1. Palaeolimnological data were used to investigate drivers of the community of primary producers in Lake Mattamuskeet, North Carolina, U.S.A. This is a large, shallow lake with two basins currently dominated by phytoplankton and macrophytes. The two basins were divided in 1940 by the building of a roadway across the lake, which also corresponded with the divergence in their ecosystem state.

2. Photosynthetic pigments, organic matter and nutrients (P, N, C, S) were analysed in sediment cores from each basin to reconstruct the primary producer community over the past c. 100 years. We sought to answer two questions. First, what changes to the ecosystem resulting from the building of the roadway caused the development of different primary producer communities in the two basins? Second, why have the alternative ecosystem states persisted despite a variety of human perturbations since 1940?

3. K-means cluster analysis and principal component analysis were applied to identify three sediment types based on photosynthetic pigment data: sediments indicating low productivity (low pigment concentrations), sediments associated with macrophytes (chlorophyll a and b) and with phytoplankton (alloxanthin and aphanizophyll). In addition, other palaeolimnological proxies measured, such as loss on ignition, total phosphorus, total organic carbon/total nitrogen and other nutrients, were different in post-1940 sediments within the two basins.

4. These differences suggest characteristics, such as nutrient cycling, water depth and other physical changes resulting from roadway construction, combined to establish and maintain the differing communities of primary producers in the two basins. Furthermore, Fe/S dynamics and waterfowl herbivory probably contributed to the development of the two ecosystem states.