

Network analysis of food webs defines the restoration status of a seabird island ecosystem.

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Burrowing seabirds are a major driver of change on islands worldwide but they have been lost from many of their island nesting sites through habitat loss and mammal invasion. Once these islands are restored and seabirds start to return the ecosystems can recover quickly, returning to a predisturbance state within as little as 20 years. However, island ecosystems are complex entities and more research is needed to further the understanding of their recovery. Here we used network analysis of invertebrate food webs across 19 islands off north eastern New Zealand to determine the state of recovery of Korapuki, a restored seabird island. We calculated eight topological metrics for each food web and used environmental and geochemical data from previous research to compare the four island types of restored (i.e. Korapuki), reference (i.e. Ruamaahuanui), uninvaded (eight uninvaded islands in north eastern New Zealand) and invaded (nine invaded islands in north eastern New Zealand). We found that Korapuki supports some areas that are virtually indistinguishable from an uninvaded burrowing seabird island and it demonstrated strong environmental gradients indicative of a recovering island. However there were still a number of areas with food web attributes similar to an invaded island on Korapuki. We concluded that as seabirds spread across Korapuki these food web gradients will become weaker and these areas similar to invaded islands, fewer as the island starts to fully resemble a burrowing seabird island ecosystem.