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## Appropriate Fees for Wilderness Day Use: Pricing Decisions for Recreation on Public Land

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An appropriate fee for the use of public lands strikes a balance between the need for fee revenues, the desire to maintain access and other normative concerns: fairness, equity, others' ability to pay and congestion. Including these other concerns in pricing decisions improves the likelihood that fees will be acceptable to users. Information was collected about wilderness visitors' maximum willingness to pay (WTP) for a day-use fee and the price they considered appropriate (AP). Sixty-two percent of Desolation Wilderness day users stated a WTP greater than the AP. The cost of choosing a fee at the median AP (\$2), rather than the revenue maximizing price (\$5), is a 30% reduction in revenue, while the gain is a smaller drop in participation (17% vs. 52%). Managers are faced with complex decisions about the purpose of fee programs. Alternative purposes will lead to alternative fee levels.

**KEYWORDS:** *Appropriate price, willingness to pay, wilderness user fees, fairness.*

### Introduction

Fees for public outdoor recreation can generate substantial revenues. Fees can also change the behavior of those who recreate. As the price to visit an outdoor recreation site increases, usage of the site would be expected to fall, other things equal. When deciding whether (and how much) to charge for outdoor recreation visits, managers of public lands—parks, forests, wildlife refuges and the like—face a tradeoff between generating revenues, on the one hand, and preserving public access for all, on the other. An appropriate fee for the use of public lands is one that strikes a balance between the need for fee revenues, the desire to maintain access and four related concerns—fairness, equity, other users' ability to pay, and congestion. Fairness refers to visitors' perceptions of what is right, or just, in a particular setting (Stapel, 1972). In the context of public land management, McCarville, Reiling and White (1996) point out that prices that seem "fair" receive little public comment or resistance while "unfair" prices can generate considerable hostility and displacement. Perceptions of fairness seem to reflect people's assumptions about how the benefits of public land are distributed.

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uted and whether all those who benefit also share the costs of managing these areas.

In a sense, public lands are shared by the entire population. Public lands benefit broad segments of society in a number of ways, including recreation opportunities, watershed values, and protection of biodiversity. As such, a case can be made that the costs of protecting and managing these areas should be borne by all, and therefore, supported by general tax revenues. In this context, many visitors view recreation fees as an unfair form of "double taxation." Alternatively, since only a limited number of taxpayers actually participate in public land recreation, advocates of the "user pays" principle believe that the costs associated exclusively with recreation should be borne entirely by those who recreate.

Related to fairness is the concept that Aizen, Rosenthal and Brown (1996) refer to as equity, where all those who benefit from a resource are to share in the cost of its provision. In a series of experiments conducted to estimate people's willingness to pay for a public (shared) good, they found that considerations of equity, i.e. who else pays for the good, can have more influence on respondents' willingness to pay than the value they place on the good itself. Recreation fees may be considered inequitable if visitors perceive that other users, either other visitors or private firms that extract resources from public lands (e.g., minerals, timber, grazing), are not paying their fair share.

In addition, those concerned about maintaining access to public land for everyone who wishes to recreate there may consider recreation fees unfair in a different sense. Recreation fees typically do not vary with visitors' ability to pay, i.e. lower income users do not pay lower fees. The issue here is whether recreation fees erect an economic barrier to public land recreation. Society's concern for the economically disadvantaged is readily observable in the markets for a number of privately-produced goods and services (e.g., food stamps, housing subsidies, Medicaid and Medicare programs), so it is not surprising that support exists for maintaining access regardless of income level to publicly-provided recreation areas. Related to this is the idea of public land access as a right afforded everyone regardless of means.

Recreation fees that restrict usage can, on the other hand, have a beneficial effect by reducing congestion in overcrowded areas. As such, fees can serve as a mechanism to force visitors to internalize the full costs associated with outdoor recreation. These full costs include not only the operating costs incurred when people visit public land, but also the costs of overcrowding and the associated ecological damage (Rosenthal, Loomis, & Peterson, 1984). Ecological damage, the injury to the ecosystem caused by excessive use, has a monetary value. It would be possible, in principle, to implement a fee equal to the sum of these combined, per-unit (marginal) costs, forcing each visitor to pay the full costs associated with their (marginal) use of the area. If these full costs can be estimated accurately, and assessed appropriately, usage will drop to the economically efficient level. This use of fees, rather than quotas, to ration the use of congested public lands remains con-

troverial and represents, to some, a troubling departure from past practice (More, in press).

Until recently, public land managers have had little experience in establishing fee programs and, in particular, in choosing the appropriate price level for a new recreation fee. Using surveys to estimate visitors' maximum willingness to pay for recreation experiences offers public land managers one helpful means of modeling the tradeoff between higher revenues and greater public access when choosing the level of new recreation fees. However, willingness to pay studies typically follow the contingent valuation (CV) method, which was not designed to make pricing decisions. Mitchell and Carson (1989) offer a useful introduction to the theory and practice of contingent valuation, a method developed to estimate the monetary value of goods and services not traded in typical markets.

Given the original purpose of the CV method, many studies using visitors' maximum willingness to pay to determine prices focus narrowly on summary statistics, i.e., mean and sometimes median, ignoring the richness of information that can be gained by examining the entire demand function (for an exception, see McCollum, Haefele, and Rosenberger, 1999). More importantly, the estimates generated from willingness to pay studies are derived solely from individual preferences and income constraints, ignoring the normative issues considered above; namely fairness, equity, others' ability to pay, and congestion. In what follows, we offer an empirical examination of whether the fee levels visitors claim they are "willing to pay" (at maximum) are consistent with the amounts they feel are "appropriate" for recreational experiences on public land.

#### Methods

We utilize data from a 1997-1998 survey of visitors to the Desolation Wilderness, conducted by researchers at the Aldo Leopold Wilderness Research Institute (see Watson et. al., 1998). The Desolation Wilderness is a high-elevation, heavily-used wilderness area located a few miles west of South Lake Tahoe, California in the Sierra Nevada Mountains. It has been the subject of numerous studies related to public land management (Stanley, 1980; Lucas, 1980; Watson, 1993; Watson & Cronn, 1994; Cole, Watson & Roggenbuck, 1995; Watson, Cole, & Roggenbuck, 1995). The Desolation Wilderness is characteristic of many other wilderness areas in the region and a day-use fee has been proposed there for the future.

Names and addresses of visitors to the Desolation Wilderness were obtained from day-use permit data collected from July 1, 1997 to June 30, 1998. Data for this analysis were obtained from surveys mailed to 632 visitors, of which 407 were returned (24 were undeliverable), yielding an adjusted response rate of 67%. Among other things, visitors were asked to indicate their maximum willingness to pay (WTP) and an appropriate price (AP) amount for three different types of day-use fees: (1) per-person, per-day; (2) per-group, per-day and (3) per-person, per-year. We focus here only on com-

paring WTP and AP for the most common type of fee—per-person, per-day—though similar results hold for the other two types. After removing respondents that indicated “don’t know” or who did not answer both parts of the per-person, per-day question, our subsample consists of 270 respondents.

Studies using the CV methodology have traditionally focused on valuation of nonmarket goods. In a departure from traditional CV studies, Baldares and Laarman (1991) obtained responses to what *should* be the price for entrance to a protected area in Costa Rica for locals and foreigners. The questions were worded to elicit responses based on notions of fairness rather than willingness to pay. The data were used, nevertheless, to estimate purchase behavior at different prices. In a later study of parks in Costa Rica, Chase et al. (1998) addressed the issue of fairness in two parts. They asked how high a fee would have to be before the respondent would choose not to come (a contingent behavioral response). They used that information to construct a demand curve. They also asked, in open-ended format, what daily entrance fee would be appropriate for the park. For all three parks studied, results showed appropriate fees to be about one-third the level of willingness to pay. While Chase et al. acknowledge that appropriate fee information can be helpful to policymakers setting fees for quasi-public goods, their interpretation of the resulting demand curve focuses on the findings from the contingent behavior responses.

In our study of day-use visitors to the Desolation Wilderness, the valuation question is structured in an open-ended format, specifically:

We would like to know your preferences for the amount of a potential day use fee at the Desolation Wilderness. For each type of day use fee below, please tell us the maximum amount you would be WILLING TO PAY, and also tell us what you would recommend as the APPROPRIATE price to charge.

Day use fee, per person, per day \$ \_\_\_\_\_ Maximum willing to pay  
 \$ \_\_\_\_\_ Appropriate price  
 \_\_\_\_\_ Don't know/Not sure

A dichotomous-choice format, first proposed by Bishop and Heberlein (1979), is generally considered more reliable when eliciting estimates of WTP for CV studies than the open-ended (fill-in-the-blank) approach we use here. In a dichotomous-choice study, each respondent is given one price or bid and asked if they would pay that amount. Bids are distributed randomly across the sample and a demand curve can be constructed using regression analysis (e.g., Richer, 1995).

However, adapting the dichotomous-choice model to estimation of AP is problematic. Whereas the visitor preferences that underlie estimates of WTP are monotonically decreasing in the level of a new fee (visitors consider higher fees to be less preferable since they consume more income), preferences for AP are not necessarily monotonically decreasing (nor increasing). For example, visitors wishing to reduce congestion may consider higher prices more appropriate than lower ones since they tend to limit usage by

other visitors. Alternatively, those concerned about others' ability to pay may consider lower prices more appropriate because they are more affordable to low-income users. This implies that knowledge of a particular visitor's AP does not imply appropriateness of any other price. The dichotomous choice method is, therefore, not suited to estimating AP.

The use of a dichotomous-choice format is problematic in another way as well. When comparing WTP to AP, two bids would be presented to the individual respondent, one for each type of value. The relative differences in bids would likely bias the results. Respondents could consider the relative differences presented in the survey instrument as clues, or hints, regarding the “correct” relationship between WTP and AP.

In this study, we construct a demand curve from WTP data and then we evaluate tradeoffs between revenue and access based on the appropriate price criterion. However, as in the studies by Baldares and Laarman (1991) and Chase et al. (1998), criteria for evaluating an appropriate price are not explicitly defined in the survey instrument. We make no attempt to suggest any reasons to visitors why the amounts they are willing to pay might differ from the levels they consider appropriate. Therefore, we don't know what respondents were thinking when they wrote down their appropriate price. While further research will undoubtedly seek to identify the reason(s) for differences between WTP and AP, our purpose here is to test whether the two amounts are equivalent, given no suggestions to the contrary, in the eyes of those who recreate on public lands.

## Results

### *Comparing Willingness to Pay and Appropriate Price*

The maximum amount survey respondents would be willing to pay is greater than the price they indicate as appropriate for 62% of the respondents in our sample. WTP is less than AP for only 1% of the respondents, while the remaining 37% indicate no difference between WTP and AP. Table 1 shows how the relative magnitudes of WTP and AP are distributed across the sample, disaggregating the respondents into categories corresponding to their maximum willingness to pay. For example, for those respondents indicating they would be willing to pay, at maximum, an amount between \$2.01 and \$3.00 for day use in the Desolation Wilderness (row 4 in Table 1), 67% indicate a WTP greater than the AP. Thirty-three percent indicate a WTP equal to AP and 0% indicate a WTP less than AP. In general, the majority of respondents indicate a WTP strictly greater than AP, while the very few who indicate a WTP strictly less than AP are all clustered among those willing to pay \$2 or less. As for those indicating no difference between WTP and AP, the percentage tends to be higher at lower levels of WTP, and drops steadily as WTP increases.

Descriptive statistics for WTP and AP for the sample of day users are summarized in Table 2. Maximum willingness to pay is shown to be greater than appropriate price by any measure of central tendency. For example,

TABLE 1  
Relationship Between Maximum Willingness to Pay (WTP) and Appropriate Price (AP) for Day Use at the Desolation Wilderness

WTP	Percent of Sample:		
	WTP > AP	WTP = AP	WTP < AP
0.00	0%	100%	0%
0.01 to \$1.00	9%	87%	4%
\$1.01 to \$2.00	42%	55%	4%
\$2.01 to \$3.00	67%	33%	0%
\$3.01 to \$4.00	100%	0%	0%
\$4.01 to \$5.00	77%	23%	0%
\$5.01 to \$10.00	93%	7%	0%
\$10.01 to \$20.00	100%	0%	0%
Entire Sample	62%	37%	1%

mean maximum willingness to pay (\$4.20) exceeds mean appropriate price (\$2.41) by 74%. A T-test reveals that this difference is statistically significant at the .01 level. The variance component is also significantly different. An F-test at the .01 level shows that the variance of WTP is significantly greater than that of AP. The greater variance on the WTP estimates suggests less agreement between respondents on the correct level of WTP than on AP.

What is the Cost of Choosing an Appropriate Price?

In any management decision, there are tradeoffs. In the case of recreation fees, the tradeoff is between revenue from higher fees and participation in the recreation activity. There are two "costs" to consider related to the selection of fee level. One is potentially lost revenue from a smaller fee, the other is potentially lost participation from users not being willing to pay a higher fee. The relative importance of those two costs is a management decision. Information can, however, be brought to bear on the magnitudes of those costs.

TABLE 2  
Descriptive Statistics for Maximum Willingness to Pay (WTP) and Appropriate Price (AP) for Day Use at the Desolation Wilderness

Measure of Value	Mean	Median	Mode	Standard Deviation	Sample Size
WTP	\$4.20	\$4.00	\$5.00	\$3.25	270
AP	\$2.41	\$2.00	\$2.00	\$1.79	270

Information about pricing tradeoffs can be obtained by considering the entire range of results rather than the mean or median WTP. The range of results can be determined by constructing a purchase rate function (PRF). The PRF can be derived by summing, for each possible price, the number of cases in the sample where survey respondents' stated WTP equals or exceeds that price. We divide this number by the sample size to convert it into a proportion, or percentage, that we term the *purchase rate*. We multiply this purchase rate by the current "zero price" visitation level, i.e. the number of zero-price permits multiplied by group size, to estimate the quantity of visits at each price.

This simple method of estimating the number of visits as a function of price is illustrated in Table 3. The number of visits that would occur if the price were zero is estimated by the five-year average number of permits issued annually for day use in the Desolation Wilderness—19,033. Permits are issued per group, so total number of visitors at a zero price can be estimated as 19,033 times 3.1 (the average group size). Multiplying visitors at zero price by the expected participation at each fee level (the purchase rate) gives an estimate of the expected number of visitors at each fee level.

Multiplying the number of visitors by the price gives an estimate of (gross) revenue. Table 3 shows that estimated revenue is relatively high when a fee level is chosen in the \$2 to \$5 range, and that revenue is maximized at the \$5 price. Figure 1 illustrates these relationships graphically, showing

TABLE 3  
Revenue Estimates for a Day Use Fee

Price <i>P</i>	Zero-Price Permits* <i>Z</i>	Group Size <i>G</i>	Purchase Rate <i>R</i>	Quantity <i>Q = Z*G*R</i>	Revenue = <i>P*Q</i>
\$0	19,033	3.1	100%	59,002	\$0
\$1	19,033	3.1	92%	54,223	\$54,223
\$2	19,033	3.1	83%	49,149	\$98,298
\$3	19,033	3.1	63%	37,171	\$111,514
\$4	19,033	3.1	52%	30,622	\$122,489
\$5	19,033	3.1	48%	28,203	\$141,015
\$6	19,033	3.1	17%	9,853	\$59,120
\$7	19,033	3.1	16%	9,381	\$65,670
\$8	19,033	3.1	14%	8,083	\$64,667
\$9	19,033	3.1	12%	7,198	\$64,785
\$10	19,033	3.1	12%	7,198	\$71,983
\$11	19,033	3.1	2%	885	\$9,735
\$12	19,033	3.1	2%	885	\$10,620

\*Assumes 19,033 day-use permits issued per year at Price = \$0 (5 year annual average 1991-95)

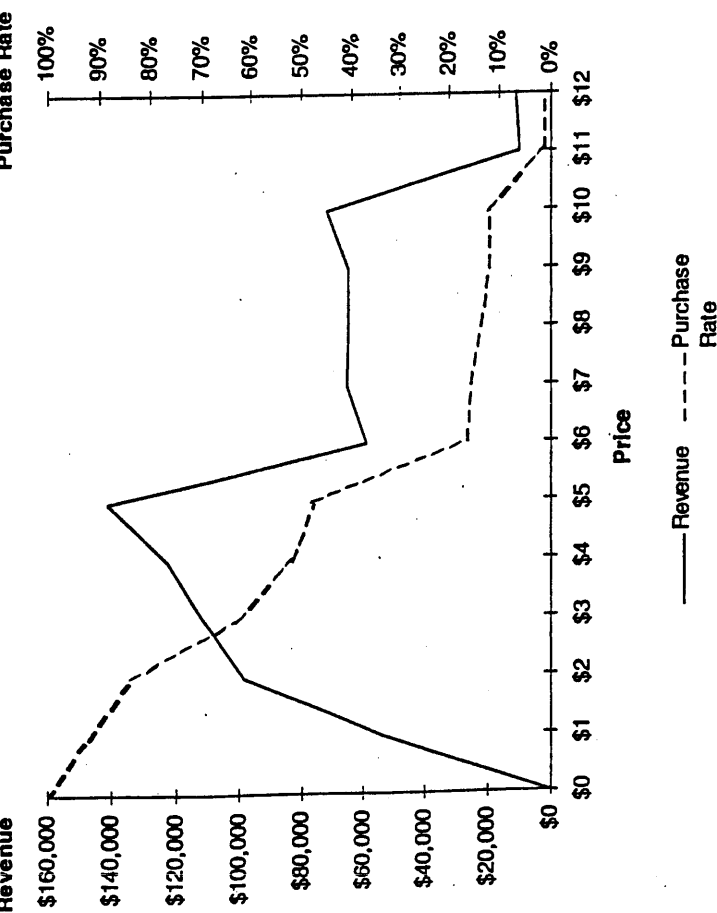


Figure 1. Purchase rates and revenues by price of a day use fee at the Desolation Wilderness.

how both revenues and purchase rates depend on the price that is chosen for the new recreation fee. The analysis is intended to show the *approximate* revenue implications of choosing different fee levels for day use. Actual revenues will also depend on other factors, such as giving visitors a choice between paying the per-day fee or purchasing an annual pass (see Richer, 1998).<sup>1</sup>

If public land managers were to base their pricing decision entirely on visitors' maximum willingness to pay, with the simple objective of maximizing revenue generated by a new fee, they would select a fee of \$5 per person, per day. Based on the assumptions outlined above, estimated revenue would

<sup>1</sup>Note also that the revenue estimates we present here assume that, as price increases, each individual visitor will continue to use the wilderness as much as before until the price reaches some critical level, after which his/her visits fall to zero. While data limitations force us to model demand in this take-it-or-leave-it fashion, price-induced changes in visitors may serve as an acceptable proxy for price-induced changes in visits in this case since the number of visits people make per year is quite low for the Desolation Wilderness (mean visits per year equals 2.1 for our sample).

be \$141,015 per year (see Table 3). The cost of that decision would be a 52% drop in participants.

Suppose, on the other hand, managers were to choose a fee level based on the appropriate price data. We recommend the median as the best measure of appropriate price. Recall that when a visitor indicates her WTP follows that she would also be willing to pay any price below that amount. However, if she indicates what she believes to be the AP, it does not follow that anything less (or more) would also be perceived as appropriate. Therefore, managers cannot simply adjust the fee level until it is considered appropriate by an arbitrarily large percentage of visitors. (In the case of WTP, the fee can be reduced until an arbitrarily-high purchase rate is achieved.) Since we cannot construct a function similar to the purchase rate generated from WTP data, managers must rely on some estimate of central tendency of the AP distribution.

The median has advantages over other measures of central tendency in the case of appropriate price. First, the median is generally a more robust measure than the mean, since it is less sensitive to perturbations caused by unusual (outlying) observations and errors in the data (Hanemann 1998). Second, the median is intuitively appealing from a public choice perspective. Suppose, for example, that a manager chooses a fee level less than the median AP. In this case, more than 50% (a majority) of the visitors would consider a higher price to be appropriate, while less than 50% (a minority) would favor a lower price. Clearly, an incremental increase in the price would be preferred by the majority of visitors. Conversely, choosing a price higher than the median AP would result in more than 50% of the visitors favoring a lower price. Therefore, an incremental price reduction would be preferred by the majority. Only if the fee level equals the median AP does it become impossible to find a majority of visitors that would favor an increase (decrease) in price.

If managers chose a fee of \$2, based on the median appropriate price, estimated revenue would equal \$98,298 per year and the current number of participants would drop by 17%. The cost to public land managers, therefore, of choosing a fee level consistent with the appropriate price criterion, rather than revenue maximization, is a 30% reduction in revenue, while gain is a smaller drop in participation (17% rather than 52%).

### Conclusions

We began the paper by pointing out the tradeoff that public land managers face when choosing whether, and how much, to charge for outdoor recreation experiences. While raising the level of a new fee tends to increase revenue, it also reduces the number of visits people make to a site, or things equal. We examined this tradeoff explicitly by focusing our attention on the distribution of WTP for day use of a popular wilderness area.

The purchase rate is defined here as the percentage of current visitors that continue to visit a site when a new fee is charged. Purchase rates a

unction of price, and tend to drop as fee levels are increased. According to the estimates presented above, a \$5 per person, per day fee generates more revenue than any other price, but only 48% of current visitors appear willing to pay this much for day use. Such a sharp reduction in usage, cutting the number of current visitors by more than half, would likely be considered unacceptable for recreation areas owned by, and managed for, the American public. Reducing the fee, for instance to \$3, would increase the purchase rate to 63%, and cutting it to only \$1 would bring the purchase rate up further, to 92%.

Given the dual (and often opposing) objectives of generating revenue and maintaining public access, public land managers face a difficult pricing decision. While analyzing maximum willingness to pay enables one to model the tradeoff between revenue and access, it stops short of suggesting a specific fee level, one that would satisfy both management objectives. Broadening the focus of pricing decisions to include normative concerns improves the likelihood that the fee levels chosen for public land recreation will be considered appropriate in the eyes of the recreating public, while still generating substantial revenues to support the management efforts of the public land agencies.

In the example offered here, we take the step of asking visitors what fee level they would consider *appropriate* for day use in a popular wilderness. Setting a new user fee at this level represents a plausible compromise between revenue and access, while allowing visitors' perceptions of fairness, equity, others' ability to pay, and congestion (and whatever other normative factors enter their evaluations of AP) to play some part in the pricing decision. While the benefits, in terms of public acceptance, of choosing a fee level based on visitor perceptions of appropriate price are difficult to quantify, the effects on revenue and access can be readily estimated. Compared to the revenue-maximizing fee of \$5, charging the median AP results in (1) a 30% loss of revenue and (2) a 74% increase in the percentage of visitors who would pay the fee to recreate there.

Areas abound for further research on the relationship between maximum willingness to pay and appropriate price. The difference between WTP and AP we observe for day use in a popular wilderness area may or may not apply in other settings. Furthermore, while our findings show a divergence between WTP and AP for the majority of respondents in our sample, we cannot explain why it exists. A better understanding of the factors that underlie visitors' perceptions of appropriate price—whether the normative issues of fairness, equity, ability to pay and congestion we identify, or others—will be of particular interest to researchers and managers alike. Finally, our focus on visitors' perceptions of appropriate fees for public land recreation could be broadened to include the views of non-visitors as well. A study of the general public's attitudes on fees would show, for example, whether the relationship between WTP and AP we find here is reversed for those who do not participate in public land recreation.

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