



*Tern restoration in Cape Cod,
Massachusetts: Past, Present and Future*

Ellen Jedrey, Coastal Waterbird Program



Outline

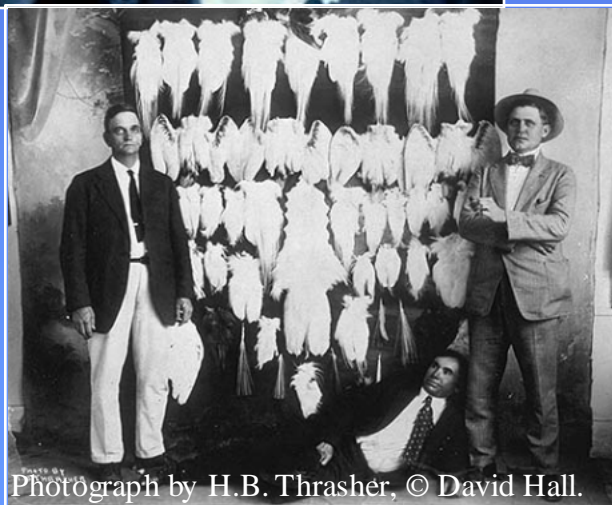
- Brief history of the Coastal Waterbird Program at Mass Audubon
- Focal species: Least Terns
- How renourishment projects relate to past and present Least Tern restoration
- Examples:
 - Tern Island
 - Dead Neck Sampsons Island
- Management considerations for beach renourishment and use of electric fencing
- Future research and projects



Conservation and Protection for over 100 years



In 1896, the Massachusetts Audubon Society was formed to protect shorebirds, wading birds and seabirds from overhunting by market gunners, in part due to the millinery trade



Photograph by H.B. Thrasher, © David Hall.

Photo © Smithsonian Institution, Neg. # 98-3487

Coastal Waterbird Program: Focal Species



Coastal Waterbird Program Goals

- Conserve and protect Massachusetts coastal ecosystems through informed management based on research
- Monitor and protect rare and threatened coastal birds



How CWP accomplishes these Goals



- Conduct field based research and monitoring of shorebirds, seabirds and coastal habitats
- Consult with federal, state, and local governments, and private landowners, and provide management recommendations for coastal birds
- Manage and protect nesting sites
- Provide educational programs and advocacy for coastal conservation issues



**CWP protection
provides benefits
for migratory and
wintering species of
birds and coastal
ecosystems**

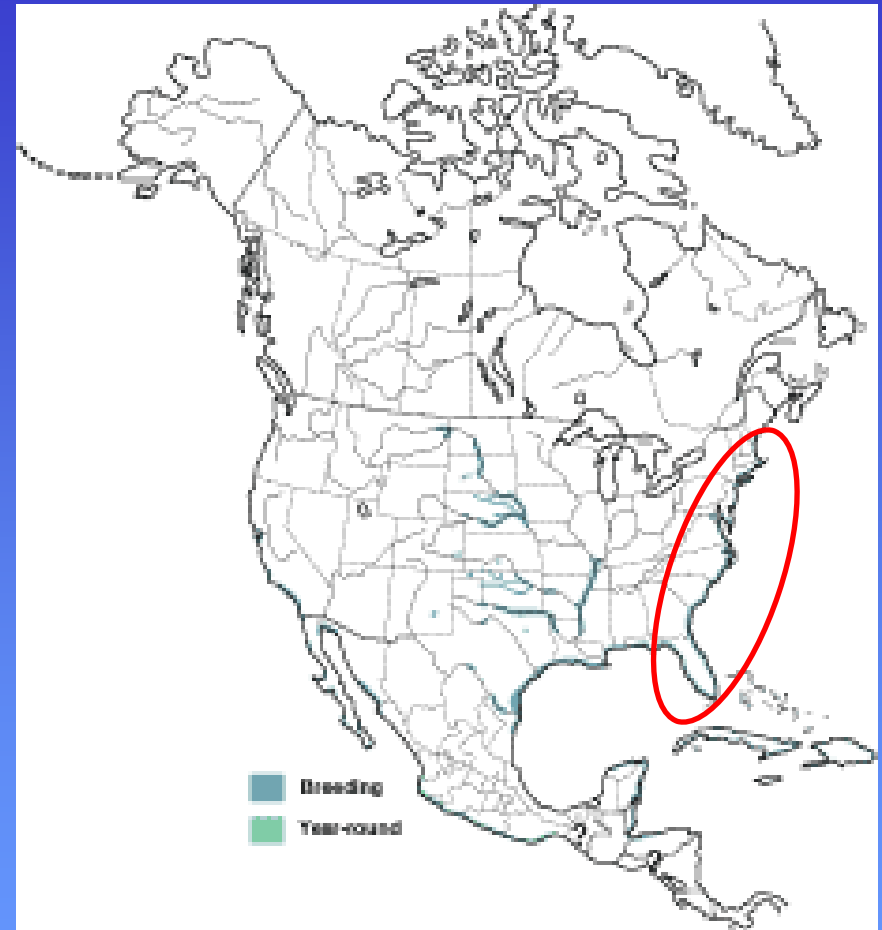


Coastal Bird Challenges: Natural and Human Related

- Storms
- High tides
- Predation
- Coastal development
- Off-road vehicles
- Crowded beaches



Natural History: Least Tern (*Sterna antillarum*)



- Listed as a Species of Special Concern in Massachusetts and is state listed throughout most of its range on the Atlantic Coast

- ~40,000 pairs on Atlantic Coast (estimate from late 1980s)

Thompson, B. C., et. al. 1997. Least Tern (*Sterna antillarum*). In *The Birds of North America*, No. 290 (A. Poole and F. Gill, eds.). Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Natural History: Least Tern (*Sterna antillarum*)

- A long-lived seabird (up to 24 years); therefore population declines may take many years to be recognized
- Nests in colonies usually, 10s to 100s of pairs
- On New England coast, dependent upon dynamic coastal processes to provide nesting habitat
- Are adapted to respond to changes habitat quickly and will shift entire colonies to new sites; can renest up to 3-4 times in response to tidal overwash, predation, etc.



Natural History: Least Tern (*Sterna antillarum*)

Foraging Habitat

Bays

Lagoons

Estuaries

River mouths

Tidal Marshes

Lakes

Preferred Prey

Juvenile (and larval?) Herring,
Hake, Sandlance

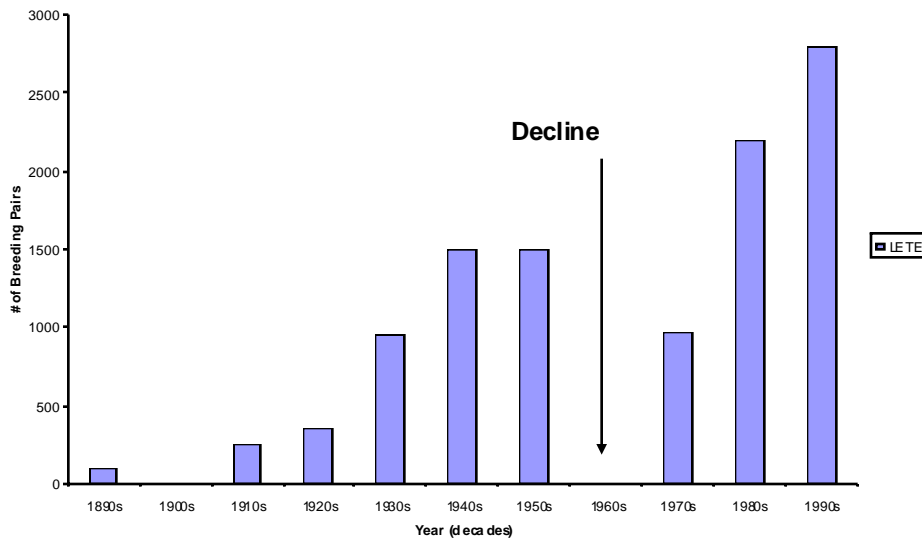
Other small fish 2 - 9 cm

Aquatic invertebrates

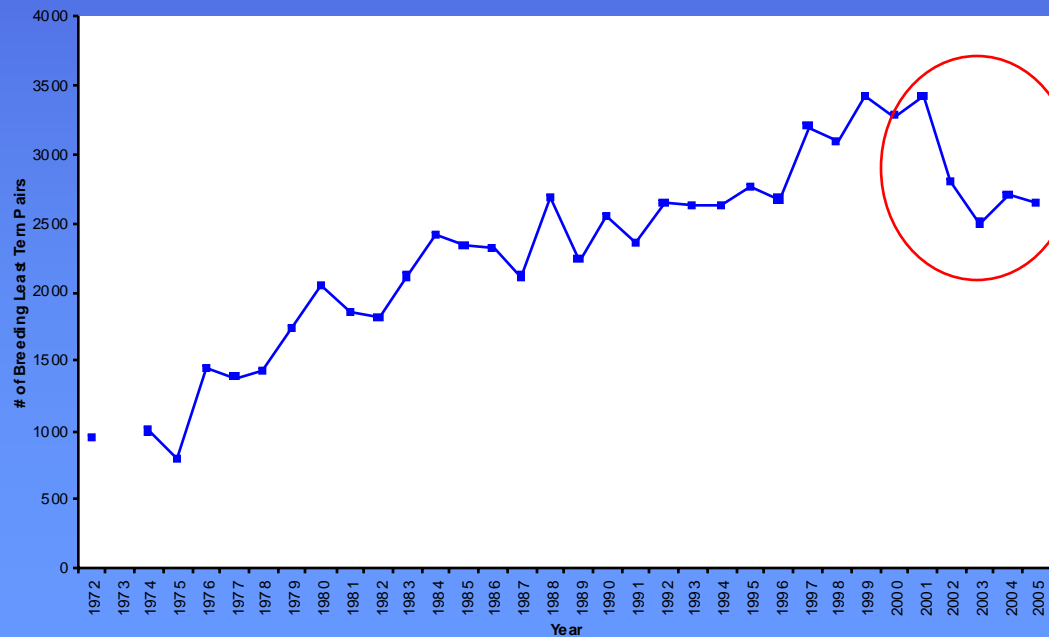
Insects



Ten Year Averages of the Number of Pairs of Least Terns Breeding in Massachusetts, 1890s - 1990s



Number of Least Tern Pairs Breeding in the Commonwealth of Massachusetts, 1972 - 2005



Unpublished data provided by Carolyn Mostello, MA Natural Heritage and Endangered Species Program

Data prior to 1980s taken from: Nisbet, I.C.T. 1973. Terns in Massachusetts: Present Numbers and Historical Distribution. Bird Banding. Vol 44 (1): 27-55.

Typical Response of Least Terns to Renourished Beaches

- Terns arrive in May, and often immediately settle in areas after renourishment occurs (projects not conducted after April 1 in MA)
- #s of pairs of Least Terns usually increase for the first 1-3 years after renourishment, followed by a decline over the next 2-3.
- Declines could be due to predators keying in on sites, encroachment of vegetation, abandonment, etc.



Dredging Projects and CWP Cooperation

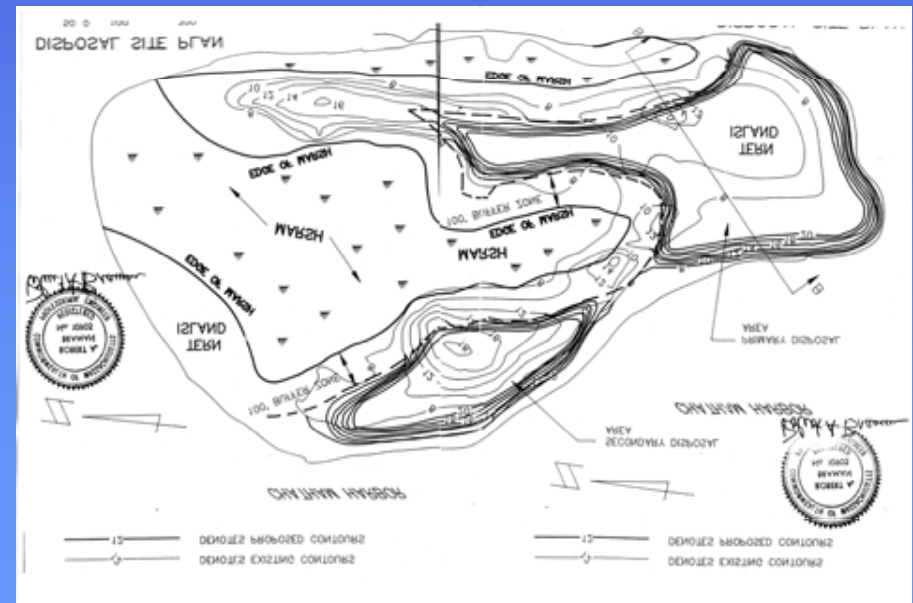
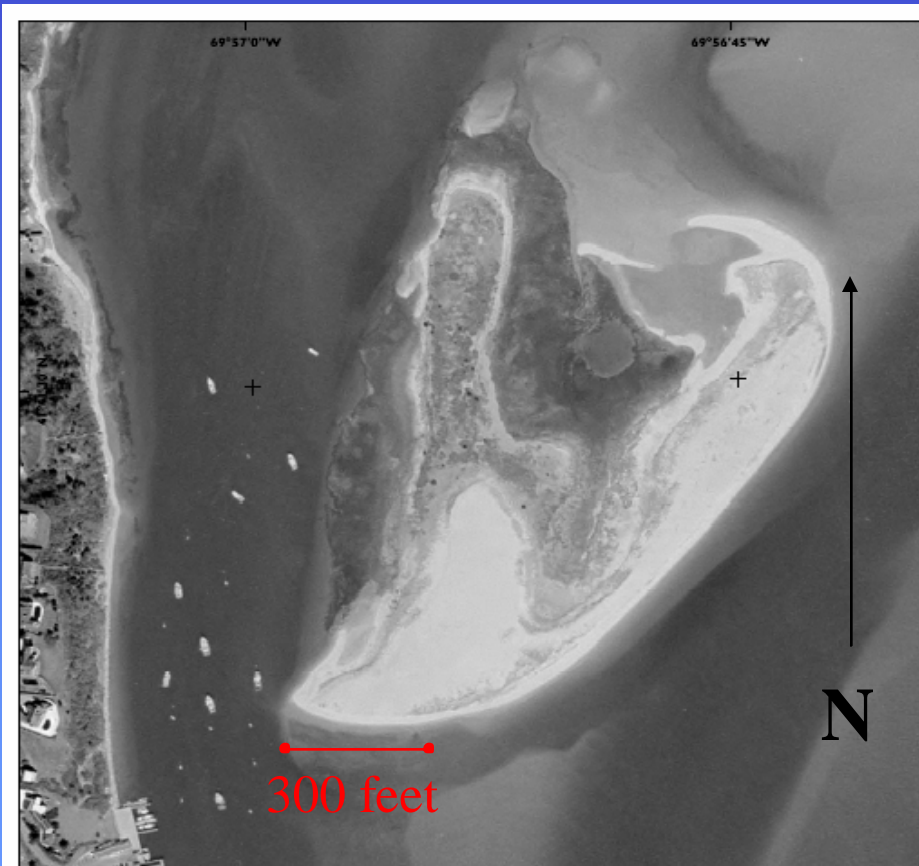


- During the past 19 years, CWP has consulted on many dredging operations in MA
- most projects are **small-scale**, sponsored by local towns and private landowners
- **Guesstimate:** roughly 80% of the beaches CWP monitors have had some kind of dredging and/or renourishment operation during the past 70+ years, mostly for navigation and tidal flushing.
- CWP has not initiated requests for renourishment projects for restoration; instead projects are initiated by landowners, towns, etc.
- Therefore, renourishment projects and dredging are of high priority and concern to Mass Audubon and CWP staff

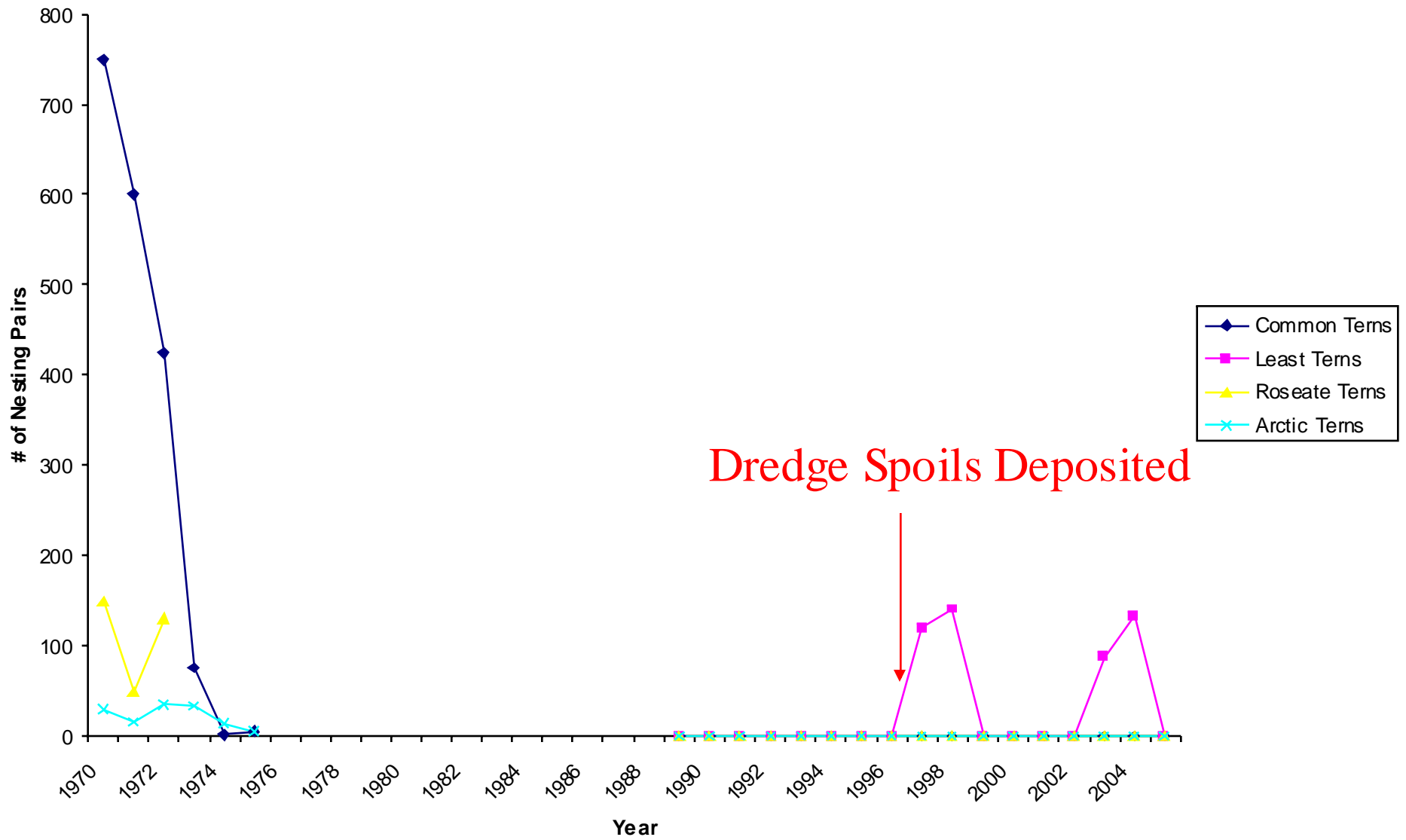
Tern Island, Chatham, MA

- History of Island under Mass Audubon management
- History of Dredging
- History of Tern Colonization of the Island
- Electric Fencing

Tern Island, Chatham



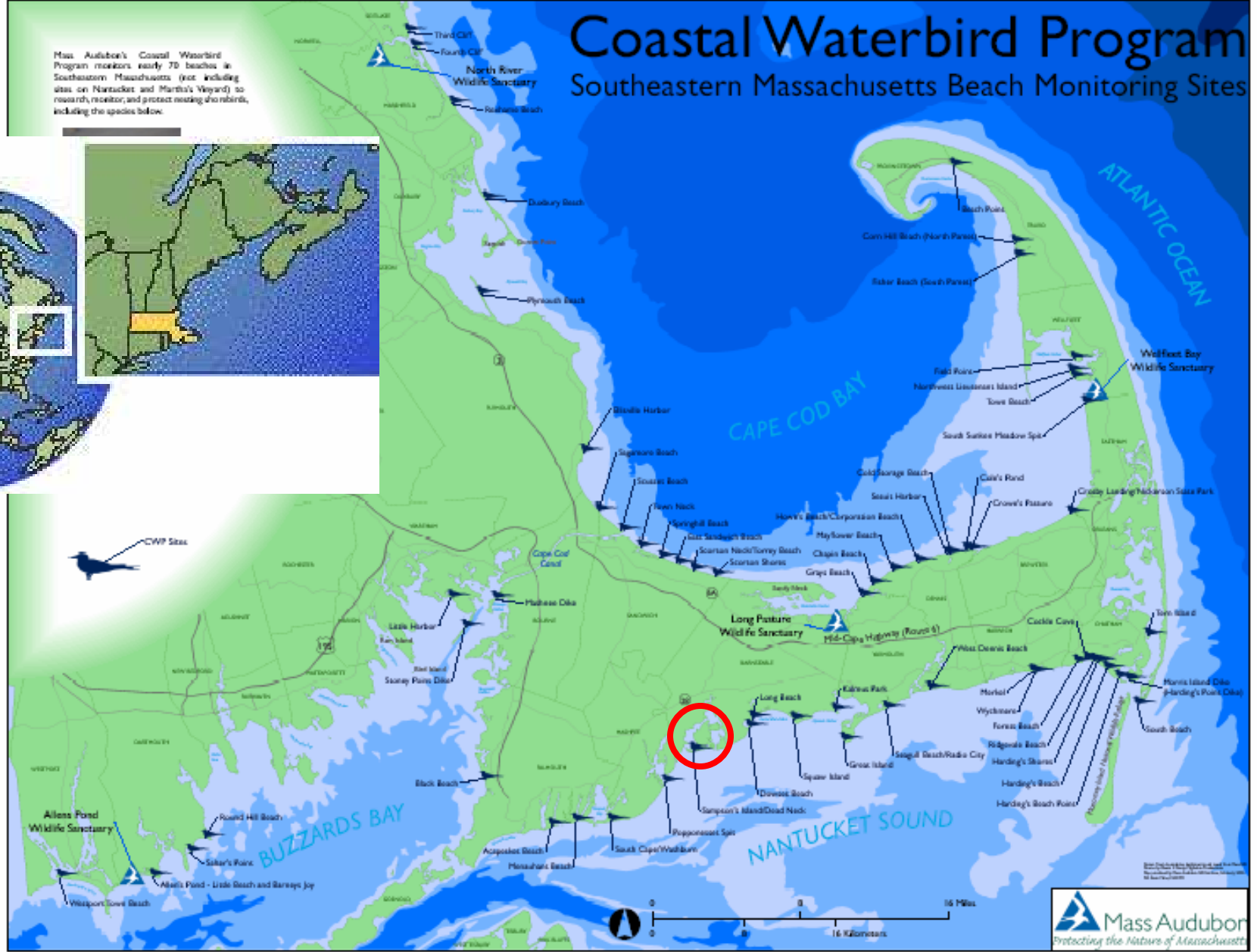
Tern Pairs Nesting at Tern Island, Chatham, Massachusetts, 1970 - 2005



Coastal Waterbird Program

Southeastern Massachusetts Beach Monitoring Sites

Mass Audubon's Coastal Waterbird Program monitors nearly 70 beaches in Southeastern Massachusetts (not including sites on Nantucket and Martha's Vineyard) to research, monitor and protect nesting shorebirds, including the species below.



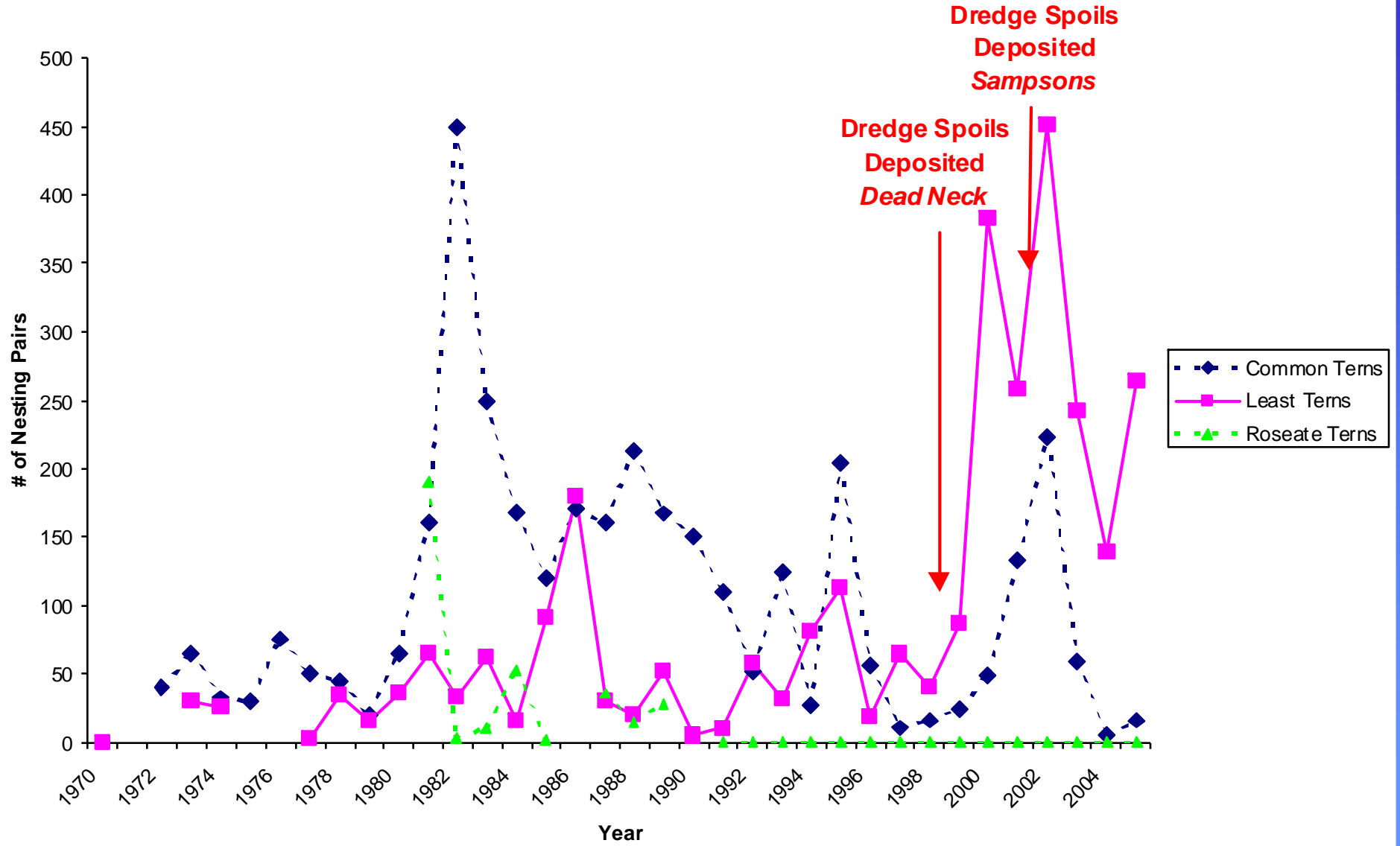
Dead Neck Sampsons Island, Osterville, MA

- History of Island under Mass Audubon management
- History of Dredging
- History of Tern Colonization of the Island
- An Example of the Use of Electric Fencing as a tool for future Management

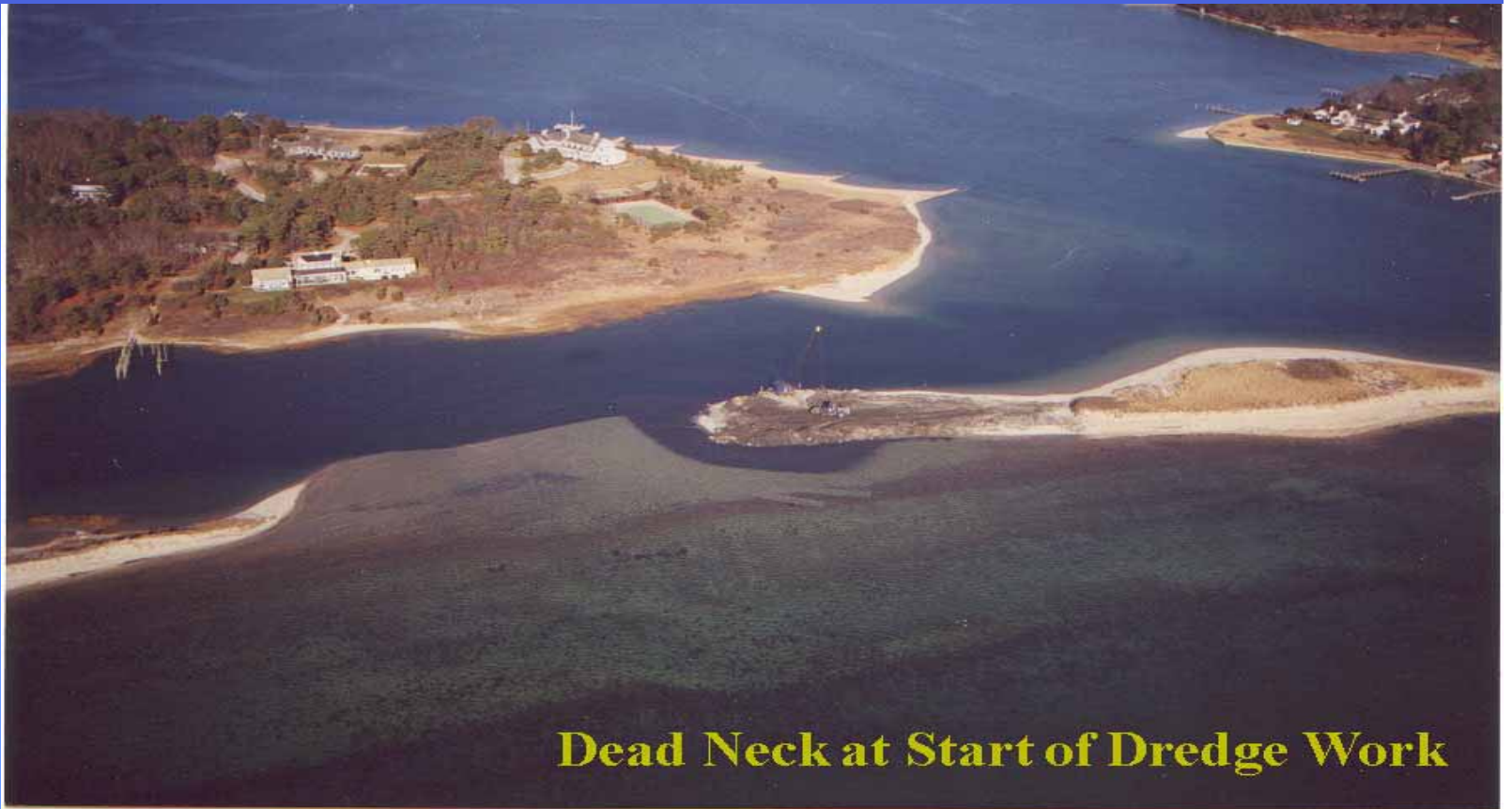
Dead Neck Sampsons Island



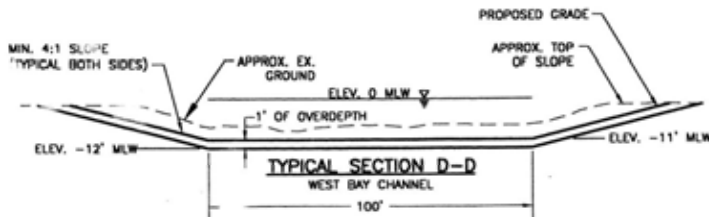
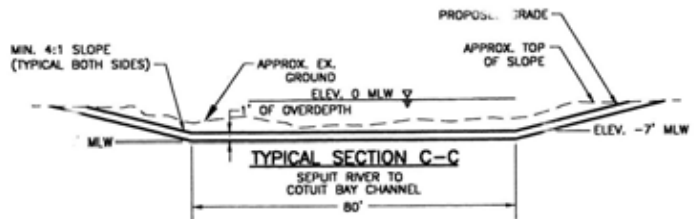
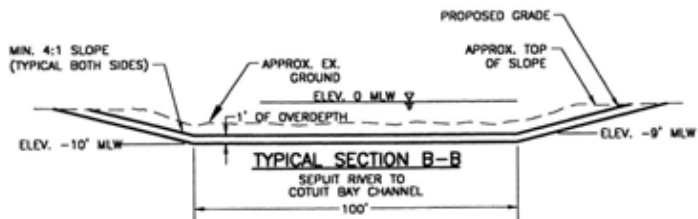
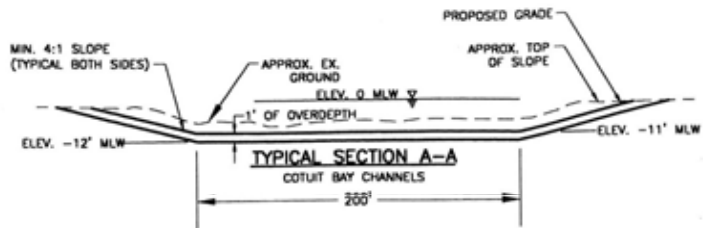
Pairs of Terns Nesting at Dead Neck Sampsons Island Osterville, Massachusetts, 1970 - 2005



Dredging Operations: a response to protecting homes and safe navigation

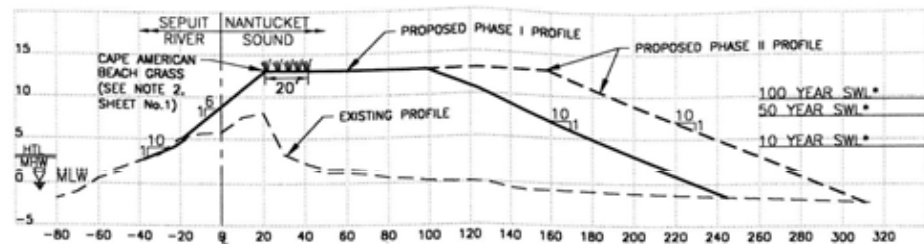


Dead Neck at Start of Dredge Work



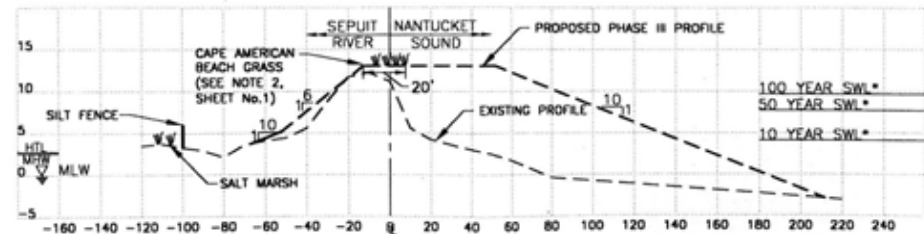
--- EXISTING GROUND
 --- PROPOSED DREDGING TEMPLATE
 NOTE: IN AREAS OF HIGH SHOALING,
 1' OF ADVANCED MAINTENANCE DREDGING
 WILL BE PERFORMED.

ELEV. 2.8 HTL
 ELEV. 2.5 MHW



SECTION E-E

DEADNECK BEACH NOURISHMENT
 STA. 0+00 TO STA. 15+00
 PHASE I AND II



SECTION F-F

DEADNECK BEACH NOURISHMENT
 STA. 15+00 TO STA. 24+00
 PHASE III

LEGEND

- EXISTING PROFILE
- PROPOSED PHASE I PROFILE
- FUTURE PROFILE (PHASE II AND III)
- SWL = STILL WATER LEVEL

NOTE: ALL ELEVATIONS ARE IN FEET AND REFERENCE MLW.

SCALE HORIZONTAL 1"=60'

REV	DATE	DESCRIPTION	BY
		THREE BAYS PRESERVATION, Inc. OSTERVILLE, MASSACHUSETTS	
		RESTORE OSTERVILLE WATERWAYS AND DEAD NECK BEACH NOURISHMENT	
CHANNEL AND BEACH CROSS SECTIONS			

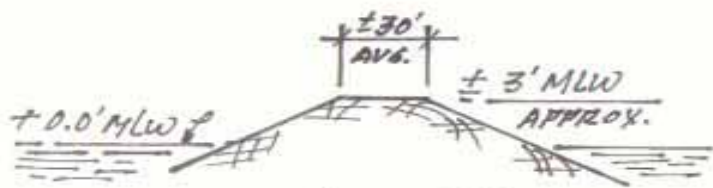
Pre and Post Dredging

DEAD NECK (LOOKING EAST TO WEST)

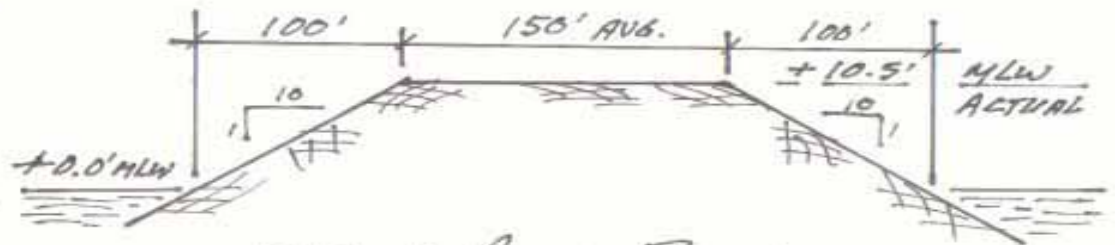
BEFORE - 2 FEB 98



AFTER - 17 JULY 99



TYPICAL BEFORE PROFILE



TYPICAL AFTER PROFILE

Photos by Cote Photography

Longshore Sand Transport



Sand From Here

Moves to Here

Dead Neck Looking East

Planted Vegetation on Dead Neck



Vegetation and Fencing, Dead Neck



Number of Pairs of Nesting Least Terns and Common Terns on the Dead Neck Portion of Dead Neck/Sampson's Island, Osterville, MA 1999 - 2005

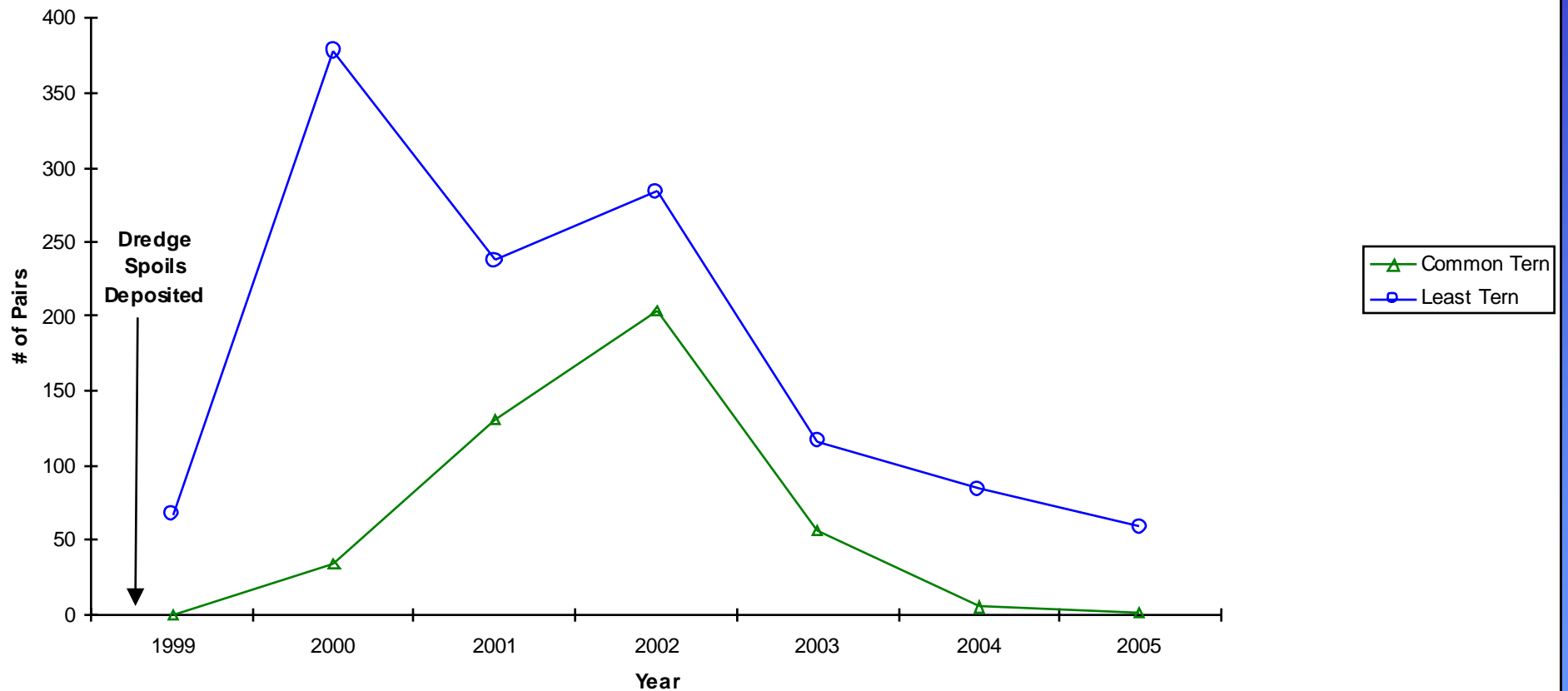


Figure showing dramatic response of breeding Least Tern pairs, however numbers have declined due to veg encroachment and predation

Dead Neck Sampsons Island



Sampson Pre Renourishment



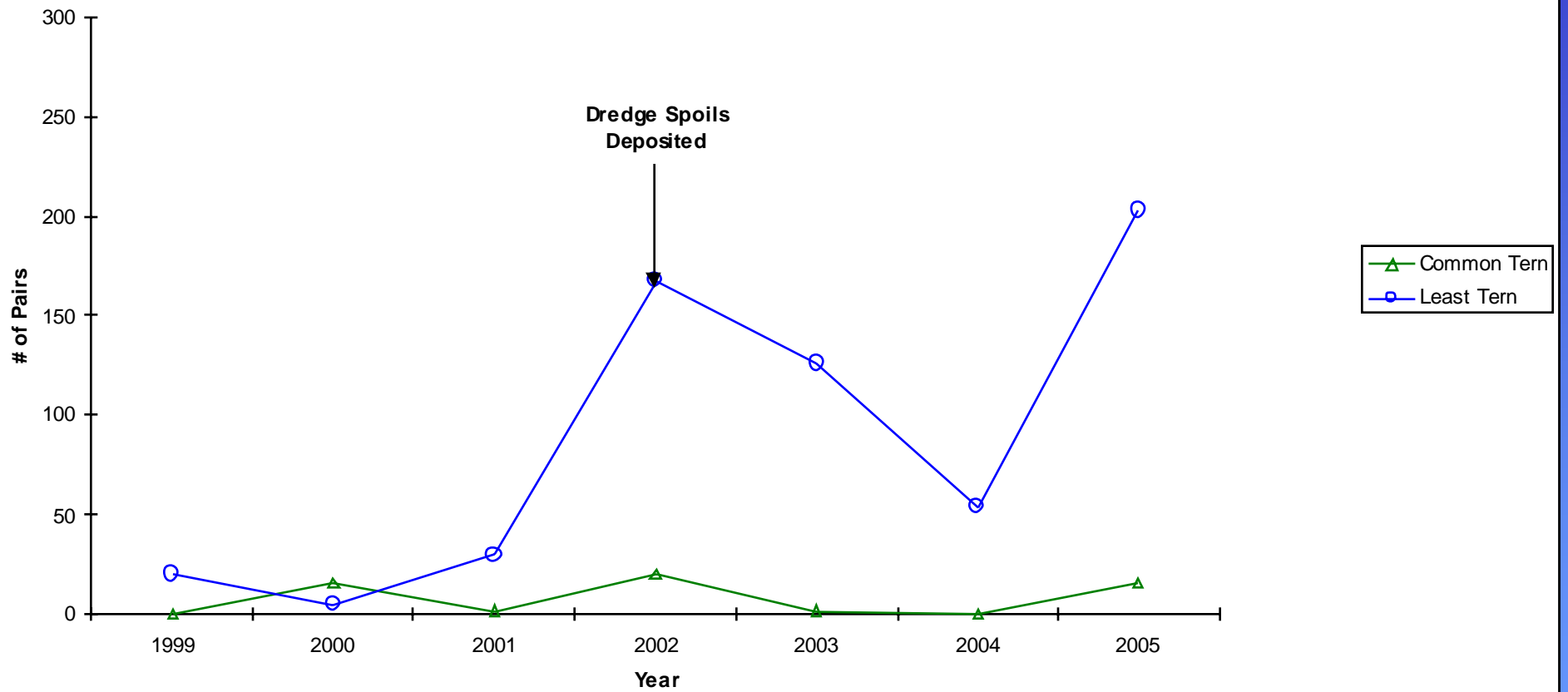
Disposal Site

Sampsons Island Post Renourishment



Planting and fencing did not occur

Number of Pairs of Nesting Least Terns and Common Terns on the Sampson's Island Portion of Dead Neck/Sampson's Island, Osterville, MA 1999 - 2005



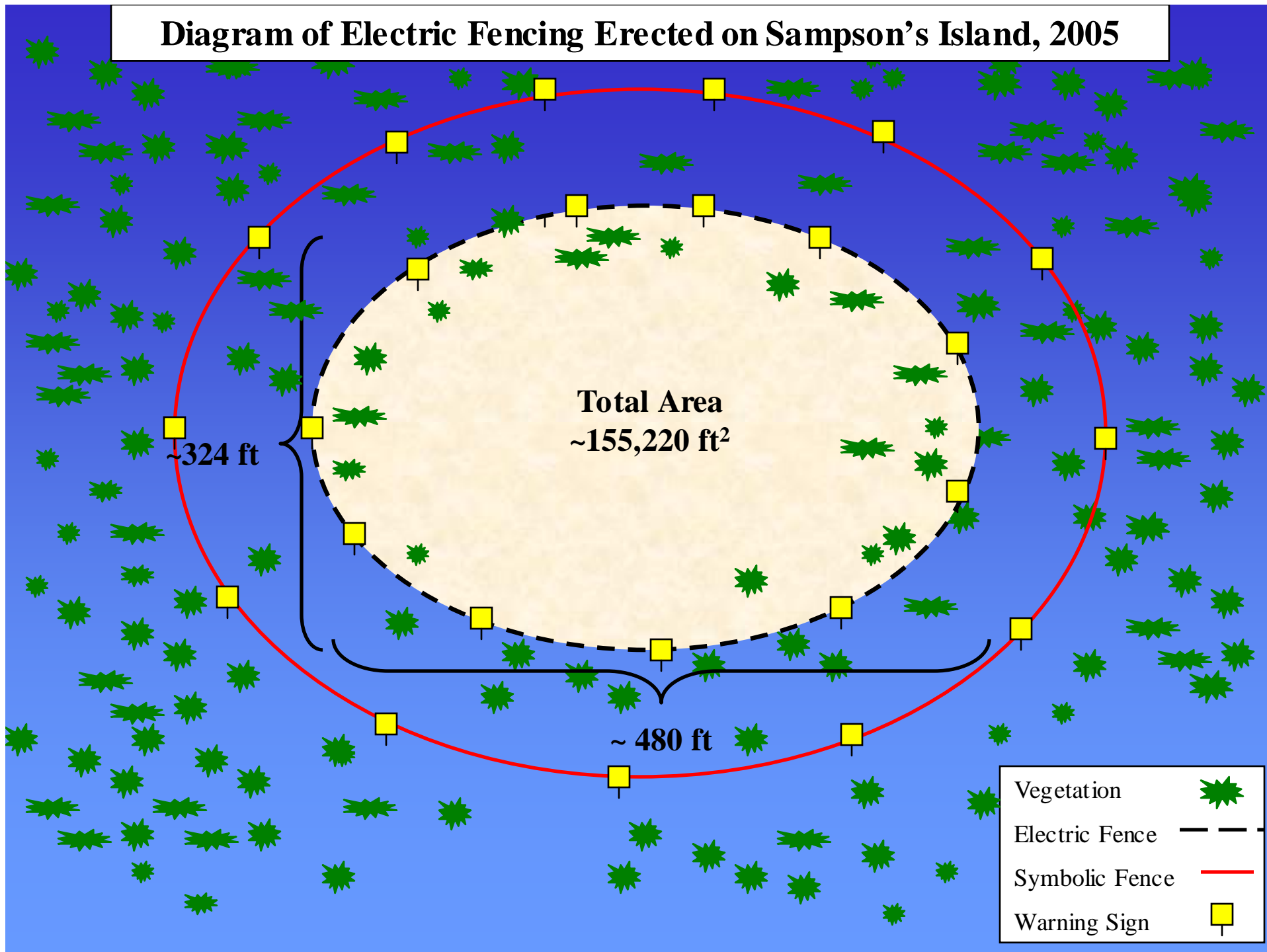


Numbers of Least Tern and Common Tern Pairs and Qualitative Estimates of Productivity (chicks fledged/pair), 1998 - 2005

Dead Neck Sampsons Island, Osterville, MA

Year	# Least Tern Pairs		# Common Tern Pairs		Total # Tern Pairs	Least Tern Productivity	Common Tern Productivity
	Dead Neck	Sampson's	Dead Neck	Sampson's			
1998	40		16		56	No data	No data
1999	67	20	0	0	87	Excellent	0
2000	378	5	34	15	432	Good	Good
2001	237	30	131	2	400	Good	Poor
2002	283	168	203	20	674	Average	Average
2003	117	126	57	2	302	Poor	Very Poor
2004	85	54	5	0	144	Very Poor	Very Poor
2005	59	203	1	15	278	Excellent	Very Poor
						> 1.0 chicks/pair (Sampsons)	~.13 chicks/pair

Diagram of Electric Fencing Erected on Sampson's Island, 2005



Installation of Electric Fence





Electric Fencing and Solar Panel Unit; developed by **Premier1** for sheep farmers

Cost: ~ \$5000 for area similar in size

Safe; used in areas with high visitation

Easy to install and maintain: 1 person can erect >1500 ft of fencing in about 1/2 hour!



Management Considerations for Renourished Beaches

- It is **vital** that all planning for renourishment operations include pre-, during and post-construction monitoring for coastal birds and the surrounding ecosystem; incorporate study design if possible
- Post-construction management (i.e. veg control, predator control) will be needed to ensure that newly created areas do not create habitat sinks
- Piping Plover and other species considerations
- Non-lethal predator management **MUST** be adaptive; there is no “one” solution to predator control
- Long-term plans and site-specific goals should be developed for sites where dredging and renourishment will occur in the future
- Regional plans should be developed

Future Projects and Research



- MA Landowner Incentive Program (LIP) has provided funding for work with electric fencing and monitoring at 5 Mass Audubon owned sites in 2006
- Pending funding, we hope to initiate our first foraging studies on Least Terns at four Mass Audubon sites in 2006, as well as more detailed productivity and mapping at all sites
- Obtain more detailed nest site information for birds using dredge spoil for nesting sites and areas adjacent to foraging (effects of dredging on fish populations and Least Terns as monitors of local forage fish populations?)
- Compilation and analysis of 20 field seasons of data (ongoing)



Thank You



Andrea Jones
MA Nat. Heritage and Endangered Species Program
Scott Hecker
Davis Conservation Foundation
3 Bays Preservation, Inc.
Franz Ingelfinger and The Trustees of Reservations
Staff of the Conservation Science and Ecological
Management Division (CSEM), Mass Audubon
CWP field staff

Photography

Shawn Carey

Roger Everett

John Fuller

Jon Van de Graff

Mark Wilson

Margo Zdravkovic