

Challenge 2. Understanding drivers of change and their effects on ecosystems and society

2a. Understanding physical effects of climate change Further our understanding of how coasts and seas are responding to climate change.	2b. Understanding habitat and species response to climate change and human pressures Better understand the combined effects of climate change and human activities on habitats and species, and their capacity to adapt.	2c. Building knowledge of socio-economic effects from climate change Develop understanding of the effects of climate change on human health, wellbeing and socio-economic activities.
<p>Large-scale oceanographic change:</p> <ul style="list-style-type: none"> *Identify multidecadal salinity and temperature changes. *Improve understanding of drivers of change affecting Atlantic Gyres and shelf-sea exchanges. *Measure air-sea carbon exchange. <p>Coastal and near-shore change:</p> <ul style="list-style-type: none"> *Identify marine heatwave occurrence and their associated impacts on ecosystem service provision. *Measure sources and sinks in carbon and nutrient cycles (including sediments). *Understand the combined effects of waves and sea-level rise on the coast. <p>Storm and wave climate:</p> <ul style="list-style-type: none"> *How North Atlantic storms and blocks will respond to external forcing. *Better data on historical storm and surge impacts and applying this knowledge to understand likely future effects. *How climate feedbacks affect sea-ice retreat and the consequences for storms and wave fetch. <p>Arctic change:</p> <ul style="list-style-type: none"> *How Arctic erosion and permafrost thaw affect carbon release. *How contaminant spill incidents will change as polar routes open. *How ship damage from waves, ice floes and spray icing will change. <p>Stratification, dissolved oxygen and acidification:</p> <ul style="list-style-type: none"> *How stratification changes affect bottom water dissolved oxygen. *Identify the role of rainfall and horizontal changes in salinity across the shelf sea in triggering spring stratification. *Understand ocean and coastal pH variability and long-term changes. *Understand the role of warming versus nutrient enrichment for dissolved oxygen levels. 	<p>Primary productivity and nuisance / harmful species:</p> <ul style="list-style-type: none"> *How marine productivity is changing. *How plankton drawdown of atmospheric carbon will change. *How non-natives pathogens and Harmful Algal Bloom (HAB) distribution and abundance will change. <p>Coastal and marine habitats and community change:</p> <ul style="list-style-type: none"> *How climate change will affect the functioning of different ecosystems. *Identifying life-cycle sensitivities to climate change (e.g. for fish in shallow nursery areas). *Identifying tipping points for habitats (e.g. at wave dominated barrier coasts). *How sea-level rise will impact on coastal habitats and sediment transport. *Building knowledge of how deep-sea biological communities are responding to climate change. <p>Multiple stressors and species resilience</p> <ul style="list-style-type: none"> *How species distribution and productivity will change in response to multiple stressors. *Identifying the species and habitats are most, or least sensitive to the combined effects of climate change and other stressors (e.g. contaminants, litter, built structures). *Understanding what evolutionary selection is being exhibited by species in response to climate change. 	<p>Food security and safety:</p> <ul style="list-style-type: none"> *Understanding climate vulnerability of fisheries (e.g. resource availability, operations and safety, and supply chain). *How the future expansion of aquaculture will be affected by climate change. *How fish and human health will be affected by changes in harmful toxins and marine pathogens, and how exposure to, and incidence of, disease is monitored. <p>Transport and infrastructure:</p> <ul style="list-style-type: none"> *Measuring infrastructure performance, deterioration and threshold failure. *Improving confidence in projections of extremes (e.g. winds, waves) that determine risk profiles. *How the nature and scale of flood risks will change, including where land and sea flooding occurs simultaneously. <p>Communities, tourism and recreation:</p> <ul style="list-style-type: none"> *Identifying the social effects of climate change on communities (e.g. health, wellbeing, and livelihoods). *How risks to tourism and recreation differ by location and sector, and how industries do, or could, actively manage climate risks. *How benefits derived from recreational fisheries will be affected. *Identifying the effects of multiple climate hazards (e.g., rain, wind, floods, erosion) on heritage assets