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Editorial

# Fronts, fish, and predators

Ocean fronts play a key role in marine ecosystems. Fronts shape oceanic landscapes and affect every trophic level across a wide range of spatio-temporal scales, from meters to thousands of kilometers, and from days to millions of years. At some fronts, there is an elevated rate of primary production, whereas at others, plankton is aggregated by advection and by the behavior of organisms moving against gradients in temperature, salinity, light irradiance, hydrostatic pressure and other physico-chemical and biological factors. Lower trophic level organisms – phytoplankton and zooplankton – that are aggregated in sufficient densities, attract organisms from higher trophic levels, from planktivorous schooling fish to squid, large piscivorous fish, seabirds and marine mammals. Many species have critical portions of their life stages or behaviors closely associated with fronts, including spawning, feeding, ontogenetic development, migrations, and other activities cued to frontal dynamics. At different life stages, an individual species or population might be linked to different fronts. The nature and strength of associations between fronts and biota depend on numerous factors such as the physical nature and spatio-temporal scales of the front and the species and their life stages in question. In other words, fronts support many different niches and micro/macro-habitats over a wide range of spatial and temporal scales.

Studies of biological–physical interactions at fronts have a long history (Le Fevre, 1986) and there is a growing realization of the importance of fronts to marine ecosystems. Recent decades have seen a renaissance in frontal studies galvanized by new technologies, particularly satellite remote sensing and tracking of tagged and instrumented animals. The rapid proliferation of studies in this field has warranted the publication of this volume – the first-ever special volume on fronts and biota, with an emphasis on higher trophic levels. The nine papers comprising this volume are presented **trophically**, from copepods and gadoid fish larvae (Munk, 2014), to Pacific saury (Mugo et al., 2014; Tseng et al., 2014), sei whales (Murase et al., 2014), neon flying squid and skipjack tuna (Mugo et al., 2014), Alaska sablefish (Shotwell et al., 2014), southern bluefin tuna (Nieblas et al., 2014), North Atlantic albacore tuna (Sagarminaga and Arrizabalaga, 2014), and seabirds (Sabarros et al., 2014; Zamon et al., 2014). **Physically**, various types of fronts are covered: the water mass front of the Norwegian Current in the North Sea (Munk, 2014); the fronts of the western boundary currents in the Northwest Pacific (Mugo et al., 2014; Murase et al., 2014; Tseng et al., 2014); the Polar front in the North Pacific (Shotwell et al., 2014); the tidally-modulated Columbia River Plume front (Zamon et al., 2014); the Benguela upwelling fronts in the Southeast Atlantic (Sabarros et al., 2014); and diverse fronts in the Northeast Atlantic (Sagarminaga and Arrizabalaga, 2014) and tropical Southeast Indian Ocean (Nieblas et al., 2014). **Methodologically**, various techniques are applied to identify fronts and higher trophic level associations and to characterize the dynamics of fish and predators in ocean fronts; such techniques include automated front detection from satellite imagery (Nieblas et al., 2014; Sagarminaga and Arrizabalaga, 2014; Tseng et al., 2014); maximum entropy models (Mugo et al., 2014); a statistical catch-at-age fish stock assessment model integrated with a novel Ocean Domain Dynamic Synergy (ODDS) conceptual model (Shotwell et al., 2014); generalized additive models (Murase et al., 2014); advection tracking in frontal reference frame derived from oceanographic section analysis (Shotwell et al., 2014); 3-D physical-biological sampling of a thermohaline front (Munk, 2014); high-frequency GPS tracking of foraging sea birds combined with concurrent, collocated satellite imagery (Sabarros et al., 2014); fine-scale visual surveys of marine birds (Zamon et al., 2014); cetacean sighting surveys (Murase et al., 2014), and satellite remote sensing of night-light fisheries (Mugo et al., 2014). **Geographically**, four oceans – Atlantic, Pacific, Indian, and Southern – are represented as are both coastal and open ocean fronts.

Since each manuscript in this issue was the result of a multi-disciplinary study, the rigorous peer review of this volume required an unusually large number of reviewers (between five and seven per manuscript) and entailed a prolonged, grueling revision process and consequently a 50% rejection rate. Each manuscript was assigned to a different Associate Editor, who was solely responsible for decision-making. All Associate Editors are listed as co-authors of this editorial. Since the peer-review process was, by default, anonymous, we cannot thank individual reviewers by name but acknowledge here that this volume would have been impossible to complete without their professionalism and dedication. We extend our most sincere gratitude to all of them.

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Igor M. Belkin
*Graduate School of Oceanography, University of Rhode Island, 215 South Ferry Road, Narragansett, RI 02882, USA*
*E-mail address:* igormbelkin@gmail.com

George L. Hunt Jr.
*School of Aquatic and Fishery Sciences, Box 355020, University of Washington, Seattle, WA 98195, USA*
*E-mail address:* geohunt2@uw.edu

Elliott L. Hazen
*Environmental Research Division, SWFSC NOAA, 1352 Lighthouse Ave., Pacific Grove, CA 93950, USA*
*E-mail address:* Elliott.Hazen@noaa.gov

Jeannette E. Zamon
*NOAA Fisheries, Pt. Adams Research Station, P.O. Box 155, Hammond, OR 97121, USA*
*E-mail address:* Jen.Zamon@noaa.gov

Robert S. Schick
*Centre for Research into Ecological and Environmental Modelling, University of St Andrews, The Observatory, Buchanan Gardens, St Andrews, Fife, KY16 9LZ Scotland, UK*
*E-mail address:* rss5@st-andrews.ac.uk

Rui Prieto
*Centro do IMAR da Universidade dos Açores, Departamento de Oceanografia e Pescas, 9901-862 Horta, Portugal*
*E-mail address:* rprieto@uac.pt

Jon Brodziak
*NOAA Inouye Regional Center, Pacific Islands Fisheries Science Center, 1845 Wasp Boulevard, Building 176, NMFS/PIFSC/FRMD, Mail Room 2247, Honolulu, Hawaii 96818, USA*
*E-mail address:* Jon.Brodziak@noaa.gov

Steven L.H. Teo
*Southwest Fisheries Science Center, NOAA Fisheries, 8901 La Jolla Shores Drive, La Jolla, CA 92037, USA*
*E-mail address:* Steve.Teo@noaa.gov

Lesley Thorne
*School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY 11794-5000, USA*
*E-mail address:* lesley.thorne@stonybrook.edu

Helen Bailey
*University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory, 146 Williams Street, P.O. Box 38, Solomons, MD 20688, USA*
*E-mail address:* hbailey@umces.edu

Sachihiko Itoh
*Atmosphere and Ocean Research Institute, University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa, Chiba 277-8564, Japan*
*E-mail address:* itohsach@aori.u-tokyo.ac.jp

Peter Munk
*National Institute of Aquatic Resources, Technical University of Denmark, Charlottenlund Castle, 2920 Charlottenlund, Denmark*
*E-mail address:* pm@aqua.dtu.dk

Michael K. Musyl
*Pelagic Research Group LLC, P.O. Box 10243, Honolulu, HI 96816, USA*
*E-mail address:* Michael.Musyl@gmail.com

Jay K. Willis
*Turnpenny Horsfield Associates, Ashurst Lodge, Ashurst, Southampton, Hampshire SO40 7AA, UK*
*E-mail address:* jkwillis@gmail.com

Wuchang Zhang
*Key Laboratory of Marine Ecology and Environmental Sciences, Institute of Oceanology, Chinese Academy of Sciences, Qingdao 266071, China*
*E-mail address:* wuchangzhang@qdio.ac.cn