



# NOAA FISHERIES

## New Webinar Series

Sponsored by the

### Quantitative Ecology and Socioeconomics Training (QUEST) Program

#### Opening Webinar Details:

**Date:** Tuesday February 18<sup>th</sup>

**Time:** 3:00–4:00 pm *Eastern Time* (12:00–1:00 pm *Pacific Time*)

Space is limited. Reserve your seat now at:

**Link:** <https://www1.gotomeeting.com/register/232239232>

**Topic:** A Perspective on the Steepness Parameter and Its Implications for Fisheries Management

**Presenter:** Dr. Marc Mangel  
*Distinguished Research Professor of Mathematical Biology and Director of the Center for Stock Assessment Research University of California, Santa Cruz*



**Abstract:** Steepness ( $h$ ) is an important parameter used to help measure the productivity and resilience of a fish stock, but is one of the more difficult model parameters to estimate. This presentation will provide a perspective and overview on steepness, reference points for fishery management, and stock assessment. It will show new results demonstrating that key reference points are fixed when steepness and other life history parameters are fixed in stock assessments using a Beverton–Holt stock–recruitment relationship. The presentation will also review the underpinning theory, using both production and age-structured models to explore these patterns. For the production model, Dr. Mangel will derive explicit relationships between steepness, life history parameters, and major reference points. For the age-structured model, Dr. Mangel will provide numerical examples to complement the analytical results of the production model. He will cover what it means to set steepness equal to 1 and how to construct a prior for steepness. Difficulties can arise by fixing steepness and life history parameters. Solutions include not fixing them at all, using a more complicated stock–recruitment relationship, and being more explicit about the information content of the data and what that means for policy makers. Strengths and limitations of each approach will be discussed.

**Background Reading:** Mangel, M., MacCall, A.D., Brodziak, J., Dick, E.J., Forrest, R.E., Pourzand, R., and S. Ralston. (2013). A perspective on steepness, reference points, and stock assessment. *Canadian Journal of Fisheries and Aquatic Sciences* 70:930-940

**Biography:** Dr. Marc Mangel is the Distinguished Research Professor of Mathematical Biology and Director of the Center for Stock Assessment Research at the University of California Santa Cruz (UCSC). At UCSC, Dr. Mangel served as Associate Vice Chancellor, Planning and Programs (1997-1999) and chaired the Departments of Applied Mathematics and Statistics (2007-09) and Technology and Information Management (2010-2012). From 1980-1996, Mangel was at the University of California Davis. There he was founding Director of the Center for Population Biology (1989-1993) and chair of the Department of Mathematics (1984-88). His research in mathematical and theoretical biology focuses on ecology, evolution and behavior and the broad goal of combining first-rate basic science with important applied questions. A current research focus is on quantitative methods for fishery management. This includes developing the tools that will be needed to make Ecosystem Based Fishery Management a practicable approach for fishery management in the 21st century. Dr. Mangel has authored numerous journal publications and books that include *Decision and Control in Uncertain Resource Systems* (1985, Academic), *Dynamic Modeling in Behavioral Ecology* (with Colin Clark, 1988, Princeton), *The Ecological Detective. Confronting models with data* (with Ray Hilborn, 1997, Princeton University Press), *Dynamic State Variable Models in Ecology: Methods and Applications* (with Colin Clark, 2000, Oxford University Press), and *The Theoretical Biologist's Toolbox. Quantitative Methods for Ecology and Evolutionary Biology* (2006, Cambridge, University Press).

**For more information, contact:**

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**Webinar System Requirements:**

**PC:** Windows® 8, 7, Vista, XP or 2003 Server

**Mac:** Mac OS® X 10.6 or newer