Barrier Beach Moths - Their Role in Conservation

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LLOYD CENTER FOR THE ENVIRONMENT

WHY ?

Why moths
Why me
Why dunes

Why Moths?

- Make up 90% of the 4th largest order (Lepidoptera) of insects
- Major prey for neotropical migrant birds
- Major pollinators
- 37 species of moths listed as rare in the Massachusetts Endangered Species Act
- Aesthetics













Why Me ?

IMPORTANCE OF MOTHS

- Enacted in 1992, MA Endangered Species Act (MESA) regulates:
  - take
  - Protection of habitat
  - on private property


cobra

FACTORS DETERMINING RARITY

- Native to and Breeding in Massachusetts
- Occurs in limited or Unique habitats
- Globally “Rare” Species
- Evidence of decline
- Habitat loss
- On the Federal Endangered Species List

Papaipema sulphurata

Key to symbols

Confirmed records

- Post-2000
- Pre-2000
- Pre-1950
- Pre-1900

Yellow: Unconfirmed records (Lit.)

? Uncertain

Re-emergence of Survey Work

- 1983 – Dale Schweitzer proposed list
- 1992 – MA Endangered Species Act
  Promuglated (28 moths)
- 2019 – Current List includes 37 moths
  5 dropped off; 14 added
- Changes due to intensive field work
- 1986 (10% my time to 2019 (80% time)

Who's on the MESA List

BARRENS/HEATHLANDS	WETLANDS	SANDPLAIN GRASSLANDS	BARRIER DUNES	OTHER
Coastal Heathlands Cutworm	Drunk Apamea	The Pink Streak	Coastal Heathlands Cutworm	NJ Tea Inchworm
Barrens Daggermoth	Pale Green Pinion	Unexpected Cycnia	Dune Noctuid	Twilight Moth
Gerhard's Underwing	Coastal Swamp Metarranthis	Phyllira Tiger Moth	The Pink Streak	Orange Sallow
Melsheimer's Sack Bearer	Pitcher Plant Borer			Northern Brocade
Chain-dot Geometer	Ostrich Fern Borer			
Imperial Moth	Chain Fern Borer			
Sandplain Euchlaena	Water-willow Borer			
Slender Clearwing Sphinx	Spartina Borer			
Barrens Buckmoth	Precious Underwing			
Sandplain Heterocampa				
Buchholz's Gray				
Pine Barrens Lycia				
Barrens Metarranthis				
Southern Ptichodis				
Pink Sallow Moth				
Pine Barrens Speranza				
Faded Gray				
Pine Barrens Zale				
Pine Barrens Zanclognatha				
Waxed Sallow				
Coastal Swamp Metarranthis				
21 species	9 species	3 species	3 species	4 species

Why Barrier Dunes

- MESA –listed species present
- Generally under-surveyed region wide
- Season-long surveys in Massachusetts
  - Crane Reservation (2006)
  - Good Harbor & Wingarsheek (2013-14)
  - Plum Island NWR (2013-14)
  - Horseneck Reservation (2015-16)
  - Acoaxet (2014)

Dead Neck

Figure 3. Dead Neck barrier dunes.

Write a description for your map.

Horseneck Reservation

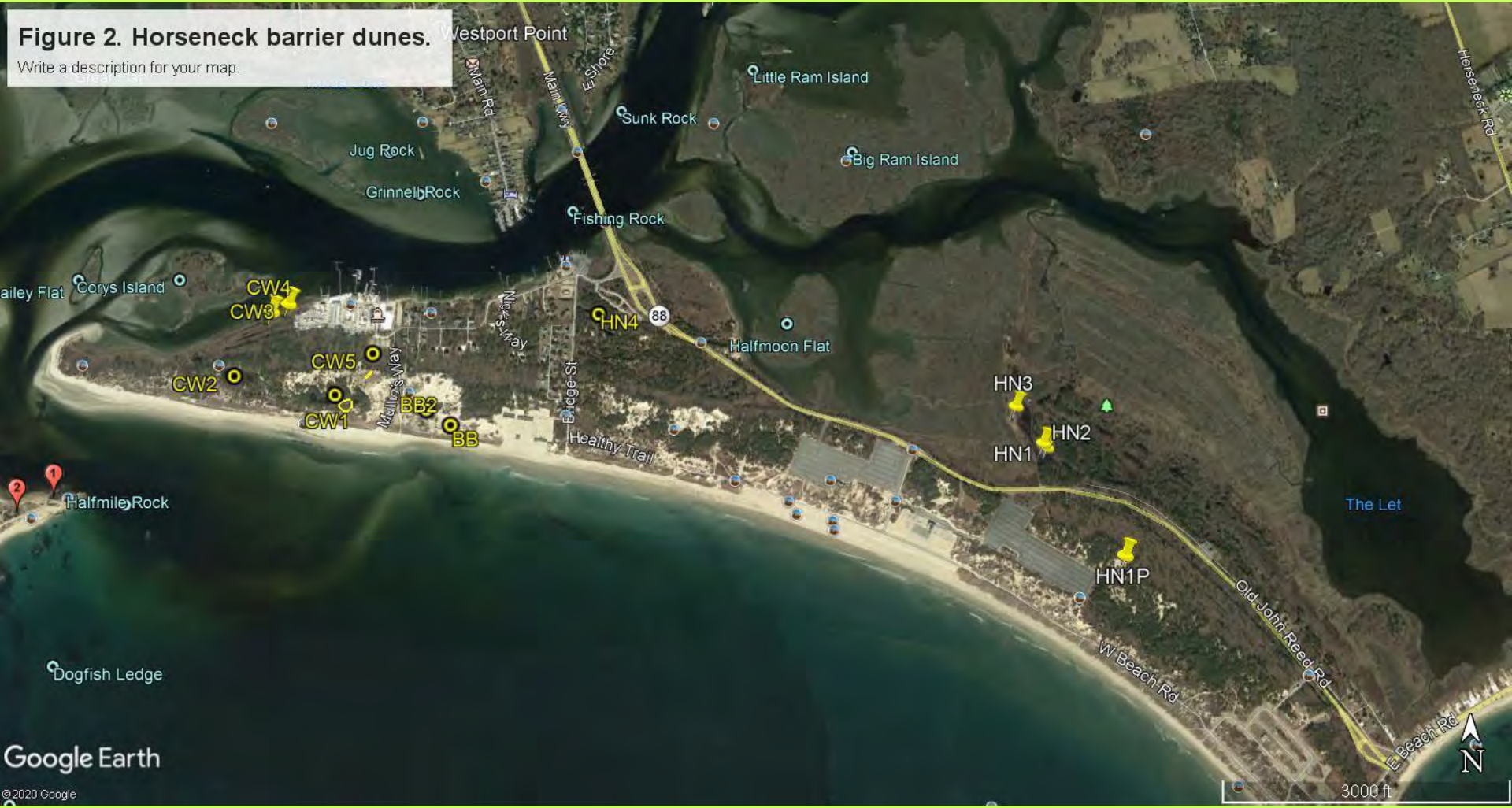


Figure 2. Horseneck barrier dunes.
Write a description for your map.
Westport Point
Main Rd
Main Hwy
E Shore
Little Ram Island
Sunk Rock
Jug Rock
Big Ram Island
Grinnell Rock
Fishing Rock
Horseneck Rd
ailey Flat
Corys Island
CW4
CW3
Nicks Way
HN4
88
Halfmoon Flat
CW5
CW2
Mellows Way
Ridge St
BB2
CW1
BB
Healthy Trail
HN3
HN2
HN1
Halfmile Rock
The Let
HN1P
Old John Reed Rd
W Beach Rd
E Beach Rd
Dogfish Ledge
N
3000 ft
Google Earth
©2020 Google

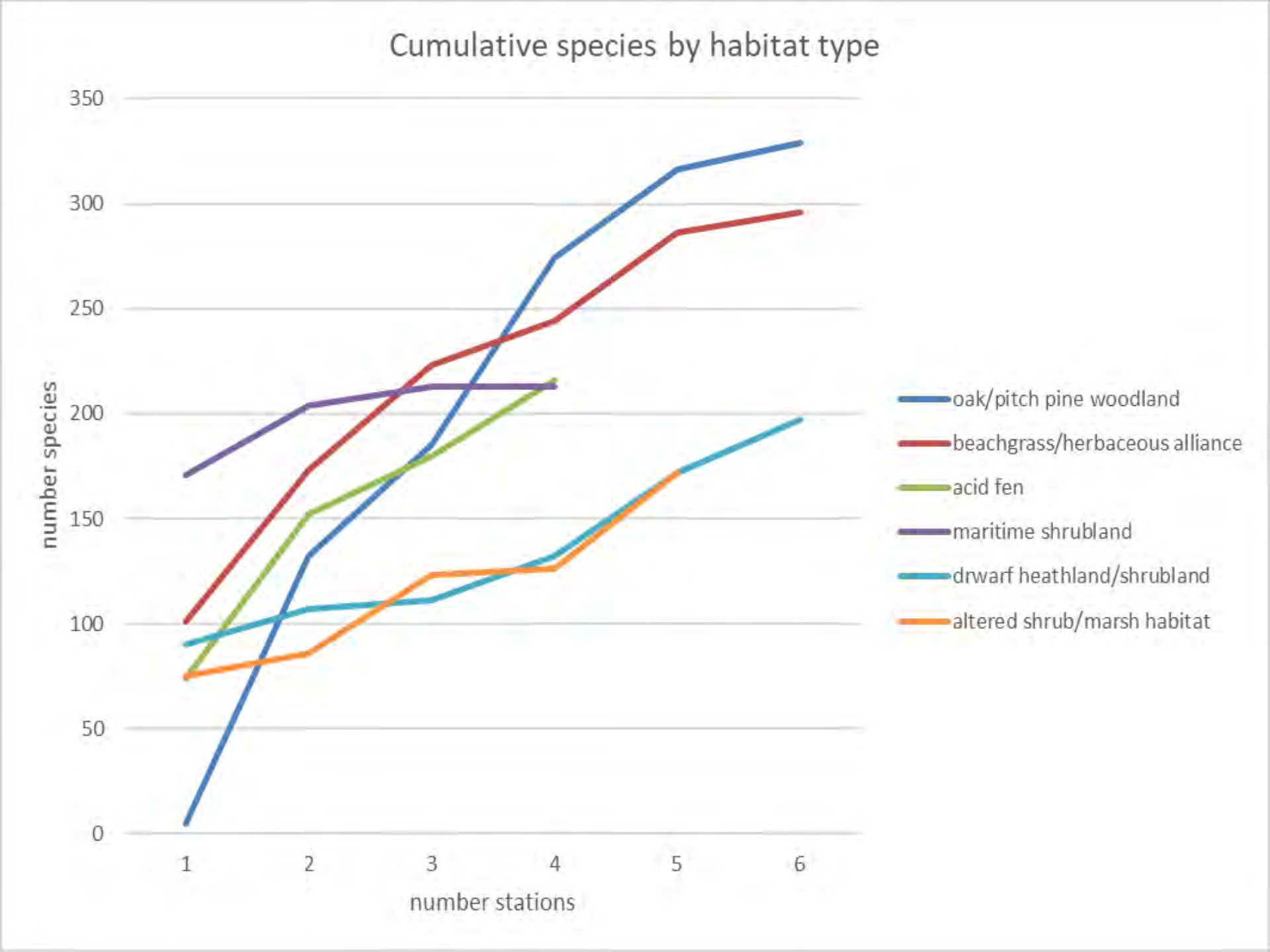
Community types surveyed at Dead Neck and Horseneck dune communities.

X = primary/co-dominant habitat(s) x = secondary habitat

	DEAD NECK				HORSENECK						
COMMUNITIES	Stations				Stations						
	SC1	SC2	SC3	SC4	BB	CW1	CW2	CW3	CW4	CW5	HN4
Beachgrass/herbaceous	X	X	x								
Hudsonia/herbaceous					x						
dwarf heathland/shrub					X						x
maritime shrubland	x	X	X	X							
pitch pine grove				x		x					
oak/pitch pine woodland							x	x	x	X	X
acid fen						X					
acid shrub fen							X				
altered shrub/wetland								X	X		
fresh marsh/wet meadow								X	X	x	
salt marsh border			x					x	x		

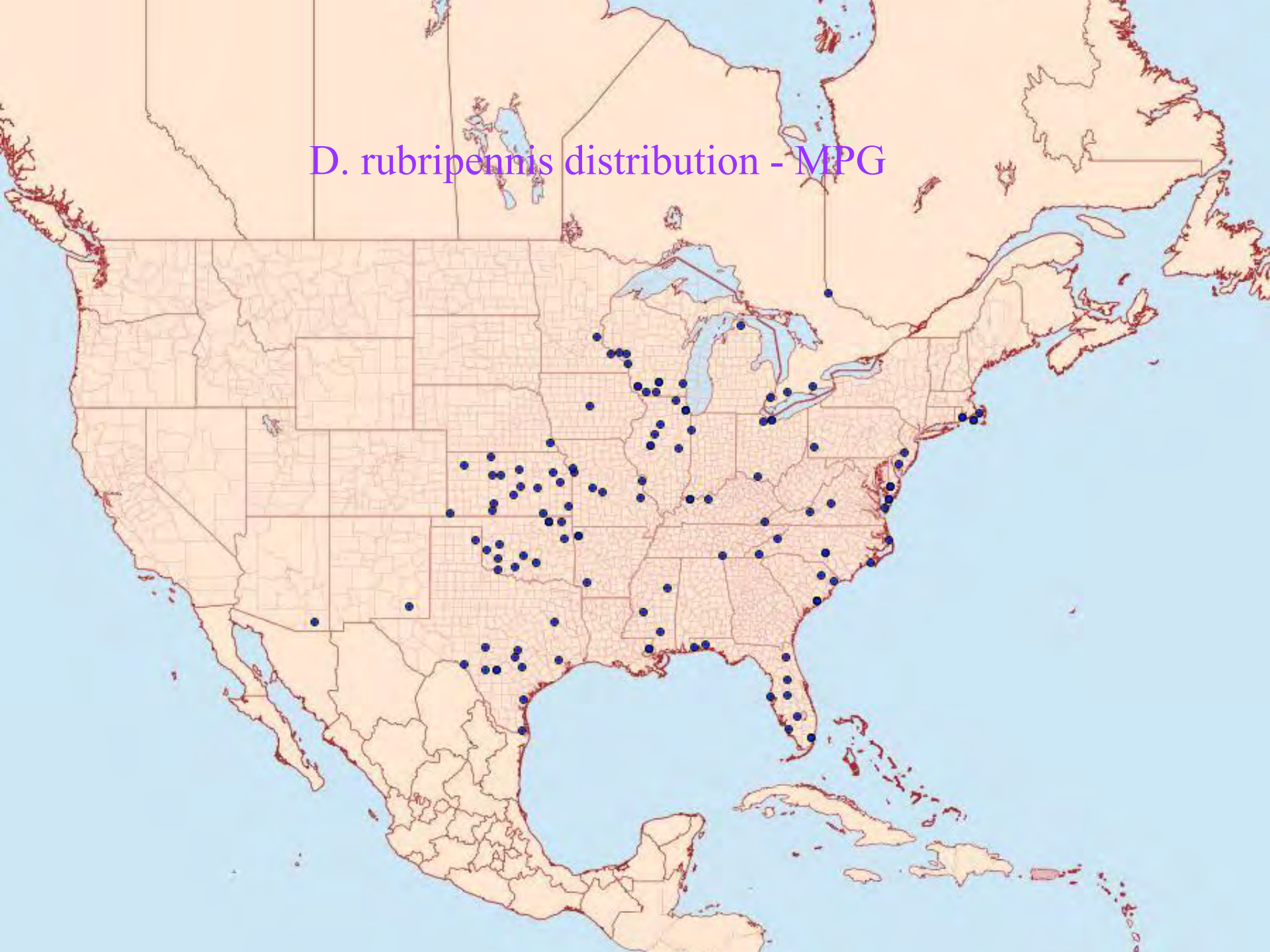
Survey Methods

Comparison of dune complexes sampled through 2019							
Town	Dune complex	acres	yr. sampled	# stations	# samples	# species	# MESA species
Newbury/Rowley	Plum Island NWR	1,285	2013-14	5	23	228	3
Ipswich	Crane Beach	1,234	2,006	5	14	157	2
Westport	Horseneck Reservation	600	2014-16	2	20	213	3
Westport	Horseneck Reservation	600	2019	7	45	284	4
Mashpee	Dead Neck	58	2019	5	29	203	2
Gloucester	Wingarsheek Beach	39	2014	2	8	127	2
Gloucester	Good Harbor Beach	15	2013-14	2	9	96	2
Westport	Acoaxet	15	2016	4	37	259	3


Cumulative species by habitat type
350
300
250
200
150
100
50
0
number species
1
2
3
4
5
6
number stations
oak/pitch pine woodland
beachgrass/herbaceous alliance
acid fen
maritime shrubland
drwarf heathland/shrubland
altered shrub/marsh habitat

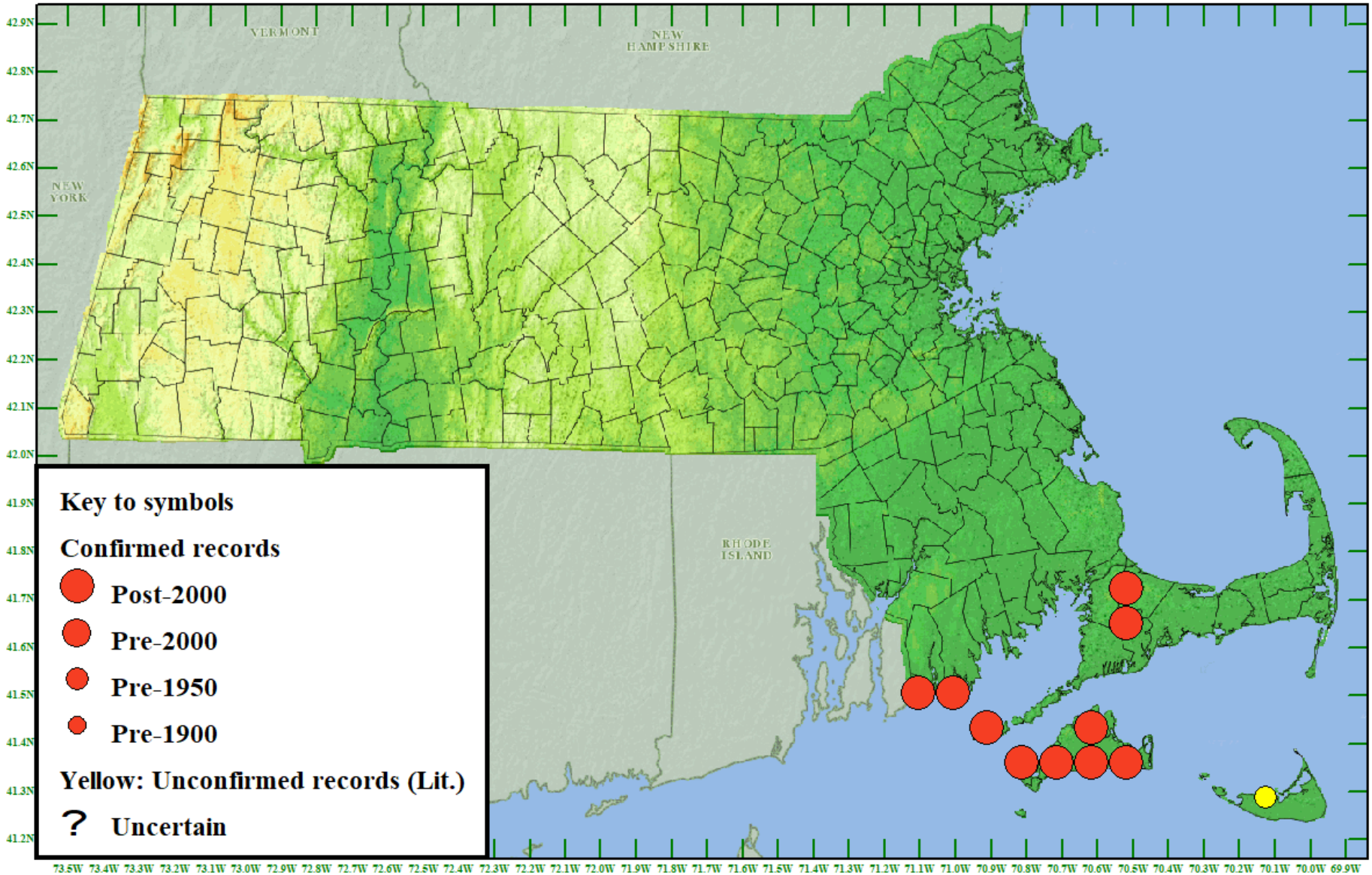
MESA-listed Species

Dargida rubripennis – larvae on switchgrass


D. rubripennis distribution - MPG

Mass Moths

932931 Dargida rubripennis

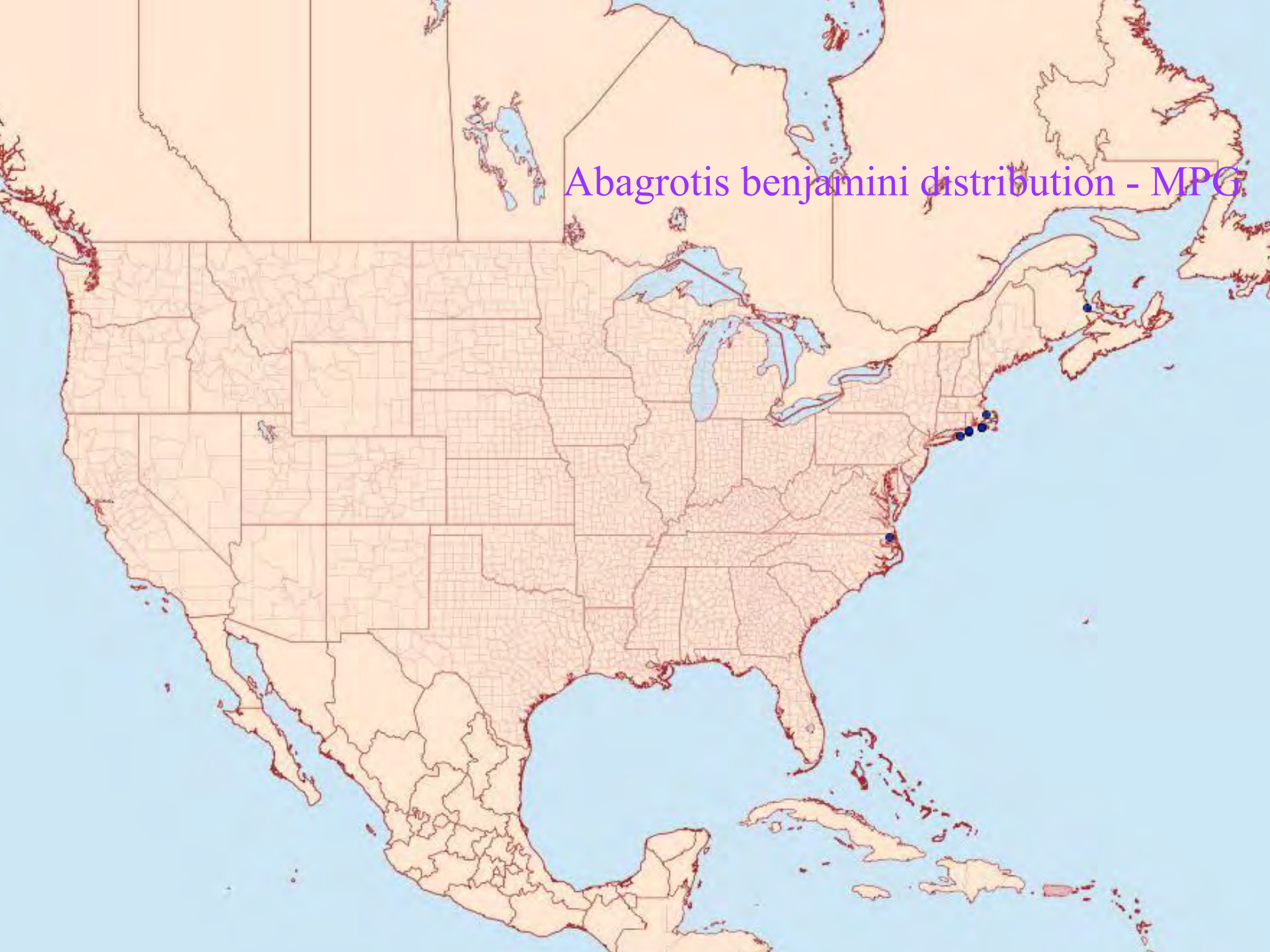


MESA-listed Species – larvae on shrubs, trees

Lithophane viridipallens – hollies, wetland shrubs

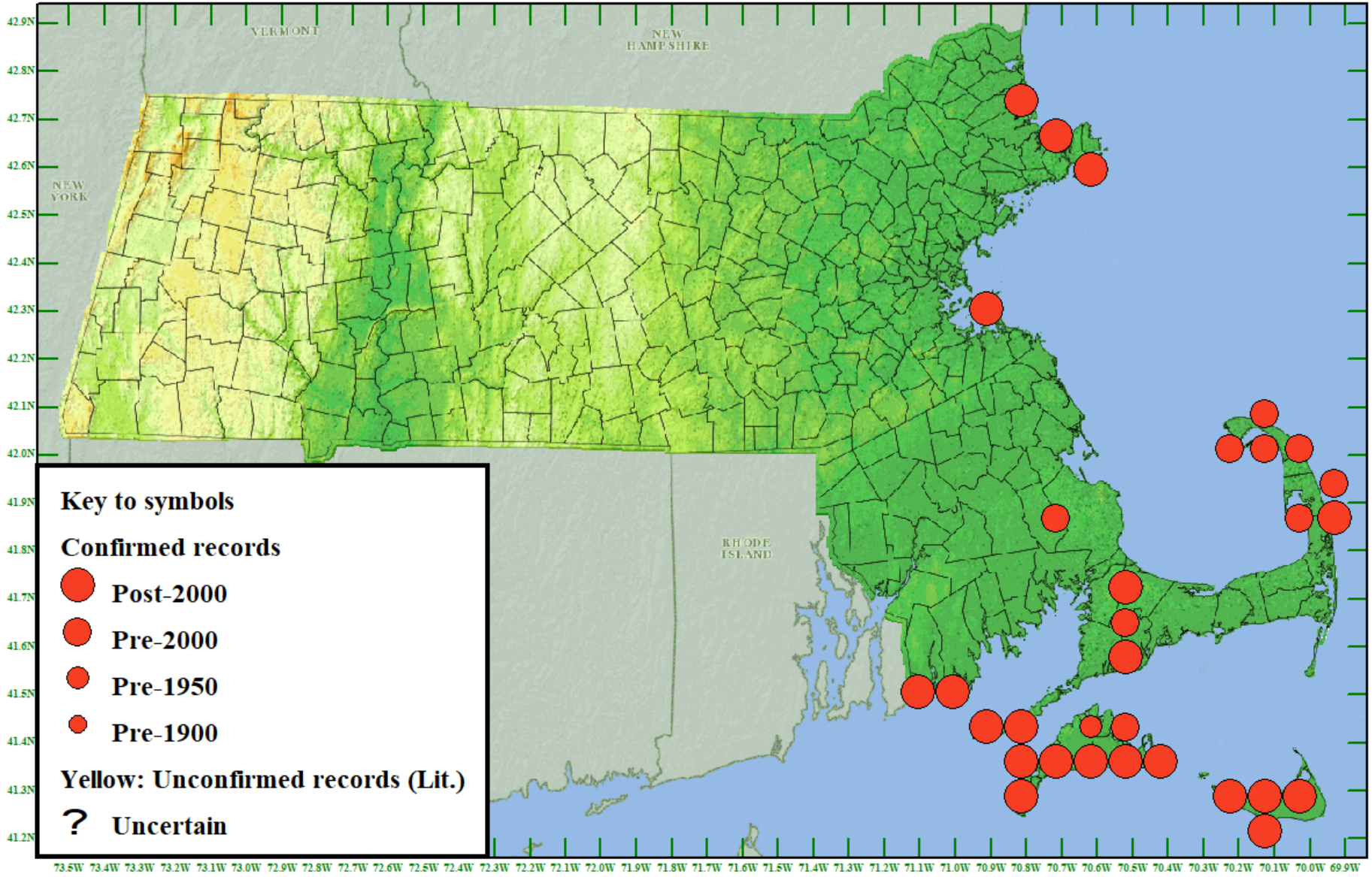
Sympistis riparia – beach plum

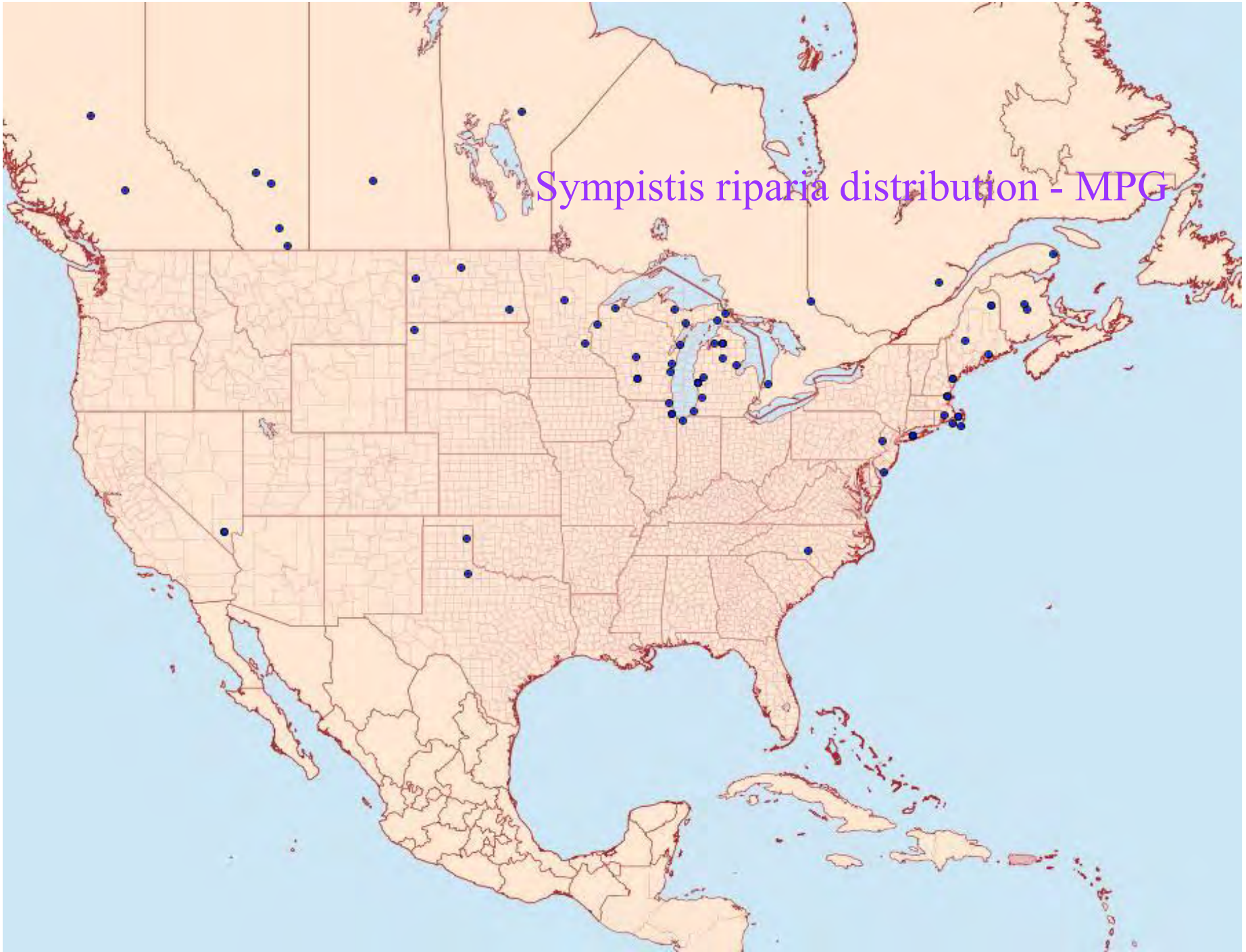
Abagrotis benjamini – beach plum


Abagrotis benjamini distribution - MPG

Mass Moths

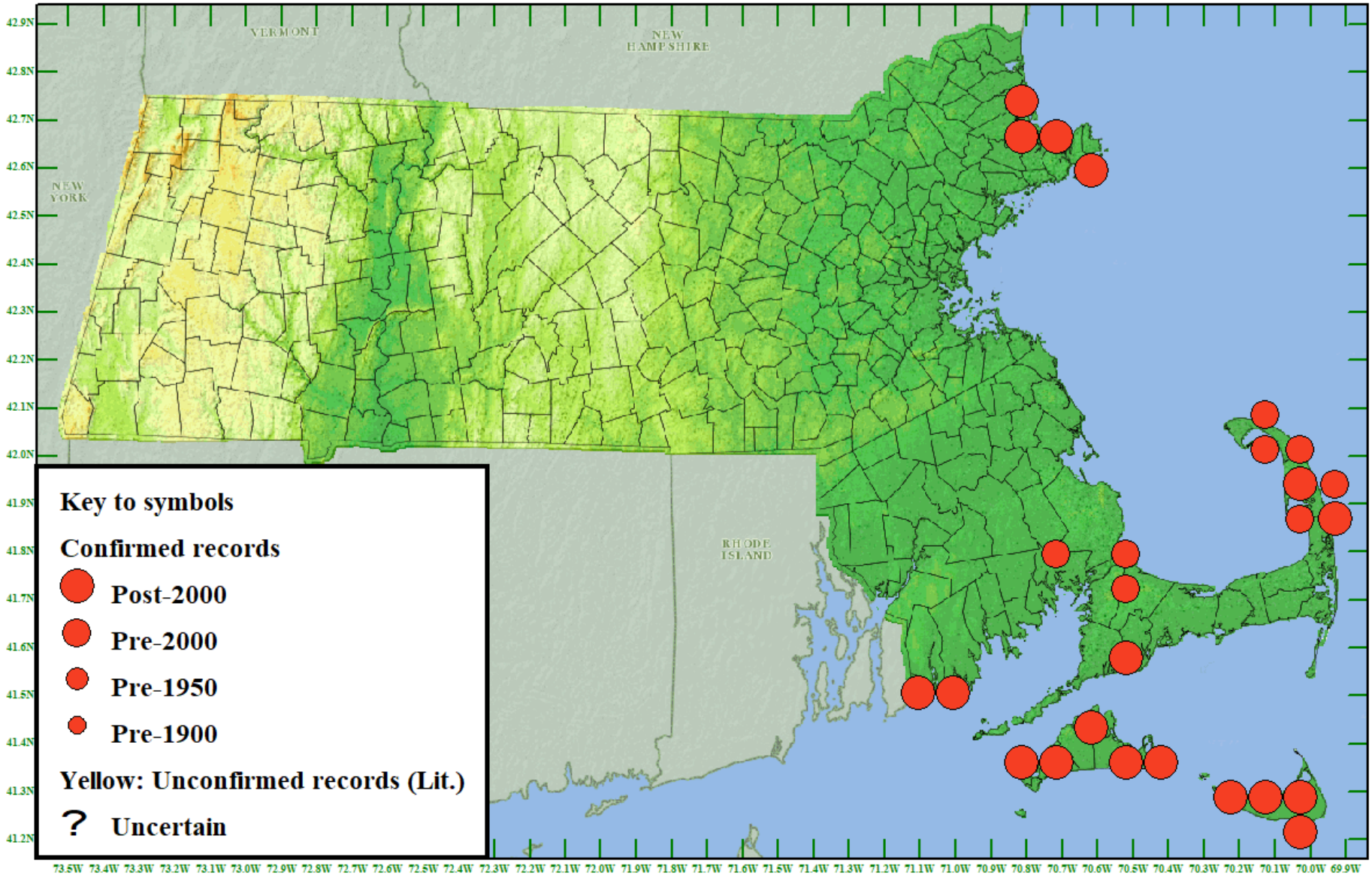
933663 Abagrotis benjamini




Sympistis riparia distribution - MPG

Mass Moths

931875 Sympistis riparia



MESA-listed moths documented on barrier dunes since 2006								
Town	Westport	Ipswich	Glou.	Glou.	Westport	Newbury	Westport	Mashpee
System	Acoaxet	Crane	G. H.	W	Horseneck	Parker NWF	Horseneck	Dead Neck
Year	2014	2006	2013-14	2014	2015-16	2012/13	2019	2019
	total	total	total	total	total	total	total	total
GEOMETRIDAE								
Euchlaena madusaria						2		
NOCTUIDAE								
Sympistis riparia	5	4	1	1	2	4	120	126
Apamea inebriata	1							
Lithophane viridipallens							2	
Dargida rubripennis					1		1	
Abagrotis benjamini	6	3	1	2	3	3	17	28
Total # spp.	3	2	2	2	3	3	4	2
Number of stations	4	5	2	2	2	5	7	5
Number samples	37	14	9	8	20	23	45	29

Larval Hostplants - shrubs

Catocala badia - bayberry

Drasteria graphica – beach heather

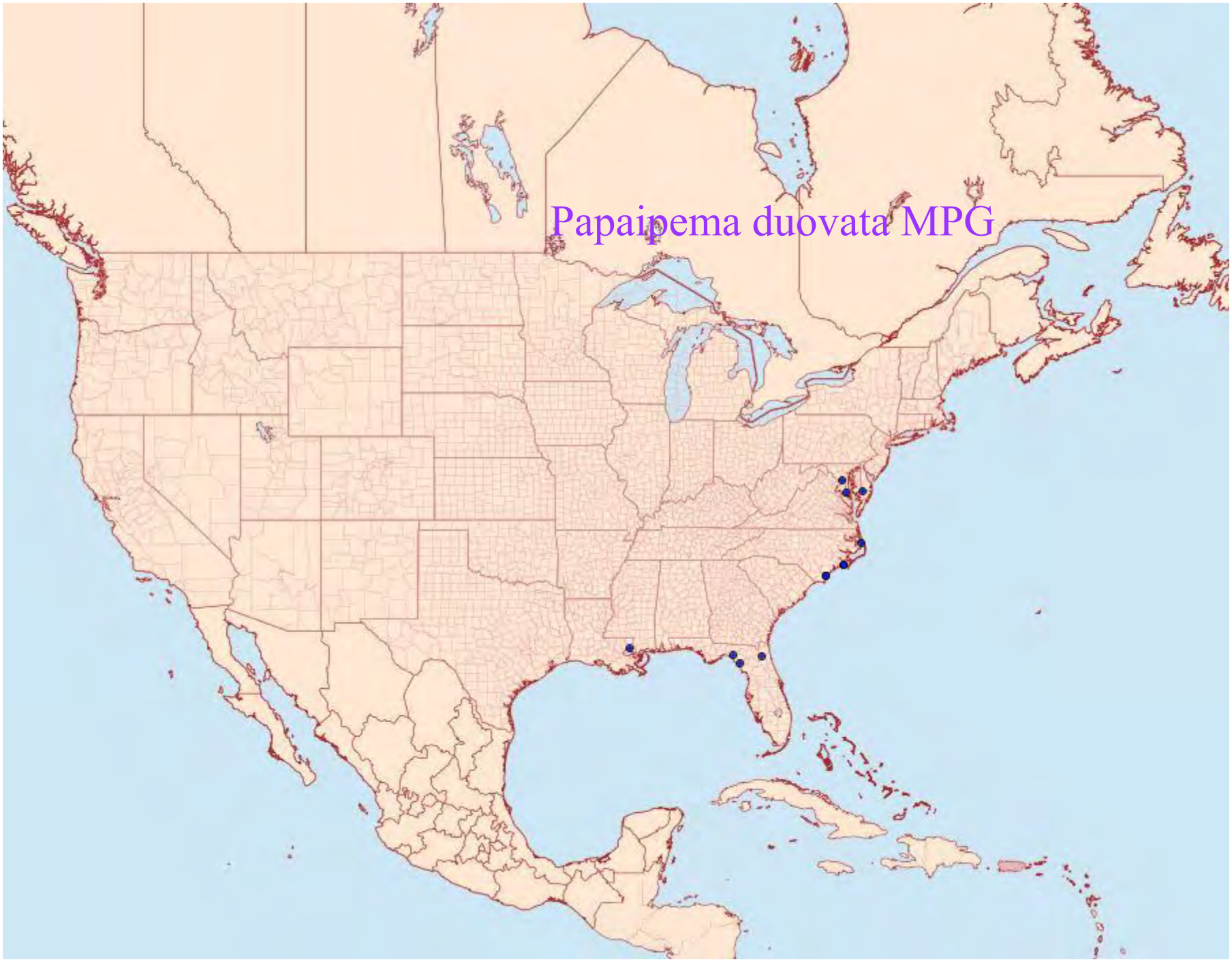
Argyrostrotis anilis – beach plum

Larval Hostplants - forbs

Papaipema duovata – seaside goldenrod

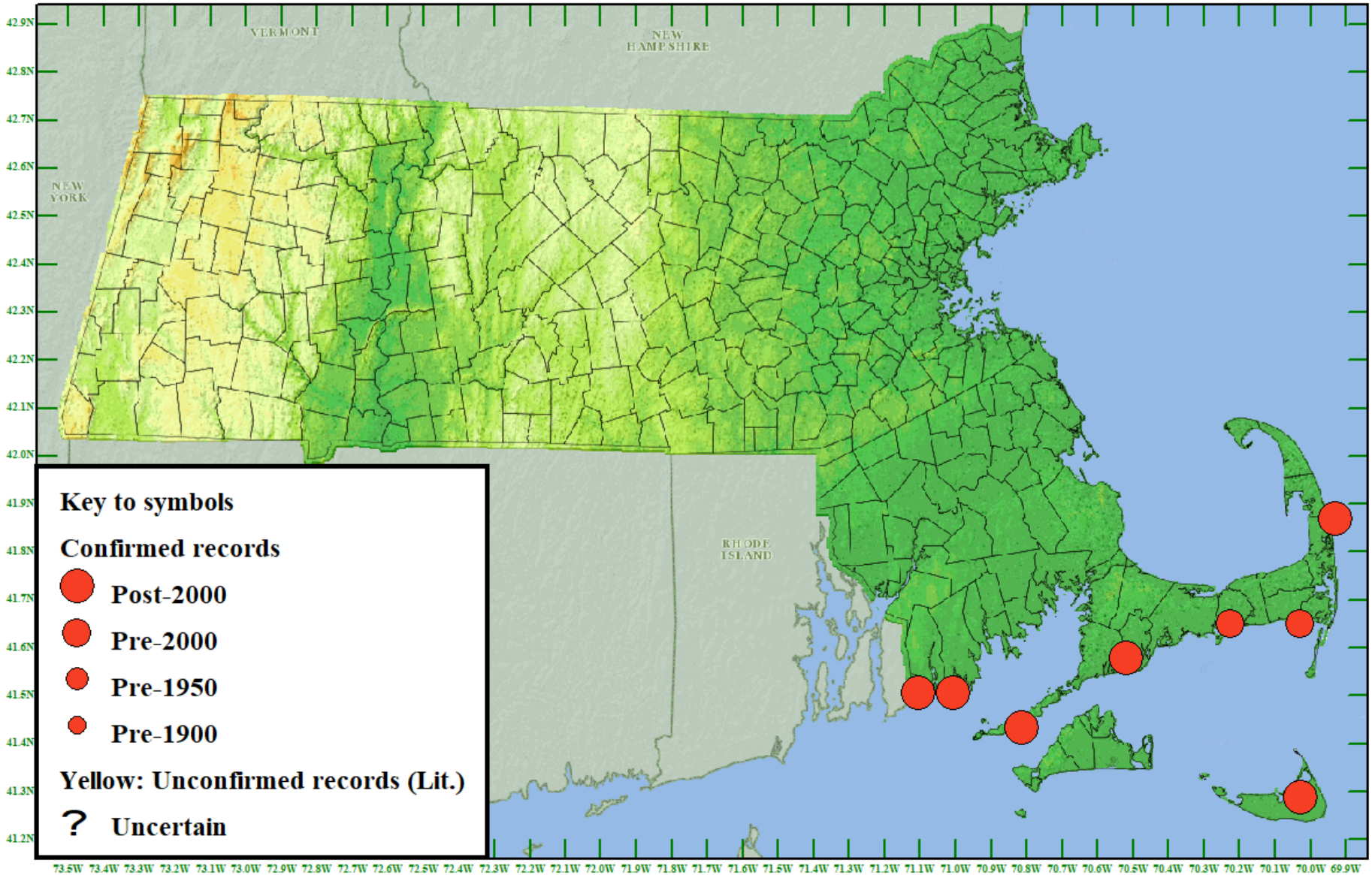
Derrima stellata – Asteraceae ?

Schinia spinosae – sickle-leaved silk-grass


Papaipema duovata MPG

Mass Moths

932496 Papaipema duovata



Larval Hostplants - Grasses

Leucania extincta - beachgrass

Apamea inordinata

Doryodes spadaria - cordgrass

Apamea burgessi

Apamea lintneri - beachgrass

Larval Hostplants – grasses; forbs

Euxoa pleuritica

Eucoptocnemis fimbriaris

Euxoa violaris

Euxoa detersa

OTHER VISITORS

Eumorpha achemon – Virginia creeper

Sphinx drupiferarum – Prunus spp.

Hostplant classes of dune affiliate moths recorded at Dead Neck and Horseneck in 2019.				
Class	**Dune affiliates**	**specific larval hostplants**	**# at Dead Neck**	**# at Horseneck**
Grasses	Euxoa detersa	generalized feeder	15	307
	Apamea inordinata		166	1
	Leucania extincta	probably beachgrass	24	14
	Euxoa pleuritica		24	2
	Doryodes spadaria	smooth cordgrass	8	6
	Apamea lintneri	probably beachgrass	4	5
	Euxoa violaris		3	
	Apamea burgessi		2	
	Eucoptocnemis fimbriaris		2	
	Dargida rubripennis	switchgrass		1
Forbs	Schinia spinosae	sickle-leaved silk-grass	64	11
	Papaipema duovata	seaside goldenrod	3	26
	Derrima stellata	unknown; Asteraceae flowers?	2	2
Shrubs/trees	Sympistis riparia	beach plum	126	120
	Argyrostrotis anilis	beach plum; other Rosaceae?	125	44
	Drasteria graphica	beachheather; beach pinweed	3	44
	Abagrotis benjamini	beach plum; other Rosaceae?	28	17
	Catocala badia	bayberry	6	1

CONCLUSIONS

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- Threats to this habitat at Dead Neck are storm overwash and non-native Beach Rose

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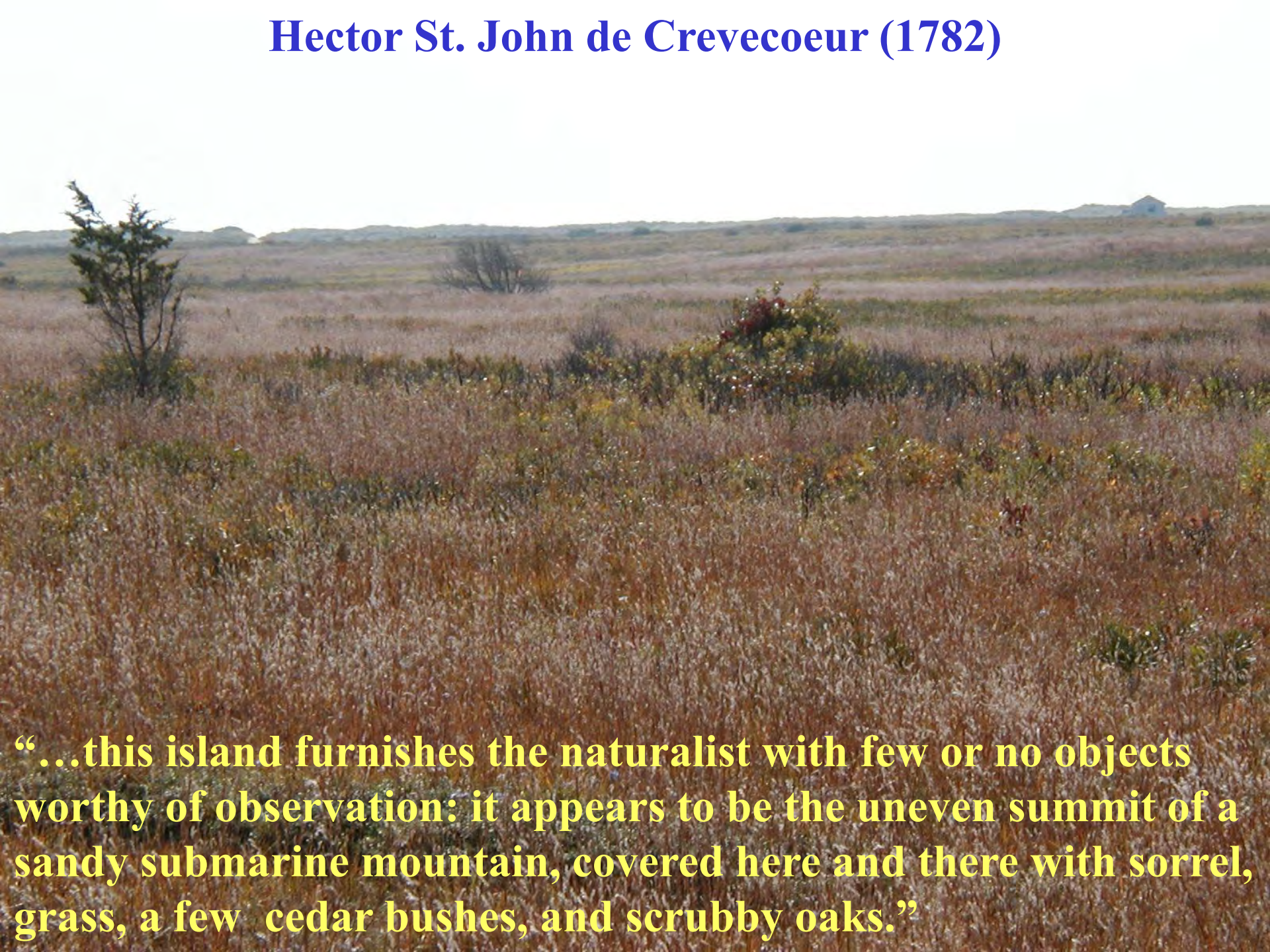
- Threats to this habitat at Dead Neck are storm overwash and non-native Beach Rose
- Future dune restoration efforts at Dead Neck should include planting of beach plum and bayberry as part of any dune stabilization efforts

Perspectives

- Re-emergence of basic field surveys in Massachusetts
  - 1883 Harris & Hitchcock: **387** moth spp.
  - 1934 Farquhar: **1,580** spp.
  - 1943 Kimball & Jones (Nantucket and Martha's Vineyard only: **1,383** spp.
  - MASS MOTHS thru 2020: > **2,800** spp.

Hector St. John de Crevecoeur (1782)



"…this island furnishes the naturalist with few or no objects worthy of observation: it appears to be the uneven summit of a sandy submarine mountain, covered here and there with sorrel, grass, a few cedar bushes, and scrubby oaks."

Acknowledgements

- Waquoit Bay National Estuarine Research Reserve
- MA Department of Conservation and Recreation
- William Wharton Trust
- Beech Tree Trust
- MA Natural Heritage & Endangered Species Program
- Harvard Museum of Comparative Zoology
- Steven Whitebread