

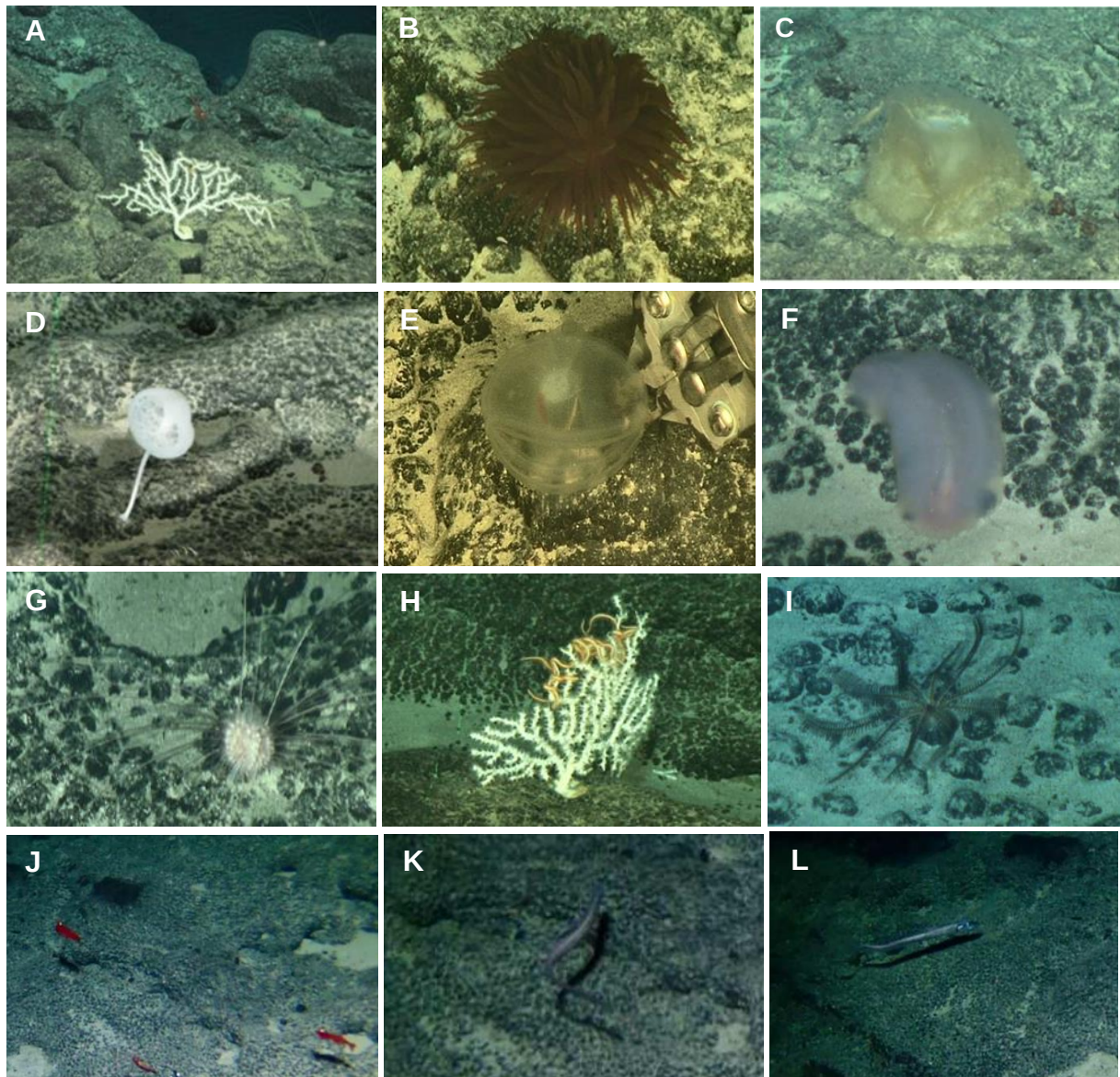


Figure S1. Examples of fauna observed during this study, Related to Figure 2

A) Class-Anthozoa, Genus-Pleurocorallium; **B)** Class-Anthozoa, Order-Actiniaria; **C)** Class-Hexactinellida, Family-Pheronematidae; **D)** Class-Hexactinellida, Family Euplectellidae; **E)** Class-Ascidiacea, Genus-Megalodicopia, **F)** Class-Holothuroidea; **G)** Class-Echinoidea, Family-Aspidodiadematidae; **H)** Class-Asteroidea, Order-Brisingida, **I)** Class-Crinoidea, Family-Pentametrocrinidae, **J)** Class-Malacostraca, Genera-Acanthephyra & Nematocarcinus; **K)** Class-Osteichthyes, Family-Synphobranchidae; **L)** Class-Osteichthyes, Order-Notocanthiformes.

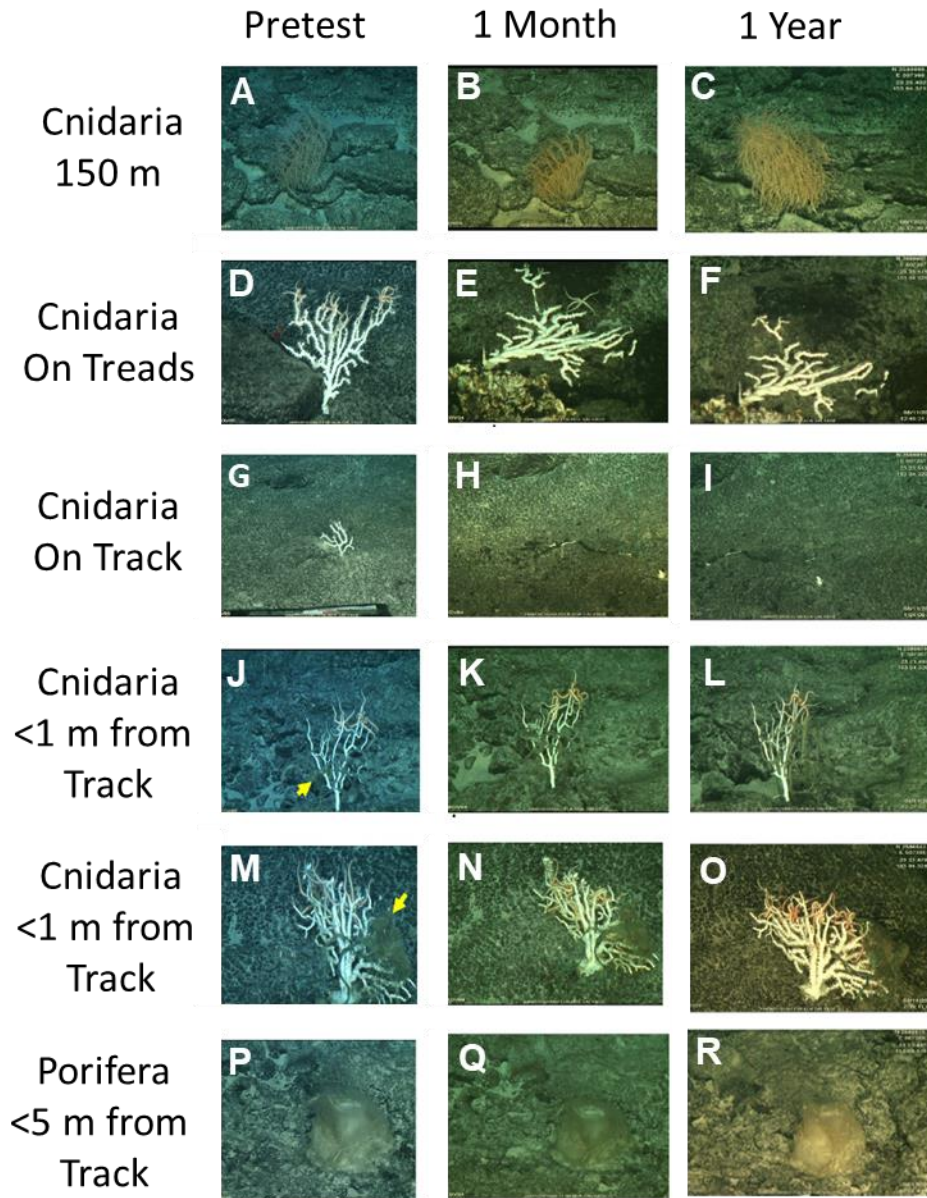


Figure S2. Time-series photos of organisms, Related to Figure 2

Photos of the same organisms were taken Pretest, 1 Month after, and 1 year after the excavation test. Images include: **A-C)** a cnidarian 150 m south of the excavation track, **D-F)** a cnidarian in the path of the excavator tread, **G-I)** a cnidarian in the path of the excavation tool, **J-L)** a cnidarian <1 m from the excavation track, **M-O)** a cnidarian <1 m from the excavation track, and **P-R)** a poriferan <5 m from the excavation track.

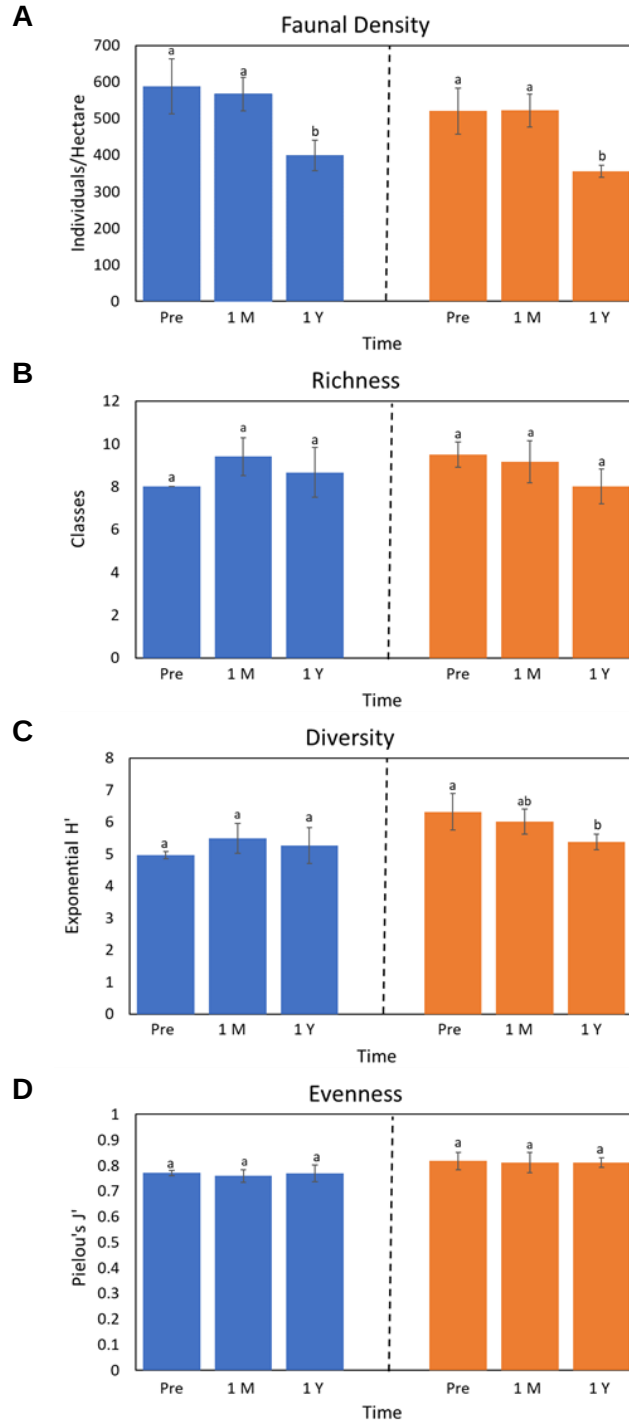


Figure S3. Megafaunal density and diversity metrics, Related to Figure 3

Variations in density and diversity measures of the megafaunal community between deposition (right, orange) and adjacent (left, blue) areas pretest (Pre), 1 month (1 M), and 1 year (1 Y) after mining disturbance. Mean values across the replicate sample sets surveyed in each seabed condition are shown along with standard deviations (error bars) while different letters above bars represent significant differences among time periods. **A)** Faunal density, **B)** Class richness, **C)** Class diversity, and **D)** Class evenness.

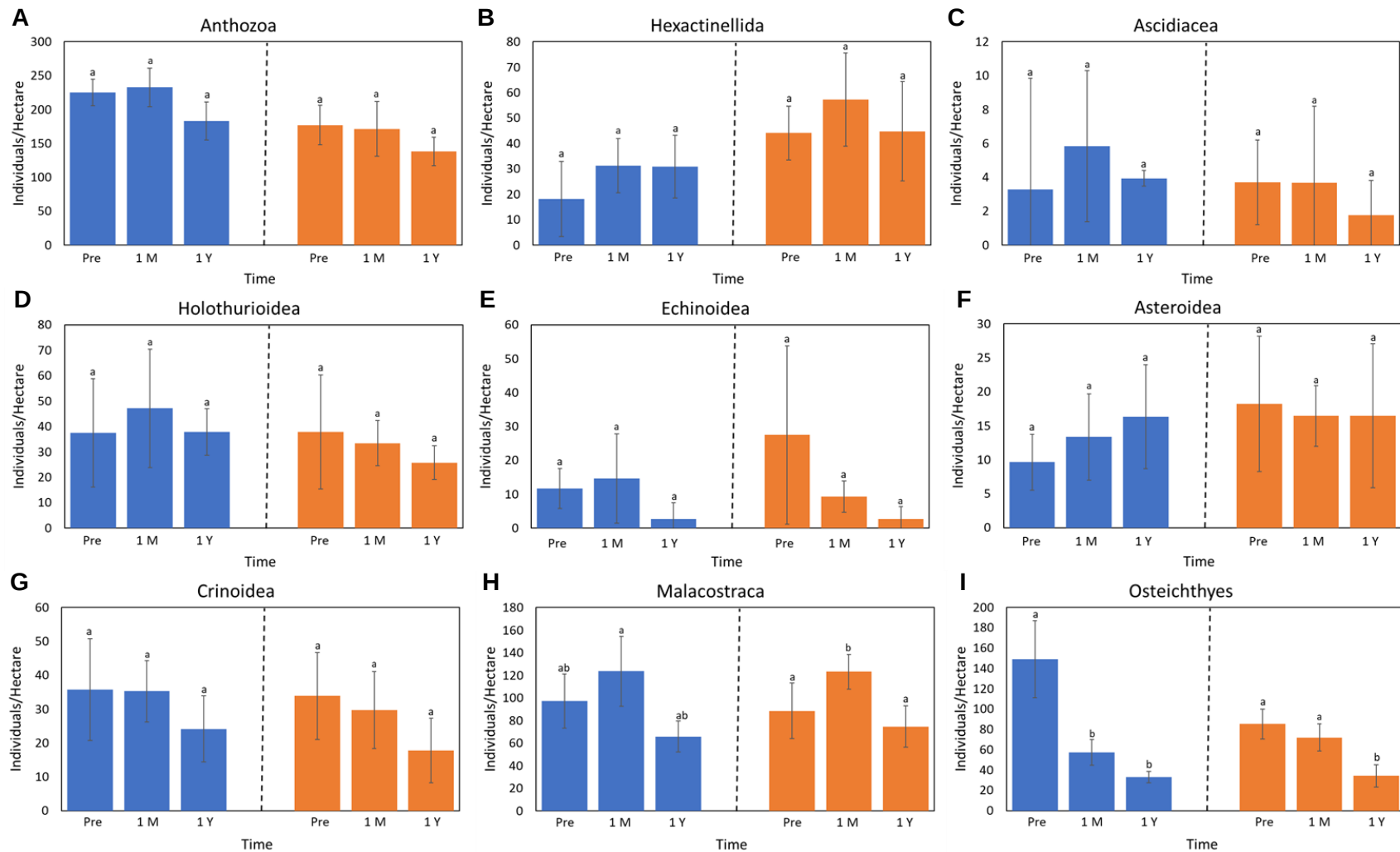


Figure S4. Megafaunal Class densities, Related to Figure 4

Variations in density of different megafaunal mobility groups between deposition (right, orange) and adjacent (left, blue) areas pretest (pre), 1 month (1 M), and 1 year (1 Y) after mining disturbance. Mean values across the replicate sample sets surveyed in each seabed condition are shown along with standard deviations (error bars) while different letters above bars represent significant differences among time periods. **A)** Anthozoa density, **B)** Hexactinellida density, **C)** Ascidiacea density, **D)** Holothuriodea density, **D)** Echinoidea density, **F)** Asteroidea density, **G)** Crinoidea density, **H)** Malacostraca density, **I)** Osteichthyes density.