

November 15, 2021

The Honorable Raúl Grijalva
Chairman
Committee on Natural Resources
Washington, DC 20515

The Honorable Bruce Westerman
Ranking Member
Committee on Natural Resources
Washington, DC 20515

Dear Chairman Grijalva and Ranking Member Westerman,

The undersigned 59 scientists seek your support for HR 5770, the Forage Fish Conservation Act. We represent a wide variety of areas of expertise, including fisheries biology and management, marine mammal and bird ecology, and social sciences. We understand the crucial role that forage fish species play in marine ecosystems and the U.S. economy, and as such, we know that the U.S. needs to manage forage fish for the larger ecosystem roles they play in the oceans.

Forage fish are small- to medium-sized fish that directly and indirectly feed the entire ocean food web, ultimately fueling the productivity of marine ecosystems. There is an expansive, growing body of research that outlines the importance of these fish as food for recreationally and commercially important species such as tuna, salmon, Alaska pollock, and cod, as well as for seabirds, sharks, dolphins, and other animals that are integral to healthy fisheries and stable ocean ecosystems (Cury et al. 2011; Engelhard et al. 2014; Pikitch et al. 2014, Essington et al. 2015, Worsøe et al. 2018). In addition to the ecological responsibility forage fish provide for the oceans, they also have unique biological characteristics that should be accounted for in fisheries management. For example, forage fish mature early, live short lives, and produce substantial numbers of offspring. Because of these life history characteristics, they generally show significant fluctuations in population size. Shifts in forage fish populations can cause ripple effects through the marine food web. Declines in forage fish populations are often accompanied by marked changes in ecosystem structure, including sharp decreases in the marine bird and mammal populations that depend upon forage fish for food (Cury and Shannon 2004).

Another unique biological characteristic of forage fish species is that they tend to form large schools, making them highly accessible to fishing, particularly as fishing gear and technologies become more efficient (Alder & Pauly 2006; Pikitch et al. 2012; Pikitch 2015). About one-third of wild marine fish caught globally are forage fish and this harvest adds around \$16.9 billion to the global economy, from both direct harvest and eco-benefits to predators (Pikitch et al. 2014). The potential for overexploitation of forage fish is high, increasing the potential for multi-species population collapses, after which recovery of the forage fish and species that depend upon them is uncertain (Pikitch et. al 2012; Pikitch 2015).

Despite the unique population dynamics of forage fish, conventional fisheries management does not adequately account for the ocean's expansive ecological dependency on forage fish populations. For example, conventional harvest control rules do not provide solutions for management trade-offs between catches and minimizing population collapse length and harvest strategies designed to maintain stability in catches result in more severe stock collapses (Siple et al. 2018). In contrast, a risk-based management scheme that reduces exploitation rates on forage species results in fewer ecosystem impacts, including population collapses, with little effect on long-term average forage fish catch. (Smith et al. 2011; Essington et al. 2015). Furthermore, ecosystem-based fisheries management (EBFM) approaches

introduce and integrate additional management levers for policymakers to achieve non-fishery-stock objectives at lowest costs to the fishing sectors (Sanchirico et al. 2021).

Regional applications of EBFM approaches for forage fish are increasing. In August 2020, the Atlantic States Marine Fisheries Commission (ASMFC) unanimously adopted the first application of quantitative ecological models in management on the U.S. East Coast. As a result of this landmark decision, fishery managers now use ecological reference points (ERPs) to ensure the menhaden population never drops below levels that would put its predators at risk (Chagaris et al. 2020; Drew et al 2021; Howell et al 2021; Anstead et al 2021).

Unfortunately, there remains a gap in forage fish management at the federal level. The country's flagship fisheries law, the Magnuson-Stevens Fishery Conservation and Management Act (MSA), does not include forage fish in its framework despite the large supporting role forage plays in the health of U.S. fisheries. The Forage Fish Conservation Act would improve federal management of forage fish to the benefit of all Americans and U.S. marine ecosystems alike by:

- Requiring the development of a national, science-based definition of forage fish;
- Limiting the establishment of new forage fish fisheries until there is scientific evidence to support their management and determine the impact the new fishery would have on the ecosystem and other fisheries;
- Requiring that catch limits be set for forage fish in ways that account for predator needs; and,
- Conserving important forage species such as river herrings and shads.

The U.S. has long been a world leader in using science to inform how our fisheries are managed. The Forage Fish Conservation Act will enhance a critical but sometimes overlooked aspect of U.S. fisheries management to the benefit of all. We urge you to enthusiastically and in a bipartisan way support the Forage Fish Conservation Act.

Sincerely,

Ellen Pikitch, PhD
Endowed Professor of Ocean Conservation
Science
Stony Brook University
Stony Brook, NY

Pat Baird, PhD
Doctor
Simon Fraser University
Burnaby, BC

Brian Tissot, PhD
Professor
Humboldt State University
Trinidad, CA

Daniel W. Anderson, PhD
Professor Emeritus
Dept. Wildlife, Fish & Conservation Biology
University of California, Davis
Davis, CA

Kerry J. Nickols, PhD
Associate Professor
California State University Northridge
Los Angeles, CA

Craig W Benkman, PhD
Professor of Zoology & Physiology
University of Wyoming
Timnath, CO

Timothy E. Targett, PhD
Professor Emeritus
University of Delaware
Lewes, DE

David William Kerstetter, PhD
Associate Professor
Nova Southeastern University
Dania Beach, FL

Dr. James K. Dooley, PhD
Professor Emeritus
Adelphi University
Homestead, FL

Geoffrey Cook, PhD
Associate Professor
University of Central Florida
Orlando, FL

Gustav Paulay, PhD
Curator / Professor
University of Florida
Gainesville, FL

Jiangang Luo, PhD
Scientist
University of Miami
Miami, FL

John Ogden, PhD
Emeritus Professor
University of South Florida
St. Petersburg, FL

Stephen Kajiura, PhD
Professor
Florida Atlantic University
Boca Raton, FL

Steven Green, PhD
Professor Emeritus
University of Miami
Coral Gables, FL

Gary Grossman, PhD
Professor
University of Georgia
Athens, GA

James Byers, PhD
Professor
University of Georgia
Athens, GA

Atsushi Fujimura, PhD
Assistant Professor
University of Guam
Mangilao, GU

Dennis Lavrov, PhD
Professor
Iowa State University
Ames, IA

Michael LaBarbera, PhD
Emeritus Professor
University of Chicago
Chicago, IL

Prosanta Chakrabarty, PhD
Professor/Curator of Fishes
Louisiana State University, Museum of Natural
Science; Smithsonian; American Museum of
Natural History, Canadian Museum of Nature
Baton Rouge, LA

David D. Dow, PhD
Doctor (ret.)
NOAA marine scientist
East Falmouth, MA

James Hanken, PhD
Professor of Biology
Harvard University
Cambridge, MA

Karen Alexander, MA
Research Fellow
UMass Amherst (ret.)
Whately, MA

Les Kaufman, PhD
Professor of Biology, and Lead, Program on
Coupled Human and Natural Systems
Boston University Marine Program
Brookline, MA

Megan Tyrrell, PhD
Research Coordinator
Waquoit Bay National Estuarine Research
Reserve
Waquoit, MA

Rob Moir, PhD
Executive Director
Ocean River Institute
Cambridge, MA

Suchi Gopal, PhD
Professor
Boston University
Boston, MA

Paul R Spitzer, PhD
PhD, Independent Scientist
Trappe, MD

Don Lyons, PhD
Director of Conservation Science
National Audubon Society
Bremen, ME

Dr. William Burgess Leavenworth, PhD
PhD, Retired Environmental Historian
Searsmont, ME

Jeremy Jackson, PhD
Emeritus Professor of Oceanography
Scripps Institution of Oceanography
Brooksville, ME

Phoebe Zarnetske, PhD
Associate Professor
Michigan State University
East Lansing, MI

William Resetarits, PhD
Professor
University of Mississippi
University, MS

Miles Silman, PhD
Andrew Sabin Professor of Conservation
Biology
Wake Forest University
Winston Salem, NC

Ben Steele, PhD
Professor Emeritus
Colby-Sawyer College
New London, NH

Carol R. Foss, PhD
Senior Advisor for Science and Policy
New Hampshire Audubon
Concord, NH

James Salierno, PhD
Professor of Biology
Fairleigh Dickinson University
Madison, NJ

Lawrence Niles, PhD
Partner/ Wildlife Biologist
Wildlife Restoration Partnerships
Greenwich, NJ

Dr. Konstantine Rountos, PhD
Associate Professor of Biology
Department of Biology, St. Joseph's College
New York
Patchogue, NY

Judith S. Weis, PhD
Professor Emerita
Rutgers University
New York, NY

Paul L Sieswerda, Associate
President, Gotham Whale
Staten Island, NY

Jim Welch, PhD
Professor of Biology
Wittenberg University
Springfield, OH

Charles Scott Baker, PhD
Professor
Oregon State University
Newport, OR

Jan Hodder, PhD
Senior Lecturer Emeritus
University of Oregon
Charleston OR

Jean Boal, PhD Ecology
Professor Emerita
Millersville University
Millersville, PA

John Cigliano, PhD
Professor of Biology & Director of
Environmental Conservation
Cedar Crest College
Allentown, PA

Natasha Gownaris, PhD
Assistant Professor
Gettysburg College
Gettysburg, PA

Gorka Sancho, PhD
Professor
College of Charleston
Charleston, SC

Kirk Winemiller, PhD
University Distinguished Professor
Texas A&M University
College Station, TX

Benjamin Elias Cuker, PhD
Professor Emeritus
Hampton University
Hampton, VA

Donald J. Orth, PhD
Thomas H. Jones Professor
Virginia Tech
Blacksburg, VA

Eric Hallerman, PhD
Professor
Virginia Polytechnic Institute and State
University
Blacksburg, VA

Romuald Lipcius, PhD
Professor
Virginia Institute of Marine Science, William &
Mary
Gloucester Point, VA

Joseph Roman, PhD
Fellow
University of Vermont
Richmond, VT

Roelof M. Boumans, PhD
Doctor
Accounting for Desirable Futures LLC
Charlotte, VT

Dee Boersma, PhD
Wadsworth Endowed Chair in Conservation
Science, Center for Ecosystem Sentinels, Dept.
of Biology
University of Washington
Seattle, WA

Tessa Francis, PhD
Research Scientist
University of Washington Tacoma
Tacoma, WA

Shannon Albeke, PhD
Senior Research Scientist
University of Wyoming
Laramie, WY

Citations:

- Alder J., Campbell B., Karpouzi V., Kaschner K., Pauly D. 2008. Forage fish: from ecosystems to markets. *Annual Review of Environment and Resources* , 33: 153–166.
- Butler C. M., Rudershausen P. J., Buckel J. A. 2010. Feeding ecology of Atlantic bluefin tuna (*Thunnus thynnus*) in North Carolina: diet, daily ration, and consumption of Atlantic menhaden (*Brevoortia tyrannus*). *Fishery Bulletin USA* , 108: 56–69.
- Cury P.M, Shannon L.J. 2004. Regime shifts in upwelling ecosystems: observed changes and possible mechanisms in the northern and southern Benguela. *Progress in Oceanography* 60(2): 223-243.
- Cury PM, Boyd IL, Bonhommeau S, Anker-Nilssen T, Crawford Rj, Furness RW, Mills JA, Murphy EJ, Osterblom H, Paleczny M, Piatt JF, Roux J-P, Shannon L, Sydeman WJ. 2011. Global Seabird Response to Forage Fish Depletion – One Third for the Birds. *Science* 334: 6063, 17031706.
- Engelhard, G. H., Peck, M. A., Rindorf, A., Smout, S. C., van Deurs, M., Raab, K., Andersen, K. H., Garthe, S., Lauerburg, R. A. M., Scott, F.,
- Brunel, T., Aarts, G., van Kooten, T., and Dickey-Collas, M. 2014. Forage fish, their fisheries, and their predators: who drives whom? *ICES Journal of Marine Science*, 71:1, 90-14
- Essington TE, Moriarty PE, Froehlich HE, Hodgson EE, Koehn LE, Oken KL, Siple MC and Stawitz CC. 2015. Fishing amplifies forage fish population collapses. *PNAS* 112(21) 6648-6652
- Pikitch EK. 2015. Stop-loss order for forage fish fisheries. *PNAS* 112 (21) 6529-6530.
- Pikitch EK, et al. 2012. Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs Lenfest Ocean Program, Washington, DC
- Pikitch EK, Rountos KJ, Essington TE, Santora C, Pauly D, Watson R, Sumalia UR, Boersma PD, Boyd IL, Conover DO, Cury P, Heppel SS, Houde ED, Mangel M, Plagányi E, Sainsbury K, Steneck RS, Geers TM, Gownaris N, and Munch SB. 2014. The global contribution of forage fish to marine fisheries and ecosystems. *Fish and Fisheries*, 15 (1) 43-64
- Sanchirico, J. N., and Essington, T. E. 2021. Direct and ancillary benefits of ecosystem-based fisheries management in forage fish fisheries. *Ecological Applications* 31(7):e02421.10.1002/eap.2421
- Siple, Margaret & Essington, Timothy & Plaganyi, Eva. (2018). Forage fish fisheries management requires a tailored approach to balance trade-offs. *Fish and Fisheries*. 20. 10.1111/faf.12326.
- Chagaris, D., Drew, K., Schueller, A., Cieri, M., Brito, J., Buchheister, A. (2020) Ecological Reference Points for Atlantic Menhaden Established Using an Ecosystem Model of Intermediate Complexity. *Frontiers in Marine Science*. <https://doi.org/10.3389/fmars.2020.606417>
- Drew, K., Cieri, M., Schueller, A.M., Buchheister, A., Chagaris, D., Nesslage, G., McNamee, J.E., Uphoff, J.H. (2021) Balancing Model Complexity, Data Requirements, and Management Objectives in Developing Ecological Reference Points for Atlantic Menhaden. *Frontiers in Marine Science*. <https://doi.org/10.3389/fmars.2021.608059>
- Howell, D., Schueller, A.M., Bentley, J.W., Buchheister, A., Chagaris, D., Cieri, M., Drew, K., Lundy, M.G., Pedreschi, D., Reid, D.G., Townsend, H. (2021) Combining Ecosystem and Single-Species Modeling to Provide Ecosystem-Based Fisheries Management Advice Within Current Management Systems. *Frontiers in Marine Science*. <https://doi.org/10.3389/fmars.2020.607831>
- Anstead, K., Drew, K., Chagaris, D., Cieri, M., Schueller, A.M., Mcnamee, J., Buchheister, A., Nesslage, G., Uphoff, J.H., Wilberg, M., Sharov, A., Dean, M., Brust, J., Celestino, M., Madsen, S., Murray, S., Appelman, M., Ballenger, J., Brito, J., Cosby, E., Craig, C., Flora, C., Gottschall, K., Latour, R.J., Leonard, E., Mroch, R., Newhard, J., Orner, D., Swanson, C., Tinsman, J., Houde, E.D., Miller, T.J., Townsend, H. (2021) The Path to an Ecosystem Approach for Forage Fish Management: a Case Study of Atlantic Menhaden. *Frontiers in Marine Science*. doi: 10.3389/fmars.2021.607657
- Smith AD, Brown CJ, Bulman CM, Fulton EA, Johnson P, Kaplan IC, Lozano-Montes H, Mackinson S, Marzloff M, Shannon LJ. 2011. Impacts of fishing low-trophic level species on marine ecosystems *Science*, 333: 1147-1150
- Tacon A. G. J., Metian M. 2009. Fishing for feed or fishing for food: increasing global competition for small pelagic forage fish. *AMBIO: A Journal of the Human Environment* , 38: 294–302.
- Worsøe Clausen, L., Rindorf, A., van Deurs, M., Dickey-Collas, M., & Hintzen, N. T. (2018). Shifts in North Sea forage fish productivity and potential fisheries yield. *Journal of Applied Ecology*, 55(3), 1092-1101.