LA TROBE UNIVERSITY

Centre for Freshwater Ecosystems

Fact Sheet

Electrofishing for Research

What is Electrofishing

Electrofishing involves the use of an electrical current to stun a fish so that it can be caught. Electrofishing devices are commonly used by scientists, managers, community groups and for industry use. The use of electrofishing devices varies greatly, but they are commonly used to conduct fish population surveys and determine abundance, density and species composition. Electrofishing is often favoured over other methods such as netting surveys because it can actively sample large numbers of fish from a range of sizes and can often access habitats that may be difficult to sample using traditional fish survey methods. There are two commonly used electrofishing devices; these are backpack and boat-mounted units.

How is it useful

When electrofishing is used to net fish in a target area researchers are able to handle each fish so that the following data can be collected immediately:

- Species
- Weight
- Length
- Signs of infection
- Presence/absence of pit tags or radio tracking tags

These details help to build an understanding of the fish community: proportions of native and non-native species, age and size distribution of fish, fish habitat preferences and more.

Electrofishing at Research Centre

Researchers at Centre for Freshwater Ecosystems have been using electrofishing technology since 1997. Staff members involved in electrofishing undertakes training in the operation of electrofishing boats and backpack units and are trained in the ethical handling of fish (including disposal of invasive species where necessary). Electrofishing techniques have enabled improved efficiency and consistency for fish surveys, contributing to a growing understanding of the ecology of freshwater fish in the Murray-Darling Basin.

Contact

Centre for Freshwater Ecosystems
P: +61 2 6024 9650
E: cfe@latrobe.edu.au
W: latrobe.edu.au/centre-for-freshwater-ecosystems

Minimising fish stress and injury A study in the US investigated the evidence of electrofishing relating to fish injuries. The study found that injuries sustained by fish from electrofishing are uncommon and almost always healed and very rarely caused immediate or delayed death. Sometimes however, fish may be stressed, injured or fatally injured as a result of electrofishing. Using a direct current (DC) is considered the safest application for fish, but some species such as large salmonids can still be injured by a direct current.

Potential injuries to fish from electrofishing are branding, internal bleeding, ruptured vertebrae and cardiac arrest. Reproductive success and eggs may also be negatively affected. To minimise any stress or injury the fish is removed from the electric field quickly, and low voltages are applied. Safe and ethical handling of fish while they are out of the water is also crucial in minimising harm to stunned fish. Fish are returned to the water as quickly as possible

Effect of fish The effect of an applied electric field on fish can vary greatly between species and different size classes, and also varies depending on the magnitude of the applied field.

There are a number of different physical responses of fish including:

Taxis—induced movement of fish toward the anode.

Narcosis—a state of electrically induced immobility with slack muscle.

Tetany—a state of electrically induced immobility with rigid muscles.

False taxis/ pseudo-forced swimming—induced swimming toward anode but fish is unconscious and usually belly up.

Oscillotaxis—induced movement without orientation in a thrashing motion.

Direct current (DC) is more commonly used during electrofishing than an alternating current (AC) as it gives a more predictable response with less chance of injury to fish. A progressive response that is most commonly seen in fish exposed to direct current is inhibited swimming – taxis – narcosis – false taxis – tetany, followed by recovery.

Electrical properties

Electrofishing works by producing an electric field between positive and negative electrodes in the water. Often the metallic hull of an electrofishing boat serves as the negative electrode while positive electrodes are suspended from the boat. There are three types of currents used; alternate current (AC), direct current (DC) and pulsed DC. Pulsed DC is most commonly used because it uses less power and is more effective than AC. The amount of power produced is dependent on the voltage and current supplied and is usually controlled by adjusting the voltage.

In an electric field the current decreases with increased distance from the electrodes. The effective range of an electrofishing field can be increased by increasing power to the electrodes (i.e. current or voltage).

Electrical conductivity of a waterbody can greatly effect the electrofishing efficiency. Water conductivity is dependent on the amount of salts or ions (charged particles) in the water. A greater electrical conductivity will result in dissipation of electrical charge and hence reduced electrofishing efficiency. Other factors that may effect electrofishing efficiency are temperature, depth and clarity of water.

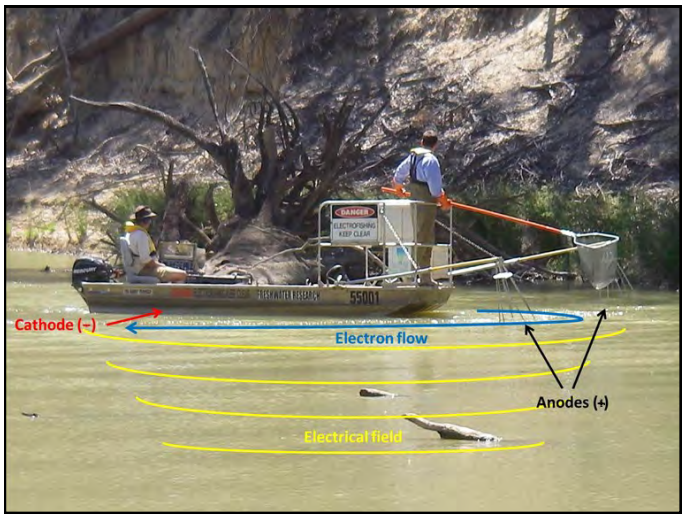

Figure 1. Schematic depicting the electric field generated during electrofishing.

Source document

Snyder DE (2003) Electrofishing and its harmful effects on fish, Information and Technology Report USGS/BRD/ ITR--2003-0002: U.S. Government Printing Office, Denver, CO, 149 p.