NEW HAMPSHIRE RECREATIONAL OYSTER HARVESTERS: PROFILE, PERCEPTIONS, AND ATTITUDES

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A survey of holders of a 1989 New Hampshire oyster-harvesting license revealed that recreational oyster harvesting is pursued mostly by older men. The 1988 closing of some parts of Great Bay to oyster harvesting resulted in license holders' taking one fewer trip and taking about six minutes longer to harvest one bushel of oysters in 1989. The average annual harvest also decreased almost one bushel. Respondents generally believed that Great Bay oysters were safe to eat. The majority of respondents were not interested in oyster depuration but were willing to contribute toward a fund dedicated to oyster-bed management. Logit analysis revealed that the probability of willingness to contribute to an oyster-bed management fund decreases when the respondent's annual income is smaller than $20,000, and when the respondent's oyster-harvesting experience is fifteen years or fewer.

Introduction

Oyster harvesting in New Hampshire's Great Bay and its adjoining waters has a long tradition. A report entitled The Fisheries and Fishery Industries of the United States, published in 1887, says that Native Americans in pre-colonial times took oysters from the Bay [U.S. Commission of Fish and Fisheries]. The same publication reports that a commercial oyster industry that started in the area in 1874 declined in 1879 because of over-raking of the oyster beds.

Today only recreational oyster harvesting is allowed in the Bay. Many people in New Hampshire, particularly those living in the southeastern part of the State, pursue this pastime. All areas of the Bay were once open to oyster harvesting, but in 1988 the New Hampshire Fish and Game Department, the State agency that has jurisdiction over this activity, announced that because of pollution, oysters may not be harvested from certain areas.

The closing of those areas raises some important issues: first, how safe for consumption are the oysters taken from the remaining open beds? If the surrounding waters are polluted, wouldn't the open area become polluted eventually? Second, because the restrictions concentrate oyster harvesting in a smaller area than before, the threat of over-harvesting in the open beds exists. How real or immediate is this problem? If license holders feel that the Great Bay oysters are unsafe to eat, or if they find that it is getting more difficult to harvest, they may cease the pursuit of this recreational activity. Oyster harvesting is generally, a pleasant and harmless way of enjoying nature's bounty. Compared to other outdoor activities, oyster harvesting poses minimal threat to the environment. Oyster harvesters, in their purchase of boats, equipment, and supplies also contribute to the economic well-being of businesses and towns around the Bay. For these reasons the possible demise of recreational oyster harvesting is a source of concern.

There are strategies that could solve the oyster-safeness and diminishing harvests problems. In particular, depuration has been used to rid oysters of contaminants that make them unsafe for human consumption. The process involves placing just-harvested oysters in tanks through which clean water runs. The oysters have to be kept in the tank for about twenty-four hours which allows them to filter out the contaminants. The problem of over-harvesting in the open area can be addressed by managing the oyster beds to maintain or increase oyster population numbers. Management could include activities like raking of the beds and planting cultch (i.e., materials like shells, etc. to which oyster larvae may attach) [Maryland Department of Fisheries].

There is little available information about oysters and oyster harvesting in Great Bay. The N.H. Fish and Game Department keeps a record of people who purchase licenses, and estimates the total oyster population periodically. Beyond these, information about the harvesters, the volume of harvest, and other oyster-related factors and activities do not exist.

The Survey

In April 1990, a survey of 1989 New Hampshire oyster-license holders was conducted. The study objectives included the following: (1) determine the socio-economic characteristics of the people who harvest oysters; (2) determine how the area restrictions affected their oyster-harvesting activities; (3) determine their perceptions about the safeness of eating Great Bay oysters; and (4) assess their attitudes toward (a) oyster depuration which could ensure safeness of oysters for consumption, and (b) management of oyster beds which could maintain or increase the oyster population.

The names of license-holders were obtained from the N.H. Fish and Game Department. The mailing list contained the names of 771 individuals who paid for a license in 1989 plus those of thirty people who had permanent licenses[1]. Of the 801 questionnaires sent out in the first mailing, 240 were returned. A second mailing to the non-respondents resulted in an additional 126 responses for a total of 366, or a response rate of forty-six percent.

1/ Those who obtain a New Hampshire oyster-harvesting license when they are 68 years old obtain a permanent license that allows them to harvest oysters in succeeding years without paying a fee.

Summary of Findings

Characteristics of Oyster Harvesters

The survey results suggest that recreational oyster harvesting is pursued mostly by older men. Ninety-five percent of the respondents were male, and sixty-two percent were fifty-five years old or older. Only ten percent of the respondents were below thirty-five years in age, and only two respondents were younger than twenty-five years.

On the surface these figures may imply that this activity may be in danger of dying out. But an analysis of the ages of people who went oyster harvesting for the first time in the period 1984-89 reveal that a high proportion took up this pastime when they were older than fifty-five years. It appears that people tend to pursue other forms of recreation when they are younger and some go into oyster harvesting in their later years.

Thirty-eight percent of the respondents had been harvesting oysters for fewer than five years, 19% for six to ten years, and 25% for more than 20 years. Those in the 55 to 67 years age group predominated in each length-of-harvesting-experience category. Seventy-five percent had an annual income of at least $20,000, and 60% had a higher than high school education.

Effects of the Closing of Some Oyster Beds

Respondents were asked for information on the following factors before and after closing of some parts of the Bay: number of oyster-harvesting trips per year, time it took to harvest one bushel of oysters, amount of annual harvest, size of oyster-harvesting party, mileage from home to place of harvest, boat fuel used per trip, and time it took to reach the oyster bed from the respondent's boat mooring. The closing of some parts of the Bay appear to have had an effect on most of the oyster-related activities of the respondents. The changes in the average number of trips per year, the average time it takes to harvest a bushel of oysters, and the average amount harvested per year were statistically significant. Respondents took, on average, about one fewer trip in 1989 than before 1988 and they also took about six minutes longer to gather one bushel of oysters. The average quantity harvested was lower by almost one bushel in 1989 than in the years before the closing of some oyster beds.

The changes appear to be minor, but it must be emphasized that at the time of the study only about two years have elapsed since the imposition of area restrictions. The long-term effects could potentially be more significant.

Perceptions as to Safeness of Eating Oysters

Respondents generally believed that Great Bay oysters were safe to eat; however, more people felt they were safe to be eaten cooked (91%), rather than raw (55%). This safe perception was confirmed by their answers to the question as to which they considered safer health-wise, eating oysters purchased from stores or consuming oysters they harvested themselves. Only 9% of the respondents felt that purchasing is definitely safer than harvesting. Fifty-two percent felt that Great Bay oysters are safer; and 39 percent felt that both are equally safe.

Ninety-nine people who believed that harvested oysters are as safe as purchased oysters gave their reasons for that perception: 27% said that Great Bay oysters are tested by the N.H. Fish and Game Department[2], and 18% said that they believe Great Bay is a safe oyster source while they do not know the pollution status of other oyster sources.

One hundred seventy respondents who thought that harvested oysters are safer than purchased oysters cited their reasons: Forty-six percent said that because they harvested their own oysters they were sure about their freshness. Forty-four percent said that they know the pollution status of Great Bay and they are confident that the oysters from the open area are safe to eat. Furthermore, they do not know how polluted the sources are of purchased oysters. Four percent said that the State Fish and Game Department monitors oyster beds and inspects the oysters.

Attitude Toward Depuration

The survey contained a question on whether the license holder would be interested in having oysters that they harvest depurated so that they will meet acceptable health standards. Forty-one percent said they were interested; 59% said they were not interested.

Respondents were asked as to the amount of money they are willing to pay for depuration and 66% answered that they are not willing to pay any amount. They cited the following reasons: 29% said they are not interested in depuration because they like oysters fresh out of the water; 18% said that the real problem is cleaning up Great Bay; and 12% believed that depuration is not necessary because oysters from the open area are safe to eat.

Attitude Toward Contributing to a Fund Dedicated to Management

The problem of potential over harvesting of oysters in the open areas can be addressed by managing the beds to assure that the oyster population remains high or at least enough to sustain the demand. Such activities would not be costless and revenue from licenses may not be enough to support a management program. Survey respondents were asked about their willingness to contribute to a fund earmarked for oyster-bed management.

Fifty-two percent of the respondents said they were willing to contribute; the average amount that they were willing to pay was $21.00. Those unwilling to contribute cited the following reasons: license fees should be used for oyster-bed management (31%); the costs of oystering are already high (16%); a management program is not necessary because there are plenty of oysters and oysters grow by themselves (12%); and the real problem is cleaning up Great Bay (10%).

The differences in the willingness to pay response in the sample was analyzed with the use of a logit model. It was hypothesized that a respondent's income level, length of oyster-harvesting experience, round-trip distance from the respondent's home to the oyster bed, and the change in average harvest per trip would affect the probability of that respondent's willingness to pay a positive dollar amount for oyster depuration. The model specification is as follows:

$$\ln \frac{(\pi_{ijkl})}{(1-\pi_{ijkl})} = \mu + Y_i + E_j + D_k + C_l$$

where π_{ijkl} is the probability of a respondent's willingness to pay a positive amount for oyster management when the

2/Contrary to some respondents' perception, the N.H. Fish and Game Department does not test oysters for the presence of contaminants or monitor water pollution levels in the open area.

respondent's annual income (Y) is i (i=1, $20,000 or less; 2=greater than $20,000), length of oyster-harvesting experience (E) is j (j=1, less than or equal to 15 years; j=2, more than 15 years), round-trip distance (D) from home to the oyster bed is k (k=1, less than or equal to 50 miles; k=2, more than 50 miles, and change (C) in average oyster harvest per trip from before 1988 to 1989 is l (l=1, greater than or equal to zero; l=2, less than zero); μ represents the mean of the logits (the dependent variable) for all combinations of the independent variables; and _ represents the effect on the logit of each category of the independent variables. The model was estimated using the SAS CATMOD procedure because the independent variables were measured on a categorical scale.

The results (Table 1) indicate that the probability of a positive willingness to pay response is associated with the respondent's annual income level and length of oyster harvesting experience. The probability of a positive response decreases when the respondent's income is smaller than $20,000 a year. Similarly, the probability decreases when the respondent has been harvesting oysters for fifteen years or fewer.

Table 1. Maximum Likelihood Estimates of Effects of the Independent Variables on the Probability that the Amount a Respondent is Willing to Pay for Oyster-Bed Management is Greater than Zero

Parameter	Coefficient	Std. Error	Chi-Square
Intercept	-0.26	0.17	2.46
Income	-0.38*	0.14	7.76
Experience	0.46*	0.13	12.81
Distance	0.05	0.13	0.13
Change	0.10	0.13	0.56
Likelihood Ratio Statistic=5.73**			

* Statistically significant at the a=0.01 level.
** Unable to reject H0: There is general association between the independent and dependent variables, at the ∂=0.10 significance level.

Implications

It appears that many respondents were not familiar with oyster biology, particularly in the area of how oysters could become unsafe for human consumption. For example, many license-holders said that they believed that Great Bay oysters were safe to eat because they were fresh. Oysters may be fresh but if they came from polluted waters they may still be unsafe.

It would be helpful to provide those who purchase a license printed information on oyster biology. Information on ways license-holders could help to ensure a viable oyster population could also be included. For example, returning shells into the water would increase the number of oysters by enhancing cultch formation.

Many respondents felt that, because harvesting was allowed in the open area, the oysters were safe to eat. This perception raises some questions: is it a fact that oysters are safe to eat? Are they safe to eat all year, or are there times when one should refrain from taking oysters from the Bay? This issue is highlighted because in some states the regulatory agencies close oyster beds after periods of heavy rain. Runoff increases the levels of coliform bacteria in the waters and in the oysters. Studies that would periodically analyze the safeness of oysters for human consumption, especially after heavy rainfall, would be helpful to the license holders in making their harvesting decisions.

Based on the survey responses, many license-holders did not understand the oyster-depuration process. An education effort that would explain the procedure as well as its benefits and costs could rectify this situation. The license-holders could then make a better-informed decision regarding the usefulness to them of this process.

The survey results show a minor decline in average harvest, as well as slightly more time involved in harvesting a bushel of oysters, after the area closing. These were the effects after only two years; the long-term effects could be greater. Although this does not necessarily indicate that the open area is being over-harvested, it does suggest the need for estimating the total harvest rate in the Bay. This information, together with knowledge about the size of the oyster population and how they thrive under current conditions, would help determine if the existing harvest pressure poses a threat to the oyster population. If over-harvesting is indeed an actual or potential problem, oyster-bed management could be practiced to assure ample quantities of this shellfish in the long run. The survey results indicate license-holder support, and even willingness to pay, for oyster-bed management.

The results of the logit analysis indicate that some care should be exercised in instituting a program that would ask oyster harvesters to contribute to a fund for management. Increasing license fees to raise the money for this purpose may drive some people, those in the lower income categories in particular, out of oyster-harvesting. Although this approach can reduce the demand for oysters and the need for management, it will likely be at the expense of the poorer people. If the objective is to raise funds (not reduce the demand for oyster-harvesting) then other approaches should be considered.

The logit analysis results also show that those who have been harvesting for more than fifteen years are more likely to contribute than those with shorter harvesting experience. Those in the first group are likely to be more familiar with the long-run history of oyster harvesting in Great Bay, and thus perceive a need for management. Perhaps those who have shorter experience could be encouraged to contribute by providing them with information on the history, current situation, and future prospects of oyster harvesting in the Bay.

Literature Cited

Agresti, A. and B. Finlay. Statistical Methods for the Social Sciences. San Francisco: Dellen Publishing Co., 1986.

Maryland Fisheries Administration. The Biological and Economic Aspects of Oyster Propagation in Maryland, by Douglas W. Campbell and Robert H. Forste. Annapolis: Maryland Fisheries Administration, May 1978.

U.S. Commission of Fish and Fisheries. The Fisheries and Fishery Industries of the United States; Section II: A Geographical Review of the Fisheries Industries and Fishing Communities for the Year 1880, by George Brown Goode. Washington, D.C.: U.S. Government Printing Office, 1887.