Influence of Angler Motivations, Expectations, and Opinions on Fishery Management Practices in the United States

James E. Brogdon
INFLUENCE OF ANGLER MOTIVATIONS, EXPECTATIONS, AND OPINIONS
ON FISHERY MANAGEMENT PRACTICES IN THE UNITED STATES

by

JAMES E. BROGDON

A report submitted in partial fulfillment
of the requirements for the degree

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Plan B

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UTAH STATE UNIVERSITY
Logan, Utah

1977
I would like to express my appreciation to Drs. Richard M. Schreyer, Richard S. Wydoski, and John D. Hunt for their criticism and help in the preparation of this report. The experience has been most rewarding and I hope the material presented in these pages lends additional knowledge to the broad field of outdoor recreation and the management of fishery resources.

A very special thanks is extended to Dr. Richard S. Wydoski and Dr. Richard M. Schreyer, who, not only provided much of the material used in this report, but who also gave inspiration to the initial idea and development for this paper.

Most of all, I would like to extend gratitude to my wife, Jane, for all the support and patience she has given during the past two years. Without her help this report could not have been written.

James E. Brogdon
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ABSTRACT

INFLUENCE OF ANGLER MOTIVATIONS, EXPECTATIONS, AND OPINIONS ON FISHERY MANAGEMENT PRACTICES IN THE UNITED STATES

by

James E. Brogdon, Master of Science

Utah State University, 1977

Major Professor: Richard M. Schreyer
Department: Forestry and Outdoor Recreation

This report is concerned with the behavioral inputs into the decisions concerning fishery resource management. Topics discussed are motives, expectations, and opinions of fishermen concerning the fishing experience and present-day fishery management practices and regulations; how management agencies and sportsmen organizations have dealt with recreational fishing; the need for managers to utilize this behavioral information in forming management decisions; and where past people-wildlife research has been and where it must lead in the future. Material for this paper came from copies of published articles and library research.

(72 pages)
"...there I sat and watched the fishes, and kept spinning the bait with the rods. And one of the fish nibbled, a fat one, for in sleep dogs dream of bread, and of fish dream I. Well he was tightly hooked and blood was running, and the rod I grasped was bent with struggle. So with both hands I strained and had a sore tussle for the monster. How was I ever to land so big a fish with hooks all too slim?"


Since colonial times, fishing has been characteristic of the outdoor scene in the United States. Izaak Walton, a draper by trade, was a biographer by avocation, but his chronicles have been forgotten. Only the discursive jottings of his favorite hobby, fishing, have endured (Kanfer, 1974). The Complete Angler, published in 1653, remains as fresh today as it was in the seventeenth Century. The very word angling was derived from the ancient Greek word "onkos", or barbed hook, and someone once described it as "a line with a worm on one end and a fool on the other."

Importance of fishing to outdoor recreation

Recreational fishing has become one of the more important outdoor recreation activities in the United States (Table 1). Fishing was sixth in importance among outdoor recreational activities in 1970 when
29.4 percent of the U. S. population (9 years old and older) fished (USFWS, 1972). Stroud and Martin (1968) stated that the greatest participation in sport fishing anywhere in the world unquestionably occurs within the United States. In 1967, the total number of U. S. angling participants, including those who fished only occasionally and spend little or nothing in the process, was reported by the Sport Fishing Institute to have numbered 58 million or more.

Table 1. Number of persons, 9 years old and older, who participated in selected outdoor recreation activities.

<table>
<thead>
<tr>
<th>Outdoor recreation activity</th>
<th>Total number of participants thousands</th>
<th>% of pop. 9 &amp; over</th>
<th>Total # of recreation days thousands</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States, total-----</td>
<td>127,938</td>
<td>76.2</td>
<td>12,126,000</td>
</tr>
<tr>
<td>Picnicking----------------------------------------</td>
<td>82,147</td>
<td>48.9</td>
<td>542,161</td>
</tr>
<tr>
<td>Swimming-------------------------------------------</td>
<td>77,298</td>
<td>46.0</td>
<td>1,721,996</td>
</tr>
<tr>
<td>Outdoor games and sports-------------------------</td>
<td>59,985</td>
<td>35.7</td>
<td>2,673,362</td>
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<tr>
<td>Attending outdoor sporting events-----------------</td>
<td>59,374</td>
<td>35.4</td>
<td>628,471</td>
</tr>
<tr>
<td>Walking for pleasure------------------------------</td>
<td>50,270</td>
<td>29.9</td>
<td>1,860,540</td>
</tr>
<tr>
<td>Fishing--------------------------------------------</td>
<td>49,435</td>
<td>29.4</td>
<td>562,052</td>
</tr>
<tr>
<td>Boating, sailing, and canoeing--------------------</td>
<td>41,136</td>
<td>24.5</td>
<td>421,530</td>
</tr>
<tr>
<td>Bicycling------------------------------------------</td>
<td>37,112</td>
<td>22.1</td>
<td>1,735,916</td>
</tr>
<tr>
<td>Camping--------------------------------------------</td>
<td>35,199</td>
<td>21.0</td>
<td>397,162</td>
</tr>
<tr>
<td>Nature walking-------------------------------------</td>
<td>30,509</td>
<td>18.2</td>
<td>374,394</td>
</tr>
<tr>
<td>Hunting-------------------------------------------</td>
<td>20,887</td>
<td>12.4</td>
<td>216,704</td>
</tr>
<tr>
<td>Horseback riding-----------------------------------</td>
<td>16,054</td>
<td>9.6</td>
<td>207,831</td>
</tr>
<tr>
<td>Other---------------------------------------------</td>
<td>10,655</td>
<td>6.3</td>
<td>311,321</td>
</tr>
<tr>
<td>Birdwatching--------------------------------------</td>
<td>7,457</td>
<td>4.4</td>
<td>432,515</td>
</tr>
<tr>
<td>Wildlife and bird photography--------------------</td>
<td>4,864</td>
<td>2.9</td>
<td>40,048</td>
</tr>
<tr>
<td>Nonparticipating----------------------------------</td>
<td>40,006</td>
<td>23.8</td>
<td>----------</td>
</tr>
</tbody>
</table>

aModified from USFWS, 1972, p. 95.

bTotal population 9 years old and over in the U. S. was 167,944,000.
Since 1955, the U. S. Fish and Wildlife Service has conducted a survey of hunters and fishermen in the U. S. at 5-year intervals. Fishing pressure has been increasing rapidly and this trend is expected to continue (USFWS, 1972). According to statistics found in this publication, there was an increase of 59.3 percent in the number of anglers (12 years old and older) between 1955 and 1970. The total population during this period increased by 31.1 percent thus indicating that, in proportion to the population, angling participation is growing at approximately twice the rate. In addition, the number of recreation days spent fishing increased 77.7 percent between 1955 and 1970.

Fishing ranks high in outdoor recreation and people of all ages participate in this sport (Figure 1) from all parts of the United States (Figure 2). According to McFadden (1969), of the existing population of the year 2000, it is estimated that 18 percent will be fishermen, that they will fish an average of 20 times per year, and that 70 percent of this fishing activity will take place in freshwaters of the United States. The U. S. Fish and Wildlife Service (1962) places the increase in fishermen by 2000 at 150 percent of the 1960 estimate of 25.3 million.

Impact of increased fishing participation on management

The increasing demand for fishing in the U. S. has resulted in changes of multi-use management (Calhoun, 1964; Moeller and Engelken, 1973; Northcote, 1970; Skanklin, 1962). For example, wildlife refuges are now providing areas for public fishing as long as they are not in conflict with the primary goals of the refuges. Fishing is allowed in some municipal water supplies and, in some cases, crowding is controlled by restricting the daily number of permits. In addition, some economy
Figure 1. Distribution of anglers by age group in the United States - 1970. (Data from USFWS, 1972).

Note: Alaska and Hawaii are included in the Pacific Division.

Figure 2. Percentage of the population that fished by area of the United States - 1970. (Data from USFWS, 1972).
is being generated to operators of private pay lakes. There has also been an increased interest in quality fishing versus quantity fishing as related to public opinion (Anderson, 1975; Gordon et al., 1969; Hampton and Lackey, 1975a; Talhelm, 1973; Wydoski, 1976).

**Human aspects of fishing**

Recreational fishing involves more than just catching fish. Clawson (1965) stated that it is a complex experience that consists of preparation for the trip, travel to the site, on-site experience, travel back home, and recollection of the trip. He further added that for future fishing trips it was this recollection that stimulates the angler to desire to participate again.

The human aspect of fishery management has been overlooked in the past; although, according to Hendee and Potter (1971) most game managers profess that wildlife management is also people management, with the human element possibly dominant. Even so, the reasons why angling remains popular with Americans is not clearly understood. Hendee and Potter suggested that much of this confusion is due to the lack of scientific research on the human behavior aspects of wildlife and fishery resources. Furthermore, Knopf et al. (1973) added that the behavioral approach to solving recreation resource problems has been employed too infrequently as a basis for decisions in wildlife and fishery management.

In any treatment of recreational fishing there are three principal factors to consider; the aquatic environment, the fish, and the fisherman. In the past, information on the first two factors has been fairly adequate, but most of the information concerning anglers have
been expressed in popular papers or published as conference proceedings. In 1971, Hendee and Potter reported that only 190 scientific journal papers, 32 doctoral dissertation, 39 master's theses, and 36 federal or state research bulletins were devoted to the human behavior aspects of wildlife. The highly regarded *Journal of Wildlife Management*, from 1960 to 1970, contained only 6 contributions on people-wildlife topics out of 698 total articles.

Although little concern was shown on the human behavior aspects of wildlife management in the past, managers are beginning to recognize the need for more knowledge about anglers (Moss et al., 1969). Hendee and Potter (1971) stated that a basic product of wildlife management is human satisfaction, and the over-riding goal should be to produce desired and worthwhile human experiences. This is especially true since the rapidly growing population of the U. S., coupled with higher incomes and more leisure time, are increasing the demand for nearly all types of outdoor recreation (Robinson, 1967).

This report will be devoted to the behavioral aspect of fishing and evolution of the angling experience as input for decisions concerning fishery resource management. Angler motives, expectations, and opinions will be assessed in making present-day fishery management policies and regulations. An analysis was made of how the state and federal agencies have interacted with the anglers for effective fishery management. Finally, the deficiencies and inconsistencies of past people-wildlife research will be identified and recommendations made for future research. This kind of information is valuable and necessary for effective management of fishery resources in the United States.
CHAPTER 2

ANGLER MOTIVATIONS

An essential element for the proper management of sport fisheries is an adequate knowledge and understanding of angler motives. Historically fishing was important for personal survival. Ley (1967) stated that, throughout the uncivilized world, hunger is among the most powerful drive of animals and people that probably provides the motivation to fish. In accordance with Maslow's "hierarchy of needs", participation in fishing would not be a recreational motive, but one of survival. However, fishing has not been a life-sustaining necessity of the American public since colonial times (Stroud, 1975). In fact, most (80%) of the fishermen surveyed in six northeastern states considered fish as a minor food source or didn't consume fish at all (Bevins et al., 1968).

The role of fish in the fishing experience

Catching fish plays an important role in the fishing experience. Stroud (1976) reported that "...why people fish is simply that people like to catch fish." The U. S. Fish and Wildlife Service (1962) suggested that all variations of fishing is fun, and catching fish adds to the personal satisfaction of most anglers. Sewell and Rostron (1970) clearly point out the importance of the "thrill of catching a fish" as the basic motive in salt water sport fishing. The results of this study point out the relative importance of numerous other aspects of the
recreation experience (Table 2). "Enjoying the companionship of others" and "the healthy atmosphere of the outdoors" were very important when compared to the other factors in the experience.

Driver and Knopf (1976) suggested that an answer to "why do people fish" is not easy; it depends on what is meant by fishing. They further added that it is unlikely that many fishermen would fish waters where no fish existed. However, many fishermen have had satisfactory trips without having caught a fish, and perhaps without having wet a line. Therefore, the satisfaction derived from fishing is dependent on the existence of fish, but goes considerable beyond the actual taking of fish. Further insight into fishing is provided by Ley (1967) who stated that, if fishing is viewed as a behavioral act and the catching of the fish as a satisfying state of affairs, it can readily be seen how the principle of reinforcement could be applied. Since fish are caught in an irregular and relatively unpredictable sequence of casts, the principle of partial reinforcement can be appropriately applied. This would help to explain why fishermen still derive satisfaction from a fishing experience even if they don't catch fish every time.

Fishing as a complex experience

Recreational fishing is a complex experience and most anglers are quick to admit that their interest is not solely in the fish they catch but in fishing itself (Moeller and Engelken, 1972). In 1973, 524 anglers, who fished the east coast of Vancouver Island, British Columbia, expressed some of the factors that added more satisfaction to sport fishing than mere catching and eating of fresh fish (Table 3).
Table 2. Importance of various components of the recreation experience for salt water fishermen in British Columbia.\(^a\)

<table>
<thead>
<tr>
<th>Rating</th>
<th>Components of the Recreation Experience</th>
<th>Score (^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Appreciating the thrill of catching a fish</td>
<td>315</td>
</tr>
<tr>
<td>2</td>
<td>Enjoying the easy-going companionship of friends or family while fishing</td>
<td>493</td>
</tr>
<tr>
<td>3</td>
<td>Enjoying the healthy atmosphere of the outdoors</td>
<td>502</td>
</tr>
<tr>
<td>4</td>
<td>Getting away from the demands of the work-a-day world</td>
<td>550</td>
</tr>
<tr>
<td>5</td>
<td>Observing the beauty of nature and the peaceful surroundings</td>
<td>561</td>
</tr>
<tr>
<td>6</td>
<td>Taking it easy and getting rid of tensions</td>
<td>565</td>
</tr>
<tr>
<td>7</td>
<td>Enjoying the pleasures of boating</td>
<td>589</td>
</tr>
<tr>
<td>8</td>
<td>Enjoying planning and anticipation of the trip</td>
<td>698</td>
</tr>
<tr>
<td>9</td>
<td>Recalling the experience of fishing trips with oneself or with friends</td>
<td>728</td>
</tr>
<tr>
<td>10</td>
<td>Having a change of pace by doing something different</td>
<td>795</td>
</tr>
<tr>
<td>11</td>
<td>Traveling to the fishing site</td>
<td>947</td>
</tr>
<tr>
<td>12</td>
<td>Traveling home from the fishing site</td>
<td>1069</td>
</tr>
</tbody>
</table>

\(^a\)Data from Sewell and Rostron, 1970, p. 69.

\(^b\)Weighing procedure whereby the most important reason for enjoying sport fishing received a rating of 1, and the least important a rating of 12.

Hendee (1974) stated that fishing means many things to fishermen who derive multiple "satisfactions" or realize many different types of satisfying experience. A survey of over 4,000 fishermen demonstrated that more than half obtained as much enjoyment from a fishing trip if they caught no fish as they did if they caught fish (Addis and Erickson, 1969). The Sport Fishing Institute in 1964 reported that at least two-thirds of the nation's fishermen catch less than one-third of the fish landed and that half of these fishermen catch no fish at all. In a study of angler use of lakes in the Uinta Mountain, Utah (Hoagland, 1973), fishing was originally hypothesized to be the most important motive for entering the study area. However, only 8 percent of the anglers
Table 3. Motives of salmon anglers in British Columbia - 1973.a

<table>
<thead>
<tr>
<th>Rating</th>
<th>Motive</th>
<th>Number of anglers</th>
<th>Percentage of anglers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To be outdoors</td>
<td>290</td>
<td>22.3</td>
</tr>
<tr>
<td>2</td>
<td>To take it easy and get rid of tension</td>
<td>230</td>
<td>18.0</td>
</tr>
<tr>
<td>3</td>
<td>To eat fresh fish</td>
<td>166</td>
<td>13.1</td>
</tr>
<tr>
<td>4</td>
<td>Change from working pressures</td>
<td>153</td>
<td>12.1</td>
</tr>
<tr>
<td>5</td>
<td>The experience of a catch</td>
<td>126</td>
<td>9.9</td>
</tr>
<tr>
<td>6</td>
<td>To take family and/or friends out</td>
<td>69</td>
<td>5.4</td>
</tr>
<tr>
<td>7</td>
<td>Change from home pressures</td>
<td>53</td>
<td>4.1</td>
</tr>
<tr>
<td>8</td>
<td>To do something different</td>
<td>47</td>
<td>3.8</td>
</tr>
<tr>
<td>9</td>
<td>Solitude</td>
<td>37</td>
<td>2.9</td>
</tr>
<tr>
<td>10</td>
<td>Good fishing available</td>
<td>23</td>
<td>1.8</td>
</tr>
<tr>
<td>11</td>
<td>Fair fishing available</td>
<td>21</td>
<td>1.7</td>
</tr>
<tr>
<td>12</td>
<td>To enjoy scenery</td>
<td>20</td>
<td>1.6</td>
</tr>
<tr>
<td>13</td>
<td>Traveling to and from fishing site</td>
<td>7</td>
<td>0.5</td>
</tr>
<tr>
<td>14</td>
<td>Other</td>
<td>36</td>
<td>2.8</td>
</tr>
</tbody>
</table>

aData from Stroud, 1974, p. 1.

from one study group stated that fishing was the most important reason for their recreation in the Uinta Mountains while another Utah group believed that fishing was most important. Anglers placed the highest value for recreation in the Uinta Mountains on "out-of-doors," "scenery," and "escape." Fishing was important as a secondary motive in this area.

Anglers in the Washington D. C. area revealed that their main reason for fishing was to relax, enjoy companionship, and pleasant surroundings (Covell, 1958). Duttweiler (1976) also reported that the reasons most frequently cited for fishing were "for relaxation," "to get outdoors," and "for fun."

Further insight on motives is provided by a recent behavioral study of 1,427 canoeists and fishermen on the Au Sable River, Michigan.
The need to escape temporarily "from stressful conditions in the non-leisure environment" was a major motivation for these recreationists. Temporary escape was found to rank particularly high among anglers (Bassett et al., 1972). Fishing has been used as a means to measure water resource enjoyment (Andrews et al., 1972). Factors in fishing enjoyment included social interaction, aesthetic enjoyment, escape from pressures, and fishing itself. The most important factor for fishing enjoyment in that study was interaction with the family. Addis and Erickson (1969) also found this factor to be highly rated in their study of Ohio fishermen. Eighty percent of the Ohio anglers spent at least some of their fishing time with members of their family and over 50 percent spent half or more of their fishing time with their family.

One of the most comprehensive studies concerning motives for participation in recreational fishing was reported by Driver and Knopf (1976). Of the motives expressed in this Michigan study (Table 4), the three most important were experience nature, general escape, and mental change. On the national level (Table 5) the three important motives were; relieves tensions, provides escape from pressure, and provides a change. Driver and Knopf also pointed out that each of these experiences is probably shared and realized by all fishermen, but some are relatively more important to some fishermen, or some time to the same fishermen, than are others. Although many types of satisfying experiences will be realized simultaneously, some will be valued by anglers more highly than others and will guide the type of fishing pursuits.

The therapeutic value of fishing

In many of the studies concerning fishing motivations, escape or "escapism" has been rated an important factor of the fishing experience,
Table 4. Preferences of experiences desired by Michigan anglers.a

<table>
<thead>
<tr>
<th>Rating</th>
<th>Desired Experience</th>
<th>Mean Scoreb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Experience nature</td>
<td>6.8</td>
</tr>
<tr>
<td>2</td>
<td>General escape</td>
<td>6.0</td>
</tr>
<tr>
<td>3</td>
<td>Mental change</td>
<td>6.0</td>
</tr>
<tr>
<td>4</td>
<td>Exploration</td>
<td>5.8</td>
</tr>
<tr>
<td>5</td>
<td>Avoid others' expectations</td>
<td>5.7</td>
</tr>
<tr>
<td>6</td>
<td>Family togetherness</td>
<td>5.3</td>
</tr>
<tr>
<td>7</td>
<td>Tension release</td>
<td>4.8</td>
</tr>
<tr>
<td>8</td>
<td>Achievement</td>
<td>4.6</td>
</tr>
<tr>
<td>9</td>
<td>Exercise/physical fitness</td>
<td>3.5</td>
</tr>
<tr>
<td>10</td>
<td>Dominance control</td>
<td>3.1</td>
</tr>
<tr>
<td>11</td>
<td>Thrill seeking</td>
<td>2.9</td>
</tr>
</tbody>
</table>


bMean scores on scale where 9 represents extremely important and 1 represents not important at all. Data derived from 30 respondents.

Table 5. Reasons other than catching fish that are important to U. S. anglers.a

<table>
<thead>
<tr>
<th>Rating</th>
<th>Reason for engaging in fishing activity</th>
<th>% anglers responding very importantb</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>It relieves my tensions</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>It provides an escape</td>
<td>51</td>
</tr>
<tr>
<td>3</td>
<td>It's a change from city life</td>
<td>43</td>
</tr>
<tr>
<td>4</td>
<td>I can spend more time with the family</td>
<td>42</td>
</tr>
<tr>
<td>5</td>
<td>I like to keep physically fit</td>
<td>39</td>
</tr>
<tr>
<td>6</td>
<td>I enjoy telling others about it later</td>
<td>29</td>
</tr>
<tr>
<td>7</td>
<td>It allows me to get away from people</td>
<td>28</td>
</tr>
<tr>
<td>8</td>
<td>It allows me to be with friends or family</td>
<td>27</td>
</tr>
<tr>
<td>9</td>
<td>I can do it on the spur of the moment</td>
<td>27</td>
</tr>
<tr>
<td>10</td>
<td>I like to perfect my skills in it</td>
<td>23</td>
</tr>
<tr>
<td>11</td>
<td>It gives me a chance to meet new people</td>
<td>14</td>
</tr>
<tr>
<td>12</td>
<td>I can demonstrate my skills to others</td>
<td>10</td>
</tr>
</tbody>
</table>

aModified from Driver and Knopf, 1976, p. 25.

bData from survey of 1,300 households.
especially for anglers close to an urban area (Knopf et al., 1973). Driver and Knopf (1976) suggested, in our so-called "Age of Anxiety," that many people believe they are under too much stress and strain. They further added that "if people think they are under stress, they probably are psychologically, and some means of coping must be employed to handle these perceived threats." This research documented that the desire to escape everyday pressures is an important reason for fishing.

Eschmeyer (1955) recognized the therapeutic value of angling for adults and Stroud (1976) stated that there seems to be a high therapeutic value from recreational fishing in the nerve-wracking technological society of America. Indeed, Blasingame (1967) stated that the greatest therapy of fishing does not lie in exercise, but in psychological and emotional refreshment in which the cluttered mind becomes uncluttered, the frazzled nerves restrung and retuned, the flagging spirit regenerated. Herbert Hoover (1964) emphasized "association with the placid ripples of the waves and the quite chortle of the streams is soothing to our 'het-up' anxieties.

Further insight was provided by the U. S. Fish and Wildlife Service (1962) that many benefits are credited to the outdoor experience at veteran's hospitals where fishing is encouraged. This is especially true for patients with mental and nervous disorders that occur more frequently in our present civilization. Stainbrook (1973) reiterated the value of the outdoor experience as 'man needs a natural environment for many good reasons. We are familiar with the need to 'get away from it all' periodically. Many seek a tranquil natural setting for its restorative qualities, which enable us to cope again with our complex world.'
Angling motivation as related to demographics

To understand the motives for angling, several authors have tried to correlate childhood experiences as well as place of residence to fishing participation (Addis and Erickson, 1969; Bevins et al., 1968; Moeller and Engelken, 1972; Sofranko and Nolan, 1972; Moss et al., 1969). Ley (1967) stated that the avid angler has a history of fishing since preadolescent years and/or experiencing considerable success in fishing. The maintenance of behaviors that are strongly established during childhood are known to persist into adulthood. The child who fished regularly will very likely remain a fisherman as an adult. Ley further added that the individual who becomes an angler as an adult is not likely to be ardent at this sport unless success results during the first few fishing trips, regardless of his inquiry, searching, observation, wit, hope, patience, and love of the art.

Bevins et al. (1968) reported that 67 percent of the respondents in the northeastern United States had a rural background and 60 percent had fished during their childhood (Figure 3). Moeller and Engelken (1972) found that 68 percent of selected Michigan anglers were from a rural background and had fished an average of 26 years. In a study of Pennsylvania hunters and fishermen, Sofranko and Nolan (1970) stated that their most important findings emerged from the analysis of previous experience. About 50 percent of these fishermen spent their youth in rural areas and 90 percent fished during youth. Bevins et al. also reported that sportsmen were primarily introduced to fishing or hunting by their parents.
Significance of human behavior to the manager

Wildlife management is based on the assumption that wildlife provides benefits to people (Hendee, 1972). Traditionally, game management has been biologically oriented to maintaining or increasing wildlife populations through habitat management. However, managers cannot keep pace with the growing demand merely by trying to produce more wildlife. Even the best efforts may only maintain game populations that are exploited by increased numbers of sportsmen who experience lower rates of success. Only efficient management of sportsmen-wildlife relationships
and habitats will provide quality recreation. One method of accomplishing this goal is through precise research into the motives for participation in fishing. Hendee and Potter (1971) refer to the behavioral approach which views recreation as an experience that governs why a person participates, what he does while participating, and what he experiences from that participation.

To many people fishing is a very relaxing sport. The individual angler can set his own pace, seek his choice of water type and try to catch his choice of fish species. All varieties of fishing is fun, and a successful trip adds to the personal satisfaction experienced by most anglers. For the best possible use of our natural resources the manager must be knowledgable about his angling clientele.
CHAPTER 3

ANGLER EXPECTATIONS AND PREFERENCES AS AN INDICATION OF A SATISFACTORY FISHING EXPERIENCE

Quality or quantity?

One of the most pressing problems facing fishery managers today is deciding exactly what constitutes output from a fishery (Hampton and Lackey, 1975a). Historically, fishery managers believed that fish production in biomass or numbers was the desirable measure of output and, therefore, devoted most of their effort toward maintaining, enhancing, or establishing fish populations and their habitat. An alternative approach was to measure man-days of use as a fishery output (Anderson, 1975; Clark and Lackey, 1974). Many natural resource managers now advocate that fishery outputs should be measured in more human-oriented terms such as satisfactions or ultimately human benefits (Hendee, 1974; Hendee and Potter, 1971; Knopf et al., 1973; More, 1973; Potter et al., 1973; Talhelm, 1973; Stankey et al., 1973). The basic premise is that recreational resources can offer a range of angling experiences which, in turn, provide various satisfactions. These satisfactions are the more specific, immediately gratifying pleasures from certain aspects of the recreational experience such as aesthetics, crowding, companionship, motivations, expectations, or other factors which affect the quality of the angling experience or the level of satisfaction of resource users.
The manager must choose the best method of evaluating the degree of angler satisfaction. Schreyer et al. (1976) emphasized that use of "sum total of all satisfactions" as a measure of the level of quality can be misleading. They stated that, assuming crowding and satisfaction are linked together, ten people experiencing 100 units of satisfaction have a total satisfaction of 1000 units. If 50 persons see each other on a river, satisfaction for each person might be reduced to perhaps 50 units, resulting in a total satisfaction of 2500 units. Thus total satisfaction of rafters may be increased by decreasing individual satisfaction through crowding people on a river. Clearly, some evaluation of individual satisfaction is necessary. Schreyer et al. (1976) suggested that recreational quality cannot be assessed through aggregate measures. To make an adequate evaluation, a quality recreational fishing experience must be defined.

Crowding and quality of angling

Quality of the recreational experience is affected not only by the chance of success, but also by crowding. It should be pointed out, however, that this aversion to crowding does not rule out the presence of people completely. Braaten (1970) found that only 9 percent of the fishermen from Seattle, Washington and vicinity spent most of their fishing alone while 91 percent spent most of their time fishing with other people. He suggested that fishing with other people should not be confused with crowding. In the previous chapter, "being with the family" and "being with friends" were often expressed as motives by fishermen.

Wagar (1964) provided a comprehensive review of crowding. He stated that the quality of a specific recreation depends on the satisfaction
that it provides. This is important to the fishery manager since his main objective is to provide benefit and enjoyment for people. Managers should assess how satisfaction, i.e. the quality of recreation, will change with different degrees of crowding. The effects of crowding on angling quality is summarized in Figure 4. Wagar stated that these graphs are not based on measured data but are freehand curves of probable relationships.

Moeller and Engelken (1972, 1973) found that "privacy while fishing" was ranked number three by fishermen (Figure 5), and "uncrowdedness" was an important criteria expressed by Duttweiler in 1976 (Table 6). Although "privacy" was expressed as important by Hampton and Lackey (1975a) "companionship" ranked even higher (Table 7). This study illustrated the variation of opinion that exists concerning individual perception of "crowdedness." This variation causes problems in providing quality management of the resource for all individuals. Wydoski (1976) suggested that no agency can advocate the management of all waters for quality angling, but they should provide the opportunity for those anglers who prefer this type of fishing. In an attempt to satisfy the "average" angler, managers are faced with the problem of eventually satisfying few angler.

**Attractiveness of the recreation site as an indication of quality**

Quality is not only limited to the presence of people, but also includes the condition of the recreation site, or both. Anglers, regardless of their attitude toward payment of a fee, consistently ranked two factors - clean water and natural beauty of the fishing area - as having the greatest influence on their total enjoyment of a fairly typical 1-day
Figure 4. Effects of crowding on the quality of outdoor recreation. (Data from Wagar, 1964, p. 7).
Figure 5. What fishermen look for in a fishing experience and their willingness to pay to fish. (Data from Moeller and Engelken, 1973, p. 3).
Table 6. Factors affecting quality in the anglers experience.a

<table>
<thead>
<tr>
<th>Factor</th>
<th>Percentage of anglers responding as:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Important</td>
</tr>
<tr>
<td>Water quality</td>
<td>77</td>
</tr>
<tr>
<td>Convenience of location</td>
<td>55</td>
</tr>
<tr>
<td>Scenery</td>
<td>40</td>
</tr>
<tr>
<td>Knowledge of spots</td>
<td>40</td>
</tr>
<tr>
<td>Uncrowdedness</td>
<td>40</td>
</tr>
<tr>
<td>Angling success</td>
<td>39</td>
</tr>
<tr>
<td>Variety of fish</td>
<td>28</td>
</tr>
<tr>
<td>Single favorite fish</td>
<td>24</td>
</tr>
</tbody>
</table>

aData from Duttweiler, 1976, p. 236.

fishing trip (Figure 5; Moeller and Engelken, 1972, 1973). Size and number of fish caught were ranked fourth and sixth, respectively, in overall importance by this group. Similar results were reported by Hampton and Lackey (1975a) who stated that fishery managers need to re-examine their historical objectives and begin to evaluate fisheries output in terms other than yield and/or angler-days. Their study revealed that the quality of fee-fishing is multi-dimensional and not dependent solely on catch (Table 7). Further insight was provided by Duttweiler (1976) who found in a questionnaire survey that water quality was by far the most important component in determining a quality experience by anglers. Convenience of location, scenery, and fishing access were also important factors (Table 6).

Fish quantity and value as a means of quality evaluation

In contrast to the other inferences provided, Anderson (1975) suggested that an exact index of fishing quality is impossible to achieve
Table 7. Important factors related to angling in selected Virginia fee-fishing areas.a

<table>
<thead>
<tr>
<th>Factor</th>
<th>Mean Score b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager's attitude</td>
<td>4.38</td>
</tr>
<tr>
<td>Water quality</td>
<td>4.34</td>
</tr>
<tr>
<td>Natural beauty of the area</td>
<td>4.17</td>
</tr>
<tr>
<td>Companionship</td>
<td>4.13</td>
</tr>
<tr>
<td>Size of fish caught</td>
<td>3.85</td>
</tr>
<tr>
<td>Facilities</td>
<td>3.82</td>
</tr>
<tr>
<td>Access</td>
<td>3.75</td>
</tr>
<tr>
<td>Number of fish caught</td>
<td>3.72</td>
</tr>
<tr>
<td>Weather</td>
<td>3.42</td>
</tr>
<tr>
<td>Privacy</td>
<td>3.28</td>
</tr>
</tbody>
</table>

aData from Hampton and Lackey, 1975a, p. 8.

bNumerical scores ranged from 1 to 5 with 5 being extremely important.

because quality and personal gratification are influenced by intangible factors such as aesthetics and environmental qualities. However, the important but tangible aspects of fishing quality that can be influenced by management are the number, sizes, and species of fish caught and harvested.

According to Anderson, the number of fish harvested alone is inadequate as an index because the numbers include all fish of all sizes. Anderson suggested that fishing quality is one based on the weight of fish harvested per hour. However, this weight per hour index of fishing quality also presents problems because it includes the cumulative weight of fish where all sizes and species have equal value. This index can be improved by intensive and relatively expensive management
practices such as direct feeding and put-and-take stocking but ignores the human factor. In addition, Anderson suggested another philosophical element that must also be incorporated into an index of angling quality. His determination of fishing quality includes the premise that one fish caught and released has half the value of a fish of the same size that is caught and retained. Thus, the quality of fishing would be equal when one fish is caught and kept or when two fish of a similar size are caught and released.

Ideally, for Anderson's method to work all fish must have "equal" value. However, species most often caught by fishermen can differ significantly from the species most preferred by fishermen, particularly for the inexperienced angler (Table 8). While 38 percent of the fishermen at Owasco Lake preferred to catch either lake trout (21%) or rainbow trout (17%), only 10 percent most often caught either of these species. Further insight was provided by Addis and Erickson (1969) who reported that 47 percent of the anglers did not fish for a particular species and 35 percent fished for whatever was biting. Forty-five percent of these anglers listed bass as a first choice, 15 percent listed walleye, 10 percent catfish, 9 percent perch, 6 percent crappie and 5 percent bluegill. Therefore, fishermen may be satisfied fishing for "whatever is biting," but they have preferences and as a result varied values would have to be placed on each species. Fishing quality would be the direct relationship of species caught to preferred species, but anglers also experience satisfaction in just catching fish.
Table 8. Principal species preferred and caught by anglers in Owasco Lake, New York.

<table>
<thead>
<tr>
<th>Species of fish</th>
<th>Percent of fishermen preferring</th>
<th>Percent of fishermen who most often caught preferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake trout</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>Rainbow trout</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Walleye</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Smallmouth bass</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Largemouth bass</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>Northern pike</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Brown bullhead</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Yellow perch</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Rainbow smelt</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Cisco</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>All others</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Combinations of the above</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>None</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Totals</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

aData from Duttweiler, 1976, p. 233.

Kinds of anglers and perception of quality

Fishing experience and judgement of fishing quality is reflected in the types of fishermen. Clawson (1965) stated that there are three classes of fishermen. "Purists" are highly informed individuals, not only about their sport but about the fish, the fishing areas, the methods of fishing, and the like. They are willing, and usually able, to incur relatively large expenditures for the kind of fishing in which they are most interested, and often they will travel far for it.

"Active Sportsmen" are interested in fishing, but not obsessed by it; they are able and skillful at fishing, but are not purists;
willing to spend money and to travel for good fishing, and moderately
well-informed about it, but probably balance fishing expenditures again-
st alternative uses of the same money.

"Incidental Fishermen" are those individuals who fish largely
to be out-of-doors, either for themselves or for their children. These
anglers often lack tackle, or at least appropriate tackle, do not know
how to go about fishing in the particular area where they are, have
little or no luck, may take inordinate pride in trophies that more skill-
ed fishermen would scorn, and may often be dominated by the desire of
their children to fish, rather than by any real desire of their own.

As a result of this variation in perception of "quality" fish-
ing experiences, fishery managers need to know angler attitudes and/or
opinions so they can manage resources efficiently for all their clien-
tele. This is especially true if managers are to implement multiple-
satisfactions to maximize satisfaction and hence angling benefits.
Gordon et al. (1969) stated that great variety in angler use of fishery
resources existed in Idaho. To provide optimum satisfaction for the
greatest numbers of both resident and non-resident anglers in Idaho
Gordon et al. suggested that it might be desirable to offer a broad
spectrum of angling opportunities in each area of the state.

Seaman (1969), in comparing quantity versus quality in fishery
management, concluded that state fishery programs should strive for qual-
ity as "a degree of excellence" and that anglers, in the long run, will
praise the manager for making the decision for quality in lieu of quan-
tity. Anderson (1975) stated that a definition of fishing quality in-
volves defining overharvest and for setting management goals and
objectives. Attempts to sustain yield for angling benefits in recreational fisheries must be aimed at maintaining or improving the quality of fishing. Sofranko and Nolan (1970) suggested that if the needs of anglers and hunters are not adequately met in the future, these sports will become less important to the American public.
CHAPTER 4

SOME ANGLER OPINIONS AND REACTIONS TO FISHERY MANAGEMENT PRACTICES AND REGULATIONS IN THE UNITED STATES

Fishery management in the United States is provided through the democratic process which surrounds all aspects governing public domain. The public, via governmental agencies, has control of the wildlife resources within state and federal boundaries. However, the public is often not involved in the establishment of regulations concerning resource management. This chapter will provide insight into the important role that involves the public in forming fishery management practices and regulations. If managers are to provide satisfactory recreational fishing they must be aware of public expectations, opinions, and preferences.

Evolution of fishery management regulations

During pioneer days fish were abundant in the United States. The land had been only sparsely settled by Indians, and their methods of taking fish were too crude and inefficient to bring about the depletion of fishery resources. Early settlers found a major supply of fresh meat in the numerous fish; there were no conservation measures since none were needed. Local evidence of depletion of fish stocks became apparent especially where spawning runs were harvested extensively. Gradually,
regulations on the fishery resources were desirable, with an emphasis on allowing fish stocks to spawn. There was also a tendency to close the season during the spawning period and to limit the individual catch (Eschmeyer, 1955). Gradually, more laws were imposed on anglers and since there were no fact-finding programs, the regulations were made more or less arbitrarily without biological justification.

In the decade between 1871-1880, the U. S. Commission of Fish and Fisheries was created by Congress and several fishery commissions were authorized by state legislatures to investigate the decline in fish stocks (Wydoski, 1976). Regulations and their enforcement, a major purpose with these commissions, were intended to: (1) protect broodstocks by preventing overexploitation; (2) provide and equitable distribution of the available fish crop to all anglers; (3) provide license fees to insure funds for carrying out the objectives of sport fishing programs; (4) provide a goal in the form of a creel limit for the angler; and (5) prevent waste and encourage fishing for sport rather than meat for the table (Eschmeyer, 1955; Everhart, Eipper, and Youngs, 1975; Hunt, Brynildson, and McFadden, 1962).

To provide greater diversity, interest, and quality in recreational fishing, attempts have been made to develop particular lakes and streams for special purposes that inevitably led to more regulations and restrictions (Northcote, 1970). These regulations usually involved size limits, bag or creel limits, closed seasons or closed areas, limitations on the efficiency of gear, and the type of terminal gear that may be used (Hunt, 1975; Eschmeyer, 1955). Although some states still impose such arbitrary regulations, others now base their laws on proven need.
Catch-and-release fishing

More than 20 years ago, an experimental project for catching and releasing trout was devised to permit catching them more than once (Stroud, 1975). This technique inspired fisheries biologists in Michigan as a possible approach to trout management to reduce the need for expensive trout stocking. This method depended upon use of artificial lures, including "hardware" as well as flies, to the exclusion of natural bait. After several years of testing, the so called "Hazzard Plan" was believed to produce only modest benefits when applied to high-quality trout streams with good natural trout populations (Cooper et al., 1959; Hunt, 1964). Negligible hooking mortality occurred in released fish from artificial lures, whereas hooking mortality was significant in released trout caught on natural bait (Hunt, 1964; Klein, 1965; Shetter and Alexander, 1962).

In catch-and-release fishing, anglers elected to increase their catches but drastically reduce their harvest as proof of their angling prowess. Stroud (1975) suggested that keeping a part of the catch will long remain an essential element for the vast majority of anglers. Ohio anglers, who caught eating or trophy-sized fish, preferred to take them home. Seventy-five percent of the fishermen either took home the fish they caught and ate them, or gave them away (Addis and Erickson, 1969). Indeed, catch-and-release programs have produced negative reactions. A catch-and-release program was conducted on Virginia's Rapidan and Staunton rivers in 1962 that was used by fewer than 5 percent of an estimated 75,000 trout anglers statewide (Martin, 1962). The chief of fisheries in Virginia emphasized that the vast majority of Virginia trout anglers
at that time (97%) preferred to use natural baits, and keep all fish. Similarly, low fishing participation was noted on waters managed by catch-and-release regulations such as Colorado's Cache La Poudre River. When bait fishing and catchable-trout stocking were eliminated from this stream, and a 12-inch minimum "keeper" length was enforced on rainbow trout, fishermen use dropped significantly (Klein, 1969, 1974).

On Lawrence Creek, Wisconsin, under a size limit of none, 6, 8, and 9 inches few brook trout under 6 inches were kept even when it was legal to do so (Hunt, 1970). "Fly fishing only" regulations attracted fewer anglers, who enjoyed high quality fishing, than in any-lure areas. In general, anglers responded negatively to catching and releasing large numbers of 6-8 inch brook trout because the catch per angler-hour was low for larger fish in Lawrence Creek.

Montgomery (1971) stated that the main objective for the Atlantic salmon fishery of Hosmer Lake, Oregon was to provide a quality "catch-and-release" fishery by managing the lake with special regulations - fly fishing only with a barbless hook; all fish must be returned unharmed to the water. Inquiries by a few anglers indicated that they would prefer to retain one fish per trip. Montgomery added that many inquiries are received regarding the survival of fish in the catch-and-release program which suggested interest in quality waters. These studies help to substantiate the motives mentioned of "experiencing the catch," "perfecting skills" and preferences such as "number of fish caught" or "size of fish caught." However, Gordon et al. (1969) reported that 50 percent of the questionnaire respondents in Idaho believed that it would be worthwhile to manage some waters in
Idaho for "fishing-for-fun" (catch-and-release), while 30 percent expressed a negative opinion and 20 percent had no opinion.

Wallis (1963) reviewed special regulation trout fishing programs that were being used experimentally on selected waters in 25 states. These programs featured the use of artificial lures or flies only, reduced catch limits, and increased size limits. Some of these programs, frequently called "fishing-for-fun," were managed for the recognition and enhancement of the "quality" aspects of trout angling by emphasizing the catch-and-release of wild trout rather than harvesting them. In 1963, programs were conducted experimentally in Pennsylvania, New York, Virginia, North Carolina, Colorado, Oregon, California and Washington, and in six National Parks, and for bass and muskellunge in Ohio and bass in Virginia.

Wallis concluded that current catch-and-release programs are: (1) acceptable to the fisherman if preceded by an adequate educational program; (2) attract less angler use than normal regulation waters; (3) can result in buildup of trout populations under such regulations; (4) result in increased catch per angler effort than in waters with regular creel limits; (5) provide ideal places for the novice fishermen to learn the art of fishing with artificial flies or lures; and (6) promotes the conservation of trout resources.

Wallis further added that "catch-and-release" programs in National Parks are successful and popular with anglers. This type fishing was accepted by most anglers in Yellowstone Lake when the fishing was good but there may have been a tendency to keep trout whether it was legal or not when success was low. Wallis concluded that a continued
education program and increased law enforcement will be required for this program to be effective in national parks.

Christenson (1965) suggested that trout waters best suited to this type of management are those in which natural populations would be easily overfished or which would require heavy stocking of hatchery fish because of angling pressure. He also stated that a catch-and-release program holds promise for supplying low-cost fishing recreation in areas of high fishing pressure while allowing continued reuse of the fishery. However, this type of program would satisfy only certain anglers since the motives and preferences vary considerably among anglers.

Stocking of hatchery fish

The vast majority of the nation's waters are self-supporting and do not require the stocking of fish to maintain a satisfactory sport fishery. In many waters, however, the stocking of hatchery fish is important in the management of fishery resources. The U. S. Fish and Wildlife Service (1962) reported that 20 to 95 percent of the stocked trout are caught by anglers in "put-in-take" fisheries.

Frequently, a substantial difference occurred among agencies in the use of stocking in public and private waters, and what land owners and/or anglers would prefer. For example, Dillard and Novinger (1975) stated that too many fish have been stocked the wrong way, in the wrong water, and for people who did not want them in the first place. Calhoun (1965) said that a portion of the public, which identifies itself as "the real sportsmen," is concerned primarily with the sportsmanship of traditional trout-angling. This group recognized the artificiality of stocking fish, detested the program thoroughly, and resented use of much
of the state budget for this type of program. However, under a program of managing for "multiple-satisfactions," these individuals would have waters in which to seek satisfaction for "their" needs.

Increasingly, managers working with catchable trout programs are becoming more objective. They are recognizing the program for what it is - recreation pure and simple that is largely unrelated to resource management (Calhoun, 1964). However, many anglers are pleased with the catchable trout program.

In Ohio Addis and Erickson (1969) found that a majority of the anglers (37%) expressed that they wanted the Division of Wildlife to continue or increase stocking of fish. Fifteen percent stated that convenience facilities were important to them, 14 percent new lakes, 10 percent fishing access sites, 7 percent fish research, and the rest miscellaneous items.

A majority of Idaho fishermen expressed satisfaction with hatchery-reared "catchable-sized" trout (Gordon et al., 1969). Approximately 10 percent of Idaho anglers considered the program excellent, 45 percent as satisfactory, 10 percent as unsatisfactory, and 35 percent had no opinion.

Further insight was provided by Kennedy and Wood (1976) who studied angler response to the stocking of albino rainbow trout in Utah. Sixty-six percent of the fishermen stated they would like to catch 1 to 4 albino trout in an eight-trout limit and 22 percent wanted more than half their limit to be albinos. Only 12 percent of the fishermen did not want any albino trout in their creel.
The effect of angler preference in decisions on management alternatives was documented in a study by Bjornn (1975) who found that a large percentage (88%) of Idaho fishermen preferred to save the fishery for native cutthroat trout in the St. Joe River rather than continue the stocking of rainbow trout when the consequences of the alternate policies were explained to them. Special regulations that included a three fish bag limit, 13 inch minimum length, and elimination of live bait succeeded in increasing the numbers of trout and the angling success. The anglers were enthusiastic with the special regulations on the fishery, even though they were unable to keep most of the fish they caught. This may be a good example of sacrificing one means (quantity) to providing a satisfaction for another (quality).

Organized sportsmen and fishery regulations

Fishermen often express their opinions through organized groups such as sportsmen clubs. Holbrook (1975) reported the reaction of a large organization, Bass Anglers Sportsman Society (B.A.S.S.), to the high mortality that occurred among largemouth bass caught and released in sponsored fishing tournaments. Holbrook emphasized that this mortality was fairly high (21%) in 25 tournaments and an additional 12.5 percent occurred as delayed mortality in 8 tournaments. Stroud (1973) stated that up to 98 percent of the bass released by tournament fishermen were known to die after release. The Bass Anglers Sportsman Society became concerned and adopted the motto "Don't kill your catch" to encourage the release of bass, with the idea of improving the quality of bass fishing in terms of success rates and sizes of fish available to the angler. As management agencies provided information on how to reduce
mortalities, B.A.S.S. provided the information to their membership, and mortalities of fish in B.A.S.S. sponsored tournaments was reduced largely due to modifications in procedures and equipment.

Wydoski (1976) stated that acceptance of other special regulations varies by the type of regulation. For example, special regulations that permit the capture of Bonneville cisco by dipnets in Bear Lake, Idaho-Utah or dipnetting for rainbow smelt in the Great Lakes or the New England states presents no problem to the fishery manager because anglers realize that this method of fishing can be controlled by restrictions on the type of net that is used and that the method may be one of the only means to harvest a renewable stock of fish. However, other special regulations may pose problems to the fishery manager from two opposing groups of anglers, those who accept and those who oppose a particular fishery, e.g., snagging of coho salmon that are surplus to hatchery needs. Although there are no biological reasons to prevent the harvest of salmon in this particular case, social opposition to the "unsportsmanlike" harvest of these fish may pose political problems to the manager.

Wallis (1971) summarized the criteria by which special regulations should be implemented as follows: (1) established to serve a special objective; (2) limited in number to those regulations that are actually required; (3) based upon sound biological principles and supported by research; (4) written clearly so that their true intent is understood by fishermen; (5) acceptable to fishermen; (6) regulations should be available to the fishermen either in printed handouts or clearly visible posters; (7) regulation should be enforceable and enforced; and (8)
periodically reviewed and evaluated for effectiveness in achieving objectives, and revised or abolished if necessary.

Ideally, angling regulations should be: (1) few in number; (2) based on active and continuous research to determine their need; (3) made by the State Conservation Commission and not by the Legislature; and (4) enforced by well-trained conservation officers who place the major emphasis on prevention rather than detection of the violation (Eschmeyer, 1955; Whitney, 1975).

If management practices and regulations are to provide the individual fisherman with a quality recreational experience, he must make an attempt to bring management philosophies and objectives into alignment with his demands. This can be done individually (by writing to the resource management agency), but more practically through the lobbying power available to sportsmen organizations.
Historically, sportsmen were responsible for modern fish conservation. Their dissatisfaction led to the hiring of biologists to serve as trouble-shooters and eventually led to a change from indiscriminate stocking and arbitrarily-made regulations to a more effective fish conservation program (Eschmeyer, 1955). Angling provided more than 33 million habitual fishermen and fisherwomen with over 700 million days of recreation in 1970 (Massemann, 1975a). The task of providing sport fishing for the growing multitude of anglers is a formidable one for responsible state fish and wildlife agencies. The fisherman is now more discriminating, more skillful, better equipped and more mobile than his predecessors; therefore, his efforts are far more effective.

The purpose of this chapter is to identify and discuss the social inputs possible to enhance decisions about management of public use of recreational fisheries, how managers, through use of this information, can be more effective in providing a more satisfying experience, and how fish and wildlife agencies and the public can help bring this about.

Social inputs and the decision making process

Recreational fishery management deals with a renewable resource that can be manipulated by the manager to provide the opportunities
demanded by the public. However, one of the major problems in setting management objectives is to determine what these objectives should be and how well they meet user demands.

Brown (1975) stated that, in setting management objectives, people's preferences, resource characteristics, institutional (legal and organizational) factors, and the current situation and past experiences are important input elements. He further added that the effective weight of any of these factors to the decision making process is dependent upon many things, including the biases and preferences of the managers/administrators involved. The output of these decisions is an explicit set of objectives, which, in the recreational context, define a recreational experience. In other words, the management objectives define the recreational opportunities that the management system will provide.

There are no set formulas for obtaining a workable solution to provide the information the manager needs. However, Figure 6 illustrates a decision making model that has potential use in a recreational fisheries program. Its effectiveness, of course, would depend on how well the manager researched the data that went into this model. Of primary importance is the identification of angler motivations, attitudes and preferences as they pertain to a satisfying fishing experience.

Following Figure 6, management objectives are derived by incorporating an understanding of why people fish with the capabilities of the resource to provide satisfying opportunities. In addition, consideration of institutional directives (fishing regulations and philosophies)
Figure 6. Decision making model for a recreational fisheries program. (Patterned after Brown, 1975).
and the existing situation are important. Management tools useful in the implementation of the objectives are institutional directives, existing situation, and adequate knowledge of the preferences, opinions and attitudes expressed by the fishing public.

Effectiveness evaluation deals with determining whether or not the management system is a means to meet management objectives. We need to know how people feel about the fishing experience they had and how related those feelings are to management decisions. We also need to know whether or not individual preference has changed over time to determine if the management system is relevant to human needs. In addition, some means of determining how the objectives have affected the fishery resource (overfishing, productivity, etc.) should be incorporated. Once this has been done modification of the system can bring about changes that will have bearing on the formulation of new management objectives. Public input is an essential element in this process and the manager should make every attempt to involve the angler. This can be approached in several ways.

Information and education: a means of assessing "needs"

State and federal natural resource agencies became interested in Public Relations (PR) in general and in Information and Education (IE) programs specifically about 40 years ago. Traditionally, IE programs described the activities of a particular agency and the resource it managed (Berry, 1976). Recently, an additional role for federal IE personnel has been that of stimulating increased public involvement in agency decision making. Schoning (1974) stated that standard public
information formalities such as public hearings have been used in federal water resources planning.

Knowledge about the satisfactions, benefits, motives and preferences of wildlife users, and how they vary under different conditions is extremely important to help guide managers. Especially since the demands on recreational fishery resources is increasing while suitable habitat for fish is becoming limited by expanding industrial development, urbanization, and pollution (Duttweiler, 1976).

The use of public surveys and public meetings by state conservation agencies has provided insight into demand. For example, a questionnaire survey of Idaho anglers demonstrated a catch-and-release program was believed to be worthwhile by a majority of anglers (Gordon, 1970). Angler pressure for more fishing areas initiated an urban fishing program in California (Calhoun, 1965), and stocking of trout is a common practice for put-in-take fisheries in many states (Addis and Erickson, 1969; Calhoun, 1964; Gordon et al., 1969; Kennedy and Wood, 1976).

In an issue of Oregon Wildlife (1974) open meetings were announced to all Oregonians who had an interest in the future of marine fishery resources. The purpose of these meetings was to obtain local opinions on fisheries problems and suggestions for management of fishery resources. In Michigan, the objective of fisherman surveys by Michigan Department of Natural Resources personnel was to measure the recreational benefits of the sport fishery for the purpose of guiding public and private investment in fishing and related programs (Jamsen, 1973; Ellefson and Jamsen, 1970). A questionnaire was specifically designed to assess
sociological features that might influence short and long range manage­ment goals in Idaho (Gordon, 1970).

"Selling yourself" to the public is a very important element in the management of wildlife resources today. This is especially true when one considers the power that the public can exert, through court action, in influencing resource management policies. Environmental groups are not only "in" the courtroom now, they have "successfully" sued the United States Government and stopped agencies "in their tracts" (Cutler, 1974). Public inputs are essential in determining what programs and projects currently are "in the public interest" as well as useful in minimizing litigation. Tollefson (1970), in a plan for Washington's food fisheries, stated that an effective plan must be understood and accepted by representatives of resource-user groups as well as by all of the state's citizens. Frome (1975) suggested that concerned citizens need to review closely and participate in drafting enabling state legislation and proposals for funding new programs concerned with protecting all wildlife, not just specific species, as well as the environment.

Kozicky (1969) stated that, when a wildlife program fails to gain public acceptance, departmental personnel should reevaluate their objectives and/or do a better job of educating the public to the biological truth. Kozicky added that we shall always know more biological facts than we are able to sell to the general public; but the public is boss. The problem is to motivate the general public so that it will demand changes for the benefit of our wildlife resources. This can only be brought about through extensive monitoring of public needs and demands while, at the same time, educating the public to management prac­tices that promote a quality renewable resource.
The role of fishery management agencies

To meet public demands, state and federal agencies have cooperated by providing funds for research on fish and the environment. The fish studies included applied basic research. About one-third of the state fishery research is supported by the U. S. Fish and Wildlife Service through Federal Aid in Fish Restoration and Anadromous Fish Conservation programs. Under these cooperative programs in 1974, a total of $12.7 million (including both federal and state matching funds) was scheduled for fishery research (Massmann, 1975b).

The Dingell-Johnson (D-J) program was the culmination of many years of effort by conservationists, enlightened sportsmen, and by the fishing tackle industry who saw the need to bolster efforts of state fish and wildlife agencies in managing recreational fisheries (Massmann, 1975a). This federal aid program of $205 million has made it possible for state fish and wildlife agencies to construct 328 new lakes, totaling 38,000 surface acres; provide public access to 800,000 acres of lakes and estuaries and 2,000 miles of streams; improve aquatic habitats; protect fish from pollution, highway construction, water diversions, logging, and poor farming practices; and through research develop new management techniques and improve upon old ones.

The most important benefit from the D-J program was the opportunity for agencies to employ professional biologists for managing state fisheries. The cost of each D-J project is supported 75 percent by federal funds and 25 percent state funds. Most of the state money is derived from sport fishing license revenues. Thus, the fisherman pays the bill for fish management, in part, through the taxes he pays on
fishing tackle and on the fishing licenses he buys. This assures that
the angler who pays the bill will receive the benefits from the program.

Since 1938, state fish and wildlife agencies have used sports­
men's license fees and special taxes under the Federal Aid in Fish and
Wildlife Restoration Acts to accomplish the following: (1) Acquire, de­
velop, or manage 2,900 wildlife refuges and management areas totalling
nearly 40 million acres. These lands protect vital habitat of a wide
range of wildlife and are heavily used by bird watchers, nature students,
and other outdoor enthusiasts. In 1974, there were 6.5 million visits
by fishermen on all the national wildlife refuges (U. S. Fish and Wild­
life Service, 1975); (2) construct or restore more than 300 lakes for
fish and wildlife with a total surface acreage of 35,000; (3) acquire or
develop more than 3,000 public access areas that open nearly a million
otherwise inaccessible acres and 2,000 miles of stream to outdoor rec­
reational use; (4) conduct extensive research on wildlife habitat needs,
diseases, population trends, predator-prey relationships, and wildlife
crop-damage abatement; (5) assist hundreds of thousands of landowners
with wildlife habitat improvement projects; (6) conduct public conser­
vation education programs for school teachers and students and promote
understanding of wildlife needs and habitats through articles and tele­
vision shows; and (7) protect both hunted and nonhunted wildlife by
apprehending conservation law violators. These violations include pol­
luters whose activities impose serious threats to wildlife and its hab­
itats (Wildlife Management Institute, 1974).

The U. S. Fish and Wildlife Service provides the chief guidance
for the federal aid program by administering research, fish management
services, and hatcheries. In addition, the U. S. Bureau of Outdoor Recreation, the Federal Water Pollution Control Administration, the U. S. Forest Service, the U. S. Park Service, the U. S. Soil Conservation Service, the U. S. Bureau of Reclamation, the Bureau of Land Management, the Tennessee Valley Authority, and the Army Corps of Engineers have programs that significantly affect sport fishing.

The role of sportsmen organizations

Individual sportsmen are only limited help to a fish conservation program; however, organized sportsmen, working together, can be highly effective in influencing the future of fishing (Warner, 1971).

Trout Unlimited is a widely recognized public organization that is dedicated to the preservation of quality fishing and fishing habitat. Hawes (1974) stated that Trout Unlimited's North American Policy for Salmoid Use and Management is concerned with the belief that, "the overall quality of trout and salmon fishing has deteriorated in many areas and that drastic and immediate action is required to restore it." As a member of North Carolina's Trout Unlimited, Hawes recommended a need for better communication and cooperation between federal, state, and local governments and conservation organizations. He suggested a need for a Mountain Land Management Act and land use ordinances by county that will be effective in stopping the deterioration of quality streams. Finally, he stated a need to restore cold water habitats to a condition where their full potential as trout streams can be realized.

Schuder (1974), president of the Virginia Council of Trout Unlimited, suggested that a yearly trout forum be established in the Southeast. He added that it is not enough to merely identify the
problems associated with trout habitat and management, but a program should be established to develop and implement solutions.

It was already pointed out how effective the Bass Anglers Sportsman Society was in curtailing mortality during fishing tournaments by redefining procedures and educating their membership. Aley (1974) stated that cooperation among sportsmen was a key to success in the stream improvement work of Cross Fork Creek, Pennsylvania, and Rosser (1974) described another restoration project in Pennsylvania in which cooperation existed between the state, private individuals, and public organizations (Trout Unlimited) for the fulfillment of a common cause. Klessig and Yanggen (1973) suggested that adequate lake management in Wisconsin can only be successful if local people, as individuals and as members of lake organizations, assume increased responsibilities.

These are only a few examples of the important influence of the public in maintaining quality fishing. Such participation supports the research and development of future management regulations and practices. In fact, public involvement in wildlife conservation is of such importance that the Wildlife Management Institute (1974) listed several steps that the concerned citizen can take to assure the future of America's wildlife.

The satisfactions derived from participation in recreational fishing are as diverse as the individuals themselves. In this respect the manager is faced with the task of determining what opportunities to offer in a multi-satisfaction approach to recreational fishery management. Much of the problem can be avoided by incorporating public input into setting management objectives. In addition, public preferences,
opinions, and attitudes should be monitored and utilized as a tool for evaluating the effectiveness of the management system. This can be accomplished through the use of appropriate information and education programs and objectives. Positive public feedback is the only true measure of the efficiency of a recreational fisheries program.
CHAPTER 6

CONCLUSIONS AND DISCUSSION

"There are two things I can say for sure: two months after you return from a fishing expedition you will begin again to think of the snowcap on the distant mountain peak, the glint of sunshine on the water, the excitement of the dark blue seas, and the glories of the forest. And then you buy more tackle and more clothes for next year. There is no cure for these infections. And that big fish never shrinks."

Herbert Hoover (1964).

Knowledge about the satisfactions, benefits, motives and preferences of fishery resource users, and how they vary under different conditions is extremely important to the manager to provide an efficient and quality-oriented fishery. Questions about the human satisfactions derived from fishing should be among the highest priority issues for research since they will help define the ultimate fishery management product - human experiences with distinctions of quality versus quantity. This is especially true in view of the present large public participation in fishing in many areas, and the estimated future increases in anglers. Fisheries specialists must be as concerned with the management of people as they are fish.

Duttweiler (1976) stated that fishery resource managers must know what anglers desire from their fishing experience before management policy can be shaped for increased user enjoyment. To date, most of the attempts to provide this information have been concerned primarily with
socioeconomic background, incidence of use, distance traveled, and equipment used. While useful, this information does not provide the complete picture. Many such studies have been inadequate because of inadequate research techniques, sample sizes, sampling procedures, follow up procedures, and/or financial support. Inconsistencies of data among different studies may be due to any of these deficiencies, especially sample size, sampling procedures and lack of adequate follow-up procedures.

There are many methods that management agencies can use to generate public input. Attitude and opinion survey techniques offer a promising opportunity for direct public input. These methods include mail surveys, telephone surveys, and personal interviews or various combinations of these techniques.

A questionnaire survey can be a useful tool to the fishery manager. The questionnaire can be easily adapted to most problems but often they have not been adequately prepared, presented, or evaluated. To be useful, questionnaires must outline specific objectives by the management agency, and should be designed to obtain answers to these objectives. It should be pre-tested to check its clarity, and sent out to a randomly selected group of anglers to prevent or minimize bias (using statistically sound techniques to obtain an adequate sample size, distribute the questionnaire by population within the state, etc.). A follow-up letter concisely stating the importance of the survey (or telephone call) will increase returns.

Design, procedures for applying questionnaires (methods), and statistical reliability are provided in the annotated bibliography of Potter et al. (1972). Individual studies that provide ideas on the
application of questionnaires and the information derived from this technique are given in Addis and Erickson (1966), Bevins et al. (1968), Brown (1968), U. S. Fish and Wildlife Service (1962, 1972), Gordon (1970), Hoagland (1973) and Sofranko and Nolan (1970).

Once precise research has been performed to define the primary motives of fishermen and the components of satisfactory fishing experiences, attention should be directed at who should set up objectives - agency personnel or the interested public. Hampton and Lackey (1975b) suggested, with the rise in public participation in all environmental matters, the latter course appears to be the most realistic.

In the management of wildlife resources, and informed and concerned public is essential for efficient decision making of natural resource management. Willeke (1973) stated, "a planning process involving the public is more nearly a democratic process and, as such, may have a higher probability for success because it provides representation from those who are affected." However, management personnel cannot rely solely on public opinion in formulating decisions, but it is valuable input because light may be shed on response to management actions (Lime and Stankey, 1971). The interaction between fishery resource managers and the fishing public will bring greater appreciation for both sides' point of view and problems. It will also help develop management objectives more in tune to providing quality social benefits to anglers and environmental protection.

Citizens may participate in fishery management decision making through letter writing, attending public hearings, or joining pressure groups. However, many people fail to participate because they feel
their efforts would be in vain (Hampton and Lackey, 1975b). Agencies need to emphasize that the information derived from the public will be used to aid in making decisions. Also, agencies need to solicit public participation from the entire affected group because individuals who attend public hearings may not be representative and, thus, tend to project a distorted view of a management problem. Public involvement will help to insure that optimal decisions are made toward satisfying public demand for quality recreational fishing.

Fishery managers should strive to incorporate "multiple-satisfactions" as an important element in their management objectives since there are numerous motives and preferences expressed by different types of fishermen. We would be "fooling" ourselves if we attempt to carry out these objectives by trying to manage for the "average" angler.

In areas of intensive angling use alternatives to reduce this pressure and prolong fishing quality have been suggested by several authors. Northcote (1970) stated that under conditions of intensive use, it should be beneficial to spread fishing pressure over a wide diversity of species and water. Duttweiler (1976) added that management emphasizing any single species is not appropriate unless a substantial majority of fishermen prefer that species over all others. If this is not the case, a multiple species management program is desirable.

Some state agencies have reacted to the increased fishing demands placed on certain species by attempting to increase interest in "secondary" fishes such as carp (Gebhards, 1972; Heley, 1977), catfish (Phillips, 1975), and whitefish (Way, 1976). These fish not only offer good eating, but also provide additional recreation for fishermen. Stocking will
continue to have its place in fishery management since size and numbers can be controlled by the manager, thus having a direct effect on satisfying preferences such as "size of fish caught" and "number of fish caught." Catch-and-release fisheries will continue to provide a quality fishing experience for large numbers of anglers, and in situations where "avoiding crowds" is an important motive of fishermen a program limiting the number of fishermen in an area might prove satisfactory.

Fishermen participate in recreational fishing for many reasons; some of which have not been adequately documented. This paper attempts to shed light on this fact and thus bring attention to the need for more research into this important, if not most important, aspect of fishery management - the fisherman.
CHAPTER 7

SUMMARY

Fishery resource management is based on the assumption that fishing provides benefits to people. This was as true when the founders of the profession developed the guiding principles for fishery management as it is today. Yet conditions have changed. Today, there is even more interest in the application of fishery management to provide human benefits, especially what these benefits are. Our rapidly growing population as well as our rising income levels are creating a growing demand for nearly all types of outdoor recreation.

Fishermen are outdoor recreationists and demands on recreational fishing are becoming limited by expanding industrial development, urbanization, and pollution. Fishing is one of the most popular of all the traditionally-recognized participative forms of outdoor recreation in terms of percentage of population involved. However, the reasons why angling is so popular with Americans remain imperfectly analyzed and understood.

Wildlife management is people management and there is need for additional knowledge of the using public. To date, most of the attempts to provide this information have been concerned primarily with socio-economic background, incidence of use, distances traveled, and equipment used. Very little research concerning the motivations of fishermen has been done in the past.
Results of research that has been done may not explain why people fish, but they do provide some insight into what fishermen consider to be important elements that influence their fishing enjoyment. Fishing means many things to fishermen who derive multiple "satisfactions" or realize many different types of satisfying experiences. Recreational fishing is also a complex experience consisting of the preparation for the trip, travel to the site, on-site experience, travel back home, and recollection of the trip. The most frequently cited reasons for fishing were: for relaxation, "escapism," enjoyment of nature, for fun, and for "companionship." Also of importance to the fishing experience is the existence of fish as well as the size and number of fish caught. In addition, fishing holds a therapeutic value for some individuals and is often a method for treatment of some psychological disorders.

Understanding why people fish is only a portion of the recreational picture that managers need to be concerned with. Quality of, and satisfaction from, the recreational experience are dependent on how well they influence the needs that motivate angler participation. Some aspects of quality expressed by fishermen as important to their enjoyment of the fishing experience were: clean water, natural beauty of the area, presence of people, and angling success. It was also found that fishermen were satisfied to catch "any fish" even though they expressed a preference for a particular species of fish. Thus catching fish was preferred to catching no fish.

Three types of fishermen were described as "Purists," "Active Sportsmen," and "Incidental Fishermen." The individuals perception of the fishing experience was suggested to be correlated with the type of fisherman he was.
An assortment of management practices and regulations were analyzed and the corresponding reactions of fishermen were presented. Reactions to catch-and-release or fishing-for-fun programs varied, but many of the fishermen found them to be worthwhile. In some instances it did cause the decline in fishing participation because take-home of proof of "angling prowess" was found to be an essential element of the fishing trip. It was also found that when fishing was unsuccessful more individuals broke the regulations and kept fish.

Stocking of fish is essential in the management of some fishery resources. Although there are groups such as "the real sportsmen" who don't agree with stocking practices, the majority of the fishermen saw a need for it and, in some cases, there was a demand for yearly stocking of fishing waters.

Fishermen preferences have changed management practices in specific instances to save a particular species of fish or aid in providing a satisfactory fishing experience. In other cases organizations of fishermen have provided guidelines to their membership which reflect concern for the maintenance of a fishery resource. Acceptance of special regulation was found to vary by the type of regulation.

Ideally, angling regulation should be few in number, based on adequate research, made by state conservation departments, and enforced by well-trained conservation officers who place major emphasis on prevention rather than detection of the violation.

Fishery resource management has come a long way since it all began. The response of private, state, and federal organizations to meet angler needs has become habitat and quality oriented. Federal agencies controlling large public domain have sought to provide varied
recreational fishing opportunities to the public in accordance with its management policies.

With the increased demand for both coldwater and warmwater varieties of fish there is increased effort to promote "secondary" species of fish for recreational consumption by the fishing public. However, the resource manager should make an attempt to maximize the recreational opportunity offered by utilizing all the preferred species as far as is biologically and economically feasible.

Through cooperation of individuals, conservation groups, and state and federal agencies much has been done to facilitate the preservation of habitat and wildlife resources. However, continued education of the public to efficient fishery management is essential, and every effort should be made to involve public participation and opinion in the decision making process of our fishery management agencies if a satisfactory recreational fishery program is to succeed.
LITERATURE CITED


