Australia's National
Science Agency

The Charging Structure for the Great Barrier Reef – A review of Willingness to Pay (WTP)

Report for the Great Barrier Reef Marine Park Authority (GBRMPA)

Anthea Coggan (CSIRO), Darshana Rajapaksa (CQU), Ella Schirru (CSIRO/JCU), Mara Emmerling (CSIRO/JCU) and John Rolfe (CQU)

June 2022

Citation

Coggan, A., Rajapaksa, D., Schirru, E., Emmerling, M., Rolfe, J. 2022. The Charging Structure for the Great Barrier Reef – A review of Willingness to Pay (WTP). Report for the Great Barrier Reef Marine Park Authority (GBRMPA). CSIRO, Australia

Cover photo courtesy of Matt Curnock.

Figures

Tables

Acknowledgments

The research reported in this document was funded by the Great Barrier Reef Marine Park Authority (GBRMPA). The authors thank Kimberley Glover, Mel Cowlishaw and Michelle Dyer (GBRMPA) and Gabriela Scheufele and Matt Curnock (CSIRO) for their review of the content. All mistakes and omissions remain the responsibility of the authors.

Acronyms used

ABS	Australian Bureau of Statistics
CB	Contingent Behaviour
CBM	Contingent Behaviour Model
CBS	Contingent Behaviour Survey
CE	Choice Experiment(s)
CF	Commercial Fishing
CFA	Conservation Finance Areas
CM	Choice Modelling
CV	Contingent Valuation
CVM	Contingent Valuation Method
CS	Consumer Surplus
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DC	Demand Curve
DCE	Discrete Choice Experiment
EMC	Environmental Management Charge
ES	Ecosystem Service
GBR	Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority
HPM	Hedonic Pricing Method
IMR	Integrated Monitoring and Reporting
MB	Marginal Benefit
MC	Marginal Cost
MP	Marine Park
MPA	Marine Protected Area
RF	Recreational Fishing
SC	Supply Curve
SEABORNE	Sustainable usE And Benefits fOR mariNE (Reef Trust Partnership Integrated Monitoring and Reporting Activity 8)
SEEA EA	System of Environmental Economic Accounting, Ecosystem Accounting
SELTMP	Social and Economic Long-Term Monitoring Program

SPSC	Strong People Strong Country
SSS	Sun, Sand, Sea Tourists
TCM	Travel Cost Method
TRA	Tourism Research Australia
USD	United States Dollar
WTA	Willingness to Accept
WTP	Willingness to Pay

Executive summary

Introduction

The Great Barrier Reef Marine Park Authority (GBRMPA or the Reef Authority) is currently conducting a comprehensive review of the charging structure for the use of the Great Barrier Reef (GBR) Marine Park with a view to implement potential changes from 1 July 2023. This component of the review:

1. Analyses existing and planned research to gain an understanding of marine park users (commercial and non-commercial) 'willingness to pay' (WTP) for use and protection. This analysis applied to marine park users in the GBR and from the broader national and international community.
2. Analyses existing and planned research to gain an understanding of existing knowledge and key knowledge gaps surrounding charging frameworks their impacts on the WTP of different user groups and the palatability of alternative charging frameworks.
3. Develops descriptions and questions relating to different ways user groups could pay for the use of the marine park and provides an understanding of the palatability of the concept of those payment structures.
4. Provides guidance to GBRMPA on an approach to fill knowledge gaps related to charging structures with a view to the implementation of a revised charging structure.

Method

Searches from the literature were conducted using key word combinations, including "willingness to pay" "willingness to accept", "marine parks" "nature", "marine" "user pay" and "charge" for publications 2010 and onwards for WTP international literature and earlier 2000 onwards for Australian focussed literature. In total, 103 peer reviewed documents were identified and reviewed. It is important to note that there are no studies reporting on the impact of Covid 19 on WTP.

Key findings from the review of international literature on willingness to pay and willingness to accept charges for use and protection of marine parks (and other natural spaces)

Key finding 1. There are many users and uses of marine parks

The resources of a marine park can be put to many uses by a variety of users. We apply the United Nations (UN) System of Environmental Economic Accounting, Ecosystem Accounting (SEEA EA) to unpack the potential uses and users of a marine park (Table E1).

Uses of the marine park can be through:

- The provision of resources/experiences that are consumed. These are categorised as provisioning ecosystem services in the SEEA EA framework and include activities such as fish and non-fish biomass extraction as well as abiotic and non-extractive use of the marine park such as the provision of access through shipping channel services;
- The enjoyment of the regulating ecosystem service function of the marine park through activities such as nitrogen fixation (leading to maintenance of good water quality, carbon sequestration and the mitigation of impacts from climatic events such as coastal erosion in the event of a storm); and
- The enjoyment of the cultural ecosystem services provided by a marine park such as cultural and or recreational experiences. The SEEA EA framework includes the existence and option values for future use in the cultural services provided by the marine area.

Users of the marine park can be those who actively benefit from using, visiting, or being close to the area in question. Active users can be local (L)(living within 10km of the coast), regional (R) (living at a distance of greater than 10km from the coastline) or international households (I). Users also include those (L, R and I) who may not receive any direct benefits but value the existence of the marine park.

Table E1. Using the UN's SEEA EA approach to distil key * direct and indirect use and users of reefs

ECOSYSTEM SERVICE CATEGORY	ECOSYSTEM SERVICE USE	ECOSYSTEM SERVICE USERS					
		HOUSEHOLDS			TRADITIONAL OWNERS	INDUSTRY	GOVT
		LOCAL	REGIONAL	I'NATIONAL			
Provisioning	Fish biomass - WILD	X(RF) √	X(RF) √	X (RF)	X	X (CF)	
	Traditional owner medicine				X		
	Traditional owner food sources				X		
Abiotic provisioning	Shipping channel access (sand) – Dredging Shipping – transport***					X	X
Regulating	Nitrogen fixation	X	X		X	X	X
	Carbon sequestration	X	X	X	X	X	X
	Coastal protection	X				X	X
Cultural	Traditional owner cultural use – ceremonial, spiritual connection, cultural, song lines, dreamtime/stories, health, heritage, continuity (past/future) etc.				X (on country)		
	Other spiritual, cultural, religious values (brand value)						
	Existence /option	X √	X √	X √	X		
	Leisure – diving, sun sand sea (SSS) tourists (snorkelling, swimming, beach recreation, sailing, jet ski), recreational fishing, cultural tourism**	X √	X √	X √		X (tourism industry)	

ECOSYSTEM SERVICE CATEGORY	ECOSYSTEM SERVICE USE	ECOSYSTEM SERVICE USERS					
		HOUSEHOLDS			TRADITIONAL OWNERS	INDUSTRY	GOVT
		LOCAL	REGIONAL	I'NATIONAL			
	Research / education				X		X
	Aesthetic	X					
	Artistic inspiration	X					
	Bequest value	X √	X √	X √			

Source: SEABORNE project
X's indicate how reef ecosystem services are used and who is benefiting from this use
√ indicates that literature on WTP exists for this user and use.
*** There are many more, but they are considered to be insignificant**
**** Tourism comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes. (Australian Bureau of Statistics). WTP studies tend to classify cultural users as tourists and these are further categorised as SSS tourisms, divers, recreational fishers. Tourists can also be classified as nature-based tourists and non-nature-based tourists with the SSS tourists tending to fall into the latter classification. Some studies also separate out cultural heritage tourism (shipwrecks)**
***** Whilst this is an important category of use it needs to be treated differently in exploring WTP as charges cover risk and management costs**
RF is recreational fishing
CF is commercial fishing

Key finding 2. Influences of WTP for marine park use and protection varies by use and user

Willingness to pay (WTP) is the maximum value a consumer is willing to spend for any good or service or group of goods and services. WTP is also represented as the demand curve for a good or service. The demand curve is downward sloping following the laws of demand – as price for goods or services increases, demand decreases while keeping other factors that affect demand in constant. WTP for particular environmental attributes can be derived through stated preference methods or revealed preference methods. For example, a contingent valuation or a choice modelling (stated preference) approach can directly ask WTP for changes in attributes. WTP for different attributes can also be derived from revealed preference methodologies such as hedonic pricing whereby pricing is a function of a number of attributes (e.g. price of a house is a function of view, distance to services etc).

A review of the literature revealed that what influences users willingness to pay for use and protection of marine parks varies significantly (Table E2).

Table E2. Key findings from the international literature about what influences WTP for marine park users

WHO IS USING THE MARINE PARK?	WHAT WAS FOUND IN THE LITERATURE REGARDING WHAT INFLUENCES WTP
Non-use	• WTP tended to be higher for what non-use respondents considered to be scarce, charismatic or iconic areas. • WTP was higher for respondents with some connection with the area even if they weren't using it. This was higher compared with those who lack such a connection • In some studies, with a random household sample, there can still be a response of zero WTP
Use – rec fishing	• Where literature exists indicates high WTP
Use – commercial fishing	• Not much literature

Use – SSS tourism	• SSS usually have higher frequency of use of sites but lower WTP than explicit purpose tourists
Use – explicit purpose (diving):	• Explicit purpose tourists such as divers generally have a higher WTP compared with SSS tourists. These tourists tend to be more nature based in their tourist demand • Degree of acceptance of an increase in charge depends on the quality of the dive experience especially the sighting of iconic species • Locals tend to be WTP less than foreigners
Use – regulatory	• Some literature available but related to marine finance and not WTP
Use – traditional owner	• Some literature available on value but not WTP.

Key finding 3. WTP for marine park use and protection influenced by socio-demographics

WTP is generally affected by socio demographic factors such as the purpose of the trip, the level of income of the respondent, respondent profession, frequency of trip, origin of respondent (local, tourist), level of wealth of country of origin and lodging type. In many studies the relationship between income, age and education with WTP was positive. Participants with higher levels of education, income and age were WTP more. In many studies, foreign visitors were WTP more for protection and use of marine parks compared with locals.

Key finding 4. WTP for marine park use and protection is influenced by price elasticity of demand

Price elasticity of demand is the measure of the percentage change in demand for a product as a result of a one percent change in price. Price elasticity is an important concept in decision-making, particularly in changing entrance fees or environmental charges because it identifies whether increases in price might significantly lower participation and revenue as a result. Inelastic demand suggests that demand for the product will not change significantly with a change in price. Elastic demand, on the other hand, indicates that a small change in price will have a significant impact on demand. Elasticity of demand is a phenomenon that needs to be taken into account when considering a change in price such as a change in use charge or an expansion of a user charge to new users.

It was found that visitation demand to marine parks is generally **inelastic to price changes** (however demand tends to be more price elastic when there are substitutes for use as users can gain utility elsewhere and/or with other activities. This tended to be consistent across both high end, explicit use tourists and visitors taking part in low cost SSS activities. From the literature, demand for access tended to be even more inelastic to price changes for international visitors compared to domestic.

Key finding 5. Acceptability/palatability of charging frameworks is influenced by the design of the scheme

The implementation of a charging scheme is important to reduce the burden on government budgets and self-sustain resource management, however, the policy should be acceptable by the users and it should be equivalent to no more than user's' utility. The price elasticity of demand mimics the user's' responsiveness to any price changes. The frequency, as well as the way of charging, are also important factors to be considered. Price should cover the direct cost of supplying the MP product. When considering the acceptability and palatability of a MP charge, it is important to remember that:

- Technology improvements for monitoring may reduce the cost of supplying the MP product in the future
- Differentiated pricing (dual or third-degree pricing) may enable better capturing of consumer surplus (CS), given the heterogeneity in uses and users.
- Users are WTP more if it is known that money raised is reinvested into the management of the natural space and that there is information about this available to those who pay fees

Understanding price elasticity of demand, substitutability of experience, visitor types and perceptions of current fees is critical to informing where changes could occur and where charging systems should remain unchanged.

Key findings from the review of WTP studies for use and protection of the GBR

Key finding 1. Users and uses of the GBR are complex and diverse resulting in scattered empirical findings about WTP values and Consumer Surplus (CS)

The diversity and the complexity of GBR makes it difficult to value all the ecosystem services generated. However, there are considerable scattered empirical findings on certain user groups such as SSS tourists, recreational fishers and explicit use tourists such as divers. Contingent valuation and TC methods have been used in estimating the WTP values and CS. First nation people and other traditional owner's WTP for their use and non-use values are yet to be explored. It is also important to note that all GBR data collected within the literature occurred pre Covid 19 pandemic. As well, it is unknown how stable value estimates for the GBR might be, given changes in perceptions and biophysical events over time. The implications of these factors need to be taken into account when considering the transfer of benefit/value estimates.

Table E2: GBR 'values' for use the protection of the GBR

USER TYPE	VALUE ($A 2021 VALUES)	FOR WHAT?	METHOD (CS OR WTP)	SOURCES
Non-user in Qld	$36/person/year for 5 years	For 1% improvement in GBR condition in 25 years	CVM (WTP)*	Averaged from surveys reported in Rolfe and Windle (2012)
Non-user in non-Qld states	$45/person/year for 5 years	To improve the health of the GBR in 25 years	CVM (WTP)*	Averaged from surveys reported in Rolfe and Windle (2012)
Recreational fisher	$200/person/day trip		TCM (CS)	Prayaga et al. (2010)
Commercial fisher	No data			
SSS tourist	$ 47/person/day trip	Beach recreation	TCM (CS)	Averaged from Prayaga (2017), Windle and Rolfe (2019), Windle et al. (2017)
	$220/person/trip	Island visits	TCM (CS)	Averaged from Rolfe and De Valck (2021) and Rolfe et al. (2011)
	$107/person/trip	Non-fishing water-based recreation	TCM (CS)	Windle et al. (2017)
Explicit use tourist	$273/person/trip	Diving	TCM (CS)	Kragt et al. (2009)
Traditional owner	No data			
Regulatory	No data			

*** Researchers have tested different hypotheses in their studies, such as improvement or maintenance of reef quality**

**** some studies have considered travel time in their estimation while others neglected reasonable justifications. Travel cost estimation also varies and could define a trip as half-day, full-day, multiple trips, or multiple day trips.**

Gaps in knowledge when GBR literature was reviewed against questions generated from the international literature and a framework for moving forward with the charging review

Given the brief to provide guidance to GBRMPA on an approach to fill knowledge gaps related to charging structures, the review of the international literature resulted in a set of questions against which to review the GBR literature. Figure E1 provides a framework which summarises findings from the review of GBR literature against critical questions, highlighting gaps in knowledge and providing suggestions and a structure for filling these gaps. A framework for working through these questions for the GBR was provided to GBRMPA as supplementary material.

Questions about Users (and non-users) of the Marine Park

Question U1. Who are the users and how are they using the marine park?

- Who are all the potential uses (incl non-use) and users of the marine park?
- What is known about who is using and how they are using the marine park?
- What is valued and what are users willing to pay for (does WTP/CS values exist for all user types)?

e.g., SSS tourists are willing to pay for clean beaches, good amenities. Explicit use tourists such as divers are willing to pay for high quality dive sites with sightings of scarce, charismatic or iconic assets.

Question U2: What are users' perceptions of current pricing for protection and use?

Question U3: What are non-users' perceptions of current ways to contribute to GBRMP conservation?

Question U4: How would users respond to a change in price?

- How responsive is demand for the resource/experience to a change in use price? (Price elasticity of demand)
- How resilient is the local economy to changes in revenue/opportunity if response is elastic and tourism numbers drop?
- How substitutable are GBRMP experiences (can users go elsewhere and get the same experience?)

User profiles can help with this, e.g. high end international tourists tend to have inelastic demand, Explicit use tourists tend to have inelastic demand, SSS tourists tend to have more elastic demand

Question U5: What influences users' acceptance of a charging scheme?

- How will funds be used and how can this be communicated to users/payers?

E.g SSS tourists would like to see clean beaches, good amenities. Divers are WTP for dive

Questions about the Design of a charging scheme (implementation and alteration)

Question D1: what will users pay? Cost cover or additional?

- Is the cost of managing tourism and the cost of conservation known?
- Who should pay (what would be the benefits and costs of charging based on origin, experience type etc – tiered pricing?)
- What will users pay? The same regardless of origin and use? Differentiated by origin and/or use?

Is the annual amount of $$ to be raised known?

Question D2: When will users pay?

- What would be the benefits and costs of charging at or over different time periods (single ticket, charge per use, annual fee etc?

Question D3: How will charges be collected?

- To what extent can tourism industry assist with fee collection
- Are there new/alternative ways to finance management? E.g., can you lease fishing rights to some parts of a MP to raise money for conservation
- Can you collect a fee from non-users?

Question D4: What are the benefit and costs (including enforcement costs) of different charging arrangements?

Figure E1: questions that should be addressed when reviewing the charging framework for the GBR

1 Introduction

The Great Barrier Reef (GBR) makes up 10 percent of the world's coral reef ecosystems and is one of the most iconic and most complex natural systems of the world (Goldberg et al., 2016). In 2019, it was recorded that the GBRMP received 2.4 million visitor days. In 1975, the 344,400km^2 GBR was protected by the *Great Barrier Reef Marine Park Act 1975* with related actions administered by the Great Barrier Reef Marine Park Authority (GBRMPA, or, the Reef Authority).

Current charging for use of the GBRMP comprises of (KPMG, 2021):

1. The environmental management charge (EMC) – a charge associated with some commercial activities, including tourism operations, non-tourist charter operations, and facilities, operating under a permit issued by the GBRMPA. For most tourism activities, visitors to the Marine Park are liable to pay the charge to the permit holder who then remits the charge to the GBRMPA. The standard tourist program charge is A$7.00/ visitor for the full day or A$3.50/part day/visitor. In 2018-19 (prior to the Covid 19 pandemic), the EMC contribution to GBRMPA's total revenue was 14% (GBRMPA, 2019a). The total annual revenue of the GBRMPA for 2020-21 was $101.892 million which included government (Queensland and Federal government) contribution and collection of environmental management (EMC) charges (GBRMPA, 2021). Since the Covid 19 pandemic (2020), the government has waived the EMC in order to support tourism and in return $8.086 million was granted to replace the EMC (GBRMPA, 2021).
2. Permit application and assessment fees – the GBRMPA collects a fee to cover part of the cost of the time spent administering and assessing the requests for marine park permissions. Fees vary according to the complexity of the application. `

The Authority is currently conducting a comprehensive review of the user charging structure for the GBR Marine Park with a view to implement any changes in this structure from 1 July 2023. From this overarching review, the Authority is working towards:

- A streamlined and transparent charging structure where regulatory charges, resource charges, fines, penalties and taxes are clearly defined, and communicated to relevant Marine Park user groups.
- A charging structure that is contemporary and capable of adapting to environmental and sectoral changes with options for phased implementation over a period of time.
- A proportion of the costs associated with managing the Reef shared equitably across government, industries and the community, without disadvantage to any particular user group.
- Upholding and strengthening the Authority's partnership approach to management of the Reef.

The aims of the review are to:

- Deliver decreased regulatory and administrative burden for Marine Park users.
- Harness technology to provide an innovative and modern system that can continue to adapt to future needs.

- Support continued world-class management of the Marine Park.
- Align with the Australian Government's Cost Recovery Guidelines and Charging Framework.

1.1 What has been done so far

In 2021, KPMG were contracted to:

- Benchmark current GBRMP charges and options against other charging structures for similar activities via a literature review.
- Conduct targeted surveys and interviews of current permit holders and representative bodies to document their sentiment about the current charging framework.
- Identify options for a modern charging framework.
- Provide a comparative analysis of those options with respect to regulatory impact, cost and benefit, risk, and likely stakeholder acceptability.
- Key findings from the KPMG review include:
    a. The GBRMP has the lowest tourist entry fee and the largest economic contribution compared to all other protected areas analysed.
    b. Identification of a number of pricing strategies that could be somewhat adopted to the financing of the GBRMP.
    c. Overall stakeholder support of the EMC.

1.2 Purpose of this component of the review.

Despite efforts to date, direct information about what users would be willing to pay is missing. Therefore, this component of the review:

1. Analyses existing and planned research to gain an understanding of 'willingness to pay' (WTP) for use and protection of marine parks by all users (commercial and non-commercial), and the broader national and international community.
2. Analyses existing and planned research to gain an understanding of existing knowledge and key knowledge gaps surrounding charging frameworks their impacts on user groups WTP and palatability.
3. Develops descriptions/questions relating to different ways user groups could pay for the use of the Marine Park and provide an understanding of palatability of the concept of those payment structures.
4. Provides guidance to GBRMPA on an approach to fill knowledge gaps related to charging structures.
5. Provides guidance on an approach that GBRMPA could lead to implement a revised charging structure.

This report is structured as follows.

Part 1: Conceptual framework and overarching method

- Overview of the concept of value, benefits, and valuation for natural spaces
    - How direct and indirect use values are generated and derived
    - How non-use values are generated and derived
- Introduction to WTP and WTA in environmental valuation
    - Strengths, weaknesses, and considerations with WTP and WTA measures of value
- Literature review method
    - Methods for understanding uses and users of marine parks
    - Use of benefit transfer in this study

Part 2: Review of international literature

- Influences on WTP for marine park use and protection for different types of users
- Influences on the acceptability/palatability of a charging framework
- Questions that should be answered when introducing or adjusting a charge for protection and/or use of a marine park

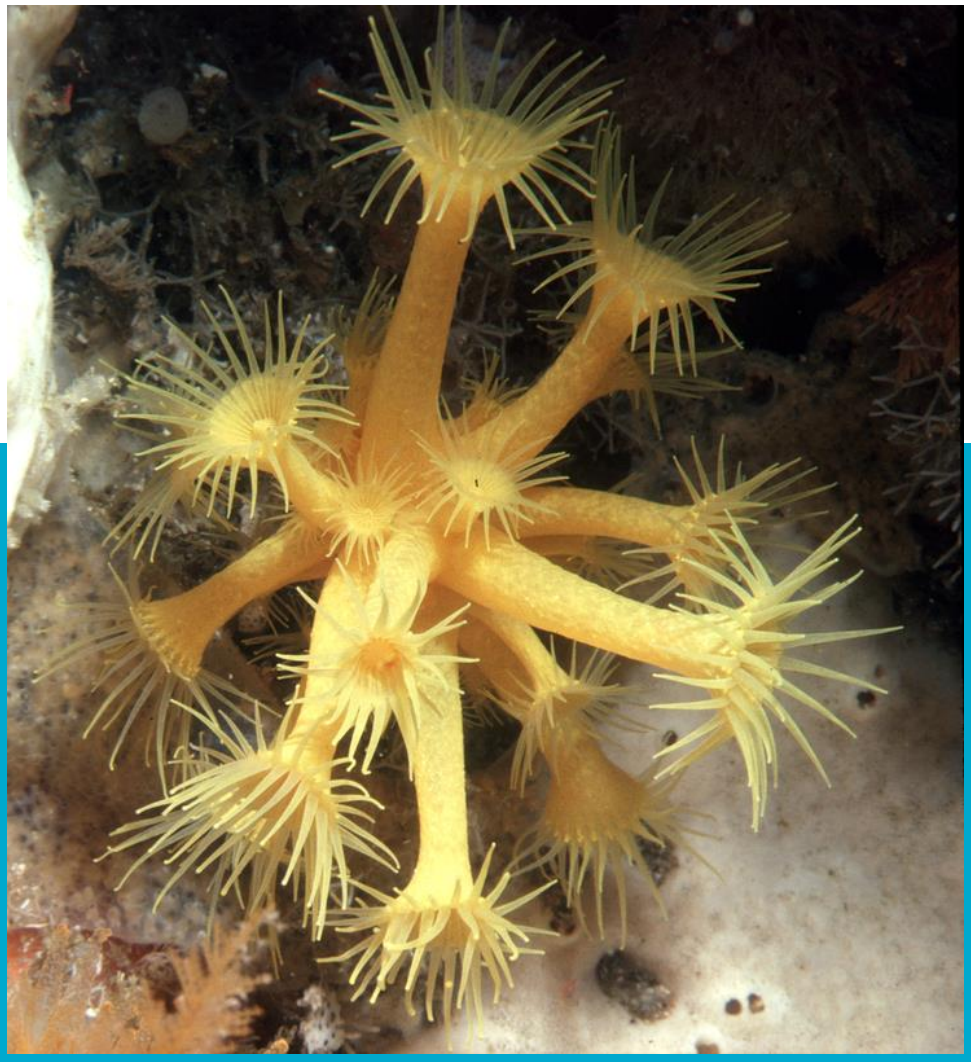
Part 3: Review of literature for the Great Barrier Reef

- Users, uses and their value for the GBR
- Perceptions of current pricing for protection and use
- Responsiveness to a change in price
- Influences on users' acceptance of a charging scheme
- Acceptability of a charging scheme to fee collectors

Supplementary Part: Moving forward with an amended EMC for the Great Barrier Reef

- Summary of questions that need answering in the GBR context

Part I Conceptual framework and overarching method



A Yellow Zoanthid

Photo Credit: Graham Blight

2 Conceptual framework

2.1 The concept of value, benefits and valuation for natural spaces

Within economic frameworks, there are two broad uses of the term 'value'. First, the micro economic approach to value is the precise measure of the trade-offs that people are willing to make for changes in an asset or service. This micro economic definition of value assumes that people make rational choices based on their preferences and considering the size of the sacrifice that they have to make, budget constraints and substitute options. The choices that are made reveal the items of greatest importance. Consumers' choices or marginal benefits (MB) and producers' choices or marginal cost (MC) can be represented in demand (DC) and supply curves (SC) respectively (Figure 1). In environmental valuation, WTP represents the demand curve and thereby consumer surplus (CS) can be estimated. In this context, economic value is measured as the difference between what consumers are prepared to pay and what it costs to provide the service, which can normally be apportioned into consumer and producer surplus components.

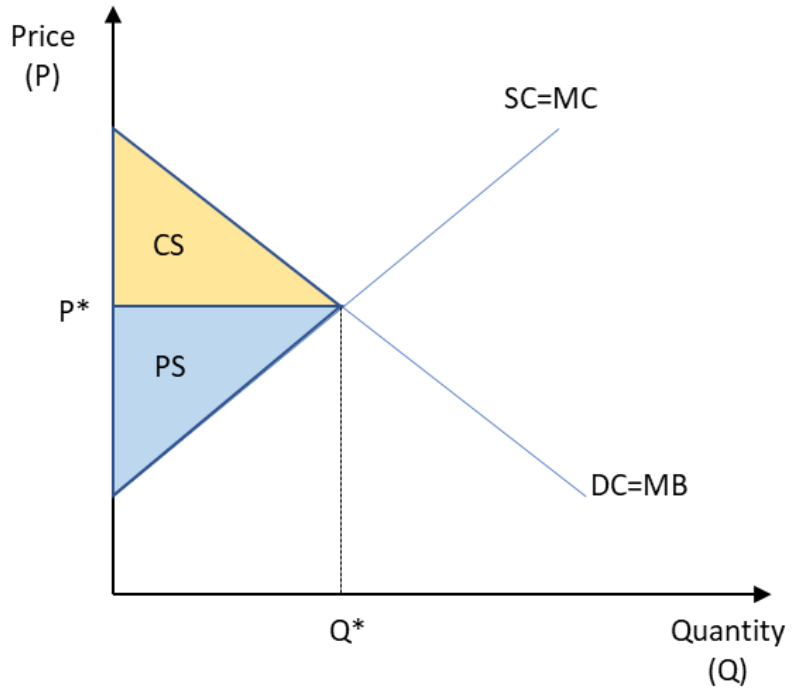


Figure 1: Microeconomic perspective of economic value

Price elasticity of demand is the measure of the percentage change in demand for a product as a result of a one percent change in price. Price elasticity is an important concept in decision-making around pricing and price changes due to the potential impact on income and economic surplus. Inelastic demand suggests that demand for the product will not change significantly with a change in price (Figure 2). Elastic demand, on the other hand, indicates that a small change in price will have a significant impact on demand (Figure 2). Elasticity of demand is a phenomenon that needs to be taken into account when considering a change in price such as a change in use charge or an

expansion of a user charge to new users. The elasticity of the demand curve also impacts on the consumer and producer surplus.

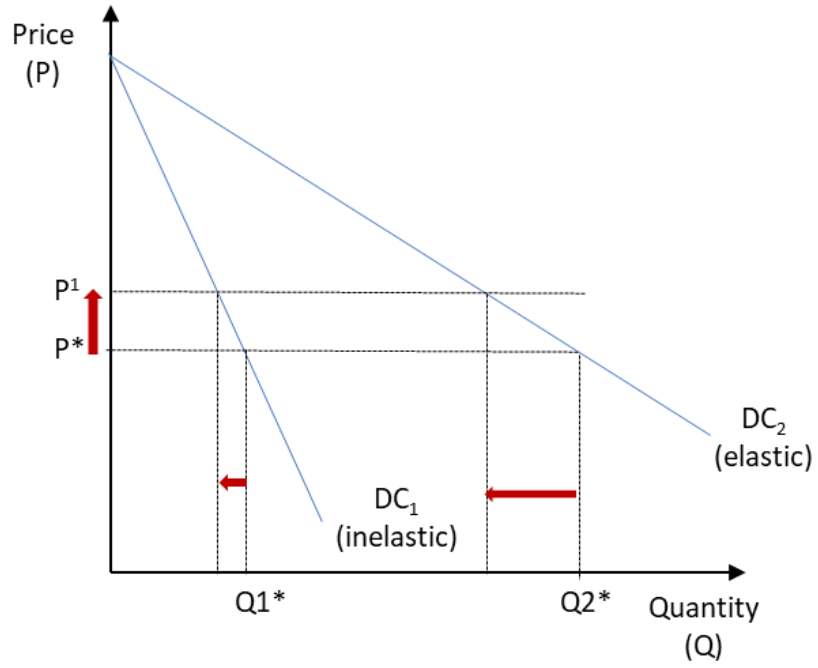


Figure 2: How price increases impact on quantity demanded

Second, a broader measure of value is the economic impact such as industry size or revenue, expenditure and employment measured as market turnover or market revenue (price times quantity).

Consumer surplus (CS) is the difference in price that the consumer is willing to pay and what they actually pay for a good summed over all units.

Producer surplus (PS) is the difference between what the producer receives and the cost to produce the good or service summed over all units (Rolfe and De Valck, 2021).

WTP is the maximum value a consumer is willing to spend for any good or service or group of goods and services. WTP is also represented as the demand curve for a good or service. The demand curve is downward sloping following the laws of demand – as price for goods or services increases, demand decreases while keeping other factors that affect demand in constant.

Price elasticity of demand Price elasticity of demand is the measure of the percentage change in demand for a product as a result of a one percent change in price. Highly elastic demand will result in a greater than one unit change in quantity demanded due to a one unit change in price whilst an inelastic demand curve will result in a less than one unit change in quantity demanded as a result of a one unit change in price.

2.1.1 How is value generated?

Value or benefit (as defined above) from a natural space/asset is generated as a result of direct and indirect use of that asset. Natural spaces/assets are also valued by those who may not actually use them but still hold a value for them (non-use).

Direct use and the values associated with this can be categorised as either extractive or non-extractive.

Extractive use values related to reefs include harvesting natural resources like fishing (both recreational and commercial), pharmaceuticals, construction and aquarium and curio trades.

Non-extractive values related to reefs include, cultural (First Nations and other), recreation, tourism, research and education. Tourism often yields the greatest direct financial benefit of all the reef uses (e.g. Brander et al., 2007).

In practice, the focus of direct use values is on the profits extracted by industries from the use of the reef (producer surplus), and the personal satisfaction that people gain from use of the asset (consumer surplus).

Indirect use values are gained indirectly from the natural resource, usually through support and protection of other economic activities. For reefs this includes biological support to fisheries, coastal zone protection, and global life support. Indirect use values are typically less straightforward to assess economically.

Values to society associated with non-use of a natural space occur indirectly either through potential future uses or through the knowledge of the presence of the resource. These are commonly divided into option/quasi-option, existence, bequest and altruistic values:

- Option values relate to the benefits ecosystems may generate through direct or indirect use in the future (Krutilla and Fisher, 1975), and quasi-option values relate to preserving environmental assets until more knowledge about their usefulness is available (Weisbrod, 1964). Because of that, option and quasi-option values are sometimes classified as use values rather than non-use values
- Existence values are those that individuals derive from the mere knowledge that ecosystems exist, i.e., altruism towards biodiversity (Pascual et al., 2010, O'Garra, 2009).
- Bequest values arise from wanting to preserve the natural space/ecosystem for future generations, i.e. intergenerational equity (e.g. Walsh et al. (1984)).
- Altruistic values are the values attached by individuals to the fact that other individuals can have a fair access to the benefits generated by the natural space/ecosystem, i.e. intragenerational equity (e.g. Vázquez Rodríguez and León (2004)). Non-use values can be derived without any current human use of the resource.

2.1.2 How are values for natural spaces/ecosystems derived?

There are a number of techniques through which values can be derived for use and non-use of a natural space/ecosystem:

Techniques to value use only:

Price based valuation	-	How much did you spend to experience the ecosystem?
Cost-based valuation[1]	-	Avoided cost, mitigation/restoration cost and replacement cost values
Production function-based valuation	-	Value of the resources produced due to the ecosystem
Revealed preference	-	Willingness to bear costs through property prices (hedonic pricing) and travel (travel cost).

Techniques to value use and non-use values:

Stated preference	-	Surveys about hypothetical WTP (contingent valuation, choice modelling and deliberative group valuation, paired comparison, life satisfaction approach).

Benefit transfer:

Use of pre-existing stated preference or revealed preference values to estimate the value of similar environment.

2.2 An introduction to WTP and WTA in environmental valuation

WTP for particular environmental attributes can be derived through stated preference methods or revealed preference methods. For example, a contingent valuation and choice modelling (stated preference) approach can ask WTP for changes in attributes. WTP for different attributes can also be derived from revealed preference methodologies such as hedonic pricing whereby pricing is a function of a number of attributes (price of a house is a function of view, distance to services etc).

Studies/methodologies that glean willingness to pay (WTP) or willingness to accept (WTA) have emerged as a way to value environmental goods, such as clean air, clean water or biodiversity, when individual preferences cannot necessarily be observed in a market-based exchange. WTA can be considered the amount that the owner/user of a good is/would be willing to be paid in

[1] Cost-based methods are an estimate of the amount of money to conserve environmental goods or services. Replacement cost, mitigation/avertive cost, and damage cost estimation are the commonly used cost-based methods. Cost-based methods are good for rapid assessment, however, there are several weaknesses associated with the method. It does not measure peoples' preference, utility, or WTP. All goods and services, such as cultural values cannot be valued. In the replacement cost, it is unlikely to find a perfect replacement. In avertive expenditure, there is an uncertainty that anticipated changes may reduce the utility.

compensation to forgo having a good or service whilst WTP reflects what the respondent is/would be willing to pay for that same good or service (Horowitz et al., 2003).

Authors such as Whittington et al. (2017) suggest that WTA questions are the most sensible approach in situations when the respondent is adversely affected by a change and have some form of rights to their original position. On the other hand, WTP is best when the respondent does not own or have entitlement to a good or service. WTP studies tend to be the preferred approach to extracting stated preferences. Whittington et al. (2017) suggests that there are several key reasons for this:

1. It is thought that respondents have less incentive to tell the truth in WTA questions. WTP questions are more reliable because respondents are bounded by income.
2. WTA questions tend to suffer from non-conforming responses - scenario rejectors, protest responses etc. This is because monetary compensation is often more unfamiliar to respondents.[2]
3. The State may actually have no intention of paying compensation so using this in questions can be considered politically unpalatable.

2.2.1 WTP/WTA through revealed preference techniques

Revealed preference techniques observe human behaviour in a way that enables the identification of the values humans' place on intangible goods and services. This is done by using information from markets associated with the resource or service being valued (Gunawardena et al., 2020). For example, property prices can reveal consumers' WTP for an amenity good such as green or a marine space (**hedonic pricing**). Through hedonic pricing, the natural environmental quality is interpreted as an attribute of a differentiated market good (Davis et al., 2019). Hedonic pricing has a number of strengths and limitations (Table 1).

Table 1: Strengths and limitations of hedonic pricing

Strengths	Limitations
Intuitive	High data requirements to generate estimates
Straightforward	Will only capture people's WTP for perceived differences in environmental attributes – if people don't perceive value from an attribute it will not be reflected in prices. This is a limitation if analysing policy scenarios or future developments and values are not incorporated.
Reliable	There may be outside influences to market prices that are not related to the environmental attribute
	Results are dependent on model specification (subject to bias)

From Coggan et al. (2022)

Alternatively, the expenses that a consumer is willing to bear to experience a resource (such as access to a reef) can inform the value that a consumer places on an asset (**travel cost method**). The travel cost method of valuation is based on the premise that time and travel cost expenses

[2] The same could be said for WTP studies.

that are incurred to visit a site represent the price of access to the site (interpreted as an unobserved shadow price for site visits (Davis et al., 2019)). Again, this valuation technique has a number of strengths and limitations (Table 2).

Table 2: Strengths and limitations of travel cost valuation

Strengths	Limitations
Mimics more conventional valuation based on market prices	Assumes people respond to travel cost the same way they respond to admission prices
Based on actual behaviour	A limitation if it is assumed that trips are taken for a single purpose so can overestimate the value of the asset. Some studies deliberately exclude multi-purpose trips to overcome this potential limitation.
Relatively inexpensive to apply	Defining and estimating the opportunity cost of time can be problematic
On-site surveys tend to generate large sample sizes	Availability of substitutes affects value (the more substitutes for the site the greater the value of the site that was visited). This can be managed through the use of nested logit random utility modelling (RUM)
	Doesn't capture the fact that some people who value a site will chose to live closer to the site (underestimate the value)
	Interviewing visitors generates sampling bias. This can be managed through off-site sampling (if budgets permit)
	Recreational quality does not always correspond to environmental quality
	Can only provide value of current condition, not gains or losses
	To estimate a demand function, you need enough difference between distances travelled to affect travel cost and for differences in travel costs to affect trips made. Therefore, not well suited for sites near major population centres where many visitations may be from "origin zones" that are quite close to one another.
	Limited in its scope of application because it requires user participation. It cannot be used to assign values to on-site environmental features and functions that users of the site do not find valuable. It cannot be used to value off-site values supported by the site. Most importantly, it cannot be used to measure non-use values. Thus, sites that have unique qualities that are valued by non-users will be undervalued.
	Only useful in valuing recreation

From Coggan et al. (2022)

Because revealed preference approaches are based on actual market transactions they are generally seen as reliable for capturing the use values of assets (Gunawardena et al., 2020) – the value of the natural asset/space is revealed through a complementary market. However, there are often challenges in sourcing appropriate data where there is a strong link between consumer purchases and a relevant environmental factor.

2.2.2 WTP/WTA through stated preference techniques

When consumer behaviour cannot be observed in a complementary market (such as the case with travel cost and hedonic pricing methods), WTP or WTA value can be derived through a number of stated preference methodologies. The most common of these for deriving estimates of WTP/WTA are contingent valuation and choice modelling. Each are described below.

Contingent Valuation (CV): The CV method (CVM) can be used to estimate use and non-use values and is the most widely used (and controversial) non-market valuation technique. Open ended CV studies ask respondents how much they would be willing to pay for a specific hypothetical environmental good or service or the amount of compensation they would be willing to accept to give up specific hypothetical environmental good or services.[3] CV questions may also be formed as a series of questions about choices and process or a referendum yes/no choice for options at different prices. Whilst CV provides a value not reliant on market exchange, the technique has many limitations (Table 3). However, limitations need to be traded off against having no value at all.

Table 3: Strengths and limitations of contingent valuation

Strengths	Limitations
Is one of the only existing tools to value certain types of ES, such as cultural services for instance. It's basically that value estimate or nothing.	Assumes people are familiar with the good or service in question (information bias)
	Valuation may be affected by bias – warm glow, respondent signalling that they like improved environmental quality generally but don't really care about the good in question or may underestimate WTP due to protest about the method of payment extraction
	Respondents may provide a value based on associations between environmental good not necessarily the good in question
	The fact that respondents don't actually have to pay may result in over estimation
	WTA and WTP are not treated the same way by respondents, including that WTP is limited by the respondent's budget whereas WTA has no limit. Horowitz et al. (2003) suggests that WTA is about seven times higher than WTP. Some argue that this difference is due to the fact that something that you own is more valuable than something you do not own (Fehr et al., 2015), more recently (Nguyen et al., 2021) highlight that preferences are reference dependent.
	Embedding effect – WTP for one part or the whole asset are the same
	Ordering problem – WTP is affected by where it is placed in the order of options
	WTP affected by the payment vehicle (taxes versus donations)
	Non-response bias – those that don't respond may have a different value compared with respondents
	Estimates of non-use are hard to validate externally
	WTP affected by the elicitation format (e.g., dichotomous choice, payment card, open ended)

[3] Only the open-ended format asks respondents directly to state a $ amount. This format is deemed biased by the NOOA panel among other reasons due to incentive compatibility problems ARROW, K. J., SOLOW, R., PORTNEY, P., LEAMER, E., RADNER, R. & SCHUMAN, H. 2001. Report of the NOAA Panel on Contingent Valuation .

From Coggan et al. (2022)

Choice modelling

As demand for disaggregating the value of environmental goods to the marginal value of changing attributes has increased, CV has somewhat given way to choice modelling. Choice modelling does not directly ask for willingness-to-pay. Instead, the choice method asks the respondent to state a preference between groups of environmental services or characteristics, at given prices or costs to the individual. Because it focuses on trade-offs among scenarios with different characteristics, it is especially suited to policy decisions where a set of possible actions might result in different impacts on natural resources or environmental services. Choice modelling may use contingent ranking, discrete choice experiments or paired rating methods. Choice modelling has a number of advantages over CV (Table 4).

Choice modelling asks the respondent to state preferences between groups of environmental services or characteristics, at a given price or cost to the individual.

Contingent ranking surveys ask individuals to compare and rank alternate program outcomes with various characteristics, including costs. For instance, people might be asked to compare and rank several mutually exclusive environmental improvement programs under consideration for a watershed, each of which has different outcomes and different costs. Respondents are asked to rank the alternatives in order of preference.

Discrete choice experiments simultaneously show respondents multiple hypothetical environmental policy scenarios. Each scenario (or 'alternative') is to be compared to the current situation (status quo). Each alternative is described in terms of a number of attributes, one of them being the cost of implementing that specific hypothetical scenario. All attributes can take different values (or 'levels') which are typically varied across multiple choice situations presented to the respondents. In each choice situation, respondents must choose their preferred alternative, i.e., the one that generates the highest utility for them. WTP estimates can then be inferred for each attribute due to the trade-offs respondents made with the cost attribute.

Paired ranking asks respondents to compare two alternate situations in terms of strength of preference.

Table 4: Strengths and limitations of choice modelling

Strengths	Limitations
Can be used to value a whole action and various attributes or effects of an action	Trade-offs may be hard to value due to unfamiliarity
Thinking in terms of trade-offs may be easier than thinking in terms of dollar values	Respondents may resort to simplified decision rules if the choices are too complicated, which can bias the results of the statistical analysis.
Respondents tend to be more comfortable providing qualitative ranking of attribute bundles	Contingent choice may extract preferences in the form of attitudes instead of behavioural intentions.
Relative values may be more accurate than total value and more useful in policy decision making	Translating the answers into dollar values, may lead to greater uncertainty in the actual value that is placed on the good or service of interest.
Minimises many of the biases present in the open-ended questioning of CV	
Potential to reduce problems such as expressions of symbolic values, protest bids, and some of the other sources of potential bias associated with contingent valuation.	

From Coggan et al. (2022)

2.2.3 Strengths, limitations and things to consider with WTP and WTA measures of value

Table 3 and Table 4 summarise the key criticisms of contingent valuation and choice modelling, the main methodologies used to establish WTP for non-traded goods. Vassilopoulos et al. (2020) provides a recent and comprehensive review especially focussed on the disparity between WTP and WTA studies. A summary of criticism and concerns include:

Hypothetical bias / Social desirability response bias:

- Tendency to inflate WTP or WTA in order to promote self-image (23-29% higher in face-to-face surveys compared to self-administered surveys)

Disparity between WTP and WTA for the same good:

- If a public good lacks a proper substitute, the ratio between WTA and WTP will be large even when the income effects are small. For example Horowitz and McConnell (2002) found that WTA is seven times higher than the WTP for the same good. Also, the further the good is from being an ordinary private good, the higher the disparity.
- Tuncel and Hammitt (2014) also find that within the category of non-traded goods, the disparity is higher for environmental and health and safety goods.
- Others suggest that transaction costs (Randall and Stoll, 1980), the endowment effect (Kahneman et al., 1990, Thaler, 1980) , costs of commitment (lack of opportunity to learn about the value of the good before committing (Zhao

and Kling, 2000) and experimental design flaws (Plott and Zeiler, 2007) could contribute to the disparity. However, Tuncel and Hammitt (2014) highlight that the disparity is smaller if participants have experience with an experiment and with trading the good. Tuncel and Hammitt (2014) also find that the disparity is smaller for experiments using student subjects and that there is no significant difference between studies using real or hypothetical transactions or between open or closed ended question formats. Further, studies using incentive compatible elicitation methodologies yielded smaller disparity for ordinary goods.

We concentrate on WTP and WTA derived from studies using contingent valuation, choice modelling, travel cost and hedonic pricing methodologies. We are interested in the WTP to use and protect marine parks. We focus primarily on WTP studies to understand dollar values of consumer surplus but also nuances of why participants were willing to pay for use and protection. We also explore WTA studies for marine and terrestrial park use to further understand what influenced users' acceptance of a use and/or protection charge.

It is important to note that there may be tensions between collection frames and value drivers. The collection frames are mainly about uses and immediate benefits but values for recreation are often for the whole experience not necessarily for a subset of benefits provided by GBRMPA. WTP in the context of user charge is probably a reflection of a subset of values.

3 Method

3.1 Literature review method

The literature evaluation method implemented for the report was based on the 'scoping review' methodology defined by Grant and Booth (2009). The aim of this technique was to provide a preliminary assessment of the scope and volume of existing literature and prevalent research gaps. The search, conducted between the 30th March 2022 and 30th April 2022 targeted a range of English papers from both Australian and overseas sources.

The review comprised of three phases, namely search, screening, and eligibility analysis (Figure 3). The databases accessed were Scopus and Web of Science. Relevant literature was sourced using various key word combinations, including "willingness to pay" "willingness to accept", "marine parks" "nature", "marine" "user pay" and "charge" Exclusion criteria for the search included sources with publication dates earlier than 2010 for WTP international literature and earlier than 2000 for Australian focussed literature, languages other than English, and publications outside of the first 30 results on Google Scholar. During the eligibility analysis phase, the remaining publications were systematically filtered using the following inclusion criteria: (1) focus on marine environments, (2) willingness to pay for use and protection, and (3) willingness to accept the introduction or increase in a charge (marine or terrestrial). A number of additional papers were also included during the eligibility phase. These were contributed to be the research group, steering committee and through the application of a snowball sampling approach. This was necessary due to the broad scope of the research topic.

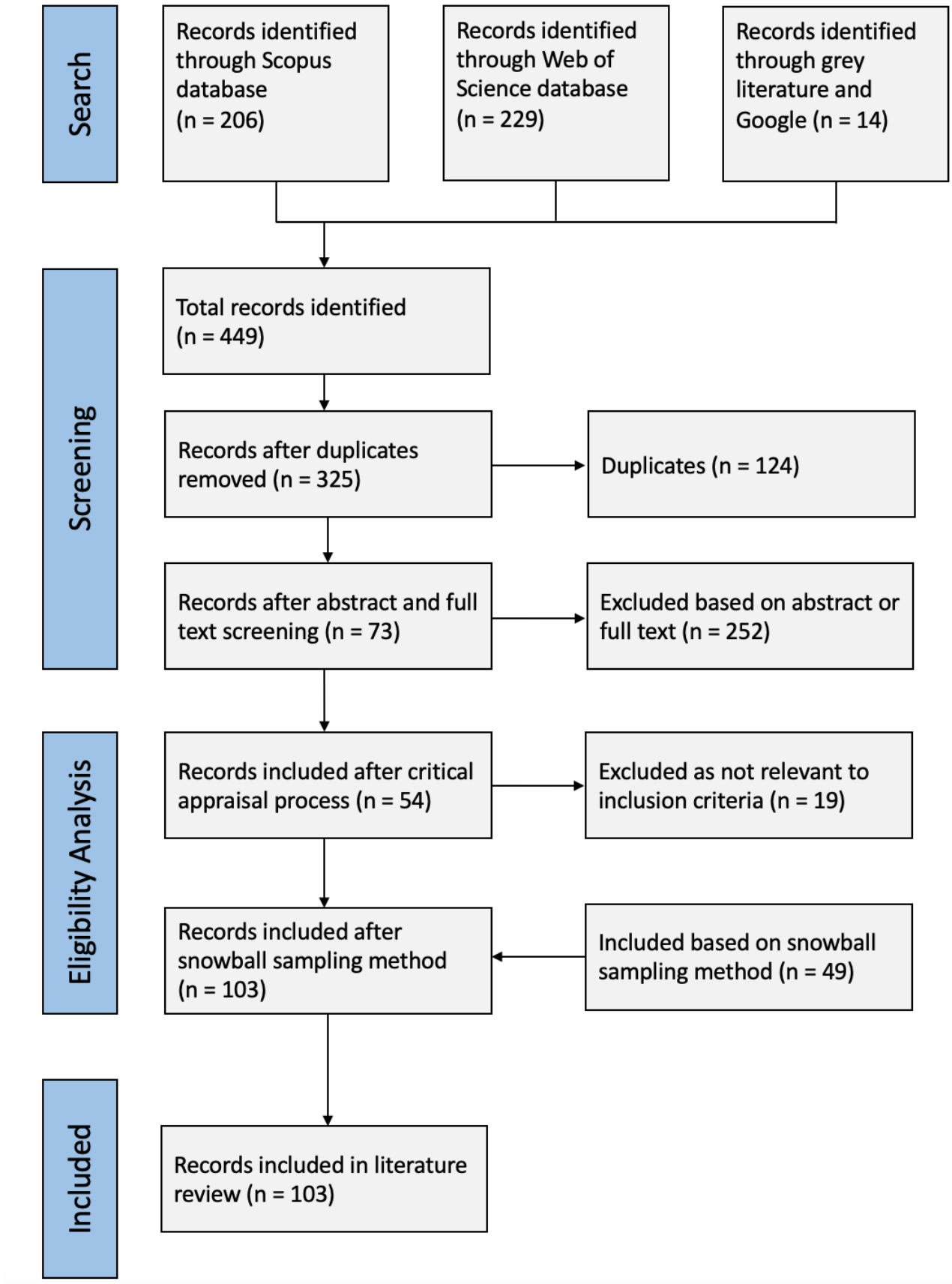


Figure 3: Literature review results

3.2 Method for understanding uses and users of marine parks

The resources of a marine park can be put to many uses by a variety of users. We apply the United Nations (UN) System of Environmental Economic Accounting, Ecosystem Accounting (SEEA EA) to unpack the potential uses and users of a marine park.

Uses of the marine park can be through:

- The provision of resources/experiences that are consumed. These are categorised as provisioning ecosystem services in the SEEA EA framework and include activities such as fish and non-fish biomass extraction as well as abiotic and non-extractive use of the marine park such as the provision of access through shipping channel services;
- The enjoyment of the regulating ecosystem service function of the marine park through activities such as nitrogen fixation (leading to maintenance of good water quality, carbon sequestration and the mitigation of impacts from climatic events such as coastal erosion in the event of a storm); and
- The enjoyment of the cultural ecosystem services provided by a marine park such as cultural and or recreational experiences. The SEEA EA framework includes the existence and option values for future use in the cultural services provided by the marine area.

Users of the marine park can be those who actively benefit from using, visiting, or being close to the area in question. Active users can be local (L)(living within 10km of the coast), regional (R) (living at a distance of greater than 10km from the coastline) or international households (I). Users also include those (L, R and I) who may not receive any direct benefits but value the existence of the marine park.

Users and uses of the marine park are summarised using the UN's SEEA EA approach in Table 5 and visually in Figure 4.

Table 5: Using the UN's SEEA EA approach to distil key * direct and indirect use and users of reefs

ECOSYSTEM SERVICE CATEGORY	ECOSYSTEM SERVICE USE	ECOSYSTEM SERVICE USERS					
		HOUSEHOLDS			TRADITIONAL OWNERS	INDUSTRY	GOVT
		LOCAL	REGIONAL	I'NATIONAL			
Provisioning	Fish biomass - WILD	X(RF) √	X(RF) √	X (RF)	X	X (CF)	
	Traditional owner medicine				X		
	Traditional owner food sources				X		
Abiotic provisioning	Shipping channel access (sand) – Dredging Shipping – transport***					X	X
Regulating	Nitrogen fixation	X	X		X	X	X
	Carbon sequestration	X	X	X	X	X	X
	Coastal protection	X				X	X
Cultural	Traditional owner cultural use – ceremonial, spiritual connection,				X (on country)		

ECOSYSTEM SERVICE CATEGORY	ECOSYSTEM SERVICE USE	ECOSYSTEM SERVICE USERS					
		HOUSEHOLDS			TRADITIONAL OWNERS	INDUSTRY	GOVT
		LOCAL	REGIONAL	I'NATIONAL			
	cultural, song lines, dreamtime/stories, health, heritage, continuity (past/future) etc.						
	Other spiritual, cultural, religious values (brand value)						
	Existence /option	X √	X √	X √	X		
	Leisure – diving, sun sand sea (SSS) tourists (snorkelling, swimming, beach recreation, sailing, jet ski), recreational fishing, cultural tourism**	X √	X √	X √		X (tourism industry)	
	Research / education				X		X
	Aesthetic	X					
	Artistic inspiration	X					
	Bequest value	X √	X √	X √			

Source: SEABORNE project
X's indicate how reef ecosystem services are used and who is benefiting from this use
√ indicates that literature on WTP exists for this user and use.
*** There are many more, but they are considered to be insignificant**
**** Tourism comprises the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes. (Australian Bureau of Statistics). WTP studies tend to classify cultural users as tourists and these are further categorised as SSS tourisms, divers, recreational fishers. Tourists can also be classified as nature-based tourists and non-nature-based tourists with the SSS tourists tending to fall into the latter classification. Some studies also separate out cultural heritage tourism (shipwrecks)**
***** Whilst this is an important category of use it needs to be treated differently in exploring WTP as charges cover risk and management costs**
RF is recreational fishing
CF is commercial fishing

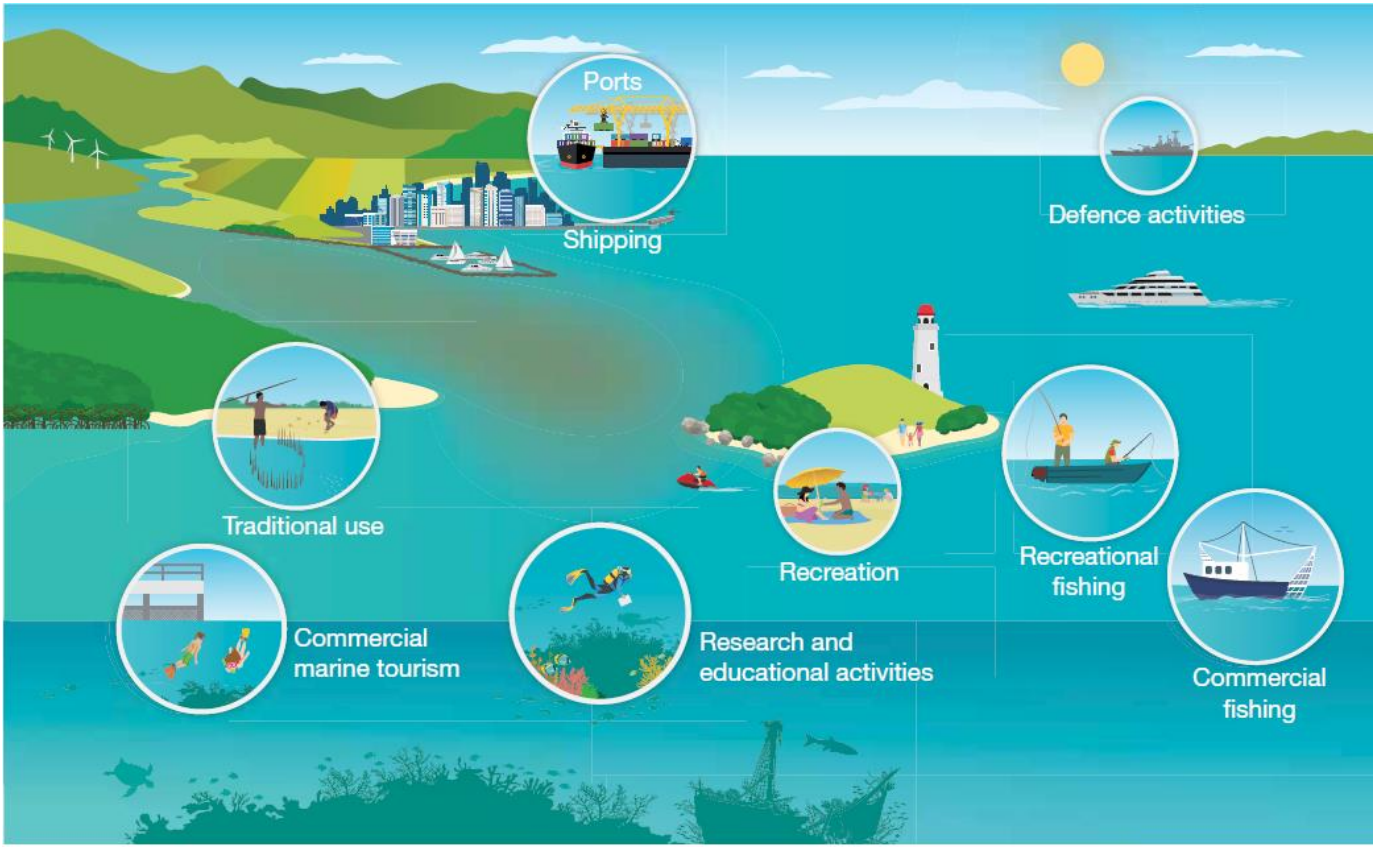


Figure 4. Commercial, non-commercial and traditional uses of the Great Barrier Reef (GBRMPA, 2019b)

3.3 Use of benefit transfer in this study

Benefit transfer is the use of pre-existing empirical studies (called study sites) from one or more settings to extrapolate economic values for a particular environmental good (called policy site) (Johnston et al., 2021). It is a feasible means of decision-making when time, funding, and other constraints impede conducting a primary valuation study for particular settings. Conducting a primary valuation for a complex ecosystem such as GBR is impractical and in such a situation, existing empirical studies for the GBR as well as similar settings can be used to inform the decision. It can be either unit value transfer or benefit function transfer (Johnston et al., 2015).

The unit value transfer includes a single unadjusted value, a value adjusted according to attributes, a measure of central tendency or range of estimates from prior studies.

The benefit function transfer use benefit function derived from primary one or set of prior studies to calculate a welfare estimate for selected characteristics of policy site (Johnston et al., 2015).

A crucial factor to be considered is the similarity between the GBR and study sites. Despite the long history of application of the benefit transfer method, the guidelines presented as Figure 5 ensure the credibility to support decision making. In the initial stage, the identification of (1) goods or services to be valued, (2) the policy or decision to be made, and (3) the type of value information required to support decision making is important (Johnston et al., 2021). In this report, the aim is to identify users and uses of GBR and propose a suitable recommendation to change the EMC.

First, the economic values of policy sites should be clearly defined with the welfare theoretical foundation. In the second important step is to search for information in systematic and

comprehensive manner to support benefit transfer including study sites. The selection of transfer method can be decided then, based on the data availability, similarity between study site and policy site, accuracy of estimation and intended uses. It is also important to note that there will always be changes in the biophysical and socio demographic characteristics of a location and the surveyed population. The implications of these changes need to be taken into account when considering the transfer of benefit/value estimates. That is, whenever necessary, data adjustment should be done to harmonize information across study sites and policy sites before data analysis (Johnston et al., 2021).

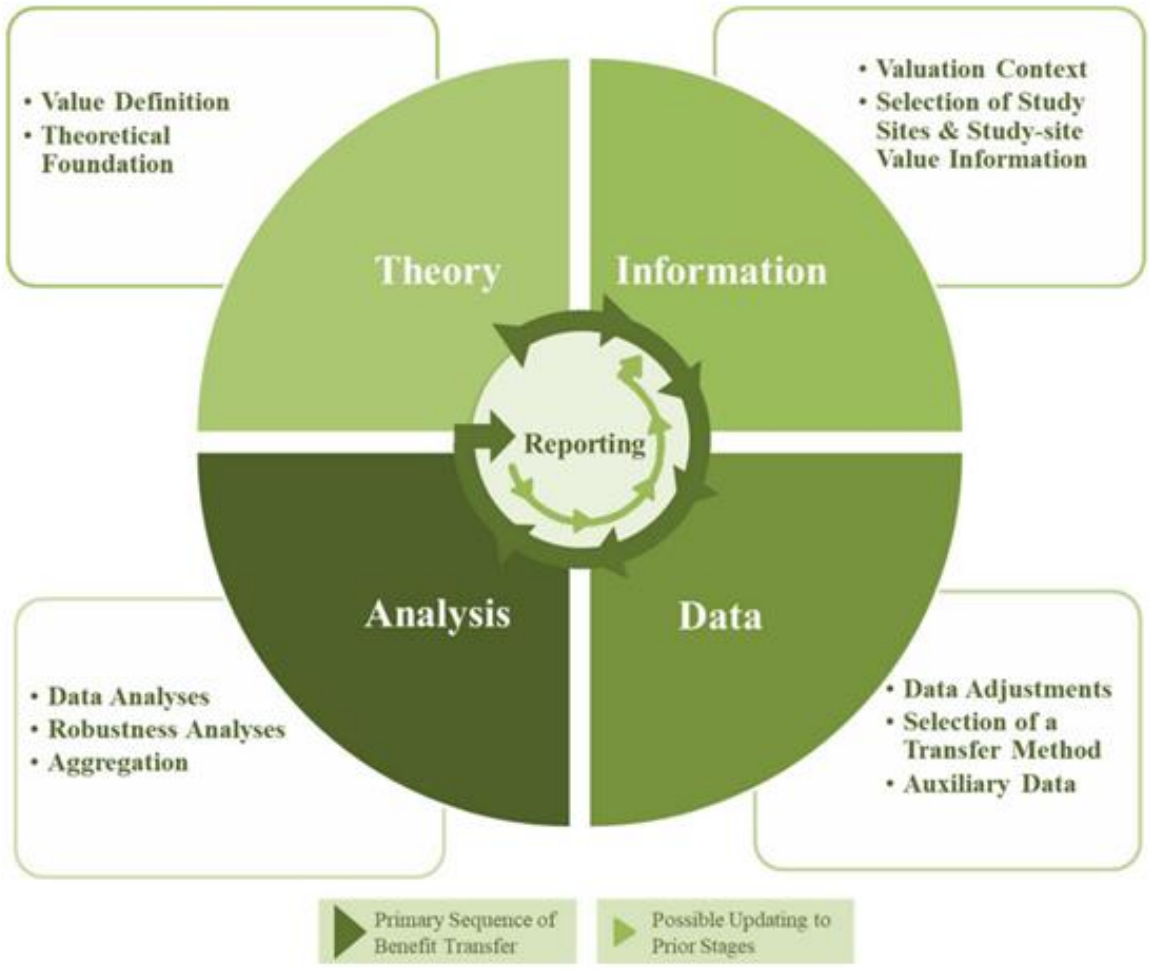


Figure 5: Procedure of benefit transfer

Adopted from Johnston et al. (2021)

Part 2 Review of international literature

4 Introduction

Despite the long history of environmental valuation research, globally, coral reef valuation studies largely commenced in the 1980s (Brander et al., 2007). Initially, valuation studies were conducted to identify resource users' WTP to prevent resource degradation or pollution. Later, researchers applied WTP methodologies to evaluate different use and non-use values of resources especially as these relate to policy decisions around financing management.

In our review of the literature, we found there to be 26 (non-Australian) publications, since 2010, focussing on WTP for use and/or protection of marine areas with a specific focus on marine protected areas (MPAs).

A summary of these international studies highlighting which uses and users were focussed upon and key findings regarding WTP or design which influences WTA a charge is provided in Appendix 1, Table 14.

5 What influences WTP for marine park use and protection in the international literature?

5.1 Type of use and user

5.1.1 Non-use

Both users and non-users value the marine ecosystem but the literature indicates that non-users of the marine park particularly value existence values (Torres and Hanley, 2017). This is due to people's preference to conserve the natural environment for future generations (Jobstvogt et al., 2014). In a recent study, Lewis-Brown et al. (2021) show 25-40% of the total WTP value of protected areas is directly related to the conservation (non-use) of the area. Xiao et al. (2021), in a study of conservation/ non-use values of tourists highlighted that the WTP for conserving these values differed between foci depending on their scarcity. In this study there was strong and consistent preference for higher WTP for conservation of scarce resources especially if they were considered charismatic – WTP was higher for reefs compared to beaches. Xiao et al. (2021) also found that conservation value was also highest when the respondents considered there to be less substitutability of the resources – they were unique. Brouwer et al. (2016), assessing beach visitors, coastal and non-coastal residents WTP to protect deep sea marine parks found that 70% of respondents were WTP an extra tax for their protection despite never having the option to visit these places. Interestingly, those visiting beaches and coastal residents had a higher WTP. Fishers also value bequest and conservation benefits but there is a wide variation in their values. Hicks et al. (2014) found that those who earn comparatively high income from fishing tend to place a higher value on bequest and conservation benefits.

Non-use value for conservation of marine parks was variable, however. For example, Cavasos and Bhat (2020) found that use (or non-use) of the resource has no impact on WTP for households when questioned about conservation of staghorn coral (but human impact did). Further, Kim and Yoo (2020), assessing acceptance and WTP for designating a new MPA in South Korea found that at least 64% of respondents to a CVM study reported a zero WTP.

- There is variation in WTP for non-use of MPAs. WTP tended to be higher for what respondents considered to be scarce, charismatic or iconic areas.
- WTP was higher for respondents with some connection with the area even if they weren't using it.
- In some studies with a random household sample, there can still be a zero WTP reported.

5.1.2 Direct use – recreational fishing

There are not many studies looking at WTP to use and protect MPAs from a fishing/fishers perspective in the international literature. Chen et al. (2014) explored fishers and local people's

attitudes to make a financial contribution to the management of MPAs explicitly for the conservation of fisheries resources. 90% of respondents were willing to contribute to fund the management of this type of conservation approach.

5.1.3 Direct use – commercial fishing

There is limited literature exploring the WTP of commercial fishers of the management of marine parks. Bodur et al. (2017) found that fishers in Turkey were WTP extra for the sustainable use of lake for commercial fishing. The WTP was affected by fishers knowing that the lake was a protected zone and also by the education level, experience in fishing, income, vessel ownership and retirement status of the fishers.

Millage et al. (2021) has looked at WTP to protect marine parks of commercial fishers in the context of conservation finance. Millage et al. (2021) introduce the concept of conservation finance areas (CFA) whereby a designated area is established around a no take fishing zone where fishing vessels can lease exclusive fishing rights. It is thought that the CFA would reduce poaching by enabling some fishing. The spill over from the MPA would create the demand for licences. This is similar to other user fee models such as tolls on highways and access fees to national parks. The viability of conservation access fee programs hinges on their ability to provide users access to sites that are both desirable and accessible. Essentially, access fees capture users' WTP and use the funding to maintain desired conservation outcomes. There is an emerging literature on sustainable ocean financing that investigates the role and opportunity for the private sector in financing ocean conservation initiatives (Sumaila et al. (2021)).

5.1.4 Direct use – SSS tourists

SSS tourists are those who visit a location for the sun, sand and sea in order to sunbathe, snorkel and swim but not necessarily to participate in any explicit consumptive (fishing) or experiential (diving and snorkelling) activities. SSS tourism is low cost and SSS tourists overall have a more casual interest in visiting sites. Overall, SSS users tend to have a lower WTP for use and management compared with specified use users. This has been found particularly by Witt (2019) who also notes that general SSS tourists are those who frequently use the sites and are less supportive of increasing the entrance fee. Lower WTP for repeat visitation was also found for SSS tourists on boat tours (Smith et al., 2016). However, this is not a consistent finding. Casey and Schuhmann (2019) found that repeat visitors were more WTP conservation fees in a study focussed on exit fees in Belize and Uyarra et al. (2010) also highlights that the location can impact on the response with their finding that repeat visitors are WTP a higher amount compared to first time visitors in the Bonaire MP.

- SSS usually have higher frequency of use of sites but lower WTP than explicit purpose tourists.
- Location of visit can influence this finding.

5.1.5 Direct (explicit purpose) use tourist - diving

There is extensive literature documenting WTP for use and/or protection of marine parks for divers. Overall, divers are generally WTP a charge and accepting of higher charges. The literature did note a number of factors that impact on WTP. Schumann et al. (2019) highlight that divers would be WTP a higher use charge but only if the dive experience was of a certain quality. Quality was related to coral quality, fish species diversity and sightings of iconic/charismatic species such as turtles as well as low crowding of dive sites. Experienced travellers with high environmental awareness (specific use nature focussed tourists) were willing to pay the most in the study by Schumann et al. (2019). WTP amount was affected by origin. Pascoe et al. (2014b) report a substantial difference in WTP between local divers and international divers in Southeast Asia (with international WTP more). Local divers were WTP less than foreigners in Mozambique (Daly et al., 2015). Thur (2010) reports that the dive charge could increase sixfold without impacting on visitation levels in the Bonaire Marine Park (MP) however Uyarra et al. (2010) reported that only 46% of divers would be WTP more than the 2010 fees with higher tolerance for fee increases from repeat visitors.

- Explicit purpose tourists such as divers generally have a high WTP. These tourists tend to be more nature based in their tourist demand.
- Degree of acceptance of an increase in charge depends on the quality of the dive experience especially the siting of iconic species.
- Locals tend to be WTP less than foreigners.

5.1.6 Direct use/regulating services

Whilst not peer reviewed literature, Iyer et al. (2018) have reviewed finance mechanisms for reef conservation. Within this is a recognition of the role that reefs play in coastal erosion management and an assessment of reef insurance to pay for this 'use'. The only example of this occurring is in Mexico where hotel owners in the state of Quintana Roo have partnered with the state government and Swiss Re to create and fund a coastal zone management trust. The trust funds coral and beach maintenance and insurance policies guaranteeing payouts in the case of extreme weather events. Payouts are parametric and tied to a pre-determined metrics of damage.

5.1.7 WTP for cross sectional issues – terrestrial with water quality benefits

WTP has been estimated considering different policy scenarios, such as onsite management, and terrestrial conservation (Roberts et al., 2017). Beach recreational activities can be enhanced by reducing pollution, but it needs public investment that can be explored by means of estimating the WTP value. For instance, Awondo et al. (2011) showed that the people's WTP for restoring wetlands reduces beach contaminations, and on the other hand, Roberts et al. (2017) showed scuba divers at Island of Bonaire were willing to pay USD31.17-413.18 to reduce overgrazing in the adjacent catchment to reduce pollution and improve water quality. A similar study in Guam shows the WTP value is USD10 for reducing the sedimentation to improve the quality of reef and increase fish populations. Nelson et al. (2019) showed that tourists in Indonesia are willing to

donate to bundled land sea conservation issues and will donate more when the treatment conditions are known and made explicit.

5.1.8 Summary of literature available on use and users of marine parks

Table 6 provides a summary of which uses for what users are covered in the international literature. X's indicate where reefs are likely to be used and green box's with √ indicates that literature on WTP exists for this user and use. Yellow highlight boxes indicate some emerging literature about use and benefit but not as WTP.

Table 6: Use* and users in the international literature

ECOSYSTEM SERVICE CATEGORY	ECOSYSTEM SERVICE USE	ECOOSYSTEM SERVICE USERS					
		HOUSEHOLDS			TRADITIONAL OWNERS	INDUSTRY	GOVT
		LOCAL	REGIONAL	I'NATIONAL			
Provisioning	Fish biomass - WILD	X (RF) √	X (RF)√	X (RF)	X	X (CF)	
	TO medicine				X		
	Traditional food sources				X		
Abiotic provisioning	Shipping channel access (sand) – Dredging Shipping - transport					X	X
Regulating	Nitrogen fixation	X	X		X	X	X
	Carbon sequestration	X	X	X	X	X	X
	Coastal protection	X				X	X
Cultural	TO – ceremonial, spiritual connection, cultural, song lines, dreamtime/stories, health, heritage, continuity (past/future) etc.				X (on country)		
	Other spiritual, cultural, religious values (brand value)						
	Existence	X √	X √	X √	X		
	Leisure – diving, sun sand sea (SSS) tourists (snorkelling, swimming, beach recreation, sailing, jet ski), recreational fishing, cultural tourism	X √	X √	X √		X (tourism industry)	
	Research / education				X		X
	Aesthetic	X					
	Artistic inspiration	X					
	Bequest value	X √	X √	X √			

*** There are many more, but they are considered to be insignificant**
X where used
Green box with √ indicates that literature on WTP exists for this user and use
Yellow box indicates some emerging literature but not WTP yet

5.2 Socio demographics of users

WTP is generally affected by socio demographic factors such as purpose of trip, income, professional category, lodging type and frequency of trip (Tongson and Dygico, 2004). Shrivastava and Mukhopadhyay (2022) also found that status as local (local and regional) or foreign influenced WTP with foreign respondents WTP user fees being greater than that of local/domestic residents. Among the international tourists, their WTP vary based on their country of origin (Clifton et al., 2021). In addition to personal or household income, wealth of the country also an influencing factor on WTP (Jacobsen and Hanley, 2009). Table 7 provides a summary of the relationship between socio demographic factors and WTP.

Table 7: Socio demographic impacts on WTP

REFERENCE	SOCIO DEMO FACTOR	IMPACT ON WTP (WHERE SIGNIFICANT)
Xiao et al. (2021)	Income	Positive
	Education	Positive for conservation of non-use values of marine tourism resources
Insafitri et al. (2020)	Age	Positive
	Education	Positive
	Income	Not significant
Schumann et al. (2019)	Income	Positive
	Country of origin	Positive
Trujillo et al. (2016)	Income and education	Positive
	Age	Negative
Piriyapada and Wang (2015)	Income, education	Positive
	Age	Negative
Daly et al. (2015)	Age and Income	Positive
	Country of origin	Positive (for non-residents of the study site; negative for residents)
Mamat et al. (2013)	Age, Education, Income	Positive
	Country of Origin	Positive (WTP for foreigners to contribute to conservation effort)
Gelcich et al. (2013)	Education	Positive
	Income	Not significant
Peters and Hawkins (2009)	Education, Income	Positive
	Environmental awareness	Positive
	Country of Origin	Mixed (Seems to be an unreliable indicator and of less relevance in setting fee levels)
	Age	Negative (older lower WTP)
Ahmad and Hanley (2009)	Country of Origin (FL)	Positive

	Education, Age	Not significant
Togridou et al. (2006)	Country of Origin	Positive (higher WTP for **domestic** visitors particular for existence and bequest values)
	Education (about environmental issues)	Positive
	Income	Positive

Note: Positive means as one variable increases, the other also increases – eg, positive relationship between age and WTP for MP use and protection indicates that as age increases, WTP also increases and vice versa

5.3 WTP and elasticity of demand to price change

Price elasticity of demand is the measure of the percentage change in demand for a product as a result of a one percent change in price. Price elasticity is an important concept in decision-making, particularly in changing entrance fees or environmental charges because it identifies whether increases in price might significantly lower participation and revenue as a result. Inelastic demand suggests that demand for the product will not change significantly with a change in price. Elastic demand, on the other hand, indicates that a small change in price will have a significant impact on demand. Elasticity of demand is a phenomenon that needs to be taken into account when considering a change in price such as a change in use charge or an expansion of a user charge to new users.

Casey and Schuhmann (2019), in a study of tourists WTP an increase in fees for conservation in Belize shows that price elasticity of high-end tourists is inelastic. This result is consistent with findings by Pascoe et al. (2014b) for dive tourism in Indonesia, Thailand and Malaysia and Witt (2019) in an assessment of general visitors to five Mexican protected areas (increase fee by 26% resulted in a change in visitation by 5%). Kamri (2013), in a study of general visitors in Malaysia, also found that price elasticity of demand was relatively inelastic and that this was particularly the case for recreational activities when the proportion spent on the activity was low. Of note is the potential difference in elasticity of demand between domestic and international tourists. Pascoe et al. (2014b) found that the average price elasticity for domestic tourists is -0.1 whereas the figure for international tourists is -0.3—a price change has less impact on international compared to domestic tourists (this could be because they have already spent a lot to get to the destination).

The importance of understanding elasticity of demand coupled with user profiles and perceptions about current pricing is highlighted by Bruner et al. (2015). Here it was recognised that different parks had different demand elasticity which called for different approaches to fee changes. For example, Serengeti had high numbers of non-resident with inelastic demand enabling a large fee hike. Visitors at Kiliminjaro already perceived use fees to be high, expressing elastic demand and resulting in a recommendation of a zero change in fees.

- Visitation demand to marine parks is fairly inelastic to price changes. This seems to be consistent across high end and visitors taking part in low cost SSS activities.
- If anything, demand for access is even more inelastic to price changes for international visitors compared to domestic.

- Understanding price elasticity of demand coupled with visitor types and perceptions of current fees can help inform where changes could be made and where charging systems should remain unchanged.

5.4 Substitutability of the experience

Perceptions of substitutability seemed to influence WTP. Xiao et al. (2021) found that conservation value was highest when the respondents considered there to be less substitutability of the resources – they were considered to be unique. This corresponds to findings by Getzner et al. (2017) who found that sailors who visited Croatian marine parks had more frequent visitation (compared with ferry transported tourists), but lower WTP. Getzner et al. (2017) concluded that this is because of the high number of substitutes that sailors can access compared to tourists visiting marine parks on a ferry. In this same study Getzner et al. (2017) noted a lower than expected WTP by ferry transported tourists. This finding was also explained with respect to substitutability. Getzner et al. (2017) suggests that not having a readily available substitute on hand makes responses to WTP questions more cautious.

- WTP was higher when the experience was not considered easy to substitute.
- But this lack of substitutability could also see lower than expected WTP amounts as respondents may feel trapped.

6 What influences the acceptability/palatability of a charging framework (insight from the literature on WTP for use and protection of marine parks and broader literature on WTA user charges)

6.1 Design of payment scheme

6.1.1 Standardised or discretionary pricing (and how to discriminate)

Pricing of access to protected areas tends to be either standardised user pays or discretionary/tiered payment schemes. Walpole et al. (2001) suggest that pricing strategies should be based on policy objectives and information about consumers WTP. Others (Pascoe et al., 2014b, Shrivastava and Mukhopadhyay, 2022, Tongson and Dygico, 2004) would add understanding price elasticity of demand and socio demographics including place of origin (local, regional, international) as key factors to consider when designing a user pay system.

Standardised low pricing may be socially acceptable in that it does not discriminate between visitors on the basis of economic wellbeing. Plus, because it maximises visitation it also generates the greatest local benefits from tourism. However, it may be inefficient as it does not capture the whole value from visitors. Low pricing may also be politically unacceptable because the domestic population are effectively subsidising foreign visitors. A revenue maximisation approach also has some problems. Large increases in fees could result in a decline in visitor numbers which may have flow on implications to the local economy. This is also likely to be politically unpalatable.

Walpole et al. (2001) suggests that a politically defensible approach is one of recovering the direct costs of supplying the tourism product. But this alone is challenging. Davis et al. (2019) looks at costs to establish a MPA but does not go as far as to consider or assess who would pay and how payment could occur. MPA operational costs are also likely to be more expensive compared to terrestrial parks. This is due to the infrastructure required for monitoring and enforcement of marine areas (ships, radars, satellites). Technology development is reducing costs, but more is needed to understand the potential. Even where costs and CVMs have been used, their evaluation reveals that most pricing schemes do not cover the full cost of upfront and ongoing management. For example, Shrivastava and Mukhopadhyay (2022), in a study to understand the potential for visitor fees to finance a marine park in Chile, found that this could cover 10-13% of the protected area running costs (Gelcich et al., 2013). A two tiered pricing scheme (different fee for local and foreign divers) for the Tubbataha reef in Philippines is generating enough revenue to cover 28% of the annual running costs and 41% of the core costs to protect this reef (Tongson and Dygico, 2004)

Because it is difficult to identify the specific costs to be recovered, one practical approach is to set a fee level that offsets best estimates of use related costs and reflects WTP without discriminating against certain user groups. Additional adaptations could further avoid discrimination against domestic visitors. These include a dual and even third degree pricing discrimination where

domestic visitors pay less than foreign visitors (this occurs in Bonaire see Thur (2010) and Uyarra et al. (2010) - dual). Or where different prices are charged for domestic local and regional and international visitors (Shrivastava and Mukhopadhyay, 2022). Dual pricing could also be established between package and independent visitors.

Knowledge of the market is critical when it comes to any payment scheme differentiated across users. This is demonstrated by the experience reported by Bruner et al. (2015) (see section 5.3). Getzner et al. (2017), when discussing the different user types and WTP to visit Croatian marine parks, suggests differentiating the payment scheme three ways - capturing consumer surplus from sailors through a national flat fee permit system, an overnight tourism tax for ferry based visitors and annual passes for frequent non-sailor visitors. Tongson and Dygico (2004) highlight that revenue raising schemes must target domestic and foreign users of a marine park in order to be sustainable even with market volatilities.

- Price should cover the direct cost of supplying the tourism product component of Marine Park management.
- But marine parks management is usually more expensive than that of terrestrial parks.
- Technology improvements for monitoring may influence this in the future.
- Differentiated pricing (dual or third-degree pricing) may improve the capture of consumer surplus. It is critical to know the type of uses and users and perceptions of costs and elasticity of demand to establish an effective differentiated pricing scheme. However, transaction costs of such an approach, may outweigh the benefits.

6.1.2 Frequency of payment

Shrivastava and Mukhopadhyay (2022), in an analysis of WTP for protected areas (marine and terrestrial) studies in Asia find that the frequency of payments is statistically significant to the result at the 1% level with a negative coefficient. This indicates that respondents are willing to pay less with one-time payments (defined as entrance or conservation fees) compared with annual payments. However, it depends on the users and research have suggested different payment options. Frequent visitors to the site may prefer an annual payment while less frequent visitors prefer to have one day passes (Getzner et al., 2017).

- Payment schemes are considered most palatable if they are linked to covering the cost of providing an ongoing tourism resource.
- The geography of marine parks tends to generate high costs so cost coverage may not always be possible. More is needed to understand costs.
- If a differentiated payment scheme is pursued, user profiles including elasticity of demand need to be constructed to best enable design and low cost capture of payments.
- Annual payments may be considered more acceptable compared with onetime payments (but the transaction costs of this need to be taken into account).

6.1.3 Method of fee collection

How a fee is collected can influence the acceptability of the fee and the efficiency and effectiveness of the user charge program. Smith et al. (2016) note that where tour operators are expected to collect the fee from their customers, tour operators may need an incentive to make this happen. Compensation for their time through a small percentage of the fee may be a way to improve fee collection. Uyarra et al. (2010) reported a substantial incidence of fee evasion by non-divers in the Bonaire dual fee scheme. The cause of this was the reluctance of the hotels to collect the fee more so than tourists' unwillingness to pay the fee. In fact, Uyarra et al. (2010) showed that 90% of tourists were keen to pay the fee. Simple communication of this fact could improve the efficiency and effectiveness of the fee collection process.

Depondt and Green (2006) note that attitude towards having a user fee system is related to the presence of a fee system. Where there is currently a fee system there is a positive attitude towards a fee system helping with the management of the park.

- Information about willingness to be charged as well as a financial incentive for implementing the charge could help with collection of charges from tour operators and hotels.
- Users tend to be more accepting of a fee (increase) when a fee system already exists.
- The low-cost ability to capture charges from SSS tourists needs to be investigated. Could a tax be included on parking meters?

6.1.4 Transparency and accountability (payment linked to problem)

Across the literature for marine and terrestrial park management it was commonly found that transparency of use of the fees/taxes in the management of the park specifically and/or impact of tourism had a significant bearing on the acceptance of a charging scheme and/or an increase in a tax or fee for the use of a protected area (Juan Cardenas-Garcia et al., 2022, Schumann et al., 2019, Casey and Schuhmann, 2019, Faizan et al., 2016, Smith et al., 2016, Daly et al., 2015, Iranah et al., 2018, Biggs et al., 2016, Walpole et al., 2001, Bruner et al., 2015). Walpole et al. (2001) also reported that tourism operators would be WTP an increase fee if they knew that money raised was reinvested into the park. In addition to reinvestment, many studies reflected that information needs to be made available to park users and tourist operators on the use of the funding (Walpole et al., 2001, Tongson and Dygico, 2004).

Generally found that users were WTP more if it is known that money raised is reinvested into the management of the natural space and that there is information about this available to those who pay fees.

Tongson and Dygico (2004) in their exploration of successful user fee systems for marine parks across the world, also note the significance of active participation by the tourism sector, information dissemination, awareness raising, multi-tiered pricing, transparency in fee collection and disbursements, monitoring of visitor arrivals before and after the establishment of a fee system or fee increase, clear arrangements on revenue sharing and ear marking funds specifically

for conservation activities—as significant components of user fee charge acceptance. Tongson and Dygico (2004) also highlight that fees also function as a permitting and regulatory instrument to control visitor volumes and activities. The permit serves as a licence for dive boats to enter the park and allows monitoring of visitor arrivals and activities.

7 Other insights from the international literature which can inform palatability and acceptability of a payment scheme

We set out to explicitly understand the impact of equity, adaptability of the payment process, efficiency, use of technology, impacts on partnership legacy on acceptability and palatability of a payment scheme. Below we provide some insights into where the literature exists and highlight where gaps in understanding remain.

7.1 Equity

Many WTP studies focussed on MPA occur in developing nations. Because of this, the literature focusses on the impact of a fee increase on the local economy, highlighting that, at some stage, the benefit of increased entrance fees is offset by greater losses to the local economy (Walpole et al., 2001).

Suggestions are made on how to overcome the equity impact of a fee increase (if the impact spills over to have a negative impact on the local economy). Barnes (1996) suggests that the income inequity that can arise from high priced, exclusive tourism could be managed by a redistribution of income among neighbouring communities and households. Bruner et al. (2015) note the critical nature of working with stakeholders to accommodate a changing fee structure and collecting data on high season visitation as well as perception issues of reducing fees if predictions of visitor behaviour is wrong - they suggest a planned and stepwise approach to increasing fees. Overall, understanding price elasticity of demand can assist in setting prices such that the risk of revenue reduction is reduced.

7.2 Adaptability of payment processes

Only Bruner et al. (2015) considered how to make fee increases adaptable. In this case the concern is around how to manage a process of adjustment if the information around elasticity is incorrect. Bruner et al. (2015) suggest a planned and transparent step wise approach towards a major fee increase supported by monitoring of visitor data.

7.3 Efficiency of payment schemes

Depondt and Green (2006) noted that user fee systems are costly to administer and suggest a solution could be a revenue collection and charge system where operators pay fees for their tourists on a monthly or quarterly basis. Thur (2010) highlight the transaction cost considerations when deciding on who and how to tax users of a marine park. Increasing the price of a dive tag is a lower transaction cost way of raising revenue for marine park management compared with attempting to collect a use fee from other users such as wind surfers, swimmers and snorkelers.

The reason for this is mainly related to the ease of applying the tax to dive tags as all divers require compressed air for tanks for shore dives or boat services for offshore trips. That is, there is always institutional contact which increases ease of tax extraction. Also, divers are accustomed to purchasing dive tags which will decrease the transaction costs of implementation. Alternative approaches such as voluntary options with online payment processes may be an efficient way of enabling voluntary contributions. This could be coupled with a reward program to showcase GBR conservation support.

7.4 Use of technology

No literature

7.5 Legacy impacts of payment schemes

No literature

8 Questions that should be answered when introducing or adjusting a charge for protection and/or use of a marine park?

Based on the review of the international literature, a number of questions emerge that can be used to guide the process of introducing or adjusting a charging framework for MP use and protection for the GBR. These are articulated below as Figure 6. These questions are referred to in the review of the literature for the GBR.

Figure 6: Questions to be answered when introducing or reviewing a charge for marine park use and protection

Questions about Users (and non-users) of the Marine Park

Question U1. Who are the users and how are they using the marine park?

- Who are all the potential uses (incl non-use) and users of the marine park?
- What is known about who is using and how they are using the marine park?
- What is valued and what are users willing to pay for (does WTP/CS values exist for all user types)?

e.g., SSS tourists are willing to pay for clean beaches, good amenities. Explicit use tourists such as divers are willing to pay for high quality dive sites with sightings of scarce, charismatic or iconic assets.

Question U2: What are users' perceptions of current pricing for protection and use?

Question U3: What are non-users' perceptions of current ways to contribute to GBRMP conservation?

Question U4: How would users respond to a change in price?

- How responsive is demand for the resource/experience to a change in use price? (Price elasticity of demand)
- How resilient is the local economy to changes in revenue/opportunity if response is elastic and tourism numbers drop?
- How substitutable are GBRMP experiences (can users go elsewhere and get the same experience?)

User profiles can help with this, e.g. high end international tourists tend to have inelastic demand, Explicit use tourists tend to have inelastic demand, SSS tourists tend to have more elastic demand

Question U5: What influences users' acceptance of a charging scheme?

- How will funds be used and how can this be communicated to users/payers?

E.g SSS tourists would like to see clean beaches, good amenities. Divers are WTP for dive

Questions about the Design of a charging scheme (implementation and alteration)

Question D1: what will users pay? Cost cover or additional?

- Is the cost of managing tourism and the cost of conservation known?
- Who should pay (what would be the benefits and costs of charging based on origin, experience type etc – tiered pricing?)
- What will users pay? The same regardless of origin and use? Differentiated by origin and/or use?

Is the annual amount of $$ to be raised known?

Question D2: When will users pay?

- What would be the benefits and costs of charging at or over different time periods (single ticket, charge per use, annual fee etc?

Question D3: How will charges be collected?

- To what extent can tourism industry assist with fee collection
- Are there new/alternative ways to finance management? E.g., can you lease fishing rights to some parts of a MP to raise money for conservation
- Can you collect a fee from non-users?

Question D4: What are the benefit and costs (including enforcement costs) of different charging arrangements?

Part 3 Review of literature for the Great Barrier Reef

Hardy Reef

Photo credit: Matt Curnock

9 Introduction

In our review of the literature, we found there to be 22 peer reviewed publications focussed on WTP for use and protection of marine parks in Australia with 20 of these focussed explicitly on the GBR. To include as much relevant literature as possible, we assessed literature from 2000. A summary of Australian focussed studies, highlighting which uses and users were focussed upon and WTP amounts is provided in Appendix B, Table 15.

In the remainder of this section, we evaluate the Australian marine park literature (focussing primarily on GBR literature) following the questions generated in Part 2 and summarised as Figure 6.

It is important to note that all studies reviewed occurred before the Covid 19 pandemic. It is possible that the sentiment of domestic and international tourists around pricing could have changed.

10 Addressing question U1 - Who are the users (and non-users), how are they using the MP and what is their value for the GBR?

In this section we seek to address question U1 generated from the review of the international literature. Specifically, we explore, what is known about:

- Users and non-uses of the GBRMP?
- What users' value about the GBRMP?
- What users of the GBRMP are willing to pay for?

Because this part of the review focusses on Australian and GBR literature, we articulate what is known about WTP and provide 2021 adjusted figures for WTP from user groups.

10.1 Non-users

Possibly the most comprehensive study into the non-use values of the GBR was conducted by Rolfe and Windle (2013). Although this study explicitly set out to explore specific components of choice model design (by assessing preferences for labelled management options and outcome uncertainties in responses), a focus on Brisbane respondents generates a valuation for the non-use value of GBR protection. The results showed that where management actions were specified and labelled on the choice card, the average WTP for a 1,000km squared improvement in the condition of the GBR was A$7.91 (adjusted for 2021 $9.13) each year for 5 years for an improvement in 25 years' time and A$6.26 (adjusted for 2021 7.22) each year for 5 years for an improvement in 25 years' time when management options were not specified. This highlights that people are more likely to support additional protection measures when they know how they will be implemented. Rolfe and Windle (2012) demonstrate that the non-use WTP figure tends to decrease the further the respondents are from the resource in focus. This is referred to as distance decay. Data of WTP for conservation of the GBR by non-users is summarised in Table 8.

Based on Table 8 it can be said that non-use values for the GBR for respondents located in Queensland are A$36 per person (annual payment for 5 years to generate a 1% improvement in coral health in 25 years) which range from A$18.48 to A$66.44. Respondents from other Australian states (Sydney, Perth and Melbourne) are willing to pay A$45 annually for 5 years to improve the health of the GBR in 25 years. These values are all 2021 adjusted values.

Table 8: Summary of known non-use values of GBRMP

REFERENCE	METHOD	LOCATION	WHAT IS BEING MEASURED?	NON-USE VALUE	VALUE (ADJUSTED FOR 2021) $ PAID EACH YEAR FOR 5 YEARS
Rolfe and Windle (2013)	DCE	Brisbane	WTP for 1000km ^{2} condition of the GBR in 25 years in the future	$7.91 each year for 5 years (when management options were specified)	$9.13
				$6.26 each year for 5 years when management options were not specified	$7.22
Rolfe and Windle (2012)	CM	Townsville	WTP for a 1% improvement in GBR condition each year for a 5 year period for an improvement in reef health in 25 years in the future	$38 each year for 5 years	$44.92
		Brisbane		$31 each year for 5 years	$36.65
		Sydney		$20 each year for 5 years	$23.64
		Perth		$18 each year for 5 years	$21.28
Rolfe and Windle (2011)	CM	GBR Coastal	WTP (each year for 5 years) per 1% increase in coral reef in good health in inshore areas	$55.23 each year for 5 years	$66.44
		Brisbane		$23.91 each year for 5 years	$28.76
		Melbourne		$43.30 each year for 5 years	$88.09
		Perth		$40.68 each year for 5 years	$48.94
Rolfe and Windle (2010)	CM	Townsville	WTP (each year for 5 years) for 1% of coral reef in inshore areas	$18.60 each year for 5 years	$23.11
		Brisbane		$14.87 each year for 5 years	$18.48

10.2 Recreational fishers

The value of recreational fishing in the Great Barrier Reef has been assessed by Farr and Stoeckl (2018), Windle et al. (2017), Rolfe et al. (2011) and Prayaga et al. (2010), and in other Australian marine parks by Pascoe et al. (2014a) (Moreton Bay) and Ezzy et al. (2012) (game fish – South Australia). All recreational fishing values have been derived using TCM to generate consumer surplus, rather than WTP.

Windle et al. (2017) (taking values in 2014 through to 2016) show that whilst Gladstone Harbour in the Southern end of the GBR, is used more frequently for beach visits and land recreation compared with recreational fishing, the trip value (measured using TCM) for recreational fishing was worth, on average A$143.16 per trip (compared to A$35.01 for beach recreation and A$61.44 per trip for land based recreation around the Gladstone harbour). Windle et al. (2017) suggest that, given that Prayaga et al. (2010) estimated recreational fishing values (through TCM) at A$166.82 per angler per trip on the Capricorn Coast and Pascoe et al. (2014a) (through TCM) has estimated recreational fishing value at between A$60 and A$110 per trip on Morton Bay, that the value and recreational fishers WTP will be very site specific. Focus of recreational fishing trips (i.e big game fishing) also influences WTP with Ezzy et al. (2012) estimating WTP to be between A$33 and A$132 per person per trip in a South Australian study. Since the study by Windle et al. (2017),

Farr and Stoeckl (2018) have estimated the value of recreational fishing off Townsville to be between A$407 and A$433/trip. [4,5]

While most of the researchers have used TCM in valuing recreational fishing, some researchers have used CVM (see, Campbell and Reid (2000) and choice experiments (Huang et al., 2020). The CS for boat fishing is slightly higher than shore fishing (Campbell and Reid, 2000). Using CV method, Yamazaki et al. (2013) valued inshore recreational and rock lobster fishing in Tasmania and estimated WTP values of A$120.97 and A$168.98 respectively.

Data of value for recreational fishers as represented by consumer surplus is summarised in Table 9. Given that the only study reflective of recreational fishing in the GBR is that by Prayaga et al. (2010), the value for recreational fishing in the GBR can be said to be ~A$200/person/trip (adjusted for 2021).

Table 9: Value of recreational fishing on the GBR

REFERENCE	METHOD	LOCATION	WHAT IS BEING MEASURED?	RECREATIONAL FISHING VALUE	VALUE ADJUSTED FOR 2021
Farr and Stoeckl (2018)*	TCM	Townsville	Consumer surplus before outing	$407/person/trip	$429/person/trip
			Consumer surplus after outing	$433/person/trip	$456/person/trip
Pascoe et al. (2014a)	TCM	Moreton Bay	Consumer surplus	Between $60 and $110/person/trip	Between $68 and $124/person/trip
Ezzy et al. (2012)	TCM	South Australia	Consumer surplus (big game)	Between $33 and $132/person/trip	Between $39 and $156/person/trip
Prayaga et al. (2010)	TCM and CBS**	Capricorn Coast	Consumer surplus (Based on CBS)	$167/person/trip	$208/person/trip
Campbell & Reid (2000)	CVM	South Queensland	WTP	$40.47/person (boat fishing) $15.14/person (shore fishing)	$67.62/person $25.30/person

*** High because this is high end multi day trips**

**** Contingent Behaviour Survey**

Dark shade are not GBR and not included in averages

10.3 Commercial fishers

No data on WTP use charge for commercial fishers in the GBR.

[4] Recreational fishing studies are usually discussed in terms of /trip. In most cases a trip is a day trip.

[5] Recreational fishing is boat based unless specified otherwise. Where recreational fishers went on their trips and if they brought home all of their catch was not discussed in any of the studies

10.4 SSS tourists

The value of reef visits for GBR SSS tourists has been derived using both travel cost (consumer surplus) and contingent valuation methodology (WTP) (Table 10).[6]

The studies by Windle and Rolfe (2019) and Windle et al. (2017) were conducted to assess the ability to use TCM in different regions and/or for different recreational activities in benefit transfer. From a regional transferability point of view, it was found that the consumer surplus values for beach recreation in Cairns and Mackay were the same but were very different from those in Townsville, Fitzroy, Gladstone and Bundaberg (which were, between them, similar). Windle and Rolfe (2019) suggest that broader regional valuations are more transferable than smaller scale valuations. Windle et al. (2017) highlight those values cannot be transferred between activities. These observations are important in benefit transfer.

Also using TCM, Prayaga (2017) estimate consumer surplus of beach recreation on the Capricorn Coast section of the GBR at $7.88/person/trip (equivalent to $8.56/person/trip in 2021 values). Prayaga (2017) note the potential for these values to decline with crowding but increase as users have more interaction with the open space being valued. Whilst not generating values, Farr et al. (2014) highlight recreational values associated with different marine species with respondents WTP the highest amount for 100% guaranteed sighting of whales and dolphins, sharks and rays, marine turtles and finally large fish. These findings indicate financially lucrative marine enterprises, even if 100% guarantee sighting is generally impossible.

Using CVM, Farr et al. (2016) explore visitors to the GBR WTP to improve water clarity (a value that had been recognised as important to visitors in previous studies. About 20% of respondents indicated a zero WTP for improvement in water clarity. The potential to nominate a zero WTP was influenced by age (younger more likely to pay), gender, education level, bid range (the higher the range, the less likely to want to pay), household income, origin and attitudes. Water clarity also had a significant impact on WTP. Visitors who were more satisfied with the water clarity were WTP more compared to those who were less satisfied. Visitor agreement to the fact that a payment was **equitable and fair** also influenced consent to pay.

Based on Table 10 it can be said that, theoretically, the value/person/trip for SSS tourists in the GBR is A$47 for beach recreation and A$220 for island visits and A$107 for non-fishing water-based recreation.

[6] Of note, coastal beaches are outside of the GBRMP above the high-water mark and many are outside of the MP boundaries.

Table 10: Value range for SSS tourists

REFERENCE	METHOD	LOCATION	WHAT IS BEING VALUED?		RECREATIONAL VALUE	VALUE ADJUSTED FOR 2021
Rolfe and De Valck (2021)		GBR	CS	Beach recreation	$44/person/trip	$44/trip
		GBR	CS	Island visits	$397/person/trip	$397/trip
Windle and Rolfe (2019)	TCM	Cairns and Mackay	CS	Beach recreation	$26--$35/person/trip 2010 data	$32--$43/person/trip
	TCM	Townsville, Fitzroy, Gladstone, Bundaberg			$54/$72/person/trip	$67/$89/person/trip
		All			$64/person/ trip (2019)	$66/person/ trip
Prayaga (2017)	TCM	Capricorn coast	CS	Beach recreation	Average of $7.88/person/trio	Average of $8.56/person/trip
Windle et al. (2017)	TCM	Gladstone	CS	Beach recreation	$35/person/trip (2014)	$39/person/trip
			CS	land-based recreation	$61/person/trip (2014)	$69/person/trip
			CS	Non-fishing water-based rec	$95/person/trip	$107/person/trip
Farr et al. (2016)	CVM	GBR	WTP	Actions to improve water clarity	$14/person/visit (2015)	$16/person/visit
Farr et al. (2014)	CVM	Northern GBR	WTP	For 100% guarantee sightings of iconic species		
Rolfe and Gregg (2012)	TCM and CB	GBR (all)	CS	Beach recreation	$35.09/person/trip $42/person/trip (2019)	$41.48/person/trip
		Cairns	CS		$23.79/person/trip	$28.12/person/trip
		Rockhampton	CS		$56.98/person/trip	$67.36/person/trip
Rolfe et al. (2011)	TCM	GBR	CS	Beach recreation	$35/person/trip/day	$42/person/trip/day
				Island visit	$331/person/trip/day	$398/person/trip/day

10.5 Explicit use tourists (diving)

Surprisingly there has been very few studies into the consumer surplus or WTP for recreational diving on the GBR (Table 11)[7],[8]. Studies found were pre-2010. Those that have been completed show a large divergence in value (between A$273/person/trip to A$1,727/person/trip in 2021 values). The higher value is reported by Carr and Mendelsohn (2003) due to the inclusion of international travel cost in the TC estimation. Kragt et al. (2009) highlights the importance of reef quality on diver value indicating that demand for reef trips could go down by 80% with a scientifically derived hypothetical decrease in coral and fish quality.

Using only the valuation by Kragt et al. (2009), it could be said that the WTP for diving in the GBR is A$273/person/trip.

Table 11: Value of GBR explicit use tourism

REFERENCE	TECHNIQUE	LOCATION	WHAT IS BEING VALUED?		RECREATIONAL VALUE	VALUE ADJUSTED FOR 2021
Kragt et al. (2009)	TCM and contingent behaviour	GBR	CS	Diving and snorkelling	$185/person/trip (2004)	$273/person/trip
Carr and Mendelsohn (2003)	TCM	GBR	CS Diving		$500-1142/person/trip	$756-$1727/person/trip

10.6 Traditional owner use

Literature exists and is an emerging in this field (Stoeckl et al., 2021, Larson et al., 2020, Stoeckl et al., 2019, Jarvis et al., 2017) however, that which exists suggests that consumer surplus or WTP is the wrong metric to value traditional owner use.

10.7 Regulatory (climate regulation) uses

No information available for Australia or GBR

10.8 Summary of literature on users and uses of the GBR

Table 12 provides a summary of where the literature exists for WTP for users and uses in the GBR. X's indicate where the GBR is used and green box's with √ indicates that literature on WTP exists for this user and use. Yellow boxes indicate emerging literature which may not necessarily be in the right form to support a WTP assessment.

[7] Farr et al (2014) is not included in this section as this study did not assess WTP.

[8] There is some anecdotal evidence to suggest that the diving market in the GBRMP is shifting from knowledgeable environmental experiences to more generic experiences (Pers comm Matt Curnock June 2022).

Table 12: Use and users in the international literature

ES CATEGORY	ES USE			ES USERS			
		HOUSEHOLDS			TRADITIONAL OWNERS	INDUSTRY	GOVT
		LOCAL	REGIONAL	I'NATIONAL			
Provisioning	Fish biomass - WILD	X (RF) √	X (RF)√	X (RF)	X	X (CF)	
	TO medicine				X		
	Traditional food sources				X		
Abiotic provisioning	Shipping channel access (sand) – Dredging – transport, reclaimed land, development Shipping - transport					X	X
Regulating	Nitrogen fixation	X	X		X	X	X
	Carbon sequestration	X	X	X	X	X	X
	Coastal protection	X				X	X
Cultural	TO – ceremonial, spiritual connection, cultural, song lines, dreamtime/stories, health, heritage, continuity (past/future) etc.				X (on country)		
	Other spiritual, cultural, religious values (brand value)						
	Existence	X √	X √	X √	X		
	Leisure – diving, sun sand sea (SSS) tourists (snorkelling, swimming, beach recreation, sailing, jet ski), recreational fishing and shipwreck (cultural heritage asset tourisms)**	X √	X √	X √		X (tourism industry)	
	Research / education				X		X
	Aesthetic	X					
	Artistic inspiration	X					
	Bequest value	X √	X √	X √			

X where used

Green box with √ indicates that literature on WTP exists for this user and use

Yellow box indicates some literature but inconsistent metric of value (ie not WTP or CS)

11 Addressing question U2: What are users' perceptions of current pricing for protection and use?

See KPMG report

12 Addressing question U3: What are non-users' perceptions of current ways to contribute to GBRMP conservation?

Not addressed in this review.

13 Addressing question U4: How would users respond to a change in price?

In this section we explore what is currently known about how users of Australian marine parks (and specifically, the GBR) would respond to a change in price. Based on findings from the international literature, specifically we assess what is known about:

- How responsive is demand for the resource/experience to a change in use price? (Price elasticity of demand)
- How resilient the local economy is to changes in revenue/opportunity if response is elastic and tourism numbers drop?
- What else influences users WTP?

13.1 WTP and elasticity of demand

Many CV, TCM, CBM, HPM studies estimate consumer surplus from recreation in the GBR. Overall, these studies indicate that demand for recreation is inelastic (Farr et al., 2011) and that revenue raising through recreation user fees is not likely to have negative consequences in terms of reduced tourism. However, Farr et al. (2011) points out that large elasticity of demand for recreation can occur. This is particularly the case for boat trips. In this context, Farr et al. (2011) explains that more expensive boat trips, because they constitute a larger proportion of the recreators budget and usually require significant planning are more inelastic to a change in price compared with cheaper trips. Farr et al. (2011) demonstrates this with price inelastic demand for live aboard boat trips out of Port Douglas compared with Minke Whale day-boats which had elastic demand. Interestingly, the price elasticity of demand for live aboard boat trips out of Cairns was inconclusive which may indicate that other socio economic factors could be at play. Prayaga et al. (2010) assess price elasticity of demand for recreational fishers on the Capricorn coast demonstrating that this reef user group demand for recreational fishing is price inelastic.

- Expensive, multiple day trips that require planning were found to be price inelastic (this is inconsistent with the international literature that found that high-end tourism tended to be price inelastic). Whilst lower cost, lower invested time trips tended to be more elastic to price changes.
- Recreational fishing has been shown to be price inelastic.
- Only a small number of studies from which to base conclusions.

13.2 How resilient the local economy is to changes in revenue/opportunity if response is elastic and tourism numbers drop?

Flow on impacts of price change to the local economy was a concerning factor for many studies in the international literature (see Table 14). This was not raised as a concern in the Australian literature but is still a factor that should be taken into account in an assessment of impact from changes in charges.

Need to understand the flow on impacts of a change in charging to local economy.

13.3 What else influences users WTP?

13.3.1 Substitutability

The ability to substitute locations or activities was a factor influencing users WTP in the international literature but was only raised in reference to SSS users (because beach going is relatively substitutable) for the GBR by Rolfe and Gregg (2012). Farr et al. (2011) highlight the lack of substitutes for heritage values of the GBR. Whilst the reef experience itself is not highly substitutable, only 14% of total tourism in Far North Queensland where the GBR is located is marine-based indicating the potential for tourists to substitute marine for terrestrial activities if a change in the charging framework was unpalatable (Rolfe and De Valck, 2021).

There are few substitutes for visitors to the GBR. It is unlikely that visitors will be able to significantly change their visitation plans to avoid a charge.

13.3.2 Socio Demographics

Table 13: Socio demographics and WTP for GBR use and protection

REFERENCE	SOCIO DEMO FACTOR	IMPACT ON WTP (WHERE SIGNIFICANT)
Farr and Stoeckl (2018)	Household income	Negatively related to number of fishing trips
	Age	Younger go fishing more (number of trips)
	Gender	Males go fishing more (number of trips)
Prayaga (2017)	Income	Positive – beach trips increase as household income increases (only significant in class 1 meaning they influence beach trips only for the larger group of beach users)
	Age	Negative (only significant in class 1 meaning they influence beach trips only for the larger group of beach users)
	Household size	Negative (only significant in class 1 meaning they influence beach trips only for the larger group of beach users)
Farr et al. (2016)	Age	Young people were most WTP a positive amount

	Industry	Those not employed in tourism-related industries were more likely to be WTP a positive amount
	Education	Level of education was positively related to the decision to pay
	Country of origin	Visitors from Japan were more likely to pay a positive amount, while visitors from China were less likely to be willing to pay anything at all; Visitors from China and Queensland were likely to pay less than international visitors from other parts of the world
Farr et al. (2014)	Age	Negative coefficient
	Gender	Males WTP more to see sharks and rays
Rolfe et al. (2011)	Gender	Males are more likely to participate in these activities (participation model)
	Income	Income has a broadly positive effect on participation (participation model)

14 Addressing question U5: What influences users' acceptance of a charging scheme?

The international literature suggests that the acceptability of a charging scheme is influenced by:

- how funds will be used; and
- if and how the use of funds can be communicated to those paying the charge.

We address what is known in the literature for the GBR below.

14.1 How funds are used

In a random sample of Brisbane based households (non-use), Rolfe and Windle (2013) demonstrate that WTP for an improvement in GBR condition was higher when the management actions for achieving the outcomes were specified. Rogers (2013) also found that preferences for conservation outcomes and payments for Ningaloo were impacted by the specified management processes. Farr et al. (2011) discuss the equity of the GBRs EMC, suggesting that the EMC fits clearly with the principle of user pays whereby, those who use the reef pay more for its upkeep compared with those who do not use the reef.

14.2 Communication of use of funds back to those who are charged.

Nothing found in the Australian literature.

- Need to know more about how the way funds are used impacts on users and non-users WTP in the Australian/GBR context.
- Need to know if WTP would be influenced by the communication of the use of the funds.

15 Addressing payment scheme design questions

15.1 Addressing question D1: What will users pay?

This question should be unpacked to assess if information exists addressing:

1. The cost of managing tourism (by type) in the GBRMPA (and if this also differs spatially); and

2. The cost of ongoing conservation of the GBRMPA

Payment amounts, their differentiation across user types and activities etc can be informed by answering the above questions.

15.2 Addressing question D2: When will users pay?

The review of the international literature also highlighted that payment schemes can vary in terms of when users make payments (see 6.1.2). If and how timing of payment impacts on WTP and price elasticity of demand in the GBR, should be assessed. No GBR focussed literature was found for this question.

15.3 Addressing question D3: How will charges be collected?

Key questions here are:

- What are the costs and benefits of different charging approaches?
- What can be done to support different charging approaches? (eg in some cases in the international literature, hotels were reluctant to collect taxes as they thought customers would not want to pay, when in fact they were happy to pay).
- Are there new/alternative ways to finance management? eg can you lease fishing rights to some parts of a MP to raise money for conservation, and what are the costs and benefits of new approaches (see Millage et al. (2021)).
- Is there scope for facilitating voluntary contributions? How could this work? What could be the costs and benefits of such an approach?

May need additional investment to answer.

16 Next steps

The purpose of this component of the review of the charging framework was to:

1. Analyse existing and planned research to gain an understanding of marine park users (commercial and non-commercial) 'willingness to pay' (WTP) for use and protection. This analysis applied to Marine Park users in the GBR and from the broader national and international community.
2. Analyse existing and planned research to gain an understanding of existing knowledge and key knowledge gaps surrounding charging frameworks their impacts on the WTP of different user groups and the palatability of alternative charging frameworks.
3. Develop descriptions and questions relating to different ways user groups could pay for the use of the Marine Park and provides an understanding of the palatability of the concept of those payment structures.
4. Provide guidance to GBRMPA on knowledge gaps related to charging structures with a view to the implementation of a revised charging structure.

Based on the review of the international literature, a number of questions emerged that were used to assess current knowledge about adjusting the charging structure for MP use and protection for the GBR. These questions form the basis of a framework designed to assist GBRMPA plan out the next steps of the review of the charging structure and are provided in a separate supplementary report.

Appendix A Summary table of international literature on WTP (marine) and WTA (marine and terrestrial) charges for use and protection

Table 14: Summary of findings from international literature on WTP for marine park use and protection and WTA charges

	LOCATION	USERS/USES	TECHNIQUE	KEY FINDINGS			REFERENCE
				WTP	ACCEPTANCE OF CHARGES	DESIGN (OF STUDY OR REFLECTIONS ON DESIGN OF CHARGING SCHEME)	
1	China	Tourists/ Tourism	CVM	• Higher WTP for non-use values of relatively scarce tourism resources • Tourists have a higher WTP for maritime cultural tourism resources compared with maritime natural tourism resources			Xiao et al. (2021)
2	Panama	Tourists/ Tourism	Survey	• Paying an entry fee did not influence the willingness to donate for conservation.	• Local stakeholders viewed poorly monitored and distributed fees as ineffective and contentious		Mach et al. (2020)
3	South Korea	General public/non-use	CVM	• Public were accepting of designation of marine park and payment of annual bid amount through tax			Kim and Yoo (2020)
4	Florida USA	Households/ non-use	CVM and DCE	• Perception of risk of damage by humans had a positive and significant impact on WTP			Cavasos and Bhat (2020)
5	Indonesia	Tourists/SSS				• Results suggest that the optimal method of requesting voluntary donations is a set default amount requiring users to opt-out if they do not wish to donate.	Nelson et al. (2019)
6	Barbados	Rec divers/diving	CVM	• Recreational divers are WTP for coral quality, fish species diversity and sightings of sea turtles and low crowding of sites • Experienced travellers with high environmental awareness were WTP a higher fee	• Divers accepting of higher charge only if the dive experience is of a certain quality • Public accountability of the use of the fee	• Reduce fishing to ensure fish sighting	Schumann et al. (2019)
7	Belize	Tourists/ Tourism	CVM	• First time visitor's less likely to be WTP conservation fees cf repeat visitors • Knowledge about the role of MPA have a significantly higher WTP • College degree or higher --> higher WTP	• 80% of tourists WTP higher exit fees if the revenue is dedicated to conservation efforts	• Mentioning of existing exit fee resulted in respondent anchoring their stated WTP (to that fee)	Casey and Schuhmann (2019)

8	Mexico	Tourists/ Tourism	CVM	• WTP more if pro environmental, high expenditure to visit site • SSS tourists not WTP more	• WTP more if known that revenue will be used directly for management		Witt (2019)
9	Seychelles	Tourists/ Tourism	CVM	• WTP impacted by country of origin			Clifton et al. (2021)
10	Malaysia	LOCAL tourists	CVM		• WTP fee if money used exclusively to fund the coral reef management		Faizan et al. (2016)
11	Croatia	Tourists/ Tourism Modes of access	CVM	• If the MP was the primary destination tourists generally stated a lower than average WTP for biodiversity conservation. • Longer stay length -> higher WTP • Locals higher WTP cf non locals • Sailor more frequent visitation but lower WTP (due to substitutes) • If respondent knew area was protected -> lower WTP		• not having a readily available substitute on hand more cautious in stating a high WTP • funding scheme focussed to sailors should apply at a national level (national permit system with a flat fee in addition to standardized mooring fee). Overnight tourism tax for ferry based visitors. Annual passes for frequent visitors	Getzner et al. (2017)
12	North Sea/ Netherlands	SSS and non-coastal residents (non-use)	CVM	• 70% WTP extra tax for protection			Brouwer et al. (2016)
13	Caribbean	Rec divers/diving	CM	Methodological			Trujillo et al. (2016)
14	Barbados	Tourists on board boat with SSS	CVM	• WTP influenced by number of marine species viewed (especially turtles), respondent age, familiarity with the reserve and level of environmental concern. • WTP more for natural cf artificial reef • Repeat visitors had lower WTP cf first time visitors	• Concern expressed related to the legitimate use of monies. • Respondents preferred to give $$ to non-government environmental organisation. • WTA user fees can increase with provision of information about the natural environment.	• Tour operators may also need incentive to be the vehicle in collecting fees. Compensation for their time and administration could occur through allowing them to keep a small percentage of fee gathered	Smith et al. (2016)
15	Mozambique	Tourists – angling, diving, dolphin swimming	CVM	• Residents were WTP less than foreign visitors. • Increased environmental awareness increased WTP	• Acceptance of fee impacted by concerns about corruption, misuse of funds, the payment vehicle or rate, adequate management and foreign involvement.		Daly et al. (2015)

				• SCUBA divers and angler fishers were WTP < dolphin swim tourists. This may be due to the taxes and cost of the activity before any additional payment is introduced. • Increasing site use -> reduced WTP (diminishing marginal utility)	• Implementation and collection of the user fee must be unambiguous and the use of revenue from a user fee must be well documented and conspicuous		
16	Ko Chang Thailand	SSS	CVM	• Foreign tourists WTP mor than local		• WTP with single bounded is less than with double bounded.	Piriyapada and Wang (2015)
17	Sri Lanka	Foreign cf local tourists	CVM		• Acceptance of fee most influenced by perceptions of affordability, use of the fee i.e. conservation of turtles and improved visitor services.		Rathnayake (2015)
18	Taiwan	Fishers	CVM	• WTP to finance fishing zone management. Amount dependent on socio economic circumstances			Chen et al. (2014)
19	Chile	Tourists – land and sea	CVM	• Nature based tourists are WTP greater amounts for management compared with SSS • Foreign nature-based tourists had highest WTP			Gelcich et al. (2013)
20	Israel	Divers and snorkelers	CVM	• Divers WTP more for fish species richness of abundance. • Divers rated corals higher than fish			Polak and Shashar (2013)
21	Malaysia	Tourists/tourism	CVM	• Higher WTP linked to positive perception of recreational facilities and services • WTP higher for first time visitors cf returning visitors			Mamat et al. (2013)
22	Malaysia	Foreign cf local tourists	CVM	• WTP strongly influenced by gender, education, and income (effects of education on WTP is strong) • Visitors with the right information on park conservation are more positive in their perception and decision and WTP	• Acceptance of fee based on WTP to keep the park beautiful, unexploited landscape and diversity of flora and fauna that belonged to the area (which are the push factors that influence visitors to	• Goods and services should contain some educational elements, contributing to knowledge and experience of the visitors	Kamri (2013)

				• Foreign WTP>local WTP	visit a national park) (nature based tourism) • Management plans supported by research are considered more credible and gain better support		
23	Greece	Tourists - residents	CVM	• High WTP for existence of natural area • High WTP for facilities such as lifesaving equipment • WTP affected by previous environmental behaviour			Halkos and Jones (2012)
24	Bonaire	Rec divers/diving	CVM	• Could increase access charge sixfold without impacting on visitation rates (very inelastic)		• Raising revenue through dive tag taxes is lowest transaction cost approach • Differentiated charges - Non-residents pay $25 for a one calendar year scuba pass or $10 for a single day pass. Non-residents (over 12 years) pay $10 for a one calendar year pass. Residents pay $25 for a one calendar year scuba diving 25pass but pay nothing for other water ba26sed activities	Thur (2010)
25	Bonaire	Tourism – diving and non-diving	CVM	• Only 46% of divers WTP >2010 fees • Higher WTP from repeat visitors	• Those dissatisfied wanted more information on use of fee	• Fee evasion by non-divers was substantial. Fee collection of non-divers falls to the hotels, some of which are reluctant to participate. Hotels may become more willing to participate if they knew that 90% of respondents consider the non-diving fee reasonable.	Uyarra et al. (2010)
26	Kenya	Tourists/tourism - diving and glass bottom boat tours	CVM		• Concern about an increase of entrance fee resulting in the exclusion of locals from the park • Acceptance related to opinions around public good nature of the MP and opinion that it was the	• Impact of fees on local business if it results in reduced visitation	Ransom and Mangi (2010)

		government's responsibility to manage this • Concern about how money would be invested in park management • Increasing fees could have an impact on local business	

Cf – compared with

Appendix B Summary of WTP literature for Australian marine parks including GBR

Table 15: Summary of literature on use, users and WTP in Australian Marine Parks since (2000) (newest to oldest)

	LOCATION FOCUS	USERS/USES	ORIGIN OF USER (L, R, I)	METHOD	WTP	CS	VALUE ($AUD UNLESS SPECIFIED)	YEAR OF DATA COLLECTION	REMARKS	REFERENCE
1	GBR – META ANALYSIS	Tourists /beach recreation (SSS)	L, R, I	various		√	On average $44/trip	Corrected into 2019 figures	• Averaged from studies by Rolfe and Gregg (2012), Prayaga (2017) and Windle and Rolfe (2019)	Rolfe and De Valck (2021)
		Fishers/Rec fishing	L, R, I				Averaged at $296/ trip		• Averaged from Prayaga et al. (2010), Rolfe et al. (2011) and Farr and Stoeckl (2018)	
		Tourists/Diving	L, R, I				Averaged at $270/trip		• From Kragt et al. (2009)	
		Tourists/ Island visits (SSS)Rec	L, R, I				$397/trip		• From Rolfe et al. (2011)	
2	GBR	Tourists/Beach recreation	L	TCM		√	$26- $35/trip in Cairns and Mackay	2010	• Study was focussed on benefit transfer of values • Paucity of rec values in Aust limits transferability. BUT regional values for beach recreation values are generally transferable.	Windle and Rolfe (2019)
			L				$54-$72/trip in Townsville, Fitzroy, Gladstone, Bundaberg			
							Average value for all $64/trip	2019 values		De Valck and Rolfe (2021)
3	GBR Townsville	Tourists/Rec Fishing	L	TCM		√	• $433 (surveyed after outing) • $407 (surveyed before outing)	2011-2012	• Difference in expectation in catch between experienced cf occasional fishers to estimate welfare loss from reduction in catch	Farr and Stoeckl (2018)
4	GBR Gladstone	Tourists/Beach recreation (SSS)	L	TCM		√	$35/trip	2014		Windle et al. (2017)
		Tourists/land-based rec	L				$ 61/trip			
		Tourists/Non-fishing water-based recreation	L			√	$ 95/trip			

	LOCATION FOCUS	USERS/USES	ORIGIN OF USER (L, R, I)	METHOD	WTP	CS	VALUE ($AUD UNLESS SPECIFIED)	YEAR OF DATA COLLECTION	REMARKS	REFERENCE
5	GBR Capricorn Coast	Tourists/Beach recreation	L	TCM		√	• Between $9.36 and $14.09 • Average trip $7.88 with mean of $10 per trip			Prayaga et al., 2017
							• $25/trip	2019 adj		Rolfe and De Valck (2021)
6	GBR	Households/existence (non-use)	L, R	Life satisfaction					• Spatial variation is important. For example the influence of income on life satisfaction south cf the north. For non-use cultural services, income is more important to life satisfaction in the north cf to the south	Jarvis et al., 2017
7	GBR	Tourists/recreation	Mainly I	CVM	√		$14/visitor/visit to help improve water clarity		• Visitors from China and locals were WTP less	Farr et al. (2016)
8	Adelaide	Households/existence	R	Choice model	√		$7.18 - $2.05	2015		MacDonald et al. (2015)
9	Northern GBR	Tourists/specific species sighting	L, R, I	CVM			Valued most to least – whales and dolphins, sharks and rays, variety, marine turtles, large fish		• WTP for 100% guaranteed sighting. • Comparative value of species	Farr et al. (2014)
10	Moreton Bay	Tourists/Rec fishing	L	TCM			Between $60 and $110/trip	2008		Pascoe et al. (2014a)
11	Ningaloo	Households/existence	L, R	CE					• Management processes do affect preferences for conservation outcomes in a DCE	Rogers (2013)

	LOCATION FOCUS	USERS/USES	ORIGIN OF USER (L, R, I)	METHOD	WTP	CS	VALUE ($AUD UNLESS SPECIFIED)	YEAR OF DATA COLLECTION	REMARKS	REFERENCE
12	Brisbane	Households/existence (non-use value)	R	DCE	√		Average household WTP for 1000km ^{2} condition of the GBR was $7.91 each year for 5 years (when management options were specified) and $6.26 each year for 5 years when management options were not specified	2009	• Preference was strongest for improving GBR condition by increasing conservation zones followed by improving water quality • WTP was higher for specified management actions as people more likely to support additional protection measures when they know how they will be implemented	Rolfe and Windle (2013)
13	Townsville	Households/existence (non-use value)	L, R	CM	√		WTP for a 1% improvement in GBR condition for a 5 year period was $38	2009	• WTP may be higher but declining with distance within the GBR state (Queensland), and then lower and reasonably uniform across the out-of-state populations.	Rolfe and Windle (2012)
	Brisbane		R		√		WTP for a 1% improvement in GBR condition for a 5 year period was $31			
	Sydney, Adelaide, Melbourne, Perth		R		√		WTP for a 1% improvement in GBR condition for a 5 year for Sydney was $20 and $18 for Perth			
14	Sth Australia	Tourists/Rec fishing	L, R, I	CVM	√		Between $33 and 132 per person per trip			Ezzy et al. (2012)
15	GBR - Bundaberg, Gladstone, Rockhampton, Mackay,	Tourists/beach recreation	L, R	TCM and CB*		√	On average $35.09/person/trip		Value varied by region	Rolfe and Gregg (2012)
							$23.79/person/ trip in Cairns			

	LOCATION FOCUS	USERS/USES	ORIGIN OF USER (L, R, I)	METHOD	WTP	CS	VALUE ($AUD UNLESS SPECIFIED)	YEAR OF DATA COLLECTION	REMARKS	REFERENCE
	Townsville and Cairn						$56.98/person/trip in Rockhampton			
							On average $42/person/trip	Updated in 2019		Rolfe and De Valck (2021)
16	GBR (coastal)	Households/non-use	L	CE	√		WTP $55.23 per 1% increase in coral reef in good health in inshore areas			Rolfe and Windle (2011)
	Brisbane		R				WTP $23.91 per 1% increase in coral reef in good health in inshore areas			
	Melbourne		R				As above $43.30 per 1%			
	Perth		R				As above $40.68 per 1%			
17	GBR	Tourists/beach recreation	L, R	TCM		√	Beach - $35/person/trip/day Island visit - $331/person/trip/day Rec fishing, boating and sailing $183/person/trip/day		Negative change in fishing quality would reduce trip value by 2% but a positive change would increase trip value by up to 25%	Rolfe et al. (2011)
18	Northern GBR	Tourists/beach recreation	L, R	TCM		√		2010	• Demand for liveaboard boat trips from Port Douglas is more elastic than from Cairns and for minke whale day trips • Doesn't mean that EMC is inefficient for trips with elastic demand • Tax is an insignificant proportion of total trip price • Even when price is elastic, EMC represents less than 1% of the trip • Regard inequity of the tax, those holidaying on the GBR are on average	Farr et al. (2011)

	LOCATION FOCUS	USERS/USES	ORIGIN OF USER (L, R, I)	METHOD	WTP	CS	VALUE ($AUD UNLESS SPECIFIED)	YEAR OF DATA COLLECTION	REMARKS	REFERENCE
									higher income earners than the general population – then the EMC unless specified may be more progressive than other forms of taxation • Fits in the principle of the 'user pays' • Dead Weight Loss associated with a 100% increase in EMC is very low – between 0.6 and 1.1% of TR	
19	GBR – Capricorn coast	Tourists/rec fishing	L, R	TCM		√	$167/angler	2010	Marginal value of a trip with a 50% chance of catching a red emperor increased by $34/trip	Prayaga et al., 2010
							$218/angler adjusted in 2019	2019 adj		Rolfe and De Valck (2021)
				Contingent behaviour survey					Angler would take 0.1 more trips if catch increased by 10%, and 0.3 and 0.9 more trips when catch increased by 25%	
20	GBR (Townsville)	Households/existence (non-use)	L	CM	√		WTP $18.60 for 1% of coral reef in inshore areas			Rolfe and Windle (2010)
	GBR (Brisbane)		L, R		√		WTP $14.87 for 1% of coral reef in inshore areas			
21	GBR	Tourists/ diving	L, R, I	TCM		√	$185/trip	2004	Reef trip demand could go down by 80% with a decrease in coral and fish diversity	Kragt et al. (2009)
22	GBR (Port Douglas)	Tourists/diving	L, R, I	TCM		√	USD 350-800	2003		Carr and Mendelsohn (2003)
							AU$1679/trip in 2019			Rolfe and De Valck (2021)

L = local
R = regional
I = international
***CB questions often follow on from TCM questions with respondents being asked follow up questions related to how their behaviour would change if there were different circumstances with their visit (Rolfe and De Valck, 2021)**

References

AHMAD, S. A. & HANLEY, N. 2009. WILLINGNESS TO PAY FOR REDUCING CROWDING EFFECT DAMAGES IN MARINE PARKS IN MALAYSIA. *Singapore Economic Review,* 54**,** 21-39.

ARROW, K. J., SOLOW, R., PORTNEY, P., LEAMER, E., RADNER, R. & SCHUMAN, H. 2001. Report of the NOAA Panel on Contingent Valuation

AUSTRALIAN BUREAU OF STATISTICS. Available: https://www.abs.gov.au/AUSSTATS/abs@.nsf/66f306f503e529a5ca25697e0017661f/5AA223EA8A78A311CA25697E0018FBFF?opendocument) [Accessed 09/06/2022 2022].

AWONDO, S., EGAN, K. & DWYER, D. 2011. Increasing Beach Recreation Benefits by Using Wetlands to Reduce Contamination. *Marine Resource Economics,* 26**,** 1-15.

BARNES, J. I. 1996. Economic characteristics of the demand for wildlife-viewing tourism in Botswana. *Development Southern Africa,* 13**,** 377-397.

BIGGS, D., AMAR, F., VALDEBENITO, A. & GELCICH, S. 2016. Potential Synergies between Nature-Based Tourism and Sustainable Use of Marine Resources: Insights from Dive Tourism in Territorial User Rights for Fisheries in Chile. *Plos One,* 11.

BODUR, H., AYAN, M., OZCAN, M. & TOSUNOGLU, Z. 2017. Are the Fishers of Lake Maramara Willing to pay for a sustainable fishery management? *Turkish Journal of Fisheries and Acquatic Sciences,* 17**,** 1199-1208.

BRANDER, L. M., VAN BEUKERING, P. & CESAR, H. S. J. 2007. The recreational value of coral reefs: A meta-analysis. *Ecological Economics,* 63**,** 209-218.

BROUWER, R., BROUWER, S., ELEVELD, M. A., VERBRAAK, M. & WAGTENDONK, A. J. 2016. Public willingness to pay for alternative management regimes of remote marine protected areas in the North Sea. *Marine Policy,* 68**,** 195-204.

BRUNER, A., KESSY, B., MNAYA, J., WAKIBARA, J. & MALDONADO, J. 2015. Tourists' Willingness to Pay to Visit Tanzania's National Parks: A Contingent Valuation Study. *In:* CONSERVATION STRATEGY FUND (ed.). Conservation Strategy Fund,.

CAMPBELL, H. F. & REID, C. 2000. Consumption Externalities in a Commercial Fishery: The Queensland Beam Trawl Fishery *The Economic Record,* 76**,** 1-14.

CARR, L. & MENDELSOHN, R. 2003. Valuing Coral Reefs: A Travel Cost Analysis of the Great Barrier Reef. *AMBIO: A Journal of the Human Environment,* 32**,** 353-357.

CASEY, J. F. & SCHUHMANN, P. W. 2019. PACT or no PACT are tourists willing to contribute to the Protected Areas Conservation Trust in order to enhance marine resource conservation in Belize? *Marine Policy,* 101**,** 8-14.

CAVASOS, K. E. & BHAT, M. G. 2020. Impact of risk perception on household willingness-to-pay to restock the threatened staghorn coral. *Ocean & Coastal Management,* 193.

CHEN, J. L., CHEN, J. Y., CHUANG, C. T., LU, H. J., LIU, H. H. & LIN, Y. S. 2014. Developing a co-management financing mechanism to enhance the financial sustainability of marine protected areas in Taiwan. *Marine Policy,* 48**,** 126-133.

CLIFTON, J., OSMAN, E. O., SUGGETT, D. J. & SMITH, D. J. 2021. Resolving conservation and development tensions in a small island state: A governance analysis of Curieuse Marine National Park, Seychelles. *Marine Policy,* 127.

COGGAN, A., JARVIS, D., DE VALCK, J., SCHIRRU, E., PERT, P. L., NEWLANDS, M. & GRAHAM, V. 2022. Literature review: Frameworks for organising and evaluating socio economic data on users, uses, benefts and sustainability

DALY, C. A. K., FRASER, G. & SNOWBALL, J. D. 2015. Willingness to pay for marine-based tourism in the Ponta do Ouro Partial Marine Reserve, Mozambique. *African Journal of Marine Science,* 37**,** 33-40.

DAVIS, K., VIANNA, G., MEEUWIG, J., MEEKAN, M. & PANNELL, D. 2019. Estimating the economic benefits and costs of highly protected marine protected areas. *Ecosphere,* 10.

DE VALCK, J. & ROLFE, J. 2021. Reviewing the use of proxies to value coastal and marine biodiversity protection: The Great Barrier Reef in Australia. *Marine Policy,* 136.

DEPONDT, F. & GREEN, E. 2006. Diving user fees and the financial sustainability of marine protected areas: Opportunities and impediments. *Ocean & Coastal Management,* 49**,** 188-202.

EZZY, E., SCARBROUGH, H. & WALLIS, A. 2012. Recreational Value of Southern Bluefin Tuna Fishing. *Economic Papers,* 31**,** 150-159.

FAIZAN, M., SASEKUMAR, A. & CHENAYAH, S. 2016. Estimation of local tourists willingness to pay. *Regional Studies in Marine Science,* 7**,** 142-149.

FARR, M. & STOECKL, N. 2018. Overoptimism and the undervaluation of ecosystem services: A case-study of recreational fishing in Townsville, adjacent to the Great Barrier Reef. *Ecosystem Services,* 31**,** 433-444.

FARR, M., STOECKL, N. & BEG, R. A. 2011. The efficiency of the Environmental Managament Charge in the Cairns management areas of the Great Barrier Reef Marine Park. *The Australian Journal of Agricultural and Resource Economics,* 55**,** 322-341.

FARR, M., STOECKL, N. & BEG, R. A. 2014. The non-consumptive (tourism) 'value' of marine species in the Northern section of the Great Barrier Reef. *Marine Policy,* 43**,** 89-103.

FARR, M., STOECKL, N., ESPARON, M., LARSON, S. & JARVIS, D. 2016. The importance of water clarity to Great Barrier Reef tourists and their willingness to pay to improve it. *Tourism Economics,* 22**,** 331-352.

FEHR, D., HAKIMOV, R. & KUBLER, D. 2015. The willingness to pay–willingness to accept gap: A failed replication of Plott and Zeiler. *European Economic Review,* 78**,** 120-128.

GBRMPA 2019a. Annual Report 2018-2019. Great Barrier Reef Marine Park Authority.

GBRMPA 2019b. Great Barrier Reef Outlook Report 2019. Great Barrier Reef Marine Park Authority, Townsville.

GBRMPA 2021. Annual Report 2000-21. Great Barrier Reef Marine Park Authority.

GELCICH, S., AMAR, F., VALDEBENITO, A., CARLOS CASTILLA, J., FERNANDEZ, M., GODOY, C. & BIGGS, D. 2013. Financing Marine Protected Areas Through Visitor Fees: Insights from Tourists Willingness to Pay in Chile. *Ambio,* 42**,** 975-984.

GETZNER, M., JUNGMEIER, M. & SPIKA, M. 2017. Willingness-To-Pay for Improving Marine Biodiversity: A Case Study of Lastovo Archipelago Marine Park (Croatia). *Water,* 9.

GOLDBERG, J., MARSHALL, N., BIRTLES, A., CASE, P., BOHENSKY, E., CURNOCK, M., GOOCH, M., PARRY-HUSBANDS, H., PERT, P., TOBIN, R., VILLANI, C. & VISPERAS, B. 2016. Climate change, the Great Barrier Reef and the response of Australians. *Palgrave Communications,* 2**,** 15046.

GRANT, M. J. & BOOTH, A. 2009. A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal,* 26**,** 91-108.

GUNAWARDENA, A., IFTEKHAR, S. & FOGARTY, J. 2020. Quantifying intangible benefits of water sensitive urban systems and practices: an overview of nonmarket valuation studies. *Australasian Journal of Water Resources,* 24**,** 46-59.

HALKOS, G. E. & JONES, N. 2012. Modeling the effect of social factors on improving biodiversity protection. *Ecological Economics,* 78**,** 90-99.

HICKS, C. C., STOECKL, N., CINNER, J. & ROBINSON, J. 2014. Fishery benefits and stakeholder priorities associated with a coral reef fishery and their implications for management. *Environmental Science & Policy,* 44**,** 258-270.
HOROWITZ, J. K. & MCCONNELL, K. E. 2002. A review of WTA/WTP studies. *Journal of Environmental Economics and Management,* 44**,** 426-447.
HOROWITZ, J. K., MCCONNELL, K. E. & HOROWITZ, J. K. 2003. Willingness to accept, willingness to pay and the income effect. *Journal of economic behavior & organization,* 51**,** 537-545.
HUANG, B., YOUNG, M., CARNELL, P., CONRON, S., IERODIACONOU, D., MACREADIE, P. & NICHOLSON, E. 2020. Quantifying welfare gains of coastal and estuarine ecosystem rehabilitation for recreational fisheries. *Science of The Total Environment,* 710.
INSAFITRI, ASIH, E. N. N. & NUGRAHA, W. A. 2020. Marine tourism in Gili Labak Island: willingness to pay method as an effort to preserve coral reef in Gili Labak Island, Madura, Indonesia. *AACL Bioflux,* 13**,** 3789-3797.
IRANAH, P., LAL, P., WOLDE, B. T. & BURLI, P. 2018. Valuing visitor access to forested areas and exploring willingness to pay for forest conservation and restoration finance: The case of small island developing state of Mauritius. *Journal of Environmental Management,* 223**,** 868-877.
IYER, V., K, M., MEYERS, D., VICTURINE, R. & WALSH, M. 2018. Finance tools for coral reef conservation: A guide
JACOBSEN, J. B. & HANLEY, N. 2009. Are There Income Effects on Global Willingness to Pay for Biodiversity Conservation? *Environmental and Resource Economics,* 43**,** 137-160.
JARVIS, D., STOECKL, N. & LIU, H.-B. 2017. New methods for valuing, and for identifying spatial variations, in cultural services: A case study of the Great Barrier Reef. *Ecosystem Services,* 24**,** 58-67.
JOBSTVOGT, N., WATSON, V. & KENTER, J. O. 2014. Looking below the surface: The cultural ecosystem service values of UK marine protected areas (MPAs). *Ecosystem Services,* 10**,** 97-110.
JOHNSTON, R., BOYLE, K., LOUREIRO, M., NAVRUD, S. & ROLFE, J. 2021. Guidance to Enhance the Validity and Credibility of Environmental Beneft Transfers. *Environmental and Resource Economics,* 79**,** 575-624.
JOHNSTON, R., ROLFE, J., ROSENBERGER, R. & BROUWER, R. 2015. Introduction to benefit transfer methods. *In:* BATEMAN, I. (ed.) *The Economics of non-market goods and resources.* Springer.
JUAN CARDENAS-GARCIA, P., IGNACIO PULIDO-FERNANDEZ, J., LUIS DURAN-ROMAN, J. & CARRILLO-HIDALGO, I. 2022. Tourist taxation as a sustainability financing mechanism for mass tourism destinations. *International Journal of Tourism Research*.
KAHNEMAN, D., KNETSCH, J. & THALER, R. 1990. Experimental tests of the endowment effect and the coase theorem. *Journal of Political Economy,* 98**,** 1325-1348.
KAMRI, T. 2013. Willingness to Pay for Conservation of Natural Resources in the Gunung Gading National Park, Sarawak. *Procedia Social and Behavioural Sciences,* 101**,** 506-515.
KIM, J. & YOO, S. 2020. What do we know about public acceptance of designating marine protected area? The case of Jaran Bay in South Korea. *Environmental science and pollution research* 27.
KPMG 2021. Exploring Marine Park Changing Structures.
KRAGT, M., ROEBELING, P. C. & RUIJS, A. 2009. Effects of Great Barrier Reef degradation on recreational reef-trip demand: a contingent behaviour approach. *Australian Journal of Agricultural and Resource Economics,* 53**,** 213-229.

KRUTILLA, J. V. & FISHER, A. C. 1975. The Economics of the Natural Environment: Studies in the Valuation of Commodity and Amenity Resources. Johns Hopkins Press for Resources for the Future, Baltimore, MD.

LARSON, S., STOECKL, N., JARVIS, D., ADDISON, J., GRAINGER, D., WATKIN LUI, F., WALALAKOO ABORIGINAL, C., BUNUBA DAWANGARRI ABORIGINAL CORPORATION, R., EWAMIAN ABORIGINAL CORPORATION, R. & YANUNIJARRA ABORIGINAL CORPORATION, R. 2020. Indigenous Land and Sea Management Programs (ILSMPs) Enhance the Wellbeing of Indigenous Australians. *International journal of environmental research and public health,* 17**,** 125.

LEWIS-BROWN, E., BEATTY, H., DAVIS, K., RABEARISOA, A., RAMIARAMANANA, J., MASCIA, M. & MILLS, M. 2021. The importance of future generations and conflict management in conservation. *Conservation Science and Practice*.

MACDONALD, D. H., ARDESHIRI, A., ROSE, J., RUSSELL, B. & CONNELL, S. 2015. Valuing coastal water quality: Adelaide, South Australia metropolitan area. *Marine Policy,* 52**,** 116-124.

MACH, L., WINNER, C., ROJAS, C. & KLEMOND, M. 2020. Protected area entry fees and governance quality. *Tourism Management,* 77.

MAMAT, M. F., YACOB, M. R., RADAM, A., GHADIM, A. A. & FUI, L. 2013. Willingness to pay for protecting natural environments in Pulau Redang Marine Park, Malaysia. *African Journal of Business Management,* 7**,** 2420-2426.

MILLAGE, K. D., VILLASENOR-DERBEZ, J. C., BRADLEY, D., BURGESS, M. G., LENIHAN, H. S. & COSTELLO, C. 2021. Self-financed marine protected areas. *Environmental Research Letters,* 16.

NELSON, K. M., PARTELOW, S. & SCHLUETER, A. 2019. Nudging tourists to donate for conservation: Experimental evidence on soliciting voluntary contributions for coastal management. *Journal of Environmental Management,* 237**,** 30-43.

NGUYEN, K., KNETSCH, J. & MAHASUWEERACHAI, P. 2021. WTP or WTA: A Means of Determining the Appropriate Welfare Measure of Positive and Negative Changes When Preferences are Reference Dependent. *Environmental and Resource Economics,* 2021**,** 615-633.

O'GARRA, T. 2009. Bequest Values for Marine Resources: How Important for Indigenous Communities in Less-Developed Economies? *Environmental and Resource Economics,* 44**,** 179.

PASCOE, S., DOSHI, A., DELL, Q., TONKS, M. & KENYON, R. 2014a. Economic value of recreational fishing in Moreton Bay and the potential impact of the marine park rezoning. *Tourism Management,* 41**,** 53-63.

PASCOE, S., DOSHI, A., THEBAUD, O., THOMAS, C. R., SCHUTTENBERG, H. Z., HERON, S. F., SETIASIH, N., TAN, J. C. H., TRUE, J., WALLMO, K., LOPER, C. & CALGARO, E. 2014b. Estimating the potential impact of entry fees for marine parks on dive tourism in South East Asia. *Marine Policy,* 47**,** 147-152.

PASCUAL, U., MURADIAN, R., BRANDER, L., GÓMEZ-BAGGETHUN, E., MARTÍN-LÓPEZ, B. & VERMA, M. 2010. The economics of valuing ecosystem services and biodiversity. *In:* KUMAR, P. (ed.) *The Economics of Ecosystems and Biodiversity: Ecological and Economic Foundations.* London, New York: Routledge.

PETERS, H. & HAWKINS, J. P. 2009. Access to marine parks: A comparative study in willingness to pay. *Ocean & Coastal Management,* 52**,** 219-228.

PIRIYAPADA, S. & WANG, E. 2015. Modeling Willingness to Pay for Coastal Tourism Resource Protection in Ko Chang Marine National Park, Thailand. *Asia Pacific Journal of Tourism Research,* 20**,** 515-540.

PLOTT, C. & ZEILER, K. 2007. Exchange asymmetries incorrectly interpreted as evidence of endowment effect theory and prospect theory? *American Economic Review,* 97**,** 1449-1466.

POLAK, O. & SHASHAR, N. 2013. Economic value of biological attributes of artificial coral reefs. *Ices Journal of Marine Science,* 70**,** 904-912.

PRAYAGA, P. 2017. Estimating the value of beach recreation for locals in the Great Barrier Reef Marine Park, Australia. *Economic Analysis and Policy,* 53**,** 9-18.

PRAYAGA, P., ROLFE, J. & STOECKL, N. 2010. The value of recreational fishing in the Great Barrier Reef, Australia: A pooled revealed preference and contingent behaviour mode. *Marine Policy,* 34**,** 244-251.

RANDALL, A. & STOLL, J. 1980. Consumer's surplus in commodity space. *The American Economic Review,* 70**,** 449-455.

RANSOM, K. P. & MANGI, S. C. 2010. Valuing Recreational Benefits of Coral Reefs: The Case of Mombasa Marine National Park and Reserve, Kenya. *Environmental Management,* 45**,** 145-154.

RATHNAYAKE, R. 2015. Estimating demand for turtle conservation at Rekawa Sanctuary in Sri Lanka. *In:* SOUTH ASIAN NETWORK FOR DEVELOPMENT AND ENVIRONMENTAL ECONOMICS (SANDEE) (ed.) *Kathmandu, Nepal.*

ROBERTS, M., HANLEY, N. & CRESSWELL, W. 2017. User fees across ecosystem boundaries: Are SCUBA divers willing to pay for terrestrial biodiversity conservation? *Journal of Environmental Management,* 200**,** 53-59.

ROGERS, A. A. 2013. Social Welfare and Marine Reserves: Is Willingness to Pay for Conservation Dependent on Management Process? A Discrete Choice Experiment of the Ningaloo Marine Park in Australia. *Canadian Journal of Agricultural Economics-Revue Canadienne D Agroeconomie,* 61**,** 217-238.

ROLFE, J. & DE VALCK, J. 2021. Values for protecting the Great Barrier Reef: A review and synthesis of studies over the past 35 years. *Marine Pollution Bulletin,* 169**,** 112531.

ROLFE, J. & GREGG, D. 2012. Valuing beach recreation across a regional area: The Great Barrier Reef in Australia. *Ocean & Coastal Management,* 69**,** 282-290.

ROLFE, J., GREGG, D. & TUCKER, G. 2011. Valuing local recreation in the Great Barrier Reef *Environmental Economics Research Hub Research Reports,.*

ROLFE, J. & WINDLE, J. 2010. Assessing national values to protect the health of the Great Barrier Reef *Environmental Economics Research Hub Research Reports.* Australian National University.

ROLFE, J. & WINDLE, J. 2011. Assessing community values for reducing agricultural emissions to improve water quality and protect coral health in the Great Barrier Reef. *Water Resources Research,* 47**,** 1-12.

ROLFE, J. & WINDLE, J. 2012. Distance Decay Functions for Iconic Assets: Assessing National Values to Protect the Health of the Great Barrier Reef in Australia. *Environmental and Resource Economics,* 53**,** 347-365.

ROLFE, J. & WINDLE, J. 2013. Including Management Policy Options in Discrete Choice Experiments: A Case Study of the Great Barrier Reef. *Canadian Journal of Agricultural Economics-Revue Canadienne D Agroeconomie,* 61**,** 197-215.

SCHUMANN, P., SKEETE, R., WAITE, R., LORDE, R., BANGWAYO-SKEETE, P., OXENFORD, H., GILL, D., MOORE, W. & SPENCER, F. 2019. Visitors' willingness to pay marine conservation fees in Barbados. *Tourism Management,* 71**,** 315-326.

SHRIVASTAVA, S. & MUKHOPADHYAY, K. 2022. Valuation and financing of National Parks in South and South East Asia: a meta-analysis. *Journal of environmental economics and policy.***,** 1-24.

SMITH, A. E., WHEELER, P. M. & JOHNSON, M. L. 2016. Artificial reefs and marine protected areas: a study in willingness to pay to access Folkestone Marine Reserve, Barbados, West Indies. *Peerj,* 4.

STOECKL, N., JARVIS, D., LARSON, S., GRAINGER, D., ADDISON, J. & ESPARON, M. 2019. Multiple co-benefits of Indigenous land and sea management programs across northern Australia. Townsville: James Cook University.

STOECKL, N., JARVIS, D., LARSON, S., LARSON, A., GRAINGER, D. & EWAMIAN ABORIGINAL, C. 2021. Australian Indigenous insights into ecosystem services: Beyond services towards connectedness – People, place and time. *Ecosystem Services,* 50**,** 101341.

SUMAILA, U. R., WALSH, M., HOAREAU, K., WALSH, M., TEH, L., ABDALLAH, P., AKPALU, W., ANNA, Z., BENZAKEN, D., CRONA, B., FITZGERALD, T., HEAPS, L., ISSIFU, I., KAROUSAKIS, K., LANGE, G. M., LELAND, A., MILLER, D., SACK, K., SHAHNAZ, D., THIELE, T., VESTERGAARD, N., YAGI, N. & ZHANG, J. 2021. Financing a sustainable ocean economy. *Nature Communications,* 12.

THALER, R. 1980. Toward a positive theory of consumer choice. *Journal of Economic Behavior & Organization,* 1**,** 39-60.

THUR, S. M. 2010. User fees as sustainable financing mechanisms for marine protected areas: An application to the Bonaire National Marine Park. *Marine Policy,* 34**,** 63-69.

TOGRIDOU, A., HOVARDAS, T. & PANTIS, J. D. 2006. Determinants of visitors' willingness to pay for the National Marine Park of Zakynthos, Greece. *Ecological Economics,* 60**,** 308-319.

TONGSON, E. & DYGICO, M. 2004. User fee system for marine ecotourism: The Tubbataha Reef experience. *Coastal Management,* 32**,** 17-23.

TORRES, C. & HANLEY, N. 2017. Communicating research on the economic valuation of coastal and marine ecosystem services. *Marine Policy,* 75**,** 99-107.

TRUJILLO, J. C., CARRILLO, B., CHARRIS, C. A. & VELILLA, R. A. 2016. Coral reefs under threat in a Caribbean marine protected area: Assessing divers' willingness to pay toward conservation. *Marine Policy,* 68**,** 146-154.

TUNCEL, T. & HAMMITT, J. K. 2014. A new meta-analysis on the WTP/WTA disparity. *Journal of Environmental Economics and Management,* 68**,** 175-187.

UYARRA, M. C., GILL, J. A. & COTE, I. M. 2010. Charging for Nature: Marine Park Fees and Management from a User Perspective. *Ambio,* 39**,** 515-523.

VASSILOPOULOS, A., AVGERAKI, N. & KLONARIS, S. 2020. Social desirability and the WTP–WTA disparity in common goods. *Environment, development and sustainability.,* 22**,** 6425-6444.

VÁZQUEZ RODRÍGUEZ, M. X. & LEÓN, C. J. 2004. Altruism and the Economic Values of Environmental and Social Policies. *Environmental and Resource Economics,* 28**,** 233-249.

WALPOLE, M. J., GOODWIN, H. J. & WARD, K. G. R. 2001. Pricing policy for tourism in protected areas: Lessons from Komodo National Park, Indonesia. *Conservation Biology,* 15**,** 218-227.

WALSH, R. G., LOOMIS, J. B. & GILLMAN, R. S. 1984. Valuing option, existence, and bequest demands for wilderness. *Land Economics,* 60**,** 14-29.

WEISBROD, B. A. 1964. Collective-Consumption Services of Individual-Consumption Goods *. *The Quarterly Journal of Economics,* 78**,** 471-477.

WHITTINGTON, D., ADAMOWICZ, W. & LLOYD-SMITH, P. 2017. Asking Willingness-to-Accept Questions in Stated Preference Surveys: A Review and Research Agenda. *In:* RAUSSER, G. C. & ZILBERMAN, D. (eds.) *Annual Review of Resource Economics, Vol 9.*

WINDLE, J. & ROLFE, J. 2019. Testing the regional transferability of coastal recreation values for report card application with limited data. *Ecological Indicators,* 98**,** 218-227.

WINDLE, J., ROLFE, J. & PASCOE, S. 2017. Assessing recreational benefits as an economic indicator for an industrial harbour report card. *Ecological Indicators,* 80**,** 224-231.

WITT, B. 2019. Tourists' Willingness to Pay Increased Entrance Fees at Mexican Protected Areas: A Multi-Site Contingent Valuation Study. *Sustainability,* 11.

XIAO, J., WANG, M. & GAO, X. 2021. Valuing tourists' willingness to pay for conserving the non-use values of marine tourism resources: a comparison of three archipelagic tourism destinations in China. *Journal of Sustainable Tourism,* 29**,** 678-710.

YAMAZAKI, S., RUST, S., JENNINGS, S., LYLE, J. & FRIJLINK, S. 2013. Valuing recreational fishing in Tasmania and assessment of response bias in contingent valuation. *The Australian Journal of Agricultural and Resource Economics,* 57**,** 193-213.

ZHAO, J. & KLING, C. 2000. Willingness-to-pay, compensating variation, and the cost of commitment. *In:* IOWA STATE UNIVERSITY (ed.) *CARD working paper series.*