School of Oceanography

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Seattle, March 16, 2016

Dear PNAS Editor,

Please find enclosed our manuscript entitled “Light-driven synchrony of *Prochlorococcus* cell growth and mortality in the subtropical Pacific gyre” submitted for publication in Proceedings of the National Academy of Sciences of the United States of America.

Synchronized ecological interactionsare assumed to underpin ecosystem stability. Yet, direct observations of such synchrony are rare in nature. In this manuscript, we use novel flow cytometry approaches to generate continuous estimates of growth and mortality rates of the abundant cyanobacterium Prochlorococcus across 2900 km of the subtropical Pacific gyre. We show that *Prochlorococcus* mortality is tightly synchronized to the day/night cycle, with essentially no cell loss during the day. This means that a pulse of *Prochlorococcus-*derived organic compounds is propagated each night through the food web, stabilizing multiple trophic interactions. The observed resilience of this synchronized food web dynamic as temperature increased within the gyre suggest that ecosystem stability may persist in future warmer oceans. Our findings are relevant to environmental scientists, oceanographers, biogeochemists, theoretical ecologists, and policy makers.

The manuscript contains 2906 words, excluding the summary paragraph of 231 words and the significance statement of 118 words. There are 3 figures comprising 12 panels in total, and supplemental information that included 10 figures. We estimate our manuscript will occupy less than 6 pages of PNAS. This manuscript contains original data that has not been previously published or is in review elsewhere. We will accept any publication charges if this manuscript is accepted.

As potential Editorial Board members we would like to suggest the following scientists:

1. David M. Karl
2. Simon A. Levin
3. Robert M. May
4. Edward F. Delong

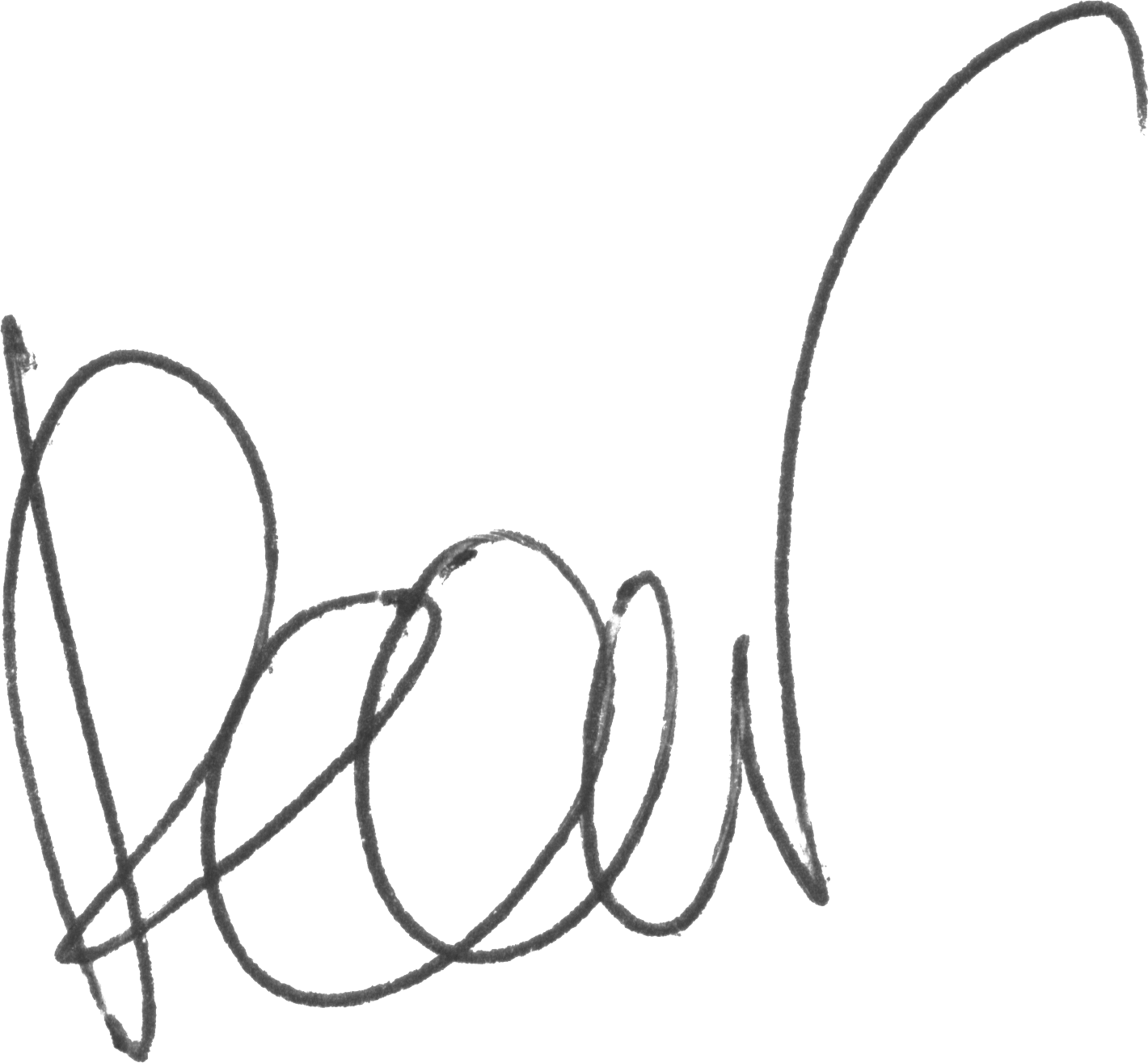
As potential Editors we would like to suggest the following scientists:

1. Sallie W. Chisholm
2. David M. Karl
3. Simon A. Levin
4. Robert M. May
5. Edward F. Delong

We recommend the following reviewers:

* Dr. Daniel Vaulot, Station Biologique de Roscoff ([vaulot@sb-roscoff.fr](mailto:vaulot@sb-roscoff.fr))
* Dr. Heidi Sosik, WHOI ([hsosik@whoi.edu](mailto:hsosik@whoi.edu))
* Dr. Debbie Lindell, Israel Institute of Technology ([dlindell@tx.technion.ac.il](mailto:dlindell@tx.technion.ac.il))
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Yours sincerely,



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