World Sailing | MMAG
MARINE MAMMAL ADVISORY GROUP

Marine Megafauna in Sailing

A Nature Action plan to improve interactions between the sailing community, marine megafauna and their ecosystems

DRAFT

sport / nature / technology

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Contributing Stakeholders

World Sailing is the world governing body for the sport of sailing, officially recognised by the International Olympic Committee (IOC). Within the organisation's Sustainability Strategy; Agenda 2030 it committed to: In conjunction with partners, World Sailing will produce guidance, as necessary, to mitigate negative impacts sailing can have on marine cetaceans.

The Marine Mammal Advisory Group (co-author of this guidance) is a cohort of stakeholders established to collaborate on the protection of biodiversity and explore solutions to strikes and collisions for the sailing & boating sector.

Informed by experts – from scientists to race organisers, the Marine Mammal Advisory Group provides a platform to establish a systemic approach to mitigating collisions with marine life through facilitating access to expert recommendations, current best practices, and technical innovations to each of these pillars.

Winners of The Ocean Race 2022-23, the 11th Hour Racing Team leaves a legacy of sustainability resources and practices.

The International Monohull Open Class Association (IMOCA) major events include the Vendée Globe and The Ocean Race. The class has contributed to the development of the Hazard reporting system and supports ongoing work to address

The Ocean Race is often described as the longest and toughest professional sporting event in the world, sailing's toughest team challenge and one of the sport's Big Three events, alongside the Olympic Games and America's Cup.

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Glossary

Definitions, and interpretations used in these guidelines.

IUCN (International Union for Conservation of Nature): A membership union of government and civil society organisations. Together, we work to advance sustainable development and create a just world that values and conserves nature.

IWC (International Whaling Commission): The IWC was established in 1946 as the global body responsible for management of whaling and conservation of whales. Today the IWC has 88 member countries. The mandate has not changed but many new conservation concerns exist and the IWC work program now also includes bycatch & entanglement, ship strikes, ocean noise, pollution and debris, and sustainable whale watching.

Marine Hazard: Uncharted object or marine life, that might be involved with an encounter or collision with a vessel.

Cetaceans: Marine mammals belonging to the order Cetacea that include whales, dolphins, and porpoises.

Marine Megafauna: Any marine animal that is large in size, often defined as those weighing more than 45 kilograms (about 100 pounds). Can include marine mammals, sharks, fish, seals, sea turtles, etc.

Mitigation measures: Appropriate actions that reduce the risk of collision, and increase safety for: 1. Marine life, 2. Sailors and 3. Boats.

Marine Mammal Observer (MMO): A person trained to identify marine mammals.

Nature action plan: A document outlining the strategy, resources, information and actions needed to promote biodiversity and mitigate risks.

Pinnipeds: The order Pinnipedia comprises the families Odobenidae (whose only living member is the walrus), Otariidae (the eared seals: sea lions and fur seals), and Phocidae (the earless seals, or true seals).

Strike: Used here to describe any physical collision between a vessel and an identified or unidentified marine animal or object.

Sighting: Observing any marine megafauna during sailing or racing activities.

UAO (OANI - Fr): Unidentified Animal or Object (Context: Strike)

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World Sailing

Introduction

Sailing is a sport dependant on nature

Sailing is a sport based in and dependent on nature. As sailors, our interactions with the natural world and a range of biodiversity are varied and occur both close to and far from land masses. As sailors and 'guardians of the planet's Oceans and waterways', these interactions can be both positive and negative.

Collisions between sailing boats and marine megafauna or floating objects can have fatal consequences for marine life and risk serious damage to sailors and boats.

Recent data show a marked increase in the number of global marine strikes with sailing vessels over the last decade. It is estimated that approximately 50% of all reported[1] strikes with marine species result in an injured or dead marine species.

'Marine Megafauna in sailing' has been developed to help the sailing community better understand and manage the risks associated with marine megafauna interactions.

With increasing reports of collisions, near-misses and environmental impact, this set of resources aims to provide a clear framework for planning mitigation and response.

Grounded in expert insight, real-world case studies, and evolving best practices, the guidance provides support for event management and sailors alike to implement; careful route planning, appropriate use of onboard technologies, promote systematic data reporting, and nurture education & outreach.

Common Misconceptions
- and corrections

Strikes are rare and unpreventable
- They are underreported, patterns exist and are often avoidable with the right data and planning.

Addressing the issue publicly is risky
- Transparency earns respect and reduces long-term reputational harm.

Marine strikes are outside the sailing community's scope
- Ocean conservation is central to the sailing community, a collaborative approach is essential to drive collective solutions.

[1] Marine Strike Log

Collision statistics

According to marine strike log of 781 reports

77% collisions

10% observations

11% near misses

2% play/attack by cetacean

53% of strike reports result in boat damage

66% of strike reports reference marine species

3% of strike reports result in injury or death to crew

45% of strike reports with marine species result in injury or death of the animal

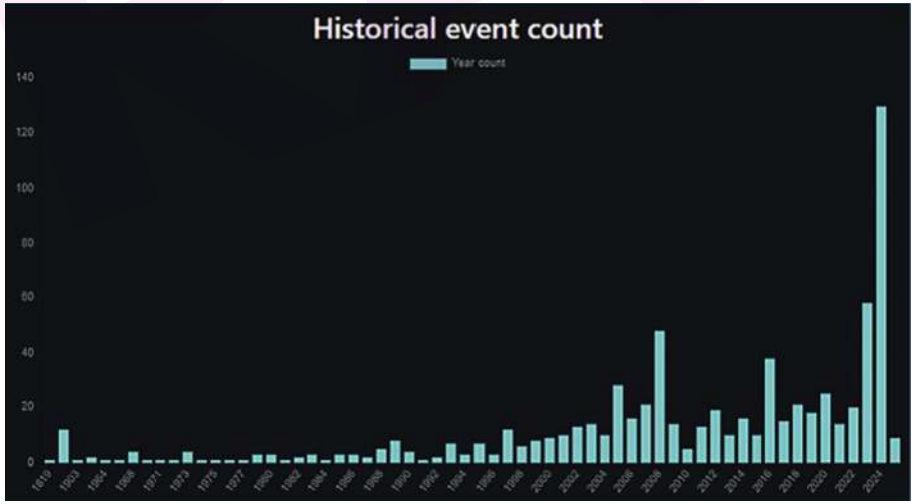

Figure: Marine Strike Log all report types by year. Note the survey effect in 2006-2008(Ritter) and 2023-24(Foxall). Other potential reasons for the increase of reports include: Historial amnesia 1800-1960; increase of pleasure boating 1970+; increase of certain whale populations after the whaling moratorium 1986; access to internet data 1990; increase of boat performance 2000; use of foils and multiple appendages 2010; increase of events and finally a general awareness with more reporting.

Source data date - Marine Strike Log 2025

Collision reports from the sailing sector represent more than 10%+ of all reports from all marine traffic in the International Whaling Commission ship strike database.

Why is this guidance important?

Safety: Good planning, well designed mitigation measures and live reporting can reduce the risk of collision, damage and injury, for events, vessels and crews.

Environmental responsibility: Marine ecosystems are one of the pillars of a healthy planet, and cetaceans are keystone species of these ecosystems. Sailing events can minimise impact and promote ocean health with thoughtful planning.

Legal compliance: Many species are protected under national and international law. Sailing events and route planning should ensure that obligations specific to the operational region are complied with.

Reputation and public trust: By demonstrating concern for marine ecosystems the sailing community will earn respect for our role as Ocean stewards.

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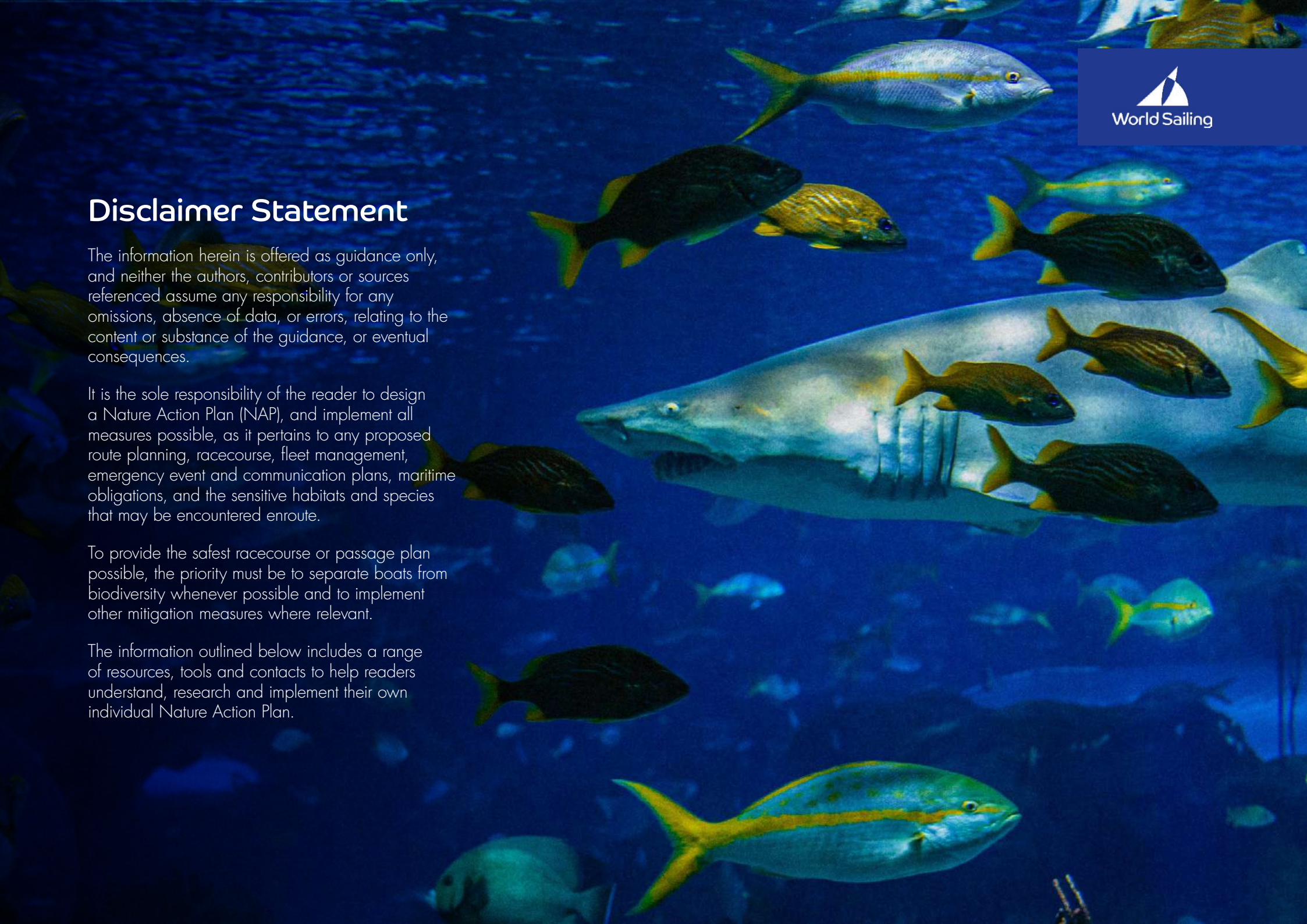
Who is this for?

The Marine Megafauna Guidance is to help and inform classes, event organisers and competitors of the high level issues and current best practice associated with both inshore and offshore sailing racing. The guidance can also be used as reference for the wider sport including cruising as many practices may also be utilised where appropriate in those arenas.

Objectives of the Guidance

- **Marine megafauna and their ecosystems** are taken into account during event and route planning.
- All events have a **Nature Action Plan (NAP)** with relevant collision **mitigation measures** in place.
- All strikes and near-miss encounters are **reported**, with increased **Citizen science** sightings submitted by the sailing community.
- **Appropriate technologies** are utilised where relevant, to improve watchkeeping and reduce the risk of collisions.
- To provide education and outreach within the sailing community, recognising its growing role as both a **steward of and ambassador for the ocean**.
- To support the matchmaking of solutions and identification of opportunities between the **sailing and marine science communities.**



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Disclaimer Statement

The information herein is offered as guidance only, and neither the authors, contributors or sources referenced assume any responsibility for any omissions, absence of data, or errors, relating to the content or substance of the guidance, or eventual consequences.

It is the sole responsibility of the reader to design a Nature Action Plan (NAP), and implement all measures possible, as it pertains to any proposed route planning, racecourse, fleet management, emergency event and communication plans, maritime obligations, and the sensitive habitats and species that may be encountered enroute.

To provide the safest racecourse or passage plan possible, the priority must be to separate boats from biodiversity whenever possible and to implement other mitigation measures where relevant.

The information outlined below includes a range of resources, tools and contacts to help readers understand, research and implement their own individual Nature Action Plan.

What is Marine Megafauna?

Marine megafauna refers to species typically characterised by their substantial size and includes a diverse range of organisms across various taxonomic groups. The term "megafauna" generally applies to animals that are large in size, often defined as those weighing more than 45 kilograms (about 100 pounds). Many of these species are threatened by human activities, which includes the significant risk of collision by vessels at sea.

Examples of Marine Megafauna:

Cetacean: Whales, dolphins

Pinnipeds: Seals, sea lions

Sirenia: Dugongs and manatees

Fish: Large species such as whale shark, basking shark, pelagic sharks and sunfish

Reptiles: Sea turtles

Other marine hazard categories include:

Unidentified animal or object (UAO-Eng OANI-Fr)

Natural marine debris – Wood, weed, etc.

Man-made marine debris – Buoys, derelict fishing gear, shipping containers, etc.

40%
bony fish

20%
sharks & rays

36%
mammals

4%
others

4 in 10
species are threatened

They face human pressure and are threatened with extinction.

Read more...

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Nature Action Plan

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Six Strategic Pillars for Ocean Stewardship

At the core of this guidance are six strategic pillars recommended by the Marine Mammal Advisory Group. This practical framework outlines the actions required to responsibly interact with marine megafauna, reduce the risk of collisions and embed ocean stewardship into every stage of sailing activity – from route planning and risk mitigation to hazard reporting, education and collaboration. Whether racing offshore or cruising coastal waters, these principles offer a blueprint for creating your Nature Action Plan to reduce your impact and contributing to marine protection.

Each element of the strategy is important - there is no single solution to mitigating collision strikes.

1 Source and Share Information

Source and disseminate the most recent information, guided by expert advice and interpretation.

2 Risk Assessment and Planning

A risk assessment to identify key issues, exclusion zones to separate boats from biodiversity, other mitigation measures as may be necessary.

3 Observe and Report

Establish live hazard reporting as a standard safety requirement, ensuring hazards observed by one vessel are shared in real time with others, and the data is compiled for future reference. This includes citizen science observations to support data collection for the marine science community.

4 Technology

Support the development of relevant technologies to improve watchkeeping, detection and collision avoidance.

5 Education and Outreach

Educate and engage with key stakeholders, notably sailors, race organisers, marine science community and safe shipping organisations, fostering a culture of ocean stewardship.

6 Collaboration

Enable collaborative solutions by matchmaking the needs of the marine science community with the responsibilities and resources of the sailing and boating sectors.

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Nature Action planning tool

It is recommended that all events develop a Nature Action Plan to consider local species, habitats, behaviours, associated risks and mitigating actions to be implemented.

The Nature Action Planning tool provides a series of questions and considerations to guide events through sourcing information, assessing risk, taking action, communicating, reporting, and engaging stakeholders.

To guide you through this process, a Nature Action Planning tool is available from World Sailing and the Marine Mammal Advisory Group.

Download the tool

		GENERIC QUESTIONS
EVENT	1	DRAFT AN EVENT NATURE ACTION PLAN
	1.1	Event Name
	1.2	What is the event type - Water body
	1.3	What type of boats/fleet
	1.4	Where is the event - Country/Ocean
	1.5	What is the venue - Exact venue
	1.6	Who is in charge of assessing risks and coordinating mitigation actions (PIC)
INFORMATION	2	What information is needed to create a full risk assessment and Nature action plan
	2.1	What are the sources of information
	2.2	Has a past edition of this or a comparable event established a Nature action plan
	2.3	Are there relevant legislations to take into account
	2.4	Have you specialist support to ensure this information is the best available and to interpret this information
RISK	3	What are the species at risk
	3.1	What are the species activities/behaviours
	3.2	What are the areas of risk
	3.3	Give details of the risk
STAKEHOLDERS	4	What mitigation actions have other event stakeholders put in place (Teams, events, shipping, host city, port..)
	4.1	What enhanced watchkeeping systems have the fleet
	4.2	What other systems have the fleet put in place
	4.4	What relevant systems or initiatives are available or need supporting along the race route
	4.4	What are other events doing that may be relevant
	4.5	What are the opportunities to collaborate with these initatives
ACTIONS	5	Identify proactive and mitigation actions
	5.1	Can you separate the boats from the area of risk
	5.2	Have you defined exclusion zones
	5.3	Have you established other limits on the race course
	5.4	Have you established limits and guidelines for non-racing boats
	5.5	How will event management monitor the race course for risks
	5.6	What will the event & fleet do in the case of an incident
INFORM	6	How will the Person in charge inform the event organisers, fleet, and teams of actions required, before the event
	6.1	How will the event management inform the fleet of risks, and give instruction, whilst racing
	6.2	How will the fleet report to event management and the fleet of hazards seen and/or experienced whilst racing
	6.3	In addition to the Marine Strike Survey, how will you report on incidents post the event?
	6.4	How will you share any learnings with others
	7	Publish and share Nature Action Plan

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1. Source & Share Information

Source the most recent information, guided by expert advice and interpretation. Tap into the local knowledge of where your sailing activities are taking place.

Sourcing information

- **Identify Experts and Local Knowledge:**

  You can contact local universities, environmental agencies and NGOs such as IUCN for expert advice

  Local organisations often have knowledge of the area and potential hot spots of marine megafauna. This could include past events, local sailing clubs, maritime organisations and the coastguard.

- **Species and areas of concern**
  - Identify the species specifically at risk of collision, especially endangered species (IUCN Red list).
  - Understand the seasonal behaviours of the marine species you are likely to encounter (Migration, feeding, breeding etc)
  - Special areas of conservation (SPAs), Marine protected areas (MPAs), Important Marine Mammal Areas (IMMAs) should be taken into account during planning decision-making

- **Marine traffic regulations**

  Understand marine traffic regulations, and local bylaws relating to marine conservation on your sailing route.

- **Marine strike data**

  Reference past marine strike data to identify hotspots for encounters with marine life. Example: Marine Strike Log.

The Marine Mammal Advisory Group provides access to information and support, including a network of marine scientists and resources.

Learn more

Sourcing Information Checklist

- [ ] Contact relevant experts
- [ ] Source local knowledge
- [ ] Identify marine species
- [ ] Understand species behaviour
- [ ] Map conservation areas
- [ ] Know marine regulations
- [ ] Identify hotspots for encounters

Sharing information

Once assimilated into the Nature action plan, it is essential this information and any recommendations or actions to be implemented is shared with stakeholders, particularly those operating vessels, whether sailing or motorised support vessels. Key opportunities and channels for sharing include:

- **Race instructions and skipper briefings**
- **Event management and support boats**
- **Education materials and outreach events**

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Examples of information sources

Important marine mammal areas

The marine mammal protected areas task force, provide an online e-Atlas identifying the Important marine mammal areas (IMMAs) relevant to various course areas.

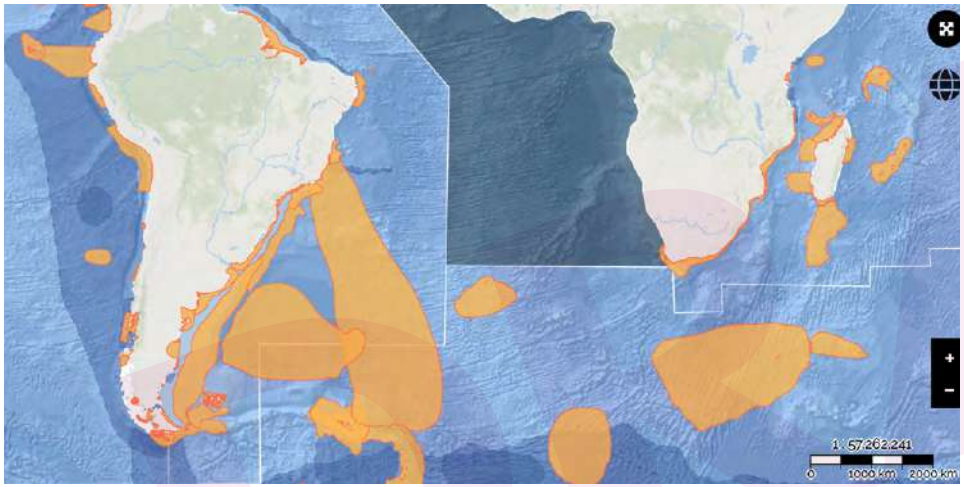


Image: IMMA e-Atlas.

Biodiversity data sources

The Bluecorridors.org platform provides a comprehensive source of 30 years of cetacean studies and migration routes.

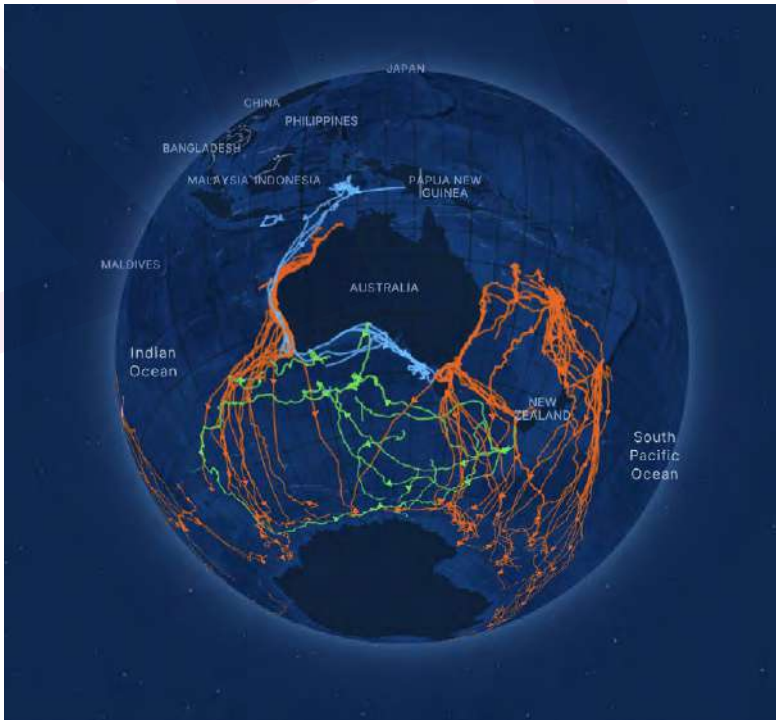
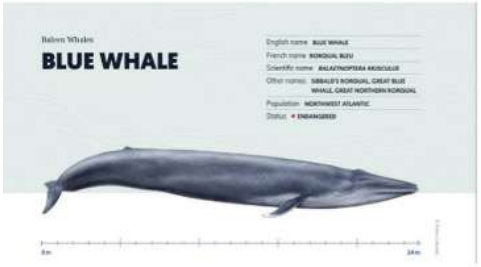
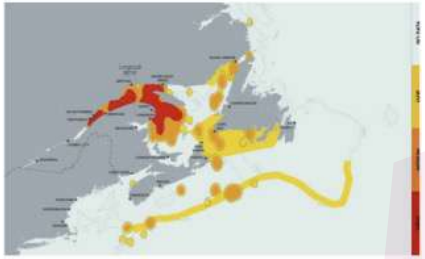


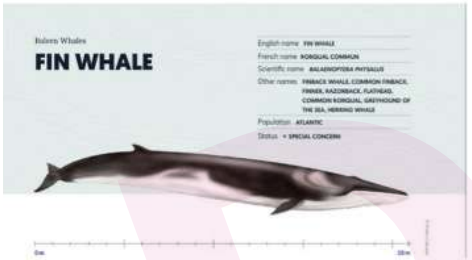
Image: Blue Corridors provides a valuable compilation of global cetacean studies, including migration routes.

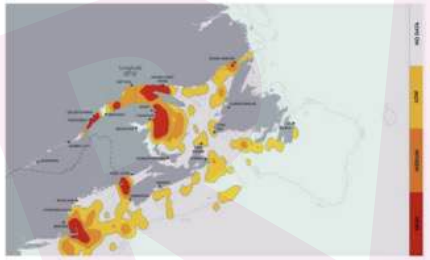
Species of interest

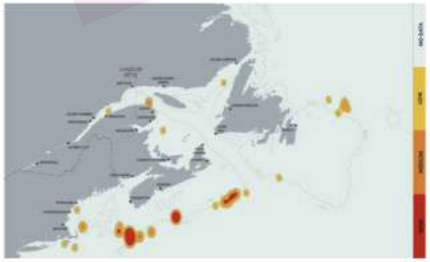
Understand the species of interest and their distribution and seasonal behaviours along your sailing route.
Here are examples from North East US/Canada.

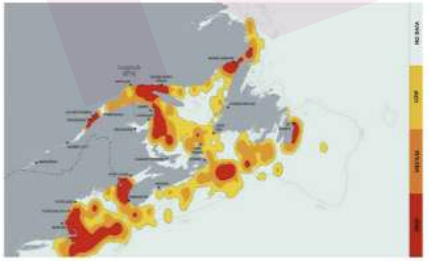












Images: Marine mammal distribution of Eastern Canada, source – Marine Mammal Advisory Group & Parks Canada.

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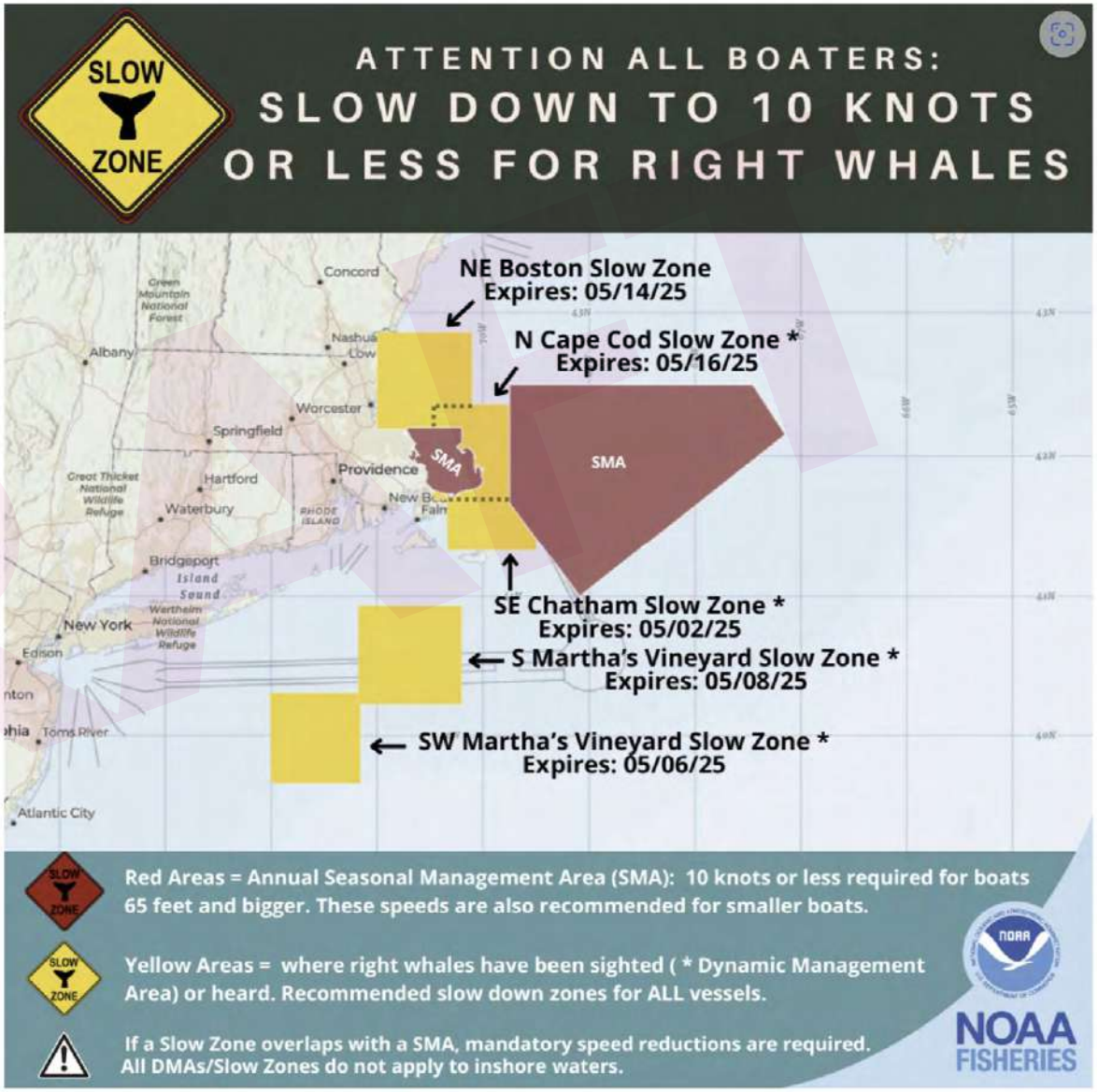
Marine traffic obligations

National jurisdictions regularly publish specific marine traffic regulations relating to marine traffic, certain elements need to be taken into account by leisure and sailing vessels.

It is important to understand the obligations relating to local marine traffic bylaws, and seasonal management areas. Dynamic management areas need to be closely monitored on a daily basis, as they can become active at short notice for extended periods of time in some jurisdictions.

Image right: NOAA Fisheries – marine traffic Dynamic and seasonal management areas, relating to the protection of the North Atlantic Right Whales, DMAs in this area once activated stay so for 15 days or more.



Marine Strike Log

Supported by the sailing community, the Marine Mammal Advisory Group MMAG has compiled the most comprehensive global database of collisions and near-miss encounters between sailing vessel and marine life. This information provides a useful data layer for understanding hotspots for collisions and can be used to prepare routes to avoid these areas where possible.

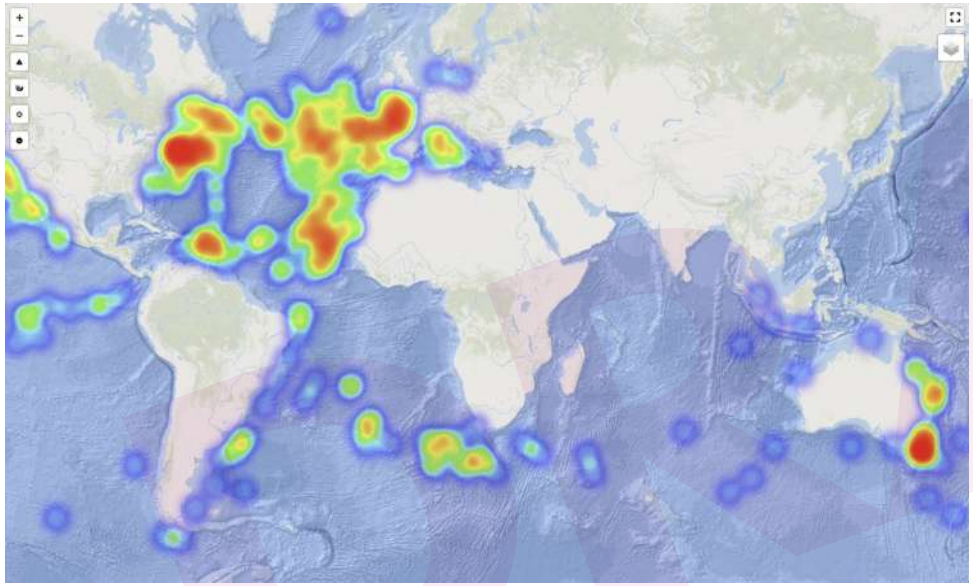


Image: Marine Strike Log, heatmap of all reported encounters 1800-2025.

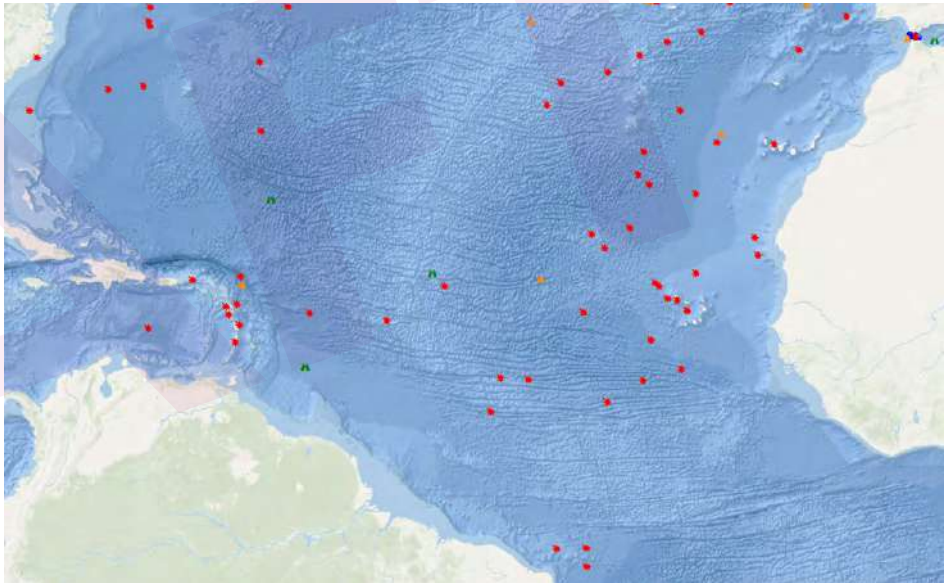


Image: Marine Strike Log, providing a set of anonymised reports of collisions, near miss and observations

Risk Assessment and Planning

Effective mitigation to avoid negative interactions with marine megafauna begins with a clear understanding of potential impacts along a planned route or within the area of your planned sailing event or activity. A risk assessment is the foundation of a Nature Action Plan, helping to identify ecological sensitivities, species presence, and areas for potential interactions.

The risk assessment also supports the implementation of proactive mitigation strategies, such as exclusion zones, adjusted routes, and other appropriate measures to ensure the safe separation between vessels and marine biodiversity.

Route planning can be affected by a range of factors, including:

	Risk Factor	Factor
☐	Boat speed	10kts Plus?
☐	Type of boat	Size & Appendages
☐	Number of boats	Fleet size
☐	Number of support vessels	Fleet size
☐	Location	Is it a known megafauna hot spot
☐	Geography of racing area	Closed or open water
☐	Relevant Marine regulations	Legal obiligations, and bylaws
☐	Time of year	Period of high biodiversity
☐	Specific species of concern	Migration, breeding
☐	Relevant species behaviours	Common, plentiful, endangered

When identifying the risks of a planned sailing route, consider the following questions:

Are there any Marine Protected Areas (MPAs) or Important Marine Mammal Areas (IMMAs) taken into account?

mpatlas.org

www.marinemammalhabitat.org

Are there marine megafauna present? If yes, does this list include any species of concern (per the IUCN Red List categorization)?

What are the current behaviours of the identified species, such as breeding, feeding, migration or other seasonal patterns?

bluecorridors.org

What are the relevant marine traffic regulations along the planned route?

Have encounters with megafauna previously been reported in the area?

A well-informed Nature Action Plan will identify appropriate mitigation measures to address the risks identified.

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Mitigation measures

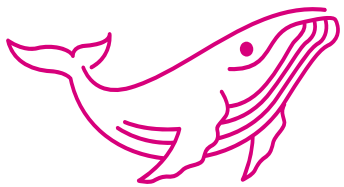
The primary goal of any mitigation strategy should be to **prioritise separating boats from biodiversity,** with carefully designed routes and racecourses. This may include the use of exclusion zones, dedicated waypoints, adjust start and finish areas, to avoid areas of high risk.

Recognising boats must still navigate through certain areas, additional mitigation measures should be identified and ready to implement. Examples include:

- Conducting high-resolution and live pre-event scientific surveys to more precisely understand the presence of marine species.
- Monitoring the racecourse and start areas ahead of, and during racing activity.
- Enhanced visual watchkeeping by all racing and non-racing vessels on the water
- Delaying or relocating the starting area if risk levels are high.
- Starting with a short inshore course, followed by a slow-speed fleet transition to a safer offshore location for a restart.
- Using a safety lead vessel during 'slow-speed delivery' phases.
- Establishing maximum limits or designated slow zones.
- Defining stop-and-start race procedures and no-racing section as needed.
- Retracting foils, daggerboards and other moveable appendages during periods of high risk.
- Limiting sail area or adjusting configuration to reduce speed and improve boat control.
- Postponing racing until the risk is clear of the racecourse.
- Stopping racing altogether if the risk remains present on the racecourse.

Each mitigation measure listed here has been implemented in some form by past race and event organisers.

Success of mitigation measures depends on frank assessment of the risks, willingness to accept alternatives exist, clear decision making, communication, and ability to adapt to evolving real-time conditions.



Observe and Report

Establish protocols for live **Hazard Reporting** as a standard safety requirement – ensuring hazards observed by one vessel are communicated in real-time to all marine traffic. Furthermore, sailors can be the 'eyes and ears' of the science community by contributing to the compilation of data for future reference through citizen science reports.

Carry a marine megafauna identification chart onboard to assist with species identification.

Observation Data Requirements for Sightings and Strikes

Below is a list of data points that are necessary to report in the case of a sighting or a strike. Take note of these in your logbook, navigation software, or reporting App when it is safe to do so.

- **Time & Date**
- **Position:** Latitude and longitude, or best estimation of where the strike occurred.
- **Type of encounter:** Was it a collision, near miss, observation, or Play/Attack interaction
- **Damage/Injury:** Any damage to the boat or sailors
- **Description of hazard:** object or animal
- **Identification:** Description of animal species
- **Injury to animal:** Assessment of injury to animal
- **Other information**

Reporting systems

Hazard reporting and citizen science reporting systems are designed to enable near-time live reporting from any vessel to other marine traffic and support the collection of that data for further research and analysis.

Select the appropriate system for your boat and event.

- Your fleets communication may be limited to VHF, or a fleet WhatsApp group.
- For boats using charting software both Adrena and Expedition are examples of navigation software that include a hazard reporting function.
- Alternatively, many events and vessels will have access to smartphone and iPad where apps such as the Whale Alert app has become one of the most inter-connected reporting systems.

Whale Alert App

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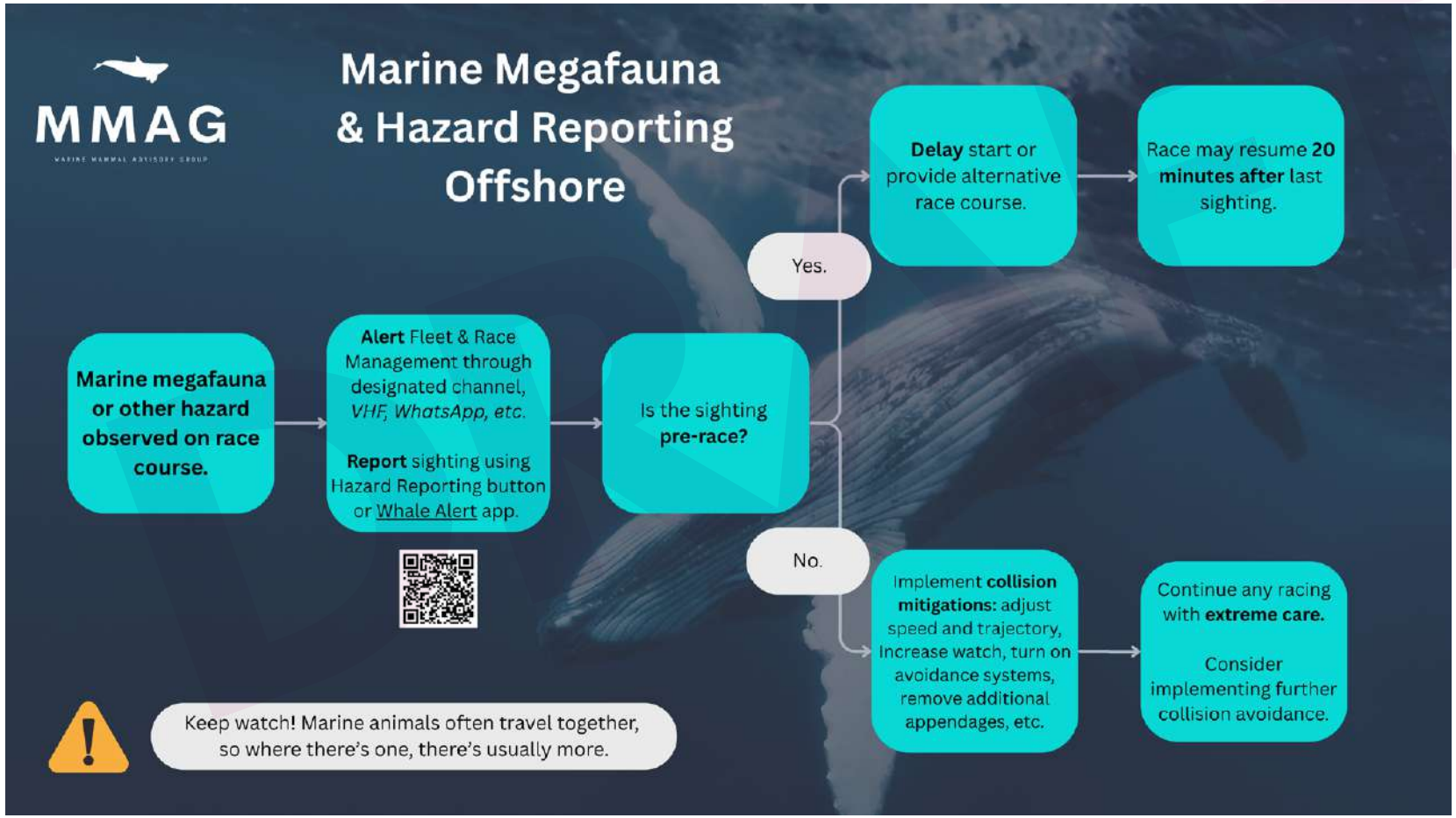
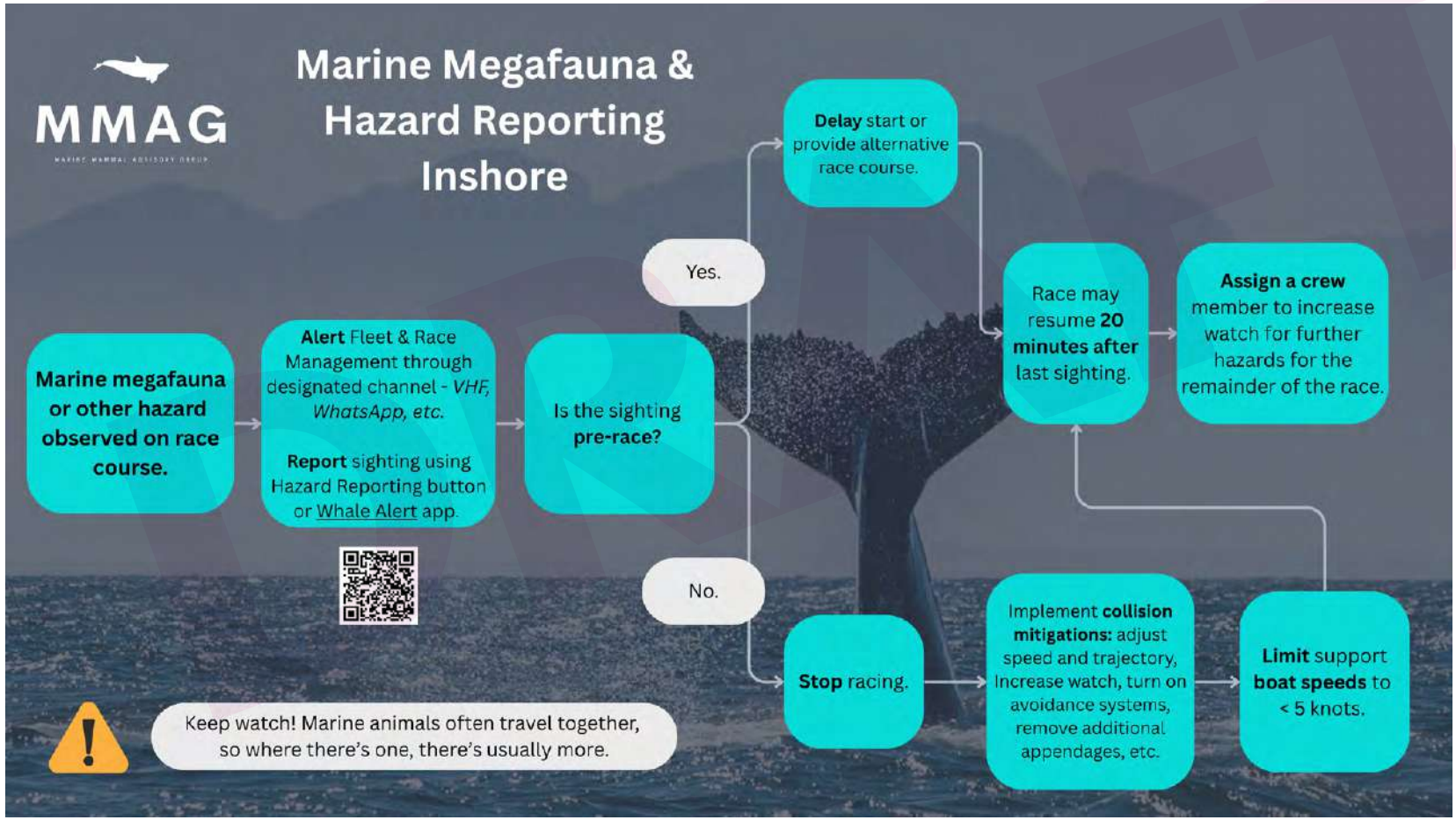
Reporting and management of sightings for events and sailors

A step-by-step guide for **offshore** race hazard reporting, outlining how to respond to sightings of marine megafauna with precautionary measures before and during the race.



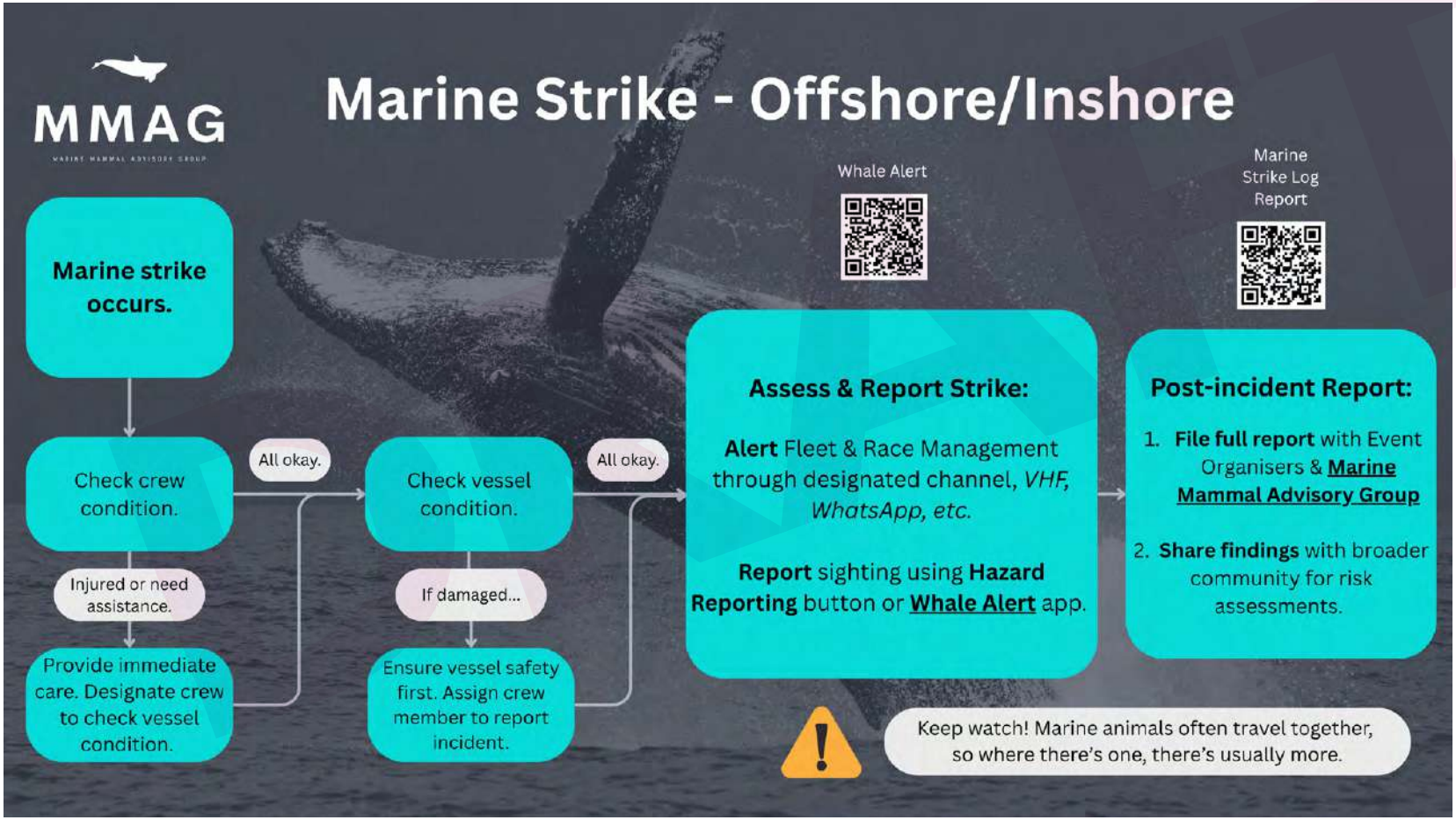
Reporting and management of sightings for events and sailors

A step-by-step guide for **inshore** racing outlining how to respond to sightings of marine megafauna with a decision-making flowchart for race organisers and teams to report and respond to marine megafauna or other hazards observed, and clear steps for pausing, resuming, and safely managing the race.



Strike incident management for events and sailors

This flowchart outlines the step-by-step response protocol for marine mammal strikes, from immediate onboard checks to post-incident reporting and data sharing.



4. Technology

Marine technology continuously evolves, offering part of the solution to mitigating risk with improved watchkeeping, detection, and avoidance systems.

However, it is important to emphasise that technology is only part of the solution and is not a substitute for responsible route planning, the primary goal of which is to separate boats from biodiversity.

Technological systems are categorised here as:

1. **Onboard**
2. **Shore-based**
3. **Sea-based**
4. **Aerial and Satellite**

Onboard systems

Onboard detection systems monitor the area above or below the water – however, the range of these systems is greatly affected by sea conditions and wave height within the turbulent surface zone. With an effective range of typically less than 500meters+/- , this is a significant limiting factor for reaction time, particularly for high-speed boats that are most in need of these detection technologies.

Many onboard systems may also be deployed on other platforms such as: Race management and safety vessels, other sailing yachts, race marks, and temporary or permanent infrastructure.

Onboard system types:

- **Good seamanship:** Standard on deck watchkeeping, and good seamanship with a pair of binoculars.
- **Optical and infrared camera systems (WHOI, SEAAI, etc):** Surface-detection thermal and optical cameras can alert to the presence of unidentified animals and objects (UAO), linked to smart warning and autopilot systems. The detection of marine megafauna when at the surface is ongoing work.
- **Radar:** The ability of radar to spot small objects and animals punctually breaking the water surface is extremely limited by height and sea conditions.
- **LIDAR:** LIDAR (Light Detection and Ranging) uses laser pulses to detect objects at or above the water surface. Performance is reduced in rough seas due to spray and wave action, but in calm conditions it can improve surface detection when paired with optical or infrared systems.
- **Forward facing sonar (e.g. Farsounder):** Maps the water column in front of the vessel using low intensity sonar and a frequency selected for the least impact on the marine ecosystem. Work is currently underway to adapt and test the Farsounder system on high speed sailing boats.
- **Integrated warning systems & intelligent autopilots:** Navigation systems such as SEA. AI are capable of receiving and automatically reacting to hazard warnings.
- **Passive Acoustic Monitoring systems (PAM):** A standard tool for the marine science community, typically towed, or dropped over the side once the vessel is stopped. Testing is underway to assess if these systems installed in the boat hull or appendages could be feasible for moving vessels.

Drones and Passive Acoustic Monitoring (PAM) systems are particularly relevant for racecourse monitoring. Both systems are key tools in Marine Mammal Observer network to help identify the presence of marine mammals.

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Shore-based systems

Certain areas have significant marine mammal observation (MMO) networks, which use integrated shore-based monitoring systems including: Radar, MMO, Camera, and Acoustic systems. Information relayed is now also becoming available via AIS networks.

Sea-based systems

Marine mammal observation networks include acoustic static and mobile drifter buoys, as well as underwater drones and subsea acoustic stations.

Aerial and satellite systems

- Drones are being used by Marine mammal observer networks, race management, and also onboard, to monitor the race course.
- Marine mammal observer networks regularly use small planes to monitor areas, according to a weekly schedule. Examples include the NOAA and Canada Department of Fisheries who both publish regular reports. This frequently updated information is crucial to monitoring cetacean populations, and a great source of 'live' information.
- Satellite systems under the right conditions can now be used to not only find biomass and large populations but also identify individual marine species. The cost is still generally prohibitive for anything beyond specific small area searches.

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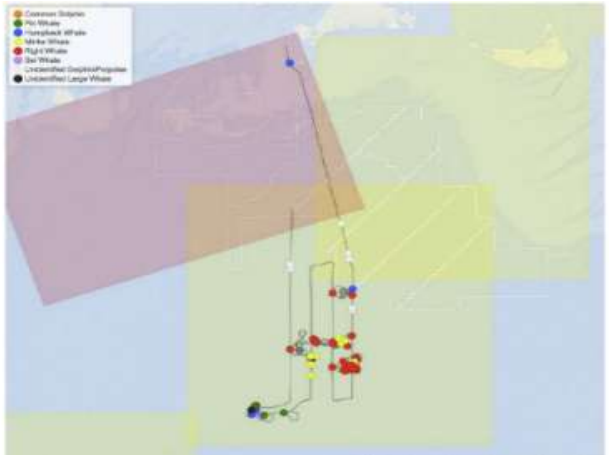

Image: NOAA Aerial marine mammal survey.

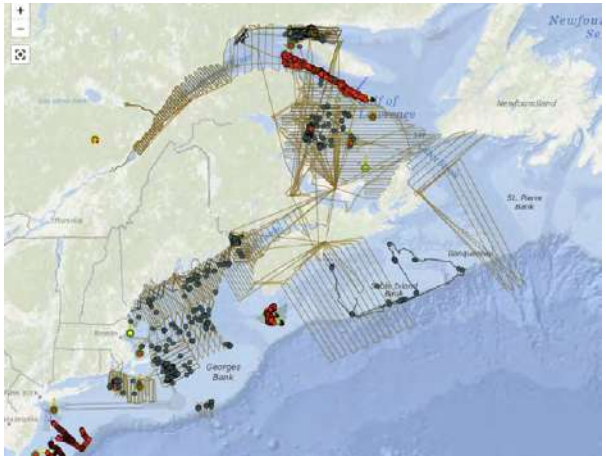

Image: whalemap.org

Access to MMO Data

In certain areas, MMO data is made directly available for marine traffic, examples include the MMO networks of the Northeastern United States and Canadian coastlines of the Atlantic:

whalemap.org

whaleinsight

These systems are particularly important to monitor as they directly inform the opening and closing of seasonal, and dynamic management areas.

Acoustic Deterrent Devices and Harassment systems

Another category of onboard technology includes acoustic deterrent devices (ADDs) and acoustic harassment systems (AHDs), commonly known as Pingers.

Originally developed for the fishing and fish farming industries, as well as specific applications like shark nets of the Australian coasts, these systems were designed to emit species-specific acoustic signals for deterrence.

A small number of sailing vessels have started experimenting with pingers over the last ten decade. However, there is still no consistent scientific evidence demonstrating the effectiveness of this technology for all vessel types or for all targeted marine species in a way that induces the desired collision avoidance behaviour.

Additional concerns around the use of ADDs and AHDs include:

- Some scientific studies have demonstrated in certain specific contexts/species that these systems may induce the opposite effect by reducing dive times and bringing some animals closer to the surface
- Unintended ecological impacts, such as additional noise pollution generated in marine ecosystems, disruption to non-target species, and potential masking of natural communication
- The potential for resources and mitigation efforts to be directed to an unproven solution, thereby distracting from the need for implementation of comprehensive mitigation strategies.

Any future use and testing of these systems should be undertaken within controlled and permitted testing protocols.

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5. Education & Outreach

Collisions with whales and other marine megafauna can cause severe harm both to the animals, crews and vessels. Many of these incidents are preventable with greater awareness and preparedness. Education builds a shared understanding of the risks, fosters responsible decision-making, and encourages consistent reporting of sightings that helps protect biodiversity, while safeguarding sailors and events.

Education & Outreach Recommendations

Include key elements of your Nature Action plan in your internal and external communications plan.

- **Promote a culture of reporting:** Normalise the use of hazard reporting to improve collective understanding and long-term solutions.
  - Establish hazard reporting as mandatory within race rules.
  - Identify a common hazard reporting and safety communication system for race management and your fleet.
- **Detailed race briefings:** Provide skippers, crew, race officials and spectator fleets with briefings on marine biodiversity and strike risk before events.
- **Use training resources:** Leverage available training and educational resources on hazard reporting, risk mitigation strategies, identification cards and species awareness.
- **Prepare:** Create an emergency action plan, incident reporting plan, and communications plan in case of observations or incidents
- **Share learnings across the sector:** Communicate with sailors and audiences. Participate in conferences, workshops, and events to exchange knowledge and experiences with peers, scientists, and experts.

Why not take a training course to become a certified Marine mammal observer?

Examples:

CRU | Training

ORCA | Training

DRAFT

6. Collaboration

Many solutions to protect marine life and reduce strike risk already exist, from scientific research on high-risk areas to technologies that detect hazards, but the sailing community often lacks access to this knowledge or a clear pathway to contribute. By bridging the gap between science and sailing, we can accelerate practical, collaborative solutions that benefit both sailors and marine life.

- **Log scientific data:** Support surveys and data collection, especially where marine mammal science needs overlap with key sailing routes and events. Report past incidents on the Marine Strike Survey.
- **Collaborate with local or global projects:** Offer participation and resources from sailing teams, classes, or events to support local or global marine mammal science initiatives or conservations. Provide a platform for raising awareness.
- **Contribute to legacy research:** Work with the Marine Mammal Advisory Group to identify long-term projects, such as the Global Routing Study, where sailors and events can contribute expertise, data, or resources to leave a meaningful impact beyond the racecourse.
- Find the **Marine Protected Areas** on your route.
  - Take the presence of marine protected areas into account in your route planning.
  - Support the global framework of 30% protection of our Ocean by 2030, there is no better way to protect and support our Ocean.
  - Sign a charter of support or become an ambassador for your event's 'Marine protected area'

Support the global framework of 30% protection of our Ocean by 2030, there is no better way to protect and support our Ocean.

Marine Strike Survey

Marine Protected Areas Guide

DRAFT

World Sailing

Summary

DRAFT

Best Practice Guidelines for Sailors

World Sailing

BEFORE

- [ ] Prepare your **watchkeeping systems** and integrate available technology where relevant, example - onboard cameras.
- [ ] Configure any onboard cameras to record incidents and sightings automatically if possible.
- [ ] During **route planning** understand the species and sensitive habitats you will encounter
- [ ] Take into account relevant i**nformation** such as maritime regulations, restricted areas, marine strike log data, and marine protected areas in your route planning.
- [ ] Be prepared to make voluntary adjustments to reduce the risk of collision, the priority action is **separate your boat from biodiversity**, and then to take further **mitigating measures** as needed, discuss what these additional mitigating measures might be with your crew.
- [ ] Install and be familiar with your onboard **hazard reporting system,** examples relevant to your boat might include: VHF, WhatsApp, WhaleAlert, or hazard reporting within navigation systems such as Adrena or Expedition.
- [ ] Carry a marine megafauna ID chart onboard to aid in species identification, and **citizen science observations**.
- [ ] Expect to see and ask for your events' **Nature action plan**, as part of the **sailing instructions** and **skippers briefing.**
- [ ] Understand the protocol for reporting observations to the rest of the fleet and communicate this to your crew.
- [ ] Ask what **collaborations** the event is undertaking with the marine science community.

DURING

- [ ] **Report** all uncharted hazards seen or encountered as soon as safely possible to ensure the **prompt transmission** of safety information to other vessels.
- [ ] **Record** any observations (including time, date, location, any species identifiers, etc.) to report as a citizen scientist observations which are also valuable for the marine science community.

AFTER

- [ ] **Share** any encounters with the event organisers for their final report.
- [ ] Share all event and historic encounters with the **Marine Strike Survey**, an anonymized database.
- [ ] Request the **Post-event report.**

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Best Practice Guidelines for Events

World Sailing

BEFORE

- [ ] Allocate a **Person in charge** and resources for the events Nature Action Plan, this is often someone close to the race management, or the events' sustainability team.
- [ ] Identify sources of **expert information.**
- [ ] Implement additional **monitoring systems,** including an on-the-water network of MMOs, (Include race officials, drone operators, spectator fleets, and infrastructure systems) and a protocol for integrating any information into decision-making on the race day.
- [ ] Commission and compile the relevant marine megafauna, species, habitat, marine protected areas, and marine traffic **information**. Include information from past events.
- [ ] Create a **Nature Action plan** for the event, identifying zones to take into account in racecourse and route planning.
- [ ] As part of registering your event with the appropriate authority, **upload** the Nature Action plan (Example to: Local authorities, and World Sailing etc)
- [ ] Be prepared to implement **mitigation measures** by modifying race routes, event dates, and on-course procedures for both sailors and event committee boats where relevant.
- [ ] Define a **reporting** platform for participants that enables the fleet to send and receive hazard reports as close to real-time as possible (VHF, WhatsApp, WhaleAlert, Hazard reporting system, etc.)
- [ ] Consider offering or requiring **pre-event education** for event management, sailing class, and teams.
- [ ] **Race instructions** include a specific requirement for hazard reporting, along with any other racecourse information, and other potential mitigation actions required of the fleet.
- [ ] **Skipper briefing** provides relevant information from the Nature Action plan including: specific race instructions, exclusion zones, marine traffic obligations, and potential mitigating actions required of participants, including a protocol for reporting and reacting to incidents.
- [ ] **Test** the hazard reporting system pre-start.
- [ ] **Prepare** an event emergency and communications plan.
- [ ] Build **Ocean stewardship** within your event, for participants and the public.
- [ ] **Develop matchmaking/legacy** collaborations with relevant marine conservation organisations along the race route, with a particular focus on Marine Protected Areas.

DURING

- [ ] **Monitor** the racecourse and hazard reporting system, promptly **implement mitigation measures** as may be required.
- [ ] **Promote ocean biodiversity** by sharing the observations and ocean stories supported by marine mammal specialists with the fans and followers.

AFTER

- [ ] Compile observations and/or incidents reported from the fleet.
- [ ] Engage with event participants (e.g., sailors, race management, MMO's, etc.) gathering feedback on the Nature Action Plan and reporting mechanisms.
- [ ] Prepare a **post-event report** summarising key success and challenges of your Nature Action Plan and reporting systems, include any observations and/or incidents reported by participants.
- [ ] Distribute the post-event report to relevant authorities, and World Sailing, and participating sailors.
- [ ] Contact the Marine Mammal Advisory Group to contribute your post-event report to the resource library and the **Global Routing Study.**
- [ ] Build the events **matchmaking legacy** collaborations to contribute to long-term conservation goals

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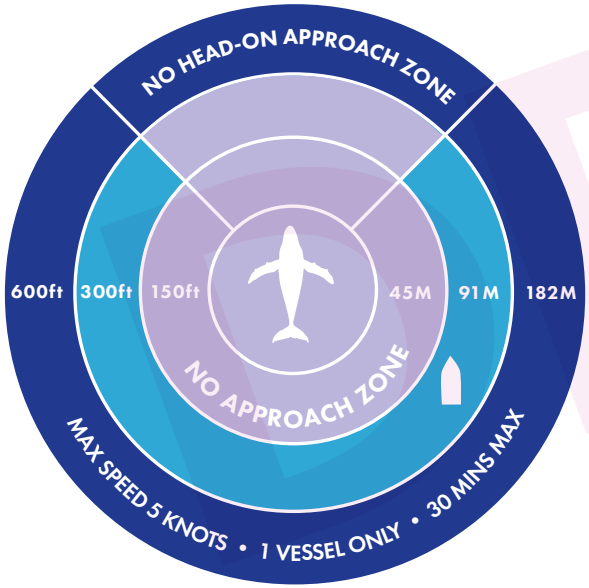
Best Practice Guidelines for all Vessels in the Proximity of Cetaceans

World Sailing

Legislation

Understand the specific guidelines and legislation regarding the protection of endangered species and marine life in your area. Example: USA - The Marine Mammal Protection Act 1972.



Ocean Conservation Society, observation guidelines

Distance

You should remain at least 100 meters (300 feet) from cetaceans and at least 50 meters (150 feet) from pinnipeds.

Indicative distances provided here for reference may vary depending on species of concern and jurisdiction.

When observing marine mammals at sea, make sure your actions do not cause any change in their behaviour.

Avoid sudden changes to vessel speed and direction. Dolphins and whales may surface unpredictably at any time or location.

Never; follow behind, approach animals head-on, encircle or trap cetaceans between your vessel and shore.

If cetaceans approach your vessel, maintain your course and speed. If the animals cut your course, put the boat in neutral and wait until they clear your vessel.

Duration: Limit your viewing time to 30 min. to avoid creating unnecessary stress for the animals.

Report encounters and sightings promptly, 'live' reports improve the safety of all marine traffic, and sharing your sightings provide important citizen science data.

Live reporting: The Whale Alert app allows you to report live encounters, sightings and strandings.

Report past incidents using the Marine Strike Survey.

RAFT

Best Practice Guidelines for Sailing Federations

World Sailing

Coordinate Across the Sector

Work with national bodies, class associations, and event organisers to develop consistent standards and guidelines for ocean stewardship across the sailing and boating communities.

Disseminate Best Practice Guidance

Provide accessible and actionable best practice guidelines for events, race organisers, and sailors. These should cover a Nature Action Plan that includes route planning, mitigation measures, and hazard reporting.

Deliver Training and Education

Ensure that both event management teams and sailors receive adequate training on risk awareness, mitigation protocols, and marine megafauna interaction procedures.

Mandate Post-Event Reporting

Require a Nature Action plan, and Post-event reporting for sailing events, particularly major events and those with “Special Event” status.

Incident reporting

Require all strikes and near-misses are systematically reported.

Ensure Data Sharing and Reporting

Facilitate the compilation and transfer of reports and relevant data to World Sailing, the Marine Strike Log, and the International Whaling Commission.

Foster Cross-Sector Stakeholder Engagement

Build partnerships with external stakeholder groups, such as the International Maritime Organisation (IMO), marine-science institutions, and marine-specific organisations, to align efforts and share knowledge.

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BEST PRACTICES
MMAG
MARINE MAMMAL ADVISORY GROUP
PLAN
Know your local species & migration habits
Monitor any active alerts or traffic obligations
Create Nature Action Plan
Establish watchkeeping & risk mitigation protocol
REPORT
LIVE HAZARDS
DOWNLOAD THE APP
Promptly report any sightings, hazards or strikes on the Whale Alert App
If you experienced a marine strike in the past, contribute to our global data log survey
STRIKE DATA
COMMUNICATE
Add Nature Action Plan to official notices
Share best practices with your network
If you're looking for more information or support on best practices for marine mammal strike mitigation, please contact us:
info@mmag.world

QUICK START PLANNING
MMAG
MARINE MAMMAL ADVISORY GROUP
Know your local species & migration habits
The **first step** in marine mammal strike mitigation is **knowing your local species, migration habits** and **associated risks.** WWF's *Protecting Blue Corridors* reports are great resources in understanding the species in your respective ocean. NOAA also provides a **comprehensive database** of marine mammal species for research purposes.
Monitor any active alerts or traffic obligations
Be sure to understand and monitor any active alerts, Seasonal Management Areas (SMA), marine traffic obligations or voluntary slowdown zones in your area. **Check your local governing body** that issues these alerts, such as NOAA or Transport Canada.
Create Nature Action Plan
Your **final step** in the planning process. Combine all research to create a formal nature action plan for your event or organization. Utilize MMAG's Nature Action Planning template and research guide to complete a plan best suited for your local needs.

Case Studies

DRAFT

CASE STUDY 1

Iberian Orcas

Introduction

The Iberian orca is a distinct and small subpopulation (estimated at 30-40 individuals), with a low number of mature members. Comprising a few different groups (10-15 individuals each), the Iberian orca was listed as Critically Endangered by the IUCN Red List in 2019.

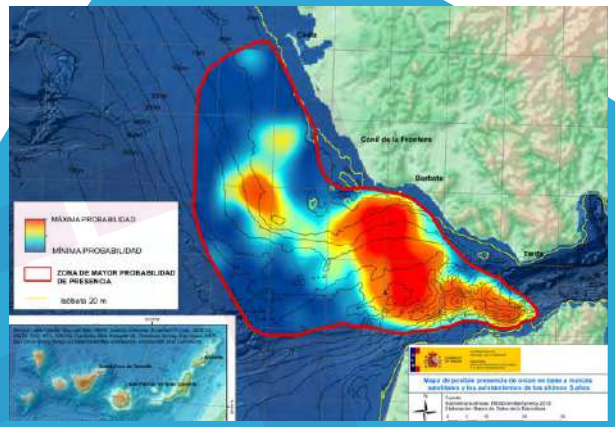
Relying heavily on the migration of the endangered Atlantic bluefin tuna, primary prey species, the Iberian orca follows the tuna from the Strait of Gibraltar northward during the summer. In autumn, they fan out into the Atlantic before returning to the Strait of Gibraltar in the Winter, where they remain until the end of spring – repeating the cycle annually.

Background & Objectives

Since 2020, more than 250 interactions have been recorded between Iberian orcas and vessels around the Iberian Peninsula, with many involving sailing vessels. In some cases, these incidents result in significant damage, including the loss of the rudder and, occasionally, the vessel itself.

For vessels sailing in the region, current recommendations include:

- **Monitor recent Orca distribution and activity reports**
- **Avoid areas of recent sightings** – for example, consider the inshore route along the Bay of Cadiz (inside the 20m depth contour, if safe to do so)
- **Follow the latest guidance** in the event of encounter with the Iberian Orca. an encounter with Iberian orcas:
  - As of 2025 **Orcas.pt** and the Spanish government guidance recommend: DO NOT STOP and to keep moving out of the area.
  - However, the **GTOA website** suggests an alternative approach: Stop all engine and rudder movement and 'play dead'.



Ultimately, it is the orcas who will decide how this learned behaviour will evolve. In the 1980s, their orca cousins in the Puget Sound, Canada carried salmon on their heads for a few weeks, and then promptly stopped the 'game' until the behaviour was observed again in 2024.

Conclusion

This contrasting guidance highlights the lack of our ability to really understand this intelligent species, and the need to choose your actions based on the latest evidence and local real-time conditions.

Summary:

- Avoid areas with Orcas where possible.
- Consider installing a watertight rudder compartment.

Appendix

References

Blue Corridors

Cru Training

Expedition

Happy Whale

IUCN Red list

IWC Ship strike database

IWC Whale watching Guidelines

IWC Iberian Orca workshop

Marine Mammal Advisory Group

MSB Product - MarkSetBot

MPA Guide Marine Protection | Marine Protection Atlas

MMAG library

Nature action planning tool

Navigation software Adrena, editor navigation software for sailboat race - Adrena software

Ocean Conservation Society, observation guidelines

Sailing with iberian orcas @portugal & spain - oras.pt

Recommendations | Orca Ibérica

Orca behaviour

Reducing Vessel Strikes to North Atlantic Right Whales | NOAA Fisheries

SEA.AI < Machine Vision for Safety at Sea

Ship-mounted camera systems increase protections for marine mammals – Woods Hole Oceanographic Institution

Training courses - CRU

Training courses - Orca

whalemap.org/

Whale Insight

Whale species IWC

Whale species NOAA

World shipping Council – Route planning for Whales

World shipping – Reroute to avoid whales

Example regulations by area

World

IWC Whale Watching Handbook's Guidelines and Regulations

World shipping Council – Route planning for Whales

Canada

Canada's Marine Mammal Regulations (SOR/93-56)

North Atlantic Right Whale protections in Gulf of St. Lawrence

Report any marine mammal incidents to the appropriate authorities:

Fisheries and Oceans Canada (DFO): Reporting site

Marine Mammal Response Program: 1-800-465-4336

Europe – Mediterranean

Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS)

Pelagos Sanctuary

Pelagos code of conduct

Barcelona Convention and Protocols

New Zealand

NZ Department of Conservation summary of vessel approach guidelines

Whale Watching Regulations in Kaikoura

Marine Mammals Protection Regulations 1992

Marine Mammals Protection Act 1978

To report marine mammal emergencies, call the Department of Conservation at 0800 DOC HOT (0800 362 468)

USA

General Regulations:

Marine Life Viewing Guidelines: Guidelines & Distances

Laws & Policies: Endangered Species Act

Laws & Policies: Marine Mammal Protection Act

Species Specific Regulations:

Alaska Marine Mammal Viewing Guidelines and Regulations

Viewing Marine Wildlife in Hawaii

Killer Whales in the Pacific Northwest

Speed Restrictions for North Atlantic Right Whales

To report a marine mammal incident in US waters:

call the NOAA Marine Mammal Hotline (24/7): 1-877-SOS-WHALe (+1 877-767-9425)

contact the U.S. Coast Guard via VHF Channel 16

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World Sailing

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www.sailing.org

sport / nature / technology