Impact of pile-driving of offshore monopile foundations on young sea bass

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The construction of offshore wind farms generates impulsive sounds which are potentially harmful for marine fish. To fill the gaps in the assessment of the lethal and stress sound level thresholds for fish, we carried out a 'worst-case scenario' field experiment on board of a piling vessel. European sea bass of 68 and 115 days old were exposed to pile-driving sound at 45m from the monopile driven in the seabed. Fish were exposed to strikes with a sound exposure level between 181 and 188dB re 1µPa².s, and an acoustic particle velocity level of 95dB re 1(nm.s^{-1})².s. The number of strikes ranged from 1739 to 3067, resulting in a cumulative sound exposure level ranging from 215 to 222dB re 1µPa².s, and a cumulative acoustic particle velocity level of 130dB re 1(nm.s^{-1})².s. No difference in immediate or delayed mortality up to 14 days after exposure between control and exposed fish groups was found. Fish exposed to pile-driving had a depressed respiration compared to fish in the control groups. This so-called hypo-activity displayed by the exposed fish is an indicator for stress. The lack of mortality in our field experiments confirms the results of lab experiments carried out by other researchers. Although, the wide diversity in physiology in fish species complicates generalizations, the results indicate that pile-driving of windmill monopile foundations creates sound pressure levels that are below the lethal sound threshold for juvenile fish, but above the stress sound threshold, at least for juvenile sea bass.