

Charles A. Stock

Research Oceanographer, NOAA/Geophysical Fluid Dynamics Laboratory
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Education

- 2005 Ph.D., Woods Hole Oceanographic Institution/MIT Joint Program
Civil, Environmental and Ocean Engineering
- 1998 M.S.E., Stanford University
Environmental Fluid Mechanics and Hydrology
- 1997 B.S.E., Princeton University (*magna cum laude*)
Civil and Environmental Engineering

Professional Experience

- 2008-present Research Oceanographer, NOAA Geophysical Fluid Dynamics Laboratory
- 2007-2008 Associate Research Scholar, NOAA/GFDL and Princeton University
- 2005-2007 Postdoctoral Investigator, UC Berkeley and Princeton University
- 2005 Postdoctoral Investigator, Woods Hole Oceanographic Institution
- 1998-1999 Visiting Investigator, Woods Hole Oceanographic Institution

Honors and Awards

- 2009 Presidential Early Career Award for Scientists and Engineers
- 2006 Outstanding reviewer, American Society of Limnology and Oceanography
- 2000 Environmental Protection Agency Science to Achieve Results (STAR) graduate fellowship
- 1997 Sigma Xi book award for excellence in undergraduate research, Department of Civil and Environmental Engineering, Princeton University

Research Interests

Marine ecosystem and biogeochemical dynamics at global and regional scales; impacts of climate on living marine resources; interactions between physical and biological processes within marine ecosystems; Ecosystem predictions and projection on seasonal to multi-decadal time-scales.

Professional affiliations

Member, the American Society of Limnology and Oceanography
Member, the American Geophysical Union
Member, American Fisheries Society

Professional and Service Activities

- 2014 Steering Committee, Advances in Marine Ecosystem Modeling Research Symposium, Plymouth UK
- 2013-present Member of Research Council at the Geophysical Fluid Dynamics Laboratory
- 2013 Steering Committee, Fourth Advances in Marine Ecosystem Modeling Research (AMEMR) symposium, Plymouth, UK, June 30-July 3 2014.
- 2013 Steering committee for workshop "Understanding Climate Impacts on Fish Stocks of the Northeast Shelf Large Marine Ecosystem: Key Research Needs and Future Directions", July 2013, Providence RI.
- 2013 Co-convener, workshop "Climate Effects on Productivity in Arctic and sub-Arctic Ecosystems", September, 2013 Reykjavik Iceland.
- 2013 Co-convener, symposium on "Climate change and conservation of marine species: bridging the gap between ecology, climate science and policy", 26th International Congress for Conservation Biology, Baltimore, Maryland, July 25, 2013.
- 2013 Member of NOAA's Sustaining Marine Ecosystems in a Changing Climate (SMECC) working group to identify priority research and activities to forward the goal of resilient ecosystems and coastal communities in a changing climate
- 2012 Co-convended session on "Climate Change Impacts on Living Marine Resources", 2012 Ocean Sciences Meeting, Salt Lake City
- 2012-13 Member of National Institute of Mathematical and Biological Synthesis (NIMBioS) working group on ocean viral dynamics and the carbon cycle.
- 2011 Co-convended session on "The future of marine fish stocks and food webs – advancing methods for projections in the face of uncertainty", ICES Annual Science Conference, Gdansk, Poland.
- 2011 Co-convended session on "Connecting Climate Science to Fisheries Management and Ecology In a Changing World", American Fisheries Society Annual Meeting, Seattle Washington
- 2010-11 Contributing author, NOAAs climate and marine resource management needs assessment
- 2010-11 Member of the climate change impacts on cusk assessment team
- 2010 Contributor to the NOAA Ocean and Great Lakes Acidification Research Plan
- 2009 Organized workshop: "Applying IPCC-class models of global warming to fisheries prediction", June 15-17, Princeton University
- 2009 NOAA Office of Atmospheric and Oceanic Research representative to the second National Ecosystem Modeling Workshop
- 2006 Conducted workshop on the use of aquatic ecosystem models for ecosystem-based marine resource management, March 19-22, Trieste, Italy
- 2001-2002 Graduate student representative for the Applied Ocean Sciences and Engineering Department, Woods Hole/MIT Joint Program

Reviewer for the National Science Foundation, Nature, Global Change Biology, Limnology and Oceanography, Continental Shelf Research, Journal of Marine Systems, Journal of Plankton Research, Deep-sea Research, Ocean Dynamics, Dynamics of Atmospheres and Oceans, Global Biogeochemical Cycles, Marine Ecology Progress Series, Biogeosciences, Fisheries Oceanography, Reviews in Fish Biology and Fisheries.

Articles in Referred Journals

- McGillicuddy, D. J., Signell, R. P., **Stock, C. A.**, Keafer, B. A., Keller, M. D., Hetland, R. D., Anderson, D. M., 2003. A mechanism for offshore initiation of harmful algal blooms in the coastal Gulf of Maine. *Journal of Plankton Research* 25 (8), 1131-1139.
- Anderson, D. M., **Stock, C. A.**, Keafer, B. A., Nelson, A. B., McGillicuddy, D. J., Keller, M. D., Thompson, B., Matrai, P. A., Martin, J. L., 2005. Mapping, experimental observations, and modeling of *Alexandrium fundyense* cyst dynamics in the Gulf of Maine. *Deep-Sea Research Part II*, 52 (19-21), 2522-2542.
- He, R., McGillicuddy, D. J., Lynch, D. R., Smith, K. W., **Stock, C. A.**, Manning, J. P., 2005. Data Assimilative Hindcast of the Gulf of Maine Coastal Circulation. *Journal of Geophysical Research*, 110 (C10011), doi:10.129/2004JC002807.
- Stock, C. A.**, McGillicuddy, D. J., Solow, A. R., Anderson, D. M., 2005. Evaluating hypotheses for the initiation and development of *Alexandrium fundyense* blooms in the western Gulf of Maine using a coupled physical-biological model. *Deep Sea Research, Part II*, 52 (19-21), 2715-2744.
- Stock, C. A.**, McGillicuddy, D. J., Anderson, D. M., Solow, A. R., Signell, R. P., 2007. Blooms of the toxic dinoflagellate *Alexandrium fundyense* in the western Gulf of Maine in 1993 and 1994: a comparative modeling study. *Continental Shelf Research*, 27, 2486-2512.
- McGillicuddy, D.J., Anderson, D.M., **Stock, C.A.**, Lynch, D.R., Townsend, D.W., 2008 Modeling blooms of *Alexandrium fundyense* in the Gulf of Maine. In: Babin, M., Roesler, C., and Cullen J. (Eds.), *Real-time Observing Systems for Marine Ecosystems Dynamics and Harmful Algal Blooms*, UNESCO publishing.
- Stock, C.A.**, Powell, T.M., Levin, S.A., 2008. Bottom-up and top-down forcing in a simple size-structured aquatic ecosystem model. *Journal of Marine Systems*, 74, 134-152.
- Stock, C.A.**, Dunne, J.P., 2010. Controls on the ratio of mesozooplankton production to primary production in marine ecosystems. *Deep-sea Research, Part I*, 57, 95-112.
- Song, H., Ji, R., **Stock, C.A.**, & Wang, Z. (2010). Phenology of phytoplankton blooms in the Nova Scotian Shelf - Gulf of Maine region: remote sensing and modeling analysis. *Journal of Plankton Research*, 32(11), 1485-1499.
- Song, H., Ji, R., **Stock, C.A.**, Kearney, K., Wang, Z. (2011). Interannual variability of phytoplankton blooms and plankton productivity in the Nova Scotian Shelf and Gulf of Maine. *Marine Ecology Progress Series*, 426, 105-118
- Stock, C.A.**, Alexander, M., Bond, N.A., Brander, K.B., Cheung, W., Curchitser, E., Delworth, T.L., Dunne, J., Griffies, S.M., Haltuch, M., Hare, J., Hollowed, A.B., Lehodey, P., Levin, S., Link, J.S., Rose, K.A., Rykaczewski, R., Sarmiento, J.L., Schwing, F., Stouffer, R., Vecchi, G., & Werner, C. (2011). On the use of IPCC-class climate models to assess the impact of climate on living marine resources. *Progress in Oceanography*, 88, 1-27.
- Friedland, K.D., **Stock, C.A.**, Drinkwater, K.F., Link, J.S., Leaf, R., Shank, B., Rose, J., Pilskaln, C.H., Forgarty, M. (2012) Pathways between primary production and fisheries yields of Large Marine Ecosystems, *PLoS ONE* 7(1) e28945 doi:10.1371/journal.pone.0028945
- Hare, J., Manderson J., Nye J., Alexander, M., Auster, P., Borggaard D., Capotondi, A., Damon-Randall, K., Huepel, E., Mateo, I., O'Brien, Richardson, D., **Stock, C.A.**, Biegel, S. (2012) Cusk (*Brosme brosme*) and climate change: assessing the threat to a candidate marine fish species under the U.S. Endangered Species Act. *ICES Journal of Marine Science*, 69(10): 1753-1768.

- Kearney, K., **Stock, C.A.**, Aydin, K., Sarmiento, J.L. (2012) Coupling planktonic ecosystem and fisheries food web models for a pelagic ecosystem: Description and validation for the subarctic Pacific. *Ecological Modelling*, 237-238, DOI: 10.1016/j.ecolmodel.2012.04.006.
- Saba, V.S., **Stock, C.A.**, Spotila, J.R., Paladino, F.V., Santidrian-Tomilo, P. (2012) Population response of an endangered marine vertebrate to climate change. *Nature Climate Change*. doi:10.1038/NCLIMATE1582.
- Tomillo, P S., Saba, V.S., Blanco, G.S., **Stock, C.A.**, Paladino, F.V., and Spotila, J.R. (2012): Climate Driven Egg and Hatchling Mortality Threatens Survival of Eastern Pacific Leatherback Turtles. *PLoS-ONE*, 7(5), DOI:10.1371/journal.pone.0037602.
- Bianchi, D., Galbraith, E.D., Carozza, D., Mislán, K.A.S, **Stock, C.A.** (2013) Intensification of open-ocean oxygen depletion by vertically migrating animals. *Nature Geoscience*, 6(7), DOI:doi:10.1038/ngeo1837.
- Bianchi, D., **Stock, C.A.**, Galbraith, E.D., Sarmiento, J.L. (2013) Diel vertical migration: ecological controls and impacts on the biological pump in a one-dimensional ocean model. Submitted to: *Global Biogeochemical Cycles*, 27, DOI:10.1002/gbc.20031.
- Hollowed, A.B., Curchitser, E., **Stock, C.A.**, Zhang, C.I. (2013) Trade-offs associated with different modeling approaches for assessment of fish and shellfish responses to climate change. *Climatic Change*, 119(1).
- Kearney, K.A., **Stock C.A.**, Sarmiento, J.L. (2013) Amplification and attenuation of increased primary production in a marine food web. *Marine Ecology Progress Series*. 491 (1-4), DOI: 10.3354/meps10484.
- Lee, H.C., Delworth, T., Rosati, A., Zhang R., Anderson, W.G., Zeng, F., **Stock, C.A.**, Gnanadesikan, A., Dixon, K.W., Griffies, S.M. (2013) Impact of climate warming on the upper layer of the Bering Sea. *Climate Dynamics*. 40(1-2) DOI: 10.1007/s00382-012-1301-8.
- Stock, C.A.**, Dunne, J.P., John, J. (2014) Global-scale carbon and energy flows through the planktonic food web: an analysis with a coupled physical biological model. *Progress in Oceanography*. 120, DOI:10.1016/j.pocean.2013.07.001.
- Kristiansen, T., **Stock, C.A.**, Drinkwater, K., Curchitser, E.N. (2014). Mechanistic insights into the effects of climate change on larval cod. *Global Change Biology*. 20(5), DOI: 10.1111/gcb.12489.

Accepted Manuscripts

- Saba, V.S., **Stock, C.A.**, Dunne, J.P. (accepted) Marine primary productivity connections to leatherback biology and behavior. In: *The Leatherback Turtles: Biology and Conservation*.

Manuscripts submitted or in revision:

- Stock, C.A.**, Dunne, J.P., John, J.G. (submitted). Understanding trophic amplification of ocean productivity trends in a changing climate. Submitted to *biogeosciences*.
- Stock, C.A.**, Dunne, J.P., Froelicher, T. (book chapter submitted to editor). *Ocean Biogeochemistry and Climate Change through a Fisheries Lens*. For: *Marine Fisheries and Global Change*.

- Watson, J.R., **Stock, C.A.**, Sarmiento, J.L. (in revision). The role of movement in determining the global distribution of marine biomass. Submitted to Progress in Oceanography
- Lynch P., Nye, J., Hare, J., **Stock, C.**, Alexander, M., Scott, James, Curti, K., Drew, K. (in revision) Projected ocean warming poses a challenge to anadromous river herring populations. Submitted to the ICES Journal of Marine Science.
- Weitz, J.S., **Stock, C.A.**, Wilhelm, S.W., Bourouiba, L., Buchan, A., Coleman, M.L., Follows, M.J., Fuhrman, J.A., Jover, L.F., Lennon, J.T., Middelboe, M., Sonderegger, D.L., Suttle, C.A., Taylor, B.P., Thingstad, T.F., Wilson, W.H., Wommack, K.E., (submitted). A multitrophic model to quantify the effects of marine viruses on microbial food webs and ecosystem processes. Submitted to the Proceedings of the National Academy of Sciences.
- Mislan, K.A.S., **Stock, C.A.**, Dunne, J.P., Sarmiento, J.L.S. (submitted). Group behavior among model bacteria influences particulate carbon remineralization depths. Submitted to the Journal of Marine Research.
- Watson, J.R., Favetta, B. and **Stock, C.A.** (submitted). On the macroecology of baleen whale migration. Submitted to xxxx.
- Christensen, V., Coll, M., Buszowski, J., Cheung, W., Frolicher, T., Steenbeek, J., **Stock, C.A.**, Watson, R., Walters, C.J. (submitted). The global ocean is an ecosystem: Simulating marine life and fisheries. Submitted to Global Ecology and Biogeography.

Invited Seminars and Talks

- 2003 HABWatch Workshop on Real Time Coastal Observing Systems for Ecosystems Dynamics and Harmful Algal Blooms, Villefranche-sur-Mere, France
- 2004 Departmental Seminar, University of Massachusetts at Dartmouth, School of Marine Science and Technology, Dartmouth MA
- 2005 Departmental Seminar, University of California, Santa Cruz, Department of Ocean Sciences, Santa Cruz, CA
- 2006 Departmental Seminar, Department of Civil and Environmental Engineering, UC Berkeley, Berkeley, CA
- 2006 Workshop on Climate Change, Upwelling, Fisheries, and Coastal Communities, Trieste, Italy
- 2006 Workshop on Skill Assessment for Coupled Biological/Physical Models of Marine Systems, Durham, NC
- 2007 Gordon Research Conference on Coastal Ocean Modeling, "Skill assessment and parameter constraints in physical-biological models: recent examples and challenges." New London, NH
- 2007 Departmental Seminar, Bigelow Laboratory for Ocean Sciences, Boothbay Harbor, ME
- 2007 Departmental Seminar, MIT department of Earth Atmosphere and Planetary Sciences, Boston MA
- 2008 Departmental Seminar, Old Dominion University Center for Coastal Physical Oceanography, Norfolk VA
- 2008 Seminar, Horn Point Environmental Laboratory, Cambridge Maryland
- 2009 Departmental Seminar, Biological Oceanography Department, Woods Hole Oceanographic Institution, Woods Hole MA
- 2009 Sea Grant Climate Network Workshop, Climate Adaptation in Coastal Communities: A Network Approach to Outreach, Charleston, SC

- 2010 Invited Plenary, Annual Science Meeting of the Regional Association for Research in the Gulf of Maine, "The impact of climate variability and change on ecosystem productivity across trophic levels", Portsmouth NH
- 2011 Invited Plenary, NOAA Cooperative Institute for the North Atlantic Region (CINAR) workshop on climate and ecosystem change in the NW Atlantic, "Connecting climate and regional ecosystems", Woods Hole, MA
- 2011 Invited speaker, NOAA Science Advisory Board Meeting, "Connecting climate and marine ecosystems: progress and challenges", Washington D.C.
- 2011 Invited speaker, Connecting climate and marine ecosystems: progress and challenges, OAR Senior Research Council Meeting, Princeton NJ
- 2011 Invited speaker, American Fisheries Society Annual Meeting, "On the use of IPCC-class models to assess the impact of climate change on living marine resources", Seattle Washington
- 2011 Invited speaker, Rutgers University Institute of Marine and Coastal Sciences, "Connecting climate and living marine resources in global-scale Earth System Models", New Brunswick NJ
- 2012 Invited speaker, Second International Symposium, Effects of Climate Change on the World's Oceans; Workshop on climate change projections for marine ecosystems: Best practice, limitations and interpretation, Yeosu Korea.
- 2012 MIT Oceanography and Climate Sack Lunch Seminar, "Estimating the global-scale flow of energy through the planktonic food web, Cambridge MA.
- 2012 NMFS Northeast Regional Office Protected Resource Division Climate Change Workshop, "The Impact of Climate Change on Primary and Secondary Production", Gloucester MA
- 2012 NOAA climate and ecosystems Science Day and Congressional Visit, "Connecting Climate and Ecosystems: Progress and Challenges", Washington DC.
- 2013 Symposium on Climate Change and Conservation of Marine Species; "On the use of IPCC-class models to assess the impact of climate on Living Marine Resources" 26th International Congress for Conservation Biology, Baltimore MD
- 2013 National Research Council Ocean Science Board Fisheries Subcommittee Meeting "Toward and understanding of global productivity and fish distributions in a changing climate", Sandy Hook NJ
- 2013 Invited speaker, University of Washington Program on Climate Change summer symposium "Global plankton production in a changing climate: how much do we know and is it enough to make fisheries projections?"
- 2014 Invited Speaker, PICES Future Meeting workshop on Ecosystem projection model intercomparison and assessment of climate change impacts of fish and fisheries: "A brief overview of the present state and future improvements of GFDL's Earth System Models"
- 2014 Invited Seminar, Stony Brook University School of Marine and Atmospheric Sciences: "Revisiting Ryther: The global transfer of energy from phytoplankton to fish"
- 2014 Invited Plenary (June), Advanced in Marine Ecosystem Modeling Research (AMEMR) Meeting, Plymouth UK, "Building Confidence in Marine Ecosystem Projections in a Changing Climate".