



Integrated Marsh Management (IMM) for Coastal Resiliency in Suffolk County, New York

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Integrated Marsh Management

- OMWM: Open Marsh Water Management
Biological/physical control of mosquitoes using techniques more compatible with resource values than ditching.
- IMM: Integrated Marsh Management Designed for multiple benefits and resources, such as wildlife use and invasive control. May include OMWM techniques where mosquitoes are a concern.
- IMM includes a variety of techniques tailored to the needs of a particular wetland
- IMM has evolved from OMWM and has largely been developed through the efforts of mosquito control agencies

Marsh Losses and Threats to Coastal Resiliency

- Salt marshes are losing ground to Rising Sea Level (RSL)
- Losses due to waterlogging of high marsh
- Losses to natural resource values
- Loss of marshes as coastal protective features



Wetlands and Coastal Resiliency Have Become a Big Federal Deal

- DOI (FWS, NPS) wetlands management projects in 7 States
- Approximately \$8.4 million in research/assessment alone
- Approximately \$56 million for IMM and IMM-like tidal wetland restoration/management on DOI lands
- National Fish and Wildlife Foundation (NFWF) coastal resiliency partnership projects-\$175 million effort, \$16M in wetlands management
- FEMA's Hazard Mitigation Grant Program (HMGP)
- Natural Resources Conservation Service (NRCS): Acquisition of coastal lands accompanied by restoration funds
- Post-Sandy efforts will transform the way we manage coastal wetlands, both in terms of techniques and process

The Wertheim NWR Demonstration Project and the Acceptance of IMM

- Demonstrated cooperative design with USFWS for multiple objectives; mosquitoes, vegetation, nekton, migratory birds
- Documented IMM benefits in the peer-reviewed literature with CTDEP, USFWS and academic authors
- Incorporated improved recognition of the need to respond to rising sea level (RSL) and waterlogging in the high marsh
- Adopted as a basis for Long Island projects

An Interagency, Cooperative Design Process is Key

- USFWS
- Corps of Engineers
- National Marine Fisheries Service
- State agencies
- Landowners
- NGO stakeholders



IMM Design Concepts

- Natural Resources: Restore habitat by replacing grid ditches with features designed to emulate natural tidal creeks and shallow ponds
- Mosquito control: Place open water features among mapped larval habitats
- Coastal Resiliency: Restoration of tidal circulation and placement of materials to address RSL and waterlogging impacts on high marsh

Major Features IMM

- Tidal Creeks
 - Ponds
- Shallow connecting channels
 - Filling select ditches
- Spreading excavated material
 - Tidal flow and circulation
- Plugging ditches is generally avoided due to RSL and waterlogging concerns

Tidal Creek Construction



Tidal circulation and exchange is of prime importance for all aspects of marsh ecology.



Pond/Connector System



Filling of Select Ditches



- Material removed from pond or channel construction used to fill select ditches
- Coir logs to reduce required material?
- Must be done in conjunction with channels (RSL)

A Filled Ditch



Thin layer placement of material



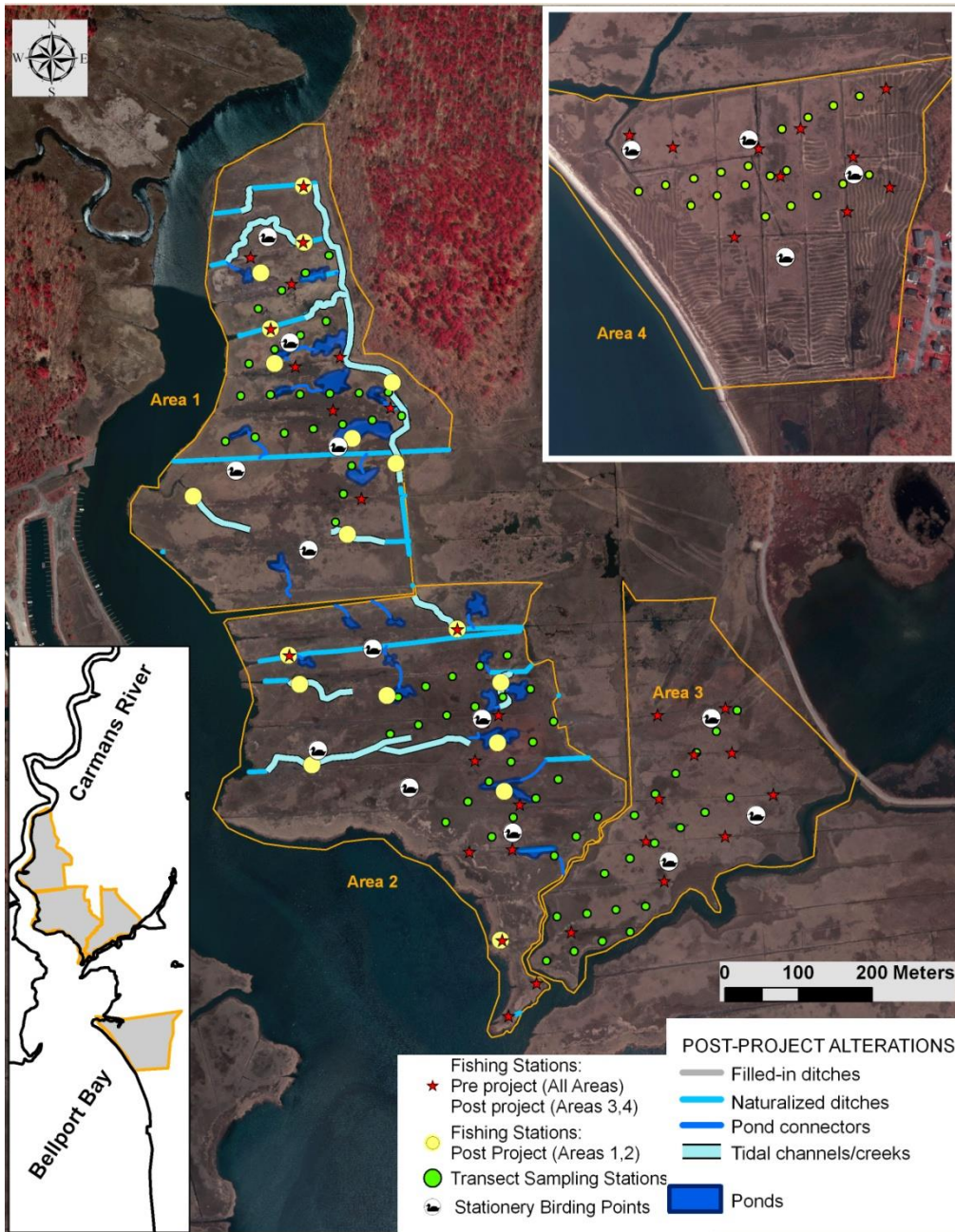
Placing material to compensate for waterlogging or subsidence, but elevation control, proper equipment and compatible materials are critical. An art and a science.





Design and Impact Assessment

- Pre-alteration and ideally 3-5 Seasons post alteration monitoring with reference sites
- Mosquitoes – GPS-assisted dip sampling
- Vegetation: Transect sampling, GIS mapping
- Nekton: Randomly selected stations along hydrologic features
- Birds – Fixed observation points
- Elevations through survey or LIDAR
- Tidal amplitudes/elevations
- SET's for sedimentation

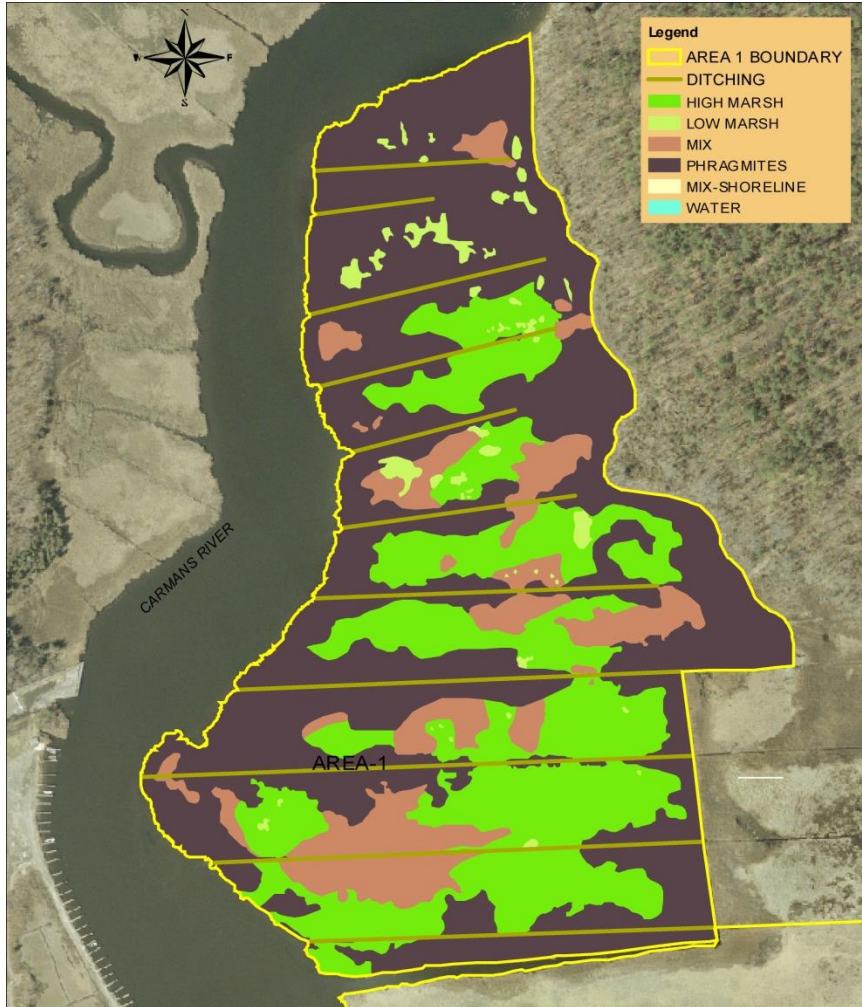


Key Measures of Success

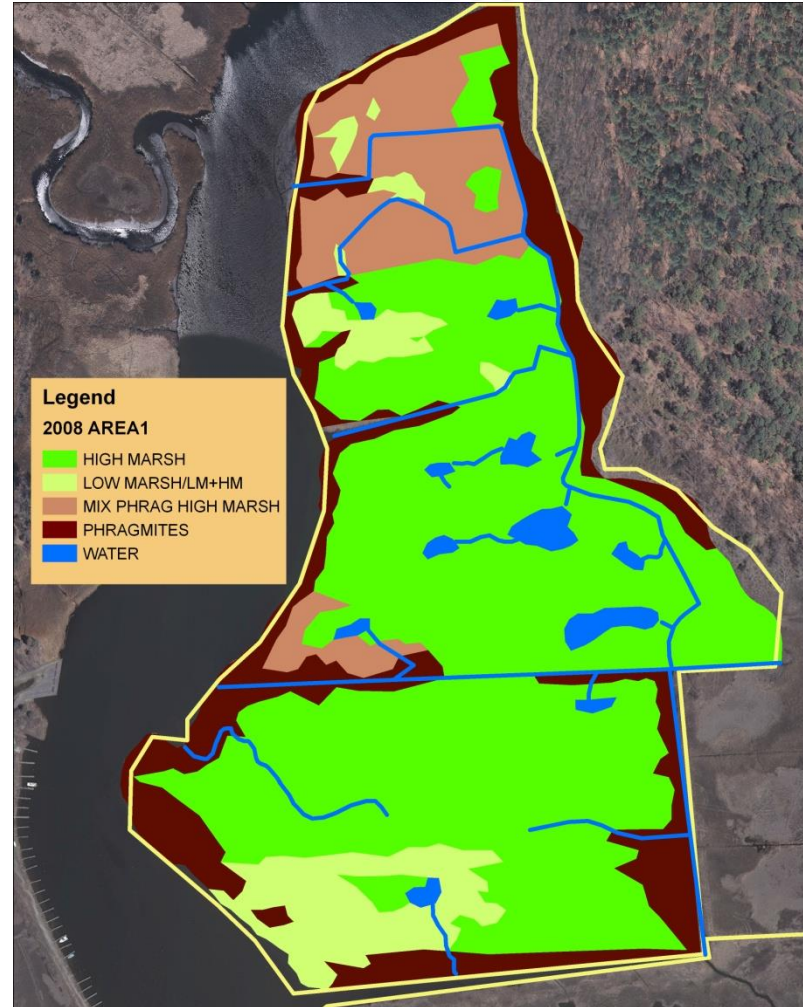
- Short Term – Mosquito larvae, vegetation, nekton and birds can be analyzed statistically and respond rapidly
- Long term – SET's can evaluate whether marsh is likely to keep pace with RSL, but long term mapping of vegetation is still needed.

Vegetation Composition Comparison Area 1

2004



2008



Post-Sandy IMM in Suffolk County - Transformation

- USFWS – \$7 million for IMM at Wertheim and Seatuck NWR's – 400 acres
- NFWF – Suffolk County with State, Town and NGO partners - \$1.3 million, 200+ acres
- HMGP - \$ 535K for 50 acre Smith Point marsh
- NRCS - \$600K for 60 acres in Mastic Beach
- 700+ acres, almost all subject to aerial larvicide
- Half our aerial larvicide acreage

Issues, Challenges

- Rapid ramping up of IMM requires use of contractors that may have limited IMM background and even more limited mosquito expertise
- Federal funds come with stringent limitations, extensive documentation and an IG
- Tight timelines, especially for NFWF
- Little or no funding for follow-up, adaptive management (leaving this to MCA's?)
- These projects will heavily influence future efforts

Conclusions

- Linking wetlands to coastal resiliency is a BFD in the post-Sandy era
- Change is coming in how salt marshes are managed in the Northeast.
- Results on Federal marshes will reverberate
- These projects are likely to set new standards in project design process, techniques and monitoring.
- Mosquito control agencies originated IMM and need to stay involved.
- There is a tremendous opportunity for quality marsh management.

Thanks to the People Who Are Making It Happen

- **USFWS:** Sue Adamowicz, Michelle Potter, Monica Williams
- **CT DEP:** Paul Capotosto, Roger Wolfe
- **NYDEC**
- **SC Dept. of Planning and Environment**
- **The resilient team at Suffolk County Vector Control**