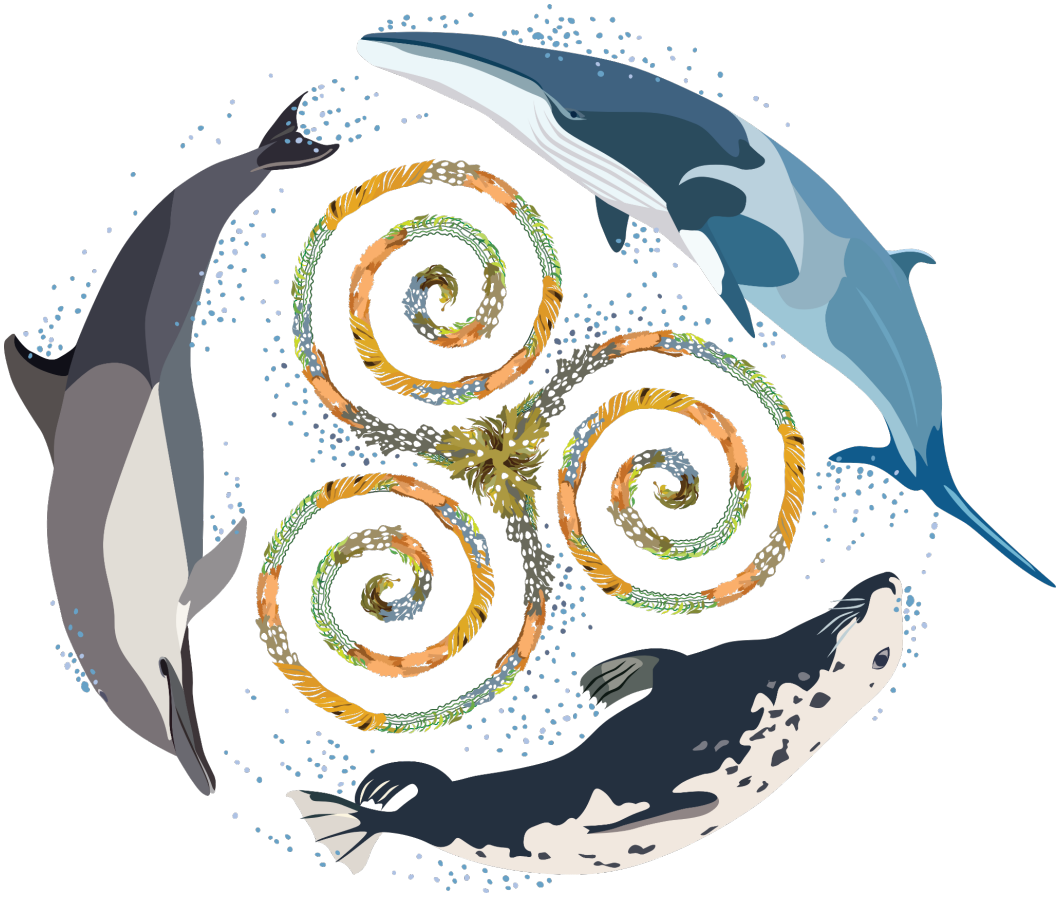
Workshop 21F2
ADVANCING TOWARDS MITIGATION OF COLLISION RISK FOR MARINE TRAFFIC

European Cetacean Society
37th Annual Conference, Dundee, Scotland

21st April 2026



Editors:
Natacha Aguilar de Soto, Alice Bouchard, Damian Foxall, Alicia Rodríguez-Juncá & Carla Rubio

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Workshop organizers & Editors:
Natacha Aguilar de Soto[1], Alice Bouchard[2], Damian Foxall[3], Alicia Rodríguez-Juncá[4] & Carla Rubio[5]

[1] Grupo de Investigación MegaMAR. Centro Oceanográfico de Canarias (IEO/CSIC), Santa Cruz de Tenerife, Spain

[2] International Whaling Commission, Cambridge, UK

[3] Marine Mammal Advisory Group (MMAG)

[4] Departamento de Biología Animal, Edafología y Geología, Universidad de la Laguna, Santa Cruz de Tenerife, Spain

[5] Escuela Superior de Ingeniería y Tecnología, Universidad de La Laguna, Santa Cruz de Tenerife, Spain

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Each chapter to be cited by its authors and title, and as part of this report.

Link to report:

English

Spanish

For more information & to access presentations: Workshop intranet

INDEX

Executive Summary

Maritime traffic represents a significant and growing threat to cetaceans worldwide. The risk of vessel strikes is exacerbated by the continuous increase in global shipping activity, particularly in regions where high-speed vessels and major shipping routes overlap with migratory corridors and critical habitats of marine megafauna. This threat extends beyond commercial shipping, with collisions increasingly reported across other sectors, including recreational boating and offshore racing. Reducing vessel strikes requires a genuine commitment from both governmental bodies and private sectors, based on a comprehensive, multi-layered approach that integrates scientific knowledge, operational and educational measures, technological innovation, and incentives for effective stakeholder engagement.

The workshop **ADVANCING TOWARDS MITIGATION OF COLLISION RISK FOR MARINE TRAFFIC,** held at the European Cetacean Society conference in 2026, provided a structured overview of the current state of knowledge and practice of ship-strike mitigation across different areas: risk assessment methodologies, mitigation measures based on operational strategies, technological developments to improve early cetacean detection, advances in education to mariners, and industry perspectives. Across all areas of mitigation, participants highlighted both challenges and substantial progress. Growing societal awareness of the impacts of vessel strikes on marine megafauna has driven vessel strike mitigation to become an increasingly active area of research and management, with increasing engagement from a diverse range of stakeholders across science, industry, policy, and conservation.

Advances in risk assessment at global and local scales were discussed. At a global scale, the International Whaling Commission (IWC) plays an essential coordination and guidance role on vessel strike mitigation, including through the recent development of guidelines for standardising risk assessment methods, which will be publicly available shortly on the IWC website. Complementary initiatives include on-going efforts for the development of a Global Risk Assessment framework aimed at providing a credible and accessible resource to support safer navigation. Limitations in risk assessment remain due to data gaps, inconsistencies in reporting, and a lack of standardisation and interoperability across methodologies and platforms. In spite of these difficulties, modelling efforts have already enabled the identification of high-risk areas worldwide through the integration of vessel traffic data and whale distribution information, including from initiatives such as Blue Corridors which maps global whale migration routes. Strike records, including those compiled in the IWC Vessel Strikes Database and the MMAG Marine Strike Log, also contribute to identifying areas of concern. Real-time detection platforms such as Whale Alert and Happywhale are further enriching these datasets by enabling sightings reporting from mariners. Building on these foundations, tools such as Whale Guardians are now facilitating the implementation of operational mitigation measures, providing practical routing recommendations with minimum disruption to navigation.

Operational measures, particularly vessel speed reduction and rerouting, remain the most consistently effective tools to reduce vessel strike risk. Evidence from regions including the United States, Canada and New Zealand demonstrates that when properly implemented, these measures can achieve tangible reductions in collision risk. However, the implementation of operational measures is often constrained by perceived economic or societal costs. Voyage optimization tools that integrate multiple data layers can help quantify these concerns and provide scenarios supporting balanced decisions that ensure both effective navigation and compliance with environmental law. Regulatory frameworks, incentive-based schemes, education to mariners and voluntary initiatives are important and not mutually exclusive mechanisms to support the uptake of operational measures, though compliance monitoring remains essential in voluntary schemes to ensure their effectiveness. Mitigation measures must be adapted to specific ecological, operational, and socio-economic contexts in order to be realistic and achieve short-term tangible reductions in vessel strike risk.

Education and training of mariners were identified as critical components of effective mitigation. Ensuring that crews and shore-based teams have access to clear, practical guidance on vessel strike prevention is essential for any mitigation strategy to translate into practice. Initiatives working to address this training gap include sector-specific programmes for seafarers (e.g. ORCA or Nautical Institute) and longer-term efforts to develop standardised training frameworks that could eventually be adopted at the IMO level.

Technological developments were presented as rapidly evolving and increasingly relevant components of vessel strike mitigation. Tools such as passive acoustic monitoring, thermal detection systems (e.g. Whale Spotter or SEA-AI) and AI-based analysis of drone and satellite imagery (e.g. Whale Seeker) are enhancing the capacity for real-time detection. Decision-support platforms integrating multiple data layers can further support real-time risk management. Participants stressed that these technologies are most effective when used in combination with operational measures, rather than as standalone solutions, and that further validation, standardisation, and integration into operational workflows are needed to ensure practical performance.

A key cross-cutting theme was the persistent gap between scientific knowledge and operational implementation in many areas. The scientific community is already in broad agreement, as reflected in ACCOBAMS Resolutions 7.12 (2019) and 8.18 (2022) and the UN position on vessel strikes, that the most effective mitigation measures are the spatial and temporal separation of vessels and cetaceans and, where separation is not possible, vessel speed reductions. However, despite this consensus and the existence of proven tools and frameworks, implementation within the maritime sector remains extremely limited in practice. Closing this gap requires a strong commitment from governmental agencies, including the IMO, as well as from the shipping and sailing sectors, to translate existing scientific consensus into consistent policy and practice. Encouraging signs include the recent designation of the NW Mediterranean as a Particularly Sensitive Sea Area by the IMO, and growing industry engagement through initiatives such as the World Shipping Council Whale Chart, which

compiles vessel strike mitigation measures globally and demonstrates that awareness of conservation obligations is increasingly reaching the maritime sector.

The workshop concluded with a concrete case study: vessel strikes in the Canary Islands, where high cetacean diversity coincides with dense international shipping and intensive inter-island fast-ferry traffic. Ongoing collaboration between government bodies, research institutions, and ferry operators has significantly improved understanding of the problem and supported the development of technological tools for early whale detection. The case clearly illustrates how mitigation strategies must be tailored to vessel type. For international shipping, a speed limit of 10 knots through the Traffic Separation Schemes of the Canary Islands PSSA would add approximately 3 hours to a typical transit, a modest cost relative to the conservation benefit. For high-speed ferries, however, operational constraints mean that speed reductions below 20 knots are not feasible, requiring a different set of approaches combining real-time detection, adaptive protocols, and stakeholder engagement. The case demonstrated the need to identify context-specific, realistic and effective solutions that can be adopted by local stakeholders.

Overall, vessel strike risk was recognised as a systemic, global, and transboundary issue requiring coordinated action. Participants emphasised the importance of applying precautionary and adaptive management approaches in the face of uncertainty, as well as the need to strengthen collaboration among researchers, policymakers, industry stakeholders, non-governmental organisations, and technology developers. Future efforts should focus on improving standardisation and data integration, enhancing the uptake of effective mitigation measures, and ensuring that scientific knowledge is made accessible and translated into practical, scalable solutions across different regions and sectors.

PART 1: RISK ASSESSMENT - METHODOLOGY

1.1 Russell Leaper. Standardising methods to identify high risk areas.

The International Whaling Commission (IWC) is currently advancing the standardisation of risk assessment methods to identify high-risk areas. Risk assessments based on modelling encounter rates are recognised as a key tool for informing management decisions. However, the diversity of existing methods and underlying assumptions remains a major limitation for comparing model outputs and developing indices of risk that are comparable between areas. Risk assessments typically combine whale density, diving behaviour, vessel density, vessel characteristics , and the probability that a collision will be lethal. However, results are highly sensitive to modelling choices, and recent studies have shown that different methodological approaches can generate substantially different outputs, highlighting the need for greater harmonisation. The different levels of detail required for global and regional assessments was also emphasised. While global models provide broad-scale insights, they often lack the resolution required for local management decisions. The probability that a whale will effectively avoid a potential collision situation was identified as one of the most influential yet uncertain parameters in current models. In response to these challenges, a dedicated IWC Technical Workshop on Vessel Strike Risk Assessment was held in January 2026 at the International Maritime Organization (IMO) headquarters in London. The workshop resulted in a guidance document on vessel strike risk assessment methodology, reviewed by the IWC Scientific Committee at its 2026 meeting. The guidance paper (SC/70/HIM13) and the workshop report (SC/70/REP03) will be available on the IWC Archive from early June 2026. Both documents are expected to be formally endorsed by the Commission at its next meeting in September 2026 and made publicly available shortly thereafter on the IWC website. A central feature of this guidance is a modular approach to risk assessment, structured around five multiplicative components: encounter rate, the probability that a whale will be close enough to the surface to be struck, the probability that a strike will be lethal, the probability that a whale will take effective avoidance action, and the probability that a vessel will take effective avoidance action. This structure allows results to be reported at each stage, making studies more transparent and comparable even where data availability differs between regions. The guidance also provides standardised terminology, recommendations on data requirements for vessel activity based on Automatic Identification System (AIS), and a suggested stepwise framework for developing and reporting risk assessments.

Relevant publications

Hague, E. L., Halliday, W. D., Dawson, J., Ferguson, S. H., Heide-Jørgensen, M. P., Serra Sogas, N., ... & McWhinnie, L. H. (2024). Not all maps are equal: Evaluating approaches for mapping vessel collision risk to large baleen whales. Journal of Applied Ecology, 61(11), 2576-2593.

Nisi, A. C., Welch, H., Brodie, S., Leiphardt, C., Rhodes, R., Hazen, E. L., ... & Abrahms, B. (2024). Ship collision risk threatens whales across the world's oceans. Science, 386(6724), 870-875.

1.2 **Charlotte Lambert**. **Mapping whale-vessel collision risk in the North-Eastern Atlantic: an integrated approach**

A modelling framework developed within the Atlantic Whale Deal project is presented to assess collision risk between whales and vessels across the North-Eastern Atlantic, from Ireland to the Canary Islands. The approach integrates species distribution models (SDMs) with shipping distribution data derived from Automatic Identification System (AIS) data to generate spatially explicit risk maps identifying areas where whale density overlaps with intense vessel activity. The analysis includes fin whales, minke whales, sperm whales, and beaked whales. Species distribution is modelled using long-term survey data collected between 2001 and 2024, incorporating environmental variables and temporal variability. Seasonal estimates are produced for fin and minke whales, while annual estimates are generated for sperm and beaked whales. Vessel traffic is characterised using high-resolution AIS data, including vessel density, speed, size, and vessel type. Different vessel categories, such as cargo ships, tankers, passenger vessels, and sailing boats, are analysed separately. A central component of the framework is the estimation of species sensitivity. This includes whale avoidance capacity, currently assessed through expert elicitation, and the probability of a strike being lethal, modelled as a function of vessel speed, length, and type. These variables are combined to generate single-species risk maps. Final outputs include integrated multi-species seasonal risk maps that also account for population-level sensitivity indicators such as abundance, inter-birth interval, and conservation status. The framework demonstrates the value of integrating ecological and maritime data to support large-scale operational risk assessment and spatial planning.

Relevant publications

Certain, G., Jørgensen, L. L., Christel, I., Planque, B., & Bretagnolle, V. (2015). Mapping the vulnerability of animal community to pressure in marine systems: disentangling pressure types and integrating their impact from the individual to the community level. ICES Journal of Marine Science, 72(5), 1470-1482. doi: https://doi.org/10.1093/icesjms/fsv003

Chero, G., Plard, F., Authier, M., Correia, A. M., De Loose, E., Fernandez, M., Hamard, E., Valente, R., Virgili, A., & Lambert, C. (2025). Geopackages of ship lanes per season in the Atlantic. Output 2.1.2 of the project InterReg Atlantic Area "Atlantic Whale Deal" (EAPA_0004/2022). doi: 10.5281/zenodo.19352008

Garrison, L. P., Lisi, N. E., Gahm, M., Patterson, E. M., Blondin, H., & Good, C. P. (2025). The effects of vessel speed and size on the lethality of strikes of large whales in US waters. Frontiers in Marine Science, 11, 1467387. doi: https://doi.org/10.3389/fmars.2024.1467387

Plard, F., Chero, G., Authier, M., Virgili, A., Correia, A. M., De Loose, E., Díaz López, B., Fernandez, M., Magalhaes, S., Hamard, E., Rodríguez-Juncá, A., & Lambert, C. (2025). Geopackages of fin, minke, sperm and beaked whales' density distributions per season in the Atlantic. Output 2.1.1 of the project InterReg Atlantic Area "Atlantic Whale Deal" (EAPA_0004/2022). doi: 10.5281/zenodo.19351806

1.3 Erik Roscam Abbing & Michael Fishbach. Whale Guardians: data based routing and speed recommendations for the shipping industry

A data-driven approach to vessel strike mitigation was presented through the Whale Guardians initiative, which integrates risk assessment tools with operational decision-making in the shipping sector. It has been implemented already in Greece, Chile, Brazil and Mexico, with the support of partnerships. A central component of this approach is the development of a shipping risk metric incorporated into the Whale Guardians application. Using Automatic Identification System (AIS) data, the metric calculates total miles sailed per square mile over a defined period, allowing the identification of areas where high vessel traffic overlaps with whale-dense areas. This information is integrated into an application designed to support safer routing decisions (i.e. defining exclusions and speed limit zones and proposing optimized and economic routes). Through an automated digital API containing global and locally specific routing recommendations, captains automatically receive practical guidance to avoid whales while ensuring minimal detours and no disruption to operations. The initiative focuses on generating actionable routing recommendations based on empirical whale occurrence data rather than modelled distributions, ensuring that mitigation measures remain practical and easy to implement for shipping companies. Collaboration was identified as a central component of the initiative. Partnerships with Whale Alert and Happywhale were highlighted as important sources of whale occurrence data, while collaborations with weather routing companies, ports, and shipping operators were presented as key to scaling implementation. The need for additional real seasonal whale data, broader industry participation, and the development of digital routing standards in collaboration with organizations such as the International Maritime Organization was also emphasised.

Q&A: A question was raised regarding how the platform is implemented in practice and how compliance is monitored. It was explained that shipping companies voluntarily join the initiative and integrate the platform's API into their routing software, allowing recommendations to become part of regular route planning. Compliance is monitored through periodic reviews of vessel movements in risk areas, and future developments aim to automate this process through compliance reports.

Relevant publications

Whale Guardians (2026). Whale Guardians Map. Accessed from: https://www.whaleguardians.org/map

1.4 Auriane Virgili. Implementing a risk assessment process to reduce collisions at sea: the example of offshore racing

A risk assessment process designed to reduce collisions at sea was presented using offshore racing as a case study. The approach aims to estimate the potential impact of offshore races on cetaceans and propose alternative routes that reduce encounter risk before events take place. The need for such tools was illustrated through previous incidents involving offshore racing vessels, including reported collisions with unidentified objects or animals (UOA) and confirmed collisions with cetaceans. The

proposed framework combines multiple components to evaluate encounter risk along racing routes. Species distribution models are used to estimate cetacean densities in areas crossed by races, while weather-routing models predict vessel trajectories based on weather conditions and vessel characteristics. Different routing scenarios are tested, including routes with and without exclusion zones and waypoints, allowing comparisons of travel time and operational feasibility. An encounter model is then used to estimate the expected number of encounters and the probability of encountering at least one cetacean along a route. The framework also integrates scientific literature and environmental legal zoning to support route planning decisions. An application of the model in the Western Mediterranean demonstrated how alternative routing scenarios could reduce encounter risk while maintaining operational feasibility. The presentation highlighted the importance of conducting risk assessments before maritime events and proposed the future expansion of the model to broader marine traffic scenarios, including economic and ecological cost analyses.

Q&A: A question was raised regarding how encounters are defined within the model and whether all instances of co-occurrence between vessels and cetaceans should be considered collision risk events. It was clarified that the model currently estimates encounters rather than direct collisions, as not all interactions between vessels and cetaceans necessarily result in impacts. An encounter is defined as a situation in which an animal is sufficiently close to a vessel for a collision to be possible. However, whales may still avoid the vessel, meaning that the number of encounters is expected to be higher than the number of actual collisions. It was noted that further methodological development is still required to better integrate collision probability into the model.

Relevant publications

Calambokidis, J., Fahlbusch, J. A., Szesciorka, A. R., Southall, B. L., Cade, D. E., Friedlaender, A. S., & Goldbogen, J. A. (2019). Differential vulnerability to ship strikes between day and night for blue, fin, and humpback whales based on dive and movement data from medium duration archival tags. Front. Mar. Sci. 6. doi: 10.3389/fmars.2019.00543.

Garrison, L. P., Lisi, N. E., Gahm, M., Patterson, E. M., Blondin, H., & Good C. P. (2025). The effects of vessel speed and size on the lethality of strikes of large whales in US waters. Front. Mar. Sci. 11, 1467387. doi: 10.3389/fmars.2024.1467387.

Schoeman, R. P., Patterson-Abrolat, C., & Plön, S. (2020). A global review of vessel collisions with marine animals. Front. Mar. Sci. 7, doi: 10.3389/fmars.2020.00292.

Virgili, A., Fournier, S., Le Maître, O., Pocheau, M., Ridoux, V., & Bañuls, R. (2026). Assessing cetacean encounter risk in offshore racing. Sci Rep 16, 3921. doi: 10.1038/s41598-025-33896-6

Virgili, A., Araújo, H., Astarloa Diaz, A., Dorémus, G., García-Barón, I., Eira, C., Louzao Arsuaga, M., Laran, S., Saavedra, C., Van Canneyt, O., & Ridoux, V. (2024). Seasonal distribution of cetaceans in the European Atlantic and Mediterranean waters. Front. Mar. Sci. 11:1319791. doi: 10.3389/fmars.2024.1319791

1.5 Aylin Akkaya. Risk Assessment Methodology. Cetacean Collision Mitigation

A spatial risk assessment methodology was presented based on the direct use of existing cetacean occurrence data rather than predictive modelling. The approach was developed to support offshore racing route planning by identifying areas where vessels may overlap with cetacean populations. The process begins by defining the race region and dividing it into subregions and spatial grids. Cetacean occurrence records are then compiled from multiple sources, including GBIF, OBIS-Seamap, Marine Strike Log records, published literature, and regional institutional databases. Records collected before 2000 are excluded and duplicate sightings are removed to improve data consistency. Species are grouped into broad categories, including baleen whales, deep-diving species, killer whales, and threatened toothed whales. These distribution layers are then overlapped with existing conservation measures such as Important Marine Mammal Areas (IMMAs), Ecologically or Biologically Significant Areas (EBSAs), Marine Protected Areas (MPAs), and whale migration corridors. Seasonality is also incorporated to identify temporal differences in species presence. Based on the overlap between species occurrence data and conservation layers, areas are classified into high-, medium-, or low-risk zones. As each area is studied, it is to be combined under a common methodology to form a Global Risk Assessment, and made available to marine operators to support route planning and precautionary measures in high-risk areas.

Q&A: A question was raised regarding the definition of “whale superhighways” and the methodology used to delineate them. It was explained that these corridors are currently defined by multiple organisations and are available through existing online platforms. However, no standardised shapefiles currently exist, and the available representations are largely based on mapped estimations derived from current knowledge. For the purposes of the assessment, these existing whale superhighway maps were manually overlaid onto GIS layers. The discussion highlighted the need for more standardised spatial datasets for migratory corridors and noted that this issue would be revisited in subsequent presentations.

Relevant publications

Foxall, D., Covington, K., Akkaya, A., Awbery, T., Kirkland, M., Kamsteeg, S., Dragovic, S., & Lyne, P. (2026). Navigating Safely: Mapping Global Risk Zones for Sailors to Minimise Cetacean Collisions. https://foxallmunro.sharepoint.com/:b:/s/MMAG2/IQCTuTXw8X_BTLbiD3r2yKAIAYouQ_8FJXtjq-LBbZ-9J4o?e=wfdi3C

1.6 Alicia Rodríguez-Juncá. Canary Islands sperm whale collision risk

A collision risk model for sperm whales in the Canary Islands was developed in collaboration with the University of La Rochelle and presented here. Due to the limited availability of data from systematic surveys, multiple complementary data sources were integrated to enhance spatial coverage. These datasets were assembled through a collaborative effort involving cetacean research groups across the

archipelago. A total of 478 validated sperm whale records collected between 1913 and 2024 were compiled from systematic boat and aerial surveys, land-based monitoring programmes, and opportunistic sightings from several platforms. To account for differences in survey design and detectability across data sources, specific spatial buffers were created to define the effective sampling area for each dataset. A presence-background modelling approach was applied using binomial Generalised Additive Models (GAMs), generating background points to compensate for the absence of systematic effort data. Environmental variables were filtered to remove collinearity, and an ensemble model was developed using the seven best-performing models. The outputs produced relative habitat suitability maps rather than abundance estimates, as the opportunistic nature of part of the dataset limited stronger ecological inference. Bathymetry, chlorophyll concentration, and Sea Surface Height were identified as the most consistent environmental predictors of sperm whale distribution. Results suggested a relatively generalist use of deep-water habitats across the archipelago, with higher suitability in areas associated with steep bathymetry. Collision risk was estimated by combining relative habitat suitability with AIS-derived vessel traffic data and lethality estimates based on vessel speed and size, following Garrison et al., 2025. Results indicated medium-to-high collision risk across much of the archipelago, particularly in inter-island channels and major routes. Fast ferries, cargo vessels, and tankers were identified as the vessel types associated with the highest collision risk. The presentation concluded by emphasising the need for mitigation measures and improved monitoring efforts in the Canary Islands.

Relevant publications

Garrison, L. P., Lisi, N. E., Gahm, M., Patterson, E. M., Blondin, H., & Good, C. P. (2025). The effects of vessel speed and size on the lethality of strikes of large whales in US waters. Frontiers in Marine Science, 11, 1467387. doi: https://doi.org/10.3389/fmars.2024.1467387

Rodríguez-Juncá, A., Lambert, C., Chero, G., Authier, M., Miranda, D., Fais, A., Pérez-Gil, M., Correia, A. M. T., Fernandez, M., Alves, F., Vázquez, J.A., Saavedra, C., Hamard, E., & Aguilar de Soto, N. (2026). Modelling sperm whale-vessel collision risk in the Canary Islands. European Cetacean Society Congress, Dundee, Scotland. doi: 10.13140/RG.2.2.27266.44483

1.7 Emily Charry Tissier. Optimized Visual Marine Mammal Detection

An overview of Whale Seeker's artificial intelligence-based monitoring tools was presented, focusing on how imagery analysis can support marine mammal detection and thus vessel strike mitigation. Founded in 2018 in Canada, the company develops AI systems to detect marine targets—particularly marine mammals—using multiple visual platforms. Whale Seeker collaborates with government agencies, NGOs, academia, and private industry. The presentation highlighted Whale Seeker's role within broader multimodal monitoring frameworks, frequently integrating visual detection tools with acoustic monitoring, vessel-based observations, land-based surveys, and aerial platforms. Examples of detections using aircraft, drones, and satellite imagery were presented, including whale detections under challenging environmental conditions and applications involving pinnipeds. The tools were

described as modular and scalable for different operational contexts. Three main solutions were introduced. Mobius processes large volumes of aerial imagery through a human-in-the-loop system combining AI detection with expert validation. Mobius Observer is a real-time drone-based detection tool currently being expanded for operational applications, including North Atlantic right whale monitoring. Cetus uses high-resolution satellite imagery to detect marine mammals at broader spatial scales. The presentation highlighted the potential of integrating AI-based detection tools into maritime risk assessment, routing strategies, and regulatory compliance frameworks.

Relevant publications

Boulent, J., Charry, B., Kennedy, M. M., Tissier, E., Fan, R., Marcoux, M., Watt, C. A., & Gagné-Turcotte, A. (2023). Scaling whale monitoring using deep learning: A human-in-the-loop solution for analyzing aerial datasets. Front. Mar. Sci. 10:1099479. doi: 10.3389/fmars.2023.1099479

1.8 Alexandra Mayette. Canadian Wildlife Federation. Risk Assessment Methodology

A vessel strike risk assessment methodology developed for North Atlantic right whales in Eastern Canada was presented. The general framework follows a co-occurrence approach commonly used in risk assessments, combining whale distribution models with AIS-derived vessel traffic data to estimate encounter risk. The presentation focused primarily on improving how the probability of lethality is calculated once an encounter occurs. It was highlighted that many previous risk assessments relied on lethality curves based exclusively on vessel speed. However, recent studies have demonstrated that vessel size also plays a significant role in determining collision outcomes. The presentation introduced the biophysical model developed by Daniel Kelley et al. (2021), later released as the whalestrike R package in 2024 and updated in 2026. This model simulates collision impacts by incorporating whale body measurements, vessel speed, vessel mass, and bow shape to estimate the probability of mortality. To improve practical implementation, the updated model includes species-specific biological measurements for eight whale species and allows vessel mass to be estimated from vessel length and type when direct mass information is unavailable. This was presented as a major improvement, as vessel mass is often difficult to obtain in operational datasets. The resulting lethality curves account for species, vessel size, vessel type, and speed. These outputs are then integrated into spatial risk assessments, allowing relative risk to be analysed across different temporal and spatial scales. Examples from North Atlantic right whale management zones in Eastern Canada illustrated how this framework can support more refined mitigation planning.

Q&A: A question was raised regarding whether the model accounts for seasonal changes in whale body condition, particularly variations in blubber thickness associated with breeding cycles and seasonal physiological changes, which could potentially influence lethality estimates. It was clarified that seasonal variation in body condition is not currently incorporated into the model. While this factor was not expected to substantially alter lethality estimates, it was acknowledged as an interesting area

for future refinement, particularly for species such as North Atlantic right whales that experience strong seasonal changes in body condition

Relevant publications

Kelley, D. E., (2026). Whalestrike: Simulate Whale Ship Strikes. R package version 0.6.3, Accessed from: https://dankelley.github.io/whalestrike/.

Kelley, D. E., (2024). Whalestrike: An R package for simulating ship strikes on whales. Journal of Open Source Software, 9(97), 6473. doi: https://doi.org/10.21105/joss.06473

Kelley, D. E., Vlasic, J. P., & Brillant, S. W. (2021). Assessing the lethality of ship strikes on whales using simple biophysical models. Marine Mammal Science, 37(1), 251-267.

Mayette & Brillant. (2026). A regression-based method to estimate vessel mass for use in whale-ship strike risk models. PLoS One. doi: 10.1371/journal.pone.0339760.

Mayette et al. [in review]. Assessment of vessel strike risk and performance of the Canadian protection measures for North Atlantic right whales in the Gulf of St. Lawrence.

1.9 Rebekah Lane. An Open-source tool adapted to assess vessel strike risk to whales near an active seaport

An open-source approach to vessel strike risk assessment was presented through the adaptation of the Natural Capital Project's Habitat Risk Assessment (HRA) model to evaluate whale strike risk in San Francisco Bay. The study responded to the increasing presence of humpback whales in this highly urbanised estuary, where vessel traffic associated with commerce, tourism, recreation, and commuting creates growing management challenges. Whale sightings were combined with AIS-derived vessel traffic data to assess spatial overlap between whales and vessels. A key feature of the model was its flexibility, allowing exposure and consequence criteria—such as vessel speed, mortality risk, likelihood of interaction, and species sensitivity—to be incorporated into the assessment. Risk scores were assigned using scientific literature and expert input, alongside weighting and data quality scores. In addition to static scores that were assigned on a scale of 1-3 for the entire study areas, some criteria can vary by grid cell depending on available data, such as speed. Unlike traditional cumulative assessments, this framework estimated risk separately for different vessel categories. Results identified cargo vessels and high-speed ferries as the highest-risk vessel types, while spatial outputs highlighted specific high-risk areas within the bay. Passenger and Pleasure vessels were lower risk, but were more pervasive than other vessel types throughout the study area. The presentation highlighted the value of using flexible open-source tools to support vessel-specific mitigation strategies, while noting limitations related to AIS coverage for smaller recreational vessels and the current focus on a single species. It was concluded that targeted management approaches will become increasingly important as whales increasingly use urban habitats.

Q&A: A question was raised regarding whether compliance with voluntary speed reduction measures is monitored within the model. It was explained that the current framework includes a management effectiveness criterion, which assesses whether mitigation measures are in place for each vessel type

rather than measuring actual compliance. For example, cargo vessels entering San Francisco Bay are already subject to speed restrictions for navigational purposes, and this was incorporated into the assessment. In contrast, vessel types such as high-speed ferries, passenger vessels, and recreational traffic currently have fewer management requirements. It was noted that future versions of the model could explicitly incorporate compliance as an additional metric.

Relevant publications

Natural Capital Alliance. (2026). Habitat Risk Assessment. InVEST User Guide. Accessed from: http://releases.naturalcapitalproject.org/invest-userguide/latest/en/habitat_risk_assessment.html

Q&A + Summary. Moderator - Alice Bouchard

The discussion reinforced the need for greater methodological standardization in cetacean-vessel collision risk assessments. Participants acknowledged that existing approaches share several common components; however, differences in methodologies, terminology, and output metrics continue to limit comparability across regions and management frameworks. The development of standardized approaches was identified as a priority to ensure that scientific outputs can be consistently translated into management actions at both regional and international scales. Several participants emphasized that risk mitigation measures cannot be universally applied across all maritime sectors. Vessel type, operational constraints, route characteristics, and associated economic implications were identified as key factors influencing the feasibility of mitigation measures. Large commercial vessels operating on international routes were described as being better suited to static management measures, such as permanent speed restrictions integrated into voyage planning. Conversely, sectors such as high-speed ferries may require more adaptive approaches due to operational limitations. The discussion also highlighted current limitations associated with vessel traffic datasets. While Automatic Identification System (AIS) data remain central to many risk assessments, participants noted that vessels operating without AIS, particularly smaller recreational and coastal vessels, represent an important and growing challenge that remains insufficiently addressed in current frameworks. Across multiple interventions, participants identified cetacean and megafauna occurrence data as the critical common foundation of effective risk assessments for all marine traffic. While vessel-specific mitigation measures may vary, robust information on cetacean distribution, occurrence patterns, and exposure remains the common denominator required to support decision-making processes. Data accessibility and interoperability emerged as an additional challenge. Questions were raised regarding the integration of real-time detection systems, including thermal cameras and reporting applications, into broader information-sharing platforms. It was noted that several initiatives currently operate through internal systems, while wider implementation remains constrained by the absence of standardized databases and shared reporting infrastructures. Ongoing international efforts aimed at improving data harmonization and platform integration were acknowledged. The discussion concluded by emphasizing that future mitigation frameworks should balance methodological standardization with operational flexibility. While standardized risk assessment methodologies are essential, management responses must remain context-specific and adaptable to the operational realities of different maritime sectors.

PART 2: RISK ASSESSMENT - DATA LAYERS

2.1 Alice Bouchard. The IWC Vessel Strikes Database

The IWC Vessel Strikes Database, created in 2007, compiles global records of vessel strikes on cetaceans, with 1,465 reports submitted to date and 666 confirmed cases, the earliest of which dates back to 1954. Data come from all over the world, though reports are concentrated in the Northern Hemisphere, particularly the North Atlantic, Mediterranean, and North Pacific, which may in part reflect reporting biases rather than the true global distribution of strikes. All cetacean species are represented in the database, though the majority of reports concern humpback and fin whales, with significant numbers also recorded for sperm whales and North Atlantic right whales. Reports are submitted through a dedicated online portal and reviewed and validated by the IWC Vessel Strikes Expert Panel before being classified as confirmed strikes. Key challenges include significant underreporting (due to undetected strikes or lack of awareness), lack of mandatory reporting systems, and inconsistent data formats requiring extensive standardisation. Current priorities are improving database structure and usability, and expanding coverage through outreach to regional networks and governments. Raising awareness and understanding of how such data contribute to mitigation measures and safer navigation is critical to increase reporting. Future goals focus on making the database a comprehensive global resource for research and mitigation and improving public access via visualisation tools. Collaboration and data sharing are essential to build a more accurate global picture, and people working with vessel strikes data are encouraged to contact alice.bouchard@iwc.int.

Relevant publications

International Whaling Commission (IWC), (2026). IWC Vessel Strikes Database. Accessed from: https://iwc.int/management-and-conservation/vessel-strikes

Winkler, C., Panigada, S., Murphy, S., & Ritter, F. (2020). Global numbers of ship strikes: An assessment of collisions between vessels and cetaceans using available data in the IWC Ship Strike Database. IWC/68B/SC HIM09.

2.2 Damian Foxall. Data Layers. Marine Strike Log

Leisure boating contributes significantly to vessel–cetacean collisions, including larger, fast recreational boats. Improving risk assessment depends on better data, reporting, technology, and collaboration between industry and science. The Marine Strike Log, compiles the global dataset of reports and incidents between sailing vessels and marine life, a multi-source dataset (>800 records) that has been compiled from previous data (1850+), ongoing surveys, and is maintained to include current and future live reports. Encounters with Cetaceans represent over half of incidents in the database. This dataset was highlighted as a critical yet underutilised layer for risk assessment, as it reflects real operational exposure rather than structured survey effort. Though biased by navigation routes, the database provides specific spatial-temporal data which reveals real exposure and identifies hotspots in major

sailing regions. It includes collisions, near misses, citizen science, and animal–vessel interactions, offering a more nuanced risk picture. The limitations of collision data sourced from other datasets related to incomplete spatial information were also addressed, while many records lack precise GPS positioning other spatial information is often available. To overcome this, methodologies have been developed to estimate locations using contextual geographic references and traditional range-and-bearing techniques with defined margins of error. These approaches allow approximate positioning with a relatively high level of confidence, thereby increasing the analytical value of historical data. The importance of live reporting was emphasised as a means to: engage behaviour change in mariners; improve situational awareness; and enable rapid communication of hazards between across all sectors of marine traffic. Current efforts under the Marine Mammal Advisory Group include: Supporting the establishment of a Global Hazard Reporting Network (GHRN) connecting multiple reporting systems; Integrating live and historical data with local knowledge into a Global Risk Assessment to be made widely available to all marine users for better route planning and mitigation strategies. Contact: info@mmag.world

Relevant publications

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Ritter, F. (2012). Collisions of sailing vessels with cetaceans worldwide: First insights into a seemingly growing problem. J. Cetacean Res. Manage., 12(1), 119-127.

Peel, D., Smith, J. N., & Childerhouse, S. (2018). Vessel Strike of Whales in Australia: The Challenges of Analysis of Historical Incident Data. Frontiers in Marine Science 5: 69. doi:10.3389/fmars.2018.00069

2.3 Rebecca Stubbs & Andrea Sánchez. How Global Fishing Watch data and tools can support the whale strike research community

The work of Global Fishing Watch was presented as an effort to enhance transparency in human activities at sea by transforming large-scale data into publicly accessible and actionable information to support ocean governance, research, and management. The initiative uses big data and machine learning to turn large-scale maritime data (mainly AIS, plus satellite imagery) into actionable insights on vessel activity, including vessels not transmitting AIS through satellite imagery. Data are openly accessible via maps, APIs, and downloads, supporting research, policy, and ocean governance. Tools

allow users to visualise vessel activity, filter by variables, analyse tracks, and integrate their own datasets, with options for sharing and collaboration. Advanced access (R, Python, APIs) enables users to integrate Global Fishing Watch data into their own analytical workflows. Additional resources, including documentation and training webinars are provided. Ongoing work includes a standardised vessel activity dataset (with the IWC) to support applications like vessel strike risk assessment. Collaboration with research institutions and other stakeholders was highlighted as a central component of the approach, alongside active scientific publishing and engagement with science.

Relevant publications

Global Fishing Watch (2026). Global Fishing Watch Map and Data. Accessed from: https://globalfishingwatch.org/

Nisi, A. C., Welch, H., Brodie, S., Leiphardt, C., Rhodes, R., Hazen, E. L., Redfern, J. V., Branch, T. A., Barreto, A. S., Calambokidis, J., Clavelle, T., Dares, L., de Vos, A., Gero, S., Jackson, J. A., Kenney, R. D., Kroodsma, D., Leaper, R., McCauley, D. J., ... & Wilson, J. (2024). Ship collision risk threatens whales across the world's oceans. Science, 386(6724), 870–875. doi: https://doi.org/10.1126/science.adp1950

2.4 Rui Prieto. Vessel Strike Risk Assessment & Challenges in the Azores

The Azores Whale Lab (LIFE IP Azores Natura), commissioned by the regional government, is assessing vessel strike and underwater noise risks to cetaceans using AIS-based maritime traffic data combined with ecological variables such as vessel speed, ship density, whale size, diving behaviour, and whale density estimates derived from large-scale North Atlantic surveys (Tregenza et al., 2000). The probability of lethal collisions is further estimated as a function of vessel speed using established logistic relationships. Preliminary results suggest high risk for large whales, though likely overestimated due to key limitations: coarse regional whale density models, absence of avoidance behaviour in simulations, and reliance on temporally averaged shipping data. These factors can inflate risk, especially at finer spatial scales. To improve accuracy, current work integrates long-term sightings data (e.g. Fisheries Observer Program POPA) with survey data to produce more realistic regional whale distribution estimates. Methodological advances also aim to better distinguish actual collisions from near encounters, including metrics like time-to-collision. Challenges remain in translating results into policy, due to limited regional authority over shipping, funding constraints affecting long-term monitoring, and gaps in EU regulation where vessel strikes are not explicitly addressed. Ongoing efforts focus on refining models, improving data resolution, and supporting evidence-based mitigation.

Relevant publications

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Tregenza, N., Aguilar de Soto, N., Carrillo, M., Delgado, I., Díaz, F., Brito, A., & Martin, V. (2000). Potential impact of fast ferries on whale populations a simple model with examples from the Canary Islands. European Research on Cetaceans, 14, 195-197.

2.5 Ryan Reisinger. The protecting blue corridors initiative

The Protecting Blue Corridors initiative addresses the mismatch between highly mobile whale migrations and static conservation approaches. A 2022 WWF report compiled decades of satellite tracking data (>1,000 whales) to map global “whale superhighways,” identifying key migration routes and critical habitats across national and international waters. This offered a global perspective on how whales move through national waters and the high seas, and highlighted the need for coordinated responses that operate across jurisdictions and scales. The BlueCorridors.org platform, an interactive and community-driven tool, expands this work by combining movement data with human pressures (e.g., vessel traffic) to highlight high risk areas along migratory routes. It is a large collaborative effort (60+ partners across scientific, non-governmental, and technological sectors), now covering 1,400+ tracks over more than 30 years. Current priorities include improving the resolution of threat data, developing standardized data-driven methods to define migration corridors (beyond manual polygon mapping), and managing data-sharing between contributors, to balance openness with the interests of contributing researchers and institutions. The initiative aims to support large-scale conservation planning and policy through an open, science-based, and collaborative framework. Participation in the initiative is actively encouraged (contact cjohnson@wwf.org.au; r.r.resinger@southampton.ac.uk), with opportunities for engagement through upcoming workshops and scientific events.

Relevant publications

Johnson, C. M., Reisinger, R. R., Palacios, D. M., Friedlaender, A. S., Zerbini, A. N., Willson, A., Lancaster, M., Battle, J., Graham, A., Cosandey-Godin, A., Jacob, T., Felix, F., Grilly, E., Shahid, U., Houtman, N., Alberini, A., Montecinos, Y., Najera, E., & Kelez, S. (2022). Protecting Blue Corridors - Challenges and solutions for migratory whales navigating national and international seas. Zenodo. doi: https://doi.org/10.5281/zenodo.6196131

2.6 Ryan Reisinger. Optimising voyages for biodiversity rerouting vessels around ocean giants can have minimal impact on shipping

Research by University of Southampton, Alan Turing Institute, and Marine Biological Association explores reducing vessel–megafauna collisions through voyage optimisation. Shipping heavily overlaps with key habitats, but mitigation is rarely applied due to the perception within the shipping industry that such actions would incur substantial operational costs. The approach integrates biodiversity into existing routing systems as an operational constraint (like weather), enabling route changes or speed reductions in sensitive areas. A case study on whale shark aggregation sites was tested. Simulations for two vessel types (a crude oil tanker and a container ship) were performed under three scenarios: no mitigation, speed limits (<10 knots), and route avoidance. By combining occurrence data, satellite tracking information, and evidence of mortality likely linked to vessel strikes, high-risk areas were identified. Using optimisation software (T-VOS), which applies a multi-objective algorithm capable of simultaneously evaluating numerous operational constraints and scenarios, results show minimal operational impact (<1% change), especially on long routes. Speed reduction works best for short routes, while rerouting is more effective for long distances, with variation by vessel type and operational conditions. Key needs include better data and processing pipelines to generate accurate predictions, real-time forecasting, integration into navigation systems, and regulatory or incentive frameworks to encourage compliance while monitoring effectiveness.

Relevant publications

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RINA. (2026). Considerations regarding the integration of dynamic biological hazard data into the S-100 ECDIS environment. Submission MEPC 84/INF.35 to the 84th session of the International Maritime Organization Marine Environment Protection Committee.

Reisinger, R. R., Grudniewski, P .A., Womersley, F. C., Sims, D. W., & Sobey, A. J. (2025). Optimising voyages for biodiversity: rerouting vessels around ocean giants can have minimal impact on shipping.bioRxiv, 2025-09. doi: https://doi.org/10.1101/2025.09.26.678754

Womersley, F. C., Humphries, N. E., Queiroz, N., Vedor, M., da Costa, I., Furtado, M., Tyminski, J. P., Abrantes, K., Araujo, G., Bach, S. S., Barnett, A., Berumen, M. L., Bessudo Lion, S., Braun, C. D., Clingham, E., Cochran, J. E. M., de la Parra, R., Diamant, S., Dove, A. D. M., Dudgeon, C. L., ... & Sims, D. W. (2022). Global collision-risk hotspots of marine traffic and the world's largest fish, the whale shark. Proceedings of the National Academy of Sciences, 119(20), e2117440119. doi: https://doi.org/10.1073/pnas.2117440119

Womersley, F. C., Rohner, C. A., Abrantes, K., Afonso, P., Arunrugstichai, S., Bach, S. S., ... & Araujo, G. (2024). Identifying priority sites for whale shark ship collision management globally. Science of the Total Environment, 934, 172776. doi: https://doi.org/10.1016/j.scitotenv.2024.172776

Yuen, S., Ezard, T. H. G., & Sobey, A. J. (2022). The effect of epigenetic blocking on dynamic multi-objective optimisation problems. En Proceedings of the Genetic and Evolutionary Computation Conference Companion (pp. 379–382). Association for Computing Machinery. doi: https://doi.org/10.1145/3520304.3533939

2.7 **Nino Pierantonio.** Whales and Ships: What Happens When They Get Too Close?

A behavioural perspective reveals key gaps in understanding vessel–whale interactions, particularly for fin whales in the NW Mediterranean, where ship-strike mortality is likely unsustainable due to chronic exposure to dense maritime traffic. Despite the existence of mitigation measures, the knowledge on their effectiveness is limited. Processes underlying collisions are still poorly understood. Uncertainties remain around whether whales detect vessels, attempt avoidance, and under what conditions. Potential influencing factors include vessel type, speed, noise, distance, environmental context, and the whale's behavioural state. To address this, recent work combines AIS vessel data with satellite tracking (15 fin whales tagged since 2021), aligning both datasets in time to reconstruct encounters. These are analysed using proximity metrics (e.g., closest point of approach) and movement parameters (speed, trajectory, turning angles), comparing whale behaviour before, during, and after interactions. Preliminary results show strong and persistent spatial overlap between whale core habitats and shipping lanes, with numerous near-miss events, suggesting whales frequently remain on potential collision paths. Behavioural responses indicate limited horizontal avoidance; whales rarely change direction and instead tend to perform shallow dives when vessels approach, sometimes crossing or staying within vessel trajectories—patterns that increase collision risk. These findings suggest current mitigation may rely too heavily on assumptions of whale avoidance. Given the observed limited and inconsistent whale responses, collision risk is likely to remain high under current conditions in the Mediterranean sea, highlighting the need for behaviour-informed, more targeted management strategies.

Q&A: Questions were raised about whether near-miss events could be compared with actual collision events to assess differences in whale behaviour or vessel responses. It was clarified that the current analyses focus specifically on behavioural responses of whales to approaching vessels, rather than quantifying or comparing collision and near-miss frequencies, and that no collisions were recorded within the studied dataset. From a navigational perspective, it was noted that distances within one nautical mile are already considered critical, as vessels have limited capacity to react, reinforcing the relevance of identifying and understanding such encounters.

Relevant publications

McKenna, M. F., Calambokidis, J., Oleson, E. M., Laist, D. W., & Goldbogen, J. A. (2015). Simultaneous tracking of blue whales and large ships demonstrates limited behavioral responses for avoiding collision. Endangered Species Research, 27(3), 219–232. doi: https://doi.org/10.3354/esr00666

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Sèbe, M., David, L., Dhermain, F., Gourguet, S., Madon, B., Ody, D., ... & Giannoulaki, M. (2023). Estimating the impact of ship strikes on the Mediterranean fin whale subpopulation. Ocean & Coastal Management, 237, 106485. doi: https://doi.org/10.1016/j.ocecoaman.2023.106485

Round Table + Q&A + Summary. Moderator - Damian Foxall

A main point of discussion was the population-level implications of vessel strikes, as they can affect not only local but also migratory whale populations, and impacts may extend beyond local populations and contribute to “sink” dynamics. As migratory species protected under international frameworks, such as the Convention on Migratory Species, impacts in one region can affect shared, transboundary populations, placing responsibility on all range states.

Demonstrating population-level impacts is difficult due to limited data and low statistical power, even where declines are suspected (e.g. Canary Islands). This supports applying the precautionary principle despite uncertainty, which is embedded in international and national regulatory frameworks, and supports proactive mitigation despite uncertainty.

Methodologically, questions addressed on how population vulnerability is integrated into spatial risk models. Approaches discussed include adjusting weighting coefficients within risk layers based on estimated population size or conservation status, and prioritising areas such as IMMAs, which can indicate relative importance. Where empirical data are lacking, environmental proxies such as bathymetry are used to infer suitable habitats, particularly for species like beaked whales or sperm whales. However, it was noted that robust estimates of mortality remain scarce, and most current assessments rely primarily on distribution data rather than direct measures of impact.

Key challenges include limited and heterogeneous whale data, especially on distribution and behavioural responses to vessels, which complicates standardisation and comparability across studies. On the other hand, it highlighted the difference between observational vs modelled approaches, with general agreement that modelling is necessary to address data gaps, despite inherent uncertainties. Combining multiple data layers including; distribution, bathymetry, encounter, and species relevant IMMA & MPA layers was seen as a way to progressively reduce biases and fill spatial “blind spots”.

The dynamic nature of marine ecosystems emerged as a major concern, with shifting species distributions driven by environmental change requiring adaptive, rather than static, management frameworks. This raised questions about the level of evidence needed to inform policy, and the challenge of continuously updating risk assessments as new data become available while maintaining credibility with decision-makers.

Current models emphasise lethality (e.g. speed–mortality relationships like Conn & Silber 2013 and the ~10-knot threshold) but often overlook collision probability. Vessel speed influences not only the severity of collisions but also the likelihood of impact by reducing detection and reaction time for both

vessels and animals. This is particularly relevant under the assumption—supported by emerging evidence—that large whales may show limited or inconsistent behavioural responses to approaching vessels. In this context, speed reduction was highlighted as a key mitigation measure that can simultaneously lower both the probability of impact and its potential lethality.

The integration of additional ecological and operational parameters into models was identified as a priority in order to better capture the complexity of vessel–megafauna interactions. Particular emphasis was placed on incorporating vertical whale movement, as animals may remain within collision risk depths (e.g. 5–20 m) even when not visible at the surface, with diel patterns further influencing exposure. This highlights the need to move beyond surface-based assumptions.

Vessel-related characteristics were discussed, including not only vessel type but also draft, keel depth, and loading condition (e.g. ballast versus fully loaded), all of which directly influence the vertical extent of risk. Rather than modelling keel length explicitly in all cases, current approaches often stratify risk by vessel class, allowing draft and associated hydrodynamic effects—such as suction and turbulence generated by large vessels (e.g. Panamax ships with drafts exceeding 15–16 m)—to be implicitly incorporated. This stratification also enables models to account for differences in exposure layers, whereby the depth range at which animals are at risk varies depending on vessel characteristics.

Additional operational and geometric factors were also identified as important, including the relative position and angle of approach between whale and vessel, which determine whether an encounter translates into actual collision risk. For instance, whales located outside the vessel's trajectory may not require avoidance, whereas those positioned along the bow face significantly higher risk.

However it is important to state that given the multiple factors that may result in an encounter, the underlying risk factor is the co-occurence of vessels and megafauna, and their respective limitations of awareness, and appropriate reaction, for avoidance of collision.

Advances in tagging technologies and the incorporation of high-resolution behavioural data were noted as promising developments.

Empirical evidence supporting the importance of these parameters was highlighted through studies such as Constantine et al. 2015, which used suction-cup tagging to assess the behaviour of Bryde's whales in the Hauraki Gulf, New Zealand. Results showed that whales spent approximately 90% of their time within the upper 5–10 m of the water column, overlapping directly with the draft of large vessels and therefore significantly increasing collision risk. In this case, rerouting was not considered effective due to the broad spatial distribution of whales. These findings informed the implementation of voluntary speed reductions (notably around 10 knots) and a transit protocol for shipping.

Data sharing and collaboration were repeatedly highlighted as essential. Emerging opportunities include the development of standardised data formats. At the same time, significant gaps remain in collision and mortality data, particularly for non-cetacean species, limiting the ability to quantify impacts.

Concerns were raised regarding the integration of information across species, particularly how existing methodologies—largely developed for cetaceans—could be extended to other marine megafauna that are highly detected in collision databases such as elasmobranchs.

Participants noted a critical limitation in collision reporting is vessel type; large ships are often unaware that a collision has occurred and the species involved is frequently unknown, on the other hand small vessels are critically aware of encounters which often result in significant damage to the vessel, injury or death of the marine animal, and in certain instances injury or even death of the crew also.

Finally, it underscored the importance of translating scientific outputs into actionable guidance for the maritime sector. There is a clear demand for consistent access to information and tools that not only assess risk but also provide practical recommendations, such as rerouting or speed adjustments, in formats usable by operators. While multiple initiatives are developing such approaches, better coordination is needed to avoid duplication and ensure coherence. Risk assessments should be transparent, comparable, and scalable beyond local contexts, enabling integration across regions, species, and populations to support more effective, large-scale conservation and management strategies. Specific risk assessments, and implementation mitigation measures may differ for various vessel types, yet global distribution maps and species specific information is the common building block for providing this guidance for all marine traffic.

Relevant publications

Conn, P. B., & Silber, G. K. (2013). Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales. Ecosphere, 4(4), 1-16. doi: https://doi.org/10.1890/ES13-00004.1

Constantine, R., Johnson, M., Riekkola, L., Jervis, S., Kozmian-Ledward, L., Dennis, T., Torres, L. G., & Aguilar de Soto, N. (2015). Mitigation of vessel-strike mortality of endangered Bryde's whales in the Hauraki Gulf, New Zealand. Biological Conservation, 186, 149-157. doi: https://doi.org/10.1016/j.biocon.2015.03.008

PART 3: MITIGATION MEASURES - EDUCATION

3.1 Aly Elsayed. Protecting whales: a shared responsibility

A maritime education perspective on vessel strike mitigation was presented, highlighting the need to strengthen awareness among seafarers and improve communication between scientists and maritime end users. It was noted that mariners are often absent from discussions on whale strike mitigation despite being responsible for implementing many mitigation measures at sea. The Nautical Institute presented several educational initiatives developed to address this gap, including The Navigator magazine and training videos designed for seafarers, maritime institutes, and universities. These resources aim to improve understanding of whale behaviour, migration routes, and how whale-related information can be incorporated into passage planning. Operational feasibility was also discussed, particularly in relation to speed reduction measures. While reduced speeds can be effective in certain high-risk areas, route adjustments, real-time detection technologies, and improved planning tools were presented as complementary strategies. Examples were used to illustrate how vessel speed, visibility conditions, and reaction time influence collision avoidance. The session concluded with a call to integrate whale strike awareness into ongoing revisions of the STCW training framework and to ensure that scientific information reaches vessel operators in practical and usable formats.

Relevant publications

The Nautical Institute. (2026). The Nautical Institute. Accessed from: https://www.nautinst.org

The Nautical Institute. (2025). Best practice to avoid ship whale strikes [Video]. Accessed from: https://youtu.be/XquUfBJbOYs

3.2 Lucy Babey. Vessel Strike Training & Education

ORCA presented its experience working at the intersection of marine conservation and shipping operations, drawing on more than 25 years of collaboration with the maritime industry. Through citizen science programmes and partnerships with commercial operators, the organisation aims to reduce vessel strike risk while improving communication between conservation practitioners and shipping stakeholders. A central message of the presentation was that effective mitigation depends on education across all levels of the shipping industry. While vessel strike training has historically focused on bridge crews and how to respond when whales are sighted, it was emphasised that mitigation begins much earlier through effective voyage planning. Training should therefore also target route planners, operational teams, management staff, and decision-makers. It was noted that policymakers, researchers, and NGOs have already invested significant effort in identifying collision hotspots and developing mitigation guidance. However, these measures often fail when they are not effectively communicated to vessel operators. ORCA highlighted the importance of building shared understanding across companies, reducing stigma associated with whale collisions, and ensuring that crews

understand why mitigation measures matter. ORCA currently trains thousands of seafarers each year, alongside shoreside teams and senior leadership staff. Training resources are sector-specific and regularly updated to incorporate the latest mitigation measures, regulatory developments, scientific research, and industry feedback. These programmes are also informed by ORCA's onboard research on whale–ship interactions.

Relevant publications

ORCA (2026). ORCA. Accessed from: https://orca.org.uk/training

3.3 Noel Covian. Towards standardised training for Navigation in IMMA

A proposal for standardised maritime training on vessel strike prevention was presented, highlighting the absence of cetacean-specific content within current maritime education frameworks. Despite growing scientific knowledge on vessel strikes, seafarers still receive limited formal training on cetacean behaviour, collision prevention, and decision-making in areas of high whale density. This contributes to underreporting, limited use of existing tools, and operational uncertainty when collisions risks arise. The presentation also introduced an ethical dimension to maritime safety, questioning whether current interpretations of the International Convention for the Safety of Life at Sea (SOLAS) remain sufficient when navigation decisions directly affect marine wildlife. Important Marine Mammal Areas (IMMAs) were presented as a science-based spatial framework that could help identify high-risk areas, although they are not yet integrated into maritime education or passage planning. To address this gap, a 20-hour pilot training programme is being developed at Universidad de La Laguna in the Canary Islands, combining lectures, practical sessions, sea outings, seminars, and case studies focused on operational decision-making. The long-term objective is to scale this initiative internationally through a standardised International Maritime Organization model course, aligned with ongoing discussions within the Human Element, Training and Watchkeeping Sub-Committee and the implementation of the 2009 IMO guidance on minimising vessel strikes with cetaceans.

Relevant publications

International Maritime Organization. (2009). Guidance document for minimizing the risk of ship strikes with cetaceans (MEPC.1/Circ.674).

Covián, R. N. R., Almeida, J. A. G., & de Ganzo, M. D. C. A. (2025). Specific Training for Navigation in Areas with the Presence of Cetaceans. Journal of Maritime Research, 22(1), 452-459.

PART 4: MITIGATION MEASURES - TECHNOLOGY

4.1 Daniel Zitterbart. Whale Spotter

An overview of WhaleSpotter's thermal imaging technology for real-time whale detection was presented, summarising more than 15 years of development aimed at providing vessel crews with sufficient warning time to avoid collisions. The system was first operationally implemented in 2013, marking the beginning of its application in real-world navigation contexts. It detects temperature differences between whale body parts or blows and surrounding water, allowing detections during both day and night conditions. Depending on species size, reliable detection ranges between 2 and 4 kilometres. The technology has been deployed on multiple vessel types, including cargo ships, tankers, cruise vessels, ferries, and autonomous platforms. A key component of the system is real-time human verification of AI detections, which helps minimise false alerts, avoid alert fatigue, and maintain crew confidence in the system. Operational examples showed how captains can modify routes after receiving whale alerts. In one preliminary case study from the Pacific Northwest and Alaska, a single vessel recorded 9,253 detections grouped into 525 encounters, with only 12 false alerts (0.13%). Average first detections occurred at 1.9 km, providing approximately 3.5 minutes for crews to react. The presentation concluded that thermal detection technology is now operationally mature and can significantly reduce collision risk when properly implemented. However, appropriate crew training, verification systems, and real-time data sharing were identified as essential to avoid creating a false sense of security.

Relevant publications

WhaleSpotter (2026). WhaleSpotter. Accessed from: https://www.whalespotter.com/

4.2 Peña Fabiani. Thermal detection in Canarias: Fast Ferries

A validation framework for real-time detection technologies was presented within the Atlantic Whale Deal project, focusing on the operational challenges of high-speed ferries in the Canary Islands. The region was described as a particularly complex environment due to intense inter-island traffic concentrated within narrow maritime corridors and vessel speeds reaching up to 34 knots. The presentation emphasised that emerging detection technologies must be rigorously validated before operational implementation. Three systems are currently being tested onboard fast ferries: WhaleSpotter, the Sea.AI Sentry 3.0 system, and a prototype developed by Windoven. A longer-term objective discussed during the presentation was whether these systems could contribute to dynamic real-time risk mapping and temporary alerts in high-traffic maritime corridors. Rather than focusing solely on maximum detection range, the study introduced the concept of Reliable Detection Rate (RDR), identifying the distance at which detection probability remains stable before declining. Results showed consistent detection probability up to approximately 0.9 km, followed by a gradual decline up to 2.7 km, with larger species being detectable at greater distances. Operational feasibility was further assessed

through the calculation of an Avoiding Limit Point (ALP), which estimated the minimum distance required for successful evasive manoeuvres. Results indicated that ALP (~235 m) remained well below the RDR threshold, providing approximately 38 seconds of reaction time at operational speeds. Human factors were also considered through comparisons with sightings recorded by ferry crews using Fred. Olsen Express' VIGIA reporting system. The presentation concluded that these technologies show promising operational potential, although validation remains ongoing.

Relevant publications

Richter, S., Yurk, H., Winterl, A., Chmelnitsky, E., Serra, N., O'Hara, P. D., & Zitterbart, D. P. (2023). Coastal Marine Mammal conservation using thermal imaging-based detection systems. bioRxiv, 2023-08.

4.3 Thomas Degermann. Machine Vision for Marine Mammal Detection

An overview of the SEA.AI detection system was presented, focusing on the use of machine vision for real-time whale detection from vessels. Originally developed as a maritime safety tool, the system is designed to detect and classify objects at sea—including vessels, floating debris, humans in the water, and cetaceans—and provide real-time alerts to users. The company currently operates two main camera systems: the Sentry camera, which combines thermal and RGB sensors and can rotate 360 degrees, and the Watchkeeper, a fixed forward-facing system available in different configurations depending on operational requirements and budget. The speaker highlighted that whale detections remain imperfect and that improving detection performance requires continuous expansion of training datasets. Since 2018, the company has built a database of approximately 24 million annotated marine images, although only around 120,000 correspond to marine mammals, highlighting the importance of targeted collaborations to improve cetacean-specific detection performance. In this context, partnerships with organisations such as the University of La Laguna, Irish Whale and Dolphin Group, WeWhale, and Iberian Orca initiatives were identified as particularly valuable. Synthetic image generation was also presented as a complementary strategy to expand training datasets by modifying real whale images under different environmental conditions. Recent improvements in the system's convolutional neural networks were highlighted, particularly for rare small objects such as whales, floating debris, ice, wooden logs, and humans in the water. Whale detection performance reportedly improved from approximately 54% to 72%, and the company aims to reach 80% detection rates in both RGB and thermal imagery. Future developments include improving automatic whale classification and enabling real-time sharing of whale detections with the broader maritime community.

Relevant publications

SEA.AI. (2026). Sentry, Offshore and Competition: AI-based vision systems for marine safety. Accessed from: https://sea.ai/

4.4 **Alexandros Xydias**. **Mitigating the Risk of Ship Strikes. SAvEWhales early warning system & Ship Operational Measures**

The SAvE Whales project was presented as a passive acoustic early-warning system designed to reduce collisions with sperm whales in the Hellenic Trench, a region hosting approximately 200 sperm whales where around 50% of stranded individuals show evidence of vessel strikes. The area includes zones where rerouting is feasible and others, such as the Strait of Kythira, where route deviations are more difficult. Funded by OceanCare, the system uses acoustic buoys to detect sperm whale echolocation clicks. For the Strait of Kythira, two buoys may be sufficient to confirm whale presence, while 8–12 buoys would be required for precise localisation. The speaker noted that localisation would mainly be necessary if course alterations were used as the primary mitigation measure. However, course alterations were described as operationally challenging due to unpredictable whale movements, vessel manoeuvrability constraints, limited reaction time and incompatibility with proper voyage planning. Bridge officers typically plan manoeuvres well in advance, making short-notice alerts difficult to implement safely. For this reason, speed reduction was presented as the most practical response. Vessels should be notified in advance so reduced speeds—around 10 knots—can be integrated into voyage planning before entering high-risk areas. The presentation also highlighted that speed reduction contributes to lowering underwater noise and supports compliance with the European Union Marine Strategy Framework Directive.

Relevant publications

International Whaling Commission (2010, September). Report of the joint IWC-ACCOBAMS workshop on reducing risk of collisions between vessels and cetaceans. Workshop proceedings, 21–24 September 2010.

International Maritime Organization. (1999). Resolution A.893(21): Guidelines for voyage planning.

International Maritime Organization. (1972). Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs).

Skarsoulis, E. K., Piperakis, G. S., Orfanakis, E., Papadakis, P., Pavlidi, D., Kalogerakis, M. A., Alexiadou, P., & Frantzis, A. (2022). A real-time acoustic observatory for sperm-whale localization in the Eastern Mediterranean Sea. Frontiers in Marine Science, 9, 873888. doi: https://doi.org/10.3389/fmars.2022.873888

4.5 **Deanna Zitterlind**. **Whale Alert. Reducing ship strike risk for all vessels through collaborative sharing of sightings and detections along with approach guidelines and management zones**

An overview of WhaleAlert was presented as a real-time whale reporting platform designed to reduce collision risk across different vessel types. Originally launched in the United States in 2012, the platform has recently expanded into European waters through collaborations with Greenov, International Fund for Animal Welfare, and the Marine Mammal Advisory Group. Although initially linked to citizen science reporting, the platform increasingly supports operational decision-making for both recreational users and commercial mariners. It allows users to receive alerts and submit sightings through mobile, desktop, and web applications. Whale Alert aggregates real-time data from multiple sources, including human

observers, acoustic buoys, gliders, aerial surveys, and infrared cameras. It also provides management zone information, approach guidelines, speed recommendations, and dynamic risk indicators, while sharing data through APIs with third-party navigation systems. The platform recorded over 16,500 unique sightings in 2025 and more than 55,000 app downloads. Current work focuses on expanding partnerships as part of the Global Hazard Reporting Network and developing common standards for integrating whale alerts into consumer marine electronics (NMEA) and commercial shipping systems. The presentation highlighted the importance of interoperability between detection technologies, reporting systems, and vessel operators to improve real-time mitigation efforts.

Relevant publications

WhaleAlert. (2026). WhaleAlert: Reducing ship strikes to whales. Accessed from: https://www.whalealert.org

4.6 Lisa McDonald. Predict Wind. Faster. Smarter. Designed for connection

PredictWind presented its DataHub platform, originally developed for global weather forecasting, marine connectivity, and real-time vessel data transmission for commercial, sailing, and recreational vessels. The platform was presented as a tool for sharing real-time marine megafauna observations, enabling vessels operating in both offshore and coastal areas to transmit sightings and environmental data to shore-based servers, marine researchers, and other maritime users. Recent developments include the integration of whale sightings and orca awareness information, creating a two-way flow of information between vessels and centralised systems. This enables real-time observations collected onboard vessels to be shared with other users and maritime stakeholders, improving situational awareness and supporting mitigation actions such as speed reductions or route adjustments in areas of high whale activity. The speaker explained that the reporting system is still being refined and currently combines real-time sightings, historical records, forecasting services, AIS data, satellite observations, and broader ocean monitoring datasets. The DataHub also functions as an AIS repeater, vessel tracker, and NMEA data gateway, providing real-time vessel information, navigation updates, and remote connectivity. The presentation highlighted the potential role of existing weather-routing services in supporting real-time whale mitigation efforts and identified opportunities for future collaboration with research institutions and organisations interested in contributing observational data to the Global Hazard Reporting Network.

Relevant publications

PredictWind. (2026). PredictWind: World leader in wind forecasting. Accessed from: https://www.predictwind.com/

4.7 Jennifer Wladichuk. JASCO. Boundary Pass underwater Listening Station

JASCO Applied Sciences presented its Underwater Listening Station (ULS) located in Boundary Pass, within the shipping lanes approaching Vancouver. The area overlaps with critical habitat for the

endangered southern resident killer whale population, which currently numbers approximately 74 individuals. Between June and November, when whales are typically present, voluntary vessel slowdowns are implemented through the Port of Vancouver's ECHO programme to reduce underwater noise and collision risk. In 2026, an additional trial slowdown was introduced in March based on historical whale presence data. The fixed acoustic station automatically detects killer whale vocalisations and integrates these detections into the Whale Report Alert System, which also incorporates citizen science reports and allows real-time notifications to be sent to commercial mariners and the Global Hazard Reporting Network. During March 2026, the system detected killer whales on nine days, including five days with southern resident killer whales, generating approximately 40 real-time alerts. Beyond whale detection, the station also measures vessel noise. The system has collected over 70,000 ISO-compliant vessel source level measurements from more than 10,000 individual vessels, allowing researchers to evaluate the effectiveness of vessel slowdowns in reducing underwater noise. The presentation highlighted the advantages of fixed seafloor acoustic infrastructure, including reliable real-time performance, continuous monitoring in high-traffic areas, advanced detection capabilities, and ongoing system improvement through expert verification.

Relevant publications

JASCO Applied Sciences. (2026). Sound science and technical excellence: Underwater acoustics and marine life monitoring. Accessed from: https://www.jasco.com/who-we-are

Q&A + Summary - Natacha Aguilar de Soto

The discussion acknowledged that some questions exist regarding the realistic implementation of different detection technologies, and that no single solution is applicable to all operational contexts. Further, in some cases a combination of technologies will be desirable. A clear consensus emerged that technology can play an important role in reducing collision risk, combined with operational measures. Detection systems can improve the early identification of cetacean presence, while data-sharing platforms allow vessels to receive whale presence information before entering high-risk areas. Participants also highlighted that lower vessel speeds improve reaction time and thus the effectiveness of collision avoidance manoeuvres enabled by detection technologies. Operational measures such as re-routing and speed reduction are the only measures that have been scientifically proven to reduce the risk of vessel strikes until now, they therefore constitute the recommendations of the International Whaling Commission and the ACCOBAMS Scientific Committee and are enshrined in the NW Med PSSA Associated protected measures. The session concluded that technology can significantly reduce vessel strike risk, but it cannot eliminate collisions on its own. In parallel to operational and technological measures, education and training for mariners remains an essential component of effective mitigation strategies. This is the key to connecting mariners to share live information, and to drive data from the ocean to the science community to inform better datasets.

PART 5: IMPLEMENTATION - CASE STUDIES

5.1 Russell Leaper. IWC/IMO progress & updates

The role of the IMO in addressing vessel strikes was outlined. The IMO first developed a guidance document on minimising the risk of vessel strikes with cetaceans in 2009. This guidance provides advice to IMO Member States on the process for implementing mitigation measures. Since the development of the guidance, vessel strikes have not been a specific agenda item within the IMO, and responsibilities are divided across committees: environmental matters fall under the Marine Environment Protection Committee (MEPC), while routing measures are handled by the Maritime Safety Committee (MSC) and its Navigation, Communications and Search and Rescue subcommittee. This division can lead to some procedural confusion on where proposals for measures to reduce vessel strike risk should be submitted. Current guidance from the IMO Secretariat indicates that proposals with an environmental objective, including those related to vessel strikes, should first be submitted to the MEPC. A range of management tools available within the IMO framework was discussed. Traffic Separation Schemes (TSS) were identified as a key routeing instrument, providing structured lanes to organize vessel traffic. However, while these schemes include rules for joining and crossing it is not mandatory to follow a TSS. This may limit the effectiveness of a TSS as a measure to reduce the risk of vessel strikes if not combined with additional measures and outreach to vessel operators. Areas To Be Avoided are an additional measure that allows certain zones to be designated as off-limits to specific vessel types, thereby directly reducing spatial overlap with vulnerable species. The IMO also designates Particularly Sensitive Sea Areas (PSSAs), with Associated Protective Measures such as routeing schemes or speed restriction. Designation of a PSSA involves analysis of all the potential impacts of shipping within an area which means they are often seen as the preferred mechanism for addressing vessel strikes. The North-West Mediterranean PSSA was cited as an example, where voluntary speed reductions are applied when whales are detected. While potentially effective, such measures can be challenging for mariners to interpret and implement in practice. Overall, PSSAs were considered a useful tool but the effectiveness depends on the design of, and level of co-operation with, the accompanying measures.

Relevant publications

International Maritime Organization. (2009). Guidance document for minimizing the risk of ship strikes with cetaceans (MEPC.1/Circ.674).

5.2 Wei-Jun Mun. World Shipping Council Whale Chart

The WSC Whale Chart, developed by governments, port authorities, and transport ministries, compiles global whale protection measures (vessel strikes, noise) into a single resource to improve mariner awareness and decision-making. It addresses fragmented, hard-to-access information and aims to become a live, digital dataset integrated into routing systems and maritime tools. It covers ~15

jurisdictions and includes diverse measures: mandatory/voluntary, static/dynamic, and sometimes incentive-based. Key types include areas to avoid, lookout requirements, minimum distance rules, routing measures, reporting systems, and speed reduction zones—especially important for reducing both collision risk and noise. In the Port of Duqm in Oman, for instance, vessels are encouraged to maintain speeds below 10 knots to protect the endangered Arabian Sea humpback whale, alongside complementary actions such as maintaining visual watch, reporting sightings, and observing distance guidelines. In the Gulf of Panama, an existing traffic separation scheme is supplemented by a seasonal voluntary slowdown recommendation between August and November, highlighting how temporal measures can be layered onto established routing systems. Challenges include ensuring compliance across regions and simplifying information for users, specially for mariners operating across diverse regulatory contexts. Emphasis was placed on the need to simplify and harmonise information to make adherence to slowdown zones more intuitive. Existing initiatives, particularly in the United States, were referenced as examples of effective stakeholder engagement and industry collaboration. Slowdowns offer co-benefits (lower GHG emissions) but raise questions such as shifting impacts elsewhere (e.g. speeding outside zones), highlighting the need for well-designed, holistic measures and evaluation of conservation measures within broader maritime operational and environmental frameworks.

Relevant publications

World Shipping Council. (2026). Whales - World Shipping Council. Accessed from: https://www.worldshipping.org/whales

5.3 Alexandra Mayette. Transport Canada's Management Measures in the Gulf of St Lawrence

Since 2017, Transport Canada has implemented a comprehensive management framework in the Gulf of St. Lawrence to protect the North Atlantic right whale. Measures (for vessels ≥13 m since 2020) include static, dynamic, and seasonal speed limits (~10 knots), a summer restricted area (8 knots), and voluntary slowdown zones (10 knots), supported by intensive monitoring and surveillance (aerial, vessel-based, autonomous). Compliance is very high (>99% mandatory; ~74% voluntary), with variations depending on seasonal conditions, and with overall vessel speeds reduced across all management zones. However, increasing maritime traffic—especially cargo and fishing—raises encounter probability. Risk assessments show lethal strike risk remains above pre-2017 levels, with no statistically significant increase or decrease over time. Highest risk occurs in zones where whales are consistently present, followed by busy shipping corridors; restricted summer areas, which corresponds to core whale habitat, also contributes to overall risk, although it is subject to stricter controls. Statistical analyses (e.g. GLMMs) indicate significant risk reductions mainly in seasonal and restricted zones, particularly where traffic is limited or removed. Remaining activity in restricted zones is largely associated with fishing vessels, which are subject to lower speed limits. Speed limits (~10 knots) provide some benefit (avoiding ~8% higher risk without them) but are insufficient to greatly reduce lethality for large vessels. Achieving substantial reductions in lethality would require speeds that are operationally

unrealistic in most shipping contexts. Overall, traffic growth offsets mitigation gains despite strong compliance. Rerouting vessels away from key habitats is the most effective strategy, highlighting spatial separation as more impactful than speed reduction alone.

Relevant publications

Mayette et al. [in review]. Assessment of vessel strike risk and performance of the Canadian protection measures for North Atlantic right whales in the Gulf of St. Lawrence.

5.4 Jessica Morten. Protecting Blue Whales and Blue Skies

A west coast U.S. partnership integrates whale protection with climate and noise benefits, targeting blue, fin, and humpback whales in high-traffic California waters. Management measures include adjusted shipping lanes (e.g. San Francisco, Southern California) and expanded avoidance areas, but as full spatial separation is not feasible, emphasis is placed on voluntary speed reductions (≤10 knots), targeting large vessels in high risk areas. Compliance has risen from ~45% (2017) to ~70–72% (2025), driven by industry engagement with sustainability and targeted outreach. A key initiative, Protecting Blue Whales and Blue Skies, a voluntary incentive-based scheme that uses AIS data to monitor performance and incentivise participation through public recognition, monthly reports feedback, and public visibility rather than enforcement. The programme also quantifies environmental benefits associated with speed reductions across multiple dimensions. By 2025, participating vessels reduced strike risk by ~40% (compared to 2016), underwater noise by ~5.2 dB in average, and emissions (NOx, SOx, PM, GHGs) significantly. Participation has grown to 787 vessels across 44 companies, which collectively reduced speeds >480,000nm. The initiative has successfully engaged major container and cargo operators, with ongoing efforts to include additional sectors such as cruise shipping. Expansion across the full California coast is planned for 2026, supported by state legislation, maintaining a collaborative, incentive-based approach.

Relevant publications

Blue Whales & Blue Skies (BWBS). (2026). Protecting Blue Whales and Blue Skies Program. Accessed from: https://bluewhalesblueskies.org/

Conti, M., Reeves, L. P., Haver, S., Frasier, K., & ZoBell, V. (2025). Underwater Radiated Noise Levels along the California Coast for Participating Vessels in the 2025 Protecting Blue Whales and Blue Skies Program.

Morten, J., Freedman, R., Adams, J. D., Wilson, J., Rubinstein, A., & Hastings, S. (2022). Evaluating adherence with voluntary slow speed initiatives to protect endangered whales. Frontiers in Marine Science, 9, 833206. doi: https://doi.org/10.3389/fmars.2022.833206

Nisi, A. (2025). Estimated reduction in whale ship-strike risk during the 2025 Protecting Blue Whales and Blue Skies voluntary vessel speed reduction program in California waters.

5.5 Rachel Rhodes. Whale Safe

The Whale Safe initiative, developed by Benioff Ocean Science Laboratory six years ago, addresses data and technology gaps in whale conservation through an integrated detection and communication system for maritime operators. It combines three data sources: near real-time acoustic monitoring (buoys), visual sightings reported by naturalists and researchers, and a dynamic habitat suitability model for blue whales based on daily satellite-derived ocean conditions. These are synthesised into a simple daily whale presence rating, providing an accessible and operationally relevant indicator of whale activity in key shipping areas, and designed for operational use rather than precise positioning. Implemented in major California shipping corridors (e.g. Santa Barbara Channel, ports of Los Angeles, Long Beach, San Francisco, Oakland), the system also uses AIS data to monitor vessel behaviour in reduction zones. It generates automated regularly updated performance assessments of company compliance with speed recommendations (e.g. % time ≤10 knots). Results are publicly available via an online platform, offering breakdowns by company and applying a grading system to reflect cooperation levels. The transparency provided by this approach supports engagement with industry stakeholders and encourages improved compliance. The system reduces analytical workload associated with large AIS datasets and facilitates integration with other conservation programs. Now expanded across North America, it provides annual performance tracking and supports both voluntary and regulatory measures, highlighting the value of collaborative, data-driven approaches to reduce whale risk.

Relevant publications

Benioff Ocean Science Laboratory. (2026). Whale Safe North America: A technology-based mapping and analysis tool. University of California, Santa Barbara. Accessed from: https://na.whalesafe.com/

5.6 Simone Panigada. Environmental Pressures in the NW Mediterranean PSSA: vessel strikes and maritime traffic

Vessel strikes in the Mediterranean pose a major threat to endangered fin and sperm whales, which belong to small, isolated populations, classified as endangered, where each mortality is significant. While some individuals survive collisions, often bearing propeller scars, most incidents are fatal and frequently go unnoticed by vessel crews. High traffic density means collision risk is severely widespread, and whales show limited ability to avoid vessels according to recent studies, reinforcing the need for mitigation measures that prioritize changes in vessel behaviour rather than relying on animal responses. A key regulation is the 2023 designation of the NW Mediterranean as a Particularly Sensitive Sea Area (PSSA) by the International Maritime Organization—the first focused on cetacean vessel strikes. Measures include voluntary speed reductions (~10–13 knots) in areas where cetaceans are detected or reported, designed as flexible. These measures were intentionally formulated in flexible terms to facilitate initial approval, with potential strengthening over time. While spatial/temporal separation is most effective (as recognised by ACCOBAMS), it is often impractical in this region given the wide and dynamic distribution of whales in the Mediterranean, making speed reduction the main

viable tool. However, data (2023–2024) show many vessels—especially passenger and Ro-Ro ferries—still exceed high-risk speeds (>15 knots), indicating limited compliance and more restrictive regulatory approaches. Supporting initiatives include LIFE SeaDetect (2022-2026), which is developing real-time onboard detection systems using thermal, radar, LiDAR, and acoustics. In parallel, the Pelagos Consortium has been established as a multi-partner initiative which promotes ecosystem-based management in the Pelagos Sanctuary (France–Monaco–Italy), including strengthening speed control, noise reduction measures, designating and enforcing highly protected areas, reducing fishery impacts through collaborative approaches, integrating conservation priorities into spatial planning, and aligning existing regional governance frameworks such as the PSSA and Natura 2000. These combined efforts illustrate a transition toward more comprehensive and coordinated management approaches, with the PSSA serving as a pioneering framework that may inform similar measures in other regions.

5.7 **Filipe Alves.** **Atlantic Whale Deal Project**

The Atlantic Whale Deal (AWD) project, funded by the Interreg Atlantic Area programme (2023–2027), brings together 15 partners from Ireland, Spain, Portugal, and France, including industry stakeholders such as ferry operators. It adopts a multidisciplinary and cross-sector approach—spanning engineering, biology, oceanography, socioeconomics, and policy—to reduce whale–ship collisions. The project also highlights the broader ecological and societal importance of whales, including their role in ecosystem functioning and carbon processes. The work is structured into five interconnected work packages. The first focuses on the development and testing of detection technologies. Detection efforts focus mainly on onboard systems such as thermal cameras and acoustic monitoring, with pilot studies in high-risk areas like the Canary Islands, while satellite approaches are explored but less central. The second work package is dedicated to the production of collision risk and noise maps using species distribution models, trajectory simulations, and acoustic propagation. The third work package develops interactive, user-oriented tools that integrate multiple data streams, including detection technologies and risk maps, to support real-time decision-making and risk mitigation by maritime operators. The fourth examines the ecosystem services provided by whales, aiming to generate evidence to inform conservation and management strategies. The fifth and final work package focuses on impact assessment and the formulation of a long-term sustainable plan, including policy recommendations, economic viability analysis, and guidelines for replication and dissemination. Overall, the AWD aims to deliver practical, scalable solutions through integrated science, technology, and stakeholder collaboration.

Relevant publications

Ferrari, V., Hague, E., Sciberras, M., Alexander, K. A., O'Hara, P. D., & McWhinnie, L. (2026). Exploring the evidence of direct threats to cetaceans from maritime vessels: A systematic map. PloS one, 21(5), e0348502.

NOAA Fisheries. (2026). Advanced technologies to reduce vessel strikes. National Oceanic and Atmospheric Administration. Accessed from: https://www.fisheries.noaa.gov/national/endangered-species-conservation/advanced-technologies-reduce-vessel-strikes

Winkler, C., Panigada, S., Murphy, S., & Ritter, F. (2020). Global numbers of ship strikes: An assessment of collisions between vessels and cetaceans using available data in the IWC Ship Strike Database (Report No. IWC/68B/SC HIM09). International Whaling Commission.

5.8 **Sharon Livermore**. **Reducing ship risk to endangered sperm whales in Greece**

An NGO perspective highlighted the importance of collaboration with the shipping industry to mitigate vessel strikes, based on coalition-building between NGOs, scientists, and industry, and supported by engagement with international bodies such as the International Whaling Commission. In the Hellenic Trench, a coalition including OceanCare, WWF Greece, and the Pelagos Cetacean Research Institute addressed risks to endangered sperm whales in a key breeding and nursing area. Long-term research identified a strong overlap between whale presence and shipping traffic, with vessel strikes responsible for over half of strandings. Industry engagement led to voluntary rerouting measures adopted since 2021 by 13 companies, reducing collision risk by an estimated 30% and demonstrating the feasibility of operational changes. A major Mediterranean operator committed to rerouting vessels away from the highest-risk areas triggered a broader uptake across the sector, with a total of 13 companies and associations adopting similar measures. A second case in southern Sri Lanka involves a resident population of endangered blue whales overlapping with a major global shipping corridor. Scientific studies showed that shifting routes by only 15 nautical miles offshore could reduce collision risk by up to 95%. While around one-third of vessels have voluntarily adopted this route, the lack of formal approval of a revised traffic separation scheme remains a key limitation. A joint proposal submitted in 2023 by a coalition representing a large proportion of the global shipping industry, together with civil society organisations, sought formal recognition of the revised routes but was not approved. These examples demonstrate that relatively small spatial adjustments in shipping routes can significantly reduce the risk of vessel strikes in high-priority areas. They also highlight the effectiveness of collaborative approaches between NGOs and industry, while underlining the need for regulatory endorsement to ensure long-term implementation, standardisation, and safety.

5.9 **Kellie Covington**. **Sailing sector mitigation & Cross sector collaboration**

The Sails of Change team presented an offshore racing sector perspective, highlighting the high collision risk associated with very fast vessels (25–50 knots). A collision during a 2023 transatlantic attempt led the team to suspend racing and recognise that existing best practices were insufficient. In response, their Horizon biodiversity protection programme was developed around three pillars: technology, advocacy, and data/risk assessment. Current efforts are focused on developing onboard detection solutions as well as undertaking risk assessments of navigational zones. The team is developing an AI enabled IR & optical camera detection system working with a number of technical and scientific partners. They are also exploring underwater solutions and undertook an accoustic study in

2025 to provide insight into the Maxi Trimaran's noise signature. This showed that the trimaran produces broadband underwater noise, primarily within the 100–1000 Hz range, with levels increasing with speed and foil use. This noise is detectable by baleen whales over several hundred metres to ~1 km, but less so by toothed whales. The team has a pinger installed but they have stopped using it due to uncertainties about the effectiveness of this technology on a high speed vessel and potential whale response behaviour. Technology effectiveness will be challenged by the complicated offshore racing environment where their performance is constrained by speed, vessel design & environmental conditions. However, team research has also shown that collisions can occur in high-visibility, flat water conditions. The program has developed significant data particularly through the image acquisition campaigns needed to train the detection algorithm (41 days in 2025, hundreds of sightings), and the team's onboard science equipment (temperature, salinity, CO2, chlorophyll). The team has contributed this data to several platforms : Marine Strike Log, BIOTA, GBIF, SOCAT. The team's risk assessment work is carried out in collaboration with MMAG and DMAD with current maps covering the Bay of Biscay and down to the Canaries. These risk assessments are integrated into onboard navigational systems to serve as an aide to routing decisions. Overall, the initiative demonstrates how the offshore racing sector can contribute to both risk mitigation and data generation, while also highlighting the need for improved technologies and stronger links between industry and research.

Relevant publications

Association Tour du Monde en 80 Jours. (2026). Trophée Jules Verne. Accessed from: https://www.tropheejulesverne.org/en/

Sails of Change. (2026). Sails of Change. Accessed from: https://www.sailsofchange.com/fr/

5.10 Tim Awbery. Global Risk assessment, piece by piece

A Global Risk Assessment framework was presented as a stepwise process in which individual data inputs are progressively integrated into broader analyses. At the smallest scale, the assessment relies on sighting and detection records, which are often spatially patchy. These gaps are addressed by incorporating additional layers such as Marine Strike Log data, Protected areas, Important Marine Mammal Areas, and expert or local knowledge. These datasets are combined into regional risk assessments based on marine mammal distribution, which are applicable across vessel types. Current efforts have produced assessments mainly in the Atlantic and Mediterranean, forming the basis of a broader, but still incomplete, global framework. Key limitations remain. The assessment currently focuses only on cetaceans and does not account for seasonal variability, despite the dynamic nature of species distributions. In addition, reliance on publicly available data creates important gaps in coverage and quality. The integration of marine megafauna species distribution models is identified as a priority to address these limitations. Overall, the global assessment is still under development, with progress dependent on improved data availability, methodological refinement, and continued collaboration.

Relevant publications

Nisi, A. C., Welch, H., Brodie, S., Leiphardt, C., Rhodes, R., Hazen, E. L., Redfern, J. V., Branch, T. A., Barreto, A. S., Calambokidis, J., Clavelle, T., Dares, L., de Vos, A., Gero, S., Jackson, J. A., Kenney, R. D., Kroodsma,

D., Leaper, R., McCauley, D. J., ... & Wilson, J. (2024). Ship collision risk threatens whales across the world's oceans. Science, 386(6724), 870–875. doi: https://doi.org/10.1126/science.adp1950

Wang, B., Zhao, L., Lu, T., Li, L., Li, T., Cong, B., & Liu, S. (2025). Global hotspots of whale–ship collision risk: A multi-species framework integrating critical habitat zonation and shipping pressure for conservation prioritization. Animals, 15(14), 2144. doi: https://doi.org/10.3390/ani15142144

5.11 Rochelle Constantine. Efficacy of voluntary ship strike mitigation actions in Hauraki Gulf (NZ)

A case study from the Hauraki Gulf (Aotearoa/New Zealand) demonstrates the effectiveness of collaborative, science-based mitigation of vessel strikes. A small population of Bryde's whales faced unsustainable mortality, with an estimated 2.3 deaths per year, largely due to collisions with vessels in a busy and shallow shipping area. Research showed that whales spent most of their time within the top 10–20 metres, overlapping with vessel draft and making collisions highly likely. In response, a collaborative effort between the Port of Auckland, the shipping industry, and scientists was established, prioritising rapid action over formal regulation, which was considered slow and complex. This led to the implementation of a voluntary transit protocol in 2013–2014. The core measure was a reduction in vessel speed to a maximum of 10 knots, a threshold shown to significantly decrease the probability of lethal collisions. Additional actions included increased vigilance to avoid whales and the reporting of sightings to harbour authorities; neither of these actions were very effective. Subsequent evaluation demonstrated strong effectiveness: average vessel speeds decreased from around 13.2 to 10 knots, reducing the probability of lethal strikes by nearly half (from approximately 51% to 26%). Following implementation, reported vessel strike fatalities dropped to near zero with the last confirmed whale strike mortality in September 2014, highlighting the impact of the measures. This case shows that voluntary, industry-led actions, when supported by scientific evidence and stakeholder collaboration, can achieve rapid and substantial conservation outcomes.

Relevant publications

Constantine, R., Johnson, M., Riekkola, L., Jervis, S., Kozmian-Ledward, L., Dennis, T., Torres, L. G., & Aguilar de Soto, N. (2015). Mitigation of vessel-strike mortality of endangered Bryde's whales in the Hauraki Gulf, New Zealand. Biological Conservation, 186, 149-157. doi: http://dx.doi.org/10.1016/j.biocon.2015.03.008

Ebdon, P., Riekkola, L., & Constantine, R. (2020). Testing the efficacy of ship strike mitigation for whales in the Hauraki Gulf, New Zealand. Ocean & Coastal Management, 184, 105034. doi: https://doi.org/10.1016/j.ocecoaman.2019.105034

PART 6: CASE STUDY - CANARIES

Natacha Aguilar de Soto. Introduction Canaries Case study

The Canary Islands were presented as a case study that brings together many of the challenges and solutions discussed throughout the workshop. Vessel strikes have been recognised as a major issue in the archipelago for decades, particularly affecting sperm whales but also rorquals and other species. Recent efforts have increased collaboration between scientists, government authorities, and shipping companies. A key challenge identified in the archipelago is the coexistence of two different types of maritime traffic: international vessels crossing the archipelago through major shipping routes, and intensive inter-island fast ferry traffic, which exceeds 20,000 crossings annually. It was emphasised that these traffic categories require different mitigation strategies:

I) For international shipping, speed restrictions within the proposed Particularly Sensitive Sea Area (PSSA) were presented as a feasible option. Most international passing traffic crosses the archipelago following one of the two Traffic Separation Schemes (TSS) defined by IMO within the PSSA Canary Islands. These TSS are 118 km long (TSS 1: channel Tenerife-Gran Canaria) and 70 km long (TSS 2: channel Gran Canaria-Fuerteventura). Thus, a reduction from typical cargo speeds around 18-20 knots to internationally advised limits of 10 knots would only increment the duration of the transit in some 3 hours (from ~3 to 6 hrs in TSS 1, and from ~2 to 4 hrs in TSS 2)d.

II) For inter-island ferries, more dynamic measures were proposed. These included i) education to mariners; ii) technological tools to improve early real-time whale detection, to share detections with all ships in the area and to improve whale distribution models; iij) a consensus protocol of collision avoidance to be applied by crew members when detections are reported; iv) speed limits within the PSSA; v) a study of occupancy of ferris to design ferry traffic schemes that optimise societal, economical and environmental gains. The Canary Islands were presented as an example of how collaborative approaches can support the development of practical mitigation strategies.

6.1 Tania López-Piñeiro. Projects launched by the Ministry for the Ecological Transition and the Demographic Challenge to prevent and reduce collisions between cetaceans and vessels

The Ministry for Ecological Transition and Demographic Challenge from Spain presented Spain's ongoing efforts to reduce vessel strikes in the Canary Islands, Balearic Islands, and the Strait of Gibraltar. The speaker emphasised that effective mitigation depends on two key elements: robust scientific knowledge on cetacean distribution and habitat use, and strong collaboration with the maritime sector, including companies such as Fred. Olsen Express. Through the LIFE INTEMARES programme, Spain has conducted photo-identification, passive acoustic monitoring, satellite tagging, genetic sampling, traffic analysis, and collision risk modelling for sperm whales in both archipelagos. In the

Balearic Islands, results identified seasonal changes in whale distribution and highlighted the Mallorca Channel as a high-risk area. Ferry-based monitoring proved to be of limited effectiveness due to low sighting rates at high vessel speeds. In the Canary Islands, acoustic monitoring, satellite tagging, habitat modelling, and collision risk mapping identified several high-risk areas for sperm whales. The presentation also highlighted thermal detection trials conducted with Fred. Olsen Express to test real-time mitigation technologies on inter-island ferry routes. Future work includes expanding thermal detection systems, satellite tagging, predictive modelling, and continued collaboration between scientists, regulators, and the shipping sector.

Q&A: A question was raised regarding why sperm whales and fin whales are classified as vulnerable under Spanish legislation, while Mediterranean populations are listed as endangered under International Union for Conservation of Nature criteria. It was suggested that aligning national classifications with international assessments could strengthen conservation measures. The speaker explained that while International Union for Conservation of Nature criteria are important at global and regional scales, Spain applies its own national assessment framework to determine conservation categories. These criteria were formally adopted by the Spanish government and apply across all protected species. The speaker acknowledged that the issue remains part of ongoing discussions among NGOs and policymakers.

6.2 **Fabian Ritter**. **Ship Strikes in the Canary Islands: High Speed Ferries and Cetaceans**

M.E.E.R. e.V. presented an overview of the long-standing vessel strike problem in the Canary Islands, highlighting the archipelago as a global hotspot for collisions between high-speed ferries and cetaceans. The region hosts around 30 cetacean species and one of the world's densest networks of fast-moving inter-island ferry traffic. In 2007 alone, researchers estimated nearly 28,900 ferry crossings, equivalent to approximately 1.5 million km travelled annually. It was highlighted how inter-island traffic has increasingly shifted toward high-speed vessels travelling at speeds of up to 35–38 knots (typical speed is around 31 knots). A previous collision involving a jet foil in the late 1990s resulted in multiple injuries and one fatality, illustrating that vessel strikes also represent a maritime safety issue. The presentation documented the severe impacts of collisions on cetaceans, particularly sperm whales. Veterinary records inform that sperm whales account for approximately 40–50% of recorded strike victims in the archipelago, alongside beaked whales and other species. Further, vessel strikes are the cause of death of 40% of all sperm whales stranded in the Canary Islands. Official records indicate between one and four sperm whale collisions per year since 1999, although actual numbers are likely underestimated. Particular concern was raised over apparent population decline. The first population abundance study in the archipelago was performed by André in 1996 and provided a best estimate of 324-459 sperm whales off the Canary Islands obtained with point-sample acoustic detections. After that, two duplicated archipelagic acoustic line transect Distance Sampling surveys were performed, providing best estimates of 240 sperm whales in 2010, and 124 in 2021. This raises concerns about potential local

extirpation. The speaker reiterated long-standing mitigation recommendations, including vessel speed reductions, rerouting shipping lanes away from high-risk areas, onboard observers, mandatory strike reporting, training for maritime personnel, and public awareness initiatives. It was emphasised that these recommendations have remained largely unchanged for more than a decade, while implementation has remained limited.

Relevant publications

André M. Distribución y conservación del cachalote (*Physeter macrocephalus*) en las Islas Canarias. Ph.D. Thesis, University of Las Palmas de Gran Canaria. (1997).

Fais, A., Lewis, T. P., Zitterbart, D. P., Álvarez, O., Tejedor, A., & Aguilar Soto, N. (2016). Correction: abundance and distribution of Sperm Whales in the Canary Islands: Can sperm whales in the archipelago sustain the current level of ship-strike mortalities?. Plos one, 11(5), e0155199.

6.3 Iván Fernández, on behalf of Fred. Olsen Express. Advancing towards mitigation of whale collision risk for marine traffic

Fred Olsen Express is a practical example of how shipping operators can actively implement mitigation measures in high-risk regions such as the Canary Islands. The presentation emphasized that vessel strikes cannot be addressed through a single solution, but require a multi-layered approach combining route planning, crew training, monitoring systems, and detection technologies. For more than two decades, Fred. Olsen Express has collaborated with the University of La Laguna and the University of Las Palmas de Gran Canaria, using its vessels as research platforms to support cetacean monitoring and environmental data collection. The company has also modified routes to avoid high-density cetacean areas, including changes in the Teno-Rasca Special Area of Conservation despite increasing travel time. A key initiative has been the development of VIGIA, an internal digital platform that allows crews to record and share cetacean sightings across the fleet in real time. Between 2015 and 2025, more than 32,000 sightings were registered, including over 300 sperm whale sightings, helping identify collision hotspots and improve voyage planning.

Fred. Olsen Express has also progressively tested onboard detection technologies. Initial thermal camera trials began in 2019, followed by collaboration with SEA.AI and the integration of radar-assisted systems capable of detecting potential obstacles with the behaviour and size of a cetacean at distances of up to 1,200–2,000 metres. These systems significantly increase reaction time compared to traditional visual detection and provide crews with automated alerts to support decision-making. It was concluded that no single technology will solve the problem, but combining operational measures, technological innovation, and collaboration between industry, researchers, and public authorities offers the most realistic pathway to reducing collision risk.

Q&A: The discussion focused on two main issues: data sharing and the use of static versus dynamic mitigation measures. Participants discussed whether real-time detections collected through onboard systems could be integrated into broader reporting platforms. Fred. Olsen Express explained that live detections are currently used by crews, while recorded data are analysed through the Atlantic Whale

Deal Project and the University of La Laguna. Although the company's internal VIGIA platform shares sightings across its fleet in real time they highlighted the need for a common international platform to standardise and share data between operators.

A second debate addressed whether mitigation measures should be static or dynamic. Shipping representatives noted that permanent measures, such as fixed speed restrictions, are easier to integrate into voyage planning. Researchers argued that dynamic measures may be necessary in areas where whale distribution changes seasonally, and suggested that these could operate at weekly, monthly, or seasonal scales. Finally, participants stressed that detection technologies alone are not mitigation measures; their effectiveness depends on crew response, training, and clear operational protocols.

Round Table + Q&A + Summary. Moderator - Natacha Aguilar de Soto

The final discussion reinforced that collision mitigation in the Canary Islands, as in most cases, requires multiple complementary measures rather than reliance on a single technological solution. Participants agreed that operational measures such as speed reductions remain the most effective tools for reducing collision risk. A question was raised about why this has not been already implemented, in the light of scientific evidence of collision impact on whales. In the Canary Islands there is a limited scope for rerouting in short inter-island channels, or in the international Traffic Separation Schemes established in the PSSA. Detection technologies should be understood as complementary systems that improve situational awareness. It was emphasised that thermal cameras and alert systems are not mitigation measures in themselves but can undoubtedly aid mitigation. Their effectiveness depends on the actions taken once an alert reaches vessel crews. Given that detection distances may still provide limited reaction time—particularly for high-speed vessels—participants highlighted that lower vessel speeds provide greater decision-making time and safer manoeuvring opportunities. The discussion also addressed the need for improved integration of real-time data. While existing systems in the Canary Islands already allow information sharing within the fleet of FRED OLSEN, an interoperable platform capable of sharing live detections across companies, regions, and broader maritime systems is highly desirable. A key debate focused on the balance between scientific recommendations and operational feasibility. While speed reduction was widely recognised as one of the most effective mitigation measures, it was also acknowledged that uniform restrictions may not be realistic for all vessel types operating in island systems such as the Canary Islands. For example, fast ferris could not practically reduce speed to the 10 knots limit advised for passing international shipping. A question was raised about what speed could be practical for fast ferries considering the construction characteristics of these ships. This reinforced the need for mitigation measures that are both operationally feasible and realistically capable of reducing collision risk. Several considerations were relevant when approaching optimization of inter-island traffic: i) limits in transit speed will not increase travel time proportionally, mainly in shorter transits, given that a variable percentage of the total travel time is spent in harbour

approaches at low speed and loading/unloading the ferris; ii) there is a societal need to provide transport services to peripheral islands even if ships are not full, this needs to be considered when performing a study about transit optimization. The discussion further highlighted the importance of crew training, as effective responses depend on crews understanding cetacean behaviour and being able to make informed operational decisions. The session concluded by recognising that substantial scientific evidence on collision risk already exists. The remaining challenge lies in translating this knowledge into practical, realistic, and widely implemented mitigation measures through continued collaboration between scientists, regulators, and the maritime sector.

CONCLUSIONS

The workshop highlighted the need for greater standardisation in risk assessment methodologies, data collection protocols, more accessible global data, reporting systems, and communication frameworks. At the same time, participants repeatedly emphasised that vessel strike mitigation cannot rely on a one-size-fits-all approach, as measures must remain flexible and adapted to different species, regions, and maritime sectors.

Considerable progress has been achieved in recent years in expanding and diversifying data collection efforts, including collaborations with the shipping industry, citizen science initiatives, the deployment of onboard observers, passive acoustic monitoring, and the development of novel detection technologies. Despite these advances, significant limitations persist due to data gaps, inconsistencies, and fragmentation across platforms and initiatives. Participants stressed the importance of improving data interoperability, enhancing data-sharing mechanisms, and developing integrated systems that allow existing datasets to be more effectively combined and utilised. These improvements are essential to strengthen the robustness, comparability, and applicability of risk assessments.

A recurring theme throughout the workshop was the persistent gap between scientific knowledge and its operational implementation. While substantial advances have been made in understanding the drivers of collision risk and in developing analytical and technological tools, their translation into effective mitigation measures remains uneven. Participants highlighted that the success of mitigation strategies depends not only on scientific validity but ease of access to this information for all mariners and also on operational feasibility, economic implications, and regulatory context. In this regard, widely recognised measures such as vessel speed reduction and routeing adjustments are known to be effective. However, the uptake of these measures varies considerably depending on whether they are mandatory or voluntary, with mandatory measures generally achieving much higher compliance rates. This disparity underscores the need for clearer guidance, targeted training, and improved communication with maritime stakeholders, and additional incentives to encourage the uptake of voluntary measures.

More broadly, discussions reinforced that vessel strike risk constitutes a systemic and global issue, largely driven by the spatial overlap between high-density shipping routes and ecologically important areas for cetaceans. This risk is further exacerbated by the limited avoidance capacity observed in some species and by uncertainties associated with key parameters in risk models, particularly those related to detection and avoidance behaviour. Although modelling approaches continue to evolve, these uncertainties should not preclude action. Participants therefore emphasised the importance of applying the precautionary principle and advancing towards adaptive and dynamic management frameworks capable of responding to temporal and spatial variability in both cetacean distribution and maritime activity.

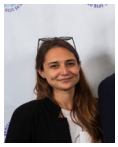
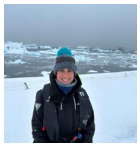
Finally, participants agreed that sustained and enhanced collaboration among researchers, policymakers, industry stakeholders, non-governmental organisations, and technology developers is critical to advancing effective mitigation. Future efforts should prioritise the identification of realistic, scalable, and context-sensitive solutions that balance conservation objectives with operational constraints. Strengthening cross-sector partnerships, promoting standardised yet flexible approaches, and ensuring that scientific knowledge is effectively translated into practice were identified as key priorities for reducing vessel strike risk at both regional and global scales.

APPENDIX 1. Presentations

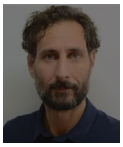
APPENDIX 2. Speakers' Background

Name and Surname		Organization	Background
	Alexandra Mayette	Canadian Wildlife Federation	Marine Research Scientist at the Canadian Wildlife Federation. Cetacean expert working on assessing the risk of vessel strike to large marine mammals in Canada and evaluating the impact of the management measures.
	Alexandros Xydias	OceanCare	Shipping Expert at OceanCare, bringing extensive seagoing experience as a captain and navigation officer on oceangoing merchant vessels, along with a background in key roles within the safety and operations departments of major shipping companies. In this capacity, he is actively engaged in efforts to reduce the ecological footprint of shipping. He is also a member of the SAvE Whales Steering Committee in Greece, contributing to the implementation of the project and the advancement of operational measures to mitigate vessel strikes.
	Alice Bouchard	International Whaling Commission	Co-Organizer of ECS workshop Vessel Strikes and Strandings Data Manager at the International Whaling Commission (IWC). She manages the IWC's global vessel strikes database, which underpins IWC policy and scientific advice on ship-cetacean collisions, and coordinates the IWC Vessel Strikes Expert Panel, a multidisciplinary advisory group advising on all aspects of vessel-cetacean collisions.
	Alicia Rodríguez Juncá	Universidad de la Laguna	Researcher focusing on interactions of human activities with protected marine megafauna. She participates in the Atlantic Whale Deal project and will present a pioneering method to integrate different sources of distribution data to enlarge sample size in distribution model of sperm whales in the Canary Islands
	Aly Elsayed	Nautical Institute	Master Mariner and Technical Advisor leading Work Package 2 for enhancing Seafarer Navigation awareness. He will present the initiatives of the Nautical Institute towards vessel strike prevention.
	Auriane Virgili	Share The Ocean	Marine ecologist and researcher within the Share The Ocean scientific consortium. Her research focuses on the global distribution of cetaceans and the impact of collisions on these species. The presentation aims to describe the risk assessment process implemented to reduce collisions at sea, based on an encounter model that considers the characteristics of both cetaceans and vessels. Offshore racing is used as a case study.
	Aylin Akkaya	DMAD	Founder of Marine Mammals Research Association (DMAD) and of Montenegro Dolphin Research (MDR) Marine Mammal Consultant of WWF-Turkey

	Charlotte Lambert	French Center for Scientific Research (CNRS), LIENSs lab	Marine ecologists researching processes determining species distributions and their variations, and how the ecological niche of marine species changes over time. Studies integrate functional and energetic aspects into ecological niche modelling, and applications to case studies, especially risk analysis of marine fauna to anthropogenic activities (offshore wind farms; maritime traffic; pollution; bycatch in fisheries). She currently co-leads WP2 of the InterReg Atlantic Area project "Atlantic Whale Deal", and will present results of modelling maps of collision risk between whales and cargo ships in the NE Atlantic.
	Damian Foxall	Marine Mammal Advisory Group	Co-Organizer of ECS workshop Co-Founder of the Marine Mammal Advisory Group, a cohort of stakeholders established to collaborate on the protection of biodiversity and explore solutions to strikes and collisions for the sailing & boating sector. As a professional sailor Damian was involved in 12 Round the World races, and multiple trans-oceanic events.
	Daniel Zitterbart	Woods Hole Institute (WHOI)	Physicist with a passion for ecosystems and conservation biology. His long-term scientific goal is to advance our understanding of ocean ecosystems within a movement ecology framework. Combining methods from statistical physics, computer vision, robotics and movement ecology, he develops methods across the spectrum from detecting animal presence to remote sensing of behavior and life history. Daniel's recent work relevant to ship-strikes includes methods development for the estimation of ocean basin scale marine mammal distributions using passive acoustic monitoring, and applications of thermal detection to aid ship-strike prevention.
	Deanna Richburg Zitterland	Whale Alert	Outreach Director for Conserve IO, a leading developer of conservation and citizen science applications, such as Whale Alert. Whale Alert is the world's largest whale protection network, developed in partnership with IFAW, NOAA, and Stellwagen Bank. Whale Alert empowers individuals on the water to actively participate in the sighting and protection of whales, with a significant focus on the critically endangered North Atlantic Right Whale.
	Emily Charry Tissier	Whale Seeker	Co-Founder and CEO of Whale Seeker, an AI company that detects marine mammals from imagery to reduce vessel strike risk and improve environmental monitoring. An ecologist with twenty years of experience in coastal and Arctic ecosystems, she works with governments, regulators, and maritime industries worldwide.
	Erik Roscam Abbing	Whale Guardians	Erik Roscam Abbing is an industrial design engineer and innovation strategist who is the tech lead at Whale Guardians. Whale Guardians works with the shipping industry to prevent vessel strikes with endangered whales through data based routing recommendations. In his role Erik is responsible for developing the technology that combines global whale data with shipping industry operational requirements to develop routing recommendations that are realistic, effective and easy to implement.

	Fabien Ritter	MEER	Co-founder, President and Director of Research of the non-profit association M.E.E.R. Since 2012, he has been a scientific advisor, policy manager and lead campaigner with Whale and Dolphin Conservation (WDC). From 2012-2021, he acted as International Whaling Commission‘s vessel strike data-coordinator where he oversaw the IWC global data base on collisions between ships and cetaceans. He will present his studies about the impact of vessel strikes on sperm whales and other cetaceans in the Canary Islands.
	Filipe Alves	MARE-Madeira	Leader of the Marine Megafauna and Open Ocean team at MARE-ARDITI and guest lecturer at the University of Madeira. He is the PI of the project Atlantic Whale Deal aimed to study vessel strike mitigation actions in the NE Atlantic from Ireland to the Canary Islands.
	Iván Fernández and Juan Ignacio Liaño	Fred. Olsen Express	Iván represents Fred Olsen Express, one of the two main companies running inter-island fast ferries in the Canary Islands. He is responsible for technology on the ferris, while Juan Ignacio is the Fleet Director. Iván will present innovation actions by Fred. Olsen Express directed towards reducing risk of ship-strikes in the Canary Islands.
	Jennifer Wladichuk	JASCO	Jennifer has been an acoustic scientist with JASCO since 2011. Jen co-leads JASCO’s Boundary Pass underwater listening station where she verifies automatic detections of marine fauna sounds, including the endangered Southern Resident killer whale (SRKW). Furthermore, Jen is involved in conducting ISO-compliant vessel source level measurements and producing reports for international class society notations of underwater radiated noise.
	Jess Morten	Blue Whales Blue Skies	Director of Marine Resource Protection at the California Marine Sanctuary Foundation (CMSF) and leader of the Protecting Blue Whales and Blue Skies Program. Supporter of NOAA as a Resource Protection Specialist. She currently serves on a variety of global and regional working groups and sub-committees, including the Northeast Pacific Collaborative to Reduce Vessel Impacts on Whales (PaC-Whale), the San Francisco Harbor Safety Committee Marine Mammals Subcommittee, or the California Maritime Security Council Maritime Domain Awareness Subcommittee.
	Kellie Covington	Sails of Change	Sails of Change is a professional sailing team based in Brittany, France. Horizon is the team's risk reduction program. It is supported by Dona Bertarelli Philanthropy and works across 3 pillars to reduce the risk of collisions with marine mammals in offshore racing. Since 2023 the program has required close collaboration with the industry and the science community resulting in a variety of data outputs.
	Lucy Babey	ORCA	Director of Programmes, ORCA. Working closely with the government, researchers, other NGOs, and the shipping industry to shape evidence-based conservation policy. She plays a central role in developing and delivering ORCA’s industry-leading vessel strike mitigation training, ensuring crews have the knowledge and confidence to take meaningful action to reduce collision risks.

	Lisa McDonald	Predictwind	Experienced sailor, e.g. America's Cup veteran, crew on board the first full female entry in the America's Cup 1995. Whitbread Round the World Race in 1997/98 Skipper of Amer Sports Too in the 2000/01 Volvo Ocean Race. Olympic racing as part of the GBR Yngling training team, sailing in pre-Olympic events in early 2005. Other Grand Prix sailing events and Blue Water classics around the world. Now project manager for PredictWind, leader in global weather forecasting, and will present novel ways of applying PredictWind for vessel strike mitigation.
	Natacha Aguilar de Soto	Oceanographic Centre of the Canary Islands (IEO/CSIC)	Co-Organizer of ECS workshop Senior Research Investigator at the Spanish Research Council and one of the directors of the research group of Marine Megafauna (MegaMar) within IEO. She is an expert on cetacean behavioural ecology, bioacoustics and conservation. She has worked on ship-strike prevention at New Zealand and the Canary Islands. She is currently part of the advisory group to the Spanish government towards developing ship-strike mitigation protocols.
	Nino Pierantonio	Tethys Institute	Nino is an Associated Researcher at the Tethys Research Institute and an active member of the Institute's newly established Tethys Telemetry Lab. His current work focuses on the application of advanced biologging techniques to large cetaceans in the Mediterranean Sea, while also contributing to improved cetacean abundance estimates across European seas.
	Noel Covian	University La Laguna	Captain focused on integrating cetacean conservation into maritime education and navigational practices to reduce ship–cetacean collisions, currently contributing to the development of training initiatives at the University of La Laguna (ULL) aligned with a future IMO Model Course.
	Peña Fabiani	University La Laguna	Professor of engineering at ULL. She is now testing different systems of integrated infrared and RGB cameras on board fast ferries. The goal is to contribute data to the development of AI software able to effectively detect cetaceans early enough to allow vessel crew to react and avoid vessel strikes.
	Rachel Rhodes	Benioff Ocean Science Lab. University of California	Marine scientist leading Whale Safe, a project that helps reduce the risk of vessel strikes through near-real-time whale detection and vessel monitoring along the California Coast.
	Rebecca Stubbs	Global Fishing Watch	Impact Head of Research of Global Fishing Watch, an international non-profit organization dedicated to advancing the sustainability of marine resources through increased transparency. By utilizing the latest technology, the GFW platform allows everyone to view or download global fishing activity data in near real-time, for free. GFW was founded in 2015 through a collaboration between Oceana, SkyTruth and Google

	Rebekah Lane	Center for Coastal Studies	Research Associate at the Center for Coastal Studies in Provincetown, Massachusetts. My work focuses on assessing the risks of human impacts on large whales to inform conservation policy, investigating individual whale health, and advancing inclusivity within the field of marine science.
	Rui Prieto	University of the Azores	Marine ecologist focusing on the ecology and conservation of marine megafauna. Recently contributing to multiple EU-funded projects towards developing tools and procedures to increase shipping safety and reduce the frequency and severity of vessel collisions with large megafauna. He has participated in international workshops and expert meetings on ship-strike mitigation, is member of the Governance Team of the WWF Protecting Blue Corridors initiative and plays a scientific advisory role for MMAG.
	Russel Leaper	International Whaling Commission	Scientific adviser to International Fund for Animal Welfare and Convenor of the Non-deliberate human induced mortality (HIM) sub-committee of IWC Scientific Committee. Russell has been a member of the UK delegation to the IWC Scientific Committee since 1999 including convening the group (since 2012) within the IWC Scientific Committee that addresses vessel strikes.
	Ryan Reisinger	University of Southampton	Associate Professor of Marine Biology and Ecology at the School of Ocean and Earth Science University of Southampton, National Oceanography Centre Southampton. He will present the project WWF Protecting Blue Corridors
	Sean Brillant	Canadian Wildlife Federation	Senior Conservation Biologist for Marine Programs at the Canadian Wildlife Federation, and Adjunct at Dalhousie University. He works with diverse stakeholders and partners to solve environmental problems, in particular to reduce harmful interactions between human activities and marine wildlife.
	Simone Panigada	Tethys Institute	President of the Tethys Research Institute, Chair of the Scientific Committee of ACCOBAMS and coordinator of the Pelagos Consortium, a coalition of NGOs, scientific institutions and other partners from France, Monaco and Italy to achieve ecosystem-based conservation in the Pelagos Sanctuary. Simone is Deputy Chair of the Marine Mammals Protected Areas Task Force, within the IUCN SSC/WCPA. He will present the case of the recent declaration of the PSSA of the NW Mediterranean for vessel strike prevention of fin whales and other cetaceans.
	Sharon Livermore	International Fund for Animal Welfare	Global Marine Conservation Program Director of IFAW, she leads IFAW's worldwide efforts to protect marine life and the ocean, with a focus on ocean noise, vessel strikes, commercial whaling, bycatch and entanglement and protected areas. Sharon also currently serves as the IWC's Vessel Strikes Working Group Chair.

	Tania López-Piñeiro	Spanish Ministry for Ecological Transition and Demographic Challenge (MITECO)	Engineer with more than 25 years of professional experience in environmental protection and management, and in biodiversity conservation. Sub-Director General for Terrestrial and Marine Biodiversity of MITECO. Here, she works on the development and implementation of international and EU biodiversity conservation policies, the planning and design of national strategies related to the preservation and restoration of nature, and the management of marine biodiversity. Tania will present the latest initiatives of MITECO towards prevention of vessel strikes in Spain.
	Thomas Degermann	SEA.AI	Project manager, SEA.AI. This company is testing thermal cameras and software to contribute to the early detection of cetaceans from ships in real time
	Tim Awbery	DMAD	Marine ecologist specialised in spatial analysis and species distribution modelling, with a focus on cetaceans and sharks. He is experienced in handling complex ecological datasets, translating field observations into robust analytical insights and scientific outputs. He currently applies quantitative methods to understand the spatio-temporal overlap between marine megafauna, and anthropogenic threats.
	Wei-Jun Mun	World Shipping Council	Director of Public Affairs at the World Shipping Council. He will present the initiative Whale Chart. The WSC Whale Chart is the first global mapping of all mandatory and voluntary governmental measures to reduce harm to whales from vessels. These measures are designed, in most cases, to either prevent accidental collisions with whales or reduce underwater radiated noise.

APPENDIX 3. Workshop Agenda

PART	THEME/ITEM	SPEAKER
PART 1: RISK ASSESSMENT - METHODOLOGY	Part 1. Introduction	Moderator (Damian Foxall)
	1.1 IWC guidance	Russell Leaper
	1.2 Atlantic Whale Deal	Charlotte Lambert
	1.3 Whale Guardians	Erik Roscam Abbing & Micheal Fishbach
	1.4 Share the Ocean	Auriane Virgili
	1.5 DMAD	Aylin Akkaya
	1.6 Canary Islands AWD	Alicia Rodríguez Juncá
	1.7 Whale Seeker	Emily Charry Tissier
	1.8 CWF - Canada	Alexandra Mayette
	1.9 San Francisco Bay	Rebekah Lane
	Q&A + Summary	Moderator (Alice Bouchard)
BREAK		
PART 2: RISK ASSESSMENT - DATA LAYERS	Part 2. Introduction	Moderator (Damian Foxall)
	2.1 IWC Vessel Strike Database	Alice Bouchard
	2.2 MMAG Database	Damian Foxall
	2.3 GFW AIS Data	Rebecca Stubbs
	2.4 Whale distribution, Azores, modelling existing data	Rui Prieto
	2.5 Blue Corridor - WWF	Ryan Reisinger
	2.6 Embedding biodiversity data into voyage optimisation	Ryan Reisinger
	2.7 Whales and Ships: What happens when they get too close?	Nino Pierantonio
	Round Table + Q&A + Summary	Moderator (Damian Foxall)
LUNCH		
PART 3: MITIGATION MEASURES - EDUCATION	Part 3. Introduction	Moderator (Natacha Aguilar)
	3.1 Nautical Institute	Aly Elsayed
	3.2 ORCA	Lucy Babey & Sally Hamilton
	3.3 Ship sector education (Canaries/Spain)	Noel Covian
PART 4: MITIGATION MEASURES -	Part 4. Introduction	Moderator (Natacha Aguilar)
	4.1 IR Camera	Daniel Zitterbart

TECHNOLOGY	4.2 Fast ferries - Canaries	Peña Fabiani
	4.3 SEA.ai	Thomas Degermann
	4.4 Ocean care - Greece Acoustics	Alexandros Xydias
	4.5 WhaleAlert reporting network	Deanna Zitterlind
	4.6 Other Technology: Predict Wind	Lisa MacDonald
	4.7 Other Technology: JASCO	Jennifer Wladichuk
	Q&A + Summary	Moderator (Natacha Aguilar)
BREAK		
PART 5: IMPLEMENTATION - CASE STUDIES	Part 5. Introduction	Moderator (Alice Bouchard)
	5.1 IWC/IMO progress & updates	Russell Leaper
	5.2 World Shipping Council Whale Chart	Wei-Jun Mun
	5.3 Canada/St Lawrence etc	Alexandra Mayette
	5.4 Blue Whales Blue Skies	Jess Morten
	5.5 Whale Safe	Rachel Rhodes
	5.6 NW Med PSSA	Simone Panigada
	5.7 Atlantic Whale Deal	Filipe Alves
	5.8 Shipping industry led initiatives	Sharon Livermore
	5.9 Sailing sector mitigation & cross sector collaborations	Kellie Covington
	5.10 Global risk assessment - Piece by piece	Tim Awbery
	5.11 Efficiency of ship strike mitigation actions in Hauraki Gulf	Rochelle Constantine
	Round Table + Q&A + Summary	Moderator (Alice Bouchard)
PART 6: CASE STUDY - CANARIES	Part 6. Introduction	Moderator (Natacha Aguilar)
	6.1 Spanish government initiatives	Tania López-Piñeiro
	6.2 High speed ferries and Cetaceans	Fabian Ritter
	6.3 Canaries collision mitigation in action	Iván Fernández
	Round Table + Q&A + Summary	Moderator (Natacha Aguilar)
CONCLUSION	Final comments. Moving forward.	Moderator (Alice Bouchard)

APPENDIX 4. Participants List

Abigail Goulding - *Joint Nature Conservation Committee (JNCC), United Kingdom*
Alexandra Mayette - *Canadian Wildlife Federation, Canada*
Alexandros Xydias - *OceanCare, International*
Alice Bouchard - *International Whaling Commission (IWC), International*
Alicia Rodríguez-Juncá - *University of La Laguna, Spain*
Alicia Velázquez-Wallraf - *University of Las Palmas de Gran Canaria, Spain*
Aly Elsayed - *The Nautical Institute, United Kingdom*
Angelo G. Torrente - *French National Centre for Scientific Research (CNRS), France*
Annalisa Sambolino - *MARE-Marine and Environmental Sciences Centre, Portugal*
Annelore Van Nieuwenhove - *Royal Belgian Institute of Natural Sciences (RBINS), Belgium*
Antonella Servidio - *Cetacean and Marine Research Institute of the Canary Islands (CEAMAR), Spain*
Auriane Virgili - *Share The Ocean, International*
Aviad Scheinin - *Morris Kahn Marine Research Station, University of Haifa; Delphis NGO, Israel*
Aylin Akkaya - *DMAD-Marine Mammals Research Association, Turkey*
Carla Rubio - *University of La Laguna, Spain*
Charlotte Lambert - *French National Centre for Scientific Research (CNRS), France*
Cláudia Oliveira - *Institute of Marine Sciences / OKEANOS & Institute of Marine Research (IMAR), University of the Azores, Portugal*
Clement Duraffourg - *Bateau Banque Populaire, France*
Damian Foxall - *Marine Mammal Advisory Group, International*
Daniel Zitterbart - *Woods Hole Oceanographic Institution, United States*
Deanna Zitterlind - *Whale Alert, United States*
Deanna Zetterlind - *Conserve.io, United States*
Dunja Jusufovski - *Marine and Freshwater Research Institute, Iceland*
Eliette Hamard - *MARE-Marine and Environmental Sciences Centre, Portugal*
Emilie De Loose - *Irish Whale and Dolphin Group (IWDG), Ireland*
Emily Charry Tissier - *Whale Seekers, Canada*
Erik Roscam Abbing - *Whale Guardians, International*
Esther Diouf - *French National Centre for Scientific Research (CNRS) / University of La Rochelle, France*
Fabien Ritter - *Marine Mammals, Encounters, Education, Research (MEER), Germany*
Filipe Alves - *MARE-Marine and Environmental Sciences Centre, Portugal*
Isabel C. Avila - *Institute for Animal Welfare (ITAW), University of Veterinary Medicine Hannover, Germany*
Ivan Fernandez - *Fred. Olsen Express, Spain*
Jennifer Wladichuk - *JASCO Applied Sciences, Canada*
Jess Morten - *Blue Whales - Blue Skies, International*
Joanna Branstetter - *Baltic and International Maritime Council (BIMCO), Denmark*
Juan Ignacio Liaño - *Fred. Olsen Express, Spain*
Kate Fuller - *Haskoning UK Limited, United Kingdom*
Kellie Covington – *Sails of Change, France*
Kim Korpes – *Faculty of Veterinary Medicine, University of Zagreb, Croatia*
Laetitia Nunny – *OceanCare, International*
Lisa McDonald – *PredictWind, New Zealand*
Lucy Babey – *ORCA, United Kingdom*
Margalida Cerdà – *Asociación Tursiops, Spain*
Mark Peter Simmonds – *OceanCare, International*
Moira Brown – *Canadian Whale Institute, Campobello Whale Rescue Team, Canada*
Monica Montoya – *University of Las Palmas de Gran Canaria, Spain*
Natacha Aguilar de Soto – *Oceanographic Centre of the Canary Islands (IEO/CSIC), Spain*
Nicholas Flores Martin – *Natural Resources Wales, United Kingdom*
Nikolina Sokcic – *CIRCE (Conservation, Information and Research on Cetaceans), Spain*
Nino Pierantonio – *Tethys Research Institute, Italy*
Noel Covian – *University of La Laguna, Spain*
Noelita Fernando – *Lloyd's Register, United Kingdom*
Nuria Varo Cruz – *Cetaceans and Marine Research Institute of the Canary Islands (CEAMAR), Spain*
Oriol Giralt Paradell – *Spanish Institute of Oceanography (IEO-CSIC), Spain*
Patrick Lyne – *Irish Whale and Dolphin Group, Ireland*

Peña Fabiani – *University of La Laguna, Spain*
Philippe Verborgh – *Madeira Whale Museum, Portugal*
Rachel Rhodes – *WhaleSave, United States*
Rebecca Stubbs – *Global Fishing Watch, United States*
Rebekah Lane – *Center for Coastal Studies, United States*
Rochelle Constantine – *University of Auckland, New Zealand*
Rui Prieto – *Institute of Marine Sciences OKEANOS, Portugal*
Russell Leaper – *International Fund for Animal Welfare (IFAW), International*
Ryan Reisinger – *Blue Corridors, International*
Sarah Randall – *JERA Nex bp (JNbp), United Kingdom*
Sharon Livermore – *International Fund for Animal Welfare (IFAW), International*
Shreya Vinodh – *University of St Andrews, United Kingdom*
Simone Panigada – *Tethys Research Institute, Italy*
Steven Benjamins – *Scottish Association for Marine Science, United Kingdom*
Tania López-Piñeiro – *Spanish Government, Spain*
Texa Sim – *Scottish Association for Marine Science, United Kingdom*
Thomas Degermann – *SEA.AI, Austria*
Tim Awbery – *Marine Mammal Research Association, Turkey*
Txema Brotons – *Tursiops, Spain*
Vicky Neild – *The International SeaKeepers Society, International*
Wei-Jun Mun – *World Shipping Council, International*

CONTACT:

Alice Bouchard
alice.bouchard@iwc.int

Damian Foxall
info@mmag.world

Natacha Aguilar de Soto
natacha.aguilar@ieo.csic.es