

# COASTAL RESTORATION IN THE NEW JERSEY MEADOWLANDS (IN THE FACE OF



CLIMATE CHANGE)

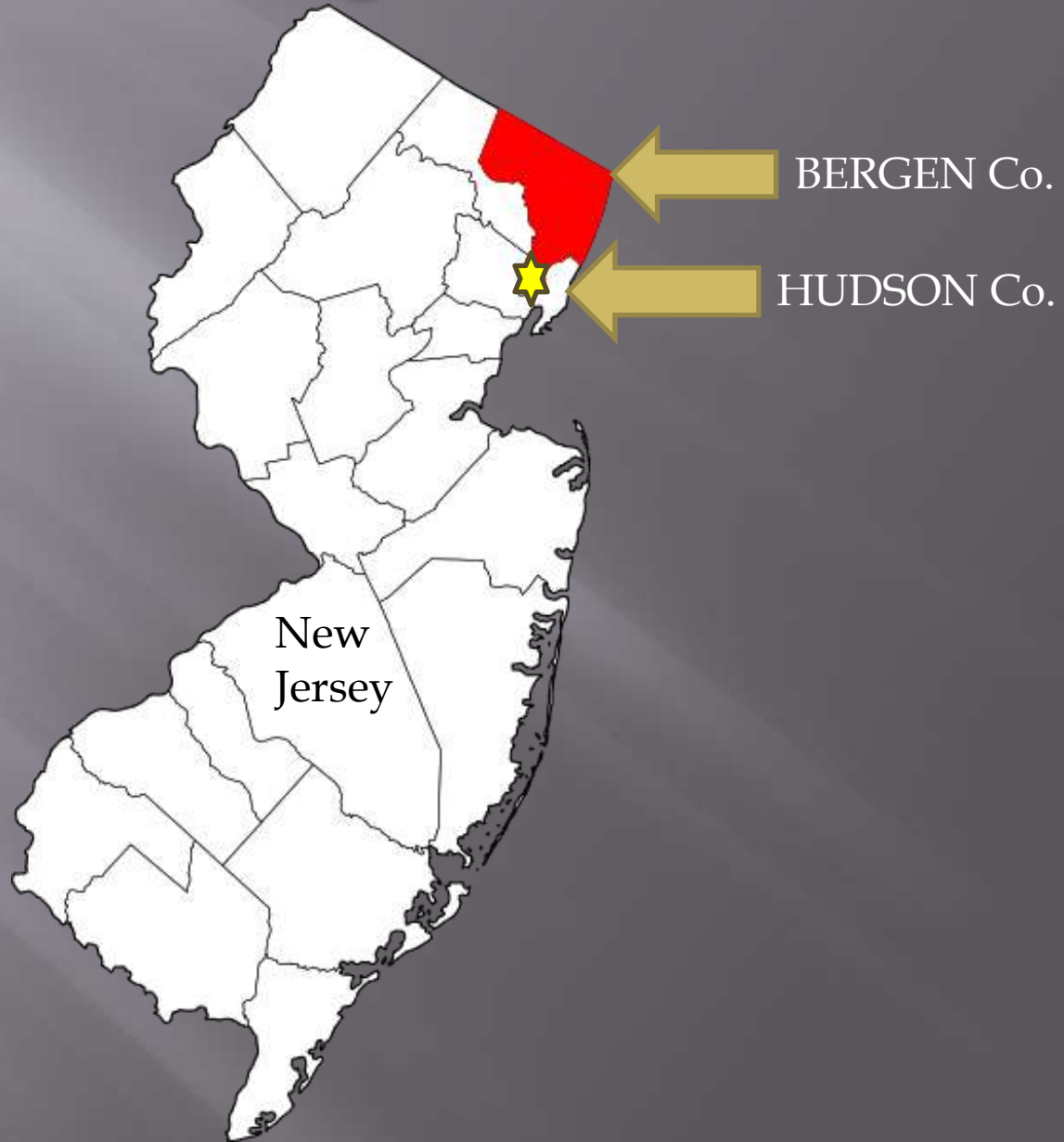
2nd National Stream Restoration  
Conference

August 2023

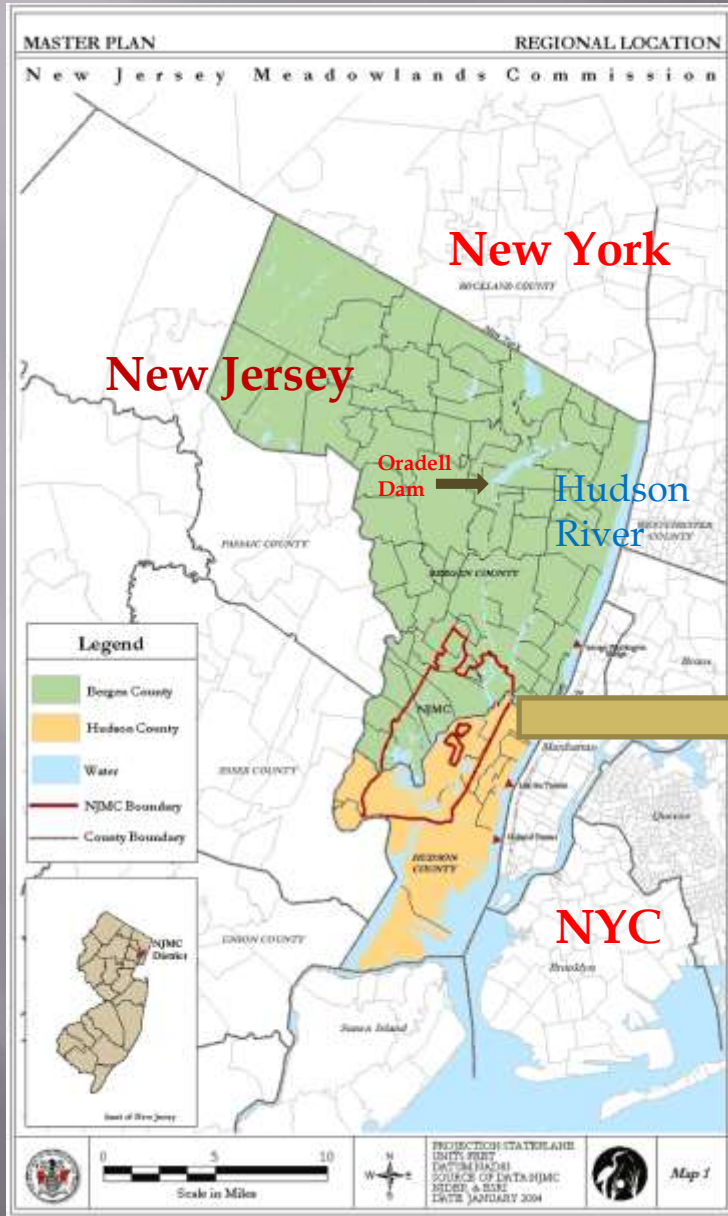
By Richard K. Mogensen, SPWS

**Mogensen Mitigation Inc.**

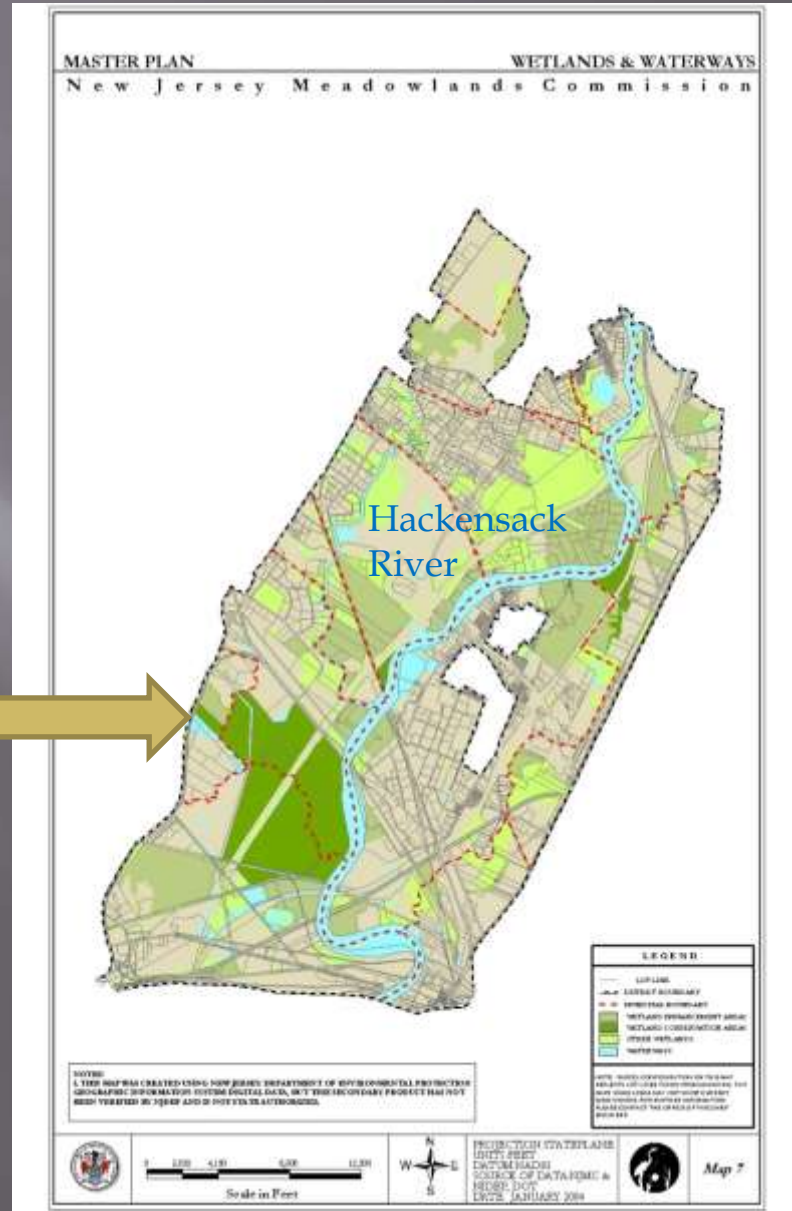
# Hudson & Bergen Counties, NJ



# New Jersey Meadowlands



Northern New Jersey



Meadowlands District

# Meadowlands Historic Maps



# What is the New Jersey Meadowlands District?

- ❖ A 32-square mile political district within Bergen and Hudson Counties, NJ. Established in 1968 with control given to a regulatory body known as the Hackensack Meadowlands Development Commission (HMDC) now called the New Jersey Sports and Exposition Authority (NJSEA)
- ❖ Provided landfills for NYC and transportation corridors for 50 years
- ❖ Located three miles from NYC

# What are the New Jersey Meadowlands?

- ❖ Also known as the Hackensack Meadowlands, the Meadowlands, the Jersey Meadows and the Hackensack Tidal Marsh
- ❖ Formerly a mixture of Atlantic white cedar swamps, freshwater intertidal creeks and marshes with scattered uplands
- ❖ The geographic area is bisected by the Hackensack River and includes a small reach of the Passaic River and all of Berry's Creek (once called the most polluted creek in the US)

# The Meadowlands, Home of...

- ▣ **Metlife Stadium and the Meadowlands Racetrack**
- ▣ **Tony Soprano**
- ▣ **Mountains of garbage**



- ▣ **Buried WWII munitions and dead mobsters (Jimmy Hoffa?)**
- ▣ **Rubble from London buildings destroyed in the Battle of Britain - brought over as ballast on early ships**
- ▣ **Radio Towers and Super Highway Flyovers**
- ▣ **The American Dream Shopping Complex**

# Did I say Landfills?

Hey use guys,  
look what I  
found in Jersey.  
Just off the  
Turnpike!



09.17.2015



# OH, DID I MENTION PHRAGMITES?

COMMON REED

Non-Native Reed  
(HaploType M) - 15' tall

Native Reed - 6-8' tall



But -The Meadowlands is also  
home of...



- ❖ **World Class Birding**
- ❖ **Riverkeeper Eco-Tours**
- ❖ **Thousands of Restored Intertidal and Freshwater Wetlands**
- ❖ **Cutting Edge Research and Restoration Technologies**
- ❖ **Much more in the works**



# A Brief History of the NJ Meadowlands

- ▣ The Meadowlands were created by receding glaciers over 10,000 years ago
- ▣ Low lying coastal areas near New York City supported an incredible amount of wildlife as it was a primary stopover for migrating birds along the east coast
- ▣ Prior to 1800, the Meadowlands were largely intact.





Atlantic white cedar  
swamps in the 1800's



Then some changes came along...

## WETLANDS WERE HISTORICALLY CONSIDERED WASTELANDS



“Swamplands are a blur upon the fair face of Nature: they are fever breeding places; scourges of humanity; which instead of yielding the fruits of the Earth and adding wealth to the general community, only supply the neighboring places poisonous exhalations and torturing mosquitos. They are, for all practical purposes, worthless. And the imperative necessity for their reclamation is obvious to all, and universally conceded.” *from “The New System of Reclaiming Lands” 1887*

As late as 1969, wetlands naturalists John & Mildred Teal would declare “Marshes are generally considered useless land that should be made useful as quickly as possible.”

# Historic Land Uses/Abuses 1 (1800's)

- ❖ Extraction – oysters, fowl, fish, small mammals
- ❖ Extraction – Land diked and ditched by European settlers to grow salt hay – primarily for livestock feed
- ❖ Alteration of Water Flow changed water distribution and water salinity
- ❖ Natural sea level rise
- ❖ Construction of dams, canals and dikes
- ❖ Dredging and deepening of Hackensack and Passaic Rivers for navigation

# Historic Land Uses/Abuses 2 (1900's)

- ❖ Reclamation/Land Making/Development
  - ❖ Only about 20% of the original wetlands remain

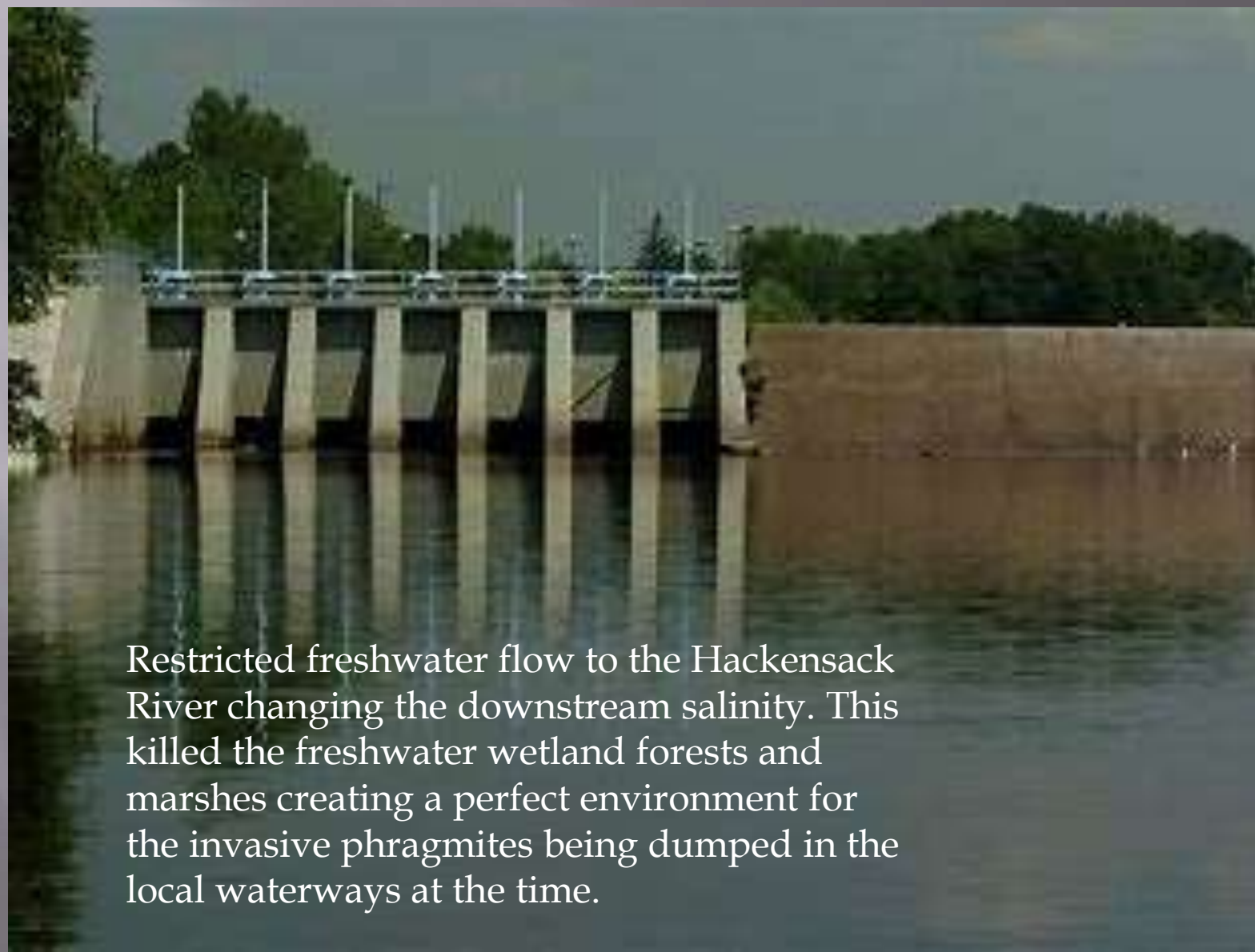


- ❖ Pollution by Sewage and Refuse
  - ❖ Landfills from NYC garbage



# Historic Land Use/Abuses 3

## Oradell Dam Built in 1923



Restricted freshwater flow to the Hackensack River changing the downstream salinity. This killed the freshwater wetland forests and marshes creating a perfect environment for the invasive phragmites being dumped in the local waterways at the time.

# Now for some good news... over 1,000 acres restored

## **1980s (277 ac)**

DeKorte Park Restoration  
Bellman's Creek Marsh Mitigation  
Carpet Mountain Mitigation  
Cromakill Mitigation  
Eastern Brackish Mitigation  
Mill Creek Marsh Mitigation  
Vince Lombardi Mitigation  
Western Brackish Marsh Mitigation

## **1990s (308 ac)**

Bellemeade Mitigation  
Eighty Assoc. Wetland Mitigation Site  
Harrier Meadow Wetland Enhancement  
Hess Mitigation Site  
Marsh Resources I & II Mitigation Bank  
Pan Am Freshwater Wetland Mitigation  
Russo Ponds Mitigation Site  
Skeetkill Creek Marsh Mitigation Site

## **2000s (238 ac)**

Encap Wetland Mitigation Site  
FD&P Wetland Mitigation  
Franks Creek Mitigation Site  
Hudson County Improvement Authority  
Mill Creek Wetland Enhancement Site  
NJSEA Wetland Mitigation  
Norfolk Southern Railway Company  
Secaucus High School Wetland Enhancement  
WLIB Radio Towers

## **2010s (306 ac)**

Global Terminals Wetland Mitigation Site  
Marsh Resources Phase III Mitigation Bank  
NYS&W Railroad Mitigation Site  
Richard P. Kane Freshwater Wetland Mitigation  
Richard P. Kane Tidal Wetland Mitigation Bank  
Rockefeller Group Development Mitigation Site

## **2020s (13 ac)**

FAA Mitigation Site on Losen Slote

RESTORATION IN THE MEADOWLANDS OVER THE LAST FOUR DECADES



# Various Restoration Projects along the Hackensack River



**Hartz  
Mtn. Mit.**

**Mill Creek  
Restoration**

**Secaucus HS  
Restoration**

Williams Nat.  
Gas LNG Tanks

Marsh Resources  
Inc. I & II Bank

MRI III

**"Mogy's  
Meander"**

Empire  
Tract

**Vince  
Lombardi  
Mit. Site**

NJTPK

**Kane Tidal  
Mit. Bank**

Hackensack  
River

Kane  
Freshwater  
Forested  
Mitigation

# Meadowlands Research & Restoration Institute (MERI)

- ❖ Under the authority of the New Jersey Sports and Exposition Authority (NJSEA)
- ❖ Mission: “to generate knowledge and predictive understanding necessary to sustain and conserve the Hackensack Meadowlands Estuary and through scientific endeavor foster the next generation of earth and environmental scientists. “
- ❖ Formerly the Hackensack Meadowlands Development Commission (HMDC)
- ❖ NJSEA acts as a regulatory and economic development agency (Hmm.....)

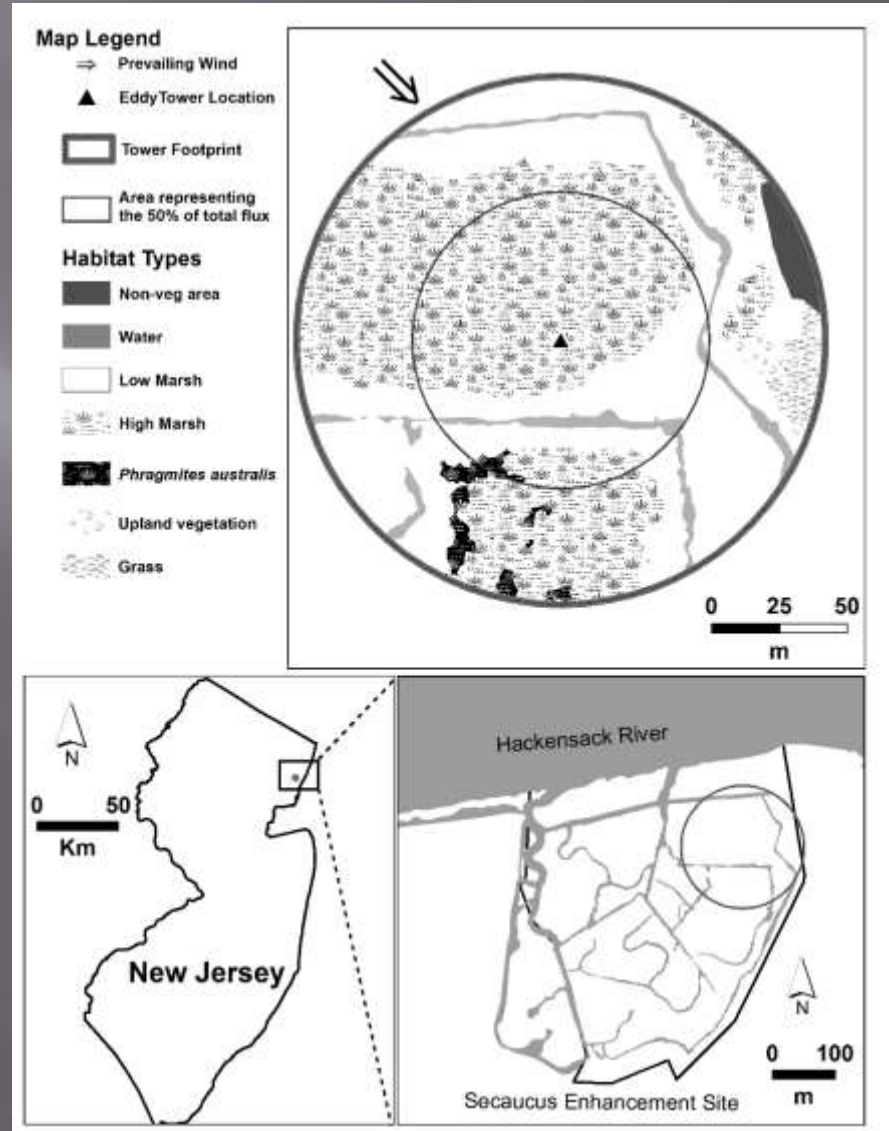
# Climate Change Research

- ❖ MERI, Rutgers University & City of Newark is sponsoring CO2 SINK STRENGTH OF A RESTORED MARSH
- ❖ Goal: “Estimate the Net Ecosystem Exchange (NEE) of dominant wetland communities at an enhanced salt marsh site”
- ❖ Layman Interpretation: Use fancy equipment to determine if restored spartina marshes are good at sequestering carbon

# Strength of a Restored Marsh (To Act as a Carbon Sink)



Sonic Anemometer with  
an Eddy Flux Tower  
(Fancy Equipment)



# Richard P. Kane Mitigation Bank – A Case Study

Do you really  
think this is going  
to work Ed?

George Shaw  
(GeoCon)

Peg McBrien, PE  
(LBG/WSP)

Ed Samanns, PWS  
(LBG/WSP)

2010/07/20





# Existing Conditions

Invasive Common Reed - Non-Native  
*Phragmites australis* (Haplo-type M)



Trash & Contamination  
Clean Up



Remove  
Existing  
Perimeter  
Berms

# KANE BANK HISTORY

- ▣ Meadowlands Conservation Trust (landowner) issued an RFP to Private Mitigation Bankers in 2008
- ▣ EarthMark teamed with The Louis Berger Group (now WSP) and was the successful bidder
- ▣ Other team members included GeoCon (grading contractor), The Dawson Corporation (planting contractor), Wolff & Samson (legal), EnviroFinance Group (\$\$)

# Kane Bank Timeline

- ▣ Lease contract finalized January 2009
- ▣ IRT/MIMAC approved the MBI  
March 2010
- ▣ Construction began April 2010
- ▣ Grading complete December 2010
- ▣ Planting complete June 2011
- ▣ Monitoring is ongoing - project is  
deemed successful despite challenges

# Freshwater Restoration Strategies

- ❖ Treat the invasive Phragmites (Haplo-Type M) with herbicide
- ❖ Build concertainer berm between freshwater and restored tidal wetland areas
- ❖ Establish micro-typography and bedding
- ❖ Plant thousands of native bottomland hardwood trees and shrubs

# Tidal Restoration Strategies

- ❖ Treat the invasive Phragmites (Haplo-Type M) with herbicide
- ❖ Restore tidal hydrology by:
  - ❖ removing existing 4-5' high perimeter berms along the Hackensack River
  - ❖ lower an existing large diameter, high pressure natural gas pipeline
  - ❖ excavate a network of tidal channels
- ❖ Plant millions of native spartina marsh grasses
- ❖ Build 10' high flood control perimeter berm protecting surrounding towns and neighboring developments

# Existing Conditions



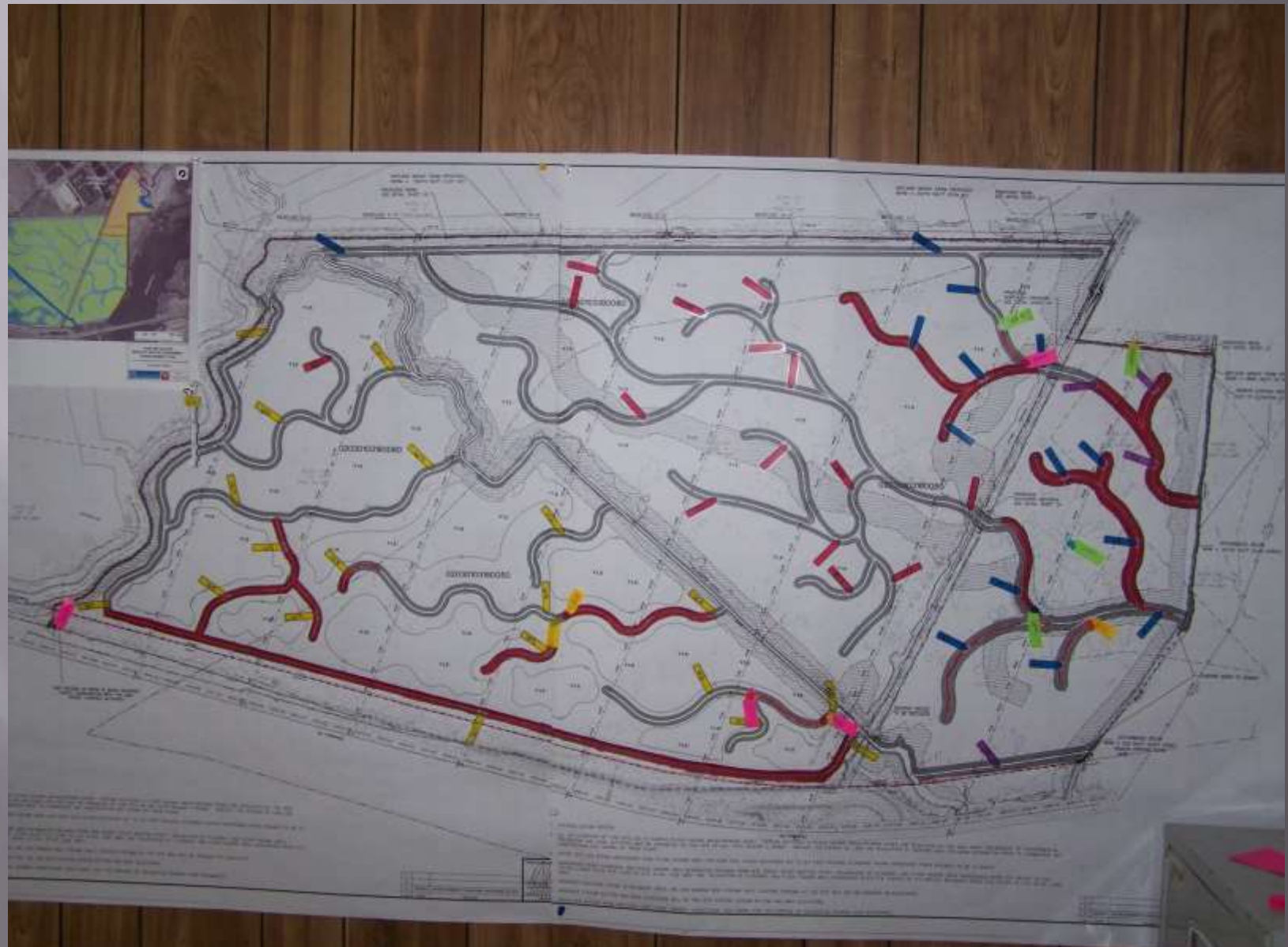
Hackensack River

Existing MRI Bank

Proposed Tidal Kane Bank

Doctors Creek

# Mitigation Plans



# Trash Removal - No Jimmy Hoffa





# Grading: Specialized Equipment

An army of  
Maroocas



A dozen long-reach  
excavators worked at the  
same time



Heavy equipment  
worked on timber mats



# Specialized Grading Techniques

Long-reach  
excavators  
worked on  
timber mats



# Re-establishing Natural Marsh Elevations

Concertainer  
Berm for Flood  
Control



01/13/2006

# Planting and Watering



# New Tidal Channels



MRI Bank

KANE  
BANK

Photo by Jim  
Wright, NJMC

# Concertainer Berm Installation



Individual cells are filled with clay

2010/07/21

# Berm Installed and Functioning



# That fall: Super Storm Sandy Took Aim and Hit





# Many Unusual Challenges

- ▣ Public/Private “Partnership”
- ▣ FAA concerns due to proximity to Teterboro Airport
- ▣ High mercury levels in sediments
- ▣ Agency scrutiny of innovative berm design (HESCO Concertainers) - Flood prevention a requirement
- ▣ Lowering a 36” diameter natural gas pipeline required
- ▣ Adaptive Management required (additional channels needed)
- ▣ Ultimately: Politics

# Other Issues



Egrets Good



Canada Geese Bad



Contaminated  
Sediments Bad

2010/07/20



Clean Soil Good

2010/07/20

# Canada Goose Prevention



# The Growth of a Restored Healthy Marsh



# Truly Urban Restoration - Yes that's the Empire State Building



# This is What You Got



# This is What You Want



# A Rare Harp Seal Paid a Visit





# PROUD PARENTS!



Richard P.  
Kane

Richard K.  
Mogensen



THE END!

A picnic in Meadows in the 1800's