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TITLE: Growth rates, densities, and distribution of *Lophelia pertusa* on artificial structures in the Gulf of Mexico

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ABSTRACT:

Using industry inspection video and ROV imaging, we examined *Lophelia pertusa* (Linnaeus 1758) on 10 artificial structures of known ages (9 to 100 years) in the northern Gulf of Mexico (GoM). Five different types deep-water energy installations with depths ranging from 320 to 995 m, and three shipwrecks with depths ranging from approximately 530 to 615 m, were examined. Density, depth ranges, and growth rates of *L. pertusa* colonies were calculated from video and image analysis. *L. pertusa* colonies were present on all structures examined. Minimum calculated growth rates for the largest colonies ranged from 0.32 to 3.23 cm/yr on the different structures. The shallowest depth at which *L. pertusa* was observed was 201 m and the deepest was 801 m, considerably expanding the known depth range of this species in the northern GoM. Colony density varied with structure type, age, and depth, with the highest density between 503 and 518 m on the single structure that spanned the entire depth range of occurrence of *L. pertusa* observed in this study. *L. pertusa* colonies growing on thinner and deeper installations appear to have higher colonization rates, i.e. to develop higher densities over a shorter time period, compared to those on shallower and more massive types of installations. However, on average, colonies have slower growth rates on these installations than colonies on more massive, shallower installations (compliant and solid installations). In general, the calculated minimum growth rates were higher on the installations than on the shipwrecks, which were substantially older. A continuum of colony sizes was documented on all installations, suggesting multiple settlement events. *L. pertusa* thickets were observed on the oldest anthropogenic structures, with most of the components of these structures covered by colonies of *L. pertusa*. Brown, orange, and mottled color-variants were documented for the first time in the GoM. All installations examined for this study were colonized by *L. pertusa* and it is likely that most artificial surfaces in appropriate depths in the GoM will be as well.

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