SOCIO-ECONOMIC STUDY OF THE IMPACT OF THE MARGIN OF TOLERANCE ON THE FRENCH TROPICAL TUNA FISHERY

State of play, issues and risks

PREAMBLE

Rinzen was commissioned by Orthongel to evaluate the socio-economic impacts of the margin of tolerance on the French tropical tuna fishery.
Rinzen was completely independent in the conduct of this study. The statements made here are the sole responsibility of Rinzen.

ORTHONGEL

ORTHONGEL is the French organisation of frozen and deep-frozen tuna producers (association under the 1901 law created in 1973). As a producers' organisation as defined in Regulation (EC) No 1379/2013 of the Parliament and the Council, one of its missions is to represent, defend and promote the general interests of shipowners of tropical freezer tuna vessels and deep freezers (in particular with the French and Community authorities).

Orthongel groups together all the French tropical tuna fishing companies, namely the Compagnie Française du Thon Océanique, Via Océan and Sapmer S.A. as well as the Italian company Industria Armatoriale Tonniera, i.e. a fleet of 21 vessels (10 operating in the Atlantic Ocean and 11 in the Indian Ocean), for an annual production of around 110,000 t and a turnover of €150 million (average 2019-2021).

www.orthongel.fr

RINZEN

Rinzen is a research firm specialising in quantitative economics founded in 2015 by Pierre Bentata. Its activity is focused on three areas: regulatory impact analysis, sectoral and macroeconomic forecasts and damage assessment in the context of litigation.

Whatever the field of intervention, Rinzen develops econometric and statistical analyses based on the most recent advances in academic research in order to provide intelligible and operational results to economic and legal actors.

SYNTHESIS

Tropical tuna fishing by Orthongel members is a major activity in French fishing, both in terms of the jobs supported and the contribution to the economic fabric of suppliers. However, this activity remains fragile, exposed to global competition, the volatility of exchange rates and fuel costs, as well as to the random volumes of catches inherent to high-sea fishing.

This already delicate balance is now threatened by another source, this time regulatory. Indeed, the European "control" regulation requires each vessel not to have a difference of more than 10% between the estimated volume at the time of fishing and the quantities landed for each species caught. However, due to technical and operational constraints, it is impossible for vessels to comply with this regulation.

In addition to the above-mentioned constraints, these regulations and the inevitable sanctions they entail clearly jeopardize the entire activity, and with it the socio-economic ecosystem that depends on it.

The present study makes it possible to estimate that the application of the "control" Regulation as it stands threatens the economic viability of this fishery in the very short term. **Thus, from 2026 onwards, the detentions will cause unbearable losses for the vessels concerned and will directly threaten 1,600 French jobs.**

KEY FIGURES

3 companies representing **20 fishing vessels**

1,588 French jobs supported

604 direct jobs

984 indirect and induced jobs

Not including **679** jobs abroad

-5% of turnover since 2018

38 million euros of investment since 2018, **42%** of which in Brittany

In the event of the forced immobilisation of a tuna vessel **870,000 euros average loss** per month,

12% of a ship's annual net profit

1. CONTEXT OF THE STUDY

The tropical tuna fishery is subject to specific regulations concerning the estimation of the composition of tuna catches, European Regulation "control" n°1224/2009. As several species may be fished simultaneously, the captain of each vessel is required to assess the composition of his catch at each haul.

This regulation results in the application of a margin of tolerance requiring each vessel not to have a difference of more than 10% between the estimated volume at the time of fishing and the quantities landed for each species caught. **However, due to technical and operational constraints, it is impossible for fishing vessels to comply with this regulation**. As a reminder, the previous regime was based on a 10% margin of tolerance on the volume fished.

In the event of non-compliance, the offending vessel may be penalized by a monetary fine as well as by the allocation of penalty points. These penalty points are accumulated from one infringement to the next and beyond a certain number of points, may lead to the temporary detention of the vessel (see Rural and Maritime Fishing Code Art R946-18).

In order to estimate the impact of this measure on the economy of tropical tuna fishing for Orthongel's members, an assessment of the socio-economic contributions of Orthongel's member vessels is first carried out (Part 2). A statistical analysis is then carried out to estimate the risks posed by this regulation on the activity by calculating the probability for a vessel, and then for the entire fleet concerned, of being condemned to temporary detention (Part 3). Finally, thanks to all this data, it is possible to assess the consequences of a detention that would ultimately sanction non-compliance with this margin of tolerance (Part 4).

2. TROPICAL TUNA FISHING SUPPORTS 1,588 JOBS IN FRANCE ALONE AND GENERATES AT LEAST 2,059 JOBS IN TOTAL

2.1. Preliminary observations: a sector under pressure

Over the last three years, the tuna fishing activity has been loss-making. Only two members of Orthongel have had a year of profit between 2018-2021. This is mainly due to a combination of lower sales prices and a reduction in the volumes fished. **Between 2018 and 2021, sales prices fell by 4% and the volumes fished fell by 5%.**

Despite this unfavorable context, the shipping companies have shown a desire to preserve jobs and maintain a high level of investment. **While their turnover fell by an average of almost 5%, employment fell by only 2%.** At the same time, the shipping companies continued their investment efforts, with more than **38 million euros invested in the renovation and modernization of their fleet.**

As a result, in order to cope with a drop in turnover, shipping companies have significantly reduced their current expenditure (-23% over the period). This decline was accompanied by a

reorientation of expenditure towards France: while purchases from outside Europe fell by 45% over the period, European purchases remained stable and purchases from France increased by 6%. Furthermore, purchases from Reunion and Brittany increased by 33% and 34% respectively.

Such results are akin to a long-term strategy aimed at improving the performance of the fleet, while maintaining employment in the sector, and strengthening relations between shipping companies and European suppliers.

2.2. Estimated employment generated by the activity

According to the data provided by Orthongel members, the shipping companies directly employ 966 people in their tropical tuna fishing activity, of which 604 seafarers residing on French territory (90% are seafarers, 10% are sedentary workers).

This is an estimate based on data provided by two of the three Orthongel member companies. Due to a lack of information on the third, it was necessary to estimate the volume of its workforce. To do this, the jobs declared by the two companies that provided information in the questionnaire were adjusted by assuming that the volume of employment was proportional to the volume of fishing and the wage bill; this information was provided by the three companies.

In addition to these direct jobs, the fishing activity of Orthongel's members indirectly generates employment through their current and capital expenditure.

These expenditures create activity in other companies which allows them to maintain their level of employment or to hire new employees. Similarly, the wages paid to seafarers and shore workers are partly spent in other companies, again generating job-creating activity (*see Box Input-output model*).

From the data provided by the shipping companies, these indirect jobs - via current expenditure and investments - and induced jobs - via the consumption of employees - are estimated for recent years.

2.2.1. Over the last 4 years, the investments of Orthongel members have generated at least 140 jobs in France, of which 116 in Brittany.

Over the last 4 years, armaments have invested more than 38 million to modernise and renovate their fleet. More than 60% of the expenditure has been made in Europe, and Brittany has accounted for 42% of this expenditure.

In total, the investments indirectly generated the creation of 140 jobs in France, 116 of which were in Brittany.

*Figure 1: Distribution of investment expenditure by region*
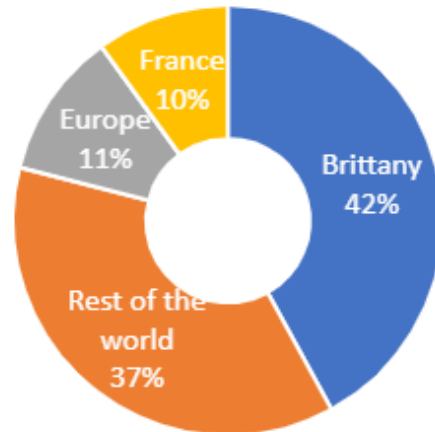
2.2.2. Current expenditure supports 672 jobs annually, of which 508 are in Brittany

More than half of the current expenditure relating to tropical tuna fishing is made in Europe, 39% of which is in France.

Thus, in 2021, Orthongel members spent nearly 65 million euros in current expenditure with companies located in Europe, of which more than 48 million were in France.

Brittany accounted for almost 34 million euros of current expenditure, i.e. 28% of all this expenditure. On the French territory, this expenditure enabled 672 jobs to be maintained or generated, including 508 in Brittany.

Figure 2: Distribution of current expenditure by region
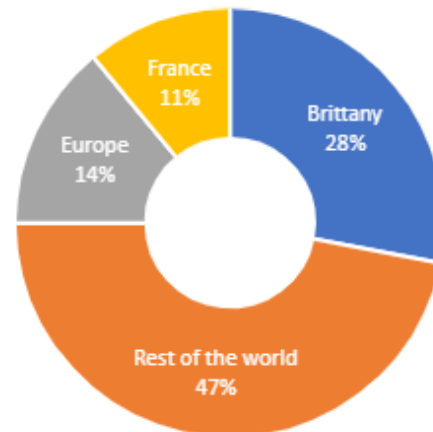
Box. Estimating the benefits for the European economy outside France

As the model used to estimate indirect job creation is specific to France, it is not possible to accurately assess the impact on employment at the European level.

However, assuming that the economies of European neighbours are similar to that of France, the sums spent or invested in these markets would support at least:

- 155 direct jobs through investment
- 94 direct jobs through expenditure

2.2.3. The consumption of the 604 French employees supports 172 jobs annually in France.

Considering that the consumption habits of the employees, both seafarers and sedentary, are similar to the average of French households in 2021 - as described by INSEE - the employees of Orthongel's member shipping companies have created and supported 172 jobs in France annually.

2.2.4. Balance of jobs generated and supported

Thus, **the tropical tuna fishing** activity indirectly supports 984 jobs in France alone, including 624 in Brittany, to which must be added the direct French jobs, i.e. **a total of 1,588 jobs on French territory.**

Taking into account non-French employees, **this means that the shipping companies generate or support, directly and indirectly, at least 1,950 jobs**. And for the territories as a whole, this implies that armaments generate or support, directly and indirectly, at least 2,059 jobs, without estimating the jobs created or supported outside Europe.

Furthermore, shipping activity generates 4.7 million euros in tax revenue in France each year, including 2.2 million euros in local taxes (CVAE, CFE, property tax and transport payments), 55% of which is collected in Brittany.

Figure 3: Indirect and induced jobs generated by the tropical tuna fishing activity of Orthongel members

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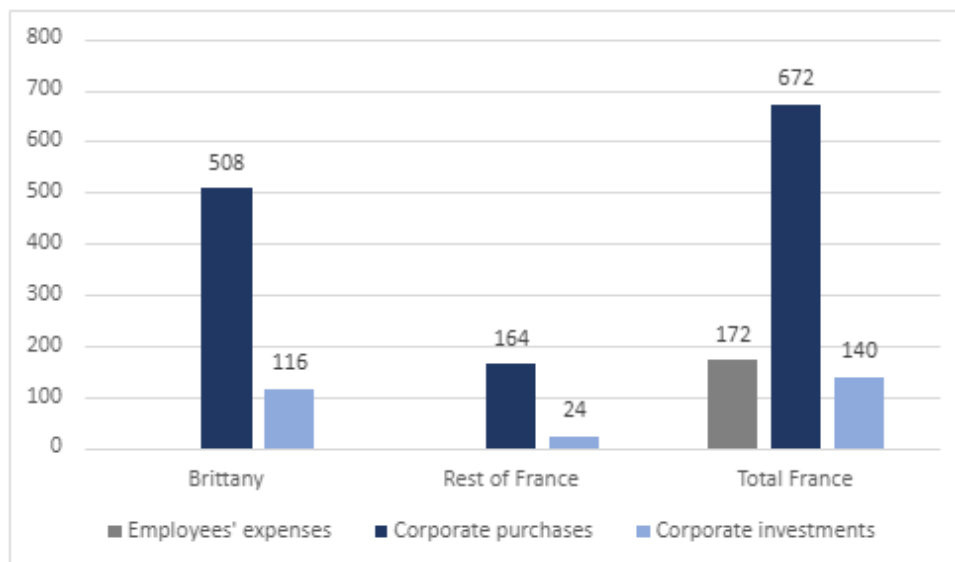
Box - Input-output model

Rinzen uses an economic impact model developed in collaboration with Asterès. This model makes it possible to analyse the impact of the activity of a company or group of companies on the French economy as a whole. Companies create wealth directly (in particular job creation, value added, tax payments), but also indirectly, through the knock-on effects that their activity has on the economy as a whole.

The construction of this model is based on the INSEE input-output matrices and adopts a methodology commonly used in economics*. These matrices make it possible to know how an expenditure impacts the other sectors of the French economy. From these matrices, it is notably possible to estimate the amounts that 'leak out' of direct economic activity, notably via household savings and imports.

The model measures the effect of three types of expenditure by companies: wage payments, investment and current expenditure by companies (intermediate consumption). The spillover effects of these three types of expenditure are calculated monthly over a four-year period (the year in which these expenditures are made and the following three years). The model theoretically allows impacts to be estimated beyond four years, however it appears that after four years the effects are so small that they no longer have a significant economic impact.

The model also estimates the taxes generated by the spillover effects of the companies studied over four years. In order to calculate the taxes calculated directly by the companies (corporate tax, production tax), it is based on the additional value added generated by the initial expenditure (wage payments, current expenditure and investment). The model also allows for the estimation of additional VAT generated by the spillover effects of business expenditure.

* Several scientific studies and economic reports use this 'input-output' approach to estimate the impact of a regulatory or fiscal change on a sector or the economy as a whole. See in particular: Quirion P, L'effet net sur l'emploi de la transition énergétique en France : Une analyse input-output du scénario NégaWatt, 2013; Lelarge C, (2019): "Quantifying the Price and Competitive Effects of Corporate Taxes", CEPR Working Paper, 2019; Caliendo L & Parro F, "Estimates of the Trade and Welfare Effects of NAFTA", Review of Economic Studies, 82(1): 1-44, 2015; Blaum J, Lelarge C & Peters M, "The Gains from Input Trade with Heterogeneous Importers", American Economic Journal: Macroeconomics, 10(4): 77-127, 2018.

3. **IMPACT OF THE MARGIN OF TOLERANCE ON THE PROFITABILITY AND SUSTAINABILITY OF THE BUSINESS: A RISK TO THE SURVIVAL OF ARMAMENTS OVER THE NEXT 3 YEARS**

3.1. **Estimation of the risk of being sanctioned for infringement of the margin of tolerance**

Based on the data provided by the shipping companies, the risk of being sanctioned for infringement with the margin of tolerance was estimated (see annexes).

To do this, the number of infringements and penalties were listed for the period 2019-2021, for each vessel and for each year. As the fleet is composed of 20 French vessels operating over

3 years, 60 situations representing a pair of 1 vessel-1 year were observed. The number of annual infringements per vessel fluctuates greatly.

Indeed, some vessels had no infringements in a year, while others had more than 10 infringements in a year. In 38% of cases, the vessel was not in breach and did not receive a sanction in the year observed. In 21% of cases, the vessel was in breach once during the year, in 16% of cases the vessel was in breach twice, in 2% of cases it was in breach three times and in 5% of cases it was in breach four times. Finally, in 19% of cases, it was in breach at least 5 times.

3.2. Estimate of the probability of a vessel being detained in the next few years

In total, a ship with no penalty points in 2022 has a 45% chance of being detained for at least 1 month in 2024 and a 90% chance in 2027. Furthermore, it is clear that as the years go by, the chance of being detained for a long-time increases. Indeed, from 2027 onwards, a ship is more likely to be detained for 2 months than for 1 month.
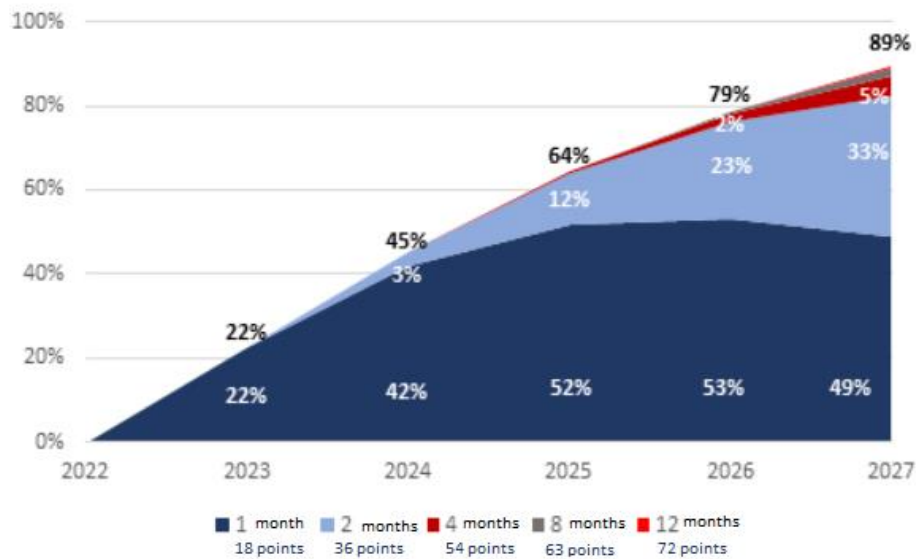
Assuming that this probability applies equally to all ships in the fleet, 4 ships would be detained for 1 month from 2023, 8 in 2024 and 10 in 2025 and 2026. In addition, 2 vessels would be detained for 2 months in 2025 and 6 in 2027. Finally, 1 vessel would be detained for at least 4 months in 2027.

Chart 1. Number of ships detained and duration of detention by year*

	2022	2023	2024	2025	2026	2027
1 month	0	4	8	10	10	9
2 months	0	0	0	2	4	6
4 months	0	0	0	0	0	1

* There is a non-zero probability that a ship will be detained for more than 4 months, but as this probability is less than 2%, it is assumed that no ship will be affected by such a sanction.

Figure 4. Probability of getting 18 points or more in the next few years

1 month 18 points **2 months** 36 points **4 months** 54 points **8 months** 63 points **12 months** 72 points

4. IMPACT OF PENALTIES ON THE SOCIO-ECONOMIC BALANCE OF SHIPPING

4.1. Hypotheses on the reaction of vessels to the detention of part of their fleet

The fact that a vessel is detained necessarily leads to losses for the fishing activity. In order to estimate these fisheries, three assumptions were made:

– **Identical economic weight for all vessels**. It is assumed that each vessel of the three Orthongel member companies has the same economic weight. Based on the data provided by the companies, a "typical" vessel was constructed. This vessel has a fishing volume, operating costs and a net profit representing the average of these variables for the twenty vessels observed. Thus, each vessel represents one-twentieth of the total turnover, costs and net profit of the three companies, for the tropical tuna fishing activity.

– **Identical economic weight of each fishing month.** It is assumed that one month of immobilisation results in a loss of one twelfth of the annual turnover generated by a vessel. It should be noted that this assumption does not take into account the additional cost of restarting and cleaning the vessel.

– **Economic strategy of the shipping companies**. It is assumed that fishing companies adapt their fishing activity according to the size of the losses resulting from the detention of their vessels. Four cases are distinguished:

1) **Moderate losses**. If the capitalization results in a loss of less than or equal to 15% of their payroll or current expenditure, the armies reduce these in order to return to the same net result as they would have had without the capitalization. In other words, they reduce their expenses in proportion to the decrease in turnover caused by the detention of the vessel.

2) **Severe losses.** If the capital asset results in a loss of more than 15% of their payroll or current expenditure, the shipowners reduce their current expenditure, payroll and investment to return to a net result equivalent to what it would have been without the capital asset. In this case, shipping companies lay off seafarers and shore-based workers.

In both cases, it should be noted that the results do not take into account the fact that the regulations impose a minimum number of seafarers per vessel, which could force shipping companies to cease their activities even if a reduction in the wage bill could in theory keep them in financial equilibrium.

3) **Bankruptcy**. If the tie-up represents a loss of more than 25% of their payroll or current expenditure, the shipping companies are in a situation where the amount of the loss exceeds their net profit. In this case, the activity is no longer sustainable. In fact, in order to return to a positive result, the shipping companies would have to fish the same volume as today by spending only 75% of their current expenses. In other words, the activity is no longer profitable and the fixed assets condemn the fishing companies to bankruptcy.

4.2. More than 500 jobs at risk in 2025, a risk of disappearance of armaments as early as 2026

The inmobilisation of a vessel for one month results in an average loss of turnover of 868 million, which is equivalent to **12% of the net result** for all shipping companies[1]. However, the immobilisation for one month only represents an average fuel saving of 150 thousand euros and incurs additional costs for restarting. In order to maintain the profitability of the activity, each immobilisation must be accompanied by a reduction in other charges and investment expenditure.

As a result, according to the assumptions made above, after one year, **the loss relating to the immobilisation of vessels represents 8% of the wage bill and 48% of the net result of shipping companies**. In order to compensate for this loss, **it would be necessary to reduce current expenditure and lay off seafarers**, which would amount to the destruction of 73 jobs in France and 148 worldwide.

Chart 2: Impact of vessel detentions on the profitability and sustainability of the activity

	2023	2024	2025	2026	2027
Number of months of downtime*	4	8	14	18	27
Losses (thousands of euros)	3 474	6 949	12 160	15 635	20 847
Loss as % of turnover	-1.7%	-3.3%	-5.8%	-7.5%	-10%
Loss as % of payroll	-8%	-15%	-27%	-34%	-46%
Loss as % of result	48%	96%	168%	216%	289%

* For all 20 vessels observed. This is the cumulative months of detentions as previously estimated and presented in Table 1.

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[1] The estimate does not take into account the additional costs of restarting the business. It merely observes the impact of the decrease in turnover related to the asset on the result, assuming no change in operating costs.

From 2025 onwards, **the losses related to fixed assets represent 27% of the wage bill and 168% of the net result**. To compensate for this loss, the wage bill and current expenditure would have to be reduced by more than a quarter, which seems impossible. However, assuming that the armaments industry could have the same volume of activity as today with only 75% of its current expenses, this reorganisation would represent a destruction of 331 jobs in France and 669 jobs worldwide.

By 2026, the loss related to fixed assets represents 34% of the payroll and 216% of the net result. At this level of loss, no reorganisation of the business appears possible from an economic point of view. Therefore, the only solution to limit the losses is to stop the activity.

Thus, **even assuming that shipping companies are allowed to reduce the number of seafarers per vessel**, which is contrary to the regulations in force, **the award of penalty points for infringement of the margin of tolerance would take about four years before the shipping companies would go bankrupt.**

Chart 3: Impact of fixed assets on direct, indirect and induced employment supported by the activity

	2023	2024	2025	2026	2027
Job losses (in volume)					
France	73	147	258	Disappearance of the activity	
World	148	297	505		
Job losses (in%)					
France	4%	9%	16%	Disappearance of the activity	
World	7%	14%	25%		

ANNEX

1. Data collection

In order to evaluate the socio-economic impact of French tropical tuna fishing companies, a questionnaire was sent to Orthongel, comprising 5 sections:

– Employment and wage bill relating to tropical tuna fishing activity. The aim was to identify the number of employees, their professions (seafarer or sedentary), their salaries and the evolution of these variables since 2018.
– Current expenditure and purchases. Referencing each of the current expenditures made since 2018.
– Investment. Referring to each of the capital expenditures made since 2017.
– Financial data. Providing details of quotas, turnover, expenses and net result of the activity.
– Infringements. The aim was to reference, for each vessel, the number of infringements and points gained for non-compliance with the margin of tolerance, over the years 2018-2021.

2. Estimating the probability of immobilisation

In order to estimate the probability of being awarded penalty points, it is assumed that each infringement results in 3 points being awarded. Thus, the probability of a ship being awarded 3 penalty points in a year is as follows:

Penalty points	0	3	6	9	12	15+
Probability	P1 = 38%	P2 = 21%	P3 = 16%	P4 = 2%	P5 = %	P6 = 19%

From the previous laws of probability, the risk of a vessel being detained for at least 1 month is estimated.

According to the Rural and Maritime Fishing Code (Art R946-18), "the title or titles of command, insofar as they allow command of a fishing vessel, are suspended for a minimum period of : One month when the total number of points reaches or exceeds 18 points; Two months when the total number of points reaches or exceeds 36 points; Four months when the total number of points reaches or exceeds 54 points; Eight months when the total number of points reaches or exceeds 63 points; 12 months when the total number of points reaches or exceeds 72 points.

Thus, assuming that it is not possible to replace the master, that there is no training aimed at removing points, and that the risks of being sanctioned are the same each year, the probability of obtaining 18 points or more over several consecutive years is similar to a repetition over several periods of the probability law observed previously.

In effect, each year a vessel faces a given probability of being sanctioned with 3 or more penalty points and these points accumulate from year to year. In other words, estimating the risk of a vessel being detained in a year is equivalent to calculating all the cases that result in the award of at least 18 penalty points, then 36 points, 54, 63 and 72 over time.

This calculation is carried out on the basis of the probability law observed previously and gives the following results: a vessel with no penalty points in 2022 has a 22% chance of being detained for 1 month in 2023 and this probability rises to 52% and then 53% in 2025 and 2026 before falling to 49% in 2027.

The probability of being immobilised for two months is 3% in 2024, then 12% and 23% in 2025 and 2026, reaching 33% in 2027. The probability of being immobilised for 3 months is 2% in 2026 and 5% in 2027. The probability of being immobilised for 8 months or more is around 2% in 2027.

Figure 5. Representation of the risks of being sanctioned and the impact on the points Awarded
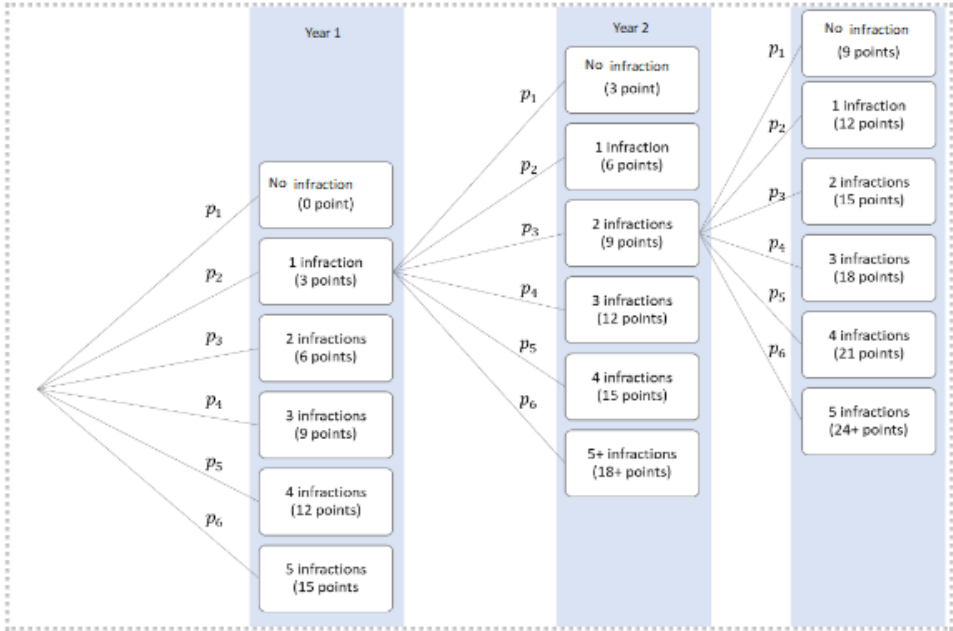
The following table provides the probabilities of a vessel obtaining a certain number of points in a particular year, given the number of points obtained in previous years.

In order to estimate the number of ships detained for at least 1 month in a year, these results are then multiplied by the number of ships in the Orthongel member fleet.

Chart 4. Probability of achieving "X" points in a year

Downtime	Penalty points	2022	2023	2024	2025	2026	2027
	0	0,379	0,144	0,055	0,021	0,008	0,003
	3	0,207	0,158	0,090	0,046	0,022	0,010
	6	0,155	0,163	0,118	0,073	0,041	0,021
	9	0,017	0,080	0,093	0,076	0,052	0,032
	12	0,052	0,071	0,080	0,073	0,057	0,040
	15	0,190	0,171	0,131	0,099	0,073	0,051
1 month	18		0,096	0,123	0,112	0,089	0,066
	21		0,062	0,107	0,116	0,103	0,081
	24		0,010	0,054	0,087	0,096	0,086

	27	0,019	0,043	0,069	0,084	0,085
	30	0,036	0,058	0,073	0,083	0,085
	33		0,032	0,061	0,079	0,085
2 months	36		0,018	0,047	0,070	0,082
	39		0,004	0,024	0,050	0,070
	42		0,005	0,018	0,037	0,058
	45		0,007	0,017	0,032	0,049
	48			0,009	0,024	0,041
	51			0,005	0,017	0,033
4 months	54			0,0011	0,009	0,023
	57			0,0014	0,006	0,016
	60			0,0013	0,005	0,012
8 months	63				0,003	0,009
	66				0,0012	0,0056
	69				0,0003	0,0028
12 months	72				0,0003	0,0018
	75				0,0002	0,0013
	78					0,0007
	81					0,0003
	84					7,8E-05
	87					7,5E-05
	90					4,7E-05