

Background

Daya Bay (22.45–22.83°N, 114.50–114.89°E) is an ecologically and economically crucial semi-closed bay along the southern coast of China, with a coastline of 92 km (Fig. 1) and water depth of 6–16 m (average 10 m). It is proven to be a stressed ecosystem and therefore obviously vulnerable to further extrinsic disturbance.

Multiple stressors in Daya Bay

- Fishing
- Mariculture
- Industrial and domestic pollutants
- Port construction and sea reclamation
- Anthropogenic climate change

Aim

To explore how the fish community has shifted over three decades under multiple stressors.

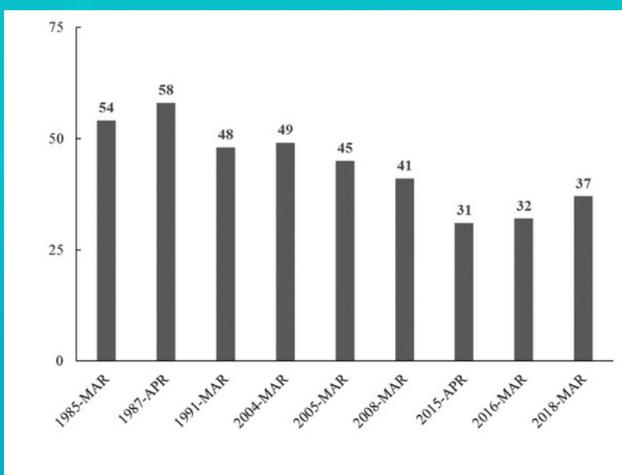
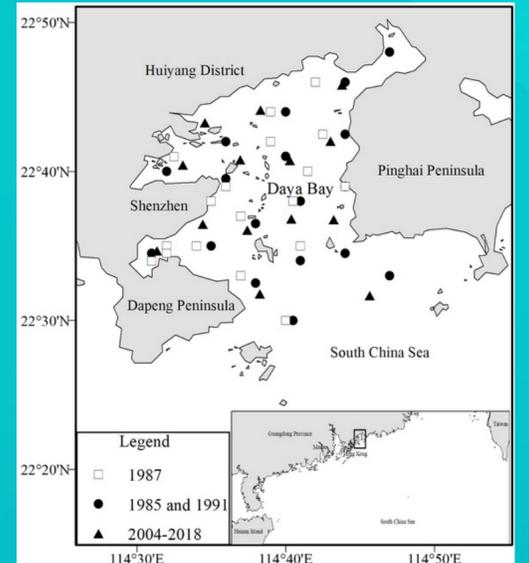


Fig. 2. Variations in the numbers of fish species captured in bottom-trawl surveys in Daya Bay, in springtime (March and April), from 1985 to 2018.

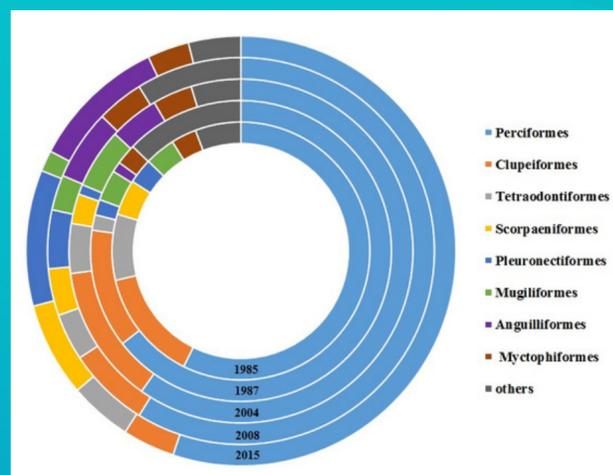


Fig. 3. Proportions of numbers of fish species in different orders caught in 1985, 1987, 2004, 2008, and 2015 in Daya Bay, based on data in all seasons.

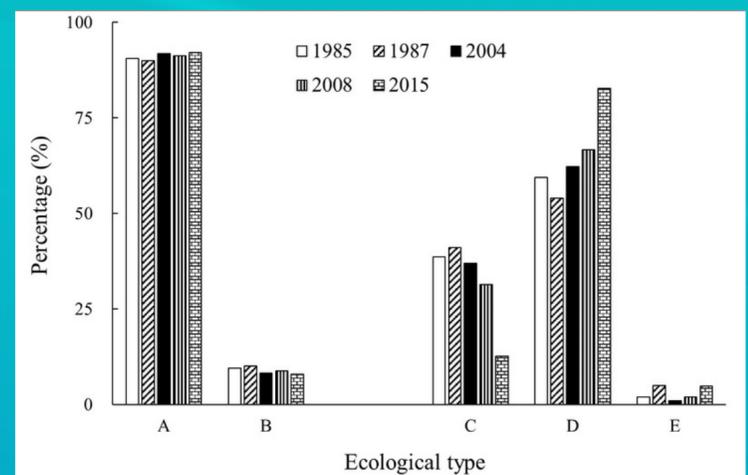


Fig. 4. The percentage of different fish species within ecological types were compared between warm-water (A) and warm-temperate (B), and pelagic (C), demersal (D) and reef inhabitants (E).

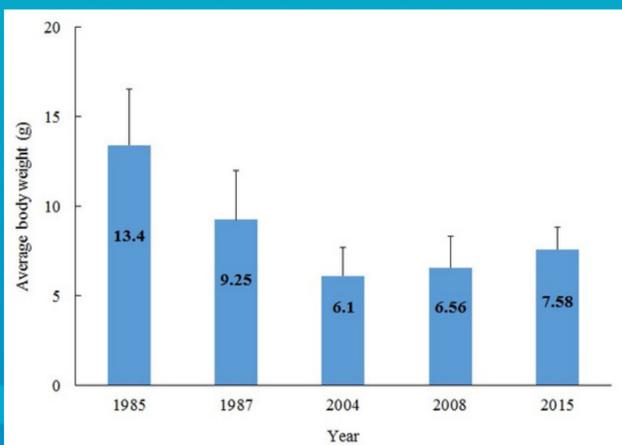


Fig. 5. Average body weight of all fish caught in the bottom-trawl surveys in Daya Bay, based on data in all seasons for different years. Average body weight is calculated between all stations sampled.

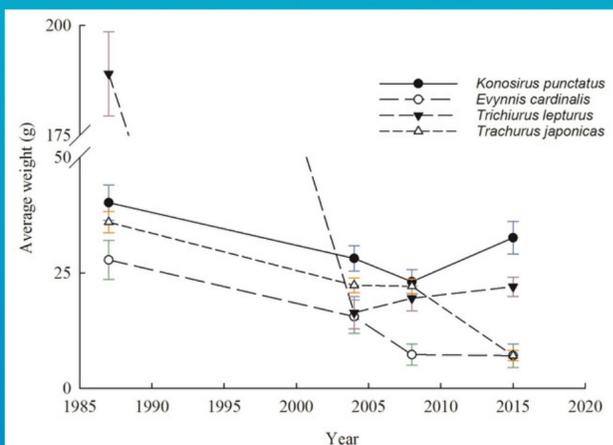


Fig. 6. Variations in average body weights of four commercially important fish species in Daya Bay based on data of four seasons, 1987–2015. Anal length was used for *Trichiurus lepturus*, and total body length for the other three species.

Results

- (1) There were evident shifts in the fish community composition from pelagic to demersal species, as suggested by the dominant species found in springtime, the dominant families, and percentages denoting the numbers of species in the main orders.
- (2) The numbers of fish species have declined, and the diversity shows a downwards trend between 2004 and 2015. Dominant species have been frequently replaced, and body sizes of typical commercial fish species have decreased. The fish community structure in Daya Bay is now in an unsteady state.
- (3) Multiple anthropogenic disturbances, such as fishing (including overfishing and changes in the main fishing gears), the destruction of natural habitats, pollutants, and anthropogenically induced temperature changes, are likely to have caused obvious shifts in the bay's fish community structure.

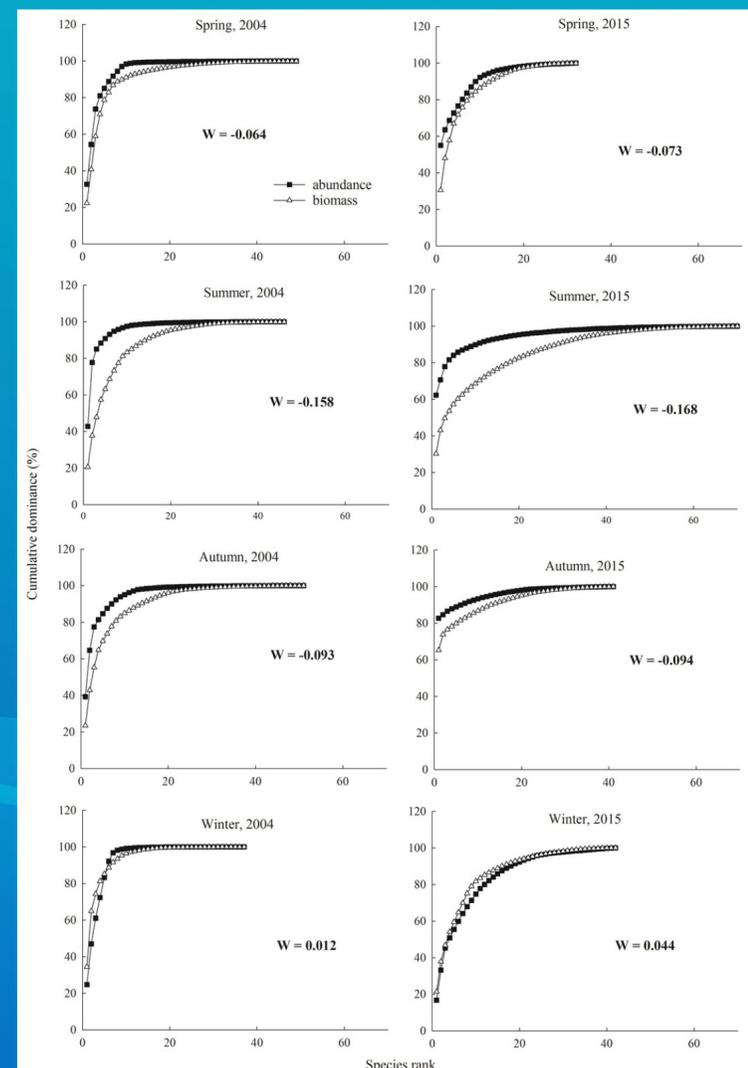


Fig. 7. Abundance–biomass comparison curves of the fish community in Daya Bay, China, during all four seasons, based on bottom-trawl survey data for 2004 and 2015.