The Marginal Values of Lifesavers and Lifeguards to Beach Users in Australia and the United States

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Abstract: We estimate the marginal benefits of increasing lifesavers and lifeguards for beach users in Australia and the United States. Visits, income, education, age, distance from a patrol, and willingness to swim on an unpatrolled beach explain willingness to pay but rivalry does not; snob and bandwagon effects prevail. By comparing benefits with costs, the levels of lifeguards and lifesavers in Australia were found to be underprovided, consistent with shared good theory. Increasing services provides greater net benefits to users but replacing volunteer lifesavers with paid lifeguards may not because volunteering brings broader social benefits.

I. INTRODUCTION

> *To whom can we turn in our time of need, when in treacherous seas, clawing for our last gasp of air, we are engulfed by a mountainous pounding wave?*
>
> *They risk their own lives to save ours.*
>
> *Surely these brave women and men, when called, are the flesh and blood of our Saviour. –* One of the many services provided by volunteer lifesavers.

Safe bathing services – a saviour indeed – are important to the social and economic wellbeing of coastal communities around the globe, including those of Australia and the United States

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(US). Despite their importance, economic theory suggests that these services, because they are shared, will tend to be underprovided (Buchanan 1965; Tisdell, 1984, 1980, 1977). In 2008, Surf Life Saving Australia (SLSA), Australia's largest voluntary authority on safe bathing services, had 32,000 patrolling lifesavers with an additional 149,000 passive members (O'Connell 2008, p. 131). From 1997 to 2008 the proportion of patrolling lifesavers declined, falling from about 33 percent to 17 percent. This fall in the proportion of patrolling members may reflect what is suggested by economic theory.

This paper's goal is to test whether economic theory holds in practice; *Are services at some beaches in Australia less than the level desired by beach users?* To answer this question beach users in Australia and the United States were asked their willingness to pay (WTP) for additional services. The value of additional services, referred to as 'marginal value', was then compared to the additional cost of supply. *Ceteris paribus*, if benefits exceed costs at the margin, additional lifesaving services are required.

The paper investigates the rivalry among users of safe bathing services to help explain people's WTP. Where rivalry or shortages exist, there may be pressure to substitute or supplement volunteering lifesavers with paid lifeguards in order to extend services. Thus, the paper also considers this substitution.

The paper is set-out in the following manner. Firstly, safe bathing services are described to explain the theoretical reasons for under provision. Secondly, the methods are presented. Thirdly, the results are presented in two parts: those to test elicitation methods and relative values of additional lifesavers versus lifeguards; and those from a number of regression analyses used to help explain users' WTP including rivalry. Estimates of mean WTP bids from the regression models are then presented and compared with marginal costs to highlight the need for additional services or 'saviours'. The final section concludes with recommendations for policy makers and those who undertake valuation studies.

II. DESCRIPTION OF SAFE BATHING SERVICES IN AUSTRALIA AND THE UNITED STATES

Safe bathing service providers take two forms in Australia: the volunteer lifesaver and the paid lifeguard. The services are complementary, with lifesavers operating over weekends during summer and lifeguards usually operating during the working week. Also, where lifesavers are not available, lifeguards often operate. Typically, clubs of SLSA provide lifesaving services while local government authorities, the Australian Professional Lifeguard Association, or the state headquarters of SLSA provide lifeguard services.

In the United States, the lifeguard services provided depend on the jurisdiction of a given beach (Federal, State or County). In the early 20th century there were voluntary lifesavers in the United States but today there are none (Blackwell 2003). The demise of volunteers may have arisen from concerns about beach accidents and liability claims. However, with no volunteers the community and society in general loses because lifesaving services provide broader social benefits beyond those of a safe place to swim.

2.1 The Economic Nature of Lifesaving and Lifeguard Services

Lifesaving and lifeguard services are commodities with a complex mix of economic attributes, termed a complex mixed good, and may be categorised as follows:

1. The service of being ‘saved’ if one gets into trouble in the surf – private but shared with pure public good consequences (see 3 below).
2. The service of identifying a safe bathing area on any given beach or monitoring and providing information to users of potential hazards – shared or quasi-public goods.
3. Benefits not related to the recreation or use of a beach, referred to as non-use benefits – pure public goods.
4. Benefits gained by the wider community, referred to as spillover benefits – merit goods.
5. Benefits derived from membership of a surf lifesaving club or lifeguarding association – mixed goods.

A lifeguard or lifesaver ‘shared’ by users may only be able to attend to one emergency at any one point in time. In a monitoring capacity, they may be able watch over many people at any one point in time. For these reasons service categories 1 and 2 are termed non-rival up to a point. Beyond that point, these services become rival by extra users impinging on the benefits provided to all users. At the point of rivalry, the possibility of being saved, if in difficulty, may be reduced. Thus, users of the foreshore may be willing to pay for additional lifeguards or lifesavers to reduce rivalry.

Nevertheless, any rivalry experienced with a shared good may provide utility to some (bandwagon effect, safety in numbers, visual amenity) while to others it may provide disutility (snob effects, people who enjoy solitude). These complicating factors, combined with the broader benefits provided by lifesavers from categories 3-5, may provide contrary findings for an individual’s utility derived from an extra lifesaver or lifeguard.

2.2 Optimal Supply of Lifeguards and Lifesavers

While the services provided by lifeguards and lifesavers are complex and mixed in nature, this study ascertained the value of extra safety services provided by an additional and fully equipped lifeguard or lifesaver: categories 1 & 2 above. With open access, these safety services are typically shared by beach users and thus present a number of problems resulting in their under provision:

- the free rider problem where some individuals freely ‘ride’, without payment, on the supply of these services by others;
- the inability of the private sector to provide the best supply of the service even though it may provide some of the service; and
- the need for different prices for users which may be difficult to implement.

Compounding problems may mean no provision of the service. Tisdell (2005, Chapter 3) provides a detailed discussion of these problems for the conservation of nature.

III. METHODS

Given theory suggested that services were likely to be underprovided, the contingent valuation method was used to survey beach users in the United States and Australia to obtain their willingness to pay for an additional services. The method values people's preferences for services or goods not yet provided, asking them for their WTP for a good contingent on its provision. The contingent valuation method suffers from a number of biases but most of these can be eliminated with pretesting and correct design and implementation (Bateman and Turner 1993; Pearce, Atkinson, and Mourato 2006). Mitchell and Carson (1990) and the US, Office of the Federal Registry (1993) provides a discussion of the appropriate use of contingent valuation.

Regardless of the method chosen, sampling error also needs to be reduced. To do this, a systematic sampling method was used to survey beach users. Moving from one end of the beach to the other, one individual from every third group of beach users was selected for questioning. Systematic sample selection combines the benefits of both simple random and stratified sampling. The method provides efficiency gains for sample estimates as compared with stratified sampling or simple random sampling. The process is still random and independent. However, by systematically selecting sample members the resulting sample is expected, in practice, to be geographically more representative of the population of beach users than samples gained via other methods.

Beach sites, as listed in *Table 1*, were selected in an efficient manner according to those renowned for high visitation and convenience from main transport routes for the first author. In Australia, the majority of respondents (140) came from Mooloolaba beach, 100 km north of Brisbane, on the Sunshine Coast in Queensland. Other users were interviewed from Kawana beach which lies to the south of Mooloolaba and Alex and Maroochydore beaches which lie to the north. A small sub-sample of the Australian survey came from Cottesloe, south west of Perth in Western Australia. In the US, 29 people were interviewed from South Miami and Fort Lauderdale beaches of Florida and 62 users were interviewed from several Waikiki beaches on the island of O'ahu, Hawaii. The sample sizes (n), day and date of interview for various sites are provided in *Table 1*.

3.1 WTP Questions

Beach users were asked whether they would be WTP per person per visit for an extra lifesaver or lifeguard dependent on the service provided at the time of the survey. The extra lifesaver or guard would patrol outside the flagged area thus, providing an extended sphere of safety. If lifesavers were on duty, the WTP would be for an extra lifesaver or, if lifeguards were on duty, for an extra lifeguard. Where no service was provided then the bids represented the value of one lifeguard or lifesaver. The present level of lifeguards or lifesavers (and associated equipment) was described to respondents and recorded hourly.

The next question assessed the amount of WTP. Various elicitation methods were used to gain these amounts. These methods and service types (lifesaver or lifeguard) are outlined for the sites in *Table 1*. The contingent valuation questions can be provided by the corresponding author upon request.

Table 1: Sample Sizes, Day, Dates, Service Types and Elicitation Methods of Site Surveys

Country and State	Beach	Day and date	n	Service types [a]	Elicitation methods [b]
Australia					
Western Australia	Cottesloe	Sat 6/11/1999	7	Saver	Bidding game dichotomous choice (bg) + substitute good (sg)
Queensland	Kawana	Sun 16/4 & Thur 20/4/2000	31	Both and nil	Double bounded dichotomous choice (db) + open ended (oe) + sg
	Mooloolaba	Sun 16/1; Thur 20/1; Fri 21/1; Sat 22/1; Wed 26/1 (Australia Day); Sun 30/1; Sat 15/4 & Wed 19/4/2000	140	Both	bg + sg, db + oe + sg
	Alex	Sat 22/4 & Thur 4/5/2000	36	Both	db + oe + sg, db + oe
	Maroochydore	Sat 29/4 & Fri 5/5/2000	36	Both	db + oe
Total Australia			**250**		
United States					
Florida	South Miami	Sat 2/10/1999	7	Guard	bg + sg
	Fort Lauderdale	Sun 3/10/ and Wed, 6/10/1999	22	Guard and nil	bg + sg
Hawaii, O'ahu Island	Waikiki, west resorts	Sat 9/10/1999	20	Guard and nil	bg + sg
	Ala Moana	Sun 10/10/1999	16	Guard	bg + sg
	Waikiki, east resorts	Mon 11/10/1999 (public holiday)	17	Guard and nil	bg + sg
	Waikiki, Royal	Mon 11/10/1999	7	Guard	bg + sg
	Kuhio Beach Park	Mon 11/10/1999	2	Guard	bg + sg
Total United States			**91**		
Total US & Australia			**341**		

Notes: a. Service type categories are guards, savers, both or none. In addition, at some sites interviews were conducted outside the hours of operation of safe bathing services, that is, in the early morning and evening. b. + = 'followed by'.

To make the questions realistic, respondents were reminded in the Australian survey instrument of their budget constraints when asked their WTP. Interviewers also asked respondents to be honest in answering the questions in the survey. In addition, to check the validity of WTP bids, interviewers asked respondents to nominate a private good they would forgo to afford their bid. The market values of these substitute goods were found to be statistically no different to the bid values. This validating of bids is an innovation within the literature.

3.2 Regression Analyses and Reasons for Bids

Because the bids obtained in this study come from onsite in-person surveys, they suffer from endogenous stratification, truncation and the presence of non-negative integers (Shaw 1988). Endogenous stratification is where more frequent visitors have a higher probability of being surveyed and bias WTP for the average visitor. Truncation occurs because people who don't use the beach are not surveyed. Lastly, non-negative integers exist because people can only provide zero or positive and genuine WTP bids. These expected errors are corrected statistically by using maximum likelihood and censored regression techniques such as Tobit (Shaw 1988). Thus, ordinary least squares and Tobit regressions are used to regress bids.

Table 2: List of Variables used in Willingness to Pay Regression

Variable name	Description	Measurement
BID	Willingness to pay per person per visit for an extra lifesaver or lifeguard	Dollars ($), AUD or USD depending on site.
INC	Annual before tax household income for current financial year	$, AUD or USD, midpoint of various income brackets
VISITS	Annual quantity of day visits to the site by respondent	Whole, positive number
SAVERS	No of lifesavers on duty at time of interview	Whole, positive number
GUARDS	No. of lifeguards on duty at time of interview	Whole positive number
EDUC	Years of education undertaken by respondent	Whole positive number
EDUC^2	EDUC squared	Whole positive number
OUTPAT175	Whether respondent was 175m outside the patrol area (flagged)	1 = yes 0 = no
SWIMUP	Whether respondent would swim on an unpatrolled beach	1 = yes 0 = no
AGE	Age of respondent in years	Whole, positive number
KAWANA	Whether site is Kawana beach or not	1 = yes 0 = no
TOWERPA	No. of towers per area of beach face	Decimal positive number, m^2
BATHERBAKER	Whether respondents main activity was bathing, swimming or sunbaking	1 = yes 0 = no

The bids of individual beach goers (BID) are regressed on a number of potential explanatory variables. *Table 2* lists and describes the variables expected to explain bids. The variable's units of measurement are also provided.

The Australian regressions are expected to take the form:

$$BID = B_0 + B_1 INC + B_2 VISITS + B_3 SAVERS + B_4 GUARDS + B_5 EDUC + B_6 EDUC^2 + B_7 OUTPAT175 + B_8 SWIMUP + B_9 KAWANA$$

The US regression is expected to take the form:

$$BID = B_0 + B_1 INC + B_2 VISITS + B_3 GUARDS + B_4 TOWERPA + B_5 EDUC + B_6 BATHERBAKER$$

The regressions were prepared with the following reasons in mind, *ceteris paribus*.

A person's income is expected to have a positive relationship with their bid. Higher income people are likely to be able to pay higher amounts for additional services.

People who visit a beach more often are likely to have better knowledge of the beach and surf hazards and thus be less willing to contribute. Additional visits also mean more cost if bids are realistic. Tourists, people who visit less often, may be willing to pay more because their incomes are typically higher than residents who visit more often.

Also a tourist's level of experience of the local surf conditions is likely to be less than a resident's. As the number of guards or lifesavers on a beach increases, people are expected to be less WTP for additions. People with more education are likely to provide higher bids consistent with the economic literature (Bateman and Turner 1994).

Also, people who sit on a beach outside the flagged area do so for good reason, e.g. to get away from crowds (snob effect). Thus, they may or may not wish for additional services depending on whether these services are seen to erode their solitude or raise their protection.

Similarly, people who swim on unpatrolled beaches may not be WTP for additional services; they believe in their own experience and decisions or are seeking solitude. However, some may bequest a payment for the safety of others.

Kawana beach is included as a dummy because it is more exposed to swell than the other Sunshine Beaches. The beach is also more expansive with fewer patrol areas.

In the US there are no lifesavers or volunteers, only paid lifeguards. Thus, the regression for the US did not include the SAVERS variable. The other variables have the same interpretation as those for Australia. The extra variables in the US are included because people who are bathing, sunbaking or swimming are more likely to need the extra services than say surfers who have aquatic aids and whose opportunity for catching an ideal wave is reduced by additional services. The United States' open beach plan warranted the inclusion of the BATHERBAKER and the towers per area variables. No red and yellow flags are used to show a safe bathing area. Instead, towers are placed at equal distances along the beach. The more towers provided on a beach, the less people would value extra services.

IV. RESULTS

4.1 Contingent Valuation Biases

The first set of results tested for bias in the bids. Observations were visually compared and no evidence of interviewer bias was found. Starting point bids influenced final bids in only 2 small subsets (48 observations) of the Australian sample. Protest bids amounted to 14 observations or about 5.6 percent of the total Australian sample and 5 observations or 5.5 percent of the US sample. These protest observations were not included in the analysis of the data. Of the people asked to undertake an interview, 1.9 percent and 2.2 percent of people in Australia and the US declined.

4.2 Non-Parametric Results

To help answer a number of policy and valuation method questions, the Mooloolaba bids were broken into 4 groups as shown in *Table 3* with 4 tests of differences between the groups. Non-parametric tests were used to check parametric tests because the sample size of group 2 was small. Bids from outside patrol times (lifeguard or lifesaver) were excluded.

Table 3: Mooloolaba On-Duty WTP Summary Statistics, $AU

Type	Mean	Median	Standard Deviation	*n*
(1) Lifesaver, bidding game (bg)	1.23	0.50	1.45	35
(2) Lifesaver, open ended following double bounded question (db + oe)	0.68	0.50	0.82	17
(3 = 1+2) Lifesaver bg and db + oe	1.05	0.50	1.30	52
(4) Lifeguard bg	1.22	1.00	1.32	56

First, the bidding game (group (1) in *Table 3*) and open-ended (group (2)) data for lifesavers were compared using the non-parametric permutation test (Johnston and DiNardo 1998, p. 360) which involved 10,000 replications, and no statistical difference was found.

Next the permutation test and its parametric equivalent found no difference in the bidding game bids for lifesavers (group (1)) and lifeguards (group (4)).

Next the lifesaver data were considered as one sample (group (3) = groups (1) + (2)) on the basis of the result of the first permutation test, and compared to the lifeguard bidding game bids (group (4)) and again the there was no difference found.

Lastly a non-parametric median test (Pett 1997, pp. 204-207) found no difference across the groups (1), (2) or (4).

4.3 Regression results

The Australian regression results are provided in *Table 4*. The results of regressions for an extra lifesaver are compared separately with those for an extra lifeguard in *Table 5*. The United States results are provided in *Table 6*.

All models were found to be overall statistically significant at the 5 percent level (See F statistics or likelihood ratio tests in *Tables 4*, *5* and *6*). The United States data performed best in terms of goodness of fit (adjusted R^2). However, for cross-sectional data reliance on the F is preferred. White's (1980) heteroskedasticity-consistent estimates of the standard errors are presented for the OLS results. Similarly, Huber or White robust covariances are used for the Tobit results. Only the significant results are discussed.

All coefficients from the Tobit regression are interpreted using their marginal effects. Unconditional adjustment factors for the models were: Australian combined 0.847; Australian lifesaver 0.802; Australian lifeguard 0.844; United States' 0.932.

4.4 Income

As can be seen from *Tables 4*, *5* and *6*, only in the combined and lifeguard Australian regressions was before tax annual household income (INC) a significant explanatory variable for willingness to pay at the 5 and 10 percent level. Higher income people are willing to pay less for safe bathing services (for each $10,000 in income, 7c less for combined and 8c less for lifeguard). This result is contrary to economic theory. Higher income people are expected to pay more.

4.5 Visits

From the Australian data (*Table 4*), for each 10 visits a beach user makes, s/he is willing to pay 2c (AUD) less for an extra lifesaver or lifeguard and 3c (AUD) less for an extra lifesaver (*Table 5*). Both are significant at the 10 percent level. In the United States (*Table 6*), people are willing to pay 8c (USD) less for every additional 10 visits made (significant at the 1 percent level).

4.6 Lifesavers, Lifeguards, Towers per Area

In the combined Australian data, the number of lifeguards and lifesavers are significant at the 5 percent level. For each extra lifesaver or lifeguard provided, beach users are WTP 4c (AUD) and 14c less, respectively (*Table 4*). For the Australian lifeguard regression (*Table 5*), people are WTP 22c (AUD) less (significant at 1 percent level) and for the US WTP is highly significant at 40c less (USD or 63c AUD per visit with exchange rate from The Economist 31 Dec. 1999, p. 144). Respondents in the US were WTP about 83c (USD) less for an extra lifeguard given one extra tower in the nearby vicinity (significant at 10 percent, correct sign).

4.7 Socio-Economic Variables

For each extra year of education, respondents were WTP $1.60 more for an extra lifesaver or guard in Australia. In contrast, with each year of education, USZ respondents were WTP 37c (USD) less for an extra lifeguard (5 percent level). More educated beach users may also know the risks and value additional services less with an open beach plan.

In the split Australian data (*Table 5*) for each additional year of age (AGE), respondents were WTP 2c less for an extra lifesaver (0.5 percent level). When regressed separately, females in the Australian model were WTP more than males (10 percent level).

Table 4: Bid Model, Australian Data

	Ordinary Least Squares (OLS) [a]			Censored Normal (Tobit) [b]		
Variable	Co-efficient (std errors)	t-ratio	p-value	Co-efficient (std errors)	z-ratio	p-value
Constant	-9.981 (5.238)	-1.91	0.058	-9.981 (5.136)	-1.94	0.052
INC	-8.00E-06 (3.90E-06)	-2.05	0.041	-8.00E-06 (3.82E-06)	-2.09	0.037
VISITS	-0.00250 (0.00147)	-1.70	0.091	-0.00250 (0.00144)	-1.73	0.083
SAVERS	-0.049 (0.023)	-2.13	0.034	-0.049 (0.023)	-2.18	0.030
GUARDS	-0.163 (0.068)	-2.40	0.017	-0.163 (0.067)	-2.45	0.014
EDUC	1.888 (0.803)	2.35	0.020	1.888 (0.787)	2.40	0.016
EDUC^2	-0.070 (0.029)	-2.38	0.018	-0.070 (0.029)	-2.43	0.015
OUTPAT175	0.543 (0.284)	1.91	0.057	0.543 (0.278)	1.95	0.051
SWIMUP	-0.456 (0.243)	-1.88	0.062	-0.456 (0.238)	-1.91	0.056
n = 235	R^2 = 0.111 Adj. R^2 = 0.080	F = 3.53	0.001	Lg L=- 458.1 Ave. Lg L =	LR[c]=27.68 -1.949	0.0005

Notes: a. White heteroskedasticity-consistent estimates of standard errors and covariance are used. b. Huber/White standard errors and covariance are used. c. A redundant variable likelihood ratio.

Table 5: Lifesaver and Lifeguard Bid Models, Australia (TOBIT)

	Lifesaver			Lifeguard		
Variable	Co-efficient (std errors)	z-ratio	p-value	Co-efficient (std errors)	z- sratio	p-value
Constant	3.028 (0.610)	4.96	0.000	2.811 (0.585)	4.81	0.000
INC	-6.83E-06 (4.95E-06)	-1.38	0.167	-1.00E-05 (6.08E-06)	-1.65	0.099
VISITS	-0.00310 (0.00185)	-1.68	0.093	-0.00282 (0.00256)	-1.10	0.271
OUTPAT175	1.165 (0.460)	2.53	0.011	-	-	-
SWIMUP	-0.759 (0.363)	-2.09	0.037	-	-	-

AGE	-0.028 (0.008)	-3.40	0.001	-	-	-
GUARDS	-	-	-	-0.261 (0.093)	-2.80	0.005
KAWANA	-	-	-	-1.013 (0.456)	-2.22	0.026
n_{savers} = 121 n_{guards} = 114	Lg L = -232.7 Ave. Lg L=-1.923	LR=20.98	0.0008	Lg L = -222.7 Ave. Lg L=-1.954	LR=11.51	0.0214

Table 6: Lifeguard Bid Model, United States

	OLS [a]			Tobit (Censored Logistic)		
Variable	Co-efficient (std errors)	t-ratio	p-value	Co-efficient (std errors)	z-ratio	p-value
Constant	7.934 (2.682)	2.96	0.004	7.606 (2.435)	3.12	0.002
INC	6.52E-06 (9.51E-06)	0.69	0.495	3.50E-06 (7.26E-06)	0.48	0.630
VISITS	-0.00951 (0.00328)	-2.90	0.005	-0.00891 (0.00217)	-4.10	0.000
GUARDS	-0.453 (0.143)	-3.16	0.002	-0.432 (0.121)	-3.57	0.000
TOWERPA	-1.101 (0.512)	-2.15	0.035	-0.887 (0.457)	-1.94	0.053
EDUC	-0.402 (0.205)	-1.96	0.053	-0.401 (0.188)	-2.13	0.032
BATHERBAKER	0.636 (0.663)	0.959	0.341	0.778 (0.407)	1.91	0.056
n = 85	R^2 = 0.192 Adj. R^2 = 0.129	F = 3.08	0.009	Lg L=-1.66.3 Ave LgL=-1.95	LR=23.34	0.0007

Notes: a. White heteroskedasticity-consistent standard errors and covariance are used.

4.8 User Type

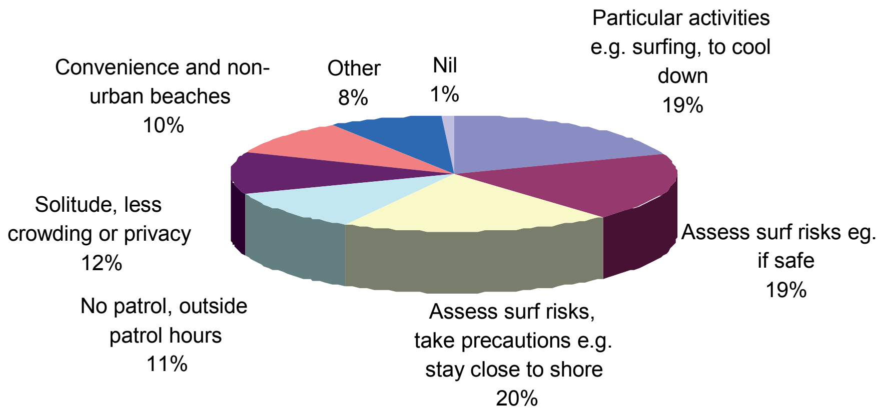
United States' users who were bathing, swimming, or sunbaking (BATHERBAKER) were found to be WTP 73c (USD) more for an extra lifeguard.

4.9 Position of Users, Congestion and Swimming on Unpatrolled Beaches

Australian users who were 175m or more from a safe bathing area (OUTPAT175) in the combined and lifesaver models were WTP 46c (AUD) and 93c (AUD) more for an extra guard or lifesaver, or lifesaver respectively (10 and 2 percent levels). OUTPAT175 is only relevant in Australia where red and yellow flags designate a safe bathing area. In the US under the open beach plan, towers are placed at intervals along the foreshore with overlapping spheres of surveillance. Thus, congestion occurs with a safe bathing area and 'decays' as one moves away from the area. The distance from a bathing area was significant rather than congestion on the beach. Beach width[1] and site congestion (users/acre, total users, beach users, water users) were insignificant.

Respondents were WTP 61c less for an additional lifesaver and 39c less for an additional lifeguard or lifesaver where they had previously swum on an unpatrolled beach (SWIMUP). 57 percent of Australian respondents had swum on an unpatrolled beach, 7 (median) times per year. The reasons for swimming on an unpatrolled beach are illustrated in *Figure 1*.

Figure 1: Reasons for swimming on an unpatrolled beach



The most popular reason was that people considered their ability to look after themselves and considered the safety of the surf conditions. The second most popular reasons were to do with undertaking particular activities, especially surfing, to cool down or enjoy the beautiful surrounds. The next most popular was to do with group dynamics e.g. respondents wished to achieve solitude, less or no crowds on the beach and in the water, and privacy. Next were to do with no patrol being provided, or that it was outside of patrol hours or the patrol season. The last was to do with time, access, convenience and they had swum at beaches away from urban areas.

[1] The following were exceptions. Beach width was significant in the logistic, censored, Tobit and when individually regressed but not in the censored normal regression. The number of water users was significant in the simple normal censored regression but had the wrong negative sign. Both variables were found to be insignificant in the multiple regression case, except for beach width in the logistic form. Distance from the patrol area was significant while beach width became insignificant in the preferred censored normal form.

The third group of reasons suggests that for some users crowding *of the beach* deters them from the safe bathing area, an example of a snob or Veblen effect as opposed to a bandwagon effect. Crowding *of safe bathing services* or *the beach itself* is captured through the OUPAT175 variable, having an opposite sign to the SWIMUP variable. The number of water users across a beach when individually regressed was found to be significant (10 percent level) and had a negative sign, while the number of beach users was insignificant with a similar sign. The signs for beach and water users suggest that rivalry is complicated by bandwagon, safety in numbers, visual amenity or other group dynamic gains from increased rivalry. When included with OUTPAT175 the number of water users became insignificant suggesting that distance from a patrol area better explained WTP rather than congestion generally across the beach and not in specific locations. The effects of these variables are difficult to separate into those for congestion of *beach recreation* and congestion of *lifesaver and lifeguard services*.

In order to separate the two effects we might consider theoretically WTP for a beach visit versus that for additional safe bathing services. People greater than 175m from a flagged patrol area are WTP for additional services, while those inside are not which reflects a lack of services beyond the flagged patrol. The numbers of beach and water users were not found to have positive impacts on WTP for additional services, which tend to reflect group dynamic effects. In part, snob effects appear to be driving the negative relationship with WTP for people who swum on unpatrolled beaches. This group of users may not demand the services because with these services comes crowding. A pressing and difficult policy question is: *How do we protect these people from surf dangers? Is the open beach plan that is used in the US a way forward?* These people wish to avoid crowds, and in so doing, are forced to recreate at beaches which are not patrolled and may be unsafe. Areas of research that may help to answer these questions include the use of remote sensing and surveillance, education and signage and innovative patrol approaches e.g. roaming patrols to help protect these user groups.

These results provide evidence that the WTP for an extra lifeguard or lifesaver results from a perception of rivalry over current services beyond those of the safe bathing patrol to areas lacking sufficient services (positive sign of OUTPAT175). This evidence of a lack of services is consistent with predictions of the economic theory of shared goods.

4.10 Site Dummy Variable

The site dummy variable for Kawana beach (KAWANA) was found to be significant at the 3 percent level for the individual Australian lifeguard model (*Table 5*). Beach users at Kawana were willing to pay 86c less for an extra lifeguard than users from other beaches. The significance of the KAWANA variable may be explained by the beach's length (9km, Short 2000), exposure to the elements, rough conditions, and higher annual visits per user (with a large local resident component). These results do not lend support to reduce or limit extensions of lifeguard services at Kawana. There is growing community concern (as indicated from beach user respondents, surf life saving club members and the lifeguard on duty at the time of interview) for the need to establish additional safe bathing services well to the South of Kawana Surf Life Saving Club.

Figure 2: Australian Box Plot for Resident and Visitor Bids by Site

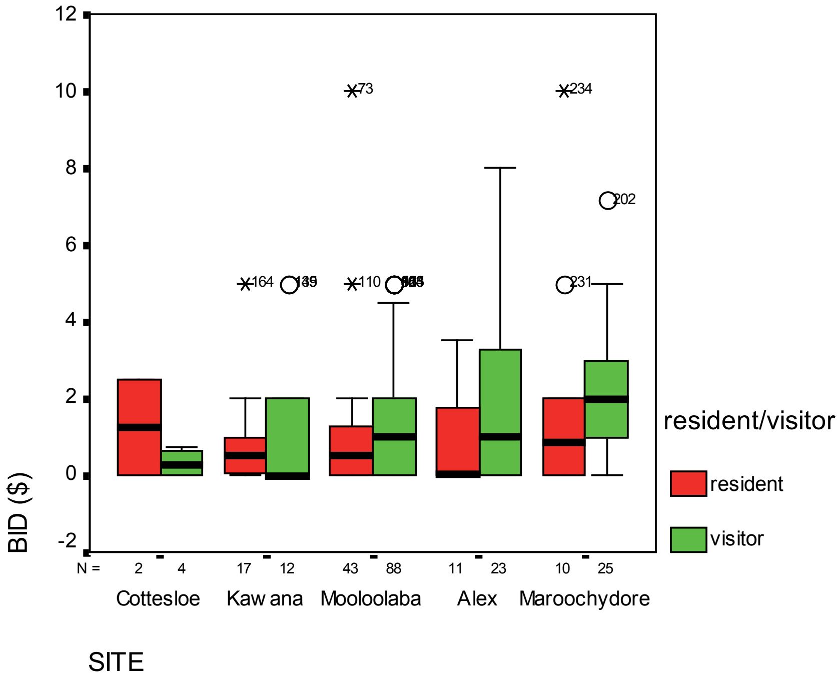


Figure 3: Box-Plots of Household Income for Visitors and Residents by Site

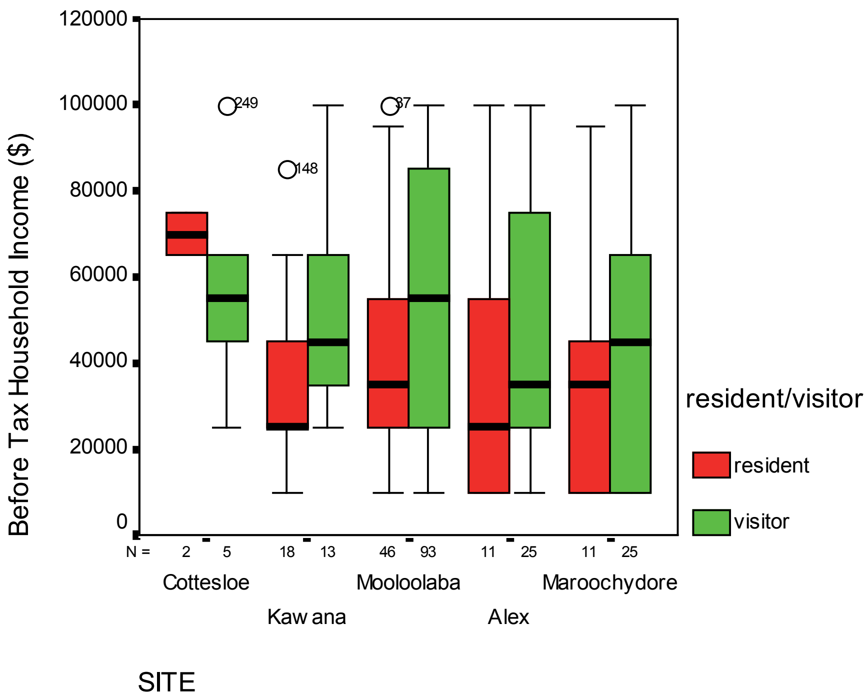
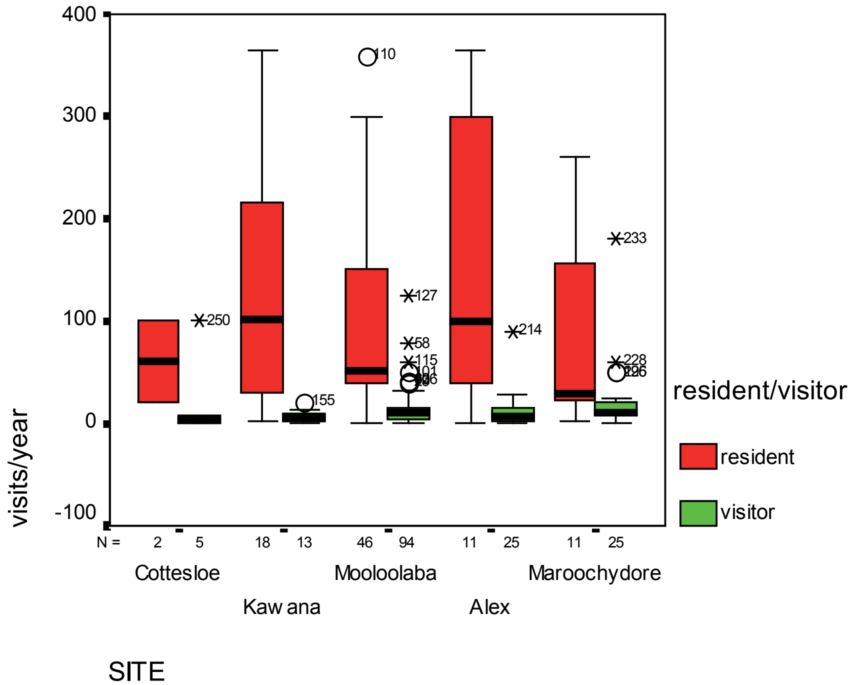


Figure 4: Box-Plots of Annual Visits for Visitors and Residents by Site



4.11 Site Analysis of Bids

The WTP data for individual sites was regressed and only the Mooloolaba model was found to be significant (5 percent level). The box plots in *Figures 2*, *3* and *4* give a breakdown by site and whether respondents were residents or visitors. Visitors are defined as those staying for one night or more.

There is a positive correlation between WTP and income, as shown by comparing the box plots in *Figures 2* and *3*. Kawana differs from other sites, with a negative correlation between WTP and income using a comparison of medians. Kawana's visitor box lies above that of residents for WTP, which indicates a positive relationship with income. However, Kawana was the only beach that had higher use by residents (58.6%) than compared to other beaches (Cottesloe 33.3%, Mooloolaba 32.8%, Alex 32.4%, and Maroochydore 28.6%). Also, Kawana residents had a lower proportion of genuine zero bids (23.5%) when compared with other sites (Cottesloe 50%, Mooloolaba 39.5%, Alex 45.5%, Maroochydore 40%). These results are sensible because people who are likely to use extra services will tend to value extra services. Thus, tourist beaches will tend to have a higher WTP by tourists and local beaches by locals (residents). The box-plot in *Figure 4* provides statistics on people's visits per year by site.

Unlike other sites, Cottesloe's resident users have higher incomes than its visitors as depicted in *Figure 3*; therefore, its resident users are WTP more on average for extra services as shown in *Figure 2*. Cottesloe's sample size is small and inference requires caution.

V. DISCUSSION

First let us interpret the results from the comparison of summary measures for Mooloolaba beach. For valuers of non-market services, there is no difference between bidding game estimates of bids and open-ended post-double bounded estimates. Secondly, for policy makers considering substituting lifesavers with lifeguards, there is no difference in mean bids for volunteer lifesavers and paid lifeguards at Mooloolaba, despite one costing considerably more than the other. Despite this, respondents acknowledged the broader benefits from lifesavers compared to lifeguards by favouring a hybrid system of lifesavers and guards in preference to a purely paid system of lifeguards. The final observation from the comparison is that the parametric tests conducted on lifesaver and lifeguard bids are robust, and thus are reliable when drawing policy prescriptions about the ideal level of services on a beach which is considered next.

5.1 Implications of the Estimates for the Optimal Supply of Lifesavers and Lifeguards

The regressions results provide estimates for the dollar value of an extra lifesaver or lifeguard as presented in *Table 7*. These estimates include data from both on and off-duty observations and hence, the contrasting results with *Table 3*. The estimates' standard deviations, confidence intervals and medians are also summarised in *Table 7*.

Table 7: Estimates of WTP per Person per Visit, 1999-2000, $AUD

Type	Mean	Median	Std Devn	95% Confidence Interval for Mean
One extra lifesaver or lifeguard, Australia	1.43	1.00	1.81	1.20 – 1.66
One extra lifesaver, Australia	1.35	0.50	1.81	1.02 – 1.67
One extra lifeguard, Australia	1.52	1.00	1.80	1.18 – 1.85
One extra lifeguard, United States ($USD1999)	2.61 (1.66)	1.57 (1.00)	3.42 (2.18)	1.87 – 3.33 (1.19 – 2.12)

The United States' value of a lifeguard is larger than the Australian. However, one should not automatically conclude the service is of a higher quality. There are many factors that may account for the difference, such as the larger international tourist resort nature of Miami and Waikiki as compared with say Mooloolaba.

A guide to the type of monetary benefits that would be provided by an extra lifesaver or lifeguard can be gained by multiplying the derived WTP estimate from the Australian bid equation in *Table 3* by the number of visits to a beach in any one period. With half a million visits to a beach such as Mooloolaba in any one year, the total marginal benefits from one extra lifesaver or lifeguard on a beach are substantial. *With an estimated 512,995 visits per year the total marginal benefits of an extra lifesaver and an extra lifeguard would be approximately $1,090,000 using a derived median of $2.12 per person per visit. Total marginal costs per annum for an extra lifesaver and lifeguard are about $135,000* as estimated by Blackwell

(2003). *The difference between the marginal cost and marginal benefit provides a lower bound estimate of the net value of an extra unit of the dual service at almost $955,000*. The estimate of marginal cost is conservative as it assumes fully equipped, state of the art, mobile safe bathing providers. The marginal benefit estimate reflects an open access value and ignores any broader social benefits (merit good nature) of safe bathing services and any adverse impacts on the ecological health of the beach from extra services. Ignoring these other affects, marginal cost is less than marginal benefit and an increase in the number of lifesavers and lifeguards is warranted. This conclusion does not change when the costs of raising public funds are considered (Blackwell 2003). Whether the marginal analysis is considered per person per visit or annually, the conclusion is the same.

The marginal costs of providing an extra lifesaver and lifeguard per person per visit to a beach on the Sunshine Coast were estimated by Blackwell (2003) at 10c ($AUD) and 50c respectively. The lifesaver would be supplied across the weekend and the lifeguard would be supplied across the remainder of the week. Comparing the sum of these two estimates with the *derived* mean and median bid estimates of $2.12 and $1.81 for the combined service shows that marginal costs are less than marginal benefits. The levels of lifesavers and lifeguards provided on a representative beach are less than optimal. To improve the net benefits to individuals and society, an increase in number of lifesavers and or lifeguards at the margin is desirable. This policy outcome assumes a static state of demand. With rising use, the difference between marginal costs and benefits will only widen and the potential net gains, from increasing the number of lifesavers and lifeguards on beaches, are likely to rise. Policy makers also need to consider the merit good nature of lifesaving services discussed at the beginning of the paper.

5.2 Qualification of Marginal Values

The bids measure marginal values and do not represent the average value across all lifesavers or lifeguards on duty at the time. Consistent with the law of diminishing marginal utility from consumption, the marginal value of a lifesaver or lifeguard was expected to decline as more lifesavers or lifeguards were supplied, *ceteris paribus*. Hence, the bids do *not* indicate the value of any particular lifesaver or lifeguard, but measure the value of an extra lifesaver or guard on top of what was provided at the time of the interview. When there were very few or no lifeguards or lifesavers on duty then an extra lifesaver or guard will be of greater value than when there are more on duty. Thus, the estimates from on-duty beaches represent lower bound estimates of people's willingness to pay. *One cannot simply multiply the number of lifesavers or lifeguards by these estimates and then suggest that this represents their value to beach goers as this would be an underestimate of their true value*.

VI. SUMMARY AND CONCLUSION

This paper focused on the shared good nature of safe bathing services on beaches and, consistent with theory, has found that such services tend to be underprovided.

Differences between mean and median willingness to pay bids were compared for the Mooloolaba data across lifesavers and lifeguards and with the open-ended post double-bounded and bidding game questions using parametric and non-parametric tests. No significant difference between the bidding game and open ended post double bounded elicitation methods were found, important information for valuers of non-market services. Also, for those policy makers considering substituting or supplementing volunteer lifesaver services with paid lifeguard services, survey respondents made little distinction in their monetary valuations of extra lifeguards and lifesavers. However, users did distinguish between lifesavers and lifeguards because of the broader benefits (merit good nature) provided to society by favouring a hybrid system of lifesavers and guards in preference to a purely paid system of lifeguards only. Such information is strategically useful to policy makers given an environment of declining proportions of active to passive volunteer lifesavers and the need to seek out appropriate incentives for attracting new and old volunteers.

Variables such as number of lifeguards and lifesavers, visits per year, household income, education, age, distance from a patrol area, and willingness to swim on an unpatrolled beach were found to explain willingness to pay estimates for an extra lifesaver or lifeguard. Australian respondents who were greater than 175m from a safe bathing area had a positive WTP response for extra services, whereas people who swum on unpatrolled beaches were found to have a negative response to WTP for additional services. Congestion for beach use was found to drive some users away from patrol areas and swim on unpatrolled beaches. This should not be confused however with congestion or rivalry of a lifeguard or the safe bathing area *per se*, even though this is possible when sites and services become highly congested. The possible relationship between distance from a patrol and WTP appears to reflect people's perceptions that services outside these areas are not adequate.

The story about people's preferences inside the safe bathing area is a little more complex. Factors other than rivalry may be driving the demand for extra lifesavers or lifeguards such as bandwagon, 'safety in numbers', or visual amenity spillovers from increased beach and water users.

Nevertheless, the findings suggest that the levels of lifesavers and lifeguards on the beaches represented by the sample data, at the time of the survey, were less than optimal and needed to be increased. Such an increase was found to result in greater net benefits to individual beach users and society as a whole from increased safety services on beaches. However, there are other benefits that may spill over into society from the increase in services, especially those from extending lifesaving services, as identified by respondents in the survey, the broader social benefits of surf lifesaving. This merit good nature of lifesaving services means that lifeguards are imperfect substitutes for lifesavers. If lifesavers are used they tend to provide greater social benefits than those from use of lifeguards alone; Saviours, but with benefits beyond the souls saved! To expand the analysis here an assessment of the ecological impacts of additional services is an area for future research.

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