

Various Fish Management Tools

- I. Many techniques exist - technological advances are always occurring
- II. Electrofishing
  - A. How it works
    - 1. Generate a voltage gradient (similar to “pressure”)
    - 2. A current results as a function of the gradient (similar to “flow”)
    - 3. Current in the fish causes involuntary muscle contractions and immobilizes it
  - B. What affects the effectiveness of electrofishing
    - 1. Voltage gradient
    - 2. Current
    - 3. Conductance of the water =  $\text{current (A)}/\text{voltage (V)} = \text{ohms or Siemens}$
    - 4. Responses of fish
      - a. Affected by size - large fish span a greater voltage gradient
      - b. Conductivity - if the water is too conductive, the current will flow around the fish
  - C. Types of electrofishing
    - 1. General concept
      - a. Set up a voltage gradient with the gear
      - b. Two types of current are generated
        - (1) AC - alternating current
          - (a) the current changes direction between the electrodes
          - (b) the current from a generator is AC; a battery produces DC
        - (2) DC - direct current
          - (a) continuous DC requires lots of power from a generator
          - (b) AC is converted to pulsed DC
          - (c) The electrodes become anodes (positively charged); the hull of an electrofishing boat becomes the cathode (negatively charged)
    - 2. Benefits and problems with AC and DC
      - a. AC
        - (1) effectively immobilizes fish
        - (2) creates big shocking field
        - (3) fish do not swim to the electrodes
        - (4) higher risk of injury
        - (5) effective in open, clear water
      - b. pulsed DC
        - (1) causes fish to swim toward the electrode (anode)
        - (2) small shocking field
        - (3) fish swim toward the electrodes
        - (4) lower risk of injury
        - (5) effective in turbid, vegetated areas
  - D. Types of electrofishers
    - 1. Boat
    - 2. Stream
    - 3. Shoreline
    - 4. Backpack
- III. Toxicants

- A. All toxicants are regulated by FDA and the EPA
- B. Determining toxicity
  - 1. Lethal concentration 50 (LC<sub>50</sub>)
  - 2. Conduct sets of toxicity experiments; recognize important factors that affect toxicity
- C. Various types
  - 1. Sodium cyanide
    - a. Easy to apply
    - b. 100% effective
    - c. Effect is reversible
    - d. Toxic to applicator
  - 2. Lampricides - sea lamprey in the Great Lakes
    - a. TFM - 3-trifluoromethyl-4- nitrophenol
    - b. Bayluscide (a molluscicide)
    - c. Apply the lampricides to spawning tributaries
    - d. LC<sub>50</sub> is very low for lamprey
  - 3. Antimycin
    - a. Interferes with cellular respiration
    - b. Not temperature-sensitive
    - c. Non-reversible
    - d. Very selective
    - e. Expensive
  - 4. Rotenone
    - a. Plant toxin from *Derris* or *Lonchocarpus*
    - b. Disrupts cellular respiration
    - c. Non-reversible effect
    - d. Temperature-dependent
    - e. Remains in environment for short time; only during warm temperatures
    - f. Cheap
- IV. Anesthetics
  - A. Carbon dioxide
  - B. Clove oil
  - C. MS 222
  - D. Quinaldine
- V. Tagging and marking
  - A. Important characteristics of tags
    - 1. Retention
    - 2. Recognition
  - B. Why tag?
    - 1. Provide information about individual or groups of fish
    - 2. Provide information about population (e.g., density estimates)
    - 3. Track movement
  - C. Potential problems with tagging
    - 1. Mortality/stress of handling
    - 2. Mortality following release
    - 3. Tagging modifies behavior or growth in the field
  - D. Types
    - 1. External
      - a. Clipping/branding
      - b. T anchor tags
    - 2. Internal

- a. Visible implant tags
- b. Coded wire tags
- c. Passive integrated transponder (PIT tags)
- 3. Chemicals
  - a. OTC - oxytetracycline
  - b. Other methods
- 4. Genetic
- 5. Telemetry
  - a. Radio
  - b. Acoustic