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Towards the Sustainable Management of Whale-Watching Tourism: A Case Study of Port Phillip Bay, Australia

Abstract: *With the rapid growth of whale-watching tourism, the importance of its management has become evident. Higham and colleagues indicated that adaptive management is the key to a sustainable whale-watching industry and proposed an integrated and adaptive management model, combining stakeholder perspectives and operating in a dynamic two-phase environment. This study applies the model to whale-watching tourism management in Port Philip Bay (Australia) examining the extent of its fit in this case study, and what management measures could be adopted to achieve sustainable development of whale-watching tourism. This study obtained secondary data to analyse the responses of target species to tourism activities and management strategies adopted since the inception of whale-watching tourism. A key outcome is the development of sustainable management for whale-watching tourism. As the tourism industry waits to recover from the COVID-19 pandemic, such a rethink has implications for the shift towards more holistic sustainability and resilience of whale-watching tourism post-COVID-19.*

Keywords: Sustainable Management, Whale-Watching Tourism, Port Phillip Bay

1 Introduction

Whale-watching is defined as "tours by boat, air or from land, formal or informal, with at least some commercial aspect, to see, swim with, and/or listen to any of the 83 [currently 90] species of whales, dolphins, and porpoises" (Hoyt, 2001, p. 3). According to this widely used definition, dolphin watching/swimming falls under the umbrella of whale-watching, which is why this study adopts this common practice and uses this term throughout the chapter. Whale-watching is considered one of the most successful and resilient types of tourism globally (Hoyt, 2007). It offers significant economic returns and solid community, educational, research, and conservation benefits and is said to cause low environmental impacts (Green & Giese, 2004). Besides, whale-watching has demonstrated resilience to economic and political instability, the ability to attract visitors from remote places, and a surprising adaptability to widely varying levels of culture and infrastructure (Hoyt, 2007). However, with the rapid development of whale-watching tourism, the impacts of tourism activities on cetaceans and the sustainability of the whale-watching industry have become a major concern (Bejder & Lusseau, 2008; Parsons, 2012; Pirotta & Lusseau, 2015). Many studies have shown that short-term changes in cetaceans' behaviour, movement, vocalisation, respiration, communication and group cohesion from whale-watching activities have brought about negative impacts on

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species populations (Bejder et al., 2006a, 2006b; Lusseau, 2003; Lusseau et al., 2006; Parsons, 2012). Consequently, it requires an increased focus on management governing the whale-watching industry because poor management can exacerbate the negative impacts on cetacean individuals, populations, and habitats and can render the whale-watching industry unsustainable.

1.1 Application of Adaptive Management to Whale-Watching

Many researchers presented the application of Adaptive Management (AM) to whale-watching. For instance, Higham et al. (2009) indicated that AM is the key to managing a sustainable whale-watching industry. They argued that planning, policy, and management in whale-watching tourism should be considered on multiple levels, including macro-level (global), meso-level (national) and micro-level (local-regional). Each of these levels will influence the management of human-cetacean interactions. Higham and colleagues (2009) thought that the macro-level (such as the position of the International Whaling Commission) and meso-level (such as national law and policy) factors would affect the sustainability of whale-watching tourism. However, they argued that the most crucial elements are micro-level factors (business management practices, licensing management, vessel operations, accident prevention, habitat protection, predation, disease issues). This is because micro-level operations are where industry operators and tourists come into contact with cetaceans. So, they proposed a micro-level model for the integrated, dynamic and adaptive management of tourist interactions with cetaceans (figure 1).

The model combined the perspectives of a range of key stakeholders (social science researchers, tourism operator/s, planning and management agencies and natural science researchers) and operates in a dynamic environment. The operation of the model was divided into the pre-tourism and tourism phases, in which different stakeholder factors should be considered. In the pre-tourism phase, management and planning agencies are responsible for developing relevant legislation (C1). Social scientists assess stakeholder (e.g. local communities) support (A1). Natural scientists collect baseline data, establish monitoring criteria and control sites (D1, D2, D3). Tourism operators identify the needs of tourists and local communities (B1). Management and planning agencies further develop licensing systems, Limits of Acceptable Change (LAC) criteria and operator guidelines based on relevant research and grant permits to tourism operators (C2, C3, C4, B2). In the tourism phase, natural scientists continue to collect data and provide monitoring reports to management and planning agencies (D4, D5). Social scientists research visitor satisfaction, perceptions and environmental education, and provide feedback to stakeholders (A2, A3, A4). Management and planning agencies make active management decisions based on the feedback (C5, C6). Tourism operators adjust their operations according to permit conditions and visitor satisfaction (B3). A new tour cycle is then started, and the above stakeholders continuously work on it (A4, B4, C7, D7).

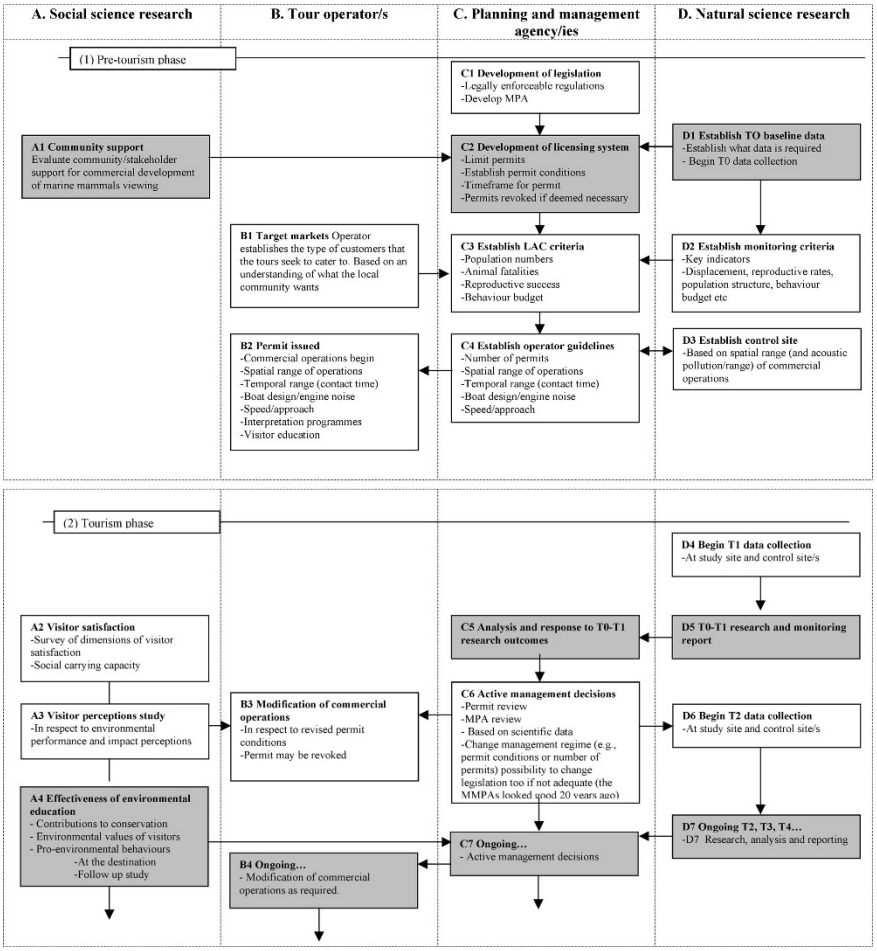

Fig. 1: Model for the integrated, dynamic and adaptive management of tourist interactions with cetaceans
Note: Shaded boxes signify where research is required to inform management decisions and modifications to the management system.

Source: Higham et al., 2009, p. 298

1.2 Case Study Area and Research Questions

Port Phillip Bay (PPB) is a semi-enclosed bay near Melbourne, Victoria, Australia (figure 2). Whale-watching tourism began here in the early 1990s, involving interactions with dolphins from vessels and in the water (Howes et al., 2012). Three kinds of dolphins can be found here, including common dolphins (Delphinus delphis), common Bottlenose dolphins (Tursiops truncatus) and Australian Bottlenose dolphins or Burrunan dolphins (Tursiops australis sp. nov.). These dolphins inhabit coastal environments adjacent to major human centres. This habitat type is considered high risk due to the impact of adjacent human

activities (e. g. many commercial vessels and private recreational boats in the bay) (Charlton-Robb et al., 2011). Therefore, better management of whale-watching tourism is needed. Studies on the effects of whale-watching tourism on dolphins in PPB have been conducted since 1998. This has also contributed to the process of adaptive management of the PPB, which has continued over the last 20 years. PPB's whale-watching tourism management is seen by the International Whaling Commission (IWC) as a model of AM applied to the whale-watching industry in reality (IWC, 2021a). Therefore, PPB was chosen as the case study site for comparison with Higham et al.'s (2009) model.

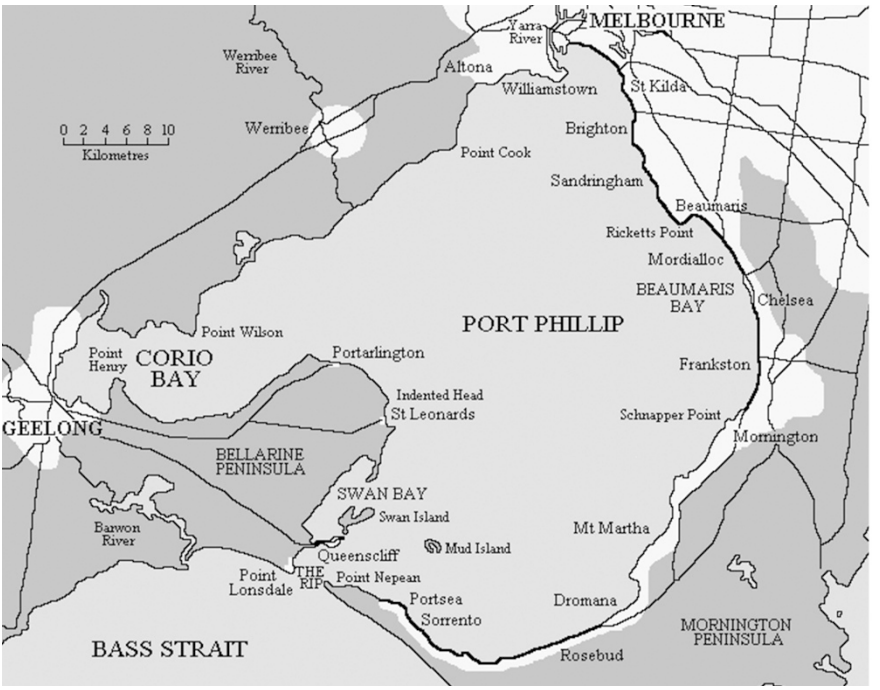

Fig. 2: Map of the Port Phillip Area
Source: Port Phillip, 2021

The management practices of PPB will be compared with Higham et al.'s (2009) model that appears to be a good fit in theory. Not only can the model's effectiveness be evaluated, but this comparison can also provide recommendations for improving the management of whale-watching tourism. The following research questions will be examined: 1) To what extent does PPB's whale-watching tourism management fit the proposed model? 2) Based on this model, what management measures could be adopted to achieve sustainable development of whale-watching tourism in PPB? The next two sections will briefly review whale-watching tourism research in PPB and present AM theory and its application to whale-watching management. And then the literature will be analysed

more detailed with regard to the research questions and the application of the model.

1.3 Overview of Whale-Watching Studies in PPB

Research into whale-watching tourism at PPB has been ongoing for over 20 years. Existing studies have focused on the following aspects: Firstly, the impact of tourism activities on dolphins has been addressed. Studies showed that Bottlenose dolphins' feeding behaviour was significantly affected when tour vessels were present. Their whistling increased to maintain group cohesion, and the long-term effects of this impact remain unclear (Scarpaci et al., 2000, 2010). The Dolphin Research Institute (DRI) classified dolphins' responses when approaching a vessel into the three categories of interaction, avoidance and neutral (Dunn et al., 2001). Filby et al. (2014) investigated the response of Burrunan dolphins to tour vessels over two time periods: 1998–2000 and 2011–2013. The investigation showed that the main response of Burrunan dolphins to the illegal approach of the tour vessels was avoidance, and that over time, dolphin responses increased significantly. Smaller groups reacted significantly more than larger groups. Filby and colleagues suggested that the consequences of this response may reduce the dolphins' core biological activities, such as foraging and resting, and thus reduce biological fitness.

The second category of research focused on assessing the effectiveness of management measures for whale-watching tourism in PPB. Scarpaci et al. (2003) investigated the compliance level with regulations by 'swim-with-dolphins' operations in PPB. Four permit conditions were investigated: type of approach, swim time, time in proximity to dolphins, and presence of calves. The results showed that the operators did not meet all four permit conditions. Compliance with temporal conditions was poorer than with other conditions. Another study examined the effectiveness of the Ticonderoga Bay Sanctuary Zone (located in PPB). The results showed that this marine sanctuary is not working as well as it should as a 'respite' and 'refuge' for dolphins from anthropogenic pressure, including commercial tourism. In all observed encounters in the sanctuary, tourism operations breached the site-specific minimum approach distance regulations (Howes et al., 2012).

The third type is tourist surveys from a social science perspective. For example, Filby et al. (2015) surveyed tourists' demographics, motivation, biocentrism, knowledge and satisfaction in PBB through 511 questionnaires between 2011 and 2013, and the results showed that tourists could be a vehicle for increasing the level of compliance by tour operators because tourists are happy to comply with regulations as they do not want to negatively affect the target species. Howes et al. (2012) suggested that one possible reason for the ineffectiveness of the marine sanctuary is that the waters close to sanctuary are more likely to encounter dolphins, which may induce operators to violate the rules and thus increase customer satisfaction. However, this is only an assumed customer benefit (Allen et al., 2007) and has not been verified by empirical studies.

1.4 Whale-Watching Adaptive Management

Whale-watching involves multiple stakeholders and multilevel governance. Despite the importance of management as an integral foundation for whale-watching, the management of whale-watching is a difficult task because many factors need to be considered, such as the lack of knowledge about target species, the regional dependence on the whale-watching industry, and the complexity of stakeholder interests (Hoyt, 2001). Various researchers suggested the application of Adaptive Management (AM) to whale-watching (Filby et al., 2014; Higham et al., 2009; Howes et al., 2012).

AM refers to the governance and treatment of large-scale ecosystems that can accommodate uncertainties arising from complex interactions (McLain & Lee, 1996). It has been widely used in environmental management because it relates past mistakes and successes to policy and management and can accommodate uncertainties arising from complex interactions (Stankey et al., 2005). The core of AM is social learning theory, which encompasses the process of knowledge acquisition and the creation of shared understanding (McLain & Lee, 1996). As stakeholders with different responsibilities form partnerships and work together to overcome conflict or disparity, the capacity for knowledge generation is increased (Berkes, 2009). A term closely related to AM is co-management, meaning sharing power and responsibility between authorities and resource users. Therefore, in some literature, the two terms are expressed together as 'adaptive co-management' (Plummer & Fennell, 2009). AM addresses the complexity of the common interests of multiple stakeholders by integrating the evolutionary process of social, economic and environmental expertise. It thus contributes to a sustainable marine conservation future (Plummer & Fennell, 2009; Waayers et al., 2012).

In the whale-watching tourism context, factors such as changes in the environment, the number of tourists, the operators' behaviour, and the number of cetaceans targeted need to be considered through AM (Higham et al., 2009). A useful concept in this process is establishing the Limits of Acceptable Change (LAC) framework. The LAC framework is used to identify the tolerance limit of an area to changes caused by various tourism activities and developments. It is concerned with how much change is acceptable and what strategies should be adopted to avoid unacceptable impacts (Duffus & Dearden, 1990). Stakeholders collectively decide on measurable limits that would require a change of regulations or management strategies. These limits are set based on biological parameters (e. g. changes in population size) or socio-economic factors (e. g. frequency of regulations and codes of conduct breach).

2 Methods

A comprehensive literature review of all studies published from 1998 to 2021 on whale-watching tourism in PPB was conducted. Literature was compiled from the online search engines and database, Google Scholar and Hospitality & Tourism Complete, using the key words "whale", "dolphin", "cetacean", "whale

watching", "dolphin swim", "regulation", "guideline", "management", "assessment", "compliance", "effectiveness", "Port Phillip Bay", "Australia". Common themes relating to both whale-watching tourism activities and management recommendations were identified and documented. In addition, a comprehensive literature review was also conducted on relevant regulations and guidelines. Regulations and guidelines information and documentation was sourced from the official webpages of the Victorian legislation and Department of Environment, Land, Water and Planning of State of Victoria. The management practices identified by literature will be compared with Higham et al.'s (2009) model.

3 Discussion: Application of the Higham et al. (2009) Model to PPB

3.1 Management Context of Whale-Watching Tourism in PPB

Higham et al. (2009) argued that planning, policy, and management in whale-watching tourism should be considered at a macro-level (global), meso-level (national) and micro-level (local-regional). At the global level, the management of whale-watching tourism is influenced by relevant international organisations, such as the IWC and the International Union for Conservation of Nature (IUCN).

At the national level, in Australia, whale-watching activities are under the multiple jurisdictions of the Australian Government, State and Territory Governments and the Great Barrier Reef Marine Park Authority. Commonwealth waters (starts three nautical miles from the shore and extends to the edge of the exclusive economic zone at 200 nautical miles) are managed by the Australian government. A legal regime under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and 'Environment Protection and Biodiversity Conservation Regulations 2000' (EPBC Regulations) has been established to apply in all Australian waters. The Department of the Environment and Energy also made the 'Australian National Guidelines for Whale and Dolphin Watching 2017' consistent with the EPBC Act and EPBC Regulations. These guidelines describe how people may observe and interact with cetaceans to ensure that the target species are not harmed or disturbed.

At the local level, state and territory governments have their own laws and guidelines and are responsible for managing coastal waters within three nautical miles. In general, state and territory regulations follow national guidelines closely. However, additional management measures are applied for species and industry trends in the particular region. As a result, state rules may be more stringent than national guidelines (Hale, 2002). For Victoria, the state has established a legal regime to protect cetaceans. This includes the Wildlife Act 1975 and Wildlife (Marine Mammals) Regulations 2019. The Department of Environment, Land, Water and Planning (DELWP) also made a guide to boating and swimming around whales, dolphins and seals, which sets out the distances people must keep from marine mammals to minimise the impact of human activities on these species. Most whale-watching activities take place within three nautical miles of the coast. As a result, state and territory governments

regulate most whale-watching activities. PPB is within the coastal waters, which is governed by the State of Victoria, and the DELWP is the government body responsible for the whale-watching industry in PPB. In addition, stakeholders such as tourism operators, recreational and commercial vessels, fishing organisations and local individuals have interests in whale-watching tourism management. Consequently, they also should be consulted during the management and decision-making process. Next, this study will apply the Higham et al. (2009) model (figure 1) to whale-watching tourism management in PPB. By comparison between PPB's management practices and Higham et al.'s (2009) model, the two research questions (see 1.2) will be examined:

1) To what extent does PPB's whale-watching tourism management fit the proposed model?
2) Based on this model, what management measures could be adopted to achieve sustainable development of whale-watching tourism in PPB?

In line with the model, the discussion is divided into a pre-tourism phase and a tourism phase, where the tourism phase is further divided into two phases based on time.

3.2 Pre-Tourism Phase

PPB's whale-watching tourism includes sightseeing on vessels and swimming with dolphins since the early 1990s (Howes et al., 2012). Prior to this, the Victorian 'Wildlife Act 1975' and the 'Wildlife (Whales) Regulations' drafted in 1990 existed and had regulations regarding the proximity of people to cetaceans (C1, figure 1; IWC, 2021a). However, there were no legally enforced regulations governing commercial dolphin swimming/watching activities at the time. Furthermore, there is no literature showing studies that have collected baseline data within the PPB before the commencement of whale-watching tourism (D1, figure 1). Therefore, it is not surprising that PPB did not establish monitoring criteria (D2, figure 1) and LAC criteria (C3, figure 1) during the pre-tourism phase. Another consequence of the lack of baseline natural science data is the absence of a licensing system (C2, figure 1). It is also argued that the absence of a licensing system was because the commercial viability of the new form of tourism was not yet confirmed (Buurman, 2010). In this case, operators established their voluntary codes to regulate whale-watching activities. However, these voluntary codes were abandoned in 1995 because they were ineffective in protecting dolphins from harm (Allen et al., 2007).

It was not until 1998, when the "Wildlife (Whales) Regulations 1998" was passed in Victoria, that a licensing system for dolphin sightseeing/swimming was first established (C2, figure 1). In 1999, the Department of Natural Resources and Environment in Victoria issued five dolphin-swim permits and three watch permits (B2, figure 1; Scarpaci et al., 2000). Besides, the "Wildlife (Whales) Regulations 1998" also specified minimum approach distances to dolphins for different categories of vessels (including dolphin watching vessels, vessels on recreational trips), approach distances in the presence of other vessels on trips, re-

stricted approach distances for groups with calves, speed of dolphins within specified distances, location of swimmers and the need for a sanctuary (C4, figure 1). Some steps like community support (A1, figure 1) and target market studies (B1, figure 1) and establishing control sites (D3, figure 1) were missing in the pre-tourism phase.

3.3 Tourism Phase

3.3.1 Phase One

The first phase was from the early 1990s to 2009. After whale-watching tourism started, research into the effects of tourism activities on target species began to recognise the potential negative effects of high levels of vessel traffic. In 2001, the Dolphin Research Institute (DRI)'s report investigated Bottlenose dolphins population number, vessel interactions with Bottlenose dolphins, response of Bottlenose dolphins to vessels and compliance by tour operators with wildlife regulations. Based on photo identification, the DRI identified 83 individual Bottlenose dolphins between 1997 and 2001. They also estimated that 20 % of the Bottlenose dolphins were not sufficiently marked for identification and therefore concluded that the population was around 100 individuals (D4, figure 1; Dunn et al., 2001). Compliance was monitored for 711 vessels during the 1998/1999 and 1999/2000 seasons. The overall compliance rate was 51 % and 63 %, respectively. The most common breach of regulations was placing the vessel in the path of dolphins (36 % in 1998/1999, 30 % in 1999/2000) (D5, figure 1; Dunn et al., 2001). The study showed an increase in avoidance responses from dolphins. The increased number of approaches by tour vessels was considered one of the reasons (D5, figure 1; Dunn et al., 2001). Scarpaci et al. (2000) monitored whistles made by Bottlenose dolphins to assess their responses to commercial dolphin-watching vessels. Thirty-two hours of dolphin sounds were recorded between 1995 and 1996. Results showed that whistle production was significantly greater in the presence of vessels, regardless of the dolphins' behavioural state before the vessels' arrival. The increase in whistle production suggests that group cohesion may be influenced by the commercial dolphin-watching vessels (D5, figure 1).

Scarpaci et al. (2003) studied the compliance of operators at PPB with the rules for swimming with Bottlenose dolphins. Between September 1998 and April 2000, the team studied a total of 128 commercial dolphin swims. Four permit conditions were investigated: type of approach, swimming time, time spent in proximity to dolphins, and presence of calves. The results showed that the operators did not comply with all four permit conditions (D5 figure 1). After one year, Scarpaci and colleagues conducted another study and the result showed no detectable change in the level of compliance for rules regarding swimming with dolphins in PPB (Scarpaci et al., 2004). In 2002, Hale supplied a report to the Victorian Department of Natural Resources and Environment which made some recommendations on achieving sustainable whale-watching tourism while minimising the impact of tourism activities on target species (D5, figure 1; Hale, 2002). The researchers concluded that the legal framework prior

to 2009 was mostly adequate and that the low level of compliance in reality was due to the fact that operators considered the risk of ignoring the regulations to be negligible, so their advice was generally to strengthen monitoring and enforcement (Dunn et al., 2001; Hale, 2002; Scarpaci et al., 2000, 2003).

In response to the above studies, a number of new management actions was taken by Victoria State. Firstly, a limit was set on the number of swimming with dolphin permits in PPB (limited to four) and a special dolphin swim permit was introduced in addition to the conditions of the existing tour operator license. Secondly, the 'Wildlife Act 1975' had been amended to strengthen the ability to identify and define offences relating to whale-watching tourism (C5, C6; figure 1; IWC, 2021a). In addition, the Ticonderoga Bay Sanctuary Zone (TBSZ) was established. This sanctuary of approximately 2,000 m² was intended to provide a *respite* and *refuge* for the dolphins in the PPB. A greater distance to the cetaceans within the sanctuary is required (C6, figure 1; Hale, 2002). Before 2004, the minimal distance between whale-watching vessels and targeted species within the sanctuary was 100m. However, based on the above natural science research, this distance was increased to 200m, and the western boundary was extended (C6, figure 1; Hale, 2002).

The most important active management action in this phase was modifying the 'Wildlife (Whales) Regulations 1998' (C6, figure 1). A 10-year renewal plan was instituted when the regulations were created. Before the expiry of the 'Wildlife (Whales) Regulations 1998', between 2007 and 2009, the Victoria State undertook an extensive review of its marine mammal legislation, examining the effectiveness of measures taken to mitigate the risks to marine mammals from human activities. The review of the regulations included extensive stakeholders' engagement and public consultations through 'Better Regulation Victoria' programme. The 'Wildlife (Marine Mammals) Regulations 2009' came into force in November 2009, following a one-year extension to the previous regulations. These new regulations aim to strike a balance between achieving sustainable development in marine mammal tourism (whale-watching tourism) and protecting the health and well-being of marine mammals and the long-term viability of their populations (Wildlife (Marine Mammals) Regulations 2009). Besides, they have also helped to strengthen monitoring and enforcement, and since 2009 the PPB has conducted targeted marine mammal compliance actions every year. On-water patrols were also in place and any observed or reported cases of non-compliance would be investigated (IWC, 2021a). It is worth mentioning that the new regulations also defined 'calf' specifically as "a young whale that is less than half the average length of an adult female whale of the same species" (Wildlife (Marine Mammals) Regulations 2009, p.2). This provided a workable standard for whale-watching tourism operators (B3, figure 1).

3.3.2 Phase Two

The second phase was from 2010 to 2019, in which PPB's whale-watching tourism continued to develop. This led to more cetaceans being exposed to high

vessel density. During this period, research conducted by independent and government-contracted researchers has highlighted some ongoing concerns about the sustainability of whale-watching tourism industry in the PPB. A study investigated the effects of vessels on Bottlenose dolphins within the PPB. The behaviour of Bottlenose dolphins at the same site was observed land-based in the presence and absence of vessels over a period of two years. The results indicated that Bottlenose dolphins were significantly less likely to feed when vessels were present. The pods with calves were larger than those without, but all pods increased in size when vessels were present (D6, figure 1; Scarpaci et al., 2010). Howes et al. (2012) evaluated the effectiveness of the Ticonderoga Bay Sanctuary Zone. Their study was conducted on 104 dolphin tour vessels where tour operations and dolphin behaviour were recorded simultaneously. The results showed that no additional precautions were taken by the tourism operations during dolphin encounters in the sanctuary. In all observed encounters, tourism operations were in breach of minimum approach distances. Consequently, this study suggested that it is recommended that a shift be made from sole reliance on passive management strategies to judicious management plans that include enhanced enforcement (D6, figure 1; Howes et al., 2012). Filby et al. (2014) investigated the response of Burrunan dolphins to dolphin-swim tour vessels in two phases, 1998 to 2000 and 2011 to 2013. The survey recorded a total of 211 encounters with dolphins. Dolphins showed more of an approach response to vessels that did not violate the regulations, while the most frequent response to vessels that approached illegally was avoidance. Small pods responded to vessels with avoidance significantly more than large pods. Resting groups showed the most avoidance response. Over time, dolphin responses (both avoidance and approach) to vessels increased significantly. The study concluded that the consequences of increased dolphin responses include the potential for reduced biological adaptations by reducing core biological activities such as foraging and resting. The authors recommended that PPB should conduct long-term studies of dolphin responses to vessels and move from passive to active management (D6, figure 1; Filby et al., 2014).

In 2015, Filby et al. conducted research investigating whether tourists can be a force to evoke compliance. Between 2011 and 2013, a total of 511 questionnaires were distributed to dolphin-swim tourists. The compliance of dolphin-swim operators was also assessed through 282 survey data collected from 1998 to 2013. The results show that the level of compliance by operators is low. In contrast, visitors were happy to comply with the regulations as they did not want to impact the target species negatively. This study suggested that these findings can be used to educate operators and help convince them that respecting the guidelines should lead to higher customer satisfaction. Filby and colleagues concluded that tourists could be used as a vehicle to increase the level of compliance by tour operators and make tourism more sustainable. Therefore, it is important to increase the educational component of whale-watching tourism for tourists (A2, A3, A4, figure 1; Filby et al., 2015). An unpublished study conducted by the DRI between 2015 and 2016 included interviews with 170

whale-watching visitors. The results showed that over 60 % either did not know or thought they could get closer to the animals than the prescribed distance. This also suggested that visitor education should be increased to promote compliance by operators (A3, A4, figure 1; IWC, 2021a).

As a result, Victoria State took a number of actions to enhance education. The Department of Environment, Land, Water and Planning have engaged with vessel owners at boat ramps, the annual boat show and through media outreach. Educational outreach is supported by on-water patrols where compliance is monitored and the regulations are enforced (C7, figure 1; IWC, 2021a). The 'Wildlife (Marine Mammal) Regulations 2009' expired in 2019, so another extensive review began. In response to the low level of compliance by tour operators, the new regulations introduced several new enhancements, such as mandatory 'monthly returns', which must be submitted monthly in the prescribed format or face penalty (C7, figure 1; Wildlife (Marine Mammals) Regulations, 2019). Significantly, the regulations have incorporated an AM approach that allows greater responsiveness and flexibility in identifying, adding or revising areas of importance to marine mammals that previously required 'administratively and slowly burdensome' amendments to regulation (Puszka et al., 2021). The 'Wildlife Act 1975', which was enacted 45 years ago, is now being comprehensively reviewed. Public and community values about wildlife have changed considerably. As a result, the Act has been outdated and out of step with current best-practice regulations. This review may consider the many lessons learned and research findings, including PPB, to ensure that it provides a best practice regulatory framework and reflects contemporary values and expectations (DELWP, 2021). The new tourism cycle started in 2019 (D7, C7, B4, figure 1).

4 Conclusion and Recommendations

The responses of target species to tourism activities and how those responses have changed over time were seen from the above analysis. In terms of the first research question, the management of whale-watching tourism at PPB combined the perspectives of four key stakeholders group proposed by Higham et al. (2009) and operates in a dynamic environment. As could be seen by the comparison of the secondary data with the actions suggested in the model, overall, the management actions in PPB follow the proposed model. However, there is clearly more work to be done in order to achieve sustainability of the industry. The most significant gap identified is the lack of clear LAC criteria. Higham et al. (2009) model has provided a practical guide for improving management at PPB. Based on the analysis in this chapter, the following recommendations are suggested (answers to the second research question).

1. Establishing clear LAC criteria and evaluation change period

Whale-watching tourism began before the permits were issued and monitoring criteria were established to define LAC. In fact, these factors are commonly overlooked before wildlife tourism begins (Higginbottom, 2004). This makes a

retroactive application of regulations more difficult. Changing management strategies if an industry outgrows the measures already in place is often more challenging than introducing management strategies where none have existed before. This is because it requires the planning and management agencies to prove that a significant negative impact is occurring rather than having the tour operators prove the opposite (Lundquist, 2014). Despite the establishment of a long-term mechanism for detecting dolphins (DRI, 2021), the LAC criteria are still ignored. Therefore, the PPB should establish clear LAC criteria so that before-and-after comparisons can be made to determine whether whale-watching tourism activities are becoming ecologically sustainable. Besides, in Victoria, the reviews of wildlife (marine mammals) regulations has taken place at 10-year intervals. However, the target species' ecological situation, environmental effects, tourist satisfaction and community support can change in a shorter period of time. So, an appropriate period (e. g. five years) for evaluating changes relative to LAC should be set.

2. Strengthening social science research

Research on topics such as community support, visitor satisfaction and perceptions is inadequate compared to natural science research. Many operators believe that tourists want to get close to the cetaceans and therefore choose to approach them too closely, too quickly, from the wrong angle, or with too many vessels simultaneously, to increase visitor satisfaction. However, many studies found that tourists were generally supportive of compliance or in favour of taking action to protect cetaceans (Avila-Foucat et al., 2017; Cárdenas et al., 2021; Filby et al., 2015; Hooper et al., 2021; Sitar et al., 2017; Tepsich et al., 2020). A study conducted by Lück (2003) showed that the tourists did not think they had learned much of cetaceans as well as marine environment. Lück's research was conducted almost 20 years ago at three locations in New Zealand. It is not clear what the situation in PPB is. There is a need for further research on such topics, in order to inform decision makers. Especially after COVID-19, it is reasonable to expect tourists' and the communities' perceptions to change (Haywood, 2020). Therefore, there is a need for more social science surveys. Only in this way can the opinions of the community be reflected in management decisions and the perceptions of visitors be responded to in the modifications of the commercial operations.

3. Enhancing monitoring and enforcement

A number of studies conducted at PPB have shown that even seemingly perfect whale-watching management plans that combine all the right elements and tools are ineffective in mitigating impacts on target species if they are not effectively monitored and enforced (Howes et al., 2012; Scarpaci et al., 2003). The following recommendations are suggested. Firstly, regulations need to be supported by clear enforceable consequences for non-compliance. Consequences may include warnings, fines, temporary suspension, or even revoking of permits or licences. For example, the Western Australian Government decided to

withdraw two dolphin watching permits in Shark Bay due to significant adverse impacts from tourism activities. This is considered to be the most effective management strategy (Constantine, 2014). Secondly, a practical form of monitoring needs to be implemented. The PPB now conducts an annual compliance check operation (IWC, 2021b). However, this does not appear to be sufficient. A key factor in the lack of monitoring is cost. Consequently, several cost-effective monitoring methods such as land-based observations (Howes et al., 2012; Lundquist, 2014) and the secret shopper method can be employed. 'Secret shopper' refers to the placement of observers on whale-watching vessels to monitor compliance, this is usually only practical and effective in areas where large vessels accommodating many tourists are used, and operators/guides are less likely to recognise the observer in the crowd. Besides, an unpredictable rotation of patrol presence should be effective. Tour operators are more likely to comply with the rules if they cannot predict the presence of patrol boats.

4. Improving knowledge exchange between different stakeholders

Whale-watching is a complex industry, which involves multiple stakeholders and multilevel governance (Dimmock et al., 2014). Higham et al.'s (2009) model also requires combining the perspectives of a range of key stakeholders and different stakeholder factors should be considered in all tour phases. The case study of PPB shows that of the four key stakeholders (social sciences researchers, tourism operators, planning and management agencies, natural sciences researchers) identified in Higham et al.'s (2009) model, the link between the natural sciences research and the planning, and management agencies is relatively strong and that this link is also capable of operating in a dynamic environment. However, the contact between the tourism operators and the planning and management agencies is inconsistent. Dimmock et al. (2014) found inconsistent perspectives between the above stakeholders in East Coast of Australia. The planning and management agencies (resource managers) focus on biological issues, species health, numbers and interpretations, while tourism operators seek clear and consistent information about compliance, laws and rules. The study also found that only half of the tourism operators had direct access to the research results. In addition, tourism operators receive little information (including new knowledge, regulations or policy) from resource managers by way of information exchange (Dimmock et al., 2014). Therefore, there is a need to improve the dialogue across the sector (especially between resource managers and tourism operators), which would allow the industry to understand where impacts are occurring. Similarly, enhanced dialogue can promote standards of practice and further promote the sustainable use of marine tourism resources.

The COVID-19 pandemic has halted global tourism. However, as an industry vulnerable to various risks (environmental, political and socio-economic), the tourism industry has become accustomed to crises, is fairly resilient and has shown to rebound in a relatively short period of time (Novelli et al., 2018). Over the past two years, many countries around the world have entered lockdown to control the spread of COVID-19. Anecdotal observations showed that many

wildlife species were enjoying the newly afforded peace and quiet (Morton, 2021). This may provide important insights into human-wildlife interactions (Rutz et al., 2020). Although the impact of reduced human activity on wildlife during the lockdown has yet to be assessed in empirical studies, minor changes to our lifestyles can potentially have major benefits for wildlife and ecosystem. While COVID-19 has had an unprecedented impact, it is also an opportunity for reflection and transformation (Mair, 2020). Specifically, for whale-watching, it requires the industry to pay more attention to sustainability and ensure that the public can view and interact with cetaceans in their natural environment now and for future generations.

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