

NRES 775
SELECTED TOPICS IN NATURAL RESOURCES – AQUATIC TROPHIC ECOLOGY
FALL SEMESTER 2023, 2 CREDITS

Instructor: Dan Dembkowski
Office: TNR 345

Lectures: Tuesday and Thursday, 8:00-8:50 AM
Location: TNR 359

****Note:** Due to sampling schedules of the instructor and students, there may be days when this class does not meet during the allotted time. Details and alternative meeting arrangements will be discussed in class.

Objectives: At the completion of the course, students will be able to: (1) understand bottom-up versus top-down regulation of food webs; (2) understand interactions between and among individuals, cohorts, and populations occupying different trophic levels; (3) develop scientifically-sound experimental designs for studies involving sampling of fish diets; (4) quantify, compare, and present fish diet information; and (5) develop a functional understanding of bioenergetics models for estimating growth and consumption dynamics of fishes.

Readings: PDF copies of weekly readings will be provided on the course Canvas website. Additional readings from *Analysis and Interpretation of Freshwater Fisheries Data* (Brown and Guy 2007) and *Fisheries Techniques, 3rd Edition* (Zale et al. 2012) will be assigned; copies of these books are available at the UWSP Library and the WICFRU Library.

Format: Two weekly lectures will cover topics related to aquatic trophic ecology, with a primary focus on bottom-up and top-down regulation of food webs; competitive and predatory interactions; design, sampling, analysis, and interpretation of fish diet studies and data; and bioenergetics models for estimating growth and consumption dynamics of fishes. The first half of the course will focus on the theoretical background of food web regulation and management, and lectures will consist of group discussions of relevant literature; students will be expected to read assigned papers prior to class and to participate in group discussions. The second half of the course will focus on applied aspects of aquatic trophic ecology, including sampling and study design, analysis and interpretation of fish diet data, and use of bioenergetics models to estimate growth and consumption. There will be mid-term and final exams, as well as several homework assignments.

Grading: Grades for this course will be based on participation in group discussions of assigned and relevant literature, homework assignments, and mid-term and final exams. Homework assignments are expected to be turned in on time unless prior arrangements have been made with the instructor. Final grades for the course will be based on the following minimum values: A = 90%; B = 80%; C = 70% D = 60%; F = < 60%.

SCHEDULE

Date	Topic	Papers (listed by senior author)
5-Sep	Introduction and overview	
	Nutrient dynamics and lake food webs	
7-Sep	Nutrient gradients and fisheries	Hanson (1982); Stockner (2000); Rook (2021)
12-Sep	Nutrient management	Sondergaard (2007 – Ch. 3-4); Welch (1999); Schindler (2008)
14-Sep	Alternative equilibria	Scheffer (1993); Scheffer (2007)
19-Sep	Biomanipulation	Drenner (1999); Schaus (2010)
21-Sep	Trophic cascades	Brooks (1965); Carpenter (1985); Carpenter (1992); DeMelo (1992)
26-Sep	Planktivory and omnivory	Rudstam (1993); Stein (1995)
28-Sep	Influence of fisheries management activities	Johnson (1995); Krueger (2005)
3-Oct	Fish-bird interactions	Glahn (1995); Rudstam (2004); Koenigs (2021)
5-Oct	NO CLASS	
10-Oct	Great Lakes food webs	Madenjian (2002); Mills (2003)
	Stable isotope and microelemental ecology	
12-Oct	Stable isotope ecology and microchemistry	Post (2002); Pangle (2010)
17-Oct	Linking stable isotopes with diets	Vander Zanden (1997); Vander Zanden (1999); Scheibel (2016)
19-Oct	MID-TERM EXAM	
	Applied aspects of aquatic trophic ecology	
24-Oct	Sampling diets and study design	FT3 chapter 16; AIFFD chapter 11
26-Oct	Sampling diets and study design	FT3 chapter 16; AIFFD chapter 11
31-Oct	Quantifying, comparing, and presenting diet data	AIFFD chapter 11
2-Nov	Quantifying, comparing, and presenting diet data	AIFFD chapter 11
7-Nov	Prey selection indices	FT3 chapter 16; AIFFD chapter 11
9-Nov	Competitive interactions	Fayram (2005); Olson (2007); Wuellner (2011)
14-Nov	Predatory interactions	Hambright (1991); Fayram (2005)
16-Nov	Estimating supply	AIFFD chapter 8; Embke (2019)
21-Nov	Estimating supply	AIFFD chapter 8; Embke (2019)
23-Nov	Estimating demand – bioenergetics overview	AIFFD chapter 12; Chipps (<i>in press</i>)
28-Nov	NO CLASS	
30-Nov	Bioenergetics and fisheries management	Stewart (1981); Tsehaye (2014); GLFC (2017)
5-Dec	Bioenergetics modeling and inputs	AIFFD chapter 12; FB4 manual
7-Dec	Bioenergetics modeling	AIFFD chapter 12; FB4 manual
12-Dec	Bioenergetics modeling	AIFFD chapter 12; FB4 manual
14-Dec	Bioenergetics modeling	AIFFD chapter 12; FB4 manual
18-Dec	FINAL EXAM	