Course name:
Introduction to Fisheries Stock Assessment and Stock Synthesis

Instructors:
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Teaching Assistant:
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Location: Southwest Fisheries Science Center, La Jolla
Dates: 24 June – 1 July, 2014
Hours: 9 am to 5 pm

Course Objective and Description

This 7-day course introduces modern statistical models used in fisheries stock assessment and natural resource modeling, through lectures, labs, and a small group project related to fishery stock assessment model development. It is organized as a series of morning sessions that focus on theoretical concepts and afternoon work sessions. These afternoon sessions will rely on different software environments such as R, MS Excel and the Stock Synthesis (SS) Stock Assessment modeling package. The first 2 days will be a quick review of introductory stock assessment topics like: 1) simple population models, 2) fitting models to data, 3) likelihoods, 4) yield-per-recruit analysis, and 5) age-structured models. In the next 5 days, we will concentrate on using Stock Synthesis as the modeling platform to perform a fully-integrated age-structured analysis, from running and debugging simple models to constructing a basic SS model from provided data (or bring your own) as a small group project. Projects will be presented to the class on the final day.

Pre-requisites:
Some knowledge of basic probability/statistical theory, population dynamics, and familiarity with MS Excel and R is strongly preferred.

Recommended Readings:
Haddon, M. 2011. Modeling and Quantitative Methods in Fisheries, Chapman & Hall/CRC.
Quinn, T., and R. Deriso. 1998. Quantitative Fish Dynamics. Oxford University Press.
Fournier, D., and C.P. Archibald. 1982. A general theory for analyzing catch at age data.
        Canadian Journal of Fisheries and Aquatic Science 39: 1195-1207.
Methot, R.D. Jr. and C.R. Wetzel. (2013) Stock synthesis: A biological and statistical framework
        for fish stock assessment and fishery management. Fisheries Research 142: 86-99.
Hilborn, R., and M. Mangel. 1997. The Ecological Detective: Confronting Models with Data.
        Monographs in Population Biology 28, Princeton University Press.

Tentative Syllabus and Schedule

Day 1 – June 24, Tuesday
Introduction to Fisheries Stock Assessment
Simple Population Models
Probability density functions
Using Likelihoods
Fitting Data to Models
Lab: Fitting Surplus Production Models (Sum of Squares and Likelihoods)

Day 2 – June 25, Wednesday
Introduction to Age-Structure (mortality, growth)
Yield-Per-Recruit Analysis
Stock and Recruitment
Catchability and Selectivity
Age-structured Stock Assessment Models
Lab: Yield-Per-Recruit Analysis
Lab: Combining Yield-Per-Recruit and Stock-Recruitment
Lab: Simple Age-structured Production Model

Day 3 – June 26, Thursday
Integrated Analysis: Statistical Catch-at-Age Models
Introduction to Stock Synthesis (SS)
Simple Models in SS
Understanding and Plotting SS Output
SS Model Development (examples of SS models in different configurations)
Debugging SS
Lab: Simple SS Models
Lab: Debugging simple SS Models

Day 4 – June 27, Friday
Growth
Maturity and Fecundity
Recruitment
Natural and Fishing Mortality
Initial Conditions
Catchability and Selectivity
Group Project: Develop a SS model (Data provided or bring your own)

Day 5 – June 28, Saturday
Group Project: Continue SS Model Development

Day 6 – June 30, Monday
Group Project: Continue SS Model Development

Day 7 – July 1, Tuesday
Group Project: Present SS Models (Student presentations)
Final Discussion