

TEXTE

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Legal Aspects of Marine Munitions Management in the Baltic Sea Region

Volume I – Current status of national and international legislation

by

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Foreword

Since World War II, the clearance of munition objects in the sea for security and safety purposes, i.e. to protect human health and develop blue economy, has been common practise in all European countries bordering the coast. The responsible authorities and organisations for explosive ordnance disposal (EOD) are mainly the navy and police as well as, in the Exclusive Economic Zone (EEZ), private companies. Environmental agencies in the HELCOM area focussed in the 1980s on issues associated with environmental risks from chemical warfare agents (CWA), which were dumped immediately after World War II in the deepest areas of the Baltic Sea. Conventional munition on the other hand was dumped in coastal areas as it was probably regarded as less dangerous. However, several recent research projects have shown, that munition compounds from conventional munition are also carcinogenic and toxic to marine life. Munition compounds should therefore be stopped from release from corroding munition shells into the sea and appropriate remediation measures should be taken by responsible authorities. In addition to the impact on the marine environment, both conventional munition and CWA objects, pose a threat to the increasing development of European seas with offshore constructions such as wind farms, cables and pipelines.

Besides the clearance and disposal of single munition objects for security and safety reasons, the vast amount of legacy dumped munition in the sea has not been addressed as a major source of environmental pollution with an appropriate remediation approach until today. Recent political commitments, such as the European Ocean Pact of 2025, the Our Baltic Conference of 2023 and the HELCOM Baltic Sea Action Plan of 2021, aim to close this gap. The MUNIMAP Remediation Roadmap aims to provide science-based support for these political commitments backed-up with specific recommendations. Further current EU-funded projects (described in chapter 3) tackle other aspects of munition remediation and cooperate with each other in order to provide consistent advice.

When considering which ministries and agencies have a responsibility regarding security, safety and environmental risks caused by munitions, it becomes obvious that most of them are concerned. This holds true for the national / federal, the provincial / state, the local / communal levels as well as for the European level. For example, Germany has an Expert Group on Munition in the Sea, which consists of representatives from about 20 ministries and agencies. In Poland, about 30 governmental organisations are dealing with munitions, coordinated by the Interministerial Team on Hazardous Underwater Materials. These governmental bodies are regulated via a vast number of laws and different chains of responsibility. But when it comes to the proactive remediation of dumped munitions for environmental protection purposes (instead of reactive clearance and disposal of single objects for security reasons), the current legislation is not suitable. Moreover, the capacity of incineration facilities for disposal on land is limited and not available in all countries. The cross-border transport of recovered munitions is heavily regulated and, in practice, often not feasible due to legal restrictions, safety concerns, limited disposal capacities and high costs. Blast-in-place operations should be avoided to the extent possible as detonations kill and harm the hearing ability of marine mammals. The German Immediate Action Programme on Unexploded Munitions in the North Sea and Baltic Sea therefore aims to invent and construct a mobile floating industrial facility to destroy the munition at sea and avoid harm to the marine environment as well as their transport to a harbour and over land.

This situation calls for a harmonisation and simplification of legislation on munitions in the sea. Within the MUNIMAP project, we would like to provide the basis for such a change. First, we have compiled and analysed the existing legislation, procedures and responsibilities in each state bordering the Baltic Sea Region except the Russian Federation. The outcome is presented

in the Volume I of the report. In Volume II, we compare the legislation within and among these countries, identify gaps and needs for harmonisation and propose recommendations for improvement at all levels including suggestions for a potential new EU Directive on munitions in the sea.

I thank all MUNIMAP partners, partners from associated MUNIMAP organisations and national authorities who contributed to the compilation of this report by providing the content of the national chapters in consultation with the authorities in their country, who prepared graphics, who commented draft versions and who replied to the numerous questions for clarification from my colleagues. I also thank the representatives from national authorities and other stakeholders, who provided input to this report and commented on it.

Dr Anita Künitzer

Leader of MUNIMAP Work Package 1: Developing policy
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Abstract

Munitions in the sea including unexploded ordnance (UXO) and dumped chemical as well as conventional munitions pose a problem that demands urgent attention from environmental, legal, and policy perspectives. After both World Wars, the Baltic Sea Region (the Baltic Sea and the Skagerrak) is especially affected by the legacy of munitions dumped at sea. This two-volume policy report is the first comprehensive legal assessment, which systematically compares national legal frameworks for munitions in the Baltic Sea Region and derives tangible proposals for EU-wide harmonisation. This first volume gives an overview on international and European legislation regarding munitions at sea, relevant international research projects and the national situation on handling munition in Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland and Sweden. The national chapters feature the national legislation, responsible authorities, procedures, environmental considerations, monitoring and mapping, gaps as well as a general evaluation of the legal framework.

Most countries consider their legal framework as “established” and/or “robust”. These legal frameworks are based on security and safety law rather than environmental law as well as on regional (HELCOM) and international commitments (e.g. United Nations). However, in order to overcome the limitations of fragmented responsibilities for munitions at sea, improving mapping and long-term environmental monitoring, fostering research and technological progress in conjunction with more international exchange and cooperation, revising national legislation on munitions in security / safety and environmental protection law, and establishing internationally recognised limit values for environmental and food contamination are considered as crucial steps solving the problems associated with munitions in the sea. Germany and Norway stand out as the first countries to develop guidelines and pilot approaches that explicitly seek to align munition clearance with nature conservation and environmental protection requirements, including recovery and controlled disposal options where technically feasible. Our comparison highlights the structural tension between security-driven emergency responses and environmentally oriented remediation approaches, underscoring the need for clear and comprehensive legal standards, responsibilities, procedures and EU-level guidance on environmentally sound remediation methods.

Kurzbeschreibung

Munition im Meer, einschließlich Kampfmittelaltlasten (*unexploded ordnance*, UXO) und verklappter chemischer und konventioneller Munition, ist ein Problem, das sowohl aus ökologischer, rechtlicher und politischer Sicht sofortige Aufmerksamkeit erfordert. Nach den beiden Weltkriegen ist die Ostsee besonders von den Folgen im Meer verklappter Munition betroffen. Dieser zweibändige Bericht ist die erste umfassende rechtliche Bewertung, die die nationalen Rechtsrahmen für Munition in der Ostsee systematisch vergleicht und konkrete Vorschläge für eine EU-weite Harmonisierung ableitet. Dieser erste Band gibt einen Überblick über den internationalen und EU-Rechtsrahmen zu Munition im Meer, einschlägige internationale Forschungsvorhaben und Länderübersichten zu den Regelungen zu Munition im Meer in Dänemark, Estland, Finnland, Deutschland, Lettland, Litauen, Norwegen, Polen sowie Schweden. Die Länderkapitel beschreiben die jeweiligen Regelungen anhand der nationalen Gesetzgebung, zuständigen Behörden, Abläufe, ökologischen Erwägungen, des Monitorings und der Kartierung, einer Defizitanalyse sowie einer allgemeinen Bewertung des Rechtsrahmens.

Die meisten Länder betrachten ihren Rechtsrahmen als „etabliert“ und/oder „robust“. Dieser Rechtsrahmen basiert eher auf Gefahrenabwehr- als auf Umweltrecht sowie auf regionalen (HELCOM) und internationalen Verpflichtungen (z. B. Vereinte Nationen). Um jedoch die Grenzen fragmentierter Zuständigkeiten für Munition im Meer zu überwinden, werden die Verbesserung der Kartierung und der langfristigen Umweltüberwachung, die Förderung von

Forschung und technologischem Fortschritt in Verbindung mit mehr internationalem Austausch und Zusammenarbeit, die Überarbeitung nationaler Gesetzgebung zu Munition im Gefahrenabwehrrecht und Umweltschutz sowie die Festschreibung von international anerkannten Grenzwerten für die Umwelt- und Lebensmittelbelastung als entscheidende Schritte zur Lösung der Probleme mit Munition im Meer angesehen. Deutschland und Norwegen gehören zu den ersten Ländern, die Leitlinien und Modellansätze entwickeln, um ausdrücklich die Munitionsräumung und den Umwelt- sowie Naturschutz in Einklang zu bringen. Dazu gehören auch die Bergung und kontrollierte Entsorgung, sofern technisch machbar. Unser Vergleich verdeutlicht die strukturelle Spannung zwischen sicherheitsorientierten Notfallmaßnahmen und umweltorientierten Sanierungsansätzen. Er unterstreicht die Notwendigkeit klarerer und umfassenderer Rechtsstandards, Zuständigkeiten und Verfahren sowie auf der EU-Ebene Leitlinien zu umweltverträglicheren Sanierungstechniken.

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List of common abbreviations and terms

Abbreviation / term	Explanation
Ammunition	Munition to be fired by a weapon (system)
Baltic Sea Region	Baltic Sea and the Skagerrak
BiP	Blast (or blow) in place, intentional, controlled explosion of explosive ordnance where it was detected, e.g. by LOD or HOD
CBRN(E)	Chemical, biological, radiological, nuclear (and explosive)
Clearance	Recovery and destruction of munition(s) (mainly UXO) for security purposes
CWA	Chemical warfare agent(s), chemical compound(s) in chemical weapons to harm, injure etc.
CWC	Chemical Weapons Convention
Disposal	Treatment and destruction of munition(s) including BiP or destruction in a facility
EEZ	Exclusive Economic Zone, extends 200 nautical miles from the established baseline
EIA	Environmental impact assessment(s)
EOD	Explosive ordnance disposal
ERW	Explosive remnant(s) of war, refers to UXO or munitions left behind by warring parties after an armed conflict has ended
EU	European Union
Explosive ordnance	Comprises munitions and ammunition including UXO
GIS	Geographical Information System
HELCOM	Helsinki Commission, Baltic Marine Environment Protection Commission
HOD	High-order detonation, full detonation to completely consume explosive ordnance, shock waves of high amplitude due to the rapid chemical reaction(s), significant impact on the surroundings due to extreme pressure and temperature
LOD	Low-order detonation, incomplete and slower chemical reaction(s) resulting in slower and less intense shock waves than HOD, contamination of the surroundings with (partially reacted or unreacted) remnants of the explosive ordnance
Munition(s)	War object(s) charged with CBRN(E) material for use in military operations including legacy object(s) which were dumped at sea and inland waters after World War II and might not be fused
NATO	North Atlantic Treaty Organisation
Ordnance	Military material including weapons and ammunition
OSPAR	Oslo Paris Convention for the Protection of the Marine Environment of the North-East Atlantic
Remediation	Recovery and destruction of (dumped) munitions for environmental purpose on land or at sea
ROV	Remotely operated vehicle(s), e.g. to detect UXO

Abbreviation / term	Explanation
Territorial water	Sovereign waters of a country, extend to 12 nautical miles from the established baseline
TNT	2,4,6-trinitrotoluene, chemical compound used as explosive
UNCLOS	United Nations Convention on the Law of the Sea
UXO	Unexploded ordnance, ammunition has been primed, fused or otherwise prepared for action and which has been dropped, fired etc. but remains unexploded, either by design or due to malfunction
World War I	Global conflict from 1914 to 1918
World War II	Global conflict from 1939 to 1945

The list is based on various literature sources (HELCOM, 2025; Jenzen-Jones, 2020; Johnsen et al., 2025; United Nations Convention on the Law of the Sea, 1982; United Nations Department for General Assembly and Conference Management, 2024; United Nations Mine Action Service, 2024) which provide more detailed explanations and further references.

Summary

Munitions in the sea including unexploded ordnance (UXO) and dumped chemical as well as conventional munitions pose a problem that demands urgent attention from environmental, legal, and policy perspectives. After both World Wars, the Baltic Sea Region (the Baltic Sea and the Skagerrak) is especially affected by the legacy of munitions dumped at sea. This two-volume policy report is the first comprehensive legal assessment which systematically compares national legal frameworks for munitions in the Baltic Sea Region and derives tangible proposals for EU-wide harmonisation. It closes a gap among the range of scientific reports and news articles on munitions in the Baltic Sea Region.

Structure and content of the first volume

This report gives an overview on international and European legislation regarding munitions at sea (chapter 2). Chapter 3 lists relevant international research projects on munitions in the Baltic Sea and North Sea. The main part of the document consists of overviews of the national situation on handling munition in Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland and Sweden (chapter 4). The respective national situation on munition at sea is described regarding national legislation, responsible authorities, procedures visualised in scenarios, environmental considerations prior to detonation or remediation, monitoring and mapping, the identification of gaps as well as a general evaluation of the legal framework. The stakeholder involvement during the preparation of this report is presented in chapter 5, followed by the conclusion in chapter 6.

Summary of international and EU legislation

Neither international law nor EU law currently provides a dedicated and explicit legal regime for the systematic remediation of sea-dumped munitions. At the international level, treaties such as the UN Convention on the Law of the Sea, OSPAR, HELCOM and the Chemical Weapons Convention establish duties to protect the marine environment, prevent pollution, apply precautionary approaches and cooperate across borders. However, these instruments do not impose a clear obligation to recover or remediate historic dumping. At EU level, environmental directives such as the Water Framework Directive and the Marine Strategy Framework Directive oblige Member States to identify, monitor and mitigate pressures on the marine environment. Taken together, these instruments establish a comprehensive framework of environmental obligations, which nonetheless has not yet crystallised into a coherent or operational remediation regime for legacy munitions. More recent political initiatives, most notably the European Ocean Pact, indicate a growing political will to address munitions contamination in a coordinated manner. However, they currently remain within the realm of soft law and do not yet close the existing regulatory gap.

Summary of national situations

The first volume on the status quo in the Baltic Sea Region reveals that most countries consider their legal framework as “established” and/or “robust”. The existing national provisions root in traditional security and hazard-prevention frameworks and are subsequently framed by international and regional obligations concerning the protection of the marine environment. However, in order to overcome the limitations of fragmented responsibilities for munitions at sea, improving mapping and long-term environmental monitoring, fostering research and technological progress in conjunction with more international exchange and cooperation, revising national legislation on munitions in security / safety and environmental protection law, and establishing internationally recognised limit values for environmental and food

contamination are considered as crucial steps solving the problems associated with munitions in the sea.

The analysis of national practices reveals significant divergence in how states remediate munitions dumped at sea as visualised in the replies to six exemplary scenarios. In many countries, blast-in-place (BiP) remains the dominant or default response, particularly where responsibilities lie primarily with military or security authorities and where the legal framework is oriented towards immediate hazard prevention. While BiP can be effective in addressing acute safety risks, it is increasingly recognised as environmentally problematic, as detonation releases munition compounds, shockwaves and noise that may harm marine ecosystems, protected species and fish stocks.

Until now, only occasional efforts have been made to systematically integrate environmental aspects into strategies for the remediation of sea-dumped munitions. While most national frameworks are primarily focus on safety-related hazard prevention, some recent initiatives indicate a gradual shift towards more environmentally oriented approaches. In particular, Germany's Immediate Action Programme on Munitions in the North Sea and Baltic Sea represents a first step towards a more systematic account of environmental impacts by combining recovery, controlled disposal and precautionary measures where technically feasible.

In other countries like Norway, similar discussions and pilot activities are also taking place to combine decisions to dispose with environmental risk assessments, monitoring and permit procedures. However, these efforts remain selective and are not yet part of a comprehensive remediation regime based on environmental law. Accordingly, the comparison reveals a structural asymmetry: while clear standards, responsibilities and procedures exist for safety-related emergency response and hazard prevention, there is a notable lack of corresponding coherent frameworks for environmentally oriented remediation. This asymmetry underlines the need for more clarity in legal standards and responsibilities as well as coordinated procedures and EU-level guidance on when it is justified to leave or blast munition on site and when alternative, more environmentally friendly remediation techniques should be prioritised.

Summary of individual national chapters

Denmark has a well-established legal framework regarding the disposal of found munition objects but requires further resources for a comprehensive remediation. Denmark has established a compensation mechanism. If fishermen catch any verified chemical munitions, they are compensated for a full catch by the Danish state.

Estonia has developed a robust legal and procedural framework for managing munitions in the Baltic Sea, leveraging its Environmental Protection Act, Explosive Substances Act, and HELCOM commitments. The involvement of the Estonian Defence Forces (Navy) ensures effective operational capacity for addressing UXO and chemical munitions. However, gaps in funding, mapping, and public awareness highlight areas for improvement. By enhancing regional cooperation, adopting modern technologies, and investing in comprehensive seabed surveys, Estonia can further mitigate the risks posed by munitions in the sea, ensuring the safety of its environment and maritime activities.

Finland's legal framework for managing munitions in the sea is robust, built on national laws and international agreements like HELCOM. However, gaps in enforcement, resource allocation, and regional coordination persist. Strengthening these areas will ensure a safer Baltic Sea and more effective mitigation of the historical legacy of munitions in the sea. In conclusion, Finland has made significant progress in addressing munitions in the sea but must continue evolving its policies, technologies, and collaborations to fully resolve this complex issue.

Germany has a well-developed and complex framework of hazard prevention and public safety law governing the handling of individual munition objects in the sea, primarily aimed at averting acute threats to human life and safety. However, the assignment of responsibilities between the federal government and the states is very complex (under hazard prevention law) when it comes to munitions. This complexity cannot only affect the effectiveness of measures but may also result in legal uncertainty. Therefore, a coordinated approach between the various authorities seems to be indispensable. However, hazard control measures must also comply with the requirements of water protection and nature conservation law. While this system is effective for isolated findings, it is not designed for the systematic, large-scale recovery or remediation of historical munitions contamination. From an environmental law perspective, there is therefore a need for clearer legal codification addressing the environmentally oriented clearance of legacy munitions. Responsibilities, authorisation procedures and financing mechanisms for this purpose remain partly unclear or fragmented.

At the same time, Germany exhibits a high level of institutional and scientific engagement. Technical and administrative cooperation has been firmly established for many years through the Expert Group “Munition in the Sea” within the Bund-Länder Working Group for the North Sea and Baltic Sea (BLANO). In addition, numerous research institutions collaborate in interdisciplinary consortia such as CONMAR, DAIMON, REMARCO and MUNIMAP. Through the Immediate Action Programme on Unexploded Munitions in the North Sea and Baltic Sea of the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety (BMUKN), Germany has launched – unique at the global level – a state-led pilot project for the precautionary and environmentally sound detection, recovery and offshore disposal of large quantities of sea-dumped munitions, including the development of a mobile maritime disposal facility.

Against this background, the establishment of a Federal Competence Centre for Munition in the Sea is currently being prepared, to be located in Rostock. According to current information, the Centre is intended to function as a nationwide coordination and expertise hub, consolidating scientific knowledge, legal competences, technical standards and operational capacities, and to serve in the long term as a central structure for systematic and environmentally oriented munition management.

Latvia’s legal framework for addressing munitions in the sea is grounded in its environmental protection and maritime safety laws, complemented by its commitments under HELCOM. The Law on Pollution and other regulations provide a robust basis for addressing the risks of sea-dumped munitions. In general, sea-dumped munitions are rarely or not mentioned in the main environment-related legislation documents. There is no direct legal definition in Latvia that would state that munition in the sea is regarded as hazardous material / waste. The precautionary principle has been adopted in the Environmental Protection Law (2006). Its Section 3 names the four principles of environmental protection including the precautionary principle.

A joint methodology on how to manage underwater munitions and general monitoring activities would be helpful. Having some joint documents from the international community would facilitate the communication to national representatives on a higher level like ministries about the meaning and importance of underwater munitions management in order to achieve the desired outcomes (e.g. legislation documents, rules, recommendations).

Through participation in numerous international projects, operations, seminars and workshops, **Lithuanian** authorities have gained valuable experience in chemical and conventional munition risk management, developed decision-making procedures, and strengthened their bonds with partner countries. Main authorities involved in the management of chemical and conventional

munitions include the National Crisis Management Centre, the Armed Forces, the Police Force, the Fire and Rescue Department, Emergency medical service, and Environmental Protection Agency.

Lithuania constantly strives to draw the attention of the international community to the problem of chemical munitions dumped at sea, the solution of which requires the consistent cooperation of international organisations, governments, science, industry and non-governmental organisations. Lithuania has initiated the periodically updated resolution of the United Nations General Assembly regarding measures related to chemical munitions dumped at sea.

Finally, clear national policies and legal frameworks are needed to ensure that all efforts are well-coordinated and that there are established standards for munitions removal. Overcoming these challenges requires a comprehensive approach that combines national actions, international cooperation, and public engagement.

In **Norway**, the responsibilities of dumped munitions are split between different ministries with several subordinate authorities. The Ministry of Justice and Public security has a coordinating role for managing explosive remnants of war. The Ministry of Defence and its subordinate Norwegian Armed Forces assist in the disposal of military explosive objects as part of public safety while the Ministry of Trade, Industry and Fisheries is responsible for preparedness against acute pollution, including dumped munitions connected to shipwrecks. The Ministry of Climate and Environment has the responsibility for the government's environmental policy, including clean seas and water and a toxic-free society and for cultural heritage, e.g. old shipwrecks, and oversees international cooperation and environmental issues. The Ministry of Local Government and Regional Development is responsible for the emergency preparedness and development of crisis plans at the municipality level.

Encounters of munitions shall be reported to the police. The police will ask for assistance by the Norwegian Armed Forces to handle the explosive remnants of war. Encounters of chemical munitions will be treated according to the national CBRNE procedures.

Knowledge gaps exist both in location, amounts and types of dumped munitions along the coastline. There are no systematic survey and monitoring of known dumpsites and no prioritised action plan for mitigating the risk related to dumped munitions due to fragmented responsibility among governmental agencies. The distribution of the contamination in dumpsites is still unknown. There are no prohibition zones for fishing or fish farms in and around dumpsites of conventional munitions.

Without international accepted environmental exposure limits or maximum levels in food for CWA or explosives, it is difficult to assess possible consequences from the measured concentrations and to make recommendations for remedial actions.

Poland's current legal framework shows that tasks related to the monitoring, identification and handling of submerged hazardous materials (CWA and UXO) are split between legal acts of varying ranks and fall within the remit of several ministries. The lack of a coherent system makes these regulations difficult to interpret and to implement in practice, particularly as some provisions apply simultaneously to land-based hazardous materials and those dumped in the marine environment. In addition, the traditional treatment of submerged chemical munitions as "weapons" rather than as toxic waste creates legislative and procedural complications, which may delay environmental protection and remediation activities. Consequently, there is a clear need to re-organise and systematise the regulations by introducing provisions dedicated exclusively to submerged hazardous materials and by supplementing existing legal gaps.

These needs are addressed by the amendment to the Act on the Maritime Areas of the Republic of Poland and the Maritime Administration, which introduces an additional Chapter 5a in that act. This chapter strengthens the legal framework for research, monitoring, the handling of submerged hazardous materials and diving on wrecks in Polish maritime areas. In particular, the new regulations impose an obligation on the Maritime Offices to maintain lists of research activities conducted in Polish maritime areas, define minimum requirements for permits to conduct research and diving operations, and require entities neutralising submerged hazardous materials to obtain permits from the competent Maritime Office.

A key element of the new system is the establishment of a register of submerged hazardous materials at the Hydrographic Office of the Polish Navy, together with rules governing the sharing of data and information from this register with other authorities and entities. These solutions are the result of several years of inter-ministerial work initiated by the Prime Minister and reflect a clear division of tasks within public administration, arising from the statutory competences of individual ministries.

As a result, the introduced amendment provides a foundation for more effective coordination of state activities related to the monitoring, identification and potential recovery and disposal of submerged hazardous materials, with the involvement of public authorities, the scientific community and private entities operating within clearly defined legal frameworks.

Sweden has established a comprehensive legal framework for managing munitions, supported by its environmental and defence policies, as well as international commitments. The Environmental Code and Maritime Safety Act provide strong regulatory foundations, while participation in HELCOM strengthens cross-border collaboration. However, gaps in mapping, resource allocation, and long-term environmental monitoring of dumpsites remain challenging. In conclusion, Sweden has made notable progress in addressing the legacy of munitions in its waters but must continue investing in research, technology, and international cooperation to ensure a safer and more sustainable future.

Outlook on the second volume of the MUNIMAP policy report

The second volume of this report will systematically evaluate and compare the national laws to identify options for national improvements and needs for common regulation on munition in the sea at EU level bringing security issues and environmental concerns into one legal framework. Such a uniform legal basis on munition in the sea shall improve the protection of the marine environment as current legislation aims to protect only human health and blue economy.

Zusammenfassung

Munition im Meer, einschließlich Kampfmittelaltlasten (*unexploded ordnance*, UXO) und verklappter chemischer und konventioneller Munition, ist ein Problem, das sowohl aus ökologischer, rechtlicher und politischer Sicht sofortige Aufmerksamkeit erfordert. Nach den beiden Weltkriegen ist die Ostsee besonders von den Folgen im Meer verklappter Munition betroffen. Dieser zweibändige Bericht ist die erste umfassende rechtliche Bewertung, die die nationalen Rechtsrahmen für Munition in der Ostsee systematisch vergleicht und konkrete Vorschläge für eine EU-weite Harmonisierung ableitet. Er schließt hiermit eine Lücke in der Vielzahl an wissenschaftlichen Berichten und Nachrichtenartikeln über Munition in der Ostsee.

Aufbau und Inhalt des ersten Bandes

Dieser Bericht vermittelt einen Überblick über den internationalen und EU-Rechtsrahmen zu Munition im Meer (Kapitel 2). Kapitel 3 listet einschlägige internationale Forschungsvorhaben zu Munition in der Ost- und Nordsee auf. Der Hauptteil des Berichts besteht aus Länderübersichten zu den Regelungen zu Munition im Meer in Dänemark, Estland, Finnland, Deutschland, Lettland, Litauen, Norwegen, Polen sowie Schweden (Kapitel 4). Die jeweiligen Regelungen werden anhand der nationalen Gesetzgebung, zuständigen Behörden, in Szenarien veranschaulichten Abläufen, ökologischen Erwägungen vor Sprengungen oder Bergungen, Überwachung und Kartierung, einer Defizitanalyse sowie einer allgemeinen Bewertung des Rechtsrahmens beschrieben. Die Beteiligung von Interessengruppen wird im Kapitel 5 dargestellt, gefolgt von der Schlussfolgerung in Kapitel 6.

Zusammenfassung der internationalen und EU-Rechtsvorschriften

Weder das internationale noch das EU-Recht bieten derzeit eine gesonderte Regelungsmaterie für die systematische Beseitigung von im Meer verklappter Munition. Auf internationaler Ebene legen Übereinkommen wie das Seerechtsübereinkommen der Vereinten Nationen, OSPAR, HELCOM und die Chemiewaffenkonvention Pflichten zum Schutz der Meeresumwelt, zur Vermeidung von Verschmutzung, zur Anwendung des Vorsorgeprinzips und zur grenzüberschreitenden Zusammenarbeit fest. Jedoch verpflichten diese Instrumente nicht, Kampfmittelaltlasten zu bergen oder zu beseitigen. Auf EU-Ebene verpflichten umweltbezogene Richtlinien wie die Wasserrahmenrichtlinie oder die Meeresstrategie-Rahmenrichtlinie die Mitgliedsstaaten, die Belastungen der Küsten und Meere mit Schadstoffen und Unterwasserlärm zu ermitteln, zu überwachen und zu verringern. Gemeinsam bilden diese Instrumente einen umfassenden Rahmen an Umweltauflagen, der jedoch noch nicht in ein einheitliches, funktionsfähiges System zur Beseitigung von Kampfmittelaltlasten mündet. Aktuelle politische Initiativen, insbesondere der Ozeanpakt der EU, zeugen von einem wachsenden politischen Willen, Verschmutzungen durch Munition abgestimmt anzugehen. Allerdings sind diese Instrumente im Geltungsbereich des Soft Law angesiedelt und schließen daher nicht die bestehende Rechtslücke.

Zusammenfassung der Länderübersichten

Der erste Band über den Ist-Zustand im Ostseeraum zeigt, dass die meisten Länder ihren Rechtsrahmen als „etabliert“ und/oder „robust“ betrachten. Die bestehenden nationalen Bestimmungen basieren auf den herkömmlichen gesetzlichen Rahmen zur Sicherheit und Gefahrenabwehr und werden durch internationale und regionale Verpflichtungen zum Schutz der Meeresumwelt ergänzt. Um jedoch die Grenzen fragmentierter Zuständigkeiten für Munition im Meer zu überwinden, werden die Verbesserung der Kartierung und der langfristigen Umweltüberwachung, die Förderung von Forschung und technologischem Fortschritt in Verbindung mit mehr internationalem Austausch und Zusammenarbeit, die Überarbeitung

nationaler Gesetzgebung zu Munition im Gefahrenabwehrrecht und Umweltschutz sowie die Festschreibung von international anerkannten Grenzwerten für die Umwelt- und Lebensmittelbelastung als entscheidende Schritte zur Lösung der Probleme mit Munition im Meer angesehen.

Die Auswertung der Praxis in den Ländern zeigt erhebliche Unterschiede in der Art und Weise wie sie verklappte Munition beseitigen, wie aus den Antworten auf sechs beispielhafte Szenarien hervorgeht. In vielen Ländern sind Sprengungen vor Ort die übliche oder standardgemäße Vorgehensweise, besonders wenn in erster Linie Militär- oder Sicherheitsbehörden zuständig sind und der Rechtsrahmen auf die unmittelbare Gefahrenabwehr ausgerichtet ist. Solche Sprengungen können zwar bei der Beseitigung unmittelbarer Sicherheitsrisiken wirksam sein, werden aber zunehmend als problematisch für die Umwelt angesehen. Sprengungen setzen Sprengstoff-typische-verbindungen, Druckwellen und Unterwasserlärm frei, welche die Meeresökosysteme, geschützte Arten und Fischbestände schädigen können.

Bislang lassen sich nur vereinzelte Bemühungen beobachten, Umweltaspekte systematisch in Strategien zur Sanierung von im Meer versenkter Munition zu integrieren. Während die meisten nationalen Regelungsrahmen primär auf sicherheitsrechtlich geprägte Gefahrenabwehr ausgerichtet sind, deuten einige jüngere Initiativen auf eine schrittweise Hinwendung zu stärker umweltorientierten Ansätzen hin. Insbesondere das deutsche Sofortprogramm Munitionsaltlasten in Nord- und Ostsee stellt einen ersten Schritt dar, Umweltwirkungen systematischer zu berücksichtigen, indem – soweit technisch möglich – Bergung, kontrollierte Entsorgung und vorsorgeorientierte Maßnahmen miteinander kombiniert werden.

Vergleichbare Diskussionen und punktuelle Pilotansätze finden sich auch in anderen Staaten, darunter Norwegen, wo umweltbezogene Risikobewertungen, Monitoring-Maßnahmen und Genehmigungsverfahren zunehmend in Entscheidungen über Entsorgung und Neutralisierung einbezogen werden. Diese Ansätze bleiben jedoch bislang selektiv und sind noch nicht in ein umfassendes, umweltrechtlich getragenes Sanierungsregime eingebettet. Der Vergleich macht daher eine strukturelle Asymmetrie deutlich: Während für sicherheitsrechtlich motivierte Gefahrenabwehr klare Standards, Zuständigkeiten und Verfahren bestehen, fehlen entsprechende kohärente Regelungssysteme für eine umweltorientierte Sanierung weitgehend. Dies unterstreicht den Bedarf an klareren rechtlichen Maßstäben, eindeutig zugewiesenen Verantwortlichkeiten, abgestimmten Verfahren sowie an Leitlinien auf EU-Ebene dazu, wann ein Verbleib oder eine Sprengung vor Ort vertretbar ist und wann alternative, umweltverträgliche Sanierungstechniken vorrangig in Betracht zu ziehen sind.

Zusammenfassung der einzelnen Länderkapitel

Dänemark verfügt über einen soliden Rechtsrahmen für die Beseitigung von Munitionsfunden, benötigt jedoch weitere Ressourcen für eine umfassende Sanierung. Dänemark hat einen Kompensationsmechanismus eingerichtet, bei dem der dänische Staat den gesamten Fang entschädigt, wenn nachweislich chemische Munition aufgefunden wurde.

Estland hat einen robusten rechtlichen und prozeduralen Rahmen für den Umgang mit Munition in der Ostsee entwickelt. Dieser stützt sich auf das Umweltschutzgesetz, das Sprengstoffgesetz sowie HELCOM-Verpflichtungen. Die Einbeziehung der estnischen Streitkräfte (Marine) gewährleistet eine wirksame Einsatzfähigkeit im Umgang mit Kampfmittelaltlasten und chemischer Munition. Allerdings gibt es Verbesserungsbedarf bei der Finanzierung, Kartierung und Sensibilisierung der Öffentlichkeit. Durch bessere regionale Zusammenarbeit, den Einsatz moderner Technologien und Investitionen in umfassende Untersuchungen des Meeresbodens kann Estland die von Munition im Meer ausgehenden Risiken weiter mindern und so die Sicherheit seiner Umwelt und seiner Aktivitäten auf See gewährleisten.

Finnlands Rechtsrahmen für den Umgang mit Munition im Meer ist robust und basiert auf nationalen Gesetzen sowie internationalen Abkommen wie HELCOM. Allerdings bestehen weiterhin Lücken bei der Rechtsdurchsetzung, der Ressourcenzuweisung und der regionalen Zusammenarbeit. Eine Stärkung dieser Aspekte wird für mehr Sicherheit in der Ostsee sorgen und eine wirksamere Beseitigung von Munitionsaltlasten im Meer ermöglichen. Insgesamt hat Finnland bei der Beseitigung von Munition im Meer erhebliche Fortschritte erzielt, muss aber seine Politik, Technologien und Kooperationen weiterentwickeln, um diese komplexe Problematik umfassend zu bewältigen.

Deutschland verfügt über ein gut entwickeltes und komplexes Rahmenwerk zur Gefahrenabwehr und Sicherheit, das den Umgang mit einzelnen Munitionsobjekten im Meer regelt und in erster Linie darauf abzielt, unmittelbare Gefahren für Leib und Leben abzuwenden. Die innerstaatliche Verteilung der Zuständigkeiten zwischen Bund und Ländern ist jedoch (im Rahmen des Gefahrenabwehrrechts) sehr komplex, sobald es um Munition geht (Kollenberg, 2022). Diese Komplexität kann nicht nur die Wirksamkeit von Maßnahmen beeinträchtigen, sondern auch zu Rechtsunsicherheit führen. Daher scheint ein koordiniertes Vorgehen der verschiedenen Behörden unerlässlich zu sein. Gefahrenabwehrmaßnahmen müssen jedoch auch den Anforderungen des Wasser- und Naturschutzrechts entsprechen. Dieses Rechtsregime ist zwar für Einzelfunde effektiv, ist aber nicht für die systematische, großflächige Bergung oder Sanierung historischer Munitionsaltlasten ausgelegt. Aus umweltrechtlicher Sicht besteht daher Bedarf an einer klareren gesetzlichen Regelung, die sich mit der umweltorientierten Beseitigung von Munitionsaltlasten befasst. Zuständigkeiten, Genehmigungsverfahren und Finanzierungsmechanismen für diesen Zweck sind teilweise noch unklar oder fragmentiert.

Gleichzeitig engagiert sich Deutschland in hohem Maße sowohl institutionell als auch wissenschaftlich. Die technische und administrative Zusammenarbeit ist seit vielen Jahren durch die Expertengruppe „Munition im Meer“ innerhalb der Bund/Länder-Arbeitsgemeinschaft Nord- und Ostsee (BLANO) fest etabliert. Darüber hinaus arbeiten zahlreiche Forschungseinrichtungen in interdisziplinären Konsortien wie CONMAR, DAIMON, REMARCO und MUNIMAP zusammen. Mit dem Sofortprogramm Munitionsaltlasten in Nord- und Ostsee des Bundesministeriums für Umwelt, Klimaschutz, Naturschutz und nukleare Sicherheit (BMUKN) hat Deutschland ein weltweit einzigartiges staatlich finanziertes Pilotvorhaben zur vorsorgenden und umwelt- und naturschutzgerechten Erkundung, Bergung und Entsorgung auf See großer Mengen von Munitionsaltlasten im Meer gestartet, einschließlich der Entwicklung einer mobilen Entsorgungsanlage.

Vor diesem Hintergrund wird derzeit die Einrichtung eines Bundeskompetenzzentrums zur Munitionsbergung in Nord- und Ostsee mit Sitz in Rostock vorbereitet.

Der Rechtsrahmen **Lettlands** für den Umgang mit Munition im Meer basiert auf seinen Gesetzen zum Umweltschutz und zur Sicherheit im Schiffsverkehr und wird durch seine Verpflichtungen im Rahmen von HELCOM ergänzt. Das Gesetz über Umweltverschmutzung (*Law on Pollution*) und andere Vorschriften bieten eine solide Grundlage für den Umgang mit den Gefahren durch im Meer verklappte Munition. Im Allgemeinen wird verklappte Munition in den wichtigsten umweltbezogenen Gesetzestexten selten oder gar nicht erwähnt. In Lettland gibt es keine direkte gesetzliche Definition, wonach Munition im Meer als Gefahrgut / Abfall gilt. Das Vorsorgeprinzip wurde in das Umweltschutzgesetz von 2006 aufgenommen. In dessen Abschnitt 3 werden die vier Grundsätze des Umweltschutzes genannt, darunter auch das Vorsorgeprinzip.

Eine gemeinsame Methodik beim Umgang mit Munition im Meer und allgemeine Monitoring-Aktivitäten wären hilfreich. Gemeinsame Dokumente der internationalen Gemeinschaft würden die Kommunikation mit nationalen Vertretungen höherer Ebenen, wie z. B. Ministerien, über die

Bedeutung und Wichtigkeit des Umgangs mit Munition im Meer erleichtern, um damit die gewünschten Ergebnisse zu erzielen (z. B. Gesetzestexte, Vorschriften, Empfehlungen).

Durch die Mitwirkung an zahlreichen internationalen Projekten, Einsätzen, Seminaren und Workshops haben die Behörden **Litauens** wertvolle Erfahrungen im Umgang mit chemischen und konventionellen Kampfmitteln gesammelt, Entscheidungsprozesse entwickelt und Beziehungen zu Partnerländern gestärkt. Zu den wichtigsten Behörden, die mit dem Management chemischer und konventioneller Munition befasst sind, gehören das Nationale Krisenmanagementzentrum, die Streitkräfte, die Polizei, Feuerwehr und Katastrophenschutz, medizinischer Rettungsdienst und die Umweltbehörde. Litauen ist stets bestrebt, die internationale Gemeinschaft auf das Problem der im Meer verklappten chemischen Munition aufmerksam zu machen. Dessen Lösung erfordert eine konsequente Zusammenarbeit von internationalen Organisationen, Regierungen, Wissenschaft, Industrie und Nichtregierungsorganisationen. Litauen hat die regelmäßig aktualisierte Resolution der Generalversammlung der Vereinten Nationen zu Maßnahmen im Zusammenhang mit im Meer verklappter chemischer Munition initiiert. Zuletzt sind klare nationale Strategien und rechtliche Rahmenbedingungen erforderlich, um sicherzustellen, dass alle Bemühungen gut koordiniert sind und dass es festgelegte Standards zur Beseitigung von Munition gibt. Die Bewältigung dieser Herausforderungen erfordert einen umfassenden Ansatz, der nationale Maßnahmen, internationale Zusammenarbeit und ein Engagement der Öffentlichkeit verbindet.

In **Norwegen** sind die Zuständigkeiten für verklappte Munition auf verschiedene Ministerien mit mehreren nachgeordneten Behörden aufgeteilt. Das Ministerium für Justiz und öffentliche Sicherheit hat eine koordinierende Rolle bei der Handhabung von Kampfmittelaltlasten. Das Verteidigungsministerium und die ihm unterstellten norwegischen Streitkräfte unterstützen die Entsorgung militärischer Sprengkörper im Rahmen der öffentlichen Sicherheit, während das Ministerium für Handel, Industrie und Fischerei für die Vorsorge gegen akute Umweltverschmutzung, einschließlich verklappter Munition im Zusammenhang mit Schiffswracks, zuständig ist. Das Ministerium für Klima und Umwelt ist für die Umweltpolitik der Regierung, einschließlich sauberer Meere und Gewässer und einer schadstofffreien Gesellschaft, sowie für das kulturelle Erbe wie alte Schiffswracks, die internationale Zusammenarbeit sowie Umweltfragen zuständig. Das Ministerium für Kommunalverwaltung und regionale Entwicklung ist für die Notfallvorsorge und die Entwicklung von Krisenplänen auf kommunaler Ebene zuständig.

Fundstellen von Munition sind der Polizei zu melden. Die Polizei wird die norwegischen Streitkräfte um Unterstützung bei der Beseitigung der Kampfmittelaltlasten ersuchen. Fundstellen von chemischer Munition werden gemäß den nationalen Verfahren für chemische, biologische, radiologische und nukleare Gefahren behandelt.

Es bestehen Wissenslücken hinsichtlich des Verbleibs, der Mengen und Typen der entlang der Küste verklappten Munition. Es gibt keine systematische Erfassung und Überwachung bekannter Munitionsversenkungsgebiete und keinen abgestuften Aktionsplan zur Eindämmung der mit verklappter Munition verbundenen Risiken, da die staatlichen Zuständigkeiten zersplittert sind. Die Verteilung der Schadstoffe in den Munitionsversenkungsgebieten ist nach wie vor unbekannt. Es gibt keine Sperrzonen für Fischerei oder Aquakulturen in und um Versenkungsgebieten konventioneller Munition.

Ohne international anerkannte Grenzwerte für die Umweltbelastung oder Höchstwerte in Lebensmitteln für chemische Kampfstoffe oder Sprengstoffe ist es schwierig, mögliche Folgen gemessener Konzentrationen zu bewerten und Empfehlungen zur Sanierung zu geben.

Polen derzeitiger Rechtsrahmen zeigt, dass Aufgaben im Zusammenhang mit der Überwachung, Identifizierung und Behandlung von gefährlichen Materialien (chemische Kampfstoffe und konventionelle Munition) im Meer auf Rechtsakte unterschiedlicher Hierarchiestufen verteilt sind und in den Zuständigkeitsbereich mehrerer Ministerien fallen. Das Fehlen eines kohärenten Systems erschwert die Auslegung sowie die Umsetzung dieser Vorschriften in der Praxis, zumal einige Bestimmungen gleichzeitig für gefährliche Materialien an Land und für solche gelten, die in die Meeresumwelt verklappt wurden. Darüber hinaus führt die traditionelle Behandlung chemischen Kampfstoffe im Meer als „Waffen“ und nicht als Sondermüll zu rechtlichen und verfahrenstechnischen Komplikationen, die Umweltschutz- und Sanierungsmaßnahmen verzögern können. Folglich besteht ein offensichtlicher Bedarf, die Vorschriften neu zu ordnen und zu systematisieren, indem Bestimmungen eingeführt werden, die sich ausschließlich auf chemische Kampfstoffe und konventionelle Munition im Meer beziehen, und bestehende Rechtslücken geschlossen werden.

Diesen Anforderungen wird durch die Novellierung des Gesetzes über die Meeresgebiete der Republik Polen und deren Verwaltung (*Act on the Maritime Areas of the Republic of Poland and the Maritime Administration*) Rechnung getragen, indem ein zusätzliches Kapitel 5a in das Gesetz eingeführt wird. Dieses Kapitel stärkt den Rechtsrahmen für Forschung, Monitoring, die Handhabung von gefährlichen Materialien im Meer sowie Tauchgängen an Wracks in polnischen Meeresgebieten. Insbesondere verpflichten die neuen Vorschriften die Behörden, Listen der in polnischen Meeresgebieten durchgeführten Forschungsaktivitäten zu führen, Mindestanforderungen für Genehmigungen zur Durchführung von Forschungs- und Taucharbeiten festzulegen sowie Organisationen, die Munition im Meer vernichten, eine Genehmigung bei der zuständigen Behörde einzuholen.

Ein wesentliches Element des neuen Systems ist die Einrichtung eines Registers für CWA und konventionelle Munition im Meer beim Hydrografischen Amt der polnischen Marine sowie die Festlegung von Regeln für den Austausch von Daten und Informationen aus diesem Register mit anderen Behörden und Institutionen. Diese Maßnahmen sind das Ergebnis mehrjähriger interministerieller Arbeit auf Initiative des Ministerpräsidenten initiiert wurde. Sie spiegeln eine klare Aufgabenteilung innerhalb der Verwaltung wider, die sich aus den gesetzmäßigen Zuständigkeiten der einzelnen Ministerien ergibt.

Die Gesetzesnovellierung schafft damit die Basis für eine effektivere Koordinierung staatlicher Aktivitäten im Zusammenhang mit dem Monitoring, der Identifizierung sowie möglichen Bergung und Entsorgung von Munition im Meer unter Einbeziehung von Behörden, Wissenschaft und privaten Organisationen, die innerhalb klar definierter rechtlicher Rahmenbedingungen tätig sind.

Schweden hat einen umfassenden Rechtsrahmen für das Munitionsmanagement geschaffen, der durch seine Umwelt- und Verteidigungspolitik sowie durch internationale Verpflichtungen gestützt wird. Das Umweltgesetzbuch und das Gesetz über die Sicherheit im Seeverkehr (*Maritime Safety Act*) bilden eine solide regulatorische Grundlage, während die Teilnahme an HELCOM die grenzüberschreitende Zusammenarbeit stärkt. Allerdings sind Lücken in der Kartierung, bei der Ressourcenzuweisung und beim langfristigen Umweltmonitoring von Munitionsversenkungsgebieten weiterhin herausfordernd. Insgesamt hat Schweden bei der Bewältigung der Altlastenproblematik in seinen Gewässern bemerkenswerte Fortschritte erzielt, muss aber weiterhin in Forschung, Technologie und internationale Zusammenarbeit investieren, um eine sicherere und nachhaltigere Zukunft zu gewährleisten.

Ausblick auf den zweiten Band des MUNIMAP-Berichts

Der zweite Band dieses Berichts wird die Rechtsvorschriften der Länder systematisch bewerten und vergleichen, um Ansatzpunkte für nationale Verbesserungen als auch für einheitliche Regelungen zu Munition im Meer auf EU-Ebene zu identifizieren, um die Gefahrenabwehr mit Belangen des Umweltschutzes in einem Rechtsrahmen zu vereinen. Solch eine harmonisierte Rechtsgrundlage zu Munition im Meer sollte den Schutz der Meeresumwelt verbessern, da sich die Rechtsvorschriften gegenwärtig auf den Schutz der menschlichen Gesundheit und die wirtschaftliche Ausbeutung der Ozeane, Meere und Küsten (*Blue Economy*) beschränken.

1 Introduction

Why are munitions in the sea a problem?

Munitions in the sea comprise unexploded ordnance (UXO), chemical weapons, and other dumped military material. They have globally accumulated over decades due to conflicts, military testing, and post-war dumping practices (Beck et al., 2018; HELCOM, 2025). Their presence is a multifaceted issue that demands urgent attention from environmental, security, safety, legal, and policy perspectives. The Baltic Sea and the Skagerrak (Baltic Sea Region) are especially affected by the legacy of the 20th century (Beck et al., 2025; HELCOM, 2025). It is estimated that 40–50,000 tons of munitions with chemical warfare agents (CWA) were dumped in the Baltic Sea and 190,000 tons in the adjacent Skagerrak besides unknown amounts of other material (Beldowski et al., 2020; HELCOM, 2025). In addition to known major dumpsites like Lubeck Bay, Skagerrak and Bornholm Deep, dumping *en route* and relocation, either natural or due to fishery and other human activity, as well as mine laying resulted in more, largely unknown distribution of munitions in the sea (HELCOM, 2025).

Hazards and impacts caused by munitions in the sea are manifold. Due to corrosion of the metallic munition shells, toxic substances are released into the water and sediments thus threatening not only the marine environment but also human health (Barbosa et al., 2023). For instance, tourists and residents may mistake white phosphorus for amber. Toxic substances like TNT may enter the human organism via the food chain (Maser & Strehse, 2021; cf. chapter 4.5.7). In addition to the economic risk for fisheries, munitions are obstacles to offshore constructions such as pipelines, cable routes or wind farms.

Environmental, safety and security concerns as well as the growing offshore industry ask for increasing action. However, addressing munitions in the sea involves significant political, financial, and practical challenges. Political will is a critical factor, as governments have to prioritise the issue among competing national interests. Financing remediation efforts poses a substantial obstacle, given the costs for identifying, mapping, and safely disposing munitions. Without adequate funding mechanisms, progress in mitigating risks remains slow. Practical challenges comprise the technical complexity of locating and neutralising munitions. However, offshore projects, such as wind farms and pipelines, often encounter munitions that pose direct threats to safety and environmental integrity.

What is the political framework for addressing remediation of munitions in the sea?

At the political level, it has been recognised that munition in the sea is not only a security and safety issue but also an environmental problem, which has to be addressed by remediation measures. Among the most relevant and recent political commitments and activities at European, regional and national level are:

The **European Ocean Pact** has six strategic objectives including “Enhancing maritime security and defence” with a strategy to remove UXO (European Commission, 2025c). The accompanying communication document states (European Commission, 2025a, chapter 6.3, p. 18):

Unexploded ordnance (UXO) in EU waters threatens ecosystems and infrastructure. A coordinated UXO removal strategy, starting in the Baltic and North Seas and expanding to the Black Sea, will utilise advanced detection and disposal technologies. Partnerships with HELCOM and other regional bodies will enhance implementation.

At the **Our Baltic Conference 2023**, the ministries of environment of the EU Member States of the Baltic Sea Region agreed to six commitments (European Commission, 2023, pp. 2–3):

1. We COMMIT to pursuing cooperation with existing regional fora, in particular with HELCOM and the CBSS, to concretely tackle the issue of hazardous Submerged Munitions in the Baltic Sea.
2. We COMMIT to closing the knowledge gaps, including the legal aspects as deemed necessary and technologies of remediation as well as their associated environmental impacts. In addition, we COMMIT to share technological knowledge, experience and monitoring of progress. We also consider setting up a reporting scheme of encountered munitions, accounting for already existing formats and particularly OSPAR.
3. We COMMIT to working towards a comprehensive mapping of submerged munitions and appropriate associated risk assessments, in line with the best environmental practices and principles to be developed under the HELCOM BSAP. In 2027, we COMMIT to take stock of a progress made until then on mapping and risk assessments.
4. On the basis of the progress made on the mapping mentioned under point 3, we COMMIT to cooperate towards establishing priority areas for further coordinated actions related to submerged munitions in the Baltic Sea, making use of information available from both civil and military sources where possible. These priority areas should include marine protected areas and areas designated for offshore renewable activities, in respect of the precautionary principle and in line with existing EU legislation and policies, inter alia the EU Green Deal, MSFD and EIA/SEA.
5. Considering the results of the risk assessment mentioned under point 3, we COMMIT to take appropriate actions, including the extraction where necessary and appropriate, in line with the priorities to be defined under point 4.
6. We COMMIT to exploring financing options, including EU means and funding mechanisms, for developing and implementing best available techniques for environmentally sound and safe management of submerged munitions. In this respect, we welcome the financial support of the European Commission in our endeavour to conduct the comprehensive mapping and risk assessment provided under point 3.

The **HELCOM Baltic Sea Action Plan** has two actions regarding munition in the Baltic Sea (HELCOM, 2021, p. 43):

Action S34: Develop Best Environmental Practice (BEP) for comprehensive risk assessment of munitions, wrecks and hazardous submerged objects by 2025 and implement the Best Available Techniques (BAT) for environmentally sound and safe management by 2028.

Action S35: Maintain the HELCOM thematic assessment on hazardous submerged objects as a living document, including munitions and wrecks and regularly update the information in the HELCOM Map and Data Service by 2024.

The **German Immediate Action Programme** on Unexploded Munitions in the North Sea and Baltic Sea (BMUV, 2024) declares that (p. 5, translated with deepl.com):

In order to get the imminent increase in pollution of German marine waters under control in the long term, the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection ... has launched a multi-year pilot project for the systematic clearance of German marine waters. The aim is to demonstrate how large quantities of recovered munitions can be disposed of directly at sea in an environmentally friendly manner using a floating industrial plant. The necessary technologies for detection and recovery under water already exist. The disposal of

munitions on land has also been tested and proven to be safe. Completely new and unique is the approach of combining these ‘wet’ and ‘dry’ processes in a mobile facility directly at sea in contaminated areas. With its ‘Immediate Action Programme on Unexploded Munitions in the North Sea and Baltic Sea’, the [ministry] is assuming responsibility in accordance with the precautionary principle to avert long-term threats to the marine environment and human beings.

The **European Parliament** in its resolution on chemical residues (European Parliament, 2021):

1. Underlines that the environmental and health dangers posed by the munitions disposed of in the Baltic Sea after the Second World War is not only a regional, European issue, but a serious global problem with unpredictable short- and long-term transboundary effects;
2. Urges the international community to embrace a spirit of cooperation and genuine solidarity to step up its monitoring of dumped munitions in order to minimise the possible risks for the marine environment and activities; urges all sides party to classified information about the dumping activities and their exact locations to declassify this information and to allow the countries affected, the Commission and the European Parliament to access it as a matter of urgency;
3. Calls on the Commission and the Joint Programming Committee of Interreg Baltic Sea Region to secure adequate financing for research and actions required to resolve the dangers posed by the munitions dumped in the Baltic Sea; welcomes the dedicated efforts and constructive research undertaken by HELCOM and within the frameworks of the CHEMSEA, DAIMON and DAIMON 2 projects [cf. chapter 3] financed by the Interreg Baltic Sea Region Programme;
4. Calls on all sides involved to comply with international environmental law and provide additional financial contributions to the Interreg Baltic Sea Region Programme for 2021-2027...;
5. Stresses the necessity for regular monitoring of the state of corrosion of the munitions and an up-to-date environmental risk assessment on the impacts of the contaminants released on human health, marine ecosystems and the region’s biodiversity;
6. Welcomes the efforts made at a national level, such as mapping the locations of the dumped munitions and monitoring and removing hazardous materials;
7. Emphasises the importance, in this connection, of interstate and interregional cooperation mechanisms, free access to public information, and the efficient exchange of scientific knowledge and research;
8. Calls on the Commission, for the purposes of its zero pollution ambition for a toxic-free environment, to establish an expert group with the Member States affected and other stakeholders and organisations, tasked with the following mandate: (i) studying and mapping the exact locations of contaminated areas; (ii) proposing suitable environmentally friendly and cost-effective solutions for monitoring and cleaning the pollution with the ultimate aim of removing or fully neutralising hazardous materials where extraction is impossible; (iii) developing reliable decision-making support tools; (iv) conducting an awareness-raising campaign to inform the groups affected (such as fishers, local residents, tourists and investors) of the potential health and economic risks; and (v) developing emergency response guidelines for environmental disasters...

What is the current legal situation?

From a legal perspective, the question arises as to the substantive legal basis on which actions to address munitions in the sea must be taken. In the Baltic Sea coastal states, competence for such measures is predominantly located within public security and safety law. Therefore, dumped munitions – regardless of their environmental impact – are primarily classified as an immediate threat to public safety, navigation, and human life and health. Accordingly, the armed forces, ministries of defence, or civil protection authorities, which possess the technical capabilities required for explosive ordnance disposal (EOD) operations are responsible (European Climate, Infrastructure and Environment Executive Agency, 2022). Furthermore, remediation and clearance operations are often case-specific and reactive, for instance in connection with offshore construction or acute hazard, rather than part of long-term, proactive, coordinated environmental or remediation programmes. “Blast in place” (BiP) operations are common practice potentially with significant consequences for marine ecosystems and organisms (Maser & Strehse, 2020) depending on the site conditions and the specific disposal approach (Johnsen et al., 2025).

At the same time, environmental law at the international, European, and national levels lacks clear substantive provisions regulating the treatment or removal of munitions in the sea or defining responsibilities for remediation. Environmental norms touch upon the issue only indirectly – for example, through general obligations to protect the marine environment, to monitor pollutants, or to apply precautionary measures – but there is no systematic integration into the environmental legal framework (cf. Graham, 2024). Therefore, there is a structural imbalance between security and environmental governance. While security and emergency law focus on the immediate removal of acute threats or hazards, a preventive and ecological counterpart addressing long-term remediation, ecosystem restoration, and sustainable risk management is still missing. Given the transboundary nature and scale of sea-dumped munitions, the issue moreover exceeds national competence and asks for a coherent supranational legal framework that includes mechanisms for addressing the legacy of historical dumping.

What are the aims and methodology of the MUNIMAP project and the MUNIMAP policy report?

“The project MUNIMAP develops a legal and administrative framework for public authorities to initiate joint remediation of dumped munitions from the [Baltic Sea Region], which pose threats to the marine ecosystem and hinder the maritime economy” (MUNIMAP, 2025; see also chapter 3.1). It aims at activating, accelerating and coordinating the national processes by establishing a versatile roadmap for the remediation of munitions in the Baltic Sea Region. The elements of this roadmap, including policy recommendations or IT solutions for site prioritisation, will be jointly developed and evaluated with the respective user groups (MUNIMAP, 2025).

Despite the many scientific and political reports on munitions in the Baltic Sea from HELCOM (HELCOM, 2025), the EU (European Climate, Infrastructure and Environment Executive Agency, 2022) and international projects like DAIMON and DAIMON2 (keep.eu, 2023a, 2023b; cf. chapters 3.7 and 3.8), a comprehensive legal assessment is – to the best of our knowledge – still missing that systematically compares national legal frameworks and derives tangible proposals for an EU-wide harmonisation. This policy report closes this gap by systematically reviewing the existing national legal frameworks, highlighting limitations and gaps and proposing options for such a harmonisation. This work relies on close collaborations with experts from relevant authorities (ministries, governmental agencies) and from various fields of responsibility like environment, defence, security, maritime safety, fisheries as well as on various stakeholder consultations.

The policy work of MUNIMAP is done in two steps and published in two volumes:

1. MUNIMAP task 1.1.1 “Updating the DAIMON policy report: An updated inventory of the current legal situation in the BSR [Baltic Sea Region]” to be published as this report “Legal Aspects of Marine Munitions Management in the Baltic Sea Region. Volume I – Current status of national and international legislation”
2. MUNIMAP task 1.1.2 “Developing policy recommendations: Policy recommendations for the national and regional regulatory frameworks” to be published as “Legal Aspects of Marine Munitions Management in the Baltic Sea Region: Volume II – Comparison of national laws and recommendations for improvement”

The methodology for the two tasks differs: Task 1.1.1 has been undertaken under the lead of the German Environment Agency in collaboration with all partners of the MUNIMAP project coming from Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, and Poland. Further, input was provided by an associated partner from Sweden and an Estonian expert. By that, the chapters on national legislation and procedures regarding the handling of munitions as previously provided in the DAIMON policy report (IDUM, 2021; keep.eu, 2023a, 2023b) have been updated by MUNIMAP partners in consultation with the respective national authorities and according to a structure provided by the German Environment Agency. For each national chapter, it is indicated, which national authorities have been consulted. A new development are also the standardised narrative scenarios (chapter 4.1), which have been answered by each country and are presented in a comparable graphic way to allow for immediate comparison of procedures and responsibilities between countries.

The finalised task 1.1.1 report has been sent into stakeholder consultation prior to publication to approve the description of the current complex structure of responsibilities and procedures on munition issues from a security as well as from an environmental point of view. The other chapters of this report were drafted jointly by the authors of the report. A questionnaire, which had been developed to obtain stakeholder views on the legal situation in each country and on the political will to improve the complex situation is used for the development of recommendations in task 1.1.2.

The analysis of the legal situation regarding gaps, needs for harmonisation and improvement at each national and the European level in task 1.1.2 is undertaken by the German Environment Agency, but the results and recommendations will be consulted with the partners and intensively with stakeholders.

This first volume of the MUNIMAP policy report provides an overview of the status quo in the international legislation (chapter 2), past and present international projects related to munitions in the Baltic Sea Region (chapter 3) as well as the national legislation on munition in the Baltic Sea Region for each country (chapter 4), including current frameworks, procedures and key responsibilities regarding munitions in the sea. It also summarises the stakeholder consultations regarding the environmental problems and legal aspects of munition in the seas (chapter 5).

In the second volume of the MUNIMAP policy report, the national laws are systematically evaluated, legally interpreted and compared using a comparative matrix. Based on comparative law, common structures as well as differences and regulatory gaps are revealed from which recommendations for the legal harmonisation are derived. Needs for common regulations are identified and recommendations for implementation as potential EU Directive are explored. Such a directive would serve as uniform legal basis to strengthen the protection of the marine environment and to improve the ability of Member States to deal with the problem of munitions in the sea across the various ministries and regulatory bodies involved.

2 International legislation

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2.1 International legal framework

2.1.1 Introduction

This chapter provides an introductory overview from an environmental law perspective of the international legal framework regarding munitions dumped at sea. Therefore, it neglects national security laws, EOD practices or emergency measures taken to avert immediate threats to human life, health or navigation. Such activities fall under distinct legal regimes and are the responsibility of defence, security and EOD authorities in most Baltic Sea coastal states. This overview is not exhaustive but merely outlines the main legal principles, treaty structures and regulatory gaps that shape the environmental dimension of the topic at the international level.

There is a long history of international law to regulate the rights and obligations of states regarding the sea including the protection and conservation of the marine environment. However, the treatment of legacy munitions in the North Sea and Baltic Sea under international law exemplifies the limits of an evolved, fragmented legislation. Although the risks posed by dumped conventional and chemical munitions are known for decades, no harmonised treaty expressly addresses legacy munitions, e.g. dumped in large amounts after World War II (e.g. Dawson, 2023). Moreover, major instruments of the United Nations do not regulate legacy sea-dumped munitions. For instance, UNCLOS (chapter 2.1.2) contains no retroactive obligations and therefore does not apply to historical dumping, the London Convention and Protocol (chapter 2.1.4) govern only future dumping activities, and the Chemical Weapons Convention (chapter 2.1.5) expressly exempts chemical weapons dumped at sea before 1 January 1985. This structural exclusion is a key reason for the current regulatory gap.¹

Nonetheless, the relevant international treaties – above all the United Nations Convention on the Law of the Sea (UNCLOS) (United Nations Convention on the Law of the Sea, 1982) and the Chemical Weapons Convention (CWC) (Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction, 1997) – but also the regional conventions OSPAR and HELCOM (chapter 2.1.3) contain various obligations to protect the marine environment. However, they leave considerable room for interpretation with respect to legacy munitions in the sea.

2.1.2 United Nations Convention on the Law of the Sea

UNCLOS is the overarching international legal basis for all marine environmental obligations. In Part XII, it obliges states to protect and preserve the marine environment in general (Article 192). This duty is specified in Article 194(1), which requires states to take all measures necessary to prevent, reduce and control pollution of the marine environment. Article 194(3)(a) expressly mentions the release of toxic or harmful substances through dumping as a source to be prevented. Van den Berg (2010) points out the causal link between historical dumping and present-day releases despite the time passed, for the current contamination would not have occurred without the original action. An obligation to recover and/or remediate can therefore be

¹ Although treaties do not apply retroactively, customary international law (chapter 2.1.6) may nonetheless play a role where certain principles – such as due diligence or the obligation to avoid significant transboundary harm – had already developed before major dumping operations after World War II took place. If such principles can be shown to have existed as customary norms at that time, they would apply independently of later treaty law and would therefore not be affected by the non-retroactivity of international conventions. Whether and to what extent such customary obligations existed in the 1940s is a matter for further legal analysis and will be explored in greater depth in the comparative assessment in Volume II.

derived from Article 194(1) provided there are no less restrictive but equally effective measures to prevent pollution (van den Berg, 2010). Whether this obligation is a strict legal one or merely due diligence remains hotly debated. Article 194 has been considered due diligence which imposes appropriate, but not absolute responsibility (Boyle & Redgwell, 2021).

Recent jurisprudence further reinforces this interpretation. In its Advisory Opinion of 21 May 2024 on the obligations of States with respect to climate change, the International Tribunal for the Law of the Sea clarified that Article 194(1) establishes a stringent obligation of due diligence to adopt all necessary and appropriate measures to prevent, reduce and control pollution of the marine environment (ITLOS, 2024). The Tribunal emphasised that obligations under UNCLOS are autonomous and not limited or displaced by sector-specific agreements. Although this Advisory Opinion addresses greenhouse gas emissions, its legal reasoning is of broader relevance: where activities under national jurisdiction pose a high risk of serious or irreversible harm to the marine environment, states are required to act with more stringent diligence, including through regulation, monitoring and enforcement. This reasoning supports the view that ongoing pollution resulting from legacy munitions may fall within the scope of current preventive obligations under UNCLOS, without implying its retroactive application.

Article 235(1) makes two statements. Firstly, the general responsibility of states for compliance with their international obligations regarding the marine environment. Secondly, the potential liability in accordance with international law for resulting damage. While the first statement emphasises obligations to comply, the second one opens the door to secondary responsibility aimed at remediation or compensation. The relevant literature (inter alia Long, 2015; Rosenne & Yankov, 1991, p. 431 et seq.) understands Article 235 as a framework without direct liability. It refers to the customary international law on state responsibility, in particular the International Law Commission's Articles on Responsibility of States for Internationally Wrongful Acts (Responsibility of States for Internationally Wrongful Acts, 2001; United Nations, 2012). Liability thus arises only where there is an internationally wrongful act and a specific damage can be attributed to that act.

In practice, Article 235 has not yet created any case law or legal practice in which states have been held liable for damage to the marine environment due to failure to remediate legacy munitions. Nevertheless, it is regularly understood as an implied duty to implement environmental protection obligations. The article therefore does not establish a direct basis for legal claims but rather reinforces the binding nature of existing primary duties under Articles 192 ff. It is therefore referred to as a "compliance clause with an implicit due diligence requirement" (Boyle & Redgwell, 2021, p. 346). Combined with Article 194, Article 235 marks the transition from programmatic to legally enforceable protection obligations. In the absence of international liability provisions, however, Article 235 still primarily remains a political-normative cornerstone.

2.1.3 Regional sea conventions

Besides the UNCLOS, the regional sea conventions for the protection of the marine environment are of great importance. Both, the OSPAR Convention (Convention for the Protection of the Marine Environment of the North-East Atlantic (1992 OSPAR Convention), 1998) and the HELCOM Convention (Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1992 (Helsinki Convention), 2000) prohibit the release and dumping of harmful substances into the sea. These bans do not directly apply to historical dumping. Nevertheless, obligations to act and to take precautions can be derived from the general obligations in both conventions. They are thus closely connected with Part XII UNCLOS but establish independent regional implementation mechanisms.

OSPAR obliges the Contracting Parties “to take all possible steps to prevent and eliminate pollution” (Article 2(1)(a)). Article 14(1) in combination with Annex V on biodiversity and ecosystem protection may serve as a basis for an obligation to remediate where the release of pollutants from munitions threat marine ecosystems. Since OSPAR expressly stipulates the precautionary principle (Article 2(2)(a), cf. chapter 2.1.7), suspicion is sufficient rather than “conclusive evidence”. Therefore, an obligation to remediate – or at least to monitor and to restrict contamination – legacy munitions can be assumed. Van den Berg (2010, p. 783) concludes that under OSPAR, contracting parties are obliged to recover and, in certain circumstances, also to remediate, insofar as this is feasible and appropriate.

The HELCOM Convention contains a similarly structured obligation in Articles 5 and 15. Likewise, the precautionary principle (Article 3(2)) imposes an obligation to act on justified suspicion of deterioration of the marine environment. The HELCOM Commission established the ad hoc Working Group on Chemical Munition already in 1993 to assess the location and impacts of dumped chemical munitions (HELCOM, 1995). Today, the HELCOM Expert Group Submerged is dealing with dumped chemical and conventional munition and hazardous wrecks. They are working on the implementation of the two Baltic Sea Action Plan (BSAP) actions on munitions in the sea (HELCOM, 2021, p. 43; cf. chapter 1, p. 29).

2.1.4 London Convention and London Protocol

The London Convention (Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, 1975) and the 1996 London Protocol (1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, 2006) form an important part of the international legal framework on marine dumping. Both instruments prohibit the dumping of certain hazardous substances at sea, including chemical warfare agents (CWA), and are implemented under the auspices of the International Maritime Organisation (IMO). They do not affect historical dumping but are of normative significance for the present-day ban of marine dumping. They mark the distinction in international law between permissible waste disposal and environmental protection upon which later instruments such as the CWC build.

2.1.5 Chemical Weapons Convention

The CWC obliges states to destroy all chemical weapons (Article 4) and establishes the Organisation for the Prohibition of Chemical Weapons (OPCW) as the implementing and verification body responsible for monitoring compliance with these obligations. However, Article 4 (17) explicitly stipulates that the provisions of this Article and the relevant parts of the Verification Annex “shall not apply to chemical weapons buried on the territory of a State Party before 1 January 1977 or dumped at sea before 1 January 1985.” This exemption illustrates that, at the time of drafting, both sea-dumped chemical weapons and other legacy munitions were deliberately excluded from the scope of the treaty’s destruction and reporting obligations. Nonetheless, the CWC reaffirms the overarching objective of the complete and environmentally sound destruction of chemical weapons. Even without a strict legal obligation to recover sea-dumped munitions, the structure and intent of the CWC indicate a continuing responsibility of states to manage and treat such legacy munitions in accordance with environmental protection and safety standards.

2.1.6 Customary international law

Beyond the individual treaties, general principles of international law also apply. In addition to these legal obligations, customary international law also plays a significant role. Numerous legal

norms regarding the protection of the marine environment – such as the obligation to prevent significant transboundary environmental harm or the precautionary principle – were already regarded binding under customary law before their codification, or developed in parallel from corresponding practice. The codification in treaties such as UNCLOS or OSPAR primarily outlined these norms more clearly without completely moving their normative origins into the treaty text. This is all the more relevant as treaties under international law are, as a rule, not retroactive. Obligations according to customary law can therefore also be applied to actions prior to their entry into force. Thus, it can be argued that certain core principles of marine environmental protection – such as the principle of the common use of the high seas or due diligence to avoid preventable damage – already existed as general *opinio juris* at the time of dumping of munitions in the 1940s. Customary law thereby offers historical continuity that extends beyond the contractual prohibition of retroactivity. And, at least in theory, allows to assess past actions in the light of current environmental standards.

A classical point of reference in customary international environmental law is the Trail Smelter Arbitration between the United States of America and Canada (United Nations, 2006). The arbitral tribunal articulated the principle that a state may not allow activities within its jurisdiction to cause serious environmental harm elsewhere, thereby laying the foundation for the no-harm principle and the precautionary principle. Although the case did not establish a comprehensive regime of state liability, it confirmed that states bear responsibility for preventing transboundary environmental damage even where harmful activities are carried out by private actors. This principle has since become a cornerstone of international environmental law and informs contemporary interpretations of due-diligence obligations under instruments such as UNCLOS (Miller, 2007).

Beyond treaty law, arbitral jurisprudence and customary international law, reference is occasionally made to soft-law instruments such as the San Remo Manual on International Law Applicable to Armed Conflicts at Sea (International Institute of Humanitarian Law, 1994). The Manual constitutes an authoritative, though non-binding, restatement of existing customary and treaty-based rules of naval warfare as they apply during armed conflict. While it provides important guidance on the conduct of hostilities at sea, including the protection of the marine environment as an incidental consideration of military operations, it does not address post-conflict environmental responsibilities or the long-term management of hazardous remnants of war. In particular, the Manual does not establish obligations relating to the recovery or remediation of sea-dumped munitions. Its relevance for the present analysis is therefore limited to the historical and doctrinal context of maritime military operations, without offering a legal basis for contemporary environmental remediation duties.

2.1.7 Principles of international law

In addition to customary law, general legal principles of international environmental law are relevant when assessing state responsibilities for legacy munitions. The precautionary principle, since its consolidation in Principle 15 of the Rio Declaration (United Nations, 1993), has become a recognised standard of conduct and is explicitly codified in both OSPAR and HELCOM (cf. chapter 2.1.3). It obliges states to take preventive measures whenever a plausible risk of environmental harm exists – not only where scientific proof is conclusive. With regard to dumped munitions, this principle supports early-stage monitoring, risk assessment, and mitigation even under scientific uncertainty.

In contrast, the polluter-pays principle has only limited relevance in the international legal context. Although widely applied in domestic and regional environmental regimes – most prominently within EU environmental law – it has not evolved into a generally binding principle

of customary international law. The historical circumstances of sea-dumped munitions illustrate this limitation: the munitions were produced by one state, deployed by another and ultimately dumped under the authority of the Allied powers after World War II, resulting in fragmented and diffuse responsibilities. Where no identifiable polluter exists or where responsibility lies far in the past, the structural limits of the principle become apparent, rendering classical liability concepts ineffective (Ryzhenkov & Anisimov, 2024). Consequently, the polluter-pays principle provides little practical guidance for assigning financial or operational responsibility for the remediation of legacy munitions at sea.

The cooperation principle – embedded in UNCLOS (Articles 197 and 200), OSPAR and HELCOM – requires states to jointly address transboundary environmental risks. Although not explicitly codified as a standalone principle in all instruments, it underpins regional coordination mechanisms, data exchange, and joint monitoring programmes. In the Baltic Sea context, this cooperative obligation provides the procedural basis for cross-border management of contaminated sites and aligns with broader EU commitments to collaborative marine protection (e.g., the EU Marine Strategy Framework Directive and the BSAP actions on munitions, cf. chapters 2.2.2 and 2.1.3).

Taken together, these principles form a normative triad: precaution requires early action, cooperation requires joint action, and polluter-pays aspires to fair cost allocation – yet, in the case of legacy munitions, only the first two principles provide operational guidance, whereas the third reveals a persistent structural deficit in international environmental law.

2.1.8 Espoo Convention

An additional element of the international framework is the Convention on Environmental Impact Assessment in a Transboundary Context (United Nations, 2018). Although originally adopted in 1991 in response to major industrial and nuclear accidents in the 1980s, the Espoo Convention has broader relevance wherever planned activities may cause significant transboundary environmental impacts. While the remediation of munitions is not explicitly listed among the activities in Annex I, the Convention's scope may nonetheless extend to such measures if they are comparable in nature or magnitude to listed activities, such as large-scale industrial or offshore works. Under Article 2(2), each state is required to ensure that an environmental impact assessment (EIA) is carried out prior to decisions on proposed activities that are likely to have significant adverse transboundary impacts. The teleological interpretation of the Convention – focusing on its purpose to prevent and mitigate cross-border environmental harm – supports the inclusion of remediating submerged munitions where potential impacts, for instance from clearance or detonation, may affect neighbouring states (Gardiner, 2015). This is particularly relevant in semi-enclosed seas such as the Baltic Sea, where close ecological and jurisdictional interconnections make transboundary effects highly probable. From a legal-dogmatic perspective, there is no indication that munitions or its contaminants are excluded from the Convention's scope. Accordingly, the Espoo Convention could therefore provide a procedural mechanism for notification, consultation and public participation among states potentially affected by remediation activities. Thus, it complements the substantive environmental obligations under UNCLOS, OSPAR and HELCOM by operationalising the precautionary principle in cases of transboundary environmental risk.

2.1.9 Summary on international law regarding munition in the sea

The policy report of the DAIMON project (cf. chapter 3.7) on legal aspects of managing munitions dumped at sea (IDUM, 2021) emphasises that, despite the existing legislation, a considerable need for regulation remains. The current situation is characterised by overlapping regulatory

levels: global instruments such as UNCLOS, regional regimes such as HELCOM and OSPAR, sector-specific instruments such as the London Protocol and the CWC, as well as non-binding resolutions of the United Nations (Cooperative Measures to Assess and Increase Awareness of Environmental Effects Related to Waste Originating from Chemical Munitions Dumped at Sea, 2011; United Nations Secretary-General, 2013). This fragmentation calls for international cooperation in detecting and remediating legacy munitions. It also makes it difficult to apply and enforce existing obligations in a coherent manner. DAIMON therefore proposed to develop the legal framework further and briefly discussed options like a new international agreement on underwater munitions or an amendment to the CWC (IDUM, 2021, chapter 11). Soft-law approaches or cross-sectoral cooperation with private actors are also discussed. More broadly, the European Commission has emphasised that, in cases of scientific uncertainty or regulatory gaps, non-binding instruments – such as recommendations, guidelines or research initiatives – may constitute appropriate and proportionate responses (European Commission, 2000, p. 3). The central idea is to operationalise the precautionary and sustainability principles in order to move gradually away from scientific assessment to actual remediation.

International law does not establish an explicit obligation to remediate sea-dumped munitions, but rather a converging set of duties arising from general principles and treaty-based environmental obligations (Dawson, 2023). States are required to avoid significant threats to the marine environment, to identify and assess the causes of pollution, and to take appropriate measures to mitigate harm where feasible. These obligations are generally interpreted as due-diligence duties, requiring states to act to the extent that measures are technically possible, proportionate and economically reasonable – an approach reflected across international environmental regimes such as UNCLOS (chapter 2.1.2) and relevant EU environmental directives (chapter 2.2). The baseline of international law can therefore be described as an obligation to act within the limits of what is realistically achievable, rather than an absolute duty of result. While recovery and remediation measures under international environmental law are expected to be science-based and carried out in a manner that does not degrade the ecological status, these requirements apply solely to environmental remediation efforts. They do not extend to emergency EOD activities, which in many Baltic Sea coastal states fall under public security and safety law and are conducted to avert immediate danger to human life, health or navigation. These distinctions notwithstanding, the broader development of international environmental law reveals a discernible shift toward a positive obligation to reduce environmental risks, moving beyond mere harm prevention toward proactive management and remediation of hazardous legacies.

2.2 European legislation

2.2.1 Introduction

European legislation does not yet contain any specific provisions on the clearance or remediation of submerged munitions. Nevertheless, there is a comprehensive set of legal acts, strategies, and action plans aimed at protecting the marine environment, regulating hazardous substances and preserving biodiversity. Legacy munitions pose not only ecological risks but also public-safety hazards for navigation and offshore infrastructure and – through the potential accumulation of munition compounds in marine organisms – possible risks to food safety. While food safety and health aspects are addressed through sectoral EU legislation, issues of public security and immediate hazard prevention remain largely within national competence. Initiatives such as REMARCO (cf. chapter 3.4) have begun to assess these aspects more systematically. However, no EU-level threshold values currently exist for TNT, its metabolites, CWA or other munition-related contaminants.

The purpose of this section is to provide an overview of those environmental legislative instruments that are relevant for assessing how the European Union addresses the risks posed by legacy munitions. The focus is therefore selective and limited to environmental law. It does not claim to offer an exhaustive analysis of all potentially relevant regulatory regimes.

2.2.2 Marine Strategy Framework Directive

The Marine Strategy Framework Directive (MSFD; Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 Establishing a Framework for Community Action in the Field of Marine Environmental Policy (Marine Strategy Framework Directive), 2008) establishes a comprehensive framework for the protection of the marine environment, with the overarching objective of achieving or maintaining good environmental status (GES) of EU marine waters (Articles 1(1) and 3(5)). GES is defined as a state in which marine waters are ecologically diverse and dynamic, clean, healthy and productive, and where anthropogenic inputs of substances and energy do not cause pollution effects.

The MSFD does not contain any explicit obligation to recover or remediate sea-dumped munitions. Nor does it regulate historic dumping activities as such. Instead, the Directive operates through a sequence of binding procedural and planning obligations that require Member States to systematically assess and manage anthropogenic pressures affecting the marine environment.

Under Article 8, Member States are obliged to carry out an initial assessment of their marine waters, including an analysis of the predominant pressures and impacts resulting from human activities. Annex III explicitly refers to contamination by hazardous substances as a relevant category of pressure. Where legacy munitions are identified as a source of hazardous substances or as posing significant environmental risks, they must therefore be captured as a relevant pressure within this assessment framework.

Based on this assessment, Member States must determine GES (Article 9), establish environmental targets (Article 10), and set up coordinated monitoring programmes (Article 11). Crucially, Article 13 requires Member States to establish and implement a programme of measures designed to achieve or maintain GES, taking into account the identified pressures and impacts. These programmes of measures must be notified to the European Commission and are subject to review at EU level.

The MSFD thus creates a conditional obligation to plan and implement measures for relevant anthropogenic pressures, including those arising from legacy munitions, where they are identified as contributing to risks for achieving or maintaining GES. At the same time, the MSFD explicitly allows for flexibility. Under Article 14, Member States may refrain from taking certain measures where, for example, there is no significant risk to the marine environment, where measures would be disproportionate in cost, or where natural conditions prevent timely improvement – provided that such decisions are duly justified and that no further deterioration occurs.

Accordingly, the MSFD does not mandate specific remediation techniques or outcomes with regard to submerged munitions. Instead, it establishes a risk-based, proportional and procedurally structured framework: legacy munitions must be identified as pressures where relevant, addressed within marine strategies and programmes of measures, and reported at EU level, while leaving discretion to Member States as to the concrete choice and scope of measures. In this sense, the MSFD contributes to a converging environmental governance framework for munitions in the sea, without constituting an autonomous or operational remediation regime.

2.2.3 Water Framework Directive

The Water Framework Directive (WFD; Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy, 2000) is not the primary legal instrument for addressing sea-dumped munitions. It neither contains specific provisions on legacy munitions nor establishes an explicit obligation to recover or remediate historical munitions dumped at sea. In particular, the WFD does not refer to typical munition-related substances, nor does it provide substance-specific environmental quality standards for explosive compounds or CWA.

The relevance of the WFD for munitions in the marine environment is therefore limited and indirect. It arises only where impacts from legacy munitions extend into the Directive's spatial scope, notably coastal waters, transitional waters or groundwater (Article 2). Where munition-related contamination constitutes a significant anthropogenic pressure affecting the chemical or ecological status of such water bodies, Member States are required to identify and assess these pressures under Article 5 and Annex II and to reflect them, where relevant, in river basin management plans and programmes of measures (Articles 11 and 13).

The obligations triggered under the WFD are thus procedural rather than operational in nature. The WFD requires the identification of relevant pressures and the establishment of programmes of measures where environmental objectives under Article 4 are at risk of not being achieved. However, it leaves a broad margin of discretion as to the choice of measures and does not prescribe remediation, recovery or disposal of munitions as such. Any action must comply with the principles of proportionality, technical feasibility and cost-effectiveness, and may include monitoring, use restrictions or preventive measures rather than physical intervention.

In this respect, the WFD and MSFD complement each other. While the MSFD constitutes the central EU framework for assessing and addressing environmental risks from legacy munitions in marine waters, the WFD may become relevant in land-sea interface areas and for pathways linking inland waters, groundwater and coastal zones. It does not, however, provide an independent or comprehensive legal basis for the remediation of sea-dumped munitions.

2.2.4 Habitats and Birds Directives

The Habitats Directive (Council Directive 92/43/EEC) and the Birds Directive (Directive 2009/147/EC) are directly applicable wherever legacy munitions at sea affect Natura 2000 sites or protected species. Many known dumpsites are located within or in close proximity to Natura 2000 areas. Pursuant to Article 6(2) of the Habitats Directive, Member States are obliged to avoid the deterioration of protected habitats and the significant disturbance of protected species. Furthermore, planned clearance or recovery operations that are likely to have a significant effect on a Natura 2000 site are subject to an appropriate assessment under Article 6(3) of the Habitats Directive.

These requirements are particularly relevant for munition remediation activities, as commonly used methods such as underwater detonations may cause substantial harm to protected species. Against this background, Germany develops a guidance document on the treatment of munitions at sea under nature conservation law (Bund-Länder Arbeitsgemeinschaft Munitionsaltlasten und Naturschutz, in prep.; cf. chapter 4.5.6). The upcoming guidance document operationalises the requirements of EU and national nature conservation law and clarifies that detonations in or near protected areas are only permissible under strict conditions, such as the use of bubble curtains to reduce underwater noise and to prevent harm to marine mammals as well as other protected species.

The EU nature conservation framework thus illustrates the dual protective function of environmental law in the context of legacy munitions: on the one hand, it limits the environmental risks arising from clearance and recovery activities; on the other hand, it imposes an obligation to prevent ongoing or secondary environmental harm. This duality characterises the complex interaction between environmental protection and risk prevention in EU law when dealing with sea-dumped munitions.

2.2.5 Regulation of chemicals and environmental law

In addition to the Water Framework Directive and the Marine Strategy Framework Directive, EU chemicals and environmental enforcement legislation is also relevant for the legal assessment of legacy munitions. In particular, the REACH Regulation (Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 Concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), 2006) and the Environmental Crime Directive (Directive (EU) 2024/1203 of the European Parliament and of the Council of 11 April 2024 on the Protection of the Environment through Criminal Law and Replacing Directives 2008/99/EC and 2009/123/EC, 2024) apply.

REACH establishes a comprehensive regime for the registration and evaluation of hazardous substances placed on the EU market. A significant number of munition-specific compounds, including typical high explosives such as trinitrotoluene (TNT) are registered substances under REACH. For these substances, registration dossiers exist that contain detailed information on their intrinsic hazardous properties, including data on toxicity, ecotoxicity, persistence and environmental fate. These dossiers provide an established scientific and regulatory knowledge base on the risks posed by explosive compounds and contribute to defining the applicable standard of care under EU chemicals law, even where the substances originate from legacy munitions rather than from current commercial uses.

Where munition-related substances are released into the environment at relevant concentrations, REACH and related EU legislation may become applicable indirectly, for example by informing risk assessments, authorisation decisions or restrictions under other environmental regimes. In this sense, REACH does not regulate legacy munitions as such, but it sets binding reference standards for the scientific assessment of hazardous properties and environmental risks associated with explosive compounds.

Beyond environmental protection in a narrow sense, EU law also addresses potential risks to human health arising from hazardous substances released into the environment. EU food safety and drinking water legislation provides reference frameworks for assessing exposure pathways and health-related risks associated with chemical contamination. However, neither the Contaminants Regulation (Commission Regulation (EU) 2023/915 of 25 April 2023 on Maximum Levels for Certain Contaminants in Food and Repealing Regulation (EC) No 1881/2006, 2023) nor the Drinking Water Directive (Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the Quality of Water Intended for Human Consumption (Recast), 2021) establish harmonised EU-wide parametric values for munition-specific compounds such as TNT or its metabolites. Where such substances are detected, health-related assessments and precautionary responses are therefore primarily developed within national regulatory or scientific risk assessment frameworks. In this sense, food and drinking water law complement EU chemicals and environmental legislation by illustrating health protection thresholds and exposure considerations, without constituting an autonomous regulatory regime for legacy munitions as such.

The Environmental Crime Directive does not establish substantive environmental standards of its own, nor does it introduce specific obligations concerning legacy munitions. Instead, it operates as an enforcement instrument that links criminal liability to violations of existing EU environmental law. In particular, the Directive requires Member States to criminalise unlawful conduct that results in, or is likely to result in, substantial damage to water, habitats or protected species, including the unlawful discharge, emission or introduction of hazardous substances into water bodies. In the context of legacy munitions, the relevance of this Directive therefore lies not in the existence of these munitions as such, but in the legal consequences attached to active or passive conduct that contravenes applicable environmental obligations – for example, failures in risk management, authorisation, monitoring or mitigation where required under Union law. It thus reinforces compliance with existing environmental regimes by attaching criminal-law consequences to serious breaches, without itself creating an independent remediation or clearance obligation.

Taken together, EU chemicals and environmental enforcement law do not constitute a dedicated legal regime for the remediation of submerged munitions. Rather, it specifies the applicable standard of care and due diligence under EU law once munition-related substances are present in the environment, and it determines the legal consequences of unlawful conduct in handling, managing or responding to such contamination.

2.2.6 EU Strategies and Soft Law

Politically, the topic has been increasingly addressed in European marine strategies and action frameworks in recent years. Particularly noteworthy is the EU Maritime Strategy for the Baltic Sea Region (European Commission, 2012; EUSBSR, 2025a), under which flagship projects like MUNIMAP serve as implementation tools for the goal of clean and safe seas. One action of its Policy Area Hazards addresses the environmental and security risks of historic contamination e.g. due to munitions dumped at sea (EUSBSR, 2025b).

A further strategic development is the European Ocean Pact, adopted in 2025 in the context of the UN Ocean Conference. Among its six strategic objectives, Priority 5 (“Enhancing maritime security and defence”) explicitly calls for the removal of UXO in EU waters through innovative technologies. The accompanying communication (European Commission, 2025a) highlights UXO as both an environmental and security risk and announces a coordinated EU approach to UXO detection and clearance, initially focusing on the Baltic Sea and North Sea.

Although the Ocean Pact is formally a soft-law instrument, it carries considerable political weight. It establishes a shared strategic direction among EU institutions and Member States and strengthens the mandate for coordinated European action on submerged munitions. By linking UXO clearance to broader objectives related to maritime security, environmental protection and technological innovation, the Ocean Pact serves as a catalyst for policy alignment, funding initiatives and cross-border cooperation.

Another relevant strategic framework is the EU Maritime Security Strategy (EUMSS) and its Action Plan of 2021 (Council of the European Union, 2018; European Commission, n.d.). While primarily rooted in security and defence policy, the Action Plan explicitly addresses risks arising from sea-dumped chemical munitions and unexploded ordnance. In particular, Action B 4.2 (Baltic Sea) calls for enhanced exercises and training programmes, improved emergency procedures for accidental recovery, the development of manuals of procedures and contingency plans, and closer cooperation with regional organisations such as HELCOM in order to optimise the disposal and, where possible, the elimination of sea-dumped chemical munitions and UXO (Council of the European Union, 2018, p. 26). Unlike EU environmental strategies, the EUMSS

does not rely on the precautionary principle as a guiding concept. Instead, it approaches legacy munitions predominantly as a maritime security and operational risk, focusing on preparedness, response capacity and coordinated incident management.

The Zero Pollution Action Plan (European Commission, 2021, 2025b) and the EU Biodiversity Strategy for 2030 (European Commission, 2020, 2025d) also indirectly address legacy pollution by calling for the reduction of persistent pollutants and the restoration of degraded marine ecosystems. These strategic documents do not contain any formal legal obligations but establish the political basis for a coordinated European approach to legacy munitions.

2.2.7 Summary on European law regarding munition in the sea

While EU environmental law currently contains no explicit legal obligation to recover or remediate submerged munitions, this structural gap is more and more politically addressed. Under the European Ocean Pact (2025), the Commission has initiated the development of a coordinated EU UXO removal strategy, which recognises UXO in EU waters as an environmental and a security risk and calls for the deployment of advanced detection and disposal technologies (European Commission, 2025a, chapter 6.3). Although the Ocean Pact remains a soft-law instrument, it marks a significant political shift. For the first time, the EU has articulated a Union-level objective to organise UXO clearance in a coherent, cross-border framework. As such, it can be understood as a preparatory step towards a possible binding instrument.

EU environmental law establishes a converging framework of obligations. It derives from the non-deterioration obligation and pollution control requirements under the WFD, the obligations of the MSFD to identify and address significant pressures, and the precautionary principle anchored in EU law (Publications Office of the European Union, 2012, Article 191). Together, these norms require Member States to systematically identify and monitor the environmental risks posed by legacy munitions and – wherever and whenever necessary – to adopt risk-mitigating measures.

Additional obligations arise under the Habitats and Birds Directives, particularly where dumpsites overlap with Natura 2000 areas, as well as from sectoral legislation such as REACH and the Environmental Crime Directive, which set standards for hazardous substances and environmental protection. While these instruments do not directly regulate historical dumping, they shape the interpretative framework for the treatment of legacy munitions – chiefly through the precautionary principle anchored in EU law, which obliges Member States to take preventive action where environmental risks are plausible, even if there is no conclusive scientific evidence.

Beyond environmental protection in a narrow sense, EU law also addresses potential risks to human health arising from munition-related contaminants through food safety and drinking water legislation. While these instruments provide reference frameworks for exposure assessment and health protection, no harmonised EU-wide threshold values currently exist for munition-specific compounds such as TNT or its metabolites. Health-related risk management therefore remains largely dependent on national standards and scientific assessments, complementing EU environmental and chemicals law without constituting a dedicated regulatory regime for legacy munitions. However, since none of these instruments contains an explicit, legally binding obligation to recover or remediate submerged munitions, such munitions still fall within a structural regulatory gap – similar to the situation at the international level.

3 International projects on munitions in the sea

The European Commission and European Parliament has funded several research projects on different aspects of munition in the sea via their funding schemes. The JPI knowledge portal on munitions in the sea (JPI Oceans, 2024) provides a partial overview on such munition-related projects. This chapter complements the JPI portal by providing details on key past and on-going projects on munitions in the sea which involved MUNIMAP partner countries. The partners working in this project are in contact with each other to ensure coordination and to build on each other's knowledge. HELCOM is partner in most Baltic Sea Projects and has a coordination role for the Baltic Sea.

3.1 MUNIMAP

MUNIMAP brings together all EU states bordering the Baltic Sea Region and Norway. It has a strong focus on legal aspects of the handling of munitions. Other projects, which also address legal aspects, are the on-going projects BALTWRECK, REMARCO and MMinE-SwEEPER (chapters 3.3 – 3.5). While MUNIMAP is compiling and analysing all legislation on submerged munitions in Baltic Sea Region countries, BALTWRECK covers the legislation on potentially hazardous wrecks in the southern Baltic Sea and REMARCO focusses on legal aspects of food safety regarding munition compounds released by World War II wrecks. Similar to MUNIMAP, MMinE-SwEEPER plans to assess legal aspects for European countries in the Mediterranean and NE Atlantic and to use the MUNIMAP questionnaire (see Annex A) and structures of this policy report to achieve comparable results.

Title: Baltic Sea Munitions Remediation Roadmap (MUNIMAP, 2025)

Funding: EU Interreg, Baltic Sea Region 03/2024 – 02/2027

Developing a legal and administrative framework for authorities to initiate the joint remediation of dumped munitions from the Baltic Sea Region

3.2 Munition in the Sea

Title: Munition in the Sea (JPI Oceans, 2021)

Funding: Action within the pan-European platform JPI Ocean, 11/2015 – 05/2024

Partners from MUNIMAP countries: DE, NO, PL, SE

Policy and operational activities regarding UXO at sea, knowledge hub to share scientific and technological expertise for e.g. management and mapping, environmental impact and remediation, cooperation between experts, predecessor of the projects MMinE-SwEEPER (chapter 3.5) and CAMMera (chapter 3.9), information portal (JPI Oceans, 2024)

3.3 BaltWreck

Title: Preventing massive marine waters chemical pollution from the leaking wrecks and munition/ weapon dumps in the South Baltic (Baltwreck Project, 2025)

Funding: EU Interreg, South Baltic Programme, 07/2024 – 06/2027

Partners from MUNIMAP countries: DE, LT, PL, SE

Wreck management to reduce pollution of the Baltic Sea by e.g. munitions, including in-situ remediation technology and legal frameworks

3.4 REMARCO

Title: Remediation, Management, Monitoring and Cooperation addressing North Sea UXO (REMARCO, 2025)

Funding: EU Interreg North Sea Region Programme, 07/2023 – 06/2027

Partners from MUNIMAP countries: DE

Pollution of marine ecosystems caused by legacy munitions, remediation concepts, (partially) automated monitoring, software tools for risk assessment and area prioritisation

3.5 MMinE-SWEEPER

Title: Marine Munition in Europe – Solutions with Economic and Ecological Profits for Efficient Remediation (MMinE-SWEEPER, 2025)

Funding: EU HORIZON, 10/2024 – 03/2028

Partners from MUNIMAP countries: DK, DE, PL, NO

Clearance of non-military UXO with focus on technology, data exchange, legal frameworks, training, and stakeholder outreach

3.6 MUNI-RISK

Title: Mitigation of Risks due to submerged munitions for a sustainable development of the Baltic Sea (MUNI-RISK, 2025)

Funding: EU, European Maritime, Fisheries and Aquaculture Fund, 11/2024 – 10/2027

Partners from MUNIMAP countries: DK, DE, PL, SE

Environmental and safety risks from legacy munitions in the Baltic Sea, practical tools and guidelines for Baltic Sea states to safely manage these risks

3.7 DAIMON

Title: Decision Aid for Marine Munitions (keep.eu, 2023a)

Funding: EU Interreg, Baltic Sea Region Programme, 03/2016 – 02/2019

Partners from MUNIMAP countries: FI, LT, DE, NO, PL, SE

Environmental impact and biological effects of chemical and conventional munitions dumped at the Baltic Sea Region, tools for safe management

3.8 DAIMON 2

Title: Decision Aid for Marine Munitions – Practical Application (keep.eu, 2023b)

Funding: EU Interreg, VB Baltic Sea, 08/2019 – 07/2021

Partners from MUNIMAP countries: FI, DE, NO, PL, SE

Practical implementation of the tools developed in the DAIMON project (chapter 3.7) and their further optimisation, decision support system for risk analysis and procedures

3.9 CAMMera

Title: Clearance Activities for Marine Munition through Efficient Remediation Approaches (CAMMera, n.d.)

Funding: European Maritime, Fisheries and Aquaculture Fund, 07/2025 – 06/2028

Partners from MUNIMAP countries: DE

Safe clearance and disposal of submerged munitions, focus on remote-controlled technology and new business cases

3.10 EROVMUS

Title: Enhanced Remote Operated Vehicle interface for Munition Studies

Funding: MarTERA ERA-NET COFUND, 07/2022 – 06/2025

Partners from MUNIMAP countries: DE, PL

ROV and tool development for pilots and ROV deployment

3.11 BASTA

Title: Boost Applied munition detection through Smart data inTegration and AI workflows (BASTA, n.d.)

Funding: European Maritime and Fisheries Fund, 11/2019 – 11/2022

Partners from MUNIMAP countries: DE

Technological and tool development for the detection of submerged munitions

3.12 North Sea Wrecks

Title: North Sea Wrecks (North Sea Wrecks, n.d.; North Sea Wrecks Project, 2023)

Funding EU Interreg, 11/2018 – 10/2022

Partners from MUNIMAP countries: DK, DE, NO

Tools to assess and propose solutions for risk mitigation regarding wrecks and munitions in the North Sea. Predecessor of the REMARCO project (chapter 3.4).

3.13 CHEMSEA

Title: Chemical Munitions Search & Assessment (keep.eu, 2021)

Funding: EU Interreg, Baltic Sea Region Programme, 06/2011 – 03/2013

Partners from MUNIMAP countries: FI, DE, LT, PL, SE

Information on CWAs in the Baltic Sea including environmental effects analysis, assessment of national procedures

3.14 MODUM

Title: Towards the Monitoring of Dumped Munitions Threat (MODUM, n.d.)

Funding: NATO, 2013 – 2015

Partners from MUNIMAP countries: DK, EE, FI, DE, LT, PL, SE

Establishment of a monitoring network for dumpsites of chemical weapons dumpsites in the Baltic Sea, using e.g. ROV

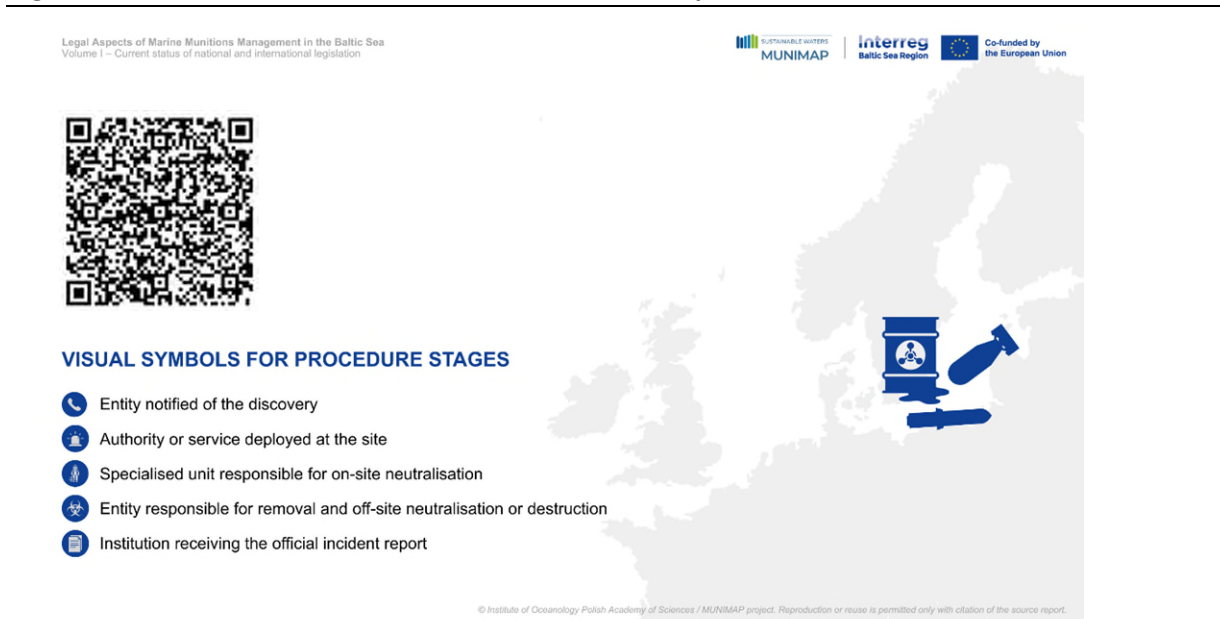
4 National legislation

4.1 Definition of scenarios

The DAIMON policy report (IDUM, 2021) had, in one of its national chapters, scenarios to describe the procedures and responsibilities for munition in different situations. As the procedures and responsibilities differ per country and as they differ for internal waters (including sea waters landwards of the baseline), coastal/territorial waters (12 nautical mile zone) and the Exclusive Economic Zone (EEZ, 12–200 nautical mile zone), six scenarios have been developed by the MUNIMAP partners to demonstrate for each country in a comparable way the chain of competences and procedures in case of conventional or chemical munition has been found. The narratives describe a potential situation and the proper reaction to it in each country (chapters 4.1.1 – 4.1.6).

The authors were asked to describe the responsible authorities and the chain of reaction in the six exemplary situations for their country in consultation with national authorities. The responses are described and visualised using a common legend (Figure 1) in the subsequent chapters 4.2 – 4.10. An online version is available (Institute of Oceanology of Polish Academy of Sciences, 2026).

Figure 1: Visualisation of the national scenario responses



Common symbols used for the country-specific scenario figures. The QRCode points to the online version (Institute of Oceanology of Polish Academy of Sciences, 2026).

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.1.1 Scenario 1: Conventional munition on the beach

A couple went for a long walk on the beach in the morning after a stormy day. At a secluded spot, they wondered what had been washed up on the beach. As they got closer, they saw something that looked like amber. When they picked it up, they realised it was not amber. Fortunately, they knew about the existence of underwater munitions. Shortly after they put it down, it started to catch fire. After their unsuccessful attempts to extinguish the fire, they called for help and reported the findings.

To whom should they report and what would happen next in your country?

4.1.2 Scenario 2: Chemical munition on the beach

The operator of the emergency number (112) received a report that on the beach in the city, the sea washed ashore a corroded barrel about 250 cm high and about 60 cm in diameter. Inside the barrel there is a dark brown crystallised substance. The first person who was in the immediate vicinity of the barrel experienced severe eye irritation and unnatural skin redness. There are hundreds, possibly thousands of persons on the beach.

What would be the reaction in your country?

4.1.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

On a hot summer day, a tourist went snorkelling and saw something that looked like an old bomb. They decided to dive after it and could finally identify it as a bomb, which is about 150 cm long. They decided to report the case and could roughly identify the place where the bomb was found. It was very close to a buoy, which was less than a nautical mile from the populated beach.

To whom would they report and what would happen next?

4.1.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

During a dredge survey for benthic animals, marine biologists made a discovery. They have found in the net something that resembled a bomb or an artillery shell in shape.

What would the captain of the vessel have to do?

4.1.5 Scenario 5: Chemical munition in the EEZ: fishing activities

While fishing in the Exclusive Economic Zone (EEZ), the fishermen pulled on deck a detached body of an aircraft bomb (length over 100 cm, diameter about 40 cm), inside which a substance resembling clay could be seen. Immediately after pulling it on board, two crew members experienced severe burning in their eyes.

To whom would the captain have to report this incident and what would happen next?

4.1.6 Scenario 6: Conventional munition in the EEZ: construction activities

An offshore wind park in the EEZ is under construction. During an UXO survey of the sea bottom using magnetometry equipment prior to the construction, several metallic objects were found. The following investigation with a remotely operated vehicle (ROV) identified 9 objects with a shape similar to munition.

How would the company find out whether the objects are UXO, to distinguish them from scrap metal? To whom are they to be reported in your country? Who would be responsible for remediation?

4.2 Denmark

Authors: Hans Sanderson, Jan Bührke

With input from the Danish Environmental Protection Agency

4.2.1 Introduction to the country history regarding munitions in the sea

Denmark, located at the strategic gateway between the North Sea and the Baltic Sea, has been heavily impacted by the dumping of munitions during and after both World Wars. Danish

waters, particularly in the Baltic Sea but also in Lille Bælt, Kattegat, Skagerrak, are known dumping grounds for CWA such as mustard gas as well as UXO in e.g. the Koral Deep outside Aarhus.

Denmark plays a crucial role in the regional management of munitions through its participation in HELCOM and OSPAR. Its approach balances maritime safety, environmental protection, and economic interests, particularly in the fishing and offshore industries.

4.2.2 National laws regarding munitions in the sea and on land

4.2.2.1 General laws

- ▶ **Environmental Protection Act:** Provides a foundation for managing hazardous materials and protecting marine ecosystems (COWI Consulting Engineers and Planners AS, 2001; Lov om miljøbeskyttelse, 1991).
- ▶ **Maritime Safety Act:** Addresses safety hazards, including UXO, in Danish waters (Bekendtgørelse af lov om sikkerhed til søs, 2000).
- ▶ **Explosives Act:** Regulates the handling and disposal of explosives.

4.2.2.2 Specific laws for munitions in the sea

According to the legal notice **BEK 844 of 2024** (Bekendtgørelse om refusion af udgifter ved myndighedernes sagsbehandling i forbindelse med undergrundsaktiviteter m.v., 2024), parties liable for payment have to reimburse expenses of authorities e.g. regarding legacy munitions. The legal notice **BEK 135 of 2005** (Bekendtgørelse om forbud mod sejlads, ankring og fiskeri mv. i visse områder i danske farvande, 2005) bans the sailing, anchoring, and fishing in restriction areas like dumpsites. § 2 regulates the routes of ships which transport munitions recovered from the sea except for Navy ships. After World War II, the **Circular 38 of 1948** (Cirkulære til Rigspolitichefen, Politidirektøren i København og Politimestrene angaaende ilanddrevne Sømærker, Krigsmateriel m. v., Dusører for Paavisning og Afmærkning af Miner m.v. samt Indberetning om Forlis og Strandinger, 1948) regulates responsibilities police and Navy regarding the handling of munitions and war remnants as well as the remuneration for found objects.

The Armed Forces supports the police in handling displaced or found war material. In the event of discovery or retrieval of submerged munitions, the Navy has an emergency team consisting of mine divers who are alerted and carry out the assessment and disposal of the found munitions. Most often, munitions are in such a state that they are detonated. However, there may be situations when war material is left for later blasting. For example, if it is located at stone reefs, bubble reefs, chalk underground or infrastructure, and you want to move the equipment to a safer position for detonation. Information regarding munitions that may be found in Danish waters and alerting of mines was previously described in the "Fisheries Yearbook", but it is no longer published.

Denmark adheres to HELCOM recommendations for identifying and remediating munitions in the sea. Activities that disturb munitions in the sea are subject to EIA.

4.2.3 List of responsible authorities

- ▶ **Navy:** Leads munitions clearance operations
- ▶ **Coastal Authority:** Oversees maritime safety and hazardous area management

- ▶ **Environmental Protection Agency:** Monitors environmental impacts
- ▶ **Geodata Agency:** Maps hazardous underwater sites
- ▶ **Fisheries Agency:** Values the fish catch in case of recompensation, assesses with the Emergency Management Agency if vessels have sufficiently been cleaned
- ▶ **Emergency Management Agency:** Cleans vessels in case of bycatch of chemical munitions

4.2.4 Scenarios

The scenario responses for Denmark are summarised in Figure 2.

4.2.4.1 Scenario 1: Conventional munition on the beach

They should call 112, and connect to the police. The police will send a patrol to arrange a safety area, and contact the Defence Joint Operations Centre (JOC). JOC will alert the special point of contact (SPOC) for munitions or UXO clearance. The SPOC is an armed forces contact point for both land and sea ammunition and UXO clearance. The SPOC will send the Navy's Clearance Diving Team.

4.2.4.2 Scenario 2: Chemical munition on the beach

The police will take action for clearing the beach and contact JOC. The SPOC will be contacted and take the necessary action to involve agencies that have responsibilities in this case, i.e. the Emergency Management Agency.

4.2.4.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

They should call 112, and will be connected to the police. The police will send a patrol to arrange a safety area, and contact the JOC. JOC will alert the SPOC for munitions or UXO clearance. The SPOC will send the Navy's Clearance Diving Team. However, often observers call directly the Navy Headquarters. They will also contact the police and the Navy's Clearance Diving Team.

4.2.4.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

The captain of the dredger will contact the Navy Headquarters. They will contact the police and the Navy's Clearance Diving Team.

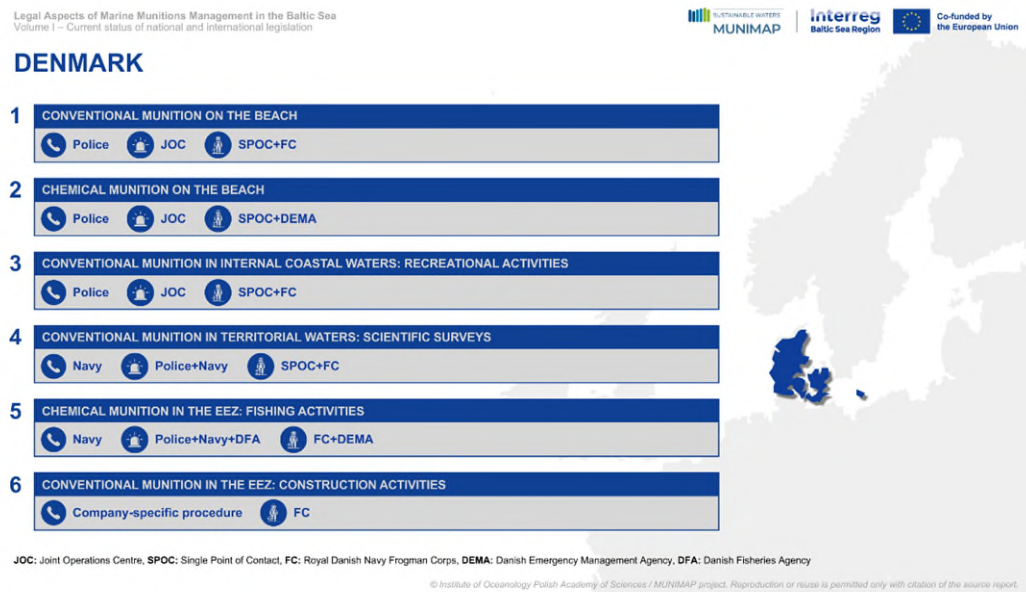
4.2.4.5 Scenario 5: Chemical munition in the EEZ: fishing activities

The fisher will contact the Navy Headquarters. They will contact the police and the Navy's Clearing Diving Team. The Navy informs the Fisheries Agency about the vessel ID. The Navy Clearance Team together with Fisheries Agency will enter the vessel to examine the catch and remove any explosives before the vessel can enter a harbour. In case of CWA, the vessel is cleaned by the Emergency Management Agency.

4.2.4.6 Scenario 6: Conventional munition in the EEZ: construction activities

In the permission of the offshore wind park, the required instructions are explained. The Navy's Clearance Diving Team will cooperate with the company to examine the object and determine what it is. If it is an UXO, the Navy will take care of the object.

Figure 2: Summary of the Danish scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.2.5 Environmental considerations prior to detonation / remediation

- **Seasonal sensitivity:** Timing operations to protect fisheries.
- **Chemical risks:** Preventing leaks during removal.

4.2.6 Monitoring and mapping in place

For the monitoring of munition objects, Denmark uses HELCOM databases, GIS, and seabed surveys. Denmark has no monitoring of munition compounds nor of underwater noise from detonations. Details on the mapping are not yet publicly available.

4.2.7 Gaps and outlook

- **Gaps:** Incomplete mapping, limited resources.
- **Outlook:** Strengthened HELCOM cooperation, advanced technologies

4.2.8 Summary / evaluation of the legal framework

Denmark has a well-established legal framework regarding the disposal of found munition objects but requires further resources for a comprehensive remediation. Denmark has established a compensation mechanism. If fishermen catch any verified chemical munitions, they are compensated for a full catch by the Danish state.

4.3 Estonia

Authors: Malle Piirsoo, Jan Bührke

4.3.1 Introduction to the country history of munitions in the sea

Estonia, located on the northeastern shores of the Baltic Sea, has a significant history related to munitions in the sea. Similar to the Baltic Sea Region, the Estonian waters were critical

battlegrounds during World War I and World War II. In consequence, mines, bombs, and CWA such as mustard gas and phosgene were left behind. However, there is no official documentation of CWA dumping in Estonian waters.

Due to its strategic location, Estonia's coastline was heavily mined during wartime conflicts. After the wars, UXO and chemical munitions were dumped into the Baltic Sea, creating long-term environmental and safety risks. This legacy impacts Estonia's maritime safety, environment, and economic activities, such as fishing and offshore development.

Today, Estonia actively participates in regional initiatives like HELCOM and develops national policies to mitigate the risks associated with sea-dumped munitions.

4.3.2 National laws regarding munitions in the sea and on land

4.3.2.1 General Laws

Estonia's legal framework for managing munitions and hazardous materials includes the following key laws:

- ▶ **General Part of the Environmental Code Act (Keskkonnaseadustiku üldosa seadus, 2014):** Ensures the protection and good state of the environment including the remediation of environmental damage, sets the principles, main duties and rights of environmental protection, regulates environmental protection permits
- ▶ **Water Act (Veeseadus, 2019):** Regulates the use and protection of water and sustainable water use, set the rights, obligations and liability of persons in water use
- ▶ **Explosives Act (Lõhkematerjaliseadus, 2017):** Regulates the handling, storage, transport, and disposal of explosive ordnance, including (am)munition, and sets basic rules what to do when someone finds historical explosive material (UXO)
- ▶ **Maritime Safety Act (Meresõiduohutuse seadus, 2003):** Ensures maritime safety, including the removal and marking of underwater hazards such as naval mines and other munitions
- ▶ **Waste Act (Jäätmeseadus, 2004):** Covers the safe disposal of hazardous waste, including toxic remnants from chemical munitions
- ▶ **Estonian Defence Forces Organisation Act (Kaitseväge korralduse seadus, 2009):** Empowers the Estonian Defence Forces (EDF) to conduct clearance and neutralising operations for sea-dumped explosive ordnance, including UXO
- ▶ **Rescue Act (Päästeseadus, 2010):** Empowers the Rescue Board to conduct clearance and neutralising operations for explosive ordnance on land and in inland water bodies

4.3.2.2 Specific laws for munitions in the sea

Specific provisions addressing munitions in the Baltic Sea include:

- ▶ **HELCOM Compliance:** Estonia adheres to HELCOM recommendations for identifying and remediating munitions in the sea
- ▶ **EIA and Environmental Management Systems Act (Keskkonnajuhitamissüsteemi seadus, 2005):** Mandates that any activity that disturbs munitions in the sea undergoes a thorough EIA

4.3.3 List of responsible authorities

Estonia has designated several agencies and organisations to manage the risks posed by sea-dumped munitions:

- ▶ **EDF:** The primary authority responsible for detecting, removing, and neutralising munitions, including naval mines and chemical weapons in Estonian waters
- ▶ **Navy's Mine Countermeasure Division:** A specialised unit inside the EDF focused on detecting and clearing underwater mines and munitions in Estonian waters
- ▶ **Rescue Board:** Estonian Rescue Services Agency, responsible for responding to incidents involving munitions on land, including coastal areas, and inland water bodies
- ▶ **Environmental Board:** Oversees environmental monitoring and ensures compliance with environmental regulations related to munitions remediation
- ▶ **Transport Administration:** Manages maritime and navigational safety and updates nautical charts to reflect hazardous areas

The recent HELCOM thematic assessment on warfare materials (HELCOM, 2025) lists further authorities which either do not exist anymore or have only indirect responsibilities:

- ▶ **Police and Border Guard Board (PBGB):** Has no active role since 1 January 2023 when EDF (Navy) took over their coast guard tasks, the Joint Rescue Coordination Centre (JRCC) is one of their structural units which persons on sea can contact when old munition or other explosive / chemical material is found. If the munition is washed to the shore, the Rescue Board may ask the police for support.
- ▶ **Estonian Emergency Response Centre (<https://www.112.ee/>):** Only indirect role like PBGB. People should call this call centre when they find old munition. They forward the message to the Rescue Board or the Navy.
- ▶ **Maritime Administration:** Does not exist anymore as a separate organisation. It was merged with the Civil Aviation Authority and coupled with the Transport Administration (as of 1 January 2021), which now provides all the services.
- ▶ **Heritage Board:** Indirectly related to UXO because of historical warships' wrecks
- ▶ **Environmental Inspectorate:** Merged with Environmental Board in 1 January 2021

4.3.4 Procedure

Estonia has a structured procedure for managing munitions in the sea:

1. **Detection and reporting:** Munitions are identified through reports from fishermen, any type of maritime survey, or construction projects. Public awareness campaigns encourage reporting of suspected UXO.
2. **Risk assessment:** The Navy evaluates the condition, type, and location of the munitions to determine the level of threat and appropriate action.
3. **Temporary marking and warnings:** Areas with detected munitions are marked on nautical charts, and warnings are issued to maritime stakeholders.
4. **Neutralisation or removal:** Munitions are either safely detonated in place or transported to special safe areas for disposal.

5. **Post-remediation monitoring:** Environmental agencies monitor the affected areas to ensure there is no residual contamination or ecological harm.

4.3.5 Scenarios

The scenario responses for Estonia are summarised in Figure 3.

4.3.5.1 Scenario 1: Conventional munition on the beach

They have to call to the Emergency Response Centre (ERC, 112) reporting what they found. This message will be forwarded immediately by the ERC to the Rescue Board who starts immediately appropriate operation according to their own standard operative procedures. The Rescue Board is responsible for extinguishing fire and elimination of any chemical and/or explosive ordnances and substances on land, including coastal areas and inland water bodies.

4.3.5.2 Scenario 2: Chemical munition on the beach

In this kind of incident, the Rescue Board starts their operation which includes the elimination of such ordnance and/or substance after they evacuated all persons from the beach. It is also responsible for the elimination of any chemical and/or explosive ordnances and substances on land, including coastal areas and inland water bodies.

4.3.5.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

Private persons call the ERC (112), but may also call directly to the EDF (to the Navy's Maritime Operation Centre, MOC). ERC will forward this message immediately to MOC together with the data of the caller. The Navy starts an operation using mine clearance divers or mine hunter depending on the exact location and type of the bomb.

4.3.5.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

They have to take exact coordinates of the place they found this finding, if possible, also take photos, and inform immediately MOC and/or Joint Rescue Coordination Centre (JRCC) in Tallin and send these data to MOC or JRCC. They also have to try to place it back carefully and not to touch it.

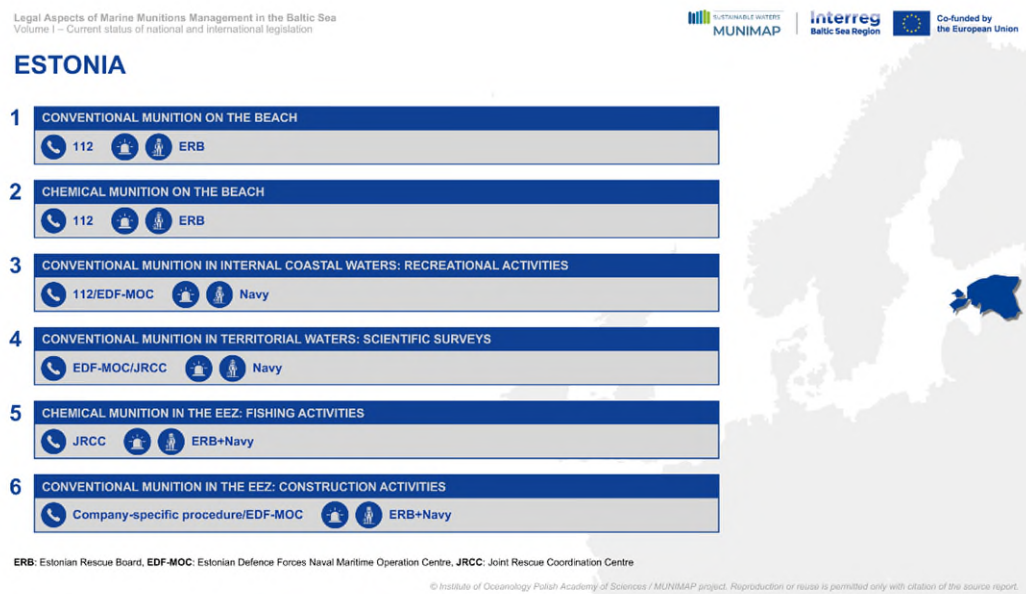
4.3.5.5 Scenario 5: Chemical munition in the EEZ: fishing activities

Crew members have to move inside the rooms of the ship. The captain should stop the vessel if possible and must inform immediately JRCC and wait evacuation of the whole crew. Further, Rescue Board together with the Navy will start operation to eliminate this bomb.

4.3.5.6 Scenario 6: Conventional munition in the EEZ: construction activities

Prior the construction and study of the sea bottom, they need to apply for the permit to study the sea bottom from the Ministry of Climate. The permit gives also the information who they have to inform if they find objects similar to the UXO. In general, they have to inform MOC (Navy) of their findings and give all relevant data including photos and videos to the Navy. The latter is responsible to decide what to do with the objects, e.g. how these will be removed and disposed.

Figure 3: Summary of the Estonian scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.3.6 Environmental considerations prior to detonation / remediation

- ▶ **Marine ecosystem protection:** Risk assessments prioritise minimising disruption to marine biodiversity, including protected species and habitats.
- ▶ **Chemical risks:** Operations involving chemical munitions aim to prevent the release of hazardous substances like mustard gas into the water.
- ▶ **Seasonal planning:** Activities are scheduled, if possible, to avoid periods of fish spawning, migration, or breeding to minimise ecological disruption.
- ▶ **Use of advanced technology:** Estonia employs technologies such as ROV to minimise environmental impacts during clearance operations.
- ▶ **Compliance with Environmental Laws:** All actions are carried out under the Environmental Protection Act and HELCOM guidelines to ensure sustainability.

4.3.7 Monitoring and mapping in place

- ▶ **HELCOM data sharing:** Estonia contributes to the HELCOM database, which tracks known munition dumpsites in the Baltic Sea.
- ▶ **Seabed surveys:** The Navy conducts regular surveys to identify and monitor munitions in its waters.
- ▶ **Geographic Information Systems:** GIS are used to map hazardous zones and guide remediation efforts.
- ▶ **Public awareness initiatives:** Efforts are made to educate fishermen, divers, and the public on the risks of munitions and how to report them.

4.3.8 Gaps and outlook

4.3.8.1 Gaps in current practices

- ▶ **Limited resources:** Financial and technological limitations constrain large-scale mapping and remediation efforts.
- ▶ **Incomplete data:** Some areas of Estonia's seabed remain unmapped, leaving potential hazards undetected.
- ▶ **Public awareness:** There is still a need for broader public education on the risks of munitions.
- ▶ **Cross-border coordination:** Shared responsibilities (with Finland, Sweden, and Latvia) for transboundary dumpsites are challenging.

4.3.8.2 Outlook

- ▶ Increased investment in advanced detection and disposal technologies
- ▶ Strengthened cooperation with Baltic nations through HELCOM and other regional agreements
- ▶ Expansion of public education campaigns to encourage safe practices and timely reporting of munitions
- ▶ Comprehensive mapping of Estonian waters to identify and address all potential hazards

4.3.9 Summary / evaluation of the legal framework

Estonia has developed a robust legal and procedural framework for managing munitions in the Baltic Sea, leveraging its **Environmental Protection Act**, **Explosive Substances Act**, and **HELCOM commitments**. The involvement of the EDF (Navy) ensures effective operational capacity for addressing UXO and chemical munitions.

However, gaps in funding, mapping, and public awareness highlight areas for improvement. By enhancing regional cooperation, adopting modern technologies, and investing in comprehensive seabed surveys, Estonia can further mitigate the risks posed by munitions in the sea, ensuring the safety of its environment and maritime activities.

4.4 Finland

Authors: Jan Bührke, Hanna Hakulinen, Matti Kuula, Milka Parviainen

4.4.1 Introduction

Finland, a country of vast forests and over 180,000 lakes, also boasts an intricate relationship with the Baltic Sea. The country's territorial sea tells a story of resilience, conflict, and environmental challenge tied to its tumultuous history. A key aspect of this history involves munitions remnants of war that continue to lie in the depths of Finnish waters.

Throughout the 20th century, Finland's geopolitical location at the crossroads of major European powers made it a battleground during pivotal conflicts, including World War I, World War II, and the Cold War. The Baltic Sea, central to these conflicts, became a theatre for naval warfare, mine-laying operations, and the disposal of surplus munitions. Both Finnish and foreign forces contributed to the extensive spread of military ordnance, from naval mines and

unexploded bombs to chemical weapons, that still rests in the seabed today. However, dumping of CWA in Finnish territorial waters has not been officially documented.

Such munitions in the sea have dual significance for Finland. On one hand, they represent historical artifacts of global and regional conflict, offering insight into the military strategies and technological advancements of the past. On the other hand, they pose a lasting environmental and safety challenge. Corrosion and leakage from these munitions threaten marine ecosystems, fisheries, and even coastal communities, making their identification and removal a pressing issue.

4.4.2 National laws regarding munitions in the sea and on land

4.4.2.1 General laws

- ▶ **Constitution (Suomen perustuslaki, 2000):** declares the responsibility of everyone for nature and environment and that the public authority should strive to secure the right to a healthy environment (Article 20)
- ▶ **Water Act (Vesilaki, 2012):** regulates the sustainable use of water resources and the aquatic environment and the improvement of their state as well as public rights, obligations and restrictions including conditions for granting permits for management
- ▶ **Environmental Protection Act (Ympäristönsuojelulaki, 2014):** prevents the pollution of the environment, safeguards its diversity and support the sustainable development, its Article 18 regulated special prohibitions concerning the sea, e.g. the dumping of waste and other substances
- ▶ **Act on Prevention of Marine Pollution (Merensuojelulaki, 1995):** bans actions which cause pollution of the sea including the release of substances (Section 1), promotes the best usable technology for the environment (Section 6)
- ▶ **Act on Compensation for Environmental Damage (Laki ympäristövahinkojen korvaamisesta, 1995):** regulates the compensation to be paid for activities which cause environmental damage, e.g. water pollution
- ▶ **Act on Safe Handling and Storage of Dangerous Chemicals and Explosives (Laki vaarallisten kemikaalien ja räjähteiden käsittelyn turvallisuudesta, 2005):** prevents and combats personal and environmental damage due to transfer, storage and other handling of dangerous chemicals and explosives to promote public safety
- ▶ **Rescue Act (Pelastuslaki, 2011):** regulates the duties of regional rescue services and rescue departments and rescue operations, ensures that people are rescued, important functions are secured in case of accidents and threats
- ▶ **Act on Defence Forces (Laki puolustusvoimista, 2008):** provides the Finnish Defence Forces with the authority to deal with military ordnance on land and in water
- ▶ **Decree on Finding and Rescuing Objects belonging to the Defence Forces (Asetus puolustusvoimille kuuluneen tavaran löytämisestä ja pelastamisesta, 1983):** lost property that apparently belonged to the Finnish or other Defence Forces should be reported to the military authority (Section 1)

4.4.2.2 Specific Laws for Munitions in the Sea

Finland adheres to international conventions such as HELCOM which calls for the monitoring and remediation of hazardous sea-dumped munitions in the Baltic Sea.

4.4.3 List of responsible authorities

The legislation on munitions is divided into several ministries, in particular:

- ▶ Ministry of Defence
- ▶ Ministry of the Interior
- ▶ Ministry of Education and Culture
- ▶ Ministry of the Environment
- ▶ Ministry of Justice
- ▶ Ministry of Transport and Communications
- ▶ Ministry of Economic Affairs and Employment

Other relevant authorities are

- ▶ **Finnish Defence Forces (FDF):** primary authority for locating, removing, and neutralising munitions on land and in the sea, including the Navy
- ▶ **Border Guard:** oversees coastal safety, including monitoring and responding to maritime incidents involving munitions.
- ▶ **National Police**
- ▶ **Rescue Services:** 21 rescue departments, managed by municipalities, carry out rescue service duties in their regions
- ▶ **Finnish Environment Institute (SYKE):** monitors environmental risks from hazardous materials and advises on ecological impacts
- ▶ **Finnish Institute for Verification of the Chemical Weapons Convention (VERIFIN):** develops identification methods for CWA to support the disarmament of chemical weapons
- ▶ **Transport and Communications Agency (Traficom):** ensures safe maritime navigation by marking hazardous areas and coordinating with naval authorities
- ▶ **Economic Development Centres²:** manage local responses to munitions-related environmental concerns
- ▶ **HELCOM Representation:** Finland works through HELCOM to address cross-border issues involving sea-dumped munitions in the Baltic Sea.

4.4.4 Procedure

The management of munitions in Finland follows a structured process:

² Established in 2026 on the basis of the previous Centres for Economic Development, Transport and the Environment

1. **Identification:** Authorities receive reports from fishermen, divers, or maritime surveys about suspected munitions.
2. **Assessment:** EOD teams evaluate the risk posed by the object, including its condition and proximity to human activity or sensitive ecosystems.
3. **Marking:** The area is cordoned off and marked on maritime charts to warn shipping and fishing operations.
4. **Neutralisation:** Munitions are either safely detonated in place or transported to specialised facilities for disposal (by FDF).
5. **Monitoring:** Post-remediation environmental assessments ensure that contamination is mitigated.

4.4.5 Scenarios

The scenario responses for Finland are summarised in Figure 4.

4.4.5.1 Scenario 1: Conventional munition on the beach

They would need to call 112. After that, a police patrol together with the rescue service are the first ones to respond to the emergency call. The regular police patrol will contact the police bomb squad. By using various indicators and measuring devices, the bomb squad will try to determine whether the object is a military or civilian product. If it is a military one, the police will still be responsible for the public order in the area while FDF will dispose the material.

4.4.5.2 Scenario 2: Chemical munition on the beach

According to the **Rescue Act**, the rescue service is responsible for carrying out rescue operations when a fire, other accident or threat thereof requires urgent measures to protect or save human life or health, property or the environment, and the measures cannot be carried out by the person affected by the accident or threat thereof on their own or are the responsibility of another authority or organisation.

Furthermore, if authorities from several sectors participate in the rescue operation, the director of rescue operations acts as the overall leader of the situation. The contents of the barrel pose a danger to the public, so the overall situation would likely be managed by a rescue authority.

Practically, the local police and rescue service would respond, while simultaneously requesting back up from the FDF. The danger area would be isolated by the police. If the barrel would be immediately recognised to be military-type, police would wait for the FDF bomb squad to arrive. If it appears to be civilian, the police bomb squad would handle it which includes analysing the substance, if needed with the support of the FDF bomb squad. However, it is likely that the FDF would later destroy the canister at the request of the police in line with the **Act 342/2022** which regulates the executive assistance of FDF to the police (Laki Puolustusvoimien virka-avusta poliisille, 2022).

4.4.5.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

Report either to the police or to FDF. FDF will destroy the found munitions.

4.4.5.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

Inform either the police or FDF. FDF will destroy the found munitions.

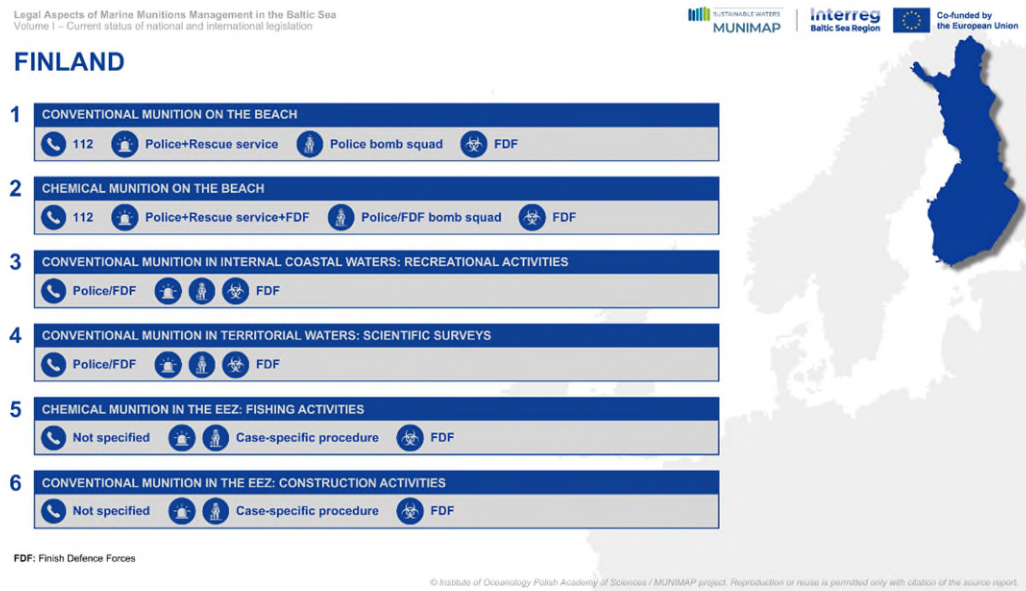
4.4.5.5 Scenario 5: Chemical munition in the EEZ: fishing activities

There is no specific process in place. FDF will only destroy the substances if for some reason a case-by-case decision is made by environmental authorities.

4.4.5.6 Scenario 6: Conventional munition in the EEZ: construction activities

There is no specific process in place. FDF will only destroy the munition if for some reason such a request is made by another authority.

Figure 4: Summary of the Finnish scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.4.6 Environmental considerations prior to detonation / remediation

- **Marine ecosystems:** Authorities assess the risk to local flora and fauna, especially in protected areas.
- **Chemical leakage:** Efforts are made to prevent the release of toxins, such as mustard gas or heavy metals, during removal or detonation.
- **Timing:** Operations avoid sensitive periods, such as fish spawning or bird nesting seasons.
- **EIA:** Detailed studies ensure compliance with the **Environmental Protection Act**.
- **Use of advanced technology:** Non-invasive techniques like ROV to minimise environmental disturbance.

4.4.7 Monitoring and mapping in place

- **Sea-mapping programs:** Finland has invested in high-resolution seabed mapping to locate dumped munitions and other hazards. The FDF has gathered detailed mappings of various dumped munitions. While this military information is generally classified, it can be shared with other Finnish authorities on a case-by-case basis.
- **HELCOM database:** Data from multinational Baltic surveys contribute to a shared map of hazardous zones.
- **Local monitoring networks:** Regional environmental authorities regularly update records based on reports from coastal communities and maritime stakeholders.

- **GIS integration:** Modern Geographic Information Systems help authorities to plan remediation efforts efficiently.

4.4.8 Gaps and outlook

4.4.8.1 Gaps in current practices

- **Incomplete surveys:** Some regions of the Baltic Sea remain underexplored, leaving potential threats undetected.
- **Limited resources:** The high cost of mapping and removal restricts the scale of operations.
- **Legal ambiguities:** Overlaps in jurisdiction between national and international waters complicate enforcement.
- **Technological limitations:** Challenges remain in safely handling deeply buried or chemically degraded munitions.

4.4.8.2 Outlook

- Increased funding for research and cleanup efforts
- Development of safer, more efficient disposal technologies
- Strengthening cross-border collaboration, especially through HELCOM initiatives
- Enhanced public awareness campaigns to improve reporting of munitions discoveries

4.4.9 Summary / evaluation of the legal framework

Finland's legal framework for managing munitions in the sea is robust, built on national laws and international agreements like HELCOM. However, gaps in enforcement, resource allocation, and regional coordination persist. Strengthening these areas will ensure a safer Baltic Sea and more effective mitigation of the historical legacy of munitions in the sea.

In conclusion, Finland has made significant progress in addressing munitions in the sea but must continue evolving its policies, technologies, and collaborations to fully resolve this complex issue.

4.5 Germany

Authors: Jan Bührke, Anita Künitzer, Erik Hanstein

With input from the German BLANO³ expert group "Munitions in the Sea"

4.5.1 Introduction to the country history regarding munitions in the sea

Germany's history with munitions in the sea is closely linked to both World Wars. The largest quantities of munitions were dumped in selected dumpsites in the German marine waters after the Second World War. The often-quoted figure of 1.6 million tons of conventional munition (300,000 tons in the Baltic and 1.3 million tons in the North Sea) cannot be confirmed beyond doubt, but seems realistic based on the German munitions stockpile in May 1945 (Deutsche Allianz Meeresforschung, 2024). In addition, there were approximately 5,090 tons of chemical warfare agents dumped in German waters (about 90 tons in the German North Sea near

³ Working group of the German federal states and the federal government on the North Sea and Baltic Sea (*Bund/Länder Arbeitsgemeinschaft Nord- und Ostsee*)

Heligoland and about 5,000 tons south of the Little Belt at the German / Danish border) (Böttcher et al., 2011).

Today, Germany faces challenges regarding the environmental risks, negative impacts on economic activities (i.e. fisheries, offshore wind energy and tourism) as well as safety risks particularly for shipping and maritime transport. Germany has taken a leading role in regional initiatives like HELCOM and OSPAR and is committed to adhere to strict environmental and safety standards (Expertenkreis Munition im Meer, 2021). Accordingly, the German MSFD program of measures addresses the management of dumped munitions with the measure DE-M408-UZ2-04 (BMUV, 2022). This measure addresses hazards (prioritisation of action based on surveying the state of dumped munitions, disposal of dumped munitions with the lowest impact possible on the marine environment, management methods with lower environmental impact), knowledge (surveys, archival and other research, munition register) and risk assessment (prioritisation of sites contaminated with munitions).

4.5.2 National laws regarding munitions in the sea and on land

4.5.2.1 Introduction

The complex issue of munition in the sea is touching many different fields of law, especially hazard prevention law, water protection and nature conservation law (Kollenberg, 2022). In contrast to other Baltic Sea States, the German federal system divides the legal framework into state and federal regulations. There is no specific and uniform law on munitions in the sea in Germany. Instead, various regulations are relevant depending on the activity (e.g. recovery, disposal, blasting, etc.) and the respective protected good (e.g. life and health, safety of shipping, environment, material assets, etc.). The regulatory competence is generally divided between the federal government and the federal states, with each of the five coastal states having own laws, own authorities and own procedures. For sake of simplicity, we focus here mainly on federal laws and procedures.

This focus on federal law necessarily entails a certain degree of abstraction. In administrative practice, the handling of munitions in the sea in Germany is shaped not only by federal legislation, but to a significant extent by the allocation of federal and state competences, as well as by the functional distinction between hazard prevention and environmental precaution. While responsibilities, procedures and operational routines for security-driven measures addressing individual munition objects in the territorial sea – particularly in situations of acute danger – are comparatively well established and clearly structured, the legal and institutional framework for environmentally oriented, preventive remediation and recovery activities is less differentiated.

In this context, an upcoming guidance document on the nature conservation-related and technical handling of munitions in the sea will provide an important contribution to legal and technical orientation (see chapter 4.5.6). It will operationalise the requirements of European and national nature conservation law for activities related to munitions in the marine environment and supports the systematic integration of environmental and species protection considerations into existing decision-making and procedural structures. At the same time, it illustrates that the practical implementation of environmental requirements takes place within a complex framework of security-related competences, federal structures and case-specific assessments.

In particular with regard to planned remediation, recovery or clearance activities that are not exclusively driven by immediate hazard prevention, questions concerning the functional allocation of responsibilities between federal and state authorities, as well as the interaction between security law, water protection law and nature conservation law, remain challenging. As

a result, environmental requirements are currently often implemented through case-by-case assessments, ancillary provisions or exemptions. The federal structure thus proves effective in the context of acute hazard prevention, while at the same time constituting a key framework condition for the further development of a systematic, preventive and environmentally oriented approach to the management of munitions in the sea.

The following sub-chapters describe the laws with (potential) links to the management of munitions in the sea, separated by security laws and precautionary environmental laws. Note, in the term “coastal waters” in German law comprises parts of the internal waters and the territorial sea.

4.5.2.2 Security and safety laws

4.5.2.2.1 Act on Regulatory Offences (Gesetz über Ordnungswidrigkeiten (OWiG), 1968) and Criminal Code (Strafgesetzbuch (StGB), 1998)

Private persons who handle explosives improperly or cause it to be disposed of at sea may be punished under the Criminal Code (§ 127 Abs. 2 Nr. h StGB referring to § 40 Abs. 1–3 SprengG, see chapter 4.5.2.2.4) or the Act on Regulatory Offences.

4.5.2.2.2 Federal Waterways Act (Bundeswasserstraßengesetz (WaStrG), 1968)

The act regulates, e.g., the maintenance of sea waterways within the territorial sea and internal waters. The maintenance is limited to the navigability of the shipping lanes marked by the Federal Waterways and Shipping Administration (WSV), insofar as this is economically justifiable (§ 8 Abs. 5 WaStrG).

4.5.2.2.3 Federal Maritime Responsibilities Act (Gesetz über die Aufgaben des Bundes auf dem Gebiet der Seeschifffahrt (Seeaufgabengesetz, SeeAufgG), 1965)

The act regulates, e.g., measures to address threats and adverse effects on the marine environment, including the removal of disruptions with regard to the safety and efficiency of navigation on maritime waterways (§ 3 Abs. 1 SeeAufgG). It is principally applicable to the territorial sea and the EEZ. In some cases, the application of the WHG (chapter 4.5.2.4.2) might be the *lex specialis* in parts of the coastal waters.

4.5.2.2.4 Explosives Act (Gesetz über explosionsgefährliche Stoffe (Sprengstoffgesetz, SprengG), 1976)

The act regulates the handling, storage, and disposal of explosives. The munitions in the sea are subject to this act which applies to land and marine areas, i.e. the coastal waters and, where applicable, the EEZ.

4.5.2.2.5 War Weapons Control Act (Ausführungsgesetz zu Artikel 26 Abs. 2 des Grundgesetzes (Gesetz über die Kontrolle von Kriegswaffen, KrWaffKontrG), 1961)

This act regulates the handling of war weapons, including munitions. It also applies to marine areas. This act only applies if existing munitions in the sea are to be used for warfare.

4.5.2.3 Regulations of the federal coastal states

In the coastal waters of the Baltic Sea, additional regulations of the federal states of Schleswig-Holstein and Mecklenburg-Vorpommern are relevant. In case of munition in the sea and EOD, these are the security laws and EOD regulations. Further details are provided e.g. by Bund-Länder Arbeitsgemeinschaft Munitionsaltlasten und Naturschutz (in prep.). As the MUNIMAP project does not cover the North Sea, regulations of the federal coastal states of Niedersachsen, Hamburg and Bremen are not mentioned here.

4.5.2.3.1 Federal states' security laws

- ▶ **Schleswig-Holstein State Administration Act (Allgemeines Verwaltungsgesetz für das Land Schleswig-Holstein (Landesverwaltungsgesetz, LVwG, 1992):** Allows interventions in the event of threats to public safety, including environmental hazards from munitions.
- ▶ **Mecklenburg-Vorpommern Safety and Order Act (Gesetz über die öffentliche Sicherheit und Ordnung in Mecklenburg-Vorpommern (Sicherheits- und Ordnungsgesetz, SOG M-V), 2020):** Rights of state authorities, including in the case of environmentally hazardous substances.

4.5.2.3.2 Explosive ordnance disposal regulations

The regulations govern the clearance and disposal of explosive ordnance in German waters.

- ▶ **Schleswig-Holstein Explosive Ordinance (Landesverordnung zur Abwehr von Gefahren für die öffentliche Sicherheit durch Kampfmittel (Kampfmittelverordnung, KmVO), 2025):** State ordinance on the prevention of threats to public safety from explosive ordnance.
- ▶ **Mecklenburg-Vorpommern Ordinance on the prevention of dangers from explosive ordnance (Verordnung zur Abwehr von Gefahren durch Kampfmittel (Kampfmittelverordnung, KampfmVO M-V), 2024):** Legal basis for EOD measures.

4.5.2.4 Precautionary environmental laws

4.5.2.4.1 Federal Nature Conservation Act (Gesetz über Naturschutz und Landschaftspflege (Bundesnaturschutzgesetz, BNatSchG), 2010)

This act also applies to coastal waters and the EEZ and is complemented by Federal States' nature conservation legislation. It protects marine biotopes, marine species and habitats as well as the performance and functioning of marine ecosystems.

The act establishes a binding decision-making framework for activities at sea that may affect nature and environment. In the context of legacy munitions, this framework is particularly relevant for assessing whether, and under which conditions, clearance, recovery or disposal measures may be carried out. Nature conservation law requires that adverse impacts on protected habitats and species be avoided wherever possible, minimised where unavoidable, and weighed against overriding public interests only on the basis of a structured assessment. This includes consideration of secondary environmental effects, such as sediment disturbance, underwater noise and shock waves from detonations, as well as cumulative impacts on sensitive marine ecosystems. In this way, the act does not merely impose prohibitions, but operationalises precautionary and mitigation requirements that directly influence the choice of remediation methods and procedures.

Activities at sea including the recovery of munitions must comply with statutory biotope protection (§ 30 BNatSchG), nature protection in particular Nature 2000 areas under the Habitats and Birds Directives (§ 34 BNatSchG), special species protection (§§ 44 ff. BNatSchG) and impact regulation under nature conservation law (§§ 14 ff. BNatSchG). An upcoming guidance document on nature conservation and technical requirements for the clearance and disposal of munition in the Baltic Sea (and the North Sea) intends to fill the gaps on nature conservation legislation and technical requirements in existing guidelines (cf. chapter 4.5.6).

4.5.2.4.2 Federal Water Resources Act (Gesetz zur Ordnung des Wasserhaushalts (Wasserhaushaltsgesetz, WHG), 2010)

The WHG regulates the management of all inland and marine waters. It is the main instrument to transpose the Marine Strategy Framework Directive (chapter 2.2.2; §§ 45a ff. WHG) and the Water Framework Directive (chapter 2.2.3) into national law and to set management objectives to achieve and maintain good chemical and ecological status in coastal waters and good environmental status in marine water. Besides the Water Acts of the federal states, the Ordinance on the Protection of Surface Water (Verordnung zum Schutz der Oberflächengewässer (Oberflächengewässerverordnung, OGewV), 2016) complements the WHG. For coastal waters, the act also provides, among others, authorisation requirements for water uses and regulations on the handling of substances hazardous to water (§ 62 WHG), including legacy munitions.

4.5.2.4.3 Circular Economy Act (Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltverträglichen Bewirtschaftung von Abfällen (Kreislaufwirtschaftsgesetz, KrWG), 2012)

The Circular Economy Act (KrWG) governs the waste management with the objective of protecting human health and the environment while conserving natural resources (§ 1 KrWG). Whether legacy munitions in the sea qualify as “waste” according to § 3(1) KrWG is legally unsettled and remains a matter of debate. However, pursuant to § 2(2)(14) KrWG, the location, recovery, storage and disposal of explosive ordnance including legacy munitions are explicitly outside the scope of this act as EOD has traditionally been governed by hazard prevention law which provides for more specific regulatory frameworks than general waste legislation (Jarass & Petersen, 2022, Lines 142–143). From a legal perspective, the exclusion from the scope is functional to avoid regulatory overlaps, i.e. the KrWG is superseded by more specific legal regimes. Nonetheless, any waste produced by EOD which is not explosive ordnance anymore falls within the scope of this act.

4.5.2.4.4 Chemicals Act (Gesetz zum Schutz vor gefährlichen Stoffen (Chemikaliengesetz, ChemG), 1982)

As munitions may contain chemical and explosive substances, they are also subject to the ChemG. The act regulates the handling, storage and disposal of such substances. It applies to both land and marine areas.

4.5.2.4.5 Environmental Impact Assessment Act (Gesetz über die Umweltverträglichkeitsprüfung (UVPG), 2021)

The act implements the EU EIA Directive (Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the Assessment of the Effects of Certain Public and Private Projects on the Environment, 2012) and provides a key procedural framework for integrating environmental considerations into authorisation decisions. While its Annex 1 does not explicitly list munition recovery or remediation projects, such activities may fall within the scope of this act depending on their type, size and location, in particular where they qualify as maritime engineering works or coastal protection measures. Where no mandatory EIA is triggered, a pre-screening on a case-by-case basis applies (§§ 5–7). Given that munition-related projects may involve seabed intervention, underwater noise and potential releases of hazardous substances, EIA requirements may become relevant in practice. The act further provides narrowly defined exemptions for projects serving exclusively defence purposes or urgent hazard prevention (§ 1(3)), which may be relevant in acute emergency situations but do not cover systematic, long-term remediation programmes.

4.5.3 List of relevant authorities

The relevant authorities have to be determined on a case-by-case basis (Frey, 2020). According to the federalist principle, the various authorities of the coastal federal states would have to be mentioned. For sake of simplification, however, only the relevant federal authorities are exemplarily listed here. Networks like the Maritime Safety and Security Centre Cuxhaven (MSSC, *Maritimes Sicherheitszentrum, MSZ*) coordinate the operational forces of the federal government and of the coastal federal states. In the following, the relevant authorities and subordinate authorities are separated by their area of responsibility.

4.5.3.1 Security response

4.5.3.1.1 Federal Ministry of Defence (BMVg)

The Federal Armed Forces (*Bundeswehr*) is subject to the directives of the Federal Ministry of Defence. The Armed Forces are not responsible for legacy munitions but may assist EOD operations upon prior request of administrative assistance.

4.5.3.1.2 Federal Ministry of the Interior (BMI)

The tasks of the ministry include the security of Germany. They include the defence against averting dangers, which may come from munitions in the sea. The Federal Police (*Bundespolizei*), which is its subordinate, has executive power. The maritime branch of the Federal Police (*Bundespolizei See, BPol See*) is part of the German Federal Coast Guard (*Küstenwache des Bundes*) – a coordination network of federal law enforcement agencies at sea under various ministries (e.g. customs and the Waterways and Shipping Administration).

4.5.3.2 Safety of shipping

4.5.3.2.1 Federal Ministry for Transport (BMV)

Together with its subordinate authorities (see next two chapters), the ministry performs departmental tasks in areas relating to the mobility of people, goods and data. It is responsible, e.g., for the federal transport infrastructure including waterways. The range of tasks includes the legal organisation and ensuring the safety of the respective modes of transport as well as the planning and financing of investments to maintain and expand the infrastructure.

4.5.3.2.2 Federal Waterways and Shipping Administration (Wasserstraßen- und Schifffahrtsverwaltung des Bundes, WSV)

The WSV manages the federal waterways and maintains them for national and international shipping. It is responsible for ensuring safe and economical shipping traffic, for the maintenance, operation, expansion and new construction of federal waterways as well as for informing vessels about munitions in the sea which pose a danger to waterways and/or shipping. The WSV is subordinated to the BMV.

4.5.3.2.3 Federal Maritime and Hydrographic Agency (Bundesamt für Seeschifffahrt und Hydrographie, BSH)

The BSH is responsible for a broad range of maritime tasks including spatial planning, issuing official nautical charts, conducting surveys and maintaining maritime safety. Activities and topics like the reporting of munitions encounters to OSPAR, surveying ship wrecks or hosting the national register on underwater noise are related to munitions in the sea. The BSH is subordinated to the BMV.

4.5.3.3 Environmental protection

4.5.3.3.1 Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN)

The ministry is responsible for environmental protection, in particular the impact of munitions on marine ecosystems. It also coordinates and enforces international agreements such as the HELCOM and OSPAR Conventions (chapter 2.1.3) as well as the London Convention / London Protocol (chapter 2.1.4). Its work on munitions in the sea is based on the precautionary principle.

4.5.3.3.2 German Environment Agency (UBA)

The UBA is the central environmental authority and researches, advises and provides information on numerous environmental and human health protection issues to the ministry and general public. UBA is subordinated to BMUKN. It is the enforcement authority in the field of environmental protection and chemical evaluation. It is working on and funding external research projects related to munitions in the sea. Data on hazardous substances are collected in its Marine Environmental Database (Umweltbundesamt, 2020) for further evaluation and reporting to the EU, HELCOM and OSPAR.

4.5.3.3.3 Federal Agency for Nature Conservation (BfN)

The BfN is subordinated to BMUKN. BfN advises the ministry on all issues relating to national and international nature conservation and landscape management, promotes nature conservation projects and supervises research projects. It is the enforcement authority for nature conservation and responsible for the management of protected areas in the EEZ. It is working on research projects related to munitions in the sea and currently chairing the elaboration of a guidance document on nature conservation in the current security related clearance and disposal of legacy munition objects in the sea (cf. chapter 4.5.6).

4.5.4 Procedure

The procedure and process in cases of security measures, i.e. to avert threats to public safety is largely determined by the question of responsibility. This chapter therefore focuses on responsibilities. In principle, responsibilities in internal waters and the territorial sea are functionally differentiated and depend on the respective legal basis and task concerned. Depending on the nature of the specific measure, both state and federal authorities may exercise regulatory powers within their respective fields of competence. On federal waterways, for example, a distinction must be made as to whether and to what extent the sovereign rights of the Federal Waterways and Shipping Administration (cf. chapter 4.5.3.2.3) are affected by the remediation of explosive ordnance in individual cases, in particular with regard to federal competences in the field of maritime safety and environmental hazard prevention (§ 1 **SeeAufG**).

The five coastal federal states have regulated threats from munitions in the sea to public security and safety differently, mainly through supplementary regulations on explosive ordnance. In some cases, however, federal state police and regulatory law is also the relevant legal basis. Wagner (2020) and Arbeitskreis Kampfmittelräumung (2024a) provide overviews of all federal state regulations. However, the actual handling of legacy explosive ordnance is left to the EOD services (*Kampfmittelräumdienste*) due to the potential danger. If UXO are found, the coastal federal states then send their EOD services to the site. Frey (2020) provides an overview of the competent bodies of the coastal states and their legal basis (p. 23), see also chapter 4.5.2.3.2. The

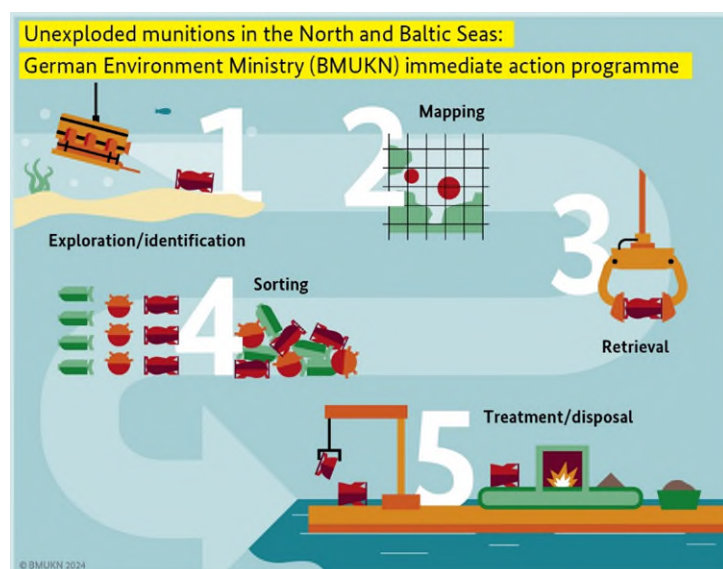
explosives experts, who are trained and certified in accordance with § 20 **Explosives Act**, decide how to proceed.

If possible, UXO are defused by the EOD services. After defusing, and if an UXO is transportable, it is taken to a disposal centre. One of these disposal centres is the company for the disposal of CWA and military waste, GEKA (*Gesellschaft zur Entsorgung von chemischen Kampfstoffen und Rüstungsaltslasten mbH*). GEKA is a state-owned company under the authority of the Federal Ministry of Defence which destroys UXO in its incineration facilities only upon request. If UXO cannot be transported, they are destroyed on site by the EOD services. This procedure relates to the handling of single munition objects.

The procedure and process in case of environmental remediation of munitions dumped at sea, which means the precautionary handling of many munition objects within one activity, is a completely new procedure and is being developed within the German Immediate Action Programme on Unexploded Munitions in the North Sea and Baltic Sea (*Sofortprogramm Munitionsaltlasten in Nord- und Ostsee*, Figure 5; BMUV, 2024; Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety, 2025)⁴. It includes the following steps: (1) Exploration of the sea bottom and detection and classification of UXO, (2) mapping of the area, (3) recovery followed by (4) sorting and (5) treatment or disposal with a mobile incineration facility. Steps 1 to 3 have been piloted in 2024/2025, while for steps 4 and 5 a mobile industrial facility has to be designed, constructed and tested.

The review of existing national legislation and its potential adaptation and harmonisation with regard to the process of environmental remediation of munitions dumped at sea is outside the scope of this report but will be a part of a separate legal assessment led by BMUKN.

Figure 5: Scheme of the German Immediate Action Programme on Unexploded Munitions in the North Sea and Baltic Sea



The area is explored and unexploded munitions are identified (step 1). The area is mapped (step 2) and munitions retrieved (step 3). The munitions are sorted (step 4) and eventually treated and disposed of (step 5).

Source: German Federal Ministry for the Environment (2024)

⁴ note: the name of the ministry changed in May 2025

4.5.5 Scenarios

The scenario responses for Germany are summarised in Figure 6. They simplify the responsibilities for the proper disposal of munitions (e.g. depending on the location of munitions) and the state-specific details of the acting chain in case of encounters (cf. Arbeitskreis Kampfmittelräumung, 2024a; Expertenkreis Munition im Meer, 2016). All incidents will be reported to and registered at the Central Reporting Office for Munition at Sea (*Zentrale Meldestelle Munition im Meer*) in operation since 1 January 2013 at the Joint Control Centre of the federal and state water police in the MSSC.

4.5.5.1 Scenario 1: Conventional munition on the beach

They should call the local police. Knowing of having an UXO or suspecting something like munition, they will contact the responsible governmental EOD service. The police / fire brigade / EOD service will come to the beach depending on the situation. The EOD service clears the situation (e.g. decide whether it was white phosphorus or not) and would investigate the vicinity of the place in order to find e.g. possible other amber-like objects.

4.5.5.2 Scenario 2: Chemical munition on the beach

The police, fire brigade or ambulance as well as the EOD service will come, evacuate people and investigate the kind of substance. If it is (chemical) munition, the EOD service will be in charge. CBRN (ABC) teams of the Armed Forces may provide support but only after prior request of administrative assistance. The chemical munition will be transported to GEKA for destruction only upon prior request (cf. chapter 4.5.4).

4.5.5.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

They should call the police. They will, by knowing of having a potential bomb or suspecting something like munition, contact the responsible governmental EOD service which will plan to solve the issue. An avoidance area will be arranged for the general shipping by the WSV (specifically, the *Generaldirektion Wasserstraßen und Schifffahrt*). The bomb will be fuse removed / disarmed and then transported to a disposal centre or, if this is not possible, detonated on site after evacuating the area.

4.5.5.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

The procedure is similar to scenario 3. The captain would have to call the water police (e.g. BPol See), Federal Coast Guard, EOD service or Central Command for Maritime Emergencies (*Havariekommando*) and wait for further instructions. UXO shall not be dumped again, as far as the own safety is not in immediate danger.

4.5.5.5 Scenario 5: Chemical munition in the EEZ: fishing activities

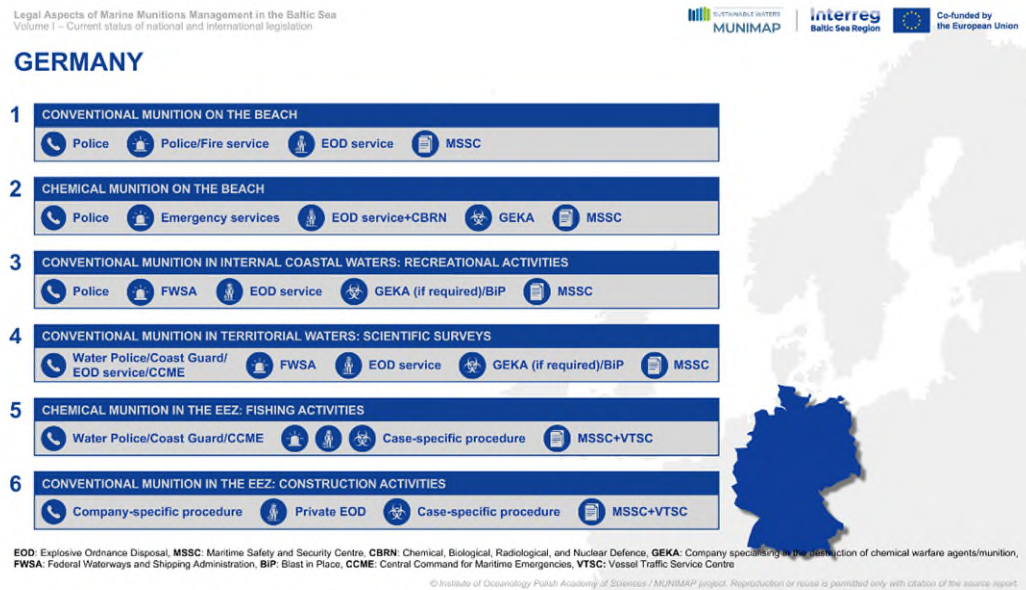
The captain would have to call the water or federal police (e.g. BPol See), Federal Coast Guard or Central Command for Maritime Emergencies and wait for further instructions. The incident is reported to the respective Vessel Traffic Service centre (*Verkehrszentrale*).

4.5.5.6 Scenario 6: Conventional munition in the EEZ: construction activities

The operator of the windfarm is responsible to find out if it is UXO as well as for further steps including clearance and disposal. They assign private EOD companies. The operator / experts from such an EOD company perform project-specific risk assessments and management plans. The consultation process with relevant authorities is case dependent. The incident is reported to the respective Vessel Traffic Service centre. The upcoming guidance document addresses the

nature conservation and technical requirements for the clearance of such UXO to ensure the protection of marine biodiversity and habitats (cf. chapter 4.5.6).

Figure 6: Summary of the German scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.5.6 Environmental considerations prior to detonation / remediation

The clearance of munitions in the sea raises many environmental aspects. And it is a major challenge to take them into account appropriately. Probably the most important aspects are the threats through toxicologic substances entering the marine environment and through underwater noise in the event of explosion of a munition object. Due to the impulsive noise pollution associated with the underwater detonation of UXO and the possible spreading of toxic and carcinogenic munition compounds into the marine environment, underwater detonation of UXO should be avoided and may only be used as a last resort or only be used if a risk to people or infrastructure cannot otherwise be ruled out (CDU/CSU & SPD, 2021), e.g. if the munition object cannot be transported, handled or relocated.

A Federal / State working group is currently developing a guidance document on nature conservation and technical requirements for the clearance and disposal of munition in the North Sea and the Baltic Sea. It is intended to fill the gaps on nature conservation legislation and technical requirements in the existing guidelines (see Arbeitskreis Kampfmittelräumung, 2024b; Frey et al., 2019). According to the draft document (Bund-Länder Arbeitsgemeinschaft Munitionsaltlasten und Naturschutz, in prep.), priority must be given to checking whether the munition object found can be cleared, brought ashore or disposed of in another way (e.g. moving the munitions to a sandbank with detonation at low tide). Recovery and disposal on land is preferable. If underwater detonation is inevitable, this must be explained. Such an explanation should be provided by a competent person, i.e. a person with a certificate of eligibility according to §§ 7, 20 **SprengG**. In this sense, the decision on a planned EOD is not subject to formal approval, but is exclusively subject to a risk assessment. After the risk assessment, an assessment pursuant nature conservation law is obligatory and, depending on the size of the UXO and the expected noise propagation, an exemption from the provisions of species and/or habitat protection is required. The evaluation of alternatives must demonstrate that blasting is

the only available alternative. The primary concern of the guidance document is the protection of marine biodiversity, particularly when blasting is inevitable, according to e.g. European and national nature conservation law. Preventing and minimising harm to sensitive protected species such as marine mammals, fish and seabirds, but also to benthic habitats and coastal ecosystems is emphasised. Any clearance has to be assessed in terms of its ecological impact. The key steps for nature conservation include (Bund-Länder Arbeitsgemeinschaft Munitionsaltlasten und Naturschutz, in prep., p. 8):

- ▶ Avoid blasting, e.g. by relocating munitions
- ▶ Implement mitigation measures when blasting is unavoidable, e.g. use bubble curtains to reduce noise or acoustic deterrence methods like seal scarer to protect marine mammals
- ▶ Monitor visually and acoustically the clearance area before and during the measures to detect and avoid early any harm to protected species
- ▶ Monitor and review the performance to assess the effectiveness of measures

The BSH guideline for offshore wind companies on handling EOD in the EEZ (BSH, 2023) supplements the upcoming guidance document on nature conservation and technical requirements for the clearance and disposal of munitions in the Baltic Sea and North Sea.

4.5.7 Monitoring and mapping in place

The Navy in Rostock has an internal database on munition objects, but is not carrying out a specific monitoring on munition objects. Research projects like CONMAR survey piles of dumped munition and provide their images and survey data to the Navy. The BSH has an internal database on obstacles to maritime transport which include ship wrecks. The wrecks are monitored by BSH. These data from the Navy and BSH are confidential.

The Central Reporting Office for Munition in the Sea (cf. chapter 4.5.5) is the central registration office for munition findings and incident reports. The reporting centre accepts reports of explosive ordnance in the North Sea and Baltic Sea, including the coastal areas and the EEZ. The following agencies regularly report: EOD services of the federal states, GDWS / WSV, BSH, Navy. Reports from third parties such as private EOD companies (e.g. from the offshore sector), science or the general public are also accepted. The data collection ranges from initial reports of munitions objects (including suspected sites) to clearance. The munitions-related data collected is systematically recorded and documented at the Central Reporting Office and updated and coordinated in cooperation with the relevant authorities. The data is transmitted annually to the Rostock Naval Command in the form of annual reports, where it is quality-assured and permanently stored in a database. Extracts of this database can be obtained for international reporting obligations (OSPAR and potentially HELCOM) as carried out by BSH.

Legacy conventional munition contains munition compounds such as TNT, RDX and HMX and heavy metals, all of which are hazardous substances, which should not be released into the marine environment. There is currently no monitoring for munition compounds in German coastal and offshore waters in place (Strehse et al., 2024). There is also no monitoring for underwater noise from explosions in place.

Munition compounds are measured in national and international research projects. The UDEMM project revealed widespread contamination with munition compounds in waters of the Baltic Sea (Beck et al., 2025). The TATTOO project (Strehse et al., 2024) investigated the concentrations of munition compounds in the food chain both temporarily and spatially. The annual collections of blue mussels of the German Environmental Specimen Bank, which were

sampled over the last 30 years at three locations along the coastline of the Baltic Sea and North Sea, revealed that munition compounds were gradually released to the open water and are detectable although not quantifiable in blue mussels (Strehse et al., 2023). In the North Sea of Lower Saxony, concentrations of munition compounds in sediment and flat fish were found to be correlated to munition deposits. Although the low concentrations currently pose no harm to humans but may do so if munition further corrodes (Maser et al., 2024).

In the German CONMAR project, UBA undertook toxicity tests in the lab on some TNT and some metabolites and is deriving an Environmental Quality Standard (EQS) for TNT and its metabolites according to the Technical Guidance Document No 27 under the Water Framework Directive (CONMAR, n.d.; European Commission, 2017; Künitzer et al., 2025). TNT concentrations above the draft EQS value are currently only reached in the close vicinity to dumped munition, thus indicating a point source pollution (Künitzer et al., 2025).

The Environmental Ministers Conference in 2019 has required a screening for munition compounds in water, sediment and biota as basis to further deciding on a regular monitoring programme as may be required under the MSFD. While a governmental screening did not take place, the various national and international research projects provided a good overview of concentrations of munition compounds in water, sediment and biota of the North Sea and Baltic Sea. Methods for a regular monitoring of munition compounds are now available. The monitoring needs to be a hot-spot monitoring as high contamination currently only occurs in the vicinity of dumpsites.

4.5.8 Gaps and outlook

4.5.8.1 Gaps

While the legal situation regarding munition in the sea is well established in terms of security and safety concerns, the remediation of munition for environmental protection is complex due to the different levels of federal and state regulations, and is currently only covered through legal exceptions and analogies. Hence, a sound legal framework for this purpose needs to be established.

A key structural gap concerns the unresolved allocation of institutional responsibilities for dealing with legacy munitions in the EEZ. While the territorial sea, as part of the national territory, is subject to a clearly defined federal allocation of competences and the responsibilities of the federal states for security-driven hazard prevention measures are comparatively well established, long-standing uncertainty persists with regard to the EEZ as to whether responsibility lies primarily with the federal administration or with the coastal states. This ambiguity arises from diverging constitutional interpretations regarding the extraterritorial extent of federal and state competences under hazard prevention law and sectoral environmental legislation beyond the territorial sea.

In this context, the guidance document described in chapter 4.5.6 makes an important contribution by systematically outlining the existing competence structures, transparently identifying divergent legal interpretations, and providing practice-oriented orientation for administrative procedures in both the territorial sea and the EEZ (Bund-Länder Working Group on Legacy Munitions and Nature Conservation, in prep., in particular part C.I). While this document cannot substitute for a legally binding allocation of competences, it establishes a robust reference framework for administrative practice, especially with regard to the integration of nature conservation instruments and participation requirements into complex clearance and remediation procedures. Nevertheless, for a long-term and environmentally oriented approach to munition remediation in the EEZ, better statutory clarification of

responsibilities at federal level remains necessary in order to reduce legal uncertainty and enable coordinated and predictable procedures.

4.5.8.2 Outlook

Germany is facing major challenges in the removal of the 1.6 million of tonnes of munitions in the North Sea and Baltic Sea for environmental concerns, but is making significant progress. Germany is taking the first step towards solving the problem by financing and implementing the Immediate Action Programme on Unexploded Munitions in the North Sea and Baltic Sea. The pioneering pilot project on the clearance of munitions in the sea in national coastal waters in the framework of the Immediate Action Programme of the government marks the beginning of a new era in munition clearance. Another focus is on the development and construction of a prototype of a mobile industrial facility for the remediation of munitions dumped at sea.

Germany is the first country worldwide to build such a facility and to start the industrial removal of munitions in the sea. But the remediation for environmental purpose poses challenges to the current legal framework. The federal environment ministry (BMUKN) leading the Immediate Action Programme therefore also aims to address these legal challenges while protecting the marine environment based on the precautionary principle. It will furthermore establish a Federal Competence Centre for Munition Remediation in Rostock. The structure and specific tasks of this Centre are currently being developed at a professional and political level.

The large-scale clearance of munitions in the sea also offers economic opportunities. The five most important fields of activity include:

- ▶ Construction of a mobile facility for remediating munitions in the sea
- ▶ Recovering the dumped munition and its disposal on land or on the new mobile facility
- ▶ Development of autonomous underwater vehicles and special ships
- ▶ Monitoring of dumped munition objects in the sea and recovery operations
- ▶ Further development of software, AI applications and robots

Although the complete clearance of munitions in the Baltic Sea (and North Sea) will take decades, current initiatives and technological developments show a promising way forward. The combination of innovative technologies, increased regional cooperation and the creation of a solid legal basis will be decisive in overcoming the challenge of dumped munitions in the sea in the long term. The financing of long-term operational remediation of munitions in the sea via a mobile facility still needs to be politically arranged. Estimates indicate costs of 70 million € per year for the operation of one facility.

4.5.9 Summary / evaluation of the legal framework

Germany has a well-developed and complex framework of hazard prevention and public safety law governing the handling of individual munition objects in the sea, primarily aimed at averting acute threats to human life and safety. However, the assignment of responsibilities between the federal government and the states is very complex (under hazard prevention law) when it comes to munitions (Kollenberg, 2022). This complexity cannot only affect the effectiveness of measures but may also result in legal uncertainty. Therefore, a coordinated approach between the various authorities seems to be indispensable. However, hazard control measures must also comply with the requirements of water protection and nature conservation law. While this system is effective for isolated findings, it is not designed for the systematic, large-scale recovery

or remediation of historical munitions contamination. From an environmental law perspective, there is therefore a need for clearer legal codification addressing the environmentally oriented clearance of legacy munitions. Responsibilities, authorisation procedures and financing mechanisms for this purpose remain partly unclear or fragmented.

At the same time, Germany exhibits a high level of institutional and scientific engagement. Technical and administrative cooperation has been firmly established for many years through the Expert Group “Munition in the Sea” within the Bund-Länder Working Group for the North Sea and Baltic Sea (BLANO). In addition, numerous research institutions collaborate in interdisciplinary consortia such as CONMAR, DAIMON, REMARCO and MUNIMAP. Through the Immediate Action Programme on Unexploded Munitions in the North Sea and Baltic Sea of the BMUKN, Germany has launched – unique at the global level – a state-led pilot project for the precautionary and environmentally sound detection, recovery and offshore disposal of large quantities of sea-dumped munitions, including the development of a mobile maritime disposal facility.

Against this background, the establishment of a Federal Competence Centre for Munition in the Sea is currently being prepared, to be located in Rostock. According to current information, the Centre is intended to function as a nationwide coordination and expertise hub, consolidating scientific knowledge, legal competences, technical standards and operational capacities, and to serve in the long term as a central structure for systematic and environmentally oriented munition management.

4.6 Latvia

Authors: Jan Bührke, Māris Skudra

With input from the Marine Rescue and Coordination Centre and Mine Warfare Squadron of the Navy, Ministry of Defence.

4.6.1 Introduction to the country history of munitions in the sea

Latvia, located on the eastern shores of the Baltic Sea, has a complex history regarding munitions in its waters. Like its Baltic neighbours, Latvia was significantly affected by the events of the 20th century, including World War I, World War II, and the Cold War, which left its seas littered with both conventional and chemical munitions. These include naval mines, bombs, and CWA dumped into the Baltic Sea after the wars by multiple nations.

Due to the strategic position in the Baltic Sea, Latvian waters were often used for naval operations and as dumping grounds for surplus munitions. Today, these underwater remnants pose risks to maritime safety, fisheries, and the environment. As part of its efforts to address this issue, Latvia collaborates with international bodies like HELCOM and implements domestic legislation to manage and remediate munitions in the sea.

4.6.2 National laws regarding munitions in the sea and on land

4.6.2.1 General laws

Latvia’s legal framework for managing munitions on land and at sea is rooted in its environmental protection, maritime safety, and defence laws:

- **Environmental Protection Law (2006):** Ensures the preservation and recovery of the quality of the environment and the sustainable use of natural resources.

- ▶ **Water Management Law (2002):** Establishes the system for the protection and management of surface water and groundwater.
- ▶ **Law on Pollution (2001):** Prevents or reduces harm to human health, property, or the environment due to pollution.
- ▶ **Marine Environment Protection and Management Law (2010):** Ensures the protection and management of the marine environment.
- ▶ **Cabinet of Ministers Order 232 on Spatial Planning of Internal Waters, Territorial Sea and EEZ until 2030 (Par Jūras plānojumu Latvijas Republikas iekšējiem jūras ūdeņiem, teritoriālajai jūrai un ekskluzīvās ekonomiskās zonas ūdeņiem līdz 2030. gadam, 2019):** Paragraph on disposal operations of unexploded munitions and sea mines with reference to the Maritime Administration.
- ▶ **EIA (Law on Environmental Impact Assessment, 1998):** Requires EIA for activities that disturb munitions in the sea to mitigate environmental harm.

4.6.2.2 Specific laws for munitions in the sea

Latvia has additional regulations specifically addressing sea-dumped munitions:

- ▶ **HELCOM Recommendations:** Latvia adheres to HELCOM guidelines for identifying and managing munitions in the Baltic Sea.
- ▶ **National Armed Forces Law (1999):** section 6 regulates that the Armed Forces are responsible for destroying explosive ordnance
- ▶ **Cabinet of Ministers Regulation 631 (Construction Regulations for Structures in the Internal Waters, Territorial Waters and Exclusive Economic Zone of the Republic of Latvia, 2014):** Refers to the necessity of inspecting the seabed to ensure it does not contain e.g. explosives. Such activities must be coordinated with the Armed Forces.
- ▶ **Cabinet of Ministers rules 633 (Procedures for the Use of Subterranean Depths in Internal Public Waters and Sea, 2012):** Regulates the information flow with the Armed Forces on explosive objects on the seabed
- ▶ **Cabinet of Ministers rules 805 (Regulations Regarding the Prospection, Exploration and Production of Hydrocarbons, 2016):** Regulates the information of the Armed Forces about found explosive objects as well their destruction

4.6.3 List of responsible authorities

Several key agencies in Latvia are responsible for addressing the challenges of munitions in the sea:

- ▶ **National Armed Forces (NAF, Nacionālie Bruņotie Spēki):** The lead authority for locating, neutralising, and safely disposing of sea-dumped munitions and naval mines.
- ▶ **Coast Guard:** Oversees maritime safety and enforces restrictions in areas with known munitions risks.
- ▶ **State Environmental Service:** Receives the results regarding the environmental monitoring and provides the control function to environment-related procedures and activities (e.g. issue of permits, EIA, remediation etc.) and ensures compliance with environmental laws

during munitions-related operations on land. It might assist with the topic of munitions in the sea if the competence and resources are available.

- ▶ **Maritime Administration:** Manages navigation safety, including mapping and marking hazardous underwater sites.
- ▶ **Ministry of Defence:** Provides strategic oversight and funding for munitions clearance operations.
- ▶ **HELCOM Representatives:** Latvia cooperates with HELCOM to address transboundary munitions challenges in the Baltic Sea.

4.6.4 Procedure

As there is no specific organisation designated for the general monitoring and management of munitions in the sea, thus, there are no administrative procedures regarding the identification and removal of such munitions. The main institution is the Navy.

Even though there is no specific designated authority in Latvia responsible for the management, there is still some international interaction to be mentioned. The Navy participates in NATO's international military exercises "Open Spirit". It happens annually on the rotational basis in one of the Baltic States and is devoted to get rid of underwater munitions along ship routes, fishing areas etc. There are mine ships, diver teams and underwater ROV teams involved. In addition, the BALTRON – Baltic Naval Squadron, which operates since 1998, is also devoted to, e.g., mine countermeasures and overall improvement of readiness.

The Ministry of Defence issues the licence for commercial activities and certificate for work with military-grade explosives and unexploded ordnance for the investigation of potentially polluted and polluted territories, for the search, identification, removal, collection and storage of unexploded ordnance (Ministry of Defence, n.d.), although currently there are no industrial facilities to destroy munitions on land as an alternative to blast-in-place operations among those companies who have obtained this licence.

4.6.5 Scenarios

The scenario responses for Latvia are summarised in Figure 7.

4.6.5.1 Scenario 1: Conventional munition on the beach

They might call 112, the police or NAF depending on the decision/knowledge of the caller/reporter. NAF transfers the info to the National Guard, a subdivision of NAF for further action, i. e. collection and/or disposal.

4.6.5.2 Scenario 2: Chemical munition on the beach

The operator transfers the info to NAF which transfers it further to the National Guard for further action, i. e. collection, disposal and/or utilisation. Regarding affected persons, a brochure / guideline of the Navy's Coast Guard Service on fishery and warfare agents in the sea could be used for the necessary first aid if exposed to chemical substances / pollution (JSF KAD, 2016).

4.6.5.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

The tourist might call 112, the police or NAF depending on the personal decision/knowledge. The NAF transfers the info to Navy which informs the Coast Guard Service. The Coast Guard Service demarcates the area for potential further action (collection and/or disposal if possible)

and informs the Maritime Administration of Latvia about the location / area which updates the maps for sailors and mark the respective area in maps.

4.6.5.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

Ideally, the captain reports this incident to the Coast Guard Service's Marine Rescue and Coordination Centre (MRCC) of the Navy. The further actions depend on the situation and joint decision of the captain and MRCC. The MRCC can suggest the best solution from their point of view, e.g. deliver the artillery shell to the closest port – then contact the National Guard for further action, and mark the coordinates where the artillery shell was found or where the trawling route was performed.

4.6.5.5 Scenario 5: Chemical munition in the EEZ: fishing activities

The captain reports to the Navy's Coast Guard Service's Marine Rescue and Coordination Centre (MRCC) and then provides first aid for crew members in accordance to the previously mentioned brochure / guideline. If necessary, MRCC involves the Emergency Medical Service (NMPD) regarding the aid for crew members (e.g. telemedical consultations via phone or transport of medical staff to the ship). Further actions depend on the situation and joint decision by the captain and MRCC similarly as in the previous scenario.

4.6.5.6 Scenario 6: Conventional munition in the EEZ: construction activities

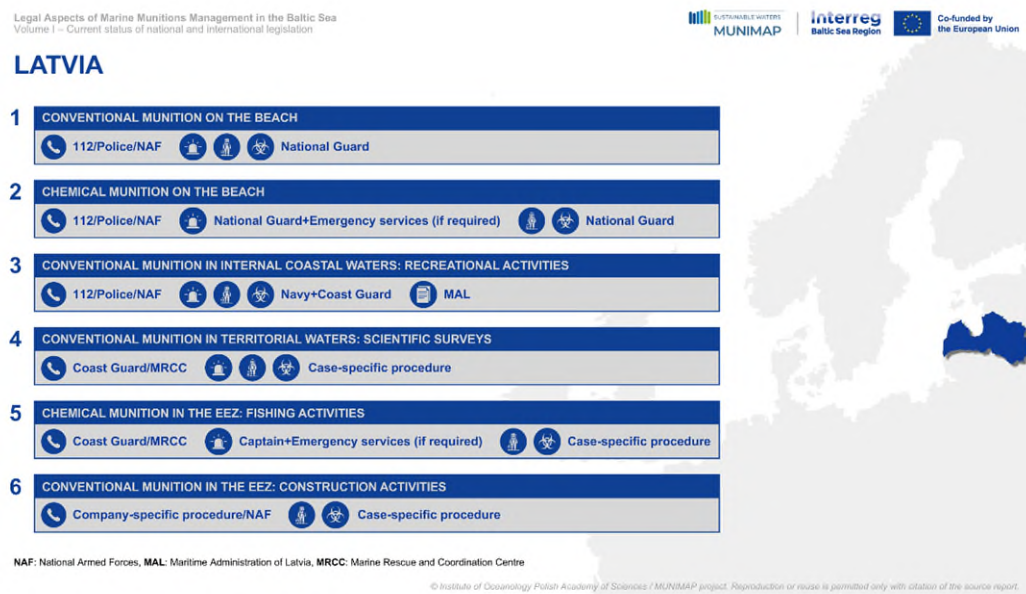
Before any activity in the sea regarding the seabed, the contractor / investor needs to obtain the license according to **Cabinet of Ministers Rule 633**. The points / sections 29–36 specify the involvement of the Navy in this process.

The Navy's involvement is also indirectly mentioned in the **Marine Environment Protection and Management Law** as it does not directly mention or define anything regarding dumped munitions or the disposal of explosives etc. Nevertheless, there is an indirect linkage through Section 19 (Rights of Public Persons and Private Persons to Use the Sea) in relation that NAF together with other institutions control the use of the sea and if, at some point, activities with explosives are planned or discovered, then NAF has to be involved in the respective process (data, licenses, disposal etc., cf. the above-mentioned rule 633).

4.6.6 Environmental considerations prior to detonation / remediation

- ▶ **Marine ecosystem protection:** Risk assessments prioritise safeguarding critical ecosystems, such as fish spawning grounds and marine protected areas.
- ▶ **Chemical risks:** Operations involving chemical munitions aim to prevent the release of hazardous substances like mustard gas and heavy metals.
- ▶ **Seasonal timing:** Remediation activities are scheduled to avoid disrupting seasonal fish migrations and breeding periods.
- ▶ **Advanced methods:** Technologies such as ROV are employed to minimise seabed disturbance during munitions clearance.
- ▶ **Compliance with Environmental Laws:** All activities adhere to Latvia's environmental protection laws and HELCOM recommendations to ensure sustainability.

Figure 7: Summary of the Latvian scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.6.7 Monitoring and mapping in place

- **HELCOM database:** Latvia contributes to the regional HELCOM database, which maps munition dumpsites in the Baltic Sea.
- **Seabed surveys:** Surveys are conducted sporadically by the NAF (mainly during different joint military exercises, e.g. NATO exercises) and might be conducted by different environmental or scientific organisations to locate and monitor munitions in the sea based on the specific target of the environmental and/or scientific mission. In November 2025, the Institute of Oceanology of the Polish Academy of Sciences conducted measurements in the Latvian EEZ and looked for munitions in specific locations. This scientific cruise was the first targeted one by a scientific organisation in Latvian EEZ.
- **Geographic Information Systems:** GIS technology is used to track hazardous sites and guide remediation operations.
- **Public reporting mechanisms:** Fishermen, divers, and the public are encouraged to report suspected munitions through official channels

4.6.8 Gaps and outlook

4.6.8.1 Gaps in current practices

- **Limited resources:** Financial and logistical constraints hinder large-scale mapping and remediation efforts.
- **Incomplete survey coverage:** Some areas of Latvia's waters remain unexplored, leaving potential hazards undetected.
- **Cross-border coordination challenges:** Shared responsibilities with neighbouring countries can complicate efforts at transboundary dumpsites.

- **Public awareness:** Limited public awareness about the dangers of munitions in the sea reduces the effectiveness of reporting mechanisms.

4.6.8.2 Outlook

- Increased investment in advanced technologies for detection and remediation.
- Strengthened cooperation with Baltic neighbours through HELCOM and regional initiatives.
- Enhanced public education campaigns to raise awareness of munitions risks.
- Expansion of seabed mapping and monitoring programs to cover all Latvian waters.

4.6.9 Summary / evaluation of the legal framework

Latvia's legal framework for addressing munitions in the sea is grounded in its environmental protection and maritime safety laws, complemented by its commitments under HELCOM. The **Law on Pollution** and other regulations provide a robust basis for addressing the risks of sea-dumped munitions.

In general, sea-dumped munitions are rarely or not mentioned in the main environment-related legislation documents. There is no direct legal definition in Latvia that would state that munition in the sea is regarded as hazardous material / waste.

The precautionary principle has been adopted in the **Environmental Protection Law (2006)**. Its Section 3 names the four principles of environmental protection including the precautionary principle.

A joint methodology on how to manage underwater munitions and general monitoring activities would be helpful. Having some joint documents from the international community would facilitate the communication to national representatives on a higher level like ministries about the meaning and importance of underwater munitions management in order to achieve the desired outcomes (e.g. legislation documents, rules, recommendations).

4.7 Lithuania

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With input from various institutional stakeholders

4.7.1 Introduction to the country history regarding munitions in the sea

World Wars I and II, which took place in the territory of Lithuania, resulted in contamination by explosive remnants of war (ERW). This poses a potential danger to people, hinders socio-economic development, impedes environmental and cultural protection efforts, and negatively affects state, social, and private activities in the affected territories, including the territorial waters and EEZ. It is estimated, that during World War I and World War II, 15 naval minefields with more than 1,600 naval mines were laid in what is now Lithuania's territorial waters and EEZ in the Baltic Sea (Lietuvos kariuomenė, 2022). Approximately 2,000 tons of chemical munitions, containing around 1,000 tons of CWA are located in the Gotland Basin (Glasby, 1997), part of this dumpsite is within Lithuania's EEZ.

The first attempts to assess the impact of dumped munitions started during a national project carried out from 2002 to 2004, followed by a technical cooperation project with the International Atomic Energy Agency (IAEA) in 2004–2005. During these projects, a portion of the Gotland Basin dumpsite, located about 70 nautical miles (130 km) from the coast in the

western part of Lithuania's EEZ, was investigated. The national project was organised by the Ministry of National Defence, the Ministry of Environment, the Marine Research Centre and the Institute of Geology and Geography. To assess the impact of chemical munitions on the environment, the bottom of the dumpsite was scanned, and additional hydrological, hydrochemical, biological, and sedimentological parameters were investigated.

In later years, Lithuania contributed to international efforts to address the issue of sea-dumped chemical munitions. At Lithuania's initiative, the United Nations unanimously adopted a periodically updated resolution on sea-dumped chemical munitions in December 2010 (Cooperative Measures to Assess and Increase Awareness of Environmental Effects Related to Waste Originating from Chemical Munitions Dumped at Sea, 2011; Ministry of Foreign Affairs of the Republic of Lithuania, 2010b). Lithuania began organising international seminars on sea-dumped chemical weapons in 2008 (Ministry of Foreign Affairs of the Republic of Lithuania, 2008), continuing in 2011 in Vilnius and in 2012 in Gdynia (co-organised by Poland). In addition, the International Scientific Advisory Board on Dumped Chemical Weapons was established at Lithuania's initiative and started its activities in 2010 (Ministry of Foreign Affairs of the Republic of Lithuania, 2010a). From 2011 to 2021, the Environmental Protection Agency participated as a partner in a number of international projects. The CHEMSEA (chapter 3.13) project addressed the assessment and mitigation of risks associated with the activities carried out on the seabed near dumpsites of chemical munitions. The key outcomes included a hydrographic survey that identified the most probable munition pieces in the Gotland Deep within Lithuania's EEZ, as well as sediment sampling that revealed degradation products of CWA at one of the locations. Although the findings did not indicate drastic environmental changes at the dumpsite compared with previous research, a notable decrease in the number of macrozoobenthos species was observed (Beldowski et al., 2014). The MODUM project (chapter 3.14) further developed the CWA monitoring with autonomous underwater vehicles (AUV) and ROV (Beldowski et al., 2018). During the DAIMON project, the Decision Support System was presented to stakeholders at the workshop organised by the Environmental Protection Agency in the Ministry of Environment (the link is available on the project website at keep.eu (2023a)). This system was launched to support maritime administration, defence, and environmental protection institutions in adopting decision-making procedures for chemical and conventional munitions in the Baltic Sea. The DAIMON 2 project was initiated to cooperate closer with the target groups, offering methodologies from the scientifically renewed DAIMON EcoTox Toolbox (cf. chapters 3.7 and 3.8). In 2020, a participant from Lithuania was invited to take part in hands-on field survey activities, which involved examining two locations where previous data indicated the presence of degradation products of CWA in environmental samples.

Since 1997, 17 international demining operations have been conducted in Lithuania's maritime area (Lietuvos kariuomenė, 2022). During these operations, 1,600 square meters of maritime area were searched, and 203 sea mines and other munitions were found and neutralised. Mines countermeasures are carried out by the Armed Forces in cooperation with partnering countries during OPEN SPIRIT, Baltic Sweep and MCOMLAT, MCOMLIT, and EODEX operations.

4.7.2 National laws regarding munitions in the sea and on land

This chapter is a revised and extended version of HELCOM (2025, pp. 122–124).

4.7.2.1 General laws

By the **Law on the Ratification of the Protocol on Explosive Remnants of War to the 1980 United Nations Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May be Deemed to be Excessively Injurious or to Have**

Indiscriminate Effects, the Seimas has ratified Protocol V in 2004, which entered into force on 12 November 2006 (cf. Dėl Likusių nuo karo sprogmenų išvalymo ir prevencijos programos ir Likusių nuo karo sprogmenų išvalymo ir prevencijos programos įgyvendinimo priemonių plano patvirtinimo, 2013). Although the majority of the provisions of Protocol V apply to ERW, which will be found after the entry into force of Protocol V, certain provisions impose the obligation on the states to also resolve the existing problems related to ERW. The states which ratified Protocol V undertook the obligation to reduce the threat posed by ERW by collecting and analysing information, clearing and destroying explosive ordnance as well as other measures that are to be implemented immediately and effectively.

Article 2 of the **Law on Crisis Management and Civil Protection** defines emergency events as well as crisis and emergency prevention (Lietuvos Respublikos krizių valdymo ir civilinės saugos įstatymas, 1998). Article 3 of this law provides the tasks of the Crisis Management and Civil Protection System, including to carry out the prevention, education and training on crises and emergency situations. The Government approved the implementation of the Law on Crisis Management and Civil Protection (Dėl Lietuvos Respublikos krizių valdymo ir civilinės saugos įstatymo įgyvendinimo, 2023) and the list of criteria for emergency events. An emergency event (clause 15.6) – an explosive object is found, which endangers human life, health, property and (or) the environment – is included in this list.

The Fire Protection and Rescue Department under the Ministry of the Interior in 2024 has approved the **Procedure for Educating the Population in Matters of Civil Safety** (Dėl Gyventojų švietimo civilinės saugos klausimais tvarkos aprašo patvirtinimo, 2024). Its main objectives are to ensure an effective and systematic education of the population, to increase the public preparedness and resilience to potential events, extreme events and/or emergency situations and other hazards, to develop the population's self-defence culture and to encourage to contribute to the culture of prevention of emergency situations, to promote public initiatives in the field of civil protection; to strengthen the confidence of the population in the crisis management system and civil protection.

The **Law on the Control of Circulation of Explosives** (Lietuvos Respublikos sprogmenų apyvartos kontrolės įstatymas, 2004) regulates the civilian circulation of explosives in order to ensure the safety of people, society and the state and to establish a system for the identification and traceability of explosives. This Law defines the actions of individuals who found explosives whose owners are unknown. A person who finds explosives must report it to the Police immediately. Police must immediately take measures so that the explosives found do not pose a danger to human life and health, the environment and property. The police department has the right to destroy these explosives (free of charge) in accordance with its established procedure.

In general, the **Environmental Protection Law** (Lietuvos Respublikos aplinkos apsaugos įstatymas, 1992) is the main legal act regulating environmental aspects, basic rights and obligations, responsibilities, economic sanctions for the noncompliance with environmental protection rules, non-legal use of natural resources. On the basis of this law, other legal acts regulating the use of natural resources and environmental protection were adopted. The national environmental protection management is carried out by the Government, the Ministry of the Environment, and other authorised national institutions. The management of environmental protection in the territories of municipalities in accordance with the procedure established by laws is performed by the relevant local authorities. Article 20 of the Environmental Protection Law regulates the production and use of hazardous chemicals. This type of prohibition is also regulated in the **Law on the Prohibition of Chemical Weapons** (Dėl Lietuvos Respublikos cheminio ginklo uždraudimo įstatymo nuostatų įgyvendinimo, 1999) and associated legal acts.

4.7.2.2 Specific laws which concern munitions in the sea

The **Programme for the Clearance and Prevention of Explosive Remnants of War** (Dėl Likusių nuo karo sprogmenų išvalymo ir prevencijos programos ir Likusių nuo karo sprogmenų išvalymo ir prevencijos programos įgyvendinimo priemonių plano patvirtinimo, 2013) was updated and approved by the Ministries of Defence and of Interior in 2021 in order to ensure that if ERW are found, the possible threat to humans is eliminated and the negative impact on state, public and private activities is reduced. Such objectives of the Programme were determined: to identify a reasonable need to clean up areas contaminated by ERW; to prepare maps, plans and documents that would allow to clean up the territories contaminated by ERW and to carry out prevention works; in cooperation with municipalities, create conditions for carrying out explosives neutralisation works; to ensure the cleaning of territories contaminated with explosive remnants war; to cooperate with other countries, international organisations, as well as with non-governmental organisations or foundations, as needed, to reduce the risk of ERW. The deadline for the implementation of the Programme is expected to be 2027, but this deadline can be extended.

In accordance with this legal act, the annual plans approved by the Commander of the Armed Forces are implemented for demining territories contaminated with explosives left over from the war. The NATO's plans for demining operations in the Baltic Sea and other plans are also implemented.

The **Law on Protection of the Marine Environment** (Lietuvos Respublikos jūros aplinkos apsaugos įstatymas, 1997) establishes the key principles of and arrangements for the protection of the marine environment, the rights and duties of the persons engaged in the marine activities affecting or likely to affect, directly or indirectly, the marine environment, the competence of state and municipal institutions and the main functions thereof in the field of management of protection of the marine environment.

According to the law and taking into account the state of the environment of the Baltic Sea Region, environmental protection measures of the Baltic Sea are planned in the national development programs approved by the Government. Baltic Sea environmental protection measures aim to: 1) protect the marine environment, prevent its deterioration and, if possible, restore marine ecosystems in water areas where this environment is negatively affected and 2) prevent pollution from entering the marine environment or reduce it, ensuring that marine biodiversity, marine ecosystems, human health or legal use of the seas are not affected or at high risk.

The law regulates the response to pollution incidents. Liquidation of pollution incidents in the national sea area is organised, coordinated and led by the Armed Forces through the Maritime Rescue Coordination Centre. Liquidation of pollution incidents at the sea, with the exception of internal coastal waters, is carried out by the Armed Forces, in the Curonian Lagoon – by the Fire Protection and Rescue Department under the Ministry of the Interior, using the forces and means of the State Border Guard Service under the Ministry of the Interior, if necessary; in seaport areas – by the port administrations. Municipal administrations organise the cleaning and restoration of coasts of the sea area polluted by oil or other polluting substances.

In 2022, the new National Water Sector Plan 2022–2027 has been approved (Dėl Nacionalinio vandenų srities 2022–2027 metų plano patvirtinimo, 2022). One of the measures in the National Water Sector Plan is to reduce the exposure and entry of hazardous chemicals into the marine environment. An action included in the action plan for the implementation of this Sector Plan (Dėl Nacionalinio vandenų srities 2022–2027 metų plano įgyvendinimo veiksmų plano patvirtinimo, 2023) focuses on the monitoring and evaluating the potential impacts of chemical

weapons dumped in the Baltic Sea on the marine environment and on human health, as well as to participating in activities of international organisations in order to share experience and information. The period for the implementation of the measure is 2023–2027. The responsible institutions are the Ministry of Environment and the Environmental Protection Agency.

Lithuania constantly strives to draw the attention of the international community to the problem of chemical munitions dumped at sea, the solution of which requires the consistent cooperation of international organisations, governments, science, industry and non-governmental organisations. Accordingly, the country has initiated the periodically updated resolution of the United Nations General Assembly on measures regarding chemical munitions dumped at sea (Cooperative Measures to Assess and Increase Awareness of Environmental Effects Related to Waste Originating from Chemical Munitions Dumped at Sea, 2011).

4.7.3 List of responsible authorities

The list of responsible authorities involved in the decision-making process, law enforcement, and civil and environmental protection regarding the management of chemical and conventional munitions in Lithuanian waters:

- ▶ **National Crisis Management Centre:** organises and coordinates the crisis management, conducts a national risk assessment of potential hazards and emergencies
- ▶ **Ministry of National Defence:** coordinates the collaboration between the Armed Forces, civil institutions, and social organisations, ensures the control over the movement of military and dangerous cargo
- ▶ **Maritime Rescue Coordination Centre:** organises, coordinates, and leads search and rescue operations, and also responds to hazardous substance spills and other pollution incidents at sea
- ▶ **Land Forces military demining unit, Naval Force military demining unit, EOD divers of the Navy, Military Police:** coordinate and execute standard explosive neutralisation operations (Dėl Sprogstamųjų užtaisų neutralizavimo tvarkos aprašo patvirtinimo, 2008)
- ▶ **Police Department under the Ministry of Interior:** ensures perimeter security around discovered explosives and, during the neutralisation operation, guarantees the safety of residents and road users during their transportation (Dėl Sprogstamųjų užtaisų neutralizavimo tvarkos aprašo patvirtinimo, 2008)
- ▶ **Fire and Rescue Department under the Ministry of the Interior:** extinguishes fires and performs primary rescue operations for people and property, and carries out localisation work on hazardous chemical substances (Dėl Valstybinės priešgaisrinės gelbėjimo tarnybos pasirengimo (parengties) gesinti gaisrus ir atlikti kitus gelbėjimo darbus užtikrinimo nuostatų patvirtinimo, 2019), performs pollution incident response operations in the Curonian Lagoon (Lietuvos Respublikos jūros aplinkos apsaugos įstatymas, 1997)
- ▶ **Ministry of Environment:** forms the state policy in the field of environmental protection and pollution prevention, strategic EIA and environmental monitoring
- ▶ **Environmental Protection Department under the Ministry of Environment:** carries out the state environmental control, ensures the compliance with environmental protection regulations

- ▶ **Environmental Protection Agency:** coordinates and conducts the national environmental monitoring, conducts the environmental state assessment of surface waters (internal, territorial and EEZ), implements measures to preserve and improve the condition of surface water bodies
- ▶ **Transport Safety Administration's Hydrographic Division:** maintains the water transport safety, issues information on navigational changes in the territorial sea, the EEZ, and national port areas, and coordinates actions to eliminate hazards (in the field of maritime transport) such as objects interfering with navigation, polluting, or threatening human life or the environment
- ▶ **Klaipeda State Seaport Authority:** ensures shipping safety, organises ship and crew rescue operations within port areas, reallocates vessels during critical situations in the port area
- ▶ **State Border Guard Service at the Ministry of Interior:** cross border communication, provides support for pollution incident response operations in the Curonian Lagoon (Lietuvos Respublikos jūros aplinkos apsaugos įstatymas, 1997)
- ▶ **Municipal administrations:** provide information on potential explosive locations, identify areas suitable for neutralisation, coordinate the use of required auxiliary equipment and machinery, and carry out public information within its competences (Dėl Sprogstamųjų užtaisų neutralizavimo tvarkos aprašo patvirtinimo, 2008)
- ▶ **Emergency Response Centre:** responds to emergency calls, promptly assesses assistance requests and determines the need for assistance, coordinates the deployment of civil protection forces to disaster sites
- ▶ **Ministry of Health:** preserves, restores and strengthens the health of the population
- ▶ **Emergency Medical Service:** provides emergency medical care
- ▶ **National Public Health Centre under the Ministry of Health:** participates in managing health emergencies and plans preparedness measures, provides municipal institutions with information on legal violations related to the pollution of the human living environment, and inspects hazardous sites and coordinates their emergency plans

4.7.4 Procedure

Lithuania follows a structured procedure for managing munitions in the sea:

1. Immediate reporting
2. Emergency Response Centre or Maritime Rescue Coordination Centre forwards the report to relevant authorities
3. Safety measures for the public
4. Area security and coordination of actions
5. Hazardous material handling
6. Reporting and documentation

4.7.5 Scenarios

The scenario responses for Lithuania are summarised in Figure 8.

4.7.5.1 Scenario 1: Conventional munition on the beach

Firstly, they should call the emergency number 112. The operator at the Emergency Response Centre will collect relevant information about the emergency (such as the type of object and its description). The operator will instruct the caller not to touch the object, not to approach it, and to warn others nearby. Next, the operator will prepare an electronic report and forward it to the appropriate emergency services, such as the Fire and Rescue Department under the Ministry of the Interior to address any fire-related issues. Also, depending on the situation (the amount of the objects, the probability of explosives) the Land Forces military demining unit on duty, the Military Police and the Police Force under the jurisdiction of the Ministry of Interior may be informed. The municipal administration is informed, assists emergency services as needed, helps with logistics and informs the local community. Information about hazardous substances found on the beach is passed to the Report Service of the Department of Environmental Protection under the Ministry of Environment.

4.7.5.2 Scenario 2: Chemical munition on the beach

People at the scene should call the emergency number 112. The operator at the Emergency Response Centre will collect relevant information about the emergency (such as the type of object and its description). The operator will instruct the caller not to touch the object, not to approach it, and to warn others nearby. After collecting the relevant information, the operator forwards it to the Fire and Rescue Department under the Ministry of Interior, Civil Protection Service, emergency medical services and the Police Operational Management Unit. In an emergency of this scale, the National Crisis Management Centre, an operational-level institution, will be engaged in managing the response. The dispatchers at the emergency medical services station contact the initial caller to gather more detailed information, provide instructions, and dispatch an ambulance crew. The Police Operational Management Unit passes the information to specific police units, which then initiate the procedure for securing the accident area. The Land Forces military demining unit on duty, the Military Police may be informed for explosives search and neutralisation. The environmental specialist will be informed about hazardous materials found on the beach, however, there is no clear legal guidance regarding the disposal of chemical weapons toxic waste. The municipal administration would be informed, as well as the National Public Health Centre under the Ministry of Health, to evaluate the risks to human health and to inform the public.

4.7.5.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

The tourist should call the emergency number 112. The operator at the Emergency Response Centre will collect relevant information about the emergency (such as the type of object and its description). The operator will instruct the caller not to touch the object, not to approach it, and to warn others nearby. Next, the operator will prepare an electronic report and forward it to the appropriate emergency services. After providing initial information to the operator, the threat elimination plan "Shield" (*Skydas*) is activated (Dėl Sprogstamųjų užtaisų neutralizavimo tvarkos aprašo patvirtinimo, 2008). It will then be decided whether the Naval Force demining unit, the Land demining unit or both should be involved. Emergency Response Centre operator informs Emergency medical services, Police Operational Management Unit and Fire and Rescue Department under the Ministry of the Interior. Forces from the Ministry of Interior institutions (Fire and Police Department) ensure the protection of found explosives and residents until the Armed Forces arrives to conduct explosives search and neutralisation. The municipal administration informs the public, designates areas where explosives can be neutralised and coordinates the use of auxiliary equipment.

4.7.5.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

The captain should call 112, mark the object's coordinates, and deploy a yellow buoy. After providing initial information to the operator, the threat elimination plan "Shield" is activated. The finding is then reported to the Maritime Rescue Coordination Centre of the Navy, which will pass the information to the EOD divers of the Navy. Information about the object will be passed on to Klaipeda State Seaport Authority dispatching office and Transport Safety Administration's Hydrographic Division.

4.7.5.5 Scenario 5: Chemical munition in the EEZ: fishing activities

The captain of the ship should call 112, mark the object's coordinates, and deploy a yellow buoy. The ship should be navigated in such a way that the chemical munition is sheltered from the wind, and it should be directed towards the nearest port. The situation must be reported to the Maritime Rescue Coordination Centre of the Navy, whose Global Maritime Distress and Security System (GMDSS) operators' group is responsible for ensuring the timely collection and analysis of information and making suggestions. Additionally, the Klaipeda State Seaport Authority dispatching office should be informed. If necessary, the Swedish Coast Guard, Finnish Border Guard or Finnish Navy who have chemical response type vessels capable of handling such incidents, will be contacted.

Before entering the port, inform the Klaipeda State Seaport about the number of contaminated individuals, the number of affected objects, and arrange a mooring place. The mooring place should be as far away as possible from other ships.

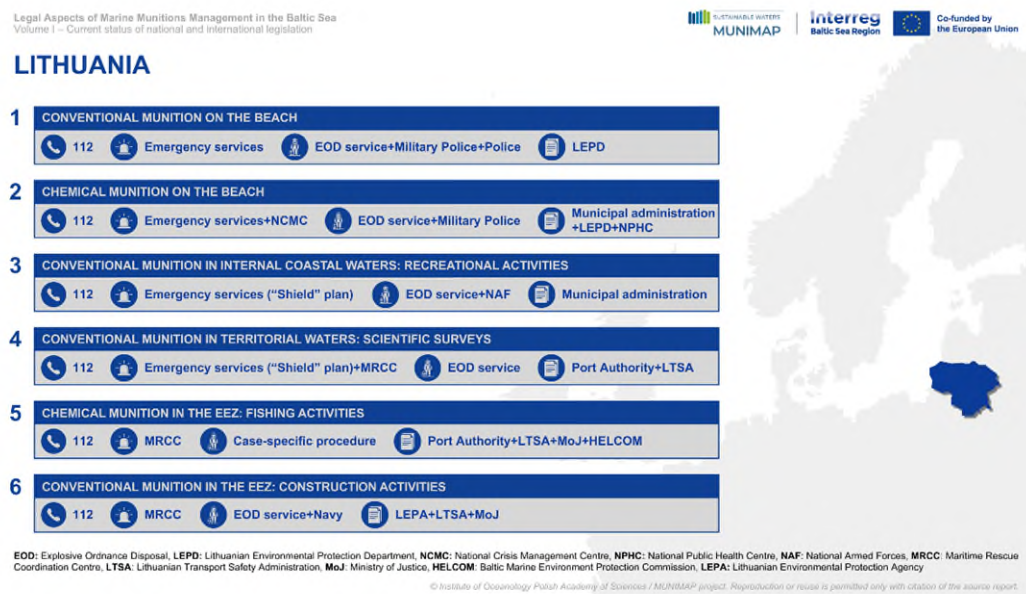
Meanwhile, the crew should avoid being in the presence of contaminated areas and avoid touching any equipment that has been in contact with the chemical weapon. All doors, hatches, and portholes of the ship should be closed. Contaminated clothing should be removed, placed in plastic bags, and sealed tightly.

The maritime incident should be reported to HELCOM, the Transport Safety Administration, and to the investigator-in-charge under the Ministry of Justice.

4.7.5.6 Scenario 6: Conventional munition in the EEZ: construction activities

The responsible person should call 112 immediately to report the discovery and mark the coordinates accordingly. The finding is then reported to the Maritime Rescue Coordination Centre of the Naval Force, which is responsible for ensuring the timely collection and analysis of information, as well as providing recommendations. They will then pass the information to the EOD divers of the Navy. A Navy specialist or diver will decide whether it is safe to demine the object in the same location or if it should be moved to another place. If the object is identified as an UXO, it may also be included in the annual demining plan for areas contaminated with ERW. This plan is approved by the Chief of Defence. Also, this information should be included in EIA and submitted to the Environmental Protection Agency. The maritime incident should be reported to the Transport Safety Administration, and to the investigator-in-charge under the Ministry of Justice. The Transport Safety Administration's Hydrographic Division, which is responsible for publicly announcing information about known dangers to navigation in the territorial sea, the EEZ, and national port areas, should also be notified.

Figure 8: Summary of the Lithuanian scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.7.6 Environmental considerations prior to detonation / remediation

The **Environmental Protection State Control Law** (Lietuvos Respublikos aplinkos apsaugos valstybinės kontrolės įstatymas, 2003) follows the precautionary principle in order to prevent violations of laws and other regulations governing environmental protection and the use of natural resources, and to strive to avoid negative impacts on the environment. During the detonation or remediation operation of munitions in the national maritime area, the Naval Forces adhere to e.g. the NATO principles and policies for environmental protection. Before proceeding with the detonation of conventional munitions, the Naval Forces consider Environmental Protected Areas (EPA) and Marine Mammal Safety regulations. They also use charts of Environmentally Sensitive Sea Areas which emphasises the importance of their protection to maintain marine health.

There are no specific regulations in the national legal documents addressing environmental considerations prior to the detonation or remediation of munitions.

4.7.7 Monitoring and mapping in place

Monitoring of munition objects/munition piles

Nautical charts consisting of information necessary for safe maritime travel are compiled and updated by the Transport Safety Administration's Hydrographic Division. Navigational maps and any known emergency in the territorial waters or EEZ are published on their webpage. In these navigational maps and nautical charts, areas with the known locations of chemical munition sites are marked as unsuitable for anchoring. The Naval Forces are actively involved in the demining of areas contaminated with ERW, with annual plans approved by the Commander-in-Chief of the Armed Forces. As a result, all known munitions sites are marked on military maps. Additionally, some chemical and conventional munitions sites were marked during the CHEMSEA project (Bełdowski et al., 2014; cf. chapter 3.13).

Monitoring of munition compound and underwater noise from detonations

The Environmental Protection Agency is responsible for monitoring the Baltic Sea within Lithuania's territorial waters and the EEZ. Research on chemical munition sites has been conducted periodically, approximately every ten years since 2003, with the most recent study being carried out in 2025. Additionally, general parameters are collected annually at the chemical munition site. The accompanying action plan for the implementation of the National Water Sector Plan 2023–2027 includes the participation in the assessment of potential impacts on the marine environment and human health of chemical munitions dumped into the Baltic Sea (cf. chapter 4.7.2.2).

Conventional munition compounds were not previously monitored or assessed in the territorial waters and EEZ. However, both water and sediment samples collected in 2025 will be analysed for the first time – water samples taken in the project MMinE-SwEEPER (cf. chapter 3.5) and sediment samples in MUNIMAP. Underwater noise monitoring is conducted on an irregular basis. Impulsive noise reported from Navy explosions was recorded 21 times in total in 2016, 2019, and 2021–2022. Recording of underwater impulsive noise and data submission were legally required by the National Water Sector Plan 2017–2023 (Dėl Povandeninių impulsinių triukšmų registravimo ir tų duomenų teikimo povandeninių impulsinių triukšmų registrui, kurį administruoja tarptautinė jūrų tyrinėjimo taryba, tvarkos aprašo patvirtinimo, 2019).

4.7.8 Gaps and outlook

Although chemical weapons are defined under ratified international law, a clear definition of them as “hazardous material” is currently lacking in Lithuanian legislation. However, the core chemical agents used in these weapons are deemed hazardous and toxic (e.g., arsenic) and are consequently listed in the national Baltic Sea's annual monitoring plans. Although research on chemical munition sites has been conducted periodically, approximately every ten years, it has mostly relied on international funding, highlighting the needs for more consistent national support and planning for future monitoring and mitigation efforts.

While the public is generally aware that UXO or chemical munitions should be reported to emergency services (e.g., by calling 112), the subsequent response of authorities for their safe handling and disposal are not clearly communicated, leaving a gap in public understanding. Furthermore, citizen education campaigns, improved public guidance, and transparent communication about how appropriate institutions respond to such hazards are needed.

4.7.9 Summary / evaluation of the legal framework

Through participation in numerous international projects, operations, seminars and workshops, Lithuanian authorities have gained valuable experience in chemical and conventional munition risk management, developed decision-making procedures, and strengthened their bonds with partner countries. Main authorities involved in the management of chemical and conventional munitions include the National Crisis Management Centre, the Armed Forces, the Police Force, the Fire and Rescue Department, Emergency medical service, and Environmental Protection Agency.

Lithuania constantly strives to draw the attention of the international community to the problem of chemical munitions dumped at sea, the solution of which requires the consistent cooperation of international organisations, governments, science, industry and non-governmental organisations. Lithuania has initiated the periodically updated resolution of the United Nations General Assembly regarding measures related to chemical munitions dumped at sea.

Finally, clear national policies and legal frameworks are needed to ensure that all efforts are well-coordinated and that there are established standards for munitions removal. Overcoming these challenges requires a comprehensive approach that combines national actions, international cooperation, and public engagement.

4.8 Norway

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Consulted institutions: Norwegian Environment Agency, National Police Directorate, Norwegian Joint Headquarters

4.8.1 Introduction

Norway has large territorial waters where conventional munitions have been dumped. Hundreds of thousands of tonnes of conventional munitions were dumped along the coast, as well as in waste dumps, landfills and lakes after World War II (Novik et al., 2022; Steinbakken et al., 2000). There are several designated munitions dumping areas as well as many unofficial dumping grounds. Most of the munitions were dumped in deep waters in Norwegian fjords. A total of 34 dumping areas are marked on navigational charts, including the area with chemical munitions in Skagerrak.

Only a few dumping grounds are partly assessed by high-resolution sonars or ROV, and thereby little is known about the amount and type of munition in each dumping ground. The experience is that the areas are larger than indicated on navigational charts. Most of the conventional munitions came from the German coastal fortresses in Norway, which counted more than 400. It is therefore expected to be more than the 34 known dumping grounds in Norway. This is also supported by the fact that munitions are entangled in fishing gear outside these dumping grounds.

The wreck database of the Norwegian Coastal Administration contains more than 2,200 registered shipwrecks dating back to the World War I. More than 400 are categorised as war wrecks and many are lacking exact position data. Many of the war wrecks contain munitions which need to be considered when mitigating measures such as oil removal are planned.

After World War II, chemical munitions were dumped by loading abandoned ships at the ports in Germany and towing them to the predetermined scuttling positions in the deepest part of Skagerrak, southeast of Arendal. At least 38 ships, containing between 118,000 and 145,000 metric tonnes of chemical munitions (gross weight), may have been dumped inside and outside the designated area in Skagerrak between 1945 and 1947 (Arison III, 2013; Stock, 1996; Tørnes et al., 2002).

There are strict regulations against the dumping of munitions and other hazardous substances into the sea today. These include requirements for the safe storage, transportation, and destruction of munitions to prevent them from ending up in the sea. UXO could still end up in military firing ranges in the sea during exercises.

Recreational divers and fishermen occasionally encounter explosive remnants of war (ERW) during their activities, particularly in shallow waters and areas used for ship anchoring. Professional divers may also come across ERW while conducting inspection surveys of underwater installations.

The dumped munitions represent a risk for both the environment and the society. As the dumped munitions contain toxic substances, they could harm the environment but also public

health through the consumption of contaminated seafood (Maser & Strehse, 2021). They also represent a threat to the fisheries as the munitions could enter fishing gear and thereby detonate, or to construction work like the establishing of wind farms offshore. Since much of the explosives in the dumped munitions are still intact, they are a source of explosive charges for criminals and terrorists. Several legal and policy frameworks as well as crisis management procedures will apply to manage this risk.

4.8.2 National laws regarding munitions in the sea and on land

Norway has a wide-ranging regulatory framework for handling ERW in the sea. This framework covers aspects such as safety, environmental protection, and preservation of cultural heritage. Several laws and regulations apply when it comes to handling the remnants. No single agency can be said to have a primary responsibility for ERW, but all agencies must contribute their resources for the benefit of the public. Some of the regulations deal with safety and environment in general and are not limited to managing ERW. Therefore, and because responsibility is divided among different agencies, it is challenging to pinpoint the exact regulations and paragraphs.

4.8.2.1 Police Act

The Police Act (Lov om politiet (politiloven), 1995) and the General Instructions for the police define the police's responsibilities and tasks. According to Section 2 of the Police Act, one of the police's duties is to protect persons, property, and public goods, and to safeguard against threats to public safety. Section 7 gives the police general authority to intervene to ensure individual or public safety, including regulating traffic and neutralising dangerous objects. Section 27 of the Police Act assigns the responsibility to coordinate rescue efforts in accidents and disasters to the police.

4.8.2.2 Armed Forces' assistance to the police

The instruction on the Armed Forces' assistance to the police is established by the **Royal Decree of 16 June 2017 No. 789** (Instruks om Forsvarets bistand til politiet, 2017). It generally applies to the Armed Forces' assistance to the police in peacetime, crisis, and war. Assistance is defined as any form of personnel and/or material support. The Armed Forces' assistance in the neutralisation or removal of explosives is specified in Section 13 as a type of operational assistance.

4.8.2.3 Explosives Regulation

The Regulation on the Handling of Explosive Substances (Forskrift om håndtering av eksplosjonsfarlig stoff, 2002) regulates the destruction of civilian explosives. The regulation implements EU Directive 93/15/EEC and excludes explosives intended for or belonging to the Armed Forces.

4.8.2.4 Regulation on dangerous goods on Norwegian ships

This regulation (Forskrift om farlig last på norske skip, 2014) controls the transport of dangerous goods on Norwegian ships, both in international and domestic voyages. It establishes requirements for documentation, safety measures, and procedures for handling dangerous goods. The regulation also applies to barges and ships operating on the Norwegian continental shelf. ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road) and RID (Regulations concerning the International Carriage of Dangerous Goods by Rail) are incorporated into the regulation by providing detailed provisions on the classification, packaging, labelling, and transport of dangerous goods.

4.8.2.5 Marine Resources Act

This Act (Lov om forvaltning av viltlevande marine ressursar (havressurslova), 2009) aims to ensure sustainable and economically viable management of wild marine resources and their genetic material. It also helps to secure employment and settlement in coastal communities. It applies to Norwegian vessels and in all Norwegian waters out to the EEZ. Its Section 21 prohibits fishing in areas affected by pollution, which can include areas with ERW.

4.8.2.6 Pollution Control Act

To the extent that ERW represent a pollution problem, the rules of the Pollution Control Act fully apply (Lov om vern mot forurensninger og om avfall (forurensningsloven), 1983). ERW represents a risk of damage to the environment.

4.8.3 List of responsible authorities

The relevant authorities are structured by the ministries as higher-level institutions.

4.8.3.1 Ministry of Justice and Public Security

The Ministry of Justice and Public Security has a coordinating role to ensure the overall and coordinated preparedness, including the handling of remnants of ERW. This coordination is anchored in the **Royal Decree of September 16, 1994** (cf. Justis- og politidepartementet, 2002, p. 100) and a white paper on social security (Justis- og beredskapsdepartementet, 2020). Four subordinate agencies have a role in dealing with ERW.

4.8.3.1.1 National Police Directorate

The National Police Directorate, under the Ministry of Justice and Public Security, is responsible for the overall management and development of police districts and specialised agencies. In crisis situations involving explosives, it coordinates resources and may issue operational orders to the tactical level. The National Police Directorate also addresses policy issues and coordinates with other actors at the operational level.

4.8.3.1.2 Police

The police, divided into 12 districts, is responsible for assessing safety and implementing necessary measures when explosives are found. The police has a cross-sectoral responsibility for rescue efforts in accidents and disasters and ensures safety until another authority takes over.

4.8.3.1.3 Oslo Police District / Police Bomb Squad

The National Police Bomb Squad provides national assistance for bomb threats and suspicious objects. It is authorised by the Directorate for Civil Protection and Emergency Planning (chapter 4.8.3.1.4) to destroy civilian explosives and provides assistance to police districts.

4.8.3.1.4 Directorate for Civil Protection and Emergency Planning

The Directorate for Civil Protection and Emergency Planning oversees risk and vulnerability in society and works to prevent accidents and crises. It also manages the **Explosives Regulation** and publishes guidelines for municipalities' risk and vulnerability analyses.

4.8.3.2 Ministry of Trade, Industry and Fisheries

The Ministry of Trade, Industry and Fisheries is responsible for fisheries and aquaculture, fish health and welfare, seafood safety and quality, harbours, maritime transport infrastructure, and preparedness against acute pollution.

4.8.3.2.1 Directorate of Fisheries

The Directorate of Fisheries is the advisory and executive body for the ministry in fisheries and aquaculture management, as well as marine spatial management, which can include areas where ERW have been dumped. The Directorate of Fisheries manages the **Marine Resources Act**.

4.8.3.2.2 Norwegian Coastal Administration

The Norwegian Coastal Administration is the advisory and executive body for the ministry in maritime and harbour management and acute pollution. It is responsible for ensuring safe and efficient maritime transport and mitigating damage from acute pollution. The Norwegian Coastal Administration can request assistance from the Armed Forces for risk assessments related to shipwrecks containing ERW.

4.8.3.3 Ministry of Defence

The Ministry of Defence is responsible for formulating and implementing defence policy. The Armed Forces assist in removing military explosive objects as part of public safety.

4.8.3.3.1 Joint Headquarters

The Joint Headquarters command military operations and support civilian society with EOD, in cooperation with the police. Requests for assistance from the police are directed to the Joint Headquarters, which order military resources.

4.8.3.3.2 Norwegian Defence Research Establishment (FFI)

The Norwegian Defence Research Establishment (FFI) operates an emergency preparedness laboratory for samples with unknown content suspected to contain CBRE agents. This includes 24/7 emergency hotline to give advice to emergency responders related to sampling and analysis in case of suspected CBRE incidents. The arrangement is formalised by the Ministry of Justice and Public Security, the Ministry of Defence, the Ministry of Health and Care Services as well as FFI.

4.8.3.4 Ministry of Climate and Environment

The Ministry of Climate and Environment has the main responsibility for the Government's environmental and climate policy, including conservation of natural diversity, cultural heritage, clean seas and waters, a toxic-free society, and a stable climate. The ministry also oversees international cooperation and environmental issues in northern and polar areas.

4.8.3.4.1 Environment Agency

The Environment Agency is a directorate under the Ministry of Climate and Environment. It is responsible for e.g. monitoring and managing environmental conditions, issuing permits, regulating pollutant emissions, and enforcing compliance. The agency also manages databases such as an overview of soil contamination, which includes data on ERW.

4.8.3.4.2 Directorate for Cultural Heritage

The Directorate for Cultural Heritage is the authority responsible for the country's cultural heritage. When ERW are part of a cultural heritage site, preservation considerations must be taken into account. This involves collaboration with cultural heritage authorities to ensure both safety and preservation of important cultural heritage. Shipwrecks older than 100 years are generally considered for protection, but the formal protection must be granted by the Directorate for Cultural Heritage. Once a shipwreck is designated as protected, any activities on the wreck, such as recovery or construction, may be restricted. This includes handling of ERW. The Directorate has a database where heritage sites with ERW are registered.

4.8.3.5 Ministry of Local Government and Regional Development

The Ministry of Local Government and Regional Development is responsible for supervising the functions of municipalities. This includes ensuring that the municipalities comply with national law and provide guidance on local governance and public services. The ministry also coordinates with the County Governors, who serve as the State's representatives at the regional level. One of the key areas of responsibility for the ministry is emergency preparedness, to ensure that the municipalities have robust plans in place to handle crises and emergencies effectively, in close collaboration with the County Governors.

4.8.3.5.1 Municipalities

Municipalities have a general responsibility for the safety and security of their inhabitants within their geographical areas, as stipulated by the **Civil Protection Act** (Lov om sivil beskyttelse og beredskap (sivilbeskyttelsesloven), 2011). They must conduct comprehensive risk and vulnerability analyses and develop emergency plans. This includes assessing risks related to ERW. The municipality is responsible for establishing a Fire Department. According to the **Fire and Explosion Protection Act** (Lov om vern mot brann, eksplosjon og ulykker med farlig stoff og om brannvesenets redningsoppgaver (brann- og eksplosjonsvernloven), 2002), the Fire Department must conduct risk and vulnerability analyses and develop emergency plans which must be coordinated with the municipality's other plans. The fire service's duty to respond applies in any case to all types of incidents or threatening situations if this is justifiable based on expertise and equipment.

4.8.4 Procedure

Upon discovering ERW in the sea, the first step is to immediately report the encounter to the police. The police have the primary responsibility for handling and disposing of explosives related to criminal activities. The police also have a responsibility for guarding and securing emerging ERW in accordance with current police legislation and instructions. This responsibility lasts until the ERW are disposed of or removed. The police will ask the Armed Forces to assist in clearing military munitions, so that they no longer pose a danger.

The Armed Forces support the civilian community in the disposal of ERW, regardless of ownership. However, this support is limited by the Armed Forces' prioritisation of their own resources. The Armed Forces are not obliged to provide such resources when the risk is not acute.

Municipalities have a fundamental responsibility for planning and construction activities within their area. They must ensure, when necessary, that planning, construction, and excavation work are carried out following a prior risk and vulnerability analysis. They should actively use the **Planning and Building Act's** rules, such as regulating areas as hazard zones, imposing construction bans, etc. (Lov om planlegging og byggesaksbehandling (plan- og bygningsloven), 2009). When relevant, municipalities should enter into development agreements that regulate cost sharing related to the presence of ERW.

Developers responsible for construction or excavation work, must prepare an action plan in case of suspected or confirmed occurrences of ERW, following the pattern of the pollution control legislation.

Other authorities may need to contribute expertise within their area of jurisdiction.

When dumped munitions are discovered, measures are taken to secure the area and safely remove or neutralise the munitions, if they pose a safety or environmental risk. This work is

often carried out in collaboration with the Armed Forces, which have specialised expertise in this area. Normally, noise pollution is not measured during underwater disposal operations.

If considered safe to remove or relocate, the munitions would either be transported to an approved location on land or moved to a location where underwater disposal (preferably by HOD methods) would be carried out as safe as possible for humans, infrastructure and marine life. The Environment Agency gives permission for relocation and disposal of ERW in the sea on certain conditions.

Destruction of live military munitions are carried out at a military demolition facility in Lærdal and at Norwegian Ammunition Disposal Company AS at Løkken Verk for civilian munitions.

FFI has carried out some surveys and monitoring on behalf of the Norwegian Coastal Administration in the Skagerrak area, known for historical scuttling of wrecks with chemical munitions. This includes using sonar and underwater robots to identify and assess the risks associated with these wrecks.

4.8.5 Scenarios

The scenario responses for Norway are summarised in Figure 9.

4.8.5.1 Scenario 1: Conventional munition on the beach

All encounters of munitions on land and in internal waters shall be reported to the police, but since the pieces have caught fire, the situation will be notified to all emergency centrals (police, fire, health), a so-called triple alert⁵. Based on the described scenario, it would quickly be established that the substance was white phosphorus. The police will call for assistance from the National Emergency and Support Resources (in the Oslo police district) and its subordinate Police Bomb Squad to handle / destruct the pieces. The Police Bomb Squad decides whether the Joint Headquarters should be contacted for advice and assistance.

4.8.5.2 Scenario 2: Chemical munition on the beach

The police (112)⁶ will treat this as a triple alert and contact fire (110) and health (113). Since the barrel is located on the beach, the police will coordinate the rescue effort⁷, the health services will take care of injured people, and the fire brigade will be responsible for security in the area and will try to find out if the corroded barrel contains chemical munitions. The situation will probably be defined as a CBRNE incident and the national CBRNE procedures will be used. These procedures describe the responsibilities of the fire-, police- and health-services in case of a CBRNE incident. If chemical munitions are suspected, the Police Bomb Squad and the Armed Forces will be asked for assistance. If this is a deliberate act, police will lead and coordinate the operation, on land and at sea in peacetime. Any questions related to diagnosis and treatment of injured personnel should be forwarded to the National CBRNE Centre of Medicine at Oslo University Hospital.

The police will only in case of a rescue operation alert the Joint Rescue Operation centres (SAR alert). With the high number of people on the beach, the police will decide to establish an evacuee and family centre, set up and run by the municipality. The municipality is responsible for providing important emergency preparedness resources at the local level.

⁵ Triple alert procedures are national procedures developed for several incidents and are in use every day at the emergency centrals.

⁶ Emergency numbers in Norway are 110 for fire, 112 for police and 113 for health.

⁷ At sea, the Joint Rescue Coordination Centres (Sola or Bodø) will coordinate the operation.

If the identity of the content needs to be determined, samples will be sent to FFI (see chapter 4.8.3.3.2). In cases where a substance represents a risk of environmental damage, the fire brigade will, depending on the extent of the health hazard for the involved fire brigade personnel, carry out mitigating measures, if necessary, with assistance from the Norwegian Coastal Administration.

4.8.5.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

The diver shall report the encounter to the police (112) or to the Coastal Radio (*Kystradio*). The police will call the Joint Headquarters who will by request coordinate the operation. The Joint Headquarters will order the tactical level to give orders for military resources to handle the encounter. If considered safe to remove or relocate by the Armed Forces, the bomb would either be transported to an approved location on land or moved to a location where underwater disposal (preferably by HOD methods) would be carried out as safe as possible for humans, infrastructure and marine life. The Environment Agency gives permission for relocation and disposal of ERW in the sea on certain conditions.

4.8.5.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

The captain shall report the discovery to the police (112) or via the Coastal Radio. The Coastal Radio is co-located with the Joint Rescue Coordination Centres, and together they handle safety at sea. The procedure will be the same as in Scenario 3.

4.8.5.5 Scenario 5: Chemical munition in the EEZ: fishing activities

The captain shall call for immediate help via the police (112) or via the Coastal Radio, who will notify the Norwegian Coastal Administration according to the guidance to fishermen on how to act if CWA are discovered. The emergency preparedness laboratory at FFI could give advice to emergency responders related to sampling and analysis in case of suspected CBRE incidents (see chapter 4.8.3.3.2).

The Joint Rescue Coordination Centres handles search and rescue. The Norwegian Coastal Administration will notify the police, who is responsible for the safety of those affected. The police will ask Joint Headquarters for assistance in handling the situation.

National CBRNE procedures to be used by all emergency services and the emergency notification centre have been issued. The procedure describes the responsibilities of the fire-, police- and health-services in case of a CBRNE incident. Any questions related to the diagnosis and treatment of injured personnel should be forwarded to the national CBRNE centre, located at Oslo University Hospital.

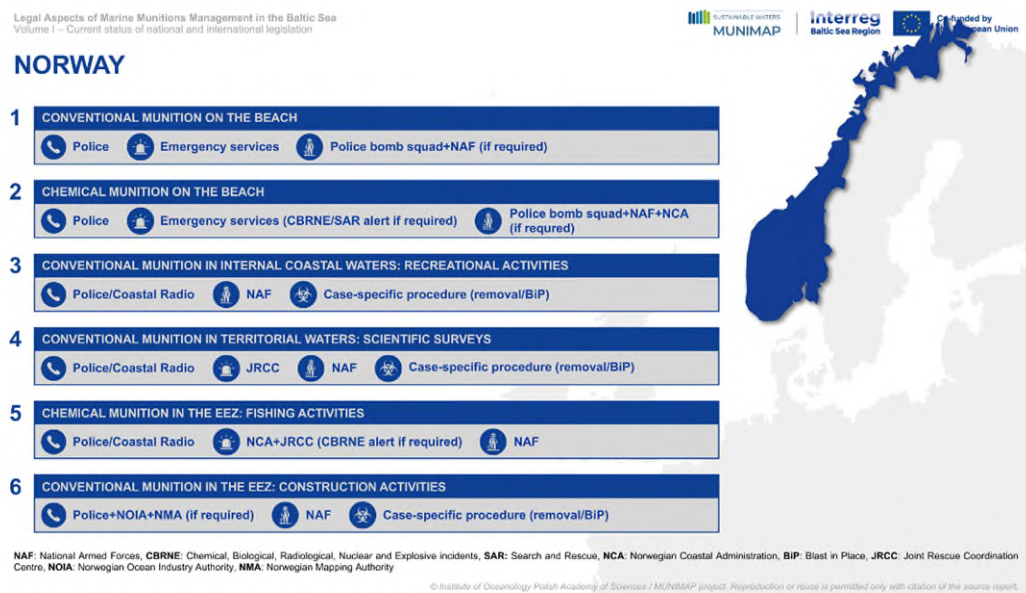
The fire brigades in the two largest cities in Norway are responsible for an operational service, named “Rescue Effort at Sea – Chemical”, which can respond to incidents involving dangerous chemicals on board. These brigades can be transported to all parts of the country and can also be used in major accidents on land involving large quantities of dangerous substances.

4.8.5.6 Scenario 6: Conventional munition in the EEZ: construction activities

The company shall report the encounters to the police and also to the Norwegian Ocean Industry Authority, which will report further to all relevant authorities. The Norwegian Mapping Authority will also be informed if *Notices to Mariners* should be issued. The company is responsible for a thorough photographic documentation of the objects and to show that they are munitions. The police will ask for assistance by the Armed Forces to identify the objects assumed to be UXO. If one or more objects turn out to be UXO, further action will be the same as

in Scenario 3. It will be the police in cooperation with the company and the Armed Forces who decide whether the UXO can be removed or the wind park should be relocated.

Figure 9: Summary of the Norwegian scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.8.6 Environmental considerations prior to detonation / remediation

The Environment Agency has, with reference to the **Pollution Control Act** (Act of 13 March 1981 No.6 Concerning Protection Against Pollution and Concerning Waste, 1981), issued in October 2024 a framework permit (no. 2024.0866.T; Miljødirektoratet, 2024) for the relocation and disposal of ERW in territorial waters. Only the Armed Forces are allowed to carry out such disposals. They shall reduce any pollution as much as possible without incurring unreasonable costs. This permit does not cover munitions disposal that are part of the normal activity of the Armed Forces.

The Armed Forces must, before each disposal, obtain knowledge about the environmental status and vulnerable natural areas in the area and carry out an environmental risk assessment. Alternative locations must be considered, and they shall carry out precautionary steps to protect natural values and the environment.

Some shipwrecks from World War II containing ERW have been emptied of oil products. The risk associated with munitions have been evaluated during this operation. A few wrecks have been examined for their archaeological value. This requires coordination with the cultural heritage authorities.

4.8.7 Monitoring and mapping in place

4.8.7.1 Monitoring of wrecks and munitions

The investigations of the wrecks with chemical munitions scuttled in the Skagerrak are carried out as national or international collaboration projects. During these projects some of the wrecks with chemical munitions have been monitored and the concentration of toxic chemicals in sediments and biota have been analysed.

Several surveys have been carried out since 1989 to locate as many of the wrecks with chemical munitions as possible in the deepest part of the Skagerrak. The survey techniques used were towed side-scan sonar, ship-mounted multibeam echosounder and, later, more detailed investigations by the HUGIN Autonomous Underwater Vehicle (AUV) equipped with Synthetic Aperture Sonar (SAS). The survey area in 1989 was the 14 km x 4 km part outside Arendal, marked as munitions dumpsite on the navigational charts, and some additional sectors around it (in total 16 km x 8 km) (Fonnum, 1997; Tørnes et al., 1989). Later, a larger area was covered by ship-mounted EM710 multibeam echosounder and more detailed mapping were carried out by the HUGIN AUV with Side Scan Sonar (SSS) in 2009 and SAS during several missions in 2015, 2016 and 2022 (Hansen et al., 2019; P. Lågstad, personal communication, 2022).

In 2022, three of the wrecks were inspected by a ROV to observe the structural changes since the last ROV inspections in 1989 and 2002 (Tørnes et al., 2024).

4.8.7.2 Monitoring of munitions compounds

Investigations of the scuttled wrecks with chemical munitions in the Skagerrak and their effect on marine biota have been carried out in various projects, e.g. in several international projects and collaborations to address the problems of dumped munitions.

In 1989, FFI inspected five wrecks with chemical munitions in the dumping area south-east of Arendal (Tørnes et al., 1989). Water samples were taken, but no nerve agents or sulphur mustard were found in the samples. In 2002, FFI inspected four of the same wrecks and took sediment and water samples close to the wrecks (Tørnes et al., 2002). Sulphur mustard, CN⁸ and Clark I were found in the sediment samples, but only TDG was found in the water samples.

Aging and corrosion have affected the munitions causing explosives and CWA to leak into the marine environment. Assessments, e.g. during the DAIMON project (cf. chapter 3.7), have revealed the uptake of these contaminants in biota (Ahvo et al., 2020; Beck et al., 2022; Johnsen, 2021; Niemikoski et al., 2017, 2025; Rossland et al., 2010; Straumer et al., 2020). It is known that both the explosive compounds and the CWA can be toxic and carcinogenic to humans and can also impact the marine organisms (Arison III, 2013; Beck et al., 2018; Mariussen et al., 2018).

The concentration of CWA, their decomposition products and total arsenic content were determined in samples of sediments collected near one shipwreck during the DAIMON project in 2015 (Tørnes et al., 2018).

The risk to humans and the marine environment has also been investigated. This includes study of the organ specific uptake and depuration, and biological effects in Atlantic salmon (*Salmo salar*) exposed to TNT in an aquarium (Mariussen et al., 2018).

FFI has investigated the content of munitions-related compounds in fish and shellfish in munitions dumping grounds, in order to assess the bioaccumulation and risk at consumption (Johnsen, 2021). Several explosives and decomposition products were detected. They were generally not detected in fish muscle, claw meat or shrimp meat. This means that the content of explosives in marine biota to a lesser extent poses a health risk when fish and shellfish caught in munitions dumping grounds are consumed. The level of mercury in the tusk muscle was higher than the national limit (0.5 mg/kg wet weight). It is, however, considered likely that this concentration is related to the general pollution of mercury along the coast. The study suggests that biota is exposed to lead from munitions in some dumpsites. However, the level is below the maximum residue limits for lead in fish and shellfish.

⁸ CN = Chloroacetophenone, Clark I = Diphenylchloroarsine and TDG = Thiodiclycol, a decomposition product of sulphur mustard

In 2024, FFI published a report with assessment of munitions compounds in fish farms established close to munitions dumpsites (Johnsen & Ueland, 2024). There are no traces of explosives in any of the analysed samples from the five fish farms collected in the period 2021–2023.

In 2022–23, a survey for evaluation of different monitoring methods were carried out (Tørnes et al., 2024). Landers with blue mussels, European giant file clam, and passive samplers were deployed at one wreck to establish the best monitoring methods for pollution from chemical munitions around the wrecks. In addition, samples from the annual shrimp survey conducted by the Norwegian Institute of Marine Research collected not far from the dumpsites of chemical munitions in the Skagerrak, were analysed. Traces of explosive compounds and CWA related compounds were detected.

4.8.8 Gaps and outlook

No complete record of munitions dumpsites showing the amounts and types of munitions dumped in Norwegian territorial waters exist. Several dumpsites have been discovered in recent years, and more are expected to be discovered in the future.

Some of the wrecks with chemical munitions in the Skagerrak have been monitored several times and the concentration of toxic chemicals in sediments and biota have been recorded, but the situations around the rest of the wrecks are unknown. The exact amount and type of chemical munitions loaded on each ship is also unknown. It is further not known how far out from the wrecks the toxic chemicals are distributed, or which processes are responsible for their distribution. The approximate time before the wrecks collapse due to corrosion needs to be established, as this can cause even more widespread pollution.

Munitions and explosive objects are normally handled as individual cases when they are discovered without any survey for additional objects in the same area. Due to the fragmented responsibility between governmental agencies, there is no systematic survey and monitoring of known sites, and consequently, no prioritised action plan for mitigating the risk related to dumped munitions.

There exist no international accepted environmental exposure limits or maximum levels in seafood for CWA and explosives. Without such limits, it is difficult to consider possible consequences from a measured concentration of CWA or explosives in the environment or in seafood. The detonation sensitivity of the explosives in dumped munitions is, in addition, poorly studied. It is therefore difficult to define cost-effective measures to mitigate the exposure and to make a realistic risk assessment.

There are no prohibition zones for fishing in and around conventional munitions dumpsites. Munitions can tangle in fishing gears and cause a detonation with consequent damage to humans and equipment. There is also a small risk associated with the consumption of fish and shellfish caught in dumpsites.

4.8.9 Summary / evaluation of the legal framework

In Norway, the responsibilities of dumped munitions are split between different ministries with several subordinate authorities. The Ministry of Justice and Public security has a coordinating role for managing ERW. The Ministry of Defence and its subordinate Norwegian Armed Forces assist in the disposal of military explosive objects as part of public safety while the Ministry of Trade, Industry and Fisheries is responsible for preparedness against acute pollution, including dumped munitions connected to shipwrecks. The Ministry of Climate and Environment has the responsibility for the government's environmental policy, including clean seas and water and a

toxic-free society and for cultural heritage, e.g. old shipwrecks, and oversees international cooperation and environmental issues. The Ministry of Local Government and Regional Development is responsible for the emergency preparedness and development of crisis plans at the municipality level.

Encounters of munitions shall be reported to the police. The police will ask for assistance by the Norwegian Armed Forces to handle the ERW. Encounters of chemical munitions will be treated according to the national CBRNE procedures.

Knowledge gaps exist both in location, amounts and types of dumped munitions along the coastline. There are no systematic survey and monitoring of known dumpsites and no prioritised action plan for mitigating the risk related to dumped munitions due to fragmented responsibility among governmental agencies. The distribution of the contamination in dumpsites is still unknown. There are no prohibition zones for fishing or fish farms in and around dumpsites of conventional munitions.

Without international accepted environmental exposure limits or maximum levels in food for CWA or explosives, it is difficult to assess possible consequences from the measured concentrations and to make recommendations for remedial actions.

4.9 Poland

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4.9.1 Introduction

The Polish EEZ covers an area of 22,595 km². Six sites with a total area of 439 km² have been identified where there is a risk of human injury or contamination of ships by dumped chemical munitions. They are located around Bornholm, i.e. the border with the Danish EEZ (approximately 220 km²), near Dziwnów (88 km²), Kołobrzeg (8 km²), Darłowo (8 km²), and Hel (8 km²). However, the largest dumpsite of chemical munitions in Polish waters, in terms of their number, is the Gdańsk Deep, with an area of approximately 100 hectares. The chemical weapons were dumped by Germany, Soviet forces in Poland, the German Democratic Republic, and the Soviet Union. Approximately 60 tons of munitions, primarily containing mustard gas, were dumped in this area (HELCOM, 2013). In the first half of the 1950s, there were also reports of containers filled with sulphur mustard washing ashore along the Polish coast, southwest of Bornholm, and along transport routes towards the dumpsites in the Gotland and Bornholm Deeps (Fabisiak, 2019).

The dumpsite of chemical munitions in the Gdańsk Deep, identified in the CHEMSEA project (cf. chapter 3.13), was originally designated as a dumpsite for conventional munitions (and accordingly marked on nautical charts). The site is 0.62 nautical miles in diameter and is 80 to 110 meters deep. The bottom of the Gdańsk Deep is covered with clayey mud. Due to the high sedimentation rate in this area, objects deposited there since 1945 could be covered with 13 cm of sediment. This area was partially explored in the CHEMSEA project. Magnetic and acoustic surveys revealed four wrecks and several dozen objects resembling munitions. Visual inspection identified one wreck as a barge that may have been used to dump munitions. Some objects near the area were identified as artillery shells.

Already in the 1990s, Poland hosted two international scientific symposia dedicated to chemical munitions dumped in the Baltic Sea. In consequence, the Chemical-Ecological Information Centre (*Centrum Informacji Chemiczno-Ekologicznej, CICE*) was established to carry out an assessment

of the threat and their impact on the marine environment (HELCOM, 2013, pp. 14–15). The awareness later increased with the planning of infrastructure projects. The possible consequences of disturbing sea-dumped munitions have therefore been addressed by various scientific conferences. However, the extensive research so far in areas for offshore wind farms did not reveal such munition.

Poland is very committed to working internationally, as well as within national activities, to solve the problem of chemical weapons residues on the bottom of the Baltic Sea. For example:

- ▶ In November 2021, a conference was held in Brussels organised by Anna Fotyga – former Chair of the Committee on Security and Defence in the European Parliament – on "Maritime Security and the Blue Economy. Unexploded munitions and chemical residues in the sea – in search for lasting and economically viable solutions" with the EU Commissioner for the Environment, Seas and Fisheries, the Deputy Prime Minister of the Republic of Poland and Polish experts as speakers.
- ▶ In October 2022, an international workshop was held in Gdańsk, organised by the Polish Academy of Sciences as part of the BALTWRECK project (cf. chapter 3.3), covering both wrecks and underwater conventional munitions and CWA. An agreement was signed to fund measurements and research activities regarding the identification and possible neutralisation of hazardous materials on the bottom of the Baltic Sea.
- ▶ In May 2025, the interdisciplinary scientific conference Baltic Sea Science Congress 2025 was hosted by Poland.

Although hazardous materials in maritime areas, including wrecks, conventional and chemical munitions, concern all countries of the Baltic Sea Region, the Polish situation is particularly complex due to the military operations in the Baltic Sea and the dumping of toxic warfare agents immediately after World War II. In addition, there is a lack of technical capabilities to conduct a rapid inventory of Polish maritime areas that would include a comprehensive assessment of the total number of ship wrecks and vessels on the sea bottom, the types of dumped chemical munitions and toxic warfare agents. About 40% of Polish maritime areas have been bathymetrically explored in detail in a way that allows determining whether there are objects on the seabed that may pose a threat to navigation or the marine environment, including wrecks or objects which may contain munitions, both conventional and chemical. Due to this level of knowledge, it is impossible to assess in detailed the actual extent of threats and challenges related to hazardous materials in the Polish maritime areas for the safety of the population, protection of the marine environment and the maritime economy. Currently, the risk of a significant impact in this area is considered to be low.

4.9.2 National laws regarding munitions in the sea and on land

4.9.2.1 Constitution of the Republic of Poland (Konstytucja Rzeczypospolitej Polskiej z dnia 2 kwietnia 1997 r., 1997)

Several articles impose on the state the obligation to protect the environment and to ensure the ecological safety of its citizens (Articles 5, 68(4) and 74). It constitutes the constitutional foundation for the state's environmental policy and measures to counteract the effects of chemical contamination. It contains general provisions and defines principles rather than procedures regarding environment protection.

4.9.2.2 Acts (of generally applicable law)

This part provides legal acts directly implementing the provisions of the Constitution. Some of them are of a general nature, others of a specific nature (*lex specialis*).

4.9.2.2.1 Acts containing general provisions

- ▶ **Environmental Protection Law (Ustawa z dnia 27 kwietnia 2001 r. Prawo ochrony środowiska, 2001):** sets definitions, responsibilities, and legal instruments for environmental protection.
- ▶ **Act on Nature Conservation (Ustawa z dnia 16 kwietnia 2004 r. o ochronie przyrody, 2004):** concerns the protection of biodiversity and Natura 2000 sites.
- ▶ **Act on Crisis Management (Ustawa z dnia 26 kwietnia 2007 r. o zarządzaniu kryzysowym, 2007):** establishes the structure and procedures for authorities in emergency situations. The Government Centre for Security prepares, in accordance with this act, the National Crisis Management Plan as the basic document regulating crisis management in the case of incidents with chemical munitions. It contains a general summary of individual types of threats and central institutions responsible for implementing projects in accordance with the Polish crisis management model.
- ▶ **Water Law (Ustawa z dnia 20 lipca 2017 r. - Prawo wodne, 2018):** establishes principles for marine water monitoring and an environmental monitoring program. The Sea Water Monitoring Program requires a monitoring of hazardous substances such as sulphur mustard and derivatives in sediments in indicated areas.
- ▶ **Homeland Defence Act (Ustawa z dnia 11 marca 2022 r. o obronie Ojczyzny, 2022):** defines the competences of the Ministry of National Defence for CWA-related activities.

4.9.2.2.2 Acts containing special provisions (*lex specialis*)

- ▶ **Act on the Maritime Areas of the Republic of Poland and the Maritime Administration (Ustawa z dnia 21 marca 1991 r. o obszarach morskich Rzeczypospolitej Polskiej i administracji morskiej, 1991):** Chapter 5a on dumped hazardous materials is the most important special provision concerning CWA.
- ▶ **Act on the Prevention of Pollution from Ships (Ustawa z dnia 16 marca 1995 r. o zapobieganiu zanieczyszczaniu morza przez statki, 1995):** specifies the obligation to report pollution and the powers of Maritime Office directors.
- ▶ **Act on the Implementation of the Chemical Weapons Convention (Ustawa z dnia 22 czerwca 2001 r. o wykonywaniu Konwencji o zakazie prowadzenia badań, produkcji, składowania i użycia broni chemicznej oraz o zniszczeniu jej zapasów, 2001):** The Act specifies the principles for the implementation on the territory of the Republic of Poland of obligations arising from the Chemical Weapons Convention (cf. chapter 2.1.5).
- ▶ **Act on Underwater Works (Ustawa z dnia 17 października 2003 r. o wykonywaniu prac podwodnych, 2004):** regulates the safety and qualifications of underwater work.
- ▶ **Act on Maritime Safety (Ustawa z dnia 18 sierpnia 2011 r. o bezpieczeństwie morskim, 2012):** refers to protection of life and the environment at sea.

4.9.2.3 Regulations (implementing acts)

- ▶ **Regulation of the Council of Ministers on the Organisation of Combating Threats and Pollution at Sea (Rozporządzenie Rady Ministrów z dnia 8 sierpnia 2017 r. w sprawie sposobu organizacji zwalczania zagrożeń i zanieczyszczeń na morzu, 2017):** defines the command structure, cooperation between services.
- ▶ **Regulation of the Ministry of the Interior and Administration on the National Rescue and Firefighting System (Rozporządzenie Ministra Spraw Wewnętrznych i Administracji z dnia 17 września 2021 r. w sprawie szczegółowej organizacji krajowego systemu ratowniczo-gaśniczego, 2021):** refers to chemical and ecological rescue, decontamination. This document includes developed principles for organising rescue operations, development of rules for organising rescue exercises, development of rules for increasing operational readiness; development of rules for analysing events; development of principles for the organisation of activities of specialised water and diving rescue teams in the book, development of principles for the organisation of chemical and ecological rescue in a National Rescue and Firefighting System (*Krajowy system ratowniczo-gaśniczy, KSRG*).
- ▶ **Regulation of the Ministry of National Defence on the Safety Conditions for Underwater Works (Rozporządzenie Ministra Obrony Narodowej z dnia 21 czerwca 2012 r. w sprawie warunków bezpieczeństwa wykonywania prac podwodnych w jednostkach organizacyjnych podległych lub nadzorowanych przez Ministra Obrony Narodowej, 2012):** gives technical and occupational health and safety standards.
- ▶ **Regulation of the Council of Ministers on the Clearance of Areas from Explosives and Hazardous Materials (Rozporządzenie Rady Ministrów z dnia 26 września 2023 r. w sprawie oczyszczania terenów z materiałów wybuchowych i niebezpiecznych, 2024):** indicates conditions for clearance areas of explosives and hazardous material, the procedure and method for reporting and securing explosives and hazardous material, the scope of participation of the Polish Armed Forces in these areas and the method for designating areas for the destruction of explosives and hazardous material. The provisions of § 9 sections 1–4 shall not apply to the destruction or disposal of found old and abandoned chemical weapons, which are stored and destroyed in accordance with the provisions of the above-mentioned Act on the implementation of the CWC. Entities which receive information on found explosives or hazardous materials shall immediately inform the provincial crisis management centre, the police, and the director of the Maritime Office and the regional director for environmental protection – if such material was located in internal marine waters, the territorial sea, the adjacent zone, the EEZ, the coastal zone and within ports and harbours (§ 2 section 3). Such materials are destroyed in locations designated by the voivode (permanent locations where these materials can be safely destroyed). In justified cases (e.g., when this is not possible for security reasons), they may be destroyed on site or at an ad-hoc location, if approved by competent authorities such as the provincial police, State Fire Service or the Maritime Office (§ 9 section 3). The regulation also specifies the role of specialised units of the Armed Forces. In accordance with § 7(1), these units may carry out the clearance of discovered explosive and hazardous materials of military origin only when this is necessary to ensure public safety and when such materials cannot be destroyed by authorised civilian entities.
- ▶ **Order No. 345 of the Prime Minister on the Inter-Ministerial Committee on Hazardous Materials Deposited in the Maritime Areas of the Republic of Poland (Zarządzenie nr 345 Prezesa Rady Ministrów z dnia 20 października 2022 r. w sprawie**

Międzyresortowego Zespołu do spraw Materiałów Niebezpiecznych Zalegających na Obszarach Morskich Rzeczypospolitej Polskiej, 2022): The Committee's tasks include: preparing a Committee action plan for each year of work, recommending actions aimed at inventorying the bottom of the Polish maritime areas, recommending actions aimed at adapting the monitoring system to newly identified threats in order to ensure that its scope and frequency are adequate to the level of threats, recommending conducting the necessary research in accordance with the action plan and monitoring results. The Committee issues opinions on research conclusions in accordance with the competences of its members, recommending methods how to handle hazardous materials, takes actions aimed at estimating the costs of neutralising hazardous materials, their possible extraction or securing on the sea bottom, recommends proposals for legal regulations related to neutralising threats caused by the deposition of hazardous materials in the Polish maritime areas. Additionally, the work comprises the monitoring of legal regulations in order to optimise the neutralisation of hazardous materials in the maritime areas and the recommendation of appropriate changes to the legal regulations as well as the principles of financing such activities.

4.9.2.4 Local legal acts

- ▶ **Order No. 3/2019 of the Director of the Maritime Office in Gdynia (Zarządzenie porządkowe nr 3 Dyrektora Urzędu Morskiego w Gdyni z dnia 10 lipca 2019 r. w sprawie postępowania załóg jednostek pływających w przypadku wyłowienia lub wydobycia z morza bojowych środków trujących, 2019):** contains instructions for the recovery of CWAs.
- ▶ **Order No. 1/2019 of the Director of the Maritime Office in Szczecin (Zarządzenie porządkowe nr 1 Dyrektora Urzędu Morskiego w Szczecinie z dnia 12 lipca 2019 r. w sprawie postępowania załóg jednostek pływających w przypadku wyłowienia lub wydobycia z morza bojowych środków trujących, 2019):** a similar document updating older regulations, contains instructions for the recovery of CWAs.

Both documents have the same introduction and instructions. In order to protect the life and health of crew members of vessels, they provide an instruction for fishing or extracting of CWA from the sea. It applies to all vessels except of the Navy, Border Guard and Police. Their managers are obliged to familiarise the crew with the instruction and are responsible for its application.

4.9.3 List of responsible authorities

The responsible authorities involved in the decision-making process, law enforcement, and civil and environmental protection regarding the management of chemical and conventional munitions in Polish waters are:

- ▶ Territorially competent directories of Maritime Offices
- ▶ Ministry of Climate and Environment with the Chief Inspectorate of Environmental Protection (GIOŚ), Institute of Environmental Protection, General Director for Environmental Protection
- ▶ Ministry of National Defence with the Navy and the Polish Naval Hydrographic Office (*Biuro Hydrograficzne Marynarki Wojennej, BHMW*)

- ▶ Ministry of the Interior and Administration with the Border Patrol, the State Fire Service as well as the Search and Rescue Service (SAR)
- ▶ Ministry of Finance and Economy
- ▶ Ministry of Infrastructure with its responsibility for transport, maritime economy and water management
- ▶ Government Centre for Security
- ▶ Voivode Crisis Management Teams

In case of chemical contamination in the sea, the Ministry of Infrastructure, the Maritime Offices and SAR are primarily responsible. They cooperate with the Ministries e.g. of Climate and Environment, of National Defence (Navy), of the Interior and Administration as well as the Government Centre for Security and the voivodes. The systematic clearance of Polish maritime areas is not the responsibility of the Navy but of the maritime administration and other public authorities.

4.9.4 Procedure

- ▶ **Monitoring:** In 2021, the update of the Monitoring Programme of Maritime areas was implemented based on Resolution no. 38 of the Council of Ministers on Granting Consent to Submit an Update of the Marine Water Monitoring Programme to the European Commission (Uchwała Nr 38 Rady Ministrów z dnia 22 marca 2021 r. w sprawie wyrażenia zgody na przedłożenie Komisji Europejskiej aktualizacji programu monitoringu wód morskich, 2021). The Polish monitoring programme is unique in Europe. No other country conducts such extensive monitoring dedicated to CWA and substances from shipwreck fuels. In 2025, the Chief Inspector of Environmental Protection developed the second update of the marine water monitoring program for 2026 – 2030, which aims to expand the current monitoring program for CWAs and petroleum substances.
- ▶ **Detection and Identification:** applies to ammunition, weapons, explosives, chemical weapons, wrecks with fuel, and other hazardous material, to ensure ecological safety, the protection of shipping and people, and compliance with national and international law.
 - If dumped hazardous material is detected or suspected, each entity (ship, research institution, company) has to immediately report to the BHMW which forwards the information to the Director of the relevant Maritime Office and the Director of the maritime SAR.
 - The Director of the territorially competent Maritime Office conducts a preliminary risk assessment. In case of high risk, it may prohibit underwater work or navigation in the area.
 - The entity planning extraction or neutralisation operations submits an application to the Director of this Maritime Office, together with a permit for trading or neutralising toxic substances, in case of chemical munition. It can be refused if the threat to the environment, navigation, or safety outweighs the benefits of neutralisation.
 - The operations are carried out by an authorised entity in mandatory cooperation with the SAR, State Fire Service, Polish Navy and the Regional Directorate for Environmental Protection, environmental and human safety measures are implemented, ongoing monitoring is conducted

- The BHMW updates the central register of dumped hazardous material, including the location, type, and threat status, data is shared with national authorities. Information is available for other entities under the terms specified in the **Act on the Maritime Areas of the Republic of Poland and the Maritime Administration**
 - The Inter-Ministerial Team on Hazardous Materials Deposited in the Maritime Areas of the Republic of Poland coordinates the information exchange, planning activities, and oversees the implementation of procedures. The Team consists of representatives of e.g. the Ministry of Infrastructure, the Ministry of National Defence, the Ministry of the Interior and Administration.
- **Crisis response:** based on the National Crisis Management Plan (NCMP), a planning document prepared by the Government Centre for Security in cooperation with ministries, central offices and voivodships, based on the Act on Crisis Management.
- The NCMP is an initial document in the civil planning process at the central and provincial level. It identifies 20 hazards including the chemical contamination on land and sea which refers to the release of CWA from dumped chemical munitions due to corroded containers. It also indicates the currently known dumpsites of chemical munitions in Polish waters.
 - The leading entities participating in crisis management in case of chemical contamination of the sea include the Minister of Infrastructure which is in charge of maritime economy, the Directors of the Maritime Offices, and the Director of the SAR.
 - Cooperating entities are other Ministers such as of National Defence (Navy), the Government Centre for Security and the voivodes. According to the NCMP, during crisis situation the Navy is involved in the identification and elimination of threats from dumped CWA. The relevant specialist units of the Armed Forces may carry out the clearance of found explosives and hazardous materials of military origin in situations where it is necessary to ensure public safety and when it is not possible for private companies to destroy these materials.
- **Risk assessment:** The risk resulting from chemical contamination on the seabed in relation to the threat to flora and fauna as well as human life and health is low (Ministerstwo Spraw Wewnętrznych i Administracji, 2025). This document published the Ministry of the Interior and Administration was adopted by the Team on Hazardous Materials Deposited in the Maritime Areas of the Republic of Poland.

4.9.5 Scenarios

The scenario responses for Poland are summarised in Figure 10.

4.9.5.1 Scenario 1: Conventional munition on the beach

The incident should be reported to the police (call 997) or the national emergency number (112). Alternatively, the mobile application Alarm112 can be used to send an emergency call to the Emergency Notification Centre which informs the appropriate services (police, State Fire Service). The information will be forwarded to the Crisis Management Centre (of the municipality, city, district or voivodeship). As this scenario is about conventional munition, EOD units or engineers of the Armed Forces should also be informed coordinated by the police or regional military command. As the munition was found in coastal areas, the Maritime Office (*Urząd Morski*) and possibly the maritime SAR should also be informed. To inform the public, the

public alarm and warning system will be activated, i.e. Government Security Centre Alert (Alert RCB)⁹, acoustic sirens, radio and television messages, Regional Warning System, etc. If the local forces and resources are insufficient to ensure public safety, the Ministry of National Defence, at the request of the governor, may transfer subunits or units of the Armed Forces.

If needed, the police would immediately secure and cordon off the area to prevent public access, evacuating nearby people if necessary. The Fire Brigade would assess the fire and chemical risks. If white phosphorus is found, the focus would be on isolating rather than extinguishing the fire. (Military) EOD specialists would examine the object to determine whether it is: explosive, a chemical warfare-related substance, or another form of hazardous military material. Depending on the assessment, the object would either be neutralised on site or safely transported for disposal at a designated military facility. The incident would be documented by the Police and relevant military authorities for an environmental and administrative follow-up assessment. If there is a risk of environmental contamination, environmental inspection bodies (e.g. Regional Inspectorate for Environmental Protection) may be involved. The site may be flagged for further monitoring, especially if it is an area known for dumped or washed-up munitions.

Polish authorities consistently warn the general public that objects resembling amber could be white phosphorus. Such objects must never be picked up, heated, or taken home. The correct response is to leave the object untouched, move away, and call 112 immediately. This procedure reflects Poland's long-standing experience with washed-up munitions along the Baltic coast, particularly after storms that disturb seabed deposits.

Legal basis (cf. chapter 4.9.2):

- ▶ **Homeland Defence Act**
- ▶ **Act on Crisis Management**
- ▶ **Regulation of the Council of Ministers on the Clearance of Areas from Explosives and Hazardous Materials**
- ▶ **Regulation of the Council of Ministers on Contamination Detection and Notification Systems and the Competences of Authorities in these Matters** (Rozporządzenie Rady Ministrów z dnia 23 lutego 2024 r. w sprawie systemów wykrywania skażeń i powiadamiania o ich wystąpieniu oraz właściwości organów w tych sprawach, 2024)
- ▶ **Act on the State Fire Service** (Ustawa z dnia 8 grudnia 2017 r. o Służbie Ochrony Państwa, 2018)
- ▶ **Act on the Police** (Ustawa z dnia 6 kwietnia 1990 r. o Policji, 1990)

4.9.5.2 Scenario 2: Chemical munition on the beach

The information about the incident is sent to the crisis management centre (municipal, city, district or Voivodeship). As this scenario is about a chemical contamination of the sea shore, the owner of the site (municipality, city or Maritime Office) is responsible for neutralising the chemical agent. Water rescue personnel carry out an immediate evacuation of people from the area of the incident. Bathing and access to water is immediately prohibited. If there are injured persons, medical evacuation is carried out. The neutralisation of the chemical agent should be

⁹ Alert RCB is a system for notifying people about threats via SMS. It is used only in emergency situations, when there is a high probability of a direct threat to life or health in a significant area. The RCB alert is created on the basis of information about potential threats received from ministries, services, e.g. the police, fire brigade, border guard, offices and central institutions, e.g. the Institute of Meteorology and Water Management, the Police or Provincial Crisis Management Centres. The Government Security Centre monitors the situation 24 hours a day, 7 days a week for various types of threats and, if necessary, issues an alert.

led by the relevant services, i.e. State Fire Service. It is important to cordon the area off. The system for alarming and warning the public will be activated, i.e. Alert RCB, acoustic signals of sirens, radio and television messages, Regional Warning System, etc. If the local forces and resources are insufficient to contain the situation, the Ministry of National Defence, at the request of the governor, may transfer subunits or units of the Armed Forces.

The decontamination of injured persons is carried out by the relevant units of the State Fire Service, hospital emergency departments of the State Medical Rescue Service or another entity specialised in CBRN decontamination. If public safety needs to be ensured, the Armed Forces may support the decontamination.

Information about the threat and the need for a possible evacuation and fencing of the area is also forwarded to the appropriate maritime administration body, which, in agreement with the local government or provincial administration body, secures and marks the area in the area of so-called the technical strip¹⁰.

Appropriate chemical units of the State Fire Service are responsible for the disposal, in accordance with the Cooperation Plan of Organisational Units included in the National Contamination Detection and Alarm System.

Legal basis (cf. chapter 4.9.2):

- ▶ **Homeland Defence Act**
- ▶ **Act on Crisis Management**
- ▶ **Regulation of the Council of Ministers on Contamination Detection and Notification Systems and the Competences of Authorities in these Matters** (Rozporządzenie Rady Ministrów z dnia 23 lutego 2024 r. w sprawie systemów wykrywania skażeń i powiadamiania o ich wystąpieniu oraz właściwości organów w tych sprawach, 2024)

4.9.5.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

They should call the Police (997) or the emergency number (112). The information about the incident is forwarded to the Crisis Management Centre (of the municipality, city, district or voivodeship). Explosives and hazardous materials located in coastal waters and in the EEZ are subject to reporting to the competent territorial Maritime Office in Szczecin or Gdynia.

In this scenario, this task will most likely be carried out by a specialist unit of the Navy (mine search and elimination forces) if the public safety has to be ensured. The Maritime Office passes on the information to the police which forwards it to the competent military unit of the Armed Forces if the structure of the found object may indicate a military origin or pose a threat to public safety. If necessary, the area is isolated from access by unauthorised persons. Similar to the previous scenarios, the public alarm and warning system is activated, i.e. Alert RCB, acoustic signals of sirens, radio and television messages, Regional Warning System, etc.

The Armed Forces carries out the clearing of the area immediately after notification, but no later than within 24 hours – when the found explosive and dangerous material of military origin is located in a place where it poses a particular threat to human life or health, property and the natural environment, but no later than within 72 hours. The clearance is led by its General Commander. It is allowed to destroy hazardous materials on site if the technical means ensure protection of human life or health, property and the natural environment. In the event of

¹⁰ The technical strip in Poland is a 10–1000 metres wide (depending on the type of shore) strip of land which legally belongs to the state and is administered by the Maritime Office based on respective laws.

destruction of material in areas controlled by the Armed Forces, there is no obligation to report to the civil administration.

Legal basis (cf. chapter 4.9.2):

- ▶ **Act on Crisis Management**
- ▶ **Regulation of the Council of Ministers on the Clearance of Areas from Explosives and Hazardous Materials**
- ▶ **Act on Conducting Economic Activities in the Field of the Manufacture of and Trade in Explosives, Weapons, Ammunition, and Products and Technology for Military or Police Use** (Ustawa z dnia 13 czerwca 2019 r. o wykonywaniu działalności gospodarczej w zakresie wytwarzania i obrotu materiałami wybuchowymi, bronią, amunicją oraz wyrobami i technologią o przeznaczeniu wojskowym lub policyjnym, 2019)

4.9.5.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

Explosives and hazardous materials located in coastal waters are subject to notification to the competent territorial Maritime Office. The removal of explosives and hazardous materials is performed by private companies, or if of military origin may be by the Armed Forces in situations where it is necessary to ensure public safety.

In this scenario, this task will most likely be carried out by a specialist unit of the Navy (mine search and elimination forces). The captain informs the Regional Contact Point of the competent territorial Maritime Office (*Regionalny Punkt Kontaktowy, RPK*), which informs the Maritime Office about the finding of explosives and hazardous materials of military origin, the services on duty pass on the information in accordance with the procedures in force (police, provincial Crisis Management Centre). The further procedure and legal basis follow scenario 3.

4.9.5.5 Scenario 5: Chemical munition in the EEZ: fishing activities

Similar to scenario 4, the captain sends a report to the RPK which forwards it to the Maritime Office in Gdynia or in Szczecin and the Vessel Traffic Service which pass on the information in accordance with the applicable procedures (police, provincial Crisis Management Centre).

On board, they should

- ▶ Cut off (if possible) and drown the fishing gear
- ▶ Note the exact geographical coordinates of the location of the drowned fishing gear
- ▶ Mark (if possible) the place with a yellow buoy
- ▶ Reposition the vessel, so that the contaminated place is on lee side
- ▶ Close all openings on the bridge and other rooms
- ▶ Direct the vessel to the nearest roadstead of the nearest port, notify the nearest alarm point – the Harbour Master's Office or port administration and do not enter the port without express permission
- ▶ Wait for further instructions and assistance at the port roadstead
- ▶ Do not touch recovered unknown objects and substances, fishing gear and contaminated parts of the ship

- Remove immediately the outer clothing of crew members who came into contact with the substance and store it in tightly closed plastic bags

Before the arrival of a specialised military unit, it is not allowed to unload any cargo from the ship, remove equipment or personal belongings of the crew and passengers.

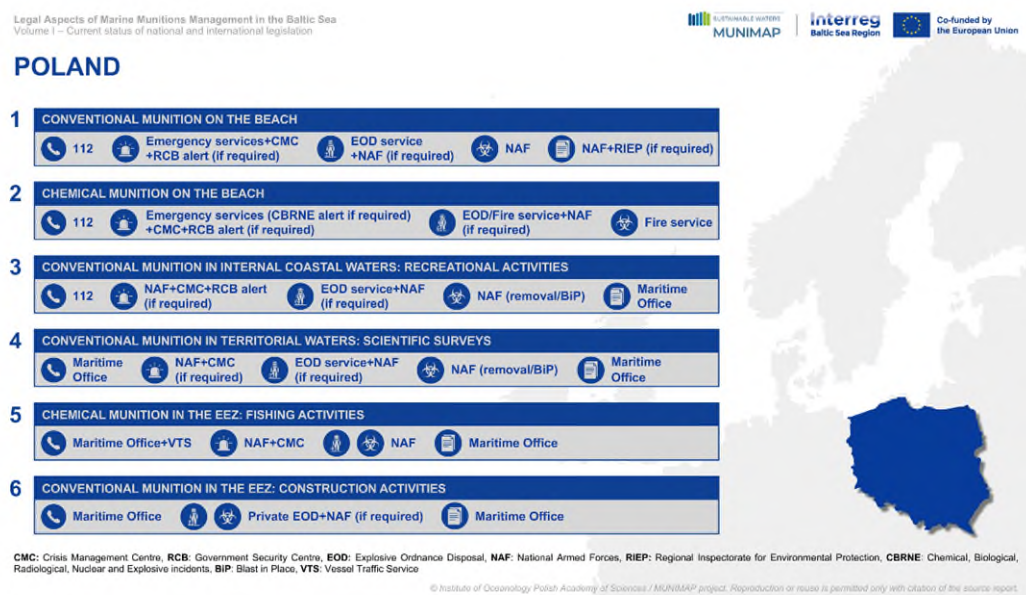
Legal basis (cf. chapter 4.9.2):

- **Order No. 3 of the Director of the Maritime Office in Gdynia**
- **Order No. 1 of the Director of the Maritime Office in Szczecin**
- **Act on the Maritime Areas of the Republic of Poland and the Maritime Administration**
- **Homeland Defence Act**
- **Act on Crisis Management**

4.9.5.6 Scenario 6: Conventional munition in the EEZ: construction activities

Explosives and hazardous materials located in the EEZ are subject to notification to the competent territorial Maritime Office. Their clearance is performed by the company or investor. If the material is of military origin, the Armed Forces may also be involved. In the case of this scenario, this task will most likely be carried out by a specialist unit of the Navy. The procedure and legal basis follow scenario 4.

Figure 10: Summary of the Polish scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.9.6 Environmental considerations prior to detonation / remediation

Environmental issues related to the presence of submerged chemical and conventional munitions are governed by a range of legal acts and institutional competences aimed at protecting the marine environment and ensuring public safety. A key role plays the **Water Law**, which establishes the framework for the protection of marine waters and for monitoring the

quality of the territorial sea and EEZ, enabling the identification and assessment of hazardous substances.

The amendments to the **Act on the Maritime Areas of the Republic of Poland and the Maritime Administration** are also important as they introduce provisions on the identification, monitoring, and neutralisation of underwater hazardous materials, including munitions. These regulations impose an obligation on maritime authorities to maintain registers of such objects and to take them into account in maritime planning and operational activities.

In the field of marine environmental protection, the General Directorate for Environmental Protection plays an important role by participating in EIA procedures for offshore investments, such as wind farms and underwater construction works. These assessments must consider risks associated with the presence of submerged hazardous materials, while environmental monitoring focuses primarily on the pathways and mechanisms of contaminant dispersion in the marine environment.

The Ministry of National Defence is responsible for operational and technical activities related to the detection, handling, and potential removal or neutralisation of explosive and hazardous materials. In the context of submerged weapons, the Ministry's responsibilities include ensuring safety and implementing technical procedures during recovery or neutralisation operations.

Prior to the commencement of any offshore works, a comprehensive environmental assessment and risk analysis concerning the presence of submerged hazardous materials is mandatory. Preparatory activities for potential recovery or remediation, including chemical neutralisation, should include an inventory of object locations and characteristics, an assessment of toxicity and the potential scale of substance release into the environment, the development of an ecological and public health risk management plan, and the establishment of procedures for the safe transport and disposal of hazardous materials.

At present, activities in this area are fragmented and largely linked to offshore investment projects. There is no dedicated, comprehensive inventory of submerged munitions. Instead, environmental studies and scientific research projects are conducted to assess the impacts of residual hazardous substances, such as mercury and igniting materials. The removal and destruction of explosive materials are carried out primarily by EOD teams when such objects pose a navigational hazard or an obstacle to investment, using methods considered optimal for the given conditions.

Overall, the issue requires close inter-institutional coordination, as it encompasses environmental protection, public health, maritime safety, and national defence considerations.

4.9.7 Monitoring and mapping in place

In 2021, the Monitoring Programme for Maritime areas was updated on the basis of Resolution no. 38 of the Council of Ministers on Granting Consent to Submit an Update of the Marine Water Monitoring Programme to the European Commission (cf. chapter 4.9.4). The programme for the monitoring of pollutant concentrations in sediments includes analyses of organochlorine pesticides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, cadmium, lead, mercury, aluminium, arsenic, copper, zinc, organic tin compounds as well as sulphur mustard and its derivatives in stratified bottom sediments. Samples are collected once every 6 years (Gdańsk Deep, Bornholm Deep, eastern Gotland Basin and Bornholm Basin) or once every three years (Vistula Lagoon and the Szczecin Lagoon). The programme also includes yearly measurements of arsenic and its derivatives from 9 sediment stations and sulphur mustard and its derivatives from 6 sediment stations as indicators of potential CWA contamination, and polycyclic aromatic hydrocarbons from 5 sediment stations as indicators of contamination from

petroleum products originating from dumped wrecks. Arsenic and its derivatives are monitored in the Bornholm Deep (2 stations), Gdańsk Deep, north-east Gotland Deep, the Gulf of Gdańsk (2 stations) and the Puck Bay (3 stations). Sulphur mustard and its derivatives are monitored in the Bornholm Deep (2 stations), Gdańsk Deep, north-east Gotland Deep, and the Gulf of Gdańsk (2 stations). PAHs are monitored in the Gulf of Gdańsk (2 stations) and the Puck Bay (3 stations).

4.9.8 Gaps and outlook

Several gaps in the Polish legal system in accordance to dumped munitions have been identified:

- ▶ Lack of clear thematic regulation
- ▶ Lack of a uniform procedure: the issue is split between different normative acts
- ▶ Resulting unclear division of responsibilities between state authorities, e.g. unclear which one leads the identification, recovery, and neutralisation

In addition, there is often a lack of targeted legal solutions regarding emergency services. For example, the State Fire Service is very well prepared to deal with chemical contamination on land, but there is no legal basis for its use at sea.

New challenges and directions for development:

- ▶ Development of soft-law regulations, bypassing the role of the state in this regard
- ▶ Development of best practices based on expert studies
- ▶ Recognising dumped chemical munitions at the normative level as a threat to national security beyond the environmental perspective
- ▶ Efforts to develop a uniform procedure addressing not only the identification and recovery but also neutralisation

4.9.9 Summary / evaluation of the legal framework

Poland's current legal framework shows that tasks related to the monitoring, identification and handling of submerged hazardous materials (CWA and UXO) are split between legal acts of varying ranks and fall within the remit of several ministries. The lack of a coherent system makes these regulations difficult to interpret and to implement in practice, particularly as some provisions apply simultaneously to land-based hazardous materials and those dumped in the marine environment. In addition, the traditional treatment of submerged chemical munitions as "weapons" rather than as toxic waste creates legislative and procedural complications, which may delay environmental protection and remediation activities. Consequently, there is a clear need to re-organise and systematise the regulations by introducing provisions dedicated exclusively to submerged hazardous materials and by supplementing existing legal gaps.

These needs are addressed by the amendment to the **Act on the Maritime Areas of the Republic of Poland and the Maritime Administration**, which introduces an additional Chapter 5a in that act. This chapter strengthens the legal framework for research, monitoring, the handling of submerged hazardous materials and diving on wrecks in Polish maritime areas. In particular, the new regulations impose an obligation on the Maritime Offices to maintain lists of research activities conducted in Polish maritime areas, define minimum requirements for permits to conduct research and diving operations, and require entities neutralising submerged hazardous materials to obtain permits from the competent Maritime Office.

A key element of the new system is the establishment of a register of submerged hazardous materials at the Hydrographic Office of the Polish Navy, together with rules governing the sharing of data and information from this register with other authorities and entities. These solutions are the result of several years of inter-ministerial work initiated by the Prime Minister and reflect a clear division of tasks within public administration, arising from the statutory competences of individual ministries.

As a result, the introduced amendment provides a foundation for more effective coordination of state activities related to the monitoring, identification and potential recovery and disposal of submerged hazardous materials, with the involvement of public authorities, the scientific community and private entities operating within clearly defined legal frameworks.

4.10 Sweden

Authors: Jan Bührke, Frederik Lindgren

4.10.1 Introduction to the country history of munitions in the sea

Sweden, surrounded by the Baltic Sea, the Kattegat, and the Skagerrak, has long navigated the challenges posed by munitions in its waters. As a neutral state in both World Wars, Sweden's waters were often used by foreign powers for mine-laying during the wars and the post-war dumping of surplus munitions. Additionally, Sweden itself engaged in naval defence strategies, deploying sea mines to protect its coastlines and conducting weapons testing during the Cold War.

In the post-conflict era of World War II, significant dumping of munitions in the Baltic Sea and Skagerrak were performed by mainly Allied forces in Swedish waters. Chemical and conventional munitions were disposed of in the deep waters, many of which now pose risks due to corrosion and leakage. Today, Sweden faces dual challenges: preserving its historical maritime legacy and addressing environmental risks posed by these hazardous remnants.

Within its MSFD program of measures, Sweden has one measure which addresses dumped munitions. The measure SE-M037 aims at minimising the dispersal of hazardous substances from marine areas with dumped conventional and chemical munitions (European Environment Agency, 2025).

4.10.2 National laws regarding munitions in the sea and on land

4.10.2.1 General laws

Sweden's legal approach to managing hazardous materials, including munitions, is rooted in its comprehensive environmental and maritime safety legislation:

- **Environmental Code (Miljöbalk, 1999):** Serves as Sweden's primary environmental law, emphasising the protection of natural resources and preventing environmental harm caused by hazardous substances.
- **Act on Flammable and Explosive Materials (Lag om brandfarliga och explosiva varor, 2010):** Governs the handling, transfer, import and export of explosives, both on land and water.
- **Maritime Safety Act (Sjötrafikförordning, 1986):** Includes provisions for ensuring safe navigation in Swedish waters, including temporary restrictions in utilising a water area if dealing with underwater hazards like mines and munitions.

4.10.2.2 Specific laws for munitions in the sea

Sweden has implemented specific regulations and initiatives to address munitions in the sea:

- ▶ **Dumped Munitions Provisions (via HELCOM):** Sweden adheres to HELCOM recommendations, including mapping and remediating sea-dumped munitions.
- ▶ **Mine Clearance Regulations:** Outline the responsibilities of the Armed Forces for clearing naval mines and other munitions (Försvarsmakten, 2023).
- ▶ **EU and international commitments:** As a member of the EU, Sweden aligns its munitions management policies with the Marine Strategy Framework Directive (chapter 2.2.2) and international treaties, including the Chemical Weapons Convention (cf. chapter 2.1).

4.10.3 List of responsible authorities

The chapter is an extended version of HELCOM (2025, pp. 131–132). Several key authorities manage munitions-related issues in Sweden:

- ▶ **Armed Forces (Försvarsmakten):** Lead agency responsible for identifying, clearing, and neutralising sea mines and UXO. The Armed Forces assist civil authorities i.e. police, coast guard and emergency services in munition clearance. Munitions that cannot be classified and findings at sea that cannot be identified are not allowed to be cleared without permission and according to the regulations from the armed forces. The marine tactical staff is responsible for the assistance to coast guard and emergency services of finds located at sea and the EOD and Demining Centre is responsible for the assistance to police, coast guard and emergency services with fins located on land. Furthermore, the Armed Forces are responsible for disposal of ammunition and UXO inside a military area or an area that is closed off for military activities. The role of the Armed Forces is governed by the Regulation (2002:375) of support to the society by the Armed Forces (Förordning (2002:375) om Försvarsmaktens stöd till civil verksamhet, 2002).
- ▶ **Coast Guard (Kustbevakningen):** Monitors maritime safety and responds to incidents involving hazardous materials. The coast guard is responsible for disposing of CWA in Swedish territorial sea and EEZ as well as in lakes Vänern, Vättern and Mälaren. In addition, they are responsible for handling CWA on a ship, which is not located inside a port area. If the find or object is deemed to contain an explosive substance together with the CWA, the Armed Forces (marine tactical staff) are obliged to support in locating, identifying, indicating, decontaminating and neutralising it.
- ▶ The **emergency services** of the respective municipality are responsible for disposing of chemical warfare agents on land or on a ship which is located in port. If the find or object is deemed to contain an explosive substance, the Armed Forces (National CBRN Defence Centre) are obliged to support in locating, identifying, indicating, decontaminating and neutralising it.
- ▶ The **police** is responsible for the disposal of ammunition and UXO, of civilian as well as military origin, on civilian land. They are also responsible for munition clearance in connection with a crime or suspicion of a crime, including inside a military area or an area that is closed off for military activities. The Armed Forces can support the police after a request for assistance. After an accident with military explosives on civilian land, decision of clearance or other action is taken by the police (Försvarsmakten, 2023).

- **Maritime Administration (Sjöfartsverket):** Manages maritime navigation safety, including marking hazardous areas on nautical charts.
- **HELCOM Coordination Body:** Sweden collaborates with other Baltic nations to address transboundary munitions challenges through HELCOM initiatives.

4.10.4 Procedure

Sweden follows a systematic process for handling munitions in the sea:

1. **Detection and reporting:** Fishermen, divers, the general public or survey teams report suspected munitions to authorities, either by contacting the Joint Rescue Coordination Centre (JRCC) on radio (VHF channel 16, call sign SWEDEN RESCUE) or by calling 112.
2. **Assessment:** The Armed Forces and/or the Coast Guard evaluate the risk posed by the munitions, including environmental and safety concerns.
3. **Marking:** Dangerous areas are marked on nautical charts to prevent accidental interaction.
4. **Remediation:** Depending on the risk level, munitions are either neutralised in place or removed for safe disposal.
5. **Post-operation monitoring:** Environmental agencies conduct follow-up studies to ensure no contamination remains.

The facility of NG Nordic in Kumla might handle the defused chemical warfare munitions. The company Dynasafe designs and build systems for the destruction of CWA and conventional munition.

4.10.5 Scenarios

The scenario responses for Sweden are summarised in Figure 11.

4.10.5.1 Scenario 1: Conventional munition on the beach

The couple would call 112 to report it, as normal in Sweden when discovering a fire or if an accident has occurred. As the lump that looked like amber does not seem to include any explosives and that the object is located on land (on shore), the emergency services will probably be the ones that response to the incident. The fire department have special units that are trained and responsible to deal with incidents involving chemicals. If the lump seems to include explosives, the police is involved as responsible authority for the clearance of the munition.

4.10.5.2 Scenario 2: Chemical munition on the beach

As the barrel containing the, likely, CWA was washed ashore, it is the responsibility for the emergency services of the municipality to dispose the barrel and its content. A special unit of the emergency services, trained and responsible to deal with incidents involving chemicals, will need to be called in, if needed from other parts of the country. If the material seems to include explosives, the Armed Forces have to be involved in the neutralisation of the threat. In the greater picture of the scenario, various other authorities are likely be involved, for example the police or the coast guard to remove people from the vicinity, both on land and sea and to maintain the blocked-off area until the threat is neutralised.

4.10.5.3 Scenario 3: Conventional munition in internal coastal waters: recreational activities

The tourist would report it by calling 112. Initially, the report would probably be forwarded to the police or Coast Guard, to determine if the tourist report is correct. If the object is indeed an UXO, the Armed Forces are responsible for clearing the object. If the clearance cannot be carried

out at short notice, the county administrative board will close the area for shipping, anchoring and fishing. The incident command, after thorough investigation and consultation with experts, might decide to also close the populated beach.

4.10.5.4 Scenario 4: Conventional munition in coastal waters: scientific surveys

The captain will first tell the crew to release the net with the find, to minimise the risk to ship and crew. He will then note the exact position of the find. The captain can report the discovery in two ways. The first one is to call 112 and request to be forwarded to Sea Rescue, the Swedish Maritime Administration's Sea rescue centre in Gothenburg. The second one is to contact the JRCC within the Maritime Administration (see chapter 4.10.4). The finding will then later be confirmed either by the Coast Guard or by the Armed Forces. The latter is ultimately responsible for the clearance of the UXO.

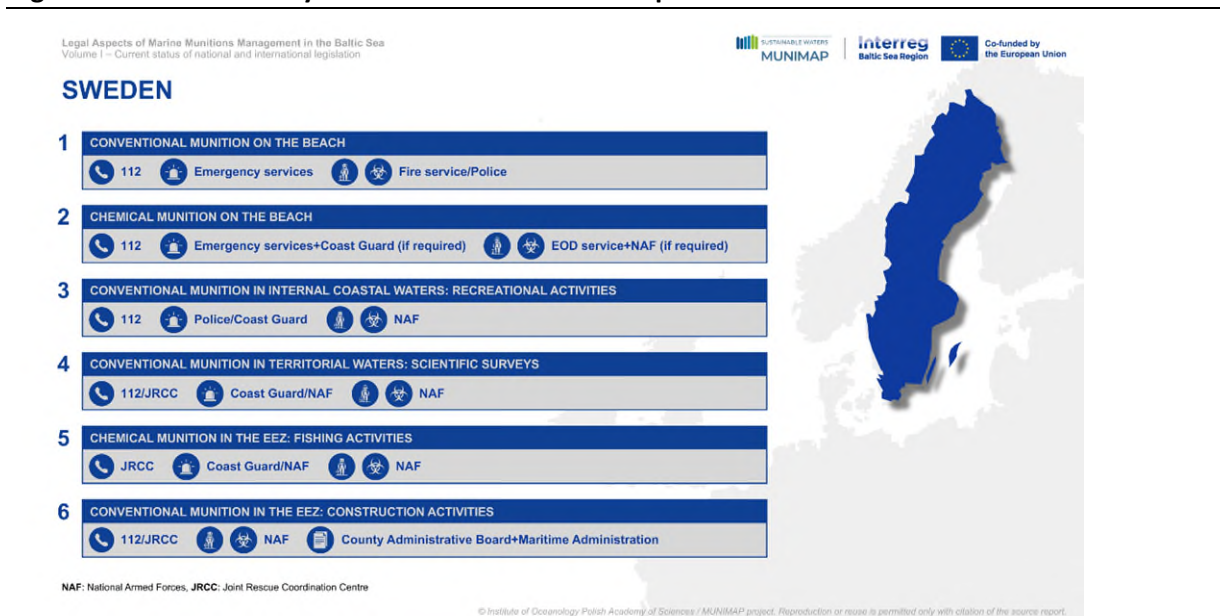
4.10.5.5 Scenario 5: Chemical munition in the EEZ: fishing activities

The captain of the ship would first report the incident to the JRCC (see chapter 4.10.4). The ship crew would probably be instructed to move away from the object, close the hatches and ventilation to the ship's interior and position the ship so that the wind would blow the fumes of the object away from the ship. As the object seems to contain both explosives and CWA, the Coast Guard will involve the Armed Forces in the decontamination and clearance of the object. Whether the captain is instructed to meet up with vessels of the Armed Forces or the Coast Guard is decided by the responsible incident commander.

4.10.5.6 Scenario 6: Conventional munition in the EEZ: construction activities

As this is not an acute situation the findings would not need to be reported to the JRCC or by calling 112. It would probably be reported to the county administrative board and to the Maritime Administration, when the company sends in its survey results. The Armed Forces will be responsible for the clearance of the UXO and its prioritisation.

Figure 11: Summary of the Swedish scenario responses



Symbols according to Figure 1.

Source: own illustration, Institute of Oceanology of Polish Academy of Sciences.

4.10.6 Environmental considerations prior to detonation / remediation

- ▶ **Biodiversity impact:** Assessments focus on protecting sensitive and critical habitats, such as fish breeding grounds and marine protected areas.
- ▶ **Chemical leakage risks:** Detailed studies are conducted to prevent the release of toxic chemical compounds in munitions into the Baltic Sea ecosystem prior to a remediation action, e.g. mustard gas or heavy metals.
- ▶ **Timing and seasons:** Operations are planned to avoid sensitive periods for marine life, such as fish and/or mammal spawning seasons.
- ▶ **Use of low-impact methods:** Advanced technologies, like ROV and underwater robots, minimise seabed disturbance.
- ▶ **Compliance with Environmental Code:** All activities align with Sweden's environmental laws to ensure sustainability.

4.10.7 Monitoring and mapping in place

- ▶ **National seabed surveys:** The Swedish Maritime Administration with some support from the Armed Forces produces hydrographic maps of the seabed which includes munition objects which were located in the mapped areas.
- ▶ **HELCOM database participation:** Sweden contributes data to the Baltic-wide HELCOM database, ensuring a collaborative approach to monitoring hazardous materials.
- ▶ **Real-time GIS:** Geographic Information Systems help authorities track and plan operations efficiently.
- ▶ **Citizen reporting channels:** Fishermen and divers are encouraged to report findings through established communication channels.

Several studies about the dispersal and concentrations of CWA degradations products have been performed in 2021–2023, as well as studies of the feasibility and cost estimation of remediation actions in areas of dumped munitions.

4.10.8 Gaps and outlook

4.10.8.1 Gaps in current practices

- ▶ **Incomplete mapping:** Some areas of the territorial waters remain insufficiently surveyed with modern hydrographic techniques like multibeam.
- ▶ **Long-term leakage risks:** Limited research on the long-term environmental impact of corroded munitions.
- ▶ **Resource constraints:** High costs limit the scope of remediation efforts.
- ▶ **Cross-border coordination challenges:** Complexities arise in addressing munitions dumpsites near international boundaries.

4.10.8.2 Outlook

- ▶ Strengthened funding for research, monitoring, and remediation.

- ▶ Adoption of innovative technologies to improve detection and disposal efficiency.
- ▶ Enhanced collaboration with Baltic neighbours through HELCOM and EU initiatives.
- ▶ Public awareness campaigns to promote reporting and responsible practices near hazardous areas.

4.10.9 Summary / evaluation of the legal framework

Sweden has established a comprehensive legal framework for managing munitions, supported by its environmental and defence policies, as well as international commitments. The **Environmental Code** and **Maritime Safety Act** provide strong regulatory foundations, while participation in HELCOM strengthens cross-border collaboration. However, gaps in mapping, resource allocation, and long-term environmental monitoring of dumpsites remain challenging.

In conclusion, Sweden has made notable progress in addressing the legacy of munitions in its waters but must continue investing in research, technology, and international cooperation to ensure a safer and more sustainable future.

5 Stakeholder consultations and questionnaire

The MUNIMAP project has a large number of associated organisations from the states in the Baltic Sea Region being involved in MUNIMAP as stakeholders (MUNIMAP, 2025). These organisations and further relevant organisations were consulted when drafting the chapters on national legislation and procedures.

5.1 Questionnaire for national authorities on underwater munitions management

A questionnaire (Annex A) for national authorities on underwater munitions management had been developed by Polish partners in the MUNIMAP consortium. It was tested, shortened and modified by the German Environment Agency to provide targeted input to the MUNIMAP policy report. The aim of the questionnaire was to seek the views of all stakeholders e.g. from authorities and industry from the Baltic Sea, EU and UN level and to raise awareness for the environmental problems and legal aspects of munition in the seas. Another aim of this questionnaire was to obtain stakeholder opinions about the direction of recommendations for improvements of the legal situation on munitions.

The test with German national authorities had revealed that governmental agencies had limited time to answer the original questionnaire and that individual representatives of governmental organisations could not speak for their organisation nor for their country. Therefore, the questionnaire was modified and shortened. Online versions of the questionnaire (Figure 12) were developed for a) European organisations at the Kiel Munition Clearance Week (KMCW) in June 2025 and b) global organisations at the UN Ocean Conference in Nice in June 2025.

Figure 12: Screenshots of the starting page of the different versions of the questionnaire



Source: own illustration generated with artificial intelligence, Institute of Oceanology of Polish Academy of Sciences.

5.2 World Café and Mentimeter sessions at KMCW

In a World Café session at the KMCW, stakeholder views on munitions policy were compiled and a Mentimeter session with questions on munition and what is hindering remediation was held in plenary with over 300 participants at KMCW. The results are summarised and will be published (Dugasseh et al., submitted). In this session, two main questions were asked to the participants:

- Question 1: “What legal challenges did you experience while dealing with the removal of ammunitions?”, and

- ▶ Question 2: “Do you see a need for an international / European legal framework and/or national legal framework to do remediation? (pros and cons of each solution)”.

The replies are summarized as follows. They show, which issues should be considered in the analysis of legislation in the upcoming volume II of the MUNIMAP policy report and for the MUNIMAP recommendations.

Responses to Question 1 “What legal challenges did you experience while dealing with the removal of ammunitions?”:

Permits requisition:

- ▶ There is often a delay in the processing time of permits for remediation activities
- ▶ A number of countries and institutions do not have specific permits for remediation activities.
- ▶ There are challenges of navigating different legal regimes within EU Member States.
- ▶ There are requirements for various permits from different authorities.

Responsibilities, clarity of existing regulations and the role of institutions:

- ▶ There is a lack of clarity on existing regulation as well as the roles of institutions in remediation activities.
- ▶ Cities with some level of responsibility for remediations are difficult to work with
- ▶ Complexities and presence of different administrative layers in working with state and federal institutions on remediation.
- ▶ Lack of clarity on both military- and non-military-related remediation activities.
- ▶ Unclear responsibilities of the navy in remediation activities.
- ▶ There is no clear responsibility of institutions for remediation.
- ▶ Unfamiliarity of EU regulations for actors within the remediation value chain.

Political commitment:

- ▶ Low political commitment due to the wrong assumption that “submerged munitions” are synonymous with “chemical weapons”.

Limitations and application of regulations:

- ▶ Legal frameworks are years behind current realities and challenges.
- ▶ Limited risk assessment guidelines in existing regulations.
- ▶ Absence of a legal framework for UXO and chemical warfare clearance.
- ▶ There is no legal framework for environmental risk.
- ▶ Restrictions related to the surveys of UXOs.
- ▶ There is no EIA required for munition clearance.
- ▶ Regulations specific to each country limit how broader regulations can be applied.

Responses to Question 2 “Do you see a need for an international / European legal framework and/or national legal framework to do remediation? (pros and cons of each solution)”:

Maintain status quo

- ▶ Legal frameworks should be country specific since countries have varying risk types.
- ▶ How a common framework should be implemented / agreed on is unclear since all countries are tackling issues differently.

Improve legal framework

- ▶ Upgrade or expand the scope of current national laws to international law.
- ▶ Update EIA directive on remediation and implemented in member states.
- ▶ Identify synergies and best practices in existing legal frameworks as learning tools.
- ▶ Improve current national remediation laws.

New legal framework

- ▶ An EU directive is needed to coordinate for remediation efforts.
- ▶ There is a need for international law on remediation, but it should be established under the auspices of the United Nations.
- ▶ New laws are needed to enforce compliance and ensure the use of common protocols.
- ▶ A single regulation is ideal but “EU is slow” in implementing regulations.

Harmonization of existing legal frameworks

- ▶ Harmonize existing legal frameworks on remediation of submerged munitions.
- ▶ Harmonize existing EU and local regulations.
- ▶ EU regulation should mirror local regulations, practices and principles.
- ▶ A unifying law for Europe with a supervising authority would streamline remediation activities.
- ▶ Produce, change or modify national for EU region with new knowledge.

Suggested approaches

- ▶ There is a need for international law on remediation, but it should be established under the auspices of the United Nations.
- ▶ Legislation should also focus on sea basins.
- ▶ Countries with hotspots should define and contribute towards the development of legal frameworks.
- ▶ It is easier to implement national laws than EU-wide regulations and therefore the need to focus on national laws.
- ▶ Proposals for new regulations should reduce administrative burden and layers.

6 Conclusion

Across the international, European and national levels, the legal framework governing sea-dumped munitions remains fragmented, indirect and incomplete. Neither international treaties nor EU directives provide a clear, binding obligation to recover or remediate legacy munitions. Instead, (EU Member) states operate within a patchwork of general environmental duties and sector-specific instruments that address the issue only partially.

At the international level, core normative principles – most notably the precautionary principle, the obligation to prevent significant transboundary environmental harm, and duties of cooperation – do provide an important conceptual foundation. However, these principles cannot currently be translated into a coherent remediation regime. The main reasons are structural: owing to the non-retroactivity of UN treaties under Article 28 of the Vienna Convention on the Law of Treaties, major international agreements do not apply to historical dumping; the London Convention and London Protocol regulate only future dumping; and the Chemical Weapons Convention expressly excludes chemical weapons dumped at sea before 1 January 1985. As a result, large-scale post-war dumping – both conventional and chemical – falls outside the operative reach of existing treaty instruments. Although UNCLOS as well as the regional sea conventions OSPAR and HELCOM establish important environmental protection duties, they leave wide interpretative discretion as to whether, when and how legacy munitions must be remediated. The international framework is therefore normatively sophisticated yet operationally insufficient regarding legacy munition.

A similar picture emerges at the European level. EU environmental laws contain no explicit obligation to recover or remediate dumped munitions. Nevertheless, functional duties arise from the Water Framework Directive and the Marine Strategy Framework Directive, which require Member States to prevent deterioration, monitor pollutant inputs and mitigate significant pressures on the marine environment. Additional obligations follow from the Habitats and Birds Directives – particularly where munition sites intersect with Natura 2000 areas – as well as sectoral regimes such as REACH and environmental criminal law. These instruments do not directly regulate historic dumping but shape the legal standard for addressing legacy munitions through the precautionary principle anchored in Article 191 of the Treaty on the Functioning of the European Union. Strategic EU initiatives – such as the EU Maritime Strategy for the Baltic Sea Region and the 2025 European Ocean Pact – express the political commitment to coordinated European action, including the development of a future UXO removal strategy. While they remain soft-law instruments and do not eliminate the underlying regulatory gap, they can already be understood as a preparatory step towards a future EU directive.

At the national level, most legal systems in the Baltic Sea Region maintain functioning emergency ordnance disposal and structures for hazard prevention, but none has a comprehensive regulatory framework for the systematic and long-term remediation of large-scale dumpsites. The competences are often fragmented, the authorisation and financing mechanisms unclear, and the legal classifications of recovered munitions – e.g. under waste or explosives law – vary considerably. National law is therefore suited for immediate hazard response but only partially equipped for forward-looking, long-term environmental remediation. This is also visible in the six scenarios. The respective national responses depict the current national response to security and safety issues of incidents with munition at sea.

Taken together, the regulatory landscape is characterised by dispersed duties, sector-specific mechanisms and political declarations that do not yet amount to a coherent framework for adequately addressing legacy munitions in the sea. This conclusion, which is confirmed by the stakeholder replies during consultations (cf. chapter 5) is the starting point for the second

volume of the MUNIMAP policy report. The volume II will provide a comparative analysis of national legal systems, identify structural inconsistencies and gaps across jurisdictions, and develop options for legal harmonisation. In doing so, it will move from descriptive mapping to normative proposals by outlining how an effective, coherent and future-proof legal framework for dealing with sea-dumped munitions in European waters can be established.

7 List of references

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A Appendix: Questionnaire for national authorities on Underwater Munitions Management



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Purpose of the Questionnaire

This questionnaire aims to collect comprehensive information from national authorities regarding the management of underwater munitions, covering both sea-dumped chemical weapons and conventional ammunition. It seeks to identify legal gaps, challenges, and opportunities for international cooperation, leading to the development of effective strategies and legal frameworks. The ultimate goal is to promote a harmonized approach to address the risks associated with underwater munitions, ensuring environmental protection and human safety.

Introduction

The Baltic Sea contains not fully identified toxic and hazardous materials, including both conventional ammunition and chemical weapons, which require urgent attention and inclusion in new legislation due to several critical factors:

- ▶ **Ongoing Deterioration:** The physical and chemical state of these materials is deteriorating over time, increasing the risk they pose to the environment and human health.
- ▶ **Scientific Findings:** Alarming results from recent scientific research (though still requiring expansion) highlight the growing threats these materials represent.
- ▶ **Climate Change Impact:** Climate changes may influence the state of the Baltic Sea, potentially exacerbating the risks associated with these sea-dumped hazardous materials.
- ▶ **Rising Awareness:** There is increasing and widespread awareness of the threats to the natural environment and human health posed by these materials.
- ▶ **Economic Activities:** Growing economic activities in the Baltic Sea, including the development of wind farms, increase the likelihood of encountering these materials, necessitating their consideration in planning and safety measures.
- ▶ **International Cooperation:** The international significance of cooperation around the Baltic Sea underscores the need for a unified approach to managing these risks.
- ▶ **Security Threats and Hybrid Warfare:** The presence of sea-dumped munitions poses potential security threats, including risks associated with hybrid warfare tactics. Recent geopolitical tensions, particularly involving Russia, highlight the need for increased vigilance and comprehensive strategies to mitigate such threats.

It is necessary for Baltic Sea states to establish comprehensive legislative, operational, and technological frameworks to counteract the threats resulting from the presence of toxic and hazardous materials, including:

1. **Proper Definition:** Accurately defining toxic and hazardous materials, based on international obligations and internal regulations.
2. **Effective Monitoring:** Implementing effective monitoring of hazardous substances and their effects on people and the environment.
3. **Regulation of Hazard Removal:** Regulating the removal of hazards caused by toxic and hazardous materials dumped in marine areas.
4. **Comprehensive Strategy:** Introducing a comprehensive strategy, indicating responsible authorities, and urgently implementing effective actions to counter threats resulting from the presence of toxic and hazardous materials.
5. **Stakeholder Inclusion:** Involving all stakeholders, including civil society and businesses, in the process of reducing risks associated with hazardous materials in the Baltic Sea and their gradual removal.
6. **Securing Resources:** Securing financial resources for research, monitoring, and removal of toxic and hazardous materials.
7. **International Cooperation Framework:** Creating a framework for the development of international cooperation to improve the safety of the Baltic Sea.

Furthermore, it is recognized as necessary to:

- ▶ **Treat Sea-dumped Chemical Weapons and Conventional Ammunition as Hazardous Material/Waste:** This approach should be reflected in legislative, administrative, and operational solutions.
- ▶ **Transition from Analysis to Action:** Move from analyses and debates to concrete actions, including monitoring threats, identifying locations and types of hazardous materials, and preparing for their removal.
- ▶ **Implement European Parliament Resolution:** Realize the provisions of the European Parliament resolution of 27 April 2021 on chemical residues in the Baltic Sea, including broad engagement of the European Commission in reducing threats related to hazardous materials in the Baltic Sea and their gradual removal.

Instructions for Submission

- ▶ Please complete all sections of the questionnaire to the best of your ability.
- ▶ Attach any relevant documents or policies that support your responses.
- ▶ Submit the completed questionnaire by [xxx] to [xxx].

Section 1: Legislative and Operational Frameworks

Legal Definitions and Classification

Objective: Assess the acknowledgment of the necessity to address underwater munitions (both chemical weapons and conventional ammunition) through comprehensive legislative, administrative, operational, and technical measures, including scientific and academic solutions, technologies, and trainings.

1. Are there legal definitions in your country for underwater munitions (chemical weapons and conventional ammunition) as hazardous materials/waste?

- a. If yes, please specify.
- 2. Are sea-dumped munitions legally classified as hazardous materials/waste?
 - a. Comments:

Administrative and Technical Measures

- 3. Are specific agencies designated for monitoring and managing underwater munitions?
 - a. If yes, list the agencies and their responsibilities.
- 4. Are there administrative procedures in your country for the identification and removal of underwater munitions?
 - a. If yes, describe briefly.
- 5. Is there investment in or collaboration with academic or research institutions for developing technical solutions?

Training and Technical Solutions

- 6. Is specialized training provided in your country for personnel managing underwater munitions?
 - a. If yes, outline the key training programs.
- 7. Are there technologies or methods in use in your country for underwater munitions management?
 - a. If yes, specify the methods or technologies.

Section 2: Transition from Analysis to Concrete Actions

Objective: Evaluate the steps taken to move from analysis and debate to concrete actions, including monitoring threats, identifying locations and types of hazardous materials, and preparing for their removal.

Monitoring and Risk Assessment

- 8. Are there monitoring or mapping activities for underwater munitions in your country?
- 9. Are risk assessments conducted in your country for underwater munitions' environmental and human health impacts?

Removal and Concrete Actions

- 10. Are there strategic plans or concrete actions taken for the removal or neutralization of underwater munitions in your country?
 - a. If yes, provide examples of recent actions.

Section 3: International Cooperation

- 11. Is there collaboration in your country with international organizations or other nations on underwater munitions management?
 - a. If yes, list the organizations and describe the nature of collaboration.
- 12. Is your country interested in developing or contributing to a unified international legal framework?

Section 4: Legal Gaps and Challenges

- 13. Are legal gaps or challenges identified in your country in addressing underwater munitions?
 - a. If yes, outline the gaps and their implications.
- 14. Are there plans or actions in your country to address these legal gaps (e.g., amendments, new legislation, or treaties)?

Section 5: Application of the Precautionary Principle

15. Has the precautionary principle been adopted in environmental policies in your country?
16. Is the precautionary principle applied to underwater munitions management in your country?
 - a. If yes, provide examples.

Section 6: Participation in International Programs

17. Has your country participated in international programs addressing underwater munitions?
 - a. If yes, list key programs and describe involvement.
18. What lessons or best practices have been learned in your country from these programs?

Section 7: Resource Allocation

19. Are specific resources allocated in your country for underwater munitions management?
 - a. If yes, specify funding sources and amounts.
20. What challenges are faced in your country in resource allocation, and what support is needed?

Section 8: Action Plan

Action Plan Development:

21. Does your country have a detailed action plan for managing underwater munitions?
 - a. ☐ Yes
 - b. ☐ No
 - c. If yes, please provide a summary or attach the plan.

Responsible Authorities:

22. Which authorities or agencies are responsible for implementing the action plan?

Section 9: Recommendations and Conclusion

23. What specific actions or international measures are recommended from your organisation for improving underwater munitions management?

Conclusion

Thank you for taking the time to complete this questionnaire. Your input is invaluable in advancing international efforts to manage underwater munitions effectively. By working together, we can enhance the safety of the Baltic Sea and protect the environment and human health from the risks posed by toxic and hazardous materials.

Additional Comments

Please provide any additional comments or suggestions below: