Environmental Studies Program: Ongoing Study

Study Area(s): Southern California, Central California

Administered By: Pacific OCS Region

Title: Understanding the Role of Offshore Structures in Managing Potential *Watersipora subtorquata* Invasions (NSL #PC-13-04)

BOEM Information Need(s) to be Addressed: BOEM needs to advance its knowledge on the biological connectivity of natural reefs and manmade structures in southern California, as well as understand the possible contribution of each platform to mainland and island marine communities. This study will describe the distribution, abundance, and life history of the bryozoan *Watersipora subtorquata*, which is a non-indigenous species (NIS) known to exist on offshore oil and gas platforms and has the potential to negatively affect native biological communities. The need for this information is to elucidate the role that offshore artificial structures may have in linking and affecting biological communities and provide a more complete body of information on the non-native *Watersipora* and the native marine invertebrate communities, including commercially important species. This will enable BOEM to comply with the duties of federal agencies that are outlined in Section 2 of Executive Order 13112 (Invasive Species). BOEM will use study results for environmental reviews concerning existing operations and decommissioning alternatives of offshore platforms and potential marine renewable energy facilities.

Total BOEM Cost: $800,000 **Period of Performance:** FY 2013–2018

Conducting Organization(s): University of California, Santa Barbara

Principal Investigator(s): Dr. Mark Page

BOEM Contact(s): Susan Zaleski

Description:

Background: Artificial substrate in the marine environment may facilitate the establishment and spread of NIS by providing novel habitats where NIS have a competitive advantage over native species. Some of these NIS may subsequently invade natural habitats and displace or change native biological communities. In southern California, biologists documented the first appearance of the non-indigenous bryozoan *Watersipora subtorquata* in 1963 at an artificial oil island located in state waters. Carlton (2000) states that the origin of this species is offshore the Pacific coast of Asia. In the decades following its first appearance, *Watersipora* has successfully colonized many bays and harbors along the California coast and a few offshore oil and gas platforms and natural reefs located in the Southern California Bight, and it is now found as far north as Yaquina Bay, Oregon. Due to its resistance to copper-based anti-fouling paints, it is commonly found on ship hulls; marine vessel traffic acts as the primary vector for translocating this species to new habitat. In other biogeographic regimes, this

bryozoan has been recorded in the waters off Hawaii and in various locations in the Gulf of Mexico and western Atlantic Ocean. Under certain conditions and water depths, *Watersipora* covers virtually 100% of the available substrate and therefore experts recognize that this species has the potential to become quite destructive to native communities. Because this bryozoan has been found on some oil and gas platforms in federal waters, the California Ocean Science Trust (2010) identified this NIS as a priority information gap needed to evaluate future rigs-to-reefs proposals.

Objectives: Evaluate the biological connectivity of marine communities in the Southern California Bight, determine the seasonality of larval settlement for native and non-native invertebrates, and describe the role that offshore structures may have in linking and affecting biological communities. This information is needed in order to include more accurate information into environmental reviews addressing ongoing operations, decommissioning of oil and gas platforms, and potential renewable energy facilities.

Methods: To meet the overall study objectives, five tasks will be performed.

1. *Quantify the existing distribution and abundance of Watersipora subtorquata.* Scuba divers will use underwater transects and photographic samples to document the relative abundance and geographic and depth distribution of *Watersipora* and other prominent NIS on (a) oil and gas platforms, (b) marine vessels used to service oil and gas platforms, (c) harbors and moorings used by these service vessels, and (d) nearby natural reefs. Voucher specimens that enable species identification and future genetic analyses (if any) will be collected, preserved and archived.

2. *Quantify rates of colonization and growth of Watersipora subtorquata.* Scuba divers will use underwater transects and photographic samples to document changes in the abundance and geographic and depth distribution of *Watersipora* and other prominent NIS on (a) oil and gas platforms and (b) nearby natural reefs in comparison to initial surveys taken during the first year of the ongoing study. In addition, the rates of colonization and growth of *Watersipora* onto areas that have been experimentally cleaned will be measured over time to determine the effect of platform cleaning operations and season on the establishment of this species.

3. *Document the seasonality of Watersipora and other marine invertebrate settlement at platforms and in harbors.* Over a two-year period, this study will use settlement plates to detail the reproductive seasonality of *Watersipora* and ecologically and economically important marine invertebrates, including mussels (e.g., native *Mytilus californianus* and introduced *M. galloprovincialis*), scallops, and commercially important crabs, in addition to *Watersipora*.

4. *Model biological connectivity.* Information from tasks 1 and 3 will be used to generate a model of biological connectivity between manmade structures and natural reefs. Updated Regional Ocean Modeling System (ROMS) flow fields from the BOEM study Expansion of West Coast Oceanographic Modeling Capability will be used to drive a 3D particle model that will model invertebrate larval dispersal in southern California and examine connectivity between and among platforms and natural reefs on the mainland and islands. The model will be used to address a set of

a priori questions, such as: are the dispersal patterns different under different oceanographic conditions; are there sources and sinks of larvae?; are there seasonal patterns?

5. *Recommend mitigation measures that would prevent establishment of Watersipora in uncolonized habitats.* Obtaining a better understanding of the factors affecting the spread of *Watersipora* will assist BOEM in evaluating a number of simple mitigation measures that may be employed to manage NIS. Such measures may include (a) adjusting the schedule of either marine vessel hull cleaning or platform maintenance operations that remove biofouling on submerged portions of the jacket so that they coincide with seasons not sensitive to NIS establishment, (b) growth abatement devices (e.g., "wave-driven" marine growth preventer), and (c) vector management and other potential actions.

Current Status: SCUBA surveys began in August 2013. Twenty-three platforms and 24 natural reefs have been surveyed to date, with no complications. Settlement plates were collected monthly through June 2018. Larval transport modeling and community level data analysis are ongoing. Final report writing is underway.

Final Report Due: December 31, 2018

Publications Completed:

Simons, R.D., H.M. Page, S. Zaleski, R. Miller, J.E. Dugan, D.M. Schroeder, and B. Doheny. 2016. The Effects of Anthropogenic Structures on Habitat Connectivity and the Potential Spread of Non-Native Invertebrate Species in the Offshore Environment. PLoS ONE 11(3): e0152261. doi:10.1371/journal.pone.0152261

Viola, S.M, H.M. Page, S.F. Zaleski, et al. 2018. Anthropogenic disturbance facilitates a non-native species on offshore oil platforms. J Appl Ecol. 2018;55:1583–1593. https://doi.org/10.1111/1365-2664.13104

Affiliated WWW Sites: https://marinecadastre.gov/espis/#/search/study/26977

Revised Date: July 13, 2018