UNITED NATIONS OCEAN CONFERENCE NICE, FRANCE 2025

# No Time to Waste: Tackling Submerged Munitions in European Seas

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Research Vessel METEOR, Port of Nice, UNOC 3

## Factsheet #5
# Security Concerns Related to Marine Dumped Munitions

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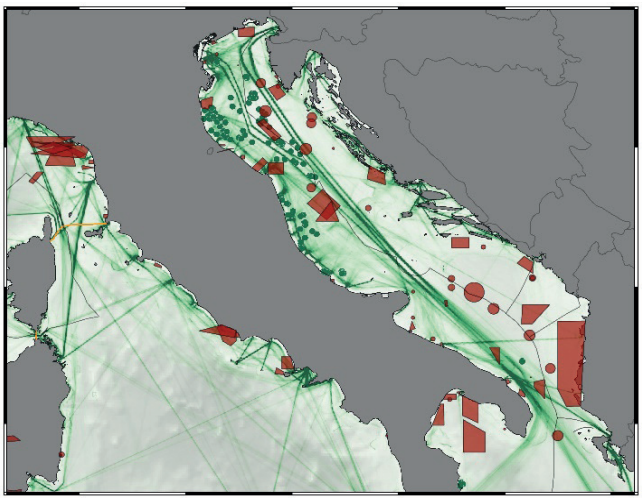
### Direct threats to human safety

**Marine dumped munitions pose a range of concerns. These primarily relate to the safety of shipping lanes and harbors, fishing activities, and the encounter of munitions or their components on beaches – for example, chunks of explosives or phosphorous from tracer ammunition or incendiary bombs. Additional risks arise during clearance operations, which endanger personnel, equipment and the environment. Beyond these immediate safety hazards, there are broader security-related issues that warrant closer attention.**

### Risk of misuse and intentional detonation

One critical concern is the potential misuse of old munitions for criminal or terrorist purposes. Likewise, deliberately triggering explosions at munition dumpsites to damage critical infrastructure could cause significant harm, while leaving uncertainty as to whether the blast was accidental or intentional. Such events would likely cause concern among the public, especially in tourist regions.

For in-situ detonation of munition piles, it is essential to determine both the net explosive mass and the overall explosive potential, along with the corresponding safety distances. A further concern arises with the prospect of industrial-scale munition clearance and on-site disposal operations in the coming years. These efforts will require the installation of substantial infrastructure for extended periods – necessitating a comprehensive and effective security strategy.



Ship traffic density (green lines) offshore infrastructure (green dots) and munition dump sites (red) in the Adriatic Sea. (Data and Illustration: GEOMAR)

### Knowing what lies on the seafloor

Before any meaningful risk mitigation can occur, munitions must first be detected and identified. Nautical charts typically mark historic dump sites based on national archival records, but these areas are often only rough estimates. Munitions are frequently found outside of the map-indicted areas. While the charted areas do indicate regions where munitions can be encountered, munitions itself cover less than one per cent of the total area – meaning that locating munitions still requires extensive mapping efforts (e.g. with multibeam echo sounders or side-scan sonar) followed by targeted identification.

In some cases, circular exclusion zones are drawn around a single known object, usually positioned at the circle center. Such isolated and typically large items may be located relatively easily by divers without the need for prior mapping.

ORGANISERS: GEOMAR, HELCOM, Federal Ministry of Research, Technology and Space, Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety

SUPPORTING PARTNERS: JPI Oceans, Council of the Baltic Sea States, AWI, Umwelt Bundesamt

Accurate, high-resolution data – sometimes down to decimeter scale or better – are already available for certain areas. These data have been gathered through hydrographic surveys, offshore infrastructure planning, the military and scientific research into the ecological impacts of dumped munitions.

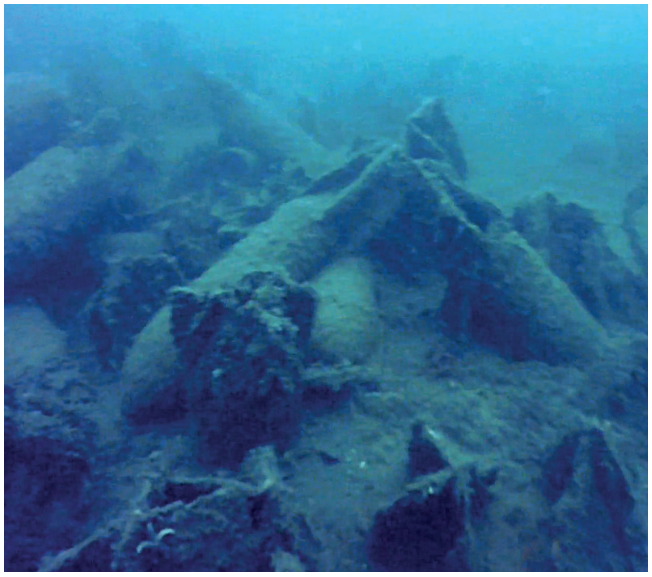
**This raises several important questions:**

1. Who needs to know the exact locations of individual objects or dump sites – and to what level of detail?

2. With whom can location data of certain accuracy be shared?

3. And how can this information be exchanged securely within a protected IT environment?

Ultimately, it must be determined who can and should access what type of information and in which level of resolution. For instance: How imprecise should coordinates be in scientific publications? Is it acceptable to publish polygon-coordinates indicating the density or type of munitions within an area? At a certain threshold, such information is deemed security-relevant and becomes subject to classification.



Half-buried bombs in a water depth easily reachable by recreational scuba divers. (Photo: ROV-Team, GEOMAR)

## Misuse of old munition

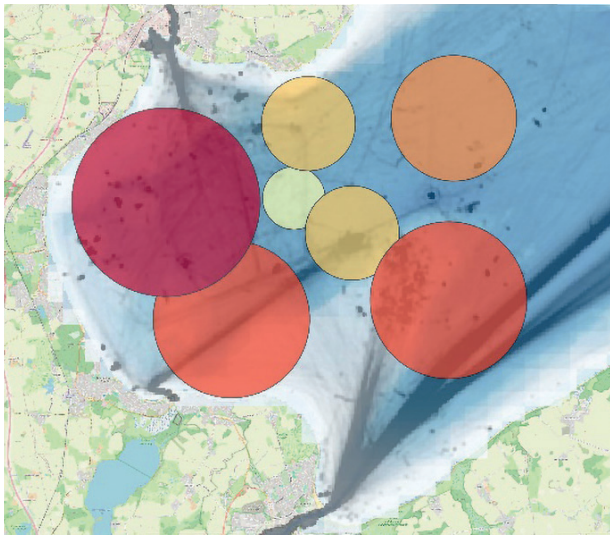
Even after decades underwater, many munitions still contain usable explosives. While their chemical properties may have changed, some materials remain viable for detonation. With sufficient local knowledge, it is theoretically possible to retrieve military explosives and reuse them for criminal or terrorist activities. That said, modern explosives are relatively accessible via legal or illegal channels — retrieving munitions from the seafloor is complex and resource-intensive, which may reduce the attractiveness of such methods. Still, the possibility must be considered.

## Terrorism via intentional detonation

Another hypothetical threat is the deliberate detonation of entire munition piles. Estimates suggest that a single pile can contain several tons of explosives, for instance:

- 18 tonnes in a box pile of 2cm-grenades
- 5.6 tonnes from seven F103 war heads with each 800 kg explosives
- 3.9 tonnes in 78 sea mines

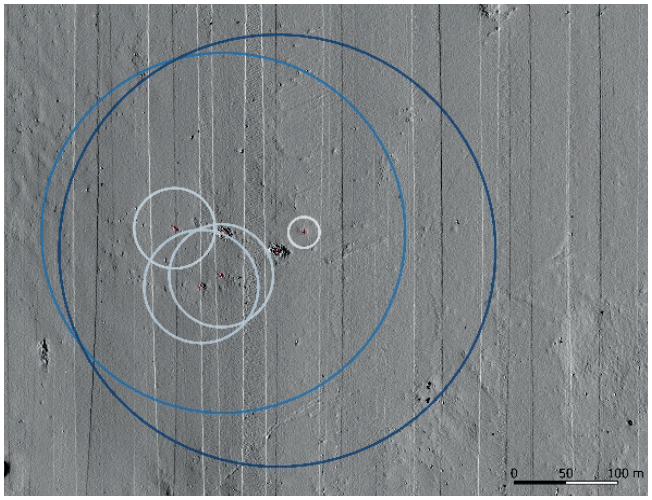
When multiple piles are located in close proximity (less than a few hundred metres apart), sympathetic detonations become a possibility, though still considered unlikely. Nonetheless, even a single event – whether accidental or deliberate – could trigger widespread fear. Such incidents would demand urgent political and security responses, even without immediate human casualties or infrastructure damage.



Safety radii of potential munition piles with a high net explosive mass. These interfere with the shipping lanes (presented as grey bands). (Hypothetic data for Lübeck Bay, Germany/ Illustration: GEOMAR)

## Mass explosive danger and required safety zones

The impact radius of an underwater explosion depends on the net explosive mass and detonation dynamics. For example, using Dutch Explosive Ordnance Disposal (EOD) guidelines, a detonation of 5.6 tonnes of explosives would result in an “insignificant damage radius” of about 175 metres – but would require a safety zone for civilian shipping of up to 1800 metres. However, whether a true mass explosion of unfused underwater munition is technically feasible remains unclear, given the damping effect of water on pressure waves compared to air. Mass explosions of underwater munition piles may thus be harder to initiate than on land.




Shock radii of six neighbouring munition piles overlapping each other may cause the spreading of munition objects if not mass detonation. (Real data from the Baltic Sea / Illustration: GEOMAR)

## Risk to critical infrastructure and marine traffic

Even if large-scale mass detonations are unlikely, smaller explosions can still pose a serious threat to critical infrastructure at sea. If old munitions are located near such infrastructure, a small amount of additional explosives might be enough to trigger significant damage. Therefore, sufficient distance between known munitions and key installations is essential – ideally, all munitions should have been cleared before construction began.

A jack-up barge in Lübeck Bay, Germany, during munition clearance operations in summer 2024 (Photo: GEOMAR).

## Surveillance of disposal platforms at sea

In summer 2024, clearance operations began in German waters to test available technologies for the removal of munitions of varying sizes and types. In this context, an offshore disposal platform is planned. As with land-based facilities, these platforms will require stringent surveillance and security protocols.

## Secure data exchange and coordination

**All clearance activities depend on a robust and secure knowledge base:**

- potential risks for the encounter of munitions from naval archives
- high resolution mapping
- object-specific identification, including condition and layering.

An ongoing debate concerns the level of detail at which munition-related data should be shared with different stakeholders, and how such data can be exchanged and stored securely. The challenge lies in balancing transparency and risk awareness with the need to protect security-relevant information.

## Conclusion

All of the above security risks are valid and represent serious concerns for national governments and European security frameworks. Several research projects are currently working together to quantify these risks, develop shared security strategies, and define data protocols that enable secure yet effective cooperation among trusted partners. Their joint goal is to ensure the best possible knowledge base for informed decision-making.

**For further information on security-related aspects, please contact: mmine-sweeper@geomar.de**