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# IFRO Working Paper

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German tourist anglers' preferences  
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Carsten Lynge Jensen  
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## Abstract

The quality of angling sites is important for attracting tourists who enjoy recreational angling. In this paper, we conduct an empirical analysis investigating which attributes of angling sites are particularly important for attracting tourist anglers from abroad. We conduct an online survey of 968 German anglers who have recently been abroad on a holiday trip in which they went angling. We focus on the particularly dedicated anglers who state that recreational angling is important for their choice of holiday destination. A stated choice experiment is employed to investigate their preferences for environmental attributes, catch attributes, and social relation/distance attributes of the angling site. We find that preferences are heterogeneous across different angler segments. Three distinct segments of tourist anglers are identified, characterised as “catch oriented” anglers (57 %), “nature oriented” anglers (24 %) and “trophy oriented anglers (19 %). All three angler segments have the strong preferences for water quality. However, they differ with respect to catch preferences and preferences for social interaction on the angling site. The catch oriented focus on the hunting aspects of angling. A high catch rate as very important for them, but the size of fish is not important. Moreover this segment prefers angling in solitude without disturbance from other anglers. For the “nature oriented” it is very important that the angling takes place in "natural" conditions, the catches rates are not important but they hope to catch large fish, and it is no problem for this group if there are a few other anglers at the angling site. For the "trophy oriented" anglers it is very important to catch large fish, while the catch rate is of moderate importance and they do not mind if there are many anglers at the site. To attract tourist anglers an angling site manager may use this information to target marketing efforts towards segments of tourist that prefer the type and quality of angling characteristics of the angling site in the managers possession. Additionally, he may seek to adjust and improve the angling sites in a way that suits the preferences of specific segments.

**Keywords:** Recreational angling, stated choice experiment, tourism, holiday destination

## 1. Introduction

It is well-documented in the literature that the value of recreational angling is a considerable socioeconomic component in many countries (e.g. Toivonen et al. 2004, Ditton et al. 2002, Arlinghaus et al. 2008, Kauppila and Karjalainen 2012). While several studies have focused on assessing the value of angling to local residents in an area or to citizens within a country, the potential of addressing recreational angling as a means of generating income from tourism has received considerably less attention in the literature. In the tourism research literature, there is general agreement that tourism development and planning should be guided by tourists' perceptions and preferences (Woodside and Lysonski 1989). The current paper contributes to the literature by aiming to obtain policy advice on how angling site characteristics could be best tailored to suit the preferences of – and thus attract more – tourists with a desire to go angling.

The ability to attract tourist anglers is dependent on the quality of environmental and nature related conditions of the angling sites in a given area (Ditton et al. 2002, Olaussen and Liu 2011). Furthermore, the type of tourists that go angling when on vacation varies greatly (Arlinghaus et al. 2008). Some are very dedicated and keen about the angling activities than others. For the most dedicated anglers, the quality of the available angling sites will potentially influence their choice of destination for a holiday. For other less dedicated anglers who are not so passionate about their angling, the angling opportunities in a potential holiday destination will not affect their choice of holiday destination – even if they do go angling during the holiday trip. In other words, they do enjoy angling, but just not to an extent where it actually influences their choice of holiday destination. We refer to the former as “Very Dedicated” (VD) anglers and the latter as “Less Dedicated” (LD) anglers. Hence, if one aims to attract new tourist anglers to an area, improving angling site quality will only attract the VD anglers. Though it would not be possible to attract new tourists from the group of LD anglers, improving angling site quality would still potentially be beneficial for the LD anglers who have chosen the area for a holiday for other reasons. Thus, it may increase the overall holiday satisfaction of these tourists, and the better angling experiences might increase the chances that these LD tourist anglers will be returning.

The perceived quality of angling sites is dependent on how the individual angler values the various attributes of the site. Attributes related to the catch aspect has been found to matter for the angling experience. Based on feedback from the recreational fishing industry in Sweden, Waldo et al (2012) conclude that lack of fish and lack of large fish are among the biggest problems for the industry.

Based on interviews with anglers, Arlinghaus (2006) also found that catch expectation was the primary driver of angler satisfaction, and in particular catch rates were found important. Contrary to this, Prayaga et al (2010) finds that the demand for recreational fishing is insensitive to actual changes in catch rates. Several other studies have however confirmed that catch rates are indeed important, but also that the fish species targeted is an important element of the catch aspect (see e.g. Arlinghaus et al. 2008; Eggert and Olsson 2009; Morey et al. 2006; Olausson and Liu 2011; Schramm et al. 2003). Several of these authors do also note that the catch aspect is not the only determinant of the perceived quality of an angling experience. More recently, Arlinghaus et al. (2014) and Beardmore et al. (2015) have found diminishing marginal returns of catch rate. Across a range of different angler types and different fish species, they also find that the size of fish as well as crowding at the site are important aspects affecting the angling experience at a given site. Another important aspect of the angling experience is the environmental aspect. Eggert and Olsson (2009) find that high values are placed on marine biodiversity in general, and Schramm et al. (2003) find clean angling environments to be particularly important. In relation to the environmental aspect, Waldo et al. (2012) found that access to the angling site is also important. Olausson and Liu (2011) found that Norwegian anglers would much rather catch wild salmon than escaped farmed salmon, but Arlinghaus et al. (2014) did not find a similar effect for German anglers who, across a range of species, on average found it irrelevant whether the fish was wild or farmed. Common for a large part of the papers mentioned above is that, despite the general tendencies mentioned, anglers are found to constitute a very heterogeneous group. In other words, anglers are often found to have different preferences for the different attributes of the angling experience, be it the catch aspect or the environmental aspect. Hence, when aiming to attract more tourist anglers it is not only important to understand how changes in the important angling site attributes affect the average angler, but also how a representative group of anglers will be affected.

In this paper we utilise the Stated Choice Experiment (SCE) method where we present respondents with angling site alternatives which vary according to angling quality attributes including the size of catch, chance of catch, nature experience, water quality, distance to angling site from accommodation, the prevalence of other anglers at the site, and finally the price of an angling license. Our results indicate that there is a large difference in how our respondents value these attributes. Hence we use a Latent Class modelling approach to identify this heterogeneity in preferences to gain insight into how to attract different types of anglers to sites.

The remainder of the paper is structured as follows: A section regarding the conceptual framework is followed by methodology, including descriptions of the survey and econometric specifications. The paper then continues with the results, a discussion and ends with a conclusion.

## 2. Conceptual Framework

A general model for traveller leisure destination choice is developed by Woodside and Lysonski (1989) which highlights perceptions and preferences as factors influencing individuals' choice of holiday destination. The model is illustrated in Figure 1.

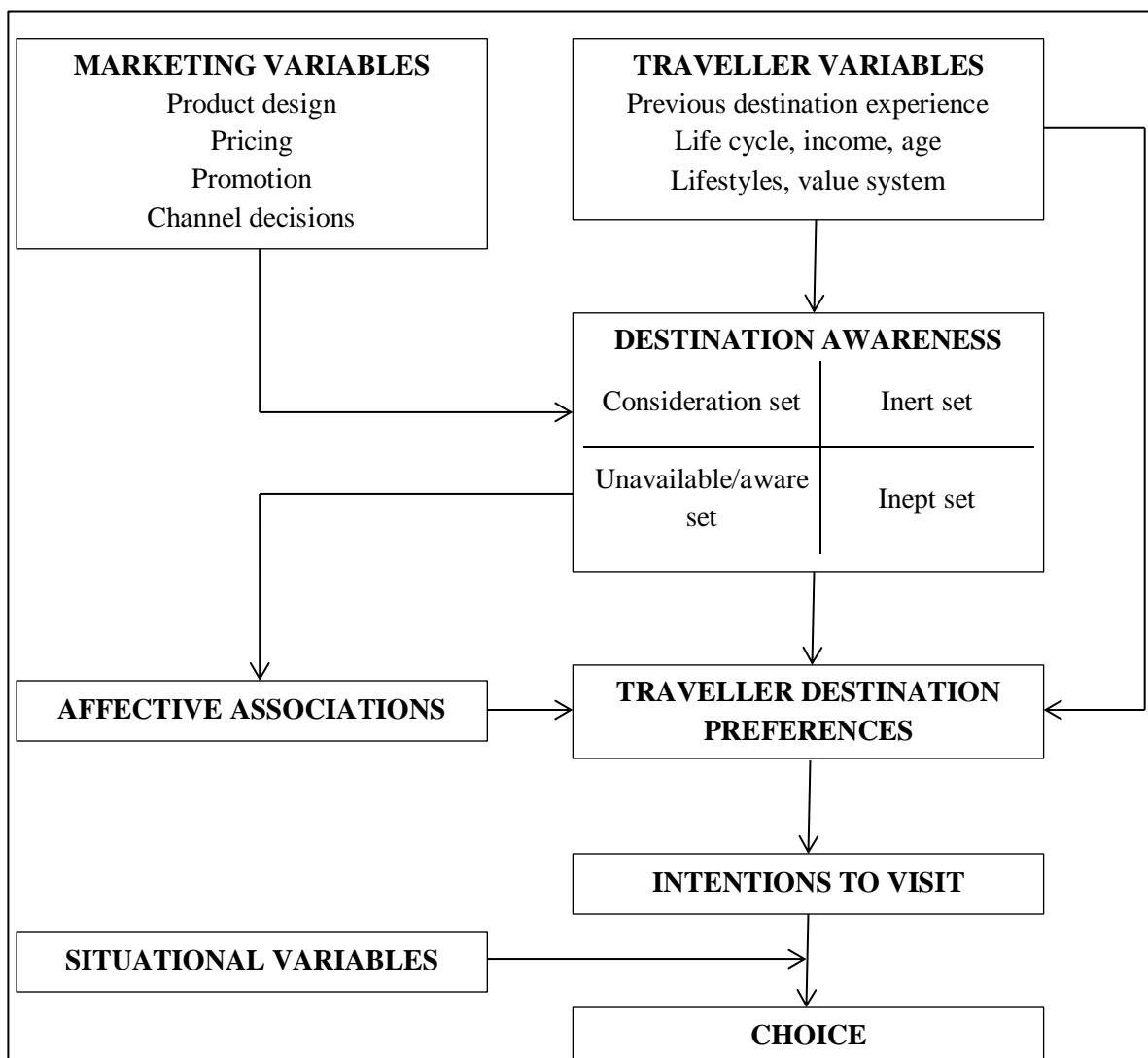


Figure 1. General model of destination choice (Woodside and Lysonski 1989)

The model suggests that a traveller's destination awareness is affected by the variables "traveller variables" such as socio-demographics and previous destination experience and "marketing variables" such as product design and price. Destination awareness includes four categories, where the consideration set is the group of destinations the traveller would consider to visit, the inert set includes destinations that the traveller have not considered as a holiday destination, the inept set includes destinations that the traveller would definitely not visit, while the final category are destinations that are unavailable to the traveller. The traveller's ranking of possible holiday destinations, i.e. their preferences, are then affected by the above-mentioned variables, but also whether they associate the destination with positive or negative feelings, shown in the figure as affective associations. The intention to visit is the likelihood of the traveller visiting a destination in a specific time period. Finally, the choice is also affected by situational variables.

Applying this model to our case of tourist anglers, if the goal is to ensure that an angling site is placed high in the consideration set for a traveller's next trip, then the improvement to angling site quality would need to be part of the product design considerations as well as the promotion efforts to ensure that potential tourist anglers become aware of the destination and hopefully link it to positive affective associations. Additionally, in a slightly longer time perspective, once the improvements are implemented they would affect the angling experience of the tourist anglers that are actually visiting and thus form the basis of the "previous destination experience" for these tourists' next destination choice.

According to Woodside and Lysonski (1989), previous travel to a country should ensure that the country will be in the consideration set for the next destination choice – given that the experience was positive. If the previous visit to the country was actually a negative experience, it might instead place the country in the inept set. This implies that even though improvements in angling site quality will not attract new LD tourist anglers, it might still have a positive impact in terms of increasing the chances that the LD anglers who visit the country will also come back in the future. This is due to the fact that the angling quality improvements are likely to give them more positive experiences while visiting, and these experiences will in turn increase the probability that they positively consider the same country for their next trip.



While improvements of angling site quality would thus only affect the LD anglers through the “traveller variables”, VD anglers would be affected through both “traveller variables” and “market variables”. Hence, new tourist anglers could potentially be captured. However, this would require that the improvements in angling site quality are in line with the angling preferences of the VD anglers and that the information about these improvements actually reaches them. In others words, decision-makers considering which specific aspects of the angling quality that should be improved and to what extent, as well as how they effectively promote the improvements, are in need of information about attitudes, preferences and information-seeking behaviour of the potential new tourist anglers. This is exactly what the current study sets out to acquire.

### **3. Methodology**

#### **3.1 Survey**

The CE method presents survey respondents with a hypothetical market for the good or service in focus and asks them to choose between two or more alternative compositions of the good or service in a series of choice sets. In accordance with Lancaster’s attribute theory of value (Lancaster, 1966), the alternatives define the good or service in terms of their key attributes, and different alternatives are described by varying the levels of the attributes. By examining the trade-offs between attributes and attribute levels that are implicit in the choices made by respondents, it is possible to derive an estimate of the utility associated with the different attributes. If one of the attributes is measured in monetary units (i.e. costs or price), it is possible to derive estimates of respondents’ WTP for the other attributes from the marginal rate of substitution between the monetary attribute and the other attributes.

The survey used in the present study elicited preferences for changes in attributes relating to angling in Denmark. Prior to the choice sets, the respondents were presented with a scenario description introducing seven different attributes related to angling: chance of catch, size of catch, nature experience, angling water quality, distance to angling site from accommodation, prevalence of other anglers and price. The price was defined as the cost in Euros for a one day angling ticket (24 hours). The attributes and their levels were identified and tested through a series of focus groups and a pilot study. The attributes were presented to the respondents with the descriptions shown in Table 1.

**Table 1. Attributes and attribute levels**

Attribute	Attribute levels and description given to respondents		
	Low	Medium	High
Chance of catch (CATCH)	Far from certain that you will catch a fish per angling trip	Somewhat certain that you will catch a fish per angling trip	Almost certain that you will catch a fish per angling trip
Size of catch (SIZE)	Smaller fish and a few larger fish	A mixture of smaller and larger fish	Larger fish and the possibility of record sized fish
Nature experience (NAT)	You will have a lower nature experience at the angling site. Nature has been affected by human activity and companies. The area is contains for example used natural areas, minor or major roads, piers and perhaps larger buildings	You will have a varying nature experience at the angling site. Nature has to some extent been affected by human activities. There are occasionally sounds from human activity and wildlife, smaller buildings nearby as well as smaller roads, farms, etc.	You will have a high nature experience at the angling site. Nature is characterised by silence or natural sounds, wild animals, beautiful landscape and limited human activity in the form of for example, gravel roads and small buildings. There are typically larger forests and natural landscapes, older fallow fields, river valleys, natural beaches, etc.
Angling water quality (QUA)	The angling water is of a lower quality. For example, the water in a lake or coastline is unclear and shows signs of pollution. If you are angling in a stream, you may experience that the river is channelled and water does not run naturally	The angling water quality is of varying quality. For example, the water in a lake or coastline is fairly clean and clear. If you are angling in a stream, you may experience that the stream is fairly untouched	The angling water is of high quality. For example, the water in a lake or coastline is clean and clear. If you are angling in a stream, you may experience that the stream seems untouched and runs completely naturally
Distance to angling site (DIST)	Short distance from accommodation – Under 4 km	Medium distance from accommodation – Between 4 and 20 km	Long distance from accommodation – Over 20 km
Prevalence of other anglers (NUM)	There are no other anglers apart from you	There are a few other anglers apart from you	There are some or many anglers apart from you
Price (P)	Cost in Euros for a day ticket (24 hours) with levels 7, 15, 25, 40, 75, 160		

A D-efficient experimental design combining the attribute levels shown in Table 1 into alternatives and choice sets was identified using SAS (Kuhfeld, 2004; Zwerina et al., 1996). Respondents answered six choice sets each, where each choice set consisted of two experimentally generated alternatives and an opt-out option. An example of a choice set is presented in Figure 2.

	Angling site A	Angling site B	None of these
Chance of catch	Medium chance of catch	Low chance of catch	
Size of catch	Smaller fish and a few larger fish	A mixture of smaller and larger fish	
Nature experience	High nature experience	Low nature experience	
Angling water quality	Fairly clean and clear	Unclear and shows signs of pollution	
Distance to angling site	Transport between 4 and 20 km	Transport over 20 km	
Prevalence of anglers	There are a few other anglers	There are no other anglers	
Expenses (€) for day pass (24 hours)	75	160	
Mark which angling site you prefer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Figure 2. Choice set example**

### 3.2 Econometric specifications

Assuming utility-maximizing behaviour of the individual, the choices made are analysed using the random utility model (McFadden 1974), which states that the true but ultimately unobservable utility  $U$  for individual  $n$  conditional on choice  $i$  can be broken down into two components: an observable systematic component  $V$  and the unobservable random component, the error term  $\varepsilon$ :

$$U_{ni} = V_{ni}(x_{ni}, \beta) + \varepsilon_{ni} \quad (1)$$

where the observable component  $V_{ni}$  is a function of the attributes of the alternatives  $x_{ni}$ , characteristics of the individuals  $S_n$ , and a set of unknown preference parameters  $\beta$ . The observable component  $V_{ni}$  is assumed to be a linear function:

$$V_{ni} = ASC + \beta x_{ni} \quad (2)$$

where  $\beta$  denotes a vector of preference parameters associated with an attribute,  $x_{ni}$ , a vector of attributes of alternative  $i$ , and  $ASC$  denotes an alternative specific constant (ASC). The ASC is assigned to the choice of the opt-out alternative instead of the two hypothetical alternatives. As suggested by Adamowicz et al. (1998), the ASC can be interpreted either as a technical parameter capturing the average effect of all relevant factors that are not included in the model, or it can be associated with a behavioural assumption and interpreted as the utility of the opt-out alternative. We choose the former interpretation of the ASC as our opt-out alternative is a “none of these” option, so

we cannot determine whether the respondents are opting-out to another fishing site or no fishing site at all.

Assuming a specific parametric distribution of the error term allows a probabilistic analysis of individual choice behaviour:

$$P_{ni} = \text{Prob}(V_{ni} + \varepsilon_{ni} \geq V_{nj} + \varepsilon_{nj}) \forall i, j \in C, j \neq i \quad (3)$$

where  $P_{ni}$  is the probability that the utility of individual  $n$  is maximized by choosing alternative  $i$  over alternative  $j$  from choice set  $C$ . If the error terms are assumed to be independently and identically Gumbel distributed, then this results in a conditional logit specification for the probability of individual  $n$  choosing alternative  $i$ :

$$P_{ni} = \frac{\exp(\mu V_{ni})}{\sum_{j \in C} \exp(\mu V_{nj})} \quad (4)$$

where the scale parameter  $\mu$  is commonly normalised to 1 in practical applications for any one data set, as it cannot be identified separately from the vector of parameters. The conditional logit model imposes several restrictive assumptions (Train, 2003), including the assumption that all respondents have identical preferences.

Latent Class models attempt to capture the heterogeneity of respondents by dividing them in different classes. The approach assumes that a number of a priori unknown segments or classes exist in a population (Swait, 2007), each with a different preference structure. Every individual is assumed to belong to one of the classes. In LC models the probability that a respondent chooses alternative  $i$ , conditional to belonging to a given segment  $s$  is:

$$P_{(ni|s)} = \frac{\exp(\beta_s X_{ni})}{\sum_{j=1}^J \exp(\beta_s X_{nj})} \quad (5)$$

The unconditional probability that an individual belongs to a specific segment can be expressed as follows:

$$P(s) = \frac{\exp(\theta_s Z_n)}{\sum_{s=1}^S \exp(\theta_s Z_n)} \quad (6)$$

where both  $q_s$  and  $b_s$  from (5) are segment specific vectors of estimable parameters associated with the individual covariates,  $Z_n$ , and the attributes,  $X_{ni}$ . Applying the Latent Class model requires the determination of the number of segments because its determination is not part of the maximization procedure. Thus, the common procedure is to sequentially estimate models with an increasing number of segments  $S$  ( $S = 1, 2, 3, 4, \dots$ ) and to select the number of classes based on statistics such as the Akaike Information Criteria and the Bayesian Information Criteria (Swait, 2007).

In order to estimate willingness-to-pay (WTP) for the non-monetary attributes, the coefficient of interest is scaled with the coefficient representing the marginal utility of price and multiplying by  $-1$ :

$$WTP_x = -\frac{\beta_x}{\beta_{price}} \quad (7)$$

where  $\beta_x$  is the coefficient of the attribute of interest and  $\beta_{price}$  is the price coefficient.

## 4. Results

### 4.1 Data

Data collection was carried out in 2009 using an online questionnaire. Respondents were sampled using a German pre-recruited online panel consisting of 257,720 individuals. A total of 11,504 emails were sent panel members who were screened by asking them if they had been abroad to angle in the last 12 months, resulting in a possible 1,917 suitable panel members. A final sample of 968 completed questionnaires was then used in the subsequent analyses. The sample was further split into the previously mentioned VD and LD anglers. This was done on the basis of a question asking respondents how important the possibility of angling is in their choice of holiday destination abroad. Those respondents stating that the possibility of angling was very important or important in the choice of holiday destination abroad were classified as VD. There are 625 VD anglers in our sample and 343 LD.

## 4.2 Preferences and WTP

Table 2 presents the results of the Latent Class model where it was found that based on the before-mentioned information criteria, models with 3 classes were best fitting the data. The classes are also determined by the variables included in the membership function. The inclusion of variables in the membership function was determined using a joint significance cut-off level across all classes of 10%. As can be seen in Table 2, the membership function for the VD anglers contains five variables representing whether the or not the respondents, on their last angling holiday abroad: Angled for trout (Trout), sought information about the holiday destination on angling websites (Info\_web), are born in 1980 or after (Young), angled in a stream (Stream) or were alone on this holiday (Alone). While Table 2 shows the parameter estimates and the membership function, Table 3 shows the WTP values for the various attribute levels. The WTP estimates are also presented graphically in Figure 3 in Appendix 1.

**Table 2. Latent Class model results for VD and LD respondents (absolute z-values in parenthesis).**

	Very dedicated			Less dedicated		
	Class 1 (VD <sub>1</sub> )	Class 2 (VD <sub>2</sub> )	Class 3 (VD <sub>3</sub> )	Class 1 (LD <sub>1</sub> )	Class 2 (LD <sub>2</sub> )	Class 3 (LD <sub>3</sub> )
Class prob.	0.57	0.24	0.19	0.65	0.20	0.16
<i>Utility function</i>						
Catch_M	<b>0.35</b> (4.65)	0.26 (1.06)	<b>0.70</b> (3.13)	<b>0.28</b> (2.60)	<i>0.44</i> (0.94)	<i>0.58</i> (0.50)
Catch_H	<b>0.58</b> (7.72)	0.27 (1.28)	<i>0.37</i> (1.56)	<b>0.37</b> (3.43)	<i>0.74</i> (1.55)	<i>1.66</i> (1.17)
Size_M	<i>0.09</i> (1.20)	<i>0.00</i> (0.00)	<i>0.27</i> (1.11)	<i>-0.06</i> (0.58)	<i>-0.31</i> (0.80)	<i>0.08</i> (0.08)
Size_H	<i>0.11</i> (1.22)	<b>1.23</b> (3.74)	<b>0.75</b> (3.06)	<i>0.02</i> (0.18)	<b>0.94</b> (2.13)	<i>0.26</i> (0.24)
Nat_M	0.13 (1.55)	<b>0.87</b> (3.43)	<i>0.22</i> (0.99)	<i>0.11</i> (0.94)	<b>0.82</b> (2.03)	<i>-1.42</i> (1.04)
Nat_H	<b>0.40</b> (5.68)	<b>1.49</b> (5.29)	0.34 (1.62)	<b>0.52</b> (5.33)	<b>0.98</b> (2.80)	<i>0.46</i> (0.42)
Qua_M	<b>0.25</b> (2.92)	<b>0.89</b> (2.91)	<b>0.65</b> (2.85)	<b>0.71</b> (5.75)	<b>1.16</b> (2.56)	<i>-1.58</i> (1.10)
Qua_H	<b>0.57</b> (6.93)	<b>1.23</b> (4.34)	<b>1.20</b> (5.18)	<b>0.79</b> (6.87)	<b>1.55</b> (3.23)	<i>-0.63</i> (0.54)
Dist_M	<i>-0.08</i> (1.07)	<b>-1.01</b> (4.02)	<b>-0.46</b> (2.18)	<i>-0.10</i> (0.95)	<i>-0.54</i> (1.41)	<i>-0.42</i> (0.47)
Dist_H	<b>-0.28</b> (3.08)	<b>-1.30</b> (3.30)	<b>-0.74</b> (3.11)	<b>-0.24</b> (1.97)	<i>-0.60</i> (1.33)	<i>-1.71</i> (1.29)
Num_M	<b>-0.27</b> (2.99)	<i>-0.04</i> (0.13)	<i>-0.11</i> (0.52)	<b>-0.27</b> (2.18)	<i>0.15</i> (0.41)	<i>1.23</i> (0.77)
Num_H	<b>-0.34</b> (4.10)	<b>-1.45</b> (3.27)	<i>-0.01</i> (0.04)	<i>-0.18</i> (1.66)	<i>-0.63</i> (1.57)	<i>2.20</i> (1.58)
Price	<b>-0.01</b> (6.51)	<b>-0.07</b> (5.86)	<b>-0.01</b> (4.40)	<b>-0.01</b> (10.1)	<b>-0.12</b> (6.96)	<i>0.003</i> (0.36)
Opt-out	<b>-2.33</b> (11.6)	<b>-2.62</b> (4.54)	<b>-1.70</b> (3.82)	<b>-0.99</b> (5.14)	<i>-0.67</i> (1.15)	<b>5.22</b> (2.66)
<i>Membership function</i>						
Info_web	Fixed	<i>-0.35</i> (1.26)	<b>-0.90</b> (3.18)	Fixed	<i>0.04</i> (0.11)	<b>-1.13</b> (2.13)
Young	Fixed	<b>-0.68</b> (2.40)	<b>-1.33</b> (4.47)	Fixed	<i>-0.91</i> (1.82)	<i>-2.32</i> (1.55)
Stream	Fixed	<b>-0.79</b> (2.54)	<b>-1.21</b> (3.32)	Fixed	<b>-0.61</b> (2.08)	<b>-1.05</b> (2.72)
Alone	Fixed	<b>-1.42</b> (3.21)	<i>-0.44</i> (1.45)			
Lake	Fixed	<b>0.78</b> (2.59)	<i>-0.30</i> (1.10)			
Individuals	356	149	120	191	96	56
LL <sub>null</sub>		-4120			-2261	
LL <sub>model</sub>		-3250			-1697	

Note: Parameter estimates in bold indicate significance on a 95% level, while italicised estimates are not significant on a 95% level.

**Table 3. WTP estimates in Euros [95% confidence intervals]**

	Very dedicated			Less dedicated	
	Class 1 (VD <sub>1</sub> )	Class 2 (VD <sub>2</sub> )	Class 3 (VD <sub>3</sub> )	Class 1 (LD <sub>1</sub> )	Class 2 (LD <sub>2</sub> )
Catch_M	51 [26; 76]	4 [-3; 10]	57 [16; 98]	22 [6; 38]	4 [-4; 11]
Catch_H	85 [54; 116]	4 [-2; 10]	30 [-10; 70]	29 [13; 46]	6 [-1; 13]
Size_M	13 [-9; 35]	0 [-6; 6]	22 [-19; 63]	-5 [-22; 12]	-3 [-9; 4]
Size_H	15 [-9; 40]	17 [11; 23]	60 [14; 106]	2 [-16; 19]	8 [1; 14]
Nat_M	20 [-6; 45]	12 [4; 20]	18 [-17; 52]	8 [-9; 26]	7 [0; 13]
Nat_H	58 [32; 83]	20 [15; 26]	28 [-6; 61]	42 [25; 59]	8 [2; 14]
Qua_M	37 [12; 62]	12 [5; 20]	53 [9; 96]	57 [36; 78]	9 [3; 16]
Qua_H	83 [53; 113]	17 [8; 26]	97 [40; 153]	63 [44; 82]	13 [6; 19]
Dist_M	-12 [-34; 10]	-14 [-21; -7]	-37 [-71; -4]	-8 [-25; 9]	-4 [-11; 2]
Dist_H	-41 [-82; -17]	-18 [-29; -7]	-60 [-100; -20]	-19 [-37; -1]	-5 [-12; 3]
Num_M	-40 [-80; -12]	-1 [-8; 7]	-9 [-43; 25]	-21 [-41; -1]	1 [-5; 7]
Num_H	-50 [-77; -20]	-20 [-28; -12]	1 [-32; 33]	-15 [-32; 3]	-5 [-12; 1]

Starting with the model for the LD anglers, we see that they generally have weaker preferences for the angling site quality attributes than the VD anglers as can be expected. LD class 1 (LD<sub>1</sub>) value the nature experience and water quality, while LD<sub>2</sub> have very weak preferences across all attributes

and LD<sub>3</sub> has an insignificant price parameter. When looking at the characteristics of VD and LD anglers across all classes, we see that LD anglers sought less information about their last holiday destination from angling websites and more answered “did not seek information”. Fewer of the LD anglers are on holiday alone, and they clearly have a lower frequency of angling trips in their home country, visit fewer countries and have lower expenses on holiday than VD anglers.

Shifting focus to the model for the VD anglers and looking firstly at the membership function for the VD model, Table 2 shows that VD class 1 (VD<sub>1</sub>) is more likely to contain younger respondents who angle in a stream, seek information about their holiday destination from angling websites and go on holiday on their own. VD<sub>3</sub> contains older respondents who do not seek information from angling websites and do not angle in a stream. Finally, VD<sub>2</sub> respondents do not go on holiday alone or angle in a stream, but they have angled at a lake on their last holiday.

Turning to the preferences and WTP for VD anglers, we see that VD<sub>2</sub> prefer that there are not too many other anglers at the angling site, catch size is not as important, a further distance from accommodation to angling site is accepted. VD<sub>3</sub> have a negative preference for distance to site and do not seem to mind that there are other anglers at the site. They seem to have a preference for the nature experience catching large fish and have the strongest preference of all the classes for water quality. VD<sub>1</sub> generally have the highest WTP of the VD classes where they also value water quality. They have their strongest preference for catching more fish, while catch size does not seem to be important to them. They have a strong negative preference for having other anglers at the site and their accommodation should not be too far from the site.

## 5. Discussion

The results show that the VD anglers fall into three groups. We label the first class (VD<sub>1</sub>) as “Catch oriented”. Based on their responses to a range of behavioural and demographic questions in the questionnaire as shown in Table 4, they can be characterised by being relatively younger and having a relatively high angling frequency across different angling sites in many different countries. They are more often using fly and spin, and they are targeting many different species (mainly trout, salmon, walleye, perch) when angling.

To attract these anglers, it is important that angling sites (stream/river, lakes) have high water quality, the catch rates should be high but the size of the fish is not really important. Furthermore, since they prefer angling in solitude in scenic surroundings, anglers should be as far as possible



spread over angling sites. According to where they seek information about their holiday destinations, it would appear that the best way to reach this type of angler is through the internet and specifically through angling websites.

The second class within the VD anglers (VD<sub>2</sub>) we label “Nature oriented”. These anglers have lower income, do not holiday alone and seem to take their families with them. On their last holiday they were more likely angling at lakes (including put and take), but also at rivers/streams. These anglers were more likely coarse angling (but also fly angling) targeting mainly trout, but also salmon, pike, walleye and perch.

The anglers in VD<sub>2</sub> have preferences for large fish, the catch rate is not so important, but they dislike crowds of other anglers at the angling site, possibly wanting to avoid competition for the scarce fish resource. For these anglers, scenic surroundings are important, but they do not seem to mind a longer travelling distance to the angling site. Interestingly, water quality is not valued highly by these anglers. These anglers seek information mainly from websites about angling but also from their friends.

The third class (VD<sub>3</sub>) can be labelled as “Trophy oriented”. This class contains anglers with comparably older and have less children living at home. They more often angle for “no particular species” and angled more off the coast or at sea (from a boat) on their last holiday, but also did angling in a lake/river. They were more likely poke angling off shore targeting cod, saithe, mackerel, flatfish, but were also angling at rivers for trout, salmon, and at lakes for pike, walleye and perch.

To attract these anglers, the angling sites should preferably have high water quality, large fish, and medium catch rates. In addition, these anglers dislike long distances from their accommodation to the angling site, while it seems to not be a problem for them that there are other anglers at the site. Finally, they are not willing to pay too much for the scenic surroundings. These anglers to a higher degree seek information about their holiday destination from websites about other outdoor activities and from friends. VD<sub>3</sub> also contains those anglers who comparably answer that they do not seek any information about their holiday destination. Therefore these anglers would probably be the hardest to reach. The above observations are summarised in Table 4.

**Table 4. Characteristics to attract the different types of angler tourist**

	“Catch Oriented” (VD <sub>1</sub> – 57%)	“Nature Oriented” (VD <sub>2</sub> – 24%)	“Trophy Oriented” (VD <sub>3</sub> – 19%)
<i>Site quality attributes</i>			
Higher catch rates	★★★★	-	★
Larger size of catch	-	★★	★★★★
Better nature experience	★★	★★★★★	★★
Higher water quality	★★★★	★★★★	★★★★★
Shorter dist. to angling site	★★	★★★	★★★★★
Fewer anglers at angling site	★★★	★★	-
<i>Angler characteristics<sup>a</sup></i>			
Age of angler	Mainly younger than 30 year of age (53%)	Mainly younger than 40 years of age (68%)	Mainly 30-50 years of age (62%)
Site of last angling trip	Lake/stream/coast	Lake/coast	Lake/coast/off shore
Species	Trout/salmon/pike/walleye /perch	Mainly trout	No particular species/trout
Information source	Angling web sites and magazines	Angling web sites/friends	Friends/websites
Accommodation	Equal distribution between camping/cabin/hotel	Mainly cabin	Mainly cabin
People on holiday	Family/friends/alone	Mainly family/friends	Mainly family/alone
Holiday group size	Betw 2-4 people (83%)	Betw 2-4 people (77%)	Betw 2-4 people (83%)
Mean length of holiday	11 days	11 days	12 days

<sup>a</sup> The angler characteristics are based on responses to additional questions in the questionnaire, and differences indicated in the table are those that emerged when comparing the response distributions using Pearson  $\chi^2$ -tests.

Compared to the results of previous studies looking at angler tourist preferences for angling sites, our results show some similarities. For example, we find that our respondents have a positive preference for environmental attributes. This is also found in Schramm et al (2003) which reports that that 70% of the anglers in Mississippi freshwaters state that a ‘clean environment’ is very import for fishing site selection, while Zwirn et al. (2005) finds that it is important to be aware of the fresh water ecosystems. They state that once tourist anglers reach threatened freshwater ecosystems, there is a risk of degrading the very fishery and landscapes that attracted them. Turning to the preferences for social interaction, we find that a large portion of our respondents prefer angling in solitude. Similar findings appear in Arlinghaus et al. (2008) where their results show that only 14% of anglers are classified as ‘social’.

## How to attract tourist anglers

To actively attract tourist anglers several aspects need to be considered simultaneously. Individual angler segments demand different things from the angling sites in terms of catch opportunities, nature environment and degree of social interaction with other anglers at the angling site. The tourist manager should therefore evaluate if the angling site conditions are of sufficient quality to attract tourists that choose holiday destination based to some extent on angling opportunities. In addition, the manager should evaluate which types of tourist it is possible to attract, and which is the best marketing strategy to attract these anglers.

Many studies find that both “catch rates” and “size of fish” are important for anglers. For example Waldo and Paulrud (2012) find that both “available of fish” and “large fish” are deemed important when asking angling tourism companies in Sweden. However, our results show that tourist anglers should not be seen as a uniform group with respect to catch preferences. We find that only 19% of the tourists focus simultaneously on both catch rates and catch size – here labelled as “trophy oriented” anglers. We find that the majority of tourist anglers are rather “catch oriented”, mainly driven by high catch rates while the catch size is not that important, somewhat contrary to Arlinghaus et al. (2014) and Prayaga et al. (2010). We find that in order to attract “catch oriented” and “trophy oriented” angler tourist segment, the tourism manager should introduce means that secure high catch rates of fish of different sizes. We find that if managers increase the rate of large sized fish, this will attract “trophy oriented” and “nature oriented” anglers. Additionally, these are more likely to be angling in lakes and off shore.

Nature conditions at the angling site are also an important means to attract anglers. In the present study we focus on “water quality” and “nature experience”, the latter described as the surroundings at the fishing site. Most significantly, we find that across all angler segments water quality is considered of high importance. Therefore to attract tourist is very important that managers provide a high quality of water in all fishing waters (lakes, streams, at the coast or off shore). Zwirn et al (2005) also find that fresh water ecosystems are very important for tourist anglers. Looking at “nature experience” at the angling site, we find that the 81% of anglers including “catch oriented” and “nature oriented”, have a positive willingness to pay for the highest level of “nature experience” which is described in the following way: *“Nature is characterised by silence or natural sounds, wild animals, beautiful landscape and limited human activity in the form of for example, gravel roads and small buildings. There are typically larger forests and natural landscapes, older fallow*

*fields, river valleys, natural beaches, etc*”. Similarly to this, Schramm et al (2003) report that 70% of the anglers in Mississippi freshwaters state that a clean environment is very important for their angling site choice. We find that high water quality and high nature experience are both important attributes to attract the majority of tourist anglers. To attract the “trophy oriented” anglers, it is more important to increase the chance of catching a large fish rather than to increase the nature experience. Overall the results show that to attract tourists and keeping a steady income from the angling tourism in the long run, it is important that the manager is aware of maintaining a high water quality as well as ensuring that the nature experiences at the angling sites are of high quality.

A couple of other angling site conditions are also important to consider. The presence of other anglers as well as the travel distance to reach the site are both questions that matter for most anglers. We find that the “catch oriented” (57 %) prefer to angle in solitude, the “nature oriented” (24%) do not mind if just a few other anglers are present at the site while the “trophy oriented” (19 %) are not at all affected by the amount of other anglers present. In relation to this, Beardmore et al (2011) find that only a small group (13%) of anglers are socially motivated. These results highlight that it may be important to avoid crowding at the angling sites since it will have negative impact on the angling experience of a fairly large share of the anglers. From a tourism management perspective it is therefore important to avoid creating a few "hotspots" for angling which might lead the tourist anglers to the same site and thus result in crowding. Rather, the tourism manager should aim to have many angling sites in order to spread the anglers across the countryside as far as possible, thus enhancing the feeling of angling in solitude which the majority of anglers prefer. Another aspect of the psychical planning of angling sites is the travel distance between accommodation site and angling site. In the present study, 90% of the German tourist anglers are travelling to the holiday destination by car. The results show that “catch oriented” anglers do not mind travelling up to 20 kilometres to reach the angling site from their holiday accommodation. However, the “nature oriented” and “trophy oriented” anglers strongly prefer to be accommodated within 4 kilometres of the angling site. Hence, when planning new accommodation options, tourism managers might want to think in terms of locating them closer than 4 kilometres to angling sites if possible. Finally, from a marketing point of view, it is important to look at which channels of information to promote angling tourism through. This study suggests that angling web sites are the most important platform for attracting tourist anglers. Moreover, personal communication with friends and fellow anglers also appears to be an important source of information when deciding on a holiday destination. Tourism managers should thus not forget to ensure that visiting tourist anglers

do indeed experience good angling conditions during their holiday, as such experiences are likely to have a high impact if passed on to friends and fellow anglers when the tourists return home.

Generally, our policy recommendations with regard to attracting recreational angler tourists revolve around the fact that our anglers are shown to have heterogeneous preferences. To attract tourist anglers several aspects of a prospective angling site should be fulfilled at the same time. The angler classes highlighted by our analysis show that each class has preferences for different characteristics of the angling site in terms of environmental attributes, catch attributes, and social relation/distance attributes of the angling site. We recommend that tourism managers wishing to attract tourist anglers should firstly evaluate whether their existing angling sites are attractive for the dedicated anglers who plan their next holiday destination partly based on available angling options. This entails assessing the type of sites (stream, lake, coastal, put and take, etc.), catch possibilities (size of fish, chance of catch, species), environmental conditions (water quality, nature experience), number of anglers (conditions more suited for social angling or angling in solitude), access to site (paths, etc.), accommodation possibilities (type and distance from angling site) and finally what the current regulation is for the site (restrictions on angling, catch, access, etc.). At this point the tourism managers should consider what features of their available angling sites may be considered unique compared to other possible angling sites. Furthermore, they should consider if there are obvious opportunities for improvements in for example water or nature quality, increasing catch rates or establishing new accommodation opportunities. Finally, the tourism manager should consider which types of anglers they can and should be aiming to attract and whether there is a correlation between the tourism managers' unique angling site possibilities and the preferences of the tourist angler, e.g. whether one should aim to attract all types of anglers or rather target a specific segment of anglers. The marketing strategy could then potentially be targeted specifically towards the type(s) of anglers they are aiming to attract.

## **6. Conclusion**

This paper presents results from a Stated Choice Experiment concerning German tourist anglers' preferences for angling site quality attributes. The attributes presented to respondents include chance of catch, size of catch, nature experience, angling water quality, distance to angling site from accommodation, prevalence of other anglers and price. We split our sample of 968 respondents into so-called "very dedicated" and "less dedicated" anglers defined by how important they deem the possibility of angling to be for their choice of holiday destination. Our results focus

mainly on the “very dedicated” anglers as we argue that these are the anglers that should be targeted when aiming to attract more tourist anglers to a site/country, since “less dedicated” anglers’ holiday destination choice would not be affected by changes in angling site quality attributes. To account for heterogeneity in preferences we utilise a Latent Class modelling approach. Within the “very dedicated” group of anglers, this modelling approach results in three classes which we label based on their strongest preferences for the angling site attributes. The labels are: 1) “Catch oriented”, 2) “Nature oriented” and 3) “Trophy oriented”. We argue that to increase the chance of attracting each type of angler within the “very dedicated” group, angling sites would need to be tailored to suit their specific preferences. Furthermore, as classes 1 and 2 mainly seek information about their next holiday destination on angling websites and class 3 either does not seek information or seek it from websites about other outdoor activities, marketing efforts may also be adjusted in order to attract more tourist anglers.

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## Appendix 1

Figure 3. WTP of very dedicated anglers with 95% confidence intervals

