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## Using Multiscale Scenarios to Investigate the Outlook for Marine Ecosystems and Coastal Communities

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This chapter uses multiscale scenario modelling as an approach for integrating our present knowledge about ocean changes and social and economic trends to produce potential outlooks for Canadian oceans and coastal communities. The scenarios use fisheries as a lens to investigate future impacts of climate and socio-economic change on Canadian marine ecosystems and society at national and local scales in terms of quantitative indicators. This research is needed because existing scenarios of Canadian oceans lack appropriate frameworks and are too narrow in scope to fully consider the multi-dimensional drivers, social-ecological and policy pathways, and geographical scales necessary for a comprehensive investigation of future ocean sustainability in Canada.

To address these gaps, we describe the development of a framework for integrated, multiscale scenarios that can be used for understanding the sustainability of Canadian coastal communities and marine ecosystems under future environmental and socio-economic change at national, regional, and local scales. We define an “integrated” scenario according to three criteria: (1) it considers the interactions and feedback between social and ecological systems; (2) it addresses the impact from natural and human drivers of change and resulting societal or biological responses; and (3) it combines models of climate, economy, social, and environmental systems (Teh et al. 2017). The ultimate aim of developing multiscale scenarios is to facilitate improved national marine governance

under the uncertainty of global change by stimulating dialogue with marine stakeholders about potential ocean futures and pathways toward marine stewardship. This is an advantage over more predictive approaches, which are hindered by future uncertainties in environmental and societal development trajectories.

### **POLICY CONTEXT FOR CANADIAN SCENARIOS**

Canadian ocean management is grounded in a policy framework that encompasses national, regional, and local scales. Canada’s Oceans Strategy stipulates the equally important roles federal, provincial, territorial, and local governments have for the management of Canadian oceans. While the federal government has broad responsibilities for the stewardship and management of Canada’s oceans and resources, shoreline and seabed areas are the primary responsibility of provincial governments, and municipalities are responsible for land-based activities that affect the marine environment. Canada’s national mandate on ocean sustainability covers finer-scale policies for different regions, species, communities, and jurisdictions. For example, the national Oceans Protection Plan (OPP) involves various regional or local level initiatives for specific species (e.g., marine mammals, Arctic char), habitats (e.g., estuarine, nearshore), and Indigenous Peoples. Moreover, the federal government’s policy on reconciliation inherently involves local-scale interests of Indigenous groups. Consequently, understanding potential futures for Canadian oceans requires a multiscale scenario