



# Définition d'un Index Sonore comme outil d'aide à la décision dans le cadre de la DCSMM : cas d'étude en Atlantique Nord

Séminaire du collectif bruit sous-marin | 30 Juin 2022





# OBJECTIVES



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Noise in the Atlantic Seas

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Atlantic Area  
European Regional Development Fund



The aim of this presentation is to **illustrate** the **practical implementation** of the methodology and the results of the assessment of pressure and risk **indexes** to achieve Good Environmental Status.

The methodology and the associated tools has been share and are **compliant** with latest **TGNoise recommendations** and can be applied in **all oceans and seas** through the Quonops® Online Sound Mapping Platform.

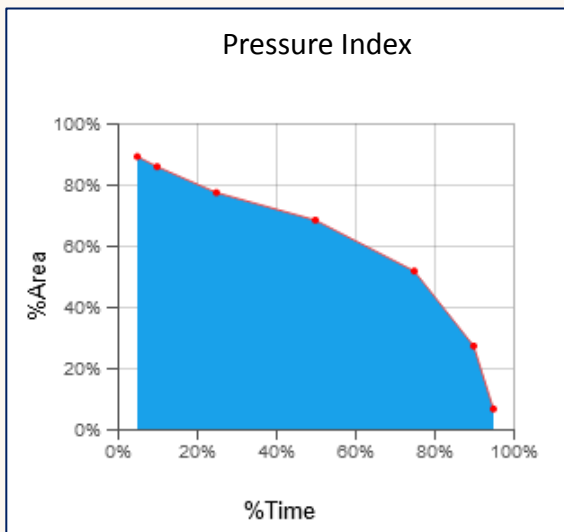


# PRESSURE & EXPOSURE INDEXES



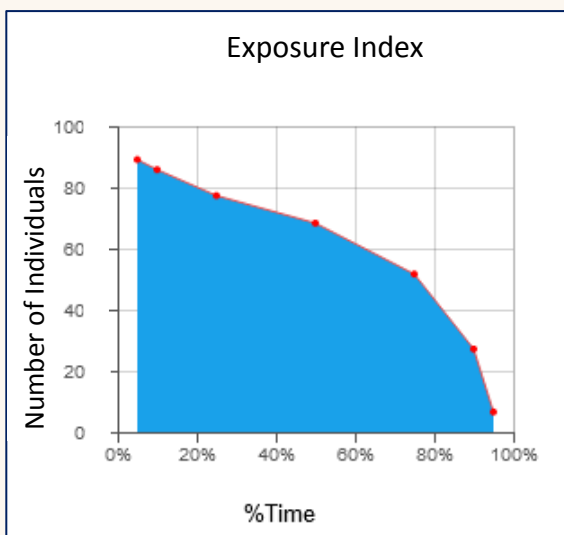
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## Pressure Index

Defined as a relationship between the proportion of **time** of exposure to a **level likely to induce an adverse effect** and the proportion of the **area** exposed to that level.



## Exposure Index

Defined as a relationship between the proportion of **time** of exposure to a **level likely to induce an adverse effect** and the estimated **number of individuals exposed** to that level.

As long as the sound maps are available, both can be calculated at various time resolutions:

- Day
- Week
- Month
- Quarter
- Year
- Multiple years

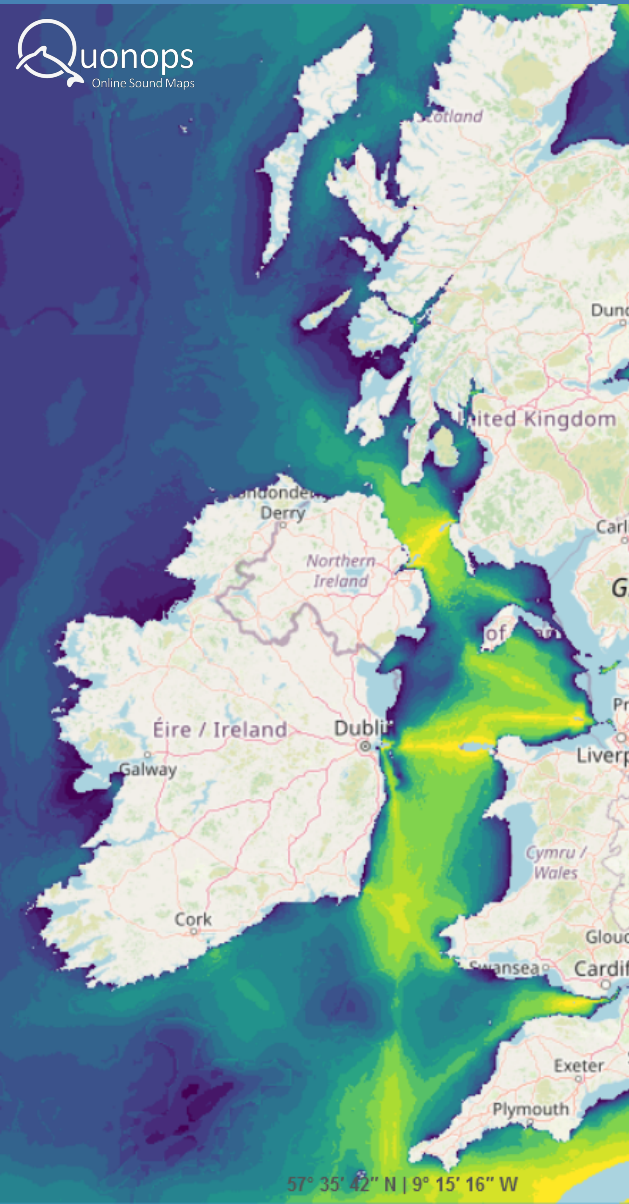


# WHAT EFFECTS DID WE ADDRESS ?



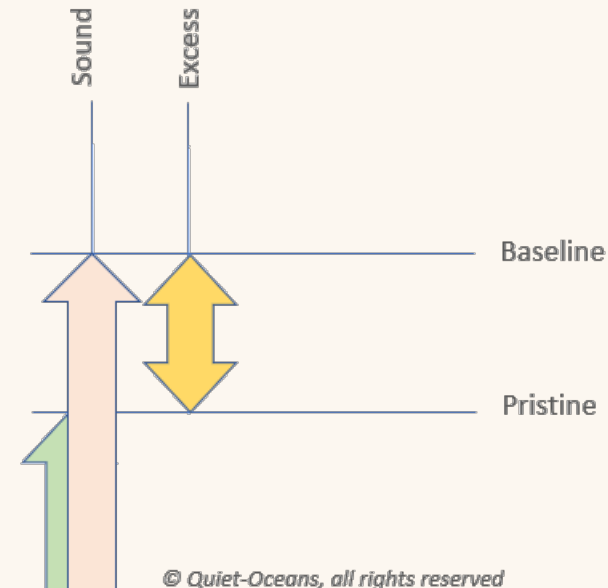
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In JONAS, two types of effects have been addressed :

- **Disturbance**, using the metric **Shipping and Wind Sound Pressure Level**
- **Masking**, using the metric **Excess Level (Shipping sound above Wind sound)**



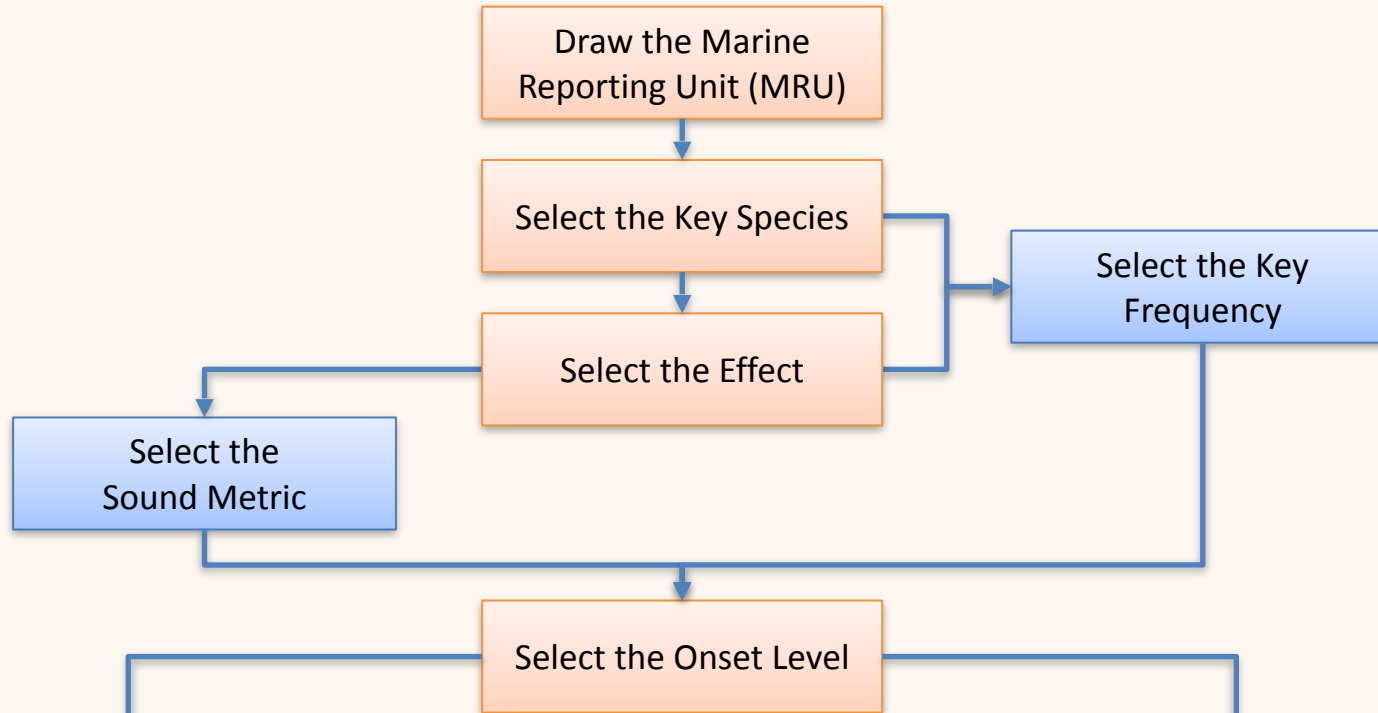




# WEB-BASED IMPLEMENTATION

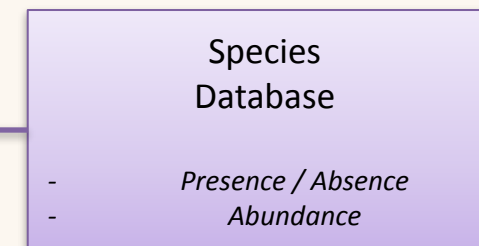
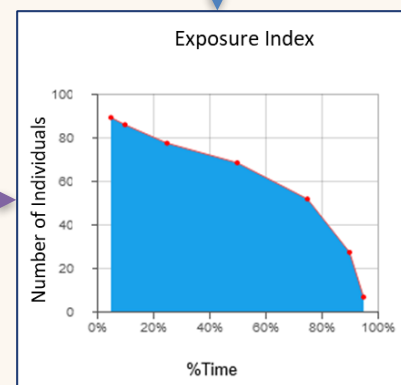
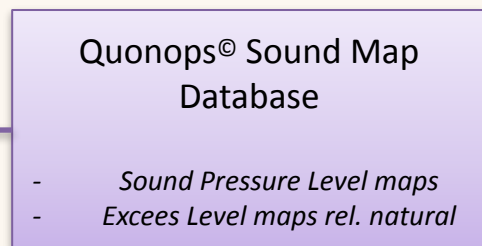
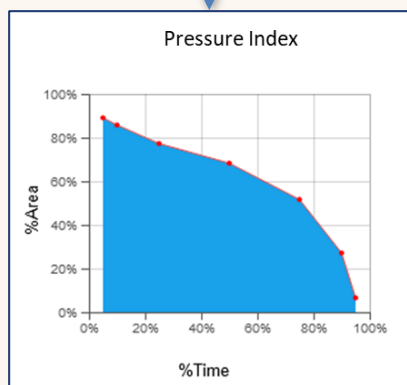


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The **user** is guided by the **web interface** through the **process** of defining the **key parameters** to get the **pressure** and/or **exposure index**.

Index calculation takes **a couple of minutes** for **one year** at **monthly resolution** in a **500x1000 km** Marine Reporting Unit.





# HIGH RESOLUTION AREAS



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Quonops®  
Online Services



6 regions are considered:

- Irish sea (Ireland/UK)
- Brittany (France)
- Bay of Biscay (France/Spain)
- Gibraltar (Spain/Portugal)
- Azores (Portugal)
- Canary Islands (Spain)

Modelling of shipping and wind sound performed for all 6 regions:

- 2019
- Monthly, Quarterly and Annual resolutions
- 7 percentiles (5<sup>th</sup>, 10<sup>th</sup>, 25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup>, 90<sup>th</sup>, 95<sup>th</sup>)
- Average resolution: 200m

Sound maps produced :

- Wind sound
- Shipping + wind sound
- Excess levels (shipping above wind sound)

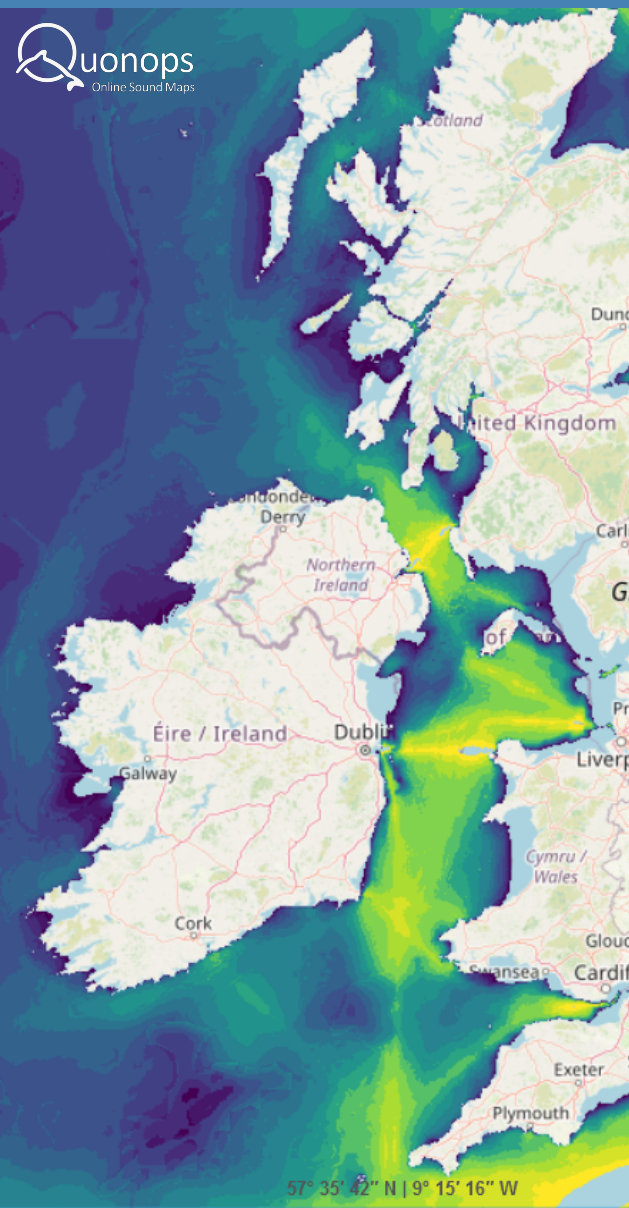


# SUMMARY OF SCENARIOS



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Scenarios are **defined by the user** based on the species presence/habitats in the MRU.

Area	MRU	Pressure	Time resolution	Target species	Key frequency	Effect	Acoustic Metric	Onset
Jonas 1	Irish Sea	Global Shipping	Month	Phoca	125	Severe Communication Loss	Exces Level	+20
	Irish Sea	Global Shipping	Quarter	Gadus	63	Disturbance	Sound Pressure Level	89
	Irish Sea	Global Shipping	Quarter	Phoca	125	Disturbance	Sound Pressure Level	92
	Belfast North Channel	Ferry	Month	Phoca	125	Barrier Effect	Sound Pressure Level	92
	Dublin Channel	Ferry	Month	Phoca	125	Barrier Effect	Sound Pressure Level	92
	Belfast North Channel	Ferry	Month	Globicephala & Tursiops	4000	Significant Communication Loss	Exces Level	+6
	Belfast North Channel	Ferry	Month	Phoca, Globicephala & Tursiops	125	Barrier Effect	Sound Pressure Level	92
Jonas 2	Iroise Marine Parc	Global Shipping	Month	Gadus	63	Significant Communication Loss	Exces Level	+6
	Iroise Marine Parc	Global Shipping	Month	Gadus	63	Severe Communication Loss	Exces Level	+20
	Ouessant Molene	Global Shipping	Month	Phoca	125	Significant Communication Loss	Exces Level	+6
	Brittany	Global Shipping	Quarter	Gadus	63	Disturbance	Sound Pressure Level	89
	Brittany	Global Shipping	Quarter	Phoca	125	Disturbance	Sound Pressure Level	92
	PNMI	Global Shipping	Month	Phoca	125	Disturbance	Sound Pressure Level	92
Jonas 3	Azores	Global Shipping	Quarter	-	63	Disturbance	Sound Pressure Level	89
	Azores	Global Shipping	Quarter	-	125	Disturbance	Sound Pressure Level	92
Jonas 4	Canary Islands	Global Shipping	Month	Balaenoptera	63	Significant Communication Loss	Exces Level	+6
	Ferry Route Gran Canaria Tenerife	Ferry	Month	Balaenoptera	63	Barrier Effect	Sound Pressure Level	89
	Ferry Route Gran Canaria Tenerife	Ferry	Month	Globicephala & Tursiops	4000	Significant Communication Loss	Sound Pressure Level	+6
Jonas 5	Gulf of Cadiz	Global Shipping	Month	Balaenoptera	63	Severe Communication Loss	Exces Level	20
	Gulf of Cadiz	Global shipping	Month	Balaenoptera	63	Significant Communication Loss	Exces Level	+6
	Gulf of Cadiz	Global Shipping	Quarter	-	63	Disturbance	Sound Pressure Level	89
	Gulf of Cadiz	Global Shipping	Quarter	-	125	Disturbance	Sound Pressure Level	92
	Strait of Gibraltar (Atl)	Global Shipping	Month	Balaenoptera	63	Strong disturbance	Sound Pressure Level	109
	Strait of Gibraltar (Atl)	Global Shipping	Month	Globicephala & Tursiops	4000	Significant Communication Loss	Exces Level	+6



# PRESSURE INDEX: Masking

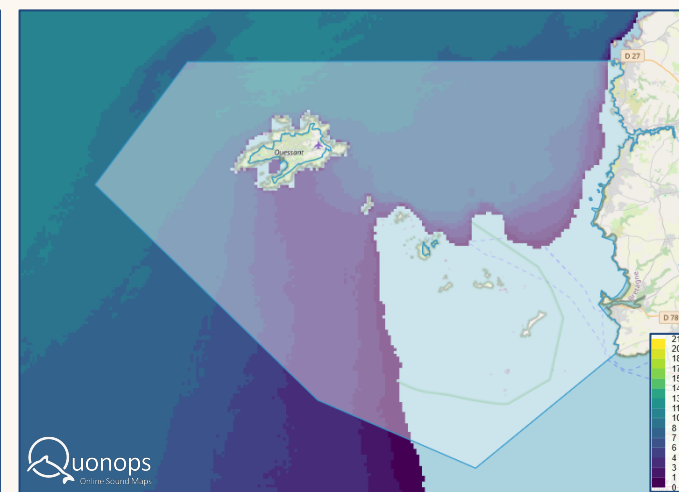
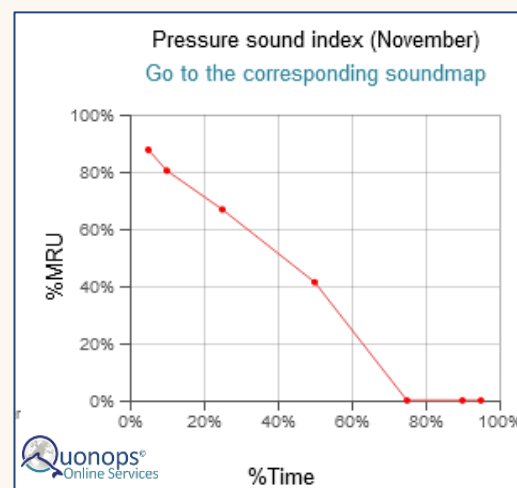
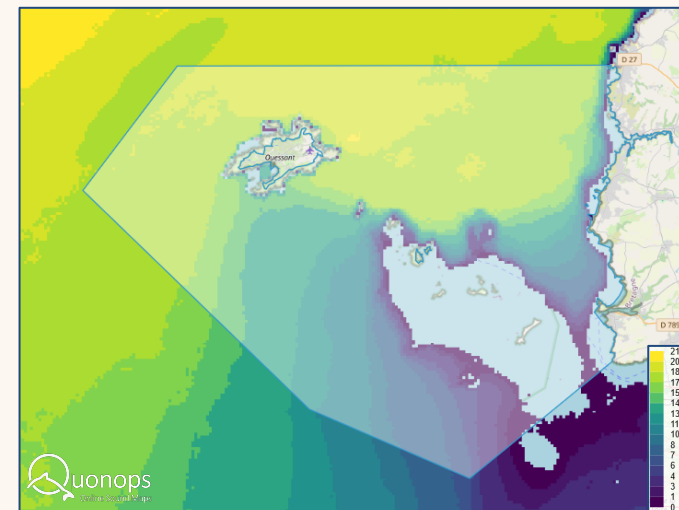
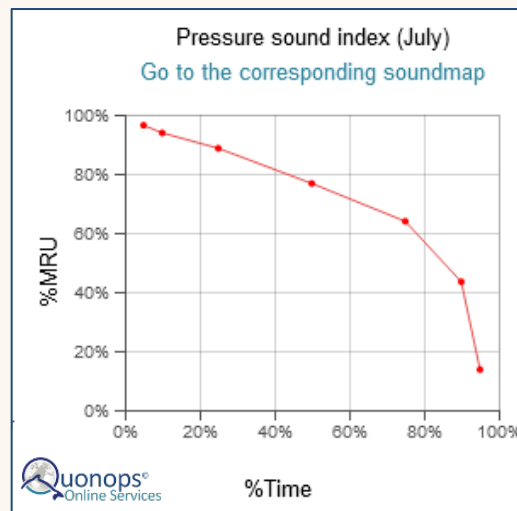


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Masking  
125Hz  
Ushant N2000  
Area  
*Percentage of the  
area that is  
exposed to an  
Excess Sound Level  
> 6 dB*







# PRESSURE INDEX: Masking for Phoca & Balaenoptera

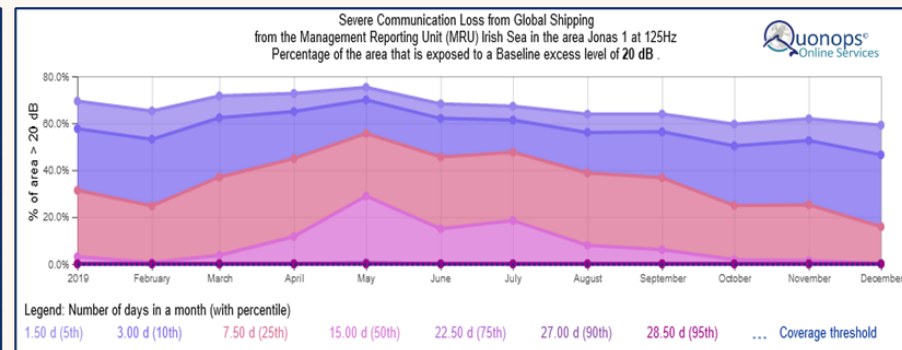
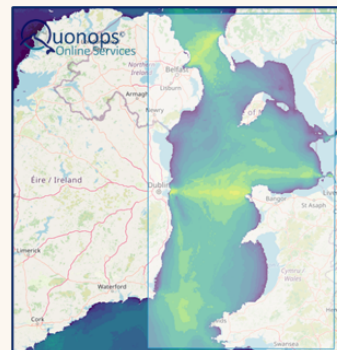


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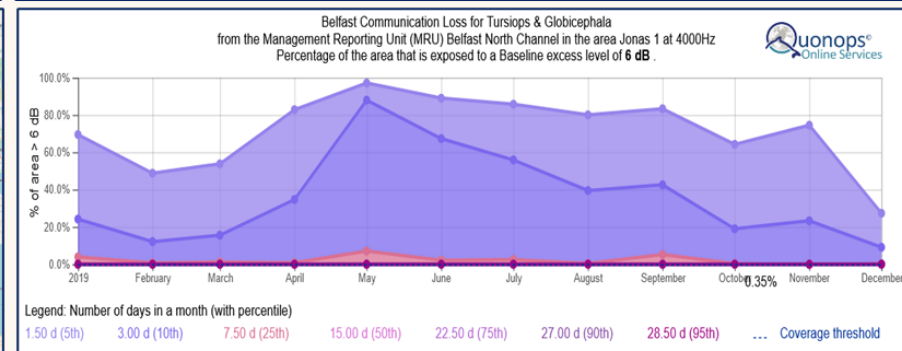
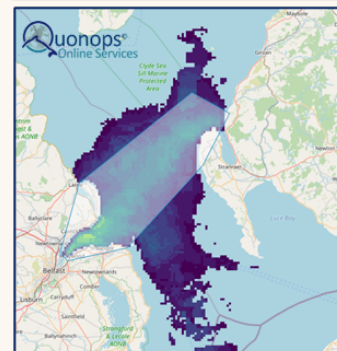
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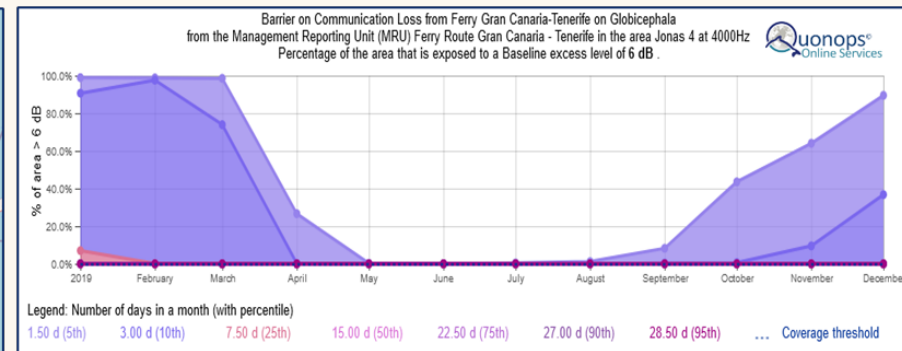
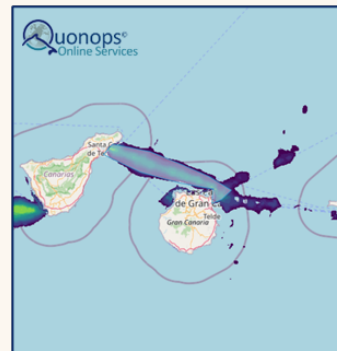
Severe Communication Loss from Global Shipping from MRU Irish Sea at 125Hz.  
*Percentage of the area that is exposed to a Excess noise level > +20dB*



Significant Communication Loss for Tursiops & Globicephala from MRU Belfast North Channel at 4kHz  
*Percentage of the area that is exposed to a Excess noise level > +6dB*



Significant Communication Loss from Ferries on Globicephala from MRU Gran Canaria - Tenerife at 4kHz  
*Percentage of the area that is exposed to a Excess noise level > +6dB*







# PRESSURE INDEX: Disturbance for Phoca & Balaenoptera

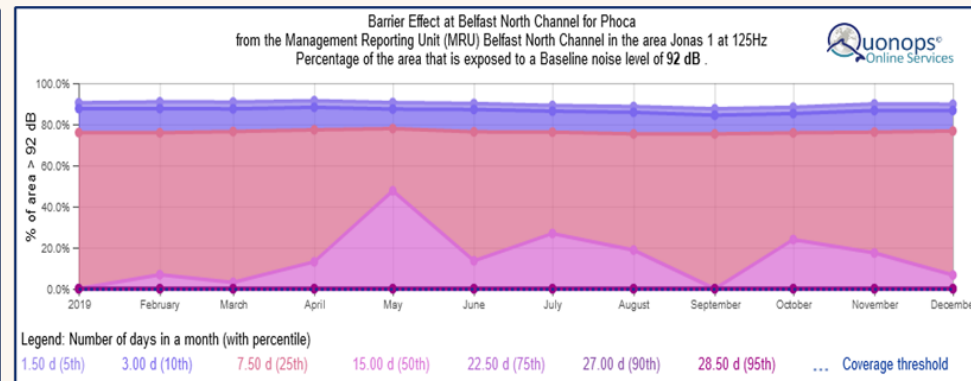
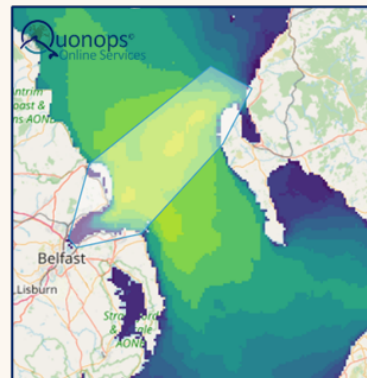


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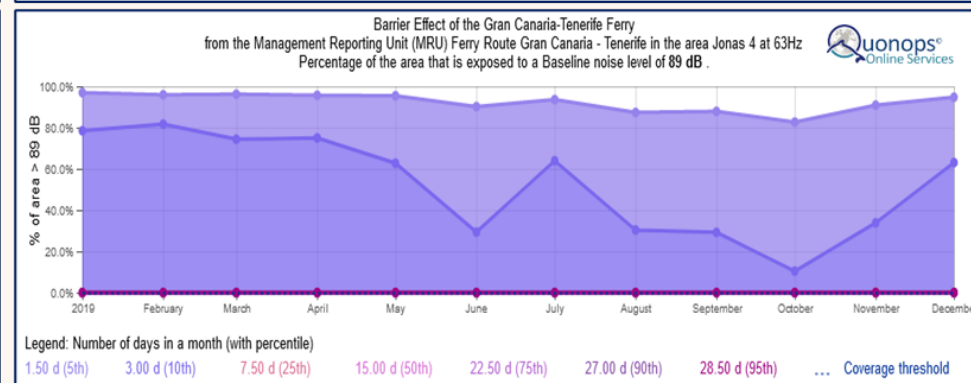
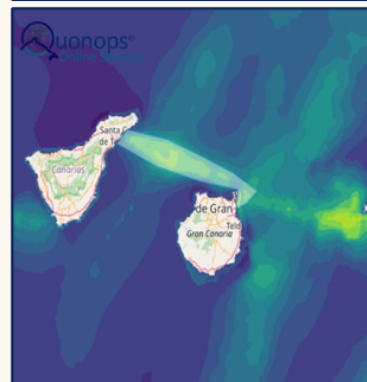
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Barrier Effect for Phoca  
from MRU) Belfast  
North Channel at 125Hz  
*Percentage of the area that  
is exposed to a Baseline  
noise level > 92 dB ref. 1μPa*



Barrier Effect on  
Balaenoptera from the  
MRU Ferry Route Gran  
Canaria - Tenerife at  
63Hz  
*Percentage of the area that  
is exposed to a Baseline  
noise level > 89 dB ref. 1μPa*





# EXPOSURE INDEX: Masking for Balaenoptera

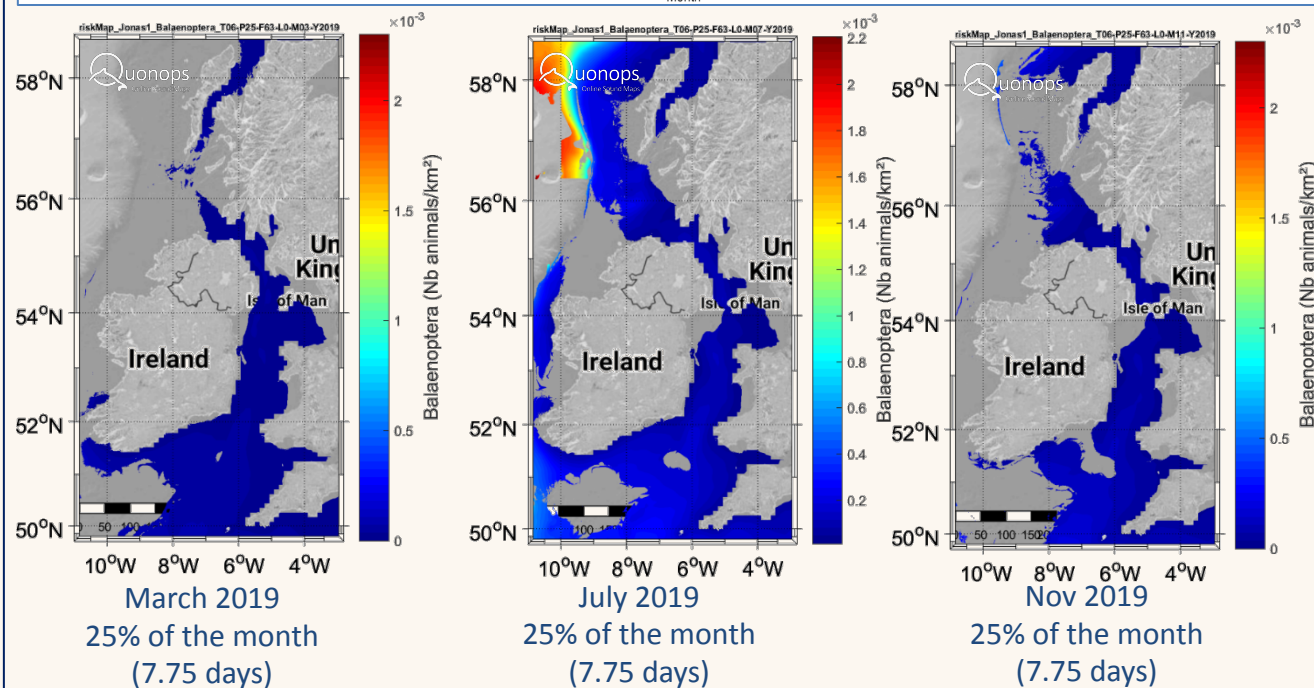
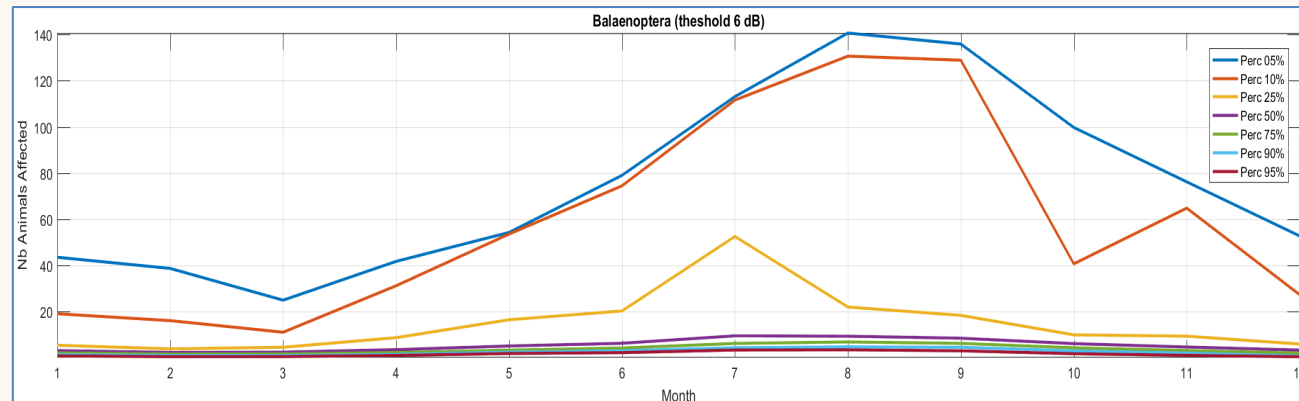


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Masking  
Balaenoptera  
63Hz  
Irish Sea  
*Percentage of the  
area that is  
exposed to an  
Excess Sound Level  
> 6 dB*







# EXPOSURE INDEX: Masking for Balaenoptera

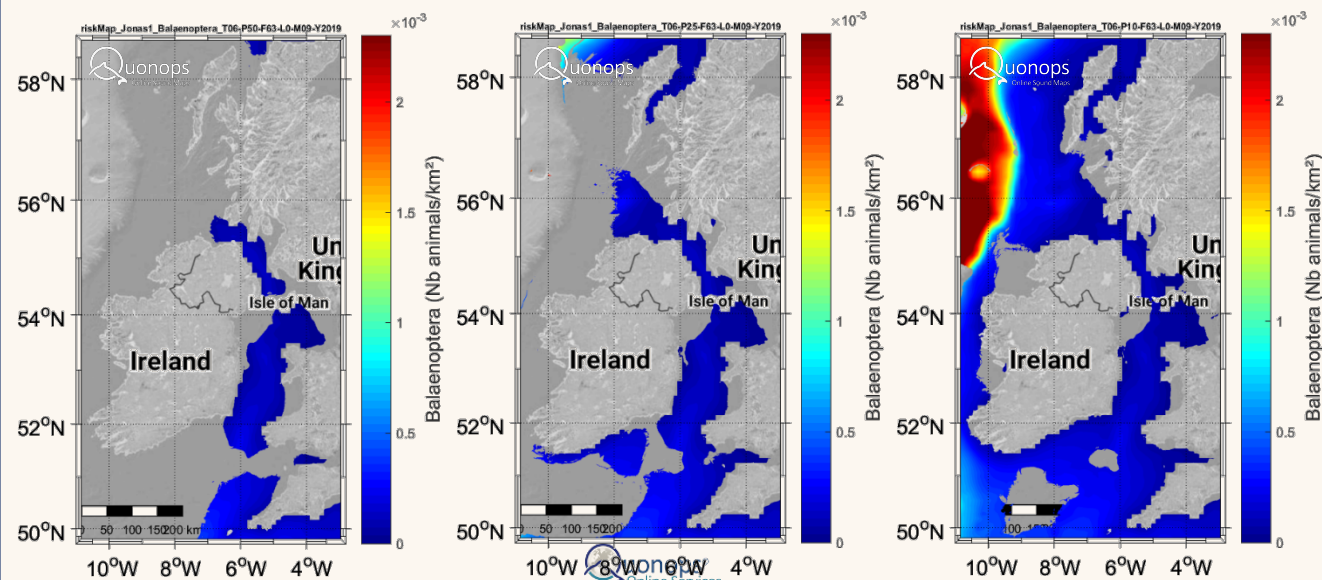
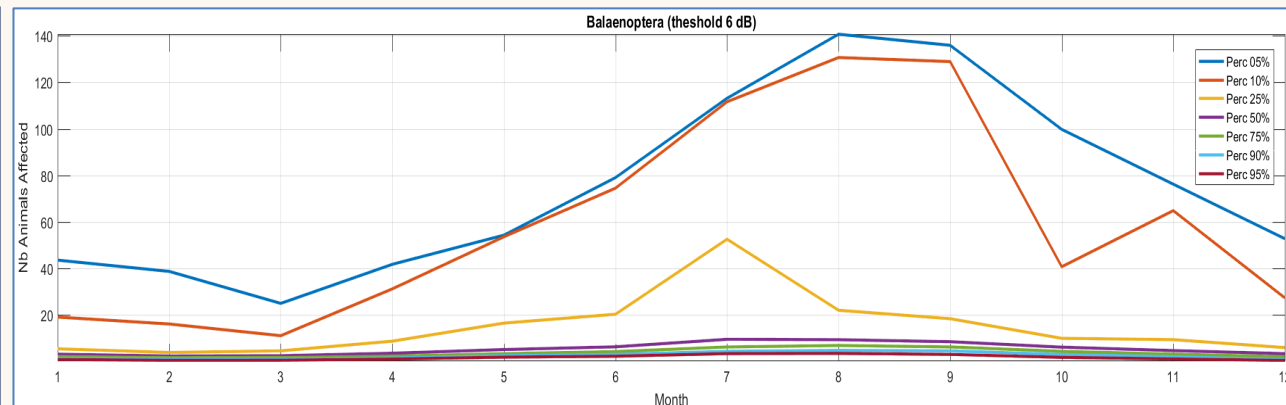


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Masking  
Balaenoptera  
63Hz  
Irish Sea  
Percentage of the  
area that is  
exposed to an  
Excess Sound Level  
> 6 dB



Sep 2019  
50% of the month

Sep 2019  
25% of the month

Sep 2019  
10% of the month



# EXPOSURE INDEX: Masking for Tursiops



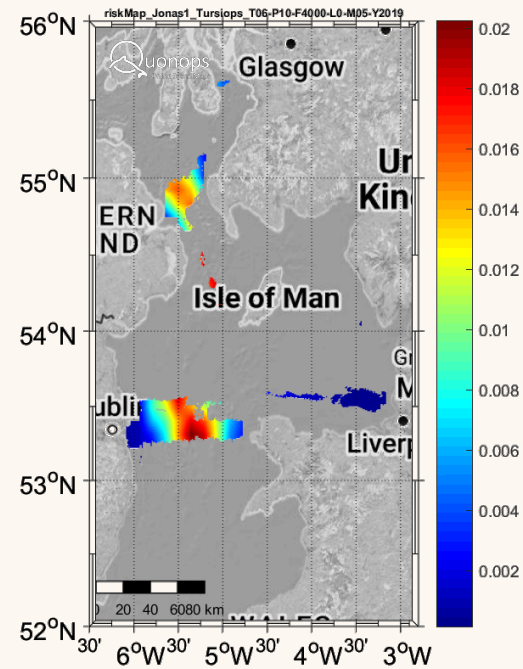
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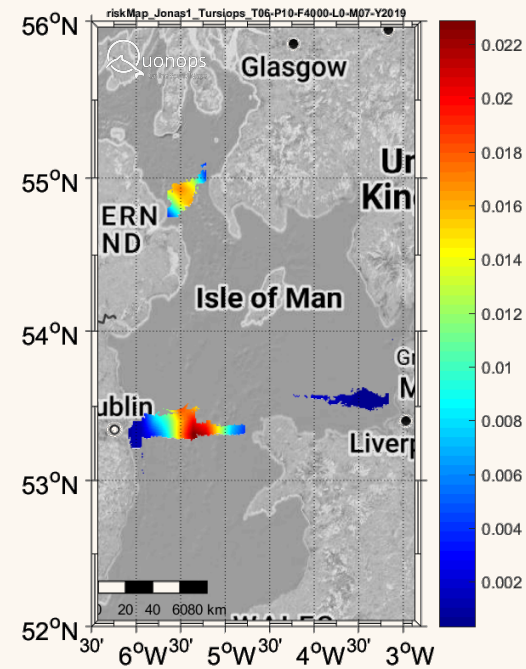


Masking  
Tursiops  
4kHz  
Irish Sea  
*Percentage of the  
area that is  
exposed to an  
Excess Sound Level  
> 6 dB*

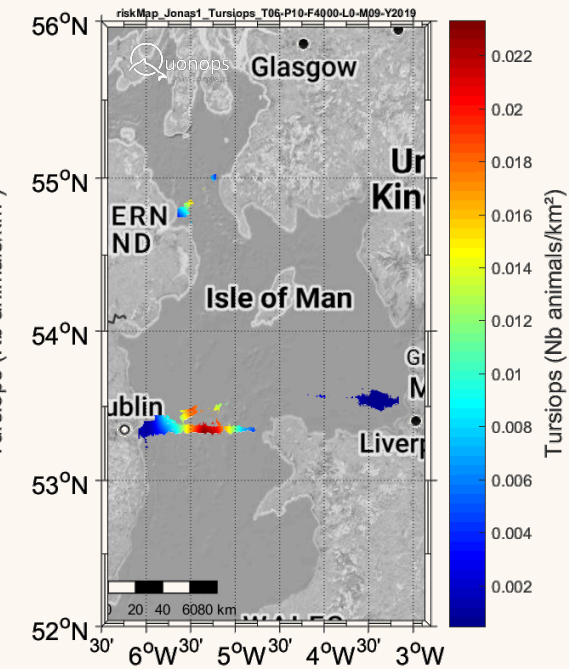
May 2019  
10% of the month  
(3 days)



July 2019  
10% of the month  
(3 days)



Sep 2019  
10% of the month  
(3 days)







1- A web-based **on-demand platform** has been successfully developed into the *Quonops®* *Online Services* platform to **assess regional pressure** and **exposure indexes** based on statistical regional sound maps.

2- The methodology/tool is compliant with TG Noise recommendations. It is **fast** and **flexible** for **non-expert users** to **adapt the assessment to the local conditions** through a **friendly** web-based interface:

- The Marine Reporting Unit (MRU)
- The key species
- The effects of concern (disturbance, masking)
- The onset levels
- Tolerable duration / Tolerable impacted area

3- The online tool has been used to evaluate pressure and risk indexes on a number of Management Reporting Units **across the North-East Atlantic region**. Pressure and exposure indexes for **disturbance**, **barrier effect** and **masking** have been assessed.

4- They seems suitable to set objectives, acceptable thresholds and targets. The tool is **ready to be used** as decision aid on setting Good Environmental Status on **all European waters**.





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## THANK YOU

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We look forward to engaging with you. Contact us at : [jonas@ucc.ie](mailto:jonas@ucc.ie).

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