SCIENTIST SIGN-ON LETTER ON U.S. WEST COAST ESSENTIAL FISH HABITAT CONSERVATION AND MANAGEMENT

August 2, 2016

Mr. Will Stelle, Administrator
National Marine Fisheries Service West Coast Region
7600 Sand Point Way NE, Bldg. 1
Seattle, WA 98115-0070

Mr. Herb Pollard, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

RE: U.S. West Coast Essential Fish Habitat Conservation and Management

Dear Mr. Stelle, Ms. Lowman and Council members:

Seafloor habitats are important to the health and biodiversity of our oceans. In order to conserve seafloor habitats, we the undersigned XX# marine scientists and conservation biologists write in support of amending the Pacific Fishery Management Council's (PFMC) Groundfish Fishery Management Plan to designate new and expanded Essential Fish Habitat Conservation Areas off the U.S. West Coast that would be closed to bottom trawling. As you evaluate alternatives to modify existing Essential Fish Habitat (EFH) Conservation Areas closed to bottom trawling, and consider new EFH Conservation Areas, changes to Rockfish Conservation Areas, and the protection of deep-sea habitats, we recommend a comprehensive spatial habitat protection approach designed to protect and conserve ecologically important, sensitive and unique habitats. We caution against opening existing EFH Conservation Areas unless there is compelling scientific information which demonstrates that impacts to the habitats in those areas are minimal.

1. **Effects of bottom trawling on seafloor habitats**

The substantial harmful effects of bottom trawling on seafloor communities have been well documented in many scientific reviews and empirical studies worldwide (e.g. Auster and Langton 1999, Collie et al. 2000, NRC 2002, Kaiser et al. 2006; Hixon and Tissot, 2007). Specific to the West Coast region, bottom trawls have the greatest impact to seafloor habitats of all gear types used (Morgan and Chuendpagdee 2003 and Whitmire and Clarke 2007). While gear configuration depends on the target species and depth, the distance between trawl doors, which are designed to contact the seafloor and spread the net open, spans anywhere between 34 and 50 meters (112 to 164 feet) for trawls fishing on the continental shelf to 50 to 200 meters (164 to 656 feet) for slope trawls (PFMC 2005). All trawl gear components that contact the seafloor have the potential to ensnare, undercut or topple seafloor habitat structures.

Bottom trawling can cause long-term, adverse impacts to fish habitat. According to findings of the National Academy of Sciences, bottom trawling has direct effects on species and habitat structure and indirect effects on community structure and ecosystem processes (NRC 2002). The effects of bottom trawling include:

- Changes in physical habitat and biological structure of ecosystems
- Reduced benthic habitat complexity and productivity
- Changes in availability of organic matter for microbial food webs
- Changes in species composition
- Reduced biodiversity
- Increased susceptibility to other stressors.

Even with existing conservation areas, bottom trawling damages other sensitive seafloor habitats. For example, U.S. West Coast groundfish observers on commercial bottom trawl vessels documented nearly 997 kg (2,198 pounds) of coral bycatch and 20,585 kg (45,382 pounds) of sponge bycatch between June 2006 and December 2010, after EFH Conservation Areas were implemented (Clarke et al. 2015). Impacts to sponges have become twice as frequent, with nearly five times the magnitude as before. Bycatch and *in situ* observations of damaged coral and sponges are direct evidence of adverse fishing impacts. These losses are not inconsequential.

2. Ecological importance of seafloor habitats

Marine habitats are fundamental to the health and diversity of marine species. The marine habitats of the West Coast support fish and wildlife at the most basic level by providing the conditions necessary for populations to sustain themselves. Biologically diverse, sensitive and unique habitats off the West Coast include nearshore and offshore reefs, submarine canyons, biogenic habitats (e.g. kelp, corals and sponges), hydrothermal vents, methane seeps and more.

Living habitat-forming invertebrates such as corals and sponges increase habitat complexity and sustain patterns of biodiversity in ocean ecosystems. By providing structure, corals and sponges increase the areas necessary for fish spawning, feeding, and growth and thus meet the definition of EFH. What is more, coldwater corals can be extremely long-lived and recovery from disturbance may take decades to centuries. Bamboo corals from Davidson Seamount off California, for example, were aged to be greater than 145 years old with growth rates of no more than 0.28 cm/ year (Andrews et al. 2009). Deep-sea corals in other Pacific regions have been aged to over 4,000 years (Roark et al. 2009). While corals and sponges are relatively conspicuous biogenic structures, they generally occur in diverse biological communities with other invertebrates such as crinoids, basket stars, ascidians, annelids, and bryozoans.

Many marine species utilize the vertical and three-dimensional structure provided by corals, sponges and other living seafloor habitats. Managed fish species off the U.S. West Coast have been documented in association with structure-forming invertebrates with some studies finding significantly higher densities of fish in these habitats than in surrounding areas (e.g., PFMC 2005 at 3-6, Tissot et al. 2006, Marliave et al. 2009, Rooper et al. 2007, Rooper and Martin 2012). Based on the levels of information currently available (i.e., presence, density), corals, sponges and other biogenic habitat types should be considered to be components of EFH for multiple fish species managed in the U.S. Pacific Coast groundfish fishery management plan.

Since 2006 much new information has been gathered on the location and extent of seafloor habitats off the West Coast. The NOAA Deep Sea Coral Research and Technology Program released a geo-database of almost 140,000 coral and sponge records identified from trawl surveys and *in situ* observations. NOAA has generated new maps showing the extent and intensity of commercial bottom trawl fishing effort, as well as the bycatch of corals and sponges (NOAA 2014). There is a new predictive deep sea coral habitat suitability model (Guinotte and Davies 2014) as well as new high resolution maps of various reefs, banks and escarpments off Washington, Oregon and California. All combined these new data and maps illustrate areas of interaction between bottom trawls and sensitive seafloor habitats.

3. **Precautionary and adaptive management approaches are warranted**

Ocean ecosystems face major stressors including fishing impacts, offshore development, marine pollution and the growing changes brought by climate change, in particular ocean acidification. Ocean acidification poses a significant and long-term concern for some coral species. While reducing carbon dioxide emissions is urgently needed, fishery managers can take actions that address direct impacts to ocean habitats. Protecting seafloor habitats from bottom trawling will help these habitats and associated communities remain intact and thus will be more resilient to other stressors and help maintain the ecological functions they provide (Levin and Le Bris 2015).

As you evaluate and consider the range of alternatives before you to modify EFH and Rockfish Conservation Areas and to protect deep-water habitats, we urge a precautionary approach that maximizes habitat protection across a range of habitat types, biogeographic regions and depth zones. Best practices include approaches to freeze the bottom trawl footprint thus limiting future bottom trawling to previously trawled areas, area closures for sensitive and representative habitat features, gear modification and effort reduction (Hourigan 2009, NRC 2002). A precautionary approach is paramount, especially where the data are poor and unclear, where recovery times are long (e.g. corals and sponges) and where habitat impacts are high even when the abundance of managed fish species is above overfished levels.

Protecting seafloor habitats from bottom trawling will help limit and prevent direct disturbance, reduce cumulative stresses, and help ecological communities be more resilient to change. While comprehensive information may not be available on the location of all habitat types and species-habitat associations, there is much new and existing data that can be used in combination with a precautionary approach to continue to protect diverse seafloor habitats from bottom trawl impacts.

Sincerely,

Brian Tissot, Ph.D. Director and Professor, Marine Laboratory, Humboldt State University
Tissot@humboldt.edu | 707-826-5827 | HSUMarineLab.org

Peter J. Auster, PhD
Research Professor Emeritus, Department of Marine Sciences
Univ. of Connecticut at Avery
Point Groton, CT

Erik Cores, Ph.D.
Associate Professor of Biology
Temple University
Philadelphia, PA

Elizabeth M. De Santo, Ph.D.
Assistant Professor of Environmental Studies
Department of Earth and Environment
Franklin & Marshall College
Lancaster, PA

Mark Hixon, Ph.D.
Professor and Hsiao Endowed Chair in Marine Biology
Department of Biology
University of Hawai‘i at Mānoa
Honolulu, HI

Thomas C. Shirley, PhD.
Professor Emeritus,
School of Fisheries & Ocean Science
Univ. of Alaska Fairbanks &
Professor Emeritus
Harte Research Institute
Texas A&M Univ.
Corpus Christi, TX

Andrew R. Thurber, PhD
Assistant Professor
College of Earth, Ocean, and Atmospheric Sciences
Oregon State University
Corvallis, OR

Citations

Andrews, A.H., R.P. Stone, C.C. Lundstrom, A.P. DeVogelaere. 2009. Growth rate and age determination of bamboo corals from the northeastern Pacific Ocean using refined ^{210}Pb dating. Mar. Ecol. Prog. Ser. 397: 173-185.

Auster, P.J. and R.W. Langton. 1999. The effects of fishing on fish habitat. In: Benaka, L., ed. Fish habitat: essential fish habitat and rehabilitation. Am Fish Soc Symp. 22:150-187.

Clarke, M.E., C.E. Whitmire, M.M. Yoklavich. 2015. State of Deep-Sea Coral and Sponge Ecosystems of the U.S. West Coast: 2015. In: Hourigan T.F., Etnoyer P.J., Cairns S.D., Tsao C-F (eds.) The State of Deep-Sea Coral and Sponge Ecosystems of the United States: 2015. NOAA Technical Memorandum X. NOAA, Silver Spring, pp 5-1 – 5-42.

Collie, J.S., S.J. Hall, M.J. Kaiser and I.R. Poiners. 2000. A quantitative analysis of fishing impacts on shelf-sea benthos. J Anim Ecol. 69:785-798.

Guinotte, J.M., and A.J. Davies. 2014. Predicted Deep-Sea Coral Habitat Suitability for the U.S. West Coast. PLoS ONE 9(4): e93918. doi:10.1371/journal.pone.0093918

Hixon, M. A. and B. N. Tissot. 2007. Comparison of trawled vs. untrawled mud seafloor assemblages of fishes and macroinvertebrates at Coquille Bank, Oregon. J. Exp. Mar. Biol. Ecol. 344: 23-34.

Hourigan, T.F. 2009. Managing fishery impacts on deep-water coral ecosystems of the U.S.A. emerging best practices. Mar. Ecol. Prog. Ser. 397: 333-340.

Kaiser, M.J., K.R. Clarke, H. Hinz, M.C.V. Austen, P.J. Somerfield and I. Karakassis. 2006. Global analysis of response and recovery of benthic biota to fishing. Mar Ecol Prog Ser. 311:1-14.

Levin, L.A., and N. Le Bris. 2015. The deep ocean under climate change. Science. 350, 766-768

Marliave, J.B., K.W. Conway, D.M. Gibbs, A. Lamb, and C. Gibbs. 2009. Biodiversity and rockfish recruitment in sponge gardens and bioherms of southern British Columbia, Canada. Marine Biology 156: 2247–2254.

Morgan, L.E., and R. Chuendpagdee. 2003. Shifting Gears: addressing the collateral impacts of fishing methods in U.S. Waters. Pew Science Series, Washington DC, 42pp

NOAA (National Oceanic and Atmospheric Administration). 2014. Deep Sea Coral Research and Technology Program. 2014 Report to Congress. Accessed at: http://www.habitat.noaa.gov/pdf/FINAL_DSCRtC_4_17_2014_Interactive.pdf

NRC (National Research Council). 2002. Effects of trawling and dredging on seafloor habitat. National Academy Press, Washington D.C.

PFMC (Pacific Fishery Management Council). 2005. Pacific coast groundfish fishery management plan: essential fish habitat designation and minimization of adverse impacts: Final environmental impact statement. Pacific Fishery Management Council, Portland, Oregon, USA

Roark, E.B., T.P. Guilderson, R.B. Dunbar, S.J. Fallon, and D.A. Mucclarone. 2009. Extreme longevity in proteinaceous deep-sea corals. PNAS 106(13) 5204-5208 DOI: 10.1073/pnas.0810875106

Rooper, C.N., J.L. Boldt, and M. Zimmermann. 2007. An assessment of juvenile Pacific Ocean perch (*Sebastes alutus*) habitat use in a deepwater nursery. Estuarine Coastal and Shelf Science 75: 371–380.

Rooper, C.N., and M.H. Martin. 2012. Comparison of habitat-based indices of abundance with fishery independent biomass estimates from bottom trawl surveys. Fishery Bulletin, U.S. 110:21–35.

Tissot, B.N., M.M. Yoklavich, M.L. Love, K. York, and M. Amend. 2006. Benthic invertebrates that form habitat on deep banks off southern California, with special reference to deep sea coral. Fish. Bull. 104: 167-181.

Whitmire, C.E. and M.E. Clarke. 2007. State of Deep Coral Ecosystems of the U.S. Pacific Coast: California to Washington. In: S.E. Lumsden, Hourigan T.F., Bruckner A.W. and Dorr G. (eds.) The State of Deep Coral Ecosystems of the United States. NOAA Technical Memorandum CRCP-3. Silver Spring MD 365 pp.