Acclimation, adaptation, traits and trade-offs in plankton functional type models – seeking clarity in terminology

We propose definitions in terminology to enhance ongoing collaborations between biologists and modellers on plankton ecology. Organism “functional type” should refer to commonality in ecology not biogeochemistry; the latter is largely an emergent property of the former, while alignment with ecology is also consistent with usage in terrestrial science. Adaptation should be confined, as in genetics, to consideration of species inter-generational change; most so-called “adaptive” plankton models are thus acclimative, modifying vital rates in response to stimuli. Trait trade-off approaches should ideally only be considered for describing intra-generational interactions; in applications between generations, and certainly between unrelated species, such concepts should be avoided. We suggest that systems biology approaches, through to complex adaptive/acclimative systems modelling, with explicit modelling of feedback processes (which we suggest should define “mechanistic” models), would provide realistic and flexible bases upon which to develop descriptions of functional type models.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, University of Dundee, Plymouth Marine Laboratory, Old Dominion University, Swansea University
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Pages: 683-691
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Plankton Research
Volume: 37
Issue number: 4
ISSN (Print): 0142-7873
Ratings:
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.92 SJR 1.098 SNIP 0.848
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.025 SNIP 0.796 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.095 SNIP 1.255 CiteScore 2.24
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.289 SNIP 1.109 CiteScore 2.39
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.557 SNIP 1.101 CiteScore 2.43
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.158 SNIP 1.045 CiteScore 1.99
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.186 SNIP 0.98
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.922 SNIP 1.046