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Portable Floating Electrofishing Unit for Fish Collections in Freshwater Stream Systems

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Abstract.—Fish collection can be difficult if the stream being sampled is too deep for backpack electroshockers and does not allow boat access. A design for a portable, flat-bottomed, floating electroshocking unit is described. The unit consists of a one-piece, structural-foam big-wheel cart from which the wheels and stand were removed. In tests, the unit was able to float loads weighing up to 90.8 kg. The total weight of the unit with the electronics and generator installed is approximately 68.1 kg, which allows two persons to transport the unit to a stream and lift it over shallow riffles and log jams. The unit allows sampling of stream pools that can be waded and provides greater mobility and less fatigue for the sampler carrying the anode and cathode poles. Due to its larger electrical field, this unit offers greater sampling distance than backpack electroshockers. The total cost, including the electronics, anode and cathode poles, and generator, was about US$3,800.

Backpack electroshocking has proven effective for fish collection in freshwater streams. When deep pools (1–2 m) are encountered, however, backpack units have several limitations. Such units usually produce a small, weak electrical field (Reynolds 1983) that restricts them to shocking in shallow areas and prevents the capture of fish at the bottom of the pools. Larger fish also avoid the electrical field. Although various designs for electrofishing boats and rafts are available (Reynolds 1983; Stangl 2001), these tend to be too large for use in small to intermediate streams. Our design allows users to sample wadeable streams that are too deep for backpack units yet do not allow access for a shocking boat.

The unit (Figure 1) consists of a Rubbermaid Big Wheel cart (147 × 85.9 × 68.6 cm) that can be found at any hardware store. The advantages of this cart are that it is constructed of one-piece molded heavy-duty structural foam with an integrated molded handle, it has a flat bottom, and it is capable of floating up to 90.8 kg. The only modification to the cart was to remove the wheels, axle, and rear stand. These were then attached to a plywood board (91.44 × 63.5 × 1.27 cm) in order to transport the assembled unit. The large wheels (52.07 cm in diameter) allow for transport of the unit over rugged terrain (Figure 2).

The electroshocking components were obtained from Smith-Root, Inc. (Vancouver, Washington) and consist of a Model 1.5KVA Electrofisher control box (17.69 kg), a pair of anode and cathode poles with positive-activated switches, and a pair of 25-ft (7.62-m) extension cables. These items comprised the bulk of the expense of the unit, at US$3,292. Floats were added to the extension cables to increase their visibility in the water, avoid entanglement, and prevent accidental tripping by the samplers. The floats consist of cylindrical expanded foam (3.8 cm in diameter × 10.2 cm long) with a slit cut to provide wire access and are attached with vinyl tape. Power is provided by a Coleman Powermate Pulse 1850 portable generator. This generator is rated at 1,500 W and was selected based on size (46.99 × 31.75 × 41.91 cm), weight (30.84 kg), and portability. The only modification to the generator consisted of the addition of a metal vertical exhaust deflector. The generator is placed atop a plywood stand (50.8 × 30.5 × 10.8 cm) in the front of the cart to provide a dry area (10.8 cm) in the event the cart takes on water (Figures 1, 3).

The Model 1.5KVA Electrofisher control box is suspended in the back of the unit by means of a frame (62.23 × 28.58 cm) fabricated from double-thickness perforated metal duct straps (Figure 3). The support frame is suspended with 1½-in (3.8-cm) pipe hangers and ¼-in (0.64-cm) lag bolts. This allows for fine adjustments to the tilt of the support frame. An L-shaped bracket placed midway in the front of the frame prevents the control box from sliding. The control box is held in place with two rubber elastic (bungee) cords. This installation allows the person steering or controlling the unit full access to the instrument panel. Other advantages of the design are that all components are easily removed, transported, and assembled on

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FIGURE 1.—Photograph of the assembled portable floating electrofishing unit. Mounted wheels are visible to the right of the unit.

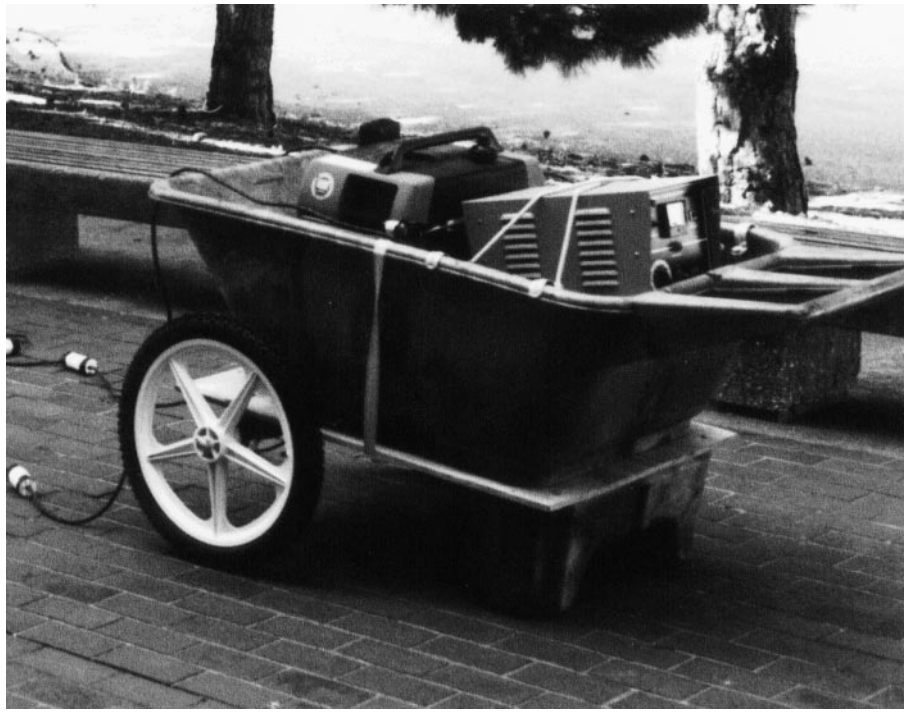

FIGURE 2.—The electrofishing unit placed on top of the mounted wheels for transport. The unit is held in place by a ratcheting strap.

FIGURE 3.—View of the control box suspension frame and generator stand inside the cart.

site. By adjusting the placement of components in the cart, a balanced load can be achieved. Electrofishing guidelines on operation and safety as described by Reynolds (1983) were followed.

The electrofishing unit was used in stream depths ranging from shallow (0.5 m; Figure 4) to wadeable deeper pools (1.5 m). Collected fish were kept on shore in buckets with battery powered aerators. An observed increase in the number and size of fish sampled from deeper stream pools indicated that the unit was more effective than conventional backpack shockers. The increased power over backpack shockers allows for a larger sampling range. The lack of a backpack allows the sampler carrying the anode and cathode poles greater mobility and safety and less fatigue, and the 25-ft electrode extension cords allow for broader sampling areas. The overall weight of the unit is about 68 kg, which allows two persons to transport the unit to a stream and to lift it over shallow riffles and log jams. The total cost, including electronics and generator, was about $3,800, and total construction time was approximately 3 d.

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FIGURE 4.—The unit in operation. This photograph was taken prior to the addition of electrode wire floats.

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