

## Effects of seismic sound on the movement and behaviour of wild Atlantic Cod (*Gadus morhua*) in the BPNS

van der Knaap Inge<sup>1</sup>, Reubens Jan<sup>2</sup>, Campbell James<sup>3</sup>, Winter Erwin<sup>3</sup> and Slabbekoorn Hans<sup>3</sup>

<sup>1</sup> Universiteit Gent, Onderzoeksgroep Mariene Biologie (UGent-MARBIOL), Campus De Sterre S8, Krijgslaan 281, 9000 Gent, Belgium

E-mail: [inge.vanderknaap@ugent.be](mailto:inge.vanderknaap@ugent.be)

<sup>2</sup> Flanders Marine Institute (VLIZ), InnovOcean site, Wandelaarkaai 7, 8400 Oostende, Belgium

<sup>3</sup> Wageningen Marine Research, Wageningen UR, PO Box 68, 1970 AB IJmuiden, The Netherlands

In the search for offshore resources like oil and gas, exploration of the seabed is performed by seismic vessels. These vessels are equipped with air guns emitting a loud blasting sound towards the sea bottom. Due to its characteristics of low frequency and high power, these seismic sounds travels far and yield high resolution information on the bottom structure but that also makes it a potential tread to marine aquatic life. The hearing range of most fish falls within the low frequency range (100-500 Hz) and the effects seismic surveys might have on their behaviour and physiology are unclear. In 2016 a Joint Industry Program (JIP) was initiated to investigate the potential impacts of seismic sound on Atlantic Cod (*Gadus morhua*). As part of this project we investigated the effects of a seismic survey on the movement and behaviour of wild cod resident in the Belgian Part of the North Sea (BPNS). In the summer of 2018 we tagged a total of 56 fish with acoustic transmitters to track their movement, depth usage and acceleration (average displacement along 3 axes) while a seismic survey took place. The survey was operational for three full days and had a closest approach of approximately 2km from the study site (Belwind offshore Windpark). Here, we will present the first results showing the movement and behaviour of individual wild cod and how this changes over time and under the influence of seismic sound.

Keywords: Seismic sound; Telemetry; Atlantic cod; Animal behavior; BPNS