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Ecological Studies on a Moor Frog population in Southern Sweden

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Below follows a summary of my studies on the Moor Frog (*Rana arvalis*) in the Revinge area (55 ' 40 N, 13 ' 30 E) in southern Sweden (LOMAN 1978a, 1978b, 1979, 1980, 1984 and unpublished manuscript). Data on density fluctuations, movements and adult growth were all obtained in one study plot, 50 x 50 m, where a capture-recapture program was carried out during the summers 1972 to 1976. Data on habitat choice, food, activity pattern and juvenile growth (size frequency distributions) were obtained from several samples in the Revinge area (4000 ha). Moist meadows, moist deciduous forests and small ponds are abundant in this area (a military training field), making it ideal for frogs. Also Common Frogs (*Rana temporaria*) and Common Toads (*Bufo bufo*) are frequent in this area. Natterjacks (*Bufo calamita*) and Spadefoot Toads (*Pelobates fuscus*) are also found.

Habitat choice

Adult Moor Frogs were mainly found in the meadow habitat (48 in a sample of 49). In contrast, Common Frogs were more equally distributed on meadow and forest habitat (57 in a sample of 76 were found in meadows). In thick vegetation Moor Frogs were often found perched in grass and herbs. This tendency was more marked for them than for Common Frogs; mean perch height was 15 cm and 11 cm respectively.

Growth

The frogs bred from a size of about 40 mm (snout — urostyle). The interpretation of the size-frequency distribution of subadults suggests that they reach this size at an age of three years. There was, however the indication that some females postpone breeding for one year, even if they contain mature ova. Adult frogs grow at a decreasing rate and probably cease growing altogether at a size of about 54 mm.

Food

Moor Frogs feed on a wide range of terrestrial invertebrates. The food composition was almost identical with that of Common Frogs. Food items could be identified in the stomach of frogs for about 24 hours after ingestion. Investigation of frogs caught and killed at different times on the day did not reveal any marked periodicity in feeding activity. Juvenile frogs (in their first summer, mean weight 0,88 grammes) consumed, on average, 37 mg food per 24 hours. Adult frogs (in their third summer, mean weight 12,1 grammes) consumed, on average, 154 mg food per 24 hours.

Annual and daily activity pattern

The results of pitfall captures suggest that juvenile Moor Frogs were more active by day than at night, while the opposite applies to adult frogs. There was, however, a slight decrease in adult activity around midnight. The adult activity pattern was confirmed in laboratory studies with an actograph. Locomotory activity increased when it rained. Activity decreased in October but some specimens, both juveniles and adults were captured throughout the winter.

Density and survival

Density of adult frogs in the study plot varied between 140 and 700 individuals per ha in the five study years. These density values were obtained from capture-recapture. Comparison of the catch-per-effort in this study plot with that at other meadow sites in the surrounding suggests that these

densities were fairly typical. Indirect evidence suggests that density in one year was associated with the conditions for breeding and larval survival three years before (when the numerically dominating class of first-year adults metamorphosed). Yearly survival was roughly 60 % for adult frogs. A comparison of the mortality and density of frogs in the Revinge area with information on frog predation and feeding rate of predators suggests that predation was the main cause of mortality.

Movements

Recapture data suggest that during the summer most frogs stay in a restricted home range, the size of which was computed at 260 qm. The proportion of frogs recaptured after one year suggests that all adult frogs return to the same summer home range every year. The distance between successive capture sites in one year was 6,8 m and between capture sites in different years 6,5 m, confirming the use of the same home range in different years.

Zusammenfassung

Ökologische Untersuchungen an einer Moorfroschpopulation in Südschweden

In Südschweden wurden mehrjährige Untersuchungen über Siedlungsdichteschwankungen, Ortsbewegungen, Aktivitätsmuster, Habitatwahl, Nahrung und Wachstum des Moorfrosches durchgeführt. Die Siedlungsdichte der adulten Tiere schwankte in 5 Untersuchungs Jahren zwischen 140 und 700 Individuen pro ha. Adulte Moorfrosche hielten sich vorwiegend in Wiesenhabitaten auf. Die Geschlechtsreife wird meist im Alter von 3 Jahren erreicht. Jungtiere sind mehr tagaktiv, Erwachsene dagegen mehr nachtaktiv. Die meisten Frösche leben im Sommer in einem eng begrenzten Gebiet und sind dabei sehr ortstreu.

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