Huntley Meadows Park

Wetland Restoration Project

Public Presentation - 2013

First, let's summarize this project – then you can explore the slide show and learn more….

What are we doing, and Why:

1) Beaver marshes have **stages**
(those stages have been accelerated by silt and aggressive plants)

2) One stage, **the hemi-marsh**, has the highest level of **biodiversity –**
(preserving and promoting biodiversity achieves Huntley's dual mission of education and resource protection)

3) Because biodiversity and marshlands are both in decline, Fairfax County Park Authority and the Huntley Meadows community have decided to **manage** the park's beaver wetland as a hemi-marsh –
(it's taken 20 years of research and public meetings to write this last sentence)

Project Goals

To be successful, this project must:

1
Encourage and Preserve the full biodiversity associated with a non-tidal hemi-marsh.

2
Fit the Site, including the hydrology, topography, soils, seasonal cycles, and the native plant and animal community.

3
Serve our Visitors, especially those engaged in environmental education and wildlife observation.

4
Be Practical, Realistic, Affordable and Maintainable.

Biodiversity is the key to the whole project

*** The final site and management plans will strive to connect all four goals ***

Park Intro:

Now, here's a brief park intro – <u>skip to **slide 11**</u> to get back to the project details.

- Established in 1975
- 1,554 acres (forests, wetlands, streams, meadows)
- 200,000 visitors a year
- Over 400 programs and 10,000 students every year
- Largest non-tidal wetland in Northern Virginia

The Wetland Boardwalk is a Destination Point for Environmental Ed. and Wildlife Observation/Study:

- ½ mile wetland board-walk/observation tower
- ADA accessible

Huntley Meadows Mission Statement = Resource Protection + Environmental Education

A. Site Mission
"To preserve, manage and interpret the natural and cultural resources found in Huntley Meadows Park in a manner that highlights and encourages the biodiversity associated with this site's native ecosystems, while also providing a site for environmental education, wildlife observation, ecological study and passive, trail-related outdoor recreation compatible with a wildlife sanctuary."

B. Vision
Following are 4 Vision statements that reflect and realize our Site Mission:

**A healthy, native and diverse plant and animal community preserved and managed in a manner that strives to reduce the negative effects of invasive exotic and overpopulated species and encourages local, native biodiversity*

**Historic landforms, structures, archaeological sites and other evidence of past land uses are identified, interpreted, protected and valued*

**Interpretive programs, exhibits and materials that are fun, educational and that inspire and affect positive change in the public's attitude towards the natural environment*

**A site and facilities that are safe, accessible, attractive, functional, enjoyable, as well as responsibly managed and maintained*

Resource Protection

Unique Community of Wetland Plants and Animals –

Many of which are Unusual to Rare in Northern Virginia –

All of which require habitats that need to be preserved, protected and managed.

Education

Many visitors,
including schools and scout groups, travel from other counties and states to learn from our wetland

- Field Trips
- Adult Programs
- Camps
- Schools
- Scouts

Site History:

Agriculture – 1800s thru 1940

Navy Antennae Fields – 1960s

Beavers Arrive and Create Wetland – *1970s

* Land purchased by the county in **1975** – beavers begin work on dam in **1977**

Project time line and history:

1. **Public Outreach**: Continuous/Ongoing Public Outreach since 1992

a) 20 Public Meetings
b) 42 Monthly Park Manager Walk and Talks (monthly thru at least 2014)
c) Many individual meetings with park patrons (contact park w/ questions)
d) Provide quarterly updates for Friends groups

2. **Professional Research Contracts**: 3 stages of project development

a) TAMS Report – 1992: Compiled Site History and Target Species Data
b) Burgess and Niple – 2006: Beaver Behavior, Fluctuating Water Levels, Engineering and Permitting Challenges
c) WSSI (Wetland Studies and Solutions, Inc.) – 2012: Improved Survey Techniques, Engineering and Permitting, Water Control Structure, and incorporated all former info into an Integrated Final Product

3. **Staff and Volunteer Research and Monitoring**: Multi-layered,1990s-Present

a) Water Levels and Rainfall Data
b) Fixed Point Photo Monitoring
c) Target Species Data
d) Bird Survey Data
e) Crayfish Survey
f) Beaver Survey
g) Fish Survey
h) Vegetation Surveys
i) Water Quality Monitoring
j) Goals: Merge all data to find relationships, causality and trends

Arial Map of Huntley Meadows Park

Project site = central wetland/ boardwalk area

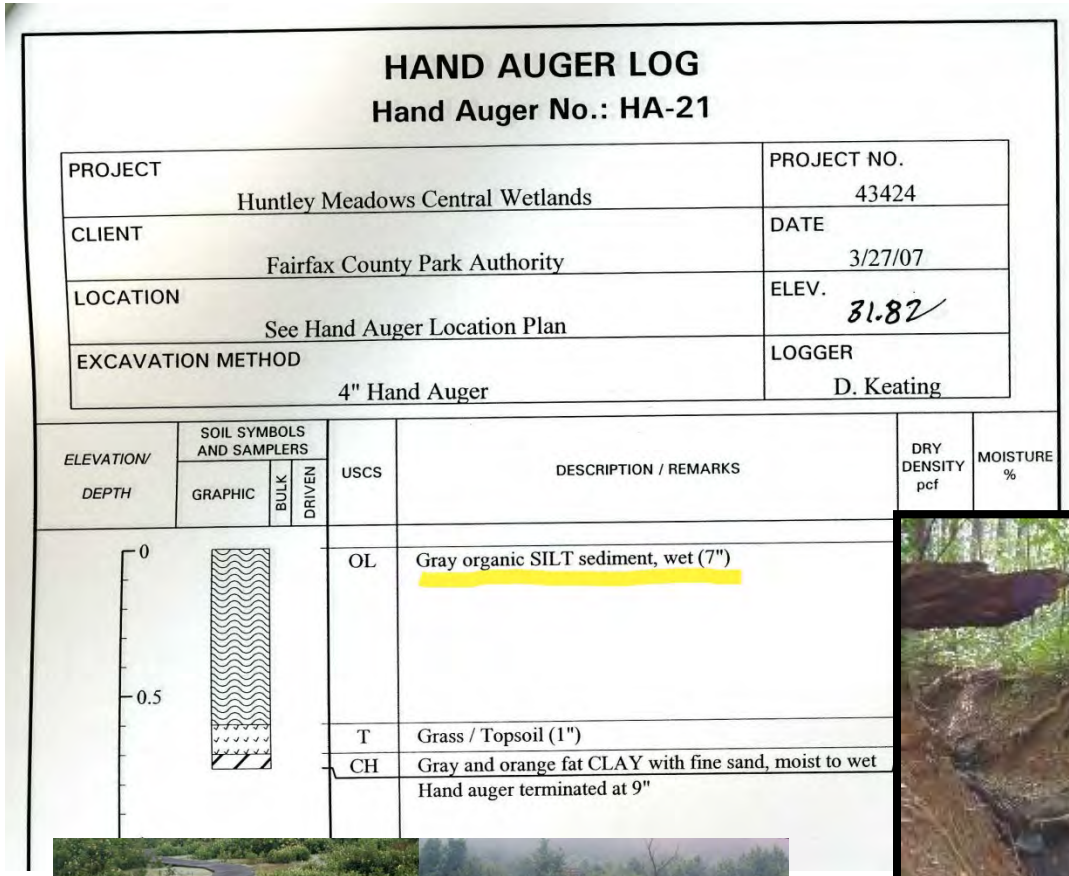
Present Challenges = decreased biodiversity and need for restoration

Siltation from Development
(average – 8-10 inches)

Aggressive Plant Species
(cattails, rice-cut grass, wild lettuce, blackberry & invasive exotics)

Additional Issues:
Deer, Geese,
Water Quality &
Invasive Exotics

Changes in beaver activity and water levels
(approx. 1-2 feet)



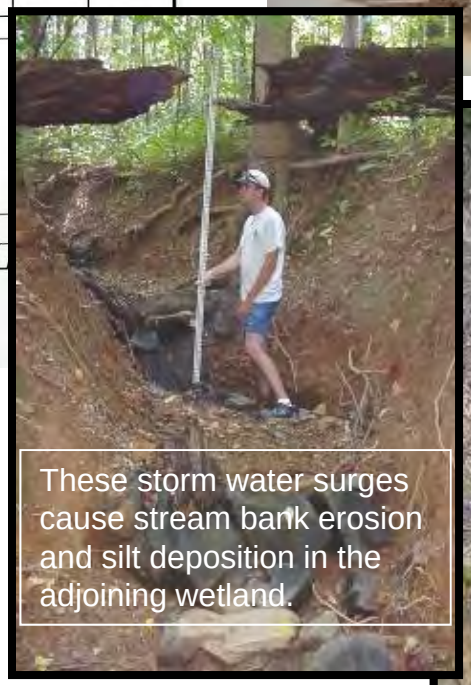
HAND AUGER LOG

Hand Auger No.: HA-21

PROJECT: Huntley Meadows Central Wetlands	PROJECT NO.: 43424
CLIENT: Fairfax County Park Authority	DATE: 3/27/07
LOCATION: See Hand Auger Location Plan	ELEV.: 31.82
EXCAVATION METHOD: 4" Hand Auger	LOGGER: D. Keating

ELEVATION/ DEPTH	SOIL SYMBOLS AND SAMPLERS: GRAPHIC	BULK	DRIVEN	USCS	DESCRIPTION / REMARKS	DRY DENSITY pcf	MOISTURE %
0				OL	Gray organic SILT sediment, wet (7")		
0.5				T	Grass / Topsoil (1")		
				CH	Gray and orange fat CLAY with fine sand, moist to wet		
					Hand auger terminated at 9"		

Poor erosion control methods and enforcement in the '80s.



These storm water surges cause stream bank erosion and silt deposition in the adjoining wetland.

Impervious surfaces, like concrete ditches, result in fast and heavy storm water surges.

Siltation = less water depth & decreased aquatic life

Fixed Point Photo Monitoring:
(allows park staff to document monthly large-scale changes in plant communities and water levels)

- 13 points along the boardwalk
- 4 photos taken at each point
- Once a month since Sept, 2008
- Documents successional changes, plant types and water/plant ratios

May,'09 (12d)

Near perfect hemi-marsh conditions (50% water, 50% plants) during spring breeding season (May, 2009), for first time since the 1990s.

May,'10 (12d)

Same spot, same time next year – low water levels led to cattail spread and poor hemi-marsh conditions.

This spread of cattails and other aggressive vegetation is taking place in many sections of the wetland and reducing the hemi-marsh conditions necessary for various species of wetland wildlife.

Sept,'08 (4b)
These next three slides
(same location, same month
over three years) also show
the spread of cattails in the marsh.

Sept,’09 (4b)

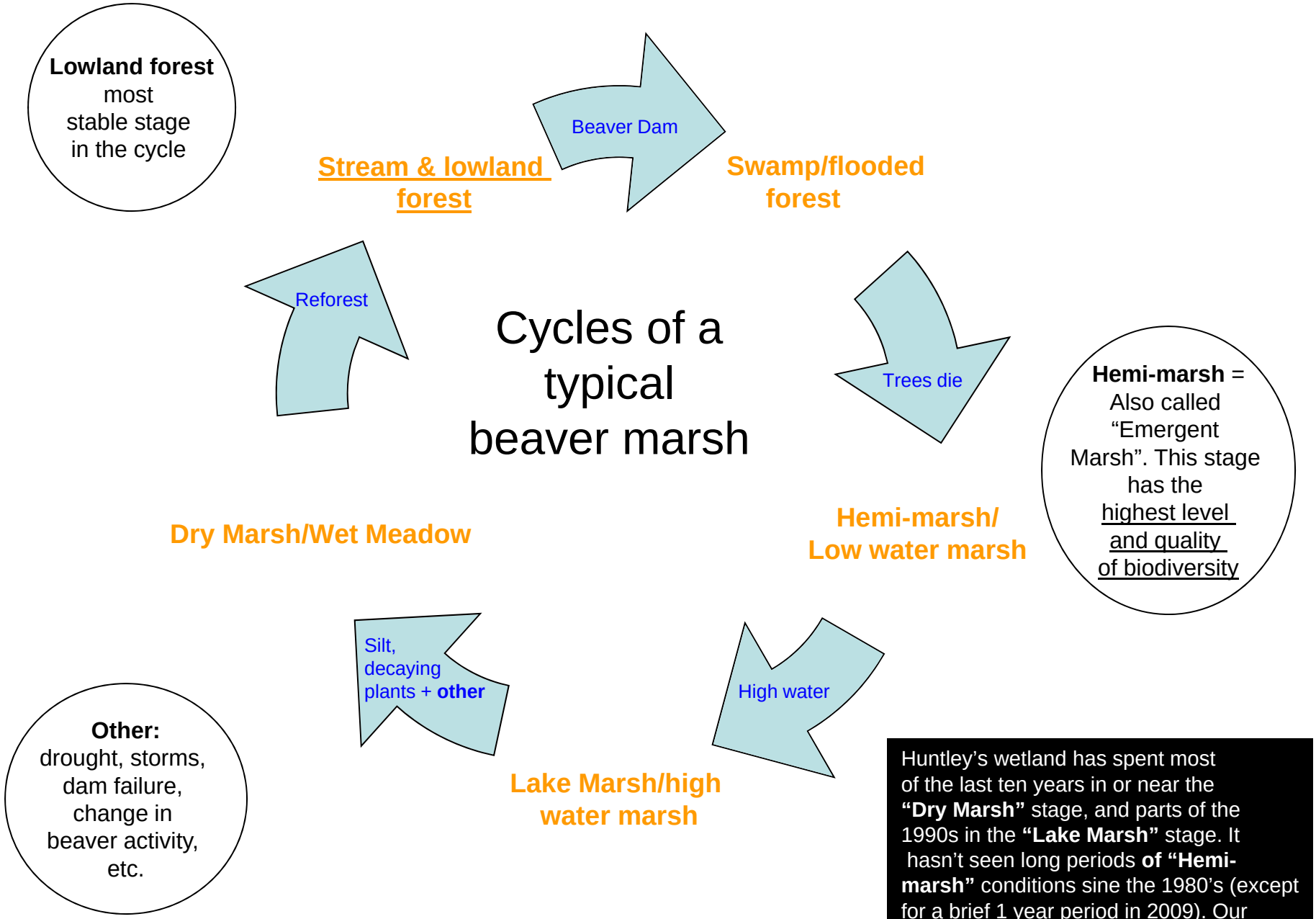
Sept,’10 (4b)

Changing Beaver Activity = changing water levels

Beavers are nomadic, gypsy-like in their movements, and create ever-changing, never static, habitats.

Their wetlands go through multi-decade cycles.

Cycles of a typical beaver marsh



Huntley's wetland has spent most of the last ten years in or near the **"Dry Marsh"** stage, and parts of the 1990s in the **"Lake Marsh"** stage. It hasn't seen long periods **of "Hemi-marsh"** conditions sine the 1980's (except for a brief 1 year period in 2009). Our primary goal for the restoration project is to manage the wetland as a Hemi-marsh.

Let's Summarize -

What are we doing, and Why:

1) Beaver marshes have **stages**
(those stages have been accelerated by silt and aggressive plants)

2) One stage, **the hemi-marsh**, has the highest level of **biodiversity –**
(preserving and promoting biodiversity achieves Huntley's dual mission of education and resource protection)

3) Because biodiversity and marshlands are both in decline, Fairfax County Park Authority and the Huntley Meadows community have decided to **manage** the park's beaver wetland as a hemi-marsh –
(it's taken 20 years of research and public meetings to write this last sentence)

http://chicagowildernessmag.org/issues/spring2000/birdshabitat.html

"Most of our threatened and endangered marsh birds are dependent on hemi-marsh conditions," Paine explains. "Marshes tend to run through cycles from fairly dry dense stands of emergent vegetation, mostly cattails, to rising water levels in which the emergents can't survive and get drowned. That creates an interspersion of water and emergent vegetation. The ideal is 50 percent water/50 percent emergent vegetation, thus the term hemi-marsh. These conditions seem best for many wetland birds including the state-endangered black tern and yellow-headed blackbird and the state-threatened least bittern, common moorhen, and pied-billed grebe."

Other Resource Managers and Park Systems, including resource sites in Illinois (see quotes), have also decided to manage their wetlands for biodiversity and specific wildlife species and communities.

Until 50-100 years ago, enough marshes and wetlands existed so if one was not at the hemi-marsh stage, birds didn't have to fly far to find another one that was suitable for breeding. In short, enough habitat existed for them to adapt to natural changes both within the marsh and due to outside influences such as drought or excessive rainfall. Today, that's no longer true: northeastern Illinois probably has only one percent of its pre-settlement wetlands, and many of them are becoming degraded. The loss of wetlands coupled with human influences — cutting roads through marshes, putting subdivisions next to marshes that over time change the water flows and levels, and introducing non-native carp that stir sediments — can all render a marsh unproductive for breeding birds, especially the rare ones. Paine poses this question: "What will happen if the remaining marshes continue to deteriorate? Do we have enough marshes to get birds through the hard times?"

Other mid-Atlantic parks that have decided to manage their wetlands for **education**, **resource protection and biodiversity**:

1. Patuxent National Wildlife Refuge (MD)
2. Primehook National Wildlife Refuge (DE)
3. Blackwater National Wildlife Refuge (MD)
4. Chincoteague National Wildlife Refuge (VA)
5. Bombay Hook National Wildiife Refuge (DE)
6. Great Meadows National Wildlife Refuge (MA)

An alarming fact to consider,
and one reason this project is important:

Before European settlement, wetlands covered approx. 221 million acres in the lower 48 states.

Today, 50-70 percent of that acreage has been lost and much of the remaining wetlands are badly degraded.

This means what remains is precious and must be cared for.

Project Goals

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MORE Info on the Management Plan:
Next Public Program (spring, 2013)

Management Plan – summary

(developed in large part from public input)

HUNTLEY MEADOWS WETLAND - MANAGEMENT PLAN NARRATIVE
Summary

The arrival of beavers in the late 70s created a swamp/flooded forest that soon changed into a hemi or emergent marsh. The hemi marsh evolved into a lake marsh (due to high water levels caused by the beaver dam), which eventually evolved into a dry marsh/wet meadow (due to droughts, siltation, beaver movements and natural marsh succession). Our goal is to bring Huntley back to a hemi-marsh and create a management regime that allows it to stay in that state for the foreseeable future. We have created a list of target and satellite species associated with local hemi marshes – an important part of our goal associated with managing a hemi marsh is to create habitat for those various species during the specific seasonal time periods they use the marsh (see target species list). **- slide 31**

We are restoring and managing habitat in order to attract a community of target species.

Our end product is to create and manage a **hemi-marsh with a woody component**. It will also include:

1. adjoining managed meadows
2. adjoining seasonally flooded forests
3. the inflow, East Barnyard Run, will have some restoration and water quality improvement components

The restoration project design and construction will consider, but not necessarily include new work, on the above listed, already existing, three adjoining habitats.

To do that we require the following habitat structures and management actions:

Structures:

- Embankment/dam with water control features
- excavated pools
- additional micro-topography (contours, mounds, etc.)
- course non-living woody debris (root wads, fallen trees/logs)
- protected woody planting clusters/groves (Buttonbush, Black Willow, etc.)
- water quality structures (Terra-tubes, erosion preventing materials - mostly in Barnyard Run)
- adjoining managed meadows

Management Actions:

- control and manipulate water levels and keep device free of debris/beaver work
- soil and topography management: excavating, mounding, grading, dredging, disking
- plant management: planting, mowing, burning, invasive removal, maintaining protected trees/shrubs
- wildlife management: beaver, muskrat, deer, geese, snakehead, nesting boxes/platforms
- large, course, woody debris management: cutting, placing and re-placing perching and loafing logs/down trees
- inflow water quality (silt and storm water contaminants): maintain terra-tubes, fascines, sediment ponds, soil erosion blankets, etc.

Management Plan – additional guiding principals

A Management Plan is being developed and will be based on the following guiding principles:

- Management regime should be as low maintenance, natural, site-specific/appropriate, sustainable and long-term as possible.

- Encourage native species and discourage exotic species by water level management, planting, mowing, controlled burns, invasive removal, and maintenance of protected trees/shrubs.

- Encourage floral and faunal biodiversity by providing a diversity of habitats, while also providing specific habitat needs for imperiled and keystone target species.

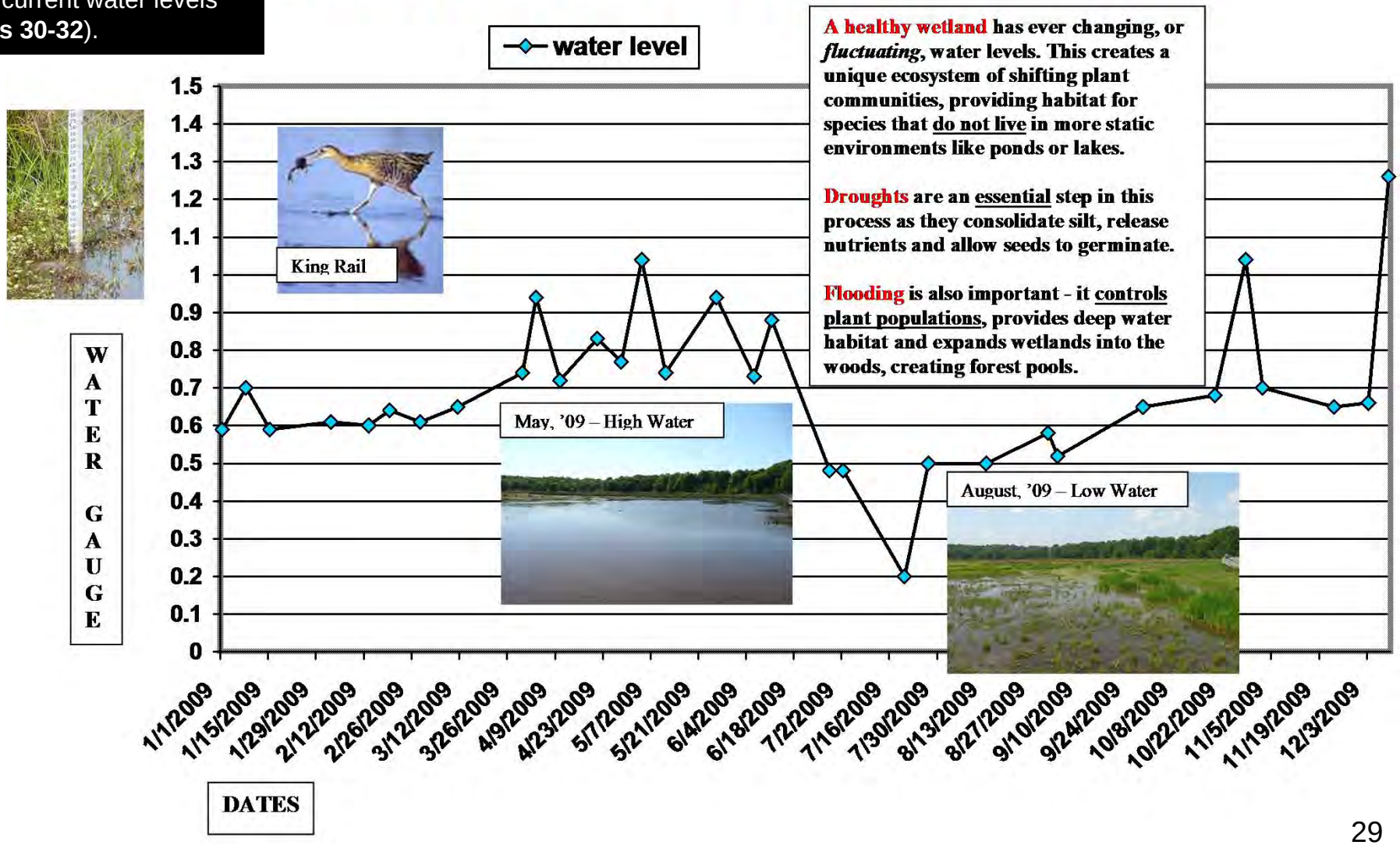
- Water levels should fluctuate and vary, both seasonally and yearly by controlling and manipulating water levels and keeping water management devices free of debris.

- Beavers will not be trapped, removed, relocated or euthanized. They are an integral and valued part of the wetland's diversity, productivity and long-term success.

- Provide both visible, wildlife observation areas for park visitors, and more secluded, sheltered areas for reclusive wildlife species.

The project will allow us to **tweak yearly water** levels in order to better **control plant communities** and maintain a hemi-marsh – it will only be **slightly different** from these current water levels (**slides 30-32**).

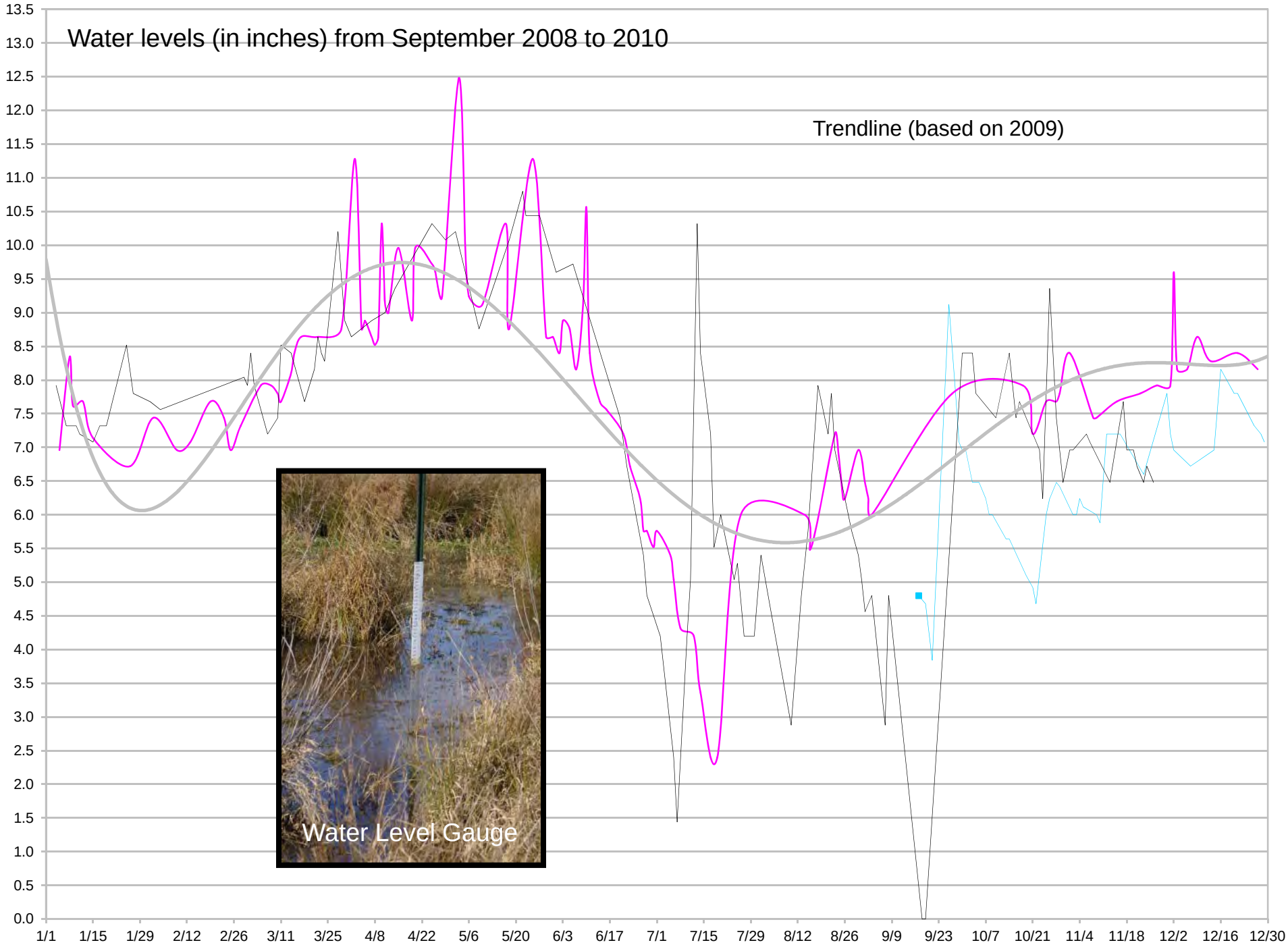
- Water Level Fluctuations - Huntley Meadows Central Wetland, 2009

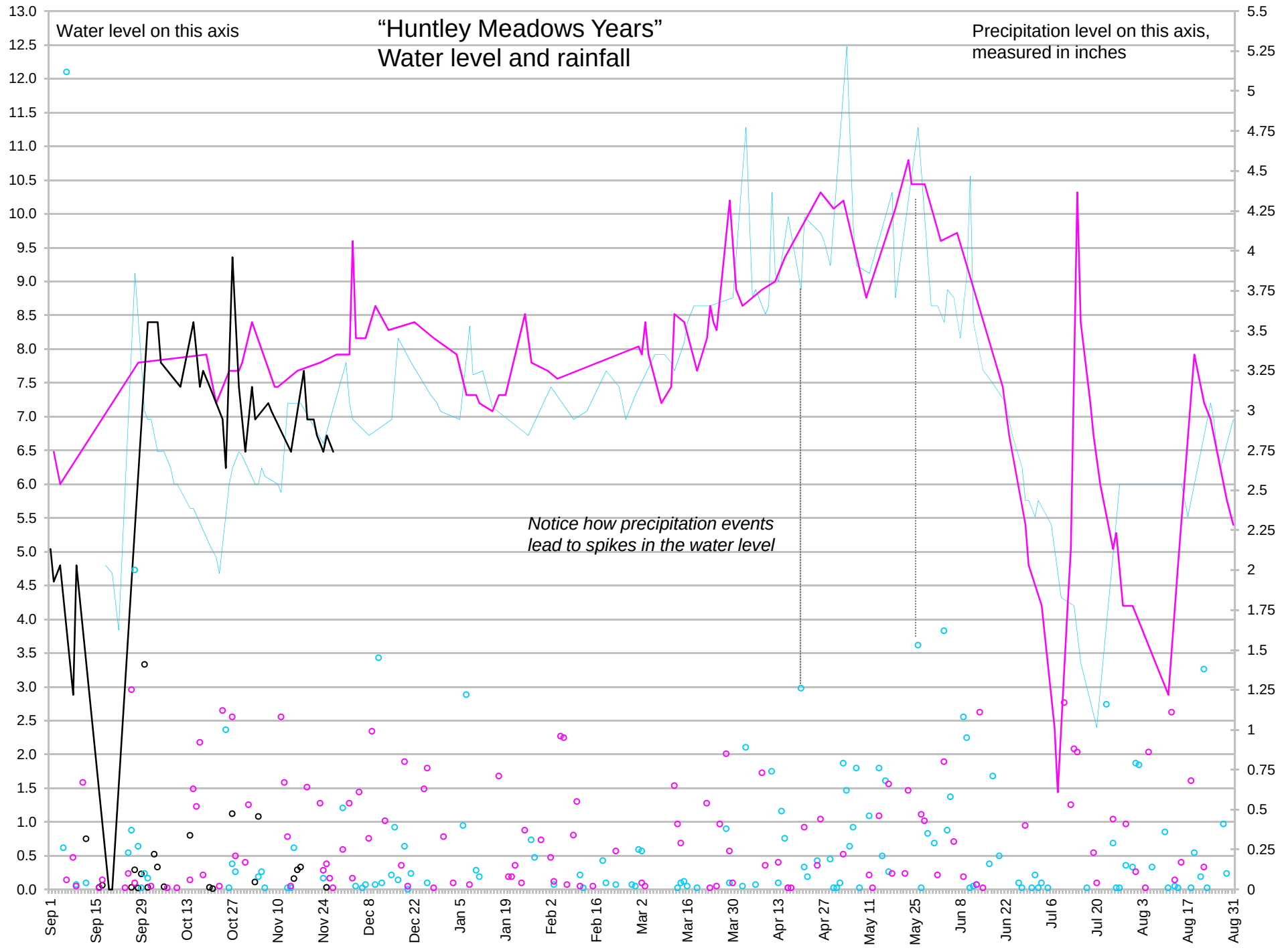


A healthy wetland has ever changing, or ***fluctuating***, water levels. This creates a unique ecosystem of shifting plant communities, providing habitat for species that do not live in more static environments like ponds or lakes.

Droughts are an essential step in this process as they consolidate silt, release nutrients and allow seeds to germinate.

Flooding is also important - it controls plant populations, provides deep water habitat and expands wetlands into the woods, creating forest pools.


Water levels (in inches) from September 2008 to 2010
Trendline (based on 2009)
Water Level Gauge
13.5
13.0
12.5
12.0
11.5
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1/1
1/15
1/29
2/12
2/26
3/11
3/25
4/8
4/22
5/6
5/20
6/3
6/17
7/1
7/15
7/29
8/12
8/26
9/9
9/23
10/7
10/21
11/4
11/18
12/2
12/16
12/30


“Huntley Meadows Years”
Water level and rainfall
Water level on this axis
Precipitation level on this axis, measured in inches
Notice how precipitation events lead to spikes in the water level
13.0
12.5
12.0
11.5
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
5.5
5.25
5
4.75
4.5
4.25
4
3.75
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0
Sep 1
Sep 15
Sep 29
Oct 13
Oct 27
Nov 10
Nov 24
Dec 8
Dec 22
Jan 5
Jan 19
Feb 2
Feb 16
Mar 2
Mar 16
Mar 30
Apr 13
Apr 27
May 11
May 25
Jun 8
Jun 22
Jul 6
Jul 20
Aug 3
Aug 17
Aug 31

Target Wildlife Species – project guides

BUILDERS (year-round): Keystone species needed to build a wetland ecosystem

Beaver
Muskrat
Frogs
Fish
Crayfish
Aquatic Insects
Mollusks

BREEDERS (spring/summer): Locally imperiled/vulnerable species with breeding habitat that Huntley could provide

Waders
(Rails, Bitterns, Night Heron)

Waterfowl
(Grebe, Black Duck)

Reptiles & Amphibians
(Spotted Turtle,
Green Tree Frog)

Dabbling Ducks
(Teal, Pintail,
Shoveler,
Gadwall, Wigeon)

These wetland species and their habitat needs will help guide the project design and management plan.

FEEDERS (fall/winter):
Locally imperiled/vulnerable species with feeding habitat that Huntley could provide

We'll manage for a wildlife **community**, not just a single species

Target Species

(the habitat needs of these species will serve as primary guides for our management decisions)

- Management Group #1 -

Hemi-marsh Growing Season Breeders

(April-July)

Yellow-crowned Night Heron
American Bittern
Least Bittern
Virginia Rail
King Rail
Common Moorhen
Pied-billed Grebe
Black Duck
Spotted Turtle
Green Treefrog

- Management Group #2 -

Hemi-marsh Dormant Season Feeders

(October-March)

Black Duck
Green-winged Teal
Blue-winged Teal
Gadwall
Northern Pintail
American Wigeon
American Shoveler
Rusty Blackbirds

- Management Group #3 -

Hemi-marsh Ecosystem Builders

(Year-round)

Beaver
Otter
Muskrat
Southern Leopard Frog
Eastern Ribbon Snake
Fish (Chain Pickerel, American Eel, Sunfish spp., etc.)
Crayfish
Warm-water Macro-invertebrates

These species will be our primary guides and tools for **measuring success**

Breeding History for Rare Birds at Huntley Meadows Park 1985 – 2000

(except for '09, none of these birds have bred in the central wetland since '99 – this project should bring them back)

	State Rank	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Pied-billed Grebe	S2	X	X	X	X	X	X	X	X								
American Bittern	S1					X	X		X						X		
Least Bittern	S3	X	X	X	X	X	X	X	X								
Yellow-Crowned Night Heron	S3	X	X	X	X	X	X	X	X	P				X			
King Rail	S2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Common Moorhen	S1			X													

Virginia Natural Heritage Program Ranking System

S1 – Critically imperiled

S2 – Imperiled

S3 – Rare

"Huntley Meadows Park is the Middle Atlantic Coast Region's ranking freshwater marsh."

American Bird Magazine, 1989, volume 43

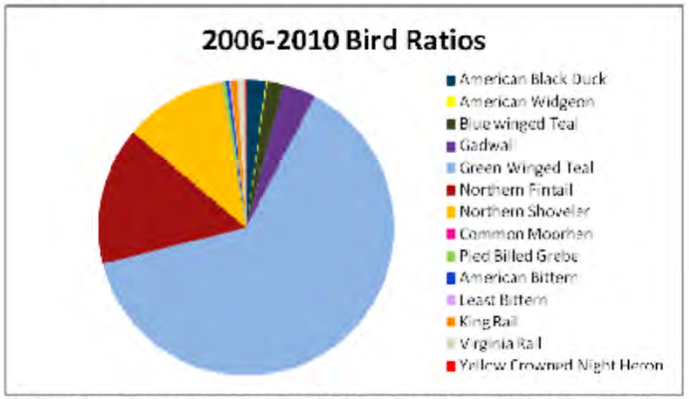
In-depth analysis have been done of the park's wetland bird species over several decades

Reporter	Marianne Mooney						
Date	7/27/2009						
Dates	27-Jul	28-Jul	29-Jul	30-Jul	31-Jul	1-Aug	2-Aug
	Mon	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat**	**Sun**
Water Level	.5?						
Target Species							
American Black Duck							
American Widgeon							
Blue winged Teal							
Gadwall							
Green Winged Teal							
Northern Pintail							
Northern Shoveler							
Common Moorhen							
Pied Billed Grebe							
American Bittern							
Least Bittern		1			1		
King Rail		5					4
Virginia Rail		7					
Yellow Crowned Night Heron							
Beaver							
Muskrat							
Otter							
Spotted Turtle							
Green Tree Frog							
Crayfish							

Weekly spreadsheets document **Target Species** sightings (since 2008)

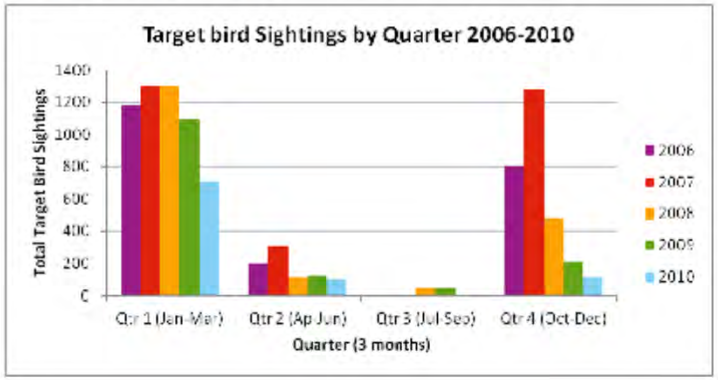
Between the years 2001 and 2006, a uniform pattern was matched for all of the years. The pattern continued to follow the inverse bell curve pattern that began in 1998, but continued to follow the specific pattern begun in 1999, with the low point for all years being in the 3rd quarter, and the high point in the 1st.

Years 2006-2010:



The chart shows the average total number of sightings for each target bird species within the total number of target bird species witnessed between 2006 and 2010.

Between 2006 and 2010, the ratio of Green Winged Teals increased even further. Northern Pintails continued to make up the second largest portion of the community. Northern Shovelers also make up a significant portion of the community.



Target Species Fact Sheets

Two to three pages of natural history info on each of our primary Target Species, including:

- Range/Maps
- Habitat Requirements
- Reproduction
- Diet
- Status and References

This info will help us manage habitat for these species.

Examples:

KING RAIL

Diet:

Crustaceans are the most important food source for King Rails, more specifically crayfish in freshwater wetlands and impoundments.
They will also eat fish, frogs, tadpoles, seeds of aquatic plants and aquatic insects. King Rails may also feed on land near water for crickets and grasshoppers.
During spring migration and nesting season in Missouri the three mot common food sources were fish, aquatic beetles and semi-aquatic beetles, these three prey items were also the most abundant (Meanley 1993)

Diets in domestic rice fields of Arkansas consisted of (% volume):

Animal	Spring	Summer	Fall	Winter
Crayfish	61%	22%	3%,	7%
Fish	1%	8%	26%	7%
Aquatic bugs/beetles	15%	30%	14%	21%

LEAST BITTERN

Reproduction:

Least Bittern nests are usually built in tall, dense stands of emergent or woody vegetation two to three feet high (*Typha*, *Carex* and *Scirpus* and occasionally *Phragmities*, *Sagittaria*, *Salix*, *Cephanlanthus* and *Rhizophora*). Nests are usually built 6 - 24 inches above water that is 3” – 38” deep.
Nests are usually within 30” of channels, open water or muskrat clearings in vegetation (Gibbs et. Al 1992). Nests are built in a flexible manner that allows nest to drop down to water level with weight of young and adults. Nests usually found 6 inches to 20 feet from open water (average = 8’).
Least bitterns may produce two broods per year in some areas. Rarely nests in button bush or willow.

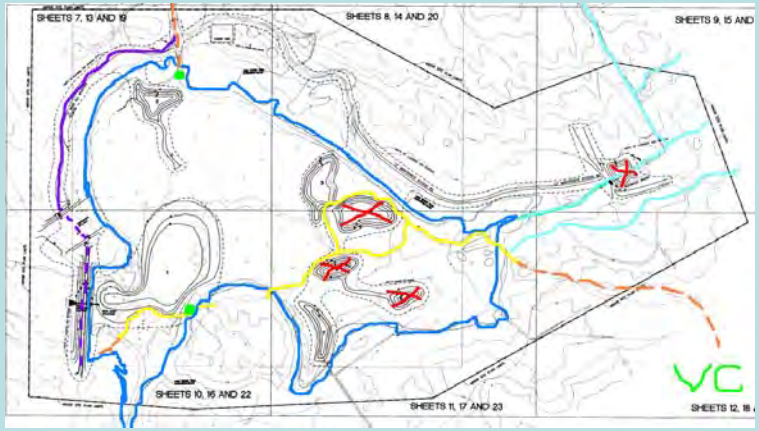
A healthy, in-tact network of marsh systems (which no longer exists in Northern VA) used to provide each stage of a beaver wetland at the same time on a local, regional level – plants and animals could then move to the marsh going through the cycle they require.

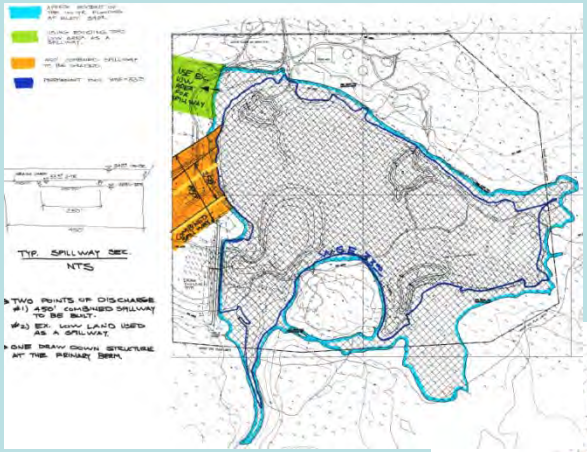
The large scale marsh systems of this area are gone – remnant components, like Huntley Meadows, are all that remain. We're left trying to squeeze the biodiversity of a whole system into one marsh.

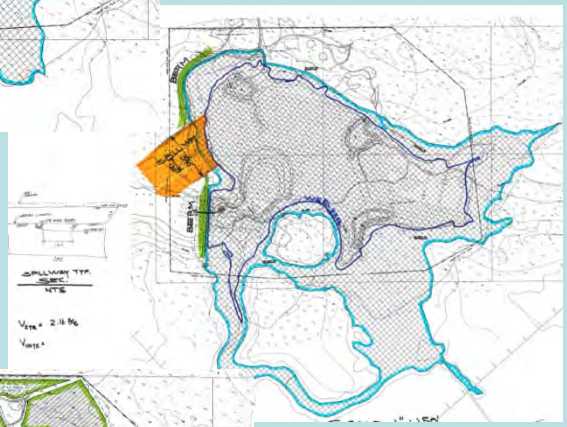
Summary:

Managing for a hemi-marsh provides the highest level and quality of biodiversity – it may be as close as we can come to "restoring" marsh systems from the past, and providing wetland plants and animals with the habitats they require on a local level.

Extensive pubic comment was given on the initial design concepts and that input has changed and guided the process and evolution of the design.

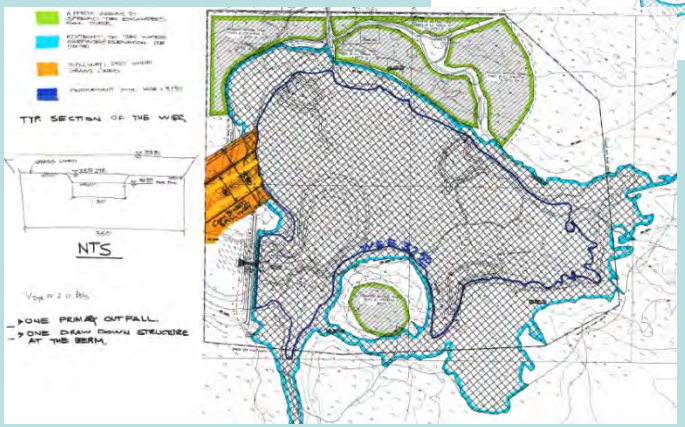




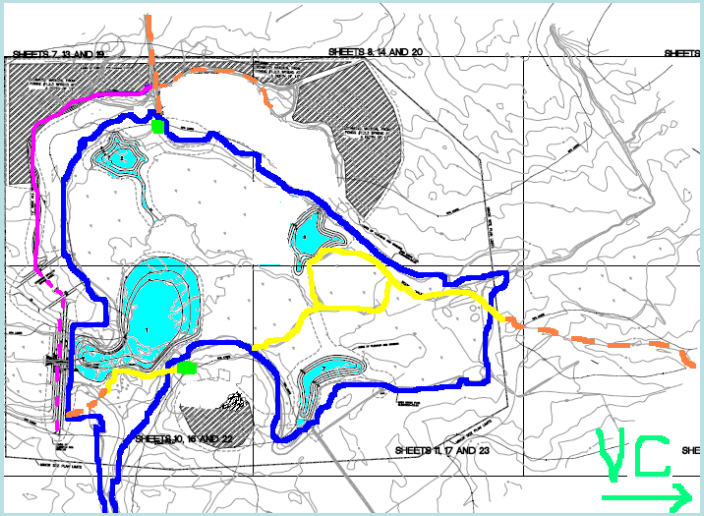


Wetland Restoration Design Drafts

We've gone thru many design stages and drafts since 2005 when the first design concepts were presented. In short, we're trying to find the best way to manage the wetland's water levels and provide a few deeper pools to provide refugia for aquatic life during droughts.



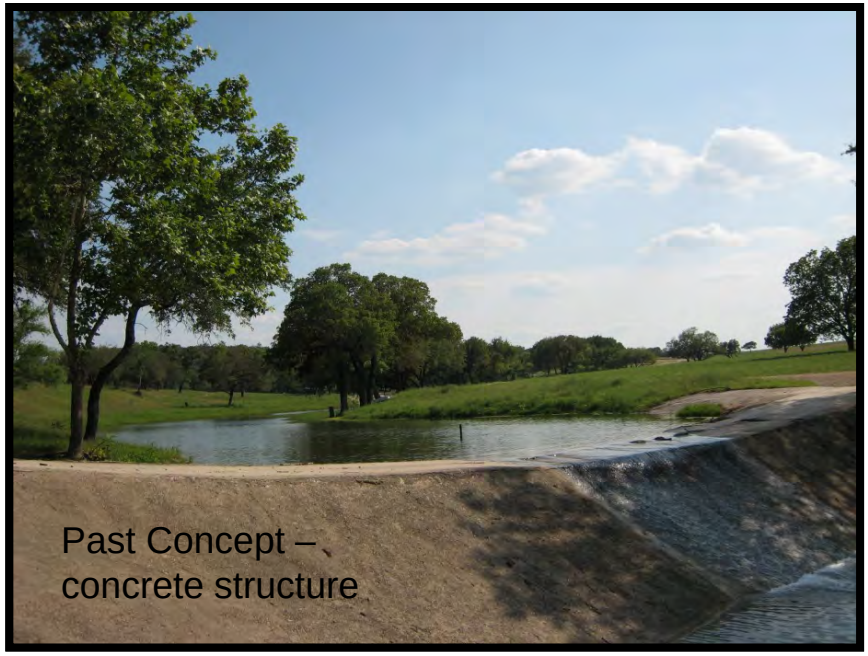
Each of these designs came close to achieving our goals, but had issues with permitting, budget or disturbance. The final design, created in collaboration with WSSI, combines our goals and is, we believe practical and achievable.



In order to hold and then manage the wetland's water levels, all of the designs have included a water control structure that would act as a dam. We explored both earthen structures and concrete structures and ran into pros and cons for each.

In short, earthen water control structures have associated issues that require them to be very large and involve a lot of site disturbance, while concrete structures, although smaller, are simply too expensive and have various logistical challenges.

Past design drafts explored concrete water control structures, or earthen water control structures.



Our final design includes a mixed material water control structure made of vinyl sheet piling and earth, and a water level device made of metal, concrete and pipes (see next slides).

Context Map

Documentation of Existing Conditions

WSSI performed numerous surveys of the project area:

- Wetland Delineation
- Endangered and Threatened Species Habitat Evaluation and Rare Species/Community Assessment
- Existing Vegetation Evaluation (Community Level)
- Geotechnical Borings
- Tree Survey
- Hydrologic Analysis
- 6-inch Contour Interval (C.I.) Topography Survey

Water Control Structure Design Alternatives

Different Systems were evaluated and explored during the concept stage:

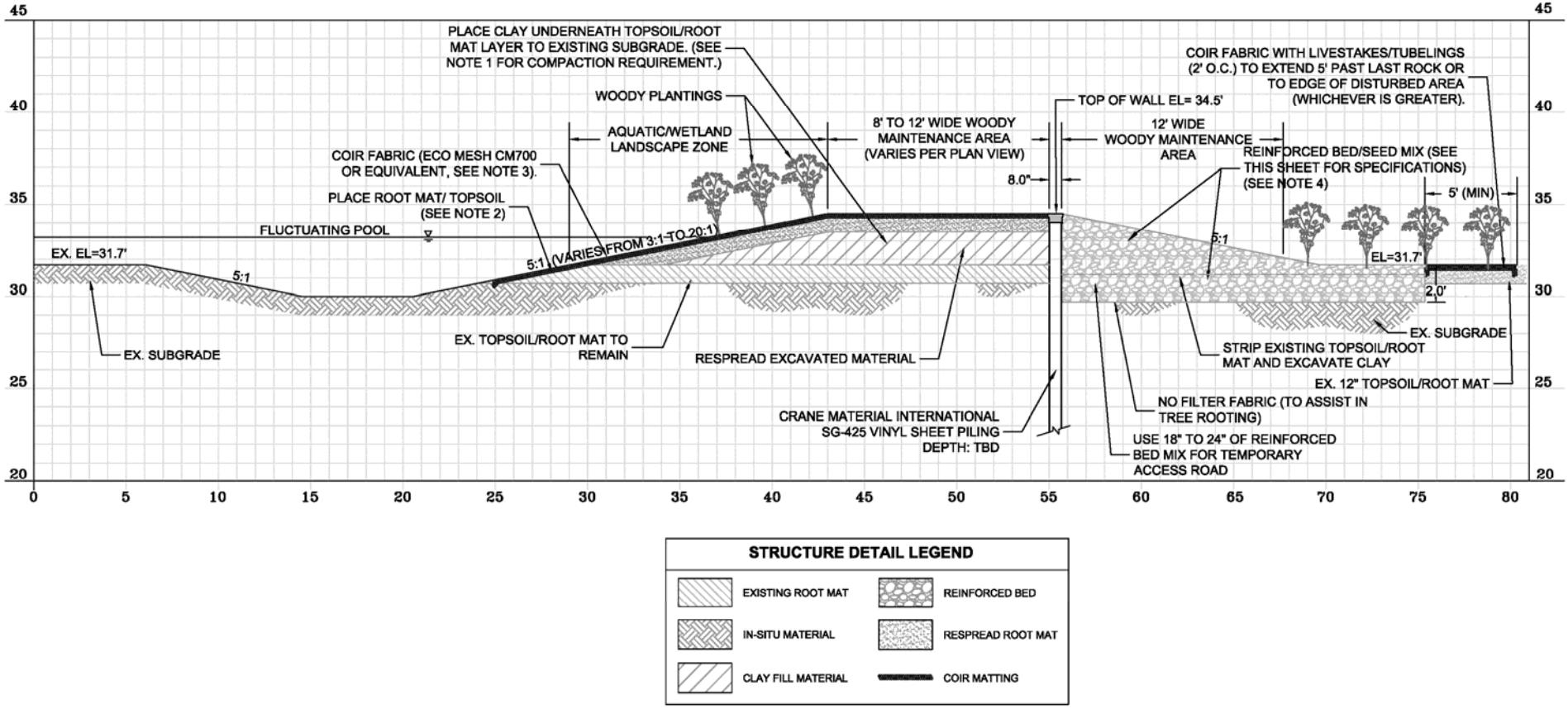
- To Raise Water Level:
  - Coarse woody debris dam
  - Concrete stem wall on sheet piles
  - Imbricated stone
  - Sheet pile
- To Manage Water Level:
  - Gate Valves
  - Stop Logs
  - Slide Gates
  - Uncontrolled
  - Combined/separate from water control structure

Many options have been explored over the years – they were looked at again, and additional ideas were explored. A **vinyl sheet pile** structure was chosen as the best option, with **slide gates** as the best method of water level management. These decisions were based on the feedback from over 40 public meetings, along with realizing the following four design goals:

- **Preserve and Promote Biodiversity**
- **Fit the Site**
- **Serve the Park's Visitors**
- **Be Practical, Affordable and Maintainable**

Water Control Structure

Vinyl Sheet Pile Design –
this design provides a stable, long-lasting, affordable structure that is visibly unobtrusive and meets our four design goals.



Water Control Structure Design

Selected Alternative:

Vinyl sheet pile embankment with reinforced bed mix

Vinyl Sheet Piling is used in water control structures by several National Wildlife Refuge (managed by the U.S. F and Wildlife Service). It' less expensive, longer-lasting, easier to install and less visually obtrusi than some other structu

Vinyl Sheet Pile

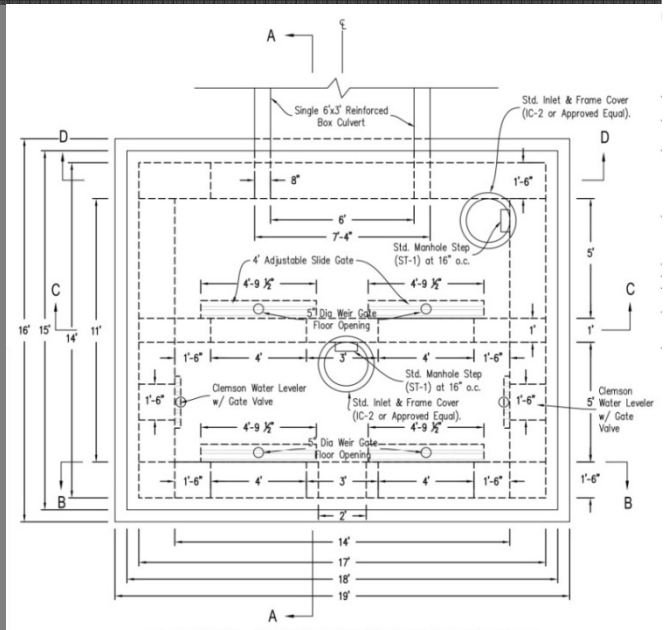
Our structure will be largely hidden
by earth, plants and a reinforced bed mix, but this photo from another site where one side is exposed shows you what vinyl sheet pile looks like.

Crane Materials International
http://www.cmisheetpiling.com

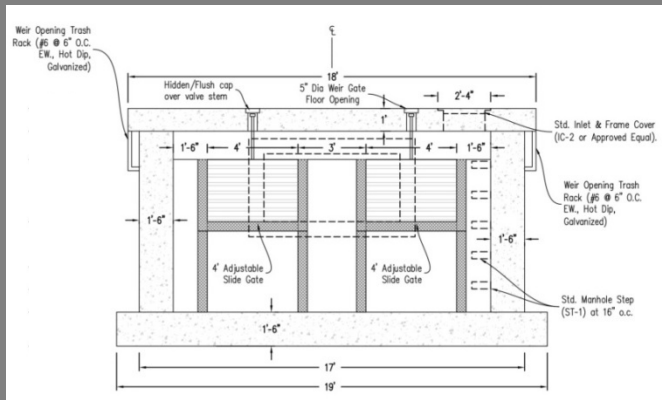
A combo of cranes and hand-work
place and vibrate the sheet pile into place – in our case, approx. 20 feet into the ground.

Water Control System (Side-flow Structure)

The **slide gate system** will be part of the side-flow structure and will be the mechanism we use to actually manage water levels. Ours will be hidden and secure.



PLAN VIEW - ADJUSTABLE SLIDE GATE OUTLET
SCALE: 1"=3'



SECTION C-C - ADJUSTABLE SLIDE GATE OUTLET

Our slide gate system will be **hidden** under a new wildlife observation platform, similar to the above photo. **Only park staff** will be able to access it.

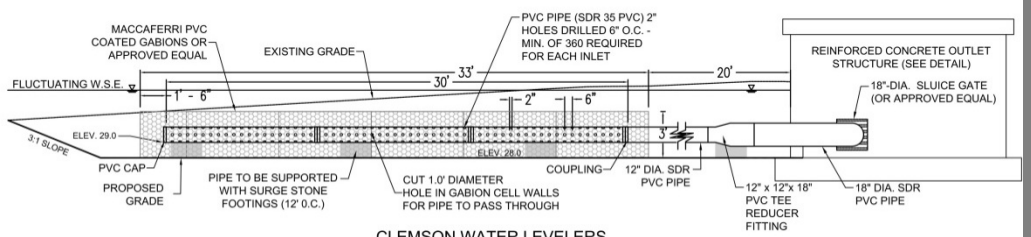
Water Control System (Side-flow Structure)

Water Control System (Side-flow Structure)

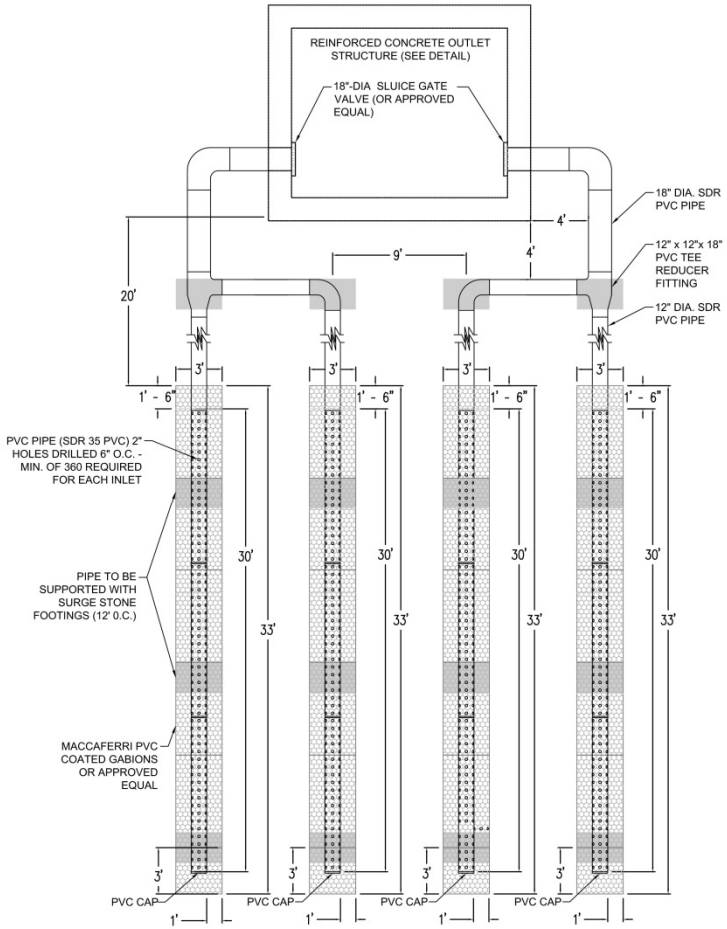
Water Control System (Side-flow Structure)

Clemson Water Leveler System (attached to the Slide Gate system)

- Low flow velocities to reduce sound of flowing water, minimizing beaver damming activities
- Minimum 10:1 orifice to pipe flow capacity
- Four 12” levelers will be used in the design to convey the 2 month storm runoff event of 26 cfs
- Minimum 6” between pipe and wire caging to help prevent debris blockage
- Large storm events may attract beaver activity, but water level will drop to desired weir level because of Clemson water levelers



CLEMSON WATER LEVELERS
PROFILE VIEW
(N.T.S.)



CLEMSON WATER LEVELERS
PLAN VIEW
(N.T.S.)

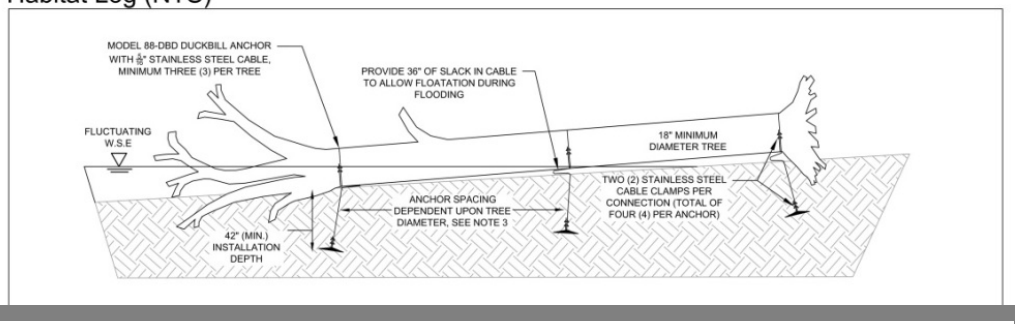
Habitat Enhancement and Pools

This project offers several opportunities for wildlife habitat improvements in the park.

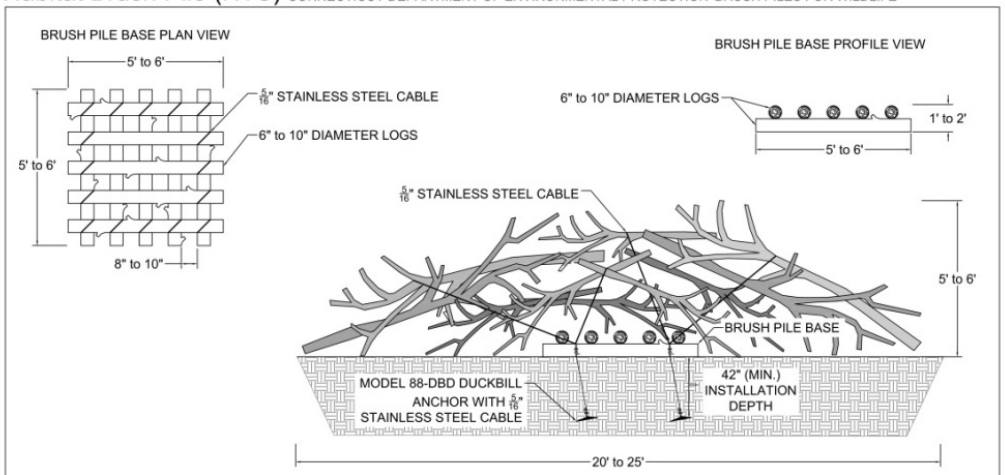
- Creation of habitat logs from select trees cleared during construction.
- Placement of partly submerged habitat brush piles made up of brush cleared during construction.

These logs and brush shelters will provide **important habitat** for reptiles, amphibians, birds, insects, aquatic mammals, fish and crayfish.

Habitat Log (NTS)



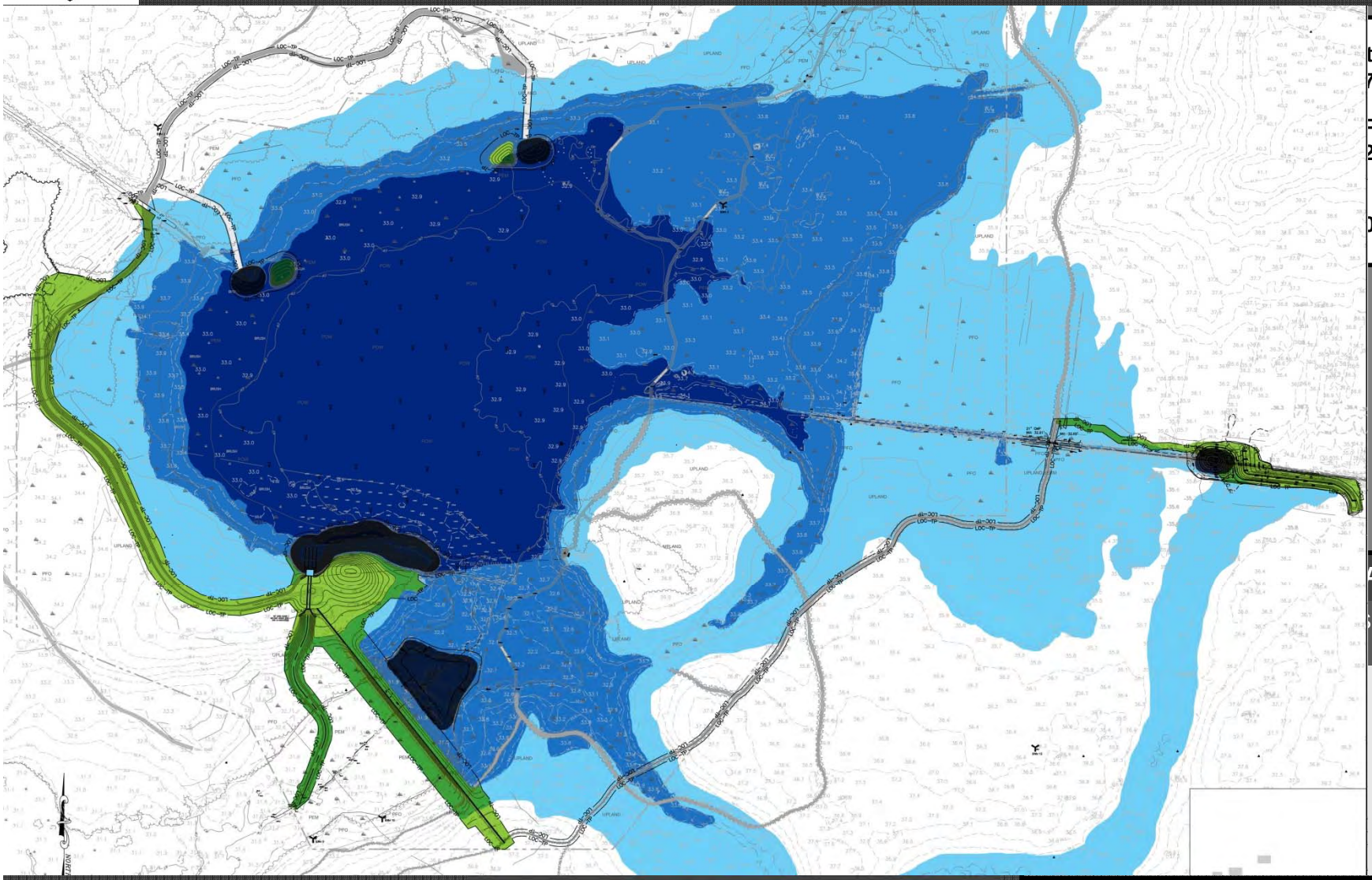
Habitat Brush Pile (NTS) CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION 'BRUSH PILES FOR WILDLIFE'



HABITAT BRUSH PILE NOTES:

1. HABITAT BRUSH PILES ARE TO BE PLACED ON SITE PER HABITAT ENHANCEMENT PLACEMENT PLAN.
2. INSTALL DUCKBILL ANCHORS TO A MINIMUM DEPTH OF 42".
3. ADJUSTMENTS TO ANCHOR SIZE AND SPACING MAY BE MADE, SUBJECT TO THE DISCRETION OF THE ENGINEER OF RECORD.

Overall Site View



torm Area
77

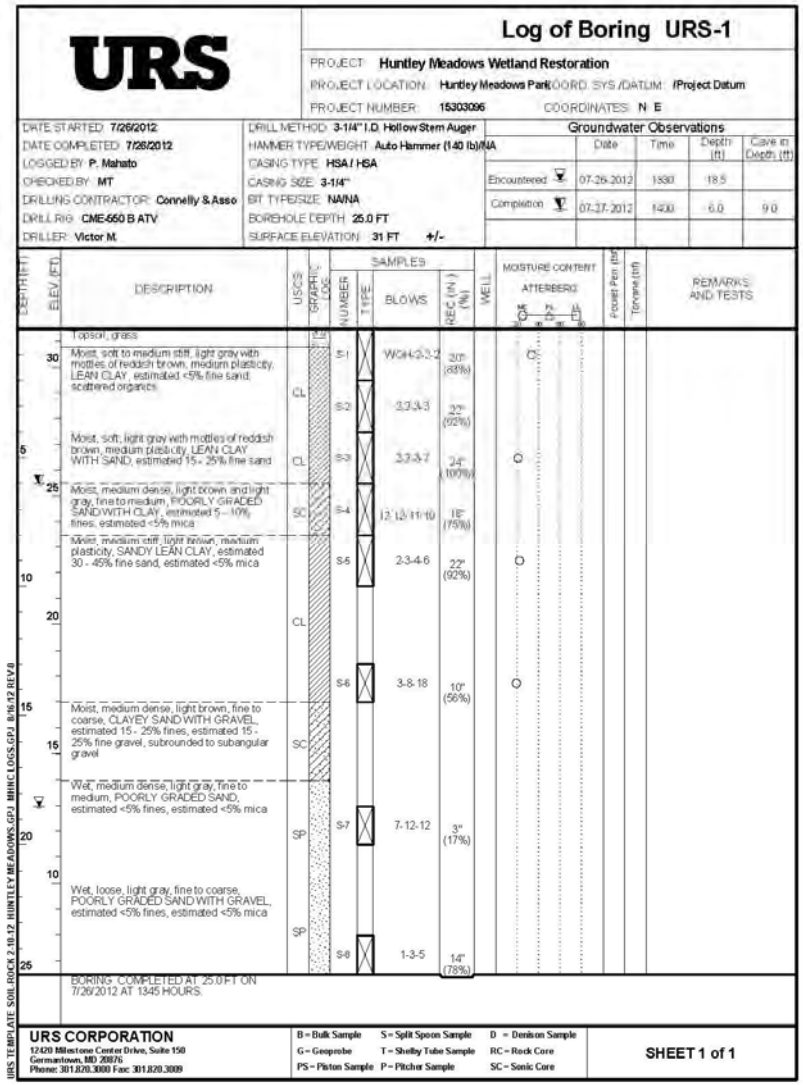
Pool Area
25

Pool Area
00

AL POOL
PERCENT
70%
28%
2%
100%

Geotechnical Information

- Borings taken at several locations on site to augment previous studies and determine feasibility of design proposal
- Main concern was depth of clay layer so habitat pools do not drain the marsh – all pool excavation is taking place well above the clay layer
- The data also helps ensure the stability of water control system design



URS

Log of Boring URS-1

PROJECT: Huntley Meadows Wetland Restoration
PROJECT LOCATION: Huntley Meadows Park COORD. SYS./DATUM: /Project Datum
PROJECT NUMBER: 15303096 COORDINATES: N: E

DATE STARTED: 7/26/2012
DATE COMPLETED: 7/26/2012
LOGGED BY: P. Mahato
CHECKED BY: MT
DRILLING CONTRACTOR: Connelly & Asso
DRILL RIG: CME-550 B ATV
DRILLER: Victor M.

DRILL METHOD: 3-1/4" I.D. Hollow Stem Auger
HAMMER TYPE/WEIGHT: Auto Hammer (140 lb)/NA
CASING TYPE: HSA / HSA
CASING SIZE: 3-1/4"
BIT TYPE/SIZE: NA/NA
BOREHOLE DEPTH: 25.0 FT
SURFACE ELEVATION: 31 FT +/-

Groundwater Observations	Date	Time	Depth (ft)	Cave in Depth (ft)
Encountered	07-26-2012	1330	18.5	
Completion	07-27-2012	1400	6.0	9.0

DEPTH (FT)	ELEV. (FT)	DESCRIPTION	USCS	GRAPHIC LOG	SAMPLE NUMBER	TYPE	BLOWS	REC. (IN.) (%)	WELL	MOISTURE CONTENT / ATTERBERG	Pocket Pen. (tsf)	Torvane (tsf)	REMARKS AND TESTS
		Topsoil, grass											
	30	Moist, soft to medium stiff, light gray with mottles of reddish brown, medium plasticity, LEAN CLAY, estimated <5% fine sand, scattered organics	CL		S-1		WOH-2-3-2	20" (83%)		O			
					S-2		3-3-3-3	22" (92%)					
5		Moist, soft, light gray with mottles of reddish brown, medium plasticity, LEAN CLAY WITH SAND, estimated 15 - 25% fine sand	CL		S-3		3-3-3-7	24" (100%)		O			
	25	Moist, medium dense, light brown and light gray, fine to medium, POORLY GRADED SAND WITH CLAY, estimated 5 - 10% fines, estimated <5% mica	SC		S-4		12-12-11-10	18" (75%)					
10		Moist, medium stiff, light brown, medium plasticity, SANDY LEAN CLAY, estimated 30 - 45% fine sand, estimated <5% mica	CL		S-5		2-3-4-6	22" (92%)		O			
	20				S-6		3-8-18	10" (56%)		O			
15		Moist, medium dense, light brown, fine to coarse, CLAYEY SAND WITH GRAVEL, estimated 15 - 25% fines, estimated 15 - 25% fine gravel, subrounded to subangular gravel	SC										
	15	Wet, medium dense, light gray, fine to medium, POORLY GRADED SAND, estimated <5% fines, estimated <5% mica	SP		S-7		7-12-12	3" (17%)					
20	10	Wet, loose, light gray, fine to coarse, POORLY GRADED SAND WITH GRAVEL, estimated <5% fines, estimated <5% mica	SP		S-8		1-3-5	14" (78%)					
	25	BORING COMPLETED AT 25.0 FT ON 7/26/2012 AT 1345 HOURS.											

URS TEMPLATE SOIL ROCK 2-10-12 HUNTLEY MEADOWS.GPJ MHHC LOGS.GPJ 8/16/12 REV 0

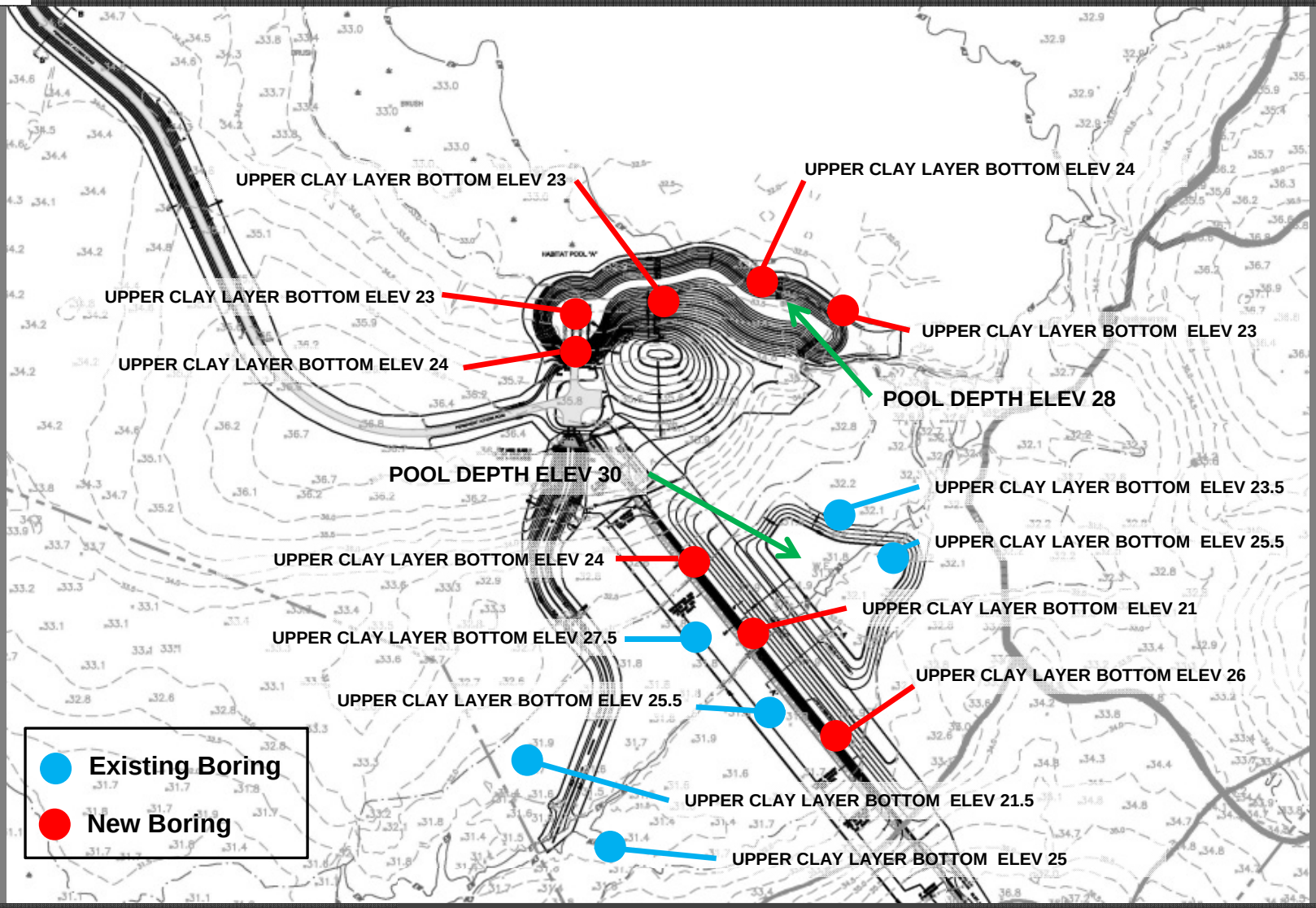
URS CORPORATION
12420 Milestone Center Drive, Suite 150
Germantown, MD 20876
Phone: 301.820.3000 Fax: 301.820.3009

B = Bulk Sample; S = Split Spoon Sample; D = Denison Sample; G = Geoprobe; T = Shelby Tube Sample; RC = Rock Core; PS = Piston Sample; P = Pitcher Sample; SC = Sonic Core

SHEET 1 of 1

Page from URS Boring Log

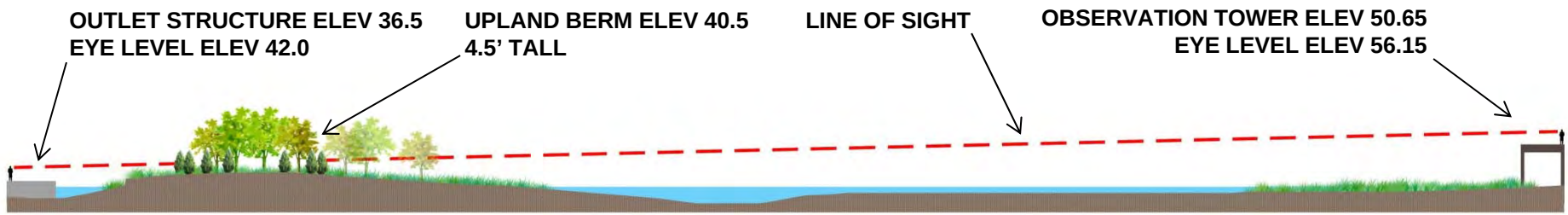
Geotechnical Information



Line of Sight Study

Special care was taken to preserve the view from the current observation tower by creating a vegetated upland berm that screens the view between the existing tower and new platform. By doing so, people looking out over the wetland from the observation tower will not be able to see people standing on the new outlet structure/observation platform.

- Combination of native evergreens and deciduous vegetation to ensure natural year-round screening
- Graded to blend into natural environment (varies from 20:1 to 10:1)
- Offers a variety of habitats ranging from emergent wetland to upland forest
- Minimum tree height of 4' needed to block the line of sight



Habitat and Planting Areas

- Prior to construction, Huntley Meadows Park staff will implement plant and seed salvation activities in the areas of the wetland that will be disturbed by the project.

- Following construction, the plants that are salvaged will be replaced and the seeds that are salvaged will be dispersed throughout all disturbed areas.

- Any additional planting/seeding that is needed will be locally native species, and sourced from the most local/regional nurseries, beginning with Earth Sangha.

- All plants and seeds selected will have been previously recorded within Huntley Meadows Park or the Dogue Creek watershed (no introduction of new species).

- All planted and seeded areas will be periodically inspected to ensure establishment.

- Invasive species monitored and managed to reduce invasive species establishment.

Benefits of Chosen Design

- Smaller footprint of water control structure then some previous designs.

- Provides ability to manage normal pool elevation from elevation of 32.0 feet to 34.25 feet.

- Eliminates emergency spillway clearing and the associated disturbance footprint.

- Cost estimate comes in on budget.

- Exempt from Virginia Department of Conservation and Recreation Dam Regulations.

- Approvable by Fairfax County Department of Public Works and Environmental Services, U.S. Army Corps of Engineers, and Virginia Department of Environmental Quality.

Management Plan

A Management Plan is being developed and will be based on the following guiding principles:

- Management regime should be as low maintenance, natural, site-specific/appropriate, sustainable and long-term as possible.

- Encourage native species and discourage exotic species by water level management, planting, mowing, controlled burns, invasive removal, and maintenance of protected trees/shrubs.

- Encourage floral and faunal biodiversity by providing a diversity of habitats, while also providing specific habitat needs for imperiled and keystone target species.

- Water levels should fluctuate and vary, both seasonally and yearly by controlling and manipulating water levels and keeping water management devices free of debris.

- Beavers will not be trapped, removed, relocated or euthanized. They are an integral and valued part of the wetland's diversity, productivity and long-term success.

- Provide both visible wildlife observation areas for park visitors, and more secluded, sheltered areas for reclusive wildlife species.

Huntley Meadows – Wetland Restoration - Next Steps and Project Schedule:

1. **Public Outreach**: Continuous and Ongoing Public Outreach since 1992
a) 20 Public Meetings
b) 42 Monthly Park Manager Walk and Talks (monthly thru at least 2014)
c) Many individual meetings with park patrons (please contact park w/ questions)
d) Provide quarterly updates for Friends groups

2. **Permitting Design and Hiring Construction Contractors:**
a) December, 2012 - June, 2013

3. **Construction Time-line:**
a) Staging/Prep – March-June, 2013
b) In-wetland work – July-Dec, 2013 (final punch-list tasks may go into March, '14)

4. **Monitoring:** Before/After Data
a) Continue to collect data from water levels, target species, crayfish survey, vegetation survey, rain gauge and water quality
b) Merge data to find relationships, causality, trends and project development
c) Develop before-and-after information

5. **Volunteer Opportunities:** Current and Ongoing
a) Monitoring
b) Plant Saves and Installations
c) Public Outreach and Education/Programs
d) Project Input

Construction Sequence

Construction activities will be monitored by Park Authority staff on a regular basis. In addition, construction will be monitored by WSSI staff via field observation an average of 4 to 6 hours per week followed by written reports to the Park Authority within three days of field observations.

In order to reduce disturbance to the park's wetland wildlife, **most of the in-wetland work will be performed in the summer and fall** when wildlife breeding cycles have either ended or slowed down.

Spring/Early Summer

- Erosion and Sediment (E&S) Controls around perimeter.
- Temporary wood, deck-mat access road.
- Construct water level control system - aka side-flow control.

Summer/Fall

- Install aqua-dam around habitat pool "A" and create pool and stockpile soil.
- Open the water level control system.
- Install aqua-dam around the vinyl sheet pile embankment and pump dry.
- Construct vinyl sheet pile embankment and then habitat pool "D".
- Cross over to install ditch "plug".
- Remove aqua-dam.
- Build berm access road and sight line berm.
- Construct habitat pools "B" and "C".

Fall/Winter

- Replant/reseed in dormant season.
- Raise water levels.
- Punch-list items