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## Fisheries and Oceans Canada

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### Science Advisory Report 2013/071

#### A Science-based Framework for Assessing Changes in Productivity, Within the Context of the Amended Fisheries Act

##### Summary

- A framework for assessing changes in fisheries productivity resulting from works, undertakings or activities (projects) is described. Generally, this framework involves determination of impact type and scale; existing Pathways of Effects (POEs) are used to determine potential residual effects; appropriate metrics of productivity are chosen to assess these residual effects; and residual effects on productivity are used to inform decision making.
- This framework is to be applied in cases when a technical assessment concludes that the project is likely to result in a permanent alteration to habitat or death of fish.
- Fisheries productivity can be directly quantified using a number of indicators, including yield or catch rates, or measured indirectly by examining components of fisheries productivity or their covariates (i.e. surrogates). Fisheries productivity is determined by the biological productivity of the fish (and fish that support such fisheries) and by fishery dynamics. In this SAR, we focus on assessing the impacts of projects on components of fisheries productivity related to the biology of relevant fish. These components correspond to a species' life cycle and include measures of vital rates (e.g. growth, survival, reproduction, migration).
- Serious harm is characterized primarily by using Pathways of Effects (PoE) models to identify endpoints that cannot be avoided or mitigated (i.e. the residual effects of stressors). PoE endpoints are linked to possible biological outcomes: localized effects on habitat quantity, effects on habitat quality, and ecosystem transformations.
- For projects considered likely to result in ecosystem transformations (often large enough to be measured in hectares), productivity assessments are recommended at the population or ecosystem scale.
- For projects that affect the quantity and/or quality of habitat (or cause the death of fish) in the project vicinity, components of fisheries productivity are analysed using a life cycle approach (reproduction, growth, survival, migration). Qualitative and quantitative metrics for each component of productivity are tabulated.
- Productivity-state response curves describe the relation between the change in habitat conditions (or the death of fish) and its effect(s) on a component of fisheries productivity and provide a direct link between Serious Harm and productivity.
- Density-dependent processes can be incorporated into productivity assessments, but detailed information on the biology of the species and a population model will be required.

This Science Advisory Report is from the March 12-14, 2013 National Peer Review on Additional Science Guidance for Fisheries Protection Policy: Science-based Operational tools for Implementation. Additional publications from this meeting will be posted on the [Fisheries and Oceans Canada Science Advisory Schedule](#) as they become available.

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