The Cretaceous-Paleogene mass extinction is among the most intensively studied of the five major biotic crises of the Phanerozoic, and is represented by numerous localities from a wide range of latitudes. Traditionally, work has been focused on specific taxonomic groups and their response to abiotic drivers of the extinction. While the scope of this work is important, a full understanding of the ecological response to this event cannot be understood without considering the dynamics and structure of whole communities from before and after the extinction boundary. Additionally, despite the breadth of taxonomic data available, few studies have focused on compiling this data into whole communities, leaving ecologists without a means of analyzing the change in community dynamics and food web structure in the wake of this biotic crisis. Thus, work must be focused on constructing paleocommunities that existed before and after the Cretaceous-Paleogene mass extinction.

Here, we constructed the first end-Cretaceous marine paleocommunity food web from the Lopez de Bertodano Formation of the James Ross Basin, Seymour Island, Antarctica. This formation ranges from the early-Maastrichtian to the early-Danian, and contains one of the best-preserved high-latitude fossil communities of the southern hemisphere. A dataset of fossil occurrences from multiple sections was compiled from relevant literature and online databases. Data for poorly represented groups was collected from localities in the same paleobiogeographical province that shared similar depositional environments and biotic affinities. A metacommunity was constructed by grouping taxa into functional guilds based on life-habit, mobility and shared predator-prey relationships inferred from morphology, gut contents and extant analogues. Interactions were assigned between guilds, resulting in a metacommunity consisting of 65 functional groups with 588 interactions between guilds. Faunal occurrences from different sections were temporally correlated in a unitary association, resulting in 53 faunal association zones and multiple potential communities leading up to the extinction boundary. This dataset will facilitate future work in modelling the ecological dynamics of high-latitude communities surrounding the end-Cretaceous mass extinction.