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ANGLERS' ATTITUDES TOWARD THE FISHERIES MANAGEMENT POLICIES OF THE LOGAN AND BLACKSMITH FORK RIVERS, UTAH

by

Larry Edwin Riley

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

of

MASTER OF SCIENCE

in

Political Science

UTAH STATE UNIVERSITY
Logan, Utah

1987

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Larry Edwin Riley

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ABSTRACT

Anglers' Attitudes Toward the Fisheries Management Policies of the Logan and Blacksmith Fork Rivers, Utah

by

Larry Edwin Riley, Master of Science

Utah State University, 1987

Major Professor: Dr. Calvin Hiibner
Department: Political Science

In the summer of 1986, anglers along three sections of the Logan and Blacksmith Fork Rivers, Utah were surveyed as to their attitudes toward fish stocking, habitat improvement, and wild trout management policies. Information concerning socio-demographic characteristics and angling values were ascertained as well. Data were crosstabulated to determine which of the variables influence anglers' attitudes toward specific fisheries management policies and the type of angling opportunity provided.

The analysis of data showed differences between the types of anglers using the three sample sections. The data showed that variables such as preferred angling method, preferred water type, number of fishing trips taken this year, age, importance of keeping fish, and whether an angler emphasizes catching a large number of fish or large fish, can influence anglers' attitudes

toward fisheries management policies.

The ungrouped data showed that the anglers sampled preferred: to catch brown or cutthroat trout; fish stocking to be limited to waters which have little or no natural reproduction or production; larger (14 inch) catchable size trout to be stocked even if it means a smaller number of fish will be stocked; the State to emphasize habitat improvement right along with fish stocking in their management plan; and the continuation of the policy to provide a limited amount of "wild trout" regulated waters for angling variety.

(76 pages)

INTRODUCTION

This paper describes the anglers (an angler is one who fishes with hook and line) on the Logan and Blacksmith Fork Rivers; it includes: their demographic characteristics, angling values (reasons for angling, importance of keeping fish, etc.), and attitudes toward the fisheries management policies of the Logan and Blacksmith Fork Rivers. It also compares these attitudes with current Utah Division of Wildlife Resources fisheries management policy and stresses the value of and need for the use of socio-political data in the planning and management of fisheries resources.

Nature of the Problem

Logan and Blacksmith Fork Rivers rank 5 and 3 on angler use days (1 meaning the river with the highest angler use days) compared to the other rivers in the state of Utah (Johnson, 1981). These rivers are interesting in that they are suited both geographically and biologically for several different types of trout management and angling. Since the rivers are located just a few miles apart, they serve anglers in essentially the same geographical areas. Collectively, the rivers provide three types of trout angling-- lake, river, and "wild trout." ("Wild trout" refers to a special regulation body of water. Generally, artificial lures and flies are the only baits permitted, and restrictive creel and size limits

usually apply.) Both rivers contain wild populations of brown trout, mountain whitefish, and to a lesser extent cutthroat and rainbow trout. (Wild fish are fish that were spawned, incubated, hatched, and reared in the wild, not in a hatchery.) There are also significant populations of stocked rainbow trout during certain times of the year.

Providing for angling variety may be important to the angling public. A study in Stone (1977) showed Wyoming anglers divided (in preference) among five different fisheries management strategies. The study showed that 23.6% of the anglers preferred basic yield, 12.8% put and take, 16.4% trophy, 6.1% species, 29.3% wild trout, and 11.8% other management.

Since fisheries resources are managed for the good of the public, opportunities should be provided for the public to realize the experiences they desire (Driver & Knopf, 1976; Hampton & Lackey, 1976). Just as anglers have their preferred angling techniques, management concepts can strive to provide anglers with their preferred type of angling opportunities (Stone, 1977).

Waters such as the Logan and Blacksmith Fork Rivers give managers a variety of management options, enabling managers to provide diverse angling opportunity. In order for managers to provide diverse angling opportunity, user needs and preferences must be known. By sampling user opinion, fisheries managers may have a

better basis for formulating fisheries management policy.

Objectives

Since the "average" sportsman does not exist, it makes little sense to base all management decisions on the mean. Information on angling values, demographics, preferred angling methods, preferred environments, and motivations for angling should be considered as well as the attitudes toward specific fisheries management policies. In light of this, five objectives were selected for this paper:

1) To describe selected demographic characteristics of the Logan and Blacksmith Fork River anglers.

2) To describe selected angling values of the Logan and Blacksmith Fork River anglers.

3) To describe angler attitudes toward fish stocking practices, habitat management, and wild trout management.

4) To estimate use patterns for the sampling period.

5) To compare current Logan and Blacksmith Fork River fishery management policies with user preferences.

LITERATURE REVIEW

Angling has become a very popular form of outdoor recreation. Because of conflicts in water uses, effective fisheries management has become more difficult to accomplish. Fishery managers have to find a balance between the desires of anglers and other water users. Increased angler-induced mortality has made it necessary for managers to implement protective fishing regulations and has brought about an attitude that in some cases recycling (catch and release) is an acceptable management alternative (Anderson & Hehring, 1984).

Besides the conflicts in water use, in general, there are also conflicts among anglers. Anglers have different preferred angling methods, different reasons for angling, and different attitudes toward conservation and the environment. It is no wonder that many of the critical issues in fisheries management take the form of "people problems" rather than exclusively biological problems (Bryan, 1979). Although the importance of political and social research in natural resources has been neglected by biologists in the past (Hendee & Schoenfeld, 1973), social scientists are now being asked to do research which once was reserved for biologists (Bryan, 1979; Hummel & Foster, 1986). Social research along with biological data can be very valuable in formulating fisheries management policy, enabling the allocation of limited resources to meet the

diverse angling desires.

Angler Behavior

There are many reasons why people angle. Some of these are: to experience nature, escape, exploration, achievement, relaxation, and family togetherness (Driver & Cooksey, 1978; Hendee & Schoenfeld 1973). Traditionally, fishery managers have been mainly concerned with yield. Several studies have indicated that "getting outdoors" may be more important to anglers than catching fish (Hamton & Lackey, 1976; Mallet, 1980; Weitham & Anderson, 1978b). In contrast to this, Hoagland and Kennedy (1974) suggested that catch may be more important than anglers want to admit and that angling may be secondary as long as a reasonable catch is maintained. This indicates that anglers motivations on a whole are complex.

Just as the reasons for angling are complex, so are the desired environmental factors in an angling area. The following environmental factors can influence an angling experience: natural beauty, water quality, privacy, ease of access, camping availability, closeness to home, chance to catch large fish, chance to catch wild fish, chance to catch a specific species of fish, and water type (lake, stream, or river) (Harris & Bergersen, 1984; Hudgins, 1984; Moeller & Engelken, 1972; Stone, 1977). A person's reasons for angling, as well as

environmental factors, can greatly influence their desired angling opportunity. For example, an angler who prefers angling in a pristine water, with less people, and wild trout, would be more suited to a "wild trout " managed stream. An angler wanting an outing with the family, where ease of access, nice camping areas, and angling opportunities for children are important, would prefer a water managed "put and take." ("Put and take" refers to the practice of stocking catchable size fish in a lake or stream making the fish immediately available for harvest. This stocking practice generally occurs in heavily fished waters with inadequate natural reproduction and production.)

By considering angler behavior in fisheries management decisions, fishery managers can provide angling diversity. Aside from biological considerations (which can limit management options), social factors must be considered (Stone, 1977).

The Use of Socio-Political Data in Formulating Fisheries Management Policy

The growth of technology and population have severely impacted outdoor recreational resources, making wise management of existing resources difficult (Bryan, 1979). Fisheries resources are no different, today's angling equipment and techniques allow for a more

efficient harvest of fish, making restrictive regulation increasingly necessary. Increased angling pressure is a problem as well. Not only does it deplete fish stocks more quickly, but the diverse preferences of the many anglers requires fishery managers to provide a variety of angling opportunities on a limited number of waters.

The need to understand outdoor recreationists' attitudes and preferences has resulted in a growing body of social science based literature (Bryan, 1979). In the past, fishery managers relied on incoming mail, sportsman groups, and field workers to provide data on angler desires. This strategy may result in biased information about angler desires. Dissatisfied people are more likely to express their opinions voluntarily than are satisfied people (Mcfadden, Ryckman, & Cooper, 1964). Use of a questionnaire with a random sampling strategy can avoid this problem while targeting a specific population (Duttweiler, 1976).

Sampling anglers from license lists may also fail to reach the users of a specific body of water. When using license lists there is no way of knowing if the anglers frequent a given water. Dunning and Hadley (1978) reported that up to 40% of anglers in all states were unlicensed (either angling illegally or under age). Unless omitting these groups intentionally is desireable or regionwide data is needed, an on-site census of a specific water

would be more effective.

Anglers' interests, needs, and preferences should be represented in fisheries management and planning. This information must be known before responsible fisheries management decisions can be made (Duttweiler, 1976; Harris & Bergersen, 1984). User data becomes very valuable in cases where the biological and environmental aspects of a body of water allow for a variety of management options. Angler input should be a strong determinant of fisheries management policy in all cases except those where the biological and environmental circumstances make a resource uniquely suited for a single species or management type (Duttweiler, 1976).

In conclusion, if the potential values of fisheries resources are to be realized, managers must maintain quality as well as quantity in their fish populations (Weithman & Anderson, 1978a). Considering anglers' desires, needs, and preferences in the formulation of fisheries policy can improve the quality of recreational angling.

METHODS

Sampling Procedure

This research involved sampling angler opinion by the use of a questionnaire. The population consisted of anglers along three sections of the Logan and Blacksmith Fork Rivers: (1) the impoundments-- which include first and third dams on the Logan River and second dam on the Blacksmith Fork River; (2) the river-- which includes the river sections between first dam and right hand fork of the Logan River and Blacksmith Fork River sections from the canyon mouth to the beginning of the "wild trout" section; and (3) The wild trout section of the upper Blacksmith Fork River.

Anglers were interviewed on-site during the last two weeks of August and the first two weeks of September, 1986. Each interview lasted approximately ten minutes. Dates and times of sampling were randomly selected over an even distribution of weekdays, weekends, holidays, mornings, afternoons, and evenings. The sample size was 104, distributed somewhat equally between the three sample sections.

The Instrument

The questionnaire consisted of 20 closed- ended and five open-ended questions (see Appendix). The

questions were divided into four sections-- (1) reasons for angling, (2) angling values, (3) fisheries management policies, and (4) the demographic characteristics of the anglers. Answers were recorded in coded form, except occupation, and place of residence, which were coded at a later date.

The pretest took place on a saturday, along a section of the first dam impoundment, on the Logan River. As a result, two questions (which were essentially the same as two other questions) were removed. Two other questions were also slightly reworded in order to improve their clarity.

Analysis of Data

Data were analyzed using Statistical Package for the Social Sciences (SPSSX) (Nie, Bent, & Hull, 1986). The following statistics were used where applicable: frequencies with percentages, chi-square, and pearson's correlation. Chi-square and pearson's correlation statistics are only mentioned when significant equal to or greater than the .05 level. Crosstabulation analysis was used to describe the data using water environment, preferred angling method, and select demographic characteristics as independent variables.

DESCRIPTION OF SAMPLE

The "average" Logan and Blacksmith Fork River angler is: male, 43.6 years old, living in the region (Salt Lake, Davis, Weber, Rich, Box Elder, counties, Utah and Franklin county Idaho), skilled occupationally, somewhat college educated, and a 27.4 years veteran to angling. This statement was derived from the mean or highest frequency of six socio-demographic characteristics measured during this study. These characteristics are: gender, age on last birthday, place of residence, occupation, highest education completed, and years involved in angling.

Gender

Logan and Blacksmith Fork River anglers are predominantly male. The sample showed 88.5% (92) male and 11.5% (12) female. A survey conducted by Moeller and Engelken (1972) showed a similar percentage of male anglers in Ohio (90%); data reported by Bevins, Bond, Corcoran, McIntosh, and McNeil (1968) showed 87% male anglers in an average of six northeastern states, and Harris and Bergersen (1984) showed that 79% of the anglers in Colorado were male. In addition to their low numbers, the females sampled were mainly found angling in the impoundments, and preferred bait-casting as their angling technique.

Age

The mean age of the anglers is 43.6 years (all anglers sampled were 18 years of age or older), median:39 years, mode:30 years, with a range of 69 years (19 to 88). This data is similar to Moeller and Engelken (1972) and Bevins et al. (1968). Both reported an average angler age of 40 years; their data represents the anglers of Ohio and an average of six northeastern states. Table 1 shows the anglers' ages grouped in ten year increments. The largest group is 26-35 years which has a frequency of 30; this represents 28.5% of the total sample.

Table 1

Angler Ages

Age	Value	N	Percent	Cum. Percent
Under 26	1	13	12.5	12.5
26-35	2	30	28.5	41.3
36-45	3	17	16.3	57.7
46-55	4	14	13.5	71.2
56-65	5	18	17.3	88.5
Over 65	6	12	11.5	100.0

Mean: 3.29 Mode: 26-35 Years

Place of Residence

Place of residence is coded in four groups: (1) local-- which includes those anglers who live in Cache county; (2) in-region-- which includes those anglers living within Salt Lake, Davis, Weber, Rich, and Box Elder counties, Utah and Franklin county, Idaho; (3) out-of-region--which includes all other anglers in Utah, southern Idaho, and southwestern Wyoming not included in group one or two); and (4) out of state-- which includes all anglers not residing in Utah, southern Idaho, or southwestern Wyoming . The data suggests most Logan and Blacksmith Fork River anglers reside in-region (47.1%), followed by local residents (40.4%). Table 2 shows frequencies and percentages for all four groups.

Table 2

Angler Places of Residence

Residence	Value	N	Percent	Cum. Percent
Local	1	42	40.4	40.4
In Region	2	49	47.1	87.5
Out of Region	3	3	2.9	90.4
Out of State	4	10	9.6	100.0

Mean: 1.82 Mode: In Region

Occupation

The most common occupation level is skilled with a frequency of 44 or 42.3%. It was followed by professional with a frequency of 35 or a percent of 33.7. When grouped together, skilled and professional occupation levels have a frequency of 79 and a percent of 76. This data suggests that most Logan and Blacksmith Fork River anglers are from a middle socio-economic class. Table 3 shows frequencies and percentages according to occupation level.

Table 3

Angler Occupational Level

Occupational Level	Value	N	Percent	Cum. Percent
Non-Skilled	1	9	8.7	8.7
Semi-Skilled	2	16	15.4	24.0
Skilled	3	44	42.3	66.3
Professional	4	35	33.7	100.0

Mean: 3.01 Mode: Skilled

Education

A total 59.6% of the anglers had at least some college education. The most frequent category was "less than four years of college" which accounted for 36.5% of the sample. "High school grad." was second with 34.6% of

the total. Table 4 shows the educational levels of Logan and Blacksmith Fork River anglers.

Table 4

Angler Educational Level

Educational Level	Value	N	Percent	Cum. Percent
<High School Grad.	1	6	5.8	5.8
High School Grad.	2	36	34.6	40.4
<Four Years Coll.	3	38	36.5	76.9
College Grad.	4	9	8.7	85.6
Post Grad.	5	15	14.4	100.0

Mean: 2.91 Mode: <Four Years College

Years Involved in Angling

Logan and Blacksmith Fork River anglers have been involved in angling for an average of 27.4 years, with a median of 25.5, a mode of 20, and a range of 79 (1 to 80 years). When grouped, the data shows the highest frequency as "11 to 30 years" which has a frequency of 49 or 47.1% of the total sample. This group is followed by "31 to 50 years," which has a frequency of 27 or a percentage of 26. Table 5 gives catagories, frequencies, and percentages of years involved in angling.

Table 5

Years Involved in Angling

Years	Value	N	Percent	Cum. Percent
Under 10	1	19	18.3	18.3
10-30	2	49	47.1	65.4
31-50	3	27	26.0	91.3
Over 50	4	9	8.7	100.0

Mean: 2.25 Mode: 10-30 Years

FINDINGS

This chapter deals with the results of two types of questions asked in this survey: angling values and views on fisheries management policy.

Angler Values

Once it has been determined that angling is a major use of a given body of water, it can be determined which fisheries management policies should be emphasized (Duttweiler, 1976). Angler values can play an important part in determining these policies. These data may be used to determine acceptable creel limits, bait regulations, number and size of fish to stock, and which species of fish to emphasize.

Data on angler values is divided into five groups: (1) preferred angling method, (2) preferred water type, (3) preferred species of fish to catch, (4) emphasis when angling, and (5) importance of keeping fish.

Preferred Angling Method

When making fisheries management policies which create special regulation areas such as "wild trout" or special management areas such as "put and take," data on preferred angling method can be very useful. Each type of angler (bait-fisherman, spin-fisherman,or fly-fisherman) may require different fisheries management policies in

order to provide their given angling opportunity.

When asked, "what angling method do you prefer?" anglers were given four choices: (1) bait-casting, (2) spinning, (3) fly-fishing, and (4) no preferred angling method. Looking at the data ungrouped, bait-casting (44%) is the most preferred angling method, followed by fly-fishing (37%)-- spinning is the least popular at 14%. (see table 6).

Table 6

Ungrouped Data for Preferred Angling Method

Angling Method	Value	N	Percent	Cum. Percent
Bait-Casting	1	44	42.3	42.3
Spinning	2	14	13.5	55.8
Fly-Fishing	3	37	35.6	91.3
No Preferred	4	9	8.7	100.0

Mode: Bait-Casting

Table 7 shows a crosstabulation of sample section by preferred angling method. When grouped according to sample section, the preferred angling method corresponds to the expected water environment. Of those anglers sampled on the impoundments 64.9% preferred bait-casting, 2.7% spin-casting, 16.2% fly-fishing and 16.2% had no preferred angling method. Percentages show a reverse trend

when looking at the wild trout section. Anglers sampled on the wild trout section show that 15.6% preferred

Table 7

Sample Section by Preferred Angling Method

Preferred Angling Method	Sample Section: Impoundments (%)	River (%)	Wild Trout (%)
Bait-Casting	64.9	42.9	15.6
Spinning	2.7	11.4	28.1
Fly-Fishing	16.2	40.0	53.1
No Pref. Method	16.2	5.7	3.1
Total (%)	100.0	100.0	100.0

Chi-Sqr.= 29.02 Sig.= .0001

bait-casting, 28.1% preferred spinning, 53.1% preferred fly-fishing, and 3.1% had no preferred angling method. The river section data shows preferred angling method for anglers sampled on the river section to be somewhere in the middle of the frequencies for the impoundment and wild trout sections. Bait-casting and fly-fishing are preferred almost equally on the river section 42.9% and 40.0%, followed by spinning 11.4% and "no preferred method" 5.7%. It should be noted these data show that anglers preferring spinning are more likely to use the wild trout section as

well as anglers preferring fly-fishing.

Years involved in angling can influence what method an angler prefers. Bryan (1977) stated that as an angler progresses through time he/she will tend to specialize by method, beginning as a bait-fisherman and progressing to a fly-fisherman. These data support Bryon's theory.

Years involved in angling by preferred angling method is shown in table 8. Of those anglers with less than 10 years involvement in angling, 57.9% preferred bait-fishing, while 10.5% preferred fly-fishing. Anglers with between 11 and 30 years involvement preferred bait-fishing 46.9% to fly-fishing 32.7%. When the number of years is increased to 31 or more, the trend begins to reverse. Of those anglers with between 31 and 50 years angling involvement, 29.6% prefer bait-fishing while 44.4% prefer fly-fishing. And finally, of those anglers having over 50 years involvement in angling, 22.2% prefer bait-fishing and 66.7% prefer fly-fishing. Also, there are no anglers with over 50 years angling involvement which have no preferred angling method.

Table 8

Years Involved in Angling by Preferred Angling Method

Years Involved Angling	Preferred Angling Method				
	Bait-Casting (%)	Spinning (%)	Fly-Fishing (%)	No Pref. Method (%)	Total (%)
Under 10	57.9	15.8	15.8	10.5	100.0
10-30	46.9	14.3	32.7	6.1	100.0
31-50	29.6	11.1	44.4	14.8	100.0
Over 50	22.2	11.1	66.7	0.0	100.0

Preferred Water Type

Information on preferred water type is used similarly to that of preferred angling method when formulating fisheries management policy. Four answers were possible for preferred water type: (1) any water containing fish, (2) lakes, (3) large streams, and (4) small streams.

The majority of the anglers selected large streams (33.7%), followed by small streams (28.8%), with a combined percentage of (62.5%). Those selecting "any water containing fish" (19.2%) and lakes (18.3%), ranked third and fourth respectively. (see table 9).

These percentages are no surprise, since most of

the sample area is stream environment, and anglers who prefer a given water type are generally attracted to that water type. Most anglers interviewed preferred angling in

Table 9

Ungrouped Data for Preferred Water Type

Preferred Water Type	Value	N	Percent	Cum. Percent
Any Water	1	20	19.2	19.2
Lakes	2	19	18.3	37.5
Large Sstreams	3	35	33.7	71.2
Small Streams	4	30	28.8	100.0

Mode: Large Streams

large or small streams. Table 10 shows a relationship between sample section and preferred water type. Note that of the anglers sampled on the impoundments, the majority (37.8%) preferred "any water containing fish." This may support Bryan's (1977) hypothesis that the majority of occasional anglers prefer "any water containing fish," and novice anglers are more likely to be found angling in lakes.

Table 10

Sample Section by Preferred Water Type

Sample Section	Preferred Water Type				
	Any Water (%)	Lakes (%)	Large Streams (%)	Small Streams (%)	Total (%)
Impoundment	37.8	27.0	13.5	21.6	100.0
River	11.1	14.3	37.1	37.1	100.0
Wild Trout	6.3	12.5	53.1	28.1	100.0

Chi-Sqr. = 22.71 Sig.= .0009

Preferred Species

Fish species preferred by anglers can be very useful in determining species management (Duttweiler, 1976). Anglers choose between five catagories for preferred species of fish: (1) rainbow trout, (2) brown or cutthroat trout, (3) any trout, (4) mountain whitefish, and (5) any fish.

The species of fish overwhelmingly preferred by Logan and Blacksmith Fork River anglers are brown trout and cutthroat trout. Brown trout constitute the bulk of the wild trout in the waters of the sample sections; cutthroats were included in the same category because they are endemic as well as wild. Table 11 shows of all anglers sampled 62.5%

Table 11

Ungrouped Data for Preferred Species

Preferred Species	Value	N	Percent	Cum. Percent
Rainbow Trout	1	11	10.6	10.6
Brown or Cutthroat	2	65	62.5	73.1
Any Trout	3	16	15.4	88.5
Mountain Whitefish	4	1	1.0	89.4
Any Fish	5	11	10.6	100.0

Mode: Brown or Cutthroat

preferred brown or cutthroat trout, this is followed by "any trout" (15.4%), rainbow trout, and "any fish" both 10.6%, and mountain whitefish 1%.

Tables 12 and 13 show when data is grouped by sample section or preferred method, the results are the same: the majority of the anglers prefer brown or cutthroat trout. However, the data suggests a relationship between the sample section and the percentage of anglers preferring either brown and cutthroat trout or rainbow trout. The percentage of anglers preferring brown or cutthroat trout increases as you move from impoundments (45.9%), to river (65.7%), and to wild trout section (78.1%). The opposite is expressed with rainbow trout. 16.2% of those anglers sampled on the impoundments preferred rainbow trout, while 11.4% on the river section,

and 3.1% on the wild trout section.

Table 12

Sample Section by Preferred Species

Sample Section	Preferred Species: Rainbow (%)	Brown or Cutthroat (%)	Any Trout (%)	Mountain Whitefish (%)	Any Fish (%)	Total (%)
Impoundment	16.2	45.9	18.3	0.0	18.9	100.0
River	11.4	65.7	17.6	0.0	5.7	100.0
Wild Trout	3.1	78.1	9.4	3.1	6.3	100.0

Table 13

Preferred Angling Method by Preferred Species

Preferred Method	Preferred Species: Rainbow (%)	Brown or Cutthroat (%)	Any Trout (%)	Mountain Whitefish (%)	Any Fish (%)	Total (%)
Bait-Casting	20.5	45.5	15.9	0.0	18.2	100.0
Spinning	7.1	64.3	21.4	0.0	7.1	100.0
Fly-Fishing	2.7	78.4	13.5	2.7	2.7	100.0
No Preferred	0.0	77.8	11.1	0.0	11.1	100.0

Emphasis When Angling

Whether anglers emphasize large fish or a large number of fish may helpful in formulating policy for trophy fish management or in determining the size and number of fish to be stocked in a "put and take" water. Three answers were possible for "emphasis while angling": (1) catch a large number of fish, (2) catching large fish, and (3) catching fish is not important.

"Catching large fish" was the most frequent answer at 64.4%. It was followed by "catch a large number of fish," 22.1%, and "catching fish is not important," 13.5%. (see table 14).

Table 14

Ungrouped Data for Emphasis When Angling

Emphasis	Value	N	Percent	Cum. Percent
Large Number	1	23	22.1	22.1
Large Fish	2	67	64.4	86.5
Fish Not Import.	3	14	13.5	100.0

Mode: Large Fish

The analysis shows no statistically significant relationship of "emphasis when angling" by sample section, preferred method, or "importance of keeping fish." The data shows that most Logan and Blacksmith Fork River

anglers are mainly interested in catching large fish while angling.

Bryan (1977) showed the emphasis on quantity of fish to decreases with movement from occasional anglers to "technique specialists" (fly-fisherman). The opposite was shown for emphasis on catching large fish. This data supports Bryan. When crosstabulating "number of fishing trips this year" by "emphasis when angling," the majority of anglers who are found to emphasize large numbers of fish are occasional anglers (less than ten trips this year). The opposite is true for anglers emphasizing large fish; the majority of those anglers had been out more than ten times this year. (see table 15).

Table 15

Number of Trips This Year by

Emphasis When Angling

	Number of Trips					
Emphasis	5 and Under (%)	6-10 (%)	11-20 (%)	21-40 (%)	41 or More (%)	Total (%)
Large Number	43.5	30.4	8.7	8.7	8.7	100.0
Large Fish	20.9	17.9	23.9	19.4	17.9	100.0
Fish Not Important	35.7	7.1	21.4	0.0	35.7	100.0

Chi-Sqr.= 15.26 Sig.= .0542

Importance of Keeping Fish

Information on the importance of keeping fish can be very useful in determining policies which restrict creel limit. Anglers in Colorado showed opposition to regulations requiring them to release large fish and also regulations requiring them to release all but one or two fish (Harris & Bergersen, 1984). Sometimes restrictive creel limits are necessary to protect the resource. However, knowing anglers' attitude toward keeping fish before the restrictions are in place, may allow fisheries managers to formulate fisheries management policies which minimize opposition.

Data on importance of keeping fish was coded on a scale from one to five, one being not important and five being very important. The ungrouped data shows a normal distribution with value 3, 31.7%, being the most popular, followed by value 1, 25%, and value 5, 21.2%. (see table 16).

Table 16

Ungrouped Data for Importance of Keeping Fish

Importance of Keeping Fish	N	Percent	Cum. Percent
1) Not Important	26	25.0	25.0
2)	17	16.3	41.3
3)	33	31.7	73.1
4)	6	5.8	78.8
5) Very Important	22	21.2	100.0

Mean: 2.82 Mode: Value 3

When crosstabulating preferred angling method by importance of keeping of fish, the data shows a significant relationship. The bait-fisherman show 20.4% of them rating the keeping of fish as value 1 or value 2, while 48.7% rated it as value 5 or value 4. 64.8% of the anglers who prefer fly-fishing rated keeping of fish as value 1 or value 2, while 5.4% rated keeping of fish as value 4 and 0% as value 5. (see table 17).

Table 17

Preferred Angling Method by Importance of Keeping Fish

Preferred Method	Importance of Keeping Fish					
	1) Not Import. (%)	2 (%)	3 (%)	4 (%)	5) Very Import. (%)	Total (%)
Bait-Casting	13.6	6.8	31.8	9.1	38.6	100.0
Spinning	35.7	21.4	28.6	0.0	14.3	100.0
Fly-Fishing	35.1	29.7	29.7	5.4	0.0	100.0
No Pref. Method	22.2	0.0	44.4	0.0	33.3	100.0

Chi-Sqr.= 30.51 Sig.= .0023

Table 18 shows crosstabulation between sample section and keeping of fish. This comparison produces results similar to preferred angling method by the keeping of fish. Of anglers sampled on the impoundments, 18.9% rated the keeping fish as value 1, while 43.6% rated it as value 5. Anglers sampled on the wild trout section rated keeping of fish as value 1, 34.4% of the time and value 5 only 3.1% of the time.

Table 18

Sample Section by Importance of Keeping of Fish

	Importance of Keeping Fish					
Sample Section	1) Not Import. (%)	2 (%)	3 (%)	4 (%)	5) Very Import. (%)	Total (%)
Impoundment	18.9	5.4	27.0	5.4	43.2	100.0
River	22.9	14.3	37.1	11.4	14.5	100.0
Wild Trout	34.4	31.3	31.3	0.0	3.1	100.0

Chi-Sqr.=27.50 Sig.=.0006 Pearson's r=-.3997 Sig.=.0000

Attitudes Toward Fisheries Management Policies

Once fisheries management policies are in effect, a fisheries manager may want to evaluate the anglers' general attitudes toward them. They may also want to identify unpopular policies or any changes in policies that the anglers would like made. Data obtained from a survey can be used for this purpose.

Survey data may also be useful when planning for the future implementation of specific fisheries management policies. Survey data can provide the manager with information concerning the anglers' desired overall management emphasis on a given water and how well specific fisheries management policies will be received by the anglers and other water users.

Data concerning attitudes toward fisheries management policies is grouped by four areas: (1) preferred waters to stock hatchery fish in, (2) size of catchable fish to be stocked, (3) Utah Division of Wildlife Resources (DWR) sponsored fisheries management, and (4) the establishment of wild trout waters.

Waters Preferred For Hatchery Fish Stocking

Where to stock hatchery fish has become somewhat controversial in recent years. Some anglers view hatchery reared fish as domestic animals and feel they should not be stocked in "wild" bodies of water. Others look at fish stocking as the answer to increased angling pressure and feel that if fish stocking ceased there would be little or no angling opportunity. Data on the what waters anglers prefer to have hatchery fish stocked in may be useful in formulating fish stocking policy.

Data on what waters to stock fish in is divided into three groups: 1) stock as many waters as funds will allow, 2) stock only waters which have little or no natural reproduction or production, and 3) do not stock hatchery fish at all.

The ungrouped data shows " stock only waters with little or no natural reproduction or production" as the most frequent answer at 52.9%. "Stock as many waters as funds will allow" is a close second with 44.2% and "do not

stock hatchery fish at all" is the least frequent with 2.9%. (see table 19).

Table 19

Ungrouped Data for Waters Preferred for Hatchery Fish Stocking

Preferred Waters to Stock Fish in	Value	N	Percent	Cum. Percent
As Many Waters	1	46	44.2	44.2
Little Reprod.	2	55	52.9	97.1
Not Stock Fish	3	3	2.9	100.0

Mean: 1.59 Mode: Little Reproduction

Mcfadden, Ryckman, and Cooper (1964) stated that Michigan trout anglers strongly supported fish stocking, with a survey majority stating that they feel fish stocking improves angling to an important degree and that the current state fish stocking budget was too small. Even though Logan and Blacksmith Fork anglers support at least limited fish stocking (97.1%), the data show they may not support unlimited fish stocking as did the anglers surveyed by Mcfadden.

It was expected that the so called "meat fishermen" would be the largest supporters of an active fish stocking program. This expectation is supported by this survey. Table 20 shows a direct relationship between

the value that an angler places on keeping the fish he/she catches and the person's attitude toward fish stocking. Of anglers that ranked the keeping of fish as very important, 77.3% selected "stock as many waters as funds will allow" and 22.7% selected "stock only waters which have little or no natural reproduction or production."

Table 20

Importance of Keeping Fish by Waters Preferred for Hatchery Fish Stocking

	Waters Preferred for Fish Stocking			
Importance of Keeping Fish	As Many Waters (%)	Little Reprod. (%)	Not Stock Fish (%)	Total (%)
1) Not Important	19.2	80.8	0.0	100.0
2	29.4	52.9	17.6	100.0
3	45.5	54.5	0.0	100.0
4	66.7	33.3	0.0	100.0
5) Very Important	77.3	22.7	0.0	100.0

Chi-Sqr.= 34.05 Sig.= .0000

Anglers who felt that keeping fish was not important preferred "stock only waters which have little or no natural reproduction or production," 80.3%, and "stock as many waters as funds will allow," 19.2%. It is

interesting to note that of this group, no one preferred not stocking fish; this may be because even though keeping fish is not important, many anglers feel that there would be no angling opportunity in low productive waters if there were no fish stocked in these waters.

What an angler emphasizes when angling can also influence that angler's attitude toward what waters to stock fish. When crosstabulating "emphasis when angling" by "what waters to stock fish in," a significant relationship is shown (see table 21). Even though it is clear that the majority of the anglers sampled emphasize catching large fish (64.4%), the majority of those anglers sampled who emphasized catching large numbers of fish also supported fish being stocked in as many waters as funds would allow (60.9%), followed by only stocking waters with little or no natural reproduction or production (39.1%).

Anglers who emphasize catching large fish may prefer a less active stocking program. These data show that 52.2% of the anglers prefer the stocking of fish only in waters which have little or no natural reproduction or production; while 46.3% preferred fish to be stocked in as many waters as funds would allow.

Those anglers who felt that catching fish was not important to their angling experience, also, as expected, preferred less active stocking. 78.6% felt that stocking should be limited to waters which have little or no

Table 21

Emphasis When Angling by Waters Preferred for Hatchery Fish Stocking

	Waters Preferred for Fish Stocking			
Emphasis	As Many as Possible (%)	Little Reprod. (%)	Not Stock Fish (%)	Total (%)
Large Number	60.9	39.1	0.0	100.0
Large Fish	46.3	52.2	1.5	100.0
Fish Not Import.	7.1	78.6	14.3	100.0

Chi-Sqr.= 15.85 Sig.= .0032

natural reproduction or production, while only 7.1% preferred fish to be stocked in as many waters as funds would allow. The remaining 14.3%, preferred no fish stocking at all.

Table 22 shows a significant relationship between the sample section and "what waters to stock fish in." Anglers sampled along the impoundments most frequently preferred "stock as many waters as funds will allow" (64.9%); while 35.1% preferred "stock only waters which have little or no natural reproduction or production." Anglers sampled along the river and wild trout sections showed 60.0% and 65.6% preferring "stock only waters which have little or no natural reproduction or production" and 34.3% and 31.3% preferring "stock as many waters as funds

would allow."

Table 22

Sample Section by Waters Preferred for Hatchery Fish Stocking

Sample Section	Waters Preferred for Fish Stocking: As Many as Possible (%)	Little Reprod. (%)	Not Stock Fish (%)	Total (%)
Impoundments	64.9	35.1	0.0	100.0
River	34.3	60.0	5.7	100.0
Wild Trout	31.3	65.6	3.1	100.0

Chi-Sqr.= 11.13 Sig.= .0251

When crosstabulating "preferred angling method" with "what waters to stock fish in," there is no significant relationship for Logan and Blacksmith Fork River anglers. Table 23 shows that according to this data, the overwhelming majority of Logan and Blacksmith Fork anglers support at least a limited fish stocking program, no matter what their preferred angling method is. This is in opposition to one finding of Bryan (1977); he states that the more specialized in method an angler becomes the less likely it is that he/she will support fish stocking.

Table 23

Preferred Angling Method by Waters Preferred for Hatchery Fish Stocking

Preferred Angling Method	Waters Preferred for Fish Stocking			
	As Many as Possible (%)	Little Reprod. (%)	Not Stock Fish (%)	Total (%)
Bait-Casting	52.3	47.7	0.0	100.0
Spinning	35.7	57.1	7.1	100.0
Fly-Fishing	35.1	59.5	5.4	100.0
No Preferred	55.6	44.4	0.0	100.0

Size of Catchable Fish to be Stocked

The word catchable refers to a fish which is large enough to catch at the time of stocking. The size of stocked catchables may vary from state to state. In Utah stocked catchables are approximately three to the pound in weight and eight to ten inches in length.

When asked, "In those waters where the Utah Division of Wildlife Resources currently stocks catchable size trout, what would you prefer?," anglers were given a choice between four answers: 1) the current number of eight to ten inch fish, 2) a lesser number of 14 inch fish, 3) a greater number of six inch fish, or 4) it makes no difference. (Quantities of fish stocked, mentioned in

the response catagories are there because there is a direct relationship between the size of a hatchery fish produced and the cost. If the state is to stock larger fish, because of limited funds they would have to stock less fish.)

The ungrouped data show the majority of Logan and Blacksmith Fork River anglers preferring 14 inch fish to be stocked when stocking catchables (42.3%) (see table 24). This is followed by eight to ten inch (30.8%), six to eight inch (6.7%), and no difference (20.2%). Anglers stating "no difference" were mainly anglers who prefer to catch wild fish.

Table 24

Ungrouped Data for Size of Catchable Fish to be Stocked

Size of Catchables	Value	N	Percent	Cum. Percent
8-10 Inch	1	32	30.8	30.8
14 Inch	2	44	42.3	73.1
6-8 Inch	3	7	6.7	79.8
No Difference	4	21	20.2	100.0

Mode: 14 Inch

The size of trout stocked may influence angler satisfaction. Braaten (1970) showed that Washington

anglers preferred fewer large fish to many smaller ones. He stated that angler satisfaction may increase if the states would stock larger fish than was the practice.

When crosstabulating sample section by size of catchables, there is a significant statistical relationship (see table 25). The majority of impoundment anglers prefer 14 inch fish (48.6%), followed by eight to ten inch fish (35.1%). River anglers show a similar pattern with 48.6% preferring 14 inch fish and 31.4% preferring eight to ten inch. These data show more anglers supporting the stocking of 14 inch catchables than do the ungrouped data. This may be because impoundment anglers as well as river anglers are more likely to use stocked fish than wild trout section anglers. Wild trout section

Table 25

Sample Section by Size of Catchable Fish to be Stocked

	Size of Catchables				
Sample Section	8-10 Inch (%)	14 Inch (%)	6-8 Inch (%)	No Difference (%)	Total (%)
Impoundment	35.1	48.6	2.7	13.5	100.0
River	31.4	48.6	0.0	20.0	100.0
Wild Trout	25.0	28.1	18.8	28.1	100.0

Chi-Sqr.= 14.71 Sig.= .0226

anglers' percentages are tied between 14 inch and no difference, both with 28.1%, followed by eight to ten inch (25.0%).

When looking at the size of catchables as the independent variable, both the majority of anglers who prefer eight to ten inch fish and the majority of anglers who prefer 14 inch fish (40.6 and 40.9%) were angling in the impoundments. This is followed by anglers at the river (34.4 and 38.6%), and anglers at the wild trout section (25.0 and 20.1%). When looking at anglers stating "no difference," there is a gradual decline in percentages starting with the wild trout section (42.9%), followed by the river (33.3%), and finally the impoundments, 23.8%. This follows the assumption that wild trout anglers place less importance on stocked fish and their size.

It would be expected that anglers who emphasize catching large numbers of fish would also support the current stocking of eight to ten inch catchables, as opposed to a lesser number of 14 inch catchables. Table 26 shows this. 56.5% of the anglers sampled, who emphasized catching large numbers of fish, also supported the current policy of stocking eight to ten inch fish. Anglers emphasizing large fish preferred stocking 14 inch catchables 53.7% to 23.9% over the stocking of eight to ten inch catchables.

Table 26

Emphasis When Angling by Size of Catchable Fish to be Stocked

	Size of Catchables				
Emphasis	8-10 Inch (%)	14 Inch (%)	6-8 Inch (%)	No Diff. (%)	Total (%)
Large Number	56.5	8.7	13.0	21.7	100.0
Large Fish	23.9	53.7	6.0	16.4	100.0
Fish Not Important	21.4	42.9	0.0	35.7	100.0

Chi-Square= 19.13 Sig.= .0040

When crosstabulating fishing trips taken this year by size of catchables, a significant relationship is shown. The more active anglers are, the more likely it is that they will prefer 14 inch catchables to be stocked. The less active anglers are, the more likely they are to prefer the stocking of eight to ten inch fish. Table 27 shows anglers who had taken five or less trips this year preferred the stocking of eight to ten inch fish to be stocked over the stocking of 14 inch fish, 55.2%, 27.6%. Anglers who had taken 41 or more trips this year preferred 14 inch fish to be stocked over eight to ten inch fish, 47.4%, 5.3%.

Table 27

Fishing Trips This Year by Size of Catchable Fish to be Stocked

Trips This Year	Size of Catchables: 8-10 Inch (%)	14 Inch (%)	6-8 Inch (%)	No Diff. (%)	Total (%)
<5	55.2	27.6	3.4	13.8	100.0
5-10	20.0	30.0	15.0	35.0	100.0
11-20	28.6	57.1	0.0	14.3	100.0
21-40	33.3	60.0	0.0	6.7	100.0
41 or more	5.3	47.4	15.8	31.6	100.0

Chi-Sqr.= 27.90 Sig.= .0057

Utah Division of Wildlife Resources Sponsored Management

This section represents the results of asking: "What type of DWR sponsored management would you prefer to be emphasized on the Logan or Blacksmith Fork Rivers?" The answers to this type of question could be used when planning the general fisheries management emphasis of a given body of water.

Four answers to this question were possible: 1) stocking hatchery fish only, 2) habitat improvement only, 3) a combination of fish stocking and habitat improvement, and 4) the State's involvement should be limited to the

establishment and enforcement of reasonable fishing regulations only.

Table 28 shows the results of the ungrouped data for DWR sponsored management. The most popular answer for this question was a combination of stocking and

Table 28

Ungrouped Data for DWR Sponsored Management

DWR Sponsored Management	Value	N	Percent	Cum Percent
Stocking Only	1	14	13.5	13.5
Habitat Only	2	12	11.5	25.0
Combination	3	59	56.7	81.7
Regulation Only	4	19	18.3	100.0

Mode: Combination

habitat improvement (56.7%). This was followed by "the State's involvement should be limited to the establishment and enforcement of reasonable fishing regulations only," 18.3%, stocking only, 13.5%, and habitat improvement only, 11.5%.

It is interesting to point out that even though there is little fisheries habitat improvement done on the Logan and Blacksmith Fork Rivers by the state of Utah, the majority of the anglers sampled preferred it be done as

well as fish stocking. Similar results were found by Mcfadden, Ryckman, and Cooper (1964). They showed that the majority (57%) of Michigan anglers felt that habitat improvement was the activity needing to be increased most to meet future angling needs.

A crosstabulation of what waters to stock fish by DWR sponsored management shows an expected relationship (see table 29). Of the anglers who support stocking at

Table 29

Waters Preferred for Hatchery Fish Stocking by DWR Sponsored Management

	DWR Sponsored Management				
What Waters Stock Fish	Stocking Only (%)	Habitat Only (%)	Combi-nation (%)	Reg. Only (%)	Total (%)
All Waters	21.7	0.0	73.9	4.3	100.0
Little Reprod.	7.3	18.2	43.6	30.9	100.0
Not Stock	0.0	66.7	33.3	0.0	100.0

Chi-Square= 34.21 Sig.= .0000

all, the most frequent answer for DWR sponsored management was "a combination of fish stocking and habitat improvement." This was 73.9% in the case of the anglers who prefer fish to be stocked in as many waters as funds

will allow, and 43.6% in the case of the anglers which prefer fish to be stocked only in waters which have little or no natural reproduction or production. The majority of anglers who prefer no fish stocking also support habitat improvement only (66.7%), while only 33.3% of those anglers preferred a combination of fish stocking and habitat improvement. It should be noted that according to this data, no matter how supportive anglers are to fish stocking they feel that the state should be involved in fisheries habitat improvement as well.

Bryan (1977) found a direct relationship between how specialized in method anglers are and their attitude toward fish stocking and habitat improvement. He stated that the more specialized anglers are, the more they support habitat improvement and the less they support fish stocking. Table 30 suggests a similar relationship; however, it is not statistically significant. It may be pointed out that according to this data anglers having no preferred method most frequently support a combination of fish stocking and habitat improvement as opposed to one or the other only.

Table 30

Preferred Angling Method by

DWR Sponsored Management

Preferred Angling Method	DWR Sponsored Management: Stocking Only (%)	Habitat Only (%)	Combi-nation (%)	Reg. Only (%)	Total (%)
Bait-Casting	18.2	4.5	61.4	15.9	100.0
Spinning	14.3	21.4	42.9	21.4	100.0
Fly-Fishing	5.4	18.9	51.4	24.3	100.0
No Preferred	22.2	0.0	77.8	0.0	100.0

Wild Trout Management

Wild trout are beginning to make a comeback in Utah as well as in much of the West. The loss of much of the wild trout population in the past has resulted from the stocking of hatchery fish, poor land management, and overfishing ("Wild trout," 1986).

By regulating specific waters, wild trout populations can be restored and/or maintained. Therefore, the enhancement of wild trout usually involves special regulations for designated waters. These regulations generally prohibit the stocking of hatchery fish, require the anglers to use artificial flies and lures only,

significantly reduce creel--limits, if not requiring catch and release only, and regulate the sizes of fish that can be kept.

Waters in which wild trout can be established are limited since successful wild trout management is only possible in waters which have or which could have adequate natural reproduction and production. In addition to natural limitations, the establishment of "wild trout" waters can be controversial; therefore, it is important that both biological and sociological data be used in the planning process.

Mallet (1980) showed that the majority, 74.9%, of Idaho anglers felt that wild trout management was worth while. Similar results are expressed by this data as well. Table 31 shows the ungrouped data on wild trout management. 92.3% of all anglers sampled felt that at

Table 31

Ungrouped Data for Wild Trout Management

What Waters "Wild Trout"	Value	N	Percent	Cum. Percent
All Waters	1	25	24.0	24.0
Select Waters	2	71	68.3	92.3
No Waters	3	8	7.7	100.0

Mean: 1.84 Mode: Select Waters

least select waters in Utah should be managed "wild trout." This is further broken down into: 24.0% desiring all waters, and 68.3% desiring that select waters which have adequate natural reproduction or production be managed "wild trout." Only 7.7% of the anglers sampled felt no waters should be managed "wild trout."

When crosstabulating sample section by establishment of wild trout waters, a direct relationship is shown. Table 32 shows anglers sampled on the impoundments and river section strongly support wild trout management for select waters, 89.2% and 68.6%. Only 8.1% and 14.3% of those anglers support all waters in Utah to be managed for wild trout.

Table 32

Sample Section by Wild Trout Management

	What Waters "Wild Trout"			
Sample Section	All Waters (%)	Select Waters (%)	No Waters (%)	Total (%)
1) Impoundments	8.1	89.2	2.7	100.0
2) River	14.3	68.6	17.1	100.0
3) Wild Trout	53.1	43.8	3.1	100.0

Chi-Square=27.87 Sig.=.0000 Pearson's r=-.370 Sig.=.0001

Anglers sampled along the wild trout section show

near opposite results. Of these anglers, 43.8% prefer select waters and 53.1% prefer all waters to be managed for wild trout.

Preferred angling method shows a similar relationship to the establishment of wild trout waters as does sample section (see table 33). Anglers preferring bait casting and/or no preferred method are less

Table 33

Preferred Angling Method by

Wild Trout Management

	What Waters "Wild Trout"			
Preferred Angling Method	All Waters (%)	Select Waters (%)	No Waters (%)	Total (%)
1) Bait-Casting	2.3	81.8	15.9	100.0
2) Spinning	42.9	57.1	0.0	100.0
3) Fly-Fishing	43.2	54.1	2.7	100.0
4) No Preferred	22.2	77.8	0.0	100.0

Chi-Sqr.=25.90 Sig.=.0002

supportive of wild trout waters than are spin casters and fly-fisherman. These data show 81.8% of the bait fisherman prefer select waters to be managed "wild trout," while only 2.3% thought all waters should be managed for wild trout. Spin-fishermen and fly-fishermen are very

similar to each other on their preference toward wild trout waters. 57.1% of the spin-fishermen prefer select waters to be managed "wild trout," and 42.9% prefer all waters to be managed "wild trout." Of the fly-fishermen, 54.1% desire select waters to be managed "wild trout," and 43.2% prefer all waters. In summary, the majority of all anglers, no matter what their preferred angling method, prefers select waters to be managed "wild trout," however, as expected, bait-fishermen show substantially less favor to all waters that can support a wild fishery being managed "wild trout" (2.3%), than spin or fly-fisherman (42.9% and 43.2%).

One hypothesis as to why some anglers do not support the establishment of wild trout waters may be that they resist restrictions on creel and size limits. Harris and Bergersen (1984) stated that Colorado anglers were very much opposed to both size restrictions and strict creel limits. A crosstabulation between the importance of keeping fish and the establishment of wild trout waters, shows a significant correlation. The lesser the amount of importance placed on keeping fish the more support is expressed for wild trout waters. The higher amount of importance placed on keeping fish, the lesser support is given to the establishment of wild trout waters. (see table 34).

Table 34

Importance of Keeping Fish by

Wild Trout Management

Importance of Keeping Fish	What Waters "Wild Trout" All Waters (%)	Select Waters (%)	No Waters (%)	Total (%)
1) Not Important	50.0	50.0	0.0	100.0
2)	47.1	52.9	0.0	100.0
3)	6.1	84.8	9.1	100.0
4)	0.0	50.0	50.0	100.0
5) Very Important	9.1	81.8	9.1	100.0

Chi-Sqr.=40.44 Sig.=.0000 Pearson's r=.424 Sig.= 0000.

When looking at a crosstabulation of the number of trips this year by the establishment of wild trout waters, a significant relationship is also shown (see table 35). These data show statistically that the more active an angler is the greater tendency there is for he/she to support the establishment of wild trout waters. This may be because the less experienced anglers, who tend to spend less time angling during the year, are more dependent on stocked fish and regulations which permit bait-fishing to provide them with their preferred angling opportunity.

Table 35

Angling Trips this Year by

Wild Trout Management

Angling Trips this Year	What Waters "Wild Trout" All Waters (%)	Select Waters (%)	No Waters (%)	Total (%)
1) 5 or Under	3.4	89.7	6.9	100.0
2) 6-10	20.0	55.0	25.0	100.0
3) 11-20	28.6	71.4	0.0	100.0
4) 21-40	53.3	46.7	0.0	100.0
5) 41 or More	31.6	63.2	5.3	100.0

Chi-Sqr.=25.55 Sig.=.0013 Pearson's r=-.307 Sig.=.0008

Angler Use Patterns

This section discusses angler use patterns as it relates to the type of anglers using each of the three sample sections. "Angler type," is defined as the groups of anglers who share, primarily, the same preferred angling method and have similar attitudes toward preferred species, importance of keeping fish, fish stocking, habitat improvement, and wild trout management.

Fisheries management practices can provide different types of angling opportunity for different types of anglers (Stone, 1977). The three sample sections for

this study are each managed in such a way that they provide three somewhat different types of angling opportunity. These differences can be attributed to the type of water environment, angling regulations, and the level of catchable size trout stocking. When comparing the current regulations and fisheries management policies of each of the three sample sections to the desired fisheries management policies, as shown by the data, a close relationship is shown. This suggests that the application of different fisheries management concepts to a given water may attract the type of anglers who prefer that type of angling opportunity.

The "average" angler using the impoundments is a significantly different type of angler than the "average" angler using the wild trout section. Since the river section shows similarities to both the impoundments (it's regulated the same) and the wild trout section (they are very similar environments), the "average" type of angler on the river section is somewhere in the middle (as far as preferred angling method, attitudes toward fisheries management policies etc.).

Table 36 shows a clear difference between the anglers sampled on each section when considering preferred angling method, importance of keeping fish, preferred species to catch, what waters to stock fish in, and wild trout management. When looking at bait casting as the

preferred angling method, these data show that 64.9% of

Table 36

Sample Section by Five Select Variables

Five Select Variables	Sample Section: Impoundments (%)	River (%)	Wild Trout (%)
Pref. Angling Method: Bait-Casting	64.9	42.9	15.6
Import. of Keeping Fish: Value 5, Very Important	43.2	14.3	3.1
Pref. Species: Rainbow Trout	16.2	11.4	3.1
Fish Stocking: all Waters	64.9	34.3	31.3
Wild Trout Mgt.: Select	89.2	68.6	43.8

the impoundment anglers, 42.9% of the river section anglers, and 15.6% of the wild trout section anglers preferred bait-casting. When comparing anglers who selected the keeping of fish as very important (value 5), 43.2% of the impoundment anglers, 14.3% of the river section anglers, and 3.1% of the wild trout section anglers stated that keeping the fish they catch is very

important (value 5). When looking at the number of anglers who prefer to catch rainbow trout, 16.2% of the impoundment anglers, 11.4% of the river section anglers, and 3.1% on the wild trout section anglers preferred to catch rainbow trout. Of the anglers who preferred fish to be stocked in as many waters as possible, 64.9% of the impoundment anglers, 34.3% of the river section anglers, and 31.3% of the wild trout section anglers preferred fish to be stocked in as many waters as possible. Finally, when considering anglers who prefer wild trout management to be limited to a select number of waters, 89.2% of the impoundment anglers, 68.6% of the river section anglers, and 43.8% of the wild trout section anglers preferred wild trout management to be limited to a select number of waters.

Table 37 shows an opposite trend when comparing the three sample sections to the near opposite response catagories of the five variables. Of the anglers who preferred fly-fishing as their angling method, 16.2% of the impoundment anglers, 40.0% of the river section anglers, and 53.1% of the wild trout section anglers preferred fly-fishing. Of the anglers rating the importance of keeping fish as "not important" (value 1), these data show the following: 18.9% of the impoundment anglers, 22.9% of the river section anglers, and 34.4% of the wild trout section anglers stated that keeping the

fish they catch is not important (value 1). Anglers preferring to catch brown or cutthroat trout were as follows: 45.9% of the impoundment anglers, 65.7% of the river section anglers, and 78.1% of the wild trout section anglers preferred catching brown or cutthroat trout. Anglers preferring fish stocking to be limited to waters with little or no natural reproduction or production were as follows: of the impoundment anglers 23.6%, river section anglers 38.2, and wild trout section anglers 38.2%

Table 37

Sample Section by Five Select Variables

Five Select Variables	Sample Section		
	Impoundments	River	Wild Trout
Pref. Angling Method: Fly-Fishing	16.2	40.0	53.1
Import. of Keeping Fish: Value 1, Not Important	18.9	22.9	34.4
Pref. Species: Brown or Cutt.	45.9	65.7	78.1
Fish Stocking: Little or No Reproduction	35.1	60.0	65.6
Wild Trout Mgt.: All Waters	8.1	14.3	53.1

felt that fish stocking should be limited to waters with little or no natural reproduction or production only. Finally, anglers who felt that all waters should be managed "wild trout" were as follows: 8.1% of the impoundment anglers, 14.3% of the river section anglers, and 53.1% of the wild trout section anglers feel that all waters should be managed "wild trout."

Desired Fisheries Management Policies Compared To Current Fisheries Management Policies

This section compares the desired fisheries management policies, as determined by the response to related questions by anglers sampled on each sample section, to the fisheries management policies currently in place on each sample section.

Current Regulations and Management Emphasis

The current (1987) regulations for trout angling on the three sample sections are as follows: 1) impoundments: a limit of eight trout May 23 through December 31, a limit of four trout January 1 through May 22, no size restrictions, and the use of live bait is permitted; 2) river section: a limit of eight trout May 23 through December 31, a limit of four trout January 1 through May 22, no size restrictions, and the use of live bait is permitted; 3) wild trout section: only artificial

lures and flies permitted, one trout 13 inches or larger may be kept, a limit of eight trout May 23 through December 31, and a limit of four trout January 1 through May 22, (Utah Division of Wildlife Resources, 1987).

The current management emphases for the three sample sections are as follows: 1) impoundments: the stocking of catchable rainbows which occurs several times during the summer; 2) river section: limited stocking of catchable size rainbows near campgrounds only; and 3) wild trout section: special regulation only (personal communication, T. St.Johns, July 1986).

Differences in Preferred Fisheries Management Policies Compared to Current Fisheries Management Policies

When comparing the preferred fisheries management policies with the current policies there are just a few differences. This is not surprising because, as suggested in the previous chapter, anglers are attracted to the waters which provide their type of angling opportunity.

Differences in preferred fisheries management policies compared to current fisheries management policies, are found in three areas: 1) what waters to stock hatchery fish in, 2) size of catchable fish stocked, and 3) habitat improvement.

Currently, DWR stocks hatchery fish in the Logan and Blacksmith Fork river impoundments and to a lesser

extent in the river section near the camp grounds. (The limited- stocking of the river section, near the camp grounds, may have more to do with budget constraints than actual policy-- if the state had more funds, the level of stocking in the river section would probably be increased)

This policy of limited fish stocking in the river section is a current policy that differs from the desired stocking policy. The ungrouped data show that the majority (52.9%) of the anglers prefer fish stocking to occur only in waters which have little or no natural reproduction or production. When crosstabulating sample section by "what waters to stock fish in" These data show 60.0% of the river anglers prefer fish stocking to occur only in waters which have little or no natural reproduction or production. Since the river section contains a naturally reproducing population of brown trout, these data suggest that the anglers would prefer the stocking of hatchery fish only in the impoundments.

The size of catchable fish to be stocked is another DWR policy which differs from angler opinion. The current policy is to stock eight to ten inch rainbow trout (three to the pound). This size of catchable is considered optimal as far as cost is concerned. These data suggest that anglers desire larger, 14 inch fish to be stocked. The ungrouped data show that a majority of 42.3% of the anglers prefer 14 inch fish to be stocked, even if it

means less fish stocked. This compares to 30.8% for anglers who prefer the stocking of eight to ten inch fish, 6.7% for anglers who prefer the stocking of six to eight inch fish, and 20.2% for angler who had no preference. When grouping data by sample section, slightly higher angler support (48.6%) was shown for the impoundments--the area with highest number of fish stocked.

The final area of difference between desired fisheries management policies and current fisheries management policies is habitat improvement. Currently their is little or no habitat improvement done on the Logan or Blacksmith Fork Rivers. According to the ungrouped data 56.7% of the anglers prefer a combination of fish stocking and habitat improvement to occur on these rivers, and 11.5% of the anglers prefer habitat improvement only, bringing the total to 68.2% of the anglers preferring at least some habitat improvement. This strongly suggests that habitat improvement is important to these anglers.

SUMMARY

Using a questionnaire and a stratified random sampling technique, 104 anglers were interviewed along three sections of the Logan and Blacksmith Fork Rivers. Questions were asked concerning socio-demographics, angling values, and attitudes toward fisheries management policies. These data were also used to analyze angler use patterns and compare desired fisheries management policies with current fisheries management policies.

The socio-demographic data showed the "average" Logan and Blacksmith Fork River angler to be: male, 43.6 years old (all anglers sampled were 18 years or older), living in the region (but not living in Cache County), skilled occupationally, somewhat college educated, and a 27.4 year veteran to angling.

The questions that were included in the angling value section dealt with preferred angling method, preferred water type, preferred species, emphasis when angling, and importance of keeping fish.

When looking at the ungrouped data, the most popular angling method was bait-casting (42.3%). However, the wild trout section had the highest frequency of fly-fishermen (53.1%) and spin-fishermen (28.1%).

The most preferred types of water to angle in were large streams (33.7%) and small streams (28.8%).
When looking at the data grouped by sample section, the

impoundment anglers preferred "any water containing fish (37.6%)," and lakes (27.0%).

The most overwhelmingly popular species of fish to catch were brown and cutthroat trout (62.5%). Data grouped according to sample section, while still showing brown and cutthroat trout as the most popular species, showed decreasing popularity when moving from the wild trout section to the impoundments-- 78.1% on the wild trout section, 65.7% on the river section, and 45.9% on the impoundments. These data showed that the continued management of the wild trout (brown and cutthroat) is important to these anglers.

Data on emphasis when angling showed most anglers emphasized catching large fish (64.4%). This data also showed a relationship between how many angling trips an angler made this year and what he/she emphasized. the less active an angler was the more likely it was that he/she emphasized catching large numbers of fish.

Percentages for "importance of keeping fish" was distributed somewhat evenly over the five point scale used to measure it. However, when the data was grouped by preferred angling method, the data showed bait-casters placed more importance on keeping fish than fly-fishermen.

The section of the questionnaire concerning attitudes toward fisheries management policies contained questions on: preferred waters to stock hatchery fish in,

size of catchable fish to be stocked, DWR sponsored management, and the establishment of wild trout waters.

The ungrouped data showed a slight majority of the anglers supported the stocking of fish only in waters which have little or no natural reproduction or production (52.9%). This was followed by "as many waters as funds would allow" (44.2%), and "do not stock fish at all" (2.9%). These data showed that 97.1% of the anglers support at least a limited stocking program. Strong support for at least a limited stocking program remains even when looking at these data grouped by sample section or importance of keeping fish. In light of this, these data show that most anglers would prefer fish to only be stocked in the impoundments since there is a substantial wild trout population in the river and wild trout sections.

When looking at the size of catchable fish to be stocked, the majority (42.3%) of the anglers preferred fewer 14 inch fish to be stocked as opposed to the current number of 8-10 inch catchables stocked. These data suggest that angler satisfaction may increase if larger sized catchable trout were stocked.

Data for DWR sponsored management shows "a combination of stocking and habitat management" as the most popular answer (56.7%). When this data is added to the percentage for "habitat only" (11.5%), 68.2% of the

angler feel that at least some habitat improvement should be done on the Logan and Blacksmith Fork Rivers.

The last question in this section was concerned with what waters to manage "wild trout." The most frequent response was "select waters only" (68.3). When this data is combined with the percentage for "all waters" (24.0%) it is shown that 93.3% of all anglers sampled supported at least limited wild trout management in the state of Utah; therefore, the majority of anglers support the continued management of waters for wild trout.

The final two chapters presented a discussion of the angler use patterns for the sample period and compared desired fisheries management policies to current fisheries management policies. Examining angler use patterns showed that the "type" of anglers using the three different sample sections were different in many ways. This was shown by comparing five select variables concerning angling values and attitudes toward selected fisheries management policies.

When comparing desired fisheries management policies with current fisheries management policies only three differences found: 1) what waters to stock hatchery fish in, 2) size of catchable fish stocked, and 3) habitat improvement. These differences were discussed in detail in the previous chapter.

CONCLUSION AND RECOMMENDATIONS

This paper is an exercise in fisheries management policy. The purpose of this paper is not so much to assess the attitudes of the Logan and Blacksmith Fork River anglers (although this assessment has been an important part of this paper) as it is to show: some of the types of attitudinal data that can be acquired, and that the method of collecting this data (the use of survey sampling techniques) can provide information which may be useful in making policy decisions that are in harmony with the desires of the angling public.

The data supports the idea that fisheries management policies and regulations can determine the type of angling opportunity a given water will provide. The application of this concept would allow fisheries managers to diversify their program and provide the different type of angling that the public desires.

There are several angler desires brought out in this study that are worth mentioning again, these are: that the Logan and Blacksmith fork anglers overwhelmingly prefer to catch brown or cutthroat trout; they desire that the state stock much larger fish (14 inch as opposed to 8-10 inch); the anglers overwhelmingly support catchable size fish only being stocked in waters with little or no natural reproduction or production; the majority of the anglers support at least some habitat improvement; and

that the vast majority of the anglers support the establishment of at least a limited number of "wild trout" waters to provide angling variety.

Based on this, it is recommended that the state do the following: 1) continue to emphasize the management of the wild trout (brown and cutthroat) populations in the river and wild trout sections; 2) limit the stocking of catchable size trout to the impoundments only; 3) stock larger (12-14 inch or a combination of 12-14 inch and 8-10 inch) catchable size trout even if it means stocking less fish; 4) provide for at least a limited amount of habitat improvement on the lower (habitat) quality portions of the Logan and Blacksmith Fork Rivers; and 5) continue to manage a limited number of waters for wild trout on a statewide basis.

Finally, since fisheries resources are managed for the good of the pubic and the publics' desires are diverse, it is the responsibility of the fisheries manager to provide the angling opportunity so desired. Since anglers' desires cannot be provided for if they are not known and questionnaire survey techniques can be an effective way to sample angler opinion, it is recommended that whenever possible, all public fisheries management agencies begin using angler attitude data as well as biological data in fisheries management policy and decision making.

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APPENDIX

FISHING SURVEY

1. Which river: 1) Logan. 2) Blacksmith Fork.

2. Type of water environment:

   1) Impoundment.
   2) River.
   3) Tributary.
   4) Wild trout section.

Experience and Skill

3. How many years have you been involved in sport fishing?

4. How many fishing trips have you gone on this year?

5. How would you evaluate the level of your fishing skill on a scale of one to five (one being beginner and Five being highly skilled)?

6. How would you rate fishing as compared with your other leisure activities?

   1) Fishing is your favorite leisure activity.
   2) Fishing is one of your favorite leisure activities.
   3) I have other leisure activities which are preferred over fishing.

7. Do you:

   a) Own any books on fishing?
      1) yes 2) no
   b) Subscribe to any magazines on fishing?
      1) yes 2) no
   c) Browse through fishing magazines at the supermarket, library, or barber shop?
      1) yes 2) no

8. What is your preferred fishing method?

   1) Bait-casting.
   2) Spinning.
   3) Fly-fishing.
   4) No preferred fishing method.

9. While fishing the Logan or Blacksmith Fork Rivers, what species of fish do you prefer to catch?

   1) Rainbow trout.
   2) Brown or cutthroat trout.
   3) Any species of trout.
   4) Mountain whitefish.
   5) Any species of fish.

10. What type of water do you prefer to fish in?

    1) lakes.
    2) Large streams.
    3) Small streams.
    4) Any water containing fish.

11. Do you prefer to fish:

    1) Alone.
    2) With family.
    3) With friends.

Reasons for Fishing

What are your reasons for fishing? (On a scale from one to five. One being not important, five being very important.)

12. To get away from the responsibilities of everyday life for a while.

13. To challenge your skill.

14. To observe the beauty of nature.

15. To be away from crowds.

16. To have a chance to relax.

17. To enjoy an experience with family and friends.

Fishing Values and Views on Policy

18. Is the keeping of fish important to your fishing experience? (On a scale from one to five. One being not important and five being very important.)

19. Which of the following do you emphasize when fishing?

    1) Catching a large number of fish.
    2) Catching large fish.
    3) Catching fish is not important.

20. In what waters do you think the State Division of Wildlife Resources DWR should stock hatchery fish?

    1) As many waters as funds will allow.
    2) Only waters which have little or no natural reproduction or production.
    3) The state DWR should not stock hatchery fish at all.

21. In those waters where the state DWR currently stocks catchable size trout, would you prefer:

    1) The current number of eight to ten inch fish?
    2) A lesser number of 14 inch fish?
    3) A greater number of six to ten inch fish?
    4) It makes no difference.

22. What type of state DWR sponsored management would you prefer to be emphasized on the Logan and Blacksmith Fork Rivers?

    1) Stocking of hatchery fish only.
    2) Habitat improvement only.
    3) A combination of fish stocking and habitat improvement.
    4) The state DWR's involvement should be limited to the establishment and enforcement of reasonable fishing regulations only. They should not be involved in fish stocking or habitat manipulation.

23. What do you think about the establishment of "wild trout" streams, rivers, and lakes? (a wild trout water is one where hatchery fish are not stocked and the fishing regulations require few or no fish to be kept and require the use of artificial lures and flies only.)

    1) All waters which can support a "wild trout" fishery should be management as such.
    2) A select number of waters should be managed "wild trout" to provide fishing variety.
    3) No waters should be managed "wild trout."

Socio-Demographics

24. Age?

25. Occupation?

26. Place of residence?

27. Highest education level?

    1) Less than high school graduate.
    2) High school graduate.
    3) less than four years of college.
    4) Four year college graduate.
    5) Post graduate education.

28. Gender:

    1) Male.
    2) Female.

VITA

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