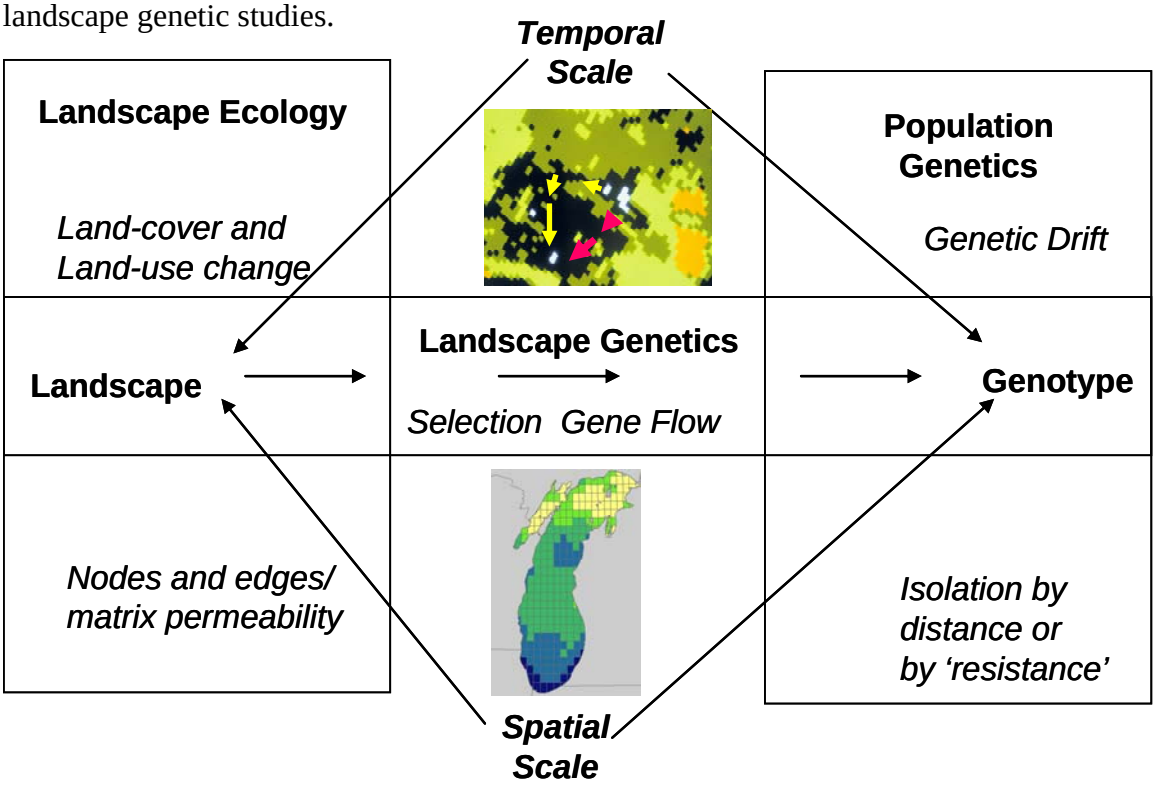
FW893 (Section 2) Landscape Genetics: Integrating Genetic and Landscape Ecological Theory in Conservation and Management

Instructor – Kim Scribner, Dept. Fisheries & Wildlife and Dept. Zoology, scribne3@msu.edu
Time and location: TBA

Landscape genetics is an interdisciplinary field that combines principles and methods from population genetics, landscape ecology, and spatial statistics. One goal of landscape genetics is to describe and explain how landscape attributes related to land-cover, land-use and environmental characteristics affect levels of functional connectivity, using genetic data as a surrogate measure of movements among terrestrial and aquatic plant and animal populations. Landscape genetic data may also inform species management and conservation.

Landscape genetics has tremendous potential for generating new hypotheses about the role of land-cover, land-use and intra- and inter-specific biotic interactions on functional connectivity at the individual and population level. This inter-disciplinary approach to resource sustainability is particularly important at a time when environmental change and transformations of aquatic and terrestrial landscapes present new challenges for the survival of species in coupled human-natural systems.

The goal of this seminar is to bridge the gap among disciplines and inspire discussion and future research in landscape genetics. Rapid advances in our ability to obtain large amounts of molecular genetic data and growth in availability of high resolution landscape data afford many opportunities for inter-disciplinary research and collaboration. Through review of peer-review literature and student-led discussion, the seminar will provide students with background in theory and research methods across the allied disciplines of population genetics, landscape ecology, geography, spatial statistics, ecology, evolution, and phylogeography that are used in landscape genetic studies.



Outline for Landscape Genetics Seminar Course

Weeks 1&2: Landscape Genetics overview, alternative views of landscapes and effects of spatial apportionment of genetic diversity

Week 3: What is genetic diversity and gene flow and how do we measure it? Observing and interpreting current gene flow what, where, how many?

Week 4: Spatial autocorrelation in response and process variables: ecological and genetical contexts

Week 5: Quantifying the organism perspective: movements, percolation, matrix resistance

Week 6: Sampling and the importance of considering spatial and temporal scale

Week 7: Identifying discrete populations

Week 8: Neutral landscape models and null expectations in landscape genetics

Week 9: Model selection and validation

Week 10: Distance-based methods

Week 11: Network-based methods

Week 12: Role of simulation modeling

Week 13: Spatial analysis framework

Week 14: Landscape genetics of adaptive variation

Week 15: class presentations