

Population structure in U.S. marine mammal management

or “Terminology is Important”

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Relevant legislation

- Endangered Species Act
 - emergency room philosophy to prevent extinction
- Marine Mammal Protection Act
 - maintenance program to keep healthy populations

Relevant Conservation Units to achieve goals of the different laws

- ESA

- maintain the evolutionary potential of the species

- Distinct Population Segment

- MMPA

- maintain “population stocks” as functioning elements of their ecosystem

- interpreted to mean maintaining the range, i.e. avoiding local extinctions

These different levels of protection have implications for the level of genetic differentiation that is relevant

- **ESA DPS**

- genetic differences should be “marked”

- implying that local adaptation is plausible
 - correlated with strong differences such that phylogeographic differences should be likely
 - high levels of differentiation expected such that small sample sizes should be sufficient

- **MMPA stocks**

- defined by dispersal that is trivial to population dynamics (less than a few tenths of a percent/year)
 - phylogeographic signal expected to be weak and likely not detectable
 - characterized by small frequency differences that can only be detected with large sample sizes for historically abundant populations

Steller Sea Lions are listed under the ESA
so what level of population structure is
important

BOTH!

DPSs are managed separately and can be up and/or down listed independently because each is worthy of separate protection as a full “species”

Stocks are demographically “independent” units that are the units used in population dynamics models to assess risk within a DPS

Population structure decision for Recovery Team

- DPSs are pre-defined
 - Eastern and Western SSL DPSs
- Recovery Units may need further definition
 - Asian and Central Alaskan?
- Stocks define the dynamics of metapopulations within either DPSs or RUs

Spatial structure in Recovery Criteria

- most sets of criteria recognize that risk of extinction is related to range size: i.e. a large range reduces the chance of a correlated environmental event (catastrophe)
- the form of the criteria often refers to “numbers of populations” reaching a safety threshold

Metapopulation Dynamics

- within DPS population structure can strongly influence estimates of risk
 - source/sink dynamics
 - dispersal can either increase risk by animals continually moving into “bad” areas, or
 - dispersal can promote recolonization of range
 - Alee effects
 - rescue effects
 - scale of environmental effects