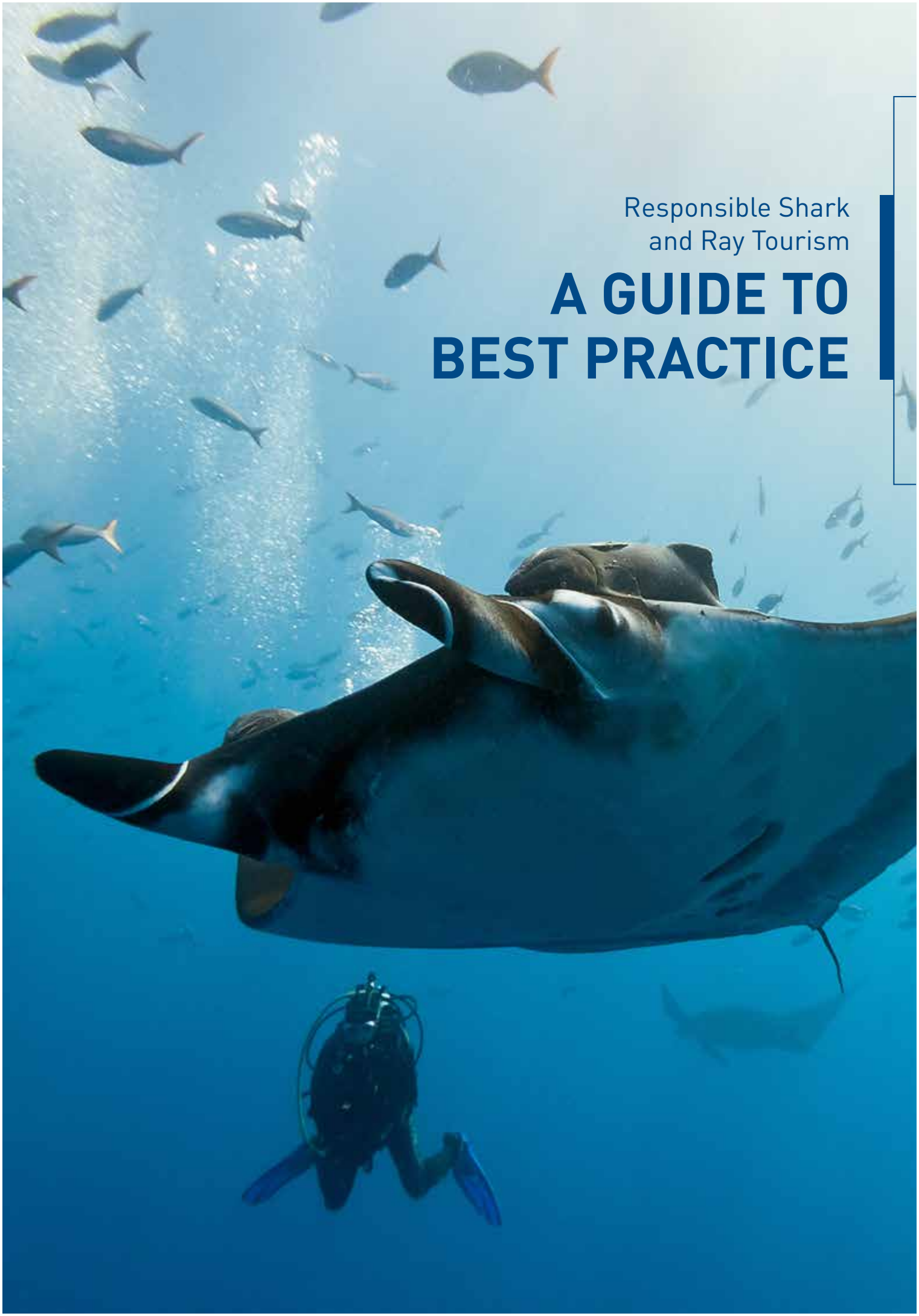

Responsible Shark
and Ray Tourism

A GUIDE TO BEST PRACTICE

ABOUT WWF

WWF is one of the largest and most experienced independent conservation organizations, with over 5 million supporters and a global network active in more than 100 countries. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable resources is sustainable, and promoting the reduction of pollution and wasteful consumption.

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ABOUT PROJECT AWARE®

Project AWARE is a nonprofit organization and global movement of scuba divers protecting our ocean planet – one dive at a time. Focused on the critical issues of Sharks in Peril and Marine Debris, Project AWARE empowers thousands to work together for a clean, healthy and abundant ocean planet.

www.projectaware.org

ABOUT THE MANTA TRUST

The Manta Trust takes a multidisciplinary approach to the worldwide conservation of manta rays and their habitat through robust science and research, while raising awareness and providing education to the general public and community stakeholders alike.

www.mantatrust.org

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CONTENTS

ABOUT THIS GUIDE

Shark and ray tourism generates hundreds of millions of dollars globally each year and is growing substantially.[1] Businesses around the world provide a variety of activities that allow people to get close to sharks and rays, ranging from boat-based spotting to guided snorkeling, cage viewing experiences and scuba diving. This guide uses the best available science to help operators create shark and ray tourism that is safe, sustainable, and conservation-minded.

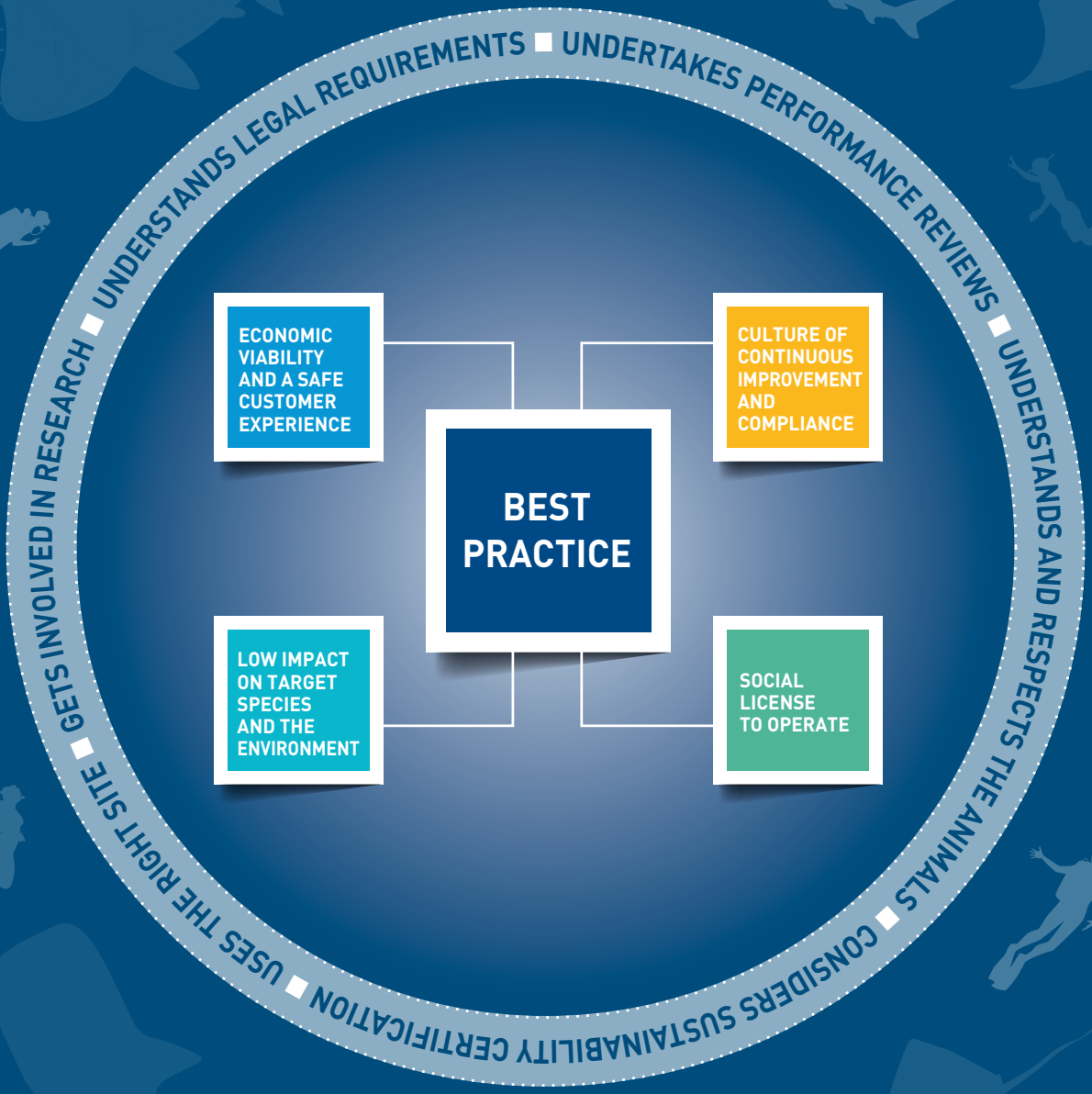
This is the first Guide to provide practical, science-based information for shark and ray tourism operators who want to offer the best possible experience to their customers, while conserving species and habitats and making a positive contribution to local communities. It provides guidance, and tools that can be tailored to local circumstances, enabling operators to improve the educational quality, safety, and sustainability of their businesses. It also gives practical information, based on the best available scientific data, to management authorities and others engaging with the industry.

Scientific experts, operators, and management authorities have all contributed to producing this Guide. It has two elements:

- **General guidance and information,** including real-life examples and scientific information
- **A hands-on toolkit** with checklists and examples to help you develop your own best practice.

While this Guide provides some information related to safety practices, these can differ by country or region. Operators should check with their local authorities to find out exactly what's required.

WHAT DOES IT MEAN TO BE A BEST PRACTICE OPERATOR?



BEING A BEST PRACTICE OPERATOR 1.0

1.0
SECTION ONE
BEING A BEST PRACTICE OPERATOR

BEING A BEST PRACTICE OPERATOR

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IN THIS CHAPTER

- Using a code of conduct: how to manage and minimize impacts on target species and their habitat.
- Provisioning: being precautionary and minimizing the risks.
- Investing in the local community and working with other stakeholders.
- Undertaking performance reviews to generate continuous improvement.
- Certification for sustainable tourism businesses.
- Creating a culture of continuous improvement and compliance.

Best practice is about running a business in a way that's financially profitable, environmentally sustainable and socially responsible. For shark and ray tourism operators, this means having a business model that includes:

- Operating profitably and safely
- Minimizing impacts on target species and their habitats
- Building a positive relationship with the local community
- Having a culture of continuous improvement and compliance.

MINIMIZING IMPACTS

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USING A CODE OF CONDUCT

- Shark and ray tourism can have negative effects on wildlife, ultimately damaging the resource it depends on.
- Using and enforcing a voluntary code of conduct is an effective way for operators to minimize their impact.
- If operators can demonstrate that they can successfully self-regulate, government intervention is less likely.

Tourism operators have a responsibility to comply with law, which includes legislation, regulations and permits. However, this alone may not be enough to prevent negative impacts on sharks, rays and their habitats.

Tourism-related impacts include pollution from vessels, discarded waste and plastics, and physical and chemical damage such as boat strikes, breaking off coral and damage from sunscreen. Changing the natural behavior of the sharks or rays and the species composition at a site, touching or injuring the animals, or altering their habitat can ultimately damage the resources upon which the tourism businesses are based.[2]

An effective way to minimize these impacts is through a code of conduct. This is usually developed by the industry, in conjunction with management authorities, and voluntarily adopted by an operator or a group of operators. It is, in effect, a set of voluntary rules to ensure staff and customers behave responsibly when interacting with sharks and rays. This can be particularly important where there is competition at a single popular site. In these cases, a code of conduct from the larger operators can lead to voluntary systems of rotation to reduce or avoid overuse of the target species.

Globally, only a few such codes of conduct exist (see **Case Study 1** for an example). There is no 'one size fits all' code of conduct for shark and ray operators. Instead, it's a matter of:

1) Understanding the minimum requirements for operating around, or having customers interacting with, the target species and their habitat. This should be based on the best available science, noting any unique characteristics or biological traits as well as habitat sensitivities that require careful attention.

2) Tailoring those minimum requirements to suit the situation and context. It's also important to monitor a site to check whether operators are adhering to the code of conduct, and understand what effect operations have on the focus species and habitats, as well as the local community.

By demonstrating that they can successfully self-regulate through an effective voluntary code of conduct, shark and ray tourism operators are less likely to be subject to future government regulation and the extra burden this can bring.

Environmental and scientific stakeholders may be able to help with ecosystem monitoring, which can inform further management strategies where needed.[3] These could include visitation fees, licensing systems or other restrictions, including on numbers of visitors, times or days of operation, or on fishing within tourism areas. Community support is vital, and makes management measures much more effective.[4]

By demonstrating that it is possible to successfully self-regulate through an effective voluntary code of conduct, shark and ray tourism operators are less likely to be subject to future government regulation and the extra burden this can bring. However, regulation remains an important tool where voluntary action fails to address potential negative impacts.

CASE STUDY 1: GREY NURSE SHARKS, AUSTRALIA

© Michael Davey / JETTY DIVE

The grey nurse shark (*Carcharias taurus*, also known as the sand tiger shark or spotted ragged-tooth shark) population on the east coast of Australia is listed as Critically Endangered under national legislation. Populations have declined significantly since the 1960s. The decline is due to recreational fishing and spearfishing, coupled with incidental capture by commercial fishers and in shark nets to protect swimmers. Fishing pressure remains the greatest ongoing threat.[5]

There is a strong dive industry along the east coast of Australia centered on diving with grey nurse sharks. Recognizing the need to reduce the impacts of human activities to support the species' recovery, the government introduced a range of management measures with the diving industry:[6]

- **Diving code of conduct:** In NSW all recreational divers and commercial dive operators follow a voluntary code of conduct prepared by the NSW Department of Primary Industries in consultation with the industry. All commercial operators have signed up to the code of conduct.
- **Penalties:** Interfering with grey nurse sharks carries an AU$500 (US$385) on-the-spot fine, with maximum penalties of AU$110,000 (US$85,000) or two years' imprisonment. Interfering includes harassing, chasing, tagging, marking or engaging in any activity for the purposes of attracting or repelling a grey nurse shark.
- **Zoning:** Protected areas have been established around most known aggregation sites. All methods of recreational fishing and spearfishing are restricted within these zones, except a few low-impact activities.
- Grey Nurse Shark Watch and Spot-a-Shark: These citizen science research programs use visual counts and photographs to monitor grey nurse shark populations.[7]

LESSONS LEARNED:

- **Conservation of the sharks is front and center.** While scuba diving in accordance with the code of conduct is generally thought to pose little threat, there is some concern about increased diver activity at the more popular sites. This situation needs to be continually monitored and, if necessary, the code of conduct revised to minimize disturbance to the sharks.
- **A robust research program has been essential** to improve knowledge on migratory and localized movements, estimates of population size and structure, mortality and bycatch levels, and identification of critical habitat. This scientific knowledge in turn provides the basis for education and awareness initiatives.
- **Diver compliance with the voluntary code of conduct is generally high**, particularly in the dive charter sector with large client groups. However, more education is needed to further reduce the impact of recreational divers not using dive charter operators.
- Having a code of conduct that has been **developed with the industry, is clear and easy to understand** and is rigorously enforced by the individual operators has been **important in gaining the high level of compliance.**[8]
- Having **comprehensive fishing stakeholder involvement and consultation** has been important to drive broad acceptance of protective zoning and other conservation measures.[9]

TOOL 6: Examples of codes of conduct aim to assist operators who want to develop a code of conduct. They cover a wide range of species and outline best practice guidance for vessel restrictions, human-animal interactions and other considerations.

1.1
SECTION ONE
BEING A BEST PRACTICE OPERATOR

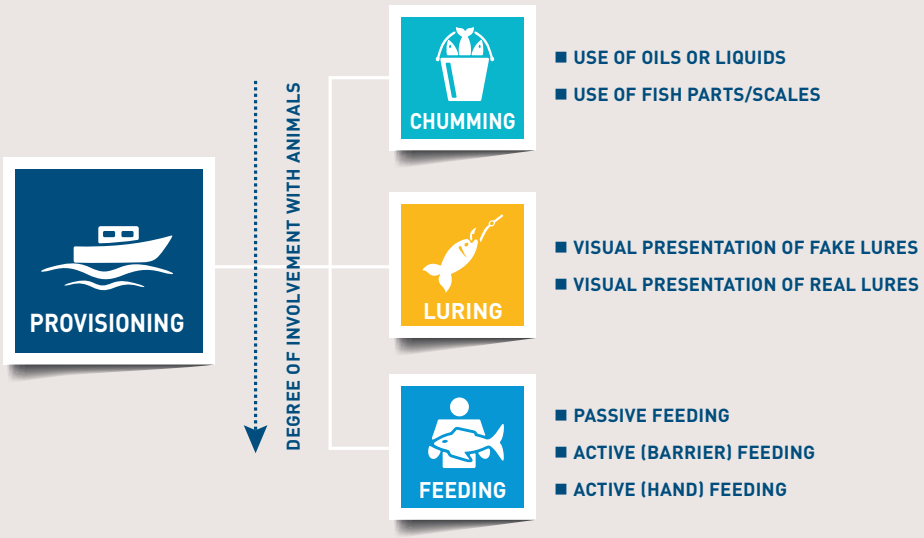
MINIMIZING IMPACTS

© Stefan Pircher

RESPONSIBLE PROVISIONING

- Provisioning of sharks and rays (using food or another attractant to lure them to a site) is highly controversial as it has the potential to significantly alter animal behavior, for example residency time and physiology, and can affect their habitat and human safety.
- Where encounters can happen without any form of attractant, it's best not to use one.
- A precautionary approach is recommended to avoid unexpected (and in many cases, still unknown) ecological, safety, and economic impacts.

Provisioning means using food, lures or visual attractants to bring animals closer to a dive/swim site.[10] While this can facilitate closer interaction with sharks and rays, it's a highly controversial and potentially harmful practice if not strictly controlled.



The various types of provisioning used in most shark diving tourism operations, showing the relative degree of involvement with the animals (moving from low (top) to high (bottom).[11]

Scientists are concerned about possible negative consequences to target species and their habitats. It has been shown that provisioning changes how a shark uses energy. Sharks and rays are also able to learn and alter their behavior as a result of provisioning. This can depend on the species, how often it occurs (both how many times per day and how often throughout the month or year), how much and what type of food is offered and how it's provided.[12]

Various studies show short-term changes to behavior, including increased times spent in particular areas (residency time), animals 'expecting' to be provisioned, and competition (competitive exclusion) within or between species.[13] Provisioning can also affect feeding behavior, population numbers and habitat use, which could lead to changes in a whole ecosystem.[14] There have been no studies on the effects of risk to humans to date, partly because of the sensitivity of the issue. However, there is a clear need for this research. Studies of terrestrial predators suggest that most species will habituate to being fed by humans, and that this may have a variety of harmful consequences.[15] Provisioning may lead to animals 'begging' from tourists, and becoming aggressive if they aren't satisfied: at a provisioning tourism site in Australia, bottlenose dolphins were found to engage in progressively more risky and aggressive interactions with humans the longer they had to wait to be fed.[16] Feeding, particularly hand feeding, of sharks can be unsafe, with the risk of accidental bites to divers.[17]

There must be a monitoring system in place to ensure impacts on species and ecosystems are reduced to a minimum.

The long-term impacts of provisioning on sharks and rays remain unclear; however, there is some conclusive research emerging. These studies are finding that long-term provisioning of populations of sharks and rays can have physiological and other impacts. **This is why a precautionary approach is important.** There is evidence that these impacts, if not carefully managed, could have negative effects on the health and survival rates of individuals and populations.[18]

A precautionary approach means acting to protect species and the environment from harm that is scientifically plausible, even if it is not yet verified – taking action once harm is evident is typically too late.[19] Uncertainty exists over the impacts of wildlife tourism on species and habitats.[20] Particularly with respect to provisioning, best practice shark and ray operators recognize the value of the precautionary approach as a proactive planning tool to mitigate potential impacts while ensuring the sustainability of tourism activities.

If you use provisioning, you need to understand and manage the risks it poses, to your own staff, customers and target animals. Developing a responsible provisioning plan is a way to do this. Where an operator decides provisioning is necessary, **there must be a monitoring system in place to ensure impacts on species and ecosystems are reduced to a minimum.**

TOOL 7: Responsible Provisioning provides a summary of the findings of the latest studies and a template for developing a responsible provisioning plan.

MINIMIZING IMPACTS

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THE BENEFITS OF MARINE PROTECTED AREAS (MPAS)

- MPAs can support both tourism and conservation objectives – as the profitability of shark and ray tourism depends on the health of the species and their habitats.
- Shark and ray operators can help identify critical habitat sites that could benefit from greater protection.

As well as minimizing their own impacts, best practice shark and ray tourism operators can go further in proactively supporting conservation of the habitats and species their business depends on. Marine protected areas (MPAs), which limit or restrict activities that affect marine life within a defined area, are one widely adopted conservation tool.[21] Well-designed and actively managed MPAs can benefit biodiversity and increase opportunities for alternative non-extractive industries, including shark and ray-based tourism.[22] For shark and ray operators, ensuring sharks and rays can be seen in their natural habitats is essential: they can make a compelling socio-economic case to encourage authorities to create MPAs.

In South Australia, for example, tourists are willing to pay up to US$1,500 to cage dive with white sharks within an MPA established specifically to protect the sharks and their prey, Australian sea lions. In Palau, shark diving within the MPA is popular because the white tip and grey reef sharks are predictable, relatively numerous, and spend most of their lives in the one area.[23]

Making the case for an MPA for sharks and rays requires a good understanding of the environmental, economic and social benefits, and how they can be quantified and presented. The case needs to show that an MPA provides equal or preferably greater value to the community than alternative uses or the 'do nothing' option. This is particularly important in developing countries, where there is heavy reliance on marine resources for income and food. Combining the social and economic case with the scientific justification for the MPA (conserving biodiversity, threatened species, etc.) is key to providing a convincing argument to regulators and other stakeholder groups.

BUILDING SOCIAL LICENSE TO OPERATE

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WHAT IS SOCIAL LICENSE?

- A business that wants to operate successfully and sustainably needs to be respected, supported and trusted by local communities and other stakeholders. This can only be achieved by spending time with these groups.
- Stakeholders can include many groups with a vested interest in the operation – including local community groups and traditional owners, the fishing industry, environmental NGOs, ethical investment funds, financial institutions, governments, and others.

Meeting regulatory or voluntary code of conduct requirements is not always enough: shark and ray tourism businesses also need a social license to operate. There are many examples across a range of industries (mining, fishing, agriculture etc.) where businesses have been disrupted and even shut down due to public opposition. For shark and ray tourism, social license issues are emerging through newspaper headlines and via social media in some areas:

- *"Conservationists call for prosecution of whale shark riders"*[24]
- *"Shark attack…raises questions about proposed cage diving industry expansion"*[25]
- *"Shark cage diving tour operators defend use of bait to attract sharks…. despite concerns from locals"*[26]
- *"Is ecotourism harming wildlife?"*[27]
- *"Researchers reveal stingrays made lazy and aggressive by tourists feeding them"*[28]
- *"5 reasons not to swim with whale sharks…"*[29]

In some communities, sharks and rays also play a significant cultural role, or are an important source of food and income to local people. Engaging with the local community to understand their values and priorities relating to sharks and rays is vital for building a strong and positive relationship with them.

Having a social license to operate means that the local community and other stakeholders accept or approve of a company's project or ongoing presence in an area.[30] The stakeholders involved can include many groups beyond the local community, including the fishing industry, environmental NGOs, ethical investment funds, financial institutions, governments, and many others.

For a shark and ray operator there are three central components to a social license:[31]

- **Legitimacy** – stakeholders need to believe an operator's activities are legal, safe and socially and morally appropriate.[32]
- **Credibility** – operators need to 'walk the talk' and show that they are reliable and keep their promises, in particular when it comes to commitments to reduce safety risks (for example, by enforcing a code of conduct or limiting provisioning activities).
- **Trust** – the way an operator engages with and treats communities and other stakeholders will shape their trust.[33] Communities usually respond well where operators do not take advantage of them, and manage risks with integrity and competence.[34] Collaboration and meeting community expectations is crucial.[35]

BUILDING SOCIAL LICENSE TO OPERATE

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HOW TO EARN SOCIAL LICENSE?

- Understanding the goals, beliefs, customs, motivations, concerns and livelihoods of the local community and other stakeholders is critical.
- Community and broader stakeholder engagement, participation and benefit sharing can all be important for successful shark and ray tourism.
- Communication and community development are two practical ways of achieving these the respect, support and trust of local communities and other stakeholders.

Many traditional or indigenous coastal communities have long-standing beliefs and customs attached to their local waters. Other local communities may also have strong history, heritage and stewardship with their local waters (although not legal ownership). Tourism operators must focus on their needs, perceptions and attitudes and demonstrate a respect for community tenure and stewardship. Management authorities will find that measures and regulations that don't incorporate traditional knowledge and beliefs or stewardship values and are not supported by local people will probably fail.

Management authorities will find that measures and regulations that don't incorporate traditional knowledge and beliefs or stewardship values and are not supported by local people will probably fail.

Situations vary. In some cases, overfishing may lead to depleted fish stocks, leaving the community struggling to find food. In other cases a stakeholder group may fish for sharks or rays for subsistence or commercial trade, and be in direct conflict with potential shark and ray tourism. Community members may believe that provisioning for certain shark species creates hazards to other water users. The community may have a spiritual or cultural connection to sharks and rays and find tourism practices incompatible with their traditional values.

Being open to the perspectives of the community and engaging with them to remove any anxiety are key to avoiding costly conflicts. To obtain a social license, practical solutions are the most effective:

- **Building a relationship based on open and ongoing communication.**
- **Transparent disclosure of information, practices, and the rationale for those practices.**
- **Strengthening community development by investing economically in local communities** – for example, hiring community members to fill vacancies whenever possible, providing training or educational opportunities to members of the community, directing customers towards other locally owned and operated businesses like hotels and restaurants, living within the community, and being available to community members and responsive to community concerns can all help maintain good relationships.

The table below provides some examples of benefits that a tourism operator can provide to a local community.[36] **Case Study 2** provides a good example of how to build a social license.

TANGIBLE COMMUNITY DEVELOPMENT	INTANGIBLE COMMUNITY DEVELOPMENT
Infrastructure – roads, communications, schools, libraries, clinics	Capacity building for institutions and individuals
Introduction and/or support of local governance and support institutions	Skills development and training
Benefit sharing schemes, e.g. joint ventures, community lease fees	Education and scholarships
Direct employment benefits, through wages and salaries	Community empowerment through partnerships
Indirect employment benefits through suppliers of goods and services	Introduction and development of partnerships, e.g. finance joint ventures, which build capacity and result in skills training and development, e.g. finance, marketing, etc.
Overall, enhancing livelihood security through providing alternative livelihoods	Promoting community cohesiveness, and structure and stewardship
	Promotion of culture and cultural activities
	Acting as a catalyst for the collective action of resource management
	Lessen the out-migration of youth to urban areas, and thereby assist in keeping rural families together
	Reduced community incentive to engage in ecologically problematic land and marine uses, e.g. mining and intensive agriculture, can promote conservation of natural resources for future generations

Many shark and ray operators have grappled with social license. Negative comments on social media, for example, can have devastating consequences for individual operations, regardless of where they are located.[37] It's essential for operators to monitor social media channels and develop an active, positive social media presence. Because anyone can voice their complaints or concerns on social media, poor practices, errors and accidents are more likely than ever before to become public. Negative perceptions of the industry can lead to governments responding with strict rules and restrictions, even when industry self-regulation may be more effective. Self-policing, early awareness of negative trends, and being proactive and transparent about problems and solutions can help the industry to address concerns and secure the legal and social license to operate.

CASE STUDY 2: SHARK REEF MARINE RESERVE, FIJI

© Ethan Daniels / WWF

In 2003, a dive operator and two villages that had traditional ownership of a small reef patch off the coast of Viti Levu, Fiji came to an agreement relating to fishing in the area known as Shark Reef.[38] This agreement led to the development of the Shark Reef Marine Reserve. In exchange for the communities' agreement to give up their fishing rights to Shark Reef, guests diving with the operator made a voluntary contribution of FJD10 (US$4.80) per dive directly to the villages concerned.

After the successful implementation of Shark Reef Marine Reserve, representatives from other villages along the coast approached the operator for an expansion of the protected area. With the support of the government and local communities, the protected area was extended to create the 30km Fiji Shark Corridor, and the voluntary contributions doubled to FJD20 (US$ 9.50) to benefit the five villages whose fishing grounds were affected. In 2014, the Shark Reef Marine Reserve was designated – Fiji's first fully protected National Marine Reserve. The voluntary contribution in 2016 is FJD25 (US$12) and the dive operator is entrusted with the day-to-day management of the reserve.

Conservation efforts focus on the habitat that supports the sharks, not just the sharks themselves. There are eight resident shark species, with bull sharks the main attraction.

Divers' contributions are collected by the dive operator and distributed to each community. The benefits are now being seen: the reserve is full of big fish with greater biodiversity, and the spillover has led to much higher fishing yields on unprotected neighboring reefs.[39]

Other features of the arrangement bring further benefits to local communities:

- A diving sponsorship program trains locals to work in the dive tourism industry.
- The dive operator offers courses and provides training for fish wardens from among the local community and dive shop staff, allowing them to monitor and enforce the no-take MPA. Attached to the Fijian Fisheries Department, the wardens have powers to stop any illegal activities.
- The dive operator helps to install moorings to avoid anchor damage to reefs.
- The operator has acted as an intermediary between the community and Fijian authorities, working to maximize tourism and MPA benefits for local communities.
- Ongoing shark research at the site is yielding data beneficial to the Fijian government, and is also monitoring the impacts of provisioning on the resident individuals.

Other operators and villages across Fiji are looking at this effort as a model for future projects.

LESSONS LEARNED:

- Engaging with the community at all stages allowed the dive operator to understand and meet the needs of the community, build trust and create a win-win arrangement.
- Some local livelihoods have been improved through the alternative and sustainable work opportunities offered by the dive operator.
- Support from the community is key to dealing with illegal activity. A law has now been introduced where poaching leads to fines and jail.

TOOL 2: **Building Social License** provides a checklist for earning the respect, support and trust of your local community and other stakeholders.

CREATING THE RIGHT CULTURE

© Guy Stevens / MANTA TRUST

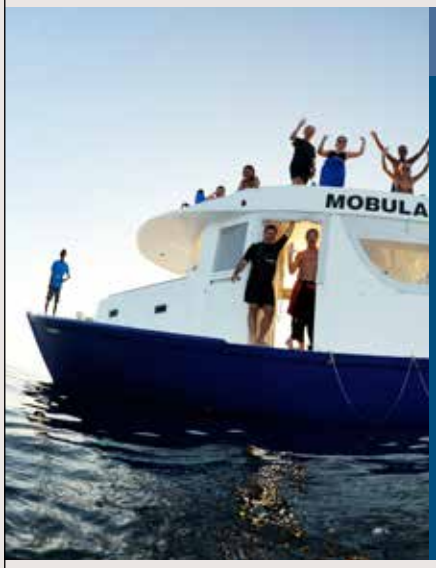
SETTING BUSINESS CORE VALUES

- A best practice business's core values contribute to the triple bottom line: economic profitability, environmental sustainability and social responsibility.

- **Core values need to be clearly stated and easily understood by those who have to adopt them**. Defining them formally with staff will ensure understanding and create a sense of ownership and investment in the company culture.
- **Core values should reflect the uniqueness of the business.** There is no 'one size fits all', although shark and ray tourism operators are likely to share some common values, including prioritizing safety and animal well-being. These values create an opportunity for a tourism operation to differentiate itself from its competitors.[40]
- **Values should be explained, communicated and constantly reinforced.** This can happen at induction training, through team meetings, by displaying them publicly on vessels and shopfronts, and through discussing them in day-to-day activities. Rewarding staff who best model the company's core values reinforces their importance.
- **Values have to be defended.** Businesses should have procedures in place for dealing with staff or suppliers who don't reflect the core values. Companies can defend and demonstrate their values to customers by prominently displaying their environmental and social policies, for example on the wall of the dive shop.
- **Values start at the top.** The leader's actions and attitude will flow down through the organization. Core values should be part of any leadership performance assessment.

While core values often include general words like communication, respect, integrity, excellence and sustainability, they form the practical foundation for the way the business works and presents itself, and they really matter to the staff who work there.[41] Core values centered around being a best practice operator can create pride in an organization and give it a positive and progressive image to customers and the local community.

CREATING THE RIGHT CULTURE



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INVESTING IN EDUCATION

- Staff training needs to go beyond safety and customer service and include education about the species, management and conservation.
- Reinforcement of a code of conduct with customers throughout their experience is important.

STAFF

Customers want the best experience they can get, so it's important **staff training** goes beyond safety and customer service. Staff should receive a **comprehensive induction** into the business; and this should be followed by **regular training and updates on the latest science, management practices, conservation and regulatory issues.** To ensure business practices are based on sound scientific and management advice, staff should be equipped to distinguish scientific fact from opinion and marketing spin.

Best practice tourism includes an aspect of **educating visitors**. Having staff who can discuss the latest science, current management practices, potential tourism impacts, and how these impacts are being mitigated improves the overall experience for the customer. Staff evaluations should include their ability to **provide accurate and relevant information to customers**, and they should be expected to avoid reinforcing negative stereotypes about target species (e.g. by exaggerating the danger associated with encountering sharks).

Staff must receive appropriate **first aid training**, and there should be established and practiced emergency procedures in case anything goes wrong. Staff should also be trained to recognize species-specific behavior such as stress signals in order to avoid potentially dangerous situations.

Staff should also be able **to interact sympathetically with the local community**, particularly if there is resistance to the tourism operation, or tensions exist between tourism and other uses of wildlife resources.

CUSTOMERS

Customers should have the **key requirements of the code of conduct clearly explained** to them at the dive or event briefing, and **reinforced throughout the experience.**

Customer briefings should provide information about the target species, including biological features, threats and conservation status. This will give customers a better understanding of the animals they have paid to see, and why they need to follow the code of conduct.

Signs and diagrams should be visible at dive shops and on all tourism vessels, especially in relation to the code of conduct – e.g. keeping the right distance from target animals.

Many operators are investing in staff education and capacity to improve the customer experience. In some cases this extends to an operator's license conditions. For example, in Yum Balam, Mexico, whale shark tourism staff are required to learn shark biology, ecology, safety, and how to provide tourist guidance. Following training, they must sit a final exam to obtain a license.[42]

Customers look to dive guides to set limits and explain how to avoid causing harm to wildlife – staff need training and experience to do this.[43] Tourists often want to know about target species and conservation issues more broadly.[44] Education leads to a greater appreciation and empathy for the target species and the wider marine world, making people more likely to adhere to a code of conduct.[45]

PERFORMANCE REVIEWS

- Best practice operators are committed to continuous improvement.
- Regular reviews are essential to monitor performance and drive improvement.

A best practice operator continually tries to improve by becoming more efficient, improving customer experiences, updating and maintaining high safety standards, and making positive contributions to the local environment and community.

Reviewing performance on a regular basis across these key areas is essential for ensuring continuous improvement. Highlighting key strengths, as well as areas needing improvement and suggesting actions to address issues identified are all important steps in the performance review process.

There are also online tools emerging that encourage customers to rate the performance of shark and ray tourism operators, such as *www.sustainablesharkdiving.com.*

TOOL 1: How do you perform? provides a scorecard that you can use to assess the quality, performance and safety of your business.

SUSTAINABILITY CERTIFICATION

- Independent certification can help best practice operators stand out to customers and suppliers.
- When one operator gets accredited – and a competitive edge – it can encourage others to follow suit to the overall benefit of the industry.
- Many countries have their own administrative systems and certification schemes for ecotourism, staff training and workplace health and safety. Operators need to look at what's available and applicable.

While there's no specific certification for shark and ray tourism, a growing number of marine tourism operators are using eco-accreditation – and some management authorities are beginning to require it. This is the case for the cage diving industry in South Australia, for example, where all three licensed operators are required to hold ECO tourism accreditation.[46]

At the center of eco-accreditation is the Global Sustainable Tourism Council (GSTC), which establishes and manages global sustainability standards. Its criteria provide guiding principles and minimum requirements that any tourism business should try to reach. A number of tourism, environmental, quality and safety standards developed by the International Organization for Standardization (ISO) are also available, which include formal certification.

For the dive industry, established regional voluntary certification programs include the NOAA Blue Star charter within the Florida Keys, and the Green Fins program initiated by UNEP within South-East Asia[47]. Green Fins is the only internationally recognized code of conduct and eco-certification scheme specifically aimed at the scuba diving and snorkeling industry. While research is limited, evidence is emerging that, when implemented properly, such programs promote compliance with environmental standards and may significantly reduce the impact of the diving industry on the marine environment.[48]

For further information see:

Global Sustainable Tourism Council	International Organization for Standardization (ISO)	NOAA Blue Star Program	UNEP Green Fins
www.gstcouncil.org	*www.iso.org*	*floridakeys.noaa.gov/onthewater/bluestar.html*	*greenfins.net*

SETTING UP A BEST PRACTICE OPERATION 2.0

SETTING UP A BEST PRACTICE OPERATION

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IN THIS CHAPTER

- What to consider when establishing a new shark or ray tourism venture, including understanding legal requirements and governance arrangements.
- Considerations for choosing a site.
- Understanding and respecting local communities and attitudes.

Globally, populations of a number of species of sharks and rays are continuing to decline.[49] One quarter of the world's sharks and rays now face an elevated threat of extinction.[50] Overfishing is the biggest threat, although populations of some species are also declining due to habitat destruction and pollution.[51]

Best practice operators take a long-term view to protect their principal asset – the sharks and rays. As the industry relies on wild populations, conserving them is a key priority. It's important to **understand biological and ecological aspects** of the target species, such as their life history traits (age and size at maturity, reproductive rates, etc.), how they use key habitats and areas, movement patterns, behavior, and how they fit in to the larger ecosystem. It's also important to understand the overall population status for target species, the key threats, and the strategies in place to manage these threats as well as the **potential carry capacity or load for a particular ecosystem** in terms of what is a sustainable number of tourism ventures. Operators need an up-to-date understanding of available research and management measures relating to the species being used for tourism.

This chapter introduces the key considerations that you will need to address to set up a new shark or ray tourism venture:

- Understanding legal requirements
- Choosing a site
- Working with the community.

Many of these issues are also relevant for existing operators, as well as for management authorities and other stakeholders. Specific guidance is provide for management authorities

UNDERSTANDING LEGAL REQUIREMENTS

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ADVICE FOR OPERATORS

- Understanding the local, regional, and national policy frameworks and legal requirements for tourism operations where you are looking to establish the venture is important.
- Understanding how tourism is managed and supported by government, particularly at the regional (state, province) and local (district, council) levels is key. It's also important to consult with any local authorities that manage MPAs.
- Know the licensing and permit requirements and penalties for non-compliance.

Best practice operators are proactive about meeting their requirements, and encourage others to make the same commitment. They are ready to work with management authorities to effectively regulate their industry when required. But they also understand that stakeholder support is just as important as regulation in determining the long-term suitability of a site and sustainability of tourism operations (see Case Study 3).

When establishing a new tourism venture it is important to have a good understanding of the legal requirements in that area and how shark and ray tourism is managed.

For more on self-regulation and developing a voluntary code of conduct, see Section 1.1. For a further discussion of building a social license to operate, see Section 1.2.

TOOL 3: How well do you know your market and legal requirements? provides a checklist to help new operators understand and meet their legal requirements. It's also useful for existing operators undertaking a general business review.

CASE STUDY 3: WHALE SHARK BIOSPHERE RESERVE AND YUM BALAM PROTECTED AREA, MEXICO

The Whale Shark Biosphere Reserve and the Yum Balam Flora and Fauna Protection Area is an important conservation area recognized by the Mexican government.[52] Whale shark tourism began within the site in 2002, and the number of tourists increased rapidly. Operations were unregulated and tourists were witnessed holding onto the dorsal fins in an attempt to ride the sharks, and blocking their natural paths.

ACTIONS:

- Several large stakeholder workshops – with local operators, experts in whale shark tourism, NGOs, and government agencies – were held to identify strategies for effective management and conservation.
- A local code of conduct was established – operators had to comply with the code of conduct to get their government permits renewed.
- Training was provided to all tour guides, including information on first aid, aquatic rescue, and biology and ecology of whale sharks. Guides must now pass a final exam to become certified.
- Logbooks are now required to document every whale shark interaction including location, length of encounter, size and sex of shark, and any identifying marks.

LESSONS LEARNED:

- Successfully establishing new tourism operations requires the participation of all stakeholders, biological and ecological information on the species being viewed, engagement with local communities and incorporation of traditional knowledge.
- A new ecotourism venture evolves as permit holders and guides become aware of the uniqueness of the activity. Stakeholder understanding, particularly of the importance of a code of conduct, will increase over time as knowledge and experience develop.
- As tourist numbers grow, the level of legal protection, management and monitoring needs to match that growth. For example, limiting the number of boats and ensuring fair distribution of economic benefits within the industry are key areas for strengthening management.
- Collaboration among NGOs, the government, the private sector and communities is very important for the sustainable management of species like whale sharks.
- Tourism operations need to be constantly evaluated and apply adaptive management.
- Prevention – a code of conduct can help prevent negative impacts on wildlife.[53]

UNDERSTANDING LEGAL REQUIREMENTS

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ADVICE FOR MANAGEMENT AUTHORITIES

- Generally, shark and ray based tourism can be self-monitoring – operators can avoid external/governmental oversight through voluntary compliance and self-enforcement. However, if industry is unable or unwilling to self-regulate then a formal management authority needs to step in. Government regulation is required when there is an ongoing risk to people, animals or the wider environment, which the operators themselves are not addressing.

- Best practice tourism does not require government intervention, but programs that have an element of public-private partnership often work best.
- When required, effective policy, legislation and enforceable regulations can set the benchmark for a fair and transparent business environment, ensuring public safety and conserving target species.
- Marine tourism operators in volatile economies often aim to maximize economic profits in the short term. They may not follow guidelines unless they are legally enforced and infractions carry high fines.
- Too much regulation and oversight can stunt business growth – it should not be unnecessarily restrictive. Combining legally enforceable license conditions with incentives for industry self-regulation and voluntary codes of conduct can work well.
- Strategies for managing the industry should allow for future innovation and growth while avoiding placing too much pressure on target species and tourist sites. Regulation can reduce the risk of profits being put ahead of conservation goals or animal well-being as the industry matures.[54]
- Species management frameworks are essential for the sustainable development of the shark and ray tourism industry, giving customers a great experience while minimizing impacts on animals and their habitats. Management authorities need to develop strategies in advance to ensure the tourism activity and its impacts on the target species are sustainable.
- Management authorities should regularly consult with shark and ray tourism operators and periodically review the legal framework to address their issues and reflect new research findings.

MANAGEMENT PARAMETERS TO CONSIDER FOR SHARK AND RAY OPERATORS	
 NUMBER OF VESSELS	 VESSEL REQUIREMENTS
 NUMBER OF LICENSES	 ALLOWABLE METHODS TO ATTRACT OR LOCATE SHARKS AND RAYS
 EXISTING CODES OF CONDUCT	 DEALING WITH MULTIPLE OPERATORS IN THE SAME LOCATION
 MINIMUM QUALIFICATIONS AND STANDARDS	 REQUIREMENTS FOR RESEARCH INVOLVEMENT INCLUDING DATA COLLECTION
 OPERATOR AND CREW TRAINING AND QUALIFICATIONS	 EXPECTATIONS FOR EDUCATIONAL INTERPRETATION

While regulations can help manage tourism operations, they generally don't extend to cover the in-water experience and encounters with the target species, unless official rangers are present. Relevant issues include the total numbers of people in the water, distances to be maintained, touching, and the use of vessels and equipment such as scuba and flash photography.[55] Voluntary codes of conduct are often used to address this gap, based on best available knowledge and research, common sense and any applicable guidelines, along with a commitment from the industry to follow them.[56]

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In Western Australia there are two codes of conduct for swimming with whale sharks at Ningaloo Reef – one for tourists and the other for vessels (both commercial and private). The tourist code of conduct says swimmers must stay three meters away from the head and four meters away from the tail-end of the shark. Touching, flash photography and motorized propulsion are all prohibited. To make the messages easy to understand, the codes of conduct have been produced as illustrations and are on display in hotel lobbies and at the nearby boat ramp.[57]

Providing supporting education and research can improve the customer experience while also making regulations and codes of conduct more effective. This is particularly important where tourist numbers are growing quickly. As numbers grow the profile of participating tourists changes, from mainly specialist divers with a particular interest in sharks to more general tourists. Operators may be dealing with larger numbers of less experienced participants – a particular challenge for scuba diving – which may increase safety risks and impacts on target species and their habitat.[58] Industry regulation and practices may need to change in line with the mix of visitors.[59]

It's also important that a regulatory system, whether industry or government managed, provides incentives to encourage best practice and continuous improvement. This could include accreditation systems like the Green Fins program[60] or competitive tenders for long-term (e.g. 10-year) licenses to operate based on sustainability principles.

This method is used in South Australia with the white shark cage diving industry. Applicants have to indicate how their operation will meet and/or exceed basic requirements in areas such as:

- Nature-based tourism and ecotourism accreditation[61]
- Knowledge of local conditions including environmental processes and conservation measures for the target species
- Commitment to quality tourism services
- Capacity and willingness to operate within specified codes of conduct.
- Compulsory annual audits, paid for by the operator, encourage best practice. If an operator is found to be 100% compliant the audit requirement is reduced to once every two years.

However, without effective enforcement, even the strongest combination of legally enforceable license conditions and voluntary codes of conduct may not be enough.

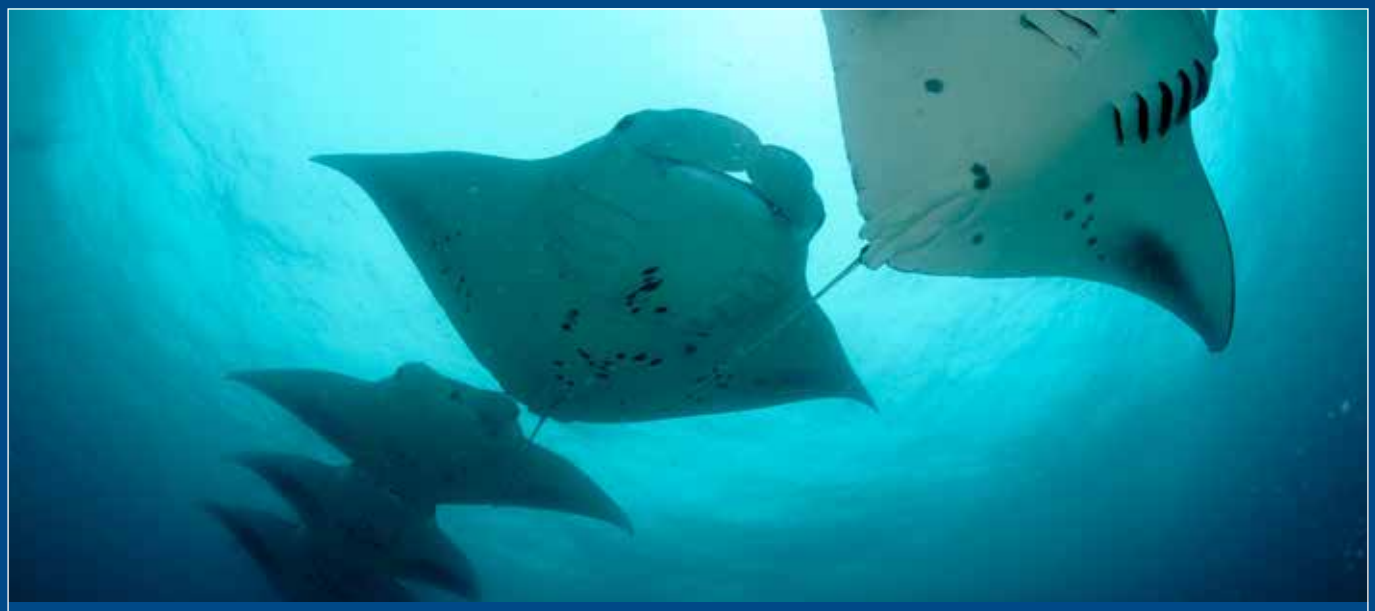
In locations where enforcement is weak, marine sites can become overcrowded, safety standards compromised and target populations and their habitats repeatedly disturbed or harmed.

In some situations – such as where there's a small number of operators a long way offshore – self-monitoring and enforcement is practical and necessary. In this case it's in the interest of each operator to ensure animals are not unduly disturbed or harmed. In other cases, it may be cost effective or necessary for the management agency to undertake monitoring and enforcement activities, including in-water.

Some management agencies use innovative enforcement methods, for example with 'secret shoppers' who join shark and ray tourism operations as paying customers. New technologies being used in fisheries – such as e-logbooks, AIS position data and e-monitoring through cameras – may also prove useful in some tourist operations. In other cases, monitoring is undertaken by wardens or rangers – who may be directly employed by the government, or members of the community trained for the purpose. In the Maldives, community rangers help enforce strict rules governing manta ray and whale shark interactions (see Case Study 4).

TOOL 4: Guidance for management authorities provides some questions to consider when developing or reviewing management arrangements for shark and ray tourism operators.

CASE STUDY 4: BAA ATOLL AND HANIFARU BAY, MALDIVES



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Baa Atoll, one of the Republic of Maldives' 26 geographical atolls, covers an area of around 1,200km^2. Within the Baa Atoll is Hanifaru Bay, a small football-field sized MPA that concentrates plankton and attracts large seasonal numbers of manta rays and the occasional whale shark. After being featured in National Geographic magazine and other media, Hanifaru Bay is attracting ever-growing numbers of tourists.

TOURISM OPERATORS:

- Operators are required to follow strict rules including access times, routes, mooring locations, maximum vessel numbers (5) and maximum tourist numbers (80).
- Tourists are required to follow strict animal-interaction guidelines, and are guided by certified Hanifaru guides. To receive certification tour guides sit an exam with the Environmental Protection Agency (EPA) of the Maldives.
- Each tourist pays a fee of US$20 to the Baa Atoll Conservation Fund (BACF). The BACF committee's nine members include fishermen, scientists, resort operators and councilors. Most of the funds go to manage the operations including rangers' salaries, reserve officers, ranger boats and atoll office overheads. The remaining funds are available for additional projects.

LESSONS LEARNED:

- **Regular patrolling is crucial since people do not always stick to the rules.** Tour operators are required to buy permits (or tokens) for tourists entering Hanifaru Bay. These tokens are often bought in bulk at the beginning of the season, and previously little was done to ensure that guidelines were being followed or that tourists had permits. Since 2015, rangers have been working alongside local businesses to help monitor and enforce the requirements of the marine park in Hanifaru Bay.
- **Developing a workable, flexible management system with key stakeholders is critical.** The EPA guidelines required resorts and liveaboards to use an alternate day roster to access Hanifaru Bay. This created problems as some operators were not able to access the areas when conditions were good, while others missed out on opportunities at other times. This was particularly problematic for liveaboards that were only in the area for a short period, and many went to different locations instead. In 2016, the EPA relaxed these restrictions, creating flexibility for operators to access key areas when conditions are good.

2.2
SECTION TWO
SETTING UP A BEST PRACTICE OPERATION

CHOOSING A SITE

© Janelle Lugge

Selecting the right site is critical for making a shark or ray tourism venture financially successful, socially acceptable and environmentally sustainable.[60] Key considerations include:

- A high probability of encountering target species – ideally a naturally occurring population that does not require provisioning.
- Physical access and weather and sea conditions that make regular operation practical.
- How to minimize disturbance and impacts on target species and habitats.
- Costs and accessibility of the site for tourists.
- How to manage human safety and animal welfare risks – including accident response and evacuation protocols. Choosing a site that allows tourists to keep a suitable distance from marine life and not interrupt normal behavior is important.
- Costs and benefits to local communities.
- Regulatory requirements.

Selecting a suitable site goes hand in hand with thinking about the type of interaction planned – scuba diving with reef sharks, snorkeling with whale sharks, viewing manta rays, cage diving with white sharks, and so on. This depends on the nature of the species present, likely tourism demand and licensing conditions.

In some cases **a dive site may need to be modified**. For example, for many shark feeding dives on coral reefs, arenas are created out of coral rubble, or nearby sand flats are designated for feeding. Frequent contact between divers and coral substrates can reduce new coral growth. In Blue Corner, Palau, for example, the regular use of diver hooks in heavy current has scarred the coral, and sites with heavy current create additional safety challenges.

In Donsol in the Philippines, whale sharks were reported to display responses to interactions with humans including violent shuddering, banking and diving.[61] Grey nurse sharks are known to temporarily use more energy to ventilate by increasing their swim speed and interrupting their resting period, as a response to divers.[62] Stingrays fed in the Cayman Islands, when compared to non-fed stingrays, have poorer body conditions, are found in abnormal densities, have changed foraging patterns, and possess more propeller scars and bites.[63]

We do not yet fully understand the impacts of shark and ray tourism on the target species and their habitat. It's important that operators are **aware of issues that may arise at a particular site and balance these with the need for profitability.**

TOOL 5: Selecting a site provides a checklist of key considerations for operators to work through.

UNDERSTANDING AND RESPECTING LOCAL COMMUNITIES

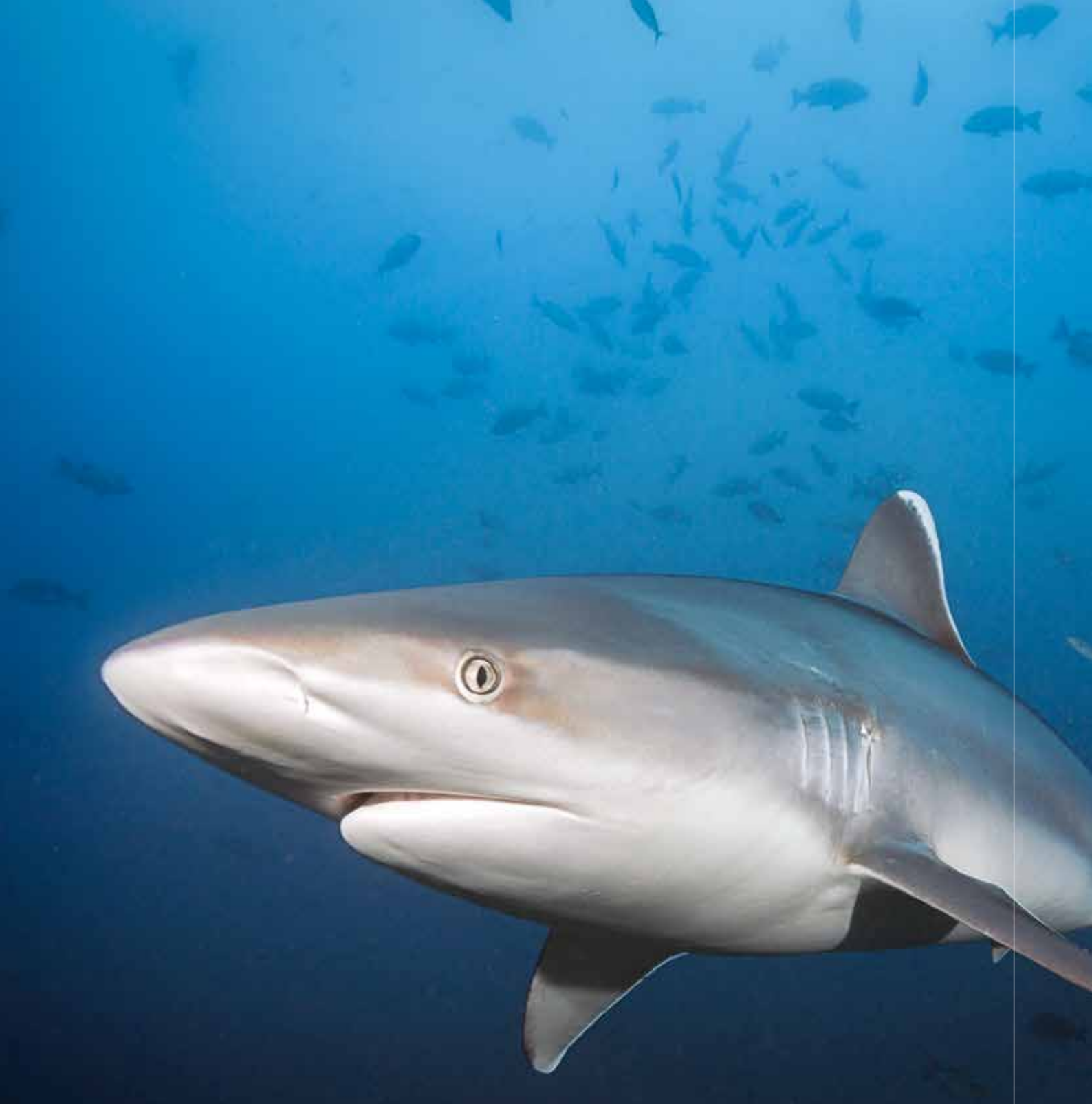
© Nicoline Poulsen / WWF

- Engage with the local community and understand the ownership and stewardship over local marine areas.
- Use local knowledge and expertise when selecting dive locations – get permission from those concerned if the site involves areas of cultural or historic importance.
- Understand the extent and types of competing resource uses.
- Local communities should benefit from increased tourism, through direct financial compensation, employment or skills training. These should be incorporated into the business plan, particularly in developing countries.

Some local communities, particularly in developing countries, hold traditional ownership or control access to stretches of local coast including reefs. This has led to strong stewardship, customs and traditional practices. By working with the local community, dive operators can use local knowledge, comply with customary laws and minimize livelihood impacts. Across the world, tourism operators have made agreements with local communities in order to gain access to traditionally owned marine resources and provide incentives for their conservation. In exchange for access, they may offer jobs, training programs and other livelihood opportunities, as well as financial assistance – for example, visitor charges may be passed directly on to the community or used to fund local projects.[64]

Whenever possible, shark and ray operators should employ local people, and locals should be given the opportunity to sell local goods and services to both the operation and their customers. By investing in conservation and providing local people with new opportunities, operators can add significant value to local communities.

For more information, see **SECTION 1.2** and **TOOL 2: Obtaining a social license.**



GETTING INVOLVED IN RESEARCH 3.0

GETTING INVOLVED IN RESEARCH

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IN THIS CHAPTER

- Contributing to citizen science projects.
- Assisting in field research and key research areas where operators can help.

As scientific knowledge about sharks and rays increases, it's important that tourism operators and management authorities use new information to continuously improve.

Data on sharks and rays is often difficult to collect, and tourism operators are in a unique position to contribute to research on their target species. Scuba divers participating as 'citizen scientists' in well-designed studies can also provide data for research and fisheries management.

There are a number of ways shark and ray tourism operators can participate in scientific research. Some methods are outlined below. It's important to connect with key researchers for the target species first to ensure studies are sound scientifically. Local universities and NGOs can help with this.

GETTING INVOLVED IN RESEARCH

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CITIZEN SCIENCE

- There are lots of ways divers and snorkelers can contribute to important research.
- Participating in science can improve a customer's overall experience.

Increasing numbers of research projects ask for data from citizen scientists, providing opportunities for divers and snorkelers to contribute to important research. In 2012, for example, dive instructors around the world responded to an online "eManta" survey (www.eOceans.org) that asked about their observations of manta and mobula rays as part of a global study on the status of these mobulid ray populations.[65] The map below shows some examples of recreational divers and the tourism industry supporting shark and ray research in this way.

Photography is often used to catalogue and identify individual animals that are found at a particular site. Photos are also used to investigate habitat use and preference, reproductive activity (courtship behavior, pregnancies), threats, injury healing rates and movement patterns.[66] This method is particularly useful for whale sharks, manta rays, grey nurse sharks, seven gill sharks and leopard sharks as their spotted pattern is as unique to each individual as a fingerprint.

CITIZEN SCIENCE RESEARCH

BAHAMAS

From 1993 to 2008 recreational divers submitted 100,000 dive observations of sharks to REEF **www.REEF.org**. The research showed a large-scale absence of reef sharks in the Caribbean with the exception of the Bahamas, and was used to support the creation of the Bahamas Shark Sanctuary.[68] It also showed declines in the small yellow stingray that hadn't been detected.[69]

THAILAND

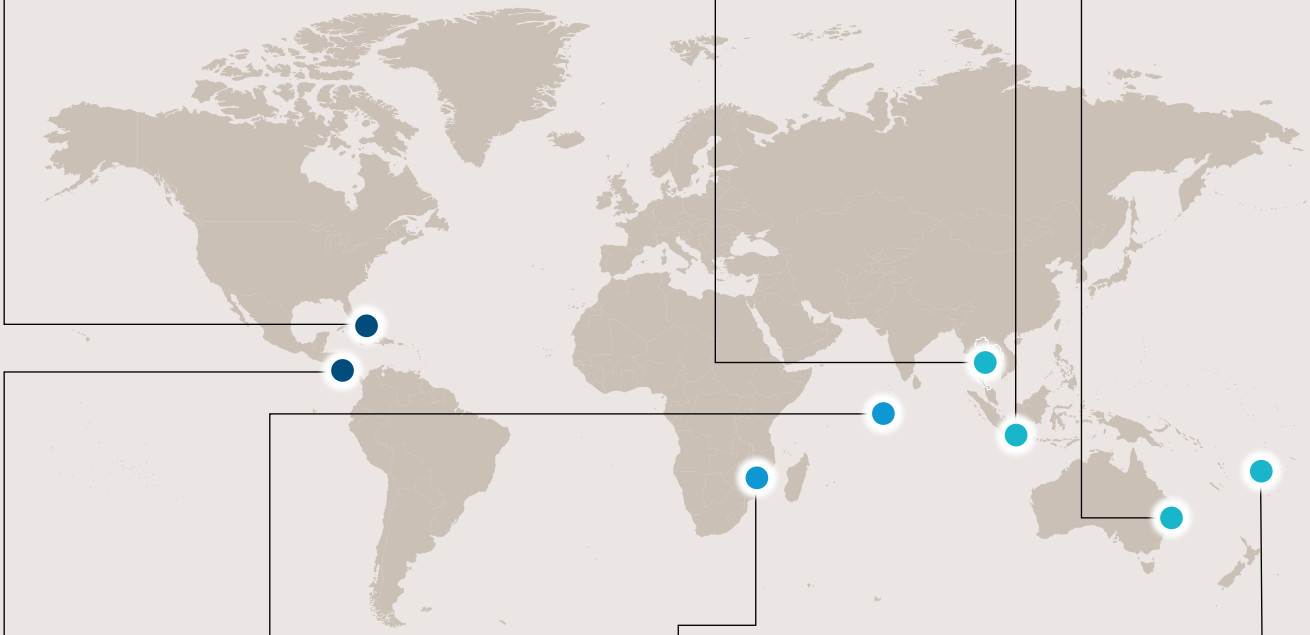
49 dive professionals contributed observations from tourists from 83,000 dives to eShark **eOceans.org**, which were used to describe hotspots in shark abundance and diversity, and changes over time.[70]

INDONESIA

Operators are contributing their daily dive observations to assess conservation needs and to identify priority MPAs through **eOceans.org**.

AUSTRALIA

Volunteer divers are providing observation and sighting information for manta rays, grey nurse and other sharks for a number of projects, including ProjectMANTA and "Spot a Shark" to improve conservation and management.[73]



COSTA RICA

More than two decades of data from divers in the Cocos Island National Park has shown declines in many pelagic shark and ray species, reflecting the need for improved conservation management and enforcement.[72]

MALDIVES

Tourism operators, scientists and the general public have been contributing manta ray sightings data and images to the Manta Trust's Maldivian Manta Ray Project since 2005. The Maldives hosts the world's largest known population of reef manta rays and a large population of oceanic mantas, with over 4,500 individuals and 50,000 sightings in the national database. **www.mantatrust.org**

MOZAMBIQUE

Volunteer divers are supporting the Marine Megafauna Foundation to study manta rays and whale sharks.[72]

FIJI

Since 2012, divers have been collecting data on the species of sharks, rays and turtles seen in Fiji as part of the Great Fiji Shark Count. This nationwide long-term monitoring project is mapping shark distribution and abundance trends in Fiji for the first time, and is providing the Fijian government with information that can be used to develop sustainable shark management plans.[67]

A carefully designed project provides a unique opportunity to collect a large amount of data that has the potential to answer research questions and evaluate existing management measures.[74]

Participating in science can also provide extra value to a customer's overall experience, leaving them more aware of the threats and issues affecting sharks and rays. Divers are generally already interested in the marine environment and have some knowledge of marine species, making them well equipped to provide support to a lead researcher (See Case Study 5).

CASE STUDY 5: LADY ELLIOT ISLAND, AUSTRALIA

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Lady Elliot Island is a small coral cay located in the southernmost end of the Great Barrier Reef within a group of islands that form the Capricorn Bunker. It's an area of high biodiversity, and around 700 individual manta rays have been identified in the surrounding waters.

Lady Elliot Island is managed by the Great Barrier Reef Marine Park Authority (GBRMPA) and the Queensland Parks and Wildlife Service as a 'Green No Take Zone'. Within this zone only boating, diving, photography and limited impact research are allowed.

The island is currently leased from the GBRMPA for the operation of a low-key resort that hosts up to 150 overnight guests. The Lady Elliot Island Eco Resort has an Advanced Eco Tourism certification, has made a commitment to preserve the natural environment and has developed its own 'Best Practice for Minimal Impact Guidelines'. These guidelines stipulate that guests will avoid sensitive areas such as breeding and nesting grounds, that no animals or plants are unduly stressed and that any animals showing distress will be left alone. The guidelines also require that group sizes are kept small and none of the animals are fed. The Lady Elliot Eco Resort also supports the 'Project Manta' program, a citizen science research project that focuses on gaining a better understanding of manta ray ecology and distribution.

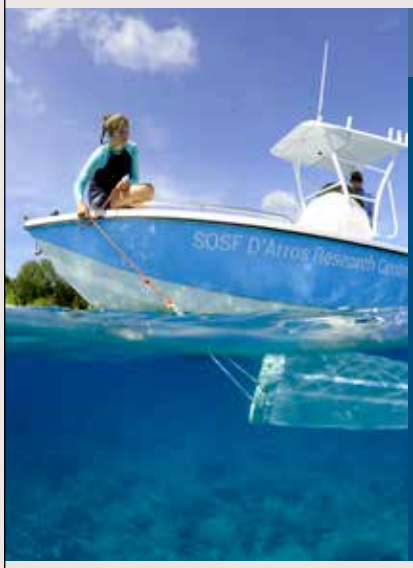
PROJECT MANTA

- Founded in 2007, the research program is based at the University of Queensland and supported by ARC Linkage Grant, Earthwatch Australia, Brother, Lady Elliot Island Eco Resort, and Manta Lodge and Scuba Centre. Project Manta has now expanded to Coral Bay, Ningaloo Reef in Western Australia as well.
- Project Manta uses photos and sighting information collected by researchers, Earthwatch volunteers, community members (citizen scientists) and the Lady Elliot Island Dive team to identify individual manta rays using their distinctive markings.
- The research is focused on four main elements: population ecology, habitat use at aggregation sites, feeding ecology, and cleaning ecology.
- The Project Manta group visits sites several times a year to conduct research on manta ray behavior and local water conditions and enter photograph IDs into the database.
- The latest research and information is distributed online and through social media (@ProjectMANTA).
- Data collected by Project Manta significantly contributed to manta rays becoming protected in Australian and international waters, and has provided important information on how to manage and monitor manta populations.

LESSONS LEARNED:

- Cross-sector partnerships are important for providing funding for a large-scale citizen-science project.
- A lot of effort and resources are required to recruit citizen scientists and keep them engaged, so they continue collecting data.
- Health and safety legislation can restrict citizens' involvement in scientific diving activities – it's important to understand the requirements in each country.
- By including the community there has been an increase in public awareness about manta rays and their marine environment.
- Partnering with organizations like NGOs can assist with community engagement.

GETTING INVOLVED IN RESEARCH



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ASSISTING IN FIELD RESEARCH

- Collaborating with scientific researchers.
- Scientists often seek to work with shark and ray operators who can assist in catching, tagging and releasing sharks and rays.

There are lots of ways operators can engage and help support scientific research. For example, working with scientists to design a research project, shooting video for analysis by scientists, collecting small tissue samples for scientists, giving scientists access to your staff or clients to study the human impacts related to shark and ray tourism and keeping careful logs on feedings/sightings for use by scientists. In addition, a number of studies use various tagging and marking techniques to monitor and map the movements of marine species. Scientists often seek to work with shark and ray operators who can assist in catching, tagging and releasing the animals[75]. Tagging can provide vital information such as on the amount of time individual animals spend at the sites where they are viewed – and possibly protected – versus other areas.

RESEARCH WHERE OPERATORS CAN HELP

Censuses: contributing to snapshot censuses of the status of different shark and ray species at site, regional, national and global scales. These can help to:

- Determine baselines of shark and ray populations – where they are present (and absent), how many, species diversity
- Monitor seasonal and annual changes
- Identify individual movement patterns
- Assess conservation actions and their results – such as MPAs, education, and management
- Identify areas of critical shark and ray habitat, nurseries, aggregation sites
- Determine conservation priorities
- Connect shark and ray populations to ecosystem diversity, and monitor changes in biodiversity
- Identify particularly valuable sites based on shark populations, ecological complexity and human use (the divers themselves).

Improving management

Helping to develop and improve shark and ray management and conservation policies through:

- Assessing what conservation strategies are in place, how they work and what threats remain unaddressed for sharks and rays
- Recording the impacts of pollution and habitat degradation (e.g. broken coral, rubbish).

Provisioning impacts

- Noting changes in resident species and individuals
- Investigating potential behavioral change (including habituation, anticipatory behaviors, and food-related excitement or aggression)
- Comparing the condition of provisioned and non-provisioned populations and individuals, including biological, physiological or behavioral differences.

Diver/animal interactions

- Researching how sharks and rays respond to humans during dive or snorkeling operations
- Recording information about individual animals, including species, sex, age, interaction time
- Recording rates of compliance with codes of conduct among divers and snorkelers
- Investigating customer satisfaction, attitudes, beliefs, educational gains.

Behavioral impacts

- Recording how different species of sharks and rays interact with one another at snorkeling/dive sites
- Recording changes in habitat use and movement patterns as a response to snorkeling/dive activity
- Recording changes to foraging behavior (for instance in frequency, foraging intensity, or timing).

BEST PRACTICE TOOLKIT 4.0

TOOL 1: HOW DO YOU PERFORM?

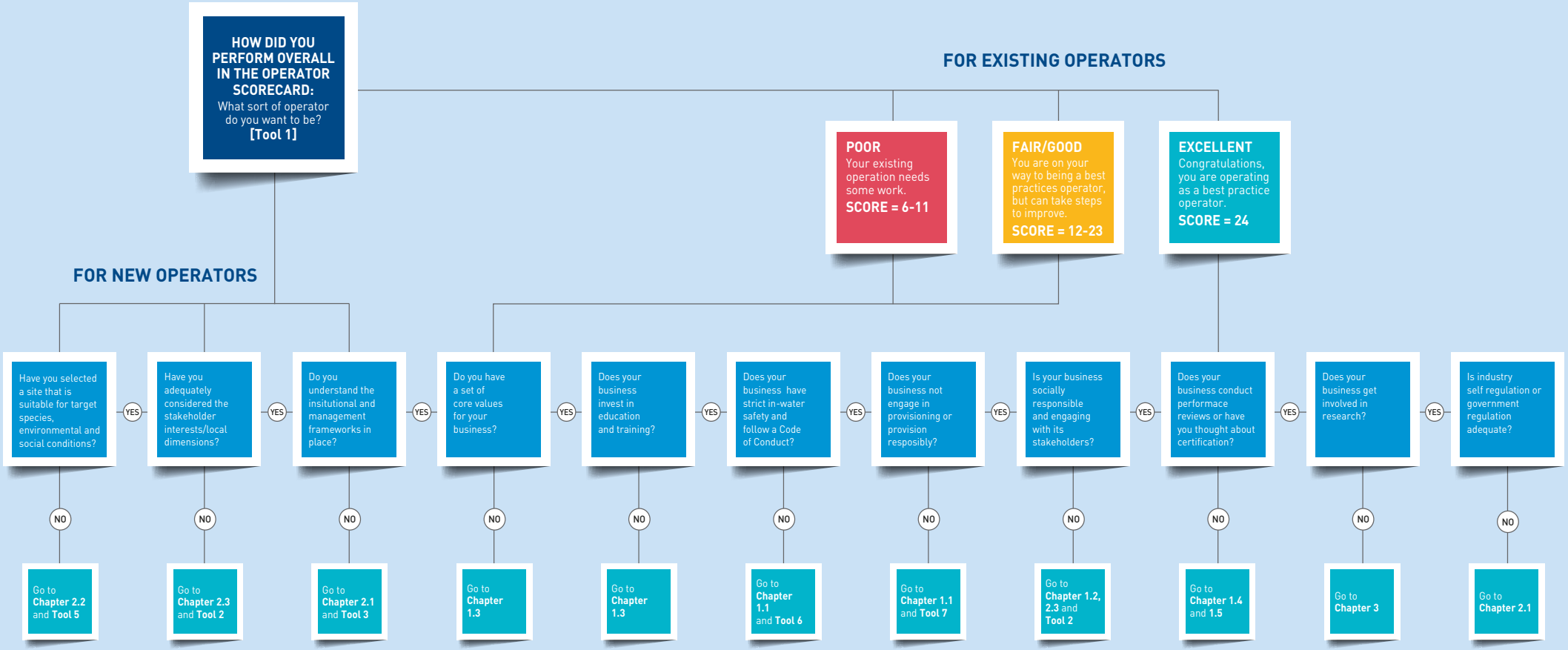
This tool helps assess the quality, performance and safety of a shark and ray tourism operation against best practice. Use this tool to see how you perform, or to determine what kind of operator you want to be, and then use the flowchart to provide guidance for how to address any issues. Go through each criteria and determine which box best represents you. Make a note of your score and then add them up at the end to determine what sort of operator you are on the flowchart.[76]

CRITERIA	POOR **SCORE = 1**	FAIR **SCORE = 2**	GOOD **SCORE = 3**	EXCELLENT **SCORE = 4**	SELF ASSESSMENT **TOTAL SCORE**
EDUCATION	Operator provides little, if any, information on the dive/swim and animals. No guidelines provided on animal interactions. No information given about the sharks, rays and their ecosystems.	Brief overview of diving/ swimming conditions and animals. No guidelines provided on animal interactions. No information given about the sharks, rays and their ecosystems.	Basic briefing of diving/swimming conditions, animals, diver/swimmer safety. Basic information provided on animal interactions. Basic information given about sharks, rays and their ecosystems. Some signage provided.	Comprehensive briefing on diving/ swimming conditions and diver safety with an emphasis on animal behavior. Detailed guidelines and related signage on animal interactions. In-depth information about sharks, rays and their ecosystems provided.	
IN-WATER SAFETY	A free-for-all with no organization. Operators make no effort to lead/communicate underwater/in the water.	Loose organization between divers/swimmers and operators. Operators remain relatively distant from divers/swimmers.	Good organization and communication between operator and divers/swimmers. Operators stay relatively close to divers/swimmers.	Effective strategy with strong organization and frequent communication with divers/swimmers. Entry and exit protocol enforced.	
ANIMAL TREATMENT	Operator frequently handles and manipulates animals and permits divers/swimmers to handle and touch animals.	Operator sometimes handles and manipulates animals; touching by divers/swimmers prohibited but is not enforced.	Operator rarely handles or manipulates animals; touching by divers/swimmers is prohibited and enforced.	Operator never handles or manipulates animals; touching by divers/swimmers is strictly prohibited and enforced.	
PARTICIPATING IN RESEARCH AND OUTREACH	Operator does not participate in research efforts.	Operator provides space on board vessel for researchers.	Operator provides space on board vessels for researchers and actively participates through collecting data and communicating results to passengers.	Operator provides space on board vessels for researchers and actively participates through collecting data and communicating results to passengers; collaborates with researchers on projects.	

TOOL 1: HOW DO YOU PERFORM? cont.

CRITERIA	POOR SCORE = 1	FAIR SCORE = 2	GOOD SCORE = 3	EXCELLENT SCORE = 4	SELF ASSESSMENT TOTAL SCORE
ENVIRONMENTAL SUSTAINABILITY	Operator makes no effort to use local or species appropriate food or lures. Gear used is high impact. Vessel is not fuel efficient. Green technology (eg, solar panels) is not incorporated into operations. Engine boat maintenance (avoiding oil spills etc.) rarely undertaken. No effort to reduce carbon footprint and improve waste management. Note - High impact is defined as: Coarse material that, if colliding with animals or people, can cause significant damage or injury. Metal and chain, as well as plastic and zip ties that can be ingested are all considered high impact.	Operator rarely uses local or species-appropriate food or lures. Gear used has moderate impact. Vessel is moderately fuel efficient. Some attempts to incorporate green technology into operations. Engine and boat maintenance (avoiding oil spills etc.) occasionally undertaken. Some effort to reduce carbon footprint and improve waste management (plastic use reduction, recycling and collection & disposal).	Operator does not provision; or operator uses local and species-appropriate food or lures. Gear used has moderate to low impact. Vessel is fuel efficient. Green technology incorporated into operations where possible. Engine and boat maintenance (avoiding oil spills etc.) regularly undertaken. Good effort to reduce carbon footprint and improve waste management (plastic use reduction, recycling and collection & disposal).	Operator does not provision, or does so under a responsible provisioning plan. Gear is specifically designed to be low impact. Vessel is certified fuel efficient and low emissions. Operator has obtained ecotourism accreditation. Green technology incorporated into operations. Engine and boat maintenance (avoiding oil spills, etc.) regularly undertaken. Extensive effort to reduce carbon footprint and improve waste management (plastic use reduction, recycling and collection & disposal).	
SOCIAL RESPONSIBILITY	Operation is not designed to benefit the conservation of resources or local communities and waters. No engagement with local community.	Operation shows some awareness of conservation of resources, animals, communities and waters. Minimal engagement with local community.	Operation demonstrates a conservation-based approach to resources, animals, communities and waters. Operator is engaged with local community.	Operation strongly demonstrates a clear conservation-based approach to resources, animals, communities and waters. Operator is engaged with local community and involves them in operations, e.g. through jobs, promoting local related businesses to customers.	

TOOL 1: HOW DO YOU PERFORM? cont.



TOOL 2: BUILDING SOCIAL LICENSE

A social license to operate – in other words, community support – is essential for shark and ray tourism operators. The following checklist highlights some important areas to consider and potential actions to take.

AREA/GROUP	POTENTIAL ACTION	DESIRED OUTCOME	CHECKLIST
CUSTOMARY TENURE, TRADITIONAL KNOWLEDGE AND STEWARDSHIP			
CUSTOMARY TENURE OF COASTAL AND MARINE RESOURCES	Identify who the traditional owners are. Meet with traditional owners to discuss ownership and cultural heritage and (if relevant) any customary compensation that may be payable to them.	Mutual respect, understanding and consideration.	
TRADITIONAL KNOWLEDGE	Discuss local knowledge of target species population size, movements, significant grounds, etc. Share additional insights gained with elders.	Traditional knowledge is used, and seen to be used, to tailor tourism operations, for example to match suitable season and minimize impacts as much as possible in nursery or pupping grounds.	
STRONG STEWARDSHIP	Meet with leaders in the local community to understand the history and stewardship values and identify opportunities for the business to strengthen those values, rather than threaten or undermine them.	Mutual respect, understanding and consideration.	
FISHERS			
COMPETING FISHING ACTIVITIES	Meet with local fishers to discuss possible involvement in tourism and working together for mutual benefit. Consider the use of zoning to reduce any conflicts.	Local residents engage in tourism and boosting local economy – conflict over access and use of marine resources is avoided where possible and fishers and their communities see tangible benefits from tourism (whether directly or indirectly).	
DESTRUCTIVE FISHING PRACTICES	Build trusting relationship with fishermen and engage on best-practice fishing techniques that minimize damage to the environment. Seek support from local NGOs to lead on this. Help provide environmentally friendly fishing gear, when possible.	Destructive activities cease and fishermen adopt more eco-friendly practices. Relationship based on mutual respect and trust established.	

TOOL 2: BUILDING SOCIAL LICENSE cont.

AREA/GROUP	POTENTIAL ACTION	DESIRED OUTCOME	CHECKLIST
EDUCATION AND KNOWLEDGE SHARING			
ADULTS/RESIDENTS	Attend local community events and festivals and engage in marine educational activities.	Local residents gain understanding of diving activities, local resources and local threats.	
	Attend community meetings where locals can voice concerns or opinions.	Become an active part of the local community and address any issues.	
	Encourage signs at reef sites or offer classes to help locals identify marine species.	Greater community involvement and understanding.	
	Support and train local people to become divemasters/tour leaders.	Local residents engage in tourism and boosting local economy – conflict over access and use of marine resources is avoided where possible and fishers and their communities see tangible benefits from tourism (whether directly or indirectly).	
	Work with researchers to share results of scientific surveys with community and management authorities	Greater community involvement and understanding.	
SCHOOLS – CHILDREN/ TEENAGERS/STUDENTS	Get involved in local school or university projects.	Young people learn about hands-on conservation.	
	Offer training courses for children, teenagers and students to become safe snorkelers and divers.	Employment opportunities for local young people, increased interest in operations and marine life.	
COMMUNITY AND ENVIRONMENT			
COMMUNITY CONTRIBUTION	Raise a contribution from customers for use in community programs (conservation, health care, facilities, sponsorships or scholarships).	Community has a stake in success of tourism operation, giving them an incentive to protect marine resources.	

TOOL 3: HOW WELL DO YOU KNOW YOUR MARKET AND LEGAL REQUIREMENTS?

New shark and ray tourism operators need to understand the market and legal requirements for an area they are looking to enter. Below are some key questions to answer.

KEY QUESTIONS	WHY ASK THIS QUESTION?	RESPONSE
WHAT RESEARCH HAS BEEN UNDERTAKEN ON THE MARKET, ITS POTENTIAL CAPACITY, THE COMPETITION, THE COMMUNITY PERCEPTION OF THE INDUSTRY, ETC.?	Researching and understanding the market provides essential baseline information from which to plan management and conservation strategies and build a sustainable business.	
WHAT NATIONAL, STATE OR REGIONAL/LOCAL LEGISLATION, POLICIES AND REGULATIONS ARE IN PLACE FOR SHARK AND RAY OPERATIONS?	Often several different authorities share responsibility for tourism. Understanding who is responsible for what – and who to go to for information on licensing and permitting, tourism levies, etc. – will make a big practical difference. It's also useful to prepare a checklist of key regulations and other requirements which you need to comply with.	
WHICH GOVERNMENT BODY OR LOCAL GROUP OVERSEES MONITORING AND ENFORCEMENT OF REGULATIONS? OR IS THE INDUSTRY SELF-REGULATED?	Regular consultation with the right agencies will help ensure they understand the purpose of the proposed venture. If the proposed venture is unregulated (or self-regulated), it's still advisable to consult appropriate agencies, such as those with responsibility for fisheries, environment and conservation, cultural heritage and tourism.	
IS THE TARGET SPECIES PROTECTED, ENDANGERED OR THREATENED? IF SO, ARE THERE ANY SPECIFIC REGULATIONS OR REQUIREMENTS TO FOLLOW?	In some cases the law prevents interaction with protected species, or only allows it under strict conditions. The legal status of the target species is fundamental to establishing an operation.	

TOOL 3: HOW WELL DO YOU KNOW YOUR MARKET AND LEGAL REQUIREMENTS? cont.

KEY QUESTIONS	WHY ASK THIS QUESTION?	RESPONSE
HOW ARE ISSUES OF NON-COMPLIANCE WITH REGULATIONS ADDRESSED?	Awareness of potential penalties for non-compliance with regulations can help focus efforts to avoid them.	
ARE THERE STRONG COMPETING INDUSTRIES SUCH AS COMMERCIAL OR RECREATIONAL FISHING IN THE AREA? IF SO, HOW WILL YOU CONSULT THESE GROUPS?	Having good relationships with other marine resource industries will help resolve any future disputes. Strong and regular communication is important. Explore whether any fishers currently participate in tourism enterprises: identifying inroads where they can get involved in a project may lead to improved outcomes.	
IS THERE AN MPA IN THE LOCAL AREA? DOES IT COVER THE SITE OF THE PROPOSED TOURISM VENTURE?	It's essential to understand the legal status of the site, and what activities are permitted, before deciding to make an investment.	
DOES YOUR BUSINESS PLAN INCLUDE THE TRIPLE BOTTOM LINE – THE ECONOMIC, ENVIRONMENTAL AND SOCIAL BENEFITS WHICH IT WILL GENERATE?	Sustainability makes good business sense. Environmental management, conservation considerations and social responsibility need to be part of any long-term business plan. The conservation of the target species itself – the focus of the business venture – needs to be fully addressed and integrated with the economic and social objectives.	

TOOL 3: HOW WELL DO YOU KNOW YOUR MARKET AND LEGAL REQUIREMENTS? cont.

KEY QUESTIONS	WHY ASK THIS QUESTION?	RESPONSE
ARE ALL THE SKILLS NEEDED TO OPERATE THE VENTURE – E.G. BUSINESS MANAGEMENT, CUSTOMER SERVICE, BOAT AND GUIDING OPERATIONS, ETC. – IN PLACE?	A shark/ray tourism business requires a mix of skill sets beyond dive/snorkeling operations. Listing these and ensuring they can all be covered is essential.	
DOES THE INDUSTRY/VENTURE HAVE A SOCIAL LICENSE TO OPERATE IN THE AREA CHOSEN?	Successful operators work hard to build a good relationship with the local community and gain their trust, respect and support. This good relationship is paramount. It may also be useful to develop a clear communications and social media strategy with this in mind.	
WHAT LEVEL OF RISK IS ASSOCIATED WITH THE VENTURE AND HOW WILL IT BE MANAGED? WHAT INSURANCE WILL BE REQUIRED?	Shark and ray tourism involves liability risks for the operator as well as safety risks for the customers. It's highly likely that public liability insurance will be required for the risks involved, so this is an essential aspect of business planning. Raising customer awareness of the inherent risks is an important part of the educational experience, particularly around more aggressive species. This should be included in a safety plan which clearly sets out the protocols the venture must follow.	

TOOL 4: GUIDANCE FOR MANAGEMENT AUTHORITIES

The following questions provide guidance for industry associations or government management authorities wishing to develop new or review existing legislation/ regulations and codes of conduct.

QUESTIONS	WHY ASK THIS QUESTION?	SUITABLE FOR INDUSTRY SELF-MONITORING	SUITABLE FOR GOVERNMENT REGULATION	RESPONSE
1. IS THERE A NEED FOR GOVERNMENT REGULATION? ■ IS THERE A CODE OF CONDUCT AND IS IT BEING FOLLOWED AND ENFORCED? ■ IS THERE A RISK TO STAFF OR PARTICIPANTS, THE ANIMALS OR THE ENVIRONMENT THAT IS NOT BEING RECOGNIZED OR ADDRESSED BY OPERATORS? ■ IS INDUSTRY UNABLE OR UNWILLING TO SELF-MONITOR?	As a general rule, shark and ray-based tourism can be self-monitoring, usually through a code of conduct. Government regulation is required only when there are failures within the industry – there is a risk either to the people, the animals or the environment and the risk is not being adequately addressed by the operators themselves.	✔	✔	
2. ARE THE POLICY OR REGULATIONS CLEAR AND PUBLICLY AVAILABLE? ■ ARE THEY BASED ON THE BEST SCIENTIFIC EVIDENCE, AND ADAPTABLE AS NEW KNOWLEDGE BECOMES AVAILABLE? ■ ARE THEY ENFORCEABLE?	Ensuring clear boundaries from the beginning is important. License conditions should be clear, practical and enforceable. They should outline what is permitted, rather than focusing only on what is not, so it is up to the operator to show they are operating correctly. Making the policy a public document will also improve the accountability of individual operators in the eyes of the community.		✔	

TOOL 4: GUIDANCE FOR MANAGEMENT AUTHORITIES cont.

QUESTIONS	WHY ASK THIS QUESTION?	SUITABLE FOR INDUSTRY SELF-MONITORING	SUITABLE FOR GOVERNMENT REGULATION	RESPONSE
3. IS THERE AN EFFECTIVE INDUSTRY ASSOCIATION TO WORK WITH, OR CAN YOU PLAY A ROLE IN ESTABLISHING ONE?	Having a single, independent point of contact for the industry makes decision-making and communication more effective.	✔	✔	
4. HOW ENGAGED ARE OPERATORS AND THE COMMUNITY IN THE DEVELOPMENT OF POLICIES OR A CODE OF CONDUCT?	Operator and community involvement in decision-making processes makes strong compliance more likely: collaboration and a sense of ownership are powerful factors.	✔	✔	
5. ARE LICENSE CONDITIONS CONSISTENT FOR ALL OPERATORS?	Inconsistent conditions will create difficult situations. Consistency also creates certainty if activities are scaled up. However, some flexibility in governance regimes may be needed as a situation changes.	✔	✔	
6. HOW IS CONFLICT MANAGED WITHIN THE INDUSTRY, AND WITH OTHER INDUSTRIES? CAN THE REGULATIONS PROMOTE A RESOLUTION PROCESS?	It's important to strike a fair balance between supporting the industry and acting as the regulator when community concerns are raised. Having a good relationship with other marine user groups and using spatial management to address industry conflicts are both important.	✔	✔	

TOOL 4: GUIDANCE FOR MANAGEMENT AUTHORITIES cont.

QUESTIONS	WHY ASK THIS QUESTION?	SUITABLE FOR INDUSTRY SELF-MONITORING	SUITABLE FOR GOVERNMENT REGULATION	RESPONSE
7. HOW IS INTERNAL GOVERNMENT CONFLICT MANAGED?	Having multiple departments involved in the regulation and management of shark and ray tourism can give rise to conflicts or inconsistencies. Establishing a cross-group steering committee that meets regularly to discuss issues and determine a unified response is an effective tool for ensuring smooth management.		✔	
8. IS THERE A STRONG SCIENTIFIC BASIS TO SUPPORT THE POLICY?	Don't underestimate the impact of politics on effective management of shark and ray tourism. Having a strong scientific basis for policy decisions, and being able to explain the scientific rationale for them to stakeholders, will help encourage acceptance of both fully validated and precautionary policies intended to protect target species and ecosystems.	✔	✔	
9. HOW IS SOCIAL LICENSE MANAGED?	This question is particularly important when provisioning is used and the local community has safety concerns, for example for cage diving and great white sharks. An effective public communications and awareness strategy may help strengthen the industry's social license.	✔	✔	

TOOL 4: GUIDANCE FOR MANAGEMENT AUTHORITIES cont.

QUESTIONS	WHY ASK THIS QUESTION?	SUITABLE FOR INDUSTRY SELF-MONITORING	SUITABLE FOR GOVERNMENT REGULATION	RESPONSE
10. HOW WELL DO THE REGULATIONS BALANCE INDUSTRY INNOVATION AND GROWTH WITH CONSERVATION AND WELFARE OF THE SPECIES, MINIMIZING ENVIRONMENTAL IMPACT AND ENSURING COMMUNITY SAFETY? WHAT ARE THE MINIMUM STANDARDS REQUIRED FOR EACH ELEMENT TO BE EFFECTIVE, WHILE PROMOTING BEST PRACTICE?	Ensuring the regulations are based on the latest science and research will help in striking the appropriate balance. So too will consultation and communication with industry operators regarding their issues and aspirations.	✔	✔	
11. HOW WILL MANAGEMENT AND ENFORCEMENT BE FUNDED – FOR EXAMPLE THROUGH LICENSING FEES, COST RECOVERY, VISITOR LEVIES, ETC.?	There is no point having strict regulations or a code of conduct if they cannot be enforced. Where visitor levies are collected it's important these are 100% re-invested in strengthening management and enforcement in the industry, and in community development and conservation efforts.	✔	✔	

TOOL 4: GUIDANCE FOR MANAGEMENT AUTHORITIES cont.

QUESTIONS	WHY ASK THIS QUESTION?	SUITABLE FOR INDUSTRY SELF-MONITORING	SUITABLE FOR GOVERNMENT REGULATION	RESPONSE
12. HOW TRANSPARENT IS THE COST OF MANAGEMENT TO THE INDUSTRY?	The more transparent the better: the industry and the community both need to understand how funds are invested.		✓	
13. HOW WILL THE POLICY OR CODE OF CONDUCT BE MONITORED AND ENFORCED? IS THERE BASELINE KNOWLEDGE? WHAT ARE THE KEY INDICATORS TO MONITOR IMPACTS AND COMPLIANCE?	Where possible, baseline data should be collected before operations begin to allow for an effective assessment of changes in behavior of the target animals or ecosystem health. Researchers can help develop indicators to suit the target species and operational circumstances.	✓	✓	
14. WHAT LEVEL OF COVERAGE WILL BE NEEDED TO MAKE MONITORING EFFECTIVE?	It's important to develop a scientific basis for determining the level of observer coverage needed to ensure compliance. Innovative, cost-effective methods can be used – for example, where government staff join trips as paying customers, without operator knowledge, to monitor activity. Cameras on board vessels (e-monitoring) and e-logbooks, as used in the fishing industry, can give good coverage of activities and drive individual operator accountability.	✓	✓	

TOOL 4: GUIDANCE FOR MANAGEMENT AUTHORITIES cont.

<table>
<tr><th>QUESTIONS</th><th>WHY ASK THIS QUESTION?</th><th>SUITABLE FOR INDUSTRY SELF-MONITORING</th><th>SUITABLE FOR GOVERNMENT REGULATION</th><th>RESPONSE</th></tr>
<tr><td>15. IS THERE AN ADEQUATE AND FUNDED SCIENTIFIC MONITORING PROGRAM SUPPORTING THE ONGOING ADAPTATION OF THE POLICY OR REGULATIONS?</td><td colspan="2">Policies should be underpinned by sound, up-to-date science.</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>16. WHAT FACTORS AFFECT THE LEVEL OF TOURISM ACTIVITY, AND ARE THERE BENCHMARKS FOR MEASURING IMPACT?</td><td colspan="2">Having benchmarks to measure change helps understand impacts identified. Below are some factors that can be used to quantify the level of tourism activity.
FACTOR — BENCHMARK
Days when tourism activity occurred — Tourism activity took place on XX days
Vessels in operations — X vessels per license were allowed to operate
Businesses using burley or lures or attractants — X businesses were authorized and using burley or lures or attractants
Businesses conducting commercial shark/ray tourism — X businesses were authorized and operating</td><td>✔</td><td>✔</td><td></td></tr>
</table>

TOOL 4: GUIDANCE FOR MANAGEMENT AUTHORITIES cont.

QUESTIONS	WHY ASK THIS QUESTION?	SUITABLE FOR INDUSTRY SELF-MONITORING	SUITABLE FOR GOVERNMENT REGULATION	RESPONSE
17. HOW WILL SOCIAL MEDIA RELATING TO SHARK AND RAY TOURISM, BOTH NEGATIVE AND POSITIVE, BE MANAGED?	Having a social media strategy is useful for proactive communication with key stakeholder groups as well as the general public. It's also useful for monitoring public sentiment on particular issues, and gives an opportunity to respond to public concerns.	✔	✔	
18. HOW CAN CONTINUOUS IMPROVEMENT IN THE INDUSTRY BE ENCOURAGED?	Best practice demands continuous improvement from operators and their staff. Providing ongoing training can encourage this, covering areas such as environmental impacts, safety, tourism operations, understanding the latest scientific research, etc.	✔	✔	
19. WHAT ROLE SHOULD OPERATORS PLAY IN EDUCATING TOURISTS ABOUT THE CONSERVATION AND MANAGEMENT OF THE TARGET SPECIES?	Having industry providing educational opportunities for customers can lead to improved community acceptance of sharks and rays. Education can also increase public support for marine conservation among locals and participating tourists.	✔	✔	

TOOL 5: SELECTING A SITE

The following checklist highlights important aspects for you to consider when selecting a site. The higher the number of yes answers, the more likely it is the site will be a suitable location.

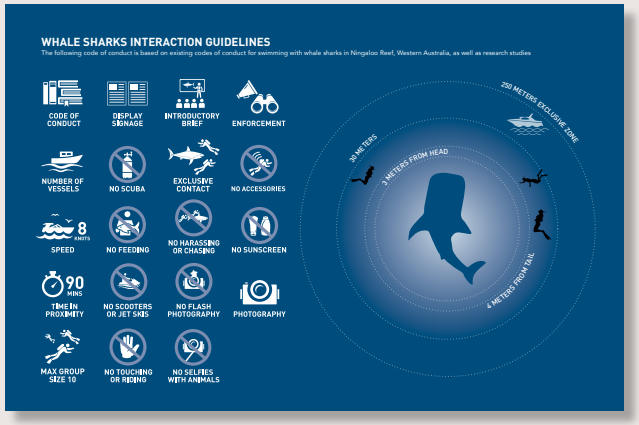
KEY CONSIDERATIONS	YES	NO	NOT APPLICABLE
SPECIES-RELATED CONDITIONS			
ARE THE TARGET SHARKS AND/OR RAYS PRESENT REGULARLY AND PREDICTABLY?			
ARE THE SPECIES CONSISTENTLY SEEN IN CONSECUTIVE SEASONS OR YEARS?			
IS THE SITE IN AN AREA THAT IS NOT A MATING, PUPPING OR SHARK NURSERY GROUND? IT'S IMPORTANT TO TRY TO AVOID THESE AREAS SO AS NOT TO DISTURB THE ANIMALS.			
ENVIRONMENTAL CONDITIONS			
IS THERE EASY ACCESS TO THE DIVE SITE BY BOAT OR FROM LAND?			
IS THE WATER CLEAR ENOUGH TO ALLOW GOOD VIEWING OF THE ANIMALS?			
CAN THE HABITAT WITHSTAND IMPACT FROM THE OPERATION? FOR EXAMPLE, IS IT POSSIBLE TO ACCOMMODATE DIVERS OR CREATE A FEEDING ARENA WITH MINIMAL DAMAGE TO CORAL COVER?			
IS THE SITE RELATIVELY SHELTERED FROM BAD WEATHER OR STRONG CURRENTS THAT MAY IMPACT ON SAFETY AND ACCESS FOR CUSTOMERS?			

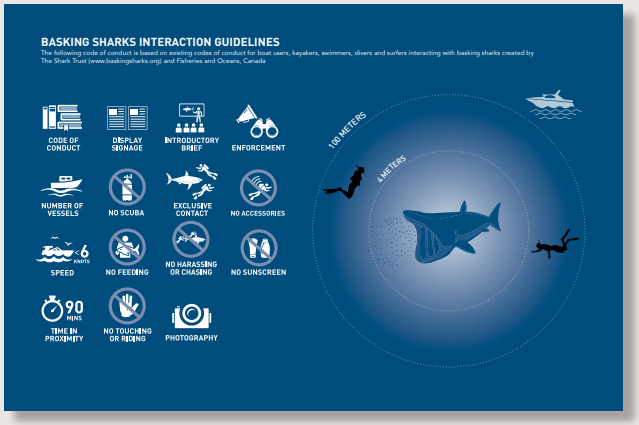
TOOL 5: SELECTING A SITE cont.

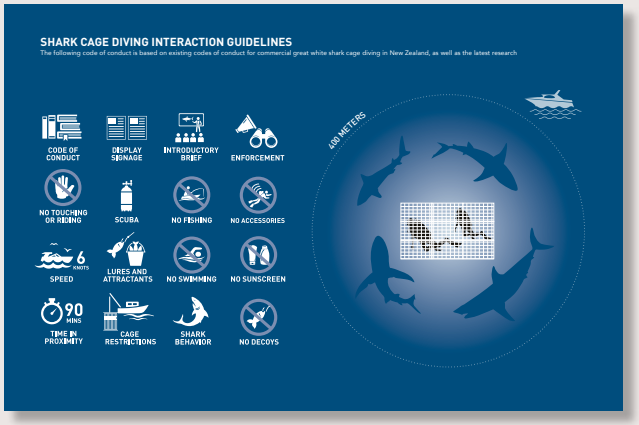
KEY CONSIDERATIONS	YES	NO	NOT APPLICABLE
SOCIO-ECONOMIC CONDITIONS			
IS THERE EASY ACCESS TO THE OPERATOR LOCATION FOR CUSTOMERS?			
ARE LOCAL FACILITIES (E.G., TRANSPORT, RESTAURANTS, HOTELS) AVAILABLE?			
ARE THERE OTHER TOURIST ACTIVITIES NEARBY? IF PROVISIONING PREDATORY SHARKS, ARE OPERATIONS WELL AWAY FROM POPULATION AND TOURISM CENTERS?			
IS THERE EASY EVACUATION AVAILABLE IF THERE ARE PROBLEMS (MEDICAL CARE, DECOMPRESSION CHAMBER ETC.)?			
ARE THERE OPPORTUNITIES FOR LOCAL RESIDENTS TO ENGAGE IN SHARK AND RAY-BASED TOURISM?			
IS THERE A LOCAL DESIRE WITHIN THE COMMUNITY TO CONSERVE MARINE RESOURCES?			
ARE OPERATIONS COMPATIBLE WITH LEVELS OF FISHING IN THE AREA?			
ARE TOURISTS IN THIS AREA WILLING TO PAY FOR DIVING/SNORKELING? CAN LOCAL TOURISTS AFFORD THE SAME AS INTERNATIONAL TOURISTS?			
IS THERE A LEGISLATIVE FRAMEWORK PROTECTING TARGET SPECIES?			
IS IT PRACTICAL TO ENFORCE REGULATIONS OR A CODE OF CONDUCT? IS SUCH ENFORCEMENT OCCURRING?			

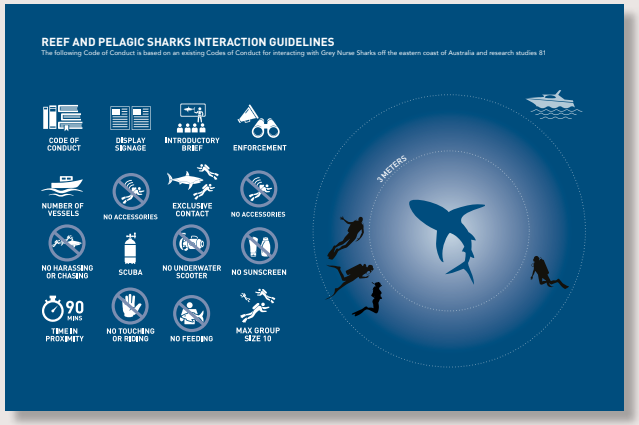
TOOL 6: EXAMPLE CODES OF CONDUCT

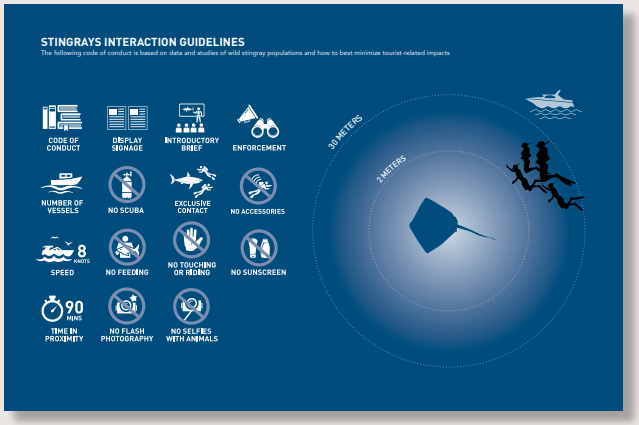
Each shark and ray operation is unique. It's important to develop a code of conduct that reflects this uniqueness, while also considering the latest science and best practice. **The following are examples only, but they can help you create a tailored code of conduct.** We've also included examples of how a poster can be used to illustrate key points and some icons which may be useful for display material (p60).

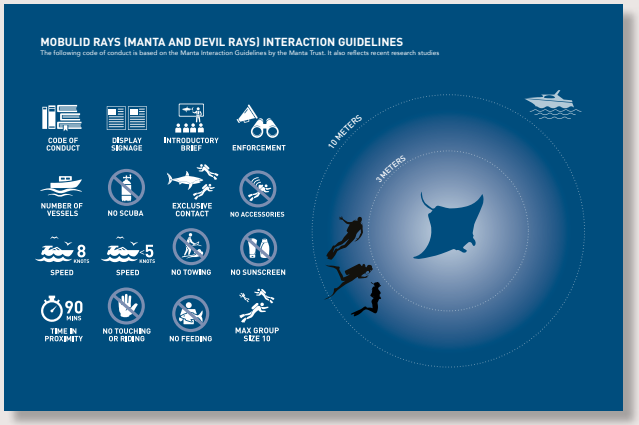






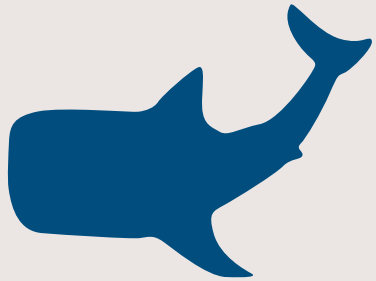






TOOL 6: SAMPLE ICONS

You may find the following icons useful in creating your own display material



TOOL 6: WHALE SHARKS example code of conduct

WHALE SHARKS

The following code of conduct is based on existing codes of conduct for swimming with whale sharks in Ningaloo Reef, Western Australia, as well as research studies[77]

VESSEL OPERATIONS	
DISTANCE	Must not approach closer than 30m to a shark Approach from ahead of the shark's direction of travel when dropping swimmers into the water.
SPEED	Less than 8 knots, no boat propellers used <100m from whale shark.
TIME IN PROXIMITY	Maximum 90 minutes in a 250m radius contact zone.
OTHER VESSELS	An exclusive contact zone of 250m radius applies around any whale shark. Only one vessel at a time may operate within the zone. The first vessel within that zone is considered to be 'in contact'. A second vessel to arrive must keep a distance of 250m from the shark. Any other vessels must be 400m from the shark. No scooters or jet skis.
EXCLUSIVE CONTACT	Each individual shark should only be interacted with by one group of tourists per day, not passed from group to group. Operators need to communicate with each other to facilitate this.

HUMAN-ANIMAL INTERACTION	
GROUP SIZE	Maximum 10 people in the water at any one time, including guides and videographer/photographer.
DISTANCE	> 3m from head of shark, > 4m from tail.
TOUCHING/RIDING	Do not touch or ride.
FEEDING	Do not feed.
SWIMMING	Do not chase, harass, interrupt swimming path or attempt to trap.
PHOTOGRAPHY	No flash photography. No selfies.
SCUBA	No scuba.
ACCESSORIES	Do not wear or use any apparatus that produces noise or that could disturb the sharks (e.g. electronic shark-repelling devices).
SUNSCREEN	Suntan lotion may cause irritation to the animals and damage some habitats. See *marinesafe.org* for information on non-marine-toxic products.

DIVE OPERATORS	
INTRODUCTORY BRIEF	Inform all snorkelers of the biology of and threats to whale sharks. Clearly explain code of conduct and reasons for rules.
SIGNAGE	Provide signs and infographics in dive shops and on boats Display both whale shark and dive flags when divers are in the water.
CODE OF CONDUCT	Display code of conduct in dive shops and on boats.
ENFORCEMENT	Inform snorkelers that non-compliance will not be tolerated. Use a two-strike system: one warning followed by a swimming ban. Have a member of staff on board to monitor compliance.

WHALE SHARKS INTERACTION GUIDELINES

The following code of conduct is based on existing codes of conduct for swimming with whale sharks in Ningaloo Reef, Western Australia, as well as research studies[77]

CODE OF CONDUCT

DISPLAY SIGNAGE

INTRODUCTORY BRIEF

ENFORCEMENT

NUMBER OF VESSELS

NO SCUBA

EXCLUSIVE CONTACT

NO ACCESSORIES

8 KNOTS

SPEED

NO FEEDING

NO HARASSING OR CHASING

NO SUNSCREEN

90 MINS

TIME IN PROXIMITY

NO SCOOTERS OR JET SKIS

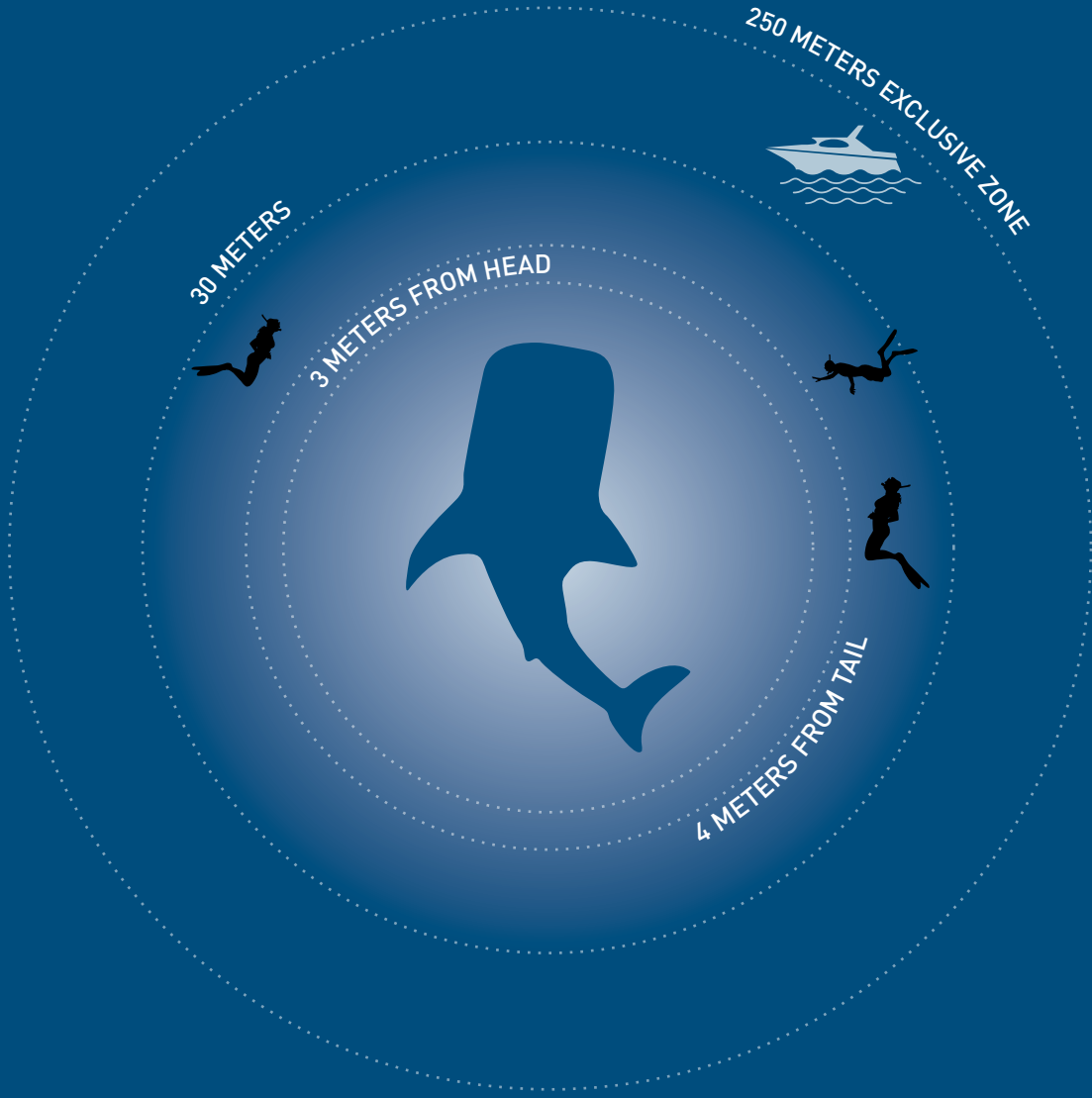
NO FLASH PHOTOGRAPHY

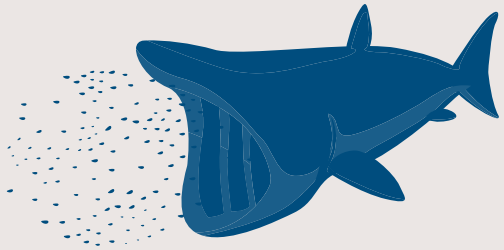
PHOTOGRAPHY

MAX GROUP SIZE 10

NO TOUCHING OR RIDING

NO SELFIES WITH ANIMALS





TOOL 6: BASKING SHARKS example code of conduct

BASKING SHARKS

The following code of conduct is based on existing codes of conduct for boat users, kayakers, swimmers, divers and surfers interacting with basking sharks created by The Shark Trust (www.baskingsharks.org) and Fisheries and Oceans, Canada [78]

BOAT/VEHICLE RESTRICTIONS	
DISTANCE	Do not approach within 100m. Maintain a distance of at least 500m where there are pairs or large numbers of sharks following each other closely. This may be courting behavior and they should not be disturbed. Caution when sharks have been seen breaching.
SPEED	< 6 knots when approaching area, no boat propellers in use < 100 meters. Avoid sudden changes in speed.
TIME IN PROXIMITY	Maximum 90 minutes.
OTHER VESSELS	Do not allow several vessels to surround the shark. No jet skies.
EXCLUSIVE CONTACT	Each individual shark should only be interacted with one group of tourists per day. Not continuously passed from group to group.

HUMAN-ANIMAL INTERACTION	
GROUP SIZE	Maximum 4 people within 100 metre of a shark.
DISTANCE	> 4m from the shark and be wary of the tail
TOUCHING/RIDING	Do not touch or ride.
FEEDING	Do not feed.
SWIMMING	Do not chase, harass, interrupt swimming path or attempt to trap. Stay in group, do not string around sharks.
PHOTOGRAPHY	Photography allowed.
SCUBA	No Scuba.
ACCESSORIES	Do not wear or use any apparatus that produces noise or that could disturb the sharks (e.g. electronic shark-repelling devices).
SUNSCREEN	Suntan lotion may cause irritation to the animals and damage some habitats. See marinesafe.org for information on non-marine-toxic products.

DIVE OPERATORS	
INTRODUCTORY BRIEF	Inform all snorkelers of the biology and threats to basking sharks. Clearly explain code of conduct and reasons for rules. Inform all snorkelers risks of injury to diver and shark.
SIGNAGE	Provide signs and infographics in dive shops and on boats.
CODE OF CONDUCT	Display code of conduct in dive shops and on boats.
ENFORCEMENT	Inform snorkelers that non-compliance will not be tolerated. Use a two-strike system: one warning followed by a swimming ban. Have a member of staff on board to monitor compliance.

BASKING SHARKS INTERACTION GUIDELINES

The following code of conduct is based on existing codes of conduct for boat users, kayakers, swimmers, divers and surfers interacting with basking sharks created by The Shark Trust (www.baskingsharks.org) and Fisheries and Oceans, Canada[78]

CODE OF CONDUCT

DISPLAY SIGNAGE

INTRODUCTORY BRIEF

ENFORCEMENT

NUMBER OF VESSELS

NO SCUBA

EXCLUSIVE CONTACT

NO ACCESSORIES

<6 KNOTS

SPEED

NO FEEDING

NO HARASSING OR CHASING

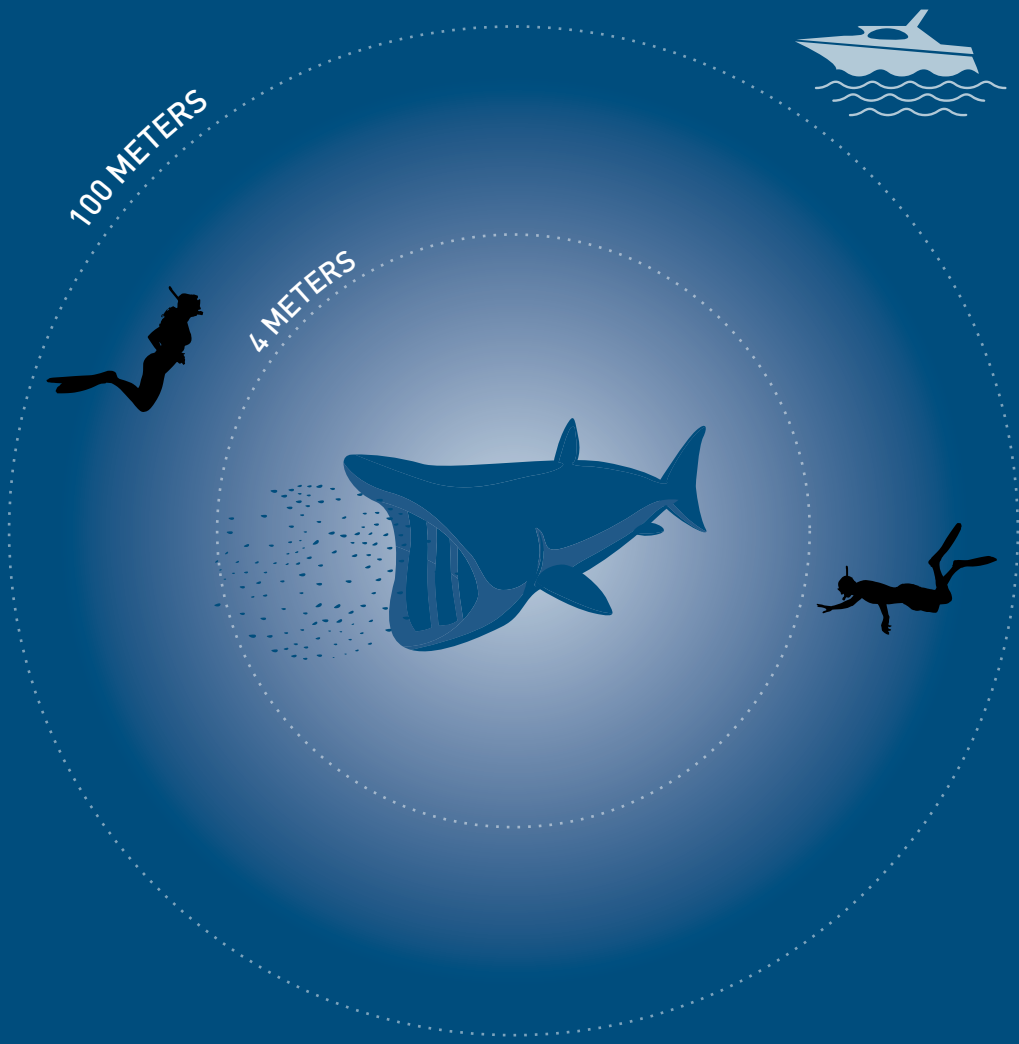
NO SUNSCREEN

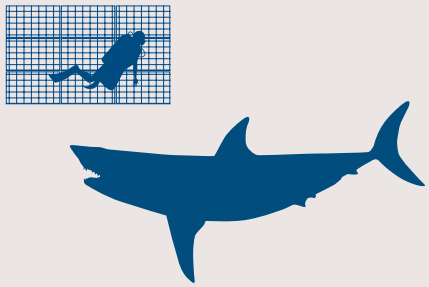
90 MINS

TIME IN PROXIMITY

NO TOUCHING OR RIDING

PHOTOGRAPHY





TOOL 6: SHARK CAGE DIVING example code of conduct

SHARK CAGE DIVING

The following code of conduct is based on existing codes of conduct for commercial great white shark cage diving in New Zealand, as well as the latest research [79]

BOAT/VEHICLE RESTRICTIONS

DISTANCE	> 400m from all other vessels.
SPEED	< 6 knots when approaching area.
TIME IN PROXIMITY	Maximum 90 minutes.
EXCLUSIVE CONTACT	One vessel and one cage per shark.
OTHER ACTIVITIES	No fishing before, during or after diving.

CAGE RESTRICTIONS

DESIGN	No sharp or protruding edges.
VIEWING WINDOW	Height of window < 30cm.
ATTACHMENT	Securely attached to boat by an arm, ramp or chain.

DECOYS

DECOYS	No use of decoys or provoking sharks – potentially harmful or physiologically costly behaviors like breaching or biting the cage should not be encouraged.

PROVISIONING

CHUMMING, LURES, ATTRACTANTS AND FEEDING	Lures and attractants must not be allowed to drift or be pulled by operators. No mammalian-based products. Lures, attractants and feed should be local and the natural food of the sharks. Burley must be minced finely enough to not provide food. Ropes in water for lures and attractants must be made of natural biodegradable material. Sacks of burley must not be hung from side of vessel or cage – it must be stored on board. Minimal use when shark has been attracted. Shark must not be fed or allowed to take a throw lure. Sharks should be given days off from provisioning.

HUMAN-ANIMAL INTERACTION

TOUCHING/RIDING	Do not touch sharks at any point or induce 'tonic immobility*. Customers must remain completely in cage at all times.
SHARK BEHAVIOR	Dive supervisors must terminate the dive if the shark shows signs of being distressed or alarmed.
ACCESSORIES	Do not wear or use any apparatus that produces noise or that could disturb the sharks (e.g. electronic shark-repelling devices).
SUNSCREEN	Suntan lotion may cause irritation to the animals and damage some habitats. See *marinesafe.org* for information on non-marine-toxic products.

DIVE OPERATORS

INTRODUCTORY BRIEF	Inform all divers of the biology of and threats to great white sharks. Clearly explain code of conduct and reasons for rules. Inform all divers of risks of injury to diver and shark.
SIGNAGE	Provide signs and infographics in dive shops and on boats.
CODE OF CONDUCT	Display code of conduct in dive shops and on boats.
ENFORCEMENT	Dive supervisors must terminate the dive if any divers harass the shark.

**Tonic immobility refers to natural state of paralysis or immobility which some shark species enter when physically inverted or handled in specific ways. It makes sharks and rays unresponsive. It can cause excessive stress to the animal.* [80]

SHARK CAGE DIVING INTERACTION GUIDELINES

The following code of conduct is based on existing codes of conduct for commercial great white shark cage diving in New Zealand, as well as the latest research[79,80]

CODE OF CONDUCT

DISPLAY SIGNAGE

INTRODUCTORY BRIEF

ENFORCEMENT

NO TOUCHING OR RIDING

SCUBA

NO FISHING

NO ACCESSORIES

6 KNOTS

SPEED

LURES AND ATTRACTANTS

NO SWIMMING

NO SUNSCREEN

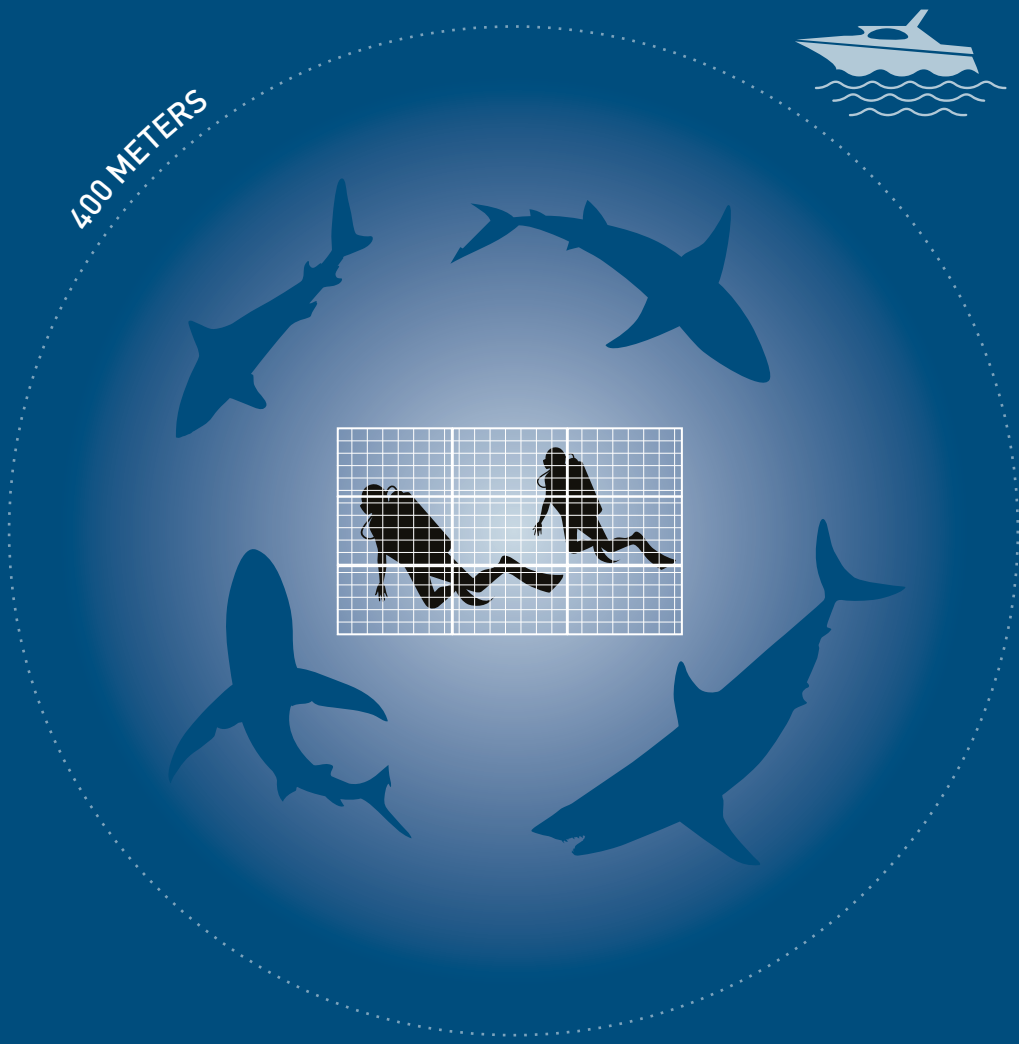
90 MINS

TIME IN PROXIMITY

CAGE RESTRICTIONS

SHARK BEHAVIOR

NO DECOYS



TOOL 6: REEF AND PELAGIC SHARKS example code of conduct

REEF AND PELAGIC SHARKS

The following Code of Conduct is based on an existing codes of conduct for interacting with Grey Nurse Sharks off the eastern coast of Australia and research studies [81]

BOAT/VEHICLE RESTRICTIONS		HUMAN-ANIMAL INTERACTION		DIVE OPERATORS	
DISTANCE	N/A	**GROUP SIZE**	Maximum 10 people, including guide and videographer/photographer.	**INTRODUCTORY BRIEF**	Inform all divers at the beginning of the biology and threats to reef and pelagic sharks, particularly critical habitat of threatened sharks in the region. Convey code of conduct clearly. Inform all divers of risks of injury to diver and shark.
		DISTANCE	> 3m and remain as close to the bottom as possible.		
SPEED	N/A	**TOUCHING/RIDING**	Do not touch, ride or induce 'tonic immobility'*		
		TOWING	N/A		
		FEEDING	Do not feed unless authorised provisioning activity.	**SIGNAGE**	Provide signs and info-graphics in dive shops and on boats for foreign tourists.
TIME IN PROXIMITY	Maximum 90 minutes.	**SWIMMING**	Do not chase, harass, interrupt swimming path or attempt to trap.		
		SCUBA	Yes but no night dives in sites identified as critical habitat (i.e. for Thresher shark and Grey Nurse Sharks). Do not block the entrance of or enter caves where sharks rest.	**CODE OF CONDUCT**	Display Code of Conduct in dive shops and on boats.
EXCLUSIVE CONTACT	N/A	**ACCESSORIES**	Do not wear or use of mechanical apparatus or any apparatus that produces noise or that could disturb the sharks (i.e. electronic shark-repelling devices), scooters and horns.	**ENFORCEMENT**	Inform divers that non-compliance will not be tolerated. Two-strike warning system. Warning followed by swimming/diving ban.
		SUNSCREEN	Suntan lotion may cause irritation to the animals and damage some habitats. See *marinesafe.org* for information on non-marine-toxic products.		

**Tonic immobility refers to natural state of paralysis or immobility which some shark species enter when physically inverted or handled in specific ways. It makes sharks and rays unresponsive. It can cause excessive stress to the animal.*[82]

REEF AND PELAGIC SHARKS INTERACTION GUIDELINES

The following Code of Conduct is based on an existing Codes of Conduct for interacting with Grey Nurse Sharks off the eastern coast of Australia and research studies [81]

CODE OF CONDUCT

DISPLAY SIGNAGE

INTRODUCTORY BRIEF

ENFORCEMENT

NUMBER OF VESSELS

NO ACCESSORIES

EXCLUSIVE CONTACT

NO ACCESSORIES

NO HARASSING OR CHASING

SCUBA

NO UNDERWATER SCOOTER

NO SUNSCREEN

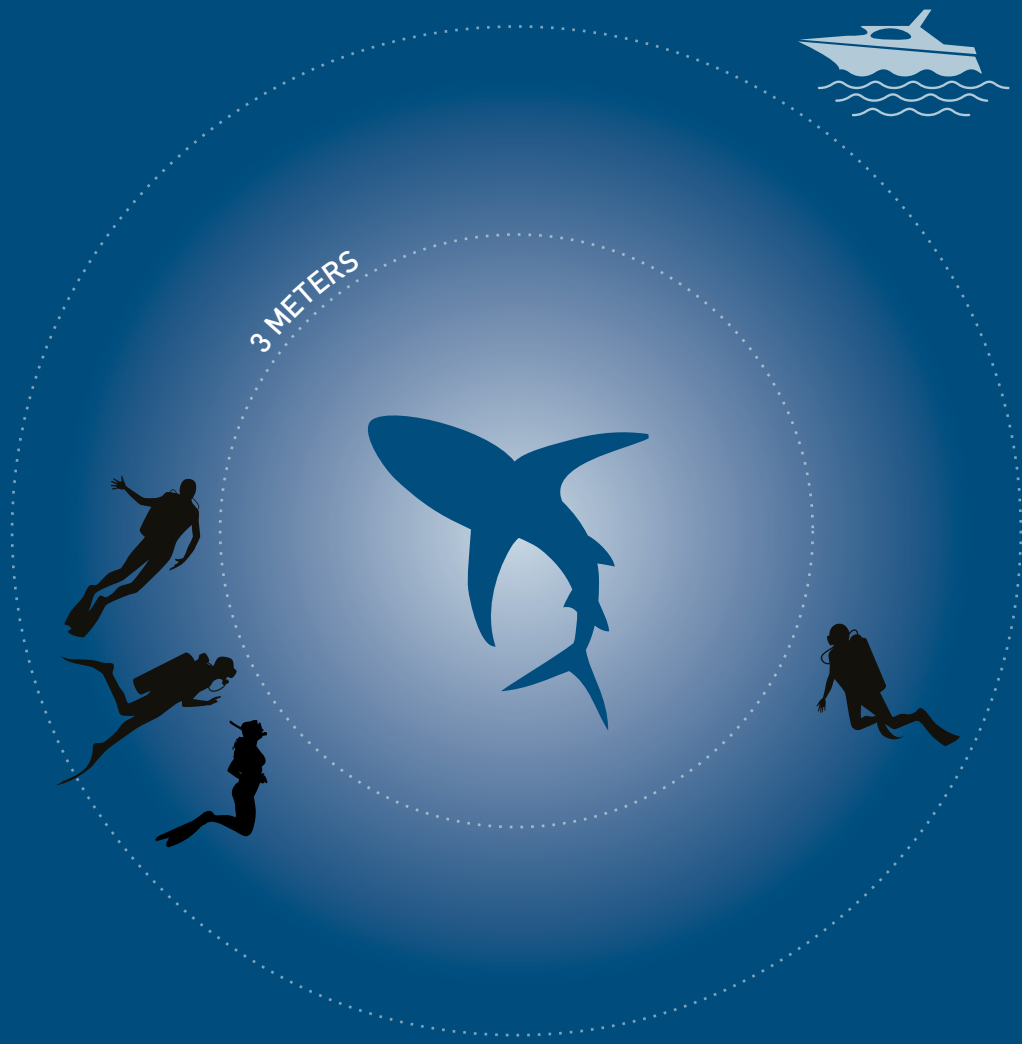
90 MINS

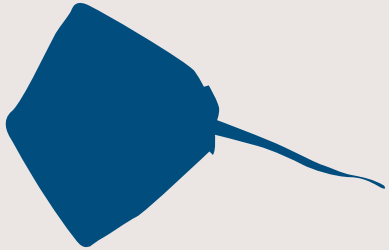
TIME IN PROXIMITY

NO TOUCHING OR RIDING

NO FEEDING

MAX GROUP SIZE 10





TOOL 6: STINGRAYS example code of conduct

STINGRAYS

The following code of conduct is based on data and studies of wild stingray populations and how to best minimize tourist-related impacts[83]

BOAT/VEHICLE RESTRICTIONS		HUMAN-ANIMAL INTERACTION		DIVE OPERATORS	
DISTANCE	> 30m from the ray aggregation.	**GROUP SIZE**	Maximum 10 people, including the guide and videographer/photographer.	**INTRODUCTORY BRIEF**	Inform all customers of the biology of and threats to rays. Clearly explain code of conduct and reasons for rules. Inform all snorkelers of risks of injury to person and ray.
		DISTANCE	> 2m		
		TOUCHING/RIDING	Do not touch or stand on the rays.		
SPEED	< 6 knots when approaching area.	**FEEDING**	Do not feed unless authorized provisioning activity.	**SIGNAGE**	Provide signs and infographics at dive shops, on boats and at locations where tourists visit groups of rays.
		SWIMMING	Do not chase, harass, interrupt swimming path or attempt to trap.		
TIME IN PROXIMITY	Maximum 90 minutes.	**PHOTOGRAPHY**	No flash photography. No selfies	**CODE OF CONDUCT**	Display code of conduct in dive shops, on boats and at tourist locations.
		SCUBA	No scuba.		
EXCLUSIVE CONTACT	1 vessel only per ray aggregation.	**ACCESSORIES**	Do not wear sharp pieces of equipment including snorkels or jewelry. Do not wear or use any apparatus that produces noise or that could disturb the rays.	**ENFORCEMENT**	Ranger or staff to educate visitors about the rays at known feeding sites to control amount of feeding and monitor tourist interaction, especially in peak season. Inform customers that non-compliance will not be tolerated. Use a two-strike system: one warning followed by a swimming ban. Have a member of staff on board to monitor compliance.
		SUNSCREEN	Suntan lotion may cause irritation to the animals and damage some habitats. See marinesafe.org for information on non-marine-toxic products.		

STINGRAY INTERACTION GUIDELINES

The following code of conduct is based on data and studies of wild stingray populations and how to best minimize tourist-related impacts[83]

CODE OF CONDUCT

DISPLAY SIGNAGE

INTRODUCTORY BRIEF

ENFORCEMENT

NUMBER OF VESSELS

NO SCUBA

EXCLUSIVE CONTACT

NO ACCESSORIES

8 KNOTS

SPEED

NO FEEDING

NO TOUCHING OR RIDING

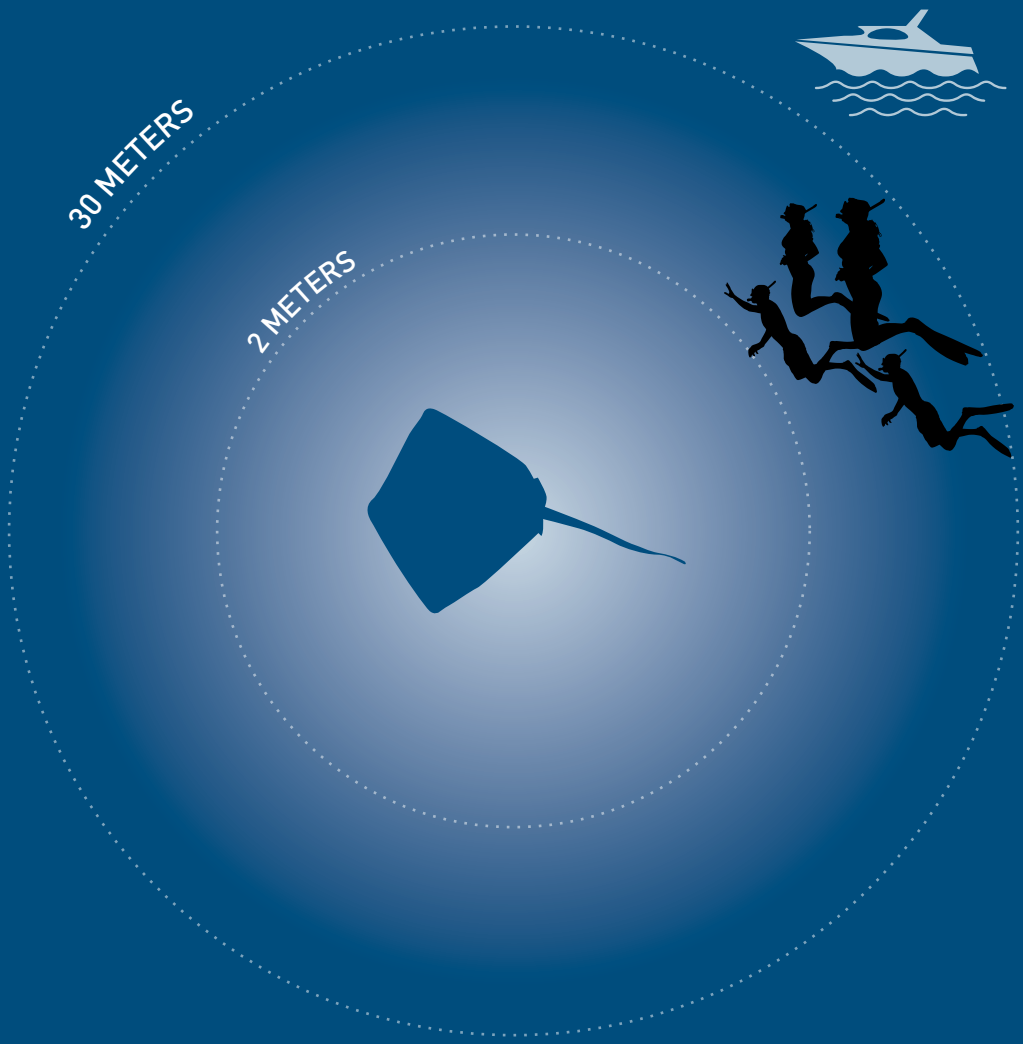
NO SUNSCREEN

90 MINS

TIME IN PROXIMITY

NO FLASH PHOTOGRAPHY

NO SELFIES WITH ANIMALS



TOOL 6: MOBUILD RAYS example code of conduct

MOBULID RAYS (MANTA AND DEVIL RAYS)

The following code of conduct is based on the Manta Interaction Guidelines by the Manta Trust. It also reflects recent research studies [84]

BOAT/VEHICLE RESTRICTIONS		HUMAN-ANIMAL INTERACTION		DIVE OPERATORS	
DISTANCE	> 10m at all times.	**GROUP SIZE**	Maximum 10 people, including guide and videographer/photographer.	**INTRODUCTORY BRIEF**	Inform all customers of the biology of and threats to rays. Clearly explain code of conduct and reasons for rules. Inform all snorkelers/divers of risks of injury to person and ray.
		DISTANCE	> 3m		
		TOUCHING/RIDING	Do not touch or ride the rays.		
SPEED	< 8 knots within 100m, < 5 knots within 30m.	**TOWING**	No boats driving over manta cleaning stations/aggregation sites. No towing swimmers through manta aggregation sites.	**SIGNAGE**	Provide signs and infographics at dive shops, on boats and at locations where tourists visit groups of rays.
		FEEDING	Do not feed.		
		SWIMMING	Do not chase, harass, interrupt swimming path or attempt to trap. Do not swim over cleaning station*. Approach mantas slowly from their side allowing the animal to see you while it can maintain a clear path of travel ahead.	**CODE OF CONDUCT**	Display code of conduct in dive shops, on boats and at tourist locations.
TIME IN PROXIMITY	Maximum 90 minutes.	**SCUBA**	Preferably divers should position themselves to the side, near to the seabed. Divers should not stand on coral reefs or other substrate that can easily be damaged, such as sponge gardens etc. If at a cleaning station, keep at a distance and remain still so as to not disrupt cleaning. Keeping to the side at a distance will also ensure that you don't create a curtain of bubbles near the feeding aggregation that may displace plankton. Snorkellers among a group of feeding manta rays should remain still.	**ENFORCEMENT**	Ranger or staff to educate visitors about the rays at known feeding sites to control and monitor tourist interaction, especially in peak season. Inform snorkelers/divers that non-compliance will not be tolerated. Use a two-strike system: one warning followed by a swimming ban. Have a member of staff on board to monitor compliance.
EXCLUSIVE CONTACT	Depends on the site and what mantas are doing, (ie cleaning or feeding).	**ACCESSORIES**	Do not wear sharp pieces of equipment including snorkels or jewelry.		
		SUNSCREEN	Suntan lotion may cause irritation to the animals and damage some habitats. See marinesafe.org for information on non-marine-toxic products.		

**Cleaning station refers to a section of a coral reef where cleaner fish, such as wrasses or gobies, remove parasites from large fish, sharks or rays*

MOBULID RAYS (MANTA AND DEVIL RAYS) INTERACTION GUIDELINES

The following code of conduct is based on the Manta Interaction Guidelines by the Manta Trust. It also reflects recent research studies[84]

CODE OF CONDUCT

DISPLAY SIGNAGE

INTRODUCTORY BRIEF

ENFORCEMENT

NUMBER OF VESSELS

NO SCUBA

EXCLUSIVE CONTACT

NO ACCESSORIES

8 KNOTS
SPEED

<5 KNOTS
SPEED

NO TOWING

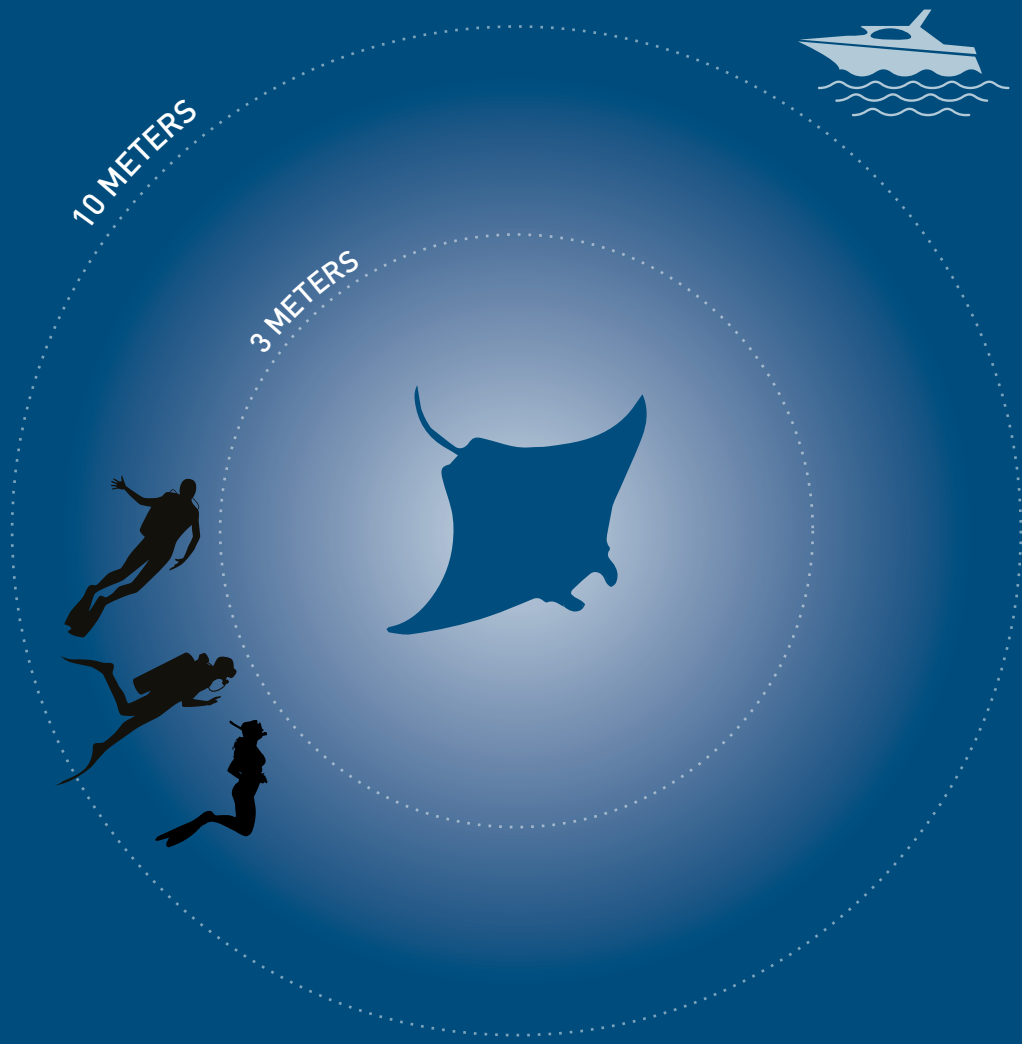
NO SUNSCREEN

90 MINS
TIME IN PROXIMITY

NO TOUCHING OR RIDING

NO FEEDING

MAX GROUP SIZE 10



TOOL 7: RESPONSIBLE PROVISIONING

Provisioning is a highly controversial and potentially harmful practice. Where natural encounters are likely without any form of attractant, it is best not to use one. Provisioning should only be undertaken in exceptional circumstances/locations and in a responsible way.

Because the long-term impacts of provisioning are unknown, a precautionary approach is recommended to avoid unexpected ecological, safety, and economic consequences. Possible management actions include:

- Controlling the amount and type of bait an operator can use over a given time period; and
- Using a permitting system to limit the number of operators allowed to provision sharks or rays.[85]

If you do use provisioning, you should have a responsible provisioning plan in place. It's wise to keep up to date with the latest research and be prepared to adapt the plan when change is needed.

A responsible provisioning plan needs to:

- Contain information about the species being provisioned – the name and any significant biological or ecological traits, e.g. size, what it eats and how often, and whether it's resident to the area year-round or seasonally. Identify risks based on the latest science associated with provisioning of that species or similar species. These risks can be environmental, social, or economic. These could include:
  - Safety issues for humans and the animals
  - Behavioral, ecological or physiological impacts to the animals
  - Changes to the local ecosystem, e.g. changes to habitats, introduction of different species or changes in the types of species found
  - Impacts on the operator's social license, e.g. community concerns that feeding will cause 'shark attacks'.
- Rank those risks according to impact and likelihood of the risk occurring.
- Identify measures that can be taken to reduce the risks identified.

The following recommendations can help you prepare your responsible provisioning plan and reduce potential risks. Note that different species of sharks can react in different ways.

RECOMMENDATIONS

1. Use a combination of local and natural foods that reflects the natural diet of the animals.
2. **Control**
   a. the amount of food for each shark/ray per day.
   b. the provisioning to once a day and consider varying the time of feeding. Note – sharks that are attracted to an aggregation site for tourism may remain in close vicinity, which could potentially put extra pressure on that area from hungry sharks.[86] In this case it is more important to limit feeding events, not the amount each shark receives.
   c. the number of provisioning days (i.e. have days off) to reduce impacts that lead to increased residency or changes in natural behavior of sharks and rays at a site.
3. Deliver food in the most natural way (e.g. lying on the bottom or under reef patches at a distance from humans).
4. Give small amounts of food at once in order to avoid competition and aggression between sharks on large pieces.
5. Feeding (especially hand feeding) is much more unsafe (in diving safety terms) than chumming or baiting.
6. Limit the number of people feeding – preferably only the dive supervisor, with everyone kneeling on the seabed. For sharks, the guests should be behind or against some structure or have lookouts (staff) behind them for sharks that may enter from behind.
7. Don't touch the sharks or rays, and ensure they have ample space in which to maneuver – although feeders may have to push animals away from guests.
8. Feed away from the vessel to prevent propeller scars and boat anticipation behavior.
9. Undertake provisioning of large predators well away from population and tourism centers.
10. Have an accident and emergency strategy and staff trained in its application.
11. Get involved in provisioning research.

TOOL 7: RESPONSIBLE PROVISIONING

RESEARCH

While the long-term impacts of provisioning remain uncertain, evidence is emerging of negative impacts. The following table summarizes some of the latest studies.

LOCATION	ACTION	RESULTS	POTENTIAL EFFECTS	STUDY REFERENCE
STINGRAY CITY SANDBAR, CAYMAN ISLANDS [87]	Feeding stingrays with squid.	Rays being lifted entirely out of water. Rays displaying shoaling behavior, skin abrasions from handling, altered feeding habits. Buzzing and bumping divers for food and displaying hunger and aggression when boat isn't able to access site.	Dependence on provisioning, limited natural foraging.	*Shackley, M. (1998). 'Stingray City' – managing the impact of underwater tourism in the Cayman Islands. Journal of Sustainable Tourism, 6(4), 328-338.*
STINGRAY CITY SANDBAR, CAYMAN ISLANDS [88]	Feeding stingrays with squid.	Disproportionate amount of fatty acid, essential fatty acids and amino acids.	Diet-related impacts on growth, reproduction, survival and overall health.	*Semeniuk, C. A., Speers-Roesch, B., & Rothley, K. D. (2007). Using fatty-acid profile analysis as an ecologic indicator in the management of tourist impacts on marine wildlife: a case of stingray-feeding in the Caribbean. Environmental Management, 40(4), 665-677.*
STINGRAY CITY SANDBAR, CAYMAN ISLANDS [89]	Feeding stingrays with squid.	Overall lower body condition of fed stingrays including injuries by boat and people, higher load of ecto-parasites, conspecific bites, reversed diel/nocturnal pattern, gregarious living and atypical densities.	Decreased long-term fitness.	*Semeniuk, C. A., & Rothley, K. D. (2008). Costs of group-living for a normally solitary forager: effects of provisioning tourism on southern stingrays Dasyatis americana. Marine Ecology-Progress Series, 357, 271.*
STINGRAY CITY SANDBAR, CAYMAN ISLANDS [90]	Feeding stingrays with squid.	Hematological differences in leukocrit, serum proteins and antioxidant potential indicating an attenuated defense system.	Indicates dietary inadequacies, immune deficiency, disease and overall lower body condition.	*Semeniuk, C. A., Bourgeon, S., Smith, S. L., & Rothley, K. D. (2009). Hematological differences between stingrays at tourist and non-visited sites suggest physiological costs of wildlife tourism. Biological Conservation, 142(8), 1818-1829.*

TOOL 7: RESPONSIBLE PROVISIONING

LOCATION	ACTION	RESULTS	POTENTIAL EFFECTS	STUDY REFERENCE
STINGRAY CITY SANDBAR, CAYMAN ISLANDS [91]	Feeding stingrays	Supplemental feeding has strikingly altered movement behavior and spatial distribution of the stingrays, and generated a high density of animals at the Stingray City Sandbar.	There could be downstream fitness costs for individuals and potentially broader ecosystem effects.	*Corcoran MJ, Wetherbee BM, Shivji MS, Potenski MD, Chapman DD, et al. (2013) Supplemental feeding for ecotourism reverses diel activity and alters movement patterns and spatial distribution of the southern stingray, Dasyatis americana. PLoS ONE 8: e59235*
HAMELIN BAY, WESTERN AUSTRALIA [92]	Feeding stingrays at unsupervised site.	Aggressive behavior between rays and other animals. Strong inter- and intra-specific hierarchy. Fed on average 12.5kg/day.	Concerns regarding stingray safety and risky behaviors by humans.	*Newsome, D., Lewis, A., & Moncrieff, D. (2004). Impacts and risks associated with developing, but unsupervised, stingray tourism at Hamelin Bay, Western Australia. International Journal of Tourism Research, 6(5), 305-323.*
BORA-BORA ISLAND, FRENCH POLYNESIA [93]	Feeding sicklefin lemon sharks.	Increased risk of accidental bites on divers linked to hand-feeding practices.	Suggest to avoid hand-feeding in implemented practices of provisioning.	*Clua, E.E., Torrente, F. (2015) Determining the Role of Hand Feeding Practices in Accidental Shark Bites on Scuba Divers. Journal of Forensic Science & Criminology, 3(5), 502.*
MOOREA ISLAND, FRENCH POLYNESIA [94]	Feeding pink whiprays.	Individual variation in frequentation rates at feeding sites. Anticipation behavior, daily bi-modal behavior.	Potential long-term effects of feeding on behavior, reproduction and health.	*Gaspar, C., Chateau, O., & Galzin, R. (2008). Feeding sites frequentation by the pink whipray Himantura fai in Moorea (French Polynesia) as determined by acoustic telemetry. Cybium, 32(2), 153-164.*

TOOL 7: RESPONSIBLE PROVISIONING

LOCATION	ACTION	RESULTS	POTENTIAL EFFECTS	STUDY REFERENCE
SHARK REEF MARINE RESERVE, FIJI [95,96]	Feeding bull sharks.	Intraspecific variation in residency and site fidelity.	Long-term movements appear unaffected	*Brunnschweiler, J. M., & Barnett, A. (2013). Opportunistic visitors: long-term behavioral response of bull sharks to food provisioning in Fiji. PloS One, 8(3), e58522.* *Brunnschweiler, J.M., & Baensch, H. (2011) Seasonal and long-term changes in relative abundance of bull sharks from a tourist shark feeding site in Fiji. PLoS ONE, 6(1), e16597*
SHARK REEF MARINE RESERVE, FIJI [97]	Multi-species shark feeding site.	Numbers of bull sharks increased over years; majority are large (>2m). Competitive exclusion among species.	Changes in natural community composition, richness and/or predation pressure unclear.	*Brunnschweiler, J. M., Abrantes, K. G., & Barnett, A. (2014). Long-term changes in species composition and relative abundances of sharks at a provisioning site. PLoS ONE, 9(1), e86682. doi:10.1371/journal.pone.0086682*
NEPTUNE ISLANDS, SOUTH AUSTRALIA [98]	Cage-diving with white sharks using attractants.	Shark numbers have increased. Increases in residency. Changes in diel patterns.	Broad-scale movement not affected. Concern that sharks miss opportunities to hunt pinnipeds, making provisioning energetically costly.	*Bruce, B.D., & Bradford, R.W. (2013). The effects of shark cage-diving operations on the behavior and movements of white sharks, Carcharodon carcharias, at the Neptune Islands, South Australia. Marine Biology, 160, 889–907.*
RED SEA, OFF JEDDAH, SAUDI ARABIA [99]	Feeding female silky sharks at two reefs.	Visit reefs irrespective of feeding. May stay longer if fed.	Modifications to local habitat use. No marked seasonal trends, potential to affect population dynamics given the sex bias.	*Clarke, C., Lea, J.S.E., & Ormond, R.F.G. (2011). Reef-use and residency patterns of a baited population of silky sharks, Carcharhinus falciformis, in the Red Sea. Marine and Freshwater Research, 62(6), 668-675.*

TOOL 7: RESPONSIBLE PROVISIONING

LOCATION	ACTION	RESULTS	POTENTIAL EFFECTS	STUDY REFERENCE
SEAL ISLAND, SOUTH AFRICA [100]	Using a seal decoy and chum to attract white sharks.	Change in swimming depth. Majority of sharks showed little interest.	The sub-set of sharks that were attracted showed a decreasing response over time. Unlikely to have behavioral impacts.	*Laroche, R., Kock, A.A., Dill, L.M., & Oosthuizen, W. (2007). Effects of provisioning ecotourism activity on the behavior of white sharks Carcharodon carcharias. Marine Ecology Progress Series, 338, 199-209.*
NEW PROVIDENCE, BAHAMAS [101]	Feeding Caribbean reef sharks.	A few sharks monopolized majority of bait, displaying a social hierarchy. These sharks had a higher N level in tissues, thought to be attributed to high-trophic level meals (grouper carcasses).	No evidence of behavioral impacts, changes to seasonal movements or degrees of residency.	*Maljković, A., & Côté, I.M. (2011). Effects of tourism-related provisioning on the trophic signatures and movement patterns of an apex predator, the Caribbean reef shark. Biological Conservation, 144(2), 859-865*
OAHU, HAWAII [102]	Multi-species cage-diving using fish scraps.	Galapagos, sandbar and tiger sharks all displayed seasonal and long-term residency changes. Social hierarchies. Only sexually mature male sandbar sharks. Both mature and immature Galapagos sharks.	No changes to long-term movements. Sandbar sharks are most likely being encountered during breeding migrations.	*Bruce, B.D., & Bradford, R.W. (2013). The effects of shark cage-diving operations on the behavior and movements of white sharks, Carcharodon carcharias, at the Neptune Islands, South Australia. Marine Biology, 160, 889–907.*
CEBU, PHILIPPINES [103]	Feeding whale sharks.	Extended residency of fed individuals, 44.9 days vs. 22.4 days. Propeller scars observed in 47% of individuals.	Changes in local habitat use. Lower body condition, risk of injury.	*Araujo, G., Lucey, A., Labaja, J., So, C.L., Snow, S., & Ponzo, A. (2014). Population structure and residency patterns of whale sharks, Rhincodon typus, at a provisioning site in Cebu, Philippines. PeerJ, 2, e543.*

TOOL 7: RESPONSIBLE PROVISIONING

LOCATION	ACTION	RESULTS	POTENTIAL EFFECTS	STUDY REFERENCE
MOOREA ISLAND, FRENCH POLYNESIA [104]	Impacts to fish populations at shark feeding site.	Long-term shark feeding does have some parasitological impact in grouper and snapper species.	Does not seem to affect health of fish.	*Vignon, M., Sasal, P., Johnson, R. L., & Galzin, R. (2010). Impact of shark-feeding tourism on surrounding fish populations off Moorea Island (French Polynesia). Marine and Freshwater Research, 61(2), 163-169.*
MOOREA ISLAND, FRENCH POLYNESIA [105, 106]	Feeding sicklefin lemon sharks.	Increased intra-specific aggression. Increased residency. Gregarious feeding though naturally solitary. Increased accidental bites to humans.	Suggest potential inbreeding risks due to increased residency (although this was discredited in a later study). Continued aggression towards people.	*Clua, E., Buray, N., Legendre, P., Mourier, J., & Planes, S. (2010). Behavioral response of sicklefin lemon sharks Negaprion acutidens to underwater feeding for ecotourism purposes. Marine Ecology Progress Series, 414, 257-266* *Mourier, J., Buray, N., Schultz, J. K., Clua, E., & Planes, S. (2013). Genetic network and breeding patterns of a sicklefin lemon shark (Negaprion acutidens) population in the Society Islands, French Polynesia. PLoS One, 8(8).*
OSPREY REEF, CORAL SEA, AUSTRALIA [107]	Feeding white-tip reef sharks.	Anticipation behavior. When boats were present these inherently nocturnal sharks exhibited long periods of vertical activity during the day.	Potential effects on energy budgets, metabolism, overall health and fitness.	*Fitzpatrick, R., Abrantes, K.G., Seymour, J., & Barnett, A. (2011). Variation in depth of whitetip reef sharks: does provisioning ecotourism change their behavior? Coral Reefs, 30(3), 569-577.*

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5.2
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END NOTES

54. Techera & Klein (2013) and Rodger et al. (2011)
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78. Refer http://www.sharktrust.org/en/basking_shark_resources and http://www.dfo-mpo.gc.ca/species-especes/documents/publications/sharks/coc/coc-basking/conduct_basking-conduite_pelerin-eng.pdf
79. Department of Conservation (2014) and Bruce (2015)
80. Brooks et al. (2011) and Henningsen (1994)
81. Department of the Environment (2014b), Gallagher et al. 2015 and Brooks et al. (2011) and Henningsen (1994)
82. Brooks et al. (2011) and Henningsen (1994)
83. Semeniuk et al. (2009), Semeniuk et al. (2007), Shackley (1998), Semeniuk & Rothley (2008), Newsome (2004) and Ford (2016)
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85. Bruce (2015)
86. Maljković & Côté (2011), Brunnschweiler & Barnett (2013) and Corcoran et al. (2013)
87. Shackley (1998)
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99. Clarke et al. (2011)
100. Laroche et al. (2007)
101. Maljković & Côté (2011)
102. Meyer et al. (2009)
103. Araujo et al. (2014)
104. Vignon et al. (2010)
105. Clua et al. (2010)
106. Mourier et al. (2013)
107. Fitzpatrick et al. (2011)

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