

On the Apparently Striking Disconnect between Motivation and Satisfaction in Recreational Fishing: the Case of Catch Orientation of German Anglers

ROBERT ARLINGHAUS*

*Leibniz Institute of Freshwater Ecology and Inland Fisheries,
Department of Biology and Ecology of Fishes, Müggelseedamm 310, 12587 Berlin, Germany*

Abstract.—In this study, three distinct segments of German anglers differing with respect to degree of catch orientation as the main fishing motive were identified in a nationwide telephone survey ($N = 474$). Noncatch aspects of the fishing experience played a major role in the motivations of anglers: about 80% of the sample was classified as anglers with a low, or minimal, catch orientation. Angler satisfaction and its determinants were examined across degrees of catch orientation to improve understanding of the link between angler motivation and satisfaction. Highly catch-oriented anglers were significantly less satisfied with the previous angling season than were minimally catch-oriented anglers. An exclusivity of activity-specific, mainly catch-related, satisfaction components as predictors of overall angling year satisfaction was found in all angler segments, irrespective of catch orientation. Satisfaction was unrelated to actual catch or harvest rates, and no significant differences in catch and harvest were found across the three catch orientation groups. This suggested that catch expectation was the primary driver of angler satisfaction. This study revealed that there are anglers, most often the majority within the population, who can be characterized as attaching relatively little importance to catch motives but whose satisfaction is still mainly catch dependent. It is not warranted to conclude that there is a striking disconnect in this finding. The reasons for the apparently striking inconsistency between motivation and satisfaction are related to (1) the fundamental conceptual differences in meaning and definition of motivation and satisfaction and (2) the differential ease in satisfying activity-general and activity-specific aspects of the fishing experience. Care must be taken not to draw overly simplified management implications from motivational information. However, by knowing the determinants of angler satisfaction, the manager's ability to plan future management actions is improved, and satisfaction rather than motivation is the ultimate product of the fishing experience.

Investigations of the motives that drive anglers to fish have been a frequent topic of research into the human dimension of recreational fisheries (Ditton 2004). Efforts to study angler motivations were stimulated by the assumption that providing quality fishing experiences to anglers (or influencing angler behavior and/or thinking) requires an understanding of what is important to the anglers (Fedler and Ditton 1994; Finn and Loomis 2001). The different experiences sought by recreational anglers can be viewed in terms of two sets of elements: those that are activity specific (unique to that activity), and those that are activity general (common to all outdoor recreation activities; Fisher 1997). Activity-specific elements include the species sought, size of fish, number of fish, setting in which fish are caught, disposition of the catch (e.g., releasing versus harvesting), pulling strength of the fish, and method by which the fish is caught. Activity-general elements are relaxation, association with peers and friends, experiencing natural

surroundings, “escaping,” and being outdoors, among other things (Fedler and Ditton 1994).

Previous motivation research has revealed that recreational fishing constitutes a multifaceted outdoor experience in which people seek multiple benefits that are both catch and noncatch related (Hendee 1974; Driver and Knopf 1976; Driver and Cooksey 1977; Fedler and Ditton 1994). The importance of the catch along with noncatch experience preferences (synonymously used in the literature with expected outcomes or motivations) has been shown to vary among angler segments (Bryan 1977; Fedler and Ditton 1986, 1994; Ditton et al. 1992; Aas and Kaltenborn 1995; Fisher 1997; Wilde et al. 1998). Many studies conducted on the relative importance of catch and noncatch motives found that catching fish was generally not as important to anglers as were noncatch motivations, and the primary motivations for fishing did not necessarily involve the catching or eating aspects of recreational angling (Driver and Knopf 1976; Fedler and Ditton 1994; Ditton 2004).

The incorporation of this finding into fishery management has generated controversy between fishery managers and human dimensions researchers, and

* E-mail: arlinghaus@igb-berlin.de

Received December 29, 2004; accepted January 9, 2006
Published online July 24, 2006

some managers question the managerial validity of angler motivation research. Matlock et al. (1988) reported a case study from East Matagorda Bay in Texas in which prohibition on retention of fish led to outright rejection among local anglers. Against the seemingly low importance attached to consumptive aspects of the fishing experience by anglers "in general," Matlock et al. (1988) "unexpectedly" found an adamant opposition to the new rule. Matlock and colleagues concluded that consumptive aspects of the fishing experience are more important than the social-psychological fisheries literature indicates (Matlock et al. 1988; Matlock 1991). Ditton and Fedler (1989) and Peyton and Gigliotti (1989) published arguments in defense of angler motivation research findings that offered alternative perspectives regarding the utility and validity of human dimensions research. Many of the social scientists studying angler behavior are convinced that "cynicism" (Hunt et al. 2002) among some fishery managers and biologists about the managerial usefulness of collecting motivational information arises from misunderstandings of survey data or underlying research concepts (Ditton and Fedler 1989; Peyton and Gigliotti 1989; Fisher 1997; Ditton 2004).

A potential explanation for the debate surrounding the managerial relevance of motivation research is related to a second human dimensions concept, angler satisfaction, which is akin to, but not equivalent to, angler motivation. There appears to remain a misunderstanding about the concepts of motivation and satisfaction among fisheries biologists and managers, who often equate motivation with satisfaction (Ditton and Fedler 1989). However, angler motivation and angler satisfaction should not be used interchangeably because these concepts are fundamentally different (Ditton and Fedler 1989). Angler motivations are outcomes the angler desires from a recreation experience (Driver and Knopf 1976; Holland and Ditton 1992). In contrast, angler satisfaction is determined by the difference between the outcomes an angler desires or thinks should be received (i.e., importance attached to specific motivations) and the perceived fulfillment of the desired outcomes (i.e., performance) (Holland and Ditton 1992; Burns et al. 2003). Therefore, the existence of certain motives among anglers is a necessary prerequisite for experiencing satisfaction with these motives. However, the mere existence of certain motives driving an angler to fish neither guarantees satisfaction with these motivations nor explains which aspects of the fishing experience constrain the angler's satisfaction. To explain angler behavior or foresee angler reactions to a regulatory change, knowledge of angler satisfaction and its determinants may be equally

as important as or more important than an understanding of angler motives per se (Arlinghaus and Mehner 2004, 2005).

According to Green (1991), in the traditional social-psychological fisheries research model, motivation and satisfaction were often treated as separate facets of the angling experience. A visible sign of this tradition is that many studies on the human dimensions of recreational angling either exclusively reported motivational information (e.g., Driver and Cooksey 1977; Fedler and Ditton 1994; Wilde et al. 1998; Ross and Loomis 2001; Arlinghaus and Mehner 2004) or exclusively provided overall angler satisfaction data, most often satisfaction with the most recent fishing trip (Vaske et al. 1982; McMichael and Kaya 1991; Spencer and Spangler 1992; Miko et al. 1995). Few efforts have been devoted to linking angler motivation and satisfaction (Green 1991; Spencer 1993), but some notable exceptions exist (Fedler and Ditton 1986; Aas and Kaltenborn 1995). Some work has also been conducted on the determinants of trip-specific (Graefe and Fedler 1986; Holland and Ditton 1992; Connelly and Brown 2000), holiday-specific (Herrmann et al. 2002), or angling-season-specific satisfaction (Arlinghaus and Mehner 2005). None of these studies assessed determinants of satisfaction in angler segments that differed in main fishing motives. In contrast to the common finding of angler motivation research, showing a dominance of noncatch motives among most angler groups, previous satisfaction research has shown that fulfillment of catch-related motives for fishing can be more important in determining trip, holiday, and angling year satisfaction among anglers than fulfillment of noncatch-related experience preferences, such as relaxation, escape, nature involvement, and social interaction (Graefe and Fedler 1986; Connelly and Brown 2000; Herrmann et al. 2002; Arlinghaus and Mehner 2005). Conversely, other studies have found that enjoying a quality environment and feeling a sense of freedom (i.e., noncatch motives) were the most important dimensions of angler satisfaction at the trip level (Holland and Ditton 1992). To improve understanding of angler diversity and the effects of motivation on satisfaction, a better understanding of the diversity of angler motivation and satisfaction experienced and the links between motivation and satisfaction is needed. To add to this understanding, the present study implicitly assumes a link between motivation and satisfaction; that is, anglers that are predominantly motivated by specific aspects of the experience (e.g., activity-general aspects) should also derive satisfaction from these aspects.

This study focuses on the infrequently studied catch-related motives (Finn and Loomis 2001) because

fisheries managers have or perceive themselves to have particular control over resource-related, activity-specific elements of angling but often perceive themselves to have less control over activity-general elements (Fisher 1997; Ditton 2004). Therefore, knowledge of the extent to which activity-specific elements are desired by various anglers and how this influences satisfaction and behavior is useful for improving recreational fisheries management (Fedler and Ditton 1986; Ditton et al. 1992; Fisher 1997) and the relationships between human dimensions researchers and fishery managers. Moreover, the past debate surrounding the validity of angler motivation research is related to the relative importance of catch and noncatch motives and the influence of catch and noncatch aspects on angler satisfaction. Consequently, categorization and analyses of angler types based on the importance attached to activity-specific as opposed to activity-general aspects of fishing constitute a salient way to combine the conceptual advantages of angler segmentation approaches over the "average-angler approach" (see Arlinghaus 2004a for discussion and references) with a concept that is more likely to be appealing to and accepted by managers (Fedler and Ditton 1986).

The objective of the present study was to examine the link between catch orientation as a motivational construct and angler satisfaction and its determinants to obtain a better conceptual understanding of the motivation-satisfaction linkage. Data gathered in a survey of anglers living in Germany are used for this purpose. By linking the importance placed by anglers on catch-related motives to the activity-specific (mostly catch related) and activity-general (noncatch related) determinants of angling year satisfaction, this paper ultimately attempts to contribute to the debate about the managerial usefulness of research on angler motivation and satisfaction.

Conceptual Background and Hypotheses

One approach to quantifying the general importance anglers attach to activity-specific elements of the fishing experience is to measure their general orientation towards catching "something" (hereafter termed catch orientation) and to segment anglers into various subgroups that share similar levels of catch orientation (Fedler and Ditton 1986; Aas and Kaltenborn 1995). The degree of catch orientation can be regarded as a motivational construct, an orientation or basic inclination to value the catch to varying degrees (Fedler and Ditton 1986; Aas and Kaltenborn 1995). The concept of catch orientation as used in this paper and elsewhere (termed consumptive orientation by Fedler and Ditton 1986 and Aas and Kaltenborn 1995 using identical measurement approaches and items) is

rooted in the multiple satisfaction framework (Hendee 1974). This concept recognizes that catching fish and the associated catch-related dimensions (e.g., pursuing specific species or sizes, or harvesting fish) may be most important for some anglers, whereas for others fishing may be a means of attaining other experiences from which satisfaction is derived (Sutton and Ditton 2001). Replication of previously published approaches to the study of angler catch orientation by Fedler and Ditton (1986) and Aas and Kaltenborn (1995) is warranted to (1) expand or validate our knowledge about the variation in catch orientation among angler populations, (2) investigate the influence of catch orientation on angler satisfaction and behavior, and (3) more generally, contribute to human dimensions theory on motivation and satisfaction that is useful for fisheries management. This is particularly relevant in jurisdictions where limited human dimensions information is available (e.g., Germany; Fedler and Ditton 1986; Aas and Kaltenborn 1995).

Aas and Vittersø (2000) evaluated a psychometric scale originally developed by Graefe (1980, cited in Aas and Vittersø 2000) to measure the multidimensional nature of angler consumptive orientation. The same three attitudinal items used by Aas and Vittersø (2000) to measure specific contentedness with catching "something" have previously been applied to quantify the single-dimensional consumptive orientation of anglers (Fedler and Ditton 1986; Aas and Kaltenborn 1995). Therefore, by applying these three items, researchers can measure the general importance attached by anglers to catching something, because consumptive orientation as a whole construct encompasses at least three different and partly covarying dimensions (eagerness to catch large fish, importance of catching something, and willingness to release fish), in addition to a general consumptiveness factor (Aas and Vittersø 2000). Graefe (1980, cited in Aas and Vittersø 2000) stated that angler consumptiveness may include six or more different aspects, namely: general consumptiveness, number of fish caught, disposition of fish caught, preference for catching big fish, preference for catching challenging game fish, and preference for trophy fish. To examine the association between motivation and satisfaction, I measured only one subdimension of consumptive orientation, the importance attached to catching something, and used this subdimension to segment anglers into different subgroups sharing similar levels of catch orientation. The components explaining angler satisfaction within the different subgroups were then analyzed to contrast the experience aspects that contributed most strongly to overall angler satisfaction with the previous fishing season as a function of catch orientation.

Most of the existing studies on angler satisfaction have used trip-specific information to measure satisfaction with the trip (Vaske et al. 1982; Graefe and Fedler 1986; Holland and Ditton 1992; Connelly and Brown 2000). The potential dynamic linkage between motivation and satisfaction (Green 1991) complicates the deduction of managerially meaningful findings based on trip-specific satisfaction research that might be generally applicable, because trip-specific satisfaction is likely to be more variable over the angling season than satisfaction with the entire angling year. Therefore, information on fishing trip satisfaction might be less useful for managers as a guide for determining which aspect of the fishing experience should be targeted by management actions in the long term. Moreover, Fishbein and Ajzen (1975) noted that prediction of human behavioral intentions or behavior is often weak because independent variables (e.g., motivations) are measured at a general, rather than specific, level. It is therefore not surprising that measuring a rather general motive, such as the importance of retaining caught fish, has only weak explanatory power for predicting the harvesting decision of an angler on a particular day at a particular fishery for a specific fish species or size (Hunt et al. 2002). Additionally, angler motives, particularly if measured at a very general scale (e.g., general importance attached to a specific noncatch motive for participating in recreational fishing), are relatively stable, basic human characteristics that change little over time, if at all (Manfredo et al. 1996). Therefore, the link between a general construct (e.g., a catch-related motive) and a specific situation (e.g., satisfaction with the same catch-related motive on a specific angling day) is likely to be weaker than the link between the same general construct and a more general situation (e.g., satisfaction with the catch-related motive over the whole course of the angling season).

In conclusion, past debates about the transferability of findings from motivational item importance research to specific angling situations may, in part at least, stem from an object specificity problem (Hunt et al. 2002). To avoid this issue, I measured motives (here, the importance attached to catching something) and satisfaction with activity-general and activity-specific satisfaction components at a comparable, more general level. In other words, I avoided use of a general angler segmentation approach in combination with a specific explanation of angler satisfaction (i.e., satisfaction with the most recent angling trip). At the broadest but still meaningful level, angler satisfaction can be measured for an entire angling season (Pollock et al. 1994). Consequently, for the purpose of the present study,

determinants of satisfaction with the angling year rather than an angling trip were assessed.

Theoretically, there should be a correlation between the elements of an angling experience that anglers expect (i.e., the experience preferences or motivations) and the components that most strongly determine angler satisfaction or dissatisfaction (Spencer 1993; Calvert 2002). This should also be the case with respect to the angler's catch orientation as a measure indicating the relative importance attached to the catch aspects of the recreation experience. Fedler and Ditton (1986) found that anglers with a low catch orientation preferred a more diverse set of outcomes from their fishing experiences than did highly catch-oriented anglers. They suggested that anglers with a low catch orientation (termed low-consumptive anglers by Fedler and Ditton 1986) should consistently be more satisfied with their fishing than highly catch-oriented anglers. This hypothesis was supported by Fedler and Ditton (1986), Aas and Kaltenborn (1995), and Calvert (2002).

An increasing level of catch orientation is indicative of an increasing importance attached to catch elements of the fishing experience. As most activity-specific elements of recreational angling are catch related, high levels of catch orientation would suggest that angler satisfaction is primarily determined by activity-specific aspects of the fishing experience. On the other hand, a low degree of catch orientation would allow the angler to benefit to a greater extent from noncatch-related aspects of the fishing experience (e.g., experiencing nature). Following this reasoning, decreasing catch orientation would translate to an increase in the importance of activity-general elements of the fishing experience for determining angler satisfaction. The hypotheses analyzed in this paper were as follows:

H_1 : As catch orientation decreases, angler satisfaction with the angling year increases.

H_2 : As catch orientation decreases, the relative importance of activity-specific, mainly catch-related, aspects of the fishing experience for determining angler satisfaction decreases.

Methods

Survey implementation.—A nationwide telephone survey was conducted that targeted the angler population older than 14 years living in Germany. Since a separate listing of anglers was not available, simple random sampling of households by the random digit dialing technique was used in the angler screening phase. Angler households identified were asked for permission to recall them. In-depth interviews (20–25 min each) were conducted with active anglers only (i.e., those that had fished within the previous 12

months). This was done because I assumed that only active anglers could provide managerially relevant data. Single-stage cluster sampling was applied to identified and recalled angler households; that is, the interview was conducted with every angler in the household to increase the total number of responses (see Lyle et al. 2002 for a similar approach in a nationwide angler survey in Australia). This was done because budgetary constraints prevented random subsampling of one angler per multiple-angler household (e.g., by the last-birthday question). Moreover, random subsampling of anglers in multiple-angler households would have demanded application of correct weights to convert the random-household sample into a random-person sample. Weighting is a matter of concern in survey research if group differences or hypotheses are being investigated or tested (Gabler et al. 1994). Because the aim of the present study was not to draw inferences about the finite population and but rather to investigate differences between distinct angler segments, the sample was not weighted. This procedure does not pose problems for the results per se, because even the existence of a covariance between, for example, catch orientation and number of anglers per household would result in limited bias, as differences between groups are the focus of the present research. Moreover, most angler households (75%) were single-angler households, therefore reducing the severity of violating the assumption of equal probability of inclusion in the sample. Nevertheless, strictly speaking, I did not explore the potential effect of single-stage cluster sampling versus single random sampling with applied correct weights on the present results.

From 15 October to 8 November 2002, 38 professional interviewers gathered the data using computer-assisted telephone interview facilities at USUMA GmbH (Berlin, Germany). In total, 474 interviews were completed, and the effective response rate was 79.7%. This response rate is related to the total number of identified and recalled angler households in the screening phase. Given the high response rate and the hypothesis-testing nature of this study, potential non-response bias was assumed to be negligible (Dolsen and Machlis 1991).

In the telephone interview, a series of questions was asked concerning demographics, participation patterns, behavior, beliefs, attitudes, and management preferences (see Arlinghaus 2004b for descriptive data). A telephone pretest was conducted with 11 anglers before the final questionnaire was developed. For the purpose of this paper, only the most relevant measurement approaches are described below. Further information

about the whole questionnaire is reported elsewhere (Arlinghaus 2004b; Arlinghaus and Mehner 2005).

Measurement of catch orientation.—The general catch orientation of an angler was measured following Fedler and Ditton (1986) and Aas and Kaltenborn (1995); I used three items confirmed by Aas and Vittersø (2000) to measure the importance of catching something. The three items were (1) “When I go fishing, I’m not satisfied unless I catch something,” (2) “When I go fishing, I am just as happy if I don’t catch a fish,” and (3) “A fishing trip can be successful to me even if no fish are caught.” Aas and Vittersø (2000) stated that these items seem to have something in common that is not shared with other items in the original consumptiveness scale developed by Graefe (1980, cited in Aas and Vittersø 2000). They also proposed that measurement of segmentation based on different subdimensions of consumptiveness seems to be far more accurate in predicting behavior than a general consumptiveness inventory. One of such subdimensions is expressed by the “catch something” factor.

The three items were translated into German. Agreement responses (coded as 1 [strongly agree] to 5 [strongly disagree], where 3 indicates neutrality) to the items were combined into an index of catch orientation. To achieve this, a summated score was calculated from responses to the three items. In the case of negatively worded items, the scores were reversed before summing. The summated total score ranged from 3 to 15, indicating an increasing level of catch orientation with increasing score level. Fedler and Ditton (1986) and Aas and Kaltenborn (1995) segmented anglers into three levels of catch (consumptive) orientation. The same segmentation system was applied in the present study. Anglers with summated scores ranging from 3 to 7 were classified as having a low, or minimal, catch orientation. Those with scores ranging from 8 to 11 were classified as having an intermediate catch orientation. Anglers with scores ranging from 12 to 15 were classified as having a high catch orientation. Also, two other segmentation procedures were tested: one based on three groups and one based on four groups. Roughly equal sample sizes were used as criteria for segmentation thresholds. I found no substantial differences in main results or in the conclusions derivable from the results between these segmentation approaches and the Fedler and Ditton (1986) approach. Because of space limitation, only one segmentation approach is reported here. Nevertheless, the lack of substantial differences in main results among segmentation approaches points to the robustness of the results presented here.

Measurement of satisfaction.—Whereas the literature is relatively consistent in approaches to assessing people's motivations or consumptive orientation as motivational construct (Fedler and Ditton 1986, 1994; Manfredo et al. 1996), no standard for measuring satisfaction has been reached in recreation research (Burns et al. 2003). Generally, however, it is not enough to determine overall satisfaction (e.g., with the trip or the angling year): the relative importance of individual attributes for overall satisfaction must also be identified (Crompton and MacKay 1989). Pollock et al. (1994) summarized the most popular approaches for measuring satisfaction in recreational fishing. With discrepancy theory (also known as contrast theory or the gap score approach), the amount of a satisfaction component actually experienced is compared with either a preferred amount (i.e., the ideal) or an expected amount. In the more-popular sum-of-satisfactions approach (see Graefe and Fedler 1986 and Connelly and Brown 2000 for applications to recreational fishing), the sum of the scores of individual angler satisfaction components is assumed to be correlated with the angler's overall or total level of satisfaction. Burns et al. (2003) found the satisfaction-only items scores (equivalent to the sum-of-satisfaction approach) to be better determinants of overall satisfaction than the gap score approach (here, differences between importance and satisfaction level are regressed on overall satisfaction) in water-based recreation. Therefore, in the present study, the sum-of-satisfaction approach was applied to measure the relative importance of single satisfaction components on overall satisfaction.

Angler satisfaction was measured by asking the anglers to rate, on a 10-point differential scale ranging from very dissatisfied (coded as 1) to very satisfied (coded as 10), their overall satisfaction with the previous angling year and their satisfaction with selected elements of the angling experience during the previous year. Twelve satisfaction components were constructed; they reflected the major activity-general and activity-specific subdimensions of angler motivations (see Fedler and Ditton 1994; Arlinghaus and Mehner 2004). Items were translated from English and modified to correspond with the specificities of a telephone interview and the conditions and popular vocabulary in Germany. They were checked for clarity in a telephone pretest. In each question, the angler was asked for satisfaction with the respective satisfaction subdimension while fishing at his or her main water body in the previous angling year. This was done to help the angler recall the situation and to lessen measurement error.

To investigate the relative importance of noncatch-related (activity-general) or catch-related (activity-

specific) satisfaction components for overall satisfaction, an indirect analysis based on multiple regressions was chosen. Indirect analysis was preferred because asking anglers directly about which satisfaction component most strongly determined overall satisfaction suffers from the possibility of strategic bias (sensu Connelly and Brown 2000). In other words, anglers might not answer such questions accurately and instead might strategically answer the question in order to pressure "somebody" (e.g., the survey coordinator or a management agency), for instance, to keep catch rates high (Connelly and Brown 2000). In indirect satisfaction measurement (sum-of-satisfaction approach), the respondent's indications of satisfaction with individual satisfaction components (independent variables) are regressed on the respondent's indication of overall satisfaction with the previous angling year (dependent variable). One indication that the assumption of the sum-of-satisfaction approach has been met is that significant correlations between individual satisfaction components and overall satisfaction are present in the data set. In the present study, all the measured satisfaction components were significantly correlated with overall satisfaction (Table 1). This supported the approach to indirectly, via multiple regressions, analyze significant satisfaction components separately for each of the different catch orientation groups.

To see whether actual or perceived catch quality explained overall angler satisfaction, anglers were also asked for an estimate of annual effort (estimate of annual angling trips multiplied by an estimate of mean angling hours per trip), annual harvest, and annual catch (kg fish/year). Although this type of question related to a 12-month recall period yields inaccurate estimates of catch and effort (Pollock et al. 1994), the quotient of catch and effort (catch per unit effort [CPUE]) can be considered a relative measure of catch quality that indicates differences in catch rate among individual anglers.

Statistical analysis.—To compare overall angler satisfaction across the three catch orientation groups and to test H_1 , I used analysis of variance (ANOVA) and Student–Newman–Keuls post hoc tests with a significance level (α) of 0.05. To assess the relative importance of individual satisfaction components for overall satisfaction, a set of multiple regressions was calculated for each level of catch orientation. By comparing the strength of correlations between individual satisfaction components and by analyzing whether activity-specific or activity-general components explained overall satisfaction, the relative importance of these components in determining angler satisfaction for each catch orientation group was assessed (H_2). To analyze the effects of actual catch

TABLE 1.—Bivariate correlation (Pearson's correlation coefficient, r) between individual satisfaction components and overall angling satisfaction for the general population sampled in Germany and results of stepwise multiple regression of individual satisfaction components (β -value) on overall satisfaction for three groups of anglers: those with low (L), medium (M), and high (H) catch orientation. Asterisks indicate statistical significance ($*P < 0.05$, $**P < 0.01$, $***P < 0.001$); ns = not significant.

Satisfaction measure	Population r	β -value		
		L	M	H
Activity-general satisfaction components				
Relaxing in the outdoors at the waterside	0.248**	ns	ns	ns
Fishing in pleasant company	0.274**	ns	ns	ns
Experiencing a natural setting with diverse spawning habitats, fish refuges, and shoreline structure	0.296**	ns	ns	ns
Enjoying clear water while fishing	0.250**	ns	ns	ns
Being untroubled in an environment that is hardly disturbed by humans	0.173**	ns	ns	ns
Activity-specific satisfaction components				
Number of consumable fish caught	0.498**	0.173**	ns	0.652***
Number of fish bites	0.483**	0.223*	0.267*	ns
Sufficient angling sites and parking places	0.309**	ns	0.352***	ns
Mastering angling-related challenges	0.405**	0.125**	0.358**	ns
Experiencing exciting fights with fish	0.274**	ns	ns	ns
Number of big fish caught	0.471**	0.241***	ns	ns
Competition with other anglers for the biggest or most fish	0.122*	ns	ns	ns
Constant		1.588***	0.637	1.514
R^2 corrected		0.371	0.439	0.402
F -value		45.288	19.233	18.468
df		375	70	26
P -value		<0.001	<0.001	<0.001
Durbin-Watson statistic		1.992	2.127	1.550

quality (as measured by CPUE, total annual catch, or total annual harvest) on overall angler satisfaction, Pearson's linear regressions were applied ($\alpha = 0.05$). Differences in mean CPUE, mean annual catch, and mean annual harvest across the three catch orientation groups were assessed by ANOVA followed by Student-Newman-Keuls post hoc tests ($\alpha = 0.05$) for cases of homogeneous variances or Dunnett's T3 post hoc tests for cases of heterogeneous variances (Levene's test, $\alpha = 0.05$). All statistical tests were conducted in the Statistical Package for the Social Sciences (version 9.0.1).

Results

Noncatch aspects of the fishing experience played a major role in the self-reported motivations of anglers

in Germany. About 90% of the sample agreed or strongly agreed with the statement, "A fishing day can be successful to me, even if no fish are caught" (Table 2); 71.5% disagreed or strongly disagreed with the item, "When I go fishing, I'm not satisfied unless I catch something" Similarly, over 75% agreed or strongly agreed with the statement, "When I go fishing, I'm just as happy if I don't catch a fish." As can be derived from Table 3, most German anglers were classified as minimally (low) to intermediately catch oriented. The segmentation approach resulted in 79.3% of anglers being classified as minimally catch oriented, 15% as intermediately catch oriented, and 5.7% as highly catch oriented. The scale measuring the degree of catch orientation revealed an acceptable reliability value for Cronbach's α (0.78, Table 2;

TABLE 2.—Catch orientation scale item composition for a nationwide sample of anglers in Germany ($N = 474$ per item).

Scale item	Percentage of respondents that					Item mean \pm SD	α if item deleted ^a
	Strongly agree (1)	Agree (2)	Neither agree nor disagree (3)	Disagree (4)	Strongly disagree (5)		
When I go fishing, I'm not satisfied unless I catch something ^b	6.3	10.3	11.8	38.0	33.5	2.18 \pm 1.19	0.81
A fishing trip can be successful to me, even if no fish are caught	51.9	37.6	2.7	5.5	2.3	1.69 \pm 0.94	0.63
When I go fishing, I'm just as happy if I don't catch a fish	38.2	37.6	11.8	9.9	2.5	2.01 \pm 1.06	0.67

^a Cronbach's $\alpha = 0.78$.

^b For the calculation of Cronbach's α and item mean, item response was reversed because of the negative wording of the item.

TABLE 3.—Distribution of catch orientation scores for a nationwide sample of anglers in Germany. Scale was constructed by combining the three items in Table 2 (summed score).

Catch orientation	Score	N	%
Low	3	109	23.0
	4	64	13.5
	5	49	10.3
	6	108	22.8
	7	46	9.7
	3–7	347	79.3
Medium	8	33	7.0
	9	15	3.2
	10	11	2.3
	11	12	2.5
	8–11	71	15.0
High	12	15	3.2
	13	5	1.1
	14	3	0.6
	15	4	0.8
	12–15	27	5.7

compared to a reliability threshold of 0.60 in Tarrant et al. 1997), which provided support for creating a summated score (Table 3).

The whole sample reported above-average (item mean = 5) satisfaction with the previous angling year (item mean = 6.73; Table 4). However, there were significant differences in overall angling year satisfaction among the three groups of anglers. Highly catch-oriented anglers were significantly less satisfied with the previous angling year than were intermediately and minimally catch-oriented anglers. Although no significant differences were found between intermediately

and minimally catch-oriented anglers, H_1 was supported by the data, as intermediately catch-oriented anglers showed a tendency to be less satisfied than minimally catch-oriented persons.

Noteworthy differences in angler satisfaction were apparent when differentiating between activity-general and activity-specific satisfaction components (Table 4). With the exception of satisfaction with the quantity of consumable fish caught, anglers were less satisfied overall with the activity-specific satisfaction components than with the activity-general, noncatch-related components. Activity-specific satisfaction components encompassed mainly catch-dependent components. In addition, a comparatively low satisfaction level was also expressed about experiencing sufficient facilities (e.g., angling sites and parking places). Because this aspect is also unique to the angling activity per se, it can be considered an activity-specific satisfaction component (Table 4).

Relative to satisfaction with activity-specific components of the angling experience, satisfaction with most of the activity-general satisfaction components was consistently rated higher by minimally and intermediately catch-oriented anglers than by highly catch-oriented anglers (Table 4). In contrast, highly catch-oriented anglers also expressed relatively low satisfaction with certain activity-general aspects of the angling experience (e.g., experience of a natural setting and clear water). Highest overall satisfaction was expressed with respect to the possibility of relaxing in the outdoors at the water side and of fishing in

TABLE 4.—Degree of satisfaction with the overall angling year and activity-general and activity-specific satisfaction components among German angler groups of low (L), medium (M), or high (H) catch orientation. Satisfaction was assessed on a scale ranging from 1 (very dissatisfied) to 10 (very satisfied). Within rows, different lowercase letters indicate significant differences. All items are expressed as means (\pm SDs).

Satisfaction measure	Angler orientation				N	P
	All	L	M	H		
Previous angling year overall	6.73 \pm 2.32	6.82 \pm 2.26 z	6.70 \pm 2.35 z	5.54 \pm 2.77 y	473	0.024
Activity-general satisfaction components						
Relaxing in the outdoors at the waterside	8.61 \pm 2.01	8.74 \pm 1.91 z	8.51 \pm 1.92 z	7.11 \pm 2.91 y	474	<0.001
Fishing in pleasant company	7.38 \pm 2.40	7.31 \pm 2.42	7.93 \pm 2.15	6.92 \pm 2.73	453	0.088
Experiencing a natural setting with diverse spawning habitats, fish refuges, and shoreline structure	6.85 \pm 2.46	7.01 \pm 2.38 z	6.62 \pm 2.57 z	5.30 \pm 2.70 y	459	0.001
Enjoying clear water while fishing	6.72 \pm 2.50	6.93 \pm 2.41 y	6.16 \pm 2.70 yz	5.44 \pm 2.56 z	458	0.001
Being untroubled in an environment that is hardly disturbed by humans	6.63 \pm 2.83	6.68 \pm 2.81	6.71 \pm 2.91	5.70 \pm 2.77	470	0.215
Activity-specific satisfaction components						
Number of consumable fish caught	6.64 \pm 2.48	6.74 \pm 2.46 z	6.60 \pm 2.50 z	5.30 \pm 2.33 y	470	0.014
Number of fish bites	6.47 \pm 2.28	6.53 \pm 2.24	6.17 \pm 2.50	6.44 \pm 2.29	466	0.476
Sufficient angling sites and parking places	6.43 \pm 2.49	6.52 \pm 2.53	6.33 \pm 2.38	5.56 \pm 2.19	461	0.142
Mastering angling-related challenges	6.34 \pm 2.25	6.43 \pm 2.25	6.11 \pm 2.33	5.68 \pm 1.97	416	0.180
Experiencing exciting fights with fish	5.66 \pm 2.54	5.75 \pm 2.49	5.52 \pm 2.64	4.92 \pm 2.81	429	0.251
Number of big fish caught	5.27 \pm 2.56	5.29 \pm 2.53	5.30 \pm 2.71	5.00 \pm 2.63	456	0.851
Competition with other anglers for the biggest or most fish	5.22 \pm 2.73	5.21 \pm 2.77	5.53 \pm 2.51	4.67 \pm 2.76	334	0.430

pleasant company. People were least satisfied with the quantity of big fish caught and with the possibility of competing with other anglers for the biggest or most fish.

Significant differences in satisfaction ratings among catch orientation groups were detected in three out of five activity-general satisfaction items, and an additional item ("fish in pleasant company") was close to statistical significance (Table 4). Generally, differences were pronounced between the minimally and highly catch-oriented groups. Satisfaction with the possibility of relaxing in the outdoors at the water side, experiencing a natural setting, and enjoying clear water while fishing was significantly higher in the minimally catch-oriented group than in the highly catch-oriented segment; the intermediately catch-oriented anglers exhibited an intermediate position. Only one out of seven activity-specific satisfaction items was rated in a significantly different manner by the three angler groups. Satisfaction with the quantity of consumable fish caught was significantly lower for the highly catch-oriented group than for minimally and intermediately catch-oriented anglers. Furthermore, there was a statistically nonsignificant tendency of highly catch-oriented anglers to be less satisfied with activity-specific satisfaction components than intermediately and minimally catch-oriented anglers, whose satisfaction ratings were more similar.

Only negligible and nonsignificant correlations were detected between realized annual catch, annual harvest, or CPUE and overall angling satisfaction or activity-specific satisfaction components. Most bivariate correlations were not significant or explained a negligible amount of variance in angler satisfaction (Pearson's linear correlation: $r^2 < 0.15$). This was also true for correlations computed separately for the three levels of catch orientation. Therefore, although satisfaction was overall lower with catch-related (activity-specific) satisfaction components than with activity-general aspects of the fishing experience, it was uncoupled from or only weakly related to actual catch qualities. There were no significant differences in mean CPUE, mean annual catch, and mean annual harvest across the three catch orientation groups. However, there was a tendency for highly catch-oriented anglers to be less successful than the other groups. For example, total annual catch (mean \pm SE) was 17.5 ± 4.2 kg/year for highly catch-oriented anglers, whereas it was 23.1 ± 3.6 and 19.2 ± 1.3 kg/year in intermediately and minimally catch-oriented anglers, respectively. The same statistically nonsignificant trends were found for CPUE and total annual harvest.

No activity-general satisfaction component explained angler satisfaction, irrespective of catch

orientation (Table 1). This result challenged H_2 , because in all groups (not just the highly catch-oriented anglers), activity-specific satisfaction components primarily explained overall angling satisfaction. Activity-specific satisfaction components primarily determining overall angling year satisfaction were either directly (e.g., amount of big fish or consumable fish caught) or indirectly (e.g., mastering angling-related challenges) catch related. However, no satisfaction component explained angling year satisfaction in all angler segments, indicating differences in satisfaction determinants depending on catch orientation. Overall, the variance explained by the independent variables ranged between 37.1% in the minimally catch-oriented group to 43.7% in the intermediately catch-oriented angler segment.

Minimally catch-oriented anglers derived their overall satisfaction primarily from catching sufficient amounts of large and consumable fish as well as from experiencing frequent fish bites. Moreover, mastering angling-related challenges determined angling year satisfaction for minimally catch-oriented anglers. This segment was characterized by the greatest diversity of satisfaction determinants.

For intermediately catch-oriented anglers, the mastery of angling-related challenges, the presence of sufficient angling sites and parking places, and the quantity of bites significantly explained overall angling year satisfaction.

Quantity of consumable fish caught was the only predictor of overall angling season satisfaction for highly catch-oriented anglers.

Discussion

In this study, three distinct segments of German anglers that differed in their degree of catch orientation were identified (Tables 2, 3). Most German anglers were characterized as having a low catch orientation. Overall angling year satisfaction, satisfaction with specific aspects of the fishing experience, and determinants of angler satisfaction were found to be dependent on angler catch orientation (Tables 1, 4). However, for all three angler segments, determinants of angling year satisfaction encompassed activity-specific, mostly catch-related, components of the fishing experience. Overall, this study supported earlier findings but also revealed new insights. In the following discussion, the apparent disconnect between motivation and satisfaction is discussed (i.e., a high importance is attached to noncatch motives by most anglers, but satisfaction is still mainly catch dependent, irrespective of self-reported catch orientation). Moreover, some implications for fisheries management are outlined, and a critical discussion on the managerial

relevance of motivation and satisfaction research in recreational fishing is provided.

The Link between Motivation and Satisfaction

In this study and studies by Fedler and Ditton (1986), Aas and Kaltenborn (1995), and Calvert (2002), overall angler satisfaction varied as a function of degree of catch orientation (Table 4). Differences in satisfaction were particularly pronounced in comparisons of and minimally and highly catch-oriented anglers. As was expected and expressed in H_1 , overall angling year satisfaction was lowest for the angler segment characterized by strong catch motivations. Minimally catch-oriented anglers prefer a more diverse set of outcomes from their fishing experiences than do highly catch-oriented anglers (Fedler and Ditton 1986). This is, *inter alia*, reflected in a greater diversity of satisfaction components determining overall angling year satisfaction for anglers with a low catch orientation (Table 1). At the same time, however, minimally catch-oriented anglers seem to be able to satisfy many aspects of the fishing experience, particularly activity-general aspects, more easily than do highly catch-oriented anglers. Albeit not always statistically supported in every case, the level of satisfaction with most of the satisfaction components was higher among minimally catch-oriented anglers than among highly catch-oriented anglers (Table 4). The greater diversity of fishing outcomes providing satisfaction, coupled with the ability of minimally catch-oriented anglers to better satisfy most satisfaction components, may explain this group's greater overall satisfaction with the angling experience.

This study stresses the notion that, irrespective of catch orientation, anglers' angling year satisfaction is predominantly constrained by activity-specific, typically catch-dependent, aspects of the angling experience (Table 1). Although the present study measured determinants of angling year satisfaction rather than angling trip satisfaction, its results concerning determinants of angling year satisfaction (Table 1) agree with those of other reports that have documented catch aspects of the angling trip to primarily explain angler satisfaction (Vaske et al. 1982; Graefe and Fedler 1986; Stoffle et al. 1987; Spencer 1993; Connelly and Brown 2000). The present study, however, contrasts with a study by Holland and Ditton (1992), who found that activity-general elements mainly explained angling trip satisfaction in Texas. Differences in survey results on determinants of angler satisfaction may be explained by differences in methods, divergent time scales (trip versus angling year satisfaction), and differences in angler populations surveyed (Holland and Ditton 1992). Also, cultural differences and the specific

institutional and ecological environment in Germany may explain the partly conflicting results. For example, typically less-disturbed water bodies are found in other western countries such as the USA, Canada, Scandinavia, and Australia, whereas catch opportunities are often low in Germany, which may result in greater catch dependence to experience a satisfying angling trip or year (Finn and Loomis 2001).

It was initially expected that the importance of activity-general aspects for determining angling year satisfaction would increase with decreasing importance attached to catch motives and hence, decreasing catch orientation (H_2). This hypothesis, however, was not supported by the data. The dominance of activity-specific, mainly catch-related, satisfaction components in explaining overall angling year satisfaction irrespective of the self-reported catch orientation is noteworthy, because this finding partly explains the controversy over the managerial utility of angler motivations research (see Matlock et al. 1988; Ditton and Fedler 1989; Peyton and Gigliotti 1989; Green 1991; Matlock 1991). Obviously, there are anglers—most often the majority within the population (Tables 2, 3)—who can be characterized as placing relatively little importance on catch motives *per se* but whose satisfaction is still mainly catch dependent. However, one cannot conclude that there is a striking inconsistency between what many anglers state as the most important motivations (i.e., predominantly activity-general, noncatch-related experience outcomes) and what often ultimately determines satisfaction (i.e., activity-specific, mostly catch-related satisfaction components). The reasons for this apparently striking disconnect between motivation and satisfaction are related to (1) the fundamental conceptual differences in meaning and definition of motivation (i.e., expected outcomes) and satisfaction (i.e., perceived fulfillment of expected outcomes) and (2) the differential ease in satisfying the different activity-general and activity-specific aspects of the fishing experience.

In addition to conceptual differences between motivation and satisfaction (Ditton and Fedler 1989), the most important reason for the apparent disparity between motivation and satisfaction is that some motives, particularly activity-general aspects of the fishing experience, are easier to satisfy than others (Table 4; Vaske et al. 1982; Fedler and Ditton 1986), and some motives are relevant to various angler segments to different degrees. Clearly, a minimally catch-oriented angler places greater importance on activity-general aspects of fishing (e.g., experiencing nature or being outdoors) than does a highly catch-oriented angler (Fedler and Ditton 1986; Aas and Kaltenborn 1995). Minimally catch-oriented anglers

will therefore value such noncatch experience components to a greater extent than highly catch-oriented anglers. The higher importance attached to activity-general aspects of fishing by minimally catch-oriented anglers may lead to a greater sense for experiencing and satisfying such benefits and indirectly may lead to greater satisfaction with noncatch aspects of fishing (Table 4). Furthermore, the angler typically has greater control over success with activity-general elements of the angling experience than with activity-specific elements. For example, the angler may choose whom to fish with and a particular fishery that will most probably satisfy his or her expectations for activity-general motivations, such as experiencing pleasant outdoor settings and nature. This will very likely allow for trips that are satisfying with respect to activity-general motivations on most occasions. On the other hand, the angler often has less control over the attainment of satisfying catches (Vaske et al. 1982). In agreement with this reasoning, in the present study satisfaction was consistently higher for activity-general elements than for activity-specific elements of the fishing experience (Table 4). This adds weight to the assumption that activity-general aspects of fishing are generally much easier to satisfy, such that activity-specific, particularly catch-dependent, aspects ultimately determined angler satisfaction in all groups, irrespective of self-reported catch orientation (Table 1).

The fact that minimally catch-oriented anglers value noncatch experiences more than do highly catch-oriented anglers does not mean that anglers with a low catch orientation *only* value activity-general aspects. Catching fish or having the possibility to catch fish is a necessary component of almost every angling trip (Fedler and Ditton 1986; Aas and Kaltenborn 1995; Schramm et al. 2003). Connelly et al. (2001), among others, found that most anglers desired an opportunity to catch fish on most or all of their fishing trips. Hendee (1974) stated that there has to be a minimum probability or level of catch success to activate or enhance other angling motivations. Vaske et al. (1982) hypothesized that consumptive recreationists, such as hunters and anglers, may be in a striving mode in which they are searching for the optimum rather than the satisficing. Such recreationists are less likely to describe their experience as perfect unless they catch a real trophy or a limit of fish, both of which are rare events. This might explain why catch-related measures, such as number of large or consumable fish or quantity of fish bites, are effective for predicting angling year satisfaction (Table 1). In conclusion, the controversy between some human dimensions researchers and managers concerning the practical utility of angler motivation research can be reduced if

motivation research is only carefully used to derive concrete management recommendations and if motives are not equated with the managerially more relevant concept of angler satisfaction.

The results of this study reinforce that often-cited statement that anglers vary in the degree to which the catch is perceived as important (e.g., Fedler and Ditton 1994). Nonetheless, this study also supported the fact that the presence of fish and the possibility of catching fish are crucial components of a satisfying angling year for the majority of anglers. However, the exact number of fish a specific angler must catch in order to be satisfied is almost impossible to assign. Not only do motivations differ between groups, but the dynamics of satisfaction is a complex process that varies among individuals and situations over time (Peyton and Gigliotti 1989). The high level of subjectivity in evaluating satisfaction is supported by this study and those of others, where angler satisfaction was not related to actual annual catch and/or harvest amount or catch rate (CPUE). Therefore, angler satisfaction is ultimately dependent on subjective evaluations of the realized catch "quality," which in turn depends on catch expectations (e.g., Hudgins and Davies 1984; Graefe and Fedler 1986; McMichael and Kaya 1991; Spencer and Spangler 1992). Moreover, the evaluation of the angler's own catch and, hence, personal satisfaction will depend on the catch others experience and the amount of information available on catch opportunities (Schramm et al. 1998) and will be highly context and situation specific, at least for trip satisfaction. Therefore, catch orientation seems only marginally related to real fishing competency and success, as evidenced by the lack of significant differences in catch parameters (CPUE, annual catch, and annual harvest) across the catch orientation groups in this study. This corresponds with results by Aas and Kaltenborn (1995) and reduces the likelihood that the presence of a high or low catch orientation is a mere artifact of specific low or high catch rates.

Even though a substantial part of the variance in overall satisfaction could be explained by the independent satisfaction components in this study, around 55% of the variance remained unexplained. Various situational variables, such as specific circumstances experienced in the main fishery, the institutional environment in Germany (e.g., high level of bureaucracy, ban on competitive fishing and live bait, intolerance of catch-and-release-only regulations, etc.; Arlinghaus 2004a, 2004b), and simply those satisfaction components not included in this study, might explain total angling year satisfaction. Irrespective of these possibilities, the amount of explained variance in this study is relatively high and comparable in

dimension to that of other angling and water-based recreation studies (e.g., 54–57%: Graefe and Fedler 1986, Connelly and Brown 2000; 3–15%: Burns et al. 2003).

Implications for Management and Research

The results of the present study suggest that overly simplified management implications drawn from motivation data alone can be misleading and that unexpected surprises can and probably will occur, as the East Matagorda Bay case study showed in the past (see Matlock et al. 1988; Ditton and Fedler 1989; Matlock 1991). For example, based on the present study, it would be unwise to conclude that because the level of catch orientation is low overall, management should focus on noncatch aspects of the fishing experience. Such an implication would result in “management surprise,” because angler satisfaction was found to be mainly catch dependent, irrespective of catch orientation. Therefore, a predominant focus on noncatch aspects of the fishing experience would probably sooner or later be confronted with satisfaction determinants of the angler constituency and would lead to conflict. Therefore, I encourage caution in the exclusive use of motivations data to support management decision making, because knowledge of motivations alone does not explain what constrains angler satisfaction: satisfaction, not motivation, is the ultimate product of the angling experience (Hendee 1974). If concrete management implications shall be drawn from human dimensions research in the future, angler satisfaction insights should be favored over reliance on motivation data alone; motivation and satisfaction or related concepts, such as constraints, should therefore be combined into a common research framework.

The results of this study do not support the assumption that conservation-driven recreational fisheries management in pressured fisheries is more likely to be effective if the activity of minimally catch-oriented anglers is promoted (Calvert 2002); the probability of angler opposition to regulations will not be reduced by a strategy of targeting such anglers. Although opposition to more restrictive catch regulations should be less among minimally catch-oriented anglers (Ditton and Fedler 1989), the results of this study suggest that opposition will still occur. Highly catch-oriented German anglers would probably be particularly impacted by more-restrictive regulations and most strongly impacted by harvest regulations, because their satisfaction is exclusively related to the quantity of consumable fish caught (Table 1). However, minimally catch-oriented anglers depend on catch aspects to derive satisfaction. Such anglers therefore

will also be impacted by more restrictive catch or harvest regulations, while intermediately consumptive anglers will range in between minimally and highly catch-oriented anglers. In a similar vein, Sutton and Ditton (2001) stated that although low-consumptive anglers may place comparatively lower importance on the catch aspects of fishing, they will not necessarily harvest fewer fish than anglers that are classified as highly consumptive, nor will they be more likely to support conservative management tools such as catch-and-release fishing. However, in agreement with statements by Fedler and Ditton (1986), minimally and intermediately catch-oriented anglers seem to have a greater range of experience preferences than highly catch-oriented anglers have, and their higher overall angling satisfaction ratings suggest that less catch-oriented anglers enjoy their fishing more and thus may go fishing even if the prospect for catching, and presumably harvesting, is not high. They therefore would probably derive greater benefits from management measures that target noncatch aspects of the fishing experience than would highly catch-oriented anglers.

Based on the results of the present study and other studies (e.g., Hendee 1974; Driver 1985), a diversity of angling waters should be provided and specific segments of the angling population should be directed toward fisheries that are designed to meet their particular needs. For example, highly catch-oriented German anglers are more likely to benefit from fisheries that provide sufficient opportunity to catch consumable fish. This might be achieved by stocking in heavily modified water bodies, some of which might resemble put-and-take fisheries. Consumable fish in Germany are generally considered top predators of the food webs (Arlinghaus 2004b; Arlinghaus and Mehner 2004). To serve intermediately consumptive anglers, facility development and the opulence of fish irrespective of size might be promoted. Minimally catch-oriented anglers, on the other hand, will benefit more from scenic beauty and environmental integrity (as subjectively defined by the angler) as well as the availability of high-quality fish—typically the larger-sized or consumable fish species that offer angling challenges. People belonging to the high-specialization angler subworld (Bryan 1977) are probably over-represented in the minimally catch-oriented angler segment relative to the intermediately and highly catch-oriented angler segments. Other studies suggest that with increasing angler specialization level, the importance attached to catch decreases (Ditton et al. 1992). At the same time, the support for more restrictive regulations increases with increasing specialization level (Ditton et al. 1992). Thus, to comply with

demands of the minimally catch-oriented angler segment, more restrictive, carefully communicated regulations (e.g., length limits, catch and release, or limits on access) might ensure high fish abundance and high densities of quality-sized fish in pressured waters. Overall, however, a clean environment and appropriate catch opportunities may serve as general management objectives across most angler groups (Schramm et al. 2003) as long as achieving them are compatible with resource conservation values and multiple stakeholder demands in the 21st century (Arlinghaus et al. 2002).

The distinction between what people primarily seek and what primarily constrains the overall experience is important for future management-oriented human dimensions research in recreational fisheries. Further research is needed that investigates how satisfaction or dissatisfaction influences angler behavior and attitudes (e.g., site selection, support for management measures, and harvesting decisions). Application of the discrete choice models or choice-based conjoint models originally developed in marketing, transportation research, and environmental valuation (Louviere and Timmermans 1990) might be valuable for improving recreational fisheries research and management by revealing the salient factors and tradeoffs that are responsible for angler choices and behavior.

Acknowledgments

The German Anglers Association (Deutscher Anglerverband [DAV]) partially funded this study. I thank Thomas Mehner, Christian Wolter, Steven J. Cooke, and Catherine Reid for comments on the manuscript. I also acknowledge the help of the staff at USUMA GmbH, Berlin, during data collection. Special thanks are extended to all participating anglers and four anonymous referees for constructive comments on a previous version of this manuscript. I also acknowledge the discussions with the "avid angler," Alexander Kobler, on the question of whether anglers are eager to catch or not.

References

- Aas, Ø., and B. P. Kaltenborn. 1995. Consumptive orientation of anglers in Engerdal, Norway. *Environmental Management* 19:751–761.
- Aas, Ø., and J. Vittersø. 2000. Reexamining the consumptiveness concept: some suggestions from a confirmatory factor analysis. *Human Dimensions of Wildlife* 5:1–18.
- Arlinghaus, R. 2004a. A human dimensions approach towards sustainable recreational fisheries management. Turnshare, London.
- Arlinghaus, R. 2004b. Recreational fisheries in Germany: a social and economic analysis. *Berichte des IGB* 18:1–160.
- Arlinghaus, R., and T. Mehner. 2004. A management-orientated comparative analysis of urban and rural anglers living in a metropolis (Berlin, Germany). *Environmental Management* 33:331–344.
- Arlinghaus, R., and T. Mehner. 2005. Determinants of management preferences of recreational anglers in Germany: habitat management versus fish stocking. *Limnologica* 35:2–17.
- Arlinghaus, R., T. Mehner, and I. G. Cowx. 2002. Reconciling traditional inland fisheries management and sustainability in industrialized countries, with emphasis on Europe. *Fish and Fisheries* 3:261–316.
- Bryan, H. 1977. Leisure value systems and recreation specialization: the case of trout fishermen. *Journal of Leisure Research* 9:174–187.
- Burns, R. C., A. R. Graefe, and J. D. Absher. 2003. Alternate measurement approaches to recreational customer satisfaction: satisfaction-only versus gap scores. *Leisure Sciences* 25:363–380.
- Calvert, B. 2002. The importance of angler motivations for sport fishery management. Pages 120–129 in T. J. Pitcher and C. E. Hollingworth, editors. *Recreational fisheries: ecological, economic, and social evaluation*. Blackwell Scientific Publications, Oxford, UK.
- Connelly, N. A., and T. L. Brown. 2000. Options for maintaining high fishing satisfaction in situations of declining catch rates. *Human Dimensions of Wildlife* 5:18–31.
- Connelly, N. A., B. A. Knuth, and T. L. Brown. 2001. An angler typology based on angler fishing preferences. *Transactions of the American Fisheries Society* 130:13–137.
- Crompton, J. L., and K. J. MacKay. 1989. Users' perceptions of the relative importance of service quality dimensions in selected public recreation programs. *Leisure Sciences* 11:367–375.
- Ditton, R. B. 2004. Human dimensions of fisheries. Pages 199–208 in M. J. Manfredo, J. J. Vaske, B. L. Bruyere, D. R. Field, and P. J. Brown, editors. *Society and natural resources: a summary of knowledge prepared for the 10th International Symposium on Society and Resource Management*. Modern Litho, Jefferson City, Missouri.
- Ditton, R. B., and A. J. Fedler. 1989. Importance of fish consumption to sport fishermen: a reply to Matlock et al. (1988). *Fisheries* 14(4):4–6.
- Ditton, R. B., D. K. Loomis, and S. Choi. 1992. Recreation specialization: reconceptualization from a social world perspective. *Journal of Leisure Research* 24:33–51.
- Dolsen, D. E., and G. E. Machlis. 1991. Response rates and mail recreation survey results: how much is enough? *Journal of Leisure Research* 23:272–277.
- Driver, B. L. 1985. Specifying what is produced by management of wildlife by public agencies. *Leisure Sciences* 7:281–295.
- Driver, B. L., and R. C. Knopf. 1976. Temporary escape: one product of sport fisheries management. *Fisheries* 1(2):21–29.
- Driver, B. L., and R. W. Cooksey. 1977. Preferred psychological outcomes of recreational fishing. Pages 27–40 in R. A. Barnhart and T. D. Roelofs, editors. *Catch-and-release fishing as a management tool*. California Cooperative Fishery Research Unit, Humboldt State University, Arcata.

- Fedler, A. J., and R. B. Ditton. 1986. A framework for understanding the consumptive orientation of recreational fishermen. *Environmental Management* 10:221–227.
- Fedler, A. J., and R. B. Ditton. 1994. Understanding angler motivations in fisheries management. *Fisheries* 19(4):6–13.
- Finn, K. L., and D. K. Loomis. 2001. The importance of catch motives to recreational anglers: the effects of catch satiation and deprivation. *Human Dimensions of Wildlife* 6:173–187.
- Fishbein, M., and I. Ajzen. 1975. *Belief, attitude, intention, and behavior: an introduction to theory and research*. Addison-Wesley, Reading, Massachusetts.
- Fisher, M. R. 1997. Segmentation of the angler population by catch preference, participation, and experience: a management-oriented application of recreational specialization. *North American Journal of Fisheries Management* 17:1–10.
- Gabler, S., J. H. P. Hoffmeyer-Zlotnik, and D. Krebs. 1994. *Gewichtung in der Umfragepraxis*. [Weighting in survey research.] Westdeutscher Verlag, Opladen, Germany.
- Graefe, A. R. 1980. The relationship between level of participation and selected aspects of specialization in recreational fishing. Doctoral dissertation. Texas A&M University, College Station.
- Graefe, A. R., and A. J. Fedler. 1986. Situational and subjective determinants of satisfaction in marine recreational fishing. *Leisure Sciences* 8:275–295.
- Green, T. G. 1991. Importance of fish consumption to sport fishermen: an economic analysis. *Fisheries* 16(6):13–18.
- Hendee, J. C. 1974. A multiple-satisfaction approach to game management. *Wildlife Society Bulletin* 2:104–113.
- Herrmann, M., L. M. Milner, K. L. Giraud, M. S. Baker, and R. F. Hiser. 2002. German participation in Alaska sport fisheries in 1998. *Alaska Fishery Research Bulletin* 9:27–43.
- Holland, S. M., and R. B. Ditton. 1992. Fishing trip satisfaction: a typology of anglers. *North American Journal of Fisheries Management* 12:28–33.
- Hudgins, M. D., and W. D. Davies. 1984. Probability angling: a recreational fishery management strategy. *North American Journal of Fisheries Management* 4:431–439.
- Hunt, L., W. Haider, and G. Armstrong. 2002. Understanding fish harvesting decisions by anglers. *Human Dimensions of Wildlife* 7:75–89.
- Louviere, J. J., and H. Timmermans. 1990. Stated preference and choice models applied to recreation research. *Journal of Leisure Research* 12:9–32.
- Lyle, J. M., A. P. M. Coleman, L. West, D. Campbell, and G. W. Hendry. 2002. New large-scale survey methods for evaluating sport fisheries. Pages 207–226 in T. J. Pitcher and C. E. Hollingworth, editors. *Recreational fisheries: ecological, economic, and social evaluation*. Blackwell Scientific Publications, Oxford, UK.
- Manfredo, M. J., B. L. Driver, and M. A. Tarrant. 1996. Measuring leisure motivation: a meta-analysis of the recreation experience preference scales. *Journal of Leisure Research* 28:188–213.
- Matlock, G. C. 1991. The East Matagorda Bay experience: the saga continues. *Fisheries* 16(6):20–22.
- Matlock, G. C., G. E. Saul, and C. E. Bryan. 1988. Importance of fish consumption to sport fishermen. *Fisheries* 13(1):25–26.
- McMichael, G. A., and C. M. Kaya. 1991. Relations among stream temperature, angling success for rainbow trout and brown trout, and fisherman satisfaction. *North American Journal of Fisheries Management* 11:190–199.
- Miko, D. A., H. L. Schramm, Jr., S. D. Arey, J. A. Dennis, and N. E. Mathews. 1995. Determination of stocking densities for satisfactory put-and-take rainbow trout fisheries. *North American Journal of Fisheries Management* 15:823–829.
- Peyton, R. B., and L. M. Gigliotti. 1989. The utility of sociological research: a reexamination of the East Matagorda Bay experience. *Fisheries* 14(4):5–8.
- Pollock, K. H., C. M. Jones, and T. L. Brown. 1994. *Angler survey methods and their applications in fisheries management*. American Fisheries Society, Special Publication 25, Bethesda, Maryland.
- Ross, M. R., and D. K. Loomis. 2001. Put-and-take fisheries: investigating catch and retention assumptions. *Fisheries* 26(2):13–18.
- Schramm, H. L., Jr., S. D. Arey, D. A. Miko, and P. D. Gerard. 1998. Angler perceptions of fishing success and the effect of on-site catch rate information. *Human Dimensions of Wildlife* 3:1–10.
- Schramm, H. L., Jr., P. D. Gerard, and D. A. Gill. 2003. The importance of environmental quality and catch potential to fishing site selection by freshwater anglers in Mississippi. *North American Journal of Fisheries Management* 23:512–522.
- Spencer, P. D. 1993. Factors influencing satisfaction of anglers on Lake Milona, Minnesota. *North American Journal of Fisheries Management* 13:201–209.
- Spencer, P. D., and G. R. Spangler. 1992. Effect that providing fishing information has on angler expectations and satisfaction. *North American Journal of Fisheries Management* 12:379–385.
- Stoffle, R. W., F. V. Jensen, and D. L. Rasch. 1987. Cultural basis of sport anglers' responses to reduced lake trout limits. *Transactions of the American Fisheries Society* 116:503–509.
- Sutton, S. G., and R. B. Ditton. 2001. Understanding catch-and-release behaviour among U.S. Atlantic bluefin tuna anglers. *Human Dimensions of Wildlife* 6:49–66.
- Tarrant, M. A., A. D. Bright, and H. K. Cordell. 1997. Attitudes toward wildlife species protection: assessing the moderating and mediating effects in the value-attitude relationship. *Human Dimensions of Wildlife* 2:1–20.
- Vaske, J. J., M. P. Donnelly, T. A. Heberlein, and B. Shelby. 1982. Differences in reported satisfaction ratings by consumptive and nonconsumptive recreationists. *Journal of Leisure Research* 14:195–206.
- Wilde, G. R., R. K. Riechers, and R. B. Ditton. 1998. Differences in attitudes, fishing motives, and demographic characteristics between tournament and non-tournament black bass anglers in Texas. *North American Journal of Fisheries Management* 18:422–431.