

## FWS Graduate Courses (7/21/2021)

\* indicates online/video option some are live video at a scheduled time others are passive online, @ indicates passive online only, ^ indicates workshop taught in 2-4 days, # indicates ½ semester course accelerated course (usually last ½ fall or first ½ spring)

*Note: Many courses are Fish/WLF integrated so do not assume Fish courses only apply to fish students and WLF courses only apply to WLF students. Full course descriptions are below.*

**All Semesters:** WLF/Fish 501 seminar

### Fall (Even)

Fish 516 Animal Movement, Dispersal and Migration\* (3 cr)  
Fish 525 Aquaculture in Relation to Wild Fish Populations\* (2 cr)  
Fish 526 Climate Effects & Cons Manage@ (2 cr) – **will also be Fall 2021**  
Fish 504 Aquaculture (3 cr - coming Fall 2022)  
Fish 504 Citizen Science (coming Fall 2022)  
WLF503 Matrix Population Modeling## (1 cr)  
WLF511 Wildland Habitat Ecology and Assessment@ (2 cr)  
WLF 522 Community Ecology #@ (2 cr)  
WLF 551 Applied Mixed Effects Modeling# (2 cr)

### Fall (Odd)

WLF511 Wildland Habitat Ecology and Assessment@ (2 cr)  
Fish 515 Large River Fisheries\* (2 cr)  
WLF540 Conservation Genetics\* (1-3 cr) – **Not in Fall 2021 taught Summer 2021**  
WLF552 Ecological Modeling\* (3 cr)  
WLF 550 Quantitative Analysis of Fish and Wildlife Populations\*# (2 cr)

### Spring (Even)

Fish 510 Advanced Fish and Wildlife Management\* (3 cr)  
WLF506 External Speaker Seminar (1 cr)\*  
WLF 561 Landscape Genetics\* (2 cr)  
WLF 562 Landscape Genetics Lab\* (1-2 cr)  
WLF 545 Wildlife Habitat Ecology\*# (2-3 cr)

### Spring (Odd)

FISH 550 Ecology & Conservation of Freshwater Invertebrates\*# (2 cr)  
FISH 551 Freshwater Invertebrate Field Methods (2 cr) – spring break  
WLF506 External Speaker Seminar (1 cr)\*  
WLF521 Communicating Science Broadly\* (2 cr)  
WLF575 Behavioral Ecology\*# (2 cr)  
Fish 511 Advanced Fish Physiology\* (2 cr)

### Summer

Fish540 Wetland Restoration\* (3 cr)  
WLF540 Conservation Genetics\* (1-3 cr) – most years  
WLF504 Wildlife Sign and Tracks (1-3 cr)

**Courses that we hope to add back into the rotation but not yet sure when:**

Fish 530 Stream Ecology, Fish503 Advanced Limnology (1-3)

**Course Descriptions**

**Fish 510 Advanced Fish and Wildlife Management (3 cr) – Quist & Ausband**

Contemporary management of fish and wildlife populations in North America. Guiding principles, relevant laws and policies, social and political aspects, select issues, the policy interface of biological systems with governmental and social institutions. Cooperative: open to WSU degree-seeking students. (Spring, Alt/yrs)

**Fish 511 Fish Physiology (2 cr) - Small**

Physiology of fishes, their implications, and applications. Principles and methods used to study organ systems and physiological mechanisms of homeostatic regulation in fishes. Cooperative: Open to WSU degree-seeking students. Joint listed with Fish411 (Spring, Alt/yrs)

**Prereq:** Permission

**Fish 515 Large River Fisheries (2 cr) - Scarnecchia**

Management issues and problems in large river fisheries in North America and globally; importance of flood plains; ecological bases for management actions in large rivers; river fisheries in the context of multiple use of large rivers. Cooperative: open to WSU degree-seeking students. (Fall, Alt/yrs)

**Fish 516 Animal Movement, Dispersal and Migration (3 cr) - Caudill**

Key theories and approaches for studying animal movement and dispersal in aquatic, marine and terrestrial environments, with critical analysis of empirical examples. Students are expected to develop an independent research project. (Fall, Alt/yrs)

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**Fish 525 Aquaculture in Relation to Wild Fish Populations (2 cr) – Cain and Scar**

Historical and current relationships between wildness and domestication as it relates to fisheries management and aquaculture in mitigation and industry. Interactions between wild and hatchery-reared fishes, including salmon. Cooperative: open to WSU degree-seeking students. (Fall, alt/yrs)

**FISH 526 Climate Effects & Cons Manage (2 cr) – Vierling, Caudill, Svancara**

Climate change and the conservation and management of populations and ecosystems. This graduate seminar will examine the current understanding of climate controls on ecosystems, likely scenarios for climate change in coming years, effects on fish and wildlife communities and populations and policy discussions as they relate to conservation and management using analysis of primary literature, and oral and written assignments. Cooperative: open to WSU degree-seeking students. (Fall Alt/yrs) Prereq: Previous coursework in ecology or Permission.

**Fish 530 Stream Ecology (3 cr) - Kennedy**

Structure and function of running water ecosystems; principles of population, community, and ecosystem ecology in streams and rivers. Three 1-day field trips reqd. (Fall, Alt/years)

### **Fish 540 Wetland Restoration (3 cr) - Crandall**

This web-based course contains modules covering wetland science, restoration ecology, freshwater restoration, coastal restoration, and monitoring/maintenance. The emphasis is on the science of wetland ecosystems and the applied ecology/practice of restoration, with additional consideration of cultural and socio-political contexts. Extensive readings, an assignment, and a study guide are required for each module. Students apply their learning in and contribute relevant professional experience to weekly online discussions. Students are also responsible for obtaining documentation of at least one wetland restoration site in their region and conducting a site visit in order to evaluate the success of the restoration project. A final exam (re-design of a failed restoration project) is administered online, with partial credit earned through discussion with an interdisciplinary team of classmates and the remaining credit earned through individual analysis and synthesis. (Fall only)

**Prereq:** Permission

### **FISH 550 Ecology & Conservation of Freshwater Invertebrates - Caudill**

**2 credits**

Joint-listed with [FISH 450](#).

The course will survey the evolutionary origins and identification of major groups of invertebrates occurring in freshwaters, examine the key behavioral, morphological, and physiological traits possessed by freshwater invertebrates, identify the key ecological roles and influence of invertebrates in freshwater ecosystems and ecosystem services, and demonstrate how freshwater invertebrates can be used to monitor water quality and ecosystem condition.

Cooperative: open to WSU degree-seeking students. (Spring Alt/yrs)

### **FISH 551 Freshwater Invertebrate Field Methods - Caudill**

**2 credits**

Joint-listed with [FISH 451](#).

The course will survey the systematics and identification of freshwater invertebrates and demonstrate how freshwater invertebrates can be used to monitor water quality and ecosystem condition. Students will collect and identify freshwater invertebrates from habitats surrounding Moscow, Idaho during an intensive field course. The course will occur on one weekend in February and five days of Spring Break. the course has two required field trips. Cooperative: open to WSU degree-seeking students. (Spring Alt/yrs)

**Prereq:** [BIOL 114](#) or [ENT 322](#) or Permission

**Coreq:** [FISH 450](#).

### **WLF 501 (s) Seminar (cr arr)**

Presentation of individual studies on assigned topics – usually thesis proposal. Graded P (pass)/F (fail).

**Prereq:** Permission

**Credits** 1-16 cr

### **WLF 503 (s) Workshop (cr arr)**

Selected topics in the conservation and management of natural resources.

- Matrix Modeling 1 cr – Gilbert (Even Falls)

**WLF 506 External Speakers (1 cr, up to 6)**

Students will attend seminars of fish and wildlife researchers and managers invited to present in our departmental seminar series. Students will read papers of external speakers, lead discussions of papers and assist with hosting speakers. Graded Pass/Fail.

**WLF511 Wildland Habitat Ecology and Assessment (2 cr) - Johnson**

This course integrates theoretical concepts with field sampling related to scientific research, wildlife habitat, and land management practices. Students collect, analyze, and report on ecological data in various formats, and learn specific protocols used by professionals to assess wildlife habitat. Class field trips are required for on-campus students and alternative field assignments will be required for remote, online students. Recommended preparation: REM 252 and REM 253, REM 341, or other plant identification class; introductory statistics course; ability to use excel. Co-enrollment in REM 410 is recommended.

**WLF521 Communicating Science Broadly (2 cr) - Ausband**

Communicating science in a clear, compelling way is critical for being an effective scientist. The purpose of this course is to master techniques that will help students communicate clearly and effectively to a diversity of audiences. This course will focus on developing oral and visually rich products (e.g., infographics, video shorts, research interviews, message boxes) that the students can use to promote their research and science broadly. The course will focus on techniques for clear communication of science regardless of the medium used (e.g., Twitter, vlog, etc.). (Alt/Spring)

**WLF522 Community Ecology (2 cr) - Johnson**

Introduction to literature and contemporary research into processes structuring ecological communities. Topics will encompass community-level patterns and processes in a range of ecological systems at local, regional, and global scales, including community impacts on ecosystem processes. This course is taught in an accelerated format during the last eight weeks of the fall semester. (Fall/Alt/years)

Recommended preparation: Introductory level ecology courses.

**WLF 540 Conservation Genetics (1-3 cr, max 3) - Waits**

Basic principles of population genetics and phylogenetics and their applications to the field of conservation and natural resource management. Taught in three 1-credit modules, and students can register for 1-3 credits. Module 1 includes introduction to conservation genetics and phylogenetics, module 2 includes population genetic theory and methods, and module 3 includes applications in conservation genetics and genomics. Cooperative: open to WSU degree-seeking students.

**WLF 541 Advanced Population Biology (3 cr) -not currently taught**

Readings and discussion of current theories of population control, their biological basis, and applications to animal populations. (Fall, Alt/yrs)

**Prereq:** WLF 448 or Permission

**WLF 543 Fish and Wildlife Population Analysis (4 cr) – not currently taught**

Quantitative analysis of fish and wildlife habitat, diet, harvest, population density, survival, and natality data; development and application of population models in fish and wildlife management. Three lec and 3 hrs of lab a wk. (Fall, Alt/yrs)

**Prereq:** WLF 448, Stat 431 or Permission

**WLF 545 Wildlife Habitat Ecology (2-3 cr) - Rachlow**

Reading and discussion on habitat concepts, analyses, and applications. Students enrolled in the 3rd credit will complete additional readings and quantitative problem sets. Cooperative: open to WSU degree-seeking students.

**Prereq:** WLF 492 or Permission, animal and plant ecology

**WLF 550 Quantitative Analysis of Fish and Wildlife Populations - Long**

2 credits

Contemporary mathematical and statistical models central to fish and wildlife research and management, including capture-recapture, occupancy, resource selection, movement, population, growth, hierarchical models.

Prereq: MATH 160 or equivalent, STAT 431.

**WLF 551 Applied Mixed Effects Modeling - Long**

2 credits

Analysis of complex ecological data with mixed effects models and their various extensions. After a brief review of generalized linear modeling, students will gain practical experience in the use of linear and generalized linear modeling, students will gain practical experience in the use of linear and generalized linear mixed models to analyze hierarchical datasets (continuous, count, binary, etc.) that include inherent serial or spatial autocorrelation. Cooperative: open to WSU degree-seeking students. (Fall, Alt/yrs)

Prereq: STAT 431.

**WLF 552 Ecological Modeling - Falcy**

3 credits

Linear and nonlinear dynamical models of biological systems; computer-intensive introduction to concepts of stability, attractors, bifurcations, chaos; model identification, estimation, and evaluation; applications in aquatic and terrestrial ecological communities.

**WLF 561 Landscape Genetics (2 cr) - Waits**

Landscape genetics is an interdisciplinary field of study that evaluates how landscape and environmental features influence gene flow, population structure and local adaptation by integrating landscape ecology, population genetics and spatial statistics. This course covers applications of landscape genetics that can improve our understanding of ecology, evolution, and management of wild populations. Recommended Preparation: Population genetics or conservation genetics, and multivariate or spatial statistics. Cooperative: open to WSU degree-seeking students. (Spring, alt/even yrs)

**WLF 562 Landscape Genetics Lab (1-2 cr) Waits**

This optional lab course is a complement to WLF561 Landscape genetics and should be taken concurrently. Students will learn to analyze and interpret landscape genetic datasets using a variety of methods. If taken for two credits, students will do a project analyzing landscape

genetic data. Recommended Preparation: Population genetics or conservation genetics, and multivariate or spatial statistics. Cooperative: open to WSU degree-seeking students. (Spring, alt/even yrs)

***Coreq:*** WLF 561