Defining Units to Conserve overview and marine mammal section

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What factors promote structure?

Natural selection driven towards maximizing reproductive output

— Finding food

— Finding mates

Maximizing survival rates

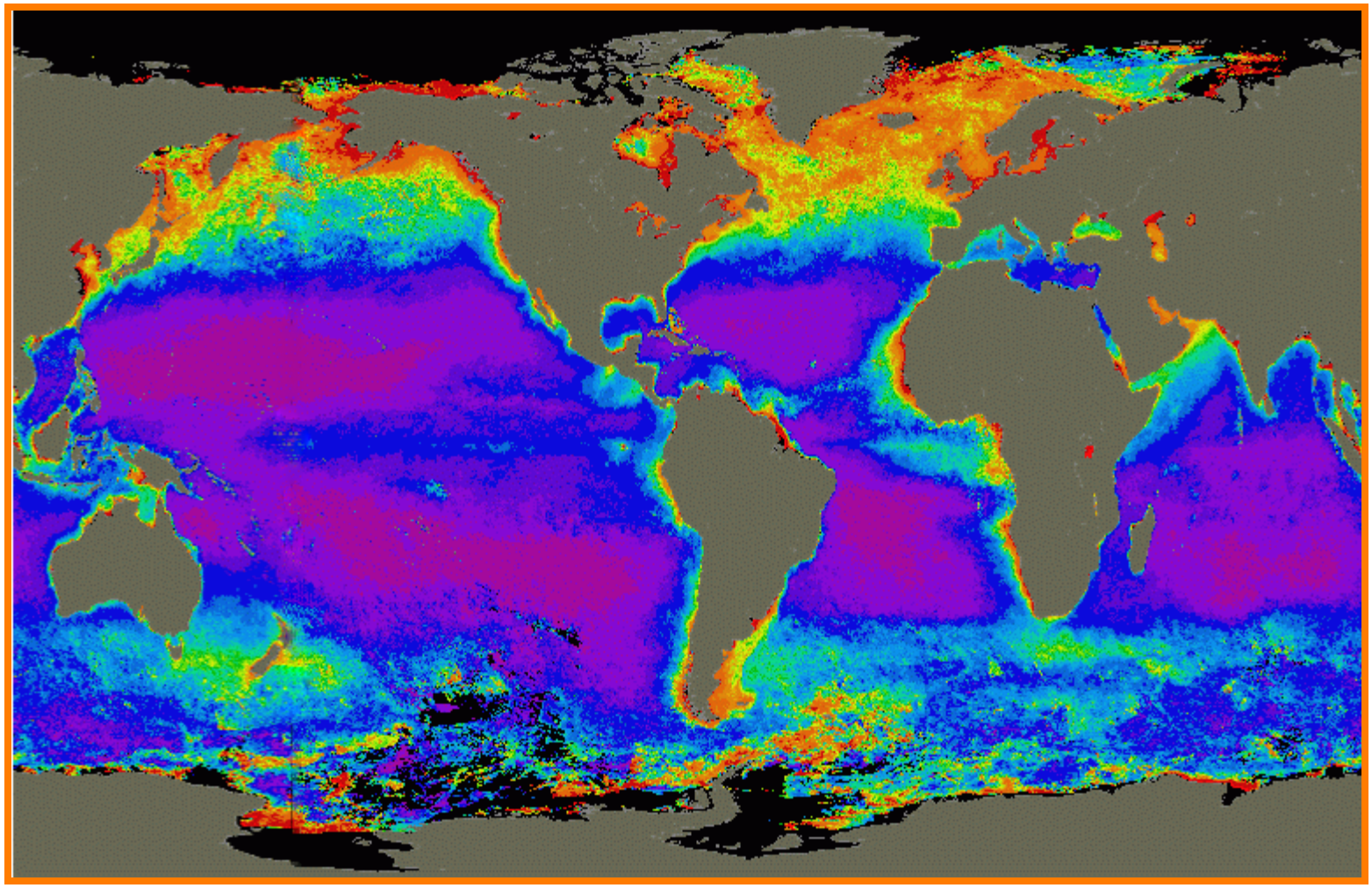
— Avoiding predators

— Niche specialization

— Social adaptations to the above

— Efficient care of young

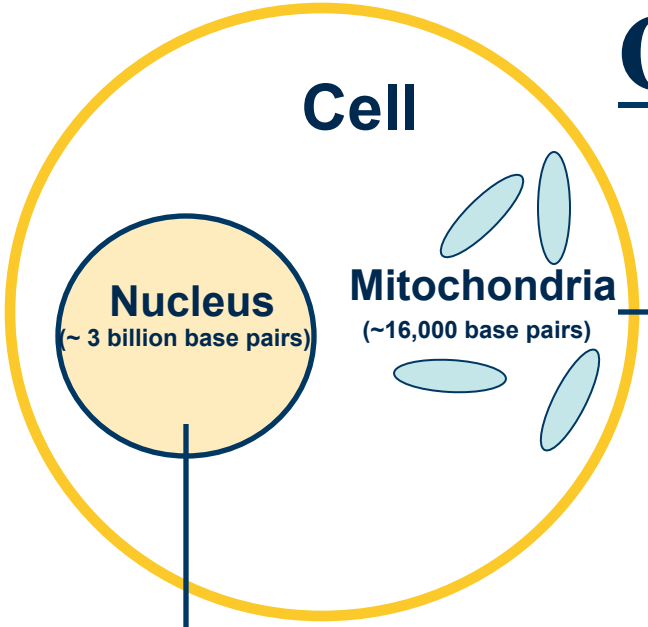
Maximizing fitness means effectively adapting to the variation in the physical and biological environment



Humpback whales illustrate the influence of the biotic and abiotic environment on developing different types of structure

Photo by B. Taylor

Genetic Markers



Mitochondrial DNA sequence (haplotype)

…ATCATCCC… **Specimen 1**

…ATCTTCCC… **Specimen 2**

Microsatellites (Short Variable Length Repeats)

…ATCACCACACACACATGCA… **Specimen 1**

5 Repeats

…ATCACCACACACACACATGAC… **Specimen 2**

6 Repeats

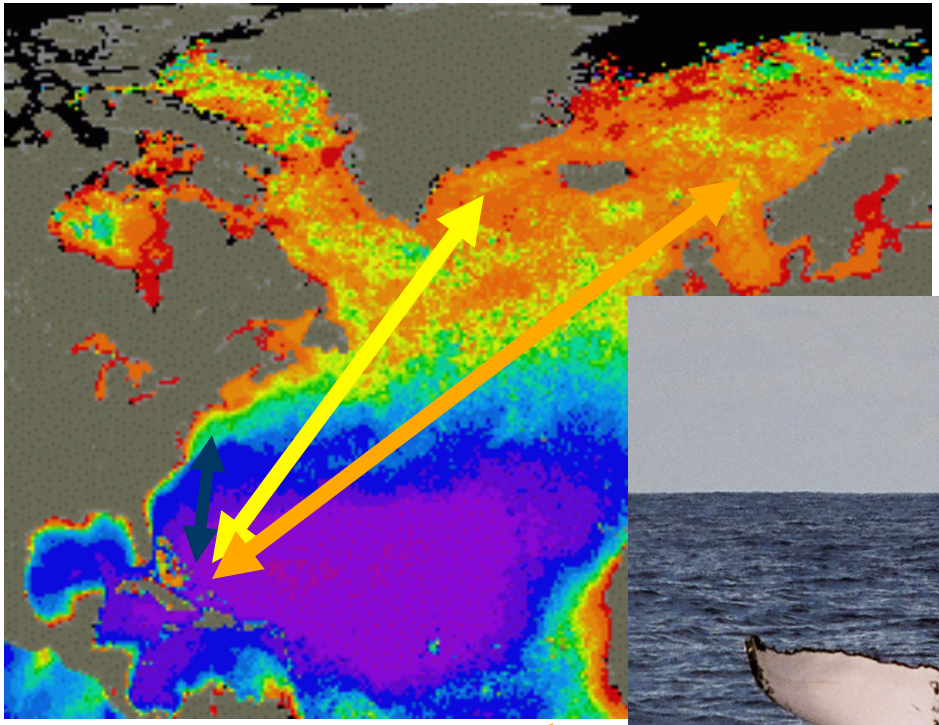
Single Nucleotide Polymorphisms (SNPs)

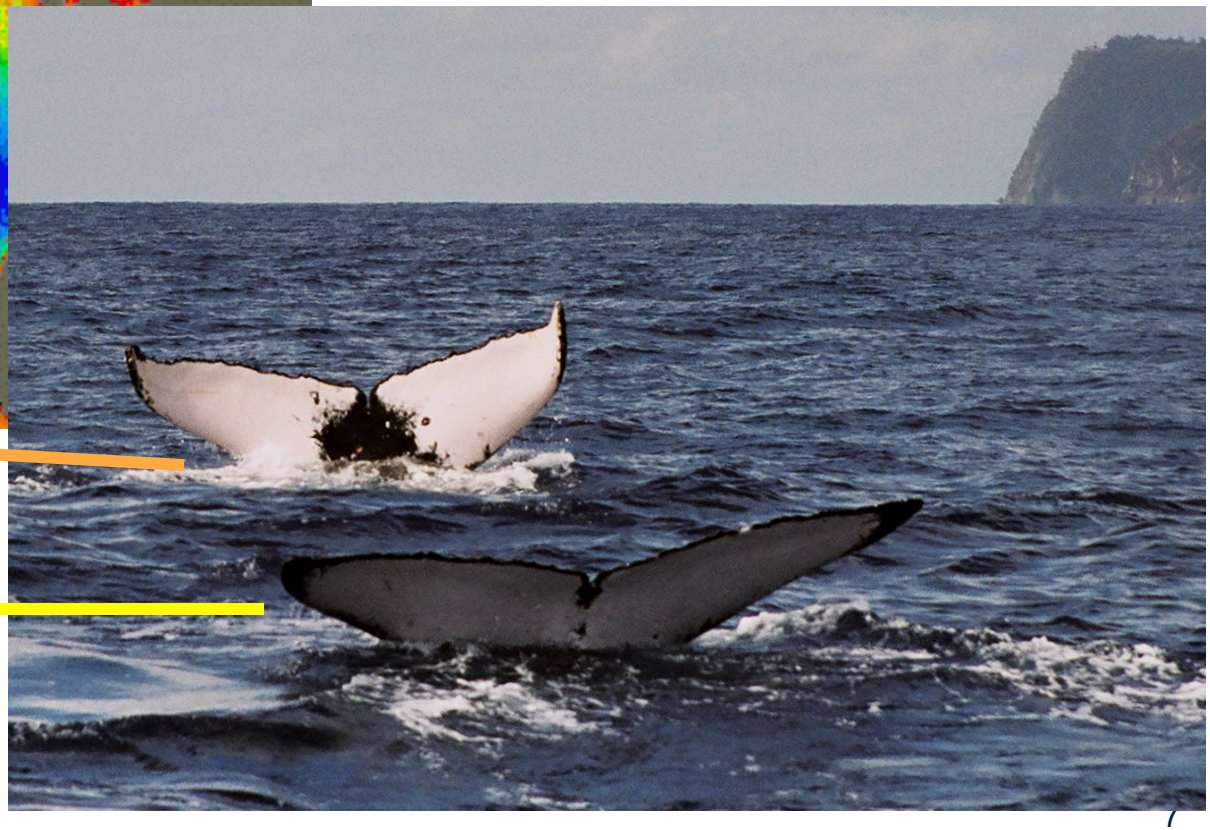
…ACAGA…….ATCA…….GCATA… **Specimen 1**

…ACAAA….…..AACA….…..GCTTA… **Specimen 2**

300-1000 bp 300-1000 bp

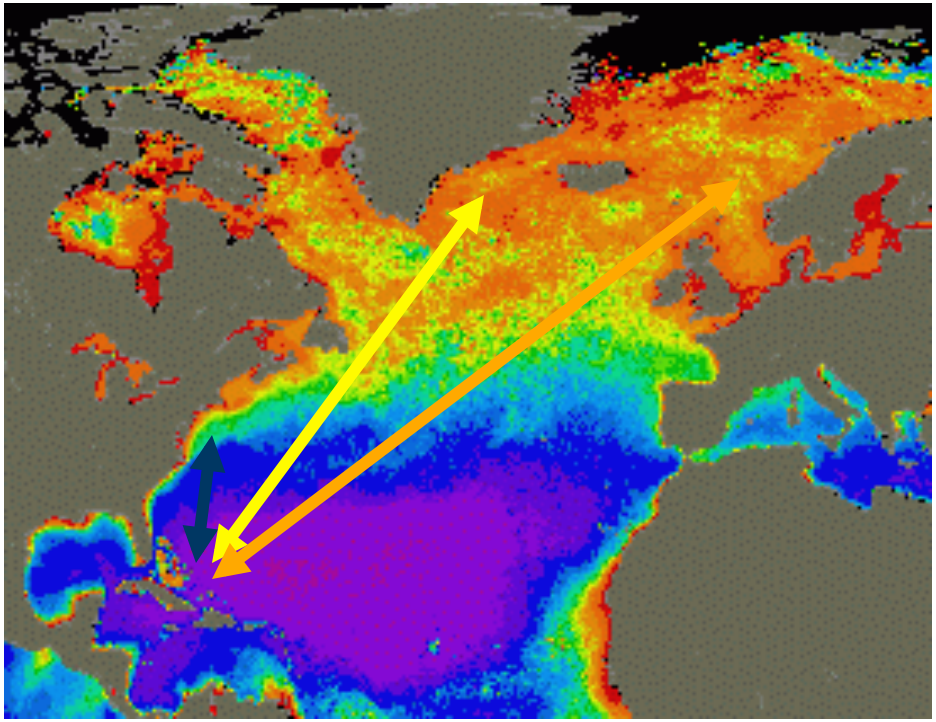
The nuclear DNA picture





Oleson	Mom
+	+
Konook	Dad
=	=
Klesok	Baby

The Mitochondrial DNA picture



Oleson + Konook = Oleson

Mom + Dad = Baby

Simplified statutory objectives

Endangered Species Act goal:

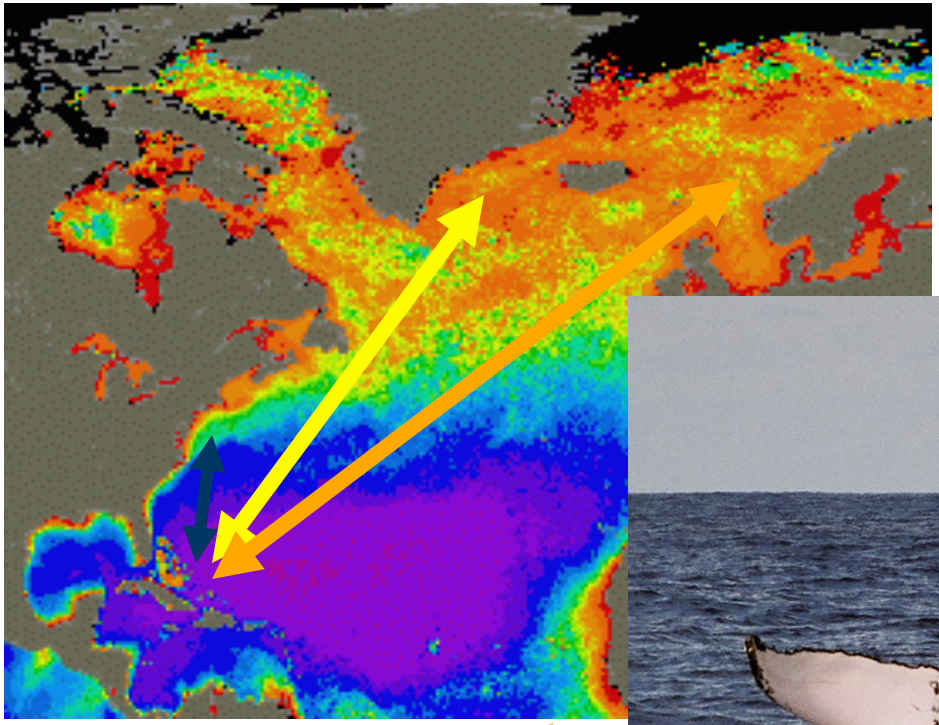
—Maintain the evolutionary potential of the “species”

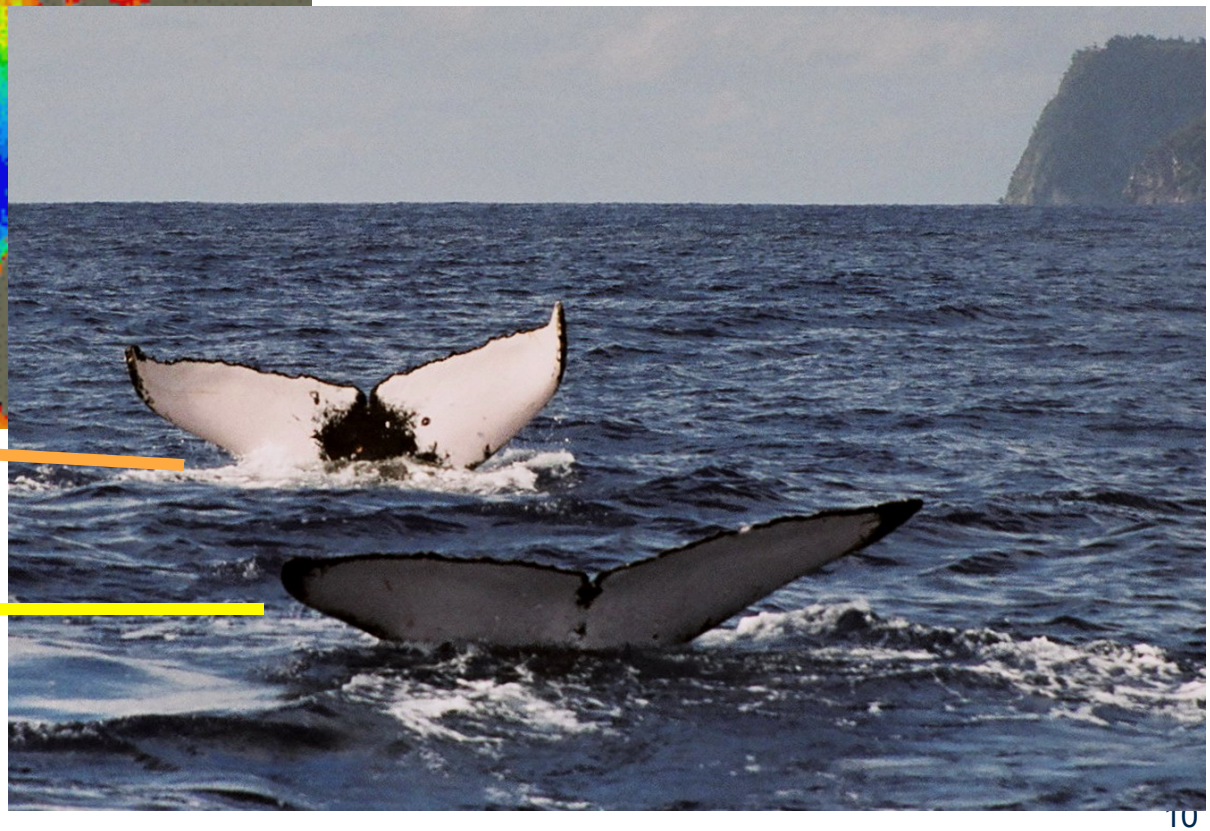
Marine Mammal Protection Act goal:

—Maintain “population stocks” as functioning elements of their ecosystem

The nuclear DNA picture

Related to local adaptation and therefore to maintaining evolutionary potential (ESA mandate)





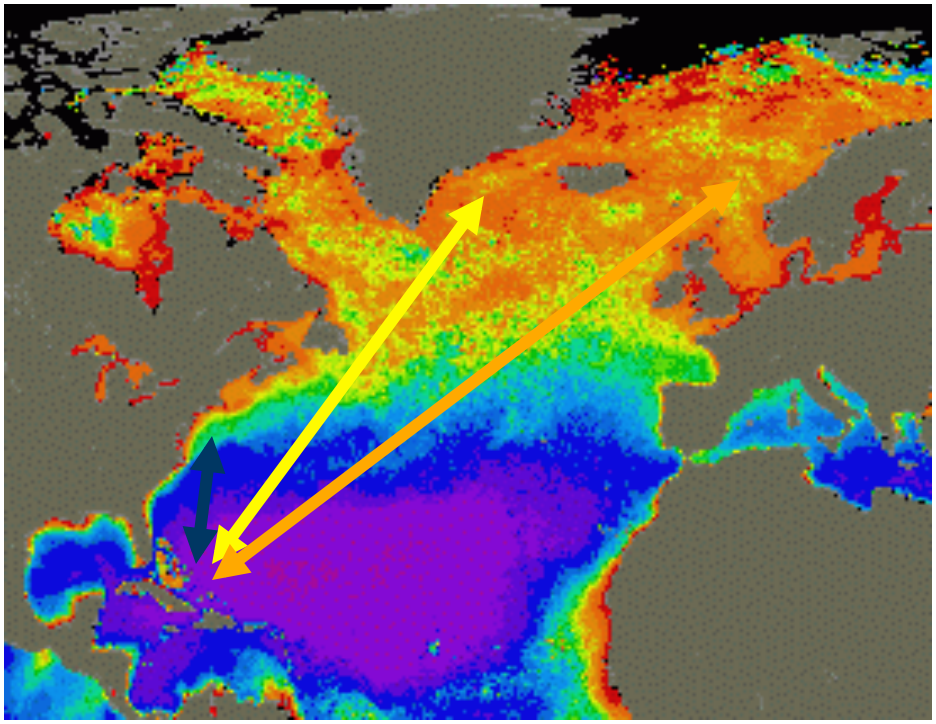
Oleson	Mom
+	+
Konook	Dad
=	=
Klesok	Baby

The Mitochondrial DNA picture

Demographically Independent Populations (DIPs):
internal population dynamics are far more important to maintaining status than external dynamics (immigration)

Relevant to MMPA mandates:

- **Ecosystem approach to management**
- **Harvest**

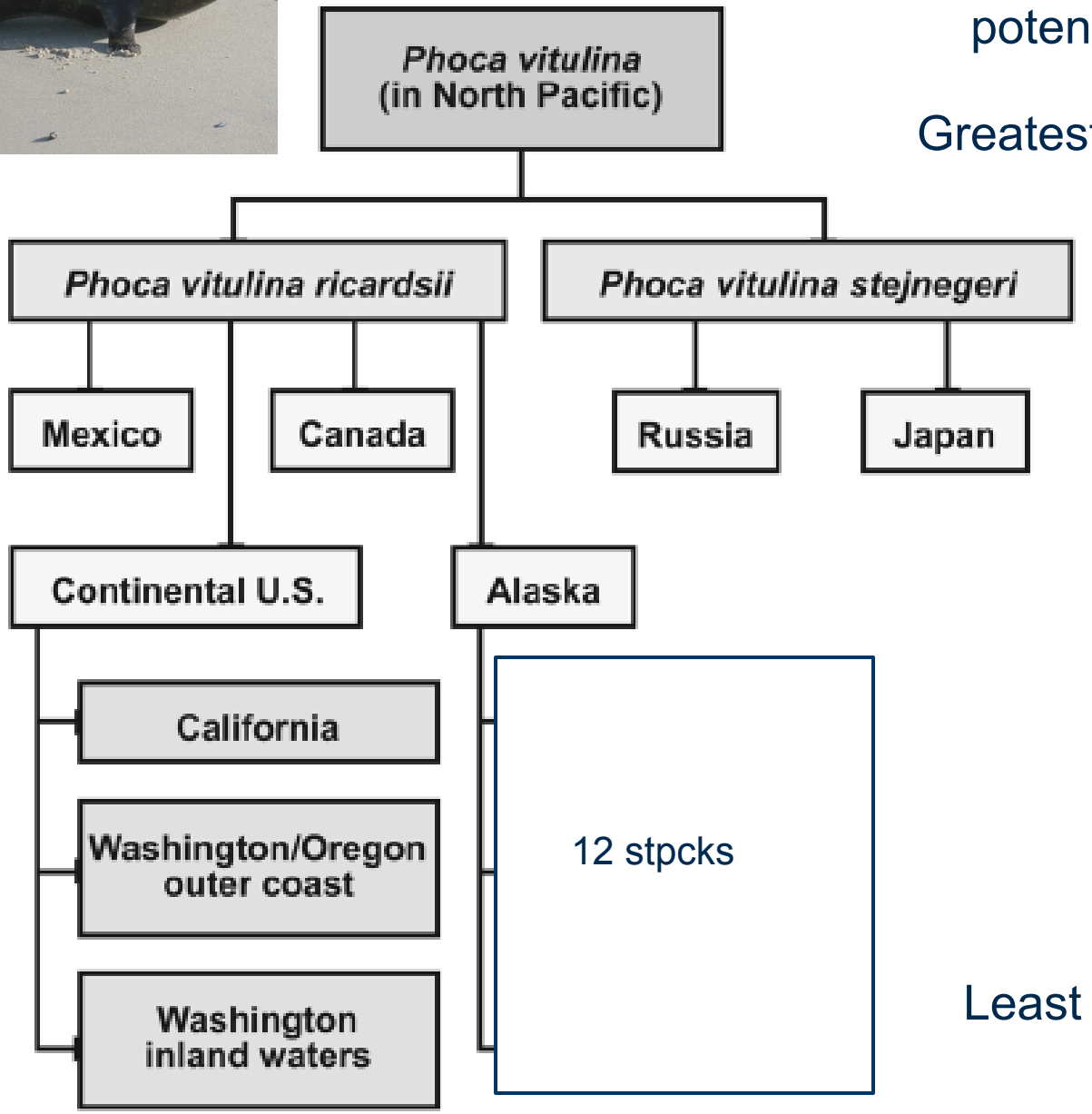


Species

Subspecies

Distinct Population Segment

Demographically Independent Population



Degree of evolutionary potential

Greatest

Least

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SERVICE

Types of questions we address

- Defining Units to Conserve (species, subspecies, DPSs, DIPs)
  - —What individuals should I consider in my
    - Species
    - Abundance estimate for estimating a trend
    - Ecosystem model
    - Unit being affected by some activity (fishery, Navy)
- For fisheries bycatch or strandings…to which species/DPS/DIP does this dead thing belong?

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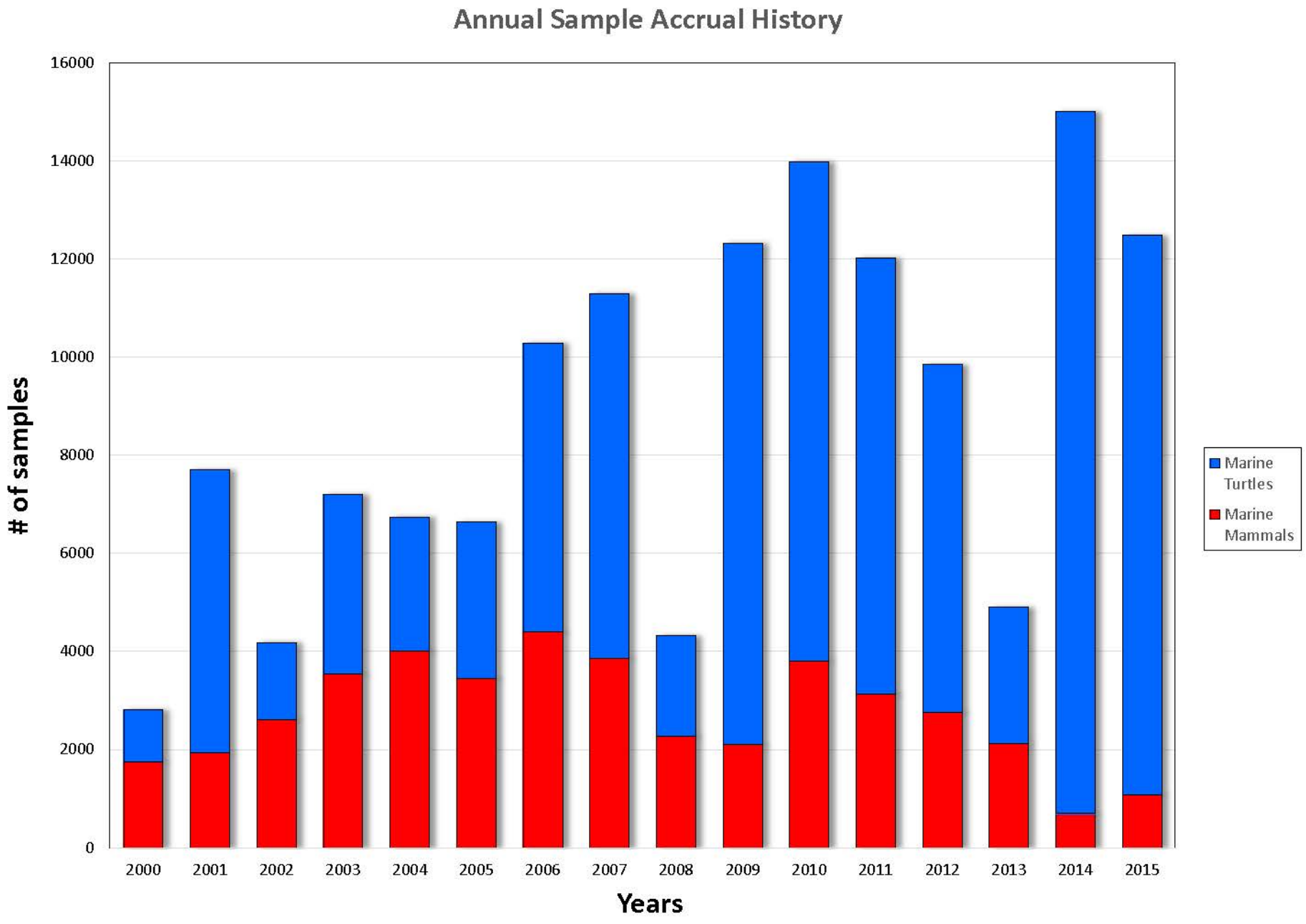
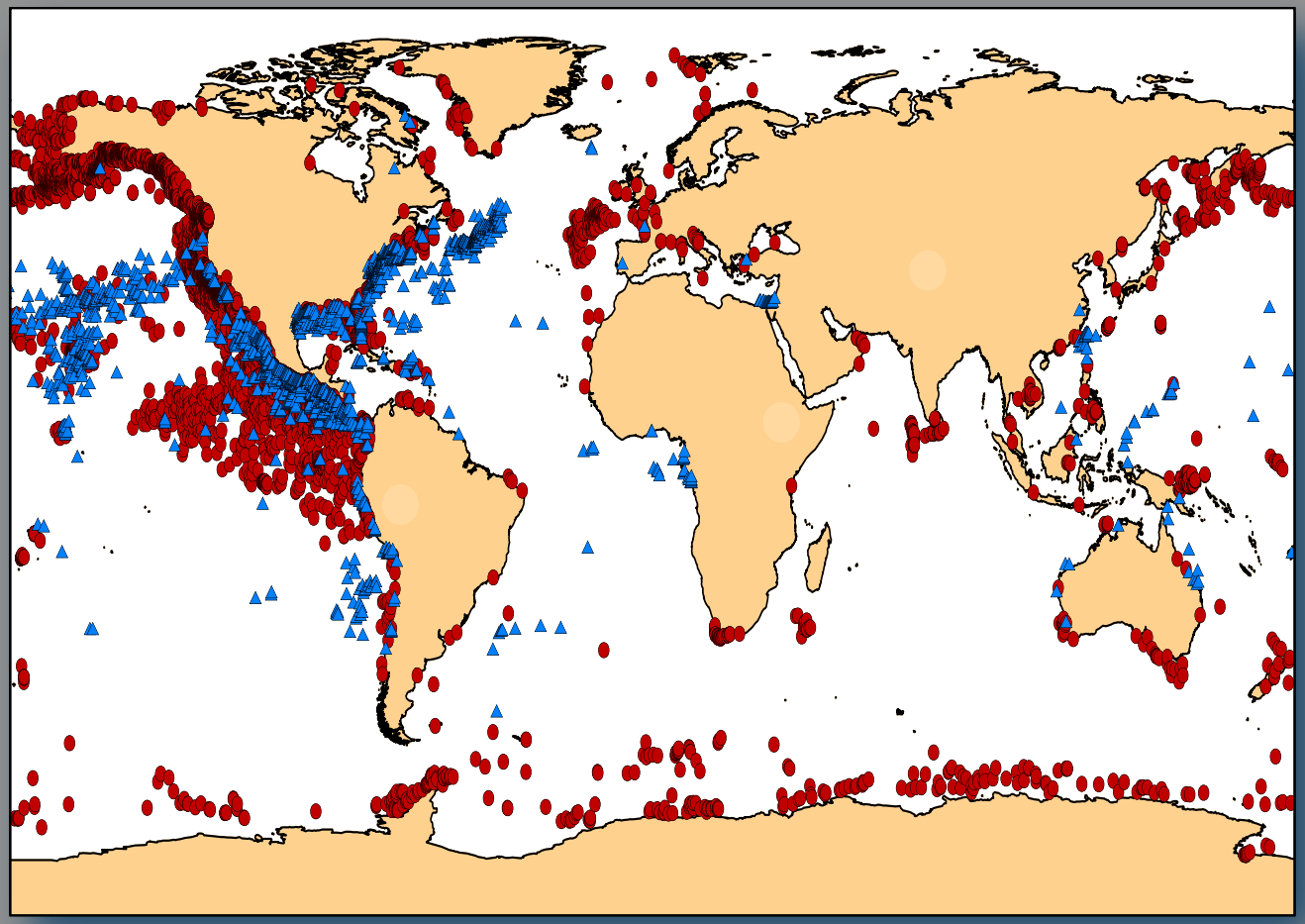
Shared resources and needs for mammals and turtles

- Lab manager and assistant
  - —Down from 2 to 1 with duties spread across other positions
- Data management
  - —Unfilled position shared between turtles (both programs) and mammals (genetics)
- Increasing magnitude of data from new technologies increases deficiency in ability to manage and curate data
- Collection
  - —Resource for genetics and life history
  - —Resource for loans for mammals
    - Down 1 position…at least


Annual Sample Accrual History
16000
14000
12000
10000
8000
6000
4000
2000
0
# of samples
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Years
Marine Turtles
Marine Mammals

Accumulation of Samples Through Time …



1975
1980
1985
1990
1995
2000
2005
2009

Marine Turtles Marine Mammals