New England Wetlands Program
Development Grant Webinar Series

Looking to the Future: Proactive Wetland Conservation Planning

March 12, 2015
2:30 – 4:00 PM
Welcome and Introductions (10 min.)
ID Restoration and Protection Opportunities (20 min.)
Brief Q&A (5 min.)
Potential for Tidal Marsh Migration (20 min.)
Brief Q&A (5 min.)
Discussion (30 min.)
Wrap-Up
Webinar Moderator

Kimberly Roth,
Environmental Analyst,
Wetlands Programs
NEIWPCC
kroth@neiwpcc.org
Kristen Puryear is an Ecologist with the Maine Natural Areas Program, within Maine’s Department of Agriculture, Conservation and Forestry. Her responsibilities include field inventories, ecological monitoring, conservation planning, and working with foresters and land managers of private and public lands. Recent projects have included the establishment of an invasive plant mapping and monitoring program in the State, vegetation team leader for the National Wetland Condition Assessment in Maine, technical support for the Maine Natural Resources Conservation Program, and the identification of wetland mitigation sites statewide. Kristen holds an MS in Plant Biology from the University of Vermont, and a BA in Geology-Archaeology from Bates College.
Identifying Wetland Restoration and Protection Opportunities in Maine

Kristen Puryear, Ecologist
Maine Natural Areas Program
Department of Agriculture, Conservation and Forestry
Maine Natural Areas Program

Our mission is to ensure the maintenance of Maine’s natural heritage for the benefit of present and future generations.

We track the locations and status of:

- Rare plant populations
- Rare and exemplary natural communities and ecosystems

MNAP facilitates informed decision-making in:

conservation, natural resources management, and development planning.
Background

- **Mitigation:** 
  Preserve, Restore, Enhance, or Create

- **Maine’s ILF Program**
  -$12 Million in funds
  - Dispersed through the Maine Natural Resources Conservation Program (MNRCP) administered by TNC
  - Organized by Ecoregion (debts and credits)

- **Other Wetland Programs**
  NAWCA
  Coastal Wetlands grants
  State grants
Objectives

1. Identify potential mitigation sites through landscape analysis and outreach

2. Conduct field inventory and assessment of potential and proposed wetland mitigation project areas

3. Provide landowners and land managers with ecological assessments

4. Create and maintain “In Lieu Fee” database of potential & proposed sites

5. Provide technical support to MNRCMP
Methods

Landscape Analysis
- remote, quick, Level I survey approach
- can be done with available statewide data
- can identify intact wetlands and upland buffers with multiple ecological values

...However...
- highlights remote areas with little development pressure
- limited ability to detect restoration or enhancement need
Methods

Landscape Analysis

- Topographic maps and aerial photos
- Conservation land and buffer
- NWI, Streams, mapped vernal pools
- Rare species and significant habitats
- SWAP Focus Areas
Methods

Landscape Analysis

- Topographic maps and aerial photos
- Conservation land and buffer
- NWI, Streams, mapped vernal pools
- Rare species and significant habitats
- SWAP Focus Areas
- Barrier data, soils, disturbed wetlands (NWI modifier)
Methods

Outreach
- Contact land trusts, towns, and state agencies
- Request for “leads”
- Gather local knowledge regarding conservation priorities and impaired wetlands
- Focus on places where there is local and regional interest by landowners and land managers (= momentum)
Methods

By Request
- MNRCP Technical Support
Methods

1. Prioritize site visits
2. Request landowner permission
3. Conduct field survey
   • Wetland types
   • Wetland functions and values
   • Rare plant and natural community survey
   • Invasive species
   • Other impairments
4. Summarize results
5. Maps and reports to landowners and/or applicant
6. Enter data in ILF database
Results

**The Numbers:**

**Contacted:** over 200 land trusts, town CCs, public land managers

**Responses:** 70 different entities

**Site leads (from landscape analysis and outreach):** 431

**Field surveys:** 150 sites

**Of the 150 Surveyed sites:**

<table>
<thead>
<tr>
<th>Natural Resource Values</th>
<th>Percent of Sites</th>
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<tbody>
<tr>
<td>Intersect SWAP Focus Areas</td>
<td>50%</td>
</tr>
<tr>
<td>Near Conservation Land</td>
<td>75%</td>
</tr>
<tr>
<td>Support rare species/NCs</td>
<td>44%</td>
</tr>
<tr>
<td>Intersect with Significant Wildlife Habitats</td>
<td>75%</td>
</tr>
</tbody>
</table>
Results
Results

32% of sites contained an impairment

Wetland Impairment by Type
Results

27% of sites were proposed and ultimately funded by MNRCPC
Outputs and Outcomes

• Catalyzed projects and fueled momentum

• Field surveys identified unique features, impairments, inform management

• Increased field data on wetland resources, including rare plants and natural communities and wildlife habitats

• Database of potential and successful mitigation opportunities

• Technical support of MNRCM
For more information:

Kristen Puryear  
(207) 287-8043  
Kristen.Purryear@maine.gov  
www.maine.gov/dacf/mnap
Don Cameron is a Botanist and Ecologist with the Maine Natural Areas Program. Don’s responsibilities include surveying for rare and exemplary habitats throughout Maine, managing the state’s Official List of Threatened and Endangered Plants, monitoring federally listed plant species, and providing technical assistance for development and conservation planning. Recently, Don’s work has focused on a statewide assessment of subalpine fir forests, assessment of rare wetland types in northern Maine, and an investigation of the potential for tidal marsh migration based on projected sea level rise. Don holds an MS in Plant Ecology from the SUNY College of Environmental Science & Forestry.
Investigating the Potential for Tidal Marsh Migration

If sea level rises as projected where will marshes go?

Maine Natural Areas Program
Maine Geological Survey

Funded by:
Tidal Marsh Migration Analysis

Two phases:

1 – South coast
2 – Entire coast

**Scope** - only estuaries with existing tidal marshes

**Analysis elements**

- land cover types / land uses
- freshwater wetlands (NWI)
- conservation lands
- coastal ecoregions
- planning considerations
Steps

1. Tidal marsh mapping
2. LiDAR ground truthing
3. Sea level rise simulations
4. Marsh migration analysis
5. Communicate results
Tidal Marsh Mapping

- Improve MNAPs significant natural feature data coverage

- Inform marsh migration analysis
  - marsh locations
  - number of acres
  - how does simulated HAT line up?
- mapping was a combination of ground truthing and GIS imagery analysis
- minimum mapping unit ~ 2.5 ac
- Result = 22,408 acres mapped in 170 estuaries
Step 2: Groundtruth LiDAR

LiDAR available for Phase 1
LiDAR Groundtruthing - Scarborough Marsh, near Old Neck Road
LiDAR Groundtruthing Results

11 sites, 4-6 transects per site

N = 2240 (elevation points)
Mean Difference = +1.2 cm
SD = 11.7 cm
Adapted from IPCC and Hugo Ahlenius, United Nations Environment Programme, 2007

Sea Level Rise (m)

Model projections, including ice sheet dynamic processes (IPCC AR4)

Four Sea Level Rise Simulations (1ft, 2ft, 3.3ft, & 6ft)

Pete Slovinsky, Maine Geological Survey 2015
Sea Level Rise Simulations - 1’, 2’, 3.3’, 6’

1 – create a model of highest annual tide (HAT) coastwide

   - data from local tide stations was used to address wide tidal variability, and was interpolated across a grid to assign values to sections of the coast (MGS - Slovinsky, Hallstead).

2 – create 4 SLR simulations with HAT as starting point

   - simulations are described as a bath tub model, only showing what non-tidal areas will inundated at each SLR depth, and do not address what may happen to existing marshes. SLAMM (Sea Level Affecting Marshes Model) was not used due to a lack of sedimentation data for most of the estuaries.
Use existing marshes to identify potential migration areas.

Assumption: marshes are most likely to migrate in estuarine areas where they already exist.

Step 4: Marsh migration analysis
Example result:
Hay Creek, Jonesport
Example result:
Hay Creek, Jonesport
Example result:
Hay Creek, Jonesport
Example result:
Hay Creek, Jonesport
What data is most relevant in planning for tidal marsh migration?
ME Landcover Categories

Pixel value Cover type

Developed
2 Developed, High Intensity (80-100% impervious)
3 Developed, Medium Intensity (50-79% impervious)
4 Developed, Low Intensity (21-49% impervious)
5 Developed, Open Space (developed areas, but 0-20% impervious - city parks, golf courses, baseball fields, etc.)
16 Road/Runway (impervious road or runway, but not in developed areas)

Agricultural
6 Cultivated Crop (production of annual crops such as corn, potatoes, strawberries, and tilled barren fields)
7 Pasture/Hay (grasses are major vegetation, managed for harvesting as hay or grazing)

Natural
8 Grassland/Herbaceous (unmanaged grasslands - rare in Maine)
9 Deciduous Forest (> 20% tree canopy cover, > 75% of trees are deciduous)
10 Evergreen Forest (> 20% tree canopy cover, > 75% of trees are evergreen)
11 Mixed Forest (> 20% tree canopy cover, 25-75% are deciduous)
12 Scrub/Shrub (woody vegetation < 5m tall is > 20% of cover - typically regenerating fields, cuts, or rights-of-way)
13 Wetland Forest (freshwater wetland with > 20% tree canopy cover)
15 Wetland (all other wetlands)
19 Unconsolidated Shore (rocky shore, mudflats, sand beach, exposed lake shoreline)
20 Bare Ground (open quarries and pits, granite outcrops and peaks)
21 Open Water (water bodies typically > 10m wide)
23 Recent Clearcut (forested area with > 90% canopy removal 2001-2004)
24 Light Partial Cut (forested area with 20-50% canopy removal 1995-2001)
25 Heavy Partial Cut (forested area with 50-100% canopy removal 1995-2001)
26 Regenerating Forest (forested area with canopy increase 1995-2001)
6ft SLR simulation w/ 3 land cover classes
Acreages for 4 SLR Simulations, Natural & Agricultural vs Developed Lands as per MELCD
Excluded:
- Developed Lands
Excluded:
- Developed Lands
- Conservation Lands
Freshwater Wetlands

Coast-wide Intersection of 4 SLR Simulations with NWI
Wetlands vs Uplands (Natural & Agricultural)

SLR Simulation

1ft
2ft
3ft
6ft

acres
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000

Wetlands
Uplands
Thinking about planning
Thinking about planning
Thinking about planning steep slopes
Thinking about planning
Planning:
- limited benefit

Thinking about Planning:
steep slopes = limited long term benefit
Thinking about planning
Thinking about planning
Thinking about planning
Thinking about Planning: increased benefit longer term

York River - York
- Existing Tidal Marsh
- HAT plus 1ft SLR
- HAT plus 2ft SLR
- HAT plus 3ft SLR
- HAT plus 6ft SLR

Birch Hill Road
Step 5: Communicate results

- Results presented and shared with primary coastal conservation programs including Rachel Carson NWR, TNC, MCHT, as well as to reps from other orgs & agencies at several conferences

Sea Level Rise simulations are now being used to:

- Assist coastal towns in planning and preparing for SLR impacts
- Inform conservation planning
- Assess vulnerability at Maine’s most popular State Parks
- Start identifying sites with high resilience to climate change

Funded by:
Discussion
Thank you

- Next Webinar: 2nd Thursdays – April 9, 2015
- Next Call for Presenters to Follow

Questions and Comments?
Kimberly Roth
kroth@neiwpcc.org
978-349-2525