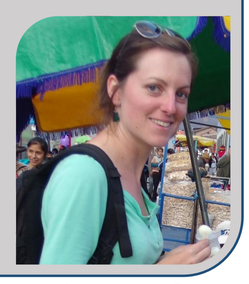
Sciaenops ocellatus: Daily and seasonal sound variation during spawning in aquaculture.



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Sciaenops ocellatus: the red "drums"

The red drum, males of the sciaenid ***Sciaenops ocellatus*** make sounds during reproduction. Since the 80's, this species is farmed in aquaculture for research and commercial purposes.

Sound recordings in captivity

Fish sounds were recorded at the Research and Aquaculture station of Ifremer (Martinique) during an artificial reproductive period (summer 2015) with a Digital Spectrogram Long-Term Acoustic Recorder (DSG). Hydrophones were placed in 3 tanks. The first housed a group of fishes (N♂=12, N♀=8) and the other each had 1 ♂ / ♀ couple. A period of 1 min 30 has been recorded every 30 minutes during 3 months for the group, and 19 and 11 days for each couple.

Objectives:

1) Characterize the sound production in *S. ocellatus* during a spawning season in aquaculture

2) Understand the role of sounds in the reproduction.

Sounds are mainly produced at night

Sound production shows a **day/night cycle**. Calls occurred from 18:00 to 1:00, with a peak at between 21:30 and 23:00. Spawning always occur during this acoustic activity.

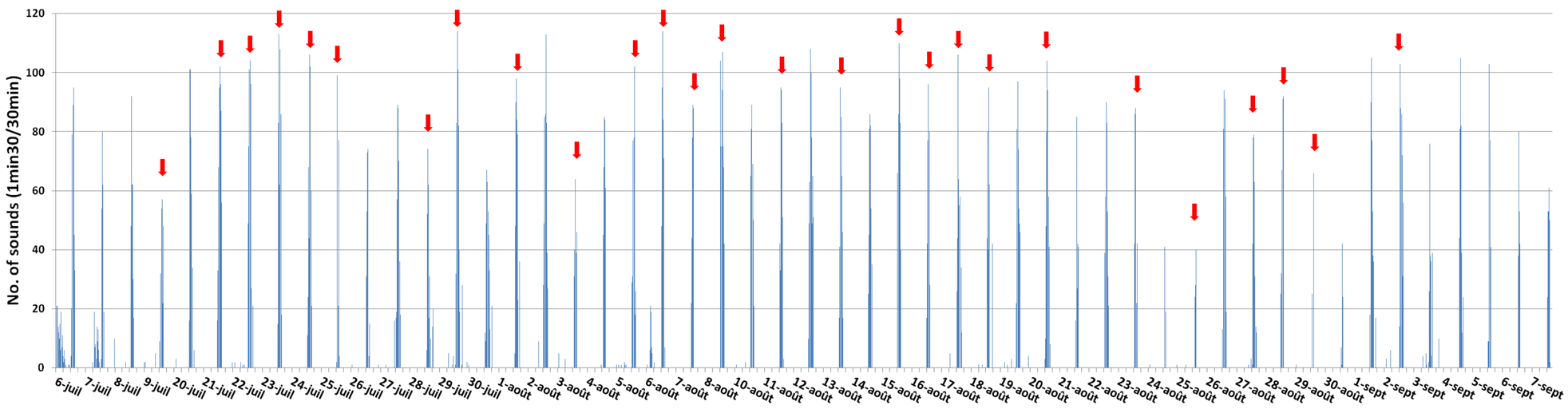

Figure 1 – Calling activity of the group of *Sciaenops ocellatus*, N♂=12, N♀=8 (July 6th to September 7th). Spawning events are shown by red arrows.

Spawns occur before or after the calls peak

Spawns started between 21:55 and 23:55 in the group. But the number of sounds produced per time unit cannot be considered as a reliable characteristic to predict the time of eggs laying (fig. 2). Same results were obtained for the two couples.

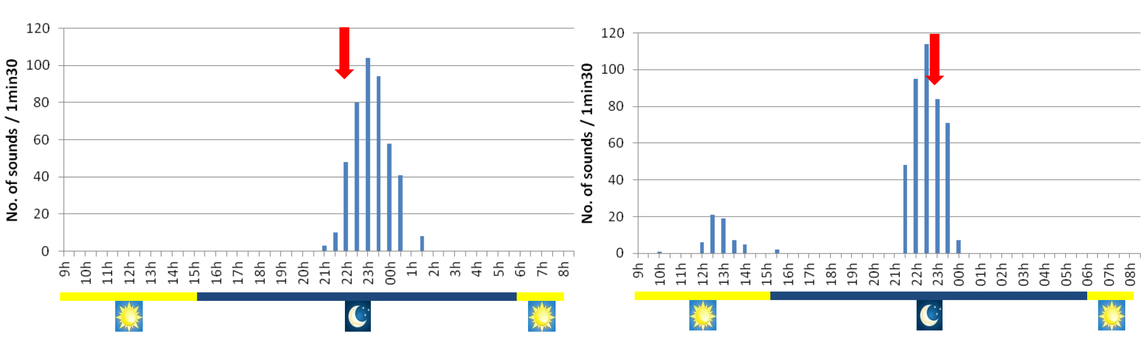

Figure 2 – Calling periods in the group of *Sciaenops ocellatus* during two nights, with time of spawn.

Night calls are longer than day calls

Calls are composed of 1 to 20 pulses (fig. 3). During the night, the ratio of sounds containing more than 7 pulses is significantly higher than sounds containing less than 7 pulses. During the day, the opposite phenomenon is observed (p<0,0001).

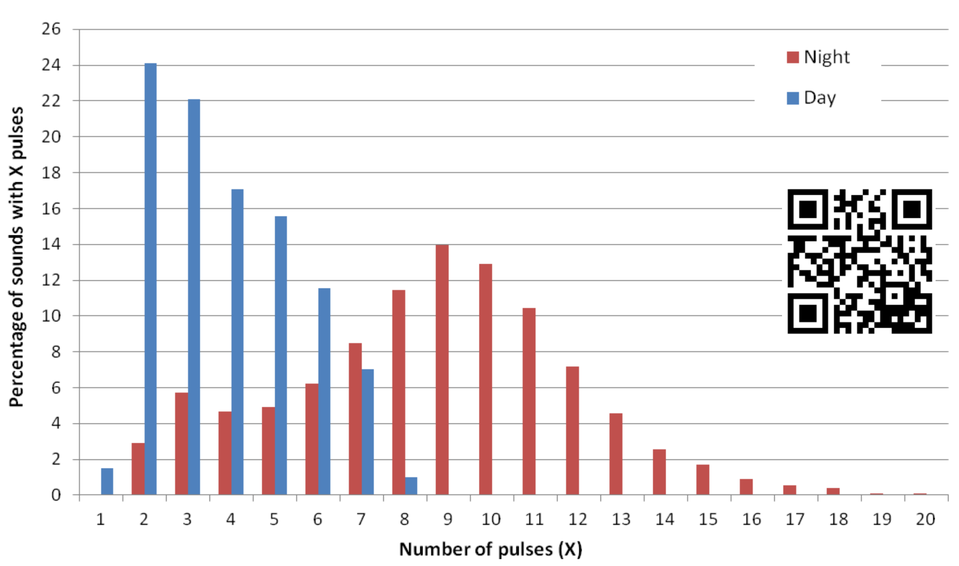

Figure 3 – Percentage of sounds with X pulses in the group of *Sciaenops ocellatus*, during night and day (July 6th to September 7th). QR codes: two sounds composed of 12 pulses

Longer sounds are produced during spawning nights

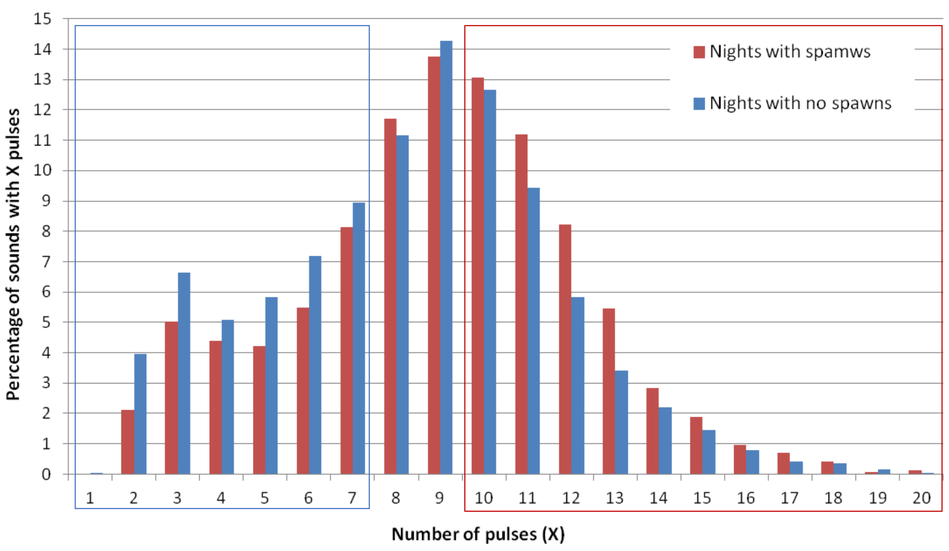

Figure 4 – Percentage of sounds with X pulses per night in the group of *Sciaenops ocellatus*, considering whether a spawn occurred or not.

The mean number of pulses per call is significantly higher during spawning nights (p<0,0001). The number of calls having 10 pulses or more was higher. Conversely, other nights showed a higher ratio calls containing less than 8 pulses.

Conclusion

The study highlights that the acoustic activity follows a circadian cycle.

Sound production is always linked to spawning, but cannot predict the time of egg laying.

Spawning nights can be associated with a higher proportion of longer sounds.

Sounds could be used as a male-female attraction during reproduction.

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