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Profile of Recreational Paddlefish Snaggers on the Upper Missouri River, Montana

Abstract

A written questionnaire was administered to 128 recreational snaggers of paddlefish (Polyodon spathula) *during a creel census on the Missouri River above Fort Peck Reservoir in 1993. We asked snaggers to describe their socioeconomic characteristics, attitudes and motivations regarding fishing for paddlefish, and attitudes on specific fishery regulations. More than 9 of 10 anglers snagged mainly or entirely at this site, and fewer than 1 in 10 had snagged for paddlefish in the past 5 years on the lower Yellowstone River, the other major snag fishery in Montana. Snaggers were most likely to be retirees or people in traditionally blue-collar professions that yielded incomes of US $20,000-29,999. Contrary to stereotypes of snaggers as meat fishers, their motivations for snagging were similar to those of other more traditional anglers. Primary motivations included opportunity to be outdoors, experience and thrill of hooking a paddlefish, experience natural surroundings, and be with friends. Although snaggers thought highly of paddlefish meat, the motivation for acquiring meat for eating ranked low. Paddlefish snagging, as practiced in Montana, is more than a meat harvest for most anglers.*

Key Words: Paddlefish, *Polyodon spathula*, anglers, Montana, Missouri River, survey

Introduction

The paddlefish (*Polyodon spathula*), a large, zooplanktivorous fish native to the Mississippi and Missouri river drainages (Gengerke 1986, Russell 1986), provides popular recreational snag fisheries in several states (Combs 1986). Fisheries in Montana are concentrated in two locations: the lower Yellowstone River at Intake near Glendive that harvests the Yellowstone-Sakakawea stock (Scarnecchia *et al.* 1996a); and, the upper Missouri River from the headwaters of Fort Peck Reservoir upriver to the Fred Robinson bridge (Needham 1979) that harvests the upper Fort Peck stock (Scarnecchia *et al.* 1995). Although the lower Yellowstone River fishery has been studied annually since the early 1960s (Robinson 1966, Rehwinkel 1978, Scarnecchia *et al.* 1996b, Stewart 1997), the Missouri River fishery, which is smaller and more dispersed, has received less consistent effort. The stock was studied by Berg (1981), who investigated life history information, including migration and probable spawning sites. Annual harvest of the stock has generally been between 300 and 900 fish (Needham and Gilge 1986, Gilge 1994, Scarnecchia *et al.* 1995). Annual harvest rates (based on recoveries of tagged fish) have been 1.0-4.5 percent since the early 1970s (Gilge 1994). The bag limit is two fish per person per year, and immediate release of caught fish is permitted.

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Until recently, few studies have focused on understanding the values, attitudes, and motivations of snaggers. Fenske (1983) reported that most salmonid anglers in Michigan supported salmon snagging, at least in restricted areas. Samples and Bishop (1981) reported that 56 percent of Wisconsin's sport anglers snagged for trout and salmon, and 60 percent of the anglers thought snagging sufficiently sporting. Dawson *et al.* (1993) reported that behavioral problems of snaggers at fishing sites in New York resulted in the elimination of snagging. Snaggers also often have been characterized as meat fishers; Catchings (1985), for example, reported that snaggers on the Coosa River, Alabama snagged mainly to obtain food and secondarily for sport. Snaggers also have been stereotyped as having lower socioeconomic status, although evidence has not necessarily supported this claim (Stoffle *et al.* 1983).

Values, attitudes and motivations of paddlefish snaggers on the lower Yellowstone River have been recently investigated in Montana (Scarnecchia *et al.* 1996a, Scarnecchia and Stewart 1997a) as part of the Montana-North Dakota paddlefish management plan (Scarnecchia *et al.* 1995). Increased attention has been directed at understanding the paddlefish snag fisheries because the fisheries are popular with Montana anglers and because snagging often has been disparaged by traditional recreational anglers (Samples and Bishop 1981; Catchings 1985). An improved understanding of the values, attitudes, and motivations of paddlefish snaggers may help alleviate any future user conflicts over snagging. Knowledge of how snaggers might react to specific regulation changes would facilitate efforts to manage the snag fisheries in Montana and perhaps elsewhere. Our objective was to characterize the values, attitudes, and motivations of paddlefish snaggers of the upper Missouri River, and to compare the results with those of a similar survey conducted on the lower Yellowstone River (Scarnecchia *et al.* 1996a).

Methods

The study was conducted from April 1 to June 17, 1993, as part of an on-site creel census. The creel census extended over a 32-km reach of river immediately downstream from the Fred Robinson Bridge (Gilge 1994). Anglers were contacted at ramps and fishing locations. Although the season is open all year, most snagging occurs from late March through June. Snagging is conducted by jerking a large (8/0 to 10/0) treble hook and a 113-170-g lead weight through the water. Fishing occurs either from a boat or from shore. Two fish per person per year could be retained; the other fish were to be immediately released unharmed. Montana regulations require landed paddlefish to be tagged at the front of the dorsal fin with an individually-numbered, locking tag.

We surveyed one randomly-selected, actively fishing person per party, unless the fishing party consisted of both males and females, in which case one male and one female were surveyed. Eighty percent of the snaggers asked to complete the questionnaire did so. Because paddlefish snagging is strenuous, snaggers rest frequently; questionnaires were often completed during rest intervals.

The questionnaire consisted of 38 written questions, including two questions with multiple parts (20 parts for one question and 16 for another question). General questions that were not specific to the paddlefish fishery were modeled after surveys administered in 1986 and 1987 by the Texas Parks and Wildlife Department (Texas Parks and Wildlife Department and Texas A&M University 1986, 1987). Other questions specific to the fishery

on the upper Missouri River were added. Questionnaires were reviewed by two specialists in the human dimensions of fisheries (one from a state fisheries agency and another from the University of Idaho) for inconsistencies, wording, and question sequence.

One series of questions addressed the motivations of snaggers (Table 1) and a second series of questions addressed the values, attitudes and preferences on snagging paddlefish and on bag limits (Table 2). Another question asked the respondents to rank the desirability of paddlefish in relation to four other popular game species. Likert scales (five ordered options) were used for responses (Bobko 1995). Although distributions of responses for the Yellowstone River fishery had been analyzed according to age, state of residency, gender, income and education (Scarnecchia *et al.* 1996a), smaller sample sizes in this study prevented such an analysis. A Kruskal-Wallis test (Conover 1980) was used to compare rankings of responses to the questions on motivations and attitudes (Tables 1 and 2), and species desirability preferences. A Chi-square test was used to compare responses to the same, corresponding questions between this sample of snaggers from the Missouri River and a sample of snaggers from the lower Yellowstone River as reported by Scarnecchia *et al.* (1996a). We also used a Chi-square test to investigate the relation between trip catch and satisfaction.

Results

The 128 questionnaires completed (representing an estimated 40 percent of all snagging parties during the creel season) were obtained from 91 percent males and 9 percent females. Ninety-

Table 1. *Motivations of 128 paddlefish snaggers. Responses were rated on a scale of 1 to 5 (1 = not important, 3 = neutral, 5 = very important). Nonresponse to specific questions ranged from 1 percent to 3 percent. Rank refers to level of statistical importance in relation to other motivations (Kruskal-Wallis test, $P < 0.05$). The lower the numbered rank (i.e., 1) the more important the motivation. Motivations that share a rank or combination of ranks (e.g. 3-4 and 3-4-5) are not statistically different from each other ($P > 0.05$).*

Motivation	Response distribution (%) for scale values							
	1	2	3	4	5	*N*	Mean scale rating	Rank
(a) To be outdoors	0	2	5	12	81	126	4.73	1
(b) For family recreation	9	5	8	18	60	124	4.16	3-4-5
(c) To experience new and different things	3	1	11	28	57	125	4.34	3-4
(d) For relaxation	5	2	10	26	57	126	4.29	3-4
(e) To be close to the river	4	6	13	27	50	126	4.14	4-5
(f) To obtain meat for eating	19	15	27	14	25	126	3.11	7
(g) To get away from the demands of other people	9	3	9	24	55	126	4.14	3-4-5
(h) For the experience and thrill of hooking one	1	1	8	12	78	126	4.66	1
(i) To be with friends	3	2	10	21	64	127	4.40	2-3
(j) To eat the eggs	87	5	6	1	1	124	1.25	8
(k) To experience natural surroundings	2	2	10	22	64	127	4.41	2-3
(l) To get away from regular routine	1	0	5	24	69	126	4.61	1-2
(m) To catch a really large fish	7	6	24	20	43	127	3.84	6
(n) For the challenge or sport	3	2	18	19	58	127	4.27	3-4
(o) To catch an unusual fish	7	6	15	25	47	127	4.00	5-6
(p) To meet new people at the fishing site	19	8	27	23	23	127	3.22	7

Table 2. *Attitudes of paddlefish snaggers toward the fish and toward the harvest regulations expressed in percentage of responses to 20 questions (a-t). Responses were recorded on a Likert scale (strongly disagree, SD; disagree, D; neutral, N; agree, A; strongly agree, SA). Percentages do not include nonresponse (0-2%) to specific questions or questions deemed not applicable by respondent (0-4%).*

Attitudes	Percent respondents that:					
	SD	D	N	A	SA	*N*
(a) I enjoy eating paddlefish.	1	1	16	22	60	124
(b) The bigger the paddlefish I catch, the better the trip.	19	6	33	22	20	128
(c) A successful trip is one in which my limit of two paddlefish is caught.	22	22	17	18	21	125
(d) Paddlefish is as good to eat as trout	7	12	20	14	47	122
(e) I am just as happy if I catch one paddlefish as two fish, as long as I do not get skunked	11	10	22	22	35	125
(f) I would rather catch one big paddlefish than two small paddlefish	19	18	37	11	15	126
(g) I would be just as happy if I didn't keep the two fish I'm entitled to catch, as long as I could be photographed next to them.	30	15	21	14	20	125
(h) Without the opportunity to paddlefish, I wouldn't spend any time in the Slippery Ann/Robinson Bridge Area.	19	11	8	13	49	126
(i) I feel unsuccessful if I catch only one paddlefish.	49	19	19	5	8	124
(j) With less than a two-fish limit, I wouldn't find it worthwhile to come to the SA/RB area for paddlefishing.	32	14	14	10	30	126
(k) I enjoy paddlefish fishing more than other types of fishing.	12	17	44	13	14	126
(l) I would find a one fish annual limit just about as satisfactory as a two fish annual limit.	42	17	17	10	14	128
(m) The paddlefish is an ugly fish compared to a trout.	31	17	25	11	16	123
(n) There is really not that much special about a paddlefish other than that they are large.	55	23	10	6	6	126
(o) The paddlefish is a really special fish and I feel privileged to be able to fish for them.	3	1	10	19	67	128
(p) I would find a three-fish annual limit just about as satisfactory as the current two-fish limit	25	17	22	13	23	127
(q) Snagging is an acceptably sporting way to catch paddlefish.	2	2	3	17	76	127
(r) I prefer snagging paddlefish at night to snagging during daylight hours.	20	23	49	6	2	120
(s) Paddlefish is as good to eat as walleye.	12	19	22	22	25	116
(t) I enjoy the people and the social atmosphere. It makes paddlefishing more fun.	3	6	13	21	57	127

five of the respondents were Montana residents, 23 were non-residents, and 10 were not identified. Snaggers tended to be men ≥ 35 years of age. The most common age groups (males and females combined) were 30-39 (31%), 40-49 (23%), 50-59 (16%) and 20-29 (11%). Respondents were a mixture of experienced and inexperienced snaggers, but most were experienced; 49 percent had snagged for paddlefish at least 4 of the preceding 5 years (including the current year) whereas only 19 percent had snagged only one year in the past five. More than 9 of 10 respondents characterized their snagging activities as centering mainly or exclusively in the area above Fort Peck Reservoir. Ninety-one percent of them had not snagged on the lower Yellowstone River in the preceding 5 years, and essentially none had fished at

the Dredge Cuts below Fort Peck Dam (two snaggers) or in North Dakota (one snagger). The snaggers found out about the fishery mainly from friends and relatives (88%), and occasionally from the newspaper (5%). Most lodged in recreational vehicles and campers (77%) and tents (18%) during their snagging trip. Most snaggers also rated vehicle access good (65%) or fair (32%) and boat access adequate (70%). Snaggers most liked the opportunity to fish for paddlefish and other species (35 responses), the scenic beauty of the area (30 responses), and the privacy of the site because of the lack of people (19 responses). When asked what they would like to see changed about the fishery in the area, 39 respondents said "nothing," 19 respondents said better ramp access to fishing spots, and 10 respondents said more and better maintained campsites.

Socioeconomic Characteristics

Retirees constituted the largest single employment category among snaggers (26 responses). Employed snaggers indicated such professions as self-employed (7), carpenter (6), student (5), coal miner (4), truck driver (4), construction worker (3), plumber (3), and maintenance supervisor (3). Most snaggers tended to have moderate household incomes and educational backgrounds. The most common household incomes before taxes were $20,000-29,999 (27%), $10,000-19,999 (21%) and $30,000-39,999 (17%). Less than 4 per cent of respondents reported incomes of $60,000 or more. Thirteen percent had not graduated from high school, 51 percent had graduated from high school, 20 percent had attended college but not graduated, 8 percent had degrees from 4-year institutions, and 7 percent had advanced degrees.

Motivations for Paddlefish Snagging

Highest ranking motivations (Kruskal-Wallis test, $P<0.05$) for snaggers were to be outdoors, experience the thrill of hooking a paddlefish, get away from the regular routine, experience natural surroundings, and be with friends. Lower ranking motivations were to enjoy the challenge or sport, relaxation, experience new and different things, provide family recreation, and get away from the demands of other people. In contrast, few were motivated by the prospect of meeting new people at the fishing site, obtaining meat for eating, or eating the eggs as caviar ($P<0.05$, Table 1).

Perceptions on Paddlefish and Paddlefish Snagging

When asked to rank the desirability of species in general (i.e., the fish itself, including food value, sport value, and other intangible values; 1 = most desirable, 5 = least desirable) against four other species in multiple comparisons—walleye (*Stizostedion vitreum*), northern pike (*Esox lucius*), cutthroat trout (*Oncorhynchus clarki*), and largemouth bass (*Micropterus salmoides*)—paddlefish (mean, 4.31) and walleye (mean, 4.04) ranked highest, followed by pike (mean, 3.46), trout (mean, 3.44) and bass (mean, 2.94).

Although eating paddlefish did not rank high among all motivations for paddlefishing, 82 percent of the snaggers enjoyed eating paddlefish. Sixty-one percent considered paddlefish as good to eat as trout, whereas only 19 percent thought it inferior. Forty-seven percent thought it equal in palatability to walleye, whereas 31 percent considered it inferior.

Perceptions on Snagging

Ninety-three percent of respondents thought snagging an acceptably sporting way to catch paddlefish; only 4 percent did not think it sporting. Snaggers found snagging for paddlefish about as enjoyable as other types of fishing (29% less enjoyable, 27% more enjoyable, 44% neutral).

Trip Satisfaction and Catch

Among returning snaggers, 80 percent were satisfied with their most recent paddlefish snagging trip. Snaggers that caught one or more fish on their previous trip expressed significantly greater satisfaction with the fishing experience than did those catching no fish (Chi-square test, P= 0.02).

Attitudes Toward Regulations

Snaggers indicated that they would not find the prospect of a one-fish limit as satisfactory as a two fish limit. Fifty-nine percent of snaggers thought a one-fish limit would be less satisfactory and only 24 percent thought it would be as satisfactory or more satisfactory. If neutral responses are interpreted as satisfactory, the percentage of snaggers that would be satisfied with a one-fish limit increased to 41 percent (Table 2).

The preference for a two-fish bag limit did not, however, indicate that snaggers necessarily felt unsuccessful if they caught only one fish. Thirteen percent felt unsuccessful if they only caught one fish but 68 percent did not feel this way (Table 2). This response was consistent with their response to the statement: "I am just as happy if I catch one paddlefish as two fish, so long as I do not get skunked" (i.e., catch no fish, Table 2). Fifty-seven percent of respondents agreed with this statement and only 21 percent disagreed. They were nearly evenly split on whether a bag limit of less than two fish would necessarily discourage them from fishing for paddlefish at the site (Table 2).

Catch-and-release fishing without any retention was not a favored alternative, although many anglers also supported the idea of releasing all fish. When asked if they would forego harvest in favor of being photographed next to their two fish before releasing them, 34 percent answered affirmatively (Table 2). Snaggers generally preferred the option of catching two small paddlefish to one large paddlefish, but 37 percent of snaggers were neutral on this question (Table 2). Forty-seven percent of snaggers were satisfied with the two-fish bag limit, and only 15 percent were dissatisfied with it.

Compared Responses Between Missouri River and Yellowstone River Fisheries

We found no major differences in responses between snaggers in the Missouri River and Yellowstone River fisheries (Scarnecchia *et al.* 1996a); all significant differences were primarily a matter of degree of preference rather than a completely different preference. For example, 8 of 16 questions on the motivations for paddlefish snagging, which were compared between the two fisheries (Table 1), were more strongly supported as "very important" by Missouri River anglers. These included the motivations: to get outdoors (P=0.003), for family recreation (P= 0.001), to experience new and different things (P = 0.012), for relaxation (P = 0.023), to be close to the river (P = 0.005), to get away from the demands of other people (P = 0.011), to experience natural surroundings (P = 0.001), and to get away from the regular routine (P = 0.012). Overall, responses were more strongly positive by snaggers in the Missouri River fishery.

Other minor degrees of difference were found between snaggers in the two fisheries. Yellowstone River snaggers were significantly more concerned than Missouri river snaggers with catching a large fish (P = 0.001), as well as catching a large fish rather than two small fish (P = 0.003). Missouri River snaggers were less concerned than Yellowstone River snaggers with catching their two-fish annual bag limit (P = 0.004), and more satisfied than Yellowstone River snaggers with the two-fish bag limit (P =0.001). Yellowstone River snaggers viewed night snagging more favorably

than did Missouri River snaggers although most in both groups were neutral toward it ($P = 0.001$). Although both groups of snaggers overwhelmingly thought snagging a sporting means of catching paddlefish, and enjoyed the social atmosphere of the fishing sites, significant differences in percentage of responses existed between the two sites ($P<0.05$). Snaggers on the Missouri River were significantly ($P<0.05$) more positive about the social atmosphere associated with the fishery.

Discussion

Results of this study corroborate findings of Scarnecchia *et al.* (1996a) that the attitudes and motivations of Montana's paddlefish snaggers are not distinctly different from Montana anglers in general. For example, our study indicated that primary motivations for paddlefish snagging included to be outdoors, the thrill of hooking a paddlefish, and to get away from routine activities. Similar motivations were reported for Yellowstone River paddlefish snaggers by Scarnecchia *et al.* (1996a), for Montana's warmwater anglers (McFarland and Brooks 1993) and for Montana anglers in general (Brooks 1991).

Paddlefish snaggers also displayed many similar socio-economic characteristics as Montana anglers in general. Snaggers that were employed tended to occupy traditionally blue-collar occupations and have educational backgrounds and incomes similar to those reported by McFarland and Brooks (1993).

Missouri River paddlefish snaggers valued the outdoor experience associated with paddlefish snagging that included enjoyment of hooking and landing one, more than the actual consumption of the meat (Table 1). Similar results were reported for Yellowstone River snaggers by Scarnecchia *et al.* (1996a) and for other Montana anglers by McFarland and Brooks (1993). However, our results contrast with studies of snaggers for other species elsewhere (e.g., Catchings 1985) in which snaggers have been condemned as primarily meat fishers. Scarnecchia *et al.* (1996a) concluded that Yellowstone River paddlefish snaggers exhibited what Fedler and Ditton (1986) classified as a low- to mid-consumptive orientation. Our results are consistent with those of numerous studies in which anglers rate nonconsumptive aspects of the experience higher than the number and size of fish caught (e.g., Moeller and Engelken 1972, Duttweiler 1976) although not inconsistent with studies reporting that catching fish was the most enjoyable aspect of the trip (e.g., Cooper 1973).

The low-to-moderate orientation for meat consumption did not imply, however, that the opportunity to acquire meat, nor the meat itself, was irrelevant to the snagging experience. Missouri River paddlefish snaggers rated paddlefish meat highly, at least as highly as walleye and more highly than trout (Table 2). Snaggers also were generally not enthusiastic about a mandatory catch-and-release regulation (Table 2). Similar results were found for snaggers on the Yellowstone River (Scarnecchia *et al.* 1996a), as well as for those pursuing marine species (Matlock *et al.* 1988). We conclude that although acquisition of meat is secondary to other motivations for paddlefish snagging, it is an important component of the total experience. It is the actual *consumption* of the meat that was of lesser importance, even though the snaggers thought highly of the meat (Table 2) and valued the opportunity to harvest fish.

Results of this study also lend support to the merit of existing regulations limiting the harvest to two fish per person per year with optional immediate release of snagged fish. Anglers indicated that a one-fish limit was worse than a two-fish limit (Table 2,

Question l), but that a three-fish limit would, overall, not be better than a two fish limit (Table 2, Question p). They did not, however, favor catch-and-release with no harvest opportunity (Table 2, Question g). The existing two-fish annual bag limit plus the opportunity to release fish permits meat harvest without emphasizing it, and accommodates a range of angler preferences and expectations known to exist in recreational fisheries (Fisher 1997). Other factors, however, make the optional release of snagged fish possible in this fishery that prevent its use in the Yellowstone River fishery. In that fishery, a high harvest rate (Scarnecchia *et al.* 1996b) and crowding at the fishing site make mandatory retention the preferable alternative (Scarnecchia and Stewart 1997b). Evidence also exists that less sorting and high-grading (release of a smaller fish in favor of larger ones) occurs in the Yellowstone River fishery, where it is illegal, than in the Fort Peck fishery, where it is not if the fish is released immediately (D. Scarnecchia, Unpublished).

Although the predominance of snaggers in the age group 30-39 was consistent with results from the Yellowstone River (Scarnecchia *et al.* 1996a), snaggers tended to be older on the Missouri River than on the Yellowstone River. On the Missouri River, age groups 40-49 and 50-59 were the next most important, whereas on the Yellowstone River, the age group 20-29 was the second most important. The reasons for this difference were unclear but might involve a greater distance of the Missouri River fishery from population centers and the prevalence of snagging from boats on the Missouri River. Snagging from boats may be less strenuous than the distant casting associated with the Yellowstone River fishery. Older snaggers may also be better able to afford boats.

Although both the Missouri and Yellowstone River fisheries were valued by snaggers for their natural outdoor surroundings, there was some evidence that Missouri River anglers placed more emphasis on the privacy and uncrowded nature of their fishery. Forty-nine of 128 respondents from the Missouri River indicated that what they liked best about the fishery (other than the paddlefish) was either the scenic beauty of the area or the privacy and freedom from crowding that the area afforded. In contrast, 68 of 353 respondents for the Yellowstone River fishery rated the people and social aspects of the fishery as what they liked best (other than the paddlefish). Ironically, the Missouri River snaggers actually rated the social atmosphere at the fishing site significantly ($P < 0.05$) higher than did Yellowstone River anglers. Although these questions are difficult to interpret, the more private nature of the Missouri River fishery may actually create a more desirable social atmosphere for these snaggers and the few friends snagging with them, as opposed to the more public and open atmosphere at the Intake site. Evidently, the two fisheries offer somewhat different intangible rewards for anglers, which might in part explain why regular snaggers in one fishery only rarely snag in the other fishery.

Results of this study and Scarnecchia *et al.* (1996a) support the idea that paddlefish snag fisheries in Montana are not purely meat fisheries but provide other intangible benefits to snaggers similar to those provided by other Montana fisheries (Brooks 1991, McFarland and Brooks 1993) and elsewhere (Hudgins 1984, Falk *et al.* 1989). Because conservation of such a late-maturing, long-lived species can sometimes require restrictive regulations (Combs *et al.* 1986), knowledge that paddlefish snagging is a total outdoor experience and not merely a meat harvest provides managers with more flexibility in managing these fisheries in the future.

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