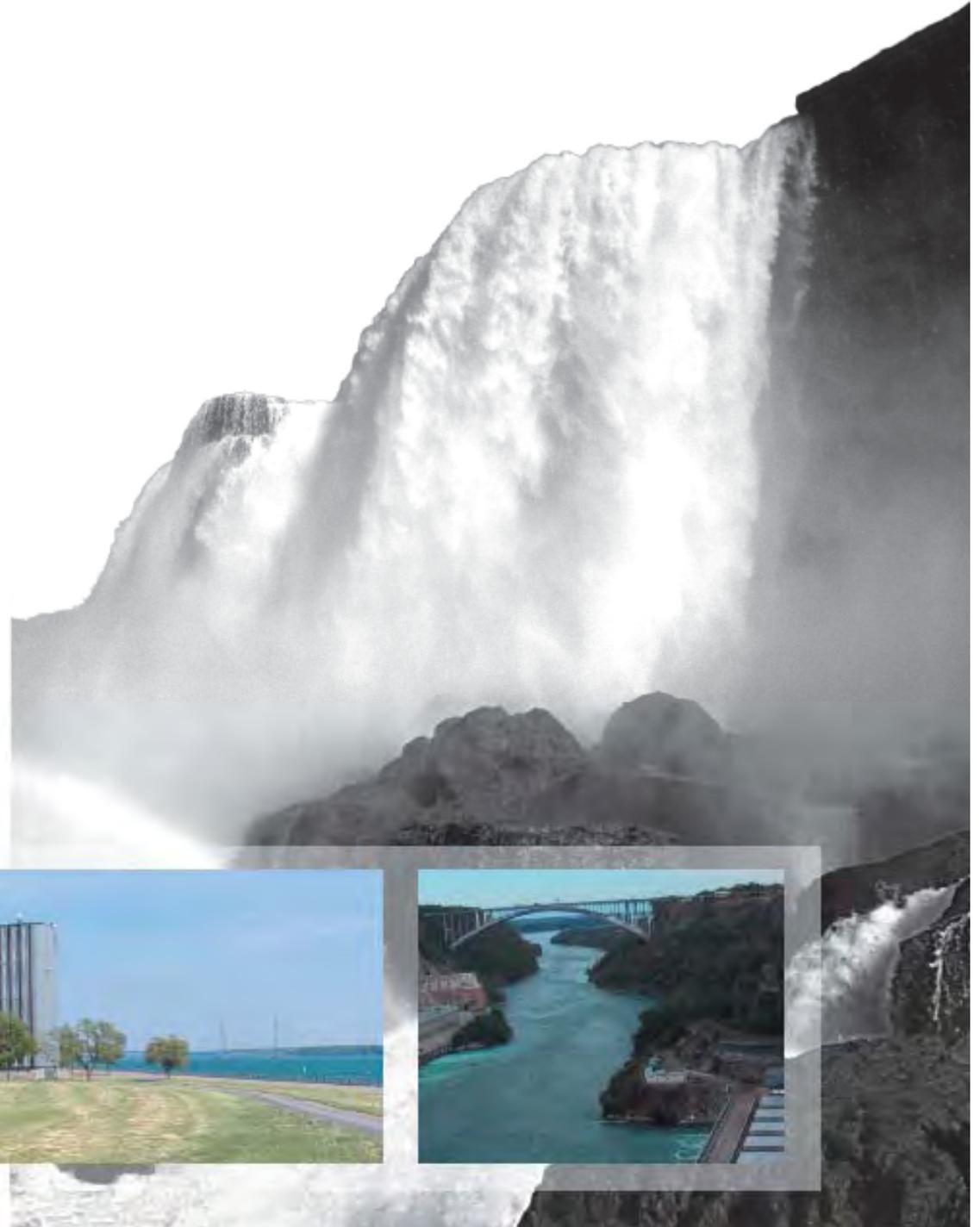


NIAGARA POWER PROJECT



RELICENSING IMPLEMENTATION

Ecological Standing Committee Meeting



November 19, 2009

Agenda

- **Review Action Items for July 21, 2009 ESC meeting**
- **Habitat Improvement Project Progress**
 - **Motor Island**
 - **Common Tern Nesting**
 - **Frog Island Wetland Creation**
 - **Little Beaver Island Wetland Restoration**
 - **Invasive Species Control**
 - **Osprey Nesting**
 - **Fish Attraction**
 - **Name-a-HIP Challenge**
- **HIP Cost Updates**
- **Meeting Wrap Up / Action Items**

July 21, 2009 Action Items

- **NYPA will post the July 21, 2009 ESC meeting presentation on the NYPA Relicensing Website**
- **NYPA will post the Little Beaver Island Preliminary Design Drawings**
- **NYPA will distribute the Invasive Species Action Plan for ESC review**

Motor Island (2009)

- Collected data on key design constraints
 - Wetland delineation
 - Subsurface soil conditions in areas of excavation
 - Cultural Resources survey
- Continued Preliminary (50%) Design of softer shoreline embayments to provide habitat and prevent erosion

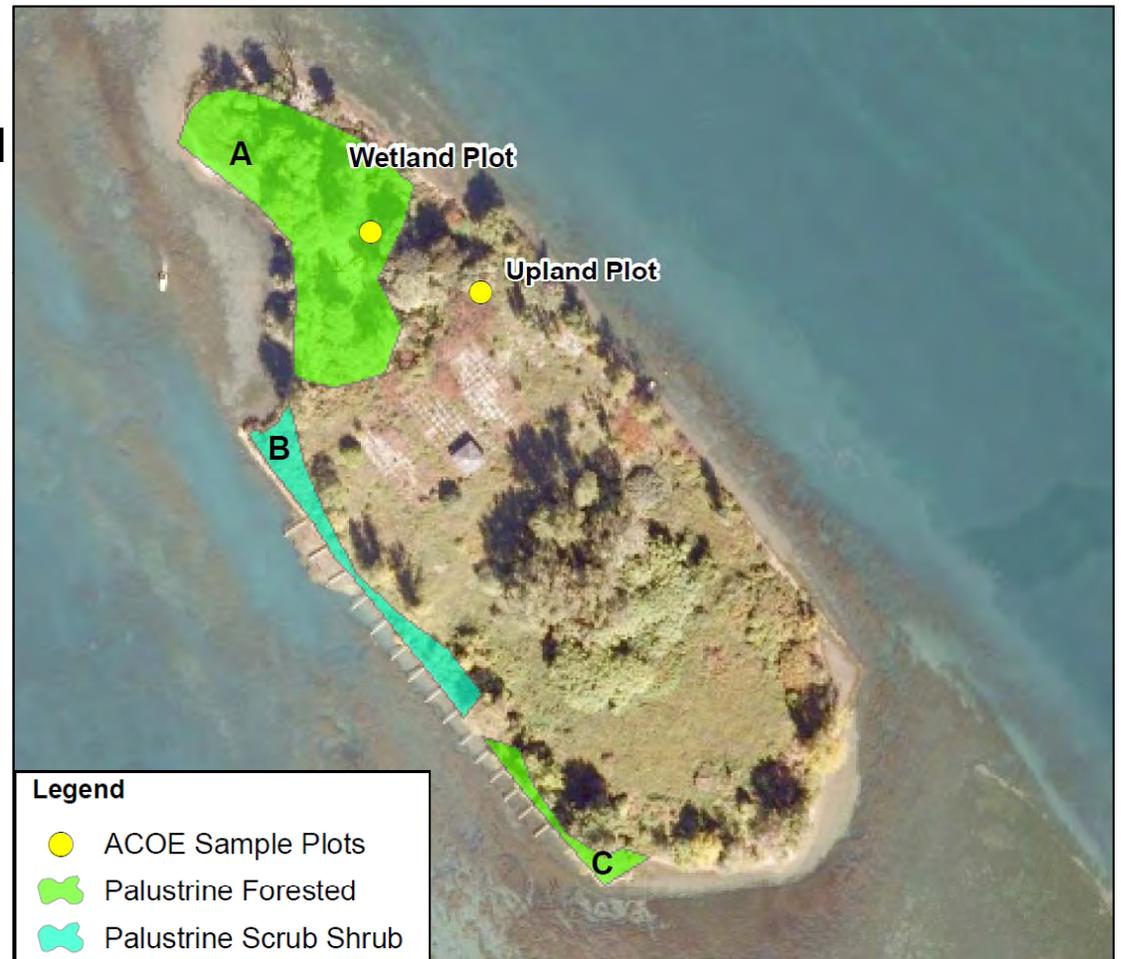


Motor Island (2009)

Wetland delineation survey – August

Preliminary Results:

- A = Mostly forested wetland with shoreline emergent wetland
- B & C = Shoreline scrub-shrub wetland
- Wetlands B and C are not functionally connected or significant
- Wetland A will be avoided in the proposed design



Motor Island (2009)

Geotechnical/environmental soil borings – Sept. 30 & Oct. 1

- Six locations 10 to 11.5 below ground surface
 - Gravelly sand underlain by finer grained sand and silt; some clay in one location
- Lab results – levels below DEC's unrestricted use soil criteria



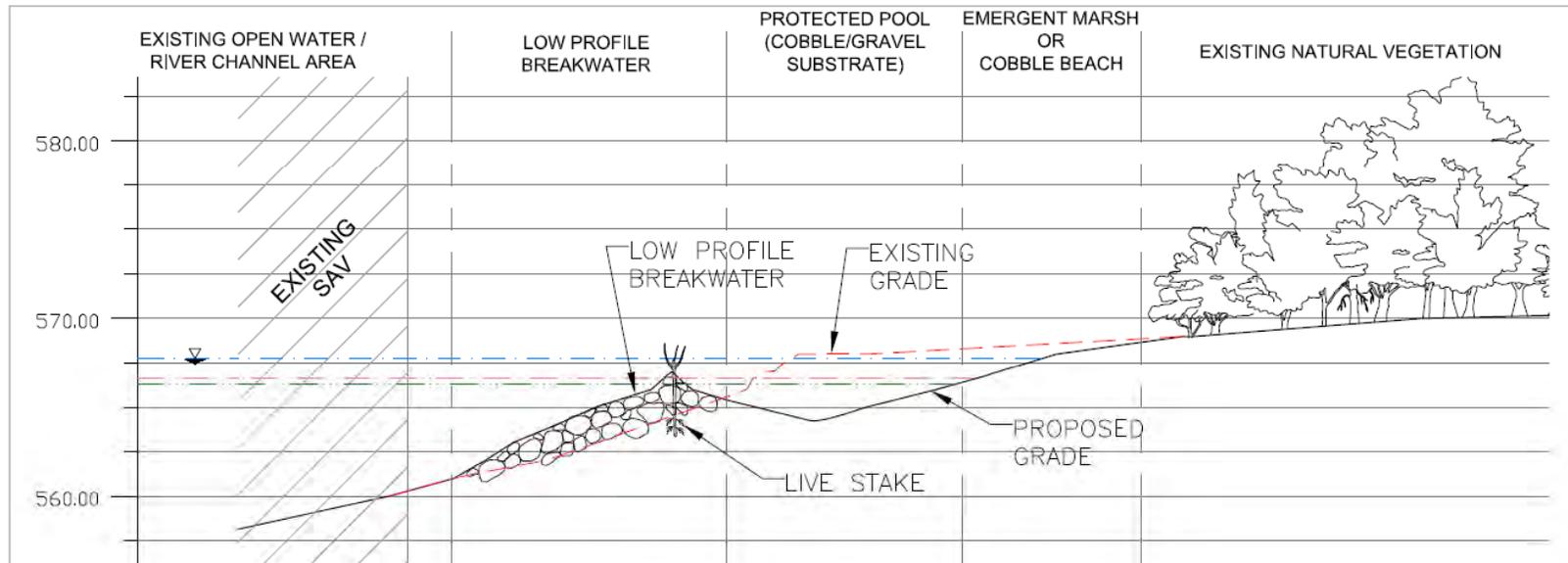
Motor Island (2009)

Cultural Resources Survey – October

- Test pits around perimeter of island in potential areas of excavation for shoreline protection structures
- Preliminary results so far
 - No archaeological findings of significance

Update designs based on key constraints

Integrate data from wetlands, soils, and cultural resource findings



Motor Island (2010)

- Complete Preliminary (50%) Design, incorporating data on wetlands, soils, and cultural resource findings as key design constraints
- Work with Agencies to Permit project
- Plan for construction in late summer 2011

Common Tern HIP (2009)

- Completed Old Breakwater End Cell and Temporary Nesting Barge installations in April
- Monitored during 2009 breeding season
- Evaluated results, updated ESC in July
- Sought USACE approval for additional enhancements
- Completed design for 3 more “end cell” type enhancements
- Permitting underway
- Evaluated end cell condition in fall



2009 Results: Barge versus End Cell



- Similar in cost for design, engineering, permitting, monitoring
- Barge required several trips for maintenance; end cell none
- Approximately equal number of tern nests/square foot
- Productivity (10 days) higher on End Cell (2.3 vs. 2.0 chicks/nest)
- Installation cost/chick for barge eight times greater than end cell

Buffalo Harbor Tern Nesting Habitat and Weather 2009

- Purpose of HIP: provide “reasonably sustainable” long term nesting habitat
- May – July
 - Six major weather events
 - 22 days with wind gusts over 30 mph
 - 4 days over 40 mph
 - 1 day over 50 mph
- Nesting habitat and nests on End Cell and barge survived without damage
- Barge mooring lines and gravel containment structure on barge suffered some damage

Storms Continued in Fall 2009



- Late September
 - 2 days with gusts over 30 mph
 - 1 day with gusts over 60 mph!
- October
 - 7 days with gusts over 30 mph
 - 2 days with gusts over 40 mph
 - 1 day with gusts over 50 mph

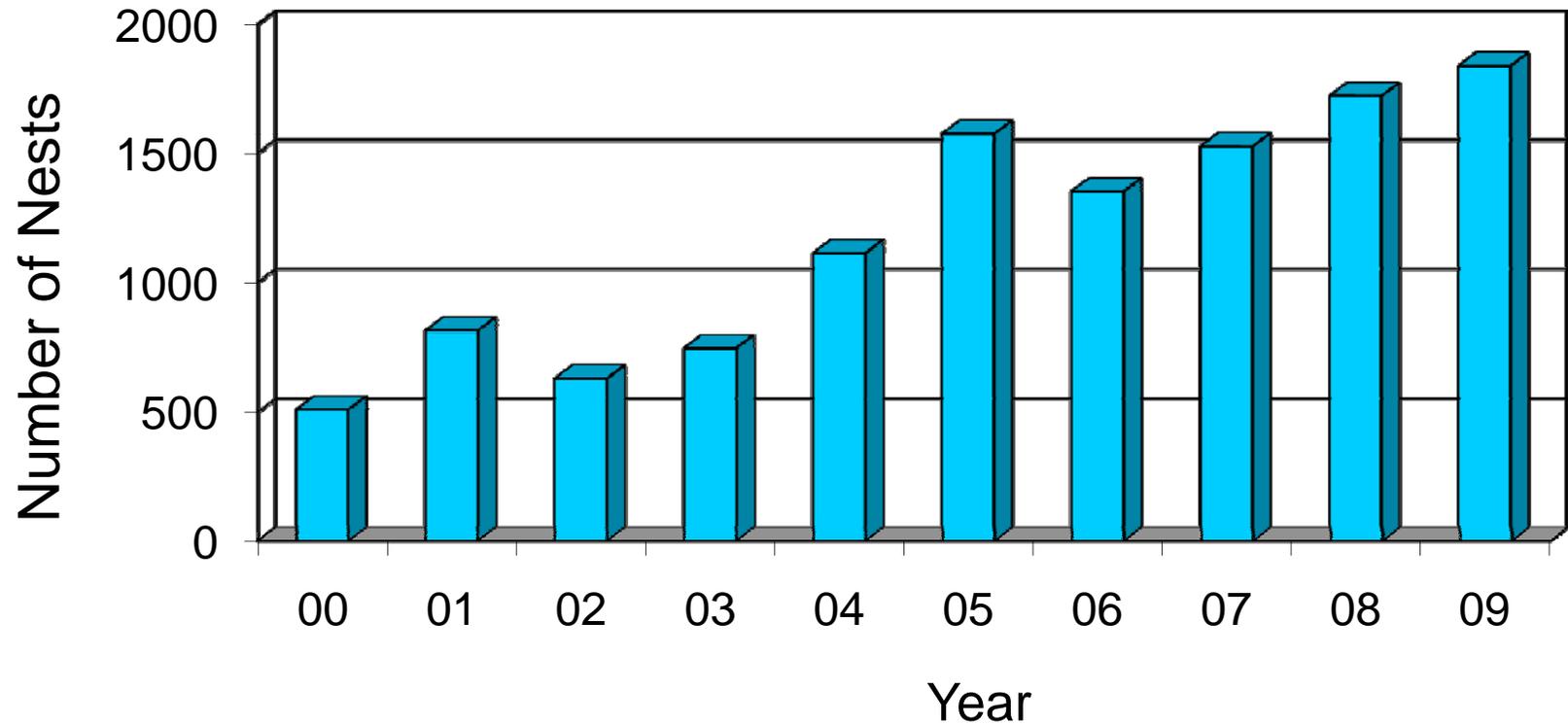
Condition of end cell gravel assessed on October 29, 2009 (barge was removed at the end of August)

Condition of End Cell - October 29, 2009



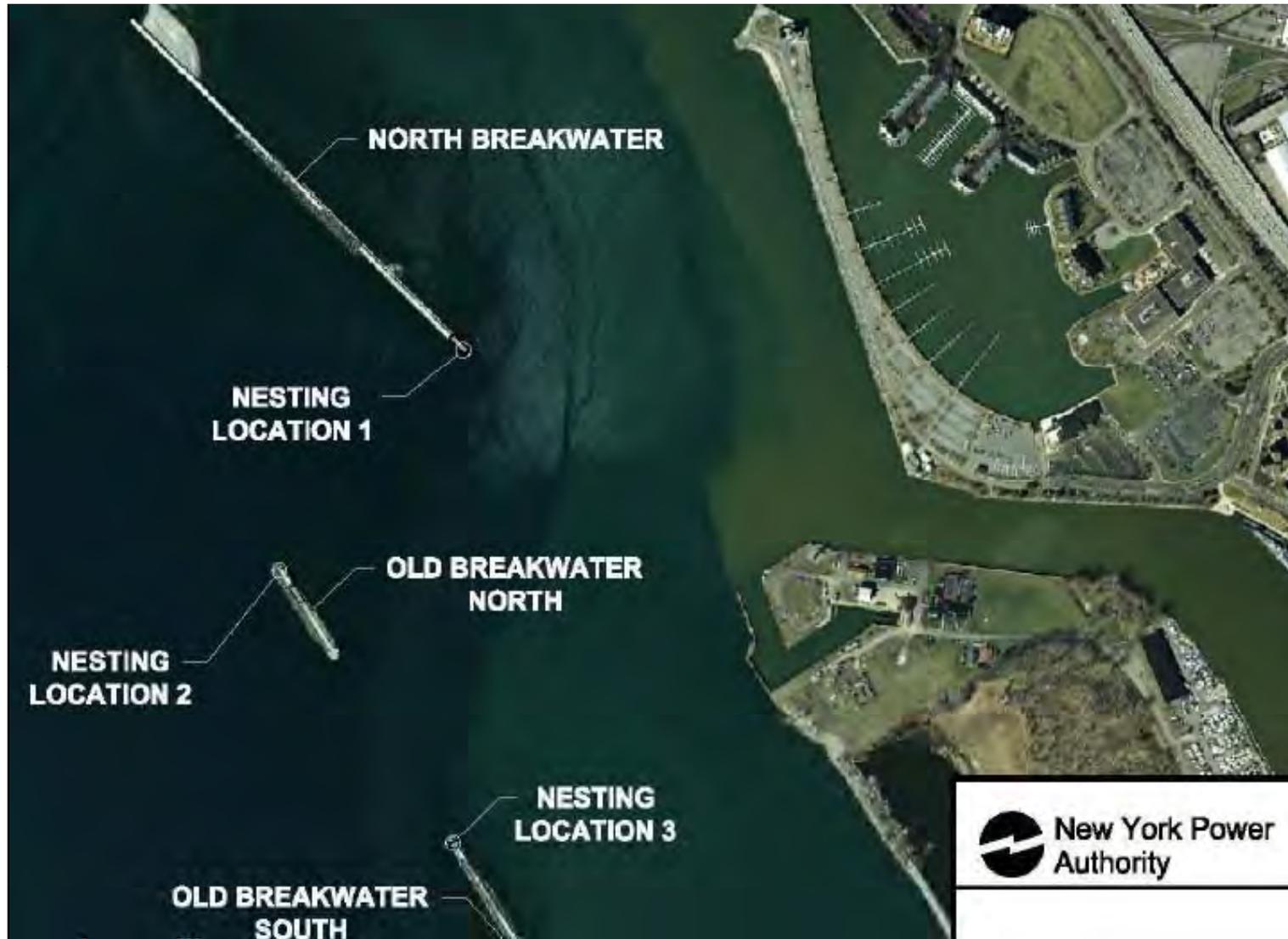
- Overall condition excellent
- Some minor shifting of gravel after storms
- Holes will be plugged in April 2010 to prevent gravel loss

Number of Tern Nests Niagara Frontier, 2000 -2009



Data provided by NYSDEC

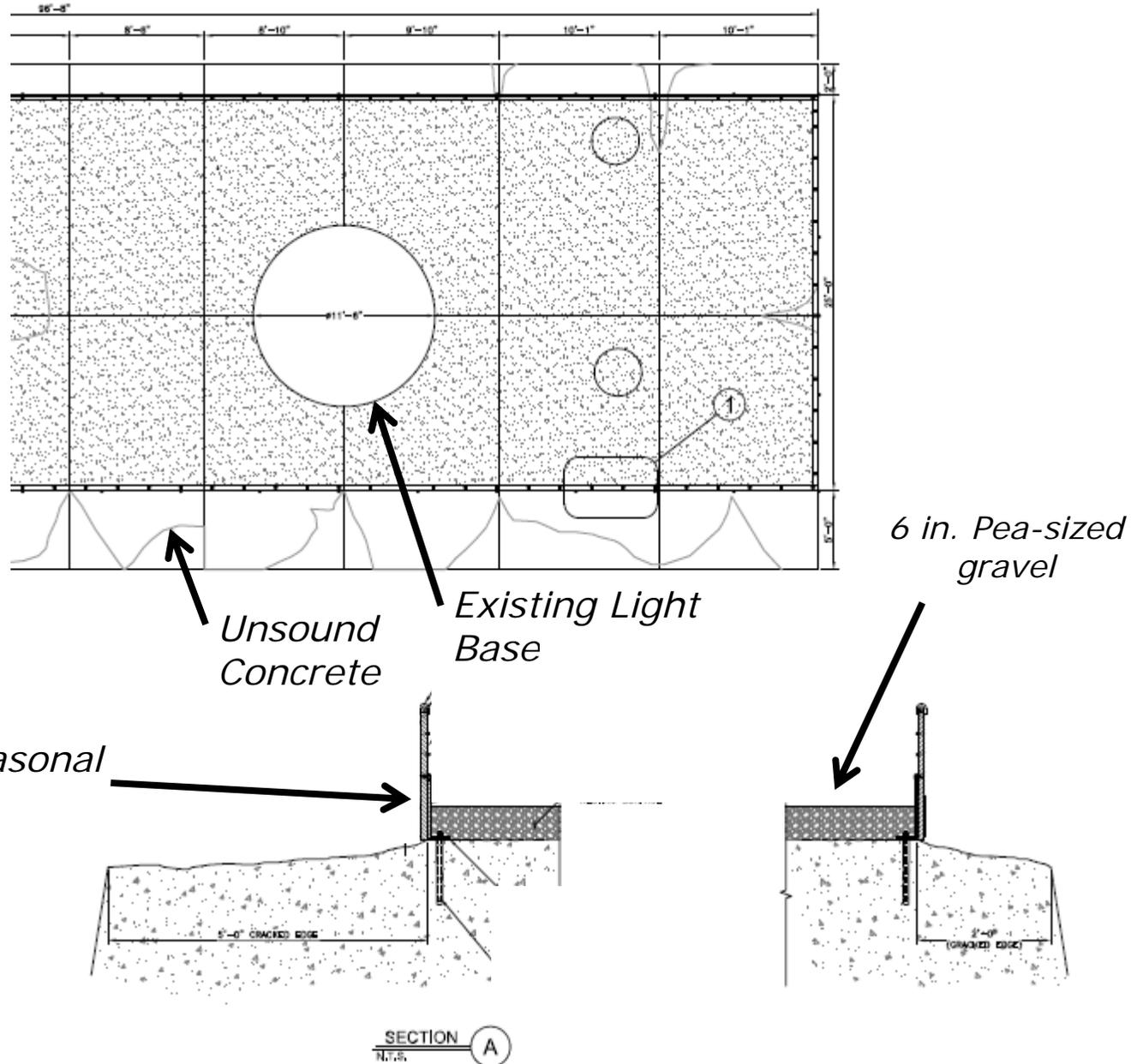
Common Tern Nesting (2010)



Common Tern Nesting (2010)

Typical Installation

- Based on 2009 installation design



Common Tern Nesting HIP



Permanent habitat provided

| Location | Area (sq ft) | Installation |
|--|--------------|--------------|
| Old Breakwater North – southern end cell | 2,100 | April 2009 |
| North Breakwater – southern end | 2,300 | Spring 2010 |
| Old Breakwater North – northern end | 1,300 | Spring 2010 |
| Old Breakwater South –double end cell | 3,100 | Spring 2010 |
| Total area improved | 8,800 | |



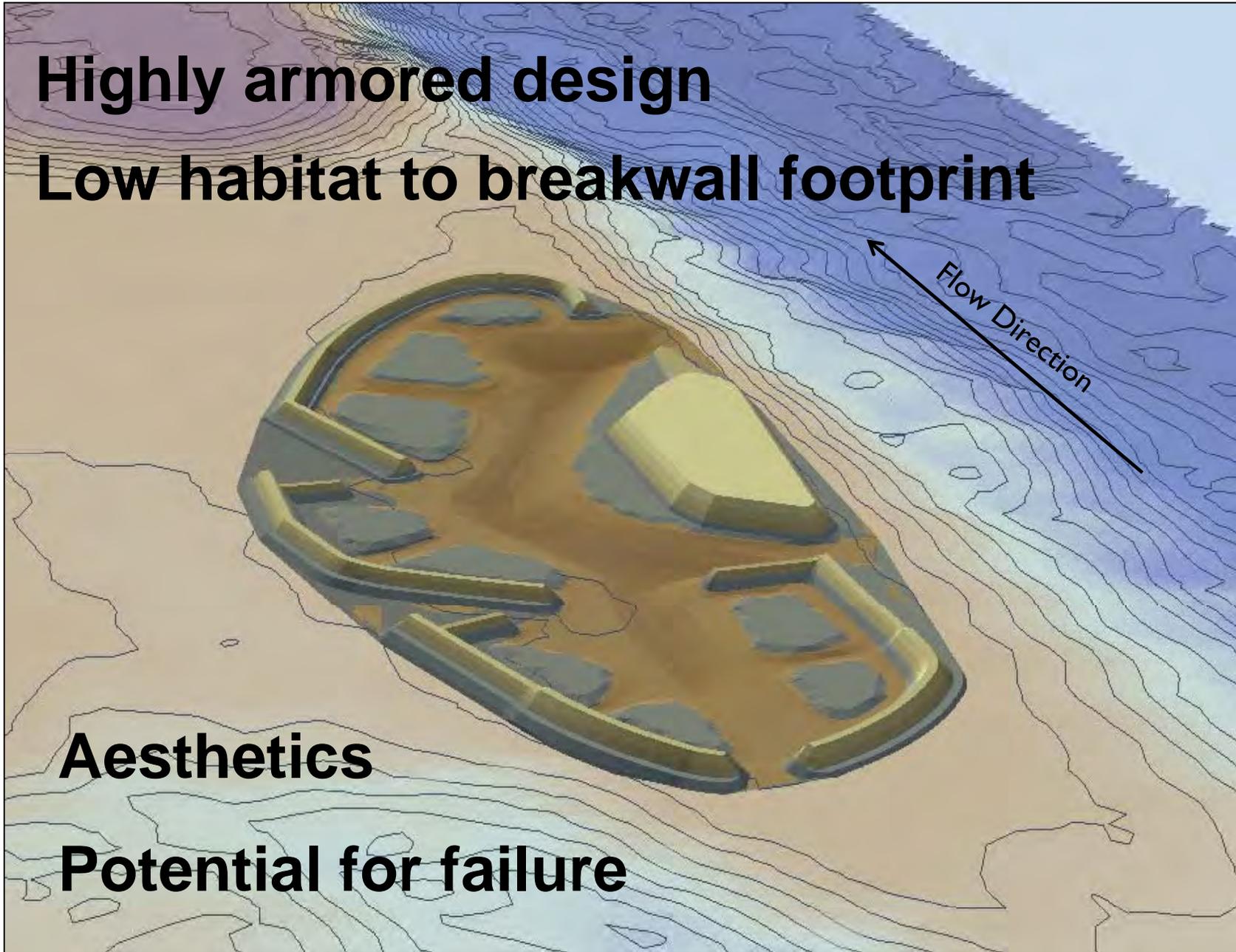
Common Tern Nesting HIP (2010)

- Finalize permits for additional breakwater enhancements
 - North Breakwater
 - Old [Short] Breakwater
 - South Breakwater
- Release RFP for construction
- Build enhancements in 2010, weather and ice conditions permitting



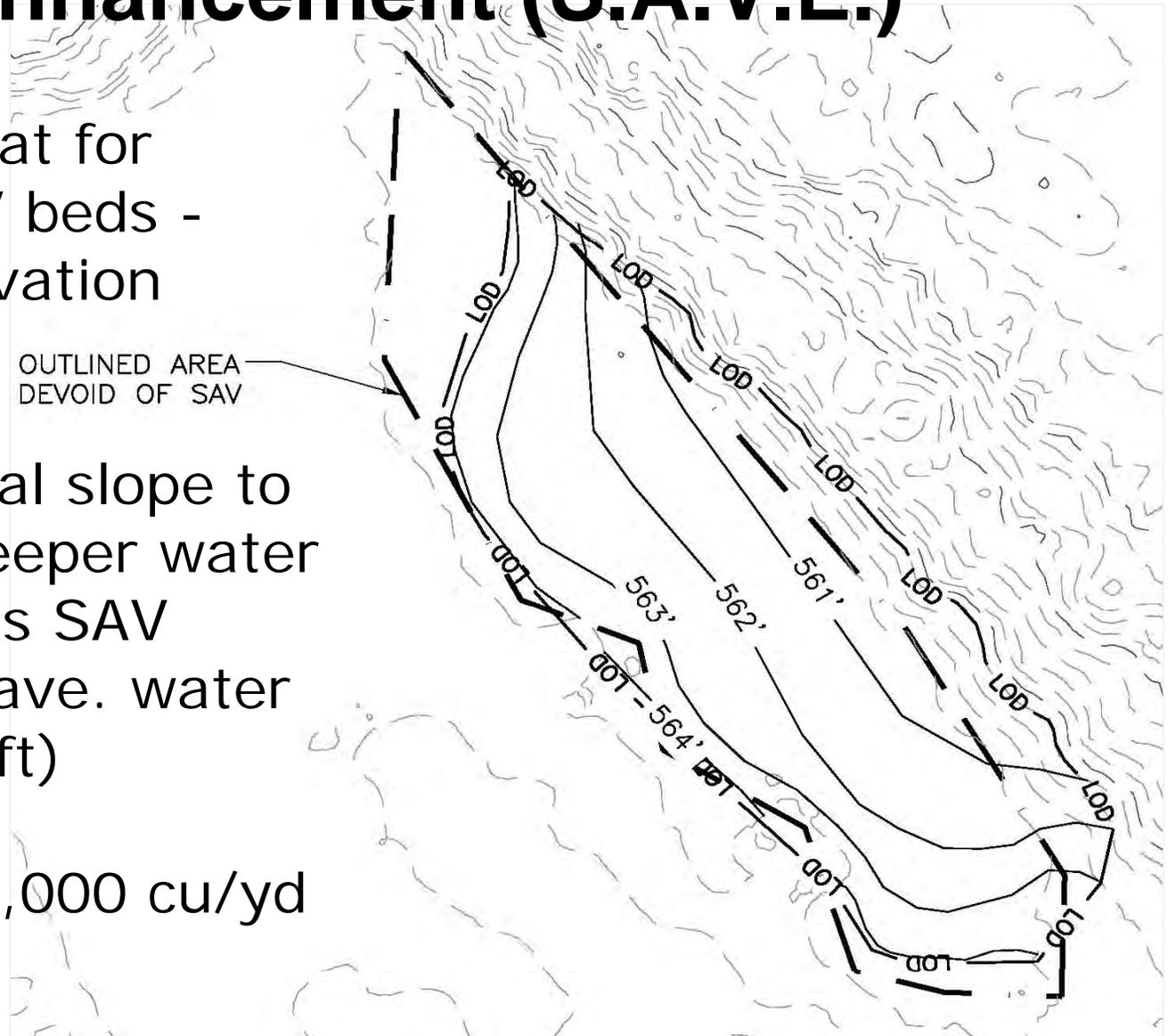
Frog Island – HIP (2009)

- Developing a Preliminary Design
 - Identified and defined a number of design challenges
 - Ice, wind driven waves, combined with a seiche – lots of energy
- Highly armored design
 - Low habitat to breakwall footprint ratio – lots of stone, up to 3 ft out of the water

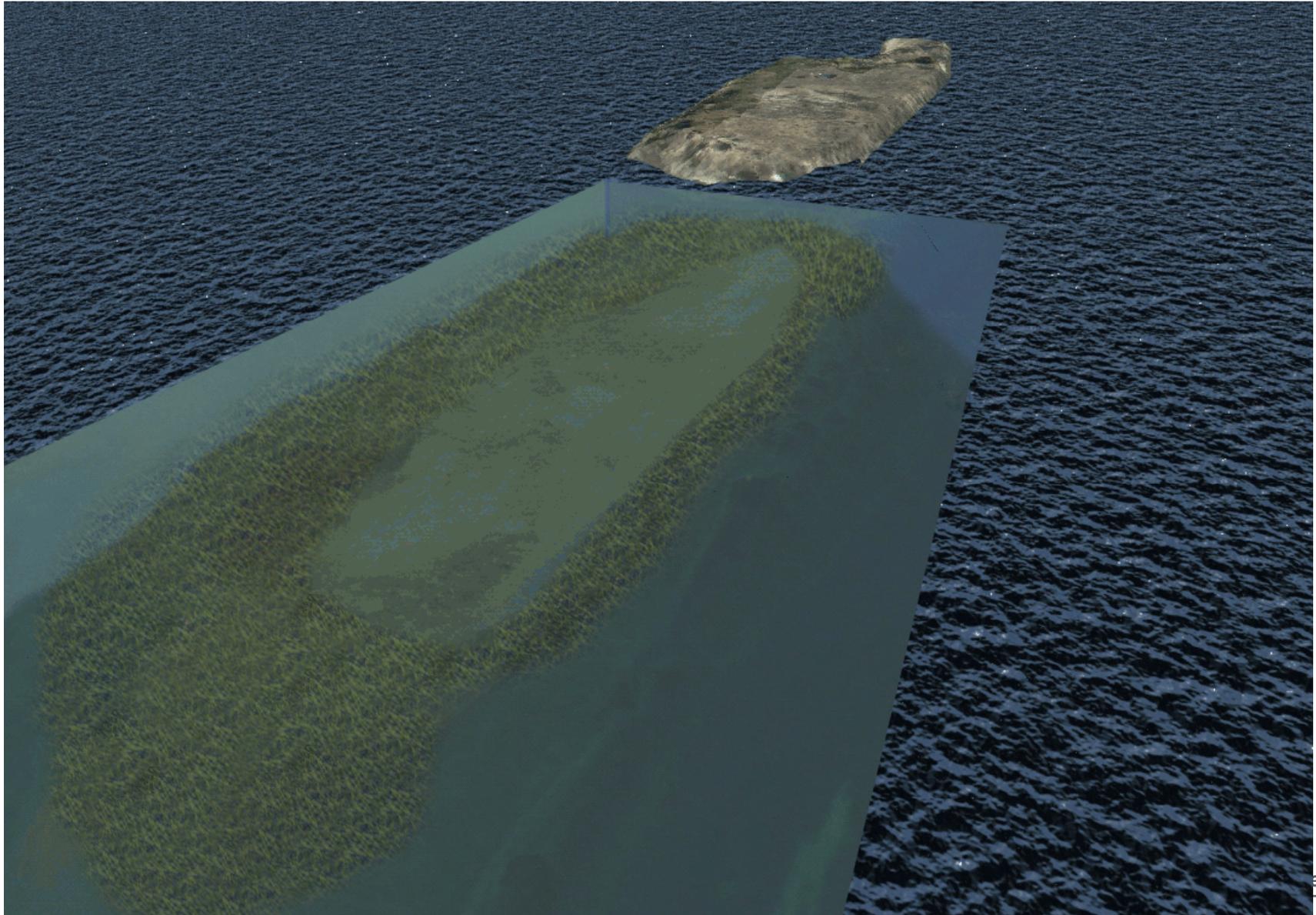


SAV Enhancement (S.A.V.E.)

- Expand habitat for adjacent SAV beds - shallow excavation (about 2 ft)
- Create gradual slope to connect to deeper water for contiguous SAV beds (attain ave. water depth of 3.5 ft)
- Excavate ~ 13,000 cu/yd



SAV Enhancement (S.A.V.E.)



November 19, 2009

Meeting

Frog Island – HIP (2009)

Input/direction received during July ESC meeting:

- Compile historic information on Motor, Frog, Strawberry, Little Beaver Island/wetland complex
- Revisit design based on low-profile “crescent” concept and higher tolerances for change/natural disturbance cycles
- Minimize impacts to ecologically sensitive area
- Develop “Design Compendium” summarizing history, design analysis, and design criteria

Frog Island - 1822

Strawberry
Island
"complex"
was 100+
acres



Frog Island - 1870

Average water year

1823 to 1825 –
excavation of
Tonawanda
section of Erie
Canal

Spoils dumped
at Strawberry
Is Complex

Small islands /
wetland area
identified
between
Strawberry and
Motor Is

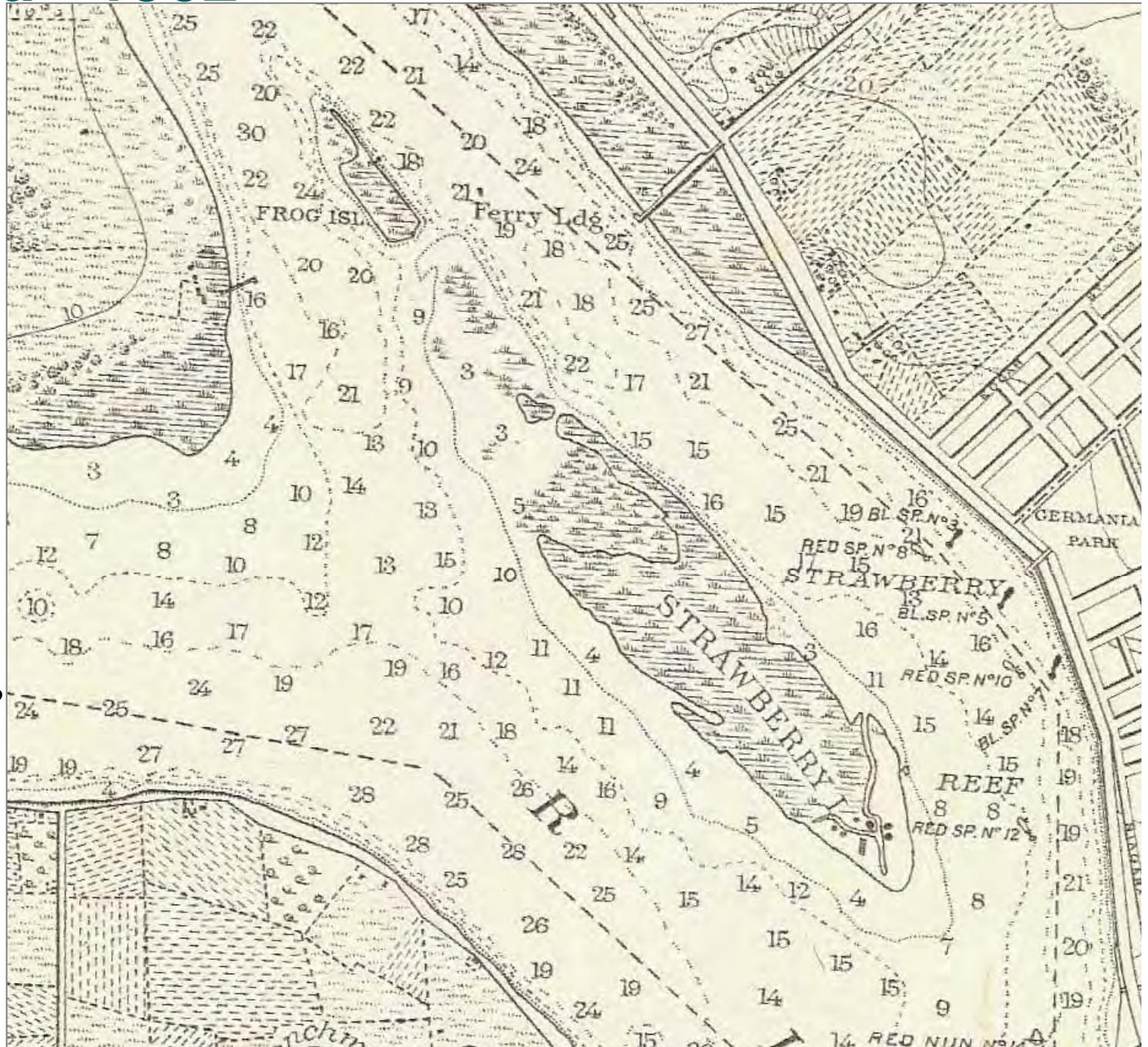


Frog Island - 1902

Below average water year

First evidence of unique shape on downstream end of Strawberry Is

Dredge spoil dumping from the east channel or was is removal ????

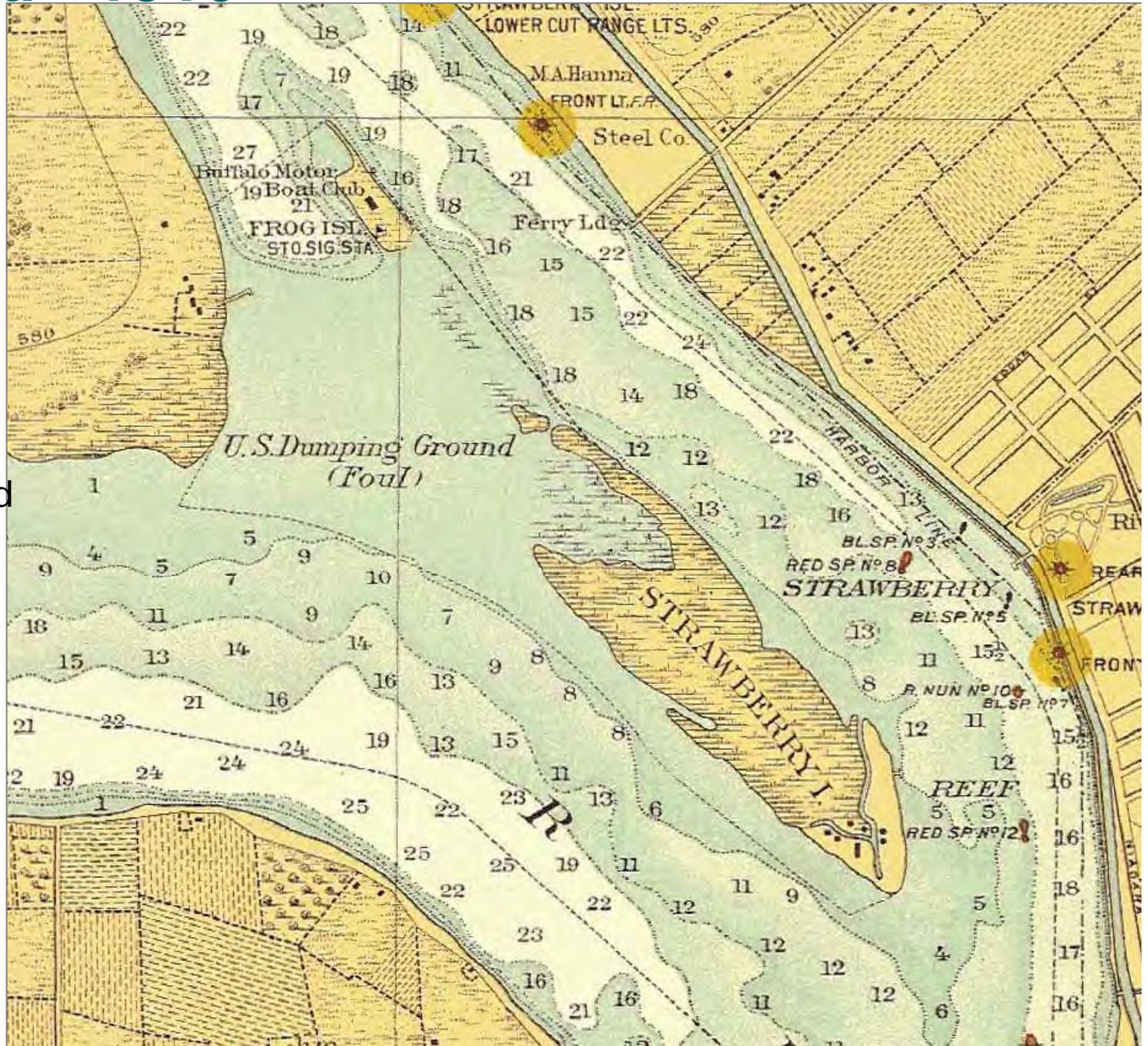


Frog Island - 1910

Below average water year

Doubled to 200 acres since 1820 from dredge spoils from Erie Canal and Black Rock Lock

Strawberry Island had a two-story hotel, and a small canal was constructed through the island for fishing

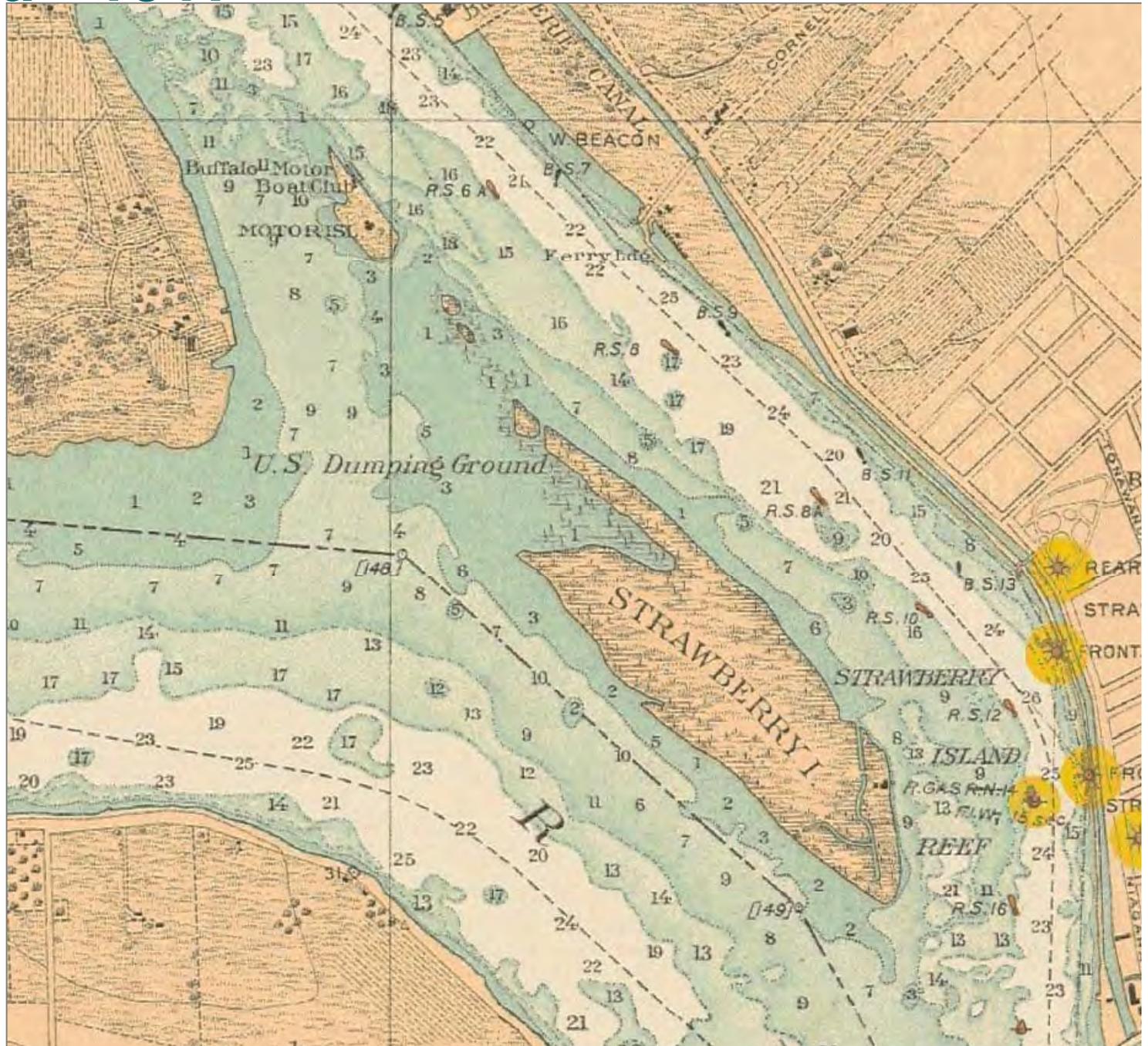


Frog Island - 1917

Average water year

7 years later –
similar shape
and size

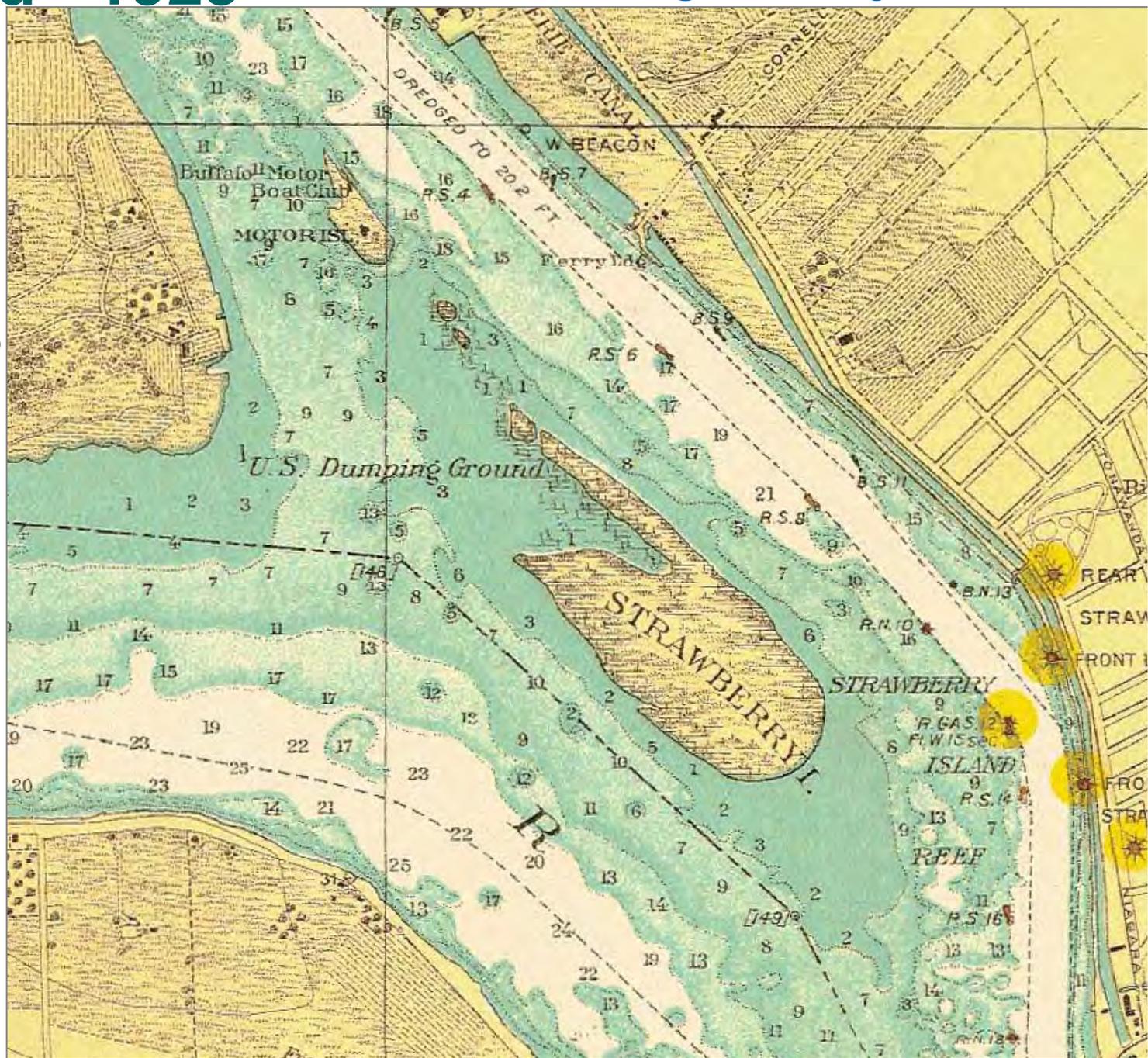
First evidence
that Frog
Island is
renamed
“Motor Is”



Frog Island - 1923

Below average water year

6 years after 1917, upper tip of Strawberry seems to be missing



Frog Island - 1927

Below average water year

First aerial

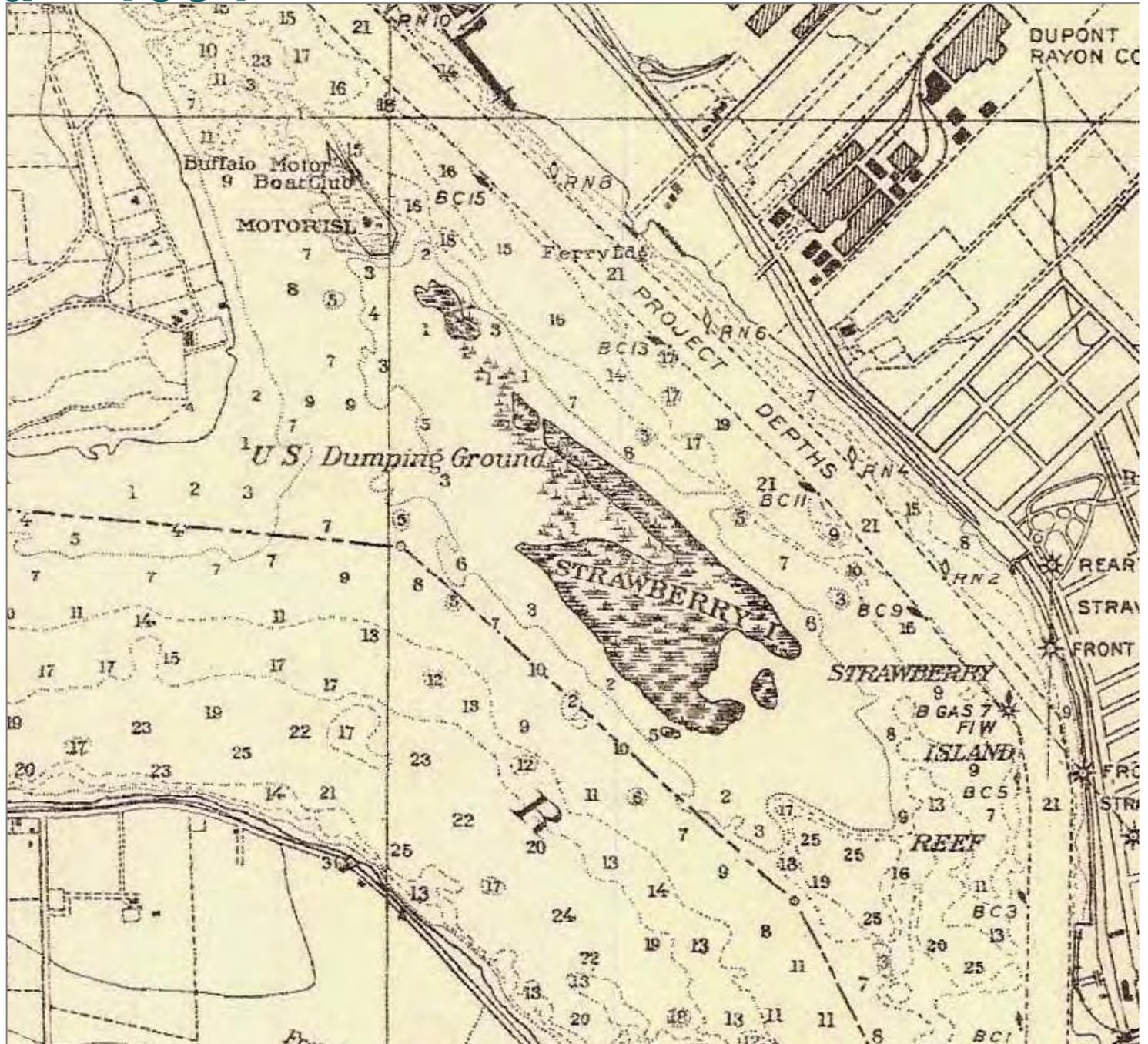
Sand and gravel mining
mid-1920s to
1953



Frog Island – 1934

Historic low water year

More changes
to Strawberry
Is – particularly
at the upper tip



Frog Island - 1938

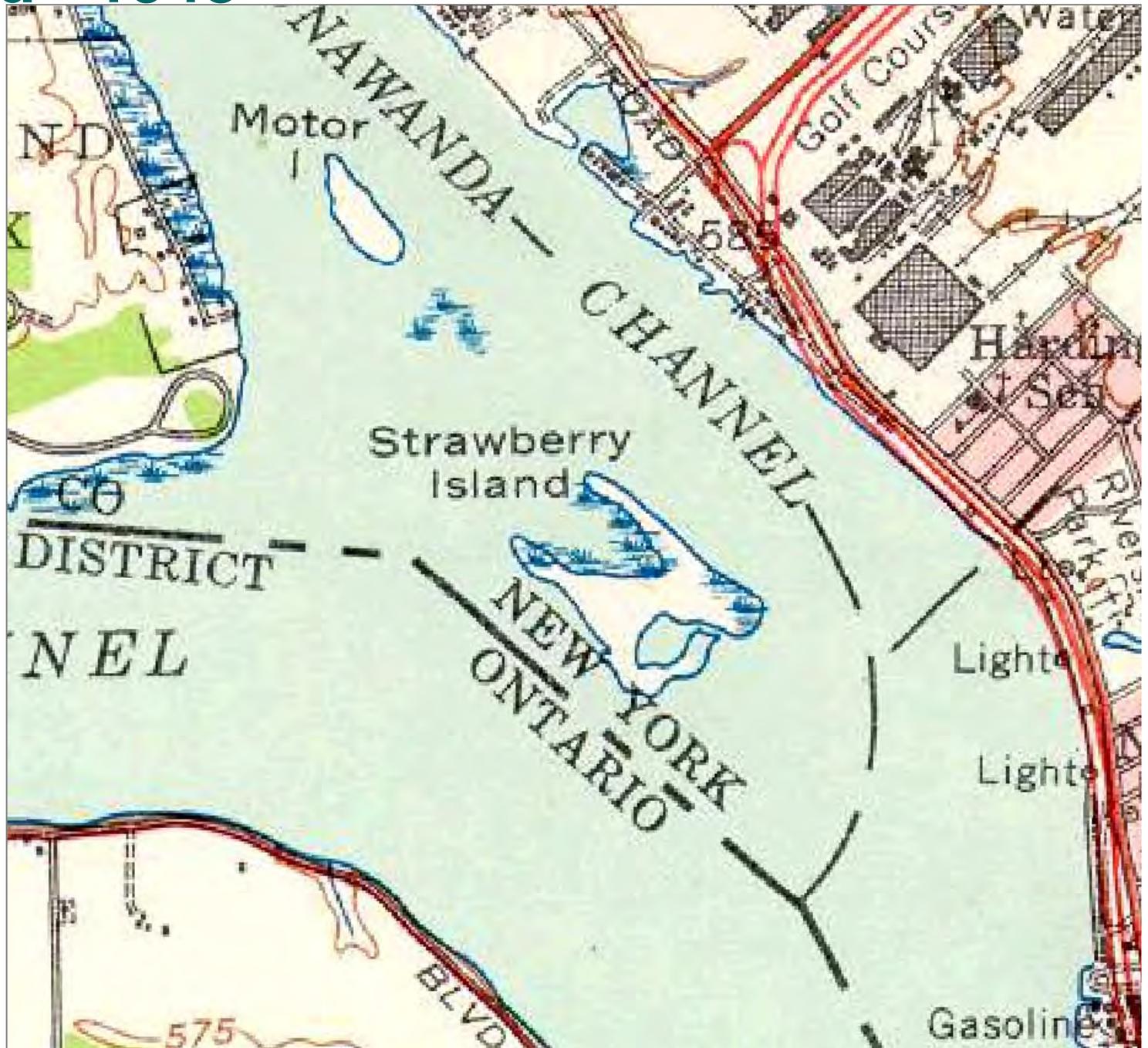
Below average water year

Largest point in
photo history
~ 4 ac.



Frog Island - 1948

Average water year



Frog Island - 1951

Average water year



Photo - 1954



Frog Island - 1966

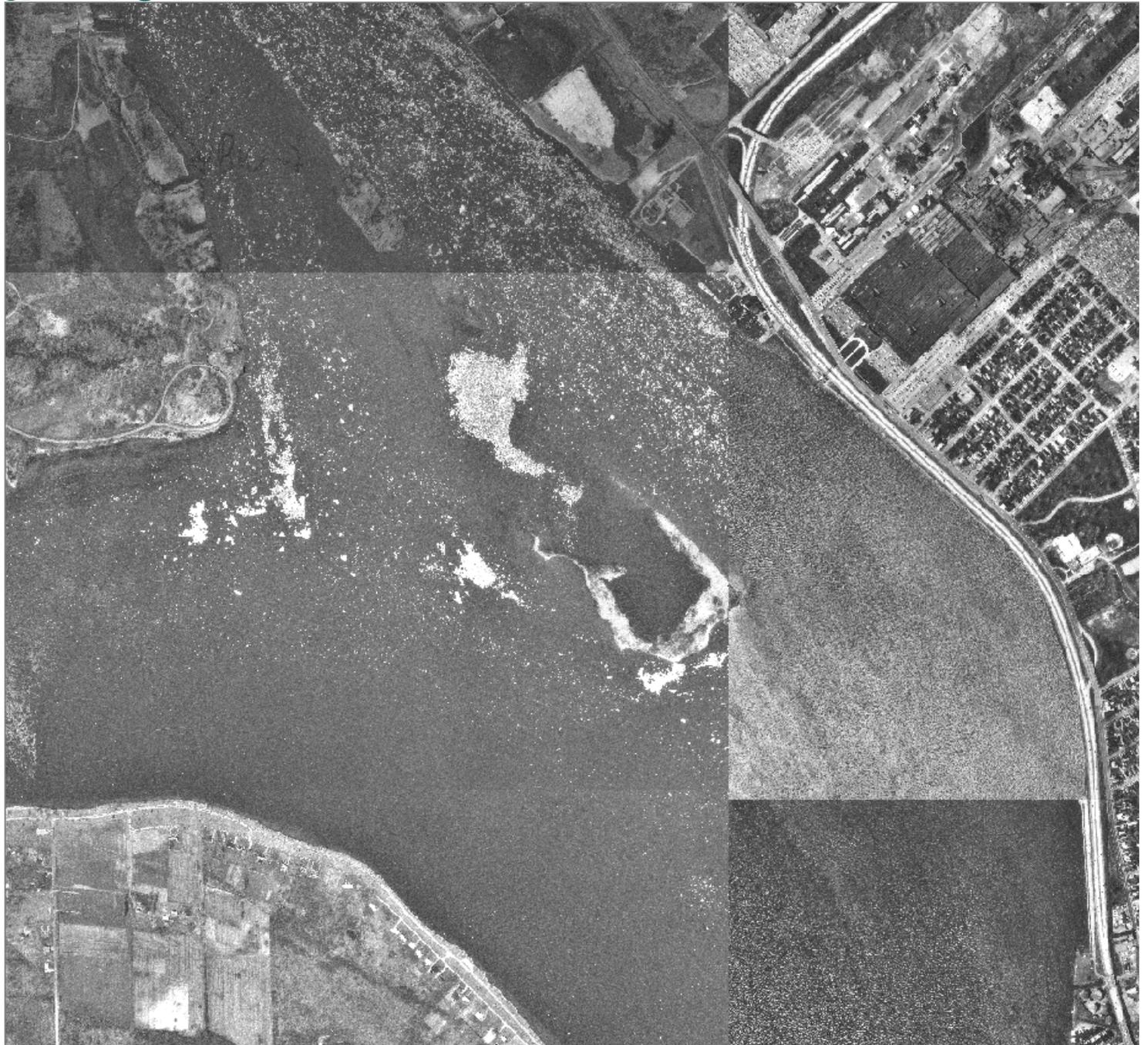
Low water year



Frog Island - 1972

Above average water year

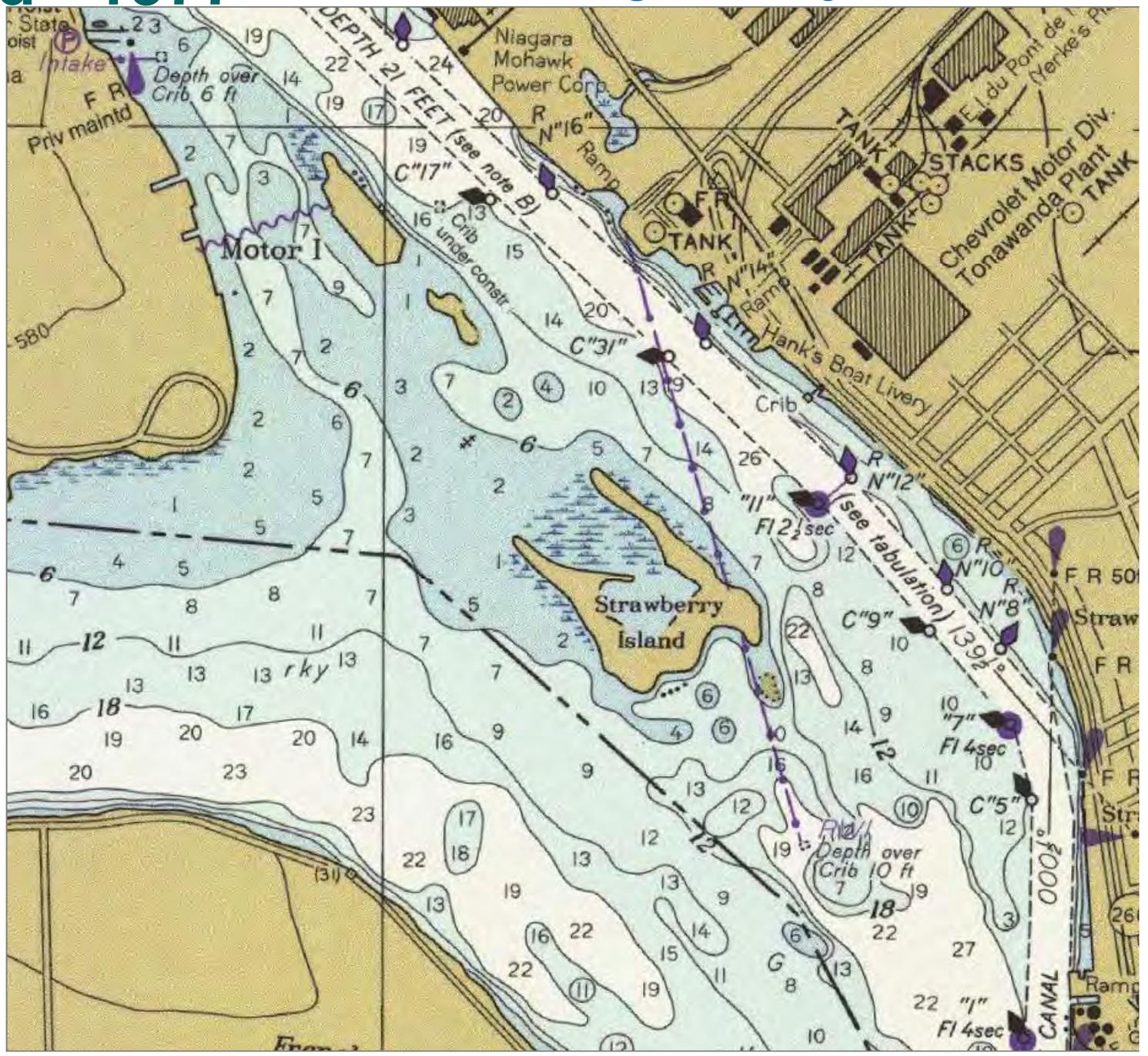
Still visible
above
water?



Frog Island - 1977

Historic high water year

Erosional processes appear to be evident



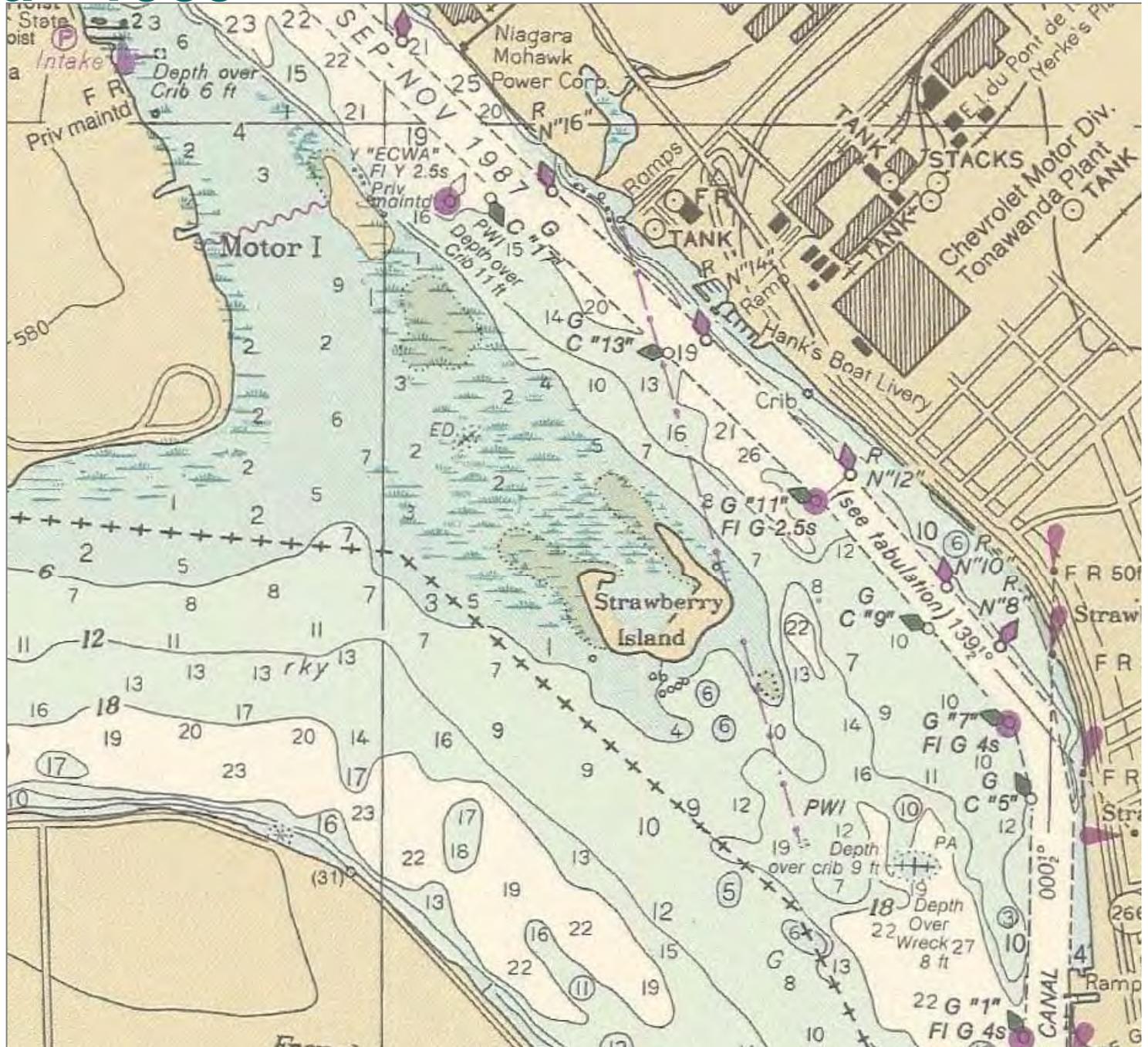
Frog Island - 1978

Above average water year



Frog Island - 1989

Above average water year



Frog Island - 1995

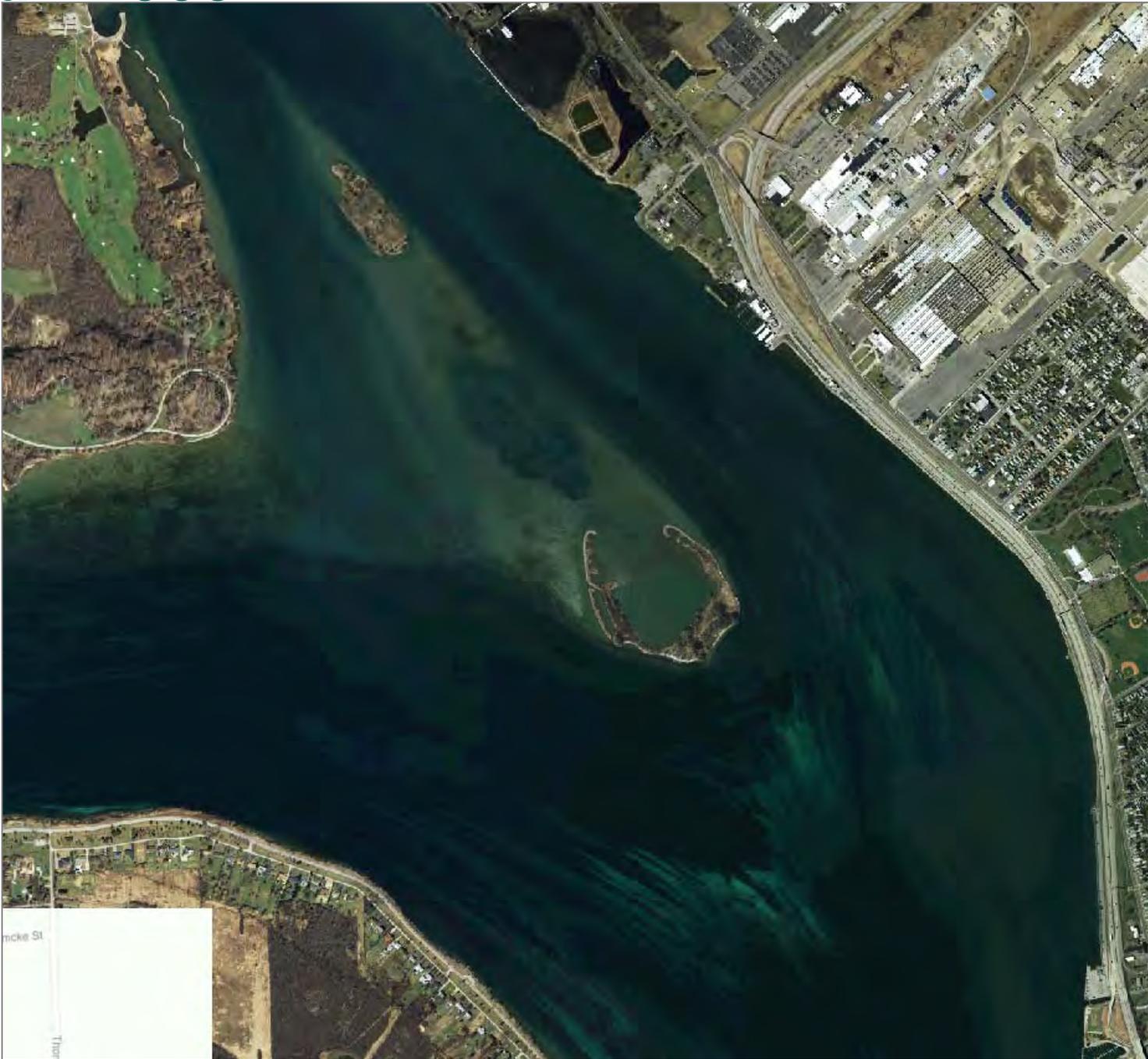
Above average water year

Motor Island
now labeled
Pirates Island
on Navigation
Charts



Frog Island - 2005

Average water year



Frog Island – Present (ca 2006-2007)



Frog Island History Summary

- What did we learn?
 - Earliest history indicates some form of wetland or small islands in the proposed Frog Is area
 - Dynamic conditions over the last 190 yrs
 - Human activities – filling/mining
 - Changing water levels – natural/controlled
 - Erosion and bank armoring
 - Names of Islands varied somewhat
[we need your help on this later]
 - Minimal reference information/data for design of present day Frog Is

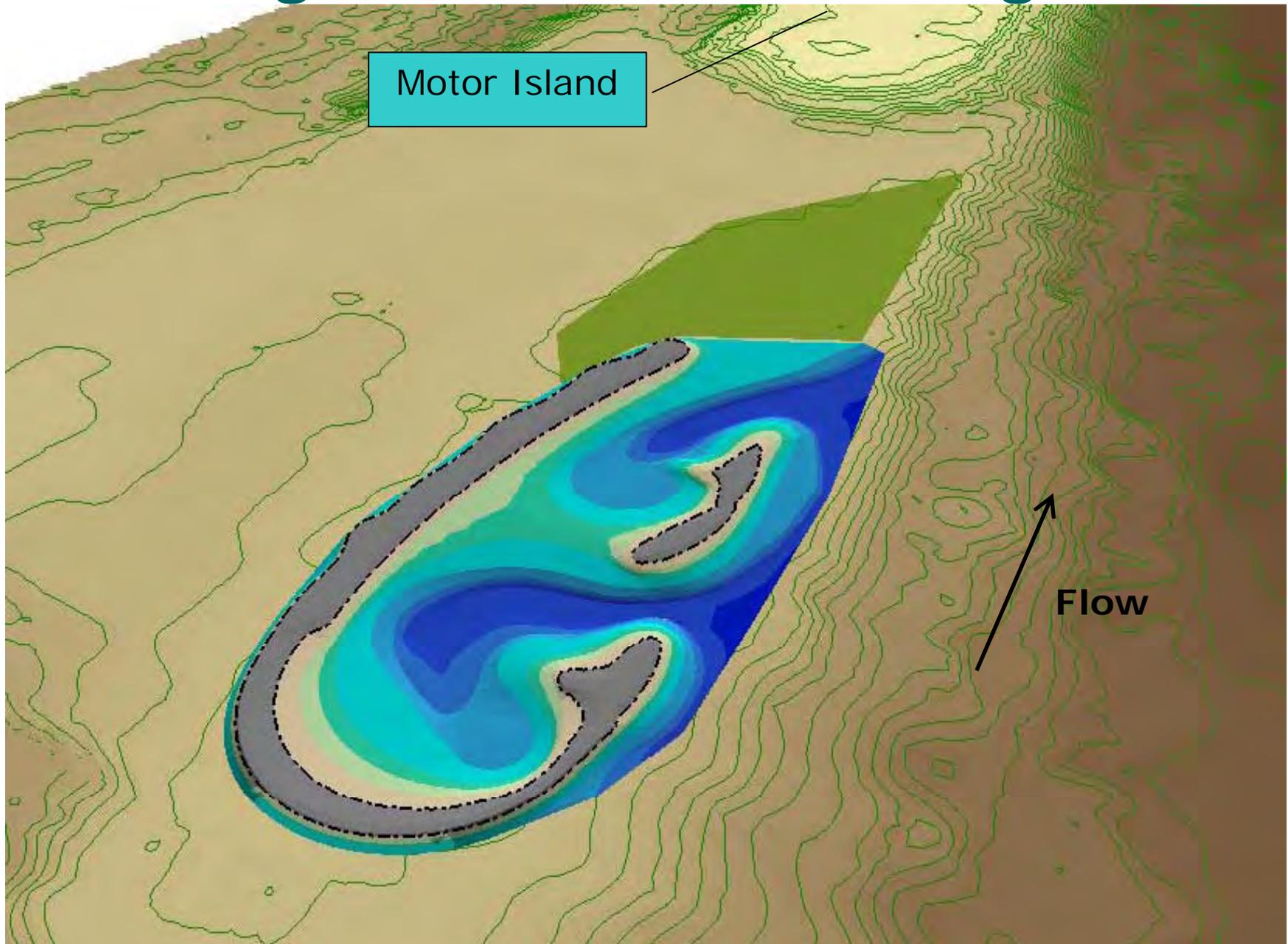
Frog Island Design Compendium

- In preparation
 - Compiled list of documents - sent to ESC
[any missing?]
 - Hydrology, wind, wave, and ice analysis
 - Soil analysis
 - Design criteria: foundation, breakwater, vegetation
 - Risk analysis
 - Review of reference habitats
 - Issue for ESC review 2010 Q1

Frog Island – Revised Design (2009)

- Dynamic river environment – slightly smaller main structure to adapt over time – Adaptive Management Approach
- Low-profile “crescent” with higher tolerances for change/natural disturbance cycles
 - Elevation 6” above average water level
 - Large boulders at head of island to break wave energy and shed ice
 - Flow through/flushing
- Incorporate open access from EAV to deep water and SAV habitat within breakwaters
- Maximize irregular edges and depth diversity (focus on SAV and deep emergent)

Frog Island Revised Design



Frog Island – HIP

Next Steps:

- Approve revised design - today
- On to 50% design in 2010
- Start Permitting in 2010
- Plan for construction in 2013

Little Beaver Island Wetland Restoration



Little Beaver Island Wetland Restoration Geotechnical Investigations



Little Beaver Island Wetland Restoration Geotechnical Investigations



Little Beaver Island Wetland Restoration Archaeological Survey



Ecological Standing Committee Meeting

November 19, 2009

Little Beaver Island Wetland Restoration Design for Planting



Little Beaver Island Wetland Restoration Spoils Disposal

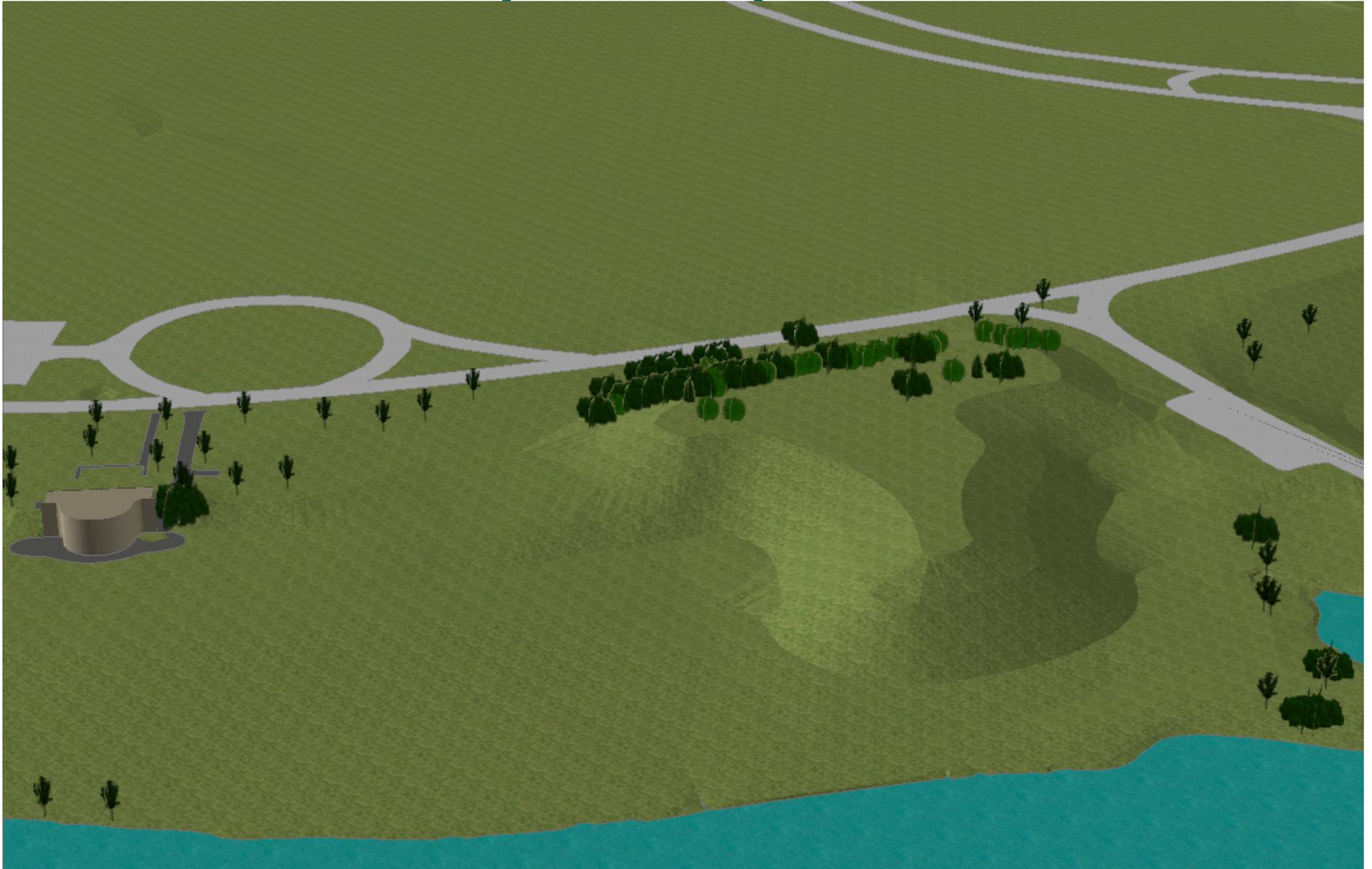


Little Beaver Island Wetland Restoration Spoils Disposal

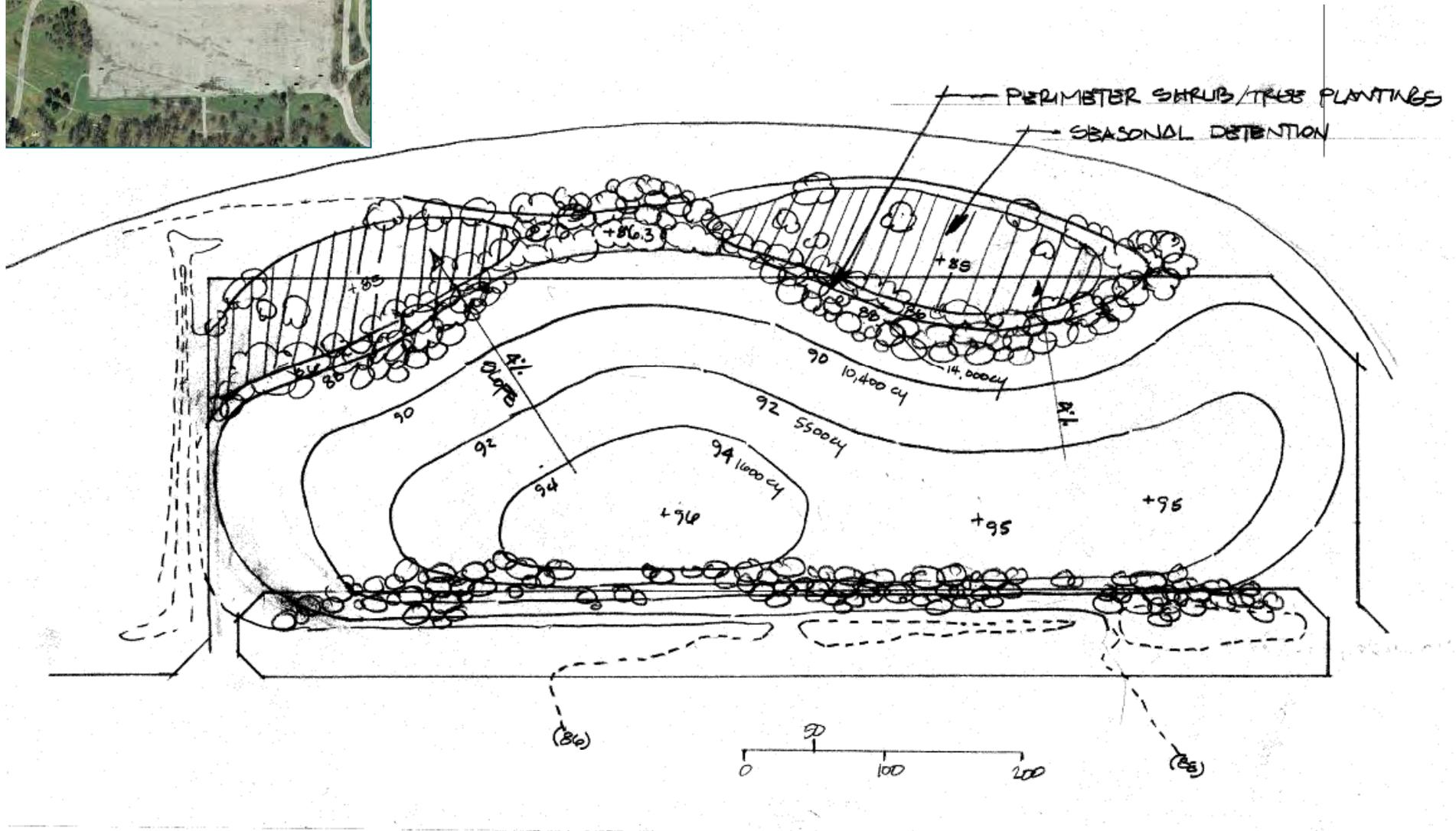
Current Condition



Little Beaver Island Wetland Restoration Spoils Disposal



Little Beaver Island Wetland Restoration Spoils Disposal



Little Beaver Island Wetland Restoration Schedule

- Final Design – December 2009
- Complete Bid Documents – February 2010
- Award Contract – July 2010
- Excavation and Grading Construction – Sept.-Nov. 2010
- Planting – Apr. – Jun. 2011

Invasive Species Control - Action Plan

Objective - Control invasive wetland species in targeted areas ...to promote growth of functionally valuable wetlands characterized by diverse community of native wetland vegetation.

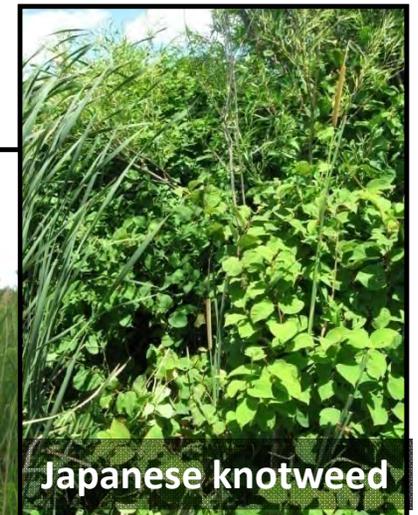


Target areas

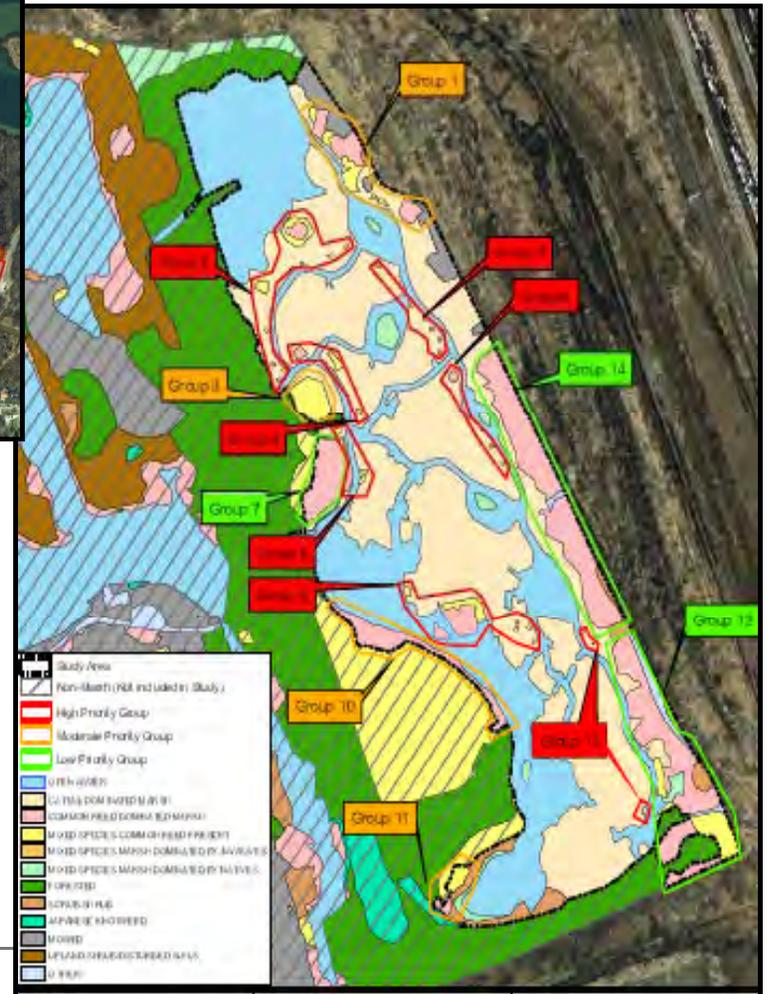
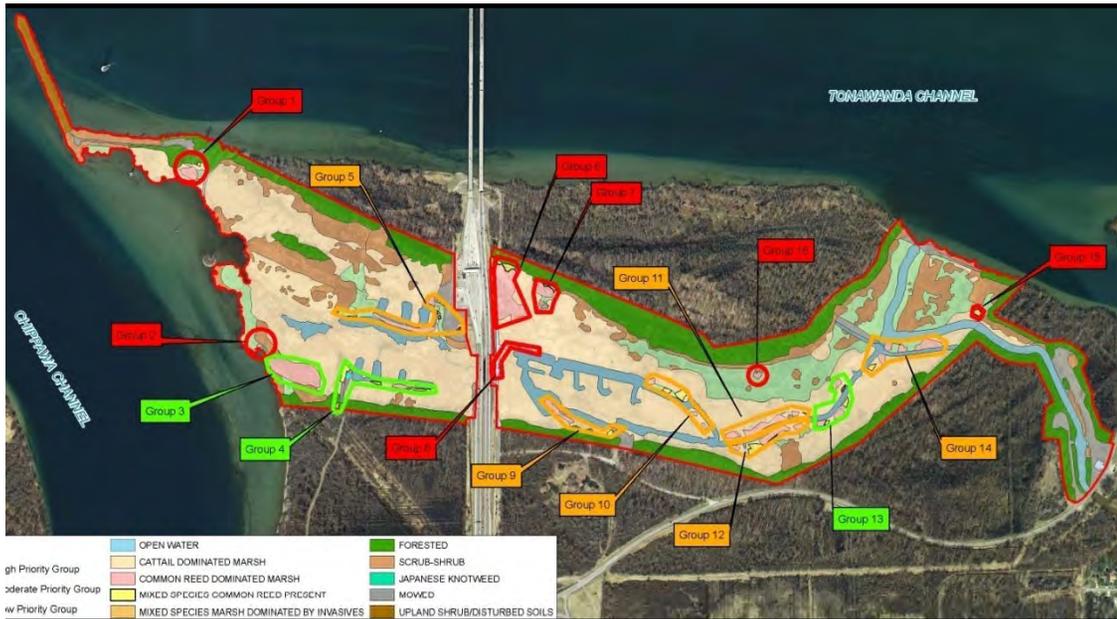
- Buckhorn Marsh
- Tifft Farm Nature Preserve

Target species

- Common reed
- Japanese knotweed



Invasive Species Control



Buckhorn Marsh

 Phase I Areas – Highest Priority

Tiff Marsh

Invasives - Tasks Completed (2009)

1. Consulted with OPRHP, DEC, City of Buffalo Museum of Science

Comments received (and incorporated into Action Plans):

- Provide additional info and final check for RTE species prior to control
 - Change large common reed stand near toll booths at Buckhorn Marsh from low to high priority treatment site
 - Mandate mechanical treatment as precursor to herbicide application
 - Conduct mechanical treatment outside of bird nesting period (i.e., end July)
2. Completed Action Plans & distributed for comment
 3. Obtained approval from City of Buffalo for herbicide application at Tifft Marsh

Invasive Species Control Activities (2010)

- Winter 2009-2010
 - Finalize Action Plans
 - Secure permits from DEC and OPRHP
 - Finalize scope of services for implementation of Action Plans
- Spring 2010
 - Issue RFP for Phase I – treat highest priority sites
 - Select qualified contractor
- June - July 2010
 - RTE surveys (birds/plants) of parcels to be treated
 - Mechanical clearing of treatment areas
- September 2010
 - Herbicide application
 - Inspect herbicide application areas

Invasive Species Control (2011)

- Monitor treatment areas for:
 - Efficacy/control
 - Soil stability
 - Native plant succession
- Repeat or spot treat 2010 treatment areas
 - Repeat RTE survey
 - Repeat mechanical clearing, as necessary
 - Repeat herbicide application
- Plan for Phase II

Osprey Nesting Platform (2009)

- Completed installation at East River Marsh in June
- Began monitoring of 4 Platforms (2 NYPA and 2 DEC)
- Site Selection Report – 4 additional platform locations recommended (Tifft, Adams Slip, Little Beaver Island HIP, 102nd St Landfill)
- Preliminary Site Investigation at 2 of 4 locations



Osprey Platform – 2009 Monitoring Results

- Observe use and maintenance needs over 5-yr period
 - Includes use at 2 existing DEC platforms in Buckhorn Marsh
- Monthly surveys during May-Sept. season
 - 2009 - May 28, June 17, July 16, Aug. 17, Sept. 15

| Location | Condition/Status | Nesting Activity |
|---------------------|---|--|
| West Buckhorn Marsh | Installed 2007, excellent condition. | Osprey nested on platform |
| Mid Buckhorn Marsh | Not assessed, pre-HIP | None observed |
| East Buckhorn Marsh | Not assessed, pre-HIP | None observed |
| East River Marsh | Installed 2009, sticks included, excellent condition. | Osprey observed on platform in summer after installation |

West Buckhorn Marsh



Male and female attending nest.
May 28, 2009

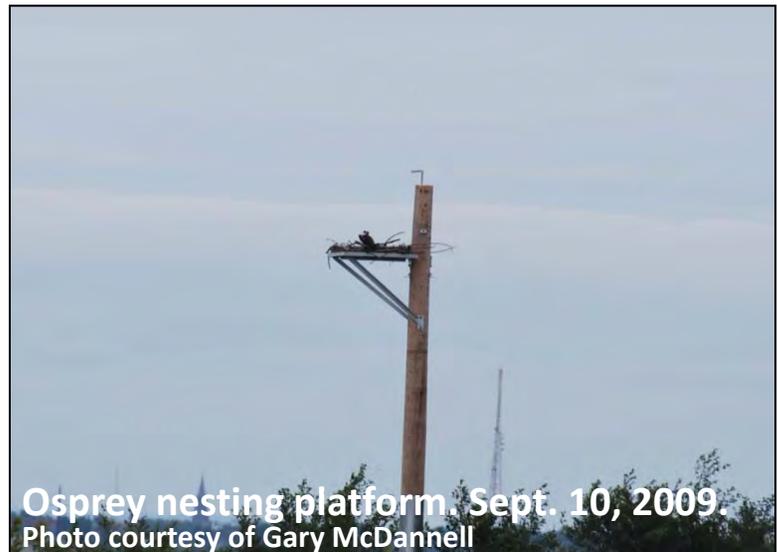


Male and female perched at nest.
June 17, 2009.

East River Marsh



Platform viewed from blind built by Eagle Scout candidate. July 20, 2009.
Photo courtesy of Paul Leuchner



Osprey nesting platform. Sept. 10, 2009.
Photo courtesy of Gary McDannell

Osprey Nesting Platform HIP: Four Additional Platform Sites Needed

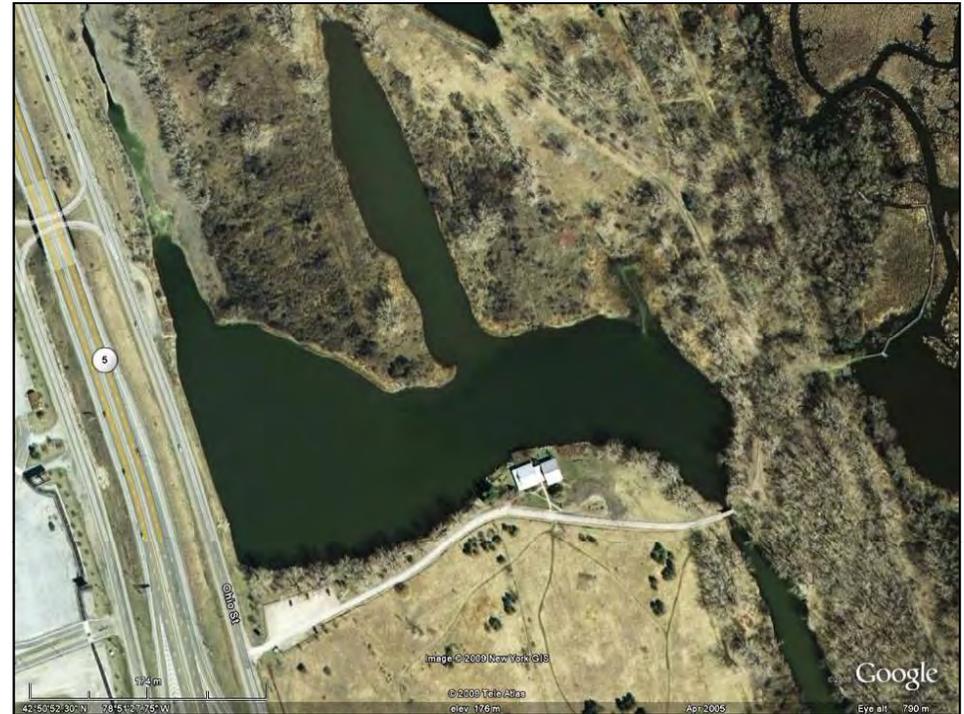
Site Selection Report
recommended locations:

- Tifft Nature Preserve
- Adams Slip
- Little Beaver Island HIP
- 102nd Street Landfill



Tifft Nature Preserve

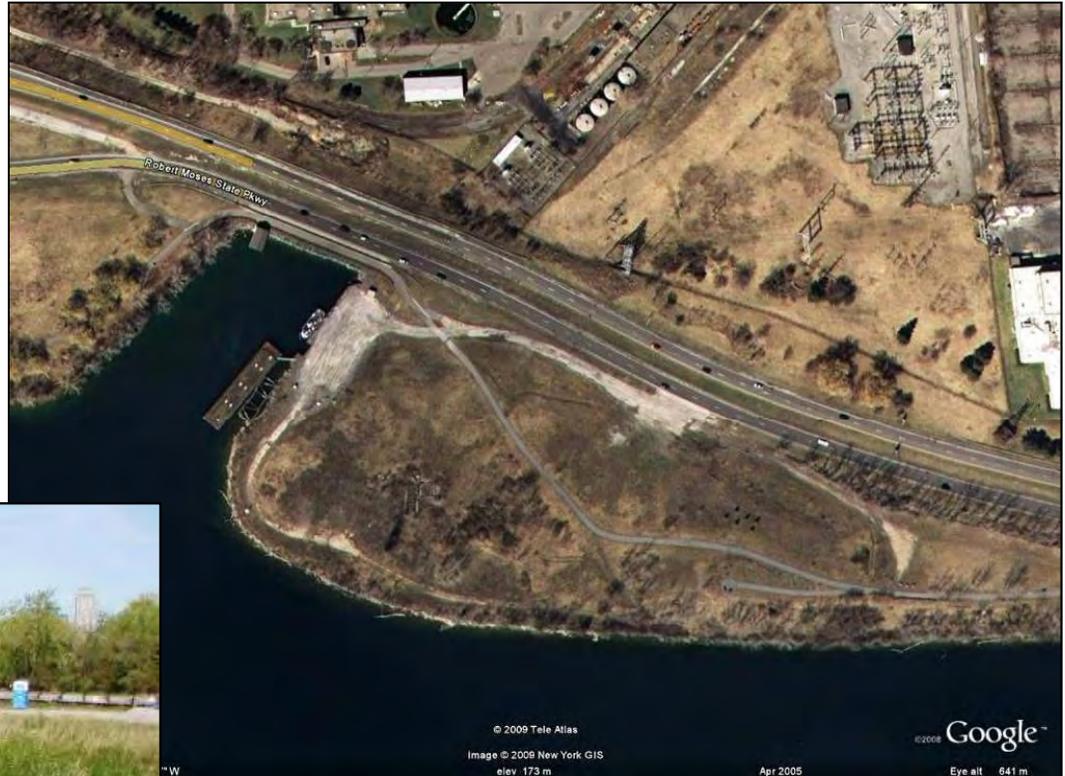
- Owned by City of Buffalo; managed by Buffalo Museum of Science
- New platform on taller pole



- Firm, dry soils on surface
- Easy access roads
- Popular nature preserve
- Some vegetation trimming, all non-native

Adams Slip, NYPA boat landing

- Owned by NYPA
- Posted and patrolled
- On Robert Moses State Parkway
- Recreational trail



- Easily accessible
- Firm soil
- Excellent viewing
- Excellent foraging nearby

Little Beaver Island HIP

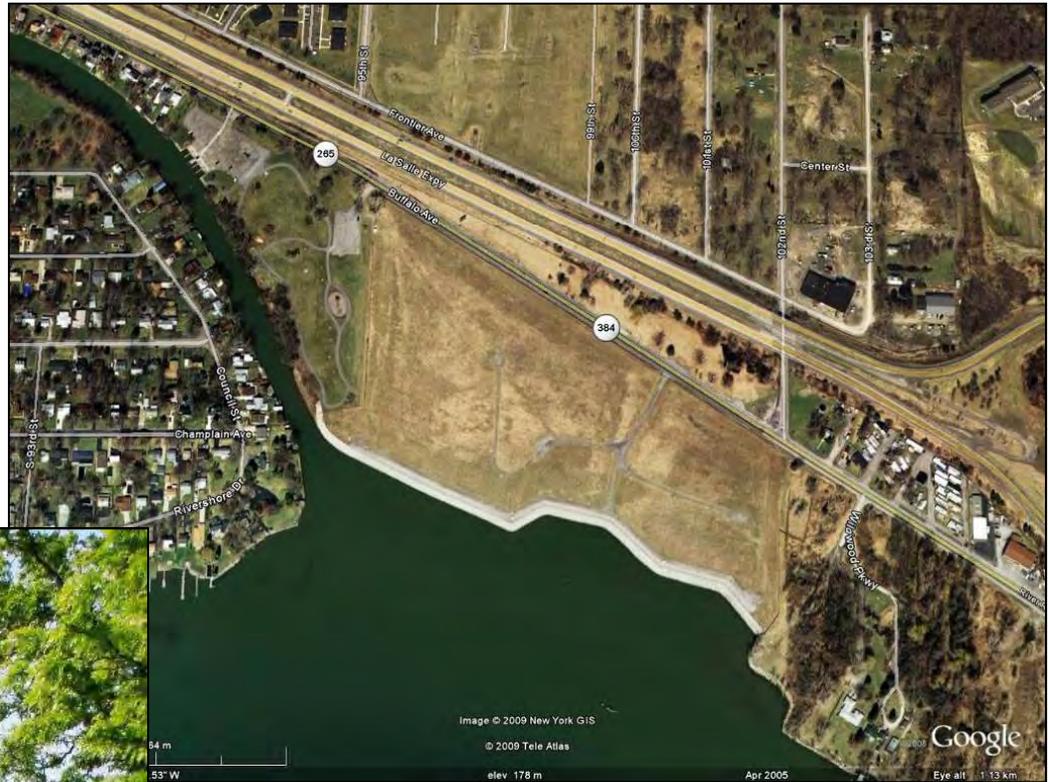
- Owned by NYSOPRHP
- Extensive wetland restoration



- Easily accessible
- Good viewing opportunities
- Excellent foraging nearby

102nd Street Landfill

- Fenced, remediated, capped landfill
- Low disturbance
- Wide open habitat
- Complements restoration efforts



- Easily accessible
- Good viewing opportunities
- Tripod design to avoid subsurface excavation

Osprey Platform – Next Locations

First two locations in progress

○ Tifft Nature Preserve

- Conducted site investigations and completed designs
- Submitted drawings to City of Buffalo for approval
- RFP issued
- Anticipated to begin installation before the end of year

○ Adams Slip

- Conducted site investigations and completed designs
- Included with Tifft in bid process
- Anticipated installation in Summer 2010

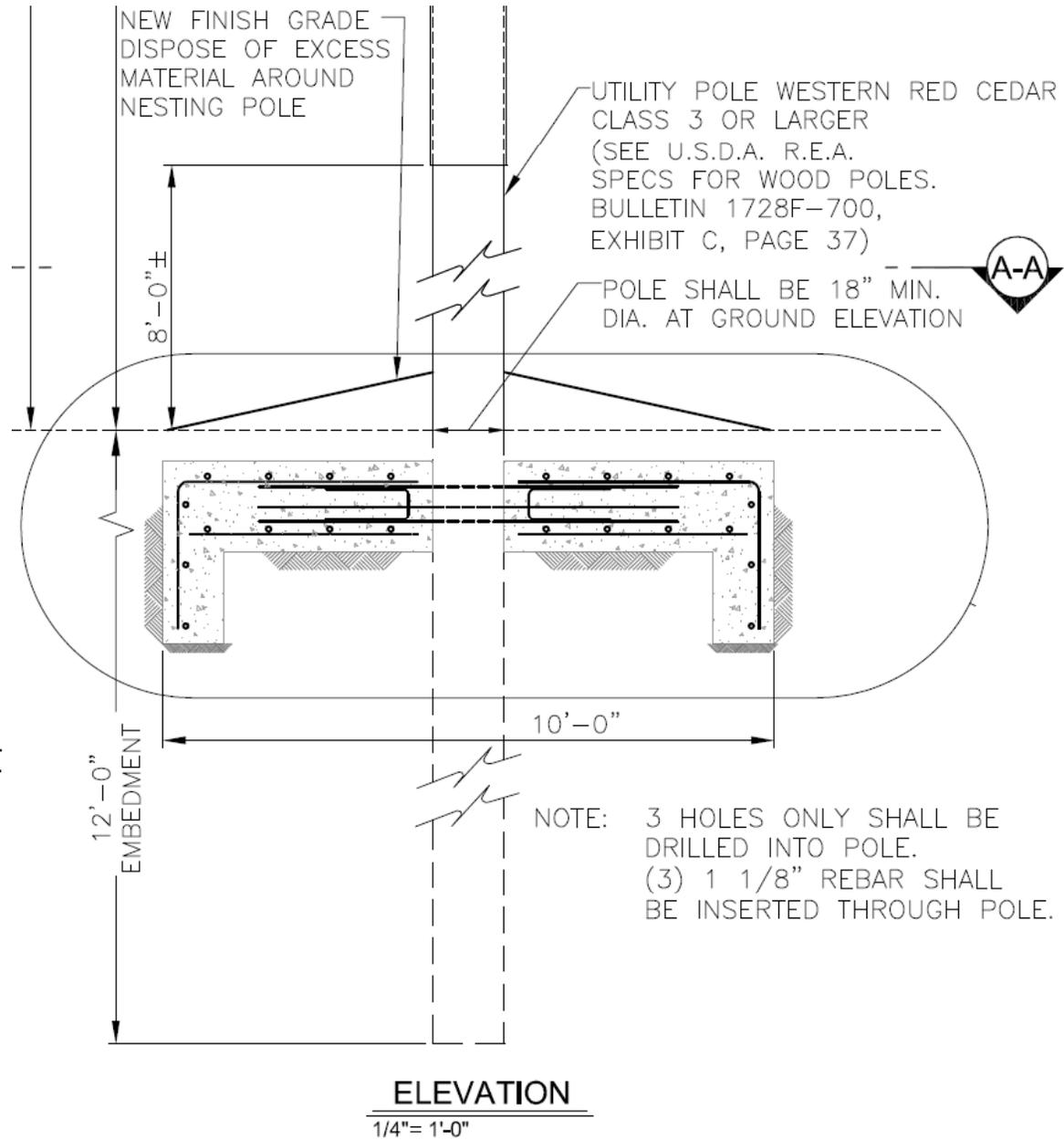
Tifft Nature Preserve – Osprey Platform



Tifft Osprey Pole Design

Soft Soils Design
Includes Concrete mat
and 12' Embedment

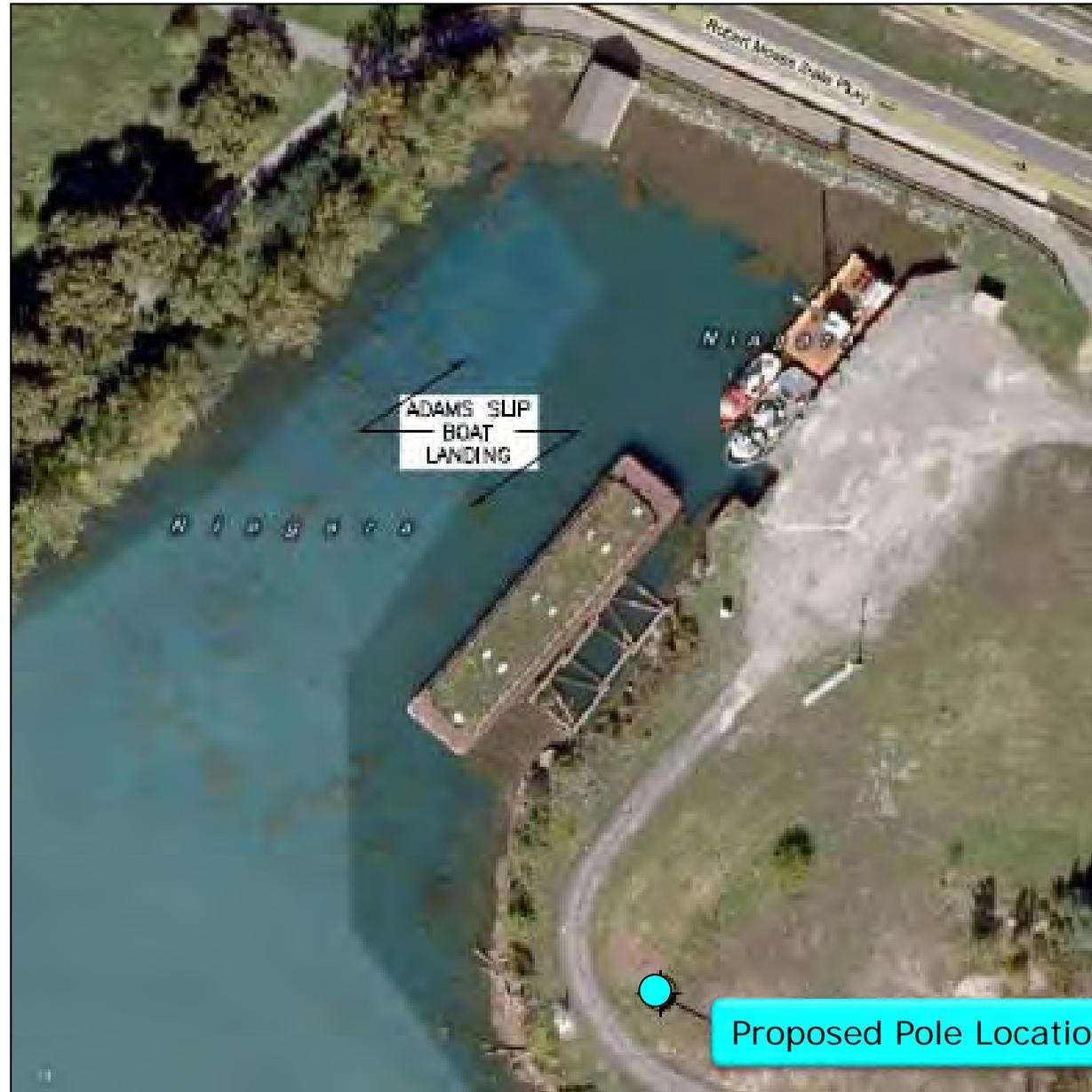
Platform 55 ft above
ground



Adams Slip Osprey Pole Design

Good Soils

Simple Design

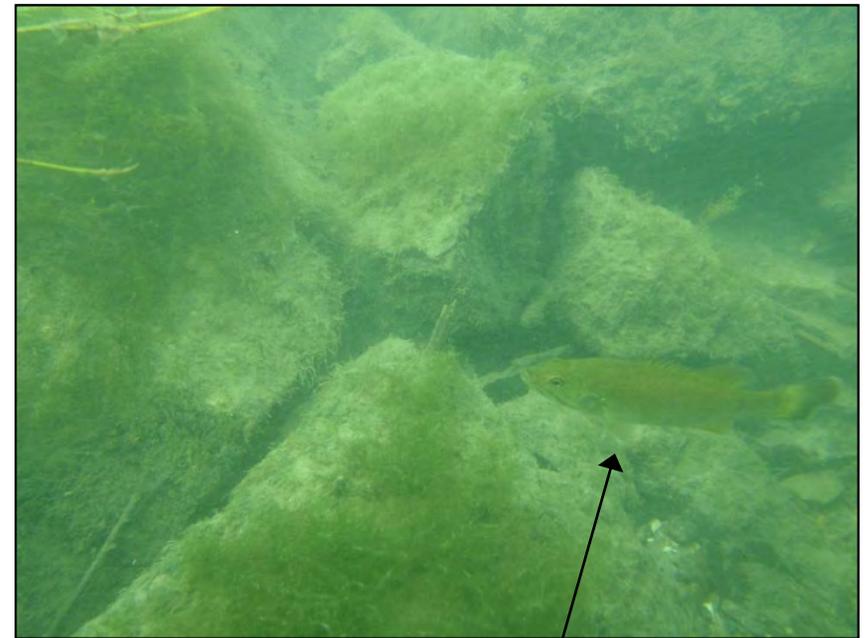


Osprey Nesting Platform HIP (2010)

- Install pole at Adams Slip – summer
- Install pole at Little Beaver Island HIP prior to wetland restoration – summer
- Continue monitoring installed platforms
- Additional inquiries for last platform – 102nd Street Landfill

Fish Attraction Structures – Monitoring (2009)

- 4 Structures installed October 2008
- Observe condition and use in years 1, 4, 7, and 10 (2009, 2012, 2015, & 2018)



Small mouth bass at structure

Growth of submerged aquatic vegetation (edges)

Fish Attraction Structures

September 23-24, 2009 Inspection Dives

| Site | Type | Structure condition | Fish present |
|---|------------------------|--|---|
| Gratwick Park  | Stone and Log Groin | Log moved (ice?), some downstream sediment accumulating downstream but low embeddedness, debris/trash abundant | SMB (11-20 adult, 11-20 juvenile), goby (11-20) |
| Downstream SGI Bridge  | Boulder Field | No boulder movement, no embeddedness, some sediment at downstream boulders, scouring in front boulder | SMB (21-50 adult, 11-20 juvenile), goby (1-10 adult) |
| Upstream SGI Bridge  | Rock Wing 'Saddleback' | Sedimentation at low ridge and upstream pile, wood debris/trash, some wild celery around edges | SMB (51-100 adult & juvenile), goby (11-20) |
| Motor Island  | Rock Slope | Structure undisturbed, flow slow but uniform, depth 10'-13' | SMB (4 adult, 5 YOY/yearling), goby (51-100 juvenile) |

Fish Attraction Structures

- Stable after first year, good colonization by SAV
- Traps sediment
- Provides large-object cover
- All four structures utilized by both juvenile and adult fish
- Anglers observed near Gratwick structure

Name-a-HIP Challenge

- Motor Island originally called Frog Island
- Wetland HIP upstream of Motor Island needs a better name...

HIPS Capital Cost Expenditure Report

| | Estimated Capital Cost | Spent To Date (8/29/2009) |
|--|------------------------|---------------------------|
| Beaver Island Wetland Restoration | \$2,700,000 | \$233,393 |
| Strawberry Island Wetland Restoration | \$2,300,000 | \$82,063 |
| Area Upstream of Motor Island | \$4,200,000 | \$446,617 |
| Motor Island Shoreline Protection | \$1,900,000 | \$272,026 |
| Invasive Species-Buckhorn and Tiffth Marsh | \$350,000 | \$128,958 |
| Osprey Nesting Platforms | \$70,000 | \$136,949 |
| Common Tern Nesting | \$560,000 | \$386,373 |
| Fish Attraction Structures | \$310,000 | \$194,735 |
| <u>Total HIPs:</u> | <u>\$12,390,000</u> | <u>\$1,881,114</u> |

Action Items / Meeting Wrap-Up