Pauly, D., J. Dalsgaard, T. Okey, R. Powell, and S. Pimm. 1998. Mass-balance food web ecosystem models as an alternative approach for combining multiple information sources in fisheries. p. 815 (abstract only) In: T.J. Quinn II, F. Funk. J. Heifetz, J.N. Ianelli, J.E. Powers, J.F. Schweigert, P.J. Sullivan, C.-I. Zhang (eds.). Proceedings of the International Symposium on Fishery Stock Assessment Models. Alaska Sea Grant College Program Report No. 98-01. Alaska Sea Grant, Fairbanks.

Mass-Balance Food Web Ecosystem Models as an Alternative Approach for Combining Multiple Information Sources in Fisheries

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Highly parameterized analytical single-species models offer a tempting framework for integrating data from different sources, e.g., survey biomass estimates, fishery catches, and catch composition data. We argue, however, that forcing data that usually cover a number of species into single-species models, however sophisticated, does not optimally use such data.

Rather, emphasis should be given to models that explicitly account for multispecies interactions, especially trophic models. While mathematically not complex, trophic models can be made complete, i.e., they can be made to include all groups in a system, and thus consider direct and indirect trophic impact on target species. Such completeness also, in itself, provides set limits on difficult-to-estimate stock sizes, production, and mortality rates, i.e., on processes directly relevant to fisheries resource management. In addition, these models lend themselves to answering questions about ecosystem dynamics and the responses of ecosystems to anthropogenic changes.

As an example, we discuss the properties and behavior of a mass-balance trophic model representing the Prince William Sound ecosystem from 1980 to 1989, i.e., prior to the *Exxon Valdez* oil spill, pending the construction, through collaboration with experts on the various ecosystem components, of a more comprehensive, consensus model to be used for answering questions such as those mentioned above.

Adapted from a presentation at the 15th Lowell Wakefield Symposium, Fishery Stock Assessment Models for the 21st Century, October 8-11, 1997, Anchorage, Alaska.