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Cruise report

FRV „Clupea“

Cruise 379,

28.08.-01.09.2023

Cruise leader: Dr. Jörn Peter Scharsack

CONMAR-Fish Effects of marine dumped munition on fish in the North Sea

Summary

The cruise was performed to investigate if fish in the North Sea in the area west of the island Sylt (Sylt Hörnum) (trawl line 83 of DYFS) are affected by munition compounds (MC) leaking from marine dumped munitions. The cruise used 3m beam trawls in close proximity to munition dumping sites. Main target species was the bottom dwelling flat fish, common dab (*Limanda limanda*), since they live relatively stationary. As a control site an area North East of Helgoland (trawl line 107 of DYFS) was used. Overall numbers of collected dab and other flatfish was low (Hörnum 6 dab, 2 flounder, 1 plaice, Helgoland NNO 4 dab, 4 plaice). However, fish were inspected for externally visible diseases and body fluid and tissue samples were collected and stored for later analysis in the laboratory.

Background

During and after WW I and II huge amounts of munition were dumped in the North Sea (approx. 1.3 Mio t). Due to corrosion munition compounds (MC), such as explosives are leaking into the marine environment, which might have negative effects on biota, including fish. During WWII a military airport was on the island Sylt and the German military maintained anti-aircraft positions on Sylt. After the war, Sylt was demilitarised and munitions from the local military positions was dumped west of Hörnum. The present cruise was performed in frame of the project CONMAR in the BMBF DAM mission SustainMare, which aims to compile

information on marine dumped munitions in German coastal waters, with the aim to develop strategies for clearance measures. Furthermore, collected information will be used for a screening of the marine munition problem requested by the German Conference of Environment Ministers. The present cruise aimed to sample in an area with marine dumped munition West of Hörnum on the island Sylt and in an area North east of Helgoland without dumped munition as a control. The investigation addressed the hypotheses that flatfish living in proximity to marine dumped munition take up leaking MC and might be altered by those with respect to their health.

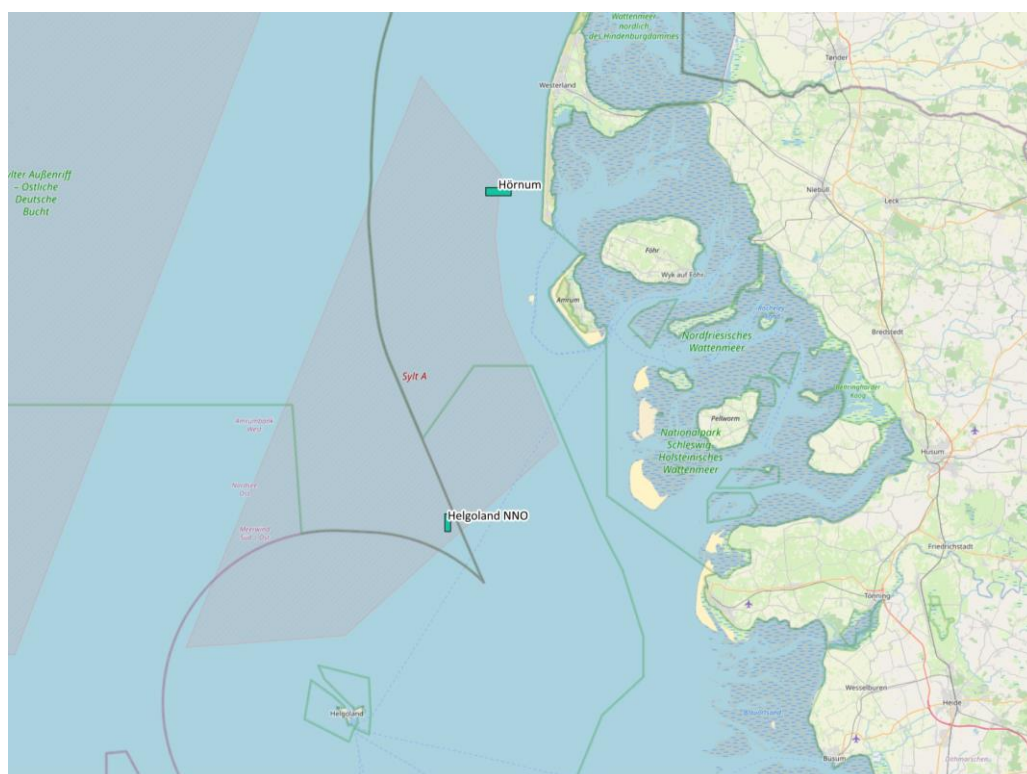


Fig. 1. Sampling areas West of Hörnum, Sylt and Helgoland North East.

Methodology

Selection of sampling sites

Directly at marine munition dumping sites, use of heavy fishing gear with ground contact is not possible, due to the risk of collecting munition which might still be fused and explosive or harmful in other ways. The present cruise therefore planned to use a 3m beam trawl with a flatfish net in the surrounding of munition dump sites. This was facilitated by the use of trawling lines that were used previously by Thünen scientists and are known to free of munition though near the munition dumping area.

Sampling of fish

Bottom dwelling flat fish (dab, *Limanda limanda*, flounder *Platichthys flesus* and plaice *Pleuronectes platessa*) were taken in focus, since they live on the seafloor and in close proximity to marine dumped munition. Previous studies found traces of munition compounds in bile of dab collected near the munition dump site Kolberger Heide in the Baltic Sea. Furthermore, elevated frequency of liver nodules (tumours) were observed in dab collected from Kolberger Heide. The present cruise aimed to investigate flat fish from the North Sea in areas around Sylt, which are potentially polluted by MC. Flatfish were collected with beam trawls with flatfish net and 5 chasing chains with 5min to 20min hauls.

Collected fish were reared in tanks with sea water supply on ship, until sampling. Fish were killed with an overdose of clove oil inspected for externally visible diseases, and measured for weight and length. Body fluids (blood, bile, urine) and tissue samples (liver, spleen, muscle) were collected and stored frozen for later laboratory analysis.

Narrative and Preliminary results

The cruise started Monday August 28th at Cuxhaven with the installation of the Beam trawl on Clupea. Helgoland harbour was reached in the afternoon. On the next day Clupea steamed from Helgoland to Sylt Hörnum and after a CTD the 3 m beam trawl with a 40mm flatfish net was pulled for 5 min. Since the amount of flat fish and by catch was low, haul time was extended to 20 for additional 2 hauls. Hauls were operated on trawling line 83 of the Thünen DYFS survey. Thereafter the Clupea returned to Helgoland harbour overnight. On Wednesday August 30st, we returned to the Hörnum position and made additional 20min hauls reaching 6 dab, 2 flounder, 1 plaice from this site.

After the night at Helgoland we steamed to a site North east of Helgoland to the trawling line 107 of the Thünen DYFS survey. In this area munition dumping was not performed. Hauls yielded relatively high amounts of sea stars, but only few and small flat fish. Sampling of 4 dab and 4 plaice was performed. On September 1st, we returned to Cuxhaven.

Table 1. Externally visible diseases of common dab, *Limanda limanda*. Percent at the sampling sites.

Location	Dab	N	Ly	EpPap	Ulc	AkHei	FloF	AkHei	KieHy	Mel	Skel	Steph	Acanth	Lepe	Cryp
Hoernum	6	0	0	0	0	0	0	33.3	0	0	16.7	0	0	0	0
HelgoNNO	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUM	10														

N = number of fish investigated, Ly = lymphocystis virus, EpPap = epidermal papilloma virus, FloF = bacterial fin rot (Flossenfäule), KieHy = gill hyperplasia, Mel = skin melanoma, Skel = skeletal deformations, Steph =

Stephanostomum baccatum, Acanth = *Acanthochondria cornuta*, Lepe = *Lepeophtheirus pectoralis*, Cryp = *Cryptocotyle lingua*.

Participants

Name	Institution	Function
Jörn Peter Scharsack	TI-FI	Cruise leader
Lea Riemeier	TI-FI	Technician

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