

Waterbird Use of Offshore Shoals and Possible Species Specific Impacts of How Shoals are Removed

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Waterbirds Using Western Atlantic U.S. Waters

Species Group	North America	Western Atlantic	Approximate Numbers in North and Mid- Atlantic U.S. Waters
Loons	5	2	150,000
Grebes	4	2	2,000
Albatross	8	4	Few
Petrels	16	5	Thousands
Shearwaters	15	5	Millions
Storm-Petrels	13	3	Millions
Boobies	6	1	300,000
Pelicans	2	1	6,000
Cormorants	7	2	Hundreds of Thousands
Seaducks	15	10	1.3 Million
Geese	2	1	100,000
Raptors	3	3	Thousands
Phalaropes	3	3	Hundreds of Thousands
Jaegers	5	4	Thousands
Gulls	22	11	Million
Terns	17	8	Hundred Thousand
Skimmers	1	1	Thousands
Alcids	20	6	Tens of Thousands
Total	164	72	7- 8 - 10 million

Birds Most Abundant Over Shoals are in Red

Seabirds and Loons

Long lived - 10 to 60 years

Age of first breeding - 3 - 8 years

Most average less than one young per year

Foods

**Forage fishes - caplin, sandlance, small fishes
Crustaceans (shrimp, euphausids, copepods
to amphipods)**

Seaducks

Moderately long lived - 10 to 20 years

Age of first breeding 2 - 4 years

Usually many eggs per year

Foods

**Clams, gastropods, worms, small crustaceans,
and fish**

Marine Birds Face Many Hazards

Longlines



Graham Robertson



Over Fishing of Forage Fish



Collisions

Greg Green

Gillnets



Tony DeGange



Wind Power?



**Introduced
Predators**

A. De Gange



Over abundance of birds that benefit from humans and prey on other birds

Copyright Ron LeValley



Oil Spills

D Forsell



Global Warming

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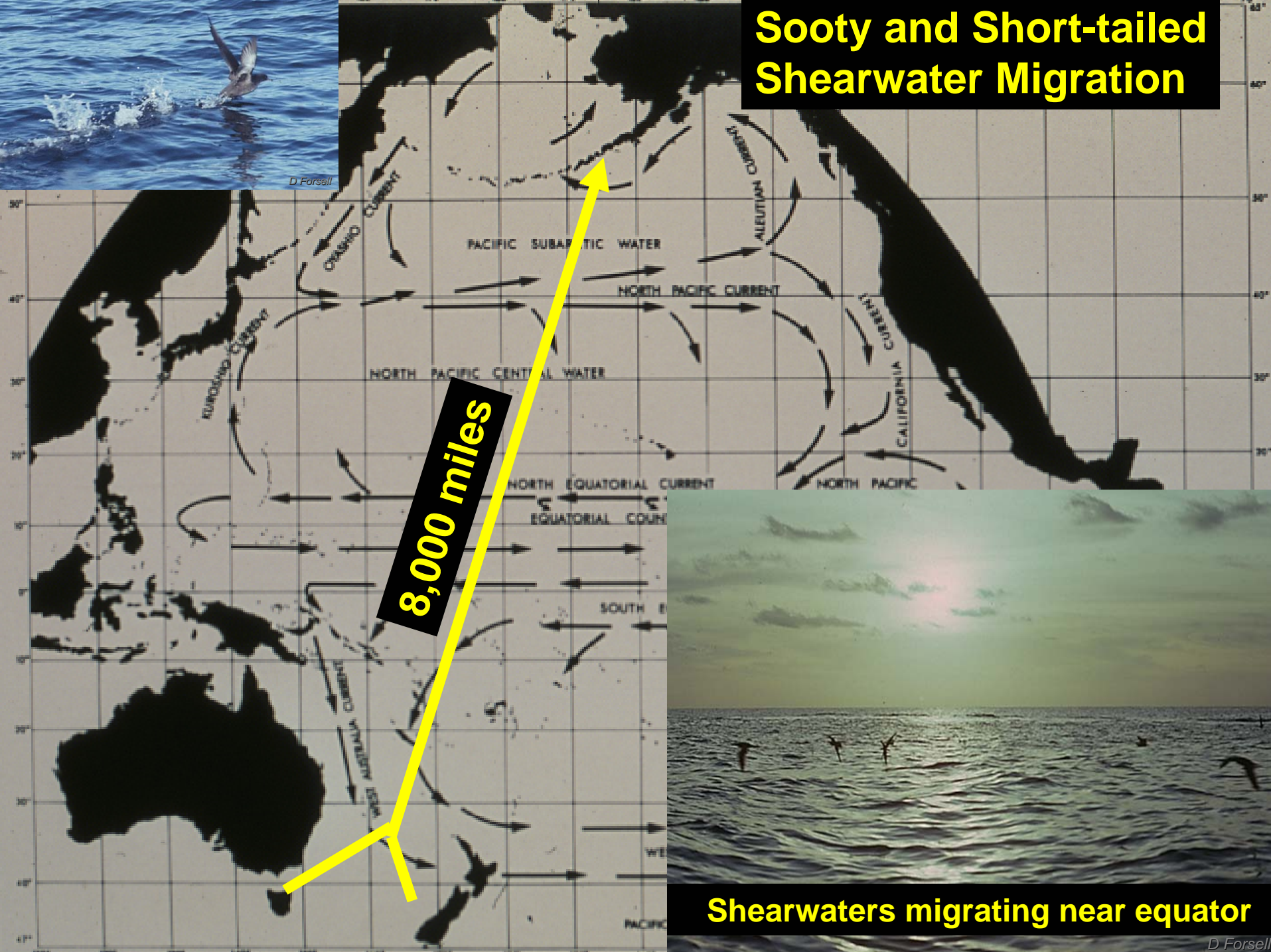


Contaminants

Sooty and Short-tailed Shearwater Migration



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8,000 miles



Shearwaters migrating near equator

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20 Million Short-tailed Shearwaters pass through Unimak Pass to and from the Bering Sea in Spring and Fall making this the most important area for this species for a few weeks each year.



Bird concentration areas, flyways, temporal patterns of use, and their behavior are more important when evaluating threats to birds than estimates of populations or baseline numbers



Shipboard Surveys - Most accurate; 300m wide; Study behavior and food habits; Can work around turbines



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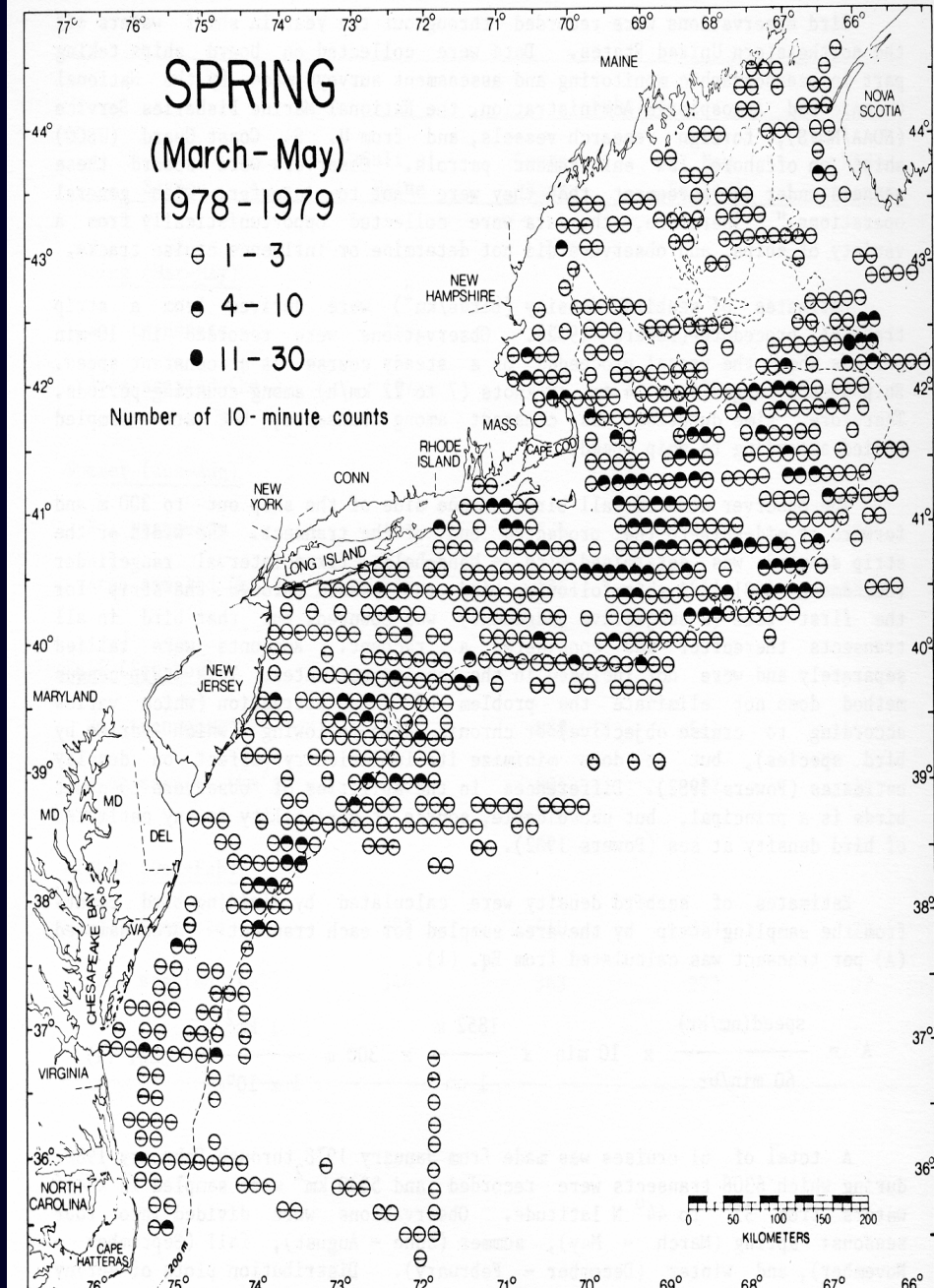
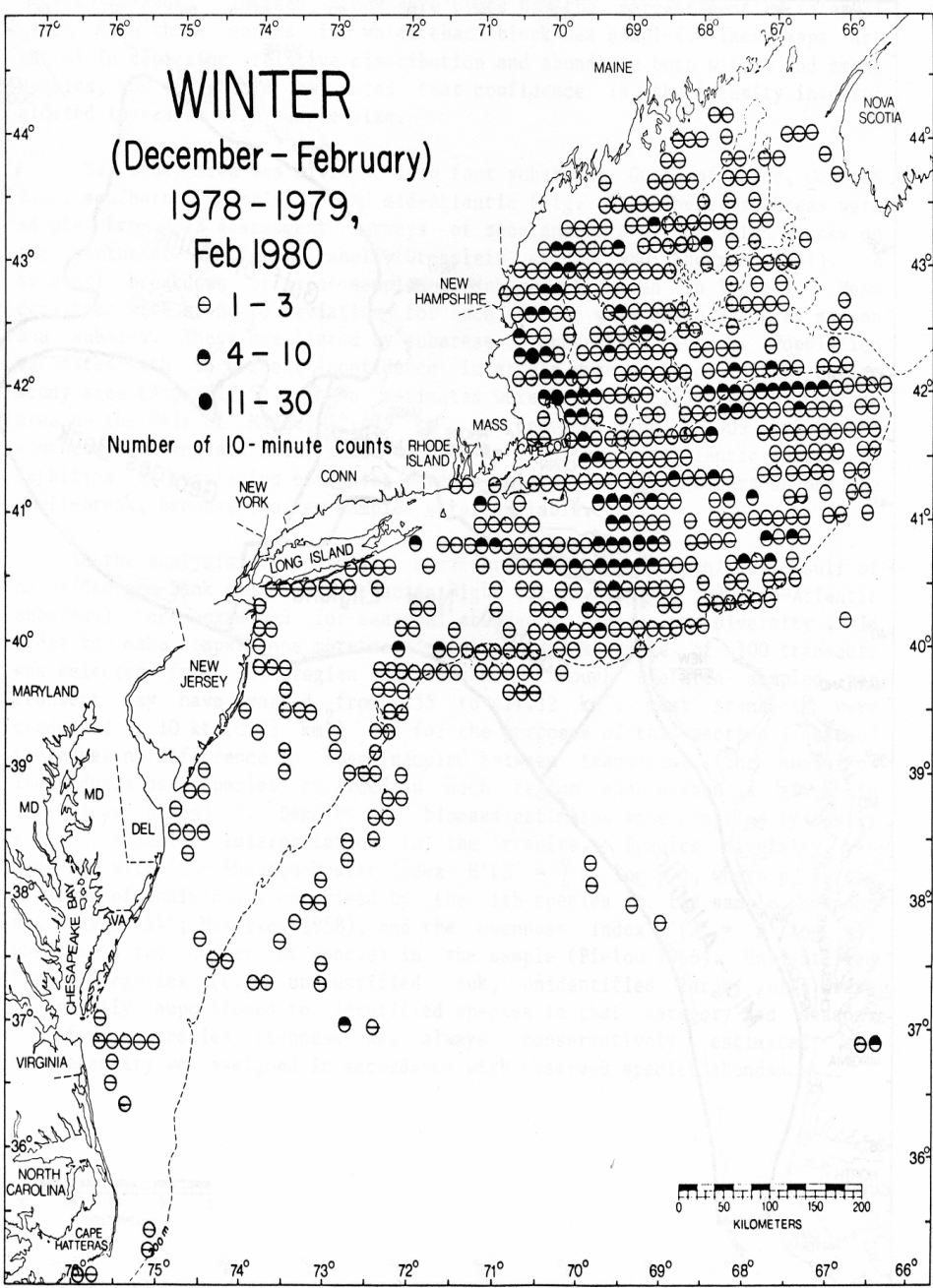
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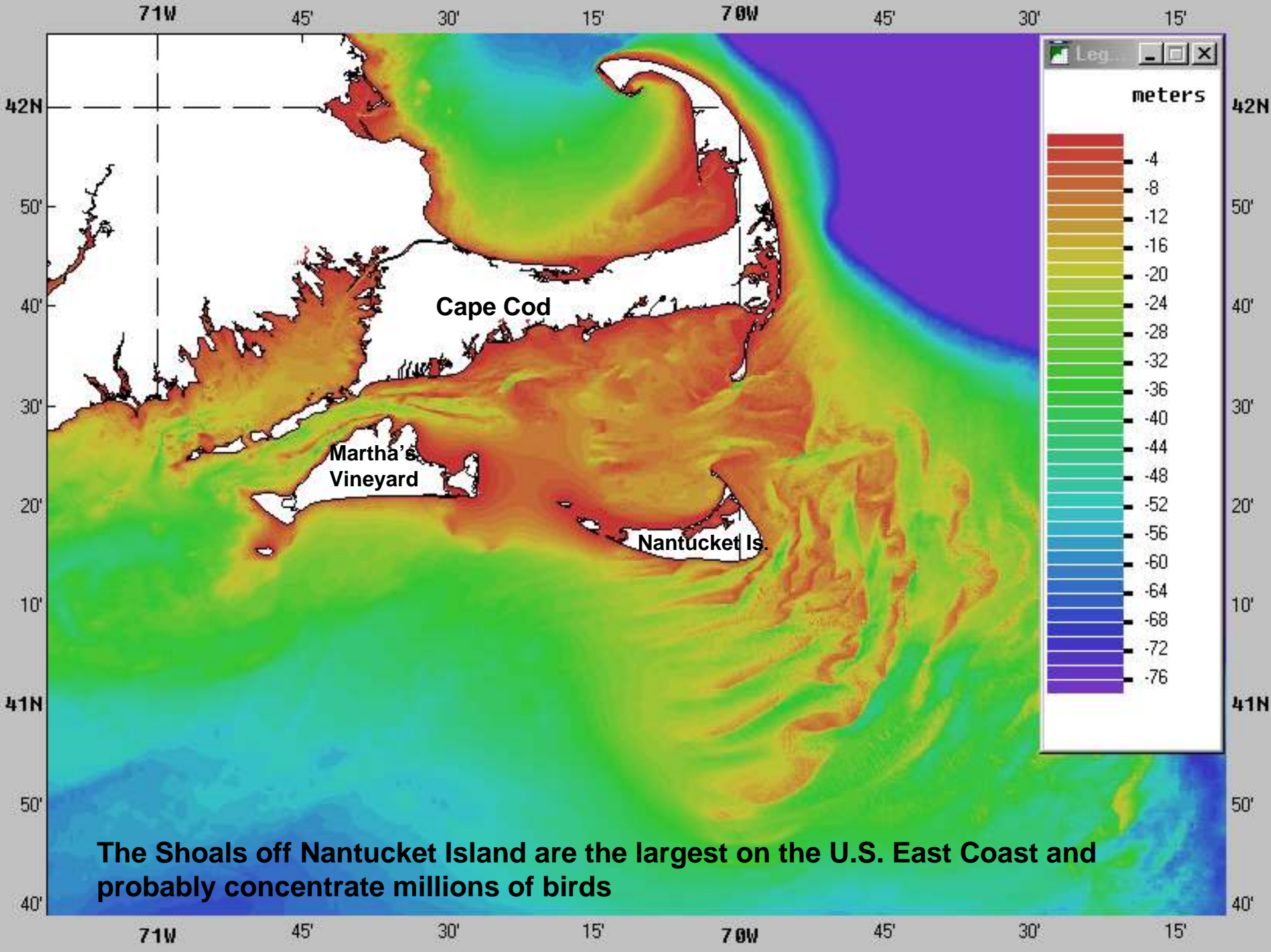
D Zweifelhofer



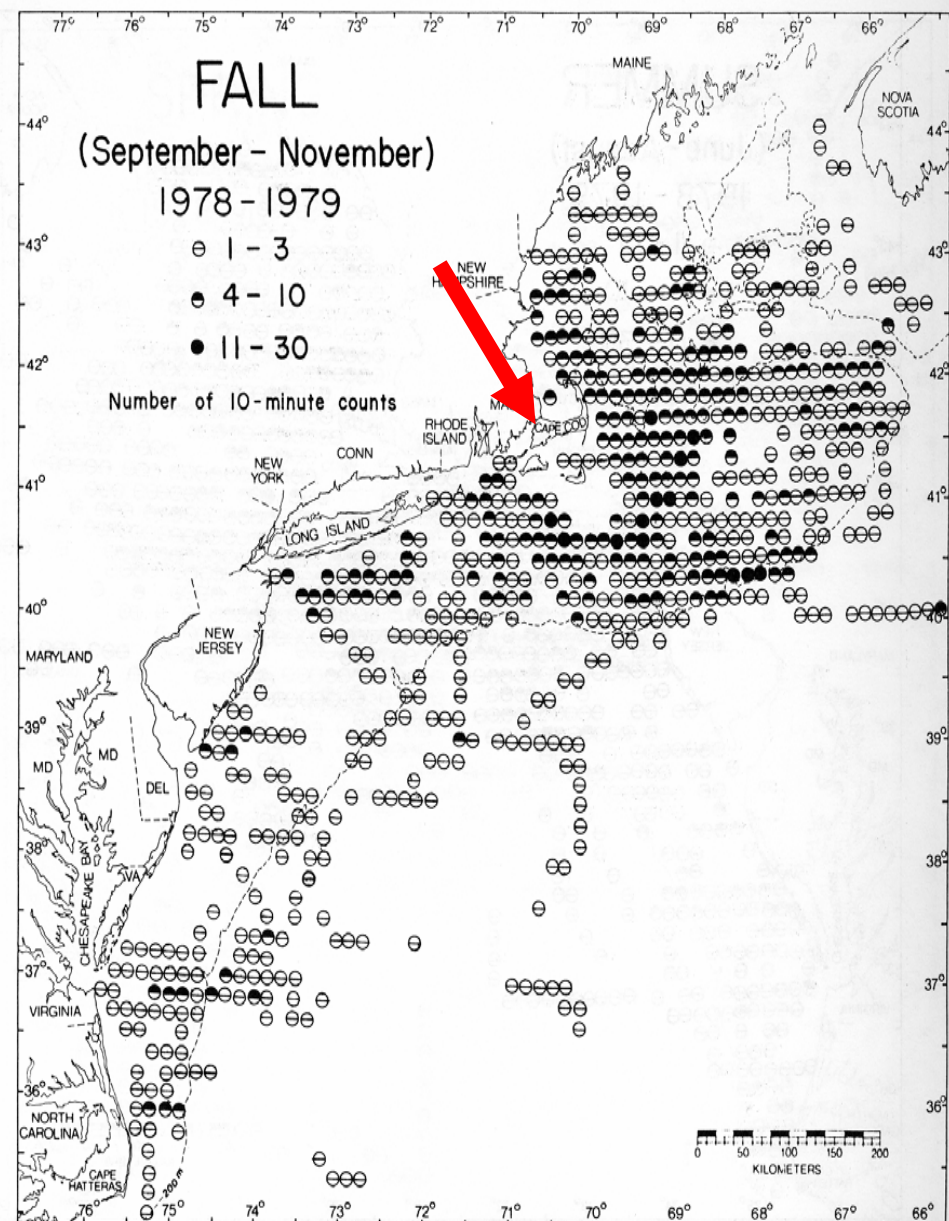
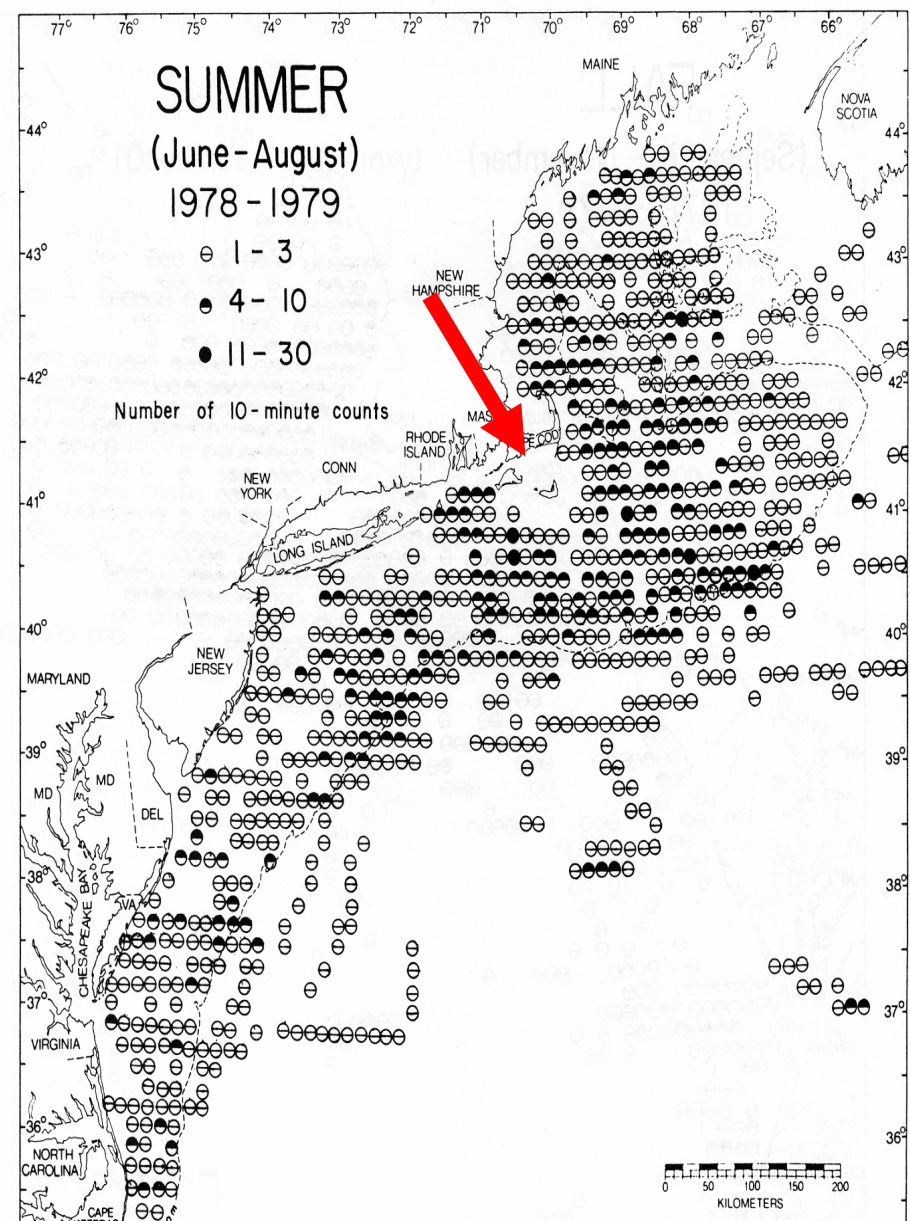
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On the Northeast U.S. Coast we have a good data set of shipboard pelagic bird surveys collected by Kevin Powers and others from Manomet Bird Observatory from 1978 to 1982



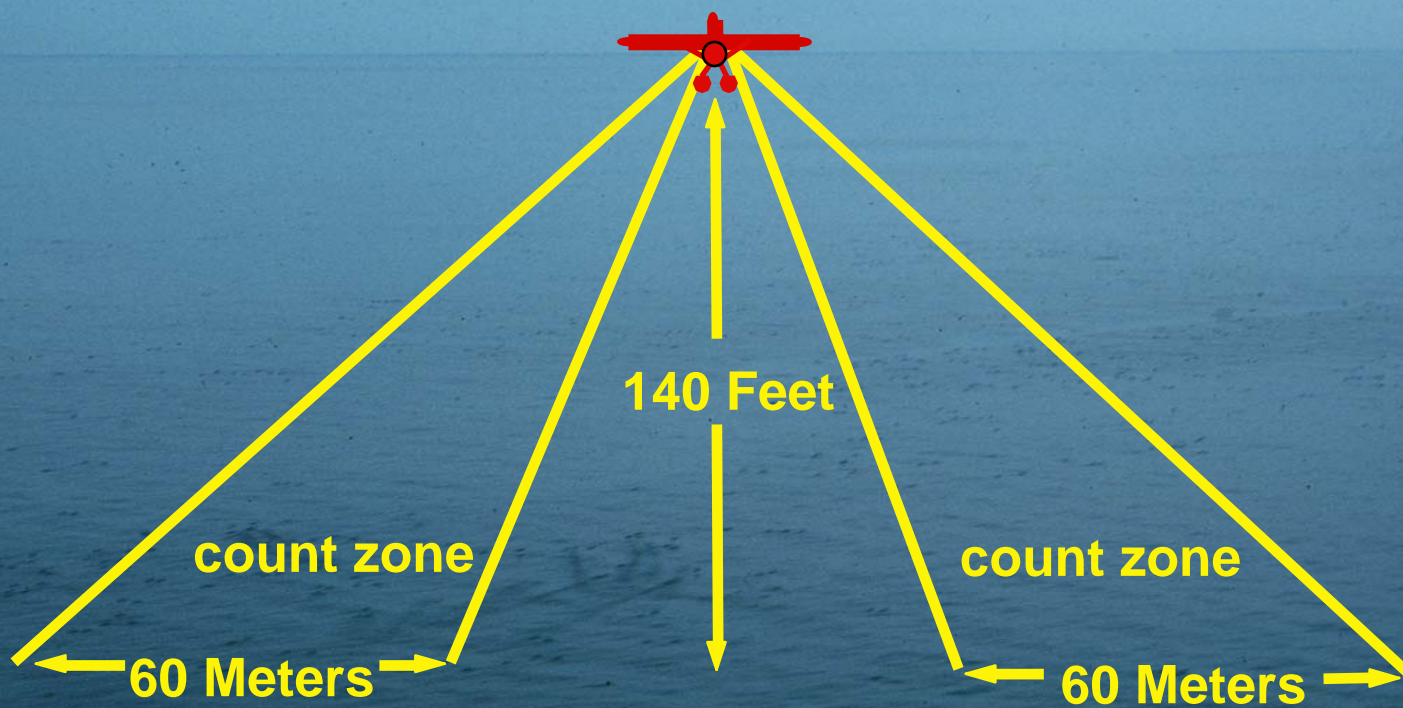
The Shoals off Nantucket Island are the largest on the U.S. East Coast and probably concentrate millions of birds



Unfortunately, the Manomet data set collected from large ships does not include shoal areas, due to the hazard of running ships in shallow waters.

To survey bird use of shoals and to cover large portions of the coast, we use USFWS aircraft





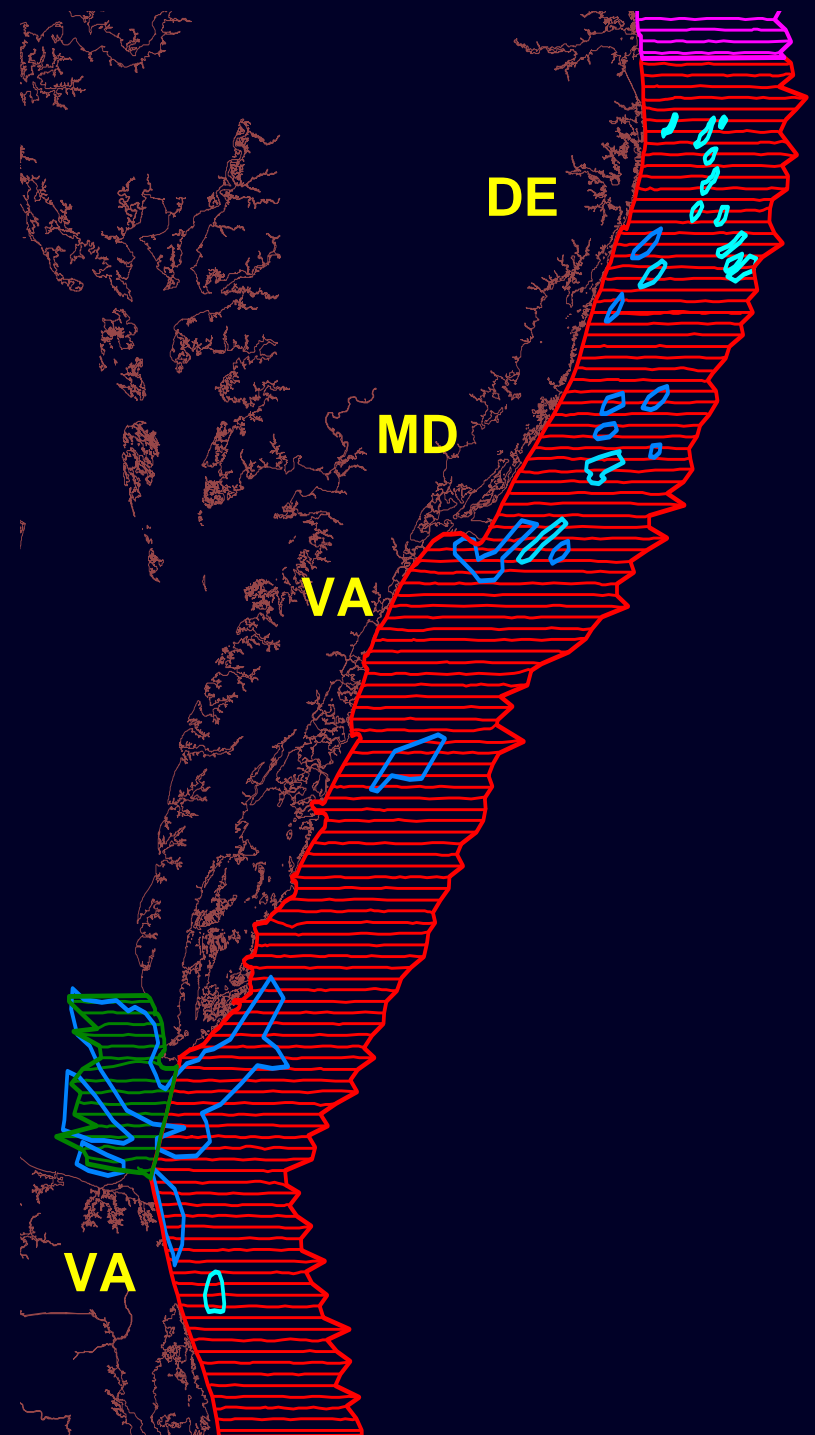
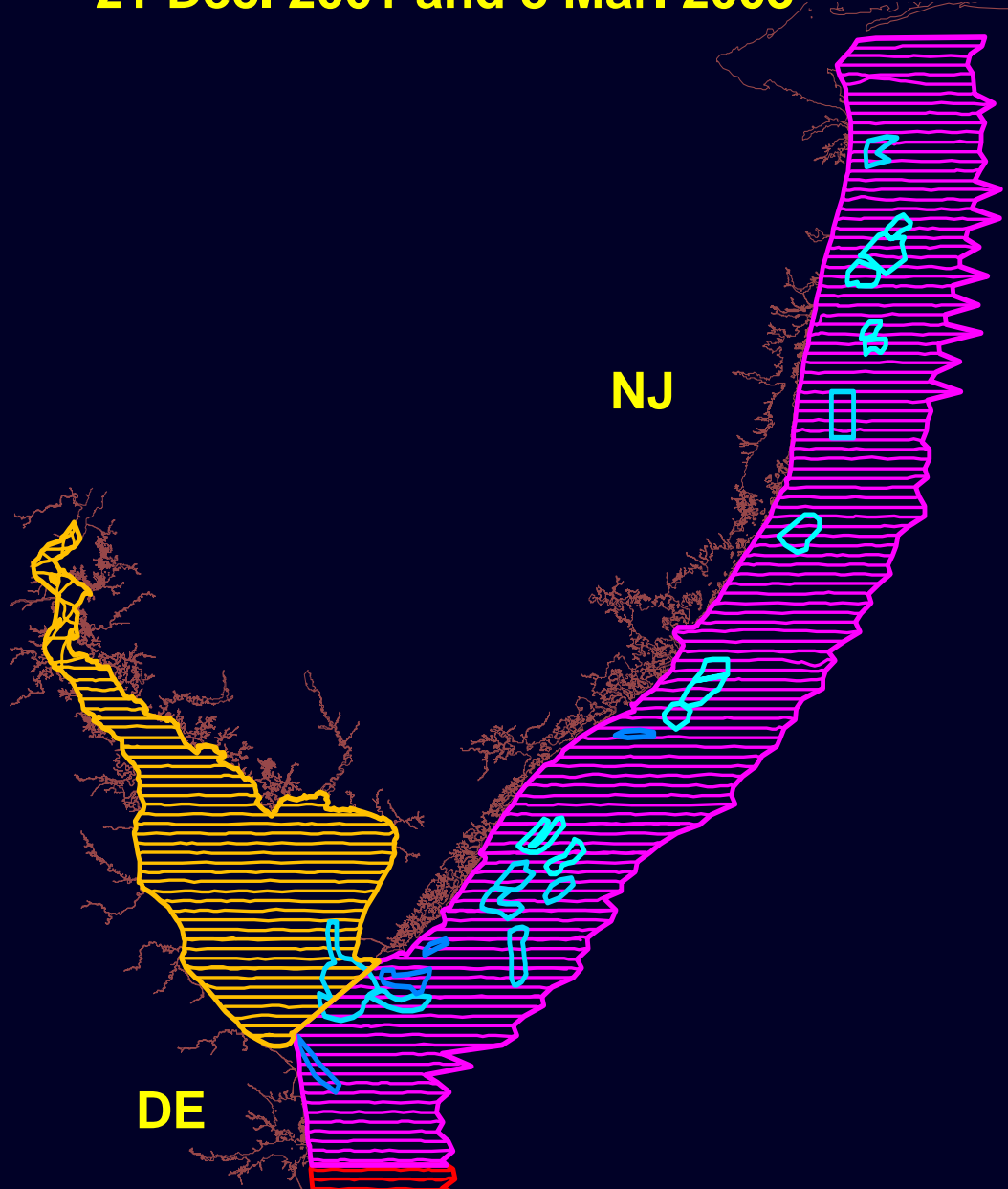
We counted birds within a 60m strip transect on both sides of the aircraft

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We also flew high altitude surveys of the each shoal three times to look for flocks such as this 5,000 Black Scoters

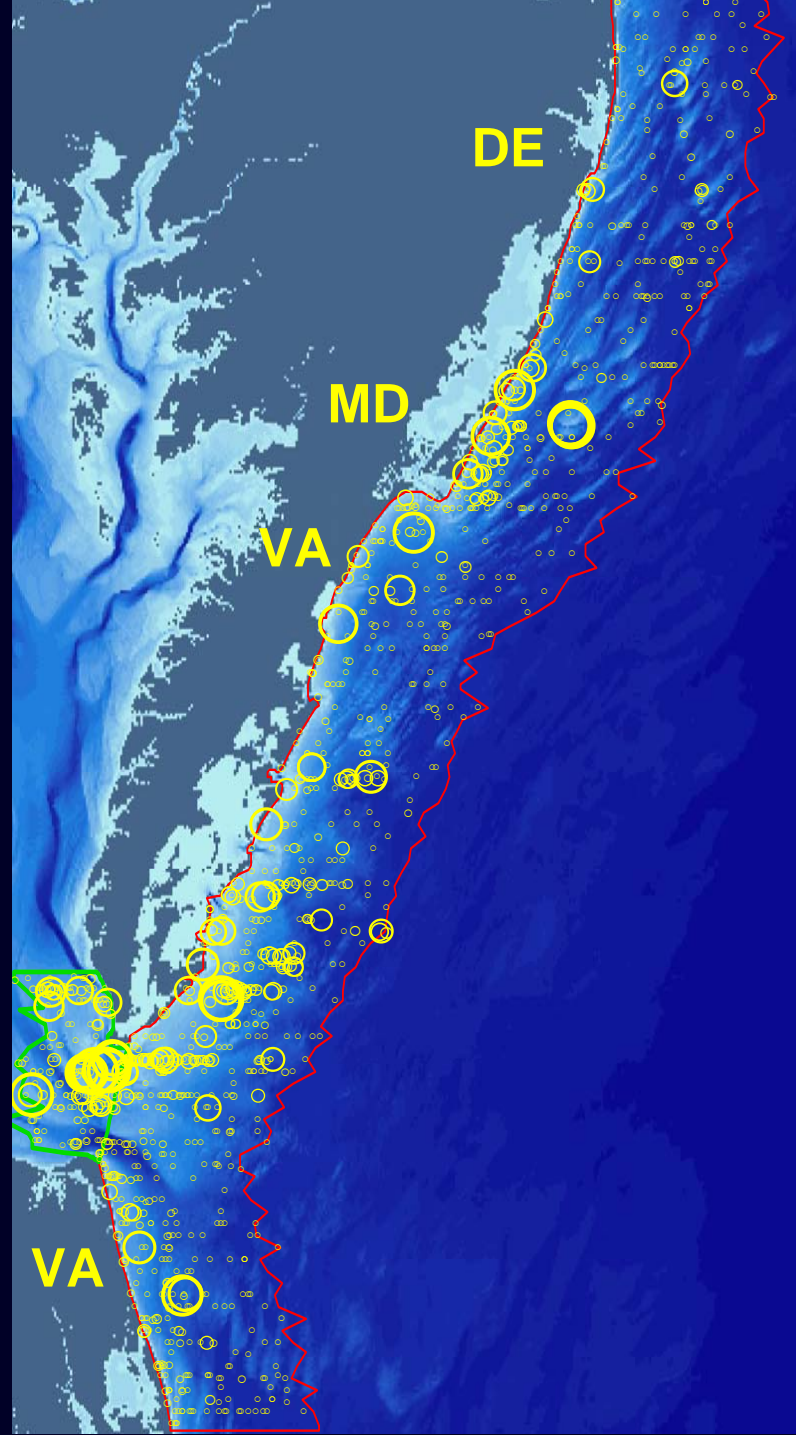
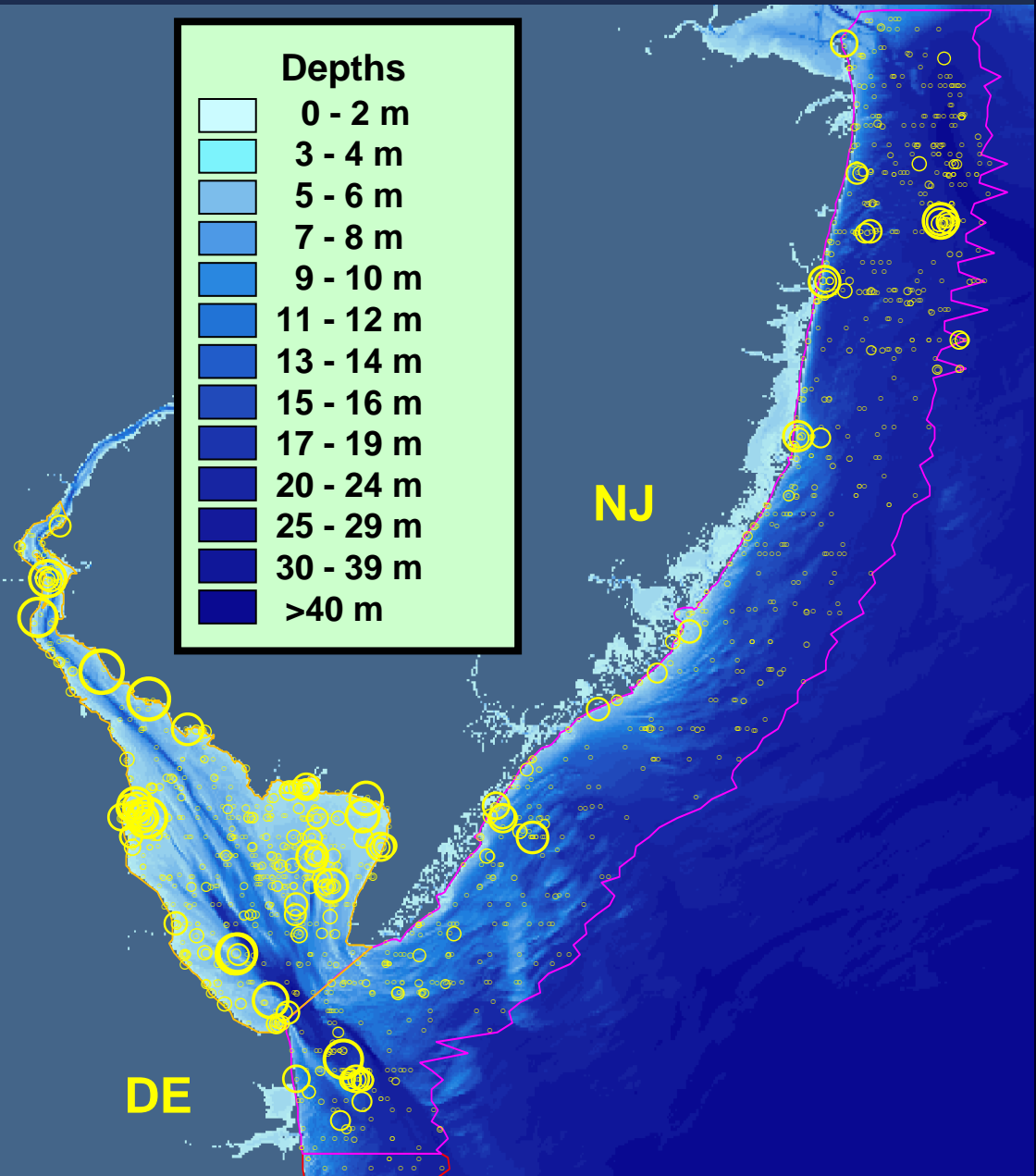
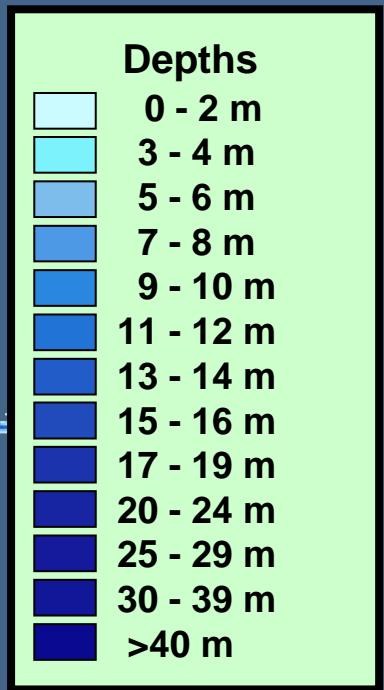
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**120 Meter Wide Survey Lines Flown
Every Minute of Latitude Between
21 Dec. 2001 and 8 Mar. 2003**



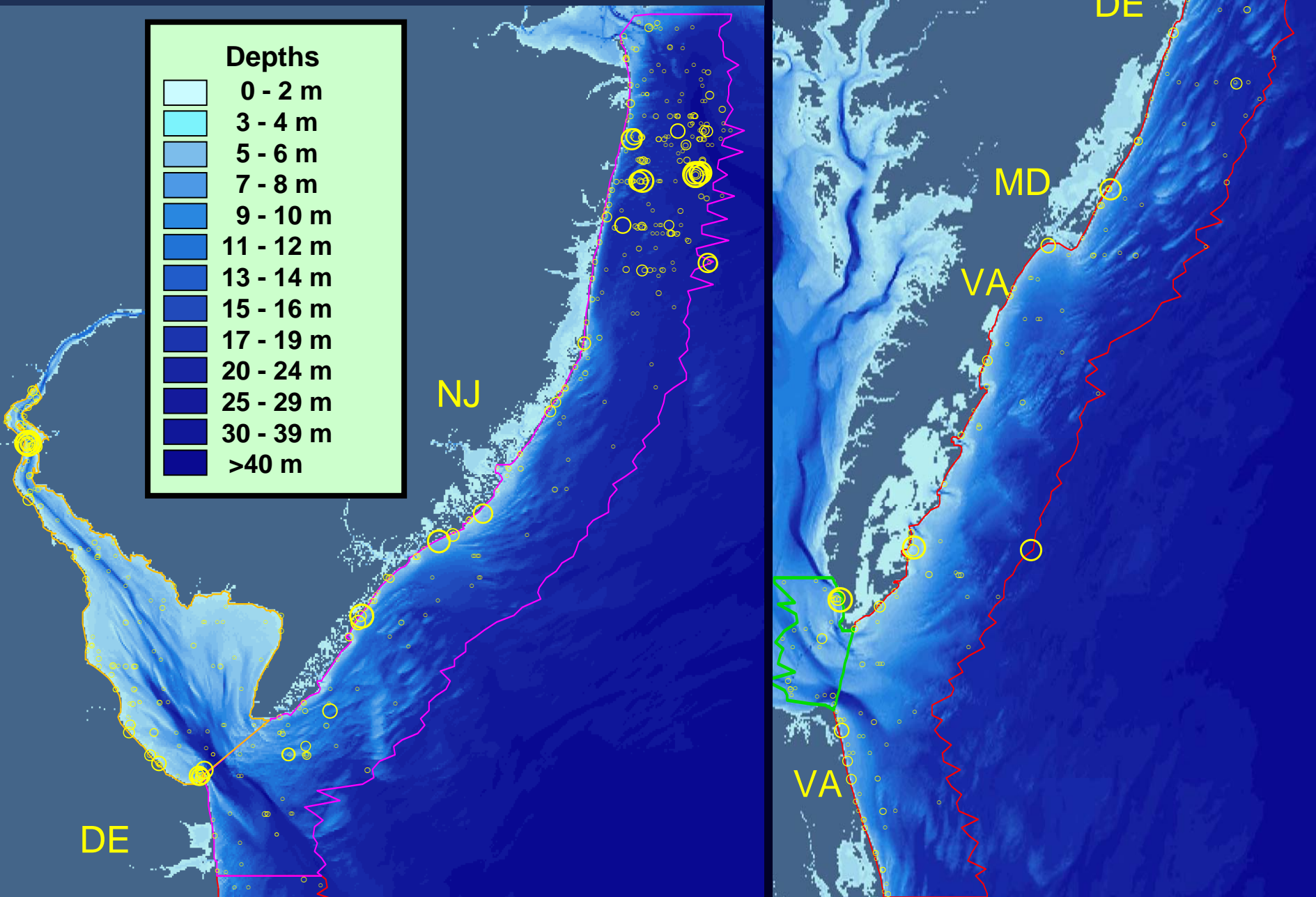
All Birds

Largest Circle = 600 birds Pop 289,000+



Large Gulls (BBGU, HEGU, RBGU, GLGU)

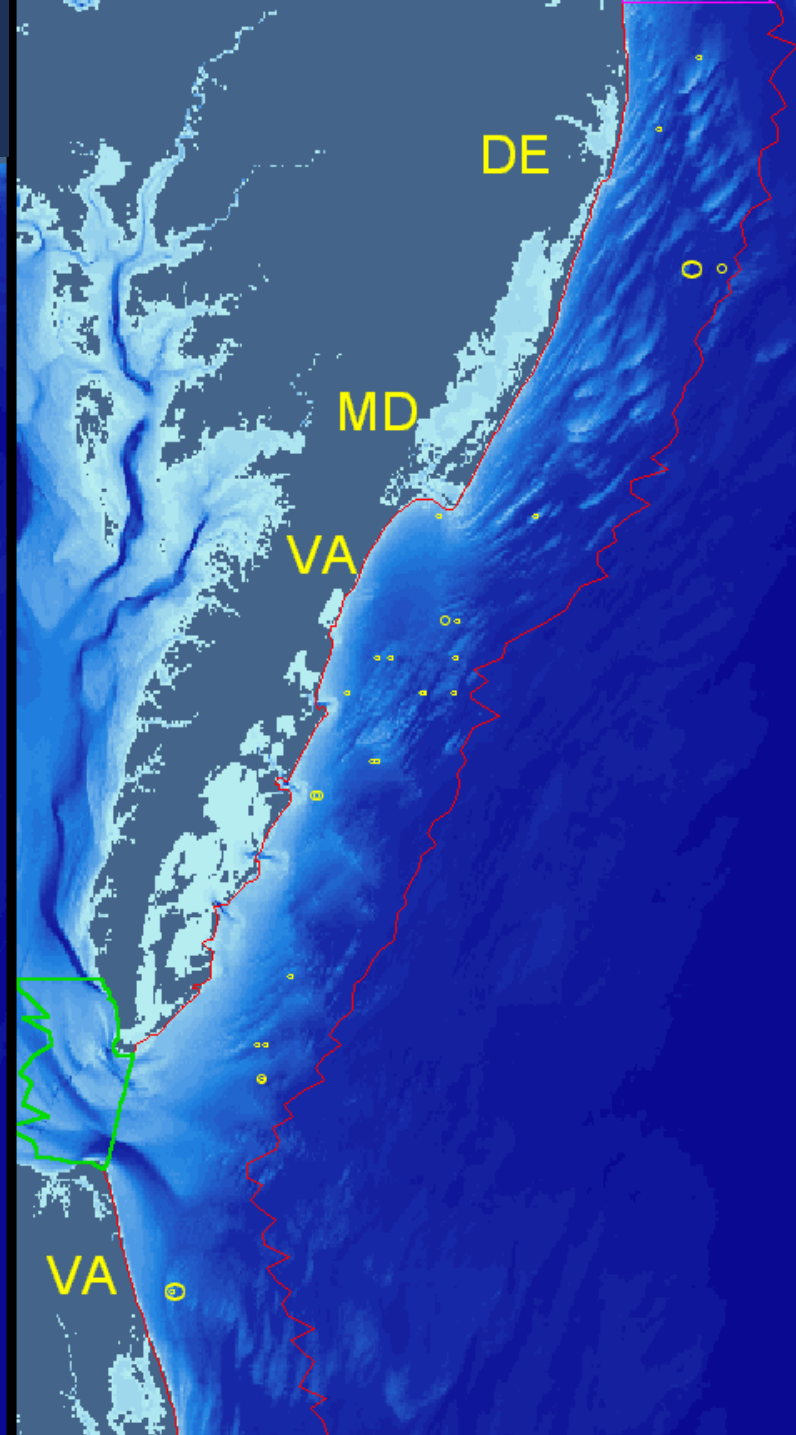
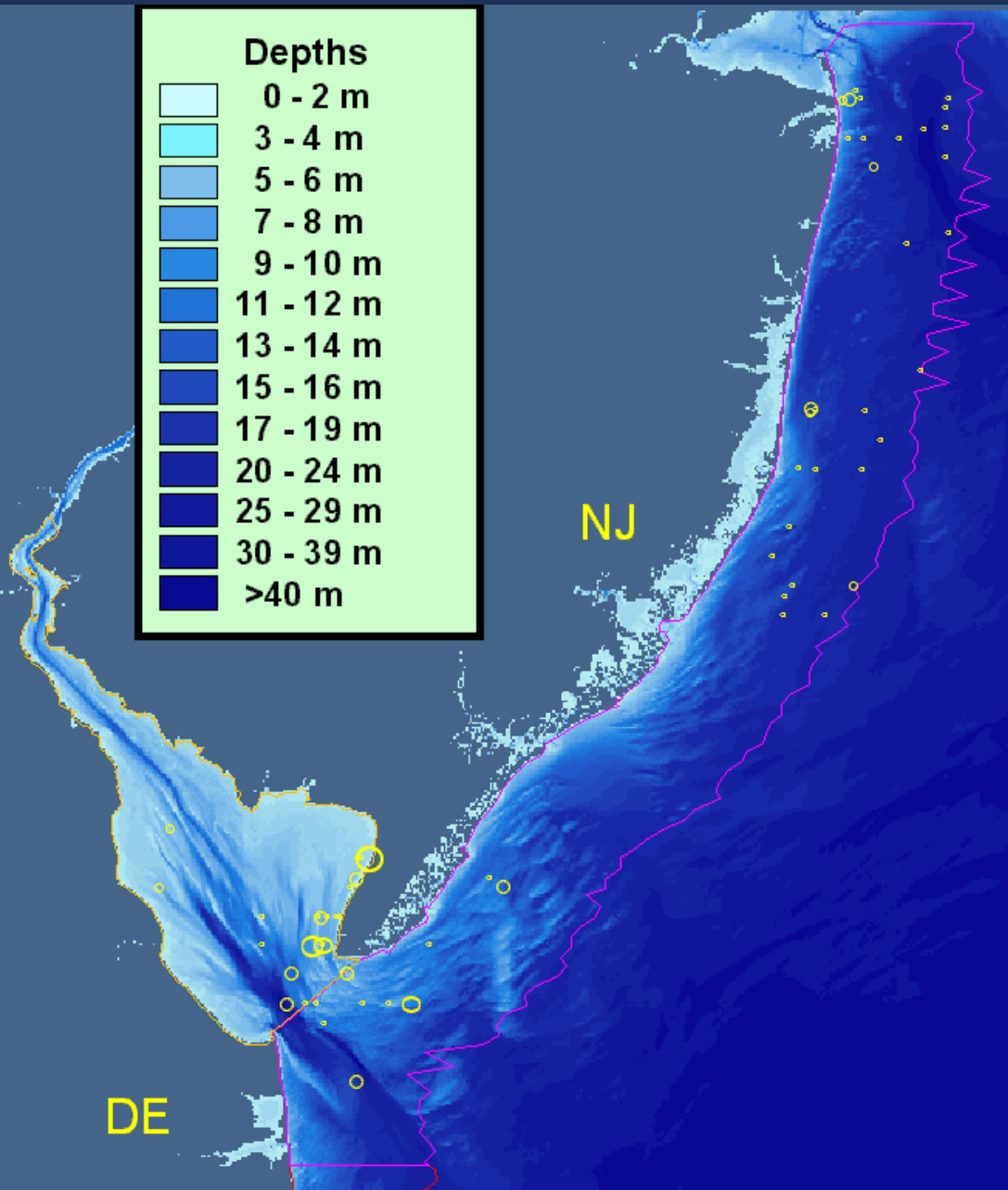
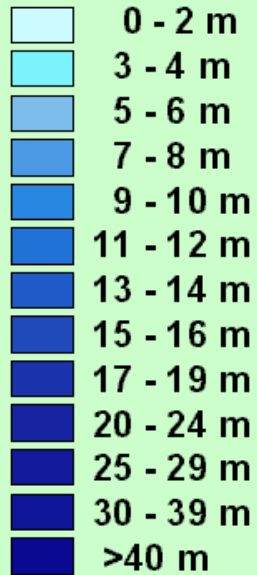
Largest Circle = 150 birds Pop. 38,000++



Small Gulls (BOGU, LIGU, BLKI, LAGU)

Largest Circle = 30 birds Pop. 3,000+

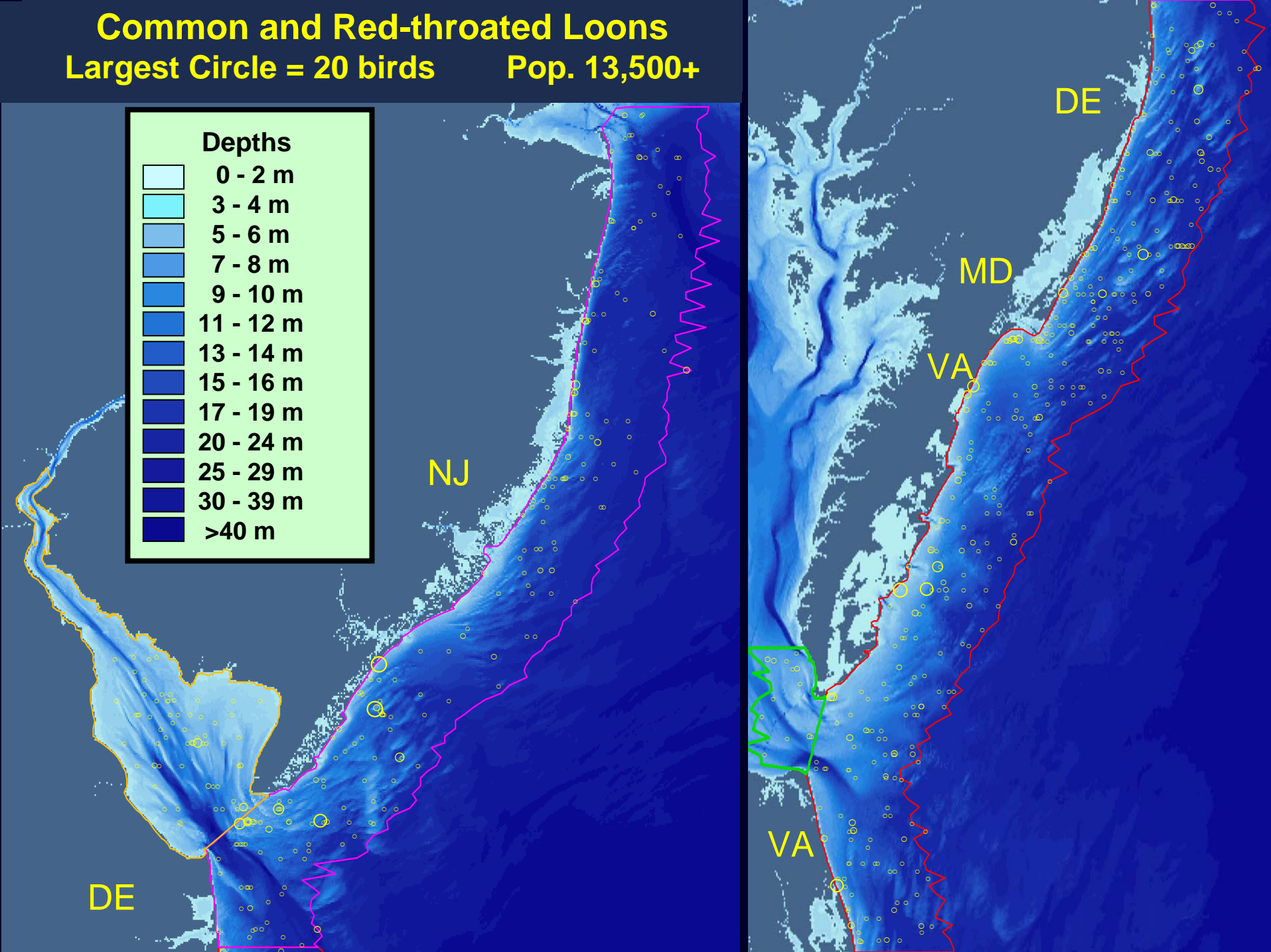
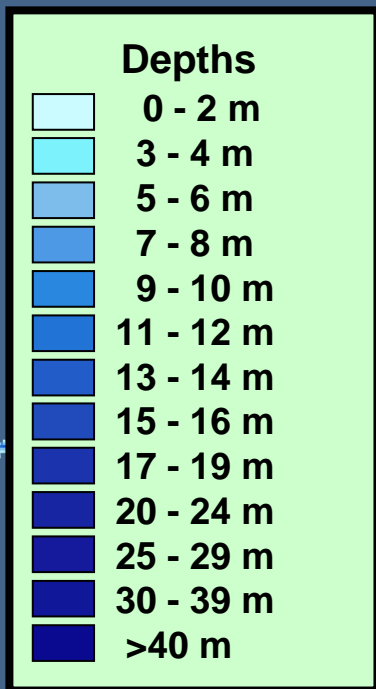
Depths



Common and Red-throated Loons

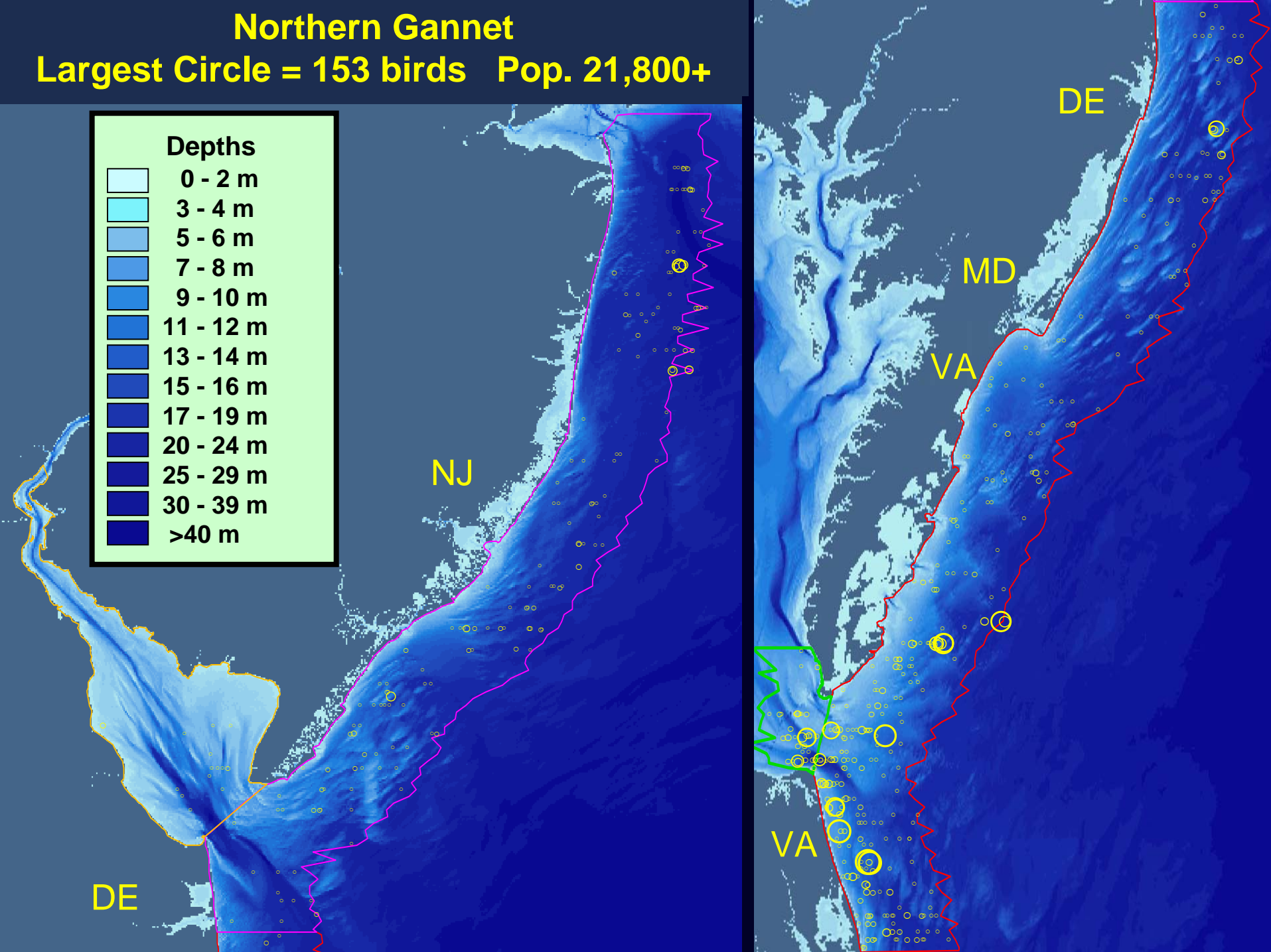
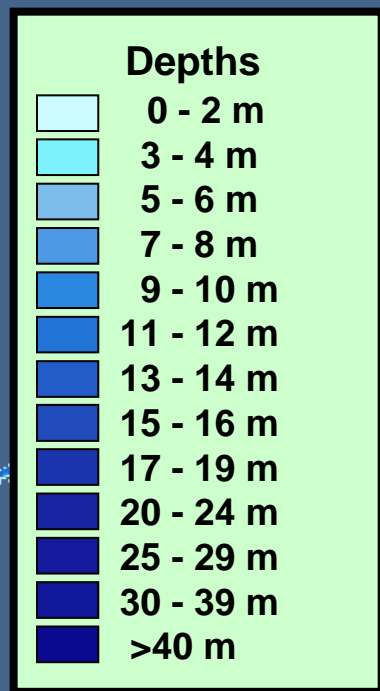
Largest Circle = 20 birds

Pop. 13,500+



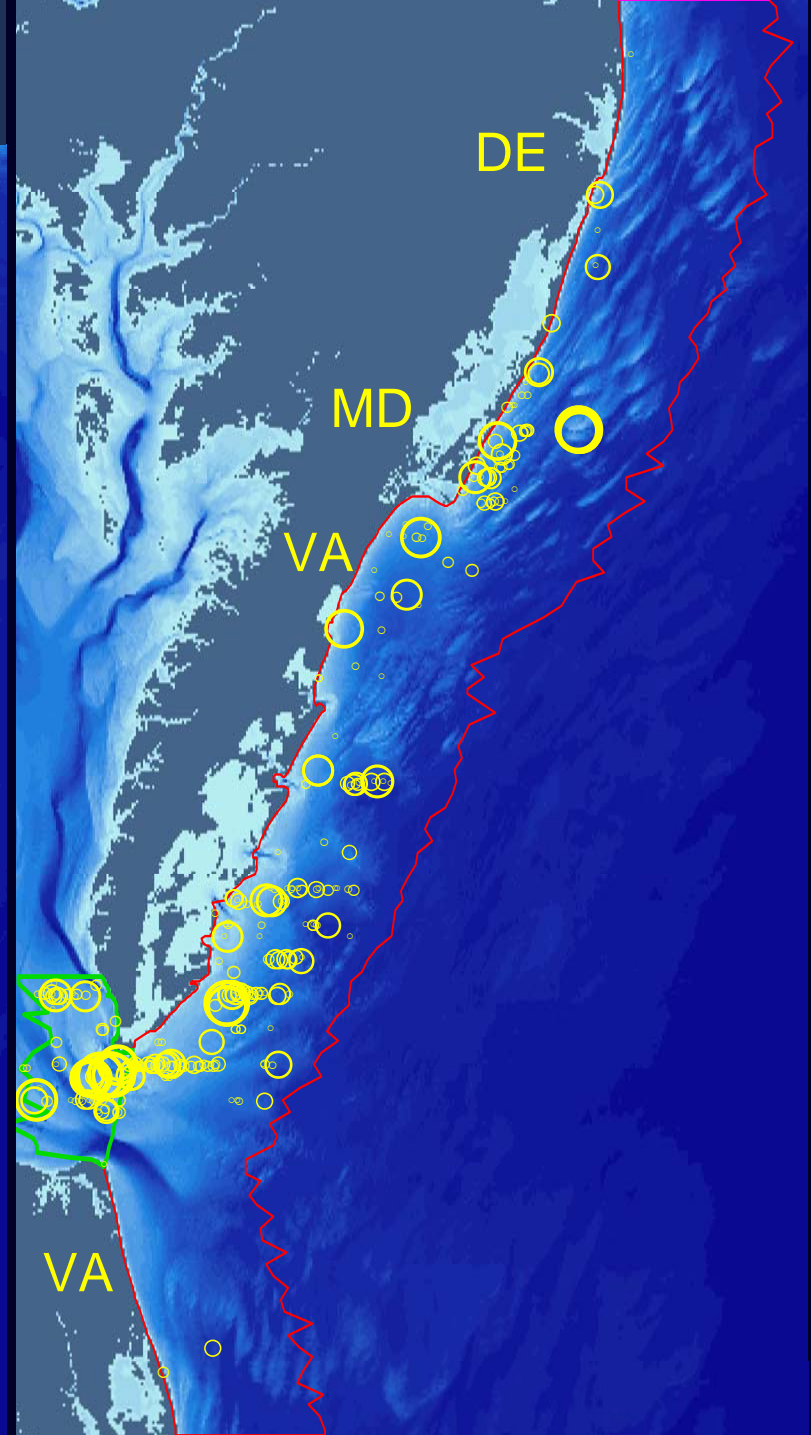
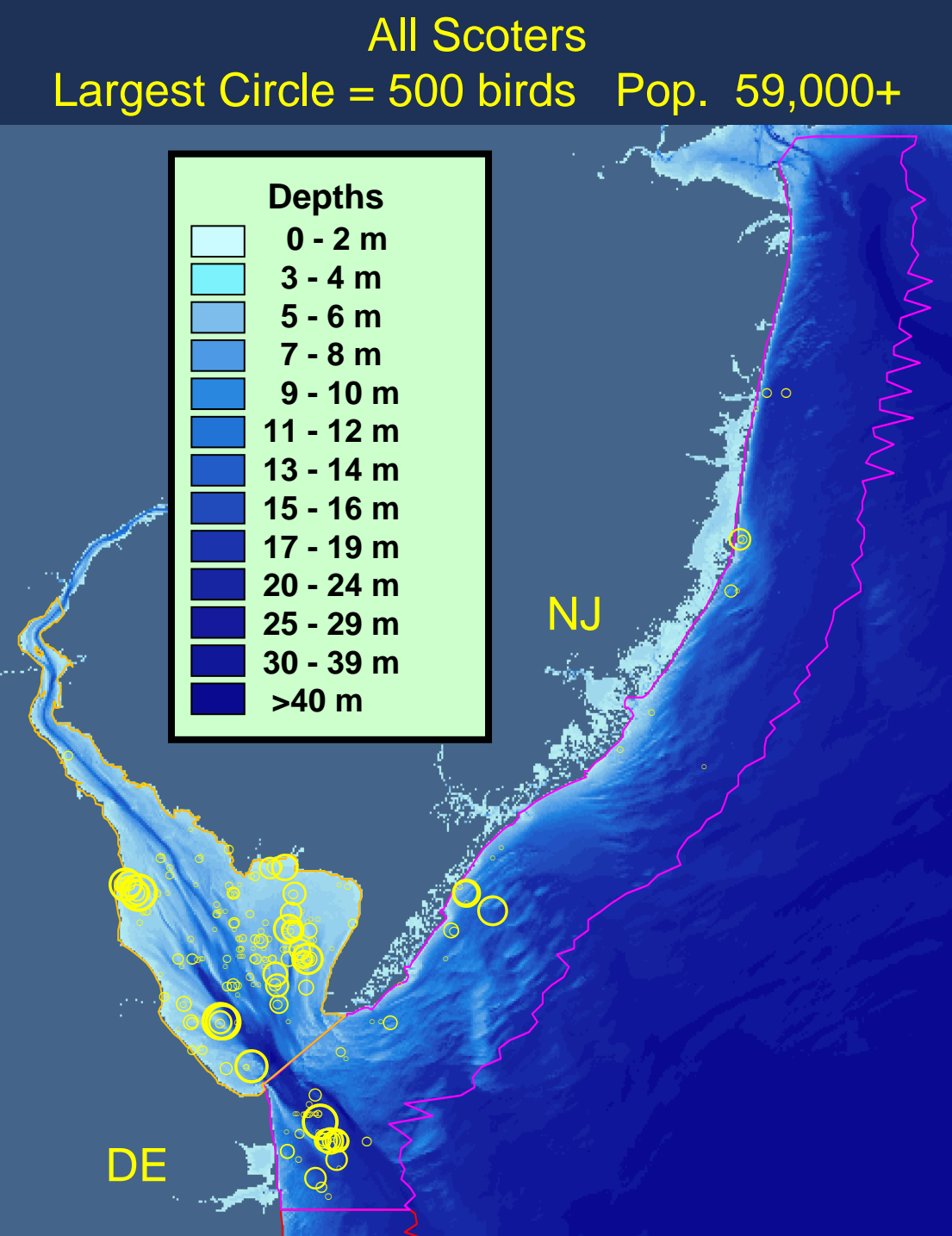
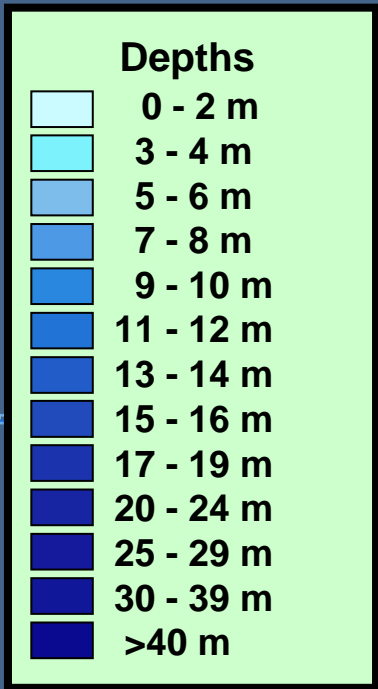
Northern Gannet

Largest Circle = 153 birds Pop. 21,800+

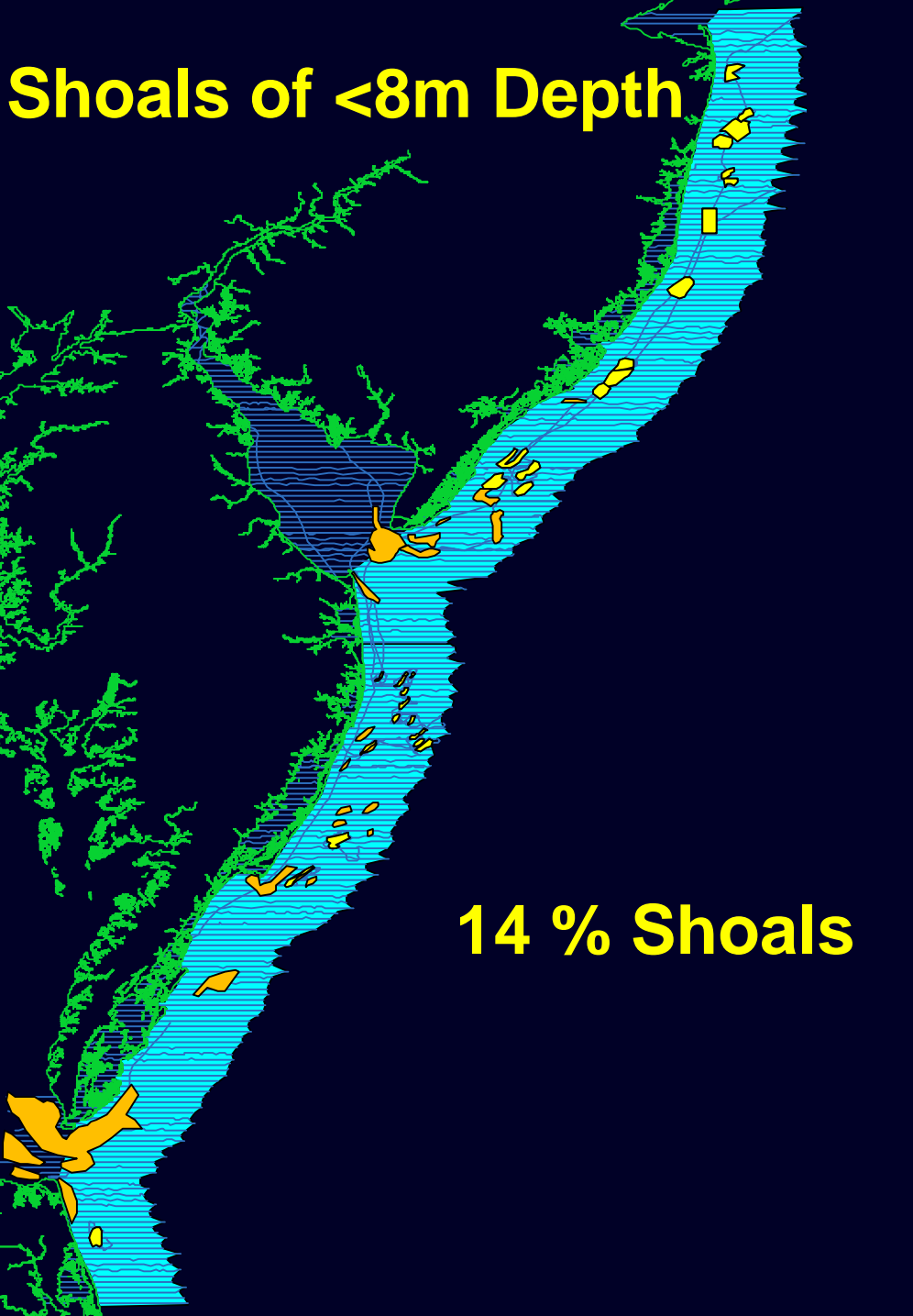


All Scoters

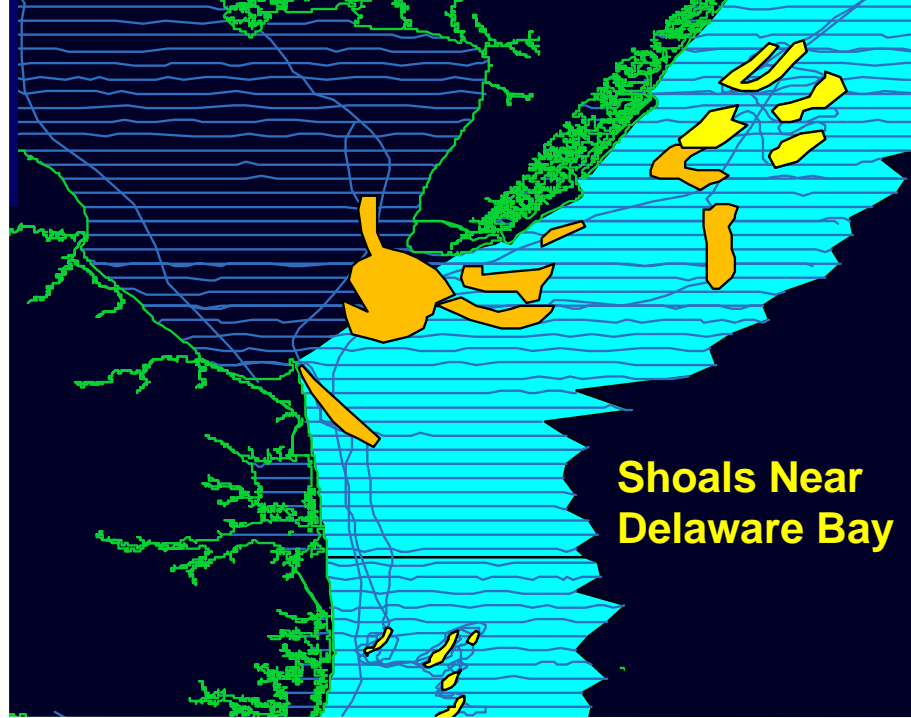
Largest Circle = 500 birds Pop. 59,000+



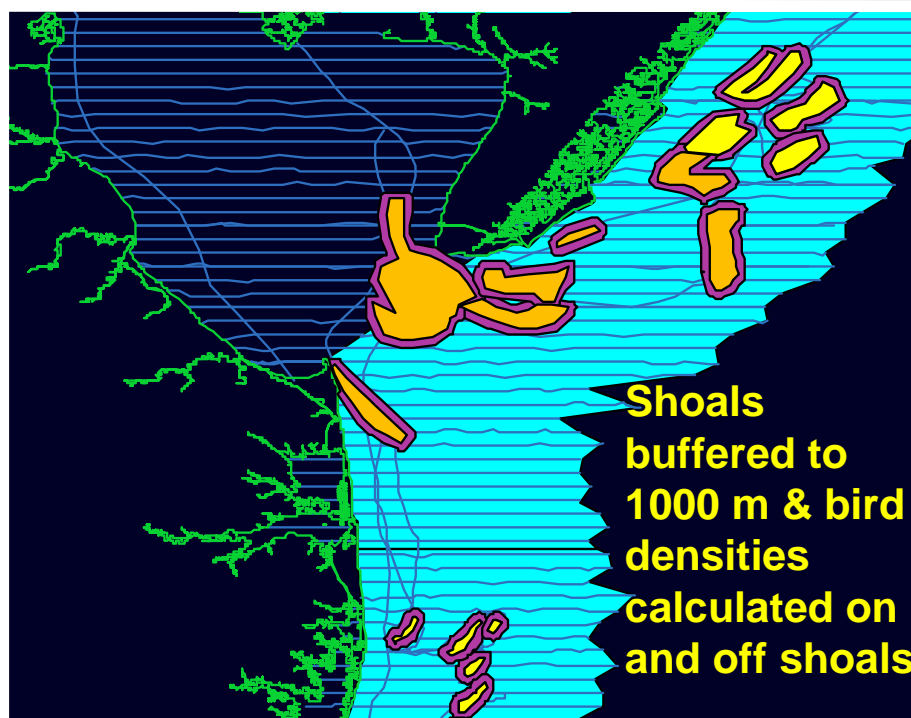
Shoals of <8m Depth



14 % Shoals

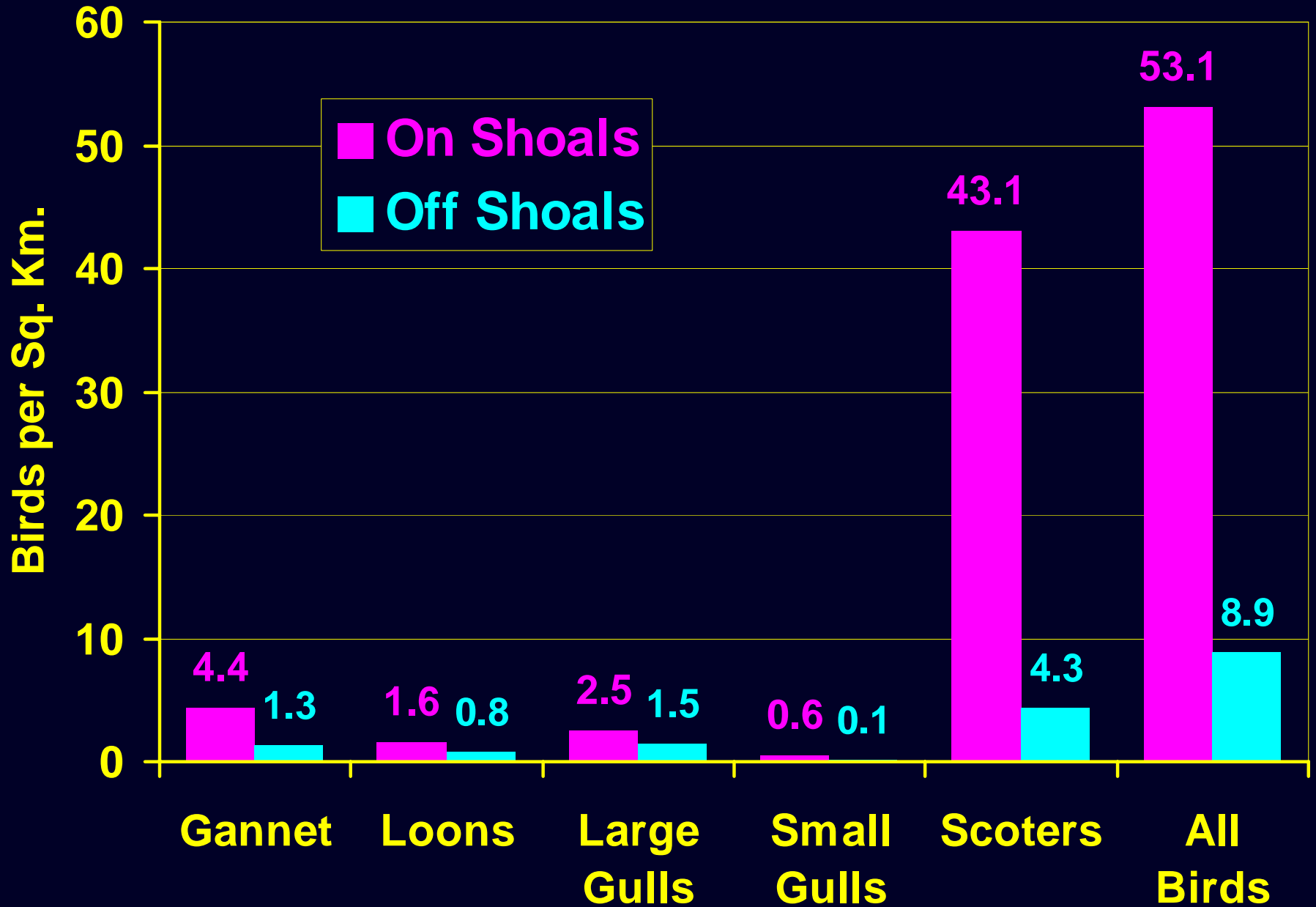


Shoals Near Delaware Bay



Shoals buffered to 1000 m & bird densities calculated on and off shoals

Density of Waterbirds in Relation to Shoals



Feeding Methods of Seabirds

Ashmole, 1965

Dipping

Aerial pursuit

Aerial piracy

Dipping

Skimming

Pattering

Hydroplaning

Surface filtering

Scavenging

Dipping

Terns & Gulls

Pelicans

Surface seizing

Pursuit plunging

Gannets

Loons

Pursuit diving : wings

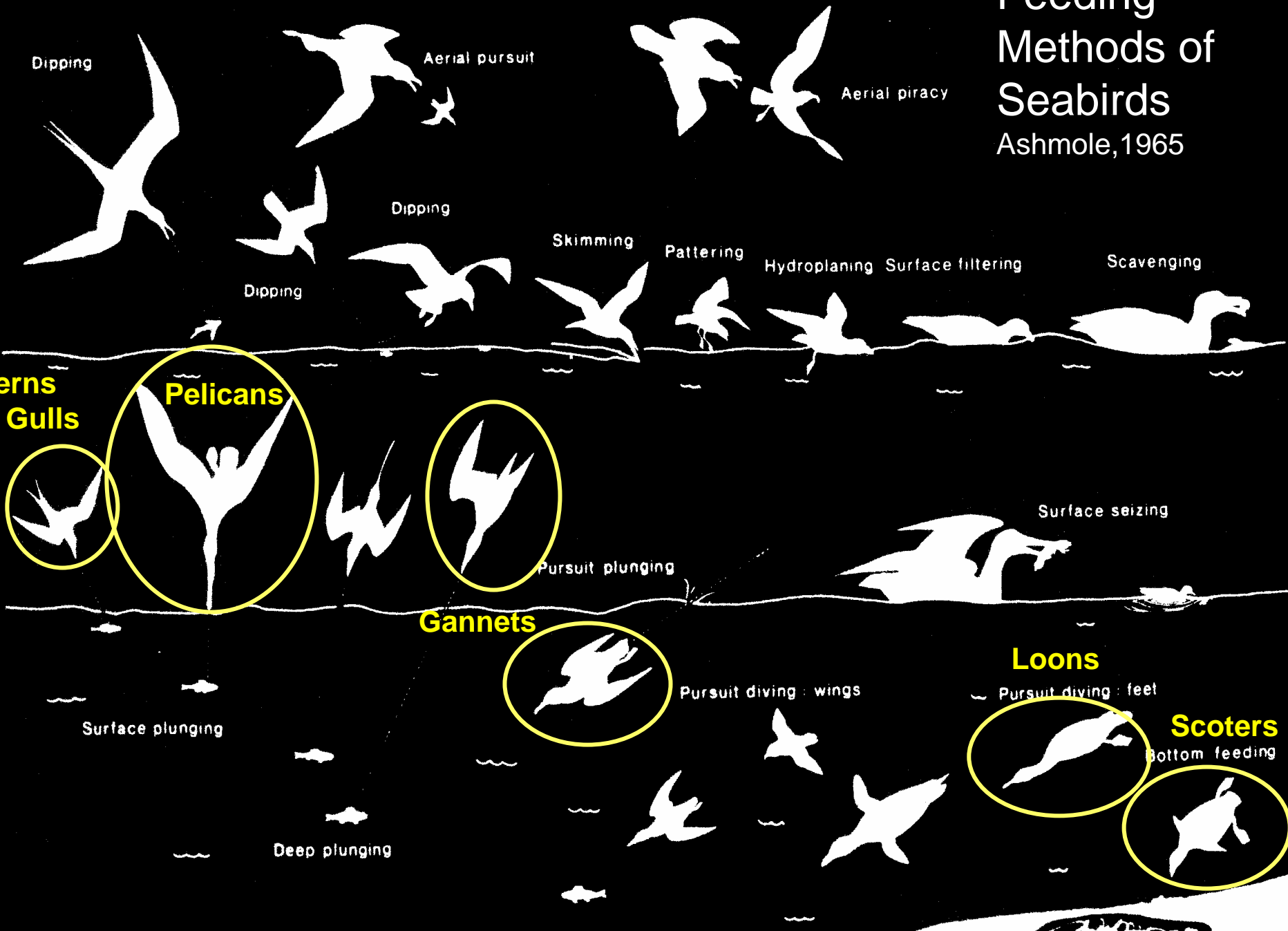
Pursuit diving : feet

Surface plunging

Scoters

Bottom feeding

Deep plunging



Winter distribution of birds largely reflects the distribution of their foods

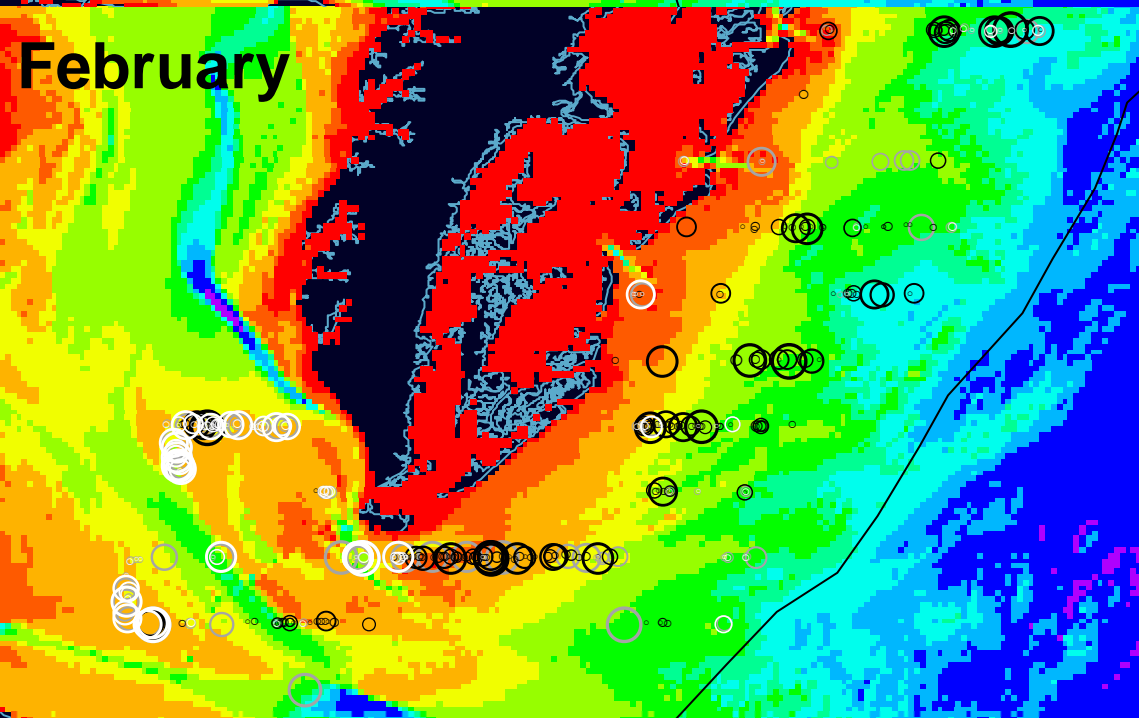
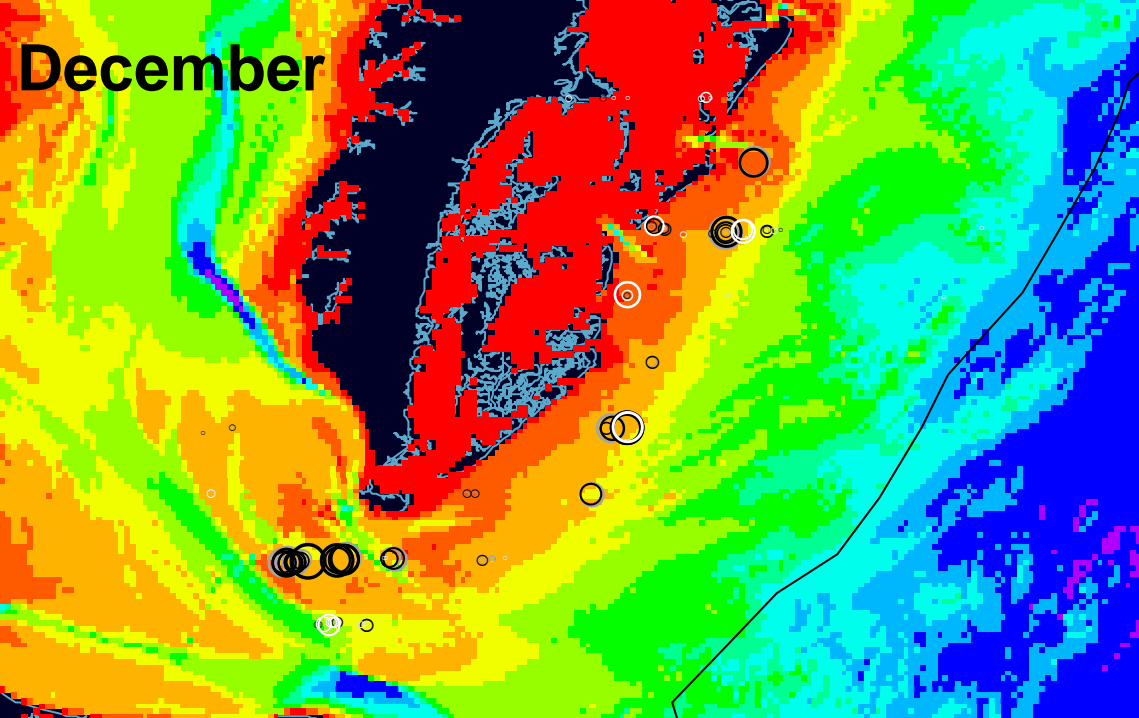


Scoters can eat up to 1 Kilogram per Day



Bivalves
Gastropods
Amphipods
Small Crabs & other Crustaceans
Polychaetes and Annelids
Fishes and Fish Eggs?





Scoters Near Mouth of Chesapeake Bay

Largest Circle = 500 birds

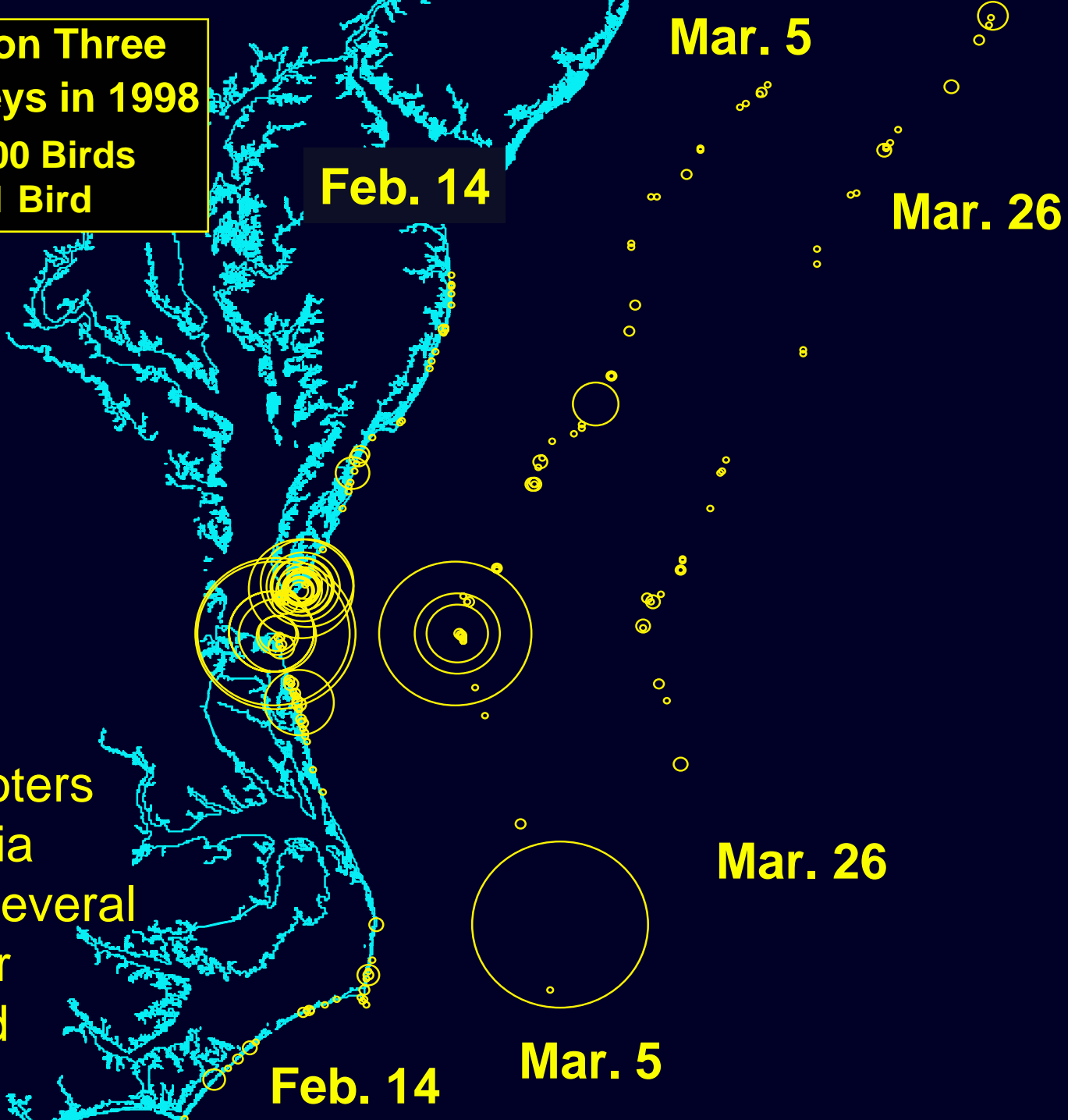
Distribution seldom the same in two years or even within the same year, so May need 3 years?

- Surf Scoters
- Black Scoters
- Unidentified Scoters

Depth

	0 - 2 m
	3 - 5 m
	6 - 8 m
	9 - 10 m
	11 - 13 m
	14 - 16 m
	17 - 18 m
	19 - 21 m
	22 - 24 m
	25 - 30 m
	31 - 75 m

Scoters Observed on Three Coastal Aerial Surveys in 1998
Largest Circles = 4,000 Birds
Smallest Circles = 1 Bird



Large flocks of scoters observed in Virginia Beach area over several years, but not after dredging to rebuild beach in 2000

Sand Mining - Minerals Management Service has jurisdiction beyond 3 miles from shore

Some States, COE, & MMS are developing 40 year plans now!

Where to Mine Sand?

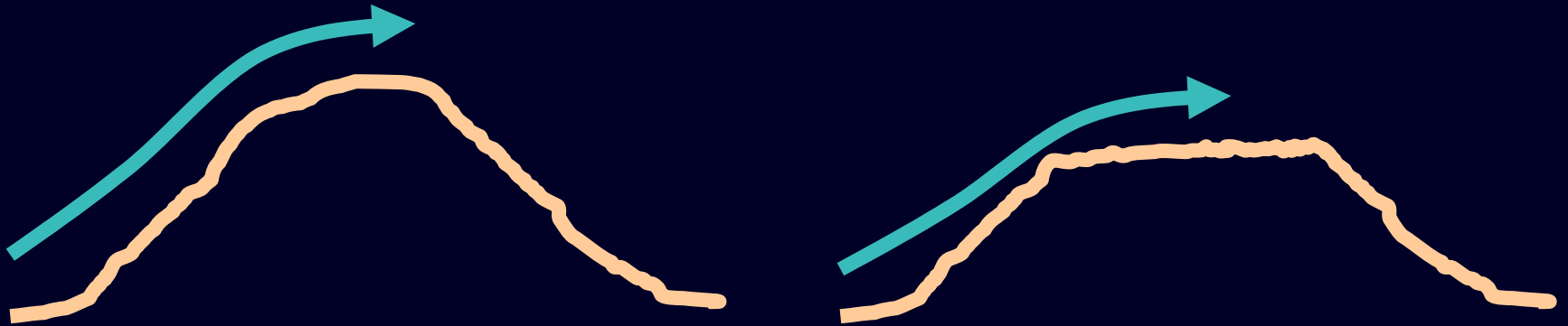
Avoid:

- Foraging Areas**
- Concentration Areas**
- Wintering Areas**
- Migration Stopover Areas**

How to Dredge?

Must know why birds are there?

Remove top of shoal

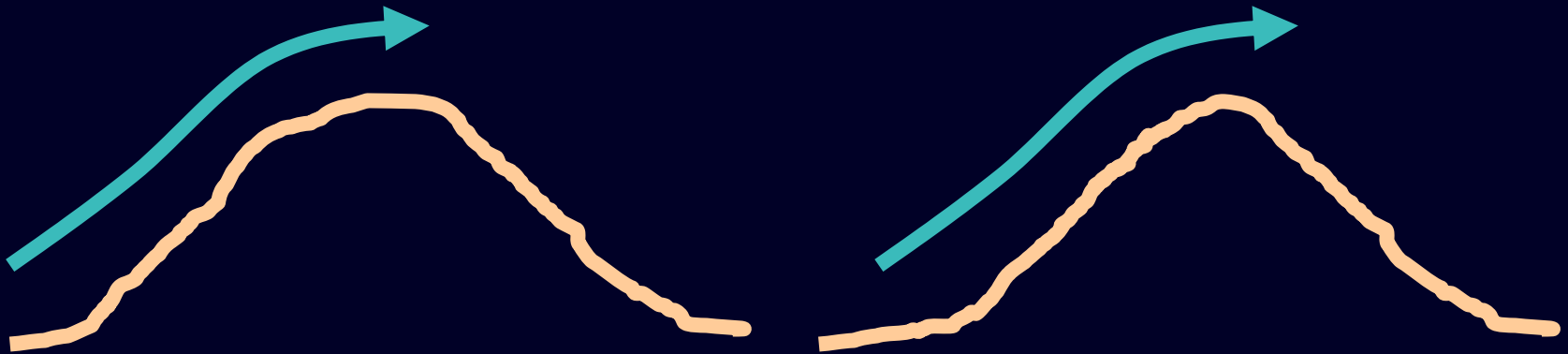


**Would probably reduce upwellings affecting fish eating
Birds such as gannets, gulls, and pelicans**

Increase diving depth for seaducks

**Remove foods for seaducks with unknown prospects
for recovery of foraging habitat**

Removing only the sides of shoals

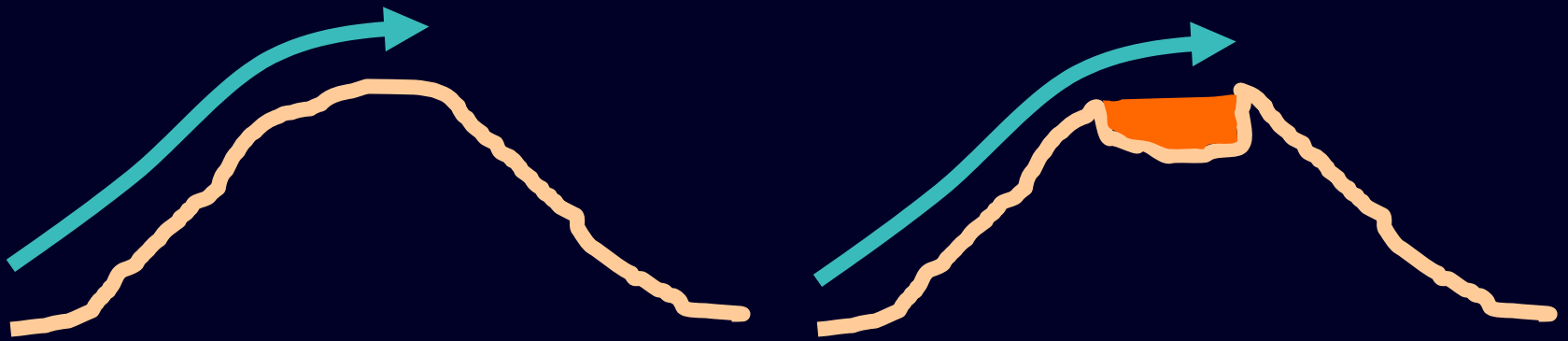


Maintain upwellings

Reduce area of shallow water – Less benthic foraging areas for scoters

Disturb sides of shoal - possible important benthic habitat

Removing only the middle of shoals

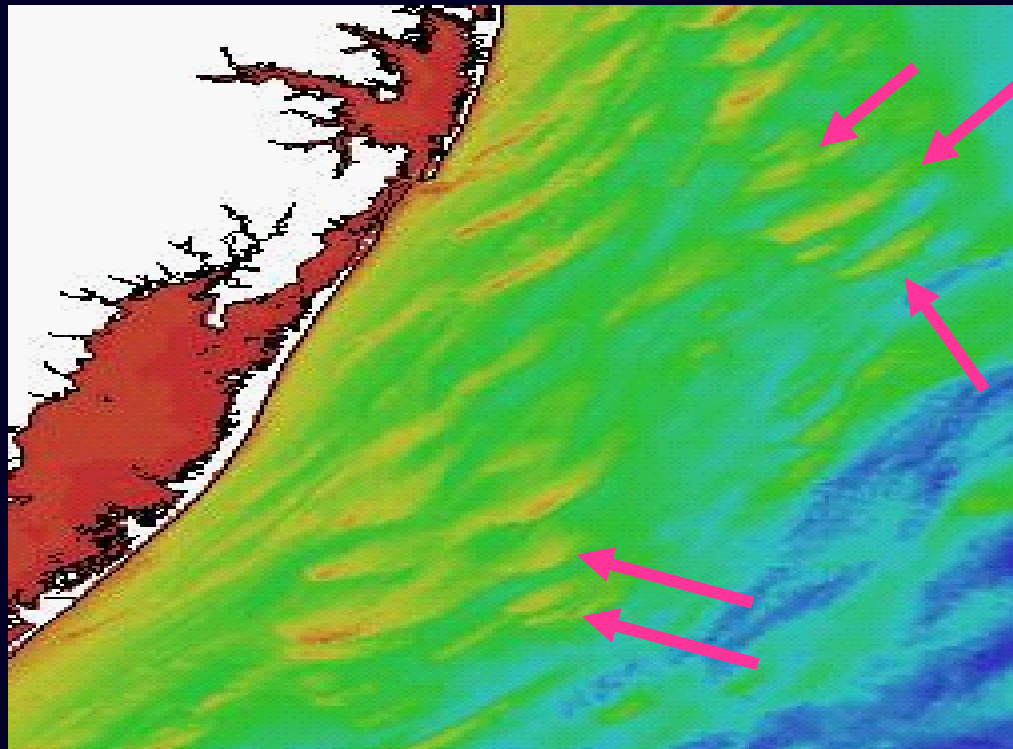


Upwellings maintained?

Could affect sedimentation resulting in change of substrate and benthic foods?

Increased diving depth for seaducks

Should we remove part of each shoal or completely remove one shoal?



If we do not understand the ecological linkages of birds to shoals and they have to be mined, we're probably better off completely removing one shoal until we are better able to predict the effects on birds

Choose shoal as far offshore as practical

Do not choose the shallow shoals

Recommendations

**Identify bird use of shoals (3 years minimum)
(seasonal, annual, magnitude of use)**

Determine what draws the birds to the shoals

**Determine the foods of birds on shoals and the
effects of sand removal on those foods**

Model the expected results of sand mining

Test model and modify dredging plans accordingly

Recommendations (cont.)

If clean sand is available from dredging projects in channels, then moving sand long distances may be cost effective if the cost of having to dredge material twice, plus the cost of disposal of the material removed from the channel are calculated in the overall project to enhance beaches.

When evaluating data from studies, finding few commercial sized clams does not mean it is not important for birds. Birds may eat most of clams and could limit the size and number of clams.