Soundscape around an offshore Dutch platform in the Dogger Bank

What goes bump in the night around an offshore platform?

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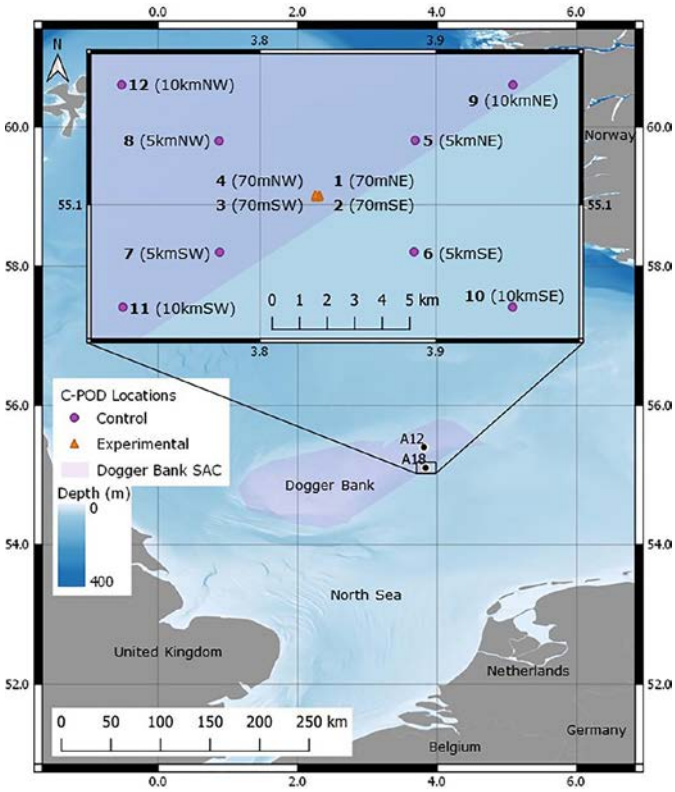
What happens when the hum of industry meets the bustle of marine life? A new study by Ocean Science Consulting Limited's (OSC) scientists explores the underwater soundscape around a Dutch offshore gas platform on the Dogger Bank Special Area of Conservation (DBSAC). Using passive acoustic monitoring (PAM), researchers found surprisingly sparse fish vocalizations – even at control sites – suggesting low acoustic activity may be typical of the region. These findings offer vital ecological insights for rigs-to-reefs (RTR) decommissioning and OSPAR-aligned marine management.

The A18 (Figure 1) is a relatively new, unmanned offshore gas production platform operated by Petrogas E&P in the Dutch sector of the North Sea. Installed in October 2015, it sits in approximately 47 metres of water on the edge of the DBSAC. This region is one of the busiest maritime zones in the world, with intense shipping, fishing, wind farm activity and oil & gas (O&G) operations contributing to a complex and noisy underwater environment.

As part of a Petrogas-commissioned cradle-to-grave RTR decommissioning study, previous remotely operated vehicle and acoustic surveys around A18 documented rapid colonization by fish and invertebrates – including soniferous species such as grey gurnard (*Eutrigla gurnardus*) and Atlantic cod (*Gadus morhua*), as well as marine mammals such as harbour porpoise (*Phocoena phocoena*) (Todd et al., 2020a; Todd et al., 2021; Todd et al., 2022; Bolgan et al., 2025). However, no prior research had investigated the platform's underwater soundscape or presence of fish-communicative sounds. It was thought that, since the platform was relatively new, the likelihood of a high-acoustic density of breeding fish would be low near the platform, compared to control locations further away.

◀ *Figure 1: A18 platform in the Netherlands sector of the Dogger Bank.*



▲ *Figure 2: Locations of C/F-POD/noise recorders at experimental (A18 platform) and control locations in the Dogger Bank Special Area of Conservation. Coordinates WGS'84 decimal degrees.*

Study methods

To characterize the underwater soundscape and assess fish acoustic activity, OSC scientists deployed passive autonomous underwater acoustic recorders with a flat frequency response from 2Hz to 384kHz and a sample rate of 48kHz, at three fixed distances from the A18 wellhead: 70 metres, five kilometres and ten kilometres north-east (Figure 2). Recordings were collected continuously from July to November 2022.

Analysis followed a twofold approach. To study the soundscape, long-term spectrogram averages (LTSA) and percentile power spectral density (PSD) plots were used to assess acoustic variability across sites and seasons. These methods helped identify dominant frequency bands and temporal patterns in the soundscape. For fish sounds, manual audio-visual inspection of selected days per month was conducted using Raven Pro software. Fish sound types were identified based on spectral and temporal features and compared with reference recordings from the Global Inventory of Fish Sounds. Principal component analysis (PCA) was used to infer potential species emitting recorded sounds.

Results

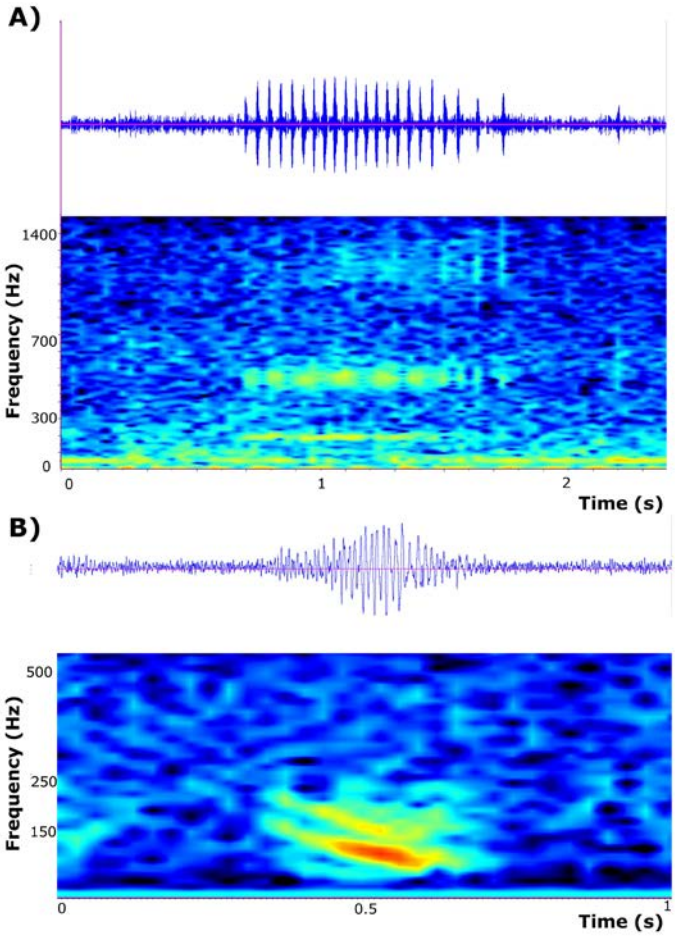
Across all three sites, the soundscape was dominated by underwater radiated noise (URN), particularly below 2kHz, with peaks between 300 and 500Hz. No acoustic-mass phenomena, such as fish choruses or low-frequency marine mammal vocalizations, were detected. The soundscape showed strong acoustic similarity between all sites and lacked clear diel (24-hour) or seasonal patterns, with anthropogenic noise most prominent during summer months.

Only two fish sound types were identified (Figure 3). The first, termed 'pulse series (PS)', was detected at the 70m and 5km sites, primarily during September evenings (19:00–23:00 UTC). These sounds closely matched those produced by the grey gurnard. The second vocalization, termed 'low-frequency down-sweep (LF-DS)', was recorded at all three sites, with acoustic features resembling the grunts of Atlantic cod. LF-DS was emitted throughout the day at the 70m site, and during evening hours at the 5km and 10km sites.

Fish acoustic richness ranged from one to two sound types per site, and abundance never exceeded two sounds per minute. PCA confirmed the likely species attribution for both sound types.

Chrono-anthropogenic noise

This research provides the first characterization of a North Sea underwater soundscape near to and at a distance from a Dogger Bank gas production platform. Results reveal a low-diversity, low-abundance fish acoustic community. The unexpectedly sparse occurrence of fish calls was not confined to the platform vicinity but also extended to control locations, indicating that low levels of acoustic activity may be a broader feature of the Dogger Bank region. This suggests that fish in this area may have naturally low vocalization rates, rather than being reduced acoustically by platform noise. As



▲ *Figure 3: Waveforms and spectrograms of fish sound types recorded during this study. (A) Pulse series (PS) and (B) low-frequency down-sweep (LF-DS) (Hanning window, FFT size 3,200, frequency resolution 15Hz, 50% overlap).*

such, attributing low fish acoustic presence solely to anthropogenic disturbance from the platform is not supported by this data.

This is highly significant because most industry-funded monitoring studies do not incorporate control locations; consequently, without controls, a study like this could have been interpreted as the platform having a significantly 'negative' impact on fish, as opposed to no impact. Nonetheless, the overall low-diversity, low-abundance fish acoustic community discovered here is still likely shaped by chronic-anthropogenic noise in general. The dominance of URN and absence of mass-acoustic events at all locations suggest that the Dogger Bank's wider intense industrial activity may suppress fish vocal behaviour or limit the establishment of stable spawning grounds.

The laconic nature of these calls is consistent with early-stage colonization, supporting the hypothesis that the relatively new A18 platform 'artificial reef' is still in the process of being established ecologically. Over time, it is predicted that fish acoustic density will increase, as the platform matures and supports more stable and diverse communities

Significant advancement

This study marks a significant advancement in understanding biophonic patterns in temperate, industrialized marine environments. Findings are highly relevant to RTR decommissioning strategies and the Oslo-Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) framework, which emphasizes the importance of evidence-based decision-making in evaluating ecological benefits of leaving infrastructure in place. This work also highlights the value of PAM for long-term ecological assessment and environmental impact evaluation, particularly in the context of offshore infrastructure and decommissioning. An example of such an evaluation is the Net Environmental Benefit Analysis Comparative Assessment, NEBA-CA (Nicolette et al., 2023; Todd et al., 2025), where noise is considered only in a mitigative context during noisy operations such as conductor driving, unexploded ordnance (UXO) and plugging & abandonment (P&A) (Todd et al., 2020b).

Noise is also not considered in any before-after control-impact (BACI) O&G decommissioning studies (Todd, 2016); consequently, in highly pressured environments such as the North Sea, integrating PAM into environmental management frameworks could improve understanding of ecosystem dynamics and inform monitoring, mitigation and end-of-life strategies. Moreover, development of open-access sound libraries and machine learning tools will be essential to support the scalable analysis of large acoustic datasets. Future studies should explore acoustic monitoring across other offshore structures to build comparative baselines and support evidence-based policy development. ■

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