CONSEIL CONSULTATIF POUR LES EAUX OCCIDENTALES SEPTENTRIONALES
NORTH WESTERN WATERS ADVISORY COUNCIL
CONSEJO CONSULTIVO PARA LAS AGUAS NOROCCIDENTALES

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Dun Laoghaire, 26 April 2021

Dear Mr Banel,

Re: Advice on best practice measures for the management of skates and rays in the North Western Waters

Following the establishment of a joint Focus Group Skates & Rays between the North Western Waters AC and the North Sea AC in 2020, the ACs collected and collated all available information on the following topics:

- best practice measures in use,
- which ones the Advisory Councils recommend could be implemented in the future,
- an overview of ongoing trials,
- proposed research.

This advice was submitted on 01 May 2020 to both the NWW Member States Group and the Scheveningen Group.

The Scheveningen Group approached the North Sea AC requesting an update of this advice and to include harmonised guidelines for best practice when handling catches of skates and rays. The Focus Group looked into this for the species throughout the North Sea and North Western Waters building on existing knowledge about identification of the different species and their vulnerability/survivability.

This information is presented in the tables on the following pages with the updates highlighted in yellow. We hope this is a useful contribution to the Member States' work on skates and rays management in the NWW and look forward to further discussions on this topic.

Yours sincerely,

Emiel Brouckaert
Chairman Executive Committee

Co-Funded by the European Union

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1 Glossary

JR Best Practices	Avoidance	Spatial methods to avoid catching individuals and/or aggregations
	Selectivity	Technical measures to prevent individuals being caught in the net
	Handling on board	Methods to increase survival on board
	Training / Communication	Ways to increase knowledge of skate and ray species and their ecological role in the ecosystem, throughout the supply chain
Approach	Measure	1 line description aligned with the exemption text - can be general (e.g. improving ID-skills)
	Projects	Description of the project, can add links to web content here
	Applicable metier/species	For which species or metier has the measure been trialled or is being implemented
	Applied in country	Where is the measure or project being carried out
	Comments	Extra information relevant for reporting on progress in the implementation of best practices
Categories	Currently in use	What methods/measures are being implemented by the fishing industry
	Could be implemented	What information/method/protocol is available that is not currently being used
	Trials ongoing	What is currently being trialled or tested in fisheries
	Proposed research	Potential measures that could be trialled but no research projects have been formulated
	Survival studies	Overview of studies being carried out to determine survival of skates and rays in fisheries

2 Best practice measures currently in use

Organisation		Measure	Projects	Applicable in metier/species	Applied in country	Comments
From Nord/ Sumaris/ Rederscentrale/ CNPMEM	Avoidance	1. Avoid known spawning/nursery areas (nearby coast of France and England, Thames estuary) 2. Fee of 4 euro for the landing of ray size class 4 (less than 1 kg) 3. Since 1/01/2021, Belgian fishermen are only allowed to land spotted rays, thornback ray and blonde rays. This was discussed with ILVO in the context of marketing. Because these ray species are doing well, ray can be promoted more.	1. It is natural behaviour enhanced by the fishermen in order to be able to fish and land rays throughout the year. 2 & 3. PO measures in Belgium	ALL metiers and species	BE / FR/ UK	Due to quota limitations (day limits), fishermen avoid spawning/nursery areas and ray hotspots.
	Selectivity	1. Flip up rope & Benthos Release Panel 2. Flemish panel 3. Large meshes in the back of the net.	1. In the willingness to obtain and preserve the survival exemption in a Discard ban context improving selectivity might have been a solution. 2. Belgian project 'netaanpassingen II' in 2015 with selectivity tests on board of commercial fishing vessels. Objective: avoidance of new born specimens/juveniles. 3. Belgian project 'netaanpassingen I' in 2014. Objective: avoidance of new born specimens/juveniles.	1. Beam trawlers 2. Beam trawlers 3. Beam trawlers and Otter trawlers.	BE	
	Handling on board	Development of ID Guides - Same tool for potentially all European fishermen. Guide of good practices on board is unique and available in 3 languages.	SUMARiS project: https://www.interreg2seas.eu/nl/sumaris Harokit project: https://www.ilvo.vlaanderen.be/language/nl-BE/NL/Diensten-en-producten/Harokit	ALL metiers and species (especially those in the Eastern Channel and North Sea).	BE / FR/ UK	
	Training / Communication	Training sessions for fishermen, fish auction staff and students in maritime schools. A presentation available in 3 languages and some afterwards quiz are also currently used. Another tool for good recognition of species and thus better recording in the logbook is mugs presenting lookalikes species with the corresponding FAO code that have been distributed to all fishermen in the SUMARiS consortium.	SUMARiS project: https://www.interreg2seas.eu/nl/sumaris Harokit project: https://www.ilvo.vlaanderen.be/language/nl-BE/NL/Diensten-en-producten/Harokit Raywatch Link to new identification sheet for fishermen that has just been released by the CNPMEM: https://www.comite-peches.fr/wp-content/uploads/2021/03/Fiche-Identification-Raie-CNPMEM_2021_Planche1_2.pdf	ALL metiers and species	BE / FR/ UK	
	Training / Communication	Within the Raywatch-project, identification training will be organized in the Belgian fishing sector and in the fish auction to improve misidentification of sandy ray and small-eyed rays. There will also be workshops in the Belgian fish auctions regarding the new Belgian measure to land only spotted ray, thornback ray and blonde ray.	Raywatch project by ILVO https://pureportal.ilvo.be/en/projects/langetermijn-dataverzameling-ter-onderbouwing-van-de-huidige-uitz	All metiers	BE	
BIM	Selectivity	Raised fishing line trawl with lights of the fishing line to reduce cod, skates and ray catches	Under Article 13 of Council Regulation (EU) 2020/123 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2020:025:FULL&from=EN: from 1 June 2020, fishers have the option to use a fishing gear (a raised fishing line trawl) that is constructed with a minimum of one meter spacing between the fishing line and ground gear. While this gear is under the remedial measures for cod and whiting in the Celtic Sea, work completed by BIM shows this gear to reduce skate and ray catches by up to ~80%. The two studies are McHugh et al. 2017 http://www.bim.ie/media/bim/content/publications/fisheries/6495-BIM-Raised-Fishing-Line-report.pdf and McHugh et al. 2019 http://www.bim.ie/media/bim/content/publications/fisheries/BIM-Staggering-the-fishing-line-report.pdf	Otter trawl	Celtic Sea	

3 Best practice measures that could be implemented

Organisation		Measure	Projects	Applicable in metier/ species	Applied in country	Comments
From Nord/ Sumaris/ Rederscentrale/ CNPMEM	Handling on board	Development of ID Guides - Same tool for potentially all European fishermen. Guide on good practices on board is unique and available in 3 languages.	SUMARiS project	ALL metiers and species	BE/FR/UK	These tools are actually only onboard of vessels in the SUMARiS consortium. But it could be more widely distributed if wanted.
	Training / Communication	Another tool for good recognition of species and thus better recording in the logbook is mugs presenting lookalikes species with the corresponding FAO code that have been distributed to all fishermen in the SUMARiS consortium	SUMARiS project	ALL metiers and species	BE/FR/UK	These tools are actually only onboard of vessels in the SUMARiS consortium. But it could be more widely distributed if wanted.
FROM Nord/OPN/Thornback Ray FIP	Training/ Communication	Actions for proper identification of all rays species and traceability of thornback ray from capture to first sale. Actions to be implemented including preparation for the traceability requirements of certification and the chain of guarantee for MSC certified products from capture to first sale	Thornback Ray FIP	Bottom trawls, trammel nets and Danish seines	FR	
NWWAC	Selectivity		A permanent working group should be established at MS level in which the fishing industry actively participates.		BE/FR/UK/ IE/ES/NL	
	Training / Communication	Use of new communication technologies	Best available technological modifications should be identified and exchanged by means of, for example, stakeholder meetings. To increase uptake of the technical modifications measures, improved communication, involvement of the industry and funding availability are essential.		BE/FR/UK/ IE/ES/NL	EMFF funding is made available for modifications.
	Training / Communication	Standardise ID-guides	Practical identification guides should consist of a single page, which is robust and waterproof. Guides should be standardised across all Member States, regionalised (e.g. Channel, Celtic Sea, West of Scotland and Ireland, North Sea) to reduce confusion with species that do not occur in specific areas and available to download online in different languages. Efforts should be made to actively engage with fishermen to increase the uptake of available identification tools		BE/FR/UK/ IE/ES/NL	
	Training / Communication	Regular training sessions	Training of both scientific observers and crew should be organised on a regular basis to guarantee uptake, and illustrate and quantify improvement		BE/FR/IE/ES/NL	
	Training / Communication	Distribute ID-guides	Fishing plans should be distributed to the fishing industry and information posters should be made available to display onboard vessels. In addition, disseminating information on best practice via video and/or training workshops increases fishers knowledge on the bycatch issue, improves their ability to remain alert, and increase buy-in. Fishermen's knowledge should be integrated into the design of a best practice guide.		BE/FR/UK/ IE/ES/NL	

Organisation		Measure	Projects	Applicable in metier/ species	Applied in country	Comments
NWWAC	Training / Communication		Taking into account that several tagging programmes are being conducted as part of survivability studies, manuals should include information on the different types of tags, their position and actions to be taken in case a tag is discovered. The fishing industry should return tags when discovered.		BE/FR/UK/ IE/ES/NL	
	Training / Communication		National data collection programmes should be standardised and harmonised. Fishing industry should actively participate in self-sampling and observer programmes to increase data availability and quality.		BE/FR/IE/ES/NL	
BIM	Selectivity	Raised fishing line trawl with lights of the fishing line to reduce cod, skates and ray catches.	Under Article 13 of Council Regulation (EU) 2020/123 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2020:025:FULL&from=EN: from 1 June 2020, fishers have the option to use a fishing gear (a raised fishing line trawl) that is constructed with a minimum of one meter spacing between the fishing line and ground gear. While this gear is under the remedial measures for cod and whiting in the Celtic Sea, work completed by BIM shows this gear to reduce skate and ray catches by up to ~80%. The two studies are McHugh et al. 2017 http://www.bim.ie/media/bim/content/publications/fisheries/6495-BIM-Raised-Fishing-Line-report.pdf and McHugh et al. 2019 http://www.bim.ie/media/bim/content/publications/fisheries/BIM-Staggering-the-fishing-line-report.pdf		Currently in use in Celtic sea, but could be implemented elsewhere	The CNPMEM and the IFO do not support the suggestion that the gear trialled by BIM and used in the Celtic Sea could also be used elsewhere due to the fact that not enough trials were carried out on this technology, which is likely to have a high impact on the relevant fisheries. The NGOs see this as a promising discard prevention measure for skates and rays and other demersal fish and support carrying out further trials.
VisNed	Handling on board		EMFF project OSW 2.1 - InnoRays aims to develop methods to improve data quality and availability on Data Limited Stocks of skates and rays. One pillar of the project focuses on DNA kinship analysis (so-called DNA close kin mark-recapture or CKMR), with a view to providing a novel information source for stock size, distribution, and recent genetic history, for thornback and blonde rays. The other pillar aims to develop a protocol to effectively monitor ray catches on a reference fleet with the use of CCTV on the sorting belt. This included a pilot on the feasibility of machine vision to automate species detection and catch monitoring. This pilot was concluded successfully, and the work is carried on under the Fully Documented Fisheries project.	Spanning multiple metiers.	NL	Project carried out in North Sea, but application not region dependent.
	Handling on board		The EMFF-funded project "Bridging knowledge gaps for sharks and rays in the North Sea" runs from 2021 until 2023. It supports the temporary exemption on rays by providing information on discarding survivability, longer-term stock development, and habitat use & migration patterns of rays in the North Sea. The project consists of two main pillars: 1) Determination of survivability of two ray species when discarded in two metiers. Exploratory research trips in Q2 of 2021 using on-board health condition assessment in twinrig, flyshoot, and quadrig will provide initial survivability estimates. A brief desk study will be carried out to collate available survivability estimates in the beam trawl fisheries, where the current expectation is that previous work already provides sufficient information for this metier. Based on the results of the exploratory work two of the metiers will be selected for a full survivability assessment study involving on-board holding facilities and shore-based follow-up monitoring in a climate-controlled facility for a period of two weeks. 2) Spatial and temporal distribution will be assessed using two methods: a) Using video catch monitoring as well as genetic techniques (close-kin mark recapture). This is partly a continuation of OSW2.1. If the research proposal on "Data Limited Stocks" is funded in 2021 (currently under review), data from that project could also feed into this part. b) Using satellite or recapture tags.	Spanning multiple metiers.	NL	Project carried out in North Sea, but application not region dependent.

4 Trials ongoing

Organisation		Measure	Projects	Applicable in metier/species	Applied in country	Comments
VisNed	Avoidance	Avoid known spawning/ nursery areas	Life-IP project to map the presence, abundance and use of the Dutch coastal area by skates and rays. This research will start in 2020 and conclude in 2022; genetic study INNORAYS to study population structure and size	all / thornback, blond	NL	
	Avoidance		Project INNORAYS aiming to: 1) study population structure and size using state-of-the-art genetic close-kin mark-recapture methods; 2) develop and validate a sorting belt camera monitoring protocol of ray catches on demersal trawlers; 3) pilot machine vision to automate the detection and classification of ray catches.	all / thornback, blond	NL	
	Avoidance		EU project Probyfish (Brunel T.) in which cluster analyses and spatial distribution of fish are modelled, rays can be part of this.	all / no species selected		
From Nord/ Sumaris/ Rederscentrale/ CNPMEM	Selectivity	1)Avoiding discards with a Benthos Release Panel (BRP) in combination with led. Led strips are placed in the BRP in the back of the net. 2) Elements (small wheels) in the chain mat that roll over the bottom so that the bottom contact of the chain mat itself is reduced. 3)Comparative fishing with larger mesh sizes in the codend.	Combituig (EMFF project by ILVO) running until summer 2021.	Beam trawl	BE	1)First tests with plaice are successful (20% loss of discards). Later on tests with other species will be performed. 2)The elements may have a slightly positive effect on the catch rate of most commercial species. A follow-up study on board a commercial vessel is recommended. 3) Positive results: reduction of undersized fish + reduction of benthos and debris.
	Selectivity	Data collection (discards, survival) in terms of achieving scientifical evidence for a surival exception for the discard ban. Integration of this new information into scientific population dynamics models to improve the management rays for Belgian fisheries.	Raywatch (EMFF project by ILVO)	Beam trawl	BE	Project started 1/07/2020. This project, in contrast to SUMARiS, focuses more on areas in the Western Waters.
BIM	Selectivity	Raised fishing line trawl with lights of the fishing line to reduce cod, skates and ray catches	Under Article 13 of Council Regulation (EU) 2020/123 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:2020:025:FULL&from=EN: from 1 June 2020, fishers have the option to use a fishing gear (a raised fishing line trawl) that is constructed with a minimum of one meter spacing between the fishing line and ground gear. While this gear is under the remedial measures for cod and whiting in the Celtic Sea, work completed by BIM shows this gear to reduce skate and ray catches by up to ~80%. The two studies are McHugh et al. 2017 http://www.bim.ie/media/bim/content/publications/fisheries/6495-BIM-Raised-Fishing-Line-report.pdf and McHugh et al. 2019 http://www.bim.ie/media/bim/content/publications/fisheries/BIM-Staggering-the-fishing-line-report.pdf	Otter trawl	IE	The gear is certainly effective in reducing catches of cod and skates & rays, and also in partially avoiding prawns, plaice, monkfish and other species in the mixed fishery. Thus, the gear is really effective only when specifically targeting haddock and it can only be used in very specific situations. While it is included in the list of gears in the Celtic Sea, more trials are needed to understand where else it could be used.

5 Proposed research

Organisation		Measure	Projects	Applicable in metier/species	Applied in country	Comments
SUMARiS/ From Nord/ Rederscentrale/ CNPMEM	Selectivity	Work on new minimum sizes more than mesh size or gear modification - potentially two different sizes for "well known and stable biomass" species and for "potentially endangered" ones	SUMARiS - or future project	All metiers - may be focused on trawl at first	All potentially and ideally	To be further discussed within the NWWAC / NSAC Rays and Skates focus group.
NWWAC	Avoidance	Effectiveness of MPAs	A wider study should be conducted to evaluate the effectiveness of closures in the control of mortality of skates and rays and the economic viability. The NWWAC recommends the evaluation of the current MPA network established for other purposes with regards to their impact on skates and rays. The fishing industry should actively participate in this study.			
NSAC	Selectivity	Behaviour of rays in and around the net	Lights as deterrents			

6 Survival studies

Organisation	Project description	Species	Gear	Results		
VisNed	"Survivability of discarded flatfish, rays, and Norway lobster", 2016 - 2019, the Netherlands. On-board fish were kept in individual holding containers and survival monitoring was continued in a shore-based climate-controlled facility until stabilisation of mortality (approx. two weeks).	Thornback ray (*Raja clavata*) and spotted ray (*Raja montagui*)	BT (pulse)	Thornback ray: 53% (95%CI 40-65%) survival. Spotted ray: two trips sampled, with 21% and 67% survival.		
	SUMARiS, 2017-2020. Belgium, France, Britain; Eastern English Channel and Southern North Sea.	thornback ray (*Raja clavata,* RJC), blonde ray (*Raja brachyura,* RJH), spotted ray (*Raja montagui,* RJM) and undulate ray (*Raja undulata*, RJU)	Beam trawl (TBB), otter trawls (OTB), trammel nets (GTR)	**FAO-code**	**Gear**	**Total survival (%)**
				RJC	GTR	99.34
					OTB	71.56
					TBB	54.46
				RJH	GTR	100.00*
					OTB	86.36
					TBB	66.58
				RJM	GTR	100.00*
					OTB	100.00*
					TBB	26.55
				RJU	GTR	100.00*
					OTB	92.64*
					TBB	57.86
SUMARiS/ From Nord/ Rederscentrale/ CNPMEM	SUMARiS PROJECT 30 survival sea trips for rays on board of commercial Belgian, French and English fishing vessels based on the RAMP-method.	Mostly thornback rays and blonde rays, but also some spotted, small-eyed and undulate rays.	Gill netters, Trammel Netters, Beam trawlers and Otter trawlers	Final report shows positive survival results. See https://sumaris-project.com/wp-content/uploads/2020/09/O-5.1.-Discard-survival-report-SUMARiS_final_version2-22-9-2020.pdf		
	PRE SURF (2019) https://www.aglia.fr/surf/ 50 fishing operations of 2 trawlers (100mm) sampled during 2 fishing trips in the spring. Vitality has been assessed using 2 indicators: ISQ and RAMP score	Cuckoo Ray	TR in area 7 and 8	RAMP: 0.43. Immediate survival rate of 88,1% considering all the fishing operation sampled		
	RAYWATCH (2020). The objective in this project is to collect more biological and survival data for seven ray species.	Thornback ray, blonde ray, small-eyed ray, spotted ray, cuckoo ray, undulate ray and sandy ray.	Beam trawl (TBB) in Western Waters (English Channel, Irish Sea, Celtic Sea).	Project started 01/07/2020.		
	SURF (2020) https://www.aglia.fr/surf/ Study of vitality and long term survival rate Study of vitality and long term survival rate	Cuckoo Ray	TR in area 7 and 8	Results will be available soon.		
BIM	Post capture condition of cuckoo ray in an Irish otter trawl fishery, Bord Iascagh Mhara, March 2019	Cuckoo Ray	Otter trawl	1 Two condition indices were used to assess postcapture condition of four ray species: reflex and injury; vitality. 2 Cuckoo and blonde rays performed best under the reflex and injury index. 3 Research on correlations between similar reflex and injury indices, and ultimate species survivability, suggests cuckoo rays are likely to survive the capture process well in the observed fishery. 4 Cuckoo ray performed best under the vitality index with 84% categorised in excellent condition. 5 Research demonstrating that ray species in excellent or good vitality condition have the highest survival probabilities suggests that cuckoo rays are likely to survive the capture process well in the observed fishery. 6 Post-capture condition of cuckoo rays compared very well with other better studied species such as thornback rays, providing further qualitative information on survivability. 7 Qualitative assessments of cuckoo ray condition and survival are important given potential difficulties in achieving sufficient sample size in other gears and areas.		

Organisation	Project description	Species	Gear	Results
BIM	Survival trial for cuckoo ray. The trial will take place on the east coast of Ireland, cuckoo ray will be collected using an otter trawler fishing in the Irish Sea. A holding and monitoring facility will be set up in Howth, near the harbour. The holding and monitoring facility will comprise an insulated shipping container with holding tanks and a water recirculation system. Overall, the trial will have similar set up and objective to a plaice survival trial that was completed last year, details can be found in this report https://bim.ie/wp-content/uploads/2021/01/BIM-plaice-survivability-report-dec-2020.pdf	Cuckoo Ray	Otter trawl	The trial had to be postponed to summer/autumn 2021 due to the COVID-19 pandemic.
VisNed	EMFF project OSW 2.1 - InnoRays aims to develop methods to improve data quality and availability on Data Limited Stocks of skates and rays.	Thornback and blonde rays	Spanning multiple metiers.	It included a pilot on the feasibility of machine vision to automate species detection and catch monitoring. This pilot was concluded successfully, and the work is carried on under the Fully Documented Fisheries project.
	The EMFF-funded project "Bridging knowledge gaps for sharks and rays in the North Sea" runs from 2021 until 2023. It supports the temporary exemption on rays by providing information on discarding survivability, longer-term stock development, and habitat use & migration patterns of rays in the North Sea.	Multiple ray species	Spanning multiple metiers.	