Michel J. Kaiser

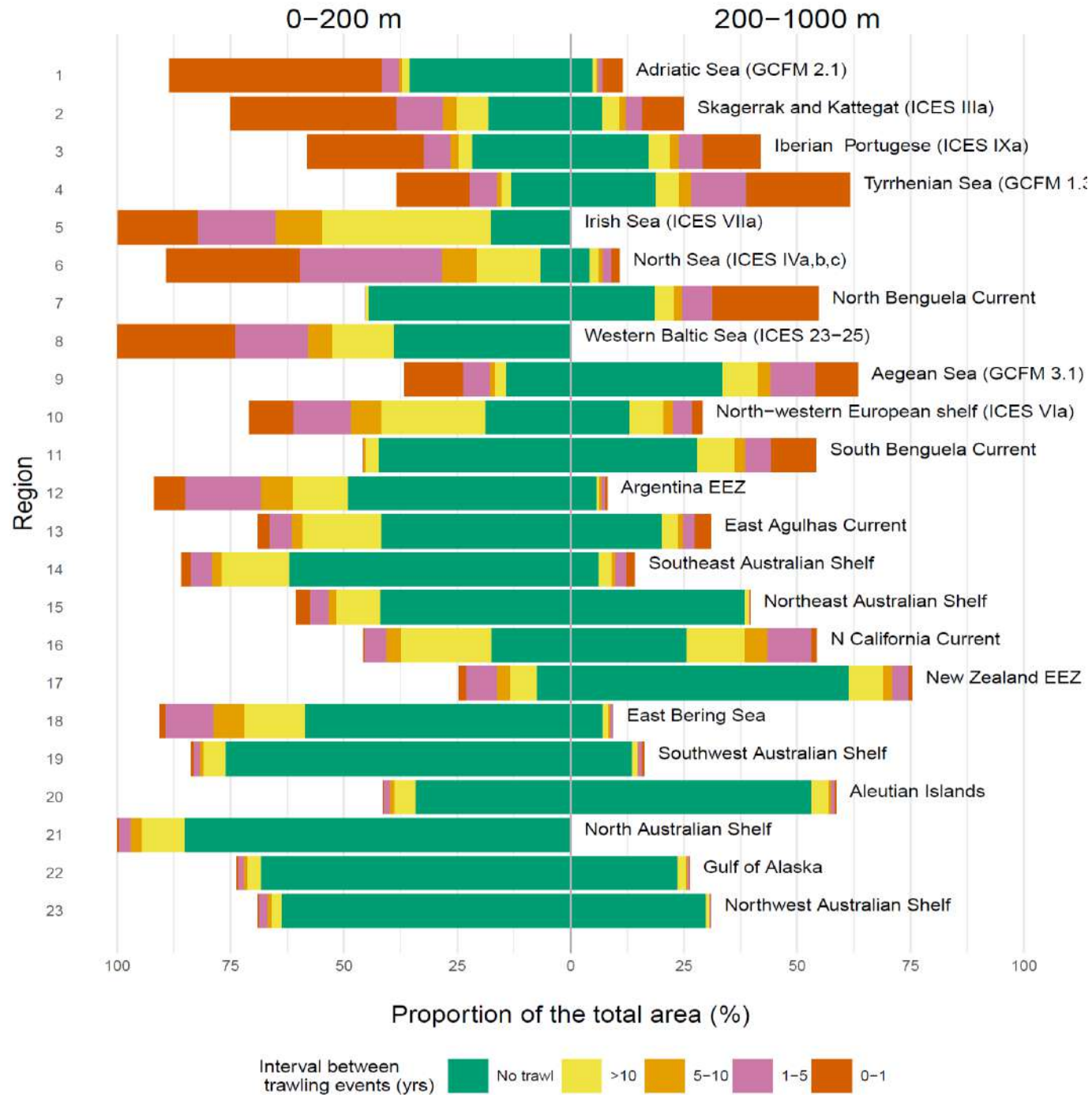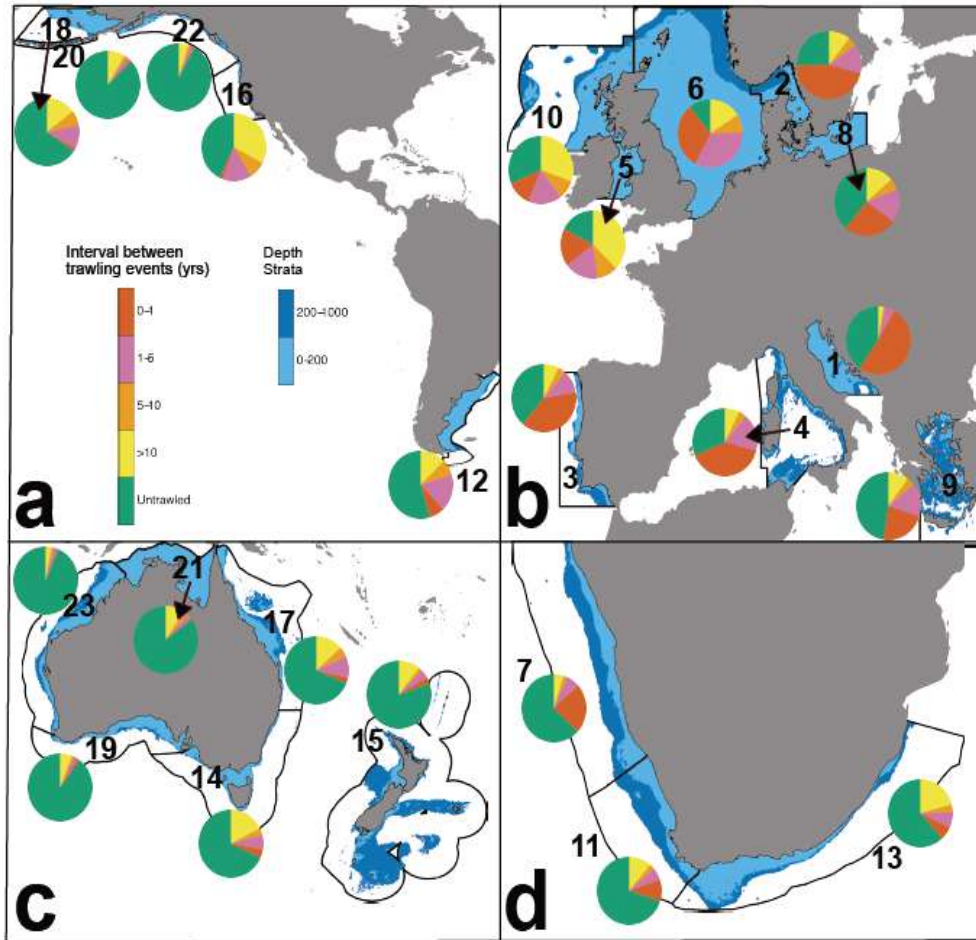**IUCN – Fisheries Expert Group**

1. **Map fishing activities & habitats**
2. **Quantify effect on the seabed**
3. Risk assessment
4. Best practices

Footprint of trawling based on VMS

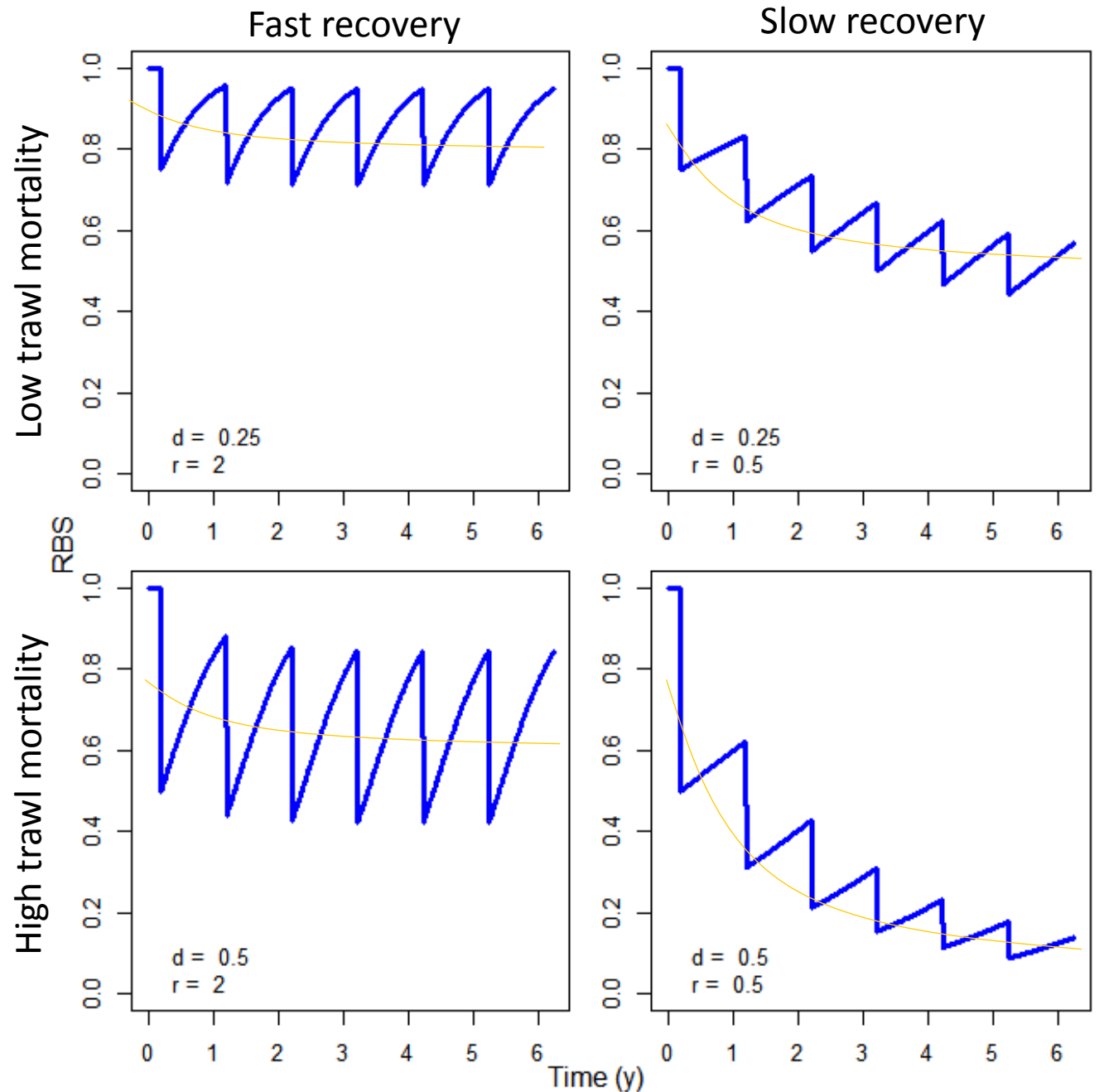# Ecological effects on biota

Depend on ratio of …

- Fraction of organisms killed by a trawl pass: depletion =
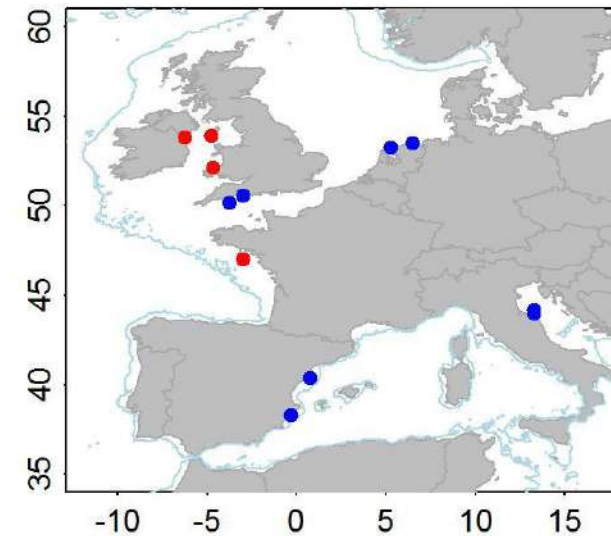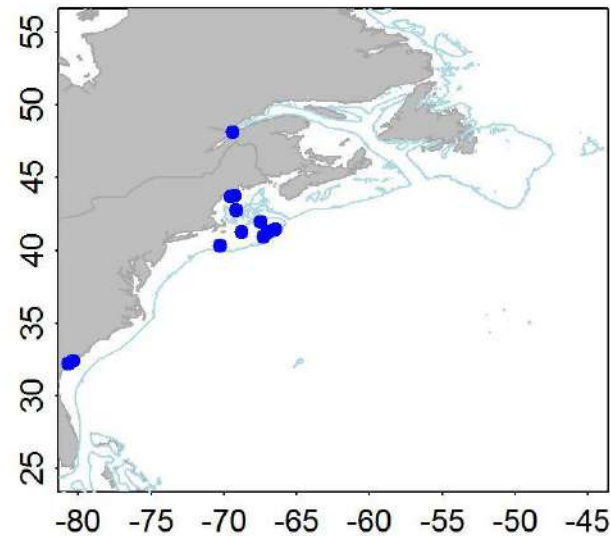 **d : gear specific**

over

- Rate of population recovery =
  r : species and habitat specific

Fast recovery | Slow recovery

Low trawl mortality

d = 0.25
r = 2

d = 0.25
r = 0.5

RBS

High trawl mortality

d = 0.5
r = 2

d = 0.5
r = 0.5

Time (y)

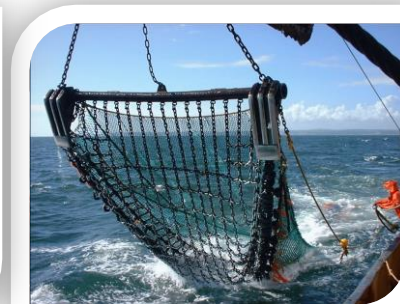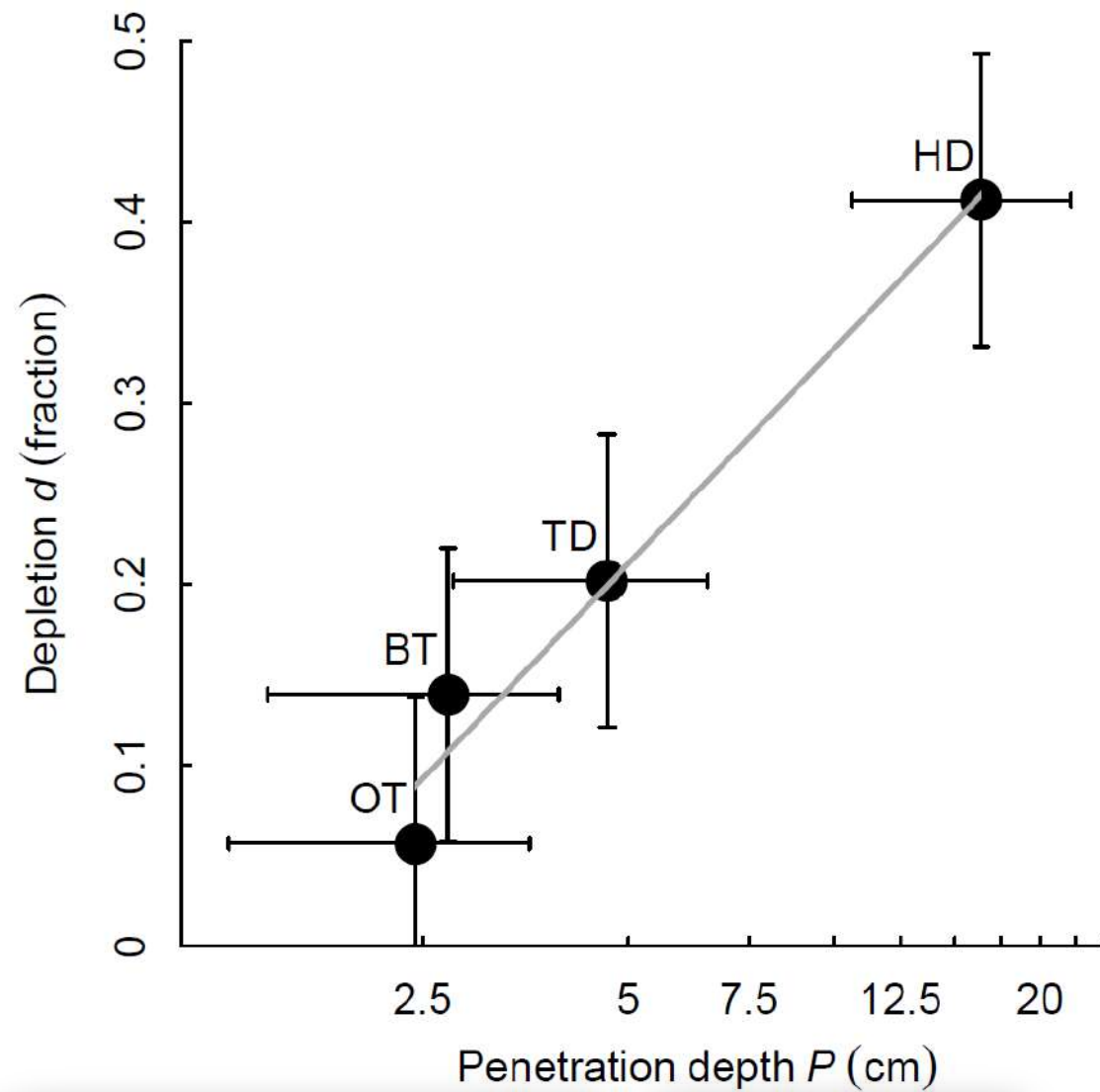# Ecological effects - Parameter estimates

Systematic review and meta-analysis
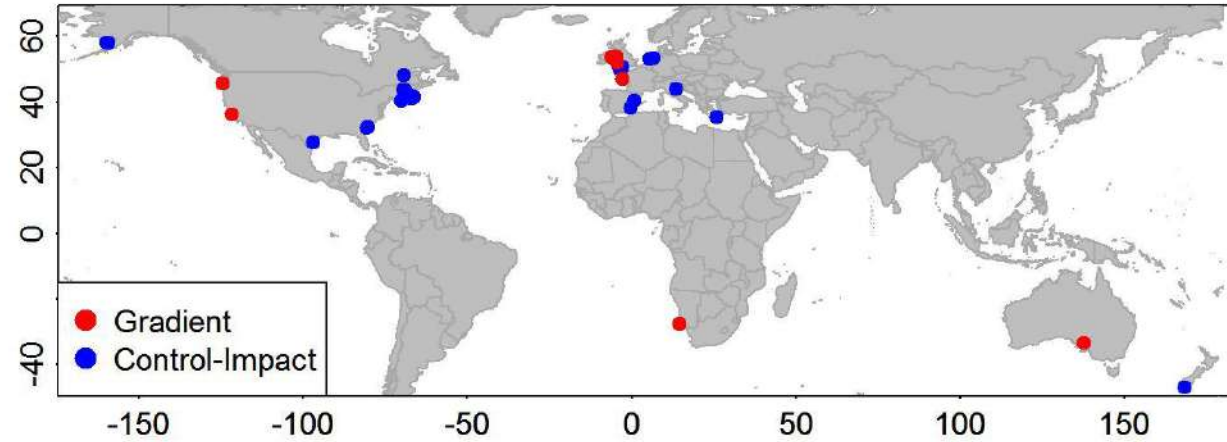
Ecological effects

d: depletion

fraction killed per trawl pass

Different gears have different effects on the seabed

Hiddink et al. 2017 PNAS

Population recovery *r* ~ longevity
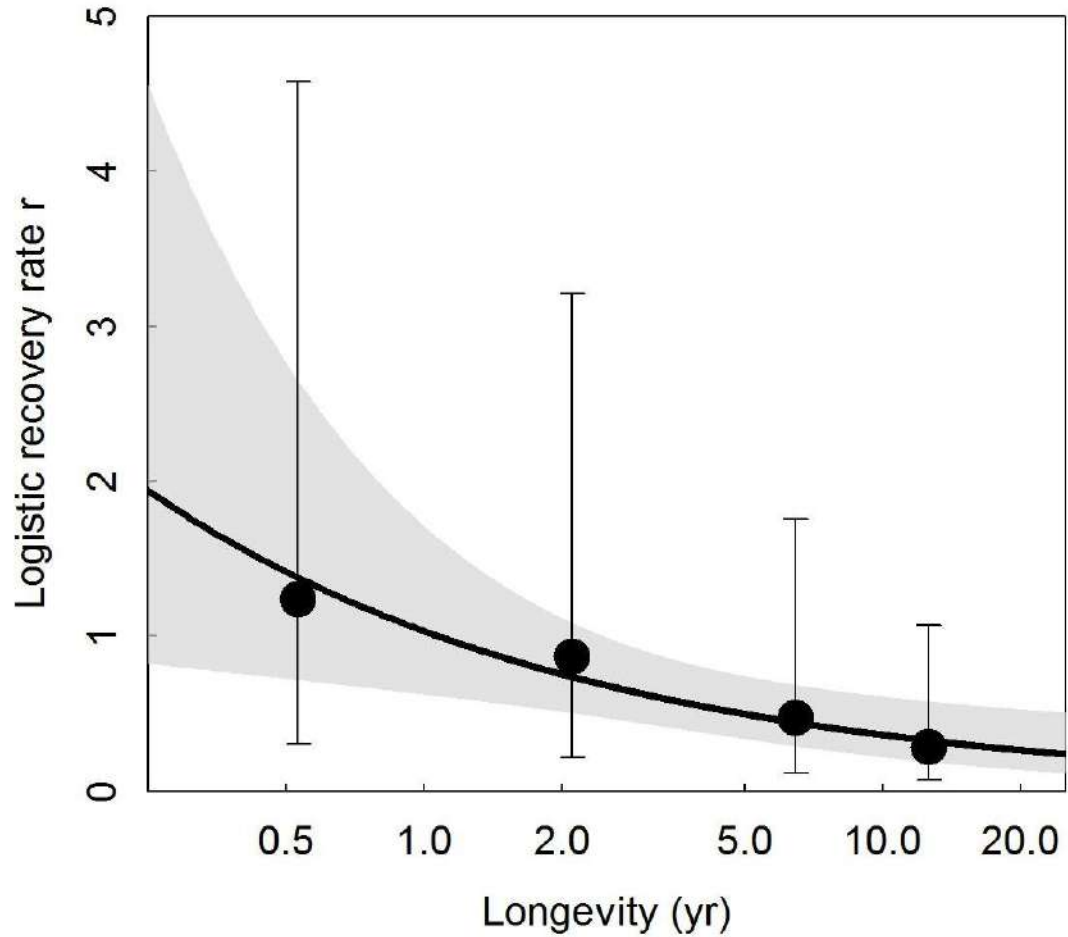
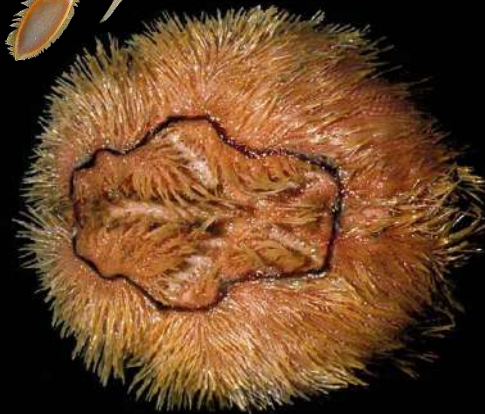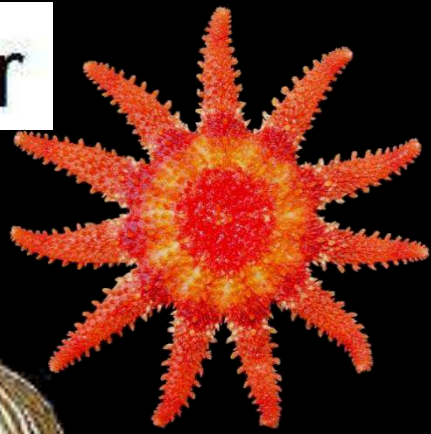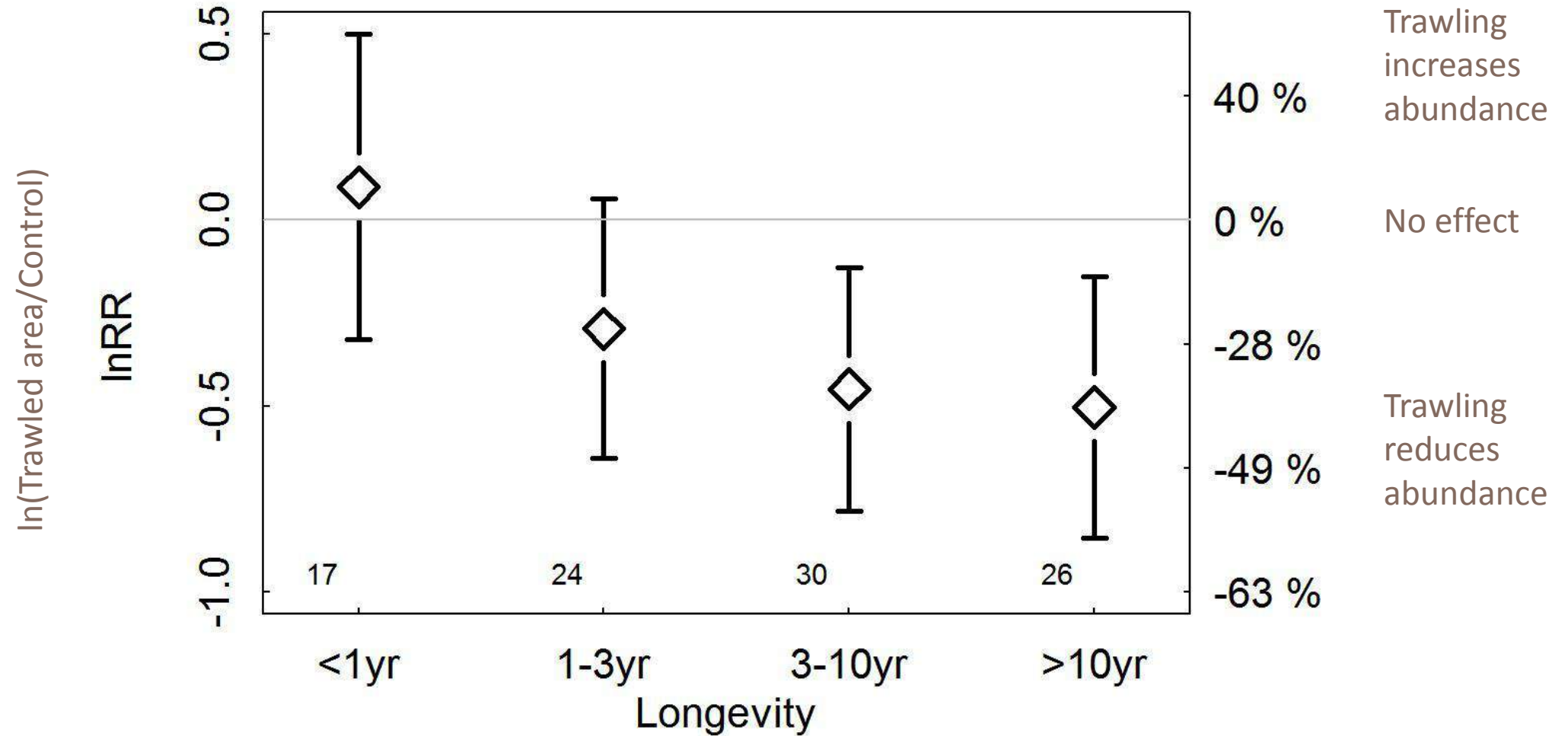<1yr   1-3yr   3-10yr   >10yr

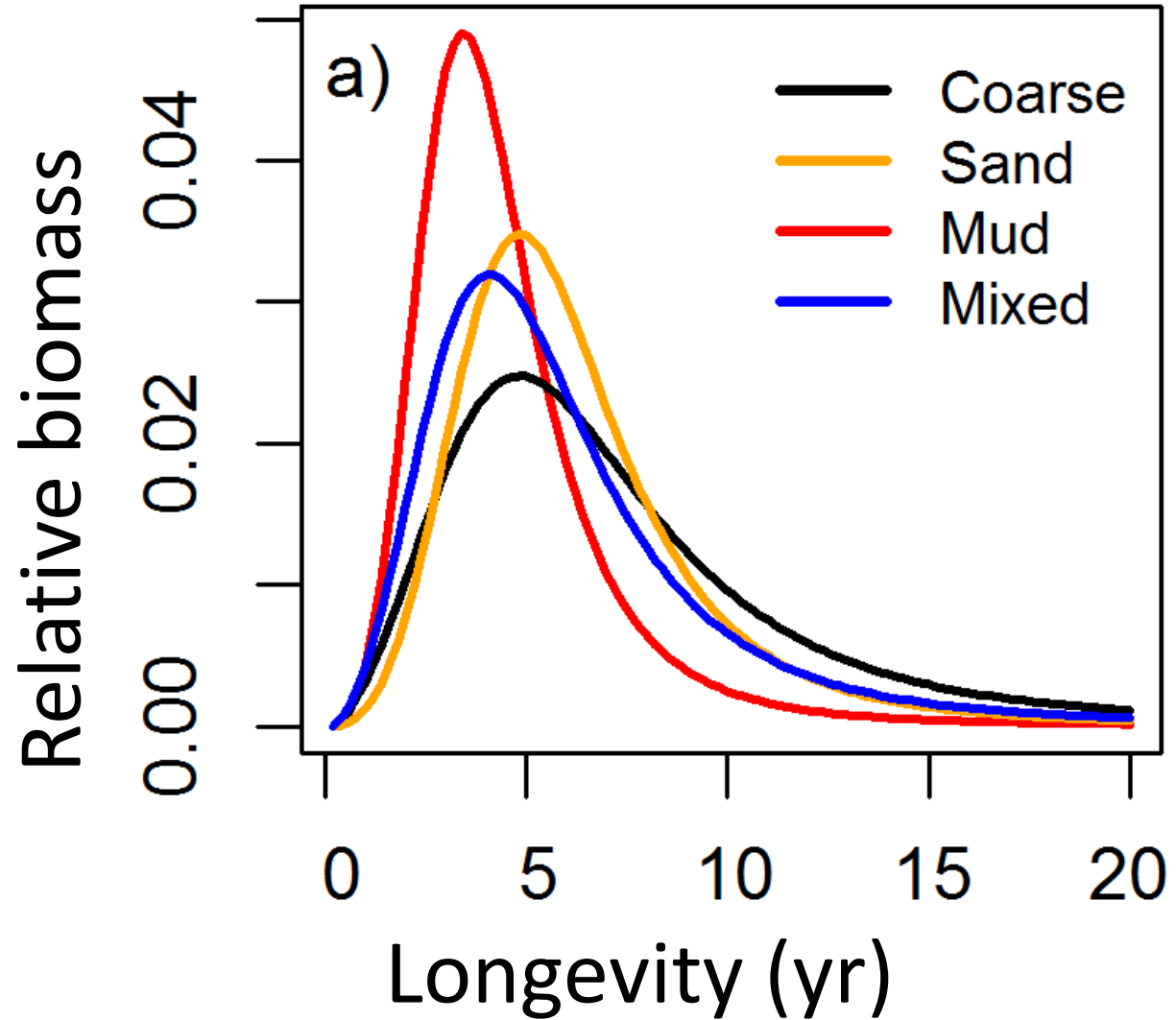# Control – impact studies, e.g. outside vs. inside MPA

Impact assessment methodologies
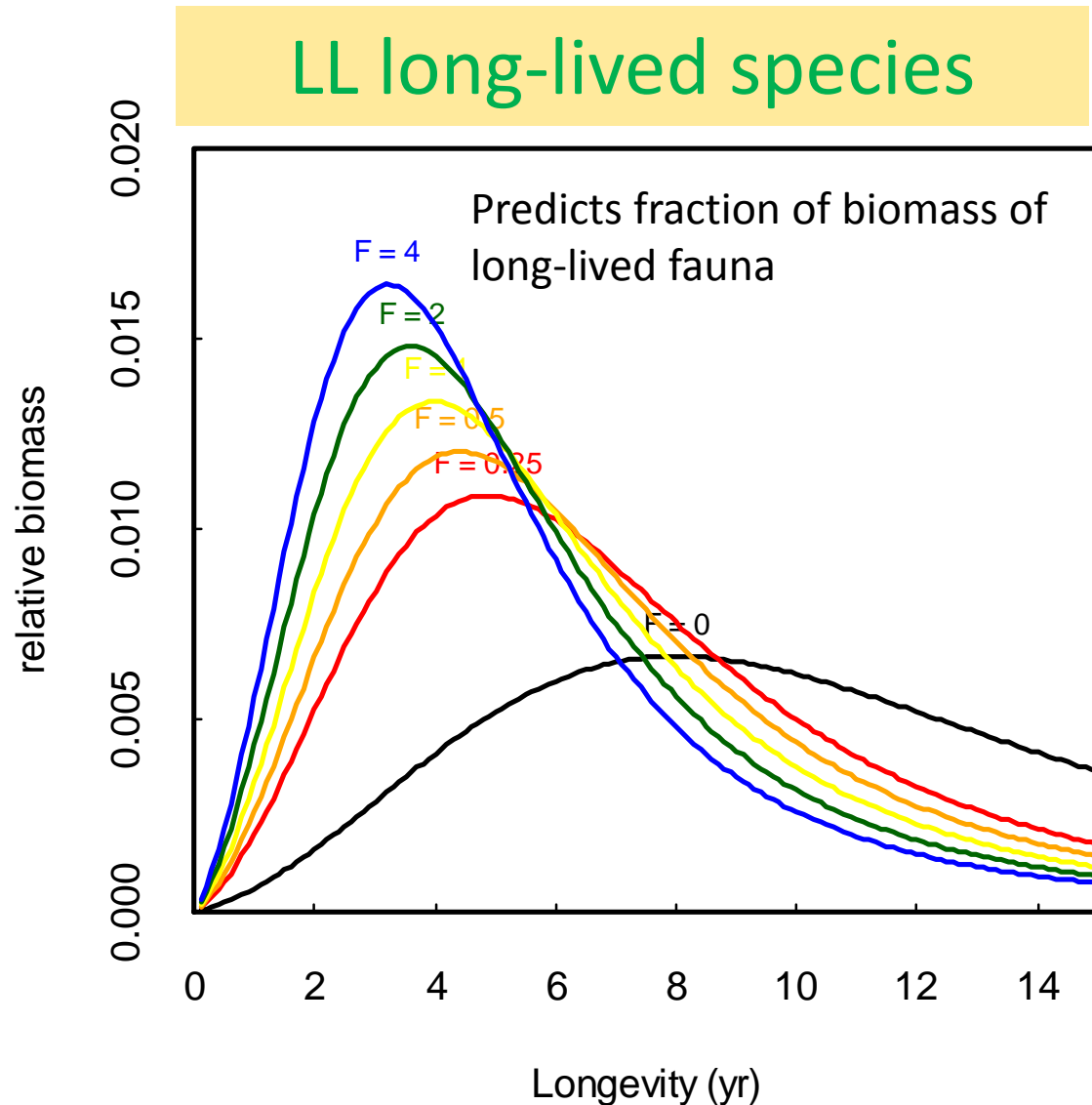
Assessment approach
- Mechanistic – based on ecological principles
- Quantitative – outputs on continuous scale
- Parameter estimates based on empirical observations
- Applicable on large scale

LL: Longevity distribution by habitat

LL estimate different aspects of benthic state

LL long-lived species

We can predict change in reduction of the proportion of long-lived species with increasing fishing mortality

Conclusions

- Two simple and robust approaches
- Mechanistic & quantitative
- Applicable on large scale

Acknowledgements