Temporal and spatial patterns in the central Gulf of Alaska groundfish community

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The ecological and anthropogenic factors structuring temporal and spatial patterns of community composition, diversity, and stability are rarely examined a large scales, especially in marine ecosystems. We used geostatistically modeled groundfish abundance and biomass from the Alaska Fisheries Science Center trawl survey data (1984 – 2015) to compare multiple community metrics for 55 species in the Central Gulf of Alaska (CGOA). This long time-series data spanned many potential large-scale stressors including the Exxon Valdez oil spill, a climate-regime shift, and decadal-scale oceanographic cycles (e.g. Pacific Decadal Oscillation). Our study areas in the CGOA were all at depths from 50 – 150 m, and ranged from Prince William Sound in the East to the Aleutian Islands in the West. We found that areas more exposed to oil spill stressors had more negative trends in total groundfish biomass than unexposed areas, and that this change was driven primarily by reductions in the abundance of the apex predator guild. These apex predators included biomass dominant species (e.g. Halibut), which showed no spatial turnover across our sites. In contrast, community composition of biomass sub-dominant species showed strong spatial turnover along a longitudinal gradient. Despite this strong turnover, species richness, diversity (alpha, beta, and functional) were remarkably similar among study areas. This suggests that community structure, but not composition, was conserved across a spatially expansive area despite a large-scale stressor.