

## Differences Between Organized and Nonorganized Anglers in an Urban Environment (Berlin, Germany) and the Social Capital of Angler Organizations

PHILIPP FREUDENBERG

*Humboldt-University of Berlin, Faculty of Agriculture and Horticulture  
Inland Fisheries Management Laboratory,  
Philipstrasse 13, Haus 7, 10115 Berlin, Germany*

ROBERT ARLINGHAUS<sup>†</sup>

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

*and*

*Humboldt-University of Berlin, Faculty of Agriculture and Horticulture  
Inland Fisheries Management Laboratory,  
Philipstrasse 13, Haus 7, 10115 Berlin, Germany*

**Abstract.**—Little is known about the differences in the human dimensions of organized and nonorganized anglers in general, and among those living in urban environments specifically. Lack of knowledge about the attitudes and behaviors of anglers can constrain the development of sustainable fisheries management strategies. The present study was based on 1,061 urban anglers responding to a mail survey in Berlin, Germany. Half of the anglers (58.3%) were members of a fishing club. Organized and nonorganized anglers differed with regard to a number of characteristics and behavioral patterns. Organized anglers comprised the more committed angler segment and were significantly more experienced, more avid, and more consumptive. Motivations of both angler segments were similar, with noncatch aspects of the fishing experience constituting the main angling motive. However, organized urban anglers placed significantly more importance on social, achievement, and challenge aspects of the fishing experience. In terms of management preferences, both groups suggested stocking of fish most often, but organized anglers more often suggested promotion of angling to children and youths as a means to increase angling quality than did nonorganized anglers. Targeted marketing approaches to increase the attractiveness of club membership to nonorganized anglers will increase the social capital held within angler organizations. Further studies need to analyze the factors that prevent nonorganized anglers from joining angler organizations.

---

<sup>†</sup>Corresponding author: arlinghaus@igb-berlin.de

## Introduction

Recreational fishing ranks among the most popular outdoor leisure activities in Germany. For example, memberships in angler clubs rank third after memberships in soccer and tennis clubs (Arlinghaus 2004) indicating the great importance of recreational fishing in the lifestyles of Germans. Currently, about 5% of the German population fishes recreationally (Arlinghaus 2004, 2008). However, urbanization, among other factors, is counterproductive to recreational fishing participation, and the increasingly urban population in Germany is expected to lose interest in angling in the future (Arlinghaus 2006a). This threatens those that depend on recreational angling participation (e.g., angling clubs, angling-dependent industries, fisheries agencies) for their existence.

Much of the social life surrounding recreational fishing in Germany takes place in fishing clubs. The reason is related to the historically determined governance regime of fishing rights in Germany, which is private property (Arlinghaus et al. 2002). In Germany, as in large parts of central Europe, individual anglers, and particularly the more wealthy angling organizations, have the option to buy or lease the fishing rights for inland waters from private owners, corporations or public authorities for long periods of time (the typical contract period is 12 years). Tied to the right to fish is the duty to manage the fish stocks (e.g., through stocking, harvesting) and, within certain limits, the entire ecosystems as laid down in state-specific fisheries legislation. Many, if not most, inland bodies of water in Germany are managed exclusively by, or together with, angling organizations. This results in a very important role that angler organiza-

tions and the anglers therein play in the German inland fisheries sector, e.g. with regard to sustainable management.

In the eastern part of Germany, including the urban area of Berlin, many bodies of water are still managed and operated by commercial fishing enterprises. In this situation, recreational anglers typically co-exploit the fish stocks with commercial fisheries. There are also joint contracts between angler associations and commercial fishing enterprises that grant anglers the right to fish in commercially managed fisheries after paying a small fee. In large parts of Eastern Germany, anglers thus have the option to choose between becoming a member in a fishing club, and correspondingly in an angling association, or buying fishing licenses from commercial fisheries and fish in a nonorganized fashion, or both. As a result, there is a need to better understand the human dimensions of organized and nonorganized anglers in eastern Germany. This is important to facilitate development of targeted fisheries management strategies and for marketing angling club membership (Arlinghaus 2004). Moreover, from the perspective of democracy, angler associations defend the interests of anglers in the public discussion. However, if nonorganized anglers have different experience preferences and attitudes compared to organized anglers, angler associations may not accurately represent the interests of all anglers, which would not be desirable.

The existence of numerous angler organizations across Germany can be considered advantageous for fisheries management and enforcement because building up organizations not only strengthens the members' sense of responsibility for fish and fisheries, but also decreases the transactions costs of implementation and monitoring of man-

agement actions (Sutinen and Johnston 2003). It can be expected that joining management organizations also can result in fewer management conflicts (Dean 1996; Sutinen and Johnston 2003). Communication contributes to clarification, better mutual understanding, and latent conflict identification (Dean 1996). Angler organizations also act as a representative institution (Falk et al. 1989). The image of recreational fishing in Germany is thus expected to be tightly linked to how angling club members behave and act locally and in the public media. Therefore, increasing club memberships for natural resource users, such as anglers and hunters, is an investment in social capital (Glaeser et al. 2002), which is particularly relevant in Germany where angling clubs not only use natural resources, but also manage them. According to Plummer and FitzGibbon (2006), "social capital recognizes the importance of social relationships and is understood as networks together with shared norms, values and understanding that facilitate cooperation within or among groups." The term "social capital" refers to forming long-lasting friendships among members, youth work, environment and nature awareness, education, exchange of experiences, sharing agendas, shared interest to maintain resources, as well as a better ability for ecologically and socially sound fisheries management (Belusz 1978). In order to facilitate this social capital, a better understanding of the human dimensions of organized and nonorganized anglers is needed, particularly in urban environments (Hickley et al. 2004).

Despite the notion of the necessity of research into angling and the human dimensions of recreational fishing (Aas and Ditton 1998; Arlinghaus 2005, 2006b), research on this topic is rare in Germany. Differences between organized and

nonorganized anglers have only been investigated at the federal level (Arlinghaus 2004), which is of limited use for individual states or regions. In the U.S., a few studies have dealt with differences between organized and nonorganized recreational anglers (King et al. 1978; Gigliotti and Peyton 1993), and all of these studies have reported a marked difference between organized and nonorganized in various human dimensions characteristics. However, nothing is known about these issues with respect to urban angler populations, particularly those living in Berlin. The objective of this study was to contribute to a better understanding of the characteristics and behavioural patterns of anglers in Berlin by analyzing group differences between organized and nonorganized anglers. Based on existing literature it was expected that organized and nonorganized anglers in Berlin would differ in demographics (King et al. 1978; Gigliotti and Peyton 1993; Arlinghaus 2004), participation (King et al. 1978; Gigliotti and Peyton 1993; Jakus et al. 1996; Arlinghaus 2004), motivations (Gigliotti and Peyton 1993; Arlinghaus 2004), variables related to resource use (e.g., harvest levels; King et al. 1978; Gigliotti and Peyton 1993; Arlinghaus 2004), fish species preferences (Gigliotti and Peyton 1993; Arlinghaus 2004), and management preferences (King et al. 1978; Gigliotti and Peyton 1993; Arlinghaus 2004).

### Study Site

The reunified German capital of Berlin is a city-state with a population of more than 3.4 million inhabitants, covering an area of 892 km<sup>2</sup>, of which 59.6 km<sup>2</sup> (6.7%) is covered by water. The landscape is characterized by glacial deposits, slow-flowing lowland rivers, and

shallow lakes with a maximum depth of 16 m (Grosch et al. 2000). There are approximately 60 lakes which are >1 ha and more than 500 natural pond-like waters (Grosch et al. 2000). The primary fishing waters are the rivers Spree and Havel. These large lacustrine-like ecosystems and their impounded areas comprise two-thirds of the total Berlin water area. Thus, Berlin urban waters are considerably different from shallow, small, artificial, stocked urban waters as typically described in the literature (Alcorn 1981; Birch and McCaskie 1999).

Because of the densely populated area, waters in Berlin have been under intense pressure from a high nutrient load and various anthropogenic activities, including shipping, hydraulic engineering, flood control and recreational uses such as swimming, boating, wildlife viewing, and commercial and recreational fishing (Grosch et al. 2000; Wolter et al. 2000). As a result, the diversity of fish species is rather poor (Wolter et al. 2003). Tolerant (eurytopic and phytolithophilic) zooplanktivorous species of comparatively low fisheries value such as Eurasian perch *Perca fluviatilis*, roach *Rutilus rutilus*, bream *Abramis brama* and silver bream *Abramis bjoerkna* occur in high abundances, particularly in the navigation waterways of the German capital (Wolter and Vilcinskis 2000; Wolter et al. 2003). Typically highly valued piscivorous fish such as northern pike *Esox lucius*, zander *Sander lucioperca*, European eel *Anguilla anguilla* and salmonids (e.g., brown trout *Salmo trutta*) are today comparatively rare and under heavy fishing pressure from both commercial and recreational fisheries that harvest most of the fish reaching the legal size limits (Arlinghaus and Mehner 2003a, 2004; Wolter et al. 2003).

## Methods

Data for this study were gathered in 2001 by a mail survey in collaboration with the Berlin Fishery Board (BFB). A simple random sample was drawn from an official list of angling license holders of the BFB (36,456 total addresses as of December 31, 2000, corrected for duplicates). In the city-state of Berlin, anglers are legally required to pass an angling examination and be issued an official fishing license (Fischereischein) to be allowed to fish. Thus, the sample of angling license holders covered all anglers who live in Berlin and legally fish in Germany.

A self-administered, six-page questionnaire was pretested with 70 anglers. It consisted primarily of closed-ended questions with ordered choices. This was done to facilitate questionnaire completion by the respondents and encourage participation. The questionnaire was designed to gather basic self-reported data including demographics, angling activity, target species, motivations, and management preferences. The aim was to gain insights into variables that are of interest for fisheries management. The mail survey was sent to 2,800 randomly chosen anglers from the BFB address list. Questionnaires were mailed in BFB envelopes provided with a stamped, self-addressed envelope and a personalized cover letter.

A nonresponse check was not possible because this would have demanded distinguishing nonrespondents from responding anglers. Any subsequent contact with the nonresponding anglers was not allowed by the BFB (Arlinghaus and Mehner 2004).

To increase participation, questions concerning income or willingness-to-pay



were avoided. As stated previously, the nonresponse bias could not be estimated; hence data had to be handled with care when generalizing them to the whole angler population. However, this study aimed at analyzing group differences between organized and nonorganized anglers living in the same city. Therefore, nonresponse bias is of less concern in the present study as compared with studies that target information at the angler population level. Because of item nonresponse, the following results are partly based on lower sample sizes than the total sample.

Most responses were given on an ordinal scale and were based on the previous angling year. Angling motivation was assessed using published items (Fedler and Ditton 1994). For the present study, motivation items were grouped into factors as described by Wolter et al. (2003) and Arlinghaus and Mehner (2004). In addition, every item was investigated separately to investigate inter-item differences between organized and nonorganized anglers. Management preferences were assessed by an open-ended question asking the anglers to mention up to four measures to promote recreational fisheries and quality of angling in general. Content analysis was conducted using the coding scheme developed by Arlinghaus and Mehner (2003a). In the presentation of the results concerning fish species preferences we distinguished highly valued piscivorous, benthivorous, salmonid, and other low valued, but widespread species, according to Arlinghaus and Mehner (2004). The survey started before the currency changed in Germany (Deutsche Mark to Euro) and in many other European states. In order to avoid impreciseness, conversion of values from Deutsche Mark (DM) into values in Euro was avoided.

Group comparisons were performed either by Mann-Whitney-U tests in the case of ordinal data or by  $\chi^2$  analysis for frequency distributions or nominal data. In the latter case, standardized residuals were examined to determine which cells contributed most to a significant  $\chi^2$  value. Standardized residuals  $\geq |2|$  were considered as contributing substantially to a significant  $\chi^2$  value (Bühl and Zöfel 2000).

To calculate arithmetic means and standard deviations, it was assumed that answers on the 5-stage ordinal scale related to fishing motivation were in fact quasi-metric and were therefore analyzed for differences between organized and nonorganized anglers by t-tests following Fedler and Ditton (1994). For all statistical tests the type 1 probability of error  $\alpha$  was set at 5% ( $p \leq 0.05$ ). All statistical analysis was conducted with SPSS version 13.0.

## Results

Six hundred twenty-seven questionnaires (18%) were undeliverable, resulting in an adjusted response rate of 37% ( $N = 1,061$ ). This indicated high mobility among Berlin anglers. Of 1,018 fishing license holders providing usable answers, 594 (58.3%) described themselves as club members, while 424 (41.7%) did not.

*Demographics*—Analysis of demographic variables revealed only one significant difference between organized and nonorganized anglers (Table 1). Nonorganized anglers were more often self-employed than organized anglers, but there were no substantial differences in other occupation groups. There were no significant differences in age, as well as in the numbers of people, anglers, and children younger than 18 years per household. Members of both angler segments were almost exclusively males and predomi-

**TABLE 1.** Demographic characteristics (class of group median, group median, or percent of total) of organized and nonorganized anglers living in Berlin (Germany).

Demographic characteristic	Organized		Nonorganized		Statistics
Age (yrs)	50–54	(N = 586)	45–49	(N = 419)	$p > 0.05$
Persons per household (no.)	2	(N = 586)	2	(N = 419)	$p > 0.05$
Anglers per household (no.)	1	(N = 567)	1	(N = 403)	$p > 0.05$
Children younger than 18 yrs in household	2	(N = 503)	2	(N = 371)	$p > 0.05$
Males (%)	96.7	(N = 583)	96.6	(N = 416)	$p > 0.05$
Married (%)	70.5	(N = 583)	67.8	(N = 416)	$p > 0.05$
<i>Highest Education</i>		(N = 559)		(N = 405)	$p > 0.05$
None (%)	0.5		1.7		
Secondary school (II-level) (%)	14.0		15.1		
Secondary school (I-level) (%)	13.4		16.0		
University entrance qualification (%)	4.3		5.9		
Apprenticeship (%)	31.5		25.9		
Technician qualification (%)	12.3		13.1		
University study (%)	24.0		22.2		
<i>Occupation group</i>		(N = 585)		(N = 418)	$\chi^2 = 17.45$ ; $p \leq 0.05$
Jobless (%)	5.5		6.9		
Pensioner (%)	32.6		27.8		
Clerk (%)	22.7		23.3		
Worker (%)	19.7		15.6		
Executive (%)	7.5		9.3		
Self-employed (%)	6.7		11.5		
Pupil/Student (%)	2.6		4.3		
Trainee (%)	1.5		0.5		

nantly married. There were also no differences in education level between groups. Young people (age 12–24 comprised 5.5% of the sample) were underrepresented among the whole angler group compared to the entire population of Berlin, where 13% belonged to this age-class.

**Participation**—Organized and nonorganized anglers living in Berlin significantly differed in a number of participation characteristics (Table 2). Members in angling clubs were more experienced in terms of lifetime angling participation, fished more often per year, annu-

ally harvested more fish, owned tackle of a higher replacement value, spent more money for substitution and supplementation of their fishing tackle, and fished more often from a boat than nonorganized anglers. Also, higher percentages of the organized angler segment undertook specific angling holidays and used public transportation to reach angling sites. However, both angler groups traveled mostly by car.

**Motivations**—Organized anglers significantly differed from nonorganized anglers in only four of the 22 fishing

**TABLE 2.** Participation characteristics (class of group median, group median, or percent of total) of organized and nonorganized anglers living in Berlin (Germany). + = significantly higher calculated median.

Participation	Organized	Nonorganized	Statistics
Angling experience (yrs)	25-29 (+) (N = 591)	25-29 (N = 422)	U = 112247.50; $p \leq 0.05$
Angling initiation age (yrs)	22.7 (N = 581)	24.0 (N = 416)	$p > 0.05$
Angling days per year ( $d a^{-1}$ )	30-39 (+) (N = 590)	30-39 (N = 420)	U = 105168.00; $p \leq 0.001$
Angling hours per day ( $h d^{-1}$ )	6-9 (N = 586)	6-9 (N = 421)	$p > 0.05$
Travel distance (bidirectional, km)	40-<50 (N = 590)	30-<40 (N = 421)	$p > 0.05$
Yearly angling licenses (number)	1 (N = 589)	1 (N = 420)	$p > 0.05$
Fish harvest per year ( $kg a^{-1}$ )	9-<12 (N = 592)	6-<9 (N = 419)	U = 98644.50; $p \leq 0.001$
Replacement value of tackle (DM)	1,000-<2,000 (N = 590)	750-<1,000 (N = 415)	U = 91259.50; $p \leq 0.001$
Expenditures for substitution and supplementation of tackle per year (DM $a^{-1}$ )	400-<500 (N = 587)	300-<400 (N = 417)	U = 85534.00; $p \leq 0.001$
Total expenditures per year (DM $a^{-1}$ )	7,584 (N = 571)	6,644 (N = 407)	$p > 0.05$
Fishing weekdays (%)	44.8 (N = 592)	42.1 (N = 423)	$p > 0.05$
Fishing during holidays (%)	60.0 (N = 592)	64.8 (N = 423)	$p > 0.05$
Fishing from boats (%)	45.1 (N = 588)	36.7 (N = 417)	$\chi^2 = 7.05$ ; $p \leq 0.05$
Angling holidays (%)	61.6 (N = 581)	53.1 (N = 416)	$\chi^2 = 7.18$ ; $p \leq 0.05$
Self-perceived species specialization (%)	29.8 (N = 567)	26.5 (N = 400)	$p > 0.05$
Traveling mode			$\chi^2 = 17.20$ ; $p \leq 0.05$
By feet (%)	4.4	4.8	
By bicycle (%)	5.1	6.7	
By motorbike (%)	2.4	1.9	
By public transportation (%)	2.0	7.0	
By car (%)	86.1	79.6	

**TABLE 3.** Means ( $\pm$  SD) for responses to motive items for organized and nonorganized anglers living in Berlin (Germany). Items were arranged according to results of factorial analysis (eigenvalue  $>1$ ) and factorial loadings  $>0.5$  (Arlinghaus and Mehner 2004). Scale for motives was: 1, not at all important; 2, slightly important; 3, moderately important; 4, very important; 5, extremely important. C = catch-related; NC = non-catch-related.

Motive items	Organized	Nonorganized	Statistics
<i>Nature/escape (NC, <math>\alpha = 0.73</math>)</i>			
For relaxation	4.5 $\pm$ 0.7 (N = 578)	4.4 $\pm$ 0.7 (N = 408)	$p > 0.05$
To get silence at the waterside	4.2 $\pm$ 0.7 (N = 582)	4.1 $\pm$ 0.7 (N = 409)	$p > 0.05$
To experience nature	4.2 $\pm$ 0.7 (N = 580)	4.2 $\pm$ 0.7 (N = 407)	$p > 0.05$
To enjoy pleasant surroundings	4.2 $\pm$ 0.7 (N = 566)	4.2 $\pm$ 0.8 (N = 399)	$p > 0.05$
To get away from everyday life	3.6 $\pm$ 1.3 (N = 561)	3.7 $\pm$ 1.1 (N = 402)	$p > 0.05$
<i>Social (NC, <math>\alpha = 0.65</math>)</i>			
To be with friends	3.0 $\pm$ 1.2 (N = 572)	2.6 $\pm$ 1.3 (N = 397)	$t = -5.40; p \leq 0.001$
To be alone	2.8 $\pm$ 1.2 (N = 563)	2.9 $\pm$ 1.3 (N = 397)	$p > 0.05$
<i>Challenge/Thrill (C, <math>\alpha = 0.72</math>)</i>			
To enjoy a fighting fish	3.2 $\pm$ 1.1 (N = 564)	3.1 $\pm$ 1.2 (N = 394)	$p > 0.05$
Because of excitement			
to outwit a fish	3.1 $\pm$ 1.2 (N = 569)	2.9 $\pm$ 1.2 (N = 397)	$t = -2.64; p \leq 0.05$
To test and experiment	2.5 $\pm$ 1.2 (N = 561)	2.4 $\pm$ 1.2 (N = 393)	$p > 0.05$
To test equipment	2.1 $\pm$ 1.1 (N = 559)	2.0 $\pm$ 1.0 (N = 390)	$p > 0.05$
<i>Catch fish (C, <math>\alpha = 0.66</math>)</i>			
To get a trophy fish	2.6 $\pm$ 1.0 (N = 561)	2.6 $\pm$ 1.0 (N = 398)	$p > 0.05$
To catch at least one fish	2.6 $\pm$ 1.3 (N = 567)	2.7 $\pm$ 1.3 (N = 398)	$p > 0.05$
To catch several fish	2.1 $\pm$ 1.0 (N = 558)	2.1 $\pm$ 1.0 (N = 394)	$p > 0.05$
<i>Novelty (C, <math>\alpha = 0.60</math>)</i>			
To experience biology of fish	2.7 $\pm$ 1.1 (N = 560)	2.6 $\pm$ 1.1 (N = 393)	$p > 0.05$
To experience new and different things	2.3 $\pm$ 1.1 (N = 557)	2.3 $\pm$ 1.1 (N = 383)	$p > 0.05$
<i>Achievement (C, <math>\alpha = 0.61</math>)</i>			
To compete with other anglers	2.7 $\pm$ 1.3 (N = 562)	1.8 $\pm$ 1.0 (N = 385)	$t = -11.68; p \leq 0.001$
To win a prize	1.4 $\pm$ 0.8 (N = 557)	1.1 $\pm$ 0.3 (N = 388)	$t = -7.87; p \leq 0.001$
<i>Without unambiguous factor loadings</i>			
To obtain fish for consumption	3.0 $\pm$ 1.2 (N = 572)	2.9 $\pm$ 1.2 (N = 400)	$p > 0.05$
Because angling is cheap	2.2 $\pm$ 1.2 (N = 549)	2.2 $\pm$ 1.2 (N = 388)	$p > 0.05$
Because of my children and family	1.2 $\pm$ 0.6 (N = 554)	1.2 $\pm$ 0.7 (N = 383)	$p > 0.05$
To publicize the catch	1.2 $\pm$ 0.6 (N = 559)	1.2 $\pm$ 0.6 (N = 392)	$p > 0.05$



motives (Table 3). Both angler segments attached an overriding importance to nature/escape-related items. Members in fishing clubs attached a significantly higher importance to the social items "to be with friends" and to the achievement items "to compete with other anglers" and "to win a prize" as well as to the challenge/thrill item "because of the excitement to outwit a fish."

**Water type preferences**—The use of urban waters by Berlin fishing license anglers, organized and nonorganized, was low, i.e. both groups spent most of their angling days outside the borders of Berlin (73.4% of organized and 67.9% of nonorganized anglers, Figure 1). However, nonorganized anglers exhibited a significantly higher frequency of fishing exclusively within Berlin (5.2% of organized, 11.5% of nonorganized;  $\chi^2 = 15.29$ ;  $p < 0.05$ )

Investigation of water type preferences within Berlin showed that organized anglers fished significantly more often in the Rivers Dahme and Spree and in gravel pits while nonorganized anglers fished more frequently in the River Havel (Table 4). Within Berlin, organized anglers preferred lakes, and nonorganized anglers fished most frequently in the River Havel.

More than two-thirds of both angler segments, fishing at least partly outside the borders of the city-state of Berlin, preferred lakes (Table 5). Organized anglers mentioned fishing in rivers, canals, and gravel pits outside of Berlin significantly more often than nonorganized anglers.

**Fish species preferences**—Analysis of the species preferences of anglers showed differences between organized and nonorganized anglers with regard to target species and the harvest of fish species (Tables 6 and 7). Organized anglers were significantly more likely to target highly valued piscivorous fish species (i.e., eel, pike, or zander), and highly valued benthivorous species (i.e., common carp *Cyprinus carpio* or tench *Tinca tinca*) than nonorganized anglers (Table 6). Additionally, organized anglers were less likely than nonmembers to fish for widespread zooplanktivorous species of low food value such as bream, white bream, and roach. Overall, organized anglers were more likely to target certain fish species than nonmembers (Table 6).

Most anglers (59.8%) mentioned harvest of highly valued piscivorous fishes, but significantly more members of fishing organizations harvested piscivorous

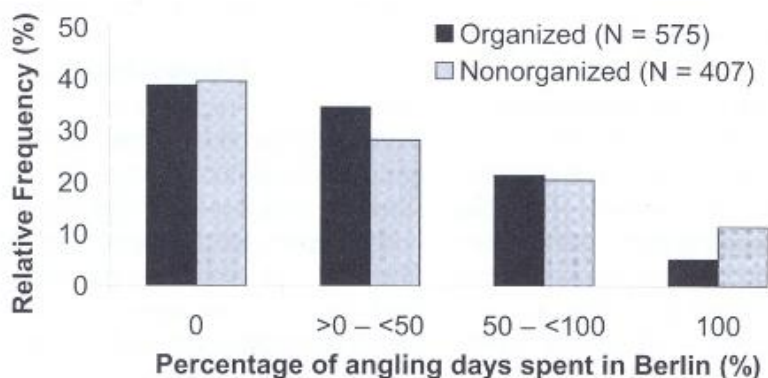


FIGURE 1. Use of urban waters (percentage of total number of angling days) by organized and nonorganized anglers living in Berlin (Germany).

**TABLE 4.** Water type preferences within Berlin (percent of total) of organized and nonorganized anglers living in Berlin (Germany).

Water type (within Berlin)	Organized (%)	Nonorganized (%)	Statistics
Lakes	49.9 (N = 359)	45.2 (N = 250)	$p > 0.05$
Canals	40.8 (N = 355)	35.2 (N = 250)	$p > 0.05$
River Havel	40.0 (N = 355)	56.4 (N = 250)	$\chi^2 = 15.85; p \leq 0.001$
Rivers Spree and Dahme	38.6 (N = 355)	26.4 (N = 250)	$\chi^2 = 9.78; p \leq 0.05$
Gravel pits	14.4 (N = 355)	3.2 (N = 250)	$\chi^2 = 20.78; p \leq 0.001$

**TABLE 5.** Water type preferences outside Berlin (percent of total) of organized and nonorganized anglers living in Berlin (Germany).

Water type (outside Berlin)	Organized (%)	Nonorganized (%)	Statistics
Lakes	69.4 (N = 546)	67.7 (N = 362)	$p > 0.05$
Rivers	43.0 (N = 546)	31.5 (N = 362)	$\chi^2 = 53.81; p \leq 0.001$
Canals	40.1 (N = 546)	17.1 (N = 362)	$\chi^2 = 12.27; p \leq 0.001$
Sea	38.8 (N = 546)	33.7 (N = 362)	$p > 0.05$
Angling ponds	28.0 (N = 546)	30.1 (N = 362)	$p > 0.05$
River lakes	21.1 (N = 546)	19.3 (N = 362)	$p > 0.05$
Gravel pits	20.9 (N = 546)	11.0 (N = 362)	$\chi^2 = 14.93; p \leq 0.001$
Brooks	13.9 (N = 546)	11.9 (N = 362)	$p > 0.05$
Reservoirs	4.0 (N = 546)	6.6 (N = 362)	$p > 0.05$
Others	2.6 (N = 546)	2.2 (N = 362)	$p > 0.05$

fish species (Table 7). Additionally, organized anglers were significantly more likely to report the harvest of carp, tench, bream, white bream, roach, and bleak *Alburnus alburnus*.

**Management preferences**—The open-ended question for the assessment of how angling quality might be enhanced was answered by fishing club members (63.7%) significantly more often than by nonmembers (54.7%;  $\chi^2 = 8.40; p < 0.05$ ). However, only marginal differences were found between the management preferences mentioned by organized and nonorganized anglers (Table 8). Only the promotion of children and youth angling was mentioned significantly more frequently by organized anglers than

by nonmembers as a means to increase angling quality in the future. A majority of both angler groups suggested that a change in stocking (mainly increased stocking), cheaper angling, and better access would improve angling quality.

## Discussion

Comparative analysis of organized and nonorganized anglers in Berlin showed that both groups were similar with respect to demographic variables. This did not support previous findings from the U.S. that organized and nonorganized anglers differed in age, level of education, and in distribution of the sexes (King et al. 1978; Gigliotti and Peyton 1993). This shows that care must be taken



**TABLE 6.** Frequency (%) of specifically targeted fish species by organized and nonorganized anglers living in Berlin; multiple responses were possible.

Fish species	Organized (%)	Nonorganized (%)	Statistics
<i>Highly valued piscivorous species</i>			
Eel <i>Anguilla anguilla</i>	57.6 (N = 564)	47.1 (N = 391)	$\chi^2 = 10.36; p \leq 0.05$
Perch <i>Perca fluviatilis</i>	38.3 (N = 564)	34.5 (N = 391)	$p > 0.05$
Pike <i>Esox lucius</i>	63.1 (N = 564)	49.9 (N = 391)	$\chi^2 = 16.61; p \leq 0.001$
Wels <i>Silurus glanis</i>	10.3 (N = 564)	13.0 (N = 391)	$p > 0.05$
Zander <i>Sander lucioperca</i>	53.7 (N = 564)	43.7 (N = 391)	$\chi^2 = 9.22; p \leq 0.05$
<i>Highly valued benthivorous species</i>			
Carp <i>Cyprinus carpio</i>	40.8 (N = 564)	31.2 (N = 391)	$\chi^2 = 9.10; p \leq 0.05$
Burbot <i>Lota lota</i>	4.8 (N = 564)	2.8 (N = 391)	$p > 0.05$
Tench <i>Tinca tinca</i>	24.5 (N = 564)	12.8 (N = 391)	$\chi^2 = 19.93; p \leq 0.001$
<i>Highly valued salmonid species</i>			
Grayling <i>Thymallus thymallus</i>	2.8 (N = 564)	2.8 (N = 391)	$p > 0.05$
Trout species	22.2 (N = 564)	23.5 (N = 391)	$p > 0.05$
<i>Low valued, but widespread species</i>			
Bream <i>Abramis brama</i>	16.5 (N = 564)	5.1 (N = 391)	$\chi^2 = 28.64; p \leq 0.001$
White bream <i>Abramis bjoerkna</i>	8.0 (N = 564)	2.0 (N = 391)	$\chi^2 = 15.51; p \leq 0.001$
Ruffe <i>Gymnocephalus cernuus</i>	2.0 (N = 564)	1.3 (N = 391)	$p > 0.05$
Roach <i>Rutilus rutilus</i>	31.2 (N = 564)	18.9 (N = 391)	$\chi^2 = 18.02; p \leq 0.001$
Rudd <i>Scardinius erythrophthalmus</i>	17.9 (N = 564)	13.8 (N = 391)	$p > 0.05$
Bleak <i>Alburnus alburnus</i>	4.3 (N = 564)	2.6 (N = 391)	$p > 0.05$
<i>Other less valued and widespread species</i>			
Aland <i>Leuciscus idus</i>	2.0 (N = 564)	1.0 (N = 391)	$p > 0.05$
Barbel <i>Barbus barbus</i>	0.9 (N = 564)	1.8 (N = 391)	$p > 0.05$
Chub <i>Leuciscus cephalus</i>	3.2 (N = 564)	2.8 (N = 391)	$p > 0.05$
Grass carp			
<i>Ctenopharyngodon idella</i>	5.1 (N = 564)	4.6 (N = 391)	$p > 0.05$
Dace <i>Leuciscus leuciscus</i>	1.2 (N = 564)	1.5 (N = 391)	$p > 0.05$
Crucian carp <i>Carassius carassius</i>	2.3 (N = 564)	3.1 (N = 391)	$p > 0.05$
Asp <i>Aspius aspius</i>	5.3 (N = 564)	5.1 (N = 391)	$p > 0.05$

when trying to transfer results from one country to another. Because of different resource ownership and management in the U.S. and Canada (public fishing rights) compared to Germany (private fishing rights, with fishing rights belonging often to angler organizations), North American anglers are obliged to buy a fishing license from the state to be allowed to fish, while German anglers have to issue a state fishing license (Fischereischein) as well as either become an

angling club member or alternatively buy angling tickets from commercial fishing enterprises. Therefore, North American anglers have less incentive to join a fishing club compared to German anglers. Indeed, the level of organization is relatively low among U.S. anglers compared to the situation in Berlin (approximately 10% in the U.S.; King et al. 1978; Gigliotti and Peyton 1993 compared to roughly 50% in the present study). Therefore, different angler types likely become orga-

nized in the U.S. compared to Germany, which may explain opposing results.

Although there was no difference in the age distribution of organized and nonorganized anglers, we found young people were underrepresented among the whole angler population compared to the entire population of Berlin. This result might be influenced by nonresponse bias, but young peoples' underrepresentation within the angler population may also be indicative of a lack of recruitment

into angling in the urban environment. This would be in agreement with other study findings that suggest a negative correlation between level of urbanization and angling participation (Hendee 1969; Walsh et al. 1989; Arlinghaus 2006a).

The finding that members and nonmembers of angling clubs were represented in nearly all occupation groups to the same degree suggested that angling clubs are not selectively attractive for special groups in Germany (e.g., the

**TABLE 7.** Frequency (%) of fish species harvest by organized and nonorganized anglers living in Berlin; multiple responses were possible.

Fish species	Organized (%)	Nonorganized (%)	Statistics
<i>Highly valued piscivorous species</i>			
Eel <i>Anguilla anguilla</i>	51.6 (N = 543)	42.2 (N = 372)	$\chi^2 = 7.76; p \leq 0.05$
Perch <i>Perca fluviatilis</i>	49.4 (N = 543)	41.7 (N = 372)	$\chi^2 = 5.25; p \leq 0.05$
Pike <i>Esox lucius</i>	49.9 (N = 543)	38.4 (N = 372)	$\chi^2 = 11.72; p \leq 0.05$
Wels <i>Silurus glanis</i>	9.2 (N = 543)	11.8 (N = 372)	$p > 0.05$
Zander <i>Sander lucioperca</i>	44.0 (N = 543)	37.1 (N = 372)	$\chi^2 = 4.36; p \leq 0.05$
<i>Highly valued benthivorous species</i>			
Carp <i>Cyprinus carpio</i>	34.8 (N = 543)	25.0 (N = 372)	$\chi^2 = 9.96; p \leq 0.05$
Burbot <i>Lota lota</i>	5.9 (N = 543)	4.6 (N = 372)	$p > 0.05$
Tench <i>Tinca tinca</i>	24.7 (N = 543)	15.3 (N = 372)	$\chi^2 = 11.70; p \leq 0.05$
<i>Highly valued salmonid species</i>			
Grayling <i>Thymallus thymallus</i>	2.8 (N = 543)	3.2 (N = 372)	$p > 0.05$
Trout species	19.5 (N = 543)	21.8 (N = 372)	$p > 0.05$
<i>Low valued, but widespread species</i>			
Bream <i>Abramis brama</i>	36.8 (N = 543)	27.2 (N = 372)	$\chi^2 = 9.37; p \leq 0.05$
White bream <i>Abramis bjoerkna</i>	25.4 (N = 543)	15.3 (N = 372)	$\chi^2 = 13.41; p \leq 0.001$
Ruffe <i>Gymnocephalus cernuus</i>	8.7 (N = 543)	7.0 (N = 372)	$p > 0.05$
Roach <i>Rutilus rutilus</i>	42.9 (N = 543)	32.8 (N = 372)	$\chi^2 = 9.51; p \leq 0.05$
Rudd <i>Scardinius erythrophthalmus</i>	26.7 (N = 543)	23.7 (N = 372)	$p > 0.05$
Bleak <i>Alburnus alburnus</i>	8.3 (N = 543)	4.3 (N = 372)	$\chi^2 = 5.64; p \leq 0.05$
<i>Other less valued and widespread species</i>			
Aland <i>Leuciscus idus</i>	2.8 (N = 543)	3.5 (N = 372)	$p > 0.05$
Barbel <i>Barbus barbus</i>	1.5 (N = 543)	1.9 (N = 372)	$p > 0.05$
Chub <i>Leuciscus cephalus</i>	3.5 (N = 543)	3.2 (N = 372)	$p > 0.05$
Grass carp			
<i>Ctenopharyngodon idella</i>	4.1 (N = 543)	5.1 (N = 372)	$p > 0.05$
Dace <i>Leuciscus leuciscus</i>	1.1 (N = 543)	1.3 (N = 372)	$p > 0.05$
Crucian carp <i>Carassius carassius</i>	5.2 (N = 543)	4.0 (N = 372)	$p > 0.05$
Asp <i>Aspius aspius</i>	4.6 (N = 543)	3.0 (N = 372)	$p > 0.05$



**TABLE 8.** Frequency of response (%) for each management dimension perceived by organized and nonorganized anglers living in Berlin (Germany) to improve recreational fishing opportunities and the quality of angling.

Management dimension	Organized (%)	Nonorganized (%)	Statistics
Change stocking strategies	34.0 ( <i>N</i> = 374)	26.8 ( <i>N</i> = 231)	<i>p</i> > 0.05
Reduce angling costs	30.5 ( <i>N</i> = 377)	28.6 ( <i>N</i> = 231)	<i>p</i> > 0.05
Improve access	24.9 ( <i>N</i> = 378)	27.6 ( <i>N</i> = 232)	<i>p</i> > 0.05
Better enforcement	22.8 ( <i>N</i> = 378)	17.7 ( <i>N</i> = 231)	<i>p</i> > 0.05
Promote angling of children/youths	19.3 ( <i>N</i> = 378)	13.0 ( <i>N</i> = 231)	$\chi^2 = 4.08; p \leq 0.05$
Reduce bureaucracy	15.9 ( <i>N</i> = 378)	19.5 ( <i>N</i> = 231)	<i>p</i> > 0.05
Improve habitat quality	15.3 ( <i>N</i> = 378)	16.4 ( <i>N</i> = 232)	<i>p</i> > 0.05
Lift bans and regulations	15.1 ( <i>N</i> = 378)	12.6 ( <i>N</i> = 231)	<i>p</i> > 0.05
Improve cleanliness	13.0 ( <i>N</i> = 378)	15.2 ( <i>N</i> = 231)	<i>p</i> > 0.05
Constrain commercial fisheries	11.4 ( <i>N</i> = 378)	8.2 ( <i>N</i> = 232)	<i>p</i> > 0.05
Expand angling possibilities, access to tickets	11.1 ( <i>N</i> = 378)	6.9 ( <i>N</i> = 231)	<i>p</i> > 0.05
Expand public relations	10.3 ( <i>N</i> = 378)	10.4 ( <i>N</i> = 231)	<i>p</i> > 0.05
Reduce boat traffic	5.3 ( <i>N</i> = 378)	7.8 ( <i>N</i> = 231)	<i>p</i> > 0.05
Expand regulations	4.0 ( <i>N</i> = 377)	2.4 ( <i>N</i> = 232)	<i>p</i> > 0.05
Reduce fish-eating birds	1.6 ( <i>N</i> = 375)	2.2 ( <i>N</i> = 232)	<i>p</i> > 0.05
Public indoctrinations	1.1 ( <i>N</i> = 378)	0.9 ( <i>N</i> = 232)	<i>p</i> > 0.05
Others	14.9 ( <i>N</i> = 376)	16.4 ( <i>N</i> = 232)	<i>p</i> > 0.05

more wealthy). This indicates that it is possible for everyone in Germany to become a fishing club member irrespective of monetary resources, resulting in the potential to benefit from the social capital held within sport clubs and organizations (compare Hemenway et al. 2001; Glaeser et al. 2002). That self-employed anglers were overrepresented among nonorganized anglers might be caused by a possibly higher level of mobility among people belonging to this occupational group. This might lead to a lower desire to bind themselves to an angling club and instead demand angling experiences outside the borders set by the waters belonging to a particular angling club and organization. Indeed, a recent study by Arlinghaus et al. (2008) found that a highly mobile, but less avid angler segment within Berlin residents comprised more wealthy people

who fished exclusively outside the urban environment in rural areas. These anglers exhibited a significantly lower level of organization compared to those Berlin residents that also fished urban waters, which corroborates our assumption.

In agreement with Gigliotti and Peyton (1993) and Arlinghaus (2004), we found that the level of angling experience was higher among the group of organized anglers than in the nonorganized angler segment. Irrespective of this, the angling initiation age was relatively old in both angler segments (>20 years). This angling career "kick off" is rather late compared to the entire German angling population (Arlinghaus 2004). In a metropolis such as Berlin, children have a vast number of leisure activities to choose from, access to fishing is difficult, and there are issues of safety. Apparently, this may lead to in-



habitants of large cities, developing their passion for angling later in life or not at all, which is counterproductive to angling participation overall. Previous research has highlighted the importance of socialization into angling early in life (Yoesting and Burkhead 1973). The results of this study raise concerns about recruitment of new anglers in Berlin, but further studies are needed to verify this assumption.

No difference was found between organized and nonorganized Berlin anglers in angling day duration. This finding is in agreement with previous research by King et al. (1978). However, echoing King et al. (1978), Gigliotti and Peyton (1993), Jakus et al. (1996), and Arlinghaus (2004), organized anglers showed greater levels of fishing frequency than nonorganized anglers. Fishing more often per year combined with greater monetary investment in angling equipment, indicates a higher level of commitment to fishing by angling club members (Bryan 1977; Buchanan 1985; Ditton et al. 1992). Indeed, greater angling experience, fishing frequency, frequency of angling holidays, ownership of tackle of a higher value, and higher expenditures for supplementation and substitution of fishing tackle by organized anglers leads to the overall conclusion that organized anglers are more active and more committed than nonorganized anglers. Interestingly, club members harvested more fish than nonmembers. This finding agrees with Arlinghaus (2004) who found the same pattern nationwide in Germany, and suggests that organized anglers either have a more consumptive attitude compared to nonorganized anglers or have a higher skill leading to higher absolute fish catches. Reasons for a higher absolute annual fish harvest by organized anglers may also be the result of their higher frequency of fishing and may be facilitated

by the fact that releasing fish that can legally be retained is not tolerated in Germany (Arlinghaus 2007). Unfortunately, we did not assess the catch levels in addition to the harvest levels, which is why we cannot explore the association of level of organization and catch-and-release rates or harvest rates in detail.

In terms of fishing motivations, we found that both organized and nonorganized anglers were primarily driven by their desire to escape and experience nature, i.e. by activity-general aspects of the fishing experience. In line with this, Herrmann et al. (2002) described German tourist anglers in Alaska as primarily preferring settings providing a beautiful landscape, solitude, and nature. Arlinghaus (2006c) reported that non-catch aspects were the primary motivations of German anglers at the national level. Similarly, Fedler and Ditton (1994) reported an overriding importance of nature-related aspects for miscellaneous angler populations. Ditton (2004) observed that activity-general aspects of the fishing experience such as the desire to experience nature and relax seem to rank among the most important fishing motives for most angler populations. In our study, in agreement with Gigliotti and Peyton's (1993) study from the USA, there were no differences in the importance attached to nature and escape-related fishing motives between organized and nonorganized anglers.

Overall, angler motivations were very similar among the organized and nonorganized anglers, but we found significant differences in four of 22 motivation items. To each of these four items, organized anglers attached a significantly higher importance than nonorganized anglers did. Differences in the items "because of the excitement to outwit a fish," "to compete with other anglers," and "to



win a prize" indicated that organized anglers placed greater importance to the challenge and achievement aspects of fishing. In attaching greater importance to the item "excitement to outwit a fish," members of angling clubs also indicated that they value the technical aspects of catching fish more than nonmembers do. Moreover, motives such as "to compete with other anglers" or "to win a prize" are typically associated with competitive fishing events in Germany. Until a few years ago, fishing tournaments were traditionally held by fishing clubs, and nonmembers did not have access to these fishing events. Today, the traditional competitive fishing model is prohibited due to animal welfare concerns (Meinelt et al. 2008). However, angling clubs continue to hold "competitive" fishing events that are classified as management fishing events to remove fish biomass of unwanted fish species (mostly zooplanktivorous fish) (Meinelt et al. 2008). Irrespective, nonmembers have no opportunity to attend these fishing events, and may have less interest to attend, which may explain the difference in the importance attached to the achievement-related items "to win a prize" and "to compete with other anglers" in the present study.

Organized anglers valued the fishing motive "to be with friends" more than nonorganized anglers. This supports the assumption that organized anglers attach a higher importance to social aspects of the fishing experience (Arlinghaus 2004). Ultimately, attaching high importance to the social item "to be with friends" and experiencing the social aspects of recreational fishing in angling clubs may result in the enhancement of the social capital of organized anglers, if this reinforces the interpersonal friendships and bonds, creating a sense of group membership and place attachment.

Generally, catch-dependent motives were rated less important than catch-independent motives, in agreement with previous angler motivation research (Fedler and Ditton 1994). However, one should not draw the oversimplified implication that catch is irrelevant for organized and nonorganized anglers in Berlin (Arlinghaus 2006c). An angler can very likely find silence and relaxing nature experiences at the waterside only if a fishing rod is in place at the same time. For an angler, experiencing nature seems to be intimately linked to the possibility of catching a fish. Although nature/escape items were the most important fishing motives for anglers in Berlin, the catch of fish is still important for angler satisfaction as nature/escape related motivations are much easier to satisfy than catch-related motives (Arlinghaus 2006c).

Most Berlin anglers spent their angling days outside of the city, which was in agreement with previous reports from this area (Arlinghaus and Mehner 2004; Arlinghaus et al. 2008). This high activity beyond the city limits can likely be explained by particular desires for angling experiences that the urban environment cannot offer, such as remote fisheries, less contact with urban dwellers, silence, and peace (Schramm and Dennis 1993; Arlinghaus and Mehner 2004; Arlinghaus et al. 2008). The reason why organized anglers showed a significantly lower frequency of fishing exclusively in Berlin is likely due to the fact that the angling clubs in which anglers are members are mostly situated in the surrounding state of Brandenburg as opposed to within the city. Moreover, being a member of a Berlin angling club often grants immediate rights to use the fisheries outside Berlin that belong to the same angler organization (mainly the German Anglers Association, DAV). This



is a good incentive for Berlin organized anglers to fish outside Berlin.

Analysis of preferred water types by anglers was difficult because it can be assumed that some were misidentified by the responding anglers (Wolter et al. 2003). However, reasons for differences in resource preferences between organized and nonorganized anglers could also be related to the distribution of the fishing rights. Possibly most of the smaller gravel pits and lakes in Berlin were managed by angling clubs and consequently were visited more often by organized anglers. Meanwhile, waters of the River Havel, including the lake-like extensions (e.g., Lake Wannsee) were primarily managed by commercial fisheries and were thus more often accessible by nonorganized anglers. Therefore, water resource preferences in Berlin by organized and nonorganized anglers are likely more an expression of available access (Harris and Bergersen 1985), which in turn is a function of resource size and productivity. As a general rule, the larger and the more productive a fishery is, the more likely it is governed by commercial fisheries for historical reasons. These waters are then more likely accessible to, and consequently more "preferred" by, nonorganized anglers.

Arlinghaus (2004) found that organized German anglers fished very infrequently in commercial put-and-take style angling ponds and that twice as many nonorganized anglers (5%) preferred this type of water. In our study, approximately 30% of both groups fished in angling ponds. This might be caused by the high number of angling ponds in the rural area surrounding Berlin, which provide an easy way to catch a fish for both groups.

Our investigation showed that highly valued fish species were most frequently

targeted and harvested by both angler segments. However, organized anglers were more specialized in pursuit of these species than nonorganized anglers who were not as species-focused. This contrasts with Arlinghaus (2004) who found limited differences in the fish species harvested between organized and non-organized anglers nationwide.

We found that organized anglers more often removed zooplanktivorous fish from the waters than did nonorganized anglers. The BFB requires that white bream and bream (both low valued) must not be released after catch to improve water quality through reductions of predation pressure on herbivorous zooplankton (Senatsverwaltung für Gesundheit, Umwelt und Verbraucherschutz Berlin 2007). Because angling clubs as fishing right holders are also responsible for fisheries management, their members are likely better informed about the social demand to harvest zooplanktivorous fish for water quality reasons (Meinelt et al. 2008). Nonmembers are often less involved in the design process of fisheries management strategies, which might make them less motivated to follow them. This may explain why nonorganized anglers were less likely to harvest less valued zooplanktivorous species compared to organized anglers.

In terms of management preferences, more than one-fourth of all respondents suggested increasing stocking. Organized anglers expressed a higher preference for stocking, but this difference was not significant. This tends to support the results of Arlinghaus (2004) and Gigliotti and Peyton (1993). Voting for a better stocking regime is presumably associated with a perceived need to protect leased or owned waters from declining fish stocks (Arlinghaus 2004). Indeed, stocking and angling clubs in Germany are historical-



ly combined into one unit (Arlinghaus 2004). Because of the traditional use of stocking as a management tool, members in angling clubs might misconceive optimal fisheries management practices. In Germany, there is a strong call today to alter traditional management practices such as stocking in favor of management practices that emphasize habitat improvement (Arlinghaus and Mehner 2003a, 2005).

Both organized and nonorganized anglers frequently suggested reducing the costs of angling. We assume that the 1995 increase in the annual fishing tax was the reason for the anglers' displeasure echoing Arlinghaus and Mehner (2003a, 2003b). This explanation is likely, given that our survey was administered through the BFB, and a recent study did not find price to be of major concern to Berlin resident anglers (Arlinghaus et al. 2008). Price increases raise negative attitudes of anglers towards fishing licence costs (Kerr and Manfredo 1991). Most of the investigated angler population in Berlin spent most of their angling days outside Berlin, where physical access is lower than in the city (Arlinghaus and Mehner 2003a). This might be the reason why the suggestion to improve access emerged, in agreement with another study from the same area (Arlinghaus et al. 2008).

That organized anglers more strongly aspired to promote fishing of children and youths compared to nonorganized anglers can be regarded as a visible desire to increase the social capital within angling clubs and retain angling interest by the public. This can be appreciated from both the social and the economic point of view because children rather than older people are more easily recruited into angling (Yoesting and Burkhead 1973). Angler clubs and organizations should focus on efforts to

educate and recruit children and youths in order to sustain recreational fishing participation and the social capital of angler associations and clubs. Anglers in the metropolitan area of Berlin are instrumental in this respect, and recently anglers began developing programs in schools in Brandenburg, where angling is integrated in the afternoon volunteer programs.

Overall, the management preferences of organized and nonorganized anglers were very similar. This is good news for fisheries managers as this indicates that the representation of angler interests through angler associations does not differentially represent the voices of only the organized anglers. Needless to say it is much more effective for nonorganized anglers to become club members and express their voices in the public discussion through the angling clubs and organizations to reach their aims (Dean 1996).

## Conclusions

Both organized and nonorganized anglers are important angler segments in Berlin. Each group comprises almost half of the entire angler population. They differ in participation and partly in species preferences, motivations and management preferences. Because of significant out of the city angling participation, rural fisheries managers are advised to pay close attention to Berlin residents as important users of rural fisheries (Arlinghaus and Mehner 2004; Arlinghaus et al. 2008), and the nonorganized anglers are a particularly interesting segment in this regard.

The use of urban waters by nonorganized anglers was higher, but their commitment to angling and the importance they attached to the social aspects of angling was lower. This is in agreement



with the tendency of angling clubs to emphasize the social aspects of angling, which might discourage nonorganized anglers from becoming club members (Arlinghaus 2004). To increase the number of angling club members, and thereby enhance the social capital of recreational fishing overall, it is essential that associations try to gain more up-to-date and scientific knowledge for better management and marketing of the fishing experience to nonorganized anglers. To sustain membership or increase it, consideration of young peoples' requirements is essential when developing management strategies (Aas 1996). Moreover, it is important to decrease the bureaucratic barriers and recruitment bottlenecks to engaging in recreational fishing. The state of Brandenburg has recently relaxed the burden of passing an angling examination before granting the right to access angling licenses. Within a year, over 25,000 angling licenses (for zooplanktivorous fish) were sold. Very likely Berlin residents, particularly nonorganized anglers, bought a large fraction of those. As long as Berlin anglers must pay the fishing license tax in Berlin, even if they are traveling outside Berlin, the BFB might not perceive lack of recruitment as a major problem for the agency. However, with more angling possibilities that have fewer bureaucratic restrictions emerging in Germany (Arlinghaus 2008), it is advisable to pay close attention to angling participation in Berlin. And indeed fishing license sales have been decreasing since 2000 (36,456 in 2000 compared to 31,621 in 2005; Arlinghaus and Mehner 2003b; Arlinghaus et al. 2008). There is no specific urban recreational fishing program in Berlin, but we recommend one should be developed and promoted by both governmental and nongovernmental bodies.

As most decisions about fisheries management are made by angler organizations in Germany, it is reassuring that we found limited differences in motivations and preferred management actions between organized and nonorganized anglers. Hence, angler associations may equitably represent and defend the interests of both groups. However, in region-wide or nationwide recreational fisheries management, none of the investigated groups should be preferred, and further studies are needed before one can ultimately conclude that organized and nonorganized anglers tend to be similar in their main motives and management preferences. For example, reasons of nonorganized anglers for not becoming a fishing club member are not yet known and need to be investigated in detail. Nonetheless, an increase in membership is advisable to increase the social capital of recreational fisheries in the long-term and defend the interests of the sector against those factors that would oppose or threaten recreational fishing.

### Acknowledgments

The present work is from the bachelor's thesis by Philipp Freudenberg. We thank Ulrich A. Grosch, the entire staff of the Berlin Fishery Board, Christian Wolter, Steffen Günther and Jürgen Meyerhoff for support. This study was partially funded by the Berlin Fishing Tax. Attendance at the 2007 AFS meeting for Philipp Freudenberg was facilitated by a travel grant by the Verein der Freunde und Förderer der Landwirtschaftlich-Gärtnerischen Fakultät der Humboldt-Universität zu Berlin. Further funding was provided by IGB and the Adaptfish project ([www.adaptfish.igb-berlin.de](http://www.adaptfish.igb-berlin.de)). Comments by three reviewers improved a previous version of this paper.



## References

- Aas, Ø. 1996. Use of two approaches to measure children's motivations to fish in Norway. *Human Dimensions of Wildlife* 1:15–28.
- Aas, Ø., and R. B. Ditton. 1998. Human dimensions perspective on recreational fisheries management: implications for Europe. Pages 153–164 in P. Hickley, and H. Tompkins, editors. *Recreational fisheries: social, economic and management aspects*. Fishing News Books, Blackwell Scientific Publications, Oxford.
- Alcorn, S. R. 1981. Fishing quality in two urban fishing lakes, St. Louis, Missouri. *North American Journal of Fisheries Management* 1:80–84.
- Arlinghaus, R. 2004. Recreational fisheries in Germany: a social and economic analysis. *Berichte des IGB* 18:1–160.
- Arlinghaus, R. 2005. A conceptual framework to identify and understand conflicts in recreational fisheries systems, with implications for sustainable management. *Aquatic Resources, Culture and Development* 1:145–174.
- Arlinghaus, R. 2006a. Understanding recreational angling participation in Germany: preparing for demographic change. *Human Dimensions of Wildlife* 11:229–240.
- Arlinghaus, R. 2006b. Overcoming human obstacles to conservation of recreational fishery resources, with emphasis on central Europe. *Environmental Conservation* 33:46–59.
- Arlinghaus, R. 2006c. On the apparently striking disconnect between motivation and satisfaction in recreational fishing: the case of catch orientation of German anglers. *North American Journal of Fisheries Management* 26:592–605.
- Arlinghaus, R. 2007. Voluntary catch-and-release can generate conflict within the recreational angling community: a qualitative case study of specialised carp, *Cyprinus carpio*, angling in Germany. *Fisheries Management and Ecology* 14(2):161–171.
- Arlinghaus, R. 2008. The social and economic significance of recreational fishing in Germany. Pages 25–29 in Ø. Aas, R. Arlinghaus, R. B. Ditton, D. Policansky, and H. L. Schramm, Jr., editors. *Global challenges in recreational fisheries*. Blackwell Scientific Publications, Oxford.
- Arlinghaus, R., and T. Mehner. 2003a. Management preferences of urban anglers: habitat rehabilitation measures vs. other options. *Fisheries* 28(6):10–17.
- Arlinghaus, R., and T. Mehner. 2003b. Characteristics of anglers living in the metropolitan area of Berlin (Germany): implications for urban fisheries management and research. Pages 117–120 in A. P. M. Coleman, editor. *Regional Experiences for global solutions. The Proceedings of the 3rd World Recreational Fishing Conference 21–24 May 2002, Northern Territory, Australia*. Fisheries Report 67, Fisheries Group, Department of Business, Industry and Resource Development, Darwin, Australia.
- 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.
- Arlinghaus, R., M. Bork, and E. Fladung. 2008. Understanding the heterogeneity among anglers across an urban-rural gradient in a metropolitan area (Berlin, Germany), with implications for fisheries management. *Fisheries Research* 92:53–62.
- Belusz, L. C. 1978. The role of private organizations in management of coolwater fishery resources—a panel. Pages 426–427 in R. L. Kendall, editor. *Selected coolwater fishes of North America*. American Fisheries Society, Special Publication 11, Bethesda, Maryland.
- Birch, S., and J. McCaskie. 1999. Shallow urban lakes: a challenge for lake management. *Hydrobiologia* 395/396:365–377.
- Bryan, H. 1977. Leisure value systems and recreational specialization: the case of trout fishermen. *Journal of Leisure Research* 9:174–187.
- Buchanan, T. 1985. Commitment and leisure behaviour: a theoretical perspective. *Leisure Sciences* 7:401–420.
- Bühl, A., and P. Zöfel. 2000. *SPSS Version 9: Einführung in die moderne Datenanalyse unter Windows*. Addison-Wesley, München.
- Dean, J. 1996. The role of angler organizations in fisheries management. Pages 172–175 in L. E. Miranda and D. R. DeVries, editors. *Multidimensional approaches to reservoir fisheries management*. American Fisheries Society, Symposium 16, Bethesda, Maryland.
- Ditton, R. B. 2004. Human dimensions of fisheries. Pages 199–208 in M. J. Manfreda, J. J. Vaske, B. L. Bruyere, D. R. Field, and P. J. Brown, edi-



- tors: Society and natural resources: a summary of knowledge prepared for the 10<sup>th</sup> International Symposium on Society and Resource Management. Modern Litho, Jefferson, Missouri.
- Ditton, R. B., D. K. Loomis, S. Choi. 1992. Recreation specialization: re-conceptualization from a social worlds perspective. *Journal of Leisure Research* 24:33–51.
- Falk, J. M., A. R. Graefe, and R. B. Ditton. 1989. Patterns of participation and motivation among salt-water tournament anglers. *Fisheries* 14(4):10–17.
- Fedler, A. J., and R. B. Ditton. 1994. Understanding angler motivations in fisheries management. *Fisheries* 19(4):6–13.
- Gigliotti, L. M., and R. B. Peyton. 1993. Values and behaviors of trout anglers, and their attitudes toward fishery management, relative to membership in fishing organizations: a Michigan case study. *North American Journal of Fisheries Management* 13:492–501.
- Glaeser, E. L., D. Laibson, and B. Sacerdote. 2002. An economic approach to social capital. *The Economic Journal* 112:437–458.
- Grosch, U., B. Rennert, and V. Hilge. 2000. Development and use of surface waters and the fate of the related fisheries in the Berlin area of Germany. *Fisheries Management and Ecology* 7:179–188.
- Harris, C. C., and E. P. Bergersen. 1985. Survey on demand for sport fisheries: Problems and potentialities for its use in fishery management planning. *North American Journal of Fisheries Management* 5:400–410.
- Hemenway, D., B. P. Kennedy, I. Kawachi, and R. D. Putnam. 2001. Firearm prevalence and social capital. *Annals of Epidemiology* 11:484–490.
- Hendee, J. C. 1969. Rural-urban differences reflected in outdoor recreation participation. *Journal of Leisure Research* 1:333–341.
- Herrmann, M., L. M. Milner, K. L. Giraud, M. Skogen Baker, and R. F. Hiser. 2002. German participation in Alaska sport fisheries in 1998. *Alaska Fishery Research Bulletin* 9(1):27–43.
- Hickley, P., R. Arlinghaus, R. Tyner, M. Aprahamian, K. Parry, and M. Carter. 2004. Rehabilitation of urban lake fisheries for angling by managing habitat: general overview and case studies from England and Wales. *Ecology and Hydrology* 4:365–378.
- Jakus, P. M., J. M. Fly, and J. L. Wilson. 1996. Explaining public support for fisheries management alternatives. *North American Journal of Fisheries Management* 16:41–48.
- Kerr, G. N., and M. J. Manfredi. 1991. An attitudinal based model of pricing for recreation services. *Journal of Leisure Research* 23:37–50.
- King, T. R., R. R. Thompson, and J. C. Buntz. 1978. Comparison of attitudes of average fishermen and fishing club members. *Proceedings of the Annual Conference of the Southeastern Association of Fisheries and Wildlife Agencies* 32:657–665.
- Meinelt, T., K. Jendrusch, and R. Arlinghaus. 2008. Competitive fishing in Germany: an overview. Pages 254–258 in Ø. Aas, R. Arlinghaus, R. B. Ditton, D. Policansky, and H. L. Schramm, Jr., editors. *Global challenges in recreational fisheries*. Blackwell Scientific Publications, Oxford.
- Plummer, R., and J. FitzGibbon. 2006. People matter: The importance of social capital in the co-management of natural resources. *Natural Resources Forum* 30:51–62.
- Senatsverwaltung für Gesundheit, Umwelt und Verbraucherschutz Berlin. 2007. Available: [www.stadtentwicklung.berlin.de/fischerei/angelfischen/de/fischarten.shtml](http://www.stadtentwicklung.berlin.de/fischerei/angelfischen/de/fischarten.shtml) (September 2007).
- Schramm, H. L., Jr., and J. A. Dennis. 1993. Characteristics and perceptions of users and nonusers of an urban fishery program in Lubbock, Texas. *North American Journal of Fisheries Management* 13:210–216.
- Sutinen, J. G., and R. J. Johnston. 2003. Angling management organizations: integrating the recreational sector into fishery management. *Marine Policy* 27:471–487.
- Walsh, R. G., K. H. John, J. R. McKean, and J. G. Hof. 1989. Comparing long-run forecasts of demand for fish and wildlife recreation. *Leisure Sciences* 11:337–351.
- Wolter, C., and A. Vilcinskas. 2000. Characterization of fish species diversity in waterways and urban waters. *Wasser & Boden* 52:14–18.
- Wolter, C., J. Minnow, A. Vilcinskas, and U. A. Grosch. 2000. Long-term effects of human influence on fish community structure and fisheries in Berlin waters: an urban water system. *Fisheries Management and Ecology* 7:97–104.
- Wolter, C., R. Arlinghaus, U. A. Grosch, and A. Vilcinskas. 2003. *Fische & Fischerei in Berlin*. VNW Verlag Natur & Wissenschaft, Solingen, Germany.
- Yoesting, D. R., and D. L. Burkhead. 1973. Significance of childhood recreation experience on adult leisure behaviour: an exploratory analysis. *Journal of Leisure Research* 5:25–36.