Damped trophic cascades driven by fishing in model marine ecosystems

The largest perturbation on upper trophic levels of many marine ecosystems stems from fishing. The reaction of the ecosystem goes beyond the trophic levels directly targeted by the fishery. This reaction has been described either as a change in slope of the overall size spectrum or as a trophic cascade triggered by the removal of top predators. Here we use a novel size- and trait-based model to explore how marine ecosystems might react to perturbations from different types of fishing pressure. The model explicitly resolves the whole life history of fish, from larvae to adults. The results show that fishing does not change the overall slope of the size spectrum, but depletes the largest individuals and induces trophic cascades. A trophic cascade can propagate both up and down in trophic levels driven by a combination of changes in predation mortality and food limitation. The cascade is damped as it comes further away from the perturbed trophic level. Fishing on several trophic levels leads to a disappearance of the signature of the trophic cascade. Differences in fishing patterns among ecosystems might influence whether a trophic cascade is observed.

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources
Contributors: Andersen, K. H., Pedersen, M.
Pages: 795-802
Publication date: 2010
Peer-reviewed: Yes

Publication information
Journal: Royal Society of London. Proceedings. Biological Sciences
Volume: 277
Issue number: 1682
ISSN (Print): 0962-8452
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 4.75 SJR 2.826 SNIP 1.677
Web of Science (2017): Impact factor 4.847
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.89 SJR 3.414 SNIP 1.723
Web of Science (2016): Impact factor 4.94
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.08 SJR 3.693 SNIP 1.8
Web of Science (2015): Impact factor 4.823
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.18 SJR 3.422 SNIP 1.895
Web of Science (2014): Impact factor 5.051
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 5.08 SJR 3.441 SNIP 1.9
Web of Science (2013): Impact factor 5.292
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 4.99 SJR 3.258 SNIP 1.972
Web of Science (2012): Impact factor 5.683
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 5.02 SJR 3.555 SNIP 1.88
Web of Science (2011): Impact factor 5.415