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Angler response to the one fish bag limit and prospective quota system in Montana's Yellowstone River paddlefish (*Polyodon spathula*) fishery

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ABSTRACT

In 1994, a written, 15-question survey was conducted on anglers snagging for paddlefish (*Polyodon spathula*) at the Intake fishing site on the Yellowstone River to obtain snaggers' opinions and preferences regarding the reduction in the individual annual bag limit from two to one fish, and on the possible implementation of a total harvest quota for the stock. Questionnaires were completed by 258 snaggers over the six-week paddlefishing season, and results were analyzed for total responses as well as by age, sex, and state of residence. Snaggers were split in their opinions on whether the reduction to a one fish bag limit was justified, and whether the paddlefish would benefit from the reduced bag limit. Nearly three-fourths of all respondents favored some sort of catch and release, and Montana residents tended to be more supportive of catch-and-release than non-residents. Support for a quota on harvest was not strong for any of the three quota options presented to them (Tag Limitation, Inseason Closure, and a Five Year Quota), but support was strongest for the Inseason Closure option, followed by the Tag Limitation option. The most common written comments called for 1) catch-and-release fishing (24 responses), 2) a return to a two fish bag limit (19 responses), and 3) retention of the one fish bag limit for conservation purposes (10 responses).

INTRODUCTION

Since the early 1960s, the paddlefish (*Polyodon spathula*) recreational snagging fishery on the Yellowstone River has provided a unique fishing opportunity in the upper Great Plains region (Robinson 1966; Rehwinkel 1978; Stewart 1994). The fishery in Montana has centered at Intake, a low head irrigation diversion dam 27 km northeast (downriver) from Glendive, MT. Over the period 1962-1993, between 2,000 and 5,000 paddlefish have typically been harvested from this stock (called the Yellowstone-Sakakawea stock) at Intake, with widely variable annual catches as high as 4,000-5,000 fish in years with high river discharge in May and June to as low as 500-1,000 fish in years of low discharge. Each spring, a portion of the stock migrates up the Yellowstone river from Lake Sakakawea, a large (156,000 Ha) mainstem Missouri river reservoir in western North Dakota.

Fishing regulations on the stock since the fishery's inception are reviewed in Scarnecchia et al. (1994a). Beginning in 1981, a two fish per person annual bag limit and mandatory retention (i.e. prohibition of catch-and-release) were instituted in response to concerns for mortality of mishandled, released fish and because of overcrowding of snaggers at the shoreline fishing sites. This set of regulations remained in place, with only minor changes, until the 1994 fishing season. In 1993, concerns over the declining success rate of paddlefish snaggers, increased capture rates on

tagged adult paddlefish (Stewart 1994), an increase in mean age of the stock (Scarnecchia et al. 1994b), and an expanding fishery for the stock downriver in North Dakota prompted the enactment in 1994 by the Montana Department of Fish, Wildlife and Parks (MTFWP) of a one fish per person annual bag limit in Montana.

In addition, the coordinated interstate management of this stock under the Paddlefish Management Plan (Scarnecchia et al. 1994a) calls for attempts to establish a total aggregate harvest quota for this stock in the interest of maintaining a carefully managed, sustainable fishery in both states. Several possible regulatory options have been considered by MTFWP for the Montana fishery, including inclusion of catch-and-release fishing in conjunction with the one fish bag limit. In the Paddlefish Management Plan, three possible quota options were listed (although others were not excluded). Under Option 1 (Tag Limitation), a specified number of paddlefish would be allowed to be harvested in each state each year, and only sufficient tags to harvest that number of fish would be sold. Under Option 2 (Inseason Closure), an annual quota for each state would be harvested with an unlimited number of tags sold. If the quota were reached, the fishery would be closed, if necessary, in mid-season. Under Option 3 (the Five Year Quota), each state would have a quota of paddlefish that could be harvested over a five-year period. Once the five-year quota was reached, the fishery would be closed for the remainder of that five-year period, even if the quota was met in, for example, the fourth year. This method would likely result in some years with no

paddlefish season in both states.

Inasmuch as the large concentration of paddlefish at the Intake fishing site results in large numbers of snaggers each May and June, the site provides managers with a concentrated sample of snaggers than can be surveyed for their attitudes and preferences regarding current and potential fishing regulations and management options. In 1993, Scarnecchia and Stewart (Unpublished) surveyed values and attitudes of snaggers at Intake on a wide variety of topics. The objective of this more focused study in 1994 was to survey snaggers on two topics: the one fish annual bag limit and the three quota options listed in the Paddlefish Management Plan.

METHODS

A written questionnaire consisting of 15 numbered questions was administered to snaggers at the Intake fishing site during the 1994 paddlefish snagging season, which extended at Intake from May 15 until June 30. Poor fishing and the one fish bag limit resulted in relatively few snaggers at the site compared to previous years, so attempts were made to survey all available snaggers. Because of the leisurely pace of paddlefishing at Intake (active fishing followed by periods of rest) more than 95% of the snaggers were willing to spend the 5-7 minutes typically needed to complete the questionnaire. The first three questions (1-3) provided

information on the state of residence (Montana resident versus non-resident), age and sex of the snagger. The next three questions (4-6) provided information on their primary and secondary paddlefishing sites, i.e., whether they paddlefished mainly or exclusively at Intake, or also fished occasionally or frequently in North Dakota or in the Missouri River above Fort Peck Dam. Questions 7, 9 and 10 concerned the change from two to one fish per year, and asked if the change was justified. Question 8 assessed their attitude toward catch-and-release opportunities.

Because we assumed that many snaggers had not carefully read and understood the three quota options listed in the Paddlefish Management Plan, we summarized the options briefly for them on the questionnaire before the three questions (11-13) on the three options (one question per option) were asked. The last two questions (14 and 15) concerned whether snaggers would prefer to have their quota of fish divided up among snaggers as a two fish or one fish bag limit. Finally, snaggers were asked to write any additional comments at the end of the questionnaire. Although we would have preferred to survey only one snagger per party, the low fishing effort in 1994 necessitated providing multiple questionnaires per fishing party if a reasonably large sample was to be obtained. Responses were summarized and analyzed with a Chi-Square statistic according to age (34 and younger versus 35 and older), sex, and state of residence (Montana resident versus non-resident). $P<0.05$ was required for statistical significance, but $0.05<P<0.15$ was considered suggestive.

RESULTS

Demographics and fishing habits -- Questionnaires were completed by 258 snaggers, of which 235 were males and 23 were females, 139 (54%) were younger than 35 and 119 (46%) were 35 or older, 154 (60%) were Montana residents and 97 (38%) were non-residents (2% unknown). Most snaggers responding to questionnaires fished only at Intake; nearly 9 of 10 respondents had not paddlefished either in North Dakota or above Fort Peck Reservoir in the past 5 years (Table 1). More than one fourth of the respondents had paddlefished at Intake in each of the past 5 years, and most had paddlefished at Intake in more than one of the past five years.

Bag limit -- Snaggers were evenly split in their response to the statement "I would be less likely to return to Intake for just one paddlefish than for two paddlefish". Responses were nearly equally split between all five response choices (Table 2). No significant differences were found according to age (P=0.33), sex (P=0.91), or state of residence, although responses of non-residents suggested a greater tendency not to return to Intake with a one fish limit (P = 0.14).

Although the rationale for the reduction in the annual bag limit from two to one fish had been presented at public meetings in eastern Montana cities, only slightly more snaggers agreed than disagreed with the conservation value of the bag limit reduction (Table 2). No significant differences were found in this response according to age (P=0.25), sex (P=0.93), or state of residence (P=0.26).

Similarly, snaggers were generally evenly split on whether the reduction from two fish to one fish was justified (Table 2). No significant differences were found in this response according to age (P=0.36), sex (P=0.99), or state of residence (0.08), although the last comparison (by state of residence) approached significance. Results of this question were difficult to interpret; a higher than expected number of residents of Montana strongly disagreed with the justification for the reduction, but a higher than expected number of out-of-state snaggers agreed with it. Overall, it appeared that opinions on this issue, either for or against, were stronger among residents than among non-residents.

Catch and release -- The snaggers strongly supported catch-and-release; 72% of snaggers agreed or strongly agreed that "I would like to see some catch and release opportunities for paddlefish at Intake" (Table 2). Only 15% did not favor some sort of catch-and-release regulation. Although both younger and older snaggers tended to support catch-and-release, support was significantly

stronger by younger snaggers than by older snaggers (P=0.05). Data also suggested that male snaggers more strongly supported catch-and-release than did female snaggers (P=0.15), but differences were small given the small sample size of females. Similarly, residents of Montana tended to be more positive on catch-and-release than non-residents, but the results were not statistically significant (P= 0.17).

Quotas -- Although support for a quota was not strong in any of the three options, among the three options presented, snaggers preferred Option 2, Inseason Closure (Table 3). This option yielded a balanced response, with 43% agreeing or strongly agreeing with it, and 38% disagreeing or strongly disagreeing. No significant differences in response to the Inseason Closure option were detected by age (P=0.42), sex (P=0.96), or state of residence (P=0.94).

Option 1, Tag Limitation, was the second choice, with 25% of respondents agreeing or strongly agreeing with it. More than 6 of 10 snaggers disagreed or strongly disagreed with this option. No significant differences in response to the Tag Limitation option were detected by age (P=0.94), sex (P=0.35) or state of residence (P=0.59).

Option 3, the Five Year Quota, was the least preferred option, with nearly half of the respondents strongly disagreeing with it,

and 21% more disagreeing with it. Although no significant differences in response were detected by age (P=0.44) or sex (P=0.28), non-resident snaggers showed a much stronger, and highly significant, preference for this option than did Montana residents (P=0.01).

Division of quota into one or two fish annual bag limit -- Snaggers were split on whether a two fish or one fish annual bag limit would be preferable under a quota system (Table 4). Thirty-eight percent of respondents agreed or strongly agreed with a one fish limit under a quota system, and 37% also disagreed or strongly disagreed with it. No significant differences in response were detected by age (P=0.52), sex (P=0.35), or state of residence (P=0.46). Preference for a two fish bag limit under a quota system was weaker than for a one fish limit. Nearly half (48.4%) of respondents disagreed or strongly disagreed with the two fish bag limit under a quota system, and only 28% agreed or strongly agreed with it. No significant differences in response were detected by age (P=0.27), sex (P=0.94), or state of residence (P=0.41).

Comments -- The most common comment (of the 100 received on the 258 questionnaires) was a recommendation for catch-and-release snagging (24 responses), followed by responses favoring a two fish bag limit over a one fish limit (19 responses). Ten responses favored the one fish bag limit, mainly for conservation purposes. Seven responses favored uniform regulations (including bag limits)

between Montana and North Dakota. Five responses favored only having to buy one tag if they could only catch one fish on the Yellowstone River, and 5 responses opposed all three quota options. A few resident and non-resident snaggers stated directly or indirectly that high costs would keep them from returning to fish at Intake in 1995. Five respondents requested a reduction in license fees, especially with the one fish bag limit. Other comments were to alternate years of fishing in Montana and North Dakota (1 response), use a harvest slot limit (1 response), close all fishing every other year (1 response), outlaw gaffs (2 responses), and several other suggestions on logistics and facilities at the Intake site.

DISCUSSION

Quotas -- Several main points emerged from this survey of relevance to potential and proposed regulation changes. First, although Option 2, Inseason Closure, was the preferred option among those listed for limiting catch if a quota were necessary, none of the three quota options gained strong support. Inasmuch as respondents were split on whether the reduced bag limit from two to one fish was justified and on whether the reduction would help the paddlefish population, it is understandable that they would resist any effort to limit catches through any of the quota options. It is not exactly clear why Inseason Closure gained the most support,

although it is the option that would permit the sale of paddlefish tags to all applicants (unlike Tag Limitation) and result in at least some fishing each year (unlike the Five Year Quota option). Option 1, Tag Limitation, is practiced for some big game mammals in Montana and other states, but its application to paddlefish would be a much more restrictive regulation than heretofore practiced for fish. Enthusiasm may also be lacking because although the paddlefish is a large and respected fish among snaggers (Scarnecchia and Stewart, Unpublished), its conversion to edible meat is low, and the combination of a drawing for only one tag may not justify the effort by many snaggers to travel to Intake to fish.

From a practical management standpoint, Option 2 (Inseason Closure) has several sapectss that would need to be addressed. Although it would be possible to monitor real-time catches at Intake and at the Yellowstone River-Missouri river confluence, which is the primary North Dakota fishing site, off-site harvest would have to be added. Secondly, the prospect of inseason closure would probably induce all snaggers to fish as early in the season as possible and result in crowding problems at Intake and the confluence, especially in years of more successful fishing, which would be when more snaggers would seek to buy tags. Thirdly, this method would affect the harvest data by tending to shift catch and effort toward the early portion of the fishing season, which would make comparison with past years' data less valid. Because the

historical data base is part of an ongoing stock assessment, it would be preferable if the fishery were not altered greatly in its seasonal pattern. Under Option 1 (Tag Limitation), historical catch rates of tag holders would be used to estimate probable catch, and the appropriate number of tags would be sold. The crowding and data base problems created under Inseason Closure would not occur. A combination of Options 1 and 2 is also a possibility; Inseason Closure would only be considered in conjunction with Tag Limitation in years of extremely high catches when emergency closure may be necessary, such as in 1991, when more than 4,000 fish were caught at Intake.

Quotas and bag limits -- Although snaggers did not favor quotas, with a quota system in place, they indicated that they would be less enthusiastic about a two fish bag limit than a one fish bag limit (Table 4). These responses seem to contradict the large number of comments (19) suggesting a return to a two fish bag limit. Our interpretation of their responses is that if the stock could withstand the pre-1994 management system of a two fish bag limit, no quota, and unlimited tag sales, this would be the preferred approach. With a quota, however, the concern is evidently that the quota will be so low that many people will not be able to obtain tags, and under that scenario, the opportunity to catch and keep one fish might be preferable to not drawing a tag and thereby not being able to catch any fish.

A combination of the one fish bag limit enacted in Montana in 1994 and the low Yellowstone River discharge resulted in all-time low catch and effort at the Intake fishery in 1994. This reduction in catch and effort raises the question of whether a quota, which is considered undesirable by snaggers (Table 3), would really be necessary under present fishing interest and a uniform one fish limit (in both states) for this stock.

Catch and release -- Catch-and-release of paddlefish was the most common request among snaggers (based on their written comments), and was supported by nearly three-fourths of the respondents (Table 2). Catch-and-release was especially popular with Montana residents, perhaps because they would be in the best position to make repeated trips to Intake if they were allowed to continue fishing once their bag limit had been reached. Catch-and-release snagging, or at least the recapture of snagged fish, has been reported on the Upper Mississippi River (Gengerke 1978), and was considered in 1993 by MTFWP, at least as part of a potentially enforceable system whereby one or two days per week would be catch-and-release days. Although Gengerke (1978) found that snagged fish could be tagged and snagged again, that fishery occurred in winter and early spring, when water temperatures were near freezing and paddlefish were sluggish. Caution would be needed when water temperatures were higher, as in the late spring and summer fishery on the Yellowstone River. All handling of paddlefish to be released should be discouraged. If any catch and release were to

be implemented on the Yellowstone, it should be strictly controlled at specific sites, only during daylight hours, and be closely monitored. Any enactment of catch and release regulations would also affect compatibility of harvest data with that of previous years.

Fidelity of Intake snaggers -- Only 1 in 10 snaggers responding to the questionnaire had fished for paddlefish above Fort Peck Dam or in North Dakota (Table 1). Although Montana fishing regulations in 1994 permitted the capture of a second paddlefish from above Fort Peck (on a different stock of paddlefish, the Upper Fort Peck Stock (Scarnecchia et al. 1994)), the fishing sites are remote and several hours' drive from Intake. Paddlefishing in North Dakota would require purchasing a North Dakota license and tag. Results from the survey indicated that the Intake clientele were strongly tied to Intake, and were reluctant to fish elsewhere. Many less reluctant snaggers may, however, have paddlefished in North Dakota in 1994 and not been at Intake to complete the questionnaire.

Sources of bias -- Although respondents were asked for their personal opinions, in some cases, communication among snaggers at Intake before and during completion of the questionnaires may have resulted in non-independent responses. A visual check of the questionnaire responses chronologically by response date showed only one series of 6 to 8 questionnaires on June 2 that showed consistent responses among respondents. These responses were

included because there was no real evidence supporting their exclusion. We would have preferred to limit responses to one person per fishing party, but the all-time low fishing effort and catch in 1994 made this approach infeasible. Under those circumstances, many snaggers probably avoided Intake entirely, and such avoidance might have resulted in a less disgruntled, more conservation-minded pool of respondents that would otherwise have been polled.

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Table 1. Number of years over the period 1990-1994 that respondent had paddlefished a) at Intake, b) in North Dakota, and c) in the Missouri River above Fort Peck.

	Intake		North Dakota		Fort Peck	
Years fished during 1990-94	No.	Percent	No.	Percent	No.	Percent
None	12[1]	4.7	227	88.0	230	89.1
One	75	29.1	10	3.9	17	6.6
Two	53	20.5	11	4.3	6	2.3
Three	28	10.9	7	2.7	3	1.2
Four	23	8.9	2	0.8	0	0.0
Five	67	26.0	1	0.4	2	0.8

[1] These 12 snaggers were fishing in 1994 at Intake when surveyed, but had not fished earlier in the season.

Table 2. Percent responses (of 258 total responses) to 4 questions related to one fish bag limit and catch-and-release fishing. For responses, SD = strongly disagree, D = disagree, N = neutral, A = agree, and SA = strongly agree, and M = missing response.

Statement	Response (%)					
	SD	D	N	A	SA	M
I am less likely to return to Intake to fish for just one paddlefish than to fish for two paddlefish.	18	19	20	21	21	<1
I would like to see some catch-and-release opportunities at Intake.	8	7	12	21	52	-
I think the paddlefish population will benefit from the reduced bag limit.	16	20	20	25	18	<1
The reduction in catch from two to one fish is justified.	24	20	26	18	12	<1

Table 3. Percent responses (of 258 total responses) to three quota options listed in Paddlefish Management Plan. For responses, SD = strongly disagree, D = disagree, N = neutral, A = agree, SA = strongly agree, and M = missing response.

Statement	Response (%)					
	SD	D	N	A	SA	M
If the number of snaggers and their expected catch exceeded Montana's quota, I would favor a lottery drawing for paddlefish tags (Method 1).	39	22	12	16	9	3
I would prefer method 2, that the season be closed each year when the quota is reached.	24	14	17	25	17	2
I would prefer method 3, a five-year quota, even if it meant that the season might be closed entirely in some years.	47	21	14	8	6	4

Table 4. Percent responses (of 258 total responses) to one fish and two fish bag limits under a hypothetical quota system. For responses, SD = strongly disagree, D = disagree, N = neutral, A = agree, SA = strongly agree, and M = missing response.

Statement	Response (%)					
	SD	D	N	A	SA	M
I would prefer to have Montana's quota divided up among snaggers so that each snagger's bag limit would be one fish.	21	16	23	26	12	3
I would prefer that Montana's quota be divided up among snaggers so that each snagger's bag limit would be two fish, even if it meant lower chances of successfully drawing for a tag.	28	21	20	18	10	4