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Abstract:
Good management models and good models for understanding biology differ in basic philosophy. Management models must facilitate management decisions despite large amounts of uncertainty about the managed populations. Such models must be based on parameters that can be estimated readily, must explicitly account for uncertainty, and should be simple to understand and implement. In contrast, biological models are designed to elucidate the workings of biology and should not be constrained by management concerns. We illustrate the need to incorporate uncertainty in management models by reviewing the inadequacy of using standard biological models to manage marine mammals in the United States. Past management was based on a simple model that, although it may have represented population dynamics adequately, failed as a management tool because the parameter that triggered management action was extremely difficult to estimate for the majority of populations. Uncertainty in parameter estimation resulted in few conservation actions. We describe a recently adopted management scheme that incorporates uncertainty and its resulting implementation. The approach used in this simple management scheme, which was tested by using simulation models, incorporates uncertainty and mandates monitoring abundance and human-caused mortality. Although the entire scheme may be suitable for application to some terrestrial and marine problems, two features are broadly applicable: the incorporation of uncertainty through simulations of management and the use of quantitative management criteria to translate verbal objectives into levels of acceptable risk.