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Irish coarse and game anglers' preferences for fishing site attributes

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ABSTRACT

Knowing which site attributes have relevance for anglers is valuable information for fishery managers seeking to improve angler satisfaction and manage fish stocks. Recreation demand models typically have limited information about site attributes and in many instances is limited to just a few measures for each site. We assemble a recreational angling dataset with extensive information on site attributes and model angling demand to ascertain the importance of attributes in decisions on trip duration. However, we find that only a small number of site attributes are important determinants of trip duration, including attributes such as ease of physical access, availability of guiding services, specimen fish, and 'catch & release' status. We also find that importance of site attributes differs by target species. The key site attributes influencing trip duration of anglers targeting coarse species (i.e. non-salmonid) are good physical access or availability of specimen fish, with trip duration to such sites one day longer, on average. Key site attributes for anglers targeting salmonid game species are the availability of guiding services and whether the fishery is regulated as 'catch & release'. On average, anglers' trip duration is a half day less in 'catch & release' fisheries.

1. Introduction

Recreational fishery managers have multifaceted jobs. Among their goals are the conservation and improvement of fish stocks, which encompass the enhancement of environmental quality and eco-system services within fishery catchments. Generally, fishery managers also seek to deliver a high quality experience for anglers. Anglers' experience is a function of many factors and what constitutes a good experience is likely to vary across anglers, as they are a heterogeneous group. Multiple angler types have been identified across many fisheries (Connelly et al., 2001; Arlinghaus and Mehner, 2005; Hutt and Bettoli, 2007) and diverse angler types generally seek different fishing experiences (Fisher, 1997). Catch rates, size of fish and fishery regulations, including releasing caught fish, can affect the level of utility derived from an fishing trip (Chipman and Helfrich, 1988; Arlinghaus et al., 2007; Hutt and Bettoli, 2007). Other non-catch factors such as the number of other anglers and diversity of angling locations are also important factors in angler satisfaction (Beardmore et al., 2014). An understanding of which fishery attributes anglers consider most important, even if their relative importance varies among anglers, is necessary if fishery managers wish to effectively manage angler satisfaction.

Assuming substitute fishing sites are available, an angler will select the fishing site location where its attributes, including travel cost, best matches the angler's preferences. Site attributes over which the decision is made may include factors such as catch rates, access, and site facilities, and such site choice decisions have received extensive attention in the recreational angling literature (Scrogin et al., 2004; Hunt, 2005, 2008; Johnstone and Markandya, 2006; Kuriyama et al., 2013; Raguragavan et al., 2013). Among the general findings are that anglers prefer sites with higher levels of water quality; sites that offer more choice or availability of fish; as well as less congested sites. Some site characteristics, in particular fishing regulations (e.g. catch & release), may be perceived as desirable by some anglers but to be avoided by others. Sites with good access, including boat ramps, are also generally preferred by anglers. It should also be noted that site choice may also be subject to habit (Hunt, 2008; Moeltner and Englin, 2004). Though many site attributes have been considered in examining site choice decisions, recreation demand models typically have limited information about site attributes (Abidoye et al., 2012). In many instances data on site attributes is limited to just a few measures for each site. Egan et al. (2009) is a notable exception, though the majority of their site attribute data relate to various measures of water quality, which are often highly correlated. Murdock (2006) notes that one cannot reasonably expect to observe all site

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characteristics that affect choice among locations and proposes adapting the random utility model of recreation demand to allow for unobserved characteristics of recreation sites.

The level of some site attributes may be easily controlled (e.g. site facilities), less so for others (e.g. water quality) but not at all for some (e.g. site area). Knowing which site attributes have relevance for anglers, as well as their relative importance, is valuable information for fishery managers seeking to improve angler satisfaction. As noted above, many site attributes are potentially important for anglers but frequently incomplete attribute data is available to analysts. In this paper we assemble an angling dataset that comprises extensive information on site attributes to examine relative importance of site attributes to anglers. Our site attribute dataset covers up to 21 site attributes ranging from fish stocks, site access, and fishery regulations, as well as, surrounding angler amenities such as food and accommodation. It should also be noted that many of the attributes are highly correlated, which means that several of the site attribute variables do not introduce more information to the analysis. This data is merged with an existing on-site survey dataset on angling trips. While not unique in terms of coverage of site attributes, it is possibly more extensive than most. For example, by comparison the Iowa Lakes Project, which is a large-scale recreation demand study at 130 angling sites, contains site attribute data on site area, indicators on availability of boat ramps and disabled access, plus at least 13 water quality attributes (Egan et al., 2009; Abidoye et al., 2012; Abidoye and Herriges, 2012). In our case we use a single water quality metric but the other site attributes should provide new insight into angler preferences over site attributes. The objective of the paper is to ascertain the relative importance of attributes in decisions on angling trip duration. Such information will potentially be useful for researchers attempting to establish similar site attribute datasets or in determining whether with limited site attribute data, models such as that proposed by Murdock (2006) are more applicable.

The paper's methodological approach is to estimate an angling demand function. However, due to the nature of our data we do not model site choice decisions. Our angler survey dataset includes revealed preference site choice decisions but we have no information on anglers' choice sets. Our model investigates how site attributes affect duration of site visit. It is feasible that some site attributes are more relevant in site choice decisions rather than decisions on visit duration. For example, in some instances availability of visitor accommodation may affect site choice but once an angling site has been selected other attributes may be more relevant for the decision on visit duration. Accordingly our analysis examines how site attributes affect angling trip duration conditional on selected site location. We estimate travel cost models for angling demand for two types of fishing (i.e. game and coarse fish) across 36 separate angling sites. Our particular interest is to examine how demand in terms of trip duration is affected by site attributes, including the relative importance of attributes, as well as which attributes are considered important by fishery mangers but not anglers.

The paper proceeds as follows: Section 2 discusses the data and methodology used to carry out the analysis; Section 3 presents and discusses model results. Finally, Section 4 presents some conclusions.

2. Methodology

We begin by describing the data used in the analysis, which is followed by an exposition of the travel cost demand model.

2.1. Data

The angling dataset was collected by on-site survey at sites around the Republic of Ireland between March and November 2012 and was scheduled to coincide with the prime angling season in respect of each angling category. The analysis here focuses on freshwater sites, specifically on game and coarse anglers. In the United Kingdom and Ireland salmonids are considered game fish, primarily Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*) and sea trout (*Salmo trutta*). Coarse fish are freshwater fish that are not salmonids, including bream (*Abramis brama*), tench (*Tinca tinca*), roach (*Rutilus rutilus*), and pike (*Esox lucius*), though pike are considered game fish in some locations such as North America.

The on-site survey collected travel cost data for the intercepted trip. Observations that were not consistent with the basic assumptions of the travel cost model were excluded, including where the interviewed angler paid the expenses of multiple anglers; where no travel cost data was reported; and where the trip length exceeded 14 days on the assumption that the primary purpose of these trips may not have been solely angling or alternatively that such anglers are a distinct niche angler group. For example, the longest trip length specified was 120 days. There are 36 separate angling sites in our dataset with game angling occurring at 27 sites and coarse angling at 13. The survey was undertaken by Tourism Development International (TDI) and a full description of the survey design and implementation is available in TDI (2013).

Data utilised in the analysis from the angler survey are presented in Table 1. *TripDays* is the number of angling days demanded on the current intercepted trip and is the dependent variable in our analysis. The financial cost of engaging in a day's fishing is encompassed in the variable *DailyCost*, which comprises expenses such as travel costs, angling related fees or expenses, and accommodation expenses. It is denominated in Euro (€) per day and calculated as total expenses divided by the number of angling days. Game anglers' expenditure is € 222/day whereas coarse anglers spend just € 148 per day. Other socio-demographic variables indicate whether the angler was of retirement age and whether the trip was with a group of 3 or more anglers. Anglers who are retired potentially have greater flexibility to take longer fishing trips, whereas

Table 1
Angler descriptive statistics.

Variable	Coarse		Game		Description
	Mean	Std. dev.	Mean	Std. dev.	
TripDays	3.95	3.62	2.29	2.53	Days angling on current trip
DailyCost	0.15	0.16	0.22	0.53	Per angling day costs, € '000
Retired	0.07	0.26	0.16	0.37	=1 if aged 65 or above, 0 otherwise
Group	0.33	0.47	0.19	0.40	=1 if angling group comprised 3 or more persons, 0 otherwise
Income	34.71	20.30	37.89	25.20	Annual gross income, € '000
MissInc	0.35	0.48	0.49	0.50	=1 if Income not reported, 0 otherwise
Ireland	0.54	0.50	0.66	0.47	=1 if angler from Republic of Ireland, 0 otherwise
NIreland	0.09	0.29	0.13	0.34	=1 if angler from Northern Ireland, 0 otherwise
Elsewhere	0.37	0.48	0.21	0.41	=1 if angler from Great Britain or continental Europe, 0 otherwise
Observations	138		303		No. of anglers