Habitat Improvements to the Motor Island Shoreline in the Upper Niagara River, NY: A Collaborative Approach

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Motor Island – Outline

• Background
  - Impetus and collaborative approach
  - Project objective
  - Island history

• Collaborative design process
  - Design considerations
  - Basis for design
  - 3-Part design approach
  - Proposed habitat improvements

• Project status

• Take home
In 2005, the Niagara Power Project applied for a new FERC license (received 2007)

Collaborative stakeholder process developed Settlement Agreement; calls for series of habitat improvement projects

Ecological Standing Committee
- NYPA, USFWS, NYSDEC, NYSDOS
- Seneca Nation of Indians, Tuscarora Nation, Tonawanda Seneca Nation
- New York Rivers United, Niagara Relicensing Environmental Coalition
Collaborative Design Approach

• Continued collaborative stakeholder involvement

• ESC assigned advisory and design review role
  ▪ Working meetings
  ▪ Consultation
  ▪ Consensus approval

• ESC/Agency involvement throughout the project
  ▪ Establish and refine objectives
  ▪ Local knowledge and expertise
  ▪ Landowner and resource consultation – historic, RTE, etc.
  ▪ Design review – 10%, 50%, 90% stages
  ▪ Permitting
Motor Island Location

- 6-acre island in the Upper Niagara River (above Niagara Falls)
- Part of State-Designated Significant Coastal Fish and Wildlife Habitat area
Motor Island

- State-owned; managed by NYSDEC for wildlife habitat
- Used as boat club in early 1900s
  - Tennis courts
  - Boat slips
  - Chimney
  - Sidewalks
  - Building

May 5, 2011
Erosional Forces

• Wind
  ▪ Fetch = 1.25 miles from SW
  ▪ Winds >50 mph every year

• Waves
  ▪ >2 ft trough to crest
  ▪ Storm surge ~4 ft above normal water levels
  ▪ Large vessel wakes

• Ice
  ▪ 2 – 3 ft thick
Motor Island Shoreline Stabilization History

- Early 1900’s – crib wall built
  - Vertical timber face backfilled with riprap
- 1980s –
  - Concrete blocks placed along top of crib wall
Motor Island Existing Conditions

- Protected habitat for colonial nesting birds (egret, heron)
- Wild celery beds valuable for water birds, muskellunge, smallmouth bass
- Managed wildlife habitat
- Limited public use
Motor Island
Existing Conditions

Concrete sidewalk

Wetland

Concrete tennis courts

SAV

Wetland

Pilings and docks

Concrete blocks on cribwall

No SAV in nearshore areas
Project Objective

• Original objective – maintain shoreline protection and avoid SAV and fish impacts
  - Sheet pile design concept

• Since 2007 – ESC and NYSDEC broadened focus to include gradual shoreline transitions to increase ecological diversity
Design Considerations

• Shoreline Protection
  ▪ Dissipate wave energy
  ▪ Prevent ice damage

• **Habitat Goals (Collaborative)**
  ▪ Increase topographic variability
  ▪ Greater habitat diversity and complexity in aquatic, wetland and riparian areas
  ▪ Control invasive plants

• Construction Limitations
  ▪ Limit environmental impact
  ▪ Ice and severe winter weather
  ▪ Biological exclusion period (April to July 15)
  ▪ Benefit/cost
Basis for Design

• Ice damage is largest threat to the design

• Field surveys to identify
  ▪ Reference conditions
  ▪ Existing conditions
    o Wetlands and SAV
    o Invasives
    o RTE species
    o Soils/geotechnical survey
    o Archaeological Phase 1B survey
  ▪ Appropriate armor size

• Small shoreline scallops for protected transitional habitat

• ESC and NYSDEC input to refine design
  ▪ Expertise and local knowledge
Reference Vegetation Survey
3-Part Design Approach

Location Specific Enhancements

1. Grade shoreline to dissipate wave energy, create habitat pools and transitional slopes
   - Low-profile berms, scallops, wave runup zone, riparian pockets

2. Bioengineering to protect soils
   - Stone, coconut fiber coir logs and matting, live stakes and posts, ice protection boulders

3. Habitat features
   - Willow logs, rootwads, protected pools
   - Native plantings – seed, herbaceous plugs, shrubs, and trees based on localized observations of species and elevation ranges
<table>
<thead>
<tr>
<th>ZONE</th>
<th>HABITAT</th>
<th>REPRESENTATIVE SPECIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>UPLAND Upland trees and grasses over spoils/tennis court</td>
<td>Staghorn sumac, box elder, red oak</td>
</tr>
<tr>
<td>1</td>
<td>RIPARIAN Native riparian trees, shrubs, herbs</td>
<td>Red and silver maple, chokeberry, bayberry</td>
</tr>
<tr>
<td>2</td>
<td>SHORELINE Wetland shrub vegetation in cobble substrate along shoreline and in breakwaters</td>
<td>Willows and red-osier dogwood</td>
</tr>
<tr>
<td>3</td>
<td>SHALLOW EMERGENT Shallow emergent marsh and cobble beach.</td>
<td>Hardstem &amp; softstem bulrush, giant bur-reed</td>
</tr>
<tr>
<td>4</td>
<td>DEEP EMERGENT Deep emergent marsh and cobble beach.</td>
<td>Pickerel weed, arrowhead, hardstem bulrush</td>
</tr>
<tr>
<td>5</td>
<td>DEEP POOL Deep pool</td>
<td>Natural colonization</td>
</tr>
<tr>
<td>6</td>
<td>LOW-PROFILE BERM Unvegetated low-profile berm</td>
<td>Natural colonization</td>
</tr>
</tbody>
</table>
Proposed Habitat Improvements

Proposed wetland

Invasive species control

Protected pools

New upland forest habitat

Remove concrete blocks; protect toe of existing cribwall

Protected pools behind cribwall

Invasive species control

Pilings to remain; Piers to be removed

Rounded Ice protection rocks
Motor Island Proposed Design

- 11 habitat features (2.52 acres) – deep pool, emergent, wetland, riparian, meadow and reforestation
Motor Island – Feature B

- Protected pool with emergent habitat
- Root wads, coir fiber logs, live stakes
Motor Island – Feature G

- Protected pool with deep pool and emergent habitat
- Wetland and riparian habitat
- Root wads, coir fiber logs, live stakes
Project Status

• Project will benefit 2.52 acres of open water, existing and created wetland, riparian reforestation, and upland shrub meadow habitat

• Submitted Joint Permit Application May 2011
  ▪ USACE, Buffalo District
  ▪ NYSDEC
  ▪ NYSDOS

• Preparing specifications and RFP package

• Target construction dates
  ▪ Excavation – late-July to October 2012
  ▪ Planting – mid-March to mid-July 2013
Take Home

• Collaborative design process:
  ▪ Takes longer
    o Coordination and manage focus
  ▪ Leads to much better projects (greater ecological benefits)
    o Vast resource of local knowledge, history, and experiences
    o Extensive expertise contributed by resource managers
  ▪ Fosters greater stakeholder buy-in