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A NEW RADIO LINK TELEMETRY POSITIONING SYSTEM

EXPERIENCES FROM TRACKING OF FISH AND CRUSTACEANS

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ABSTRACT

Telemetry positioning systems based on hydrophone arrays have been used for different tracking applications. The main improvement of this new system is the wire-less transmission of signals from hydrophone - radio buoys to the receiver unit. The system is briefly described, some results from different applications are given, and the possibilities, advantages and limitations of the system are discussed.

INTRODUCTION

Remote monitoring and tracking by ultrasonic- or radio telemetry is widely used in studies of animal behaviour (Priede and Swift 1992). Such behaviour studies of marine animals are basically done either by mobile tracking methods (signal reception by directive hydrophones, which give a bearing to the tagged animal) or by stationary arrays of omnidirectional hydrophones, where the position of the tagged animal is calculated based on time differences

,nal reception by the hydrophones (e.g. Hawkins et al. 1974; Glass et al. 1992; Urquhart & Smith 1992; Bjordal and Johnstone 1993). These fixed hydrophone arrays have so far been based on signal transmission by cable from the hydrophones to the receiving unit. This paper gives a short description on a new stationary tracking system (VR-20 Buoy Positioning System, VEMCO Ltd., Halifax) with radio transmission between hydrophone/radio buoys and the receiving unit, including examples from tracking of Norway lobster (*Nephrops norvegicus*) and cod (*Gadus morhua.*)

TAGGING EXPERIMENTS

The radio buoys and hydrophone arrangement is shown in Figure 1. The receiving unit was mounted on board the R/V "Fjordfangst", moored outside the hydrophone array when studying natural behaviour.

Norway lobster

Tracking of Norway lobster (20-22 cm total length) was done at 30-40 m depth in the Nærøyfjord, from 15 February to 4 March 1993. Norway lobsters were caught by baited pots. The tags were attached to the dorsal carapax by epoxy glue, and the lobsters were released in the same area as they were caught. After 10 days of tracking the animals under natural conditions, two baited pots were fitted with acoustic tags to observe response to the gear.

Figure 2a and b are result display examples, showing the movements of two lobsters - one (N1) being attracted to the pot (and captured), while another (N2) did not seem to be affected by the bait odour.

Cod

Tracking of cod was carried out at approximately 60 m depth in the Ramfjord from 28 August to 16 September 1993. Cod were tagged at 60 m depth by allowing cod to ingest transmitters put inside baited nylon bags. Tagging was observed by underwater TV. As an

example of the tracking under natural conditions, the movements of one cod (approx. 60 cm length) at day and night are shown in Figure 3a and b.

Reactions of tagged cod towards vessel and trawl during bottom trawling were also studied. During these experiments, tags were mounted to the trawl doors and the trawl. The positioning system provided good observations on reaction distance of cod to the vessel and the trawl, change in swimming direction as the trawler approached the fish, and differences in the response to vessel and trawl between day and night.

DISCUSSION

The positioning system gives the possibility to study behaviour of single fish and crustaceans under natural conditions, i.e. study the change in behaviour with change in environmental factors as light, current, temperature, etc., and to study the behaviour of single fish and crustaceans towards different fishing gears.

The main advantage of the new positioning system is the easy handling of the hydrophone /radio-buoys when settingn up an array as compared with cable-based system. Further, it is also much simpler to move the hydrophone array according to the movements of the tagged animals. Although the system easily can be moved, it is still limited to observations of animals that stay within a relatively restricted area.

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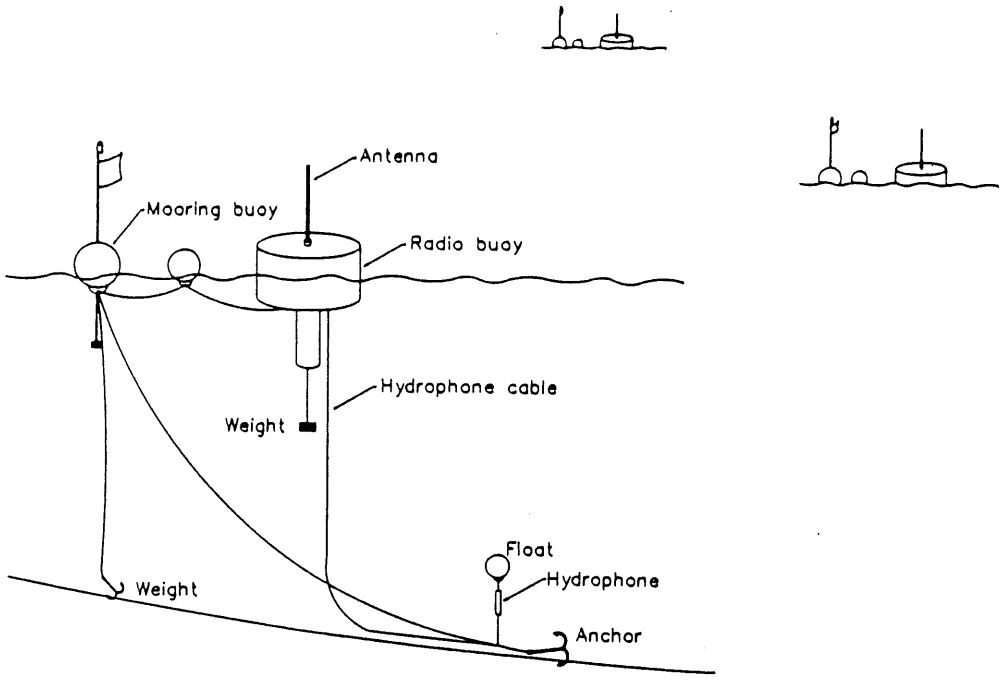


Figure 1. Scetch of hydrophone/radio-buoy arrangement

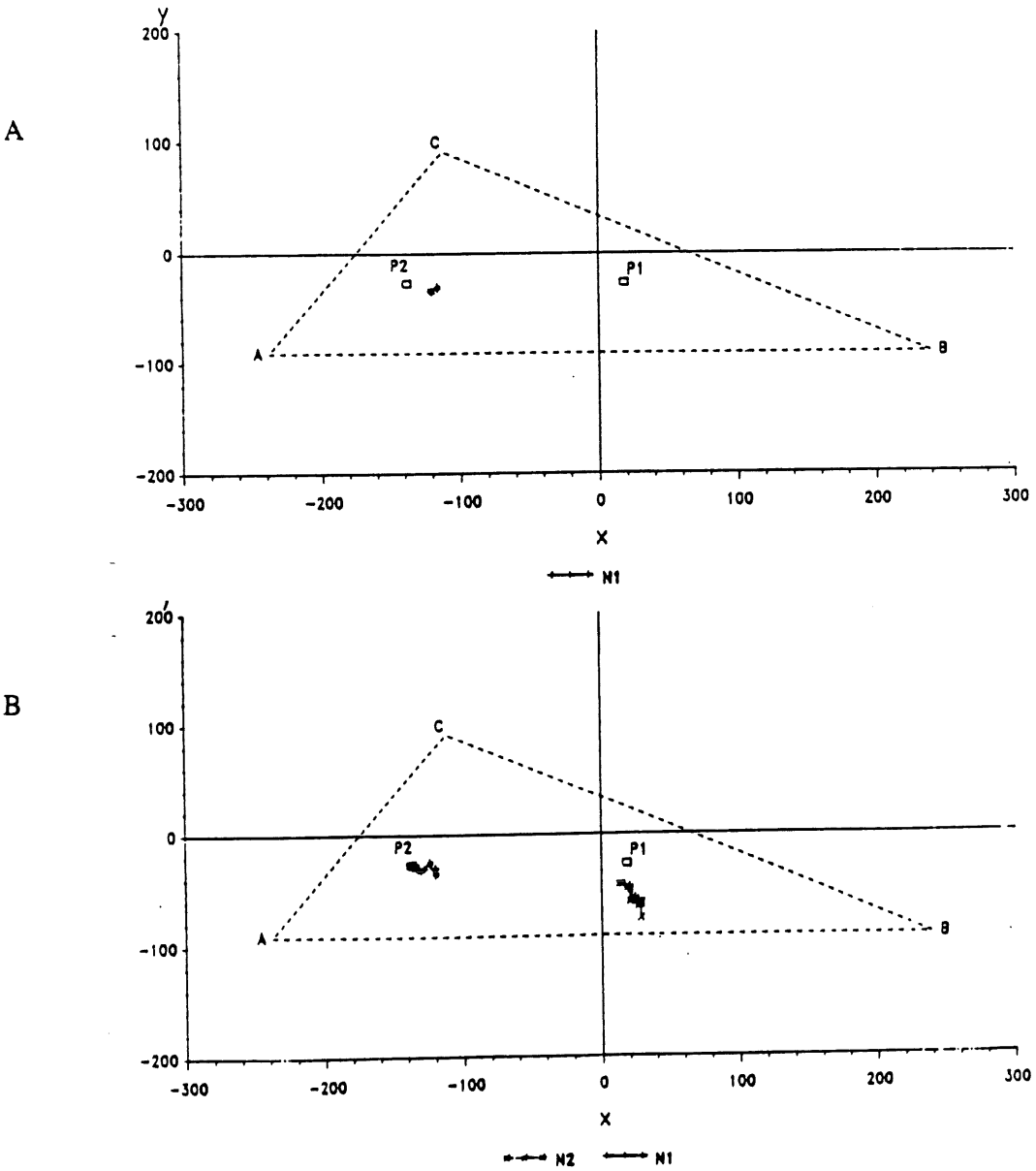
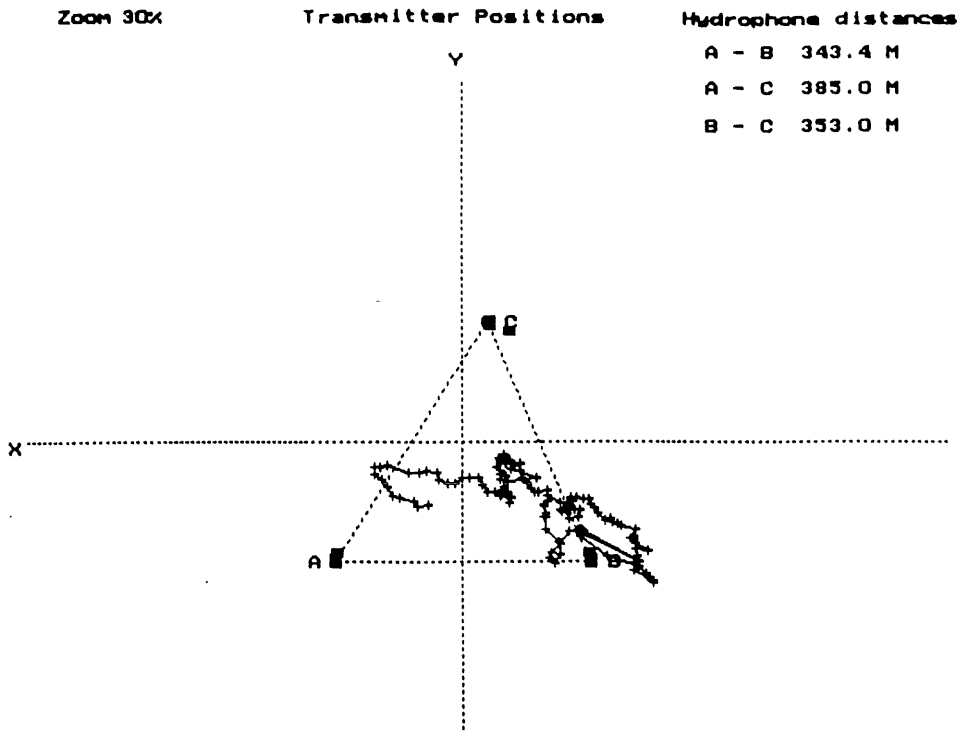


Figure 2. Position of baited pots (P 1 and P 2) and movements of Norway lobsters (N 1 and N2) 03 March 1993. a) 1730-1800 hrs, b) 1800-2300 hrs: Movement of N1 (towards pot P 2) and N2 around burrow.

A



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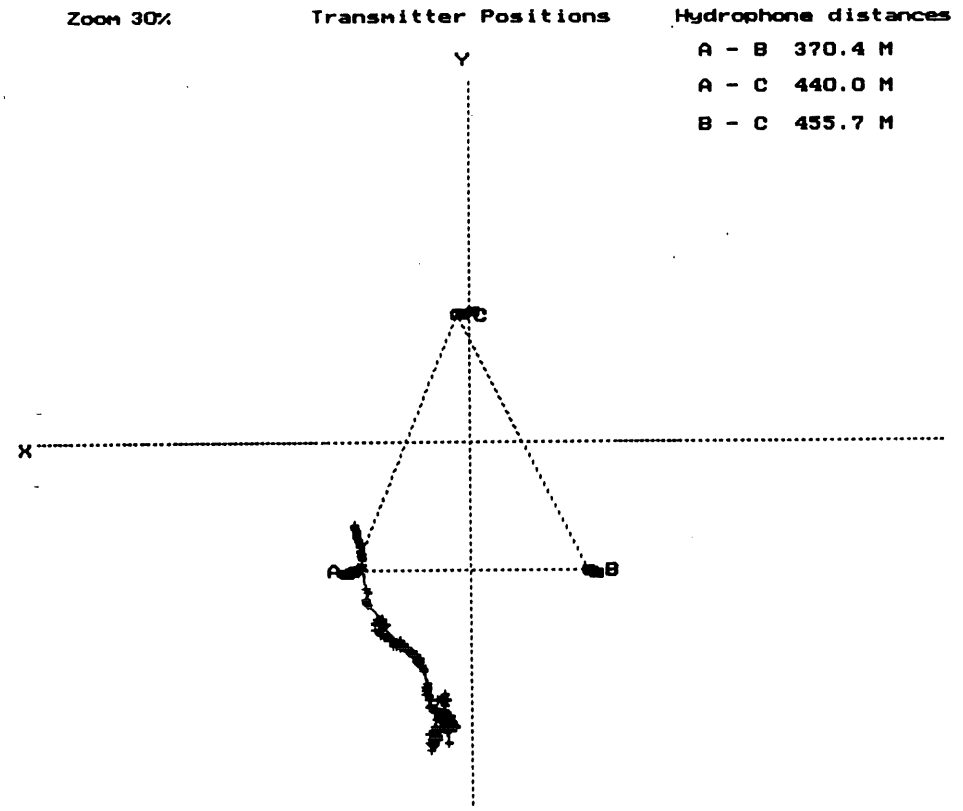

Figure 3. Movements of one cod (+) between 1700 and 2100 hrs (A) and 2200 and 0200 hrs (B).