

## Assessment and Mitigation of Fisheries Impacts on Marine Ecosystems

**By Daniel Pauly and Tony Pitcher**

*Below is the abstract of: Pauly, D. and Pitcher T.J. (2000) Assessment and Mitigation of Fisheries Impacts on Marine Ecosystems: A Multidisciplinary Approach for Basin-Scale Inferences, Applied to the North Atlantic. In Pauly, D. and Pitcher T.J. (eds) Methods for assessing the impact of fisheries on marine ecosystems of the North Atlantic. Fisheries Centre Research Reports 8(2): (in prep).*

**T**he aim of the Sea Around Us Project is to quantify, in ecological and economic terms, the impact of fisheries on the marine ecosystems of the North Atlantic, and to evaluate the costs and benefits of various scenarios of mitigation, such as the status quo, rebuilding of depleted resources and implementation of closed areas. Dealing with these issues requires a methodological package related to, but different from, that typically used in fisheries management, notably because of its ecosystem focus and the much larger temporal and spatial scales, relative to

standard fisheries assessments. This paper summarises the methodology deployed by the project by introducing a suite of papers in which the rationale and details are provided.

**F**irst, we review the relationships between scale and methodology choices in marine science. Then, the principle modules of the Sea Around Us project methodology are described as follows:

- 1) The North Atlantic as study area, where we report a new ecosystem classification scheme that is compatible hierarchically with previous work and with all statistical divisions;
- 2) North Atlantic fisheries catches in time and space, where we present the project's catch and effort database, discuss the problems in estimating total extractions, and

outline methods used to overcome them;

- 3) Fish distribution transects, where the biology and migrations of key commercial North Atlantic species are used to link catches by shallow-water and offshore fisheries;

- 4) Bio-economic analyses of fisheries sectors, where the effect of competition between small and large – scale fisheries are quantified using multi-species, multi-gear yield per recruit and a bio-economic Nash equilibrium analysis;

- 5) Ecosystem modelling, discussing the use of ECOPATH with ECOSIM and ECOSPACE to represent present and past North Atlantic ecosystems with their embedded fisheries, to evaluate ecosystem status, and to simulate likely response to change;

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6) Evaluating alternative ecosystem-based management regimes to quantify the benefits of different ecosystem-based management scenarios;

7) Energy consumption and the ecological footprint of North Atlantic fisheries, to contrast the energy incorporated in landed fishes to that required to catch them;

8) Rapid interdisciplinary appraisal of fisheries status and compliance analyses using RAPFISH, to compare and characterise North Atlantic fisheries in terms of their sustainability (in ecological economic technological and social fields), analysis of their ethical status, and to score their compliance with the FAO Code of Conduct for Responsible Fisheries, together with the compliance of North Atlantic countries vis-à-vis their

internationally agreed commitments.

9) Mapping the fate of fisheries landings from the North Atlantic, to identify possible pressure points for intervention by fish product consumers;

**W**e anticipate that the synthesis to emerge from integrating the results of these modules will contain many surprises, both in terms of the ecological damage and economic waste presently generated by the North Atlantic fisheries, and in clarifying the foregone benefits that could be regained, were these economic and ecological issues to be addressed.

*Figure 1 (page 4) presents a schematic of the approach being taken in the Sea Around Us project.*

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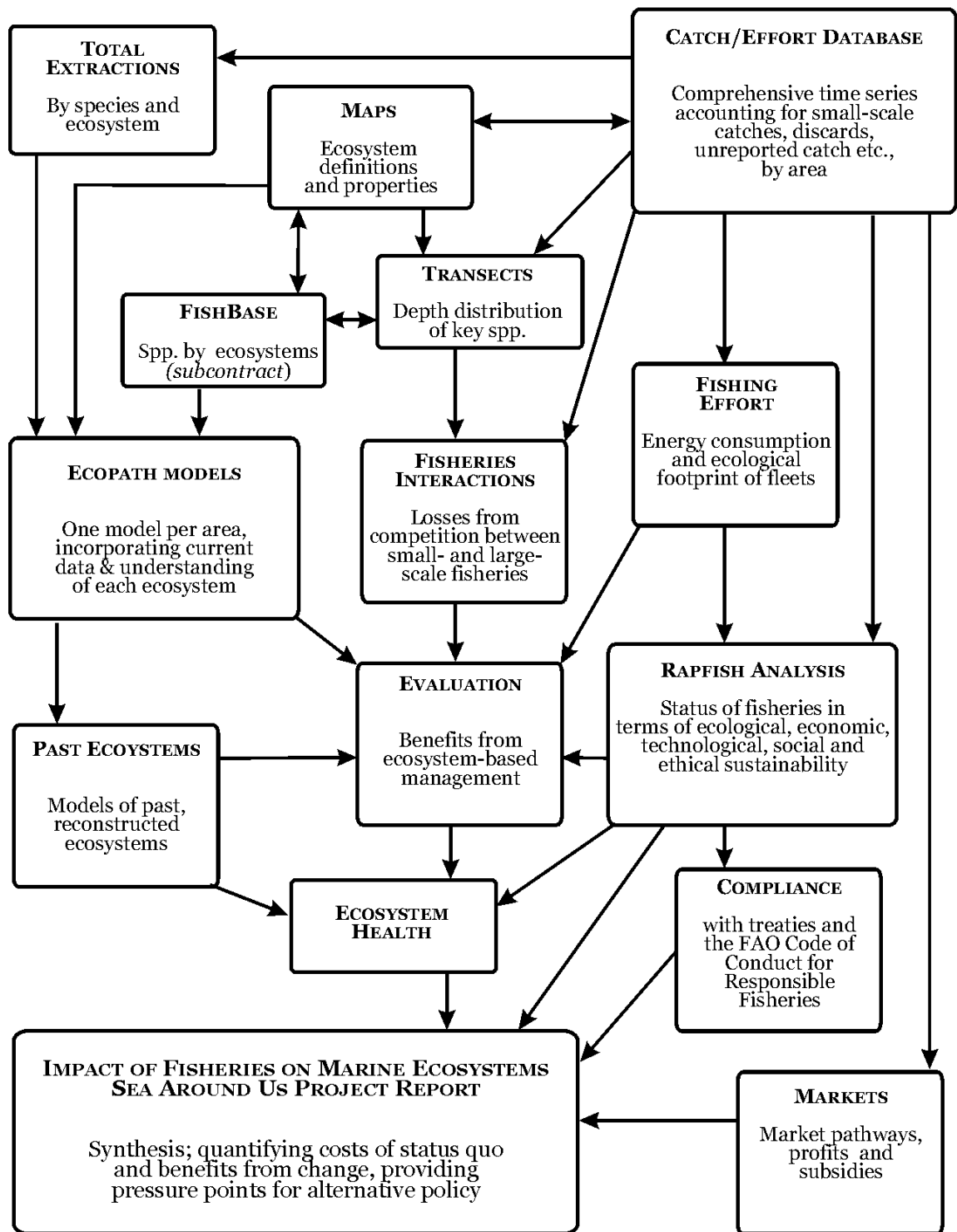


Figure 1 - Key elements of the Sea Around Us project, with basic data on top, and derived elements further down.