



Simplified methodological guide for assessing the impacts of derelict fishing gear

2020

INTRODUCTION

This simplified methodological guide provides, in a simple and intuitive way, all the information needed to assess the impact of derelict fishing gear and to estimate the Gear Removal Index (GRI). The GRI allows the prioritization for the removal of lost fishing gear by assessing the impact they have on the marine environment. For more details see the complete methodology in: Ruitton S., Belloni B., Boudouresque C.F., Marc C., Thibault D., 2020. Methodological guide for the assessment of the impacts of derelict fishing gear. 2nd edition. M I O publ., 46 pp.

This document can be downloaded on the Ghostmed web site:

<https://ghostmed.mio.osupytheas.fr/en/documents/>

The first part of this document will present the descriptors to assess the impact of derelict fishing gear and the second part presents the methodology to implement the GRI.

Methodological guide designed with support from the French Office for Biodiversity. Special thanks to the Gulf of Lion Marine Natural Park for its technical participation and involvement in the program. This second edition also exists in French.

To quote this document:

Ruitton S., Belloni B., Boudouresque C.F., Marc C., Thibault D., 2020. Simplified methodological guide for assessing the impacts of derelict fishing gear. 2nd edition. M I O publ., 12 pp.



GENERAL INFORMATION

FIRST INFORMATION



Date



Identity of the observer (last name, first name, phone number, email)



GPS coordinates (if possible) or description of the location



Size and type of gear

ENVIRONMENTAL CRITERIA



Type of habitat



Posidonia meadow



Coralligenous



Sublittoral reef



Wrecks



Artificial reefs



Pebbles



Sandy bottom



Coastal detritic



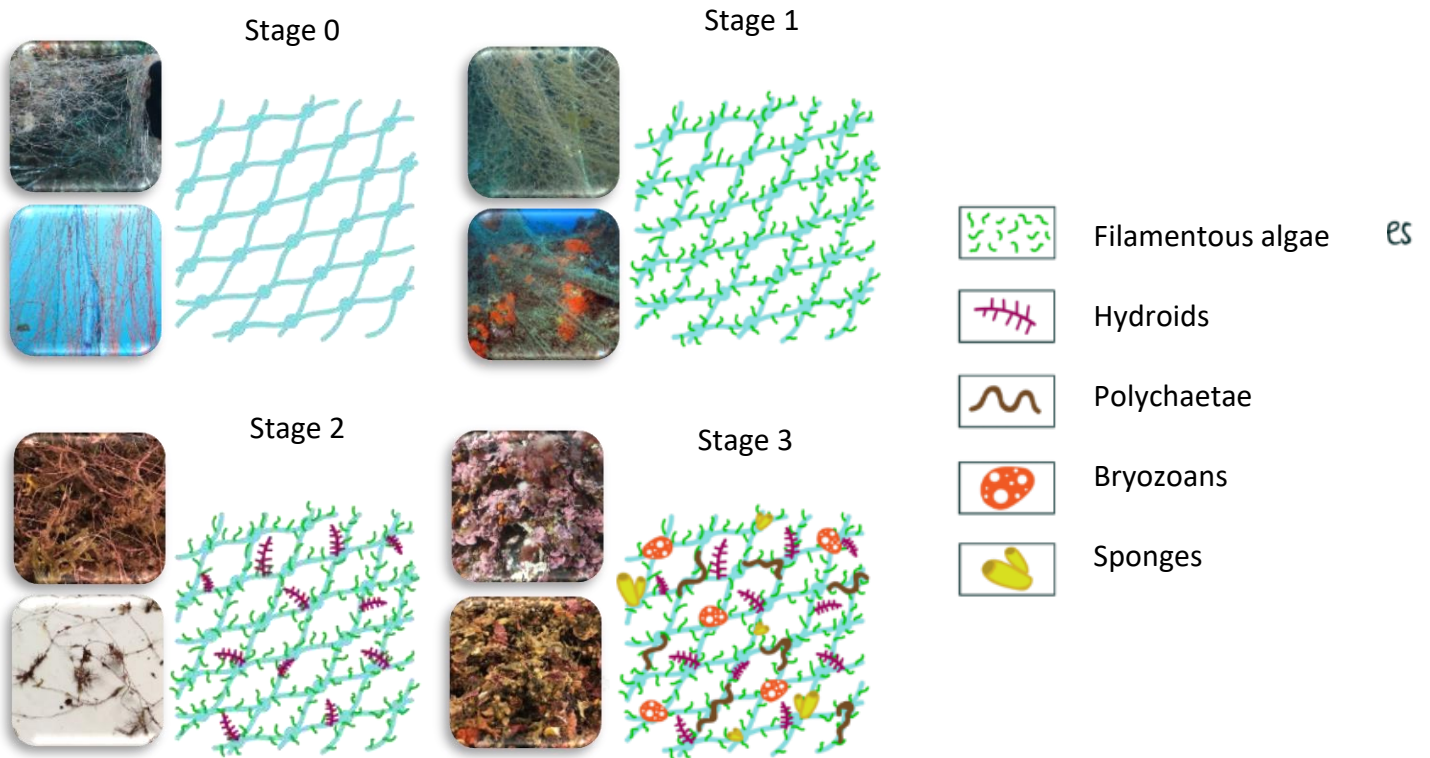
Mud



Underwater canyons



2.3 Colonization of the derelict gear



© Claire MARC



The number of trapped individuals (specifying if possible, the state of decomposition):



Alive



Recent death



Partially decomposed



Apparent skeleton



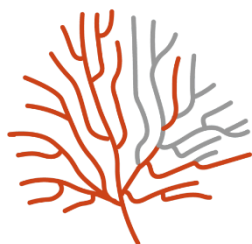
Completely decomposed flesh



The number of fixed individuals torn off or damaged specifying if possible, the rate of necrosis:



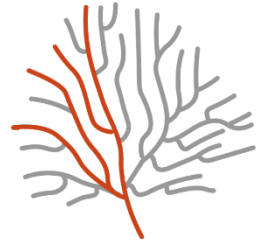
10%



25%



50%



75%

Rate of gorgonian necrosis



Presence of remarkable species: note if protected, rare or heritage species colonized and/or are closed to the gear (example: fan mussel, Cystoseira, red coral, black coral)



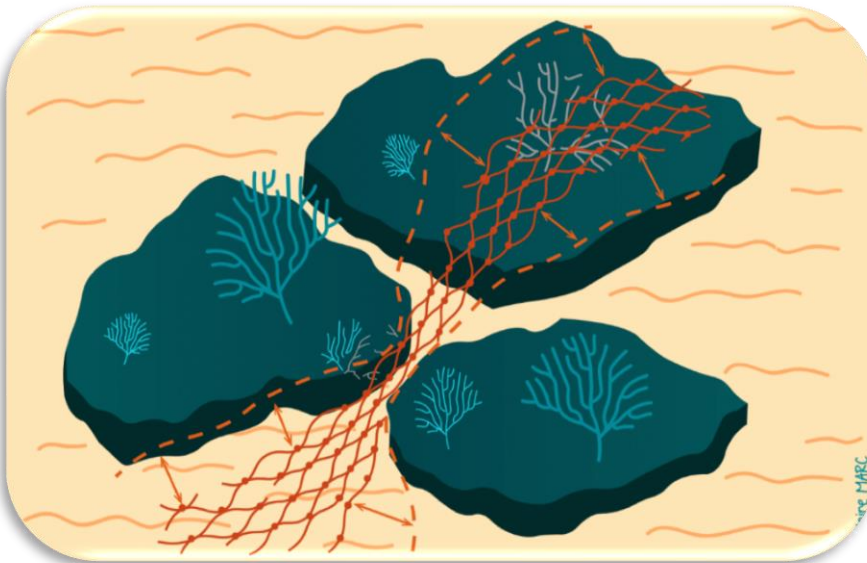
The breadth impact: estimate whether the extent of the impact is between 0 m² to 5 m², 5 m² to 20 m² or more than 20 m²



The fishing capacity: estimate if the fishing capacity of the gear is reported as zero, low or significant



The scouring extend: estimate if the scouring of the substrat by the gear is null, low or significant



The number of obstructed crevices by the gear: evaluated and placed within 3 classes (0; 1 to 10 and >10)



The formation of new habitat: note whether or not there is habitat creation for fauna or flora by the derelict fishing gear

IMPACTS ON THE SEASCAPE



Modification of the seascape by the presence of the gear or not



Use of an adjective to describe the seascape with the derelict gear (ex. desolated, sinister, common, enjoyable, admirable, magnificent)



Topography modification which can be described as diminished, unaltered, or increased relief

RISK FOR THE USERS



Swimming



Scuba diving/snorkeling/ spearfishing



Sailing/mooring



Fishing

TECHNICAL DIFFICULTIES



Depth: The depth of the derelict fishing gear will determine the diver's qualification and the risk: 0 to 30 m, 30 to 50 m and beyond 50 m depth

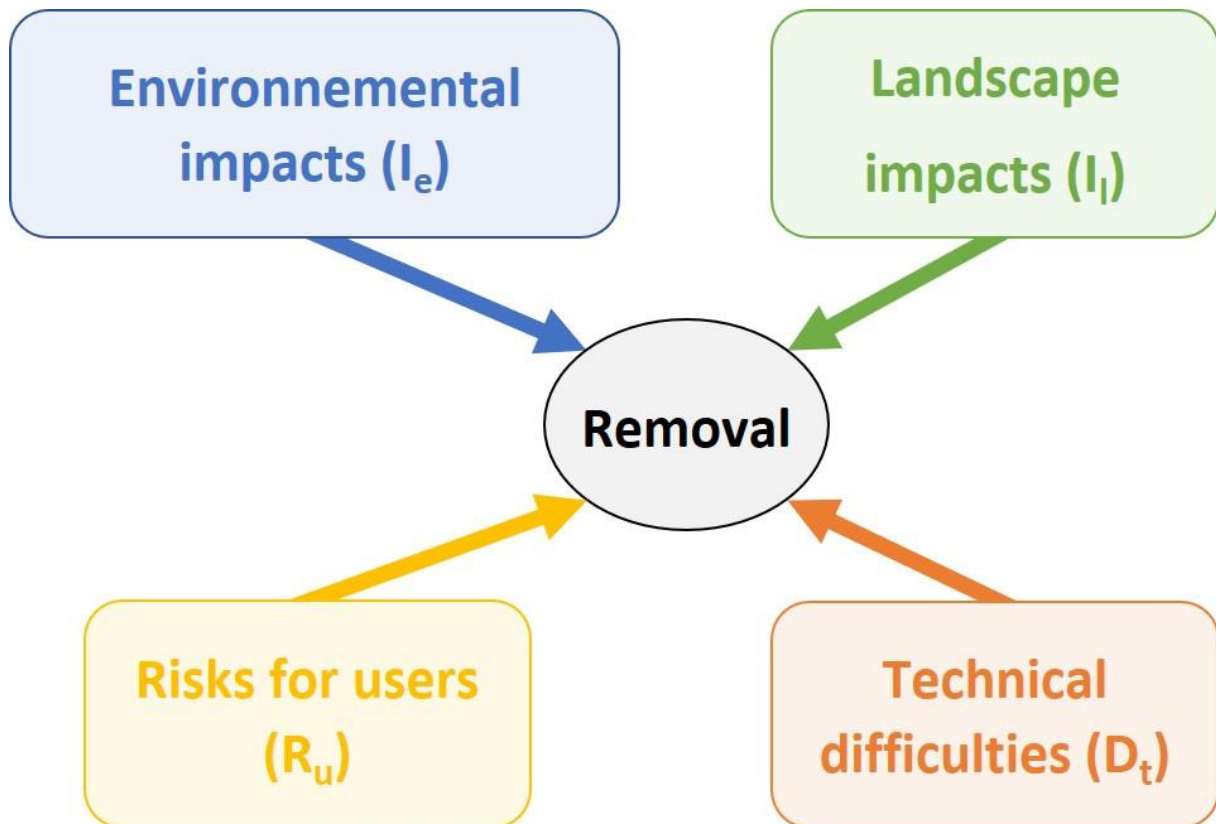


The rate of engagement of the gear on the seafloor: estimate if it is low (< 10% of the gear is hooked); medium (10- 50% of the gear is engaged) and important (> 50% of the gear is hooked)



GEAR REMOVAL INDEX (GRI) OF DERELICT FISHING GEAR

Data collected on the field sheet during the dive (see the end of the document) allow to implement the 4 major parameters:



The evaluation of these parameters should be used to calculate a **Gear Removal Index (GRI)**.

Environmental Impact Assessment

The environmental impact assessment is carried out using 12 criteria and is the sum of the scores of each criterion, with a total score between -7 and 28. The lower the score higher the positive effect on the environment will be. On the contrary, a high score will reveal a strong negative impact. The grades were awarded based on the importance of the criteria from an environmental point of view. Notes for the different criteria for assessing the environmental impact are presented in Table 1.

Table 1: Criteria for assessing the "environmental impact".

Criteria	Assessments	Scores
Habitat	Posidonia meadow	2
	Coralligenous	3
	Sublittoral rock formation	2
	Wreck	1
	Artificial reef	2
	Pebbles	1
	Sand	0
	Coastal detritic	1
	Mud	0
	Underwater canyon	2
Gear colonization	Stade 0	0
	Stade 1	-1
	Stade 2	-3
	Stade 3	-5
Trapped mobile species	0 individual	0
	1 à 2 individuals	2
	3 à 5 individuals	4
	> 5 individuals	6
Species fixed torn off	0 individual	0
	1 à 10 individuals	1
	> 10 individuals	2
Damaged fixed species	0 individual	0
	1 à 10 individuals	1
	> 10 individuals	2
Presence of remarkable species colonizing the gear	Yes	-1
	No	0
Remarkable species in the vicinity of the gear	Yes	1
	No	0
Engagement of the impact	0 m ² to 5 m ²	1
	5 m ² to 20 m ²	3
	> 20 m ²	5
Fishing capacity	Nil	0
	Small	2
	Large	4
Substrate abrasion	Nil	0
	Small	1
	Large	2
Obstructed crevices	0 crevice	0
	1 to 10 crevices	1
	> 10 crevices	2
Habitat creation	Yes	-1
	No	1
Total		-7 to 28

Assessing seascape impact

Seascape impact is assessed by 3 criteria with scores between -2 and 1 (Table 2). The maximum score that can be obtained is 4, it represents a very strong seascape impact (Table 2). The minimum score is -3, in this case it corresponds to a positive effect on the underwater seascape. The "seascape modification" criteria are based on the identification of a change in the seascape by the presence of a derelict gear. The perception of this change may be different depending on the nature of the gear itself. Indeed, a large net will be very visible, easily noticed and the seascape will inevitably be altered by its presence. On the other hand, since the program studies all fishing gear, a simple fishing line is more complicated to notice, much less visible and therefore less impactful with regard to one's perception of a seascape.

Table 2: Criteria for assessing the "seascape impact".

Criteria	Assessment	Scores
Seascape modification	No	0
	Yes	1
Adjective qualifying the gear	Neutral	0
	Negative	1
	Positive	-1
Topography	No changes	0
	Decrease of topography	2
	Increased of topography	-2
Total		-3 to 4

Site Usages

The risk to users is assessed according to 4 criteria which represents the main activities carried out off the coast: swimming, diving/snorkeling/spearfishing, sailing/mooring; and fishing. Scores for the first two criteria (swimming and scuba diving/snorkeling/ spearfishing) range from 0 if no activity to 3 if activity undertaken as there is a significant danger to humans (Table 3). The following two criteria (sailing/mooring and fishing) have scores ranging from 0 no activity to 1 activity occurs. The scores are lower for these activities because human life is not directly endangered. The "Site usages" will therefore get a score ranging from 0 to 8. A low score will indicate that there is no known usage where the derelict fishing gear is present. On the contrary, a high score will correspond to a site with multiple usages.

Table 3 : Evaluation criteria for the "site usages".

Criteria	Assessment	Scores
Swimming	No	0
	Yes	3
Scuba diving/snorkeling/ spearfishing	No	0
	Yes	3
Sailing/mooring	No	0
	Yes	1
Fishing	No	0
	Yes	1
Total		0 to 8

Technical difficulties

Technical difficulties are assessed through two criteria, with a minimum score of 0 and a maximum of 5 (Table 4). If the gear is shallow and not engaged, its rating will be minimal. Otherwise, if the craft is engaged at a depth deeper than 50 m, the technical difficulties will be maximum. It should be noted that the cost of removing fishing gear depends heavily on the time it takes professional divers to complete the task. Therefore, the deeper and more engaged the gear, the more costly the intervention will be due to the dangerousness and time spent underwater. The decision not to put actually “cost” as an evaluation criterion was made considering that technical difficulties is taken as proxy to the cost of the intervention.

Table 4 : Criteria for evaluating the "technical difficulties".

Criteria	Assessment	Scores
Depth	0 – 15 m	0
	15 - 30 m	1
	30 – 50 m	2
	> 50 m	3
Engagement	Low (0-10%)	0
	Medium (10-50%)	1
	Important (>50%)	2
Total		0 to 5

Calculating the Gear Removal Index (GRI) of derelict fishing gear

The derelict fishing gear removal Index (**GRI**) is calculated using the following formula:

$$GRI = I_e + I_l + R_u - D_t$$

with I_e : Environmental impact (ranking from -7 to 28)

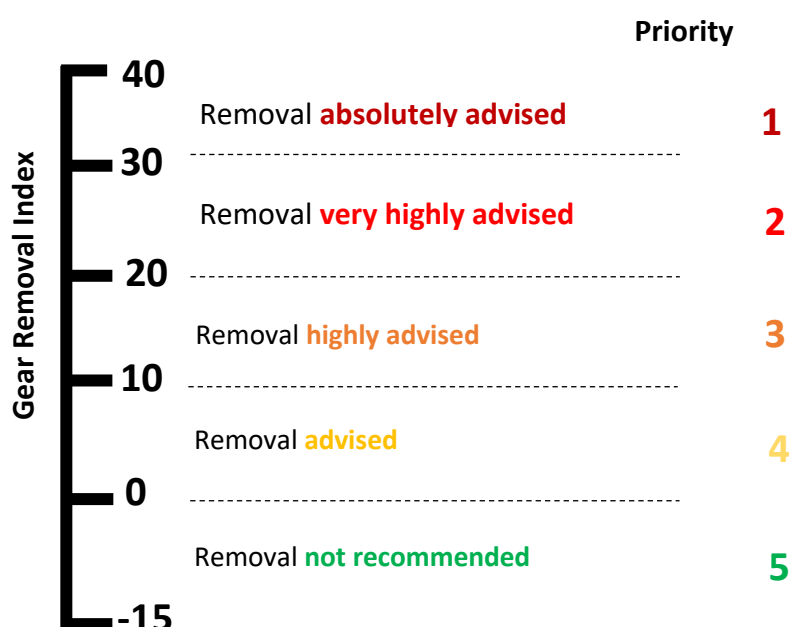
I_l : Seascape impact (ranking from -3 to 4)

R_u : Risk to users (ranking from 0 to 8)

D_t : Technical difficulties (ranking from 0 to 5)

GRI therefore corresponds to a theoretical value between -15 and 40. The higher the value, the more advisable it will be to remove the fishing gear. This index is an aid to the decision making and is in no way intended to replace the final choice made by local managers. It is also important to visualize which criteria have mostly influenced the index's score to make a thoughtful decision that is in line with the situation encountered. The GRI allows to classify the various fishing gear lost, thus allowing managers to decide on priorities keeping in line with funding available to carry out such operations. Decision making classes can be defined as follows:

- $30 < GRI < 40$ removal of the gear **absolutely advised, priority 1**
- $20 < GRI < 30$ removal of the gear **very highly advised, priority 2**
- $10 < GRI < 20$ removal of the gear **highly advised, priority 3**
- $0 < GRI < 10$ removal of the gear **advised, priority 4**
- $-15 < GRI < 0$ removal of the gear **not recommended, priority 5**



Level of priority to remove derelict fishing gear



Notes, drawing of the area:

Dimensions and characteristics

Depth:

Dimensions of the gear (width x Length:

Breadth of the impact:	0m ² to 5m ²	<input type="checkbox"/>	5m ² to 20m ²	<input type="checkbox"/>	> 20m ²	<input type="checkbox"/>
Fishing capacity:	Nil	<input type="checkbox"/>	Weak	<input type="checkbox"/>	Strong	<input type="checkbox"/>
Scouring of the substrate:	Nil	<input type="checkbox"/>	Low	<input type="checkbox"/>	Important	<input type="checkbox"/>
Obstructed crevices :	None	<input type="checkbox"/>	1 à 10	<input type="checkbox"/>	> 10	<input type="checkbox"/>
Habitat creation:	YES	<input type="checkbox"/>	NO	<input type="checkbox"/>		
Engagement:	Weak (0-10%)	<input type="checkbox"/>	Medium (10-50%)	<input type="checkbox"/>	Important (>50%)	<input type="checkbox"/>

Colonization :

Stage 0 :



Stage 1 :



Stage 2 :



Stage 3 :



Species attached to the gear	Size/number

Number of mobile individuals trapped:

None ☐

1 to 2 ☐

3 to 5 ☐

> 5 ☐

Trapped mobile species	Size/number	Stage (1 to 5)

1

Alive

2

Recent death

3

Partially decomposed

4

Skeleton visible

5

Flesh completely decomposed

Number of fixed individuals torn off:

None ☐

1 to 10 ☐

> 10 ☐

Species fixed torn off	Size/number	Remarks

Number of fixed individuals damaged :

None ☐

1 to 10 ☐

> 10 ☐

Damaged fixed species	Size/number	% necrosis	Biofouling

Presence of remarkable species :

colonizing the gear

Yes ☐ No ☐

near the gear

Yes ☐ No ☐

Seascape

Change in seascape :

No ☐

Yes ☐

Adjective qualifying the gear:

Negative ☐

Neutral ☐

Positive ☐

Topography:

Decrease ☐

No changes ☐

Increase ☐

Remarks

Posidonia

☐

Coralligenous

☐

Sublittoral

☐

Wreck

☐

Artificial

☐

Pebble

☐

Detritic

☐

Sand

☐

Mud

☐