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A COMPARISON OF MAINE OPEN WATER AND ICE FISHING ACTIVITIES AND PARTICIPANTS

Janice L. Taylor and Stephen D. Reiling

**DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS
LIFE SCIENCES AND AGRICULTURE EXPERIMENT STATION
UNIVERSITY OF MAINE AT ORONO**

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A COMPARISON OF MAINE OPEN WATER AND ICE FISHING ACTIVITIES AND PARTICIPANTS

Janice L. Taylor and Stephen D. Reiling*

INTRODUCTION

Freshwater fishing is a popular recreational activity in Maine. In 1976, almost 3.7 million angler days were consumed by the 253,000 people who purchased Maine fishing licenses. In 1976 an estimated 418,600 or 11.4 percent of the total angler days were spent ice fishing. While 32 percent of the total licenses sold in 1976 were purchased by out-of-state residents, non-resident anglers accounted for only 4 percent of the ice fishing angler days (Department of Inland Fisheries and Wildlife, 1976). The level of participation in open water and ice fishing has continued to increase since 1976, as evidenced by the growing number of anglers participating in recreational fishing. In 1979, for example, over 270,000 licenses were sold, 28 percent of which were purchased by non-residents.

Fishery management programs are essential to ensure that fishery resources will be available in the future. Management responsibilities for freshwater fish species in Maine rest with the Maine Department of Inland Fisheries and Wildlife. Effective management programs involve not only assuring an adequate quantity of the fishery resources, but also must consider the characteristics and preferences of resource users. Today the public is demanding a higher level of accountability for public expenditures and greater input into the decision-making process of government agencies. Therefore, agencies such as the Department of Inland Fisheries and Wildlife must be aware of the attitudes, preferences, and behavior of the people who utilize the resource. The apparent increase in demand for fishery resources also contributes to the need of the Department to keep abreast of user attitudes and preferences.

Equally important, however, is the dual role performed by many resource management techniques. Habitat enhancement, hatchery and stocking programs, length of season, creel limits, and minimum size regulations are more than management tools; they are also factors that influence the fishing experience of anglers. Therefore, management

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programs must be evaluated in light of their effect upon the population of resource users as well as their effect upon the fishery resource. Programs that strive to maximize the production of a given resource or species of fish are no longer acceptable if they are unnecessarily inconsistent with the attitudes and preferences of users.

Although the Department of Inland Fisheries and Wildlife has collected considerable information about use levels for both open water and ice fishing, it has virtually no information about the socioeconomic characteristics or the attitudes and preferences of participants in either activity. Since anglers are not a homogeneous group, the characteristics, attitudes, and preferences of ice and open water anglers may differ. Previous research, for example, indicates that the behavior and attitudes of fly fishermen differ from those of bait fishermen (Bryan, 1977). Therefore, it is important to determine the attitudes and preferences of both open water and ice anglers so that the differences can be considered in the design of future management practices.

OBJECTIVES OF THIS REPORT

During the spring of 1980 a survey of resident anglers was conducted by the Department of Agricultural and Resource Economics, in cooperation with the Maine Department of Inland Fisheries and Wildlife. The survey was designed to accomplish several objectives, one of which was to determine the socioeconomic characteristics of resident anglers and their attitudes and preferences about open water and ice fishing activities. The other objectives pertained only to ice fishing. For example, the study was designed to determine the extent of ice fishing in the State and to estimate the economic value of that activity in Maine.

This publication focuses on the characteristics, attitudes, and preferences of Maine anglers and examines the differences that exist between open water and ice fishing activities and participants. The results provide valuable information for management purposes in that the Department of Inland Fisheries and Wildlife can assess future policies on the basis of more complete information about fishermen in general and the attitudes and preferences of open water and ice anglers in particular.

DATA COLLECTION PROCEDURES

The Department of Inland Fisheries and Wildlife provided a listing of all Maine residents who purchased fishing licenses in 1978 (the most recent year for which a complete list was available). This list served as the population from which the sample was drawn for the 1980 study. Non-residents were excluded from the population since they account for only a small proportion of ice fishing in Maine. The population was stratified according to the various types of resident fishing licenses purchased and a random sample was drawn from each stratum. The total sample consisted of 5,000 resident anglers. The sample represents about 2.7 percent of the total resident license holders (178,252) in 1978.

The large sample size was necessary for several reasons. First, the response rates for mail surveys are traditionally low. Second, based on the 1976 survey and discussions with fishery biologists, it was estimated that only one-fourth of resident anglers ice fish. Because the study was to obtain information about ice fishing, the large sample was needed to guarantee sufficient observations on anglers who ice fish. Finally, the sample was large because the population from which it was drawn was two years old. One would expect the survey response rate to be lower because of changes in addresses, people who no longer fish, and other factors related to the use of the 1978 population of resident anglers to obtain information about 1980 fishing activities.

The mail questionnaire used in the survey contained several sections. The first consisted of paired preference questions. Space was provided for the respondent to indicate open water and/or ice fishing preferences on the basis of fishing activities during the last two years. That is, an angler that only fished open water during the last two years was instructed to answer only the open water portion of each question; if the angler had participated in both activities, he or she was instructed to answer both portions of the paired questions, etc. Following the taste and preference questions, respondents were asked to give their opinions regarding selected State fishing regulations and funding problems of the Department of Inland Fisheries and Wildlife.

The second section of the survey instrument was designed to ascertain the socioeconomic characteristics of the respondents and their previous fishing experience.

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The third section of the questionnaire applied only to those respondents who had ice fished during the 1979-1980 ice fishing season. Anglers were asked to report the total number of trips they took during each month of the ice fishing season and to provide detailed information for up to three of their most recent trips. The latter information included: the number of anglers in the group, the actual number of fish caught (by species), length of trip (days), distance traveled to the fishing site, travel time, and travel and on-site expenditures.

A random selection of 138 license holders was drawn from the sample of 5,000 to pretest the questionnaire before it was mailed to the remaining license holders in the sample.

Two mailings were sent to the remaining 4,862 license holders. The first was mailed on April 1, 1980, the day following the close of the ice fishing season in Maine. The second mailing, a followup and reminder, was sent out about six weeks later. A usable response of 35 percent (1,708 questionnaires out of 4,862) was obtained. Of these, 72.4 percent were returned from the first mailing and 27.6 percent from the second. Additional contacts to test for non-response bias were not made.

Of the 1,708 usable returns, 714 or 41.8 percent of the respondents had fished both open water and ice during the last two years. Thirteen respondents (0.8 percent) had only ice fished, and 858 (50.2 percent) had only fished open water. In addition, a significant number of respondents (123 or 7.2 percent) had not fished at all during the two years prior to the survey.

Those respondents who had not fished in the last two years cited several reasons for their non-participation. Lack of time was the most common reason given; it was cited by 42.6 percent of the non-fishing respondents. Other reasons given include personal health reasons (19.1 percent), no longer enjoy fishing (8.7 percent), poor quality of fishing (8.7 percent), and too expensive (6.1 percent). About fourteen percent mentioned some other reason for their non-participation.

SURVEY RESULTS

Results of the 1980 freshwater fishing survey are presented below in three topical sections. The first section consists of a brief description of ice fishing trip characteristics. The second section is

a presentation of the activities, attitudes, and preferences of anglers by fishing type. Finally, the socioeconomic characteristics of all Maine anglers are presented in the third section, along with a comparison of these characteristics by the type of fishing activity in which the respondents participated.

Ice Fishing Trip Characteristics^{1/}

For the purpose of this study, an ice fishing trip is defined as a part of a day or a group of consecutive days that the respondent was away from home for the primary purpose of ice fishing. A total of 546 or 31.97 percent of the respondents participated in at least one ice fishing trip during the 1979-80 season.^{2/} The respondents took a total of 5,112 trips, or 9.36 per respondent.

February was the most popular ice fishing month; 36.3 percent of all trips taken during the season were taken in February. About 31.6 percent of the trips were taken in January and 13.7 percent and 18.4 percent of the total trips occurred in December and March, respectively.

As noted above, respondents who ice fished during the 1979-80 season were asked to provide detailed information for up to three of their ice fishing trips during the season. Detailed information was provided for about 1,200 ice fishing trips. The remaining trip characteristics reported below are based on the information provided for those 1,200 trips.

The average length of an ice fishing trip was 1.33 days. Over 80 percent of all trips were one-day trips and 95 percent of all trips were three days or less in duration. The average one-way distance traveled to reach the fishing site was 34 miles. Autos and snowmobiles were used to travel about 90 percent and five percent, respectively, of the total distance. Foot travel (including snowshoes and cross country skis) accounted for about four percent of the distance and the remainder was traversed by air or some other vehicle. The average time spent traveling to the site was just over one hour.

^{1/}A brief summary of trip characteristics is reported here. A more detailed description and the level of expenditures associated with the trips will be reported in subsequent publications.

^{2/}The ice fishing season in Maine extends from December 1 to March 31. However, fishing for cold water species is not allowed during December.

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The size of ice fishing groups ranged from one to 16 members, and averaged 3.53 persons. An average of 3.2 members actually fished on the trip. About 15 percent of the total group members were under 16 years of age.

Based upon the data provided, the average fish catch per group was 7.02 fish and 0.36 quarts of freshwater and/or salt water smelts per trip. These figures underestimate actual catches because numerous anglers indicated that they caught "many" fish but did not report the actual number. Warm water fish species comprised about 59 percent of the reported catch; chain pickerel and the various varieties of perch accounted for about 85 percent of the warm water species caught.^{3/} Cold water species comprised 33 percent of the fish catch, with land-locked Atlantic salmon, lake trout, and brook trout being the dominant species caught. Respondents did not identify the species of the other eight percent of the fish caught.

The geographical distribution of the ice fishing trips for which detailed information was provided is shown in Table 1. Kennebec and Penobscot Counties were the two most popular locations for ice fishing; about 25 percent of the ice fishing activity occurred within those two counties. Aroostook, Hancock, Piscataquis and Somerset Counties were also popular for ice fishing activities. Based on the survey results, the lowest level of ice fishing activities occurred in Knox and Sagadahoc Counties. Of course, the level of fishing activity in a given county is partially influenced by the size and population of the county and the quantity of ice fishing sites within the county.

Activities, Attitudes and Preferences of Maine Anglers

As noted above, one of the objectives of the study is to determine whether differences exist between open water and ice fishing and anglers' attitudes, preferences, and motivations regarding different aspects of the activities. Many differences were noted and they are reported in this section.

^{3/} Respondents were not asked to identify the variety of perch caught because some anglers have difficulty identifying the various species.

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TABLE 1. Location of Resident Ice Fishing Activities, by County, Maine, 1980

County	Number of Trips	Percent of Total ^{1/}
Androscoggin	27	2.3
Aroostook	111	9.3
Cumberland	80	6.7
Franklin	33	2.8
Hancock	107	9.0
Kennebec	171	14.4
Knox	16	1.3
Lincoln	28	2.4
Oxford	76	6.4
Penobscot	134	11.3
Piscataquis	116	9.8
Sagadahoc	26	2.2
Somerset	105	8.8
Waldo	36	3.0
Washington	47	4.0
York	<u>76</u>	<u>6.4</u>
Total	1,189	100.0

^{1/} Column may not sum to 100% because of rounding error.

Reasons for Fishing

One of the factors investigated is anglers' motivations or reasons for participating in open water and ice fishing activities. Respondents were asked to identify the three most important reasons why they open water and/or ice fish.^{4/} The results are presented in Table 2. Although primary, secondary, and tertiary reasons for open water and ice fishing followed similar patterns, chi-square tests indicate that significant differences exist between the reasons given for open water and ice

^{4/} Anglers who fished both open water and ice during the last two years were instructed to answer questions pertaining to both activities while those anglers who specialized in one of the activities answered the questions related to that activity only.

TABLE 2. Resident Anglers' Primary, Secondary, and Tertiary Reasons for Open Water and Ice Fishing, Maine, 1980^{1/}

Reason	Open Water				Ice			
	Primary	Secondary	Tertiary	Total	Primary	Secondary	Tertiary	Total
	- Percent -				- Percent -			
Being Outdoors - Close to Nature	46.9	24.4	13.5	84.8	43.1	19.2	14.3	76.6
Change from Daily Routine	12.6	18.8	19.1	50.5	13.5	21.4	15.8	50.7
Companionship	3.2	9.2	11.1	23.5	7.9	16.0	14.8	38.7
Challenge of Catching Fish	32.2	28.7	16.1	77.0	27.9	24.8	17.7	70.4
Eating Fish	2.2	9.2	15.7	27.1	2.7	7.7	15.5	25.9
Adding to Food Supply	1.7	2.1	6.1	9.9	2.1	3.3	5.7	11.1
Exercise	0.4	2.6	5.9	8.9	1.0	4.7	7.0	12.7
Exploring the State	0.4	4.6	11.9	16.9	1.0	2.8	8.7	12.5
Other	<u>0.6</u>	<u>0.3</u>	<u>0.5</u>	1.4	<u>1.0</u>	<u>0.2</u>	<u>0.5</u>	1.7
Total ^{2/}	100.0	100.0	100.0		100.0	100.0	100.0	
Number of Observations	1,393	1,360	1,348		631	613	600	

^{1/} Primary, secondary, and tertiary reasons for open water and ice fishing are statistically different at the 95% level.

^{2/} Columns may not sum to 100% because of rounding error.

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fishing. Among the primary reasons, respondents had a stronger preference for being outdoors - close to nature, and for the challenge of catching fish when open water fishing (46.9% and 32.2%, respectively) than for ice fishing (43.1% and 27.9%, respectively). In contrast, change from the daily routine, companionship, eating fish, and all other categories received higher responses for primary reasons for ice fishing. Slight differences also exist among the secondary and tertiary reasons cited for participation in the two activities.

When the percentages for the primary, secondary, and tertiary reasons are summed, being outdoors - close to nature is the reason mentioned most often as the motivation for both open water and ice fishing (see Total columns, Table 2). Challenge of catching fish, and change from daily routine ranked second and third, respectively, for both activities. The motivational factor of companionship exhibited much greater importance for ice fishing than for open water fishing. This suggests that ice fishing is considered to be more of a social activity than open water fishing.

Type of Fishing Party

Significant differences also exist with respect to the types of open water and ice fishing parties (Table 3). The majority of open water respondents fished with members of their immediate family while ice fishing parties were more often comprised of groups of friends. In addition, a much higher percentage of open water anglers prefer to fish

TABLE 3. Types of Fishing Party for Open Water and Ice Fishing, Maine, 1980^{1/}

<u>Type of Party</u>	<u>Open Water (%)</u>	<u>Ice (%)</u>
Fish Alone	13.7	5.9
Immediate Family	50.8	38.6
Other Relatives	4.7	5.8
Friends	<u>30.8</u>	<u>49.7</u>
Total ^{2/}	100.0	100.0
No. of Observations	1,500	678

^{1/}Differences in the type of fishing parties for open water and ice fishing are statistically different at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

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alone. These results are consistent with the observation made above that ice fishing is a more socially-oriented activity than open water fishing.

Fishing Site Preferences

Data in Table 4 illustrate clearly that fishermen have different site preferences for the two fishing activities. Open water anglers prefer to fish areas that offer isolation from other groups of anglers. In contrast, the majority of ice fishermen prefer sites that are frequented by a few other groups. Once again, this illustrates the social aspects of ice fishing.

TABLE 4. Resident Anglers' Site Preferences for Open Water and Ice Fishing, Maine, 1980^{1/}

Type of Site	Open Water (%)	Ice (%)
Far From Other Groups	61.2	32.8
A Few Other Groups Around	33.4	55.1
Many Other Groups	1.5	7.7
Other	3.9	4.4
Total ^{2/}	100.0	100.0
No. of Observations	1,585	702

^{1/}Differences in site preferences for open water and ice fishing are statistically significant at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

Participation in Other Activities

Anglers were asked whether they participated in recreational activities other than fishing while on a fishing trip. The results indicate that about 50 percent of open water and ice anglers participate in multiple activities during fishing trips. Specifically, 50.6 percent of the open water respondents participated in other activities. About 28 percent of the multiple-activity respondents camped while open water fishing. Hiking (14.7 percent) and canoeing (11.1 percent) were also popular activities enjoyed during open water fishing trips. In comparison, 48.6 percent of the ice fishing respondents participated in

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multiple activities. The most popular activity associated with ice fishing was snowmobiling; 39 percent of the ice fishermen who participated in other activities participated in this activity. Other activities enjoyed while ice fishing include skating (12.8 percent), picnicking (7.7 percent) and camping (5.9 percent).

Species Preference

The data in Table 5 indicate that both open water and ice fishermen prefer to catch the cold water fish species while fishing. However, this preference is much stronger among open water fishermen. Almost three-fourths of the open water anglers prefer cold water species compared to only 59 percent of ice fishermen. In addition, a higher percentage of ice fishermen do not have strong preferences regarding species. Almost one-fourth of the responding ice fishermen indicated they would be satisfied with any species they could catch.

TABLE 5. Resident Anglers' Species Group Preferences for Open Water and Ice Fishing, Maine, 1980^{1/}

Species Group	Open Water (%)	Ice (%)
Cold Water	73.6	58.8
Warm Water	12.3	18.7
Anything I Can Catch	14.1	22.5
Total ^{2/}	100.0	100.0
Number of Observations	1,513	699

^{1/}Differences in species group preferences for open water and ice fishing are statistically different at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

Reasons for Species Preference

Respondents were also asked to give the three primary reasons they preferred either warm or cold water species while open water or ice fishing. The reasons cited by open water anglers are reported in Table 6. The two primary reasons for favoring warm water species while open water fishing are fighting quality, and the ease of catching the

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warm water varieties. In contrast, open water anglers who preferred cold water species cited fighting quality and eating quality as the two most common primary reasons. Interestingly, fighting quality was the most common primary reason given by open water anglers for preferring both warm and cold water species. Anglers clearly feel, however, that cold water species are much more difficult to catch than the warm water species. Significant differences also exist among the secondary and tertiary reasons given for species preferences while open water fishing.

TABLE 6. Resident Anglers' Primary, Secondary, and Tertiary Reasons for Preferring Warm and Cold Water Species While Open Water Fishing, Maine, 1980^{1/}

Reason	Species Preference					
	Warm			Cold		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
	- Percent -			- Percent -		
Ease of Catching	21.1	14.4	17.6	4.9	3.4	5.7
Fighting Quality	36.0	14.4	10.5	38.0	25.2	14.1
Size of Fish	5.0	27.5	15.0	6.6	18.3	17.4
Number of Fish	11.2	27.5	22.2	2.0	7.5	8.5
Beauty of Fish	3.1	5.9	5.2	11.6	22.9	21.7
Eating Quality	18.0	10.5	26.1	33.1	21.1	30.2
Other	<u>5.6</u>	<u>0.0</u>	<u>3.3</u>	<u>3.9</u>	<u>1.6</u>	<u>2.3</u>
Total ^{2/}	100.0	100.0	100.0	100.0	100.0	100.0
Number of Observations	161	153	153	1,021	965	943

^{1/} Differences in primary, secondary, and tertiary reasons for preferring open and cold water species are statistically significant at the 95% level.

^{2/} Columns may not sum to 100 percent because of rounding error.

The differences among the reasons given for preferring warm or cold water species while ice fishing are even more pronounced (Table 7). About 46 percent of the respondents who preferred warm water species

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indicated that ease of catching was their primary reason for preferring that species group. The potential of catching more fish and the eating quality of the warm water species were also important primary reasons for preferring warm water fishes.

TABLE 7. Resident Anglers' Primary, Secondary, and Tertiary Reasons for Preferring Warm and Cold Water Species While Ice Fishing, Maine, 1980^{1/}

Reason	Species Preference					
	Warm			Cold		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
	- Percent -			- Percent -		
Ease of Catching	45.7	11.7	10.9	6.1	2.3	9.0
Fighting Quality	11.2	7.8	10.9	25.6	21.5	15.2
Size of Fish	3.4	25.2	26.7	13.2	24.1	20.3
Number of Fish	15.5	32.0	16.8	2.9	7.4	7.2
Beauty of Fish	2.6	2.9	5.9	11.6	21.2	19.7
Eating Quality	17.2	18.4	26.7	36.7	22.6	27.5
Other	<u>4.3</u>	<u>1.9</u>	<u>2.0</u>	<u>4.0</u>	<u>0.9</u>	<u>1.2</u>
Total ^{2/}	100.0	100.0	100.0	100.0	100.0	100.0
Number of Observations	116	103	101	379	349	335

^{1/}Differences in primary, secondary, and tertiary reasons for preferring open and cold water species are statistically significant at the 95% level.

^{2/}Columns may not sum to 100 percent because of rounding error.

Eating quality and fighting quality were the most common reasons cited by those anglers who preferred cold water species while ice fishing. Eating quality ranked higher than fighting quality among ice fishermen who preferred cold water species. Clearly, fighting quality is considered to be a less important reason for preferring either warm or cold water species while ice fishing. Anglers seem to be more concerned with eating quality, ease of catching fish, and the number of fish caught while ice

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percent of both open water and ice anglers stated that catching fish was of no importance while fishing. As noted earlier, anglers participate in fishing activities for many reasons and catching fish is not a necessary condition for participating in and enjoying the activity.

Importance of Fish Caught as a Meat Source

Resident anglers were also asked to indicate the level of importance of fish catch as a food source. Only about three percent of the anglers responded that it was a major meat source for their household (Table 9). However, about one-third of the respondents indicated that the fish caught was occasionally important as a meat source. The responses of open water and ice participants are not statistically different at the 95 percent level.

TABLE 9. Importance of Open Water and Ice Fishing Catch as a Meat Source, Maine, 1980^{1/}

<u>Level of Importance</u>	<u>Open Water (%)</u>	<u>Ice (%)</u>
Major Meat Source	3.1	2.4
Occasionally Important	31.1	31.6
Of Little Importance	62.1	62.7
Not Consumed	3.5	3.2
Total ^{2/}	100.0	100.0
No. of Observations	1,551	708

^{1/}The differences between the importance of catch as a meat source by participants in open water and ice fishing are not statistically significant at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

Distribution of Fishing Time

Data presented in Table 10 illustrate that weekends are the most popular time for fishing in Maine. This is especially true for ice fishing; almost 69 percent of all ice fishing activity occurs on weekends, compared to about 47 percent for open water fishing. About one-third of the open water fishing occurs during the vacation time of anglers whereas vacation time only accounts for 18 percent of the ice fishing activity.

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TABLE 11. Resident Anglers' Attitudes Toward the 1978 January Ice Fishing Regulation, by Type of Activity, Maine, 1980^{1/}

Attitude	Fishing Activity				
	Open Water (%)	Only	Ice Only (%)	Both (%)	All (%)
Approve	29.1		100.0	62.6	45.4
Disapprove	24.6		0.0	24.1	24.2
Impartial	46.3		0.0	13.2	30.4
Total ^{2/}	100.0		100.0	100.0	100.0
Number of Observations	786		12	704	1,502

^{1/}The attitudes expressed by participants in the three fishing activities are statistically different at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

Another question related directly to the funding problem of the Department of Inland Fisheries and Wildlife. As with most state fish and game agencies, the Maine Department of Inland Fisheries and Wildlife has been severely affected by the general inflationary trends of the 1970's. Costs have risen much more rapidly than revenues, resulting in a shortage of funds to maintain programs at current levels. Several solutions to the funding problem have been mentioned by the news media. Therefore, a question was designed to determine resident anglers' opinions about the possible solutions.

Respondents were asked to identify their first, second, and third choices for solving the Department's funding problems. The responses are summarized in Table 12. Increasing the price of non-resident licenses was cited by almost one-third of the resident anglers as their first choice for increasing revenues. In contrast, only one percent and eight percent favored an increase in resident license fees only, and all license (resident and non-resident) fees, respectively, as their first choice. The percentage of anglers opting for appropriations from the state general fund and sales tax revenues was also quite high on the list of first choices. In addition, eleven percent of the respondents indicated that their first choice was for the Department to maintain its current budget level, even if it required a reduction in programs. The second and third choices of anglers are also reported in Table 12.

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TABLE 12. Resident Anglers' Primary, Secondary, and Tertiary Choices for Increasing the Department of Inland Fisheries and Wildlife Funding Sources, Maine, 1980^{1/}

Funding Source	First Choice (%)	Second Choice (%)	Third Choice (%)	Total (%)
Appropriation From General Fund	20.6	17.8	19.5	57.9
Bond Issue	1.8	5.2	6.8	13.8
Share of State Sales Tax	15.4	27.0	17.9	60.3
Excise Tax on Sporting Goods	6.4	13.4	12.9	32.7
Increase All License Fees	7.9	9.1	9.8	26.8
Increase in Non-Resident License Fees, Only	32.3	14.5	10.0	56.8
Increase in Resident License Fees, Only	1.0	1.4	1.5	3.9
Maintain Current Budget	11.0	10.1	15.9	37.0
Other	<u>3.6</u>	<u>1.6</u>	<u>5.5</u>	10.7
Total ^{2/}	100.0	100.0	100.0	
Number of Observations	1,429	1,331	1,254	

^{1/}The choices expressed by participants in the three fishing activities are not statistically different at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

The "Total" column in Table 12 indicates the percentage of respondents that listed each funding source as one of their three choices for solving the funding problems. The three solutions mentioned most often include a share of the state sales tax revenue, appropriations from the general fund, and an increase in non-resident license fees. The latter solution was number one among the first choices but slipped to number three when second and third choices are considered. Once again, an increase in resident license fees only was the least popular among the proposed solutions.

Readership of Maine Fish and Wildlife Magazine

The Department of Inland Fisheries and Wildlife was also interested in determining the extent of readership of its publication, Maine Fish and Wildlife. Approximately ten percent of the responding anglers subscribe to the magazine and read it on a regular basis (Table 13).

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TABLE 13. Subscription and Readership of Maine Fish and Wildlife by Maine Anglers by Type of Fishing Activity, Maine, 1980^{1/}

Subscription/Readership	Fishing Activity			All (%)
	Open Water (%)	Only Ice (%)	Both (%)	
Subscribe and Read	8.5	0.0	11.5	9.8
Do Not Subscribe but Read Frequently	9.5	23.1	18.4	13.6
Do Not Subscribe but Read Occasionally	32.5	23.1	33.5	32.9
Do Not Subscribe or Read	<u>49.6</u>	<u>53.8</u>	<u>36.6</u>	<u>43.8</u>
Total ^{2/}	100.0	100.0	100.0	100.0
Number of Observations	702	13	834	1,549

^{1/} Difference in subscription and readership by participants in the three types of fishing activities are statistically significant at the 95% level.

^{2/} Columns may not sum to 100% because of rounding error.

Another 45 percent of the respondents indicated that they read the publication frequently or occasionally. Hence, the magazine should be a relatively effective medium of informing anglers about Department programs and policies.

The level of readership also varied significantly among anglers who participate in the different types of fishing activities. Readership was highest among anglers who participate in both open water and ice fishing. Readership was lowest among the few anglers who only ice fished.

Socioeconomic Characteristics of Maine Anglers

Socioeconomic characteristics, such as personal history and experiences, age, sex, education, and income, often influence a person's attitudes and preferences. They may also influence the type of activities in which a person participates, including fishing. Socioeconomic data for Maine anglers who responded to the 1980 Freshwater Fishing Survey are presented in this section by the type of fishing activity of the respondents. Three categories of anglers, based on their fishing activity during the preceeding two years, are discussed: those who only fished open

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water, anglers who only ice fished, and anglers who participated in both fishing activities. The reader is reminded that there are only 13 potential observations of anglers who only ice fished during the two years prior to the survey.

Age and Years Lived in Maine

The respondents averaged about 42 years of age and had lived in Maine an average of 36 years. Slightly more than three-fourths of all anglers were born in Maine (see Table 14). Generally speaking, those anglers who participate in both open water and ice fishing are younger than those who specialize in either of the two activities. The average age of anglers who participate in both types of fishing was 39.8 years,

TABLE 14. Selected Socioeconomic Characteristics of Resident Anglers, by Type of Fishing Activity, Maine, 1980

Characteristic	Fishing Activity			All
	Open Water Only	Ice Only	Both	
Average Age (Years)*	43.7	43.3	39.8	41.9
Sex (% Male)*	75.8	100.0	88.8	81.9
Marital Status (% Married)	79.0	76.9	75.6	77.4
Born in Maine (%)*	72.9	76.9	82.6	77.3

*Indicates the differences that exist among the three types of fishing activities are statistically significant at the 95% level.

compared to average ages of 43.7 and 43.3 years, respectively, for anglers who specialize in open water and ice fishing. The reader is referred to Appendix A, Table 3 for the complete age distributions of responding license holders who fished in Maine during the last two years. The length of time that anglers had lived in Maine was not statistically different for participants in the three categories of fishing activity.

Sex and Marital Status

The sex of respondents participating in the various fishing activities was significantly different. Males dominated all three activity categories but females were more prevalent among open water only anglers. Females comprised almost 25 percent of that group compared to only 11 percent of the anglers who participate in both open water and ice fishing. None of the females who responded to the survey specialized in ice fishing. The low female participation rate for ice fishing may

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partially explain the significant difference in types of fishing parties noted earlier. Family groups were much more common while open water fishing than while ice fishing.

The marital status of participants was fairly uniform for the three activities. The observed differences are not statistically significant. In all, about 77 percent of the respondents were married.

Occupation

The occupations of responding anglers were grouped into four broad categories and a "not working" category to determine if the occupations of participants varied with the type of fishing activity of respondents. The data in Table 15 indicate that the occupations of anglers in the various fishing activities are statistically different. A higher proportion of respondents in the white collar, blue collar, and farm-forestry occupation categories participated in both open water and ice fishing. In contrast, anglers working in the service sectors had a higher participation rate for open water fishing only, as did those anglers who were not working at the time the survey was conducted.

TABLE 15. Occupation of Anglers by Type of Fishing Activity, Maine, 1980^{1/}

Occupation Class	Fishing Activity			All
	Open Water Only	Ice Only	Both	
	- Percent -			
White Collar	30.6	45.5	32.7	31.7
Blue Collar	35.5	45.5	43.6	39.2
Service	4.1	0.0	2.9	3.5
Farm-Forestry	1.5	0.0	2.2	1.8
Not Working (Retired, Student, etc.)	<u>28.4</u>	<u>9.1</u>	<u>18.6</u>	<u>23.8</u>
Total ^{2/}	100.0	100.0	100.0	100.0

^{1/}The occupations for participants in the three fishing activities are statistically different at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

Vacation Time

The amount of paid vacation received by respondents also varied significantly with the type of fishing enjoyed by participants. The

majority of anglers who received either two weeks or over three weeks of vacation time participated in both fishing types. In contrast, open water participants were dominant in the categories of less than one week, one week, and three weeks of vacation. In addition, a majority of anglers who did not receive any paid vacation only participated in open water fishing. Almost one-half of the anglers who only ice fished received more than three weeks of annual paid vacation.

Childhood and Current Place of Residence

The type of setting or area in which a person currently resides or resided in during childhood often influences the participation rate in various activities. For example, the current place of residence influences the type of activities and opportunities that individuals can currently pursue. Similarly, the place of residence during childhood may also influence current participation in certain activities because people often establish life-long activity patterns during the first two decades of life. Hence respondents were asked to indicate the setting of their current and childhood residence to determine if either had an influence on the type of fishing activity of respondents. The results are reported in Tables 16 and 17 for childhood and current place of residence, respectively.

TABLE 16. Childhood Residence of Resident Anglers, by Type of Fishing Activity, Maine, 1980^{1/}

Childhood Residence	Fishing Activity			All
	Open Water Only	Ice Only	Both	
	- Percent -			
City	16.3	16.7	13.3	14.9
Suburb	22.5	8.3	20.5	21.5
Rural	<u>61.2</u>	<u>75.0</u>	<u>66.3</u>	<u>63.6</u>
Total ^{2/}	100.0	100.0	100.0	100.0
Number of Observations	840	12	709	1,561

^{1/}Childhood residence for participants in the three fishing activities are not statistically different at the 95% level.

^{2/}Columns may not sum to 100% due to rounding error.

The data in Table 16 indicate that the place of childhood residence of anglers did not have a statistically significant influence on the

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TABLE 17. Current Residence of Anglers by Type of Fishing Activity, Maine, 1980^{1/}

Current Residence	Fishing Activity				
	Open Water (%)	Only (%)	Ice Only (%)	Both (%)	All (%)
City	19.2		16.7	14.2	16.9
Suburb	29.2		8.3	23.6	26.5
Rural	<u>51.6</u>		<u>75.0</u>	<u>62.2</u>	<u>56.6</u>
Total ^{2/}	100.0		100.0	100.0	100.0
No. of Observations	849		12	712	1,573

^{1/}The current place of residence for participants in the three fishing activities are statistically different at the 95% level.

^{2/}Columns may not sum to 100% due to rounding error.

type of fishing activity enjoyed by respondents. Overall, about 64 percent of all respondents resided in rural areas during childhood, compared to about 21 percent and 15 percent who resided in suburban and city areas, respectively, during childhood.

In contrast, the current place of residence of respondents varies significantly with the type of fishing activity (Table 17). For example, a much larger percentage of open water only anglers resides in either suburban areas or cities. Rural residents, on the other hand, account for 75 percent of the respondents who specialize in ice fishing and 62 percent of the anglers who participate in both open water and ice fishing activities. Overall, about 57 percent of the responding fishing license holders currently reside in rural areas.

Education and Income

The education and income levels of people also influence activity patterns. For example, low levels of income can constrain participation in some recreational activities while education levels influence behavior and interest patterns of people. Of course, there is often a high degree of correspondence between income and education levels.

The income and education levels of Maine anglers do not differ significantly for those participating in the three categories of fishing activities. Overall, about 19 percent of the responding licensees had not completed high school while slightly more than 40 percent had

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completed high school but had not attended post-secondary schools (Table 18). The other 40 percent of respondents had attended at least one year of post-secondary schooling and about 17 percent had completed at least four years of college.

TABLE 18. Educational Levels of Anglers by Type of Fishing Activity, Maine, 1980^{1/}

Education Level	Fishing Activity			All
	Open Water Only	Ice Only	Both	
	- Percent -			
Less Than 12 Years	19.5	30.8	17.9	18.8
12 Years	41.2	30.8	41.4	41.2
1-3 Years of College or Vocational School	21.4	15.4	23.9	22.5
4 or More Years of College	18.0	23.1	16.9	17.5
Total ^{2/}	100.0	100.0	100.0	100.0
Number of Observations	843	13	711	1,567

^{1/}The differences in education levels of participants for each fishing type are not statistically significant at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

The income distributions of anglers by type of fishing activity are reported in Table 19. Overall, almost 60 percent of the respondents had

TABLE 19. Income Levels of Anglers by Type of Fishing Activity, Maine, 1980^{1/}

Education Level	Fishing Activity			All
	Open Water Only	Ice Only	Both	
	- Percent -			
Less than \$ 5,000	6.3	9.1	4.9	5.7
\$ 5,000 - \$ 9,999	15.5	9.1	12.6	14.1
\$10,000 - \$14,999	24.3	18.2	24.7	24.4
\$15,000 - \$24,999	33.2	36.4	36.7	34.8
\$25,000 - \$34,999	13.0	18.2	12.8	12.9
\$35,000 or More	7.6	9.1	8.3	8.0
Total ^{2/}	100.0	100.0	100.0	100.0
Number of Observations	761	11	649	1,421

^{1/}The differences in income levels of participants for each activity are not statistically significant at the 95% level.

^{2/}Columns may not sum to 100% because of rounding error.

incomes between \$10,000 and \$25,000. About 20 percent of respondents reported income levels of less than \$10,000 and an equal percentage had incomes of \$25,000 or more. Again, the variation in income levels for anglers participating in the three types of fishing activities was not statistically significant.

SUMMARY AND CONCLUSIONS

Freshwater fisheries management is a complex process. Programs must be based on the physical and biological requirements of the resource and the attitudes and preferences of the people who utilize the resource. Several types of information are required to achieve and maintain a balance between the resource and the users. Since anglers utilize the resource for both open water and ice fishing activities, management programs must address both activities and the differences in participants' attitudes and preferences about the activities.

The 1980 survey of freshwater anglers was designed to obtain the type of information needed to design management programs. About 35 percent of the 5,000 mail questionnaires sent to a random sample of 1978 Maine fishing license holders were returned. The information obtained from the respondents provides a profile of Maine anglers and their attitudes and preferences toward open water and ice fishing. The results indicate that fishermen are not a homogeneous group, even though they possess many similar characteristics and attitudes.

Open water fishing is a specialized sport, as illustrated by the variety of fishing techniques and equipment used. This study found that open water fishing participants regarded this sport as a challenge, a chance to get out-of-doors, and a change from the normal routine. Open water anglers have a strong preference for cold water fish species, especially landlocked Atlantic salmon, lake trout, and brook trout. These species are preferred for their fighting qualities and their flavorful meat.

Part of the open water fishing experience is being close to nature and away from other groups of fishermen. Most open water anglers prefer the more remote areas that are rarely frequented by other fishermen. A majority of open water anglers fish with members of their immediate family and almost one-half of the fishing activity is concentrated on weekends. In spite of these specialized preferences, less than 20

percent of the open water respondents consider fishing success to be of prime importance to the enjoyment of the open water fishing experience.

Ice fishing, on the other hand is a more social experience for many participants. The companionship of family and friends is relatively more important while ice fishing. In addition, ice anglers prefer fishing sites frequented by a few other fishing parties. Ice anglers also prefer cold water fish species but the preference is much weaker than that exhibited by open water anglers. However, fishing success is slightly more important while ice fishing than it is while open water fishing. Ice fishing activities are heavily concentrated on weekends; over two-thirds of all ice fishing occurs on Saturdays and Sundays. Thus, the survey results clearly indicate that the attitudes and expectations of anglers differ for open water and ice fishing.

As expected, the fishing regulation change to extend the season for cold water fish species during ice fishing was more popular among those anglers who ice fish. A majority of the ice anglers approved of the change, whereas only 29 per cent of the open water only anglers approved it. Almost one-half of the open water only anglers were impartial or had no opinion about the regulation change.

Open water and ice fishermen were relatively consistent in their opinions regarding solutions to the funding problems of the Department of Inland Fisheries and Wildlife. The three most popular solutions were appropriations from the general fund, revenue from the state sales tax, and an increase in non-resident hunting and fishing license fees. The least popular solution was an increase in resident hunting and fishing license fees.

Several socioeconomic characteristics of open water and ice anglers also varied with the type of fishing activity of respondents. For example, respondents who participate in both open water and ice fishing are generally younger than those who specialize in either of the two activities and female anglers are more prevalent among open water only anglers. Occupation, the amount of paid vacation received, and the current place of residence of respondents also varied significantly with fishing type. On the other hand, there was no statistical difference in income or education levels of respondents who participate in the various types of activities.

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The information presented above is vital to the Maine Department of Inland Fisheries and Wildlife in that it can be used to design and evaluate management programs. Together with the biological and physical data, it can be used to determine the best course of action to achieve a given objective. Now, for the first time, information about the characteristics, attitudes, and preferences of both open water and ice anglers can be considered explicitly in the formulation and evaluation of freshwater fishery management policies and programs.

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APPENDIX A

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APPENDIX A

TABLE 1. Resident Anglers' Primary, Secondary, and Tertiary Reasons for Preferring Cold Water Species While Open Water and Ice Fishing, Maine, 1980^{1/}

Reason	Fishing Type					
	Open Water			Ice		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
	- Percent -			- Percent -		
Ease of Catching	4.9	3.4	5.7	6.1	2.3	9.0
Fighting Quality	38.0	25.2	14.1	25.6	21.5	15.2
Size of Fish	6.6	18.3	17.4	13.2	24.1	20.3
Number of Fish	2.0	7.5	8.5	2.9	7.4	7.2
Beauty of Fish	11.6	22.9	21.7	11.6	21.2	19.7
Eating Quality	33.1	21.1	30.2	36.7	22.6	27.5
Other	<u>3.9</u>	<u>1.6</u>	<u>2.3</u>	<u>4.0</u>	<u>0.9</u>	<u>1.2</u>
Total ^{2/}	100.0	100.0	100.0	100.0	100.0	100.0
Number of Observations	1,021	965	943	379	349	335

^{1/}Differences in the primary, secondary, and tertiary reasons for preferring cold water species while open water and ice fishing are statistically significant at the 95% level.

^{2/}Columns may not sum to 100 percent because of rounding error.

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APPENDIX A

TABLE 2. Resident Anglers' Primary, Secondary and Tertiary Reasons for Preferring Warm Water Species While Open Water and Ice Fishing, Maine, 1980^{1/}

Reason	Fishing Type					
	Open Water			Ice		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
	- Percent -			- Percent -		
Ease of Catching	21.1	14.4	17.6	45.7	11.7	10.9
Fighting Quality	36.0	14.4	10.5	11.2	7.8	10.9
Size of Fish	5.0	27.5	15.0	3.4	25.2	26.7
Number of Fish	11.2	27.5	22.2	15.5	32.0	16.8
Beauty of Fish	3.1	5.9	5.2	2.6	2.9	5.9
Eating Quality	18.0	10.5	26.1	17.2	18.4	26.7
Other	5.6	0.0	3.3	4.3	1.9	2.0
Total ^{2/}	100.0	100.0	100.0	100.0	100.0	100.0
Number of Observations	161	153	153	116	103	101

^{1/}Differences in the primary, secondary, and tertiary reasons for preferring warm water species while open water and ice fishing are statistically significant at the 95% level.

^{2/}Columns may not sum to 100 percent because of rounding error.

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APPENDIX A

TABLE 3. Age Distributions of Resident Fishing License Holders by Type of Fishing Activity, Maine, 1980^{1/}

Age Category	Fishing Activity			All
	Open Water Only	Ice Only	Both	
	- Percent -			
Less Than 20 Years ^{2/}	3.5	0.0	5.0	4.2
20-29 Years	18.7	7.7	23.3	20.7
30-39 Years	21.2	38.5	25.6	23.3
40-49 Years	19.1	15.3	17.6	18.4
50-59 Years	17.3	23.1	17.8	17.6
60-69 Years	15.5	7.7	8.9	12.4
70 or More Years	<u>4.7</u>	<u>7.7</u>	<u>1.8</u>	<u>3.4</u>
Total ^{3/}	100.0	100.0	100.0	100.0
Number of Observations	850	13	713	1,576

^{1/}The age distributions of participants in the three type of fishing activities are statistically different at the 95% level.

^{2/}The percentage of license holders less than 20 years of age is low because juveniles below the age of sixteen are normally not required to purchase a license. Since the sample was drawn from the population of 1978 licensees, most of the respondents were at least 18 years of age at the time the survey was conducted.

^{3/}Columns may not sum to 100% because of rounding error.