

2026

Lost Fishing Gear:

Retrieval, recycling, and preventive actions for abandoned recreational fishing gear in the central Baltic Sea

Guidelines for participatory argumentation and mutual learning-based ALDFG preventive management actions

Interreg



Co-funded by
the European Union

Central Baltic Programme

Re:Fish

Lost fishing gear is found in all seas, lakes, and waterways where recreational fishing takes place. It causes unnecessary suffering for fish, birds, and marine mammals. In the EU project Re:Fish, we are working towards a cleaner and healthier Baltic Sea.

Project period: 2023–2026

Funded by Interreg, Central Baltic Programme

Project partners: Keep Sweden Tidy (SE, lead partner), Keep the Archipelago Tidy (FI), University of Tartu (EE), Finland Environmental Institute (FI)

Read more at centralbaltic.eu/project/refish/



Project information

Funded by the EU's Interreg Central Baltic Programme under its "Improved Coastal and Marine Environment" priority, the Re:Fish project "Retrieval, recycling, and preventive actions for abandoned recreational fishing gear in the central Baltic Sea" (project period from March 2023 to February 2026) was coordinated by the Keep Sweden Tidy Foundation in cooperation with partners from Finland, Keep the Archipelago Tidy Association and the Finnish Environment Institute, and from Estonia, the University of Tartu.

The Re:Fish project addressed the problem of ghost fishing and plastic pollution caused by lost recreational fishing gear in Sweden, Finland, and Estonia. Through activities such as gear retrieval operations, end-of-life gear collections, citizen-based science initiatives, educational training and awareness campaigns, the project engaged anglers and fishers using passive gears, manufacturers, NGOs, research institutions, and authorities to prevent gear loss and advance practical measures for gear recovery and material recycling.

More information, project materials, and results can be found on the [project webpage](#).

Abbreviations

ALDFG – Abandoned, lost or otherwise discarded fishing gear
CFP – Common Fisheries Policy
EU – European Union
EEZ – Exclusive Economic Zone
FAO – Food and Agriculture Organization of the United Nations
FFA – Finnish Fishing Act
LOVA – Local Water Conservation Projects
SwAM – Swedish Agency for Marine and Water Management's

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1 Introduction

Abandoned, Lost or Otherwise Discarded Fishing Gear (ALDFG), often referred to as "ghost gear," includes any fishing equipment that has been left, discarded, or lost in the marine environment and poses a significant threat to the marine ecosystems. The primary concerns with ALDFG arise from its tendency to continue catching marine life, a phenomenon known as "ghost fishing". This ongoing capture of species, some of which are endangered, leads to significant ecological imbalances, and threatens the sustainability of fish stocks. The environmental and economic impacts of ALDFG are multifaceted. Not only does it pose a direct threat to marine life, including entanglement and death of various species, but it also contributes to broader environmental degradation. As most fishing gear contains significant amounts of plastic, ALDFG is a considerable source of marine plastic litter, which degrades into microplastics, impacting water quality and potentially human health. Additionally, ALDFG creates navigational hazards for vessels, mars coastal landscapes, and incurs economic costs through lost fishing equipment and diminished fishery yields (Drinkwin, 2022).

It is stated (Unsbo et al., 2023) that the presence of abandoned, lost, and discarded fishing gear (ALDFG) in aquatic environments leads not only to severe environmental impacts but also to socioeconomic ones, polluting with macro- and microplastics and harmful chemicals while degrading habitats.

Recreational fishing is a popular leisure activity in countries around the Baltic Sea with about 1.7 million active practitioners in Sweden, 1.5 million in Finland and 156 000 in Estonia. Based on recent trends, the numbers are expected to increase (e.g., Lyach and Čech, 2018). ALDFG is consequently a common challenge in the central Baltic Sea region, which the project addresses, starting with Sweden, Finland and Estonia as pilot areas. Recognizing that top-down management alone cannot fully address this issue, these guidelines advocate for a collaborative, participatory approach that involves all stakeholders—from fishermen and industry representatives to policymakers, researchers, and environmental organizations. By combining elements of participatory argumentation, mutual learning, deliberative democracy, and socio-ecological systems thinking, these guidelines provide a flexible conceptual framework followed by a detailed, step-by-step action plan. The aim is to empower all parties to work together in preventing ALDFG and to create a sustainable, long-term solution.

One of the project's goals was to explore effective and relevant preventive strategies to minimize the loss of fishing gear during the fishing operations in the Baltic Sea. With a deeper

insight into the associated challenges, the project partners and key national stakeholders hoped to identify and deliberate on practical, acceptable prevention techniques for recreational fishers and the fishing industry, ultimately working towards reducing gear loss rates in the future. All this was done during interactive and participatory discussions and workshops. Within this document, a relevant conceptual framework will be suggested with a step-by-step implementation guide together with final guidelines recommended by the project to prevent ALDGF in the future.

Utilised as a conceptual tool, the environmental stewardship framework (Enqvist et al., 2018) facilitates collaboration and dialogue among various stakeholders, accommodating different uses and perceptions associated with recreational fisheries activities. This framework highlights the care dimension and relational approaches as key areas for future efforts in environmental stewardship related to recreational fisheries. Furthermore, transdisciplinary cooperation with scientists, managers, and policymakers is unleashing the environmental stewardship potential of recreational fishers, enhancing their capacity to contribute to the common good. It is suggested (Shephard et al., 2023) that in a skilled community of practice, outdoor experiences cultivate environmental stewardship in recreational fishers, grounded in place, identity, care, knowledge, and action. These fishers, deeply embedded in natural settings, have the unique potential to heighten ecological awareness of aquatic systems, particularly when their nature experiences are augmented by effective mentoring.

2 Guidelines

2.1. Participatory argumentation and mutual learning based ALDFG preventive management actions

Effective ALDFG prevention in the Baltic Sea requires a participatory, mutual learning approach that integrates scientific knowledge with local experience. By engaging all stakeholders—from fishers to policymakers—in a structured yet adaptable process, these guidelines offer a pathway to develop, implement, and sustain ALDFG preventive management actions. Through continuous dialogue, shared decision-making, and iterative learning, the Baltic Sea region can significantly reduce the presence of ghost gear, protect marine life and enhance the sustainability of its fisheries. These guidelines are designed to be both scientifically sound and practically applicable. They provide a flexible conceptual

foundation ensuring that every stakeholder can contribute to, and benefit from, a cleaner, safer Baltic Sea.

2.1.1. Participatory argumentation and deliberative dialogue

Stakeholders are encouraged to engage in open, respectful dialogue where each party explains their perspective and reasoning. This process promotes a shared understanding of the ALDFG problem by ensuring that every voice—from fishers to policymakers—has equal opportunity to contribute. Constructive debate and exchange of ideas help build common ground, foster trust, and lead to collectively developed solutions.

2.1.2. Mutual learning and participatory action

The process is designed so that all participants learn from each other. Fishermen contribute practical, experiential knowledge, while scientists, regulators, and NGOs share technical insights and research findings. By actively involving everyone in data collection, analysis, and solution-testing, all parties become co-researchers and co-decision-makers. This mutual learning strengthens the relevance and legitimacy of the proposed solutions to enforce better gear marking, improve control and enhance reporting of gear loss as a practical foundation for prevention of gear loss in the future (WWF, 2020; MARELITT Baltic project, 2019).

2.1.3. Social-ecological systems perspective

ALDFG prevention is viewed within a broader social-ecological context that recognizes the interdependence of human activities and marine ecosystems. Understanding the entire system—from the economic and cultural drivers behind fishing practices to the ecological consequences of lost gear—allows stakeholders to identify multiple intervention points. This perspective encourages the design of adaptive, multi-level solutions that address both human and environmental needs.

2.2. Ensuring inclusive stakeholder participation

2.2.1. Fishers

Recreational fisheries are embedded to social-ecological systems (Arlinghaus et al., 2017) and engage approximately 10% of the population in industrialized nations (Arlinghaus et al., 2021). Outdoor experiences within a skilled community of recreational fishers are stated to develop environmental stewardship, based on place, identity, care, knowledge, and agency (Shephard et al., 2023). Recreational fisheries, deeply embedded in natural settings, have a unique potential to enhance ecological awareness of aquatic systems. This is achieved when

nature experiences are combined with effective mentoring. Although stewardship efforts of recreational fishers may focus on selected fish species, numerous activities supported by these communities, such as habitat enhancement or reduced fishing pressure, benefit non-target taxa and habitats as well.

Furthermore, transdisciplinary cooperation with scientists, managers, and policymakers can unlock the stewardship potential of recreational fishers and engage their capacity for the common good. When speaking of fishing with passive gears involving both commercial and recreational fishermen is essential. Their on-the-ground experience provides critical insights into why and how fishing gear is lost and what are the most effective ALDFG prevention management actions. Engage them through meetings held at convenient times and locations, using clear and accessible language. Emphasize that their input is key to developing practical, effective solutions and that the goal is collective improvement rather than blame.

2.2.2. Policymakers and government agencies

Government representatives from fisheries, environment, and maritime sectors should be active participants. Their role is to integrate practical experiences into formal policy and ensure that regulations and support mechanisms align with on-the-ground realities. They are encouraged to participate in equal dialogue and to work collaboratively with other stakeholders in refining policies.

2.2.3. Researchers and technical experts

Scientists and technical experts provide data and analytical insights essential to understanding the problem and evaluating solutions. They are encouraged to present their findings in accessible language and to actively listen to local knowledge. Their collaborative role is to help co-design solutions that are both scientifically sound and practically viable.

2.2.4. Conservation organizations and NGOs

NGOs and environmental groups can facilitate dialogue and help mediate between diverse stakeholder interests. They provide expertise in public outreach and environmental management and can act as neutral conveners to help build trust. Their involvement ensures that broader ecological and societal values are considered in the decision-making process.

2.2.5. Fishing industry and gear manufacturers

Representatives from the fishing industry and gear manufacturers bring an important perspective on economic and technological feasibility. Their input helps shape practical

solutions related to gear design, maintenance, and replacement, ensuring that preventive measures are economically sustainable and technically sound.

2.2.6. Other relevant groups

Other stakeholders—such as port authorities, waste management companies, recreational divers, and coastal community members—are also essential. Their participation helps complete the picture, ensuring that all aspects of ALDFG prevention, from disposal to retrieval, are addressed.

2.3. Alignment with Baltic Sea policies and initiatives

These guidelines are designed to complement existing Baltic Sea initiatives and policies, including regional action plans and EU regulations. These are an extension of knowledge gained within MARELITT Baltic project (March 2016-April 2019, <https://interreg-baltic.eu/project/marelitt-baltic/>) and the given Re:Fish project (May 2023-March 2026, <https://centralbaltic.eu/project/refish/>) and address ghost gear and marine litter from commercial fishing, by offering a framework that integrates stakeholder dialogue into formal management processes. By aligning with current regional and national commitments, the participatory process gains legitimacy and the potential to attract funding and institutional support.

2.4. Step-by-step implementation guide

Step-by-step implementation guide was developed, and it contains six different steps how to most effectively and structured gather the important information and knowledge for the methods and actions to prevent the loss of the gear and through that reduce the ALDFG problem in the Baltic Sea region. As part of the implementation guide each project country (Sweden, Finland and Estonia) organized a participatory argumentation and mutual learning workshops (physical or online) in their countries in national languages with various groups of stakeholders with the aim to involve all the mentioned groups in paragraph 3.4. The basis of the events was to discuss the effectiveness of the existing prevention measures and seek innovative and new ideas for future how to most effectively prevent the ALDFG in the Baltic Sea. Additionally, an online questionnaire was developed in collaboration with all the Re:Fish project partners. The online questionnaire was shared with stakeholders through e-mail lists and social media.

Step 1: Initiation and stakeholder mapping

- **Form a Core Planning Team:** Assemble a small, diverse team including a neutral facilitator, representatives from key stakeholder groups, and an organizer who can coordinate outreach and logistics.
- **Identify Stakeholders:** Conduct a stakeholder mapping exercise to compile a comprehensive list of all affected parties and document their interests and roles.
- **Outreach:** Send clear, inviting communications explaining the process, its goals, and the benefits of participation.
- **Resource and Logistics Planning:** Secure necessary resources, arrange venues (or online platforms), and schedule initial meetings. Gather baseline information on local ALDFG conditions.

In Re:Fish project each project partner followed the Step 1 individually but structured as described above. This means that every country formed a core planning team for the national participation and mutual learning workshop. Inside the planning team national most relevant stakeholders were identified and they were invited to participate the workshop. Each of the countries decided for different format of the workshop. In Sweden the national workshop was organized online, in Finland it was held as hybrid event (some participated physically and some through online platform), and in Estonia it was decided to organize a physical event. Based on the chosen workshop format, each partner did their own resources and logistics planning as described in the last bullet point of the Step 1.

Step 2: Building a shared understanding (kick-off workshop and mutual learning)

- **Introductory Workshop:** Hold a plenary meeting where participants introduce themselves, share their experiences, and establish a respectful, open dialogue.
- **Presentation of the Problem:** Present current data and local case examples that illustrate the scale and impact of ALDFG, using visuals to enhance understanding.
- **Interactive Knowledge Mapping:** Conduct a group exercise to map out causes, effects, and current responses to ALDFG, ensuring all perspectives are recorded.
- **Establish Mutual Learning Norms:** Explicitly state that this process is about shared learning; encourage open questions and cross-sector dialogue.
- **Define Shared Goals:** Develop a consensus on the primary objectives, such as reducing gear loss and enhancing recovery efforts.

Each Re:Fish project country (Sweden, Finland, Estonia) organized national kick-off workshop for mutual learning and shared understanding about the ALDFG problem in the Baltic Sea region. All the participants got the opportunity to share their experiences with ALDFG and overall situation of the ALDFG was described based on the previously collected information. Additionally, the current prevention actions and their effectiveness were discussed. All the

information about the existing experiences and suggestions for the prevention of the ALDFG were mapped. More detailed description of the national workshops can be found in paragraph 4 of the guidelines document.

Step 3: Participatory problem analysis and brainstorming solutions

- Deep-Dive Analysis: Review and elaborate on the root causes of ALDFG, identifying sub-causes and specific local issues.
- Brainstorming Session: Generate a wide range of potential preventive actions across categories such as technical, regulatory, economic, and educational.
- Stakeholder-Specific Input: Encourage each group to propose solutions from their perspective, ensuring the final list of ideas is broad and inclusive.
- Structured Deliberation: Evaluate the proposals through balanced discussion, listing pros and cons, and using methods like multi-voting to rank ideas.
- Prioritization: Narrow the list to a set of promising, broadly supported interventions.
- Formation of Working Groups: If needed, form sub-groups to develop detailed plans for each prioritized action.

Regarding to Step 3, the root causes of ALDFG were discussed and identified during the national kick-off workshops. Different potential preventive actions across various categories were discussed and mapped with discussing pros and cons of each of them. More detailed description of the outcomes of the national workshops can be found in paragraph 3 of the guidelines document. Additionally, online questionnaire was conducted in 4 languages (English, Swedish, Finnish and Estonian) and shared in each of the project partners countries to get input for the causes, extent of the problem and potential preventive actions suggestions from wider group of the stakeholders.

Step 4: Joint action planning and decision-making

- Draft an Action Plan: Create a detailed document outlining each prioritized action, including objectives, tasks, responsible parties, timelines, and required resources.
- Deliberative Review: Present and refine the draft plan in stakeholder meetings, ensuring consensus on roles and responsibilities.
- Formalize Commitments: Secure explicit commitments from each stakeholder group, possibly through a written memorandum or joint declaration.
- Policy Integration: Align the action plan with existing regional, national, and EU policies, ensuring that the measures support and enhance formal regulatory frameworks.
- Resource Mobilization: Identify and assign funding sources and in-kind contributions needed for implementation.
- Timeline and Milestones: Develop a realistic timeline with clear milestones to monitor progress.

For the joint action planning and decision making across the border online workshop was organized and all the three countries stakeholders were invited to participate. The list of suggested potential preventive actions across various categories from national kick-off events were introduced and validated during the joint online workshop.

Step 5: Implementation of Actions

- **Launch Collaborative Actions:** Begin executing the agreed-upon interventions, such as deploying reporting systems, holding training sessions, or piloting new gear technologies.
- **Coordinate Regularly:** Hold periodic update meetings or conference calls to monitor progress, address challenges, and maintain momentum.
- **Ensure Inclusive Execution:** Involve all stakeholder groups in the implementation process to maintain mutual learning and shared ownership.
- **Leverage Regional Networks:** Share experiences and best practices with other Baltic Sea communities to enhance the effectiveness of the measures.
- **Document Progress:** Keep detailed records of activities, successes, and challenges to facilitate future evaluation and knowledge sharing.

Step 6: Monitoring, Mutual Learning, and Adaptation

- **Track Progress:** Monitor key performance indicators such as reporting rates, gear recovery statistics, participation in training, and changes in ALDFG levels.
- **Evaluation Meetings:** Convene regular evaluation sessions to review outcomes, share experiences, and learn from successes and challenges.
- **Document Lessons Learned:** Record both successes and shortcomings to refine future actions and build a repository of best practices.
- **Adjust and Update:** Modify the action plan as needed based on the feedback and new data. Revise targets, timelines, or responsibilities to improve outcomes.
- **Institutionalize Practices:** Work toward embedding successful practices into official policies and routine operations to ensure long-term sustainability.
- **Decide on Future Collaboration:** Evaluate whether to continue the stakeholder group as a permanent body or to disband with a mechanism for re-convening if needed.

2.5. Summary

Effective ALDFG prevention in the Baltic Sea requires a participatory, mutual learning approach that integrates scientific knowledge with local experience. By engaging all stakeholders—from fishers to policymakers—in a structured yet adaptable process, these

guidelines offer a pathway to develop, implement, and sustain preventive management actions. Through continuous dialogue, shared decision-making, and iterative learning, the Baltic Sea region can significantly reduce ALDFG, protect marine life, and enhance the sustainability of its fisheries. These guidelines have been designed to be both scientifically sound and practically applicable. They provide a flexible conceptual basis with a detailed step-by-step action plan, ensuring that every stakeholder can contribute to and benefit from a cleaner and safer Baltic Sea.

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3 Results from events

Each project country (Sweden, Finland and Estonia) organized a participatory argumentation and mutual learning kick-off workshops (physical, hybrid or online) in their countries in national languages. The basis of the events was to discuss the effectiveness of the existing prevention measures and seek innovative and new ideas for future how to most effectively prevent the ALDFG in the Baltic Sea. Additionally, an online questionnaire was developed in collaboration with all the project partners. The online questionnaire was shared in stakeholders' e-mail lists and on social media.

3.1. ALDFG participatory argumentation and mutual learning workshop in Estonia

The Estonian participatory argumentation and mutual learning kick-off workshop was organized on the 9th of April 2024 in Pärnu, Estonia. In total, 74 people registered to the workshop, of which 66 people from 25 different organizations physically attended the event at the end. The participants represented different stakeholders' groups such as recreational fishers, policy makers, scientists, nature NGOs, local tourism sector (including fishing tourism) and fishing harbours representatives. The event agenda was developed to be diverse to bring more participants to attend and dive into ALDFG related topics. Additionally, providing a higher variety of topics and presentations will give the participants a higher value of the event.

The event started at 11:00 and lasted until 17:00. The agenda of the workshop was following:

- 11:00 – 11:30 Welcome coffee and gathering
- 11:30 – 11:40 Welcome words – *University of Tartu, Estonian Marine Institute, Robert Aps*
- 11:40 – 12:10 Overview of the Re:Fish Project – *University of Tartu, Estonian Marine Institute, Redik Echbaum, Maria Põldma, Anneliis Kõivupuu*
- 12:10 – 13:15 Discussion: Measures to Prevent the Loss of Fishing Gear – *University of Tartu, Estonian Marine Institute, Anneliis Kõivupuu, Üllar Meriste*
- 13:15 – 14:00 Lunch
- 14:00 – 14:30 Do Anglers Litter? – The Example of the Pärnu River – *University of Tartu, Estonian Marine Institute, Maria Põldma*
- 14:30 – 15:00 Fishing Tourism in Pärnu – *We Create Ltd., Taavi Holter*
- 15:00 – 15:15 Coffee break
- 15:15 – 15:45 Recent Changes in Fisheries Regulations – *Fisheries Policy Department, Ministry of Regional Affairs and Agriculture, Kaire Märtin*
- 15:45–16:30 Cormorant and Fisheries Conflict–*University of Tartu, Estonian Marine Institute, Timo Arula*
- 16:30 – 17:00 Final discussion and summary of the day

The event started with an overview of the Re:Fish project, about the main aims and ongoing activities, following the open discussion and sharing the knowledge and experiences about different preventive management strategies for the ALDFG. The discussion was moderated, and the outcomes of the discussion were mapped at the same time.

Usually if people in Estonia will find the ALDFG or illegal and not marked fishing gear they can inform Estonian Environmental Board about it with calling (+372) 1247. When the information is forwarded the inspector from Estonian Environmental Board will react as soon as possible. When asked by the audience who have been in contact or have previous experiences with ALDFG in their life, then most of the people raised their hand and let know that they have been previously in contact with ALDFG (Figure 1).



Figure 1. Attended people were asked to raise hand if they have been in contact with ALDFG previously on any situations.

Attendees named the main reason for the ALDFG to be the weather conditions (for nets). The main period when the nets usually get lost is the period when ice is moving. Fisherman put their nets to catch the fish under the ice

and when ice is starting to move the nets will be taken by ice and/or fisherman can't go and bring back their nets because of the weak ice conditions. Additionally, strong winds and storms take away nets and contribute to the loss of fishing gear.

It was highlighted several times that especially the cheap "Chinese nets" will be left behind because of the stormy weathers as it's easier and cheaper to buy a new one instead of going and collecting your nets with a bad weather condition. Attendees added to the cheap nets problem that we don't have a good and long consumption culture, that means that often cheap price is preferred to the quality.

All the attendees mostly agreed that usually nobody intentionally does not want to leave their fishing gear behind, but it happens still and mostly because of the weather conditions. Another problem is illegal fishing, where nets are left behind intentionally. However, in Estonia only an authorized inspector may remove incorrectly or not marked fishing gear from the water. When talking about the handheld gear then the main reasons for the loss are usually snagging of the lure or breaking of the line.

To know how much is left behind it was suggested from the audience that when recreational fishers buy a license through a <https://kalaluba.ee/> then afterward filling the catch report (mandatory if you'll buy a license) you could have a possibility to report a loss of the gear or you should add photo there taken from the gear that is taken out from water to "prove" that it's not lost. In general, the attendees were not so sure how big this ALDFG problem is in Estonia and is it at all a problem.

EU's single-use plastic Directive (the SUP Directive) from 2019 includes provisions for fishing gear and components of fishing gear containing plastic. Hopefully, the implementation of the SUP-directive with the beginning of the 2025 1st of January will help to also prevent the emergence of ALDFG. The producers and retailers must provide information about the gear's environmental impact on the packaging of the gear and how to utilize the gear and where to take it after the end-of-life. With that, it's becoming increasingly of the producer's responsibility to educate the consumers about the product they produce and sell. However, it was pointed out that we don't have in Estonia very good recycling solutions for end-of-life fishing (EOL) gear. We have now theoretically the obligation to collect the EOL gear from the beginning of 2025, but practically no good solutions for what to do with the collected gear.

Additionally, the presenters highlighted the high rate of general litter associated with fishing activity, not directly only the ALDFG, but mostly the litter that is left behind on the riverbanks and on ice on the sea. Everyone in attendance agreed that behind this issue there are mostly behavioural habits of littering, and the impact of weather is important, but secondary. As for litter on the riverbanks (active fishing areas), the general share of items directly related to fishing was around 10% of all the findings, and the general waste related to leisure activities

(eating/drinking/smoking) was over 50%. Similarly to Finland, at the same time the share of fishing related items in the beach litter was < 1% of all the found items (data collected via national monitoring program, 2023) indicating that the higher share of fishing related items is directly related to the hot-spot areas, that is areas with higher fishing pressure. To deal with the general litter problem connected with recreational fishing activity, people thought that educating fishers and anglers and raising public awareness of the topic would be the most effective way to prevent litter from being left behind in nature.

Social campaigns were brought out as one possible way to acknowledge the problem and reach the people. As for example it was brought out that campaign such as taking a photo from bag of litter collected during fishing activity with a topic or hashtag example “No fish today but got a bag of litter instead”.

3.2 ALDFG preventive actions events in Sweden

The Swedish participatory argumentation and mutual learning event was a digital workshop that was held on the 20th of August 2024. The aim of the workshop was to bring together relevant stakeholders, including government agencies, anglers, fishing associations, and producers, to discuss and develop strategies for reducing the loss of fishing gear. The duration of the workshop was 3 hours and consisted of an introduction about the project, presentations and discussion opportunities. The moderator of the workshop was Lisa Bredahl Nerdal, an expert on ALDGF (abandoned, lost, or otherwise discarded fishing gear). Lisa also held a presentation about the problem and regulations related to ALDFG. This was the agenda for the workshop:

- Brief presentation of the Re:Fish project
- Overview of the problem with ALDFG (Abandoned, Lost, or Otherwise Discarded Fishing Gear) within EU and Sweden – Lisa Bredahl Nerdal
- Overview of regulations related to ALDFG - Lisa Bredahl Nerdal
- How does the Directorate of Fisheries work with marine littering from recreational fishing? - Hilde Sofie Fantoft Berg from Directorate of Fisheries (Norway)
- Joint policy lab on measures to reduce the loss of fishing gear

Altogether, the workshop had 15 participants including the moderator and project members from Re:Fish. In total, there were 10 external participants ranging from SwAM (Swedish Agency for Marine and Water Management), different County Administrative Boards in Sweden, Swedish Coast Guard, municipalities, Swedish Sport Fishing Trade and Fladen Fishing (a producer).

For the discussion part, several questions and discussion points were brought up and was followed by a lot of discussion, ideas and thoughts. Down below is a summary of each question and what was discussed related to that question. After the workshop, all participants received the presentations and a compilation of the discussion through e-mail.

The problem – prevent the loss of fishing gear in the aquatic environment

- Need for updated hydrographic surveys
- Unintentional loss of fishing gear during handling or use
- Insufficient knowledge of how to properly use and maintain fishing gear
- Lack of awareness about the ALDFG problem and its environmental impact
- Littering in aquatic environments is not visible, making it difficult to understand the scale of the problem
- A cultural shift is needed, like catch and release, for example
- Easy to fish sustainably
- QR code on a package with education about the problem, handling of fishing gear, etc.
- More localized fishing knowledge
- Education is key
- Parts of equipment are sold separately, making it difficult to keep track of the entire chain
- Choice of materials (for example durability vs biodegradability)
- Fishing permits resemble hunting permits
- Fishing conservation fee along with information on the regulations
- Intensive use of equipment can increase the risk of damage and loss
- Take a digital "green card" for fishing, like golf
- Difficult to spread information as online shopping increases
- Switch equipment to more sustainable alternatives
- The economic loss of fishing gear becomes more expensive as prices rise
- Return to older types of lures, for example, metal instead of plastic

What are the reasons behind the loss of fishing gear in aquatic environments?

- Lack of experience/training in safe use
- Unintentional incidents (line tangles, catching large fish leading to lost gear)
- Unawareness of the environmental consequences of lost fishing gear
- Carelessness/lack of attention during fishing activities

- There are no consequences for losing fishing gear, and it's easy to replace (not always expensive to buy new gear)

Is there legislation that you see today as a barrier to preventing losses?

- No legislation requiring labelling on passive fishing gear
- A more holistic view of fishing (consider fishing in terms of both extraction and environmental impact). More clarity and cooperation among authorities is needed.
- Lack of clear support from authorities for implementing new legislation (producer responsibility)
- The Fishing Act is under review, and it is important to include lost fishing gear in that discussion
- The fee is added to the packaging; there is a proposal to place it at customs instead
- Lack of a ban on fishing near wrecks (there are many fish near wrecks, and fishing is conducted there today)

Suggestions for preventive measures

- Communication is very important
- Restrictions on who can purchase large-capacity gear. Register/requirements for who is allowed to use this gear
- QR code on packaging, on gear, in stores, etc., with explanations of the problem and solutions
- Suggestions for reaching new target groups/discovering how to reach different target audiences
- Collaboration is important
- Free digital training, especially for newcomers
- Green card for fishing

3.3 ALDFG preventive actions events in Finland

The participatory argumentation and mutual learning workshop in Finland were arranged 13th of November 2024 in Helsinki. In total, 42 participants registered for the workshop, representing 25 different stakeholder groups (e.g. representatives of research institutes and organizations, state and city authorities, both professional and recreational fishermen, divers, suppliers, fishing gear manufacturers and importers; Figure 2). Of the registered participants, 23 people were physically present, and 16 people attended remotely in Teams.

The event delved into the workshop topic through short presentations representing different stakeholder groups and mapped the participants' perspectives through a joint discussion and a Mentimeter survey conducted at the event. The workshop program is presented in Appendix 1 and the results of the Mentimeter survey in Appendix 2.



Figure 2. Pre-registered workshop participants by their role. Participants were allowed to choose one or more of the options given when registering.

The problem of lost fishing gear was familiar to almost all workshop participants. Almost everyone had either lost or found fishing gear or removed it from the environment (Question 2; Appendix 2). At the workshop, a Rosgis application (www.rosgis.syke.fi) was presented as an easy way to anonymously report ALDFG to the Finnish Environment Institute's database. These observations help to map areas with high occurrence of ALDFG both in the sea and inland waters. In accordance with the principles of open science, the reported observations are visible to everyone in the Rosgis application map service.

When mapping the reasons why fishing gear is lost, the most significant factors in the participants' responses were carelessness and laziness (10 responses) and the effect of weather conditions (10 responses). Other reasons for the loss of fishing gear that emerged were also theft and vandalism (3 responses), the quality of the seafloor and the snagging of lures (4 responses), the breakage of the fishing line or string (4 responses) and the breakage of fishing gear (2 responses), damage and bad luck (2 responses). Incompetence, poor

marking, and poor-quality fishing gear were also mentioned in responses (Question 3; Appendix 2).

The influence of ice conditions on losing nets was more thoroughly discussed in one of the workshop presentations. It was noted that significant changes in the length of the ice winter can be observed when looking at previous decades off Rauma, in western coast of Finland: the duration of permanent ice cover has decreased by about three weeks, and the final disappearance of the ice occurs about two weeks earlier. It is possible that due to the early ice break-up, nets used in winter fishing will not have time to be retrieved before the ice melts. Other issues related to ice conditions were also discussed at the event, such as drifting ice, which can tear nets from their moorings.

In the workshop, it was also discussed how to prevent losing fishing gear. Although the Fisheries Act describes the correct marking of fishing gear and prohibits leaving fishing gear tags and flags in the water, there is no mention of leaving fishing gear in the water, and it is not punishable under the Fisheries Act. As a solution to this, it was proposed that the fishery cooperatives could write conditions into the fishing permit sales instructions, and if necessary, not sell the permit to a fisherman who has previously left the fishing gear in the water. The proposal also raised the question of when properly marked fishing gear becomes litter, and it was reminded that only an authorized fishing supervisor may remove incorrectly marked fishing gear from the water.

An overview of how fishing-related litter is reflected in the results of litter monitoring and research conducted in Finland was also given. For example, based on the results of the 2023 coastal litter monitoring, the proportion of litter clearly associated with fishing is small, on average 0.47% of all litter. In the same year, of the seafloor litter collected by midwater trawling around the Finnish sea area, fishing-related litter constituted 12.4% of the total number of collected litter items and 51.7% of the total mass. In addition, based on the preliminary results of the Re:Fish project near Rauma and Uusikaupunki in the summer 2024, more than 4 km of nets were dragged from the surveyed area of approx. 35 km², highlighting that fishing-related litter can be locally abundant.

84% of respondents had personally observed that ALDFG had caused harm (Question 4; Appendix Z). Assessed on a five-point scale, the greatest harm was felt to be caused to animals (4.2), the environment (3.9), recreational values (3.6), the safety of those on the water (3.4), fishing (3.2) and the fishermen's own wallet (2.7) (Question 5; Appendix Z). To combat the environmental harm caused by the ALDFG, one suggested solution has been the development of biodegradable materials. However, there are still many challenges in their development, such as their tensile strength and durability in the aquatic environment, as well as the uniformity and price of the material.

In one of the presentations, it was told that the Finnish Marine Rescue Society receives several dozen cases of fishing gear entanglement each year. Often, the cause is unmarked fishing gear, escaped fishing gear or fishing gear placed in the fairway. Also, bad weather conditions and the boat driver's own errors, for example in observing, affect the entanglements. Discussions also brought up commercial fishing, as often serious hazards were particularly related to the entanglement to snares, which are made of strong material, and fence nets can be hundreds of meters long. Not all boaters are familiar with their markings and may thus drive into them, aiding their detachment. Therefore, it was seen important to spread knowledge on fishing net markings to the boaters.

One problem that was brought up was that in cases of illegal fishing, fishing gear is not collected unless it can be classified as an obstacle to navigation; otherwise, the removal of the fishing gear is the responsibility of the commercial fisherman. Possibly, abandoned fishing gear could be regulated within the framework of national legislation by defining it as litter or waste, or by treating the harm caused by it as a nature conservation violation.

One of the presentations delved into the topic of responsible fishing. Some mentioned responsible acts that can be done by fishermen included jig and lure recycling, beach clean-ups and ghost nets observations. It was pointed out that many fishermen want to act responsibly and are quite commonly using small collectors intended for storing pieces of monofilament fishing line. The Single Use Plastics Directive (SUP Directive) producer responsibility law will also affect the fishing gear market and possibly consumer behaviour soon: extended producer responsibility for fishing gear and the costs arising from it will inevitably affect the prices of fishing gear, perhaps also increasing the willingness to take better care of one's own gear.

When asked what should be done to reduce the loss of fishing gear, half of the responses highlighted the need to raise awareness through education, training and information campaigns (Question 6; Appendix Z). A need was also seen for the development of supervision and legislation, and a notification of obligation for fishing gear owners regarding the fate of their gear (in use, lost, removed, stolen) was proposed. Multidisciplinary collaboration in collecting and sharing information, as well as volunteer work, was suggested to help remove fishing gear. The importance of anticipating changing weather conditions and unexpected situations was also mentioned.

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Appendixes

Appendix 1. Workshop programme (Finland)

13th November 2024, 13-15.30 in Helsinki

WELCOME WORDS

Researcher **Pinja Näkki**, Finnish Environment Institute

PRESENTATIONS

Fishing-related litter in the Finnish marine litter data

Leading researcher **Outi Setälä**, Finnish Environment Institute

Presentation of the Re:Fish project – preliminary results from summer dragging.

Senior researcher **Pekka Kotilainen**, Finnish Environment Institute

Fishing gear on the map – presentation of the Rosgis application.

Researcher **Anna-Riina Mustonen**, Finnish Environment Institute

Changing ice conditions? Impact on the loss of fishing gear.

senior marine expert **Jouni Vainio**, Finnish Meteorological Institute

COFFEE BREAK

PRESENTATIONS CONTINUED

Fishing permits and marking of fishing gear: can fishing legislation prevent the loss of fishing gear?

Fisheries and Communications Specialist **Tapio Gustafsson**, The Federation of Finnish Fisheries Associations

History and trends in fishing gear from the manufacturer's perspective.

CEO **Helena Boucht Lindeman**, *Lindeman Oy*

A fishing supervisor's everyday life: challenging situations from a supervision perspective.

Fishing Master **Petri Savola**, *Uusimaa ELY Centre*

Fishermen and boaters on a collision course?

Safety and Preparedness Manager **Marko Stenberg**, *Finnish Marine Rescue Society*

Good practices in recreational fishing and measures to reduce litter.

Environmental Manager **Juha Ojajarju**, *The Finnish Federation for Recreational Fishing*

Appendix 2. Mentimeter survey results (Finland)

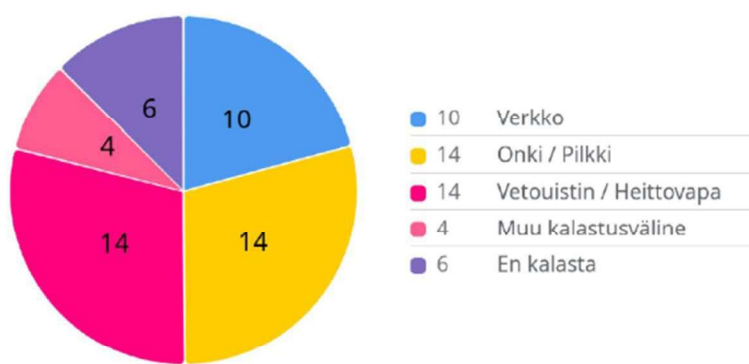
A survey was conducted for participants at the workshop, the purpose of which was to raise awareness of the workshop topic and to collect information on e.g. possible reasons why fishing gear is lost, the harm caused by ALDFG, and ideas for reducing fishing gear loss.

The survey was conducted using the Mentimeter tool, which allowed for anonymous responses to the questions posed via participants' own mobile phone or computer. On average, 78% of the participants who opened the survey answered the questions posed, with the response rate varying between 38–97% depending on the question. For some questions, the same respondent was allowed to give more than one answer (questions 1, 2, 3, and 6). Questions and answers are shown below (and answers summarized in section 3.3)

Question 1. What gear are you using?

(blue = fishing net, yellow = fishing rod/ice fishing, dark pink = trolling lure/throwing rod, light pink = other, purple = I do not fish)

Millä pyydyksillä kalastat?



Question 2. Have you ever... (select one or more options)

(blue = lost a fishing gear, yellow = found a fishing gear, dark pink = removed a lost gear from the environment, light pink = none of the options)

Oletko koskaan... (valitse yksi tai useampi vaihtoehto)



Re:Fish

Question 3. Why do you think fishing gear is disappearing? (Describe in a few words. You can give more than one answer.)

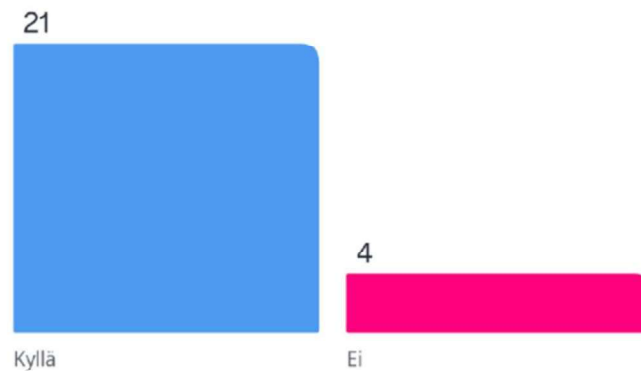
Miksi sinun mielestäsi pyydyksiä katoaa? (Kuvaile muutamalla sanalla. Voit antaa useamman vastauksen.)

56 responses



Question 4. Have you noticed that abandoned or lost gear has caused harm?
(blue = yes, pink = no)

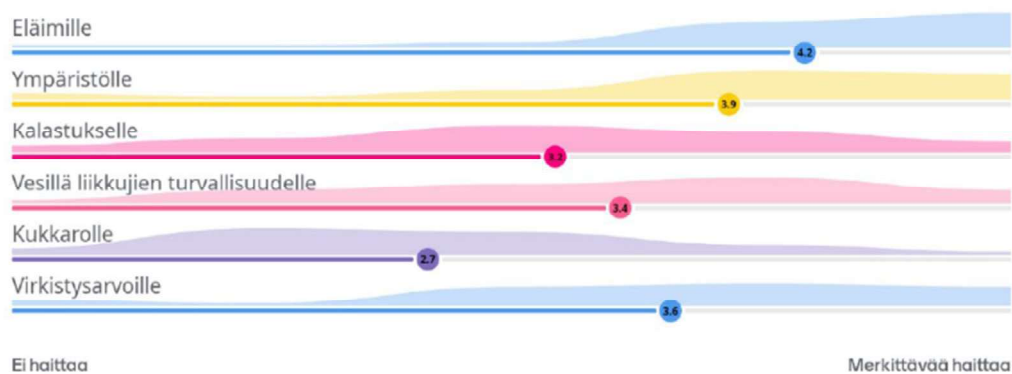
Oletko havainnut hylättyjen tai kadonneiden pyydysten aiheuttaneen haittaa?



Question 5. How significant do you perceive the harm caused by lost fishing gear?

(blue = to animals, yellow = to the environment, dark pink = to fishing, light pink = to the safety of boaters, purple = to the wallet, blue = to recreational values; on the left of the scale “no harm” and on the right “significant harm”)

Kuinka merkittäväksi koet kadonneiden pyydysten haitat?



Question 6. What should be done so that less fishing gear is lost?

Mitä pitäisi tehdä, jotta pyydyksiä katoaisi vähemmän?

Valistus	Koulutus	Valistaa menettelytavoista jotka ehkäisee pyydysten katoamista.	Tiedotusta haitoista
Tutkimus kadonneiden pyydysten vaikutuksista	Kansalaisten vastuullisuuden pitää kehittyä	Seurata sääoloja että millon jäät lähtee tai myrksy tulossa että verkkoja lähde mukana	Raising awareness, what negative effects are caused by lost fishing gear. Establish a report Center for lost gear so divers may be able to retrieve it.



Mitä pitäisi tehdä, jotta pyydyksiä katoaisi vähemmän?

Näkyvät kampanjat

Jonkinäköinen seuranta hankituista pyydyksistä ja siitä kuinka paljon niitä on käytössä ja/tai olisi myös ilmoitettava niiden kohtalo (poisto, häviäminen, varastaminen).

Ilmoittamalla esim. kaverille missä pitää pyydyksiä. Jos jotain odottamatonta sattui niin kaveri huolehtisi pyydykset pois vedestä.

Moniammatillinen yhteistyö tiedon jakamisessa ja pyydysten keräämisessä, vapaaehtoistyö

Valistus ja seuranta

Lainsäädännön kiemuroiden oikominen siten että ainkaan lait eivät ole este haamuverkkojen plistolle. Lisäksi myös valvontaa lisää.

