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Special Issue
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Guest Editors
Kenneth Allan Rose and Icarus Allen

Ecological Modelling

Volume 264, Pages 1-168 (24 August 2013)

Modeling marine ecosystem responses to global climate change: Where are we now and where should we be going?

Pages 1-6
Kenneth Alan Rose, J. Icarus Allen

Research Articles

Modeling suspended solids in a Northern Chilean Patagonia glacier-fed fjord: GLOF scenarios under climate change conditions
Original Research Article
Pages 7-16
Víctor H. Marín, Antonio Tironi, María Alejandra Paredes, Manuel Contreras

Highlights

► We modeled a Patagonian fjord under three climate change scenarios. ► The state variable was terrigenous suspended solids (glacier flour). ► Results show effects concentrated on inner fjord sector. ► Main ecosystem effect is light limitation of primary production.

Effects of global warming on hypoxia in the Baltic Sea–North Sea transition zone
Original Research Article
Pages 17-26
Jørgen Bendtsen, Jørgen L.S. Hansen

Highlights

► We model the bottom water oxygen distribution during a three year period. ► Climate change scenarios simulate a significant increase in hypoxia. ► Increased hypoxia may be the most significant effect from climate change in the area.

Reprint of Modelling wetland surface elevation dynamics and its application to forecasting the effects of sea-level rise on estuarine wetlands

Original Research Article
Pages 27-36
Kerrylee Rogers, Neil Saintilan, Craig Copeland

Modeled phytoplankton diversity and productivity in the California Current System
Original Research Article
Pages 37-47
N.L. Goebel, C.A. Edwards, J.P. Zehr, M.J. Follows, S.G. Morgan

Highlights

► We represented 17 individual phytoplankton in a self-emergent ecosystem model of the CCS. ► Highest diversity was modeled in intermediate productive offshore oligotrophic surface waters. ► High productivity-low diversity was modeled in the diatom-dominated nearshore upwelling region. ► Low productivity-low diversity was found in deep, light-limited regions. ► Species richness and productivity covaried with time.

Reprint of: "Impacts of natural and anthropogenic climate variations on North Pacific plankton in an Earth System Model"
Original Research Article
Pages 48-63
Lavinia Patara, Marcello Vichi, Simona Masina

Highlights

• A plankton model with variable stoichiometry has been used in a coupled climate study. • Natural climate variations modify North Pacific plankton biomass by 10–30% while a warming scenario decreases primary production up to 50%. • DOC production and the microbial foodweb will be favored in a warmer North Pacific. • Positive phases of natural fluctuations counteract the impacts of global warming. • Natural and anthropogenic impacts are distinguishable only in the second part of the 21st century.

Environmental influences on the interannual variation and spatial distribution of Peruvian anchovy (*Engraulis ringens*) population dynamics from 1991 to 2007: A

three-dimensional modeling study
Original Research Article
Pages 64-82
Yi Xu, Fei Chai, Kenneth A. Rose, Miguel Ñiquen C., Francisco P. Chavez

Highlights

► We coupled a hydrodynamics-NPZ model to an individual-based fish model. ► We studied influences of physical–biological process on Peruvian anchovy recruitment. ► Modeled anchovy growth and survival showed strong interannual variation. ► During El Niño anchovy were located closer to shore, farther south, and at deeper depth. ► Model results can be used to infer anchovy recruitment under future climate change.

Modeling climate change impacts on phenology and population dynamics of migratory marine species
Original Research Article
Pages 83-97
James J. Anderson, Eliezer Gurarie, Chloe Bracis, Brian J. Burke, Kristin L. Laidre

Simulating the effects of global climate change on Atlantic croaker population dynamics in the mid-Atlantic Region
Original Research Article
Pages 98-114
Sandra L. Diamond, Cheryl A. Murphy, Kenneth A. Rose

Ecosystem model of Tasmanian waters explores impacts of climate-change induced changes in primary productivity
Original Research Article
Pages 115-129
Reg A. Watson, Gabrielle B. Nowara, Sean R. Tracey, Elizabeth A. Fulton, Cathy M. Bulman, Graham J. Edgar, Neville S. Barrett, Jeremy M. Lyle, Stewart D. Frusher, Colin D. Buxton

Highlights

► Climate change will impact global marine systems especially hotspots like Tasmania, Australia. ► Changes to primary production regimes that result could severely impact fisheries and wildlife. ► It is

yet uncertain whether net primary productivity in this area will increase or decrease. ► An ecosystem model was constructed to investigate some of the more likely impacts on coastal marine systems. ► Although some fisheries would benefit from increased primary productivity the results were asymmetric and there are losers.

Effects of hunting, fishing and climate change on the Hudson Bay marine ecosystem: I. Re-creating past changes 1970–2009
Original Research Article
Pages 130-142
Carie Hoover, Tony Pitcher, Villy Christensen

Highlights

► A Past model of the Hudson Bay marine ecosystem was driven with climate and harvest changes. ► Climate drivers show influence lower trophic levels. ► Harvest is more influential on predators than climate changes. ► Changes in bentho-pelagic coupling are observed in the model. ► Some marine mammal stocks cannot withstand current harvest levels.

Effects of hunting, fishing and climate change on the Hudson Bay marine ecosystem: II. Ecosystem model future projections
Original Research Article
Pages 143-156
Carie Hoover, Tony Pitcher, Villy Christensen

Highlights

► We show future simulations of varying levels of climate change and harvest for Hudson Bay. ► Identified stocks of marine mammals likely to be extirpated due to over-harvest. ► Food web shifts from benthic to pelagic dominated system. ► Identifies species likely to benefit from climate change. ► Results indicate harvest efforts on some marine mammals should be decreased.

The relative impact of warming and removing top predators on the Northeast US large marine biotic community
Original Research Article
Pages 157-168

Highlights

► Warming affected lower trophic levels and macroinvertebrates much more than upper trophic levels. ► Removing top predators had little to no effect on plankton or invertebrate functional groups. ► Removal of top predators had a much larger effect on the pelagic:demersal (P:D) ratio than warming. ► The combined effect of warming and removal of top predators was additive in majority of the cases. ► When these two perturbations were modeled simultaneously synergisms and antagonisms occurred rarely.