Design & Recycling of Fishing Gear
Scoping Study – Preliminary conclusions

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Main results of Scoping Study

- Fishing gear types: marine litter & supply chain
- Design & recycling as a solution:
  1. Collection & logistics
  2. Recycling
  3. Design for recyclability & re-use
  4. Design to reduce impact on the marine environment
  5. Design for better traceability
Annual loss of aquaculture + fishing gear in Europe: **4,000 – 10,000 tonnes**
(Viool et al. 2018)
Main reasons for gear loss

› **Trawl gear**: (un)intentional discarding of net sections / inadequate waste management

› **Passive gear**: extreme weather / currents & conflict with other gear

› **Aquaculture gear**: extreme weather & mismanagement / discarding
Fishing gear distribution

- Bottom & pelagic trawls main gear in **North Sea/Eastern Arctic**
- Passive gear (gillnets) important in **Baltic**, Spain, France
- Bottom trawls & long lines in **Mediterranean**
- In **Bay of Biscay** & Iberian coast: bottom & pelagic trawls, multi-gear (polyvalent), purse seine
- Small scale: pots & traps (UK), drift nets (France)
- Main **aquaculture** countries: Norway, Spain, UK, France
- **Recreational** gear loss important in UK, Germany

Sources: OSPAR questionnaire, STECF (2018), FAO (2019)
Fishing gear suppliers

- **Raw materials** predominantly from overseas
  - Big suppliers such as Euronete and Hampiðjan
  - Also wide range of local suppliers
  - Some online ordering (gillnets, rods & lines)

- **Assembling** generally done locally, in country itself
  - Often tailormade, especially trawl gear
  - Sometimes through local fisheries cooperative
  - To some extent: self-assembling by fishermen
  - Repairs & re-use
Fishing gear supply chain

› Complex supply chains with many actors
› Valuable product stream – high potential for re-use
› Differences between countries

› Recommendations:
  › Perform mapping exercise of supply chain in each country
  › Involve all stakeholders (designers, users, recyclers) in the discussion on minimising marine litter
Design & recycling of fishing gear as a potential solution
1. Collection & logistics

- Challenges for collection:
  - No legal obligation for recycling
  - Lack of port facilities
  - Mismanagement / behaviour

- Logistical challenges:
  - Only 2 main recycling companies in Europe: Plastix & Aquafil
  - Highly selective in material & recycling method
  - High standards on accepted end-of-life gear
  - Result: high effort & costs for pre-processing & transport
1. Collection & logistics

- **Best practice example:** PechPropre, France
  - Diagnosis of current plastic management in fishing
  - Survey of 67 fishing ports

- **Recommendations:**
  - National legislation to support recycling
  - Economic incentives to support logistics
  - Expand possibilities & funding for recycling projects
2. Recycling: materials

> Main plastics:
  - Polypropylene (PP)
  - Polyethylene (PE)
  - Nylon (PA6)
  - PET (in gillnets)

> Other materials:
  - Metals
  - PVC
  - Polystyrene
  - PVDF
  - HMPE (e.g. Dyneema®)
  - Rubber
  - Foams
  - Hazardous materials (lead weights, copper coatings)
2. Recycling: state of play

- **Recycling pathways:**
  - **Steel** (and sometimes lead) - regular metal recycling (all countries)
  - **PP/PE**: floats, lines and nets; single polymer trawl / purse seine nets - mechanical recycling (Plastix Denmark)
  - **PA6 (nylon)**: mostly in gillnets - chemical recycling (solvolysis) and re-threading into yarns (Aquafil Slovenia)
  - **PET**: chemical recycling and re-threading into yarns (Antex Spain)

- **Challenges:**
  - Mix of polymer types requires costly sorting/dismantling
  - Contamination (ALDFG)
  - Materials mixed with hazardous waste (e.g. lead)
  - Quality / market value of recycled material
2. Recycling: best practice examples

› **Icelandic return scheme:**
  - Over 90% of fishing gear recycled
  - Return scheme with fee system
  - Mostly trawls & purse seines

› **Healthy Seas:**
  - Socks made of recycled nylon from Aquafil
  - Using fishing gear recycling as positive branding
2. Recycling: recommendations

› Promote re-use & repairs; increase awareness of materials during repairs
› Clear guidelines for pre-processing & sorting
  › Including: degree of necessary pre-processing
› Examine ways to reduce pre-processing costs
› Investigate potential of colour-coding for polymer separation
› Availability & marketing of high-quality outputs
3. Design for recyclability and re-use

- Several materials cannot be recycled or re-used:
  - **Lead lines** containing a mixture of lead, PP, Dyneema and soft PVC
  - **Mixed materials** difficult to dismantle / separate; e.g. bridle lines, sweep lines, head and foot ropes or towing warps - different polymers, sometimes metal fortification
  - **Treated nets** (e.g. copper or other antifouling): potential toxicity

- Currently **design for functionality** - no waste management considerations

- Design as a potential solution to enhance recycling & re-use
3. Design for recyclability and re-use

› **Recommendations:**

› (National) economic incentive to increase purity (reduced mixture) in gear manufacturing

› Utilise alternatives for copper threads / coating in ropes & lines

› Innovation: develop environmentally friendly coatings

› Innovation: move away from exclusive consideration of functionality towards more circular economy oriented design
4. Design to reduce impact

› Still use of hazardous materials
› Little research on environmentally friendly design
› Off-cuts / discards are a problem (behaviour)
› **Biodegradability** as a solution?
  › Increasing research, but: need to consider fisherman’s perspective
  › Only if loss cannot be prevented!
  › Risk of ‘perverse incentive’
4. Design to reduce impact

- **Best practice examples:**
  - Biodegradable panels / ropes on pots & traps
  - Pilots: DollyRopeFree & DropS

- **Recommendations:**
  - Reduce / replace hazardous materials
  - Increase research & field testing
  - Design criteria to include environmental impact
  - Increase awareness of impacts
  - Economic incentives for enhanced collection of discards on board & in port

Pictures: DollyRopeFree; Wouter Jan Strietman & Dirk Kraak
5. Design for better traceability

› New technologies: e.g. electronic tags, QR codes, colour coding, metal tags, radio beacons

› Gear labelling of material: to easily identify material

› Gear marking for ownership: to ensure traceability

› Challenges:
  – Current lack of standardized approaches
  – Often only portion of gear is lost
  – No legal obligations
5. Design for better traceability

› **Best practice example:** mandatory gear marking of all passive & trawl gear in the UK
  › Fishers easily identified by enforcement agencies
  › Fines for non-compliance & prosecution for violations

› **Recommendations:**
  › Gear marking only if there is chance of loss of larger sections
  › Extend marking to retrievability of lost gear (e.g. echolocation)
  › Investigate marking systems for owner identification
  › Improve legislation & enforcement
Concluding remarks

- Enhanced recycling of fishing gear is one of the solutions
  - To reduce marine litter from intentional discards
  - Challenges remain in logistics & recycling
  - Design modifications are part of the solution

- Workshop: verify & expand recommendations; focus on practical aspects and feasibility

- Recommendations will:
  - Aid OSPAR Contracting Parties to assist fishing gear handlers in the best way possible, and with effective implementation of SUP
  - Support the Commission in development of standard for circular design of fishing gear