

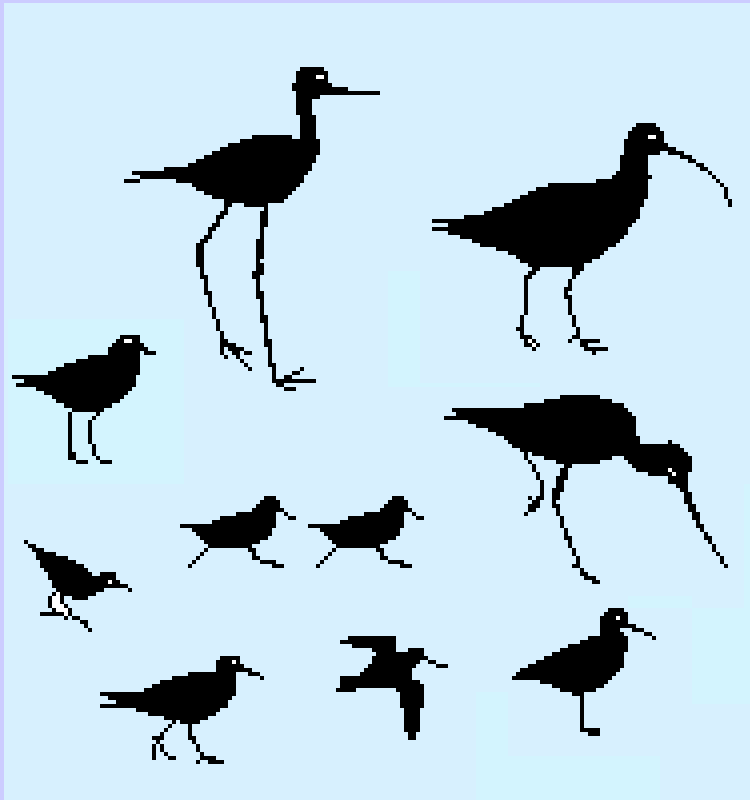
# Shorebirds – their migration biology and conservation

Declining knot populations-- exploring  
whether the cause is rooted at Delaware  
Bay



## Some characteristics of shorebirds:

Many sizes and shapes



Lots of bill forms for specialized foraging

➤ **Super feeders !**

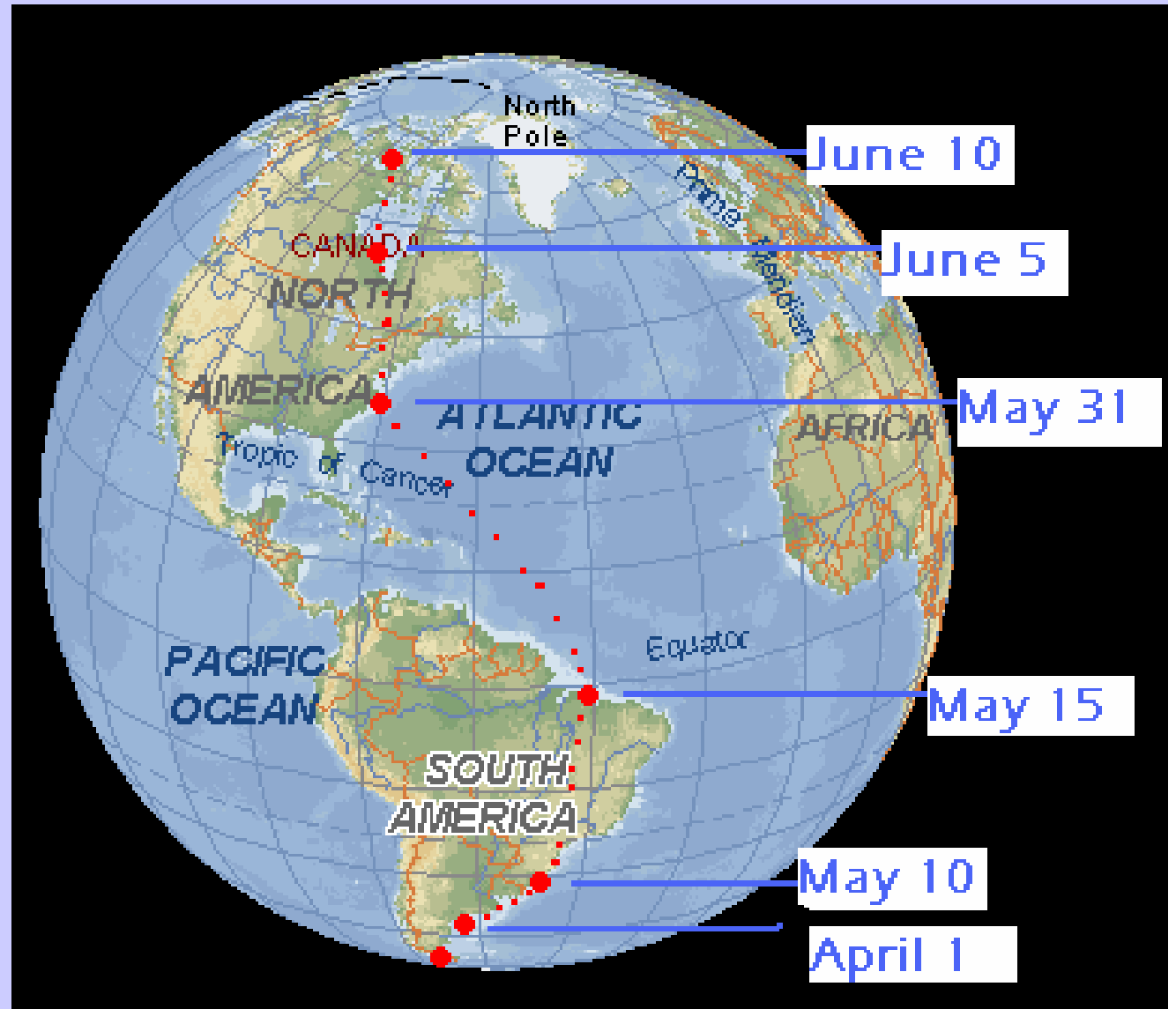
- Bills, legs, eyes, & behaviors.
- Double wt. in 3-10 days, then off again...

➤ **Expert travelers !**

- Up to 20,000 miles round-trip!
- Arctic to Patagonia
- 72 hr non-stop flights w/o food or water
- 1-2,000 mi at 10,000+ ft.

Red Knots have one of the longest animal migrations known.

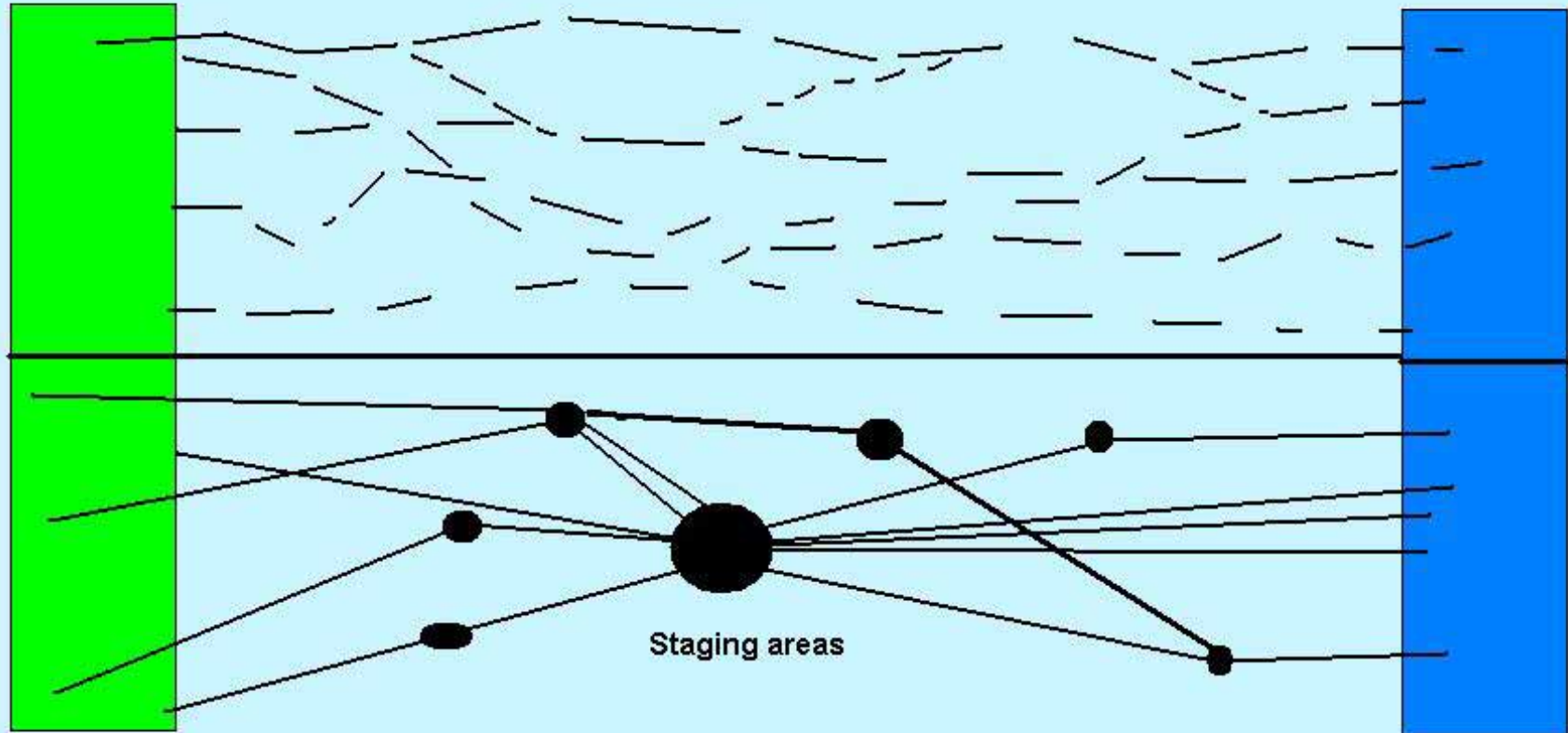
From a conservation view, their **long-hop** migration strategy is a central issue.



## Short hop migration

Breeding

Wintering



## Long hop migration





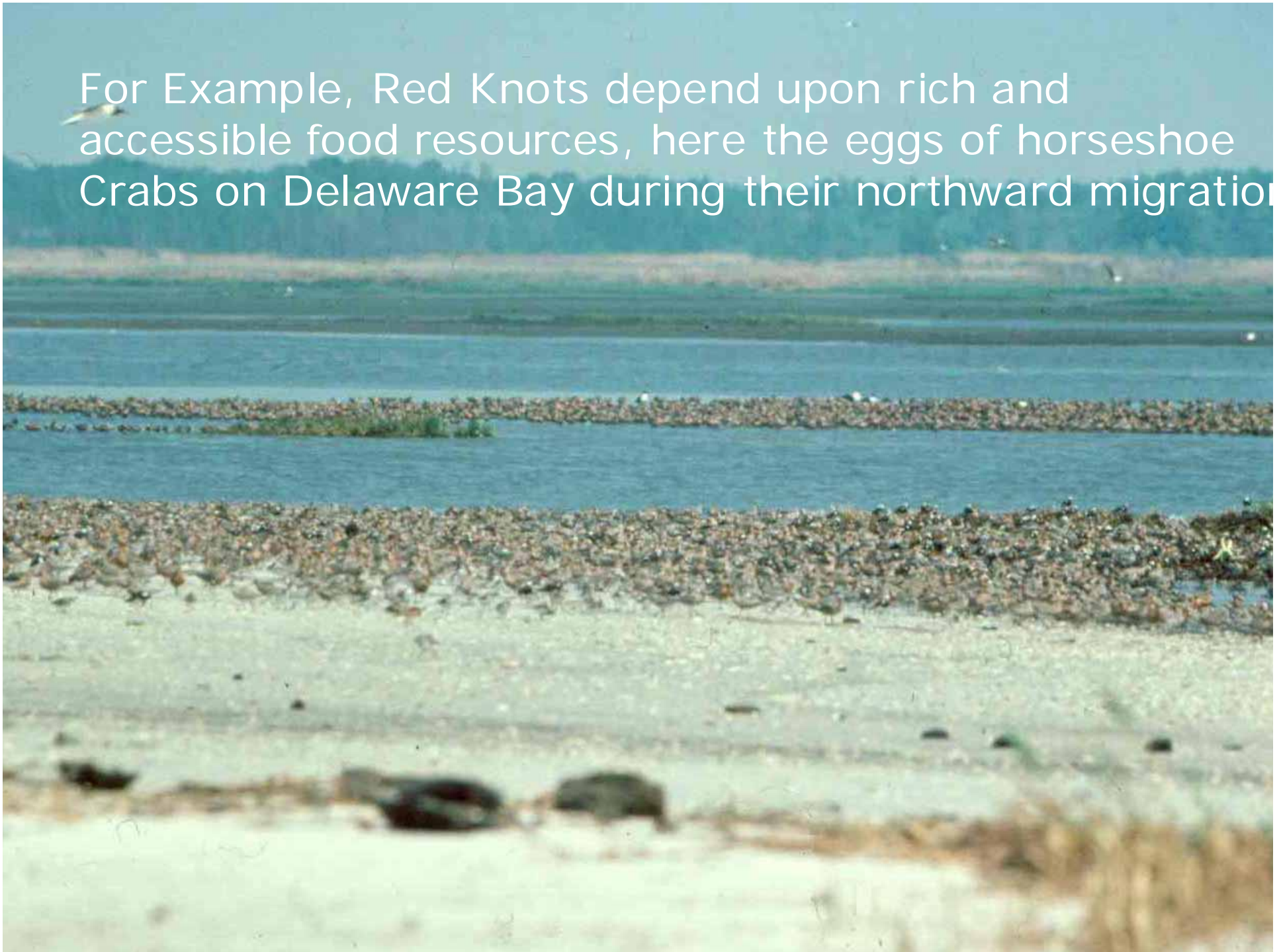
**Arrive  
famished....  
depart FAT!**

**Fattening is key  
to success --**





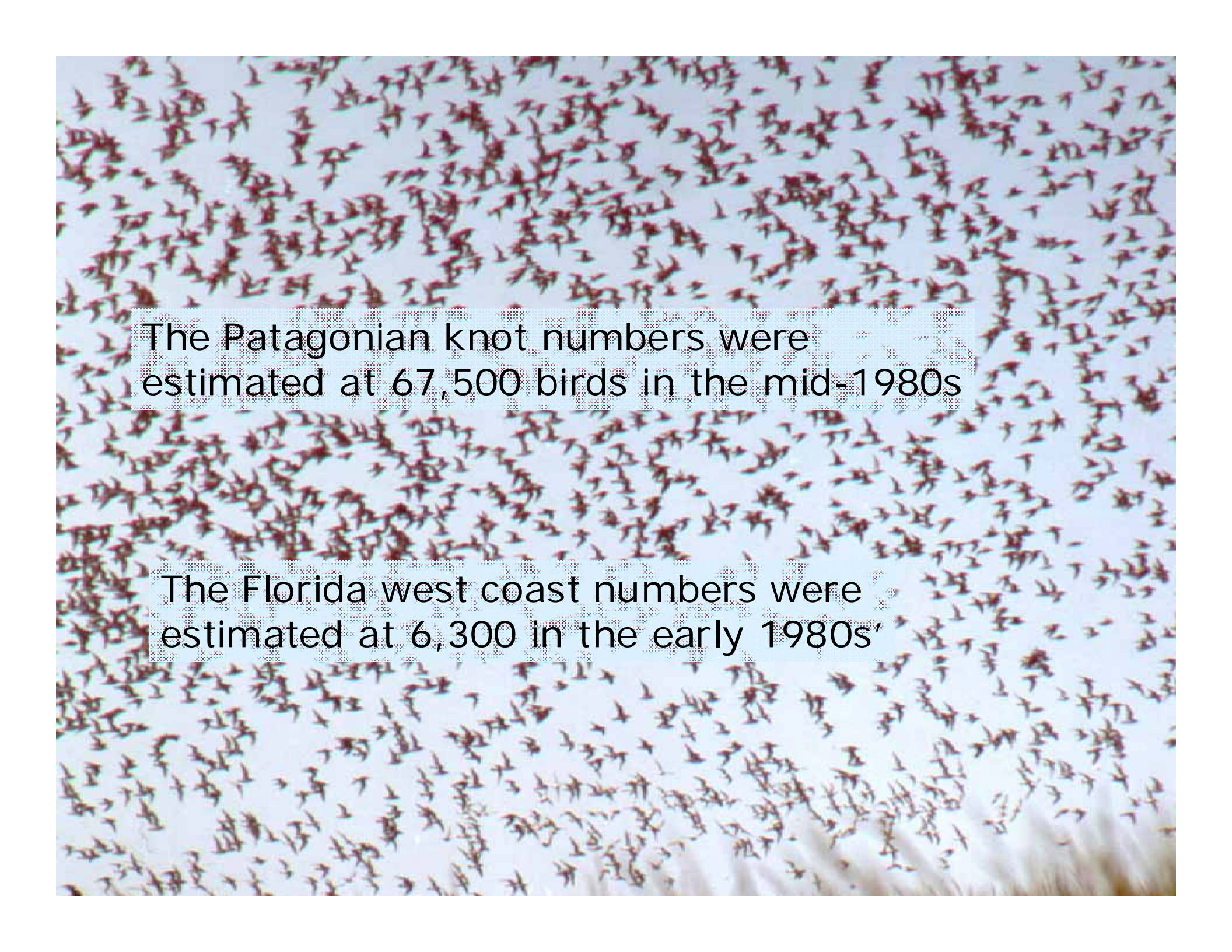
For Example, Red Knots depend upon rich and accessible food resources, here the eggs of horseshoe Crabs on Delaware Bay during their northward migration



Now there is good evidence that there are at least 2 major wintering groups of knots in the Americas, one in Patagonia and one farther north which includes knots wintering in the southeastern United States, largely west Florida.





A large flock of birds, likely terns, is shown in flight against a light sky. The birds are densely packed, filling most of the frame. They appear as small, dark silhouettes with some lighter underparts. The overall scene conveys a sense of a massive bird colony.

The Patagonian knot numbers were estimated at 67,500 birds in the mid-1980s

The Florida west coast numbers were estimated at 6,300 in the early 1980s'



# Red Knots

With gulls and skimmers



**A major migration staging site for the northern wintering knots is at the The Altamaha River Estuary , Georgia, during September.**

The numbers of knots that visit the Georgia coast are very important on a world scale.



In partnership with the Georgia DNR, Manomet has been working on the "Altamaha knots" since 1998.



The rich food resources and the quiet resting areas knots (and other birds) find at the mouth of the Altamaha River are extremely important in their annual cycle.





Rich foods of the Altamaha Estuary attract shorebirds; many arrive in single flights originating in the Arctic.





We have found up to 10,000 Red Knots – more than have ever been recorded on the Atlantic coast during fall, and an important fraction of the entire North American population.



Other teams have been catching and marking knots in Patagonia, Brazil and Delaware Bay, using colors that will identify when and where birds were marked.



**Color banded knot**

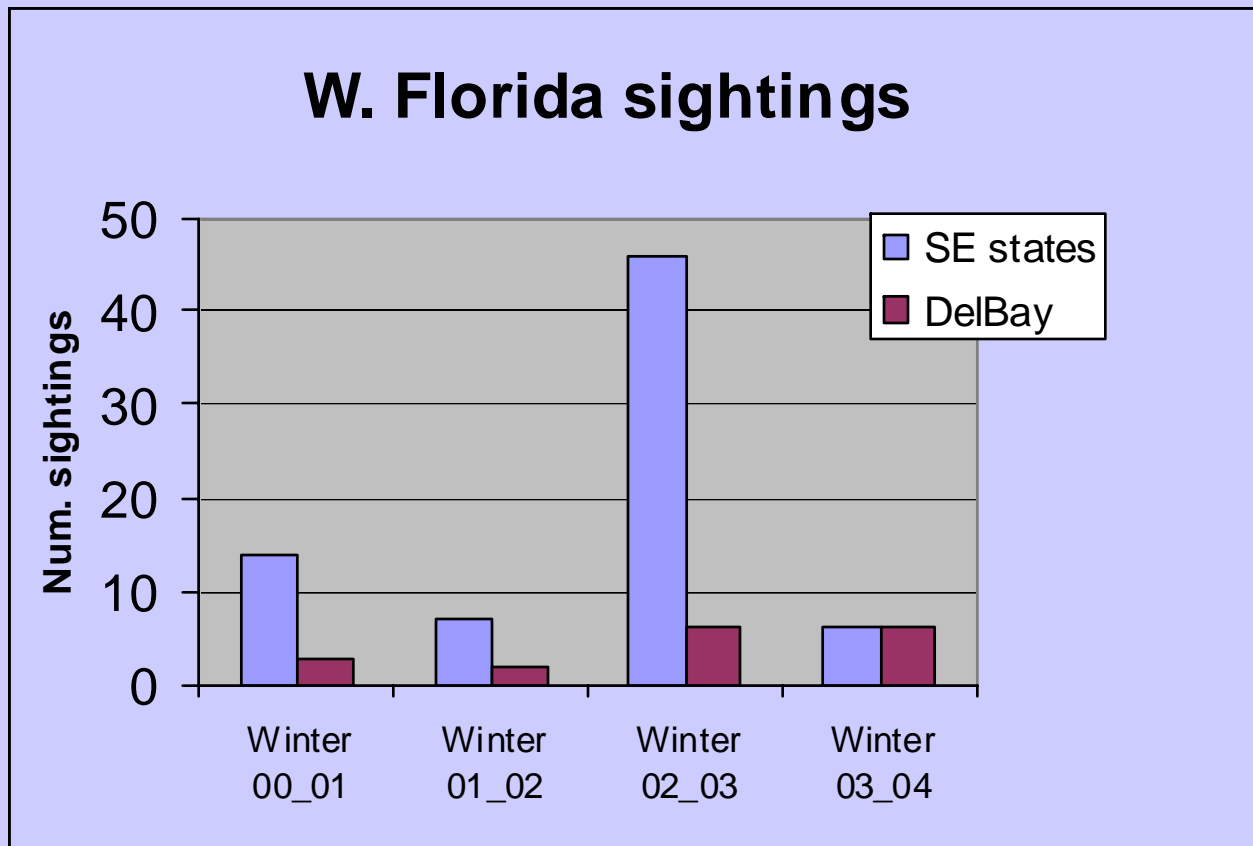


**We have scanned through thousands of knots to find color bands.**

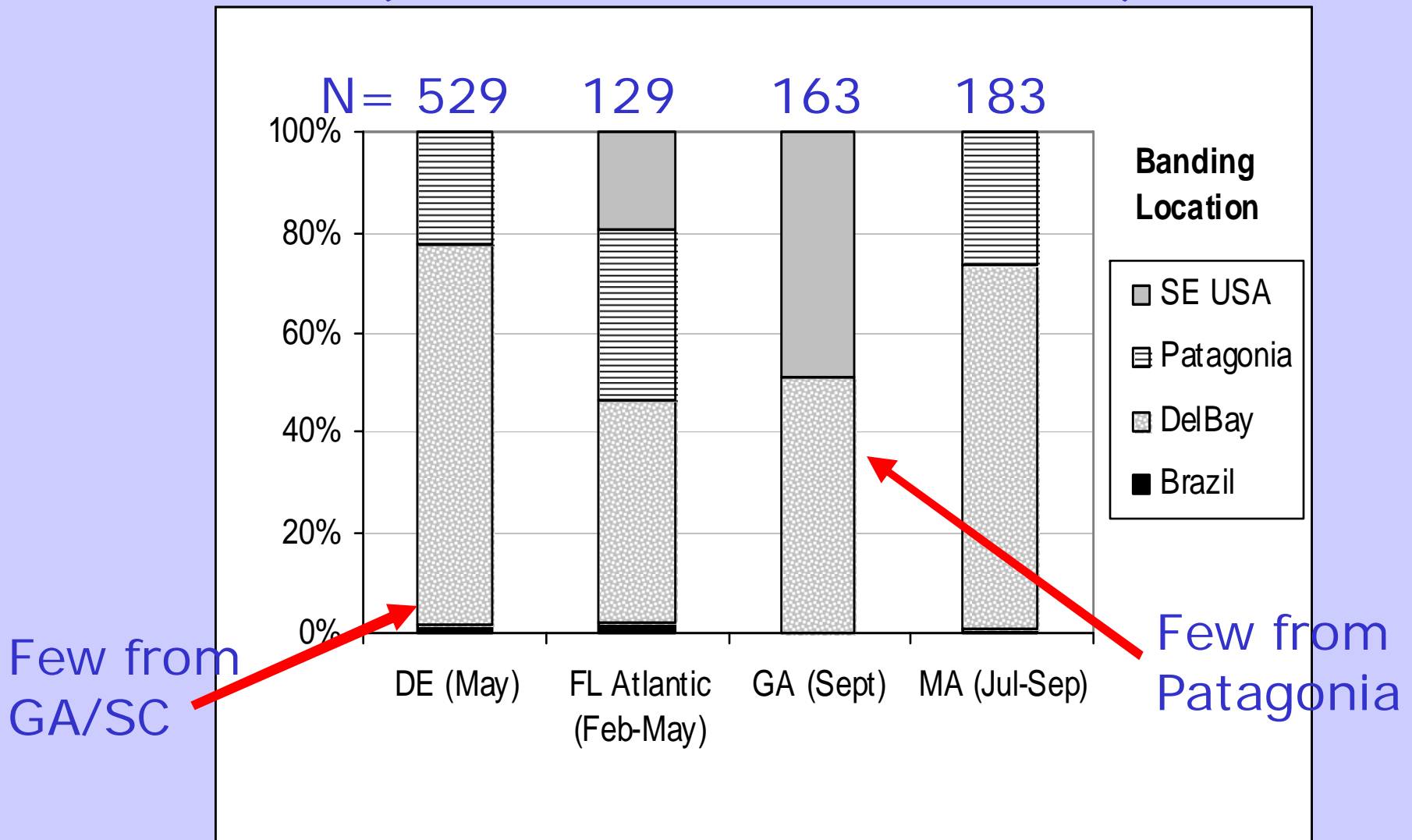




During recent winters we have found many of the knots marked on the se Atlantic coast during migration on the Florida west coast. We also found knots marked on Delaware Bay, **but none from Patagonia.**



In contrast, many Patagonian knots were seen in DE and MA (all data here are from 2004\*)



\* In 2002 and 2003 we did find a few Patagonian knots in Georgia



In 1988 survivorship (based on resighting rates) of Argentina knots appeared to be lower than among Florida-wintering knots.

Chart from Harrington et al, 1988, Auk

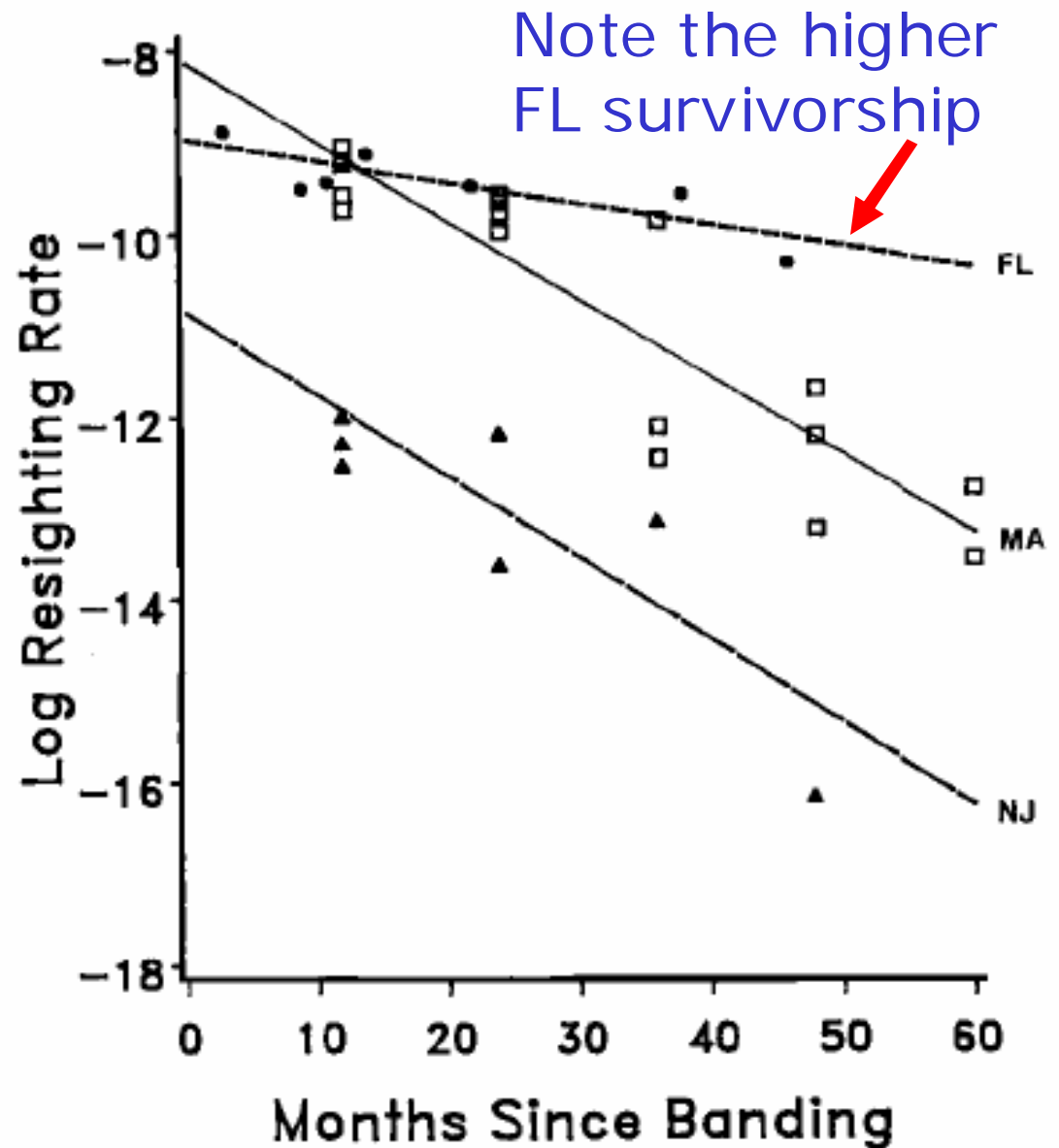


Fig. 1. Resighting rates of color-banded Red Knots at original banding areas according to capture date in Florida (FL), Massachusetts (MA), and New Jersey (NJ).

A photograph showing a vast colony of birds, likely terns, on a sandy beach and in the shallow water of a coastal area. The birds are densely packed, extending from the foreground into the distance. The water is shallow and reflects the sky. The sky is a pale blue with some light clouds. The overall scene depicts a natural habitat for these birds.

With our color banding, we know that there is almost no mixing of knots between the 2 wintering grounds.

Within the last 10 years there has been a 50% decline of the knots in Patagonia.



The cause of the decline of Patagonian-wintering knots is thought to be a decline of food resources – horseshoe crab eggs – at the Delaware Bay migration staging area.



The decline of *Limulus* is probably related to increased harvesting

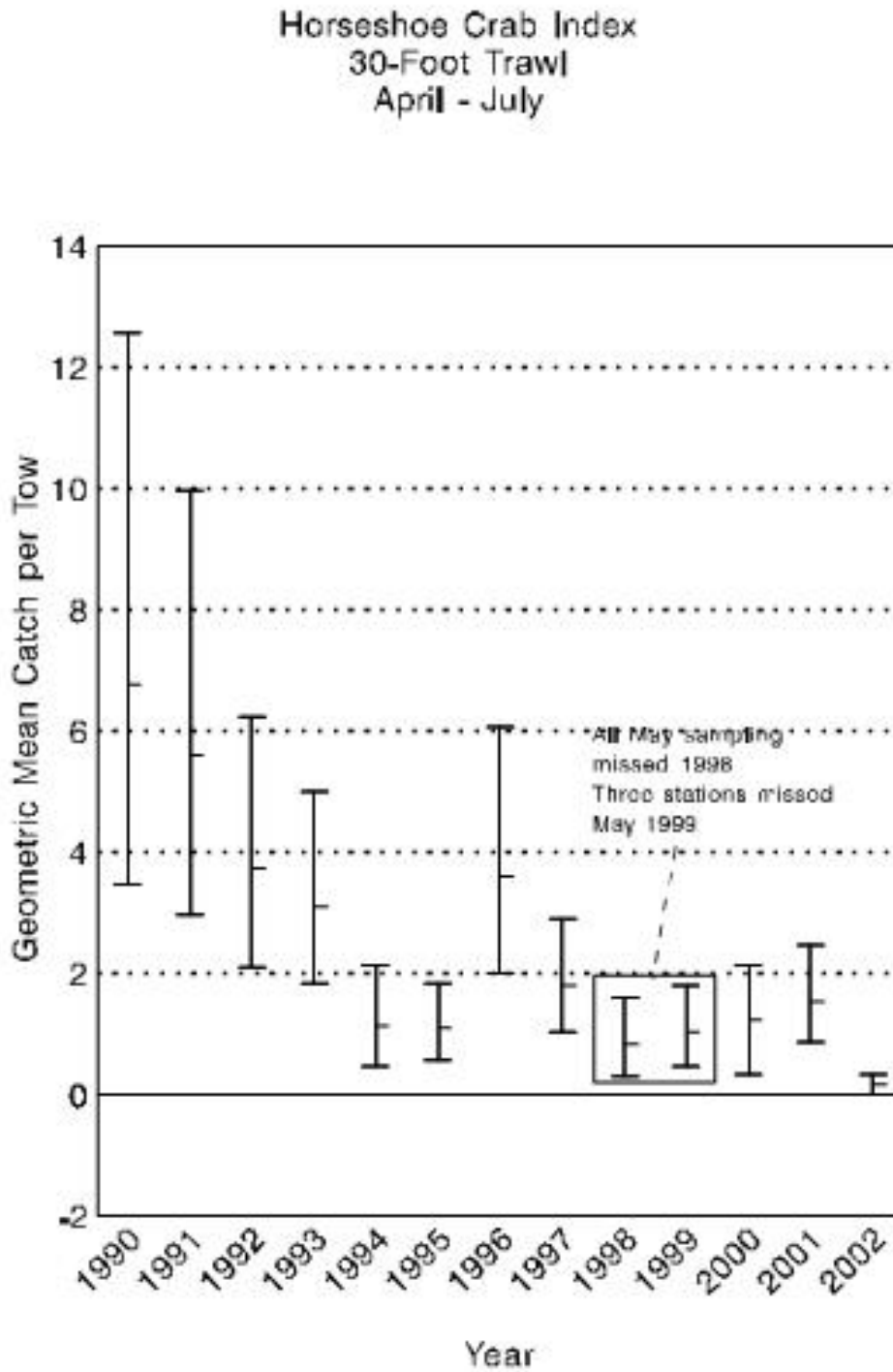


Figure 1. Geometric mean, and 95% confidence intervals, of catch of all horseshoe crabs in the Delaware 30-foot trawl survey, 1990-2002.

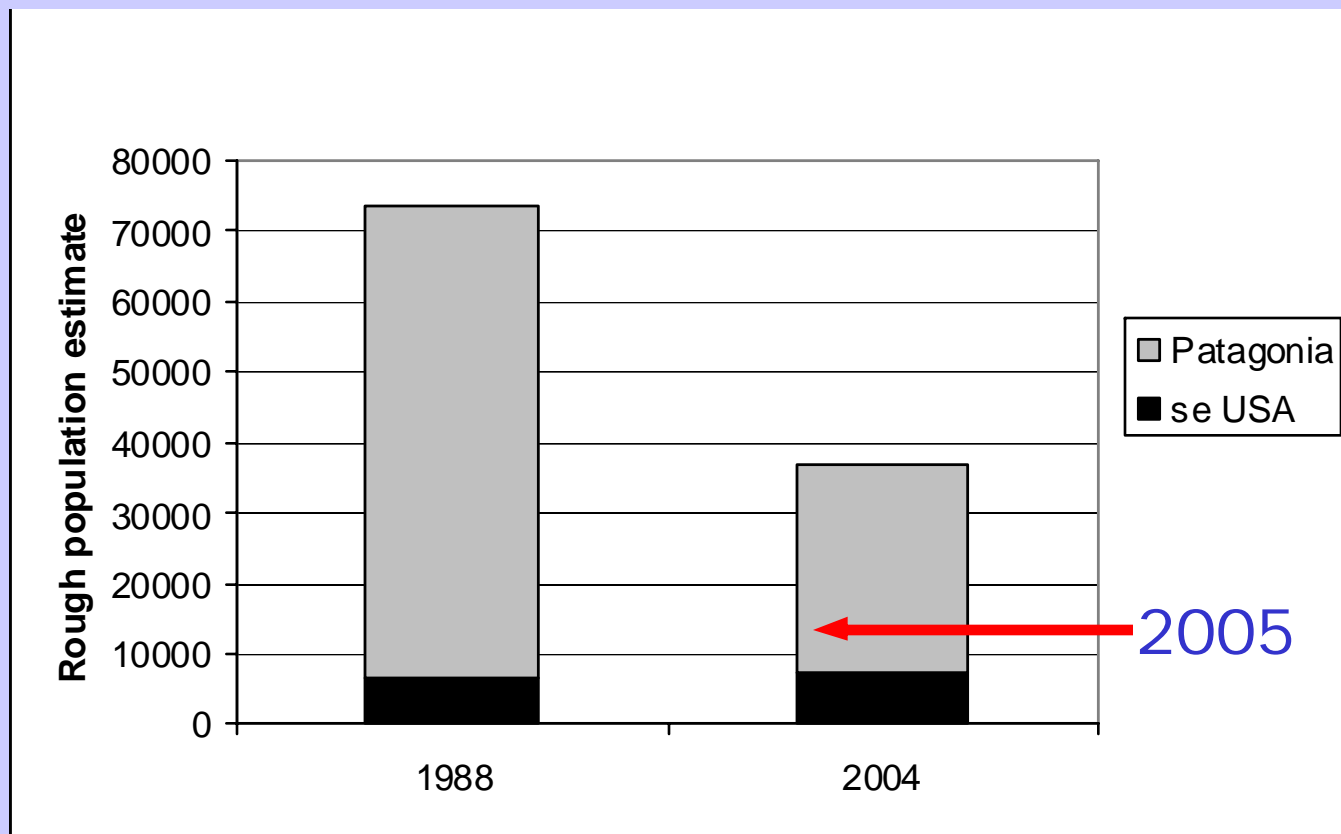
If horseshoe crab harvesting on Delaware Bay is causing declines of knot populations,

and if relatively fewer of the 'northern' than Patagonian wintering knots use Delaware Bay, then ...

we would expect to see more of an effect on the Patagonian-wintering knots than on the southeastern-US-wintering knots because relatively fewer southeastern knots pass through Delaware Bay.



The Patagonian numbers of knots have declined alarmingly, largely within the last 5 years<sup>a</sup> but we think our counts from Georgia and Florida have remained relatively stable (unpublished data).



<sup>a</sup> After Morrison et al., Condor 106, 2003

Are knots flying out of the picture?





According to the 2001/2002 United States Shorebird Conservation Plan, Red Knots are a highly imperiled species.

The Patagonian group has decreased precipitously Since 2001

And now there is an ongoing effort to have Red Knots considered for listing under the Endangered Species Act.



# Thanks

The American Bird Conservancy, and  
Canadian Wildlife Service  
Delaware Coastal Management Programs  
Georgia Department of Natural Resources  
Manomet Center for Conservation Sciences  
National Audubon Society  
National Marine Fisheries Service  
New Jersey Div. of Fish and Wildlife  
US Fish & Wildlife Service



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