

Principles and Techniques of Electrofishing

Course #CSP2c01

This class builds knowledge and skills that will enable biologists to increase the standardization and efficiency of electrofishing sampling. Participants learn how to apply electrical circuit and field concepts to various challenges related to sampling, equipment performance, electrode design, selection of suitable equipment, equipment troubleshooting, fish injury, and safety. Important capabilities that will be gained include the ability to

- improve standardized sampling and efficiency by developing power/power density goal settings (power and electric field standardization), manipulating waveform attributes (type, frequency, duty cycle, voltage, etc.), evaluating electrode design and placement; and incorporating efficiency factors in sampling designs and calibration equations;
- evaluate equipment by estimating effective operating range across water conductivities based on equipment specifications, electrode resistance, and power required for successful electrofishing;
- evaluate equipment by considering waveform control, metering, and safety features;
- operate electrofishing equipment safely;
- develop a safety program for staff;
- use a fish injury risk model to assess and minimize electrofishing-induced fish injury;
- investigate the conditions when index or count data (as CPUE) is sufficient for management needs or when index data should be adjusted by capture probabilities;
- describe a process to estimate capture probabilities and how to use these estimates to adjust catch per effort data to abundance estimates; and
- understand and apply concepts presented in the electrofishing literature.

Other related knowledge and skills-

- Describe basic principles of electricity in circuits (circuit theory) and in water (electric field theory);
- List three major voltage waveforms and calculate peak-to-peak voltage, rms voltage, frequency, pulse duty cycle, and power;
- Describe the power transfer theory of electrofishing;
- List the arrangement and functions of the major components of an electrofishing system;
- Describe the use test equipment (multimeters, oscilloscopes) to evaluate electrofishing gear;
- Describe simple equipment trouble-shooting methods;
- Describe desirable features that an electrofishing unit should possess;
- Describe the major types of electrofishing equipment that are currently in use and discuss the capabilities, limitations, efficiencies, and safety features of each;
- Measure electrode resistance and calculate the power, voltage, and current demand on equipment given a proposed electrode configuration and water conductivity;
- Describe the process to map the voltage/power gradient field projected by an electrofishing unit;
- Discuss the effects that various electrode systems have on electric field configuration;
- Use calculated power demand and concepts of electric field pattern to guide electrode design;
- Derive applied power density and voltage tables that allow development and maintenance of desired effective field sizes; and
- Discuss factors affecting electrofishing efficiency.

Learning will be aided by various approaches, including PowerPoint-style presentations, technique descriptions (“job-aids), videos, and Excel software tools. Successful completion of the course is obtained by a score of 80% or higher on the exam. Participants achieving this minimum score or greater will be awarded a course completion certificate.