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What is **Baltic Sea Blueprint**?
What is **MARELITT Baltic**?

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Budget and partners

Total budget **EUR 3,8 MM**.

Nine partners in 4 countries

Municipality of Simrishamn, Sweden (Lead partner)
Keep the Estonian Sea Tidy
WWF Poland Foundation
WWF Germany
Keep Sweden Tidy
Maritime University of Szczecin
Kolobrzeg Fish Producers Group
Institue of Logistics and Warehousing
Estonian Divers Association

22 associated organizations

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Winner of 2017 BALTIC SEA CLEAN MARITIME AWARD

Objectives:

To provide practical tools and an all-in-one solution to mitigate ghost fishing problem!

What is an **All-in-one** solution**:**

1 process covering 4 fields of activities

- Mapping
- Retrieval
- Recycling
- Prevention

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All-in-one solution: 1 process covering 4 fields of mitigation activities

Mapping
”designation of DFG host areas”

Retrieval
How to recover the located nets

Recycling
Waste management soltions

Prevention
How to reduce gear loss during fishing

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An example: **Plan to initiate cleaning actions**

Are you responsible of those old nets? Tourists are complaining.

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What is **Baltic Sea Blueprint**?

- **MARELITT Baltic solution** distilled in to 30 pages
- **In 1 hour reader should be aware** of a the most crucial result of the project; **need of a strategic overall solution**
- **Baltic Sea Blueprint** is a *Handbook* designed to meet the needs of policy builders as well as practical level actors.

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Baltic Sea Blueprint works on two levels:

- **A roadmap for policy builders**
- **To secure** a smooth working process
- **Provides basics** for general strategic planning
- **Helps to identify** involved stakeholders, address legal or regulative frameworks

- **A guide to access the entire detailed MARELITT Baltic result**
- **Following the links** you can access the information you need when you need it
- **Information of** backgrounds, presumptions, developed methodologies
- **Presents** results, lessons learned and recommenations

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Pillar I. Mapping of DFG host areas

Work package 2

Sylwia Migdal, WWF Poland

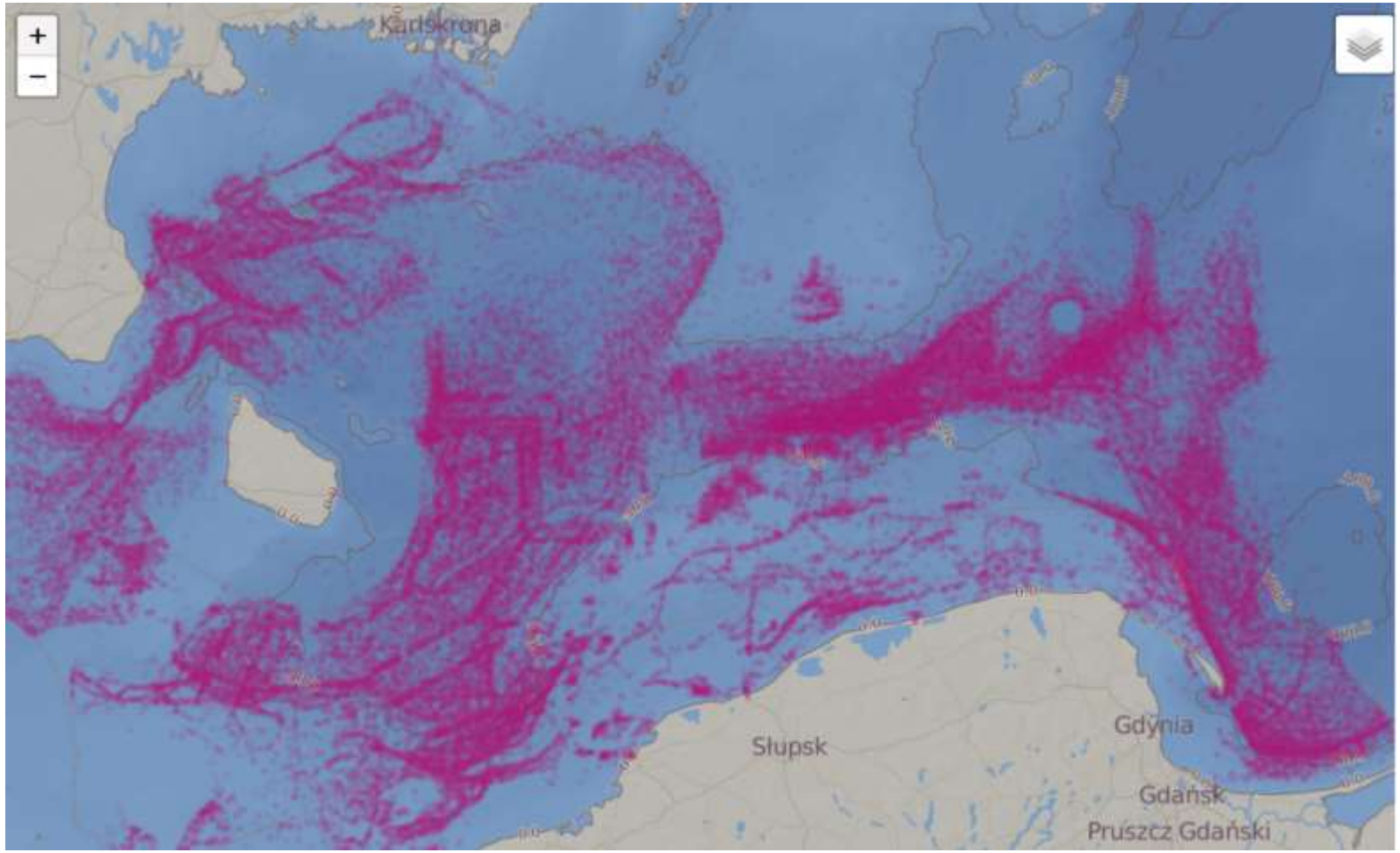
Stockholm, 20-21 March 2019

1. Raise awareness and earn trust of fishermen and divers. Involve key target groups.

LESSONS LEARNED	RECOMMENDATIONS
• **Cooperation with** fishermen and divers is crucial. • **Mapping of** DFG host areas, development of cleaning methods and assessment of gear loss reasons are closely interrelated. • **Data collection activities** should be run jointly for Pillar I. and Pillar IV.	• **Contact local** fishermen and divers to involve them in the process. • **Highlight the importance** of practical knowledge. • **Organize** roundtable meetings. • **Address the benefits** for target groups.

2. Collection of data and knowledge on DFG host areas.

LESSONS LEARNED	RECOMMENDATIONS
• **The format of** official fishing logbook data vary greatly between countries. • **Mapping of wreck**s can be carried out with modern techniques. • **Environmental Impact Assessment** should be done in case of planning cleaning activites in sensitive / protected areas.	• **Initiate cooperation** with national institutions to obtain the required data. • **Analyze historical** fishing effort data and gear loss reasons. • **Identify** conflict zones.

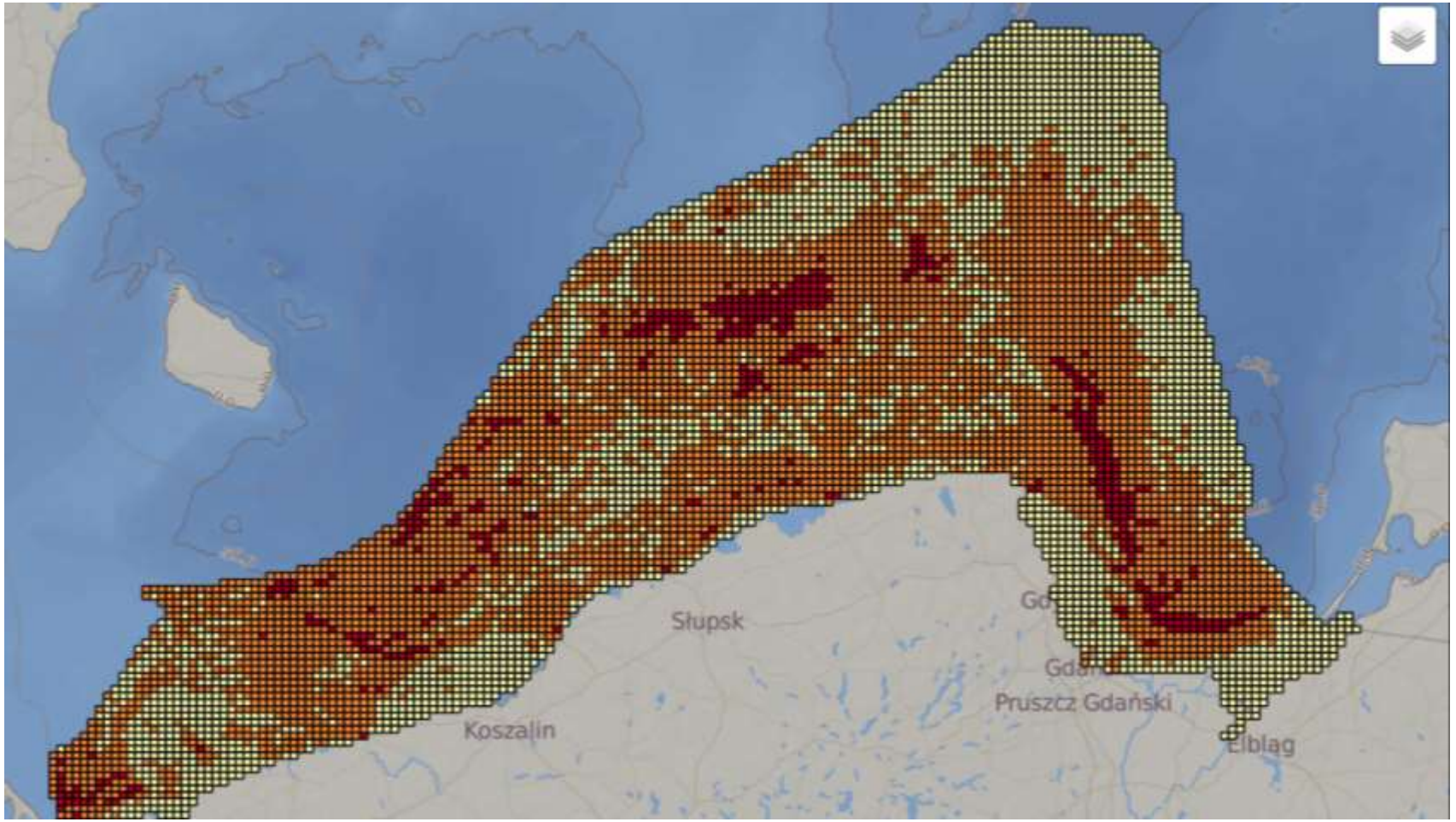


Bottom trawling effort data in Poland and Sweden.

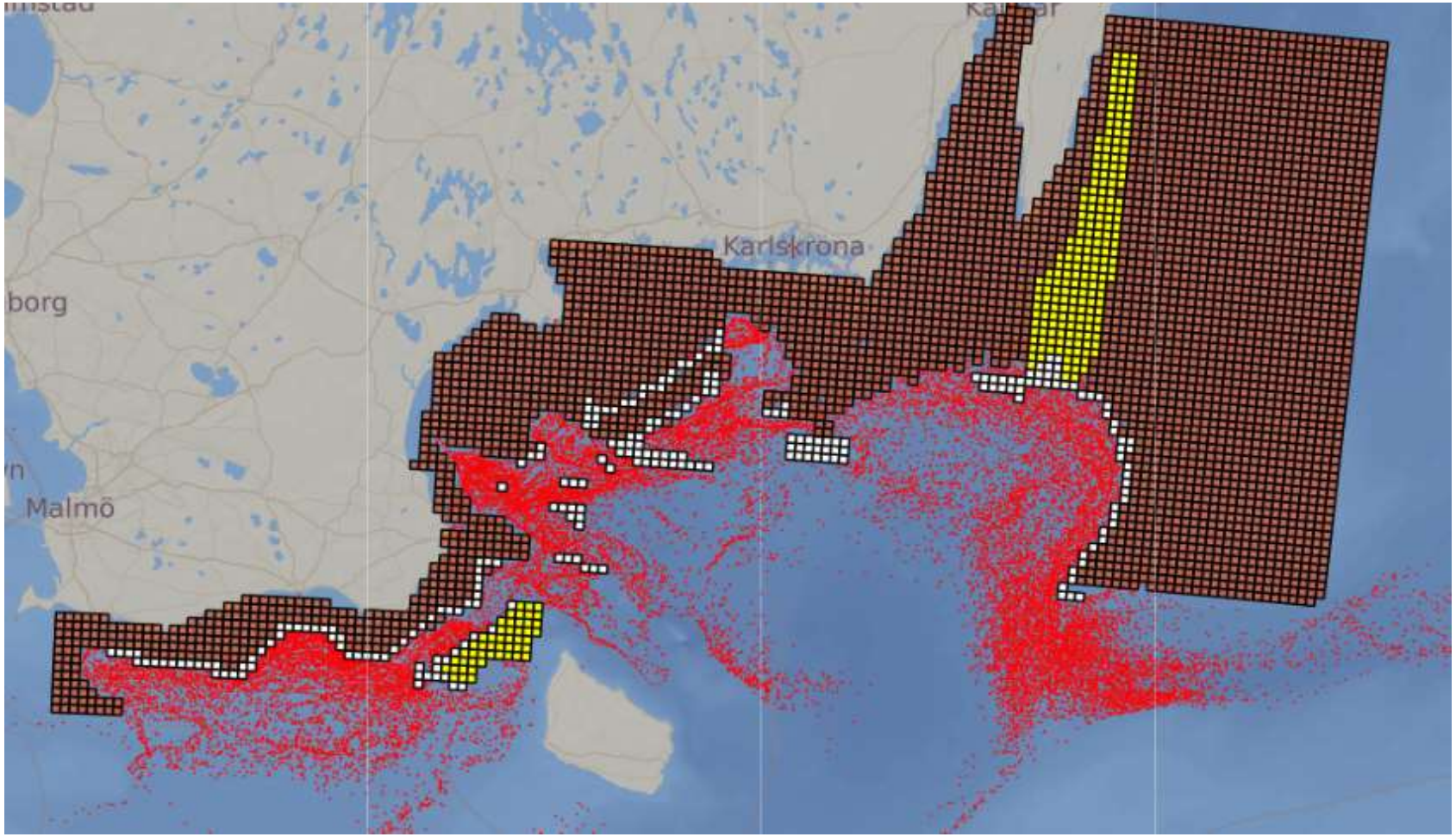
3. Mapping of the DFG host areas.

LESSONS LEARNED	RECOMMENDATIONS

• **A regional** DFG host area map is an efficient and practical tool to:
  • **visualize** the problem;
  • **improve** possibilities for strategic planning.
• **The map helps** in spatial planning of marine activities e.g. to avoid DFG cleaning actions to be carried out in cultural heritage sites.
	• **Use GIS platforms to** preferably secure maximal technological preconditions.
	• **Consider production** of 2 maps:
	  • **a light** public version;
	  • **a more detailed** version working one.
	• **Verify the result** of mapping activities with a randomized dragging or side-scan sonar survey.



Polish zone categorized.



Swedish zone categorized.

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Pillar II. Retrieval of DFG

Work package 2

1. EIA tutorial and cultural heritage analysis during planning of cleaning actions.

LESSONS LEARNED	RECOMMENDATIONS
• **Dragging is possible** in the majority of the Baltic Sea, except for in certain sensitive areas or on very rough or rocky seafloor. • **In case of** cleaning shipwrecks from DFG, several interests collide, leading to high precaution or uncertainty regarding decision to take measures.	• **Draw attention** to knowledge presented in the EIA, use the decision tree. • **Involve** underwater archeologists and other experts. • **Use a** “shipwreck friendly” cleaning approach • **Avoid ammunition risk areas** and look for non-invasive search methods such as sonar

Environmental Impact Assessment Study

Environmental Consultancy
WSP, Stockholm
Authors:
Jonas Sahlin, Ingrid Tjensvoll

Expected impacts DFG search

Low impact:

- Hard substrates
- All soft sediments & silts

Medium impact:

- Blue mussel beds
- Bladder wrack meadows
- Reefs

High impact:

- Eelgrass meadows
- Wrecks

Ammunition Risk Assessment

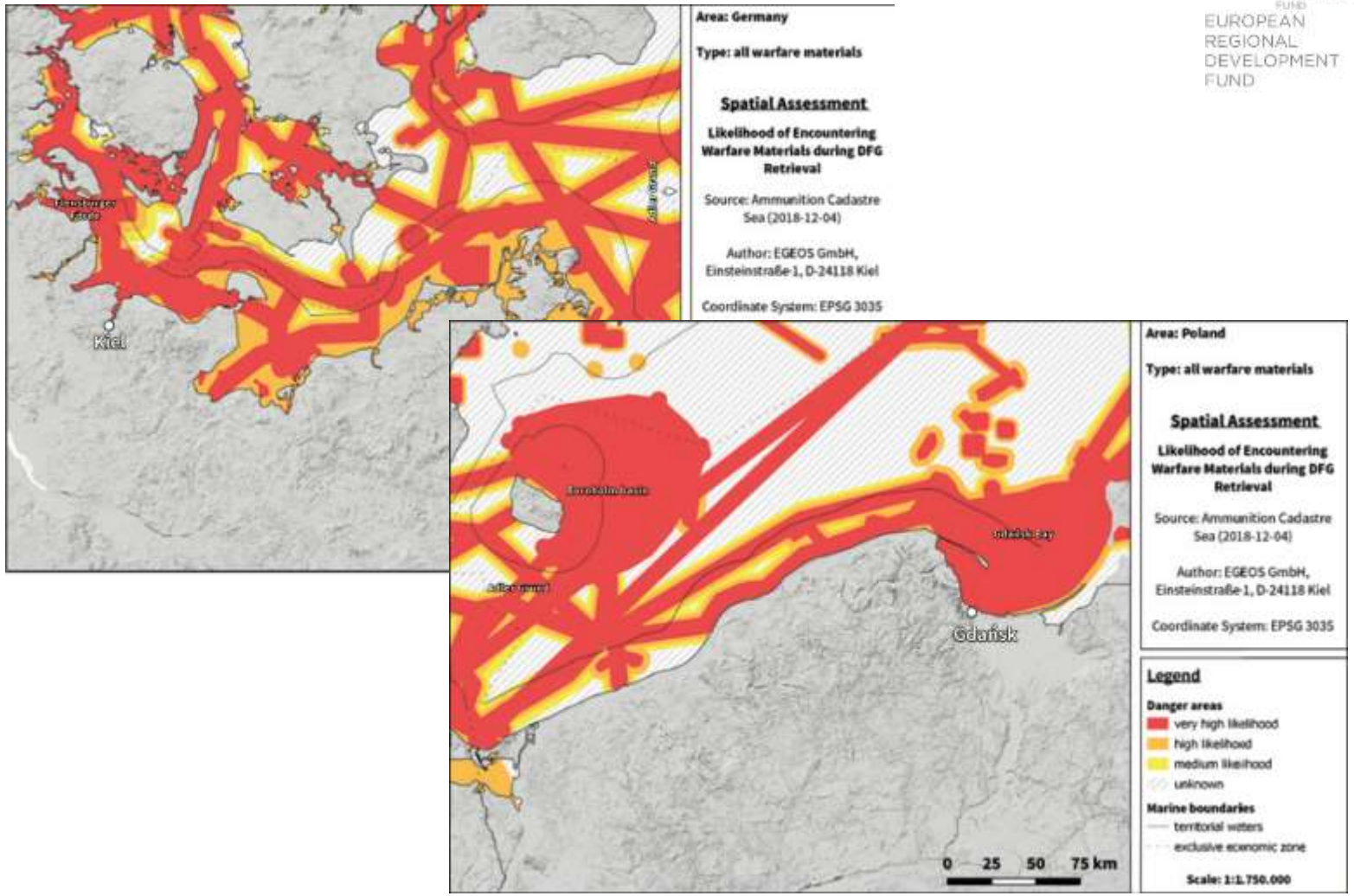
EGEOS GmbH, Kiel

Authors: Jann Wendt, Ezra Eisbrenner

Ammunition Risk Assessment Study

For DFG search and retrieval actions

EGEOS Jann Wendt, Ezra Eisbrenner et al. EGEOS GmbH, February 2019, Kiel

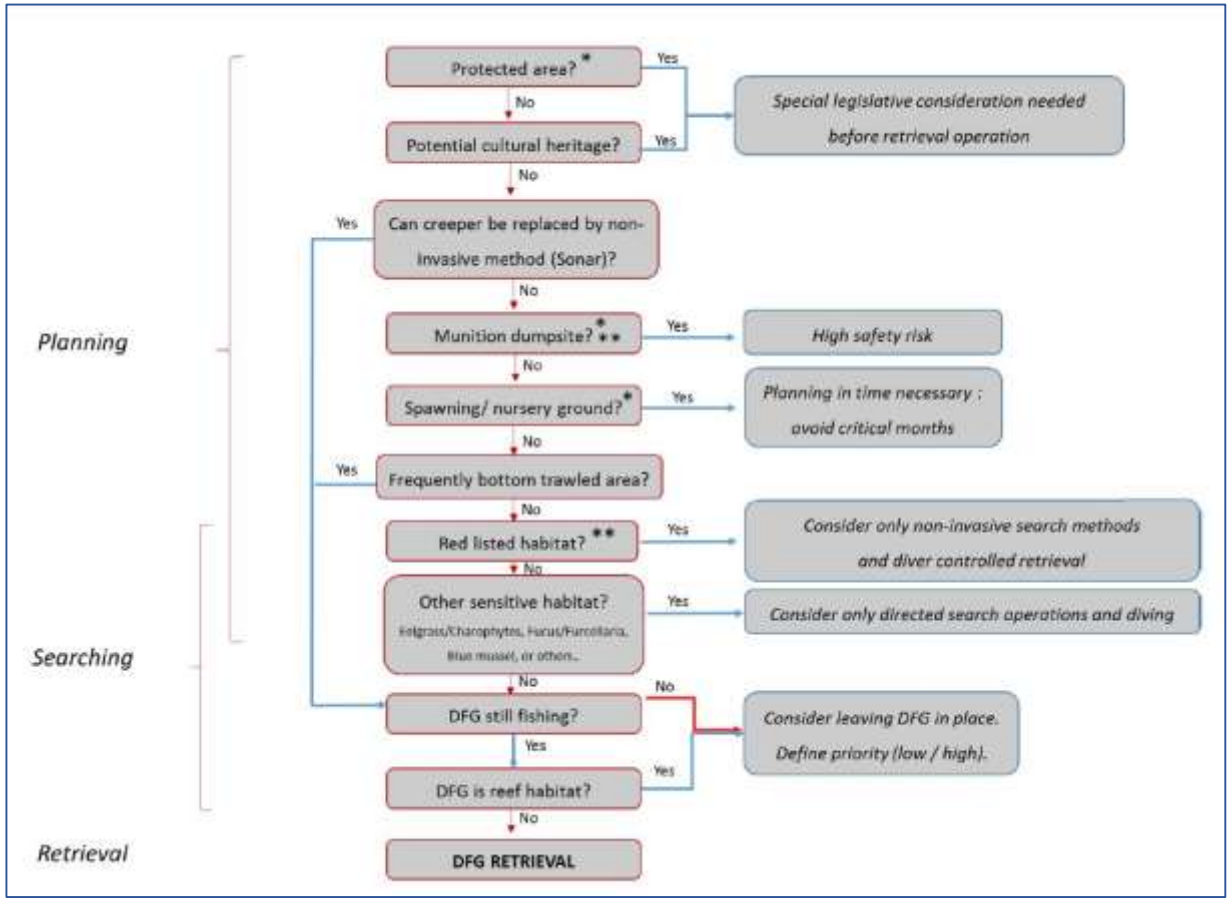


Best practice recommendations

Decision has to be made on a case-by-case basis:

- **Is DFG search & retrieval ecologically acceptable?**
- **Which search & retrieval methodology shall be used?**
- **What is the advantage compared to leaving the DFG in the marine environment?**

Decision tree supports evaluation



2. Cleaning activities at sea.

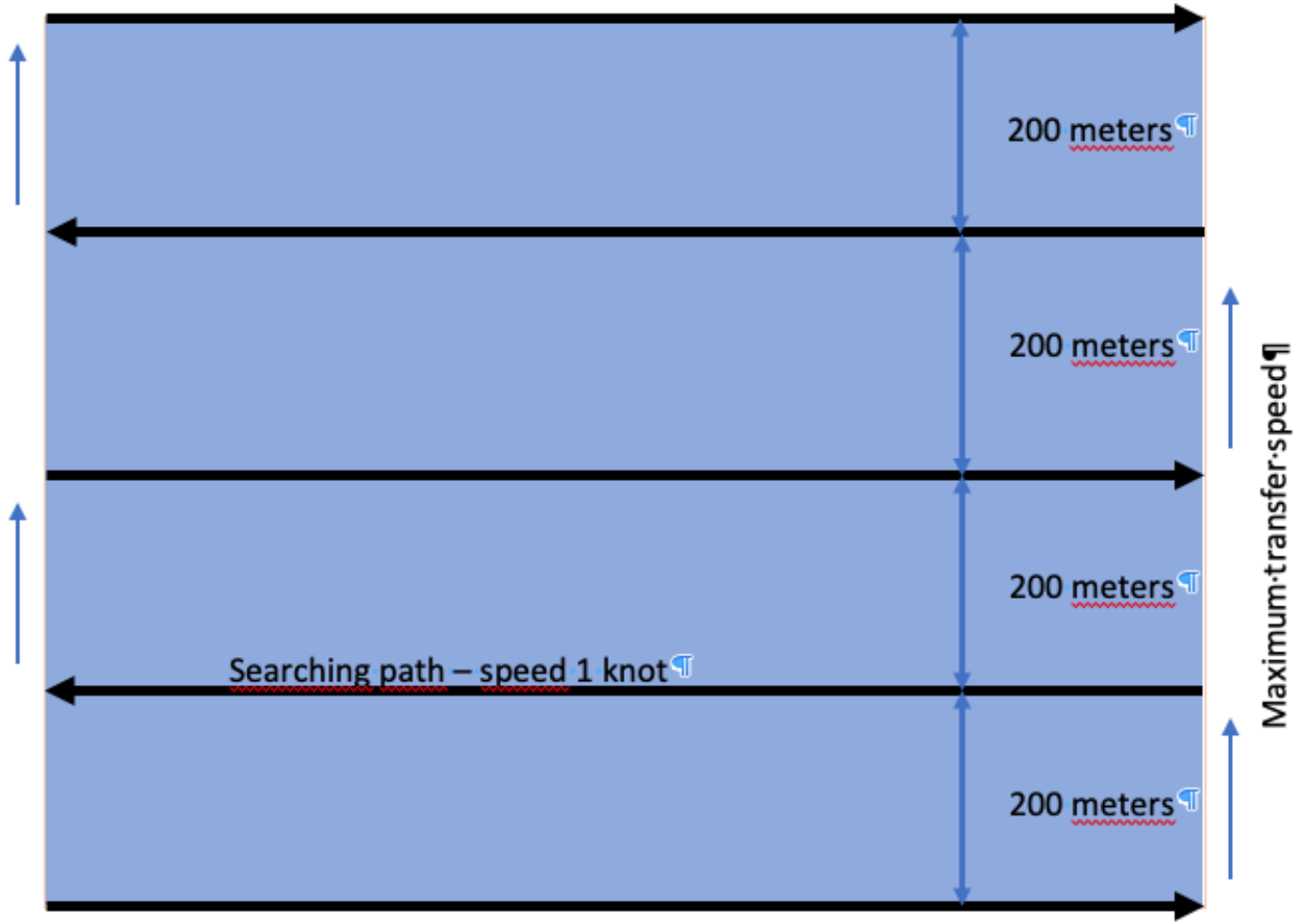
LESSONS LEARNED	RECOMMENDATIONS
• **Retrieved DFG** may not be appropriately specified in legislation. • **Cleaning/dragging actions** are a practical and a justified way to both diversify the income profile for fishing companies and to improve the environmental status of the marine ecosystem. • **Legal and safety requirements** of diving work for each country need to be clarified.	• **Carry out dragging operations** in cooperation with local fishermen. • **Create a quality assurance system** for standardization of the practical operation at sea and uniform documentation of results. • **Carry out diving operations** in cooperation with professional or specifically trained retrieval divers, in compliance with all applicable legal regulations.

SE

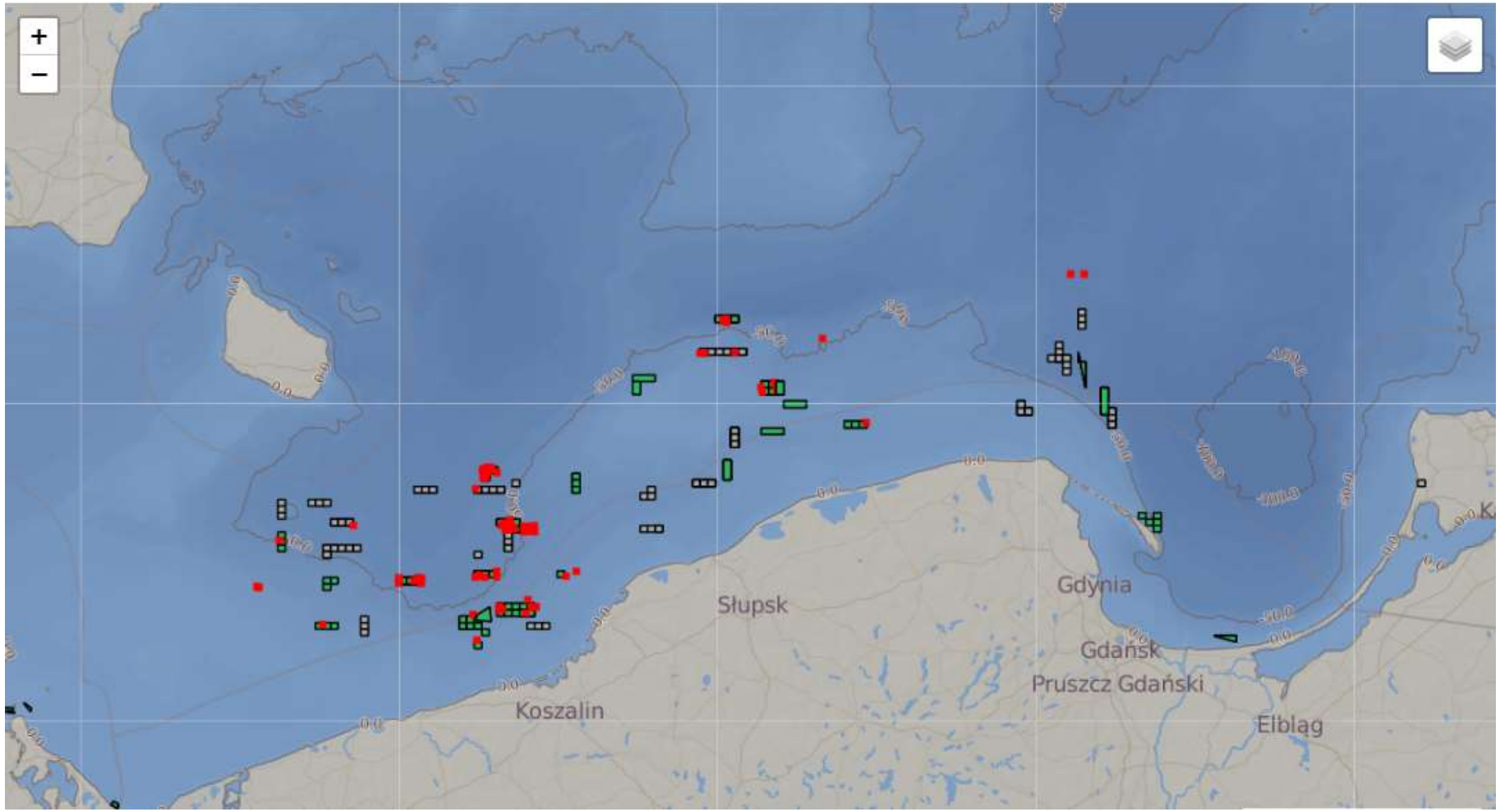
EE & DE

DE & PL

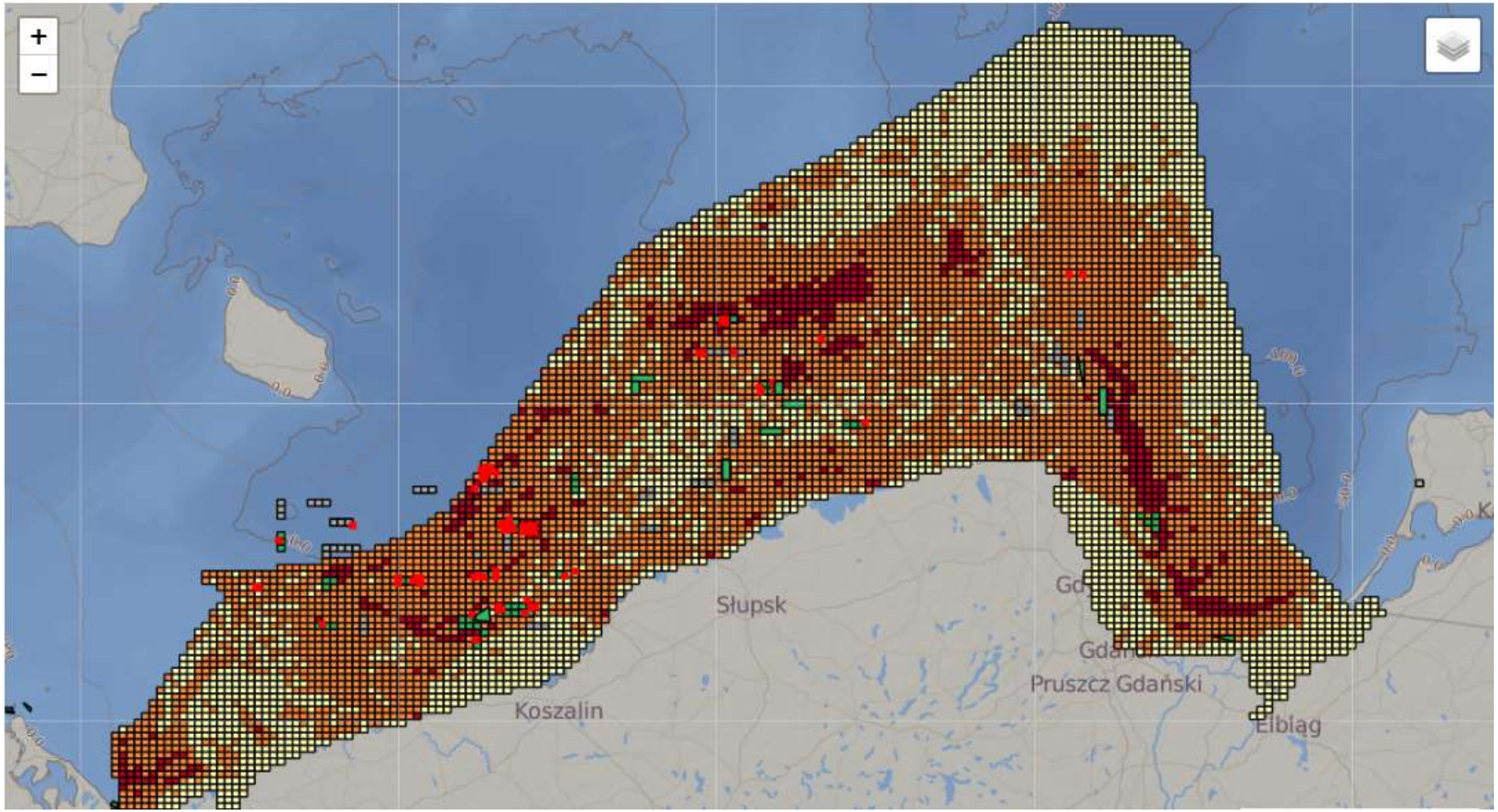
Searching devices used in different countries.



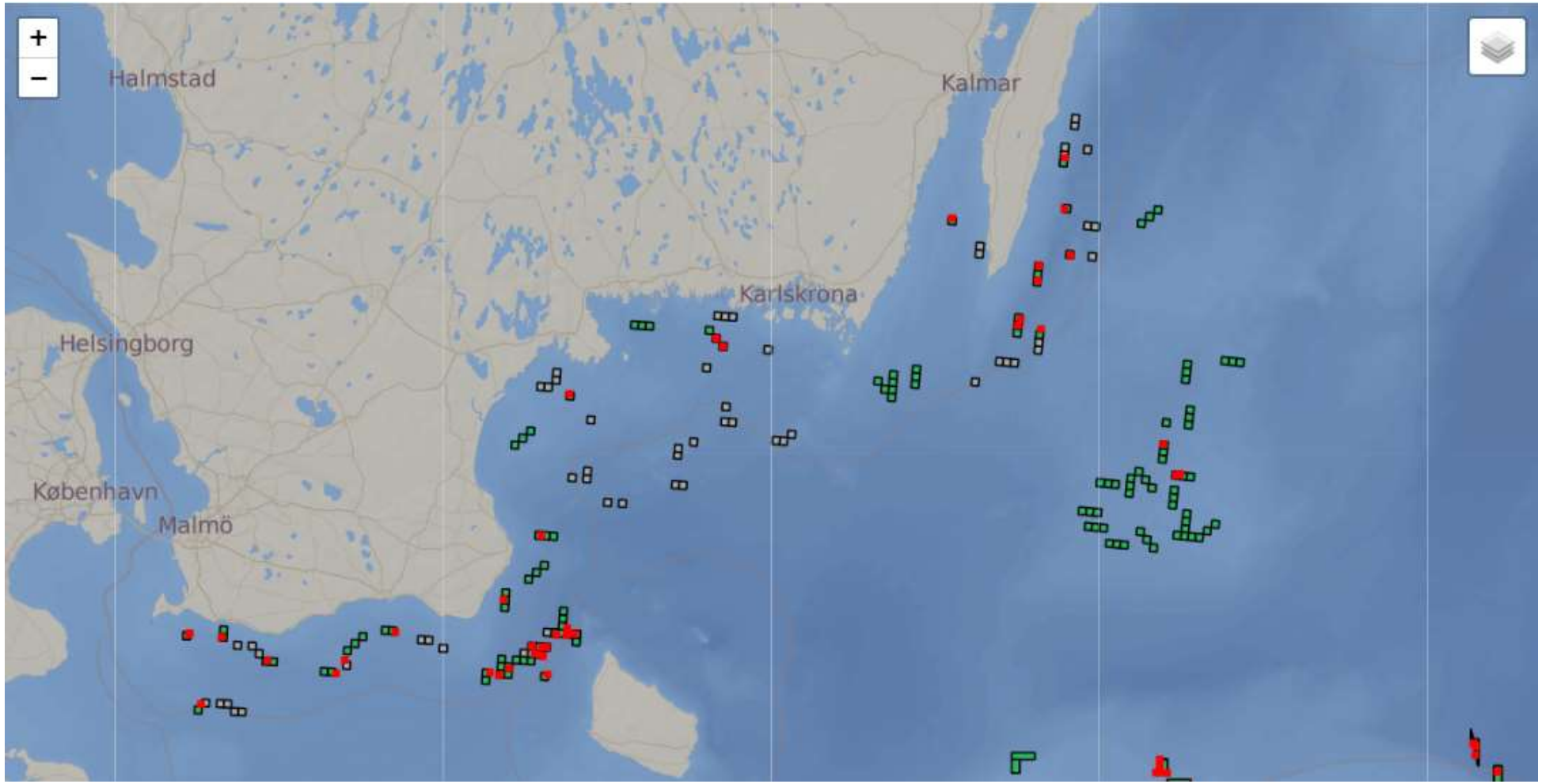
Searching pattern (Polish example).



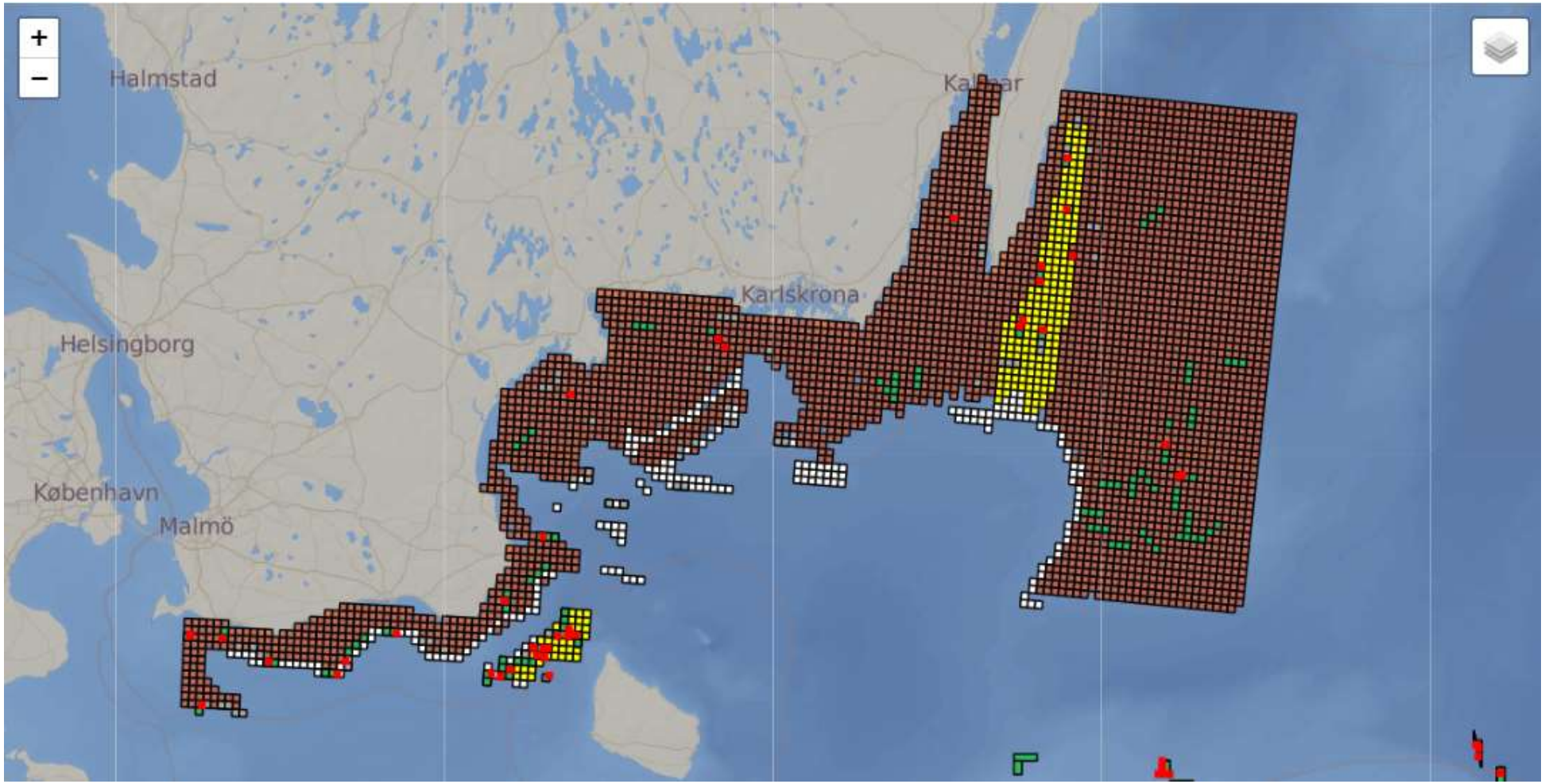
Net finding in Poland in 2018.



Net finding in Poland in 2018.



Net finding in Sweden in 2017-2018.



Net finding in Sweden in 2017-2018.

	SE	PL	DE	EE
2017	4774,2 kg	842 kg	5572 kg*	89 kg
2018	4737 kg	7400 kg	904 kg	256 kg

Search and retrieval results in 2017 and 2018.

** In Germany, actions were held in years 2016 – 2018.*

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Pillar IIIa: Reception of retrieved fishing gear at fishing harbours

Work Package 4

Marek Press, KEST

MARELITT Baltic Final Conference

Stockholm, 20-21 March 2019

1. Improve harbour reception facilities

LESSONS LEARNED

The MARELITT Baltic Harbour Survey in the Baltic Sea region revealed that:

- **harbours do not offer** enough containers for sorted litter
- **fishing gear** waste facilities are only available on a regular basis in 28% of fishing harbours for end-of-life gears, and no facilities are available for DFG.

RECOMMENDATIONS

- **Improved availability and accessibility** of different type of collection containers for separate collection of waste at harbours.
- **This must be accompanied by** an increase in the quantity and quality of suitable supporting waste management services.
- **Provide separate containers/areas** for end-of-life and retrieved fishing gear.

2. Raise awareness about DFG handling

LESSONS LEARNED	RECOMMENDATIONS
• **DFG retrieved from** the sea is often considered hazardous waste, containing lead weights or copper coating. • **The mix of** different types of plastics, metals, and organic material makes treatment of DFG technically challenging.	• **Harbour users** must be made aware that DFG can neither be disposed as household nor commercial waste. • **Wherever possible**, lead lines should be extracted, because lead is toxic and a hazardous waste material.

2. Raise awareness about DFG handling

LESSONS LEARNED	RECOMMENDATIONS
• **DFG often contains** components of fishing gear that can be re-used and which it is easy for fishers to separate from the rest of the DFG aboard ship or immediately after landing of DFG at the harbour – *such as anchors, buoys, floats, chains, cables and sinklines*	• **Reach agreement with** fishers performing DFG retrieval to ensure that they will separate objects for re-use from other DFG on board ship or immediately after it reaches harbour. • **Provide pre-processing** areas for fishers at harbours.

3. Improve harbour waste management plans

LESSONS LEARNED	RECOMMENDATIONS
• **Harbour waste management** plans do not include a proper description of sorting procedures for DFG and end-of-life fishing	• **Properly consulted** port waste management plans including a proper description of sorting procedures for DFG and end-of-life fishing gear. • **Harbour managers** should provide educational materials regarding the requirements of DFG disposal and sorting procedures. • **Follow the recommendations** in the proposal for the revised Directive on Port Reception Facilities.

4. Implement *no-special-fee* system at fishing harbours

LESSONS LEARNED	RECOMMENDATIONS
• **The MARELITT** Baltic Harbour Survey revealed that: **not all Baltic Sea** fishing harbours have implemented *no-special-fee* system	• **Promote full** implementation of *no-special-fee* system at fishing harbours. • **Increase incentive** to bring end-of-life and retrieved fishing gears to harbour, • ***No-special fee* system** is recommended to be established in all European harbours, following recommendations in the proposal for the revised Directive on Port Reception Facilities.

Pillar IIIb: The challenge of DFG recycling & waste management

Work Package 4

Dr. Andrea Stolte, WWF Germany

MARELITT Final Conference

Stockholm, 20-21 March 2019

Pillar IIIb: Solutions for the economically & environmentally viable management of lost fishing gears retrieved from the sea.

<u>The treatment of lost fishing gear</u>

- Trials for pre-processing in harbours
- Recommendations on improvements of reception facilities in harbours
- **Develop pathways for environmentally sound waste management**
- **Trials on possible recycling or processing options for DFG**

What are the problems with (lost) fishing gear recycling?

Fishing gear is considered „general waste“

The situation today:

- Fishermen currently discard end-of-life fishing nets in household trash
- Retrieved fishing nets are incinerated, landfilled, but might be hazardous waste
- Some fisheries associations collect end-of-life nets on their own expense

A regular scheme to sort and, if possible, recycle fishing gear is not in place.

The idea: Retrieved FG - from marine litter to new products

Fishing nets discarded at the end of their lifetime are already recycled:

- **Plastix Denmark:** nets, ropes, fish boxes → pellets
- **Bureo Chile:** discarded fishing nets → skateboards, frisbies, …
- **Aquafil Italy/Slowenia & Antex/Ecoalf Spain:**
  nylon fishing net + other fibres → carpets and outdoor clothing

Can we make something useful from retrieved fishing nets?

A variety of techniques were tested to evaluate ecologically & economically viable recycling methods for retrieved fishing gear.

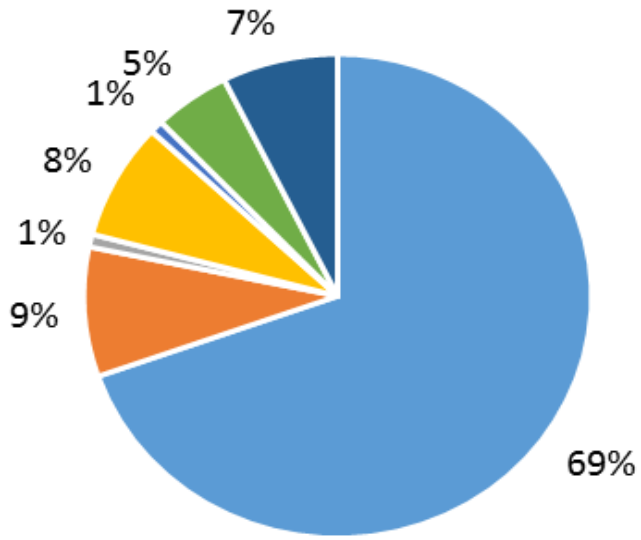
Photo credits: Ecoalf

This is what we want...

Nicely bundled, clean, sorted nylon ropes & nets → nice, clean fibres

Photo credits: Andrea Stolte, WWF Germany

Fishing gear retrieved from the Sea: the reality



© Falk Schneider, University of Bath, UK

Photo credits: Andrea Stolte, WWF Germany

Fishing nets in the sea collect all sorts of marine litter!

Recycling trials in Marelitt Baltic: Developing a recycling pathway for fishing gear

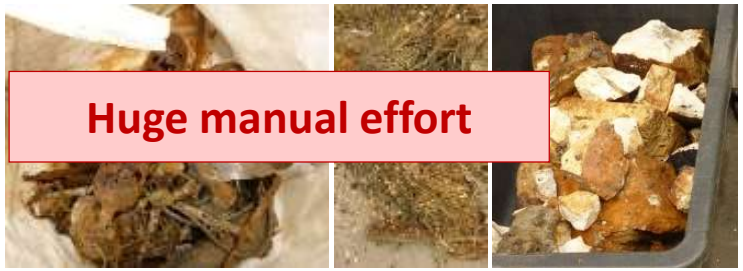
1. Sorting to extract polymers from very mixed materials

Huge manual effort

Photo credits: Andrea Stolte, WWF Germany

Recycling trials in Marelitt Baltic: Developing a recycling pathway for fishing gear

1. Sorting to extract polymers from very mixed materials



Huge manual effort

2. Shredding & cleaning of fibres
   - removal of fine-grained sediments & lead fragments

Tricky to remove 100% lead & sand

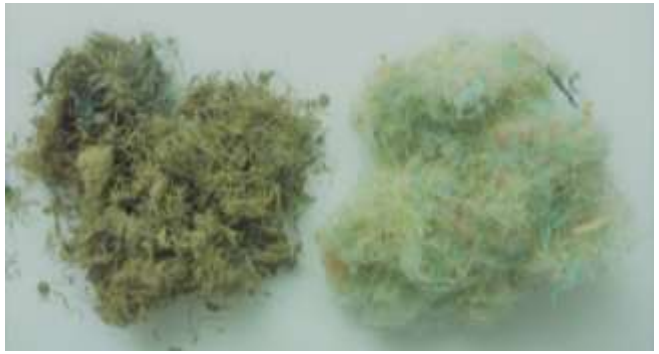
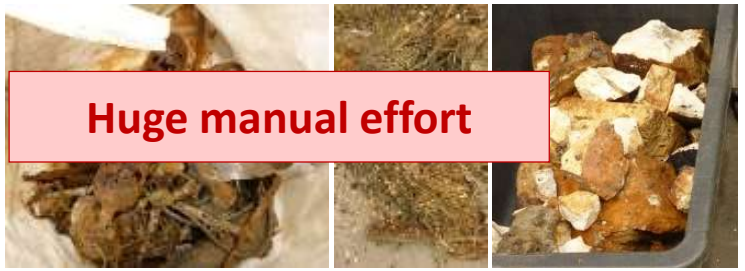


Photo credits: Andrea Stolte, WWF Germany

Recycling trials in Marelitt Baltic: Developing a recycling pathway for fishing gear



Huge manual effort

Tricky to remove 100% lead & sand

3. Granulation or yarn spinning
   - preparation for new products

”Fluffy fibres” are not very cooperative

Photo credits: Andrea Stolte, WWF Germany

Recycling trials in Marelitt Baltic: Developing a recycling pathway for fishing gear

1. Sorting to extract polymers from very mixed materials

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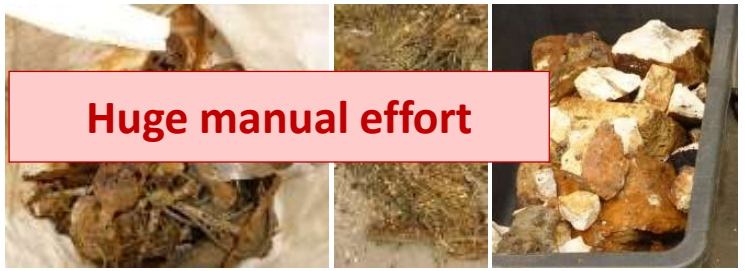


Photo credits: Andrea Stolte, WWF Germany

Pillar IIIb 1-2: A recycling pathway for retrieved fishing gears

Working with harbours, fishers, municipalities & waste managers

LESSONS LEARNED	RECOMMENDATIONS
• **Pre-sorting and removal** of hazardous objects is absolutely crucial. • **Material recycling of clean**, pre-sorted DFG is possible together with end-of-life fishing gears. • **Recycling of mixed** DFG is likely not economically viable.	• **Local teams with** waste managers, harbours, fishers ensure that fishermen knowledge is employed for DFG dismantling. • **Existing end-of-life** FG processing facilities should be used to process clean DFG.

Recycling is possible for the cleanest DFG, else it is very hard…

Getting frustrated? Let’s try the general waste stream...

Photo credits: Martin Siegel

Suprising waste management problem

- 500m gillnet retrieved by scientific divers
- Bladder wreck, algae, 2 cormorants, fish

Photo credits: Martin Siegel

Photo credits: Wolf Wichmann

Photo credits: Martin Siegel

An attempt to dispose of gillnets retrieved from the Baltic Sea

1. Incineration & energy recovery?

- No! Lead needs to be removed
- Cut into small net fragments

2. Household & commercial waste to landfill?

- No! Lead needs to be removed

3. Hazardous waste landfill?

- Out of the sea & into open-air landfill is not an ecologically desirable solution!

There is NO sustainable waste management pathway for gillnets retrieved from the Baltic Sea today!

Lead Line
© Gerke & Weißbach 2018

Photo credits: Martin Siegel

Recycling vs. Discarding?

Collecting nets from the Sea is great!

Photo credits: Andrea Stolte

Recycling vs. Discarding?

Collecting nets from the Sea is great!

Recycling DFG is a tough challenge

Photo credits: Andrea Stolte

Recycling vs. Discarding?

Collecting nets from the Sea is great!

Recycling DFG is a tough challenge

Discarding retrieved DFG gillnets is almost impossible

Photo credits: Andrea Stolte

Recycling vs. Discarding?

Collecting nets from the Sea is great!

Recycling DFG is a tough challenge

Discarding retrieved DFG gillnets is almost impossible

High-quality, non-toxic DFG

↓

Material recycling

Mixed DFG, lead, marine litter

↓

Lead extraction & incineration?
Alternative processing scenarios?

Photo credits: Andrea Stolte

Pillar IIIb 3: Extend the existing waste management system to enable the treatment of retrieved DFG

LESSONS LEARNED	RECOMMENDATIONS
• **DFG retrieval at sea by fishers** is supported by the EU through the EMFF. Continued retrievals raise awareness of DFG hazards. • **A DFG disposal system** must be available.	• **Waste sorting facilities** and retrieval teams must be equipped and capable to treat DFG.

Innovation: Re-thinking the standard waste management

Alternative systems to generate energy gas or fuel from special organic/plastic wastes are currently tested:

- Semi-central, small-scale facilities
- Lead is extracted ”on the fly” as high-value metal
- Medical, electronic, ... hazardous wastes can be processed

Photo credits: Andrea Stolte, WWF Germany

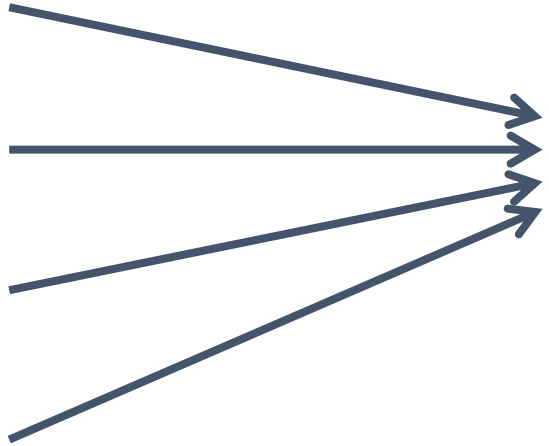
Generate a new concept of regional waste management streams would solve the DFG and other special waste problems!

Pillar IIIb 4-5: Policy recommendations for DFG treatment

LESSONS LEARNED	RECOMMENDATIONS
• **Extended Producer Responsibility & return schemes** envisioned in the EU Plastics Strategy for fishing gears. • **Alternative thermal conversion technologies** are capable to process DFG and extract the toxic lead, diverting DFG from landfills. • **Plastics can be converted** to energy gas or fuel in regional facilities for small DFG volumes and other hazardous materials.	• **Identify harbours** adaptable to DFG processing. • **Establish a network of** “net-friendly” fishing harbors accepting DFG. • **Secure funding** for pilot thermal processing scenarios. • **After a pilot phase**, implement alternative processing facilities in Baltic and European coastal areas near DFG-retrieval harbours.

Recycling trials in Marelitt Baltic: Developing a recycling pathway for fishing gear

1. **Harbour reception facilities**
2. **Pre-processing in harbours & analysis**
   - cutting, sorting, cleaning in harbours
   - chemical & physical analysis: recycling?
3. **Processing of nets for recycling**
   - sorting + cutting, shredding, washing
4. **Recycling trials**
   - thermal processing (”hydrolysis”, pyrolysis)
   - material recycling



MARELITT Baltic

DFG Treatment Scheme

Best-practice recommendations for the treatment of Derelict Fishing Gear

DFG waste management – the way forward

LESSONS LEARNED

- **No ecologically & economically** feasible waste management for DFG exists today.
- **A pathway for DFG processing** is urgently needed to support future DFG retrievals.

RECOMMENDATIONS

- **Recycling of** clean, pre-sorted DFG needs to be implemented & financially supported.
- **Processing and recycling** of all types of DFG need innovative, new solutions.

Life-cycle analysis by Falk Schneider, University of Bath, UK

© WWF / Vaude

Pillar IV. Prevention

Work Package 3

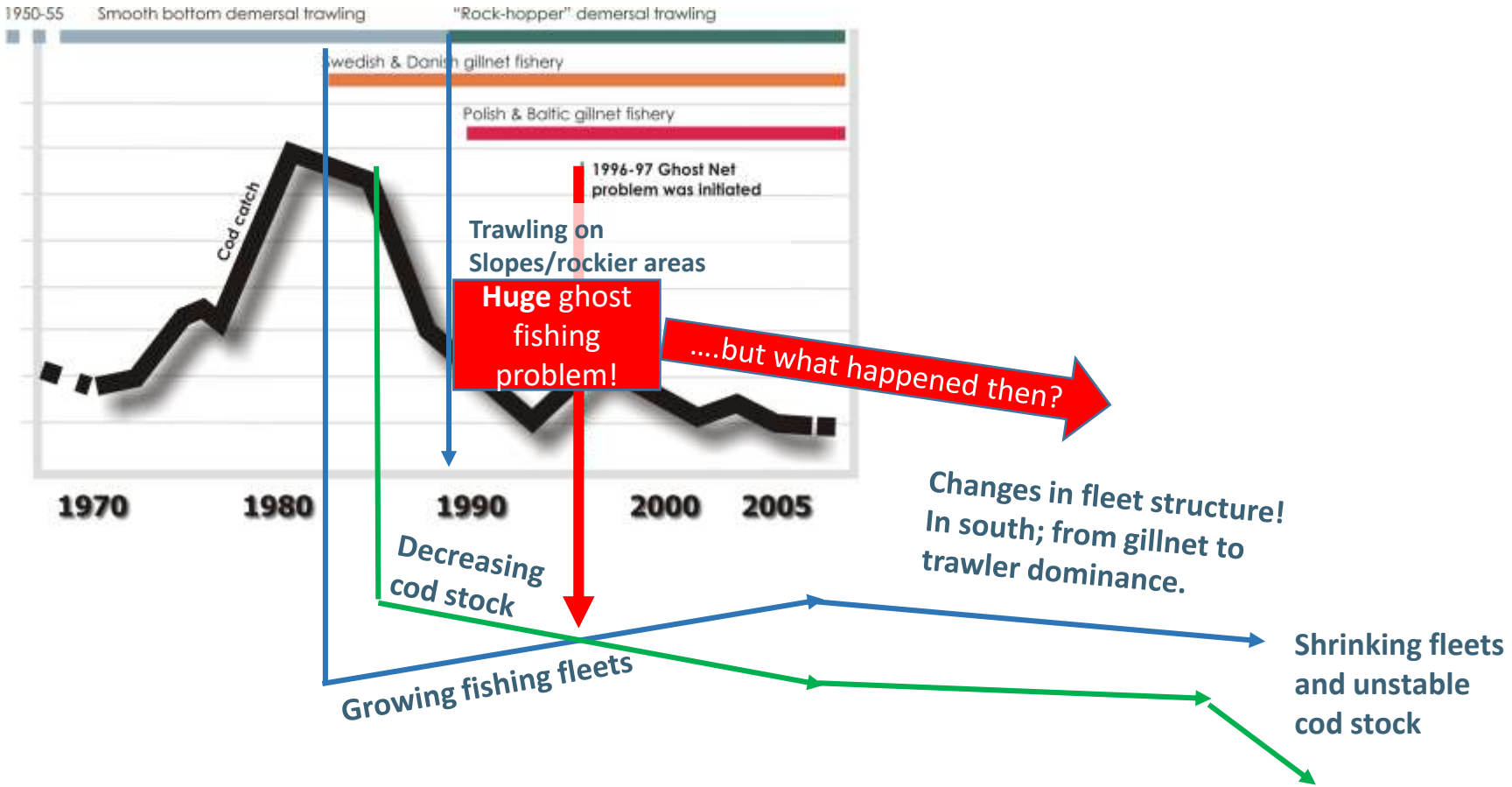
Vesa Tschernij, Marine center/Simrishamn

Stockholm, 20-21 March 2019

Background

Fishing strategic context
Relevant prevention method

From a traditional coastal fishery using passive fishing gears, to todays fragmented, highly specialized fishing fleet



PILLAR IV: Prevention

Reduction of gear loss during fishing operation

1. **Raise awareness among all stakeholders** including market actors, earn trust of fishermen
2. **Adjustment of** methodology and collection of data
3. **Analysis of criteria and presumtions** for relevant prevention methods
4. **Definition of criteria and presumptions** for potential prevention method(s)
5. **Design of relevant** prevention method(s) or approach(es)

1. Raise awareness among all stakeholders including market actors, earn trust of fishermen.

LESSONS LEARNED

- **Fisherman can play a major role** in development of methodologies, interpretation of results, mapping of DFG host area and assesment of gear loss
- **All activities above are** closely interlinked which makes it beneficial to run jointly first steps of pillar I and IV
- **Cooperation in pillar I is** more likely to result in successful results, which helps to earn trust of fishing sector. This can be used to eventually increase involvement of fishermen in more delicate topics like prevention!

RECOMMENDATIONS

- **Contact local fishermen** to involve them from start
- **Inform fishermen's** organizations, authorities and other stakehoders crucial for policy building
- **Organize regional/local roundtable** or eye-to-eye meetings with key target groups

2. Adjustment of methodology and collection of data.

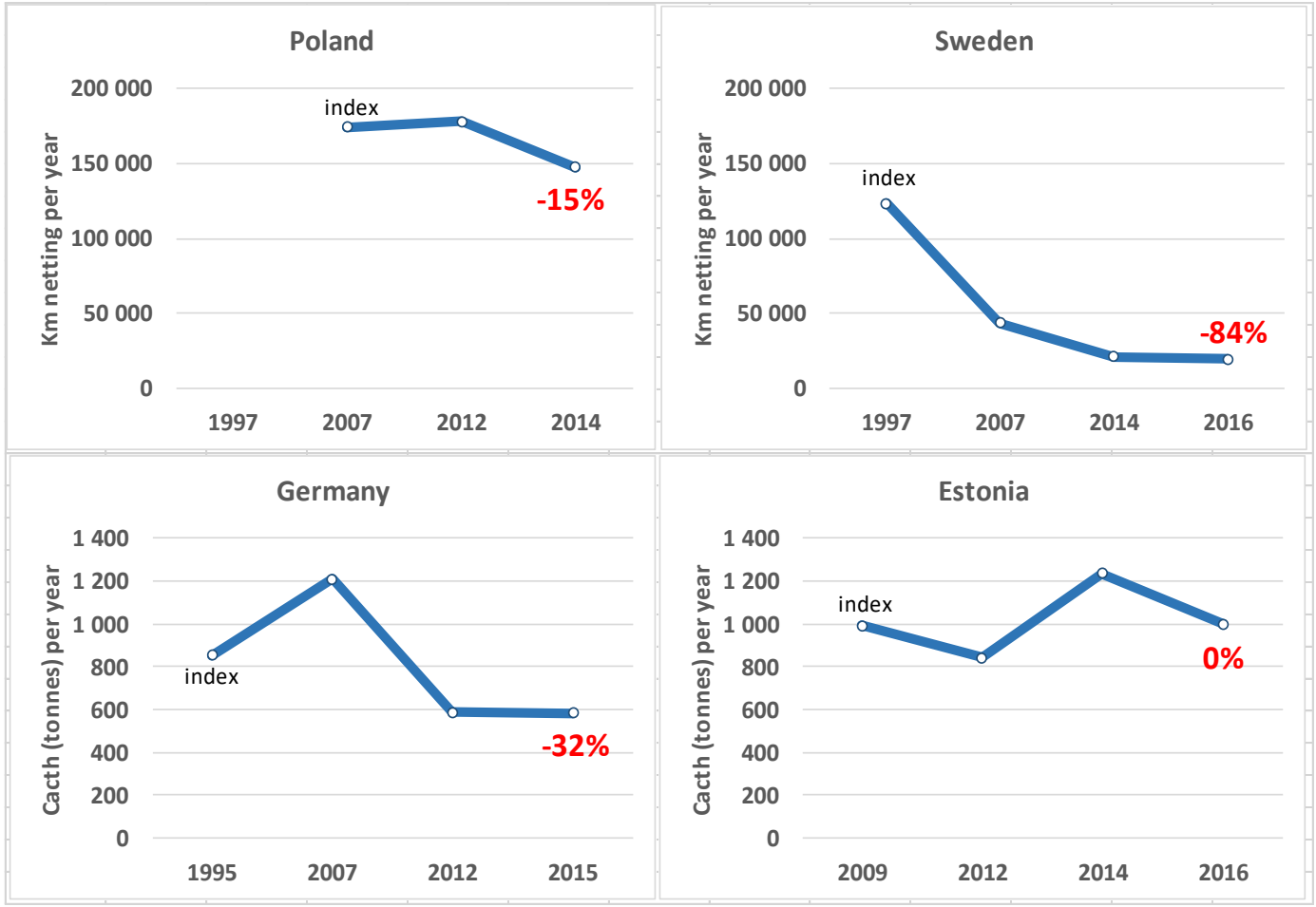
The proposed methodology includes two phases:

- Assessment of fishing strategic context
  - Changes in fishing effort
  - Reasons leading to gear loss
- Development of prevention method(s)

LESSONS LEARNED	RECOMMENDATIONS
• **To analyze all data** jointly helps in understanding characteristics of the ghost fishing problem and background to the reasons for gear loss	• **Collection and wide utilization** of fisherman knowledge strengthens their dedication to the process and helps to establish a common view on the ghost fishing problem.

Examples of results:

Changes in fishing effort



Examples of results:

Typical reasons for gear loss (past & present) % of fishermen

	Estonia		Poland		Sweden		
Factors	Past	Present	Past	Present	Past	Present	Total
Sea bed objects	-	29	47	40	21	21	158
Conflicts	-	26	19	27	40	43	155
Ship wrecks	-	9	24	23	16	19	91
Environment (strong current)	-	0	9	10	14	12	45
Environment (ice)	-	23	0	0	0	0	23
Environment (wind/waves)	-	14	0	0	0	0	14
Other reasons (theft, sabotage)	-	-	-	-	9	5	14

Examples of results:

How often do you experience gear loss?

Country/ region	Less than ones/year	Ones/year	Ones/month	Never	% of interviewed losing gear (n)
Polish	22	30	12	-	90% (70)
Swedish	4	2	-	-	25% (24)
Estonian	4	-	1	18	>3% (59)

In MARELITT Baltic it is possibile to compare results from different activities.
Higher gear loss frequency should result in more newly lost nets?

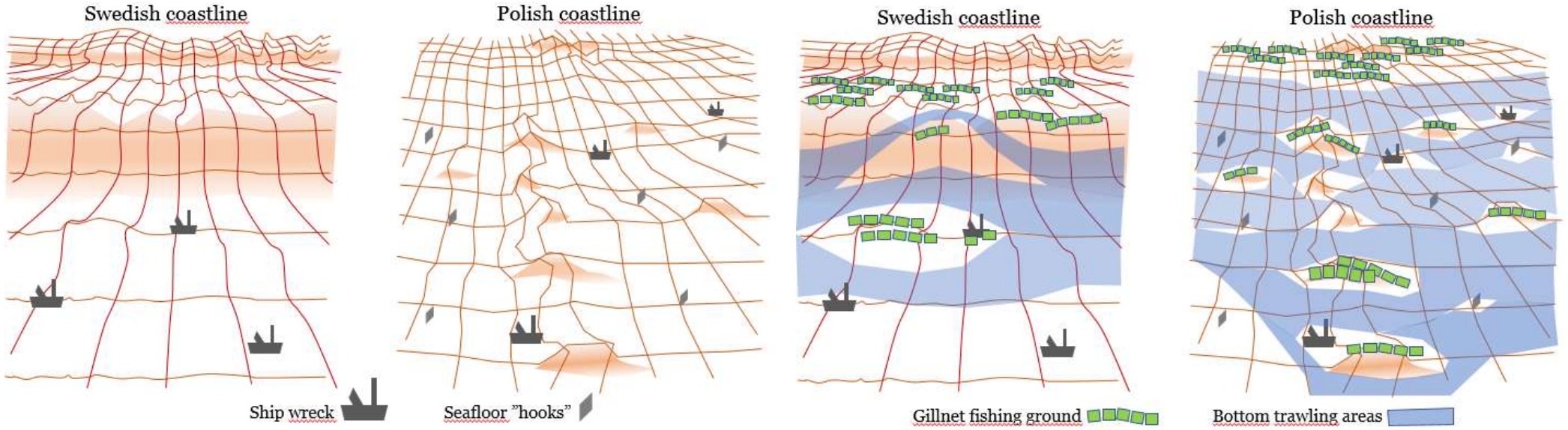
Results of 2017-18 randomized net netrieval activities:

	Age of retrieved nets	
	≤5 year	5 - 10 years
Poland	19	51
Sweden	0.3	3

1. Analysis of criteria and presumtions for relevant prevention methods.

LESSONS LEARNED	RECOMMENDATIONS
• **Marked regional variations** in fishing effort and characteristics of ghost fishing was identified • **Changes in fishing strategic context** are likely to impact on gear loss	• **It is recommendable** to study changes in fisheries (effort, gear composition etc.) and their impact on gear loss • **To combine information** from pillar I of environmental factors (type of seabed, water currents etc.) present in DFG host areas, can deepen understanding on reasons for gear loss thus advocate relevant prevention methods

Fishing strategic context, morphology and seabed characteristics



5. Design of relevant prevention method(s) or approach(es)

Selection of conclusions characterising the results:

- **Marked regional variation** in fishing strategic context (effort, morphology, seabed characteristics) results in differentiated gear loss pattern = not possible to **fix** with one measure!

- **An assumption that fishermen can** through strategic decisions e.g. selection of fishing ground, always manage the risk of gear loss, seems not to be the case. Especially, if profitableness is expected to be unchanged!

- **In case of studied** Polish waters the fishing strategic context makes reduction of gear loss during fishing complicated.

5. Design of relevant prevention method(s) or approach(es)

Selection of conclusions characterising the results

- **In Estonia and Sweden** (studied cases) with a low fishing effort and small fleets gear loss in commercial fishery is generally low. Higher gear losses is temporarily and locally possible (winter fishing(ice)! Ghost fishing is history (depends of course on baseline!).

- **A developed gear marking system** and improved gear loss reporting are considered widely as the keys to future prevention. *In combination with MARELITT Baltic mapping/retrieval methodology it can be a potential solution for some reagions* (compare the Norwegian system on place since 1990's). Observe! Cursive text is a *personal* reflection NOT an official result/recommendation byt the project!

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Thank you for your attention!