

## 2 The tropicalization of temperate marine ecosystems: climate-mediated changes in herbivory and community phase shifts.

Vergés A<sup>1</sup>, Steinberg PD<sup>2</sup>, Hay ME<sup>3</sup>, Poore AG<sup>4</sup>, Campbell AH<sup>5</sup>, Ballesteros E<sup>6</sup>, Heck KL<sup>7</sup>, Booth DJ<sup>8</sup>, Coleman MA<sup>9</sup>, Feary DA<sup>8</sup>, Figueira W<sup>10</sup>, Langlois T<sup>11</sup>, Marzinelli EM<sup>12</sup>, Mizerek T<sup>13</sup>, Mumby PJ<sup>14</sup>, Nakamura Y<sup>15</sup>, Roughan M<sup>16</sup>, van Sebille E<sup>17</sup>, Gupta AS<sup>17</sup>, Smale DA<sup>18</sup>, Tomas F<sup>19</sup>, Wernberg T<sup>11</sup>, Wilson SK<sup>20</sup>

show author affiliations

Proc Biol Sci. 2014 Aug 22; 281(1789)

Save/Follow

Export

Get Article

Find It@UWA

8+1

RECOMMENDATIONS 1 | ABSTRACT | COMMENTS

collapse all

### Recommendations:

Very Good

26 May 2015



Kevin Lafferty

F1000 Ecology

US Geological Survey, UC Santa Barbara,  
Santa Barbara, CA, USA.

#### INTERESTING HYPOTHESIS

DOI: 10.3410/f.718487718.793497707

The coral reef is dead; long live the coral reef. Much has been made of the impacts of higher temperature on the persistence of coral reefs, primarily through the increased frequency of coral bleaching. Whether today's tropical oceans will become too warm to support corals is not yet clear, but given the other threats to corals, warming remains a concern that will be difficult to mitigate. Vergés et al. lay out a mechanism for the pole-ward expansion of coral reefs (and the consequent retreat of kelp forests). Herbivorous fishes are more diverse in warmer waters (due, we've proposed, to more efficient conversion of plant food at high temperatures), and they can denude areas of algae that otherwise displace corals. As herbivorous fishes move north with climate change, we should see fewer algae, and a conversion to bare rock, followed by opportunities for corals (assuming other needs, like water quality, are also met) where kelps now dominate. While this prediction pertains mostly to an unknown future, the authors point to a remarkable case study in Japan where conversion from kelp to coral has already occurred as the water warmed and herbivorous fishes moved in, and to similar evidence from the Mediterranean. Because humans value both kelp forests and coral reefs, it is hard to put a judgment on conversion of one type to the other (except for the fact that we usually don't like to see change in the systems we are familiar with).

Good news! *The University of Western Australia* has a subscription to F1000, so you have full access to the new F1000Workspace suite of tools for collecting, writing and discussing scientific literature.

FIND OUT MORE

Use of cookies. [Find out more »](#)

close

#### ABSTRACT

Climate-driven changes in biotic interactions can profoundly alter ecological communities, particularly when they impact foundation species. In marine systems, changes in herbivory and the consequent loss of dominant habitat forming species can result in dramatic community phase shifts, such as from coral to macroalgal dominance when tropical fish herbivory decreases, and from algal forests to 'barrens' when temperate urchin grazing increases. Here, we propose a novel phase-shift away from macroalgal dominance caused by tropical herbivores extending their range into temperate regions. We argue that this phase shift is facilitated by poleward-flowing boundary currents that are creating ocean warming hotspots around the globe, enabling the range expansion of tropical species and increasing their grazing rates in temperate areas. Overgrazing of temperate macroalgae by tropical herbivorous fishes has already occurred in Japan and the Mediterranean. Emerging evidence suggests similar phenomena are occurring in other temperate regions, with increasing occurrence of tropical fishes on temperate reefs.

© 2014 The Author(s) Published by the Royal Society. All rights reserved.

DOI: 10.1098/rspb.2014.0846

PMID: 25009065



Abstract courtesy of PubMed: A service of the National Library of Medicine and the National Institutes of Health.

### Comments:

COMMENTS

add a comment

An open access journal that expands on the recommended literature coverage of **F1000Prime** by publishing unique, peer-reviewed reports to provide context on emerging themes in biology and medicine.