

Extinction and Threat in the Sea

Nick Dulvy

CEFAS, Lowestoft Laboratory, UK

Overview

Marine extinctions of species and populations

Threat in exploited populations

Rate of marine extinctions

Marine Species Extinctions

- 15 marine species listed as extinct (IUCN Red List 2004)
- 12 unequivocal marine extinctions
 - 3 mammals
 - 5 birds
 - 4 molluscs (Carlton et al. 1999)

Marine Population Extinctions

- Populations carry unique genetic material and are often behaviourally and morphologically distinct
- Impacts and management often occur at population scale
- Disappearance of populations precedes global extinction
- Population extinctions at local, regional and global scales

133 Local, Regional & Global Extinctions

14 mammals
12 sea birds
32 teleosts
33 elasmobranchs
3 echinoderms
18 molluscs
5 arthropods
2 annelids
3 coelentrates
12 algae



Causes of Marine Extinctions

Many populations suffered from combined impacts
Single cause attributed to 80% of cases

- Exploitation 55%
- Habitat loss 37%
- Invasive species 2%
- Other 6%
(climate change, pollution, disease)

Threat in Exploited Populations

- Compared threat status with exploitation status for 76 NE Atlantic populations
- Two thirds of stocks were exploited *outside* safe biological limits ($B < B_{lim}$, $F > F_{lim}$)
- A quarter of stocks met one or more threat criteria
- **All** threatened stocks were exploited *outside* safe biological limits (ICES)

Rate of Marine Extinctions

Difficult to estimate due to

- Uncertainty in number of marine species
- Incomplete survey of current status
- *Poor detection of marine extinctions*

Detection Patterns

- Most documented marine extinctions have been from
 - well-studied areas
(North Sea, NE Atlantic, Wadden Sea & Bermuda)
 - of large, prominent species

Detection Methods

- 80% were detected using indirect methods
 - historical species list comparisons and questionnaires of traditional ecological knowledge vs. direct surveys
- 53 year detection lag
 - between disappearance and reporting

Summary

- Marine extinctions of populations and species have occurred within the last century
- Exploitation is the primary cause of threat and population extinction
- Marine extinction rates are likely to be underestimated