BARAS, E., OVIDIO, M., BIRTLES, C. (1997). Effect of sub sampling data sets of daily radio locations on the identification of mobility patterns of freshwater fish: trade off between accuracy and cost effective tracking strategies. p.5 In *Abstract book of the Second conference on fish telemetry in Europe*. La Rochelle (France), 5-9 April 1997.

Abstract

Selecting an optimum sampling frequency is a key problem in fish telemetry studies. High frequency positioning gives an accurate idea of the actual mobility pattern of the animal but may be impossible due to environmental constraints, prohibitive cost or when using long life transmitters operating on duty cycles. Low frequency positioning may prove effective, but only for a minimum loss of accuracy (i.e. decrease in the estimates of home range or mobility). This paper analyses the respective benefits and limitations of the 'high cost-high return' and 'low cost-unknown return' strategies. It is based on a day-by-day tracking study of the cyprinid fish *Barbus barbus* (L.) in Belgian waters (River Ourthe, seven fish, 112 tracking days each), and re-examines the estimates of home range and distance travelled, as if the fish had been located at longer time intervals (2–28 d). The estimates are compared to the original data set, in order to quantify the resulting loss of accuracy, and to provide predictive models for future studies.

Increasing the time interval between successive locations from 2 to 28 d introduced losses of accuracy, which were higher for mobility (21.1 to 70.0%) than for home range estimates (0.5 to 35.3%). Based on cost-effectiveness, the rationale for tracking *B. barbus* was determined as once a week. This positioning frequency produced consistent home range estimates (5% of inaccuracy) but rather poor estimates of mobility (circa 40% of inaccuracy). A simple predictive model of loss of accuracy depending on time interval, and a multiple regression model, integrating the heterogeneity between subsamples, were generated and tested with an independent data set. Both substantially reduced the inaccuracy of estimates (from 39.4 to 14.1% with 7 d intervals and from 19.7 to 5.7% when using four parallel subsamples at 7 d intervals).

These results clearly indicate that positioning fish at intervals longer than one day always generates a bias, but may prove effective, at least when the resulting inaccuracy can be predicted and (partly) corrected. The analysis and proposed predictive models open promising perspectives for long term studies relying on the use of transmitters operating on duty cycles (e.g. reproductive homing, role of experience on behaviour, ...).