CURRENT AND FUTURE FISHERIES MANAGEMENT GOALS:

Implications for Future Management

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ABSTRACT

A structured one-page mail questionnaire was used to evaluate present and future management goals of state recreational fisheries management personnel. Recreational fisheries management goals evaluated were (1) maximizing sustained yield, (2) maximizing catch, (3) establishing trophy fisheries, (4) maximizing fishing license sales, (5) maximizing angler-trips, (6) maximizing angler-days, (7) maximizing angler hours, (8) minimizing angler crowding, and (9) minimizing angler complaints. Respondents indicated that maximum sustained yield is currently the dominant goal being used in recreational fisheries management. Future fisheries management goals were likely to be similar to current goals. No significant differences were found between manager's educational levels for the current and future list of top-ranked goals. Significant differences were found between a manager's years of work experience and his anticipated future fisheries management objectives: more experienced managers tended to anticipate a change in goals away from yield toward angler-oriented goals. However, the total number of recreational fisheries managers favoring maximum sustained yield and catch as realistic goals is not likely to change in the future. Comparison of the "desires" of the angling public for a multifaceted fishing experience to the managers' heavy orientation towards yield suggests a concerning disparity.

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What constitutes a "successful" fisheries management program? For decades this question has been discussed at field, administrative, and academic levels. One oft-quoted response is that a successful fisheries management program addresses and satisfies the desires of the angling public. Angler desires ostensibly vary with the angling opportunities afforded by a geographic area. Further, angler desires and preferences are clearly a function of *why* people fish—one of the most difficult questions to answer with scientific credibility.

Determining why people fish has been the object of many analyses. After a thorough review of the issue, Martin (1976) and Stroud (1974) concluded that most anglers fish primarily to catch fish. Ruckelshaus (1975) suggested that most people want to catch fish, but not necessarily to keep or eat them. Others have found that the consumptive reasons for fishing were only one part of the fishing experience (Hoagland and Kennedy 1974; Moeller and Engelken 1972). Such factors as privacy, aesthetics, and the relaxation values associated with the fishing experience rated higher than the actual act of catching fish. From these and other studies, it is clear that the fishing experience is a different experience to different people. A "successful" fisheries management program is, then, one that satisfies all aspects of the fishing experience, including adding fish to the creel.

Two major problems that managers seemingly have are identifying the aspects of the overall fishing experience and encompassing these aspects into sound management goals and objectives. Historically, and for a variety of reasons, many fisheries managers (and agencies) have operated without clear goals in mind (Joseph 1974). Unfortunately, functioning without specific goals in fisheries management may lead to ineffective management (i.e., less than optimal use of funds and personnel). Increased budgetary accountability and increased public participation in fisheries management policy issues have clarified the importance of management goals. This latter point is certainly clear to personnel in agencies using the management approach of "management by objectives." The problems that agencies have in formulating goals are clearly real, multidimensional, and very complex.

GOALS IN FISHERIES MANAGEMENT

Management by objectives is a relatively new approach to fisheries management and allied disciplines of natural resource management. Some fisheries scientists have differentiated between objectives and goals (Hampton and Lackey 1976; Anderson 1974) while others have treated the words inter-

changeably. Regardless, fisheries managers have traditionally recognized two principal goals (or objectives): maximum sustained yield (MSY) and maximization of angler-days or man-days of use. The fundamental assumption of MSY is that output from a fishery is measured in biomass or numbers of fish caught and removed. The MSY goal was widely accepted in commercial fisheries management (especially by biologists) but was seldom achieved and appears to be giving way to other goals that encompass economic and/or social considerations (Joseph 1974).

A different and highly promising development in the evolution of MSY toward broader social goals is being pioneered by Anderson (1976). Anderson has developed procedures for actually quantifying as "yield" the repeated capture of fish.

Maximizing the number of angler-days (any part of a day fishing by one person) assumes that time spent afield is an index of fisheries output. Two common objections to maximizing angler-days as a goal are that the "quality" aspect of time spent fishing is not considered and that the overall time spent fishing does not necessarily correlate well with total societal benefits. The advantage is that fisheries output is measured in human-oriented terms.

All benefits from a fishery, whether measured by consumptive or nonconsumptive terms, accrue either directly or indirectly to man (Lackey 1975), but this does not mean that fish in the *creel* are the only benefit. Some managers have attempted to establish a management approach that more clearly maximizes *human benefits* (Hendee 1974) with the assumption that fisheries output is angling *experience* that generates human *satisfaction*. Satisfaction could be derived from outdoor exercise, displaying fishing skill, companionship, fishing success, and others; but such satisfactions ultimately lead to human benefits, possibly including physical health, self-esteem, more or different friends, and social interactions. Catch is only *one* measure of satisfaction and, therefore, cannot encompass the *entire* angling experience and associated multiple satisfactions. While this is widely recognized and accepted among managers in theory, quantification of the angling experience is difficult. It is much easier to identify the problem than develop a solution.

Another development similar to the maximizing human benefit approach is "optimum sustained yield," which treats fisheries output as multidimensional, encompassing physical, social, and psychological factors (Stroud 1974). The "management benefit unit," incorporating the various physical, social, and psychological factors associated with fishing, is a related concept for quantifying optimum sustained yield (Lackey 1974). These approaches, while laudable in theory, are difficult to implement in practice.

In practice, all of the above management approaches attempt to incorporate a measure of angling quality. The problem lies in quantifying quality and the methodology does not yet exist. Two developmental routes are now being taken within the profession: (1) expanding and quantifying desired catch (either kept or released); and (2) developing a measure of human satisfaction and *then* deciding what tactics should be used. These two developmental routes are closely related and, perhaps, are better represented by a continuum. Anderson's work (1976) illustrates the latest advances in the first developmental route. Hampton and Lackey (1976) summarize the current status of measuring human satisfactions derived from fishing.

The purposes of this paper are to evaluate and quantify

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what practicing fisheries managers actually use as goals in managing recreational fisheries resources in the United States and to compare these goals to angler preferences and desires.

SURVEY OF FISHERIES MANAGEMENT GOALS

A one-page, mail questionnaire was developed to evaluate present and future management goals of state fisheries management agencies. Development of the questionnaire closely followed guidelines and procedures outlined by Ary et al. (1972). A cover letter for each questionnaire was also drafted explaining the purpose and importance of the study. Refinement of the questionnaire and cover letter was accomplished through a pilot study with professors and graduate students. The final list of alternative fisheries management goals in the questionnaire was

(1) Maximizing sustained yield (pounds);
(2) Maximizing catch (numbers);
(3) Establishing trophy fisheries;
(4) Maximizing fishing license sales;
(5) Maximizing angler-trips;
(6) Maximizing angler-days;
(7) Maximizing angler-hours;
(8) Minimizing angler crowding; and
(9) Minimizing angler complaints.

While this approach to compartmentalize goals was an effort to simplify a complex statistical problem, the analysis and interpretation were still difficult.

Six copies of the questionnaire, each with a cover letter, were mailed to the chief of every state recreational fisheries management agency along with a personal letter requesting that the questionnaire be sent to six representative fisheries managers within his state. In the letter, it was stated that all respondents would remain anonymous and tabulation of results by state would not be made. Respondents were asked to rank their projected fisheries management goals for the future, rank the management goals under which they were currently operating, and complete the remaining questions pertaining to their highest completed level of formal education, cumulative number of years of experience in fisheries management, and the estimated time commitments in management, research, planning, and public relations.

RESULTS

Eighty percent (240) of the fisheries managers responded to the questionnaires. The model fisheries manager who responded to our survey held a bachelor's degree and had more than 10 years of experience in fisheries management. The majority of the manager's time was spent in fisheries "management" activities; lesser amounts of time were spent in public relations, planning, and research.

Managers indicated that maximum sustained yield is cur-rently the dominant goal being used in recreational fisheries; 49 percent of the respondents ranked this goal number one (Table 1). Maximizing catch was ranked number one by 25 percent of the respondents. The three "yield-oriented" goals (maximum sustained yield, maximizing catch, and establishing trophy fisheries) accounted for 77 percent of the goals that were ranked number one. Conversely, only 28 percent of the respondents ranked an "angler-oriented" goal as number one. (Numbers do not necessarily add to 100 because some respondents ranked two or more as number one; some only ranked the top several goals). Among the six angler-oriented goals possible, maximizing angler-trips and angler-days were ranked the highest.

Respondents considered *future* management goals (Table 2) to be similar to *current* goals. Maximizing sustained yield and catch were dominant yield goals while maximizing angler-days and angler-hours were dominant angler-oriented goals.

A comparison of management goals for all respondents showed no significant difference between current and future goals ($\chi^2 = 1.22$, 1 d.f., $\alpha = 0.05$). To determine if respondent attitudes regarding current and future management goals were independent of region, the 50 states were divided into five geographical regions (U.S. Fish and Wildlife Service regions). The fisheries management goals receiving a number one rank were divided into two categories, angler-

Table 1. Number (percent) of respondents who ranked *current* fisheries management goals from 1 to 9. Some respondents marked 2 objectives as being number one. The first three goals are arbitrarily defined as "yield-oriented"; the remainder as "angler-oriented."

	Rank																	
	1		2		3		4		5		6		7		8		9	
Goal	No.	(%)	No	(%)	No.	(%)	No.	(%)	No	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Max. sust. yield	118	(49)	38	(16)	9	(4)	8	(3)	1	(.4)								
Max. catch	61	(25)	71	(30)	17	(7)	3	(1)										
Trophy fisheries	8	(3)	13	(5)	25	(10)	16	(7)	7	(3)	2	(1)	3	(1)	3	(1)	1	(.4)
Max. license sales	6	(3)	4	(2)	11	(5)	3	(1)	1	(.4)	7	(3)	1	(.4)	1	(.4)	7	(3)
Max. angler-trips	22	(9)	21	(9)	10	(4)	7	(3)	6	(3)			1	(.4)	1	(.4)	1	(.4)
Max. angler-days	18	(8)	15	(6)	12	(5)	5	(2)	5	(2)	1	(.4)	2	(1)	2	(1)		
Max. angler-hours	6	(3)	6	(3)	5	(2)	8	(3)	4	(2)	5	(2)			1	(.4)		
Min. angler crowding	5	(2)	11	(5)	10	(4)	5	(2)	3	(1)	3	(1)	7	(3)	1	(.4)	2	(1)
Min. angler-complaints	8	(3)	11	(5)	24	(10)	7	(3)	7	(3)	1	(.4)	3	(1)	5	(2)	3	(1)

Table 2. Number (percent) of respondents who ranked *future* fisheries management goals from 1 to 9. Some respondents marked 2 goals as being number one. The first three goals are arbitrarily defined as "yield-oriented"; the remainder as "angler-oriented."

	Rank																	
	1		2		3		4		5		6		7		8		9	
Goal	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Max. sust. yield	120	(50)	39	(16)	11	(5)	5	(2)	1	(.4)	1	(.4)						
Max. catch	46	(19)	75	(31)	19	(8)	4	(2)	2	(.8)								
Trophy fisheries	12	(5)	27	(11)	29	(12)	17	(7)	11	(5)	4	(2)	2	(.8)	4	(2)		
Max. license sales	11	(5)	7	(3)	5	(2)	12	(5)	5	(2)	4	(2)	2	(.8)	2	(.8)	4	(2)
Max. angler-trips	20	(8)	17	(7)	14	(6)	7	(3)	6	(3)			3	(1)	1	(.4)	3	(1)
Max. angler-days	24	(10)	8	(3)	14	(6)	6	(3)	3	(1)	6	(3)	4	(2)	2	(.8)	1	(.4)
Max. angler-hours	6	(3)	3	(1)	9	(4)	5	(2)	8	(3)	2	(.8)	5	(2)	1	(.4)	1	(.4)
Min. angler crowding	9	(4)	15	(6)	22	(9)	14	(6)	1	(.4)	5	(2)	6	(3)	5	(2)	2	(.8)
Min. angler-complaints	7	(3)	11	(5)	20	(8)	7	(3)	7	(3)	4	(2)	2	(.8)	4	(2)	6	(3)

oriented and yield-oriented. A significant difference among regions was found for current (Table 3) and future goals ($\chi^2 = 12.8$, 4 d.f., $\alpha = 0.05$; $\chi^2 = 22.4$ 4 d.f., $\alpha = 0.05$, respectively), suggesting a possibly greater interest in angler-oriented goals in the future in some geographical areas.

Table 3. Number (percent) of respondents indicating either an angler or yield-oriented goal as being number one, presented by regions. Data pertain to list of *current* and *future* goals. Some respondents checked more than one goal as number one.

	Goals							
	Angler-oriented[b]				Yield-oriented[c]			
	Current		Future		Current		Future	
Re-gion[a]	No.	(%)	No.	(%)	No.	(%)	No.	(%)
1	13	(37)	16	(46)	22	(63)	19	(54)
2	15	(32)	21	(44)	32	(68)	27	(56)
3	8	(19)	13	(23)	47	(81)	43	(77)
4	8	(13)	7	(11)	53	(87)	57	(89)
5	21	(40)	20	(39)	33	(60)	32	(61)

[a] Region 1—Alaska, California, Hawaii, Idaho, Montana, Nevada, Oregon, and Washington

Region 2—Arizona, Colorado, Kansas, New Mexico, Oklahoma, Texas, Utah, and Wyoming

Region 3—Illinois, Iowa, Indiana, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin

Region 4—Arkansas, Alabama, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia

Region 5—Connecticut, Delaware, Massachusetts, Maine, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia

[b] Consists of the goals of maximizing license sales, angler-trips, angler-days, angler-hours, and minimizing angler crowding, and angler complaints.

[c] Consists of the goals of maximizing sustained yield, catch, and establishing trophy fisheries.

The years of total fisheries management work experience and formal education were analyzed to determine if these factors were related to the goal ranked as number one. The largest group of respondents (45.5 percent) had greater than 10 years working experience. The most common educational degrees were Bachelor's (53.3 percent) and Master's (45 percent). No significant differences existed between educational levels for the current and future list of top-ranked goals. However, significant differences between the four categories of working experience were found for future top-ranked goals. Inspection of the data suggests that differences occur in the category of greater than 10 years working experience (Table 4). No significant differences among the four categories of working experience were found for the list of current goals. Therefore, years of working experience do not seem to influence the current top-ranked goals checked.

Time commitments of the fisheries managers surveyed indicated that few managers spend all their time only in

Table 4. Number (percent) of respondents, by years of working experience indicating either an angler- or yield-oriented goal as being number one in the future. Some respondents checked more than one goal as number one.

	Goals[a]				
	Angler-oriented[a]		Yield-oriented[a]		
Years working experience	No.	(%)	No.	(%)	Total No.
0–3	5	(15)	29	(85)	34
4–6	10	(18)	45	(82)	55
7–10	15	(31)	33	(69)	48
>10	47	(40)	71	(60)	118
Total	77	(30)	178	(70)	225

[a] See Table 3 for explanation of categories of goals.

Table 5. Number of respondents indicating the percentage of their work time spent in four fisheries activities.

	Time Spent (%)			
Activity	0–25%	26–50%	51–75%	76–100%
Management	83	99	49	9
Research	173	47	15	5
Planning	197	33	8	2
Public Relations	119	20	1	0

"management" or field activities (Table 5). Most managers spent part of their time in research, planning, and public relations work.

DISCUSSION

We recognize the complexity of the fisheries management problems facing individual state agencies and the difficulty in developing generalizations. Extrapolating from a survey is difficult, but results from our study suggest possible differences among fisheries management goals in the various geographic regions in the United States. A significant difference in the top-ranked goals among regions was probably a result of regions three (North Central) and four (Southeast) being skewed toward yield-oriented goals for both current and future goals. The question still remains whether these differences reflect differences in fisheries resources or attitudes of managers. Unfortunately, our survey cannot answer this question.

Our results suggest that level of formal education had no relationship to the top-ranked management goal. Prior to the survey we presumed that a greater level of education would expose managers to a broader array of management approaches and produce a concomitant decrease in yield-oriented goals.

Have course content and curricula in fisheries science changed as a response to increased emphasis on optimum sustained yield in the last few years? Based on results of our survey, we infer the MSY must be strongly entrenched in most university programs. *(Continued)*

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It was also noteworthy that working experience had no significant effect on current goals. However, for the future goals, our results indicate that managers with 10 or more years experience may be more concerned with angler-oriented goals than those managers with fewer years of experience. We feel this shift towards the angler is important because more experienced managers will have greater influence over management policy than less experienced managers.

Several fisheries managers indicated that none of the goals presented on the questionnaire reflected realistically their management emphasis. Other goals that were ranked first were generally related to habitat preservation, including prevention of habitat destruction and pollution abatement. These goals are ostensibly considered important by all managers but more critical in certain regions.

Results of our survey indicate that yield-oriented management goals ranked significantly higher than angler-oriented goals in state recreational fisheries programs and little change will occur in *future* objectives. The finding of no differences between *current* and *future* goals indicates that the total number of fisheries managers advocating maximum sustained yield is not likely to change in the future. Therefore, recreational fisheries management will presumably continue to place great emphasis on yield or quantity as a measure of fisheries output, especially in the north central and southeastern United States. However, our survey suggests that other regions of the United States may develop a trend toward more angler-oriented goals.

Although it is difficult to assess suitable changes in fisheries management goals by questionnaire (or any) survey, our results indicate that yield is deeply entrenched as a goal in state fisheries management programs. Comparison of the "desires" of the angling public for a multifaceted fishing experience to the managers heavy orientation towards yield suggests a concerning disparity.)➤

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