

Evaluating ecological states of rocky intertidal communities: A Best Professional Judgment exercise

Steven N. Murray¹, Stephen B. Weisberg², Peter T. Raimondi³, Richard F. Ambrose⁴, Christy A. Bell³, Carol A. Blanchette⁵, Jennifer L. Burnaford¹, Megan N. Dethier⁶, John M. Engle⁵, Michael S. Foster⁷, C. Melissa Miner³, Karina J. Nielsen⁸, John S. Pearse³, Daniel V. Richards⁹, Jayson R. Smith¹⁰

¹Department of Biological Science, California State University, Fullerton, CA

²Southern California Coastal Water Research Project Authority, Costa Mesa, CA

³Department of Ecology and Evolutionary Biology, University of California, Santa Cruz, Long Marine Lab, Santa Cruz, CA

⁴Department of Environmental Health Sciences, University of California, Los Angeles, CA

⁵Marine Science Institute, University of California, Santa Barbara, CA

⁶Friday Harbor Laboratories and Biology Department, University of Washington, Friday Harbor, WA

⁷Moss Landing Marine Laboratories, Moss Landing, CA

⁸Romberg Tiburon Center for Environmental Studies, San Francisco State University, Tiburon, CA

⁹Channel Islands National Park, Ventura, CA

¹⁰Biological Sciences Department, California State Polytechnic University, Pomona, CA, USA

ABSTRACT

A Best Professional Judgment (BPJ) exercise was performed to determine the level of agreement among experts in evaluating the ecological states of western North American rocky intertidal communities. Species-abundance and environmental data from 12 central and 11 southern California sites were provided to 14 experts who independently ranked communities from best to worst and assigned each to one of five categories based on the degree of deviation from an expected natural biological state. Experts achieved Spearman correlations of 0.49 (central California) and 0.30 (southern California) in their rankings and averaged 75.4% and 70.0% Euclidean Similarity (ES) in their community evaluations. These ES values compare favorably with agreement levels found for similar exercises with soft bottom macroinvertebrate assemblages. The experts emphasized macrophytes with functional characteristics related to morphology and sessile macroinvertebrates in their assessments. Several challenges were noted in interpreting rocky intertidal data sets, the most prominent of which are high spatial and temporal variation and site-to-site differences in natural disturbance regimes, features that lead to multiple, expected community states. Experts required detailed, physical habitat descriptions to develop community composition expectations that differed for different shore types, and expressed concern about evaluating rocky intertidal communities based on only a single sampling event. Distinguishing natural from anthropogenic disturbance without information on the sources and magnitudes of anthropogenic perturbation was also found to be challenging because the biological responses to these stressors are often similar. This study underscores the need for long-term data sets that describe the dynamics of populations and communities and rigorous testing of expert judgments to firmly establish broadly applicable and consistent links between community states and anthropogenic stressors on rocky shores.

Due to distribution restrictions, the full-text version of this article is available by request only.

Please contact pubrequest@sccwrp.org to request a copy.