THE ROLLER-NET: A NEW MARINE SAMPLING GEAR

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Abstract: The roller-net, a new fisheries sampling gear incorporating features common to the pushnet and bag seine, is described. The roller-net is compared with nearshore gear types, including pushnet, bag seine, and minnow seine, in beachfront, grassbed, barren sand-shell, and soft organic substrates. The roller-net is effective in sampling nekton from grassbed and barren sand-shell substrates, but ineffective in characterizing beachfront and soft organic substrates.

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The pushnet equipped with rollers (Strawn 1954) has been a favored method of obtaining qualitative fisheries data from grassbed environments. The pushnet enables the collector to sample nekton inhabiting dense vegetation, minimizes destruction of delicate grassbed substrates, and is difficult to clog. Although the pushnet enables capture of small, cryptic species such as seahorses, pipefish and gobies, its single plane of netting and small surface area allow larger, more mobile fishes to avoid entrapment.

This paper describes the "roller-net", a modified bag seine-pushnet complex designed for increased efficiency in sampling nekton from grassbeds and other delicate substrate environments.

MATERIALS AND METHODS

Roller-net design (Fig. 1) incorporates the addition of wings, a larger bag, and extra rollers to the pushnet introduced by Strawn (1954). The roller-net consists of a rigid 1.2 x 1.7 x 9.9 m weighted, PVC frame supporting four 3.2 cm (inner diameter) PVC rollers spaced 38.1 cm apart. Wings (3.1 x 1.2 m and 0.6 cm square mesh) equipped with braille poles and float-and-lead lines were attached to the front of the frame. A 0.6 cm square mesh bag was affixed to the sides of the frame and extended as a cod-end for 2.3 m.

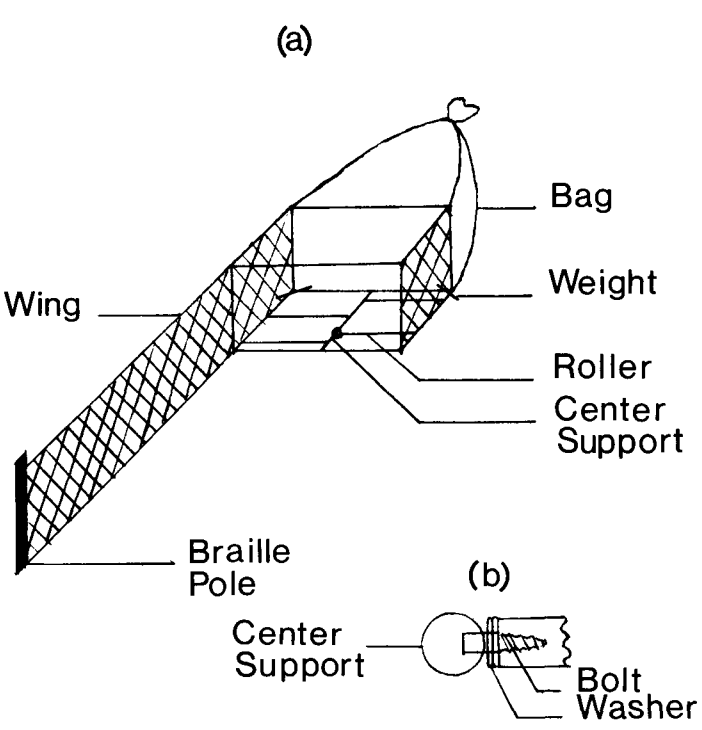
The roller-net and other nearshore sampling gears were deployed simultaneously in a variety of substrates to compare sampling efficiencies. The roller-net and a non-bag pushnet (1.7 x 1.2 m frame fitted with 0.6 cm square mesh netting) were fished during the day in comparable areas from grassbed and sand-shell environments, and again at night in the grassbed environment. A 9.1 m (0.6 cm square mesh) bag seine, a 1.6 m minnow seine (0.6 cm square mesh), and the roller-net were tested over comparable areas of soft organic substrate. The bag seine and roller-net were fished with wings extended so that the distance between braille poles equalled the bag aperture. Wave action along the beachfront rendered deployment of the roller-net and pushnet in this habitat ineffective.

Four replicate samples per net were taken through a 30 m horizontal column of water at each sampling site. Only ichthyofauna was retained at daytime grassbed and sand-shell substrate sites while all nekton was retained in nighttime grassbed and daytime organic substrate samples.

Catch data from daytime grassbed and sand-shell substrate sites were used to compare number of species, number of individuals, and biomass of ichthyofauna taken in the roller-net and non-bag pushnet. Similar comparisons were made for fishes and invertebrates taken in the roller-net, bag seine, and minnow seine at the soft organic substrate site.

RESULTS

The roller-net, when compared to the pushnet in grassbed and barren sand-shell substrates, yielded higher catch rates. Mean catch of fishes in the roller-net and pushnet



during daytime grassbed sampling was 62.3 individuals and 55.5 g and 0.3 individuals and 0.1 g, respectively. The roller-net yielded 12 species of fish and the pushnet 1 species.

Nighttime grassbed sampling yielded a mean catch of 179 individuals and 200.4 g from the roller-net and 44.8 individuals and 35.3 g from the pushnet. Total catch of invertebrates in the roller-net was over twice that of the pushnet while biomass was almost equal. Total number and biomass of fishes taken by the roller-net was 8 and 15 times, respectively, that taken by the pushnet. The roller-net yielded 11 invertebrate and 17 fish species as compared to a pushnet catch of 11 invertebrate and 10 fish species.

Mean catch of fish for the roller-net and pushnet in barren sand-shell substrates was 135.5 individuals and 37.6 g and 0.8 individuals and 0.05 g, respectively. Five species of fish were collected by the roller-net and 2 species in the pushnet.

The bag seine deployed in soft organic substrate yielded a greater mean number (312 individuals) and biomass (610.9 g) of fishes and invertebrates than did the roller-net (114.3 individuals and 135.6 g) and minnow seine (58.7 individuals and 111.8 g). Total number of invertebrates yielded by the roller-net was approximately half that taken by the bag seine and nearly equal to that taken by the minnow seine. Invertebrate biomass in roller-net samples was less than that in bag seine or minnow seine samples. The number of invertebrate species caught in bag seine, roller-net and minnow seine was 9, 6, and 6, respectively. Total number of fish from roller-net samples was nearly one-third the number netted by the bag seine but more than seven times the total taken by the minnow

seine. Fish biomass captured by the roller-net was nearly one-sixth that sampled by the bag seine and over 4 times that in the minnow seine. Numbers of fish species yielded by the roller-net, bag seine, and minnow seine were 11, 15, and 6, respectively.

DISCUSSION

Addition of wings and a larger bag to the roller frame modifies the standard pushnet into an encompassing gear. With these modifications the roller-net encompasses an increased surface area, lowers net-avoidance by reducing pathways of escape and, in turn, produces higher catch rates than does the pushnet. Incorporating extra rollers to the roller-net also may have enhanced sampling efficiency by increasing substrate disturbance.

Roller-net deployment requires at least 2 workers, while the pushnet may be operated effectively with 1 or 2 workers. The pushnet tended to float during normal operation and, on softer bottoms and in stronger currents, became difficult to push. The roller-net maintained contact with grassbed and sand-shell bottoms due to the weighted frame. The roller-net did not appear to be adversely affected by softer portions of grassbed and sand-shell substrates or by stronger currents. The roller-net, in present design, is ineffective in soft organic substrate due to frequent bogging of frame and rollers.

Wave action, which tossed and subjected the frame to excessive structural stress, rendered the roller-net inappropriate for sampling beachfront environments.

LITERATURE CITED

Strawn, K. 1954. The pushnet, a one-man net for collecting in attached vegetation. Copeia 3:195-197.