass currently dominates the majority of the capped area; however, the cattails appear to be encroaching on the edges of the cap, perhaps indicating deterioration of the cap, particularly along its perimeter.
- The narrow, linear area of stressed vegetation was observed at WP #053. Per Cheryl B. it appears as if the vegetation is impacted by a herbicide. Is the cap failing at this location? Is the arsenic being released to the surface water?
- Birds observed nesting in area trees as well as on the ground within the marsh grasses. If arsenic is being released to the environment, is it concentrated enough in the surface water to impact avian life?
- Ponds within the fenced area appear to have filled in over time. Areas of high ground adjacent to the ponds with trees are likely where spoils were piled when the ponds were dug.
- River was observed at 3.79' (581.13'), this is 1.79' above the elevation observed in 2004 according to the map drafted by STS Consultants, Ltd., *Drawing 1, 12/18/04*. Much of the surface topography of the marsh, according to the same map, is below 581', so standing water on the site is understood to be river water. Standing water on the cap is above 581'; this water is theorized to be accumulated rainwater or from depressions into the water table. What effect does increased water elevation have on Arsenic concentrations? What effect does it have on groundwater flow?

3.70' (581.04) 1.70'

Recommendations:

- Additional investigation of surface water given the changed conditions of the site (flooded state of the marsh).
- Additional investigation of the area of stressed vegetation to determine if the cap is failing and significant arsenic being released to the environment.
- Obtain updated aerial photos of the marsh.
 - o Brown cattails would indicate the size of the ponds
 - o The changes in vegetation across the central area of the site may indicate the area of the cap and the parts of the cap that are deteriorating.
 - o Identify the location/state of the previously investigated sloughs given the very high water of the eastern area of the marsh along the river.

Attachments:

- Photo Log for photos taken 6/15/16
- Kewaunee Marsh Photo Thumbnails, 6/15/16
- Coordinates measured in field on June 15, 2016
- Kewaunee Marsh: Waypoints and Tracks from 6/15/16 Visit, 6/22/16
- Field Notes, 6/15/16
- Drawing 1, STS Consultants Ltd., 12/18/04

- August 29, 2016 Amendment to Field Report by *SAF*
 Sarah E. Frederick

Photo Log for photos taken 6/15/16

Kewaunee Marsh Field Reconnaissance

Photos taken by E. Victor using DNR's Canon Powershot SX 210 IS

Image No.	Topic
1361-1368	View to northwest of marsh photo taken from bridge over river
1369-1372	View from bridge to northwest showing river gage
1373-1375	View to north from trail near se corner of fence
1376	Waypoint 47 – standing water
1377	Waypoint 48 – standing water half way up boots
1378-1380	Waypoint 49 – high ground south of cap
1381-1386	At fence east of waypoint 43/44
1387-1390	Interesting flower
1391-1408	Area of stressed/stunted vegetation on top of cap
1412-1413	Cheryl and Sarah, respectively
1414-1425	Pond 12
1426	Interesting flower between ponds 12 and 6
1427-1429	Pond 6
1430-1435	MW02-2i
1436-1451	Area near Pond 7
1449-1450	View to north/northwest of pond 7
1452-1456	Mallard nest
1457-1465	Blue Flag Iris near Waypoint 59
1467-1469	Sarah retrieving bucket from MW11-2
1470-1471	Sign and Kiosk

Camera time is set 1 hour later than actual time recorded in field notes.

Waypoints: these were recorded by GPS - refer to Field Activities Report for details.

KEMAWISE MARSH FIELD WORK 6/15/16 by EN



1362



1365



1368



1361



1364



1367



Placement of "cap" in 1997.

141



1363



1366



1371



1374



1377



1370



1373



1376



1369



1372



1375

REMNANT MARSH - FIELD WORK 6/15/16 - by EM



1380



1383



1386



1379



1382



1385



1378



1381



1384

47



1389



1392



1395



1388



1391



1394



1387



1390



1393

KENAWANEE MARSH 6/15/16 - FIELD WALK - by EMV
08-21-000 R08



1398



1401



1404



1397



1400



1403



1396



1399



1402

5



1407



1410



1413



1408



1409



1412



1401



1404



1411

KEWANUK MAESI - FIELD WORK - by GW
02-31-000508



1416



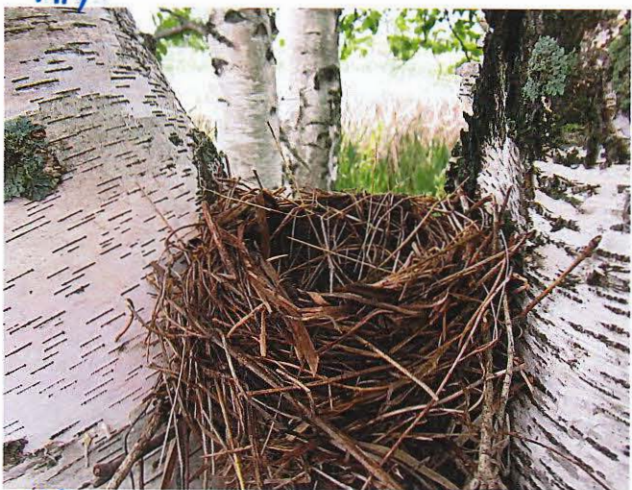
1419



1422



1415



1418



1421



1414



1417



1420

2



1425



1428



1431



1424



1427



1430



1423



1426



1429

02-21-020508
KEWAUWEE MARSH FIELD WALK - 0615116 - by GAV



1434



1437



1440



1433



1436



1439



1432



1435



1438



1443



1446



1449



1442



1445



1448



1444



1444



1447

ICAWWEE MAASH - Field walk by AN
02-31-000508



1452



1455



1458



1451



1454



1457



1450



1453



1456

(11)



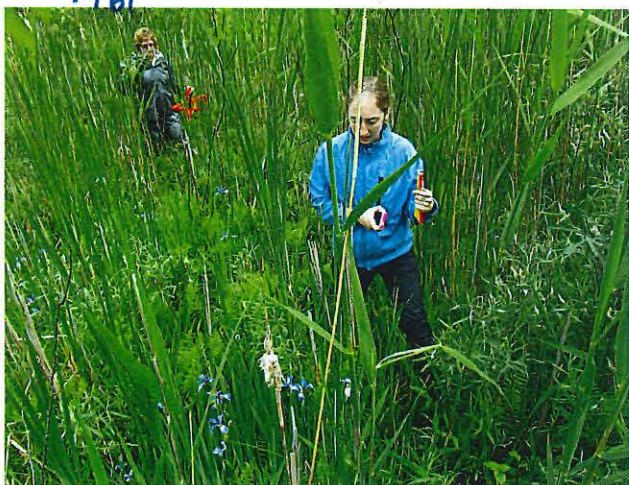
1461



1464



1467



1460



1463



1466



1459



1462

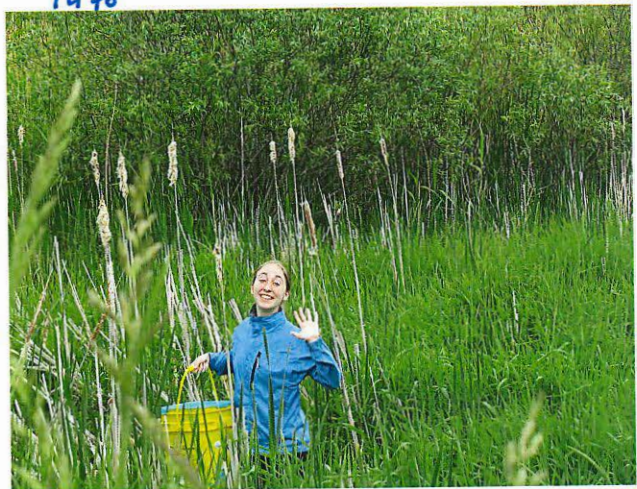


1465

02-31-00508
KUMMERS MASH- Field
Waste - 6/15/16 by EHV



1471



1469



1471

(13)

Coordinates measured in Field on June 15, 2016 by garmin GPSMAP 62s S

Kewaunee Marsh Arsenic Spill Site

02-31-000508

WPOINT

ident	Latitude	Longitude	Date/time	Comment
43	44.474301	-87.515035	06/15/2016 10:32	first gate west of river
44	44.474302	-87.51504	06/15/2016 10:33	first gate west of river
45	44.475797	-87.517549	06/15/2016 10:41	second gate west of river
46	44.475299	-87.516387	06/15/2016 10:50	change in vegetation from reed canary grass to cattails (grass to west, cattails to east)
47	44.475082	-87.515797	06/15/2016 10:54	3 inches of standing water
48	44.474913	-87.514863	06/15/2016 11:03	~6-7 inches of standing water
49	44.474707	-87.514991	06/15/2016 11:06	high (dry) ground - paper bark birch, ferns, dogwood.
50	44.475538	-87.516755	06/15/2016 12:27	change in vegetation from reed canary grass to cattails (grass to west, cattails to north east), dry
51	44.475459	-87.516353	06/15/2016 12:32	edge of cattails, dry
52	44.475476	-87.515798	06/15/2016 12:34	MW02-3i. Mixed cattails/reed canary grass, standing water, cattails extend to E/NE (slough?)
53	44.475244	-87.514711	06/15/2016 12:41	approx center of area of stunted/stressed vegetation and standing water. 123 ft L (SW/NE) and 10-25 ft wide.
54	44.475258	-87.51438	06/15/2016 12:50	approx Ne end of stunted/stressed vegetation and standing water
55	44.475796	-87.515097	06/15/2016 13:10	Pond 12
56	44.476147	-87.514658	06/15/2016 13:23	pond 6
57	44.47605	-87.5161	06/15/2016 13:42	mallard nest
58	44.476008	-87.516041	06/15/2016 13:43	GW-06
59	44.476004	-87.516699	06/15/2016 13:48	possible filled in pond? Ferns
60	44.475879	-87.517666	06/15/2016 14:14	Gate

Kewaunee Marsh June 29, 2016 Field Points



108 SW16-5
110

111
hole in fence

132 SW16-6/
SW16-13

112
hole in fence

133

113
SW16-7

↑
unlabeled
well
GW-07

131
SW16-4

GW01-5 119

118

←
swib-1
located
near
mwd4-11

128 129 130
wedged stressed
veg

chemical
odor

slough? →

120
SW16-8

115 116
114

SW16-10

125
↑
edge of
CQP?

126

127
SW16-3

1140

gate

122 123
121
SW16-9

124

135

134

SW16-2
(±20' from
trail)

swib-1a (river)

GARMIN e Trex 20 Sof WAYPOINTS.

Kewaunee Marsh June 29, 2016 Field Points



Kewaunee Marsh



FIELD VISIT

JUNE 15 9:45A 2016

emp: 58°F

conditions - overcast, rained last couple days, forecast = rain / thunderstorms

NR on-site: E. Victor
S. Frederick

purpose: Site Reconnaissance
Review / document
SW Features.
(June 2016 Workplan)

walk along to trail to River,
all up river to sloughs

From bridge it appears that
river level is high (LAKE MI
levels are at a high
level ($\pm 4'$ higher than normal))

Difficult to tell where
mouth of sloughs are
from river - can see one
but not both)

p. 1 of 5

water is high into the
cattails.

River Staff Gage: 3.79'

Staff gage is on wood
piling on N. side of E. ~~side~~
bridge - can be seen and
read from bridge.

Waypoint #043, Offt same
First gate west of river (Gate A)
standing water in cattails

Waypoint #045
Second gate west of river (Main Gate)

Waypoint #046
change in vegetation to cattails

Waypoint #047
standing water 3 inches
photo of Sarah's foot

Waypoint #048
standing water half way up bank
heading toward trail (South)

p. 2 of 5

Map #049

paper birch, high grasses, ferns, dry wood
can channel around
can re-entrance the marsh

#050

dry edge of cattails
cattails appear to be encroaching onto cap

#051

dry edge of cattails

#052

mixed cattail/red canopy grass

- 023-I

standing water on the cap
mixed cattails/red canopy grass
appears that there is a small cattail stem
draining to the E/NE from well cluster

#053

area of stunted red canopy grass
~123' 2" extending SE/NW ~170°
10-25 ft variable width
vegetation is dead to the tips
is the cap failing? release of arsenic
low water areas - area follows water path

p. 3 of 5

EPV - Corrected SW/NE.

#054

edge of stressed vegetation
low areas most impacted
cattails very sparse and few are stunted
in impacted area

MW-024-I

standing
good 6" of water

Pond 12 - W.P. #55

30 ft diameter

NW corner adjacent to channel of birch
does not appear that birds use "pond"
very overgrown

Pond #6 W.P. #56

slightly larger than Pond #12
would be nice to get an aerial photo - however
cattails would indicate 3-7 ft
mud, branching birch W. part of pond

MW-025-I

good 6" of
several inches of standing water
but ferns present indicating that water is
higher than normal
pond #7 not visible

higher ground thought to be spalls from ponds

p. 4 of 5

#057

duck nest - mallard

#058

1 1/2" GW-010 or GW-012

#59

Pond #11?

37 ft in diameter

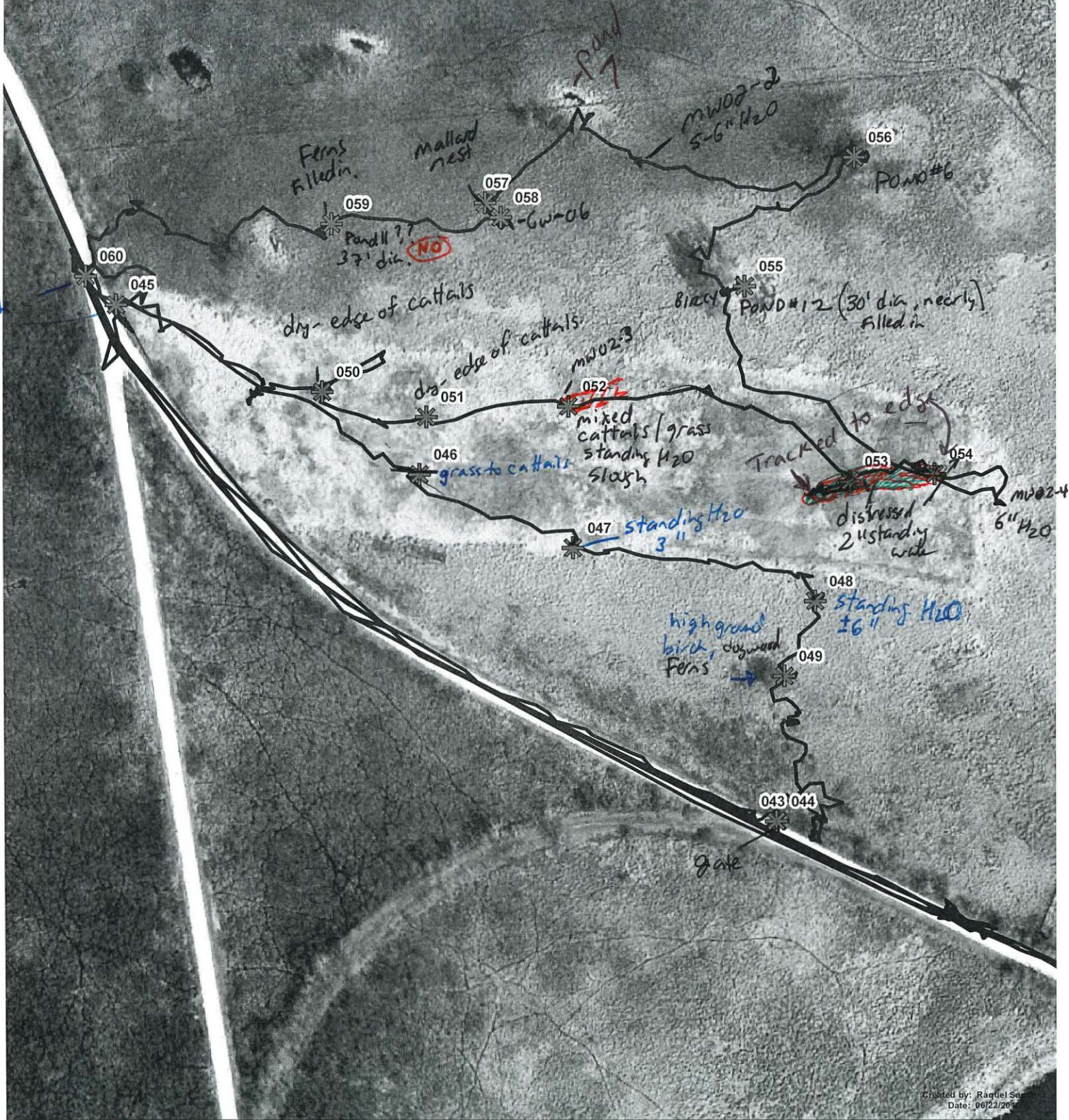
Ponds appear to have filled in
lots of ferns

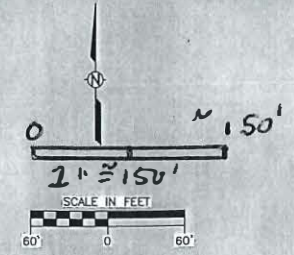
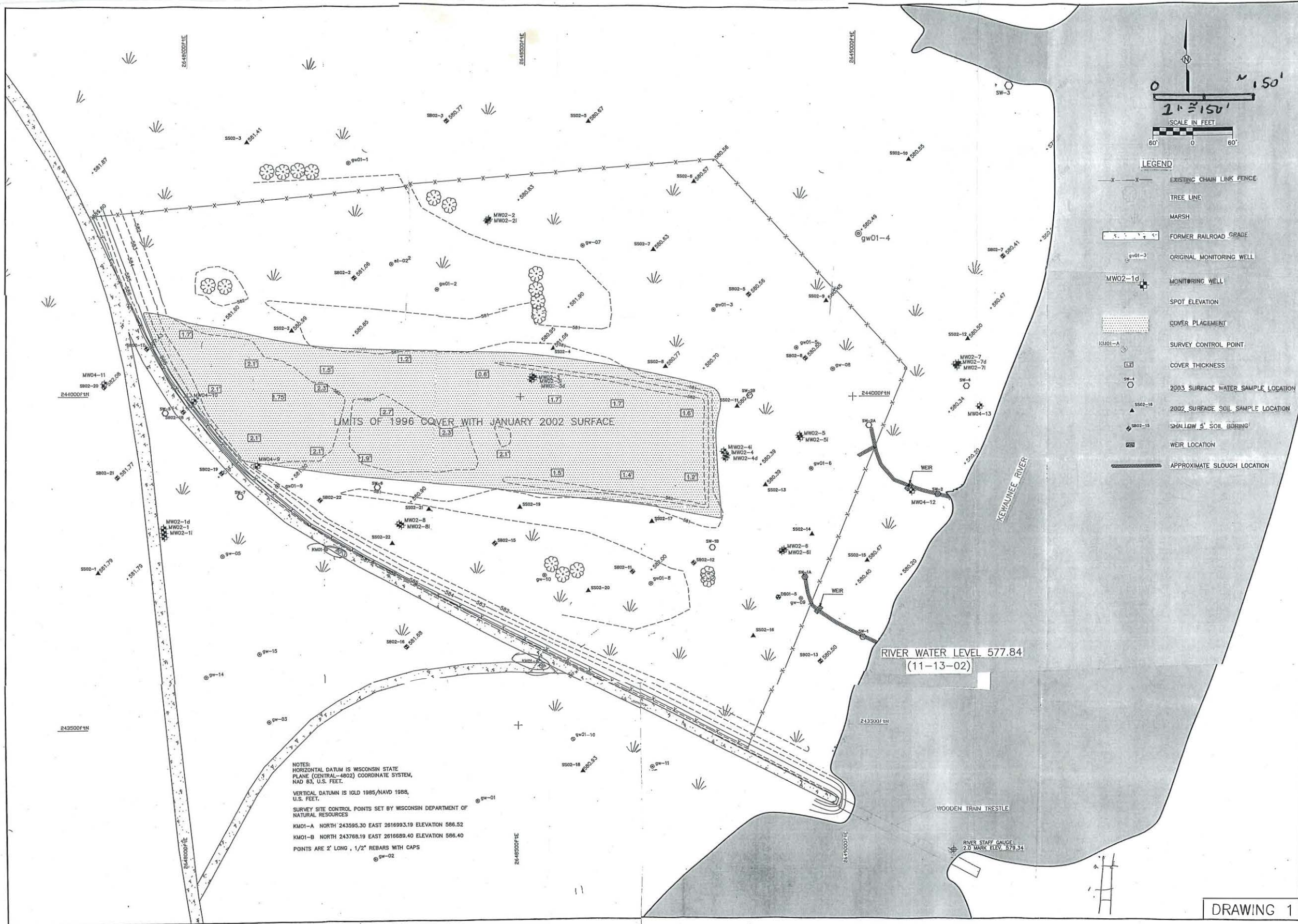
standing water up to main glc behind cap

7pm - Done for day.

Kewaunee Marsh

Waypoints and Tracks from 6/15/16 Visit





- LEGEND**
- x-x- EXISTING CHAIN LINK FENCE
 - TREE LINE
 - MARSH
 - FORMER RAILROAD GRADE
 - ORIGINAL MONITORING WELL
 - MW02-1d MONITORING WELL
 - ▲ SPOT ELEVATION
 - COVER PLACEMENT
 - SURVEY CONTROL POINT
 - COVER THICKNESS
 - 2003 SURFACE WATER SAMPLE LOCATION
 - ▲ 2002 SURFACE SOIL SAMPLE LOCATION
 - ▲ SHALLOW SOIL BORING
 - WEIR LOCATION
 - APPROXIMATE SLOUGH LOCATION

NOTES:
 HORIZONTAL DATUM IS WISCONSIN STATE PLANE (CENTRAL-4802) COORDINATE SYSTEM, NAD 83, U.S. FEET.
 VERTICAL DATUM IS IGLD 1985/NAVD 1988, U.S. FEET.
 SURVEY SITE CONTROL POINTS SET BY WISCONSIN DEPARTMENT OF NATURAL RESOURCES
 KM01-A NORTH 243595.30 EAST 2616993.19 ELEVATION 586.52
 KM01-B NORTH 243768.19 EAST 2616689.40 ELEVATION 586.40
 POINTS ARE 2' LONG, 1/2" REBARS WITH CAPS

RIVER WATER LEVEL 577.84
 (11-13-02)

WOODEN TRAIN TRESTLE

RIVER STAFF GAUGE
 2.0 MARK ELEV. 579.34

DESIGNED BY	PJK	DATE	12-04
DRAWN BY	DTB	DATE	12-18-04
APPROVED BY	PJK	DATE	12-04
CAPULE & PROJECTS 4273436 VIG C-2.dwg			
LWAK			
REVISION			
C.D. BESADNY FISH AND WILDLIFE AREA			
WISCONSIN DEPARTMENT OF NATURAL RESOURCES			
KEWAUNEE, WISCONSIN			
SITE MAP AND SAMPLING LOCATIONS			
STS Consultants Ltd. Consulting Engineers 1833 Kipling Dr. Green Bay, WI 54301 820.498.1978			
STS PROJECT NUMBER			
27393			
STS PROJECT FILE			
SCALE			
1"=60'			
SHEET NUMBER			
C2			

Map Source: Loose map in DNR Files

DRAWING 1

August 29, 2016 Amendment to Field Notes:
Photo of river staff gage, Kewaunee Marsh, June 15,
2016.



Depth to water observed from bridge and reported in field notes: 3.79'.

Depth to water based on closer examination of above photo: 3.70'

EATV