Data describing post-recruit (adult) fish assemblages and the abundance of recruiting cryptobenthic species associated with 28 artificial reefs of different sizes (0.12, 0.24, 0.48, 1.08, 1.92, 4.32, 7.68 m2) and supporting different densities of transplanted kelp (*Ecklonia radiata*) (0,, 4.1, 8.3, 16.6 kelp/m2). Adult assemblages were assessed using diver-based visual surveys conducted at three times (early: spring 2015, middle: autumn: 2016, late: spring 2016). At each time, 2 separate surveys were conducted, and the results were averaged. Recruiting cryptobenthic fishes were assessed using SMURF collectors that were deployed for a six-week period in the centre of each reef on four consecutive occasions (November 2015 to March 2016).

patch\_size: refer to the size of artificial reefs in m2.

kelp\_density: refers to the density of *E. radiata* transplanted to the reefs (zero: 0 kelp/m2, low: 4.1 kelp/m2, medium: 8.3 kelp/m2, high: 16.6 kelp/m2).

time: refers to the time when adult fish assemblages were assessed.

adult\_biomass: refers to the estimated biomass (in grams) of adult fish associated with each reef at each time.

adult\_abundance: refers to the abundance of adult fish associated with each reef at each time.

adult\_density: refers to the density of adult fish (abundance/reef area) associated with each reef at each time.

adult\_diversity: refers to the Shannon Weiner diversity index of adult fish species associated with each reef at each time.

adult\_richness: refers to the species richness of fishes associated with each reef at each time.

total\_recruit: refers to the total number of cryptobenthic recruits collected in SMURFs on each reef across four rounds of deployment.

total\_blenny\_recruit: refers to the total number of *Parablennius tasmanianus* recruits collected in SMURFs on each reef across four rounds of deployment.

total\_triplefin\_recruit: refers to the total number of *Forsterygion gymnotum* recruits collected in SMURFs on each reef across four rounds of deployment.

total\_jan\_recruit: refers to the total number of cryptobenthic recruits collected in SMURFs on each reef from a single deployment round in January.