Comparing model predictions for ecosystem-based management

Ecosystem modeling is becoming an integral part of fisheries management, but there is a need to identify differences between predictions derived from models employed for scientific and management purposes. Here, we compared two models: a biomass-based food-web model (Ecopath with Ecosim (EwE)) and a size-structured fish community model. The models were compared with respect to predicted ecological consequences of fishing to identify commonalities and differences in model predictions for the California Current fish community. We compared the models regarding direct and indirect responses to fishing on one or more species. The size-based model predicted a higher fishing mortality needed to reach maximum sustainable yield than EwE for most species. The size-based model also predicted stronger top-down effects of predator removals than EwE.

In contrast, EwE predicted stronger bottom-up effects of forage fisheries removal. In both cases, the differences are due to the presumed degree of trophic overlap between juveniles of large-bodied fish and adult stages of forage fish. These differences highlight how each model’s emphasis on distinct details of ecological processes affects its predictions, underscoring the importance of incorporating knowledge of model assumptions and limitation, possibly through using model ensembles, when providing model-based scientific advice to policy makers.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, University of Washington
Contributors: Jacobsen, N. S., Essington, T. E., Andersen, K. H.
Pages: 666-676
Publication date: 2016
Peer-reviewed: Yes

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 73
Issue number: 4
ISSN (Print): 0706-652X

Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 2.44 SJR 1.329 SNIP 1.036
Web of Science (2017): Impact factor 2.631
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.56 SJR 1.388 SNIP 1.185
Web of Science (2016): Impact factor 2.466
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.22 SJR 1.267 SNIP 1.025
Web of Science (2015): Impact factor 2.437
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.6 SJR 1.476 SNIP 1.379
Web of Science (2014): Impact factor 2.287
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.25 SJR 1.439 SNIP 1.086
Web of Science (2013): Impact factor 2.276
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 2.29 SJR 1.359 SNIP 1.232
Web of Science (2012): Impact factor 2.323