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Title: Seasonal variation in the diurnal periodicity of activity of the perch, Perca fluviatilis L.

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Seasonal variation in the diurnal periodicity of activity of the perch, Perca fluviatilis L.

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Translated by: T. Armitage.

The most common catch of the amateur angler is the perch and it is the diurnal periodicity of activity (& catchability) which is examined in this study based on earlier articles and manuscripts by the authors.

Of all environmental factors, variation in light and temperature are the chief reasons in establishing the times of activity periods.

Methods

The winter activity was studied at Paijanne by winter angling during the years 1967 - 1971. 50 study days in all.

Spawning activity was studied in the Kuusamo area for 5 consecutive days in 1971. A cage'trap' was used for sampling and the study area was the Ylempi Hiidenlampi lake.

Summer activity was also studied in a few small lakes in Kuusamo, at Oulanka river and at Kiutajarvi lake during 1968 - 1970. Number of sampling days per month were: 7 in June, 17 in July and 9 in August, 33 in all. Fishing was done by a cage and by net, both methods giving similar results. In August, activity of the perch was also examined in an artificial pool. In the experiment, fish were active at the same times of the day that catches were highest in the cages.

Autumn activity was studied in Kuusamo on 4 days during September - November 1972. Fishing was done by net.

Feeding periods in the winter.

In mid-winter fish were feeding at mid-day. In February the feeding period was longer, but otherwise similar. In March the morning feeding

period occured a little earlier and also there was another feeding period in the evening. During April the morning activity peak decreased and the evening one increased, activity was then typically two peaked. This trend continued in May and resulted in a weak morning feeding period and strong evening one. At this stage, part of the ice along the shore had melted.

During the winter months the feeding periods generally lasted a few hours in a day. As there can be no significant variation in water temperature under ice, light must be the deciding factor in establishing the times of feeding periods.

The spawning perch are more active than the non-spawning perch.

During the spawning season, 80% of the non spawning, small fish, were caught between 1800 and 0300 hrs. The greatest numbers being caught between 2100 - 2400 hrs. Since the most active feeding time, in May, occured at 1800 hrs, the shift to later feeding hours must have continued in June.

The spawning fish of a small lake were found in the cages at all times of the 24 hours period but a slight increase was observed at 2100 hrs but the activity pattern was mainly non-synchronous. Roe was discharged at any time of the day. However, in the very clear-watered Ruoppilampi (small lake) the spawning perch were only caught between late evening and mid-night.

Activity in the summer

In the clear-water lakes, after spawning, the activity was clearly concentrated into the evening and mid-night hours. At these times i.e. between 2000 and 2400 hrs, 2/3 of the day's catch was caught, therefore the mature perch, after spawning show almost identical activity patterns as that of the immature fish during the spawning season. Signs of change in the periods of activity appeared at the end of the month.

In July this change resulted in activity patterns peculiar to this

month. The catches were greatest in the afternoon and evening with a minor peak also in the morning. In the main, activity was non-synchronous. This was confirmed by the fact that although peaks did occur in the numbers of fish caught, the peaks occurred at different times from day to day. On many days no peak occurred, but more often 2 or 3 did at the times mentioned above. Same results were obtained by Lehtonen and Merivesi using various methods of fishing.

In August the number of fish caught was greatest at sunset and at sunrise. Evening activity was dominant, since this was observed on more days than morning activity. When one activity period faded out, it usually was the morning one. During the latter two weeks of the month the fish were not active at mid-night. Also the period between 0800 - 1600 hrs was quiet. This type of activity pattern was also observed in laboratory experiments (Alabaster & Robertson).

Autumn Activity

In September the pattern of activity was similar to the August one except that the morning peak occurred slightly later and the evening one occurred earlier i.e. at 2100 hrs.

In October the two peaked pattern continued, greatest activity occurring at 1800 hrs. The morning peak had shifted later and so the two peaks of activity occurred closer to one another.

In November the perch were active only during the 5 hours of day light, with only one peak in activity. The activity pattern was similar in December.

Synchronized, non-synchronized and inversed periods of activity.

As can be seen from the above, the diurnal periodicity of activity varies according to the time of year.

In mid-winter activity occurs during the few hours between sunrise and

sunset. In the summer, the immature fish, during spawning season, and all fish after spawning,were active for a few hours between the late evening and mid-night. In both cases the activity pattern is synchronized with one peak. Since the peaks occur at opposite ends of a 24-hour period, the activity patterns are inversed. The shift from day activity to night activity occurs in the spring.

The synchronized activity pattern is also demonstrated by the distribution of the number of fish caught per 24-hour period during the spring and autumn. In both cases the activity pattern was two-phased, with one peak occurring at sunrise and the other at sunset.

In June, during the spawning season, fish were caught in the cages and roe was discharged at all times of day and night, and although a minor peak occurred in the latter half of the day, the activity pattern was basically not synchronized. A similar pattern occurred in July. The non-synchronous nature of the activity was also demonstrated by the fact that peaks occurred at varying times on consecutive sampling days.

Light, temperature and activity.

The time of day in which the fish may be active is dependant on its ability to sense changes in the external environment. Its adaptation to light is the reason for day-activity in the winter, and also accounts for the fact that hardly any activity occurs between sunset and sunrise when this period exceeds 6 hours. Although requiring sufficient light for activity it is presumed that the light should not be too intense. This would explain, that when peaks in activity do occur, they occur at the times of sunrise and sunset, especially at sunset.

During the spawning season, not even the intense mid-day light inhibits activity. Obviously the instinct to reproduce is stronger than the inhibiting effect of the very bright light.

In July the nonsynchronized activity pattern is probably due to

higher temperatures, since the light conditions are similar to that of May. In pokilotherms, such as perch, increase in activity is generally related to temperature rises.

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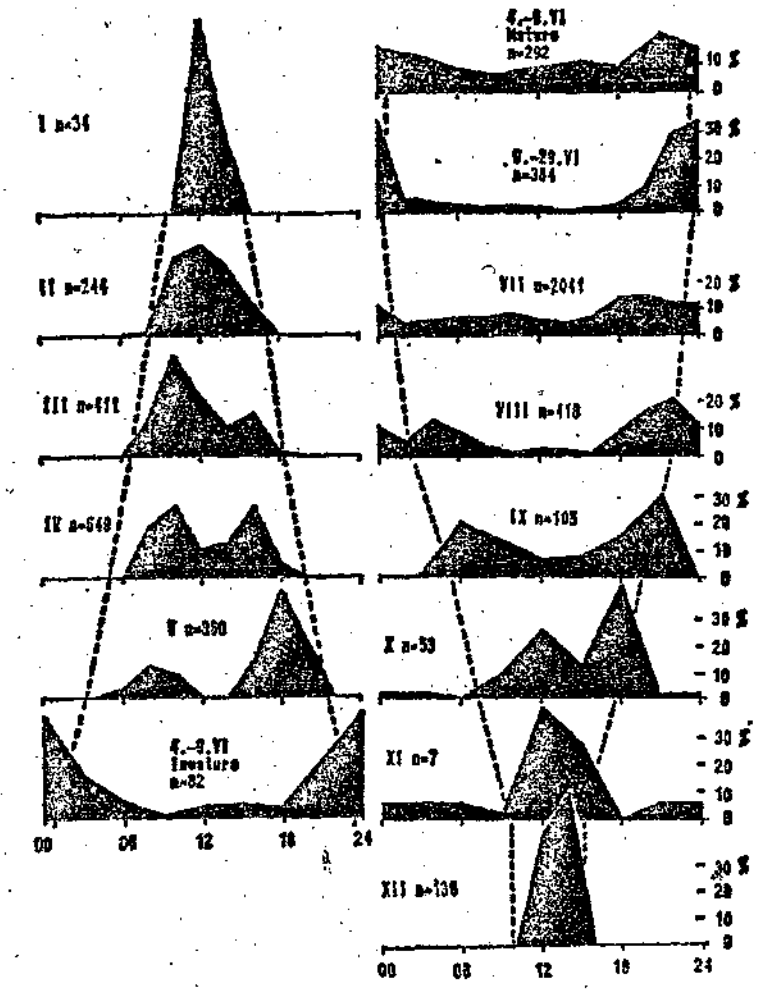

The variation in numbers of perch caught per 24 hours at Paijanne lake during December - May (XII - V) and at Kuusamo lakes and at Oulanka river during June - November.

y axis on the right shows the distribution of each month's catch/ 24 hrs. On the left and in the middle are given the month (in Roman numerals) and the number of fish caught. Broken line shows the times of sunrise and sunset. x axis hours GMT.

Notice

Please note that these translations were produced to assist the scientific staff of the FBA (Freshwater Biological Association) in their research. These translations were done by scientific staff with relevant language skills and not by professional translators.