Climate Change Multiplies Existing Threats to the Ocean
Fisheries provide three billion people with around 20% of their average intake of animal protein, and 400 million depend critically on fish for food. Projected climate change impacts on fisheries and aquaculture are negative on a global scale; severely so in many regions.

FIVE AREAS TO WATCH
- High latitude spring bloom systems
- Subtropical gyres
- Equatorial upwelling systems
- Coastal boundary systems
- Eastern boundary current upwelling systems

The Economics of Fish Redistribution
Fisheries yield is projected to increase by 30–70% in high latitudes, but to fall by 40–60% in the tropics and Antarctica, based on 2°C warming. Large species such as tuna in the Pacific and Indian Oceans are likely to shift eastwards. Global loss of landings is projected at USD17 to 41 billion up to 2050.

Dead Zones are Becoming More Common
The extent of oxygen-depleted ‘dead zones’ in coastal waters is increasing. These are caused by high levels of nutrient run-off from land, exacerbated by higher water temperatures and ocean acidification in the open ocean. The extent of ‘oxygen minimum zones’ (OMZs), caused by ocean warming, also appears to be increasing. These waters are oxygen-poor in the mid-layers and so are unable to support large active fish.

Options
- Undertake vulnerability assessments. Strengthen coastal zone management. Reduce aquaculture dependence on fishmeal.

Negative Effects on Shellfish
Shellfish are particularly vulnerable to ocean acidification and other changes in ocean chemistry. Seasonal upwelling of acidic waters onto the continental shelf in the California Current region has been offsetting enhanced upwelling in the open ocean, leading to over-production of shellfish in these areas. However, ocean pH continues to fall, overall global production of shellfish fisheries is likely to decrease.

Options
- Reduce non-climate change-related stressors. Policies aimed at reducing fossil fuel use across economies will affect the seafood industry.

Coral Reefs at Risk
Coral reef ecosystems are declining rapidly, with the risk of collapse of some coastal fisheries. If CO₂ emissions continue to rise at the current rate, coral reef systems are likely to suffer irreversible damage during this century. Rebuilding is an important component of supporting reef health and resilience.

Options
- Create new habitats such as artificial reefs to act as fish nurseries in areas where coral destruction occurs.