Short Course

Morning Session: Quantifying Food Web Interactions (Dave Beauchamp)

Goal: To provide a conceptual understanding of approaches and feasibility for quantifying food web dynamics to address fisheries management questions

8:00-Overview: Defining food web interactions & relationship to fisheries management.
-Factors that limit production of desirable species (teasing apart environmental and ecological effects): Temporal food supply-carrying capacity, predation impacts, competition, environmental stress (temperature, DO, contaminants).
-Trophic considerations factor into species introductions, hatchery release strategies, predator-competitor control, and harvest regulations.
-A quick tour of past applications in western lakes

8:30 Tools: Integrated approach linking bioenergetics models, directed field sampling, and basic population dynamics to estimate population-level consumption rates, food-supply-demand, and predation impacts.

Bioenergetics modeling: Energy balance: relationship between consumption and growth, effects of body mass, temperature, feeding rate, and food quality.

Field Sampling Inputs: Age-specific growth, diet composition, thermal experience, energy density, temporal-spatial distribution and population dynamics of predators and prey.

Estimating Predation Impacts: Expanding from individual- to population-level consumption estimates (linking population assessment of predators and prey to bioenergetics): Using relative abundance versus absolute abundance of predators and prey, based on netting, hydro-acoustics, mark-recapture, etc.

10:00-10:30 Break

Estimating Predation Mortality: Assessing prey density, abundance, biomass, production and relate to predation.

Some Case Studies: Flathead Lake, Lake Washington, Gulf of Alaska pink salmon

Future: Using foraging models to enhance capabilities for predicting responses (growth, survival, distribution) to changing conditions.

Demonstration of the Wisconsin Bioenergetics Model software

12:00-1:30 Lunch

Afternoon Session: Catch-per-unit-effort As an Index of Abundance: Applications and Analysis in Fisheries Management (Wayne Hubert

Goal: To provide a conceptual understanding of catch per unit effort as an index of population abundance and of the utility of catch-per-unit-effort data when addressing fisheries management questions

1:30-3:00 Concepts in the use of C/f data to index abundance

When to use C/f and indices of abundance vs. estimates of true abundance: Applications of C/f in fisheries science

Need for standardization of sampling methods: Dependence of C/f on standardization of sampling methods, discussion of efforts to standardize sampling methods

Assumptions of using C/f as index of abundance: C/f is directly proportional to density and other assumptions

Sample distributions and impact on analysis of C/f data: Distributions common to C/f data, impacts on data analysis, summary statistics

3:00-3:30 Break

3:30-5:00 C/f Data Analysis

Data analysis tools: hypothesis testing, spatial comparisons, temporal comparisons: Two-sample comparisons, one-way ANOVA, complex ANOVA models, regression analysis, and more.

Needed samples sizes: How big a sample is needed to detect changes in C/f? Old and new methods to address this question.

Additional data and indices: Age structure, length frequency, body condition