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Perceptions of Trout:
Results of a Consumer Study

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in Cooperation with the
Idaho Department of Agriculture

by

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Background and Purpose of Study

The U.S. trout industry as a whole, including Idaho, has been losing its position in the aquacultural marketplace at a time when consumer concern for health, diet, and appearance would seem to suggest significant growth. The 1990 level of trout production was only 140% of its 1980 level, whereas for all other categories of private U.S. aquaculture, production was more than 500% of 1980 levels (Joint Subcommittee on Aquaculture, 1993).

The immediate goal of this study is to provide the Idaho and U.S. trout industry with information useful in developing appropriate educational and marketing strategies. The long-range goal is to economically strengthen both the Idaho and U.S. trout industry.

Relevant Literature

Gempesaw et al. (1995) surveyed 10,000 residents of the Northeast and Mid-Atlantic region of the U.S. regarding consumer preferences for northeastern aquaculture seafood products. This included consumption patterns for these products as well as perceptions of the relative quality and safety of farmed products as opposed to wild-harvested products. They looked at several finfish and shellfish species. They focused on consumer's "evoked set" -- a concept used to understand the decision behavior of consumers when confronted with a number of alternative solutions to a particular question. They found that trout was part of the evoked set of at least half of the respondents. Regarding trout purchase decisions, the factors that they found to be significant

were: respondent's area of residence is a city; that respondents with annual incomes of more than \$50,000 were more than twice as likely to purchase trout as those making less than \$25,000 in income; families with children and teenagers were 1.9 times more likely to purchase trout than senior citizen households; consumers who viewed variety of diet and taste as important were 3 and 4 times as likely, respectively to purchase trout; and consumers who purchase salmon were 4 times more likely to purchase trout.

Block (1984) surveyed 200 trout consumers from each of the following markets: New York, Cleveland, St. Louis, Denver and Los Angeles. He found that approximately two-thirds of those surveyed had eaten trout within the previous 12 months. His survey also found that women generally have a somewhat more positive view of trout than men. Approximately 60 percent of all the respondent households served trout at least occasionally -- with the remaining households relying on restaurants as a source of trout for eating. 48 percent of the respondents in his study rated trout as "very appealing as a food." One interesting approach this study took was to ask consumers about their initial "top of the mind" reaction when rainbow trout is mentioned. Block found that these comments were substantially more positive than negative and included the following: Positive -- good flavor/nonfishy (27.7%), enjoyment (22.1%), pleasure of catching (17.3%), nutritious/good for your diet (10.8%); Negative -- dislike bones/looks (7.7%), generally dislike it (2.5%). When specifically asked what they considered the most attractive aspect of trout as a food, its flavor and

tastiness were mentioned most often (45.1%), followed by its nutritional attributes (23.9%). A substantial majority of the respondents in this study said that they prefer fresh trout (83.4%) over frozen trout. Finally, Block queried consumers regarding what could get them to buy and eat rainbow trout more frequently. Twenty-five percent said "nothing would help," and another 20 percent indicated that they "didn't know." Specific suggestions made most frequently included: reduce the price, increase availability and have fresh trout available. Block indicated that even though reducing the price was given as a suggestion by a fair number of individuals (24.3%), that it should be kept in mind that over 50 percent of those interviewed did not know what price trout was selling for in the grocery store. Consequently he concluded that it would seem reasonable to assume that a lower price would go unnoticed by most shoppers.

A 1990 research project looked at trout distribution by wholesalers and retailers (McCain and Guenther, 1994). They classified retailers to include specialty fish markets, seafood departments in groceries, and grocery meat departments that carry fish as part of their product line. Distributors included in the study included brokers, distributors and wholesalers. They reported that retailers and distributors were generally critical of the advertising support received from the trout industry. Most did not believe that the trout industry provided good advertising support, or useful sales support materials. Retailers wanted more point of sale materials from trout suppliers. Both retailers and

wholesalers indicated that fewer deals were offered to support trout sales than for other seafood and fish species. They found that 15 percent of the responding retailers believed that trout is harder to prepare than other fish. They also believed that most consumers prefer trout with the head removed and boned. However, 24 percent of the retailers did not believe the head needed removing. In their study, distributors indicated divergent experiences with trout sales. One-third of the distributors experienced substantial growth in trout sales, with the remainder reporting a lack of substantial growth. Distributors also agreed that supply and prices were stable and that trout is not high-priced..

Shaw and Gabbott (1992) summarized recent events in the development of trout markets and marketing in Europe, noting that there are strong parallels with experiences elsewhere, particularly in the United States. They stated that in general, European consumers, as a result of changing lifestyles and their increased awareness of nutritional issues, have been moving away from the consumption of red meats and towards the consumption of white meats and fish. The researchers go on to state that as far as trout products are concerned, two developments have been of particular importance over the last 10 years. The first has been the increasing importance which has been attached to the quality of the products supplied to the consumer.

The second development according to Shaw and Gabbott has been the production of filleted trout, which accounted for 6 percent of

total UK production in 1989. They outline several reasons for the importance of filleted trout with respect to developing demand:

- (i) Filleted trout has opened up a new market of consumers who prefer food products which are convenient to prepare and eat. This product meets both of these requirements. It could be argued that the preparing and eating of whole trout is not intrinsically difficult, but it is an easier task to adapt to the consumer rather than attempt to change consumer attitudes concerning the preparation of fish.
- (ii) Filleted trout fits with the changing pattern of life styles in Europe, principally more working women with less time for food preparation.
- (ii) The widespread use of pigmented feeds produces a pink fillet which consumers find more acceptable. Consumers "eat" with their eyes as well as their mouths and the presentation of the product is all important. It is interesting to note that even in the French and Italian markets where consumers have traditionally been used to white fleshed trout, it is pink fillets which have found greater market acceptability.

Turning to consumer perceptions, Shaw and Gabbott indicate that consumers have to be aware of products, to be informed about them and reminded, even when familiar with them. This is partly achieved through making products attractive when on display. It is also achieved through enhancing the activities of point of sale

literature, through promotions, and through advertising. The researchers indicated that this is where there are potential difficulties. Since most trout is sold with relatively little packaging, there is not a big incentive for an individual producer to spend heavily on promotion, since the benefits of that investment may accrue to competitors as well as themselves. This is where the role of generic promotion by trade associations has assumed an important role. By acting collectively on behalf of their members they are able simultaneously to promote products of all their members. Table 1 below shows the annual promotional expenditure in each EC country as an absolute figure and as a proportion of sales revenue.

Table 1. Promotional Activity by major European Community trout producing countries (£ converted to US \$ as of May, 1992)^a

Country	Price per lb.	Total Revenue	Promotion Budget	% of Revenue
Belgium	\$0.46	\$809,222	\$2,759	0.3
Denmark	\$0.30	\$28,547,568	\$63,406	0.2
France	\$0.32	\$22,505,160	\$34,791	0.2
W. Germany	\$0.52	\$24,405,120	\$37,957	0.16
Ireland	\$0.44	\$1,522,644	\$7,493	0.5
Italy	\$0.32	\$21,193,920	\$107,040	0.5
UK	\$0.56	\$18,996,924	\$37,464	0.2

^a Source: unpublished proceedings of FES Annual Assembly, 1992 in Shaw and Gibbs (1992)

Cheng and Capps (1988) analyzed demand for fresh and frozen shellfish and finfish (which included cod, flounder/sole, haddock, perch and snapper but not trout) in the United States. They

determined that factors which influenced expenditures on seafood commodities were own price, household income, value of any coupon offered, household size, geographic region, population density, race and seasonality. Own price elasticities ranged from -0.45 (flounder/sole) to -1.13 (oysters). They found that expenditures on fishery products were more sensitive to changes in household size than to changes in household income.

Cremer et al. (1983) surveyed 158 restaurants, and retail and wholesale grocers in Kentucky to gauge the current and potential demand for trout and catfish. They found that 29 percent of the restaurants offer fresh trout (Table 2), and that the most widely preferred product form was trout fillets, which were preferred by 45 percent of the retail grocers and 33 percent of the restaurants.

Table 2. Percentage of Kentucky Market Outlets Offering Trout and Their Preferred Product Form

Establishment	Product Form					
	Fresh Trout	Frozen Trout	Fillet	Headed	Gutted	Whole
Restaurant	29 ^a	22	33	26	32	9
Retail grocer	25	30	45	40	10	5
Wholesaler	3	14	30	20	40	10

^a Percentage of establishments preferring product in this form

Johnson of Johnson and Associates (1991) cite a number of trends which are impacting fish/seafood consumption. They cited a survey on why consumers eat seafood, which indicated that 39% of U.S. seafood consumers eat it because they like the taste (Table 3.) In addition, they mention a survey done by the National Fish

and Seafood Promotion Council that indicates several reasons why consumers **would not** eat seafood -- among them being difficulty of cooking, most popular species (shrimp, salmon, swordfish, etc.) considered too expensive and concerns about fish from polluted areas. Johnson also discusses results from a survey done by the California Seafood Council on what would cause consumers to eat more seafood. Lower prices and easier preparation were among the top responses in this survey (Table 4).

Table 3. Reasons for Eating Seafood Given by U.S. Seafood Consumers

Why Do You Eat Seafood?	Percent of Respondents
Like the taste	39
Health/Nutrition	33
Add variety to diet	17
Easy to prepare	4
Makes a light meal	4
Good value	1
Other	2

Source: U.S. Seafood Market Survey, 1989

Table 4. Seafood Consumer Attitudes: What Would Cause You to Eat More Seafood?

Heavy Users (4 x/month)	Medium Users (1 - 3 x/month)
Lower prices 37%	Lower prices 37%
Nothing 21%	Nothing 13%
Diet/health 15%	Easier preparation 12%
Easier preparation 7%	Diet/health 11%
Better quality 6%	Better quality 10%
	Fresher, not frozen 10%
Light Users (4 - 6 x/year)	Non-Users (Less than 3x/year)
Lower prices 35%	Nothing 42%
Easier preparation 17%	Lower prices 16%
Better quality 15%	Easier preparation 14%
Nothing 15%	Better quality 12%
Safer 11%	Safer 7%

Source: California Seafood Council

Consumers are faced with a choice of up to 10,000 items in a typical grocery store and will only buy (according to Sheth et al.) (1988) "if function, perception, possession time and place values bridge the gap between supplier resources and consumer needs." In terms of food consumption, this can be re-stated as a series of necessary conditions:

1. Consumers are aware of the products presented.
2. Consumers hold favorable attitudes toward the product.
3. Consumers understand the product.
4. The price is acceptable.
5. The product is available when and where the consumer wishes to buy.

Methodology

The execution of this research project involved the following steps: (1) distribution channel analysis, and (2) an in-depth consumer survey.

Distribution Channel Analysis

The basis for the development of a valid survey questionnaire was an attempt to get a thorough understanding of the distribution channel for trout products, including producers/growers, processors, distributors and consumers.

Growers/Processors

In consultation and with assistance from the Idaho Aquaculture Association and the Idaho Department of Agriculture, interviews were conducted with growers,

processors and distributors representing a diverse range of size and sophistication of operations.

Consumers

The consumer perspective was gathered in four 2-hour focus group interviews conducted by Beta Research West, Inc. of La Miranda, California. Two groups were done in each of the following cities: Chicago and Los Angeles, representing the east/midwest and western regions of the United States. Each of the regional focus groups was then broken into trout eaters and non-trout fish eaters. Topics discussed included taste, appearance, preparation characteristics, usage scenarios, product safety considerations, substitute products and price.

Consumer Survey

The information from the distribution channel analysis and the focus groups was used to develop consumer questionnaires for several distinct groups: vegetarian, non fish or seafood eater, non-trout fish eaters, and trout eaters. The survey was implemented by the Social Survey Research Unit (SSRU) in the University of Idaho College of Agriculture. This group utilized a Computer Assisted Telephone Interview (CATI) system to collect the data. The survey was pretested on a group of sample respondents and modifications were made based on their feedback. The sample was selected by Survey Sampling, Inc. a company that maintains and distributes database information including phone number listings. They generated the phone numbers using a random digit dialing

program which selected numbers in the sample area and screened businesses and government out. Multiple attempts were made to each telephone number before it was retired from the list.

Results

Distribution Channel Analysis

Laura Johnson, marketing specialist with the Idaho Department of Agriculture carried out the industry survey. She visited with 6 of the grower/processors in the industry, and questioned them about their business as well as their thoughts on the direction of the industry.

Regarding the type of sales these firms made, all of the respondents marketed 100 percent of their product to wholesalers (Table 5). However, there was variation in where this wholesale trout went from the wholesaler. On average, 57 percent went from the wholesaler to retail grocery outlets, with the remaining 43 percent destined for foodservice use. By far, on average, the largest percent (63.25%) of these grower/processors sold trout in the western U.S. Regarding product form, an average of 40.8 percent of the firms marketed whole, fresh trout, while an equal percent marketed boneless pan sized fillets. However, it should be noted that there was wide variability in these figures, as some firms marketed as much as 60 percent of their production as whole, fresh trout, while other companies marketed as much as 60 percent of their production as boneless pan-sized fresh fillets.

Table 5. Results from Idaho Trout Grower/Processor Survey

	<u>Wholesale</u>	<u>Retail</u>					
Where do you market the majority of your fish?	100%	0%					
	<u>Retail Grocery</u>	<u>Foodservice</u>					
Where does your wholesale trout go?	57%	43%					
	<u>East</u>	<u>Midwest</u>	<u>Southern U.S.</u>	<u>Western U.S.</u>			
Where in the U.S. do you market your trout?	9.8%	12.25%	14.5%	63.25%			
	<u>Whole, fresh</u>	<u>Boneless, pan-sized fresh fillets</u>	<u>Boneless large fresh fillets</u>	<u>Frozen fillets</u>	<u>Smoked</u>	<u>Canned</u>	<u>Other</u>
In what form do you market your trout?	40.8%	40.8%	2%	14%	1.8%	0.3%	1.5%

Another area which the industry survey focused on was the participants thoughts on how they felt the industry could be made more profitable. No respondents felt that profitability could be improved by selling more fish at current prices. However, views were about evenly split between those that felt that the industry should sell the same volume of fish at higher prices (via developing more demand through intelligent marketing and educating of the consumer) and those that felt that firms should develop additional value-added products such as boneless fillets, prepared products, smoked fish, pink trout, or other similar products.

Focus Group Results

The focus groups provided useful insight into consumer thoughts regarding the purchase and consumption of trout. The

make-up of the Chicago focus group regarding ethnicity and income range can be found in Table 6 (Los Angeles results were unavailable). The focus groups were videotaped, and copies of these videotapes are available from the authors of this study for a nominal charge. The "top-line" summary of the focus groups as prepared by Beta Research West can be found in Appendix A. Several interesting findings were uncovered in the focus group interviews. Participants were intrigued by a possible new, thicker, "Steak-like" pink rainbow trout well suited "for a gourmet dinner party" where "you are not wanting to come across like grandma's home cooking." The steaklike thickness, combined with the salmoneque coloring could be translated into higher price expectations as well. In addition, strong support was found for trout fillets. Non-trout eaters associated trout with the whole fish (which evoked comments such as "snake-like skin," "evil eyes," and "bones, bones, BONES.") Thus, the facilitators of the focus groups felt in their summary, that one of the biggest barriers to increased trout consumption is the presentation of the whole fish.

Table 6. Demographic Make-up of Chicago Focus Group

<u>Group</u>	<u>Gender</u>	<u>Marital Status</u>	<u>Age</u>	<u>Ethnicity</u>	<u>Income Range</u>
Non-Trout	Female	Single	51	Hispanic	15-20K
Non-Trout	Male	Married	41	Asian	45-55K
Non-Trout	Female	Single	26	African-Amer.	30-45K
Non-Trout	Female	Married	29	Hispanic	65-75K
Non-Trout	Male	Married	34	White	55-64K
Non-Trout	Male	Single	37	White	15-19K
Non-Trout	Female	Single	37	White	30-44K
Non-Trout	Female	Single	52	White	75-99K
Non-Trout	Female	Single	42	White	55-65K
Non-Trout	Male	Single	31	White	30-44K
Non-Trout	Male	Single	32	White	55-64K
Non-Trout	Male	Married	36	Hispanic	45-54K
Trout	Male	Married	53	African-Amer.	100K+
Trout	Female	Married	43	Native-Amer.	45-54K
Trout	Female	Divorced	53	African-Amer.	100K+
Trout	Female	Widowed	67	White	15K
Trout	Male	Married	38	African-Amer.	75-99K
Trout	Female	Married	52	White	30-44K
Trout	Female	Single	30	White	30-44K
Trout	Female	Divorced	33	White	30-44K
Trout	Male	Divorced	57	White	65-75K
Trout	Female	Single	41	White	30-45K
Trout	Male	Divorced	54	African-Amer.	75-99K
Trout	Male	Married	29	White	20-30K
Trout	Male	Single	44	White	20-30K

Other comments and suggestions that came out of the focus groups included an in-store sample campaign which would appeal to people's sense of taste regarding trout that is prepared properly. In addition, it was suggested that this type of campaign be followed up with coupons and preparation suggestions. There was also some indication that consumers might be receptive to trout dishes that are easy to prepare -- something that is preseasoned and ready to cook.

Consumer Survey Results

The consumer survey was done by telephone, utilizing software which branches to differing questions dependent upon the respondent's response. This technique actually generated four distinct questionnaires, which may be found in Appendix B: one each for vegetarians, non fish or seafood eaters, non trout eaters, and trout eaters.

The sample size for Los Angeles was 1400. Of this number, 406 were ineligible because the phone number was a business or government agency which hadn't been screened out, had been disconnected, the respondent was in poor health and could not complete the survey or spoke a language which our interviewers could not speak (interviewers were available who spoke Chinese, Spanish, Vietnamese and Russian). Thus there were 994 eligible consumers for the survey. Of this number, 405 completed the interview for a response rate of 41 percent (405/994).

The sample size for Chicago was 1375, with 454 ineligible for the same reasons as mentioned above. This left 921 eligible

respondents; 349 interviews were completed for a response rate of 38 percent (349/921).

Demographic characteristics of the sample are reported in Table 7. The average age of the respondents was about 43 years. The majority (30.8%) of the people responding had some college or vocational training. Household income covered a broad range, with the largest percentage (17.5%) of households falling in the \$50,001 - \$75,000 category. The sample was also comprised of people from a variety of different ethnic backgrounds: 52.7 percent white, 23.7 percent Hispanic, 10.4 percent African American, 4.9 percent Asian/Pacific Islander, 1.4 percent biracial or mixed ethnic and 0.5 percent Native American. The average number of years the respondent had lived in the community was almost 28 years, ranging from less than 1 year to 85 years.

The survey was initiated with general questions on food purchases and consumption. Interviewers queried respondents regarding their satisfaction with food quality (Table 8). By and large it would appear that people are satisfied with the food quality they receive, as 52 percent and 44.7 percent were either "very satisfied" or "somewhat satisfied," respectively with food quality. Table 9 shows that the vast majority (80.8 percent) of Americans visit the grocery store once a week (unlike our European counterparts who tend to buy food on a biweekly or daily basis).

Respondents were asked about their purchasing behavior for meat, poultry and fish (Tables 10 - 14). Dairy products were consumed by 46 percent of the sample on a daily basis and by

another 42.6 percent at least once a week. This contrasts with poultry (including eggs), which was eaten daily by only 21.1 percent of the sample, but eaten weekly by another 70.6 percent of the respondents. Few respondents (5.0 percent) ate beef daily, with a much larger percent (64.3) eating beef weekly. Pork and fish consumption were similar in nature: very few respondents ate these products daily (0.9 percent and 1.7 percent, respectively), with weekly and monthly consumption about equally split (31.2 percent and 43 percent for weekly pork and fish consumption, respectively and 32.8 percent and 39.5 percent for monthly consumption of the same items, respectively).

Table 15 summarizes percentages of those in the sample that did not eat certain types of protein. 15.9 percent of the respondents never eat pork -- most likely due to religious dietary restrictions such as those placed on Jews and Moslems. The second largest category at 7.2 percent were those respondents who did not eat fish.

Following the general questions, the survey then became more focused on fish consumption. Table 16 summarizes those survey respondents who had tried different fish and/or seafood in the past five years. The largest portion of the sample (76.4%) had tried tuna. This was followed by shrimp at 76 percent, salmon at 59 percent, and crab at 50.4 percent. Forty-one percent of the respondents had eaten trout in the **past five years**.

Interviewees were then questioned regarding the importance they placed on differing attributes which might influence their

decision to purchase fish and/or seafood (Table 17). Taste placed highest in terms of that item having the largest percentage (91.0%) of people stating that it was a "very important" attribute influencing their fish purchase decision. This was followed by freshness at 90.8% and then appearance and smell at 84.2 and 83.5 percent, respectively. Serving fish or seafood on a holiday or special occasion and purchasing it upon the recommendation of others ranked lowest on the list in terms of these attributes being "very important," with 28.5% and 20.7% indicating this level of importance respectively.

A somewhat surprising finding can be found in Table 18. The survey found that **70 percent** of the respondents have eaten trout at any time in the past. This is a higher percentage than was hypothesized, and bodes well for the trout industry -- indicating that a large percentage of consumers are at least aware of the product. However, there is a good deal of misinformation that consumers have about trout. In the focus groups, several of the "non-trout eater" participants had never heard of trout and were not aware of what it looked like. Another participant thought they knew what trout was, but characterized it as a "bottom feeding" fish (which is incorrect -- it is a top feeder). Thus, there is significant opportunity for consumer education and awareness, and this will be discussed in more detail below.

Table 18 also outlines where these trout consumers would purchase trout -- 1.2 and 27.9 percent would "always" or "sometimes" order it in a restaurant, respectively and another 8.4

and 28.8 percent, respectively would "always" or "sometimes" buy trout in the grocery store. The disconcerting news -- at least as far as trout consumption is concerned, is that almost 1/3 of the sample indicated that they would "seldom" purchase trout in either a restaurant or grocery store, and another 1/3 indicated that they would "never" buy trout in either of these locations.

As lifestyles have changed, consumers are increasingly desiring foods that are more convenient to prepare. As discussed in the relevant literature section regarding findings in Europe, this study also found support for consumer demand for filleted trout. Almost fifty-three percent of the respondents indicated that they would be "very likely" to purchase fresh trout filets (Table 19). In addition, another 31.9 percent of those surveyed indicated that they would be "somewhat likely" to purchase trout in this form. Again, following the trend toward more convenience -- the second ranking product form in terms of those indicating a "very Likely" probability of purchase, was fresh trout steaks with 44.9 percent of the sample indicating a "very likely" probability of purchase of this product. Almost thirty five percent of the sample indicated that they would "very likely" purchase fresh whole trout.

Given that the market as it appears today (at least as far as how processors and grocery stores sell trout) is largely fresh whole trout, the survey asked consumers what they do with whole trout (Table 20). The largest percent (40.4%) indicated that they filet the whole trout first. This was followed fairly closely with

38 percent of the respondents who said that they cook the trout whole. Given the above comments regarding the probability of purchase of trout filets, it is interesting to note that many consumers already filet the whole trout that they buy.

The survey also questioned consumers regarding possible purchase of further processed trout products. There seemed to be little demand for breaded trout patties, canned trout or trout pate, as indicated by the large percentage of respondents indicating a "not likely" probability of purchase of these forms of trout (Table 21).

Trout producers have the opportunity to raise trout with pink colored flesh through the feeding of different feedstuffs (also discussed in the relevant literature section previously). The survey attempted to ascertain whether consumers felt there was a difference between white, pink and red fleshed trout. Sixty-two percent of the respondents felt that there was a flavor difference between different colored trout, with 56.7 percent indicating a preference for white-colored flesh and 27.8 percent indicating a preference for pink-colored flesh (Table 22). These findings indicate that there is likely an opportunity for pink colored trout.

Regarding serving size, consumers were about evenly split, with 36.1 percent indicating a preference for a single 8 ounce serving and 37.7 percent desiring a double or 16 ounce serving for purchase (Table 23). Tradition continued to carry through in terms of packaging/presentation as a large majority (79.6%) of the

respondents wanted trout presented on ice (as it has historically been presented in the fish case). Trout also would appear to be an impulse item for most shoppers as 53.8 percent of those surveyed said it was not necessarily on their shopping list (Table 23). **This has definite implications for marketers** -- whether it be grocery stores or processors. Eye catching slogans, in-store advertising, coupons and other methods need to be employed to do one of two things: make the consumer decide to buy trout when they pass the fish counter, and/or get them to add trout to their shopping list through the use of coupons or newspaper/magazine advertising.

One of the important determinants of demand for any product is the price of that product. Price did not rank particularly high for those surveyed at least in terms of those stating that it was a "very" important attribute influencing their fish/seafood decision. Forty-six percent indicated that it was "very" important, with another 36.8 percent indicating it was "somewhat" important (Table 17). This study also elicited responses from consumers as to how they viewed the price of trout relative to other meats and other fish (Table 24). Respondents seemed to feel that trout was somewhat more expensive than other meats, as 16.7 and 44.2 percent indicated that trout was either "A Lot More Expensive," or "A Little More Expensive," respectively. However, relative to other fish, trout fared much better, as the majority of respondents (45.5%) felt that trout was "About the Same" price as other fish.

In addition to consumers' desire for increased convenience as discussed above, consumers are also becoming more health conscious regarding their diet. Fish in general is perceived as a healthy source of protein, and the majority of the sample (56.8%) felt that trout was "Very Healthy" (Table 25). This is an attribute that can and should be utilized very successfully in advertising and promotion campaigns for trout.

Non-trout consumers were afforded the opportunity to indicate what about the appearance of trout would influence them **NOT** to buy it. This was an "open-ended" question, meaning they could "fill-in-the-blank" with their own response. Of those that answered this question, Table 26 indicates that almost nine percent said that the "whole fish" is what turns them off to buying trout, while another seven percent indicated "color" as a reason not to buy, followed by 6.3 percent indicating "skin" as a non-purchase reason. An equal percent (4.7%) stated that "bones," and "eyeballs and head" caused them not to purchase trout. In addition to the "convenience factor" mentioned above regarding consumers' desire for quicker and easier meals, there is the concern mentioned in the focus groups that some consumers do not like to have to deal with the whole fish -- the head and bones turn them off. Many consumers today do not want to be reminded about where the meat comes from -- they would like to disassociate the filet of fish from the fish, or the pork chop from the pig -- it is somehow neater and more acceptable to them. As society becomes further removed from the farm or place of production, we don't have to slaughter and cut up our own chickens

or pigs -- the same applies to trout. Now, this is not true for everyone -- as those consumers who fish, and eat what they catch, must gut, clean and perhaps filet their catch. This comment will be discussed in more detail below, where a discussion is made regarding the percent of the sample that fishes.

Table 27 outlines respondents' replies regarding trout preparation at home. Eighty-eight percent of the sample stated that they had eaten trout prepared at home, and of those, fifty-five percent indicated that they had prepared it themselves. One of the areas we wanted to investigate was the perceived difficulty in preparing trout, and also compare it to the preparation of other fish/seafood. Seventy-six percent of the sample said that trout preparation was "not difficult," while another 12.1 percent felt that it was "slightly difficult." In comparison to other fish and seafood, a smaller percent (71.3 %) felt that other fish and seafood was "not difficult" to prepare. Thus, overall about three-quarters of the respondents did not feel fish in general or trout in particular was difficult to prepare. However, if trout producers and marketers wish to expand the market, there is about 11 percent of the market that indicated that preparing trout was "somewhat difficult" or "very difficult," indicating a need for a filleted product or directions on how to simplify preparation.

Consumers in the sample were asked an "open-ended" question about what was their favorite way to prepare trout. The methods with the largest percentage of responses were (with percentages in parentheses): baking (8.9%), broiling (8.0%), pan frying (7.7%),

grilling (7.0%), deep frying (4.4%), with the remainder being found in Table 28.

Recipe information was found to be "very important" to almost 43 percent of the respondents (Table 29). Another 26.4 percent of the sample felt that recipe information was "somewhat important."

Consumers in the survey were asked what types of food they serve with trout. The largest percentage of respondents stated that they served rice (12.2%) followed by lettuce/spinach salad (10.2%) and then lemon (9.9%) (Table 29). Producers of another Idaho commodity -- potatoes -- will be glad to note that 9.5 percent of the sample serve potatoes with trout.

People who participated in the survey eat trout primarily at dinner (18.0%), but also serve trout for lunch (8.1%) and even breakfast (2.4%) (Table 30). Eleven percent of the sample replied that they would serve trout as an everyday meal, with about five percent stating that they would serve trout on a "special occasion."

As mentioned above, the survey also looked at the respondents' fishing habits (Table 31). Almost sixty three percent of the sample said they ate freshwater fish as a child, and 58.8 percent had gone fishing as a child. Of this number, almost thirty seven percent answered that they still go fishing. Then, of those that fish, 52.7 percent "always" eat what they catch, with another 25.8% "sometimes" eating what they catch. This is likely the group (as discussed above) that would not be particularly "squeamish" when it comes to buying whole trout in the grocery store.

Trout producers are concerned about how their fish compare in relation to wild trout. Consumers in the survey were asked to compare farm raised trout to wild trout on several attributes. In the important area of safety, farm trout was ranked as "better" by 49.7 percent of the respondents (Table 32). **This is a key finding,** that trout producers should be able to use to their advantage, and likely comes about because of consumer concerns regarding polluted waters that wild trout may inhabit. On the other attributes of taste, freshness, nutritional value and texture, farm raised trout was rated "about the same" by the majority of the respondents (though there was variability in the responses as can be seen in Table 32).

The final area investigated by the survey were reasons people gave for not eating trout. Responses were separated by group: non-fish/non-seafood eaters and non-trout eaters. Table 33 summarizes the responses of these groups. Taste was a more important reason as to why non-trout eaters did not eat trout than it was for non-fish/non-seafood eaters, as 64.7 percent said this was a "very important" reason as to why they did not eat trout, relative to 51.1 percent of the non-fish/non-seafood eaters. Concerns about safety and spoilage were two additional areas where there was a considerable difference between these two groups. 61.8 percent of the non-trout eaters stated that concern about fish safety was "very important" to them compared to 40.4 percent of the non-fish/non seafood eaters. Regarding spoilage, 57.5 percent of the non-trout eaters felt that this was "very important," compared to

29.8 percent of the non-fish/non-seafood eaters.

Econometric Procedure

Econometric analysis was undertaken with the data in order to further investigate relationships between consumers and their perceptions and purchase patterns of trout. The econometric procedure involves a two step analysis. In the first step, factors affecting binary consumer decisions, such as whether or not to purchase trout, are first determined using a probit analysis. The next step consists of a multinomial logit analysis to determine the effect of factors affecting different levels of consumer choice regarding purchase of trout and value-added trout products. For example, consumers can respond to the question of whether or not they would buy trout by indicating that they would "definitely", "probably", "probably not" or "definitely not" purchase the product. In the multinomial logit analysis, one choice must be made a numeraire to remove model indeterminacy by assuming all regressor coefficients pertaining to that choice are zero. Since the data allows us only the above four degrees of definitive consumer choices, we present results of the multinomial logit analysis for only three such choices. The probit model lends itself to analyzing regressor impacts by considering the marginal effects of the right hand side variables. However, marginal effects from a multinomial logit analysis can be a potential source of confusion because they need not have the same sign as the corresponding regressor coefficient estimates. Hence, we present the coefficient estimates and not the marginal effects in the

multinomial logit results.

The dependent variables used here pertain to consumer choices regarding purchase of trout, trout filets and trout steaks. The independent variables are classified into three categories: consumer demographics, rural/urban background and personal preferences. A list of variables under each category appear in Table 34. Regressor choice for each model involves selection from each category based on the highest log-likelihood value.

The binary choice models and multiple choice models are expressed in equations (1), (2) and (3).

$$(1) \text{ Binary Choice: Let } \beta' X = \beta_0 + \beta_1' \text{ Category 1} + \beta_2' \text{ Category 2} \\ + \beta_3' \text{ Category 3}$$

$$\text{Multiple Choice: Let } \beta_j' X = \beta_{0j} + \beta_{1j}' \text{ Category 1} + \beta_{2j}' \\ \text{Category 2} + \beta_{3j}' \text{ Category 3}$$

where β_j refers to the regressor coefficients of the j th choice such that $j \in \{1, 2, 3\}$ ($\{2, 3, 4\}$) if choice 4 (1) was the numeraire.

(2) Binary Choice Model:

$$\text{Pr (Consumer buys trout or trout product)} = \Phi[\beta' X]$$

(3) Multiple Choice Model:

$$\text{Pr (Consumer makes choice } j) = \frac{e^{\beta_j' X}}{1 + \sum_{j \in \{1,2,3\} \text{ or } \{2,3,4\}} e^{\beta_j' X}}$$

Results

We first present results of the econometric analysis pertaining to consumer choices of purchasing trout, followed by

trout filet purchasing choices and finally trout steak purchasing choices. We then present results from probit analyses on binary choice data of consumers. This is followed by results from the multinomial logit analyses on multiple choice data. For each food item (i.e., trout, trout filet and trout steak) the choices available to a consumer are restricted to four: a strong willingness to buy, a weak willingness to buy, a weak unwillingness to buy and a strong unwillingness to buy. In each multinomial logit analysis we make either the first or the fourth choice the numeraire.

Trout Purchasing Choices

Results of a probit analysis on a consumer's choice as to whether or not to purchase trout appear in Table 35. Age, income and race are significant among the regressors in the consumer demographics category. The age of the consumer has a significant positive effect on their likelihood of purchasing trout, indicating that older consumers are more likely to purchase trout. The income dummy variable indicates that consumers with income of \$30,000 or above are more likely to purchase trout. The race dummy variable indicates that consumers that are **neither** black nor white are more likely to purchase trout -- these groups being primarily Native Americans, Asian/Pacific Islanders or Hispanic/Latinos or Chicanos in this study. From the rural/urban background category, the number of years that the consumer had lived in a city has a significant negative influence on the

consumer's likelihood of purchasing trout -- with a longer tenure being negatively associated with trout purchase. The consumer's childhood community size has a significant positive influence, i.e., if the consumer is from a small community, they have a greater likelihood of purchasing trout. From the personal preferences category, only the dummy variable "smell" has a significant positive influence on a consumer's likelihood of purchasing trout.

Results from a multinomial logit analysis on the different degrees of consumer choices appear in Table 36. The three choices considered here indicate if a consumer would "definitely," "probably" or "probably not" buy trout. The fourth choice: consumer would "definitely not" purchase trout is made the numeraire. From the consumer demographics category, age, income and race exert significant influence on certain consumer choices. Older consumers have a lower likelihood of "probably not" buying trout, which is one of the two "mid" choices among the continuum of choices. The income dummy variable indicates that consumers with income of at least \$30,000 have a higher likelihood of "probably" or "probably not" buying trout -- again the two "mid" choices among the continuum. The race dummy variable indicates that a consumer that is neither white nor black has a significantly higher (lower) likelihood of "definitely" ("probably not") buying trout. From the rural/urban background category, the number or years of residence in a metropolitan area and community size from their childhood

significantly influence some of the choices. Consumers who have lived longer in a metropolitan area have a significantly lower likelihood of either "definitely" or "probably" buying trout. Consumers raised in smaller communities (at most 2,500) have a significantly higher likelihood of "definitely" buying trout. From the personal preferences category, freshness, price and smell significantly influence some of the choices. Consumers considering freshness of fish to be important have a greater likelihood of either "probably" or "probably not" buying trout. Consumers considering price (smell) of the fish to be important have a higher likelihood of "probably not" ("probably") buying trout.

The above results provide a mutually supportive view of consumer preferences of buying trout. Variables in the consumer demographics category generally indicate that consumers that are more inclined to purchase trout are either older individuals, with moderate to high income (at least \$30,000) and/or are **neither** white nor black. The rural/urban category indicates that consumers more likely to purchase trout are those that have relatively recently moved to a metropolitan area and/or have grown up in a small community (at most 2,500). The personal preferences category indicates that smell is an important factor in making a consumer more inclined to purchase trout. These conclusions are further strengthened by results in Table 37 which indicate a high proportion of consumers that have purchased trout have incomes that are at least \$30,000, have eaten freshwater

fish as a child and buy trout because they consider it as a healthful food item.

Trout Filet Purchasing Choices

Results of a probit analysis on the consumer choice of purchasing filet trout and not the whole fish appear in Table 38. Consumers that are white have a greater likelihood of purchasing filet trout and not the whole fish. Consumers that have been raised in communities that are larger than 2,500 have a greater likelihood of purchasing filet trout. Consumers who consider cooking time to be important have a greater likelihood of purchasing filet trout and not the whole fish. Further, consumers that buy beef at least once a month have a lower likelihood of purchasing filet trout.

Results of a multinomial logit analysis conducted on consumer choices pertaining to buying fresh and frozen filet trout appear in Tables 39 and 40. For the fresh (frozen) filet analysis, we consider the choice "not likely" ("very likely") to buy as the numeraire. Age, household size, income and "nfishing" exert significant influence over certain choices. Older consumers have a lower likelihood of being "slightly likely" to buy a fresh trout filet. The income dummy variables indicate consumers with income of at least \$30,000 have a greater likelihood of being "slightly likely" to buy fresh filet and "somewhat likely" to buy frozen filets. Consumers with larger households have a lower probability of being "not likely" to buy frozen filets. Consumers who have never been fishing as a child

or adult have a greater probability of being "somewhat likely", "slightly likely" and "not likely" to buy frozen trout. The number of years a consumer has spent in a metropolitan area increases their probability of being "slightly likely" to buy fresh filets and decreases their probability for being "somewhat likely" and "not likely" to buy frozen filets. Cooking time, smell and "tryshell" exert significant influence over some of the choices. Consumers considering cooking time to be important have a higher probability of being "very likely" to purchase fresh filets. Consumers considering the smell of the fish to be important have a higher probability of being "somewhat likely" to purchase fresh filets. Consumers who have eaten shellfish in the past three or four years have a greater probability of being "somewhat likely" and "not likely" to purchase frozen filets.

The above results indicate consumers that have grown up in larger communities and are white have a greater likelihood of buying filet trout and not the whole fish. This is further supported by the results in Table 41 which indicate that a large proportion of consumers who buy filets and not whole trout have been raised in larger communities, are white and consider the appearance of the fish to be important. Cooking time is also an important consideration that increases consumer likelihood of purchasing filet trout. These conclusions are further supported by the multinomial logit results which indicate cooking time and smell considerations increase the likelihood of purchasing filets in general. These results also indicate that consumers who have

lived in metropolitan areas for relatively long periods of time have a greater tendency of purchasing filet trout. Large household sizes and/or having moderate to high income also induce a greater tendency to purchase filets.

Trout Steak Purchasing Choices

Results from a probit analysis on consumer's binary choice of purchasing trout steaks and not the whole fish appear in Table 42. The consumer demographics category indicates that white individuals have a greater likelihood of purchasing trout steaks and not the whole fish. The rural/urban background category indicates that consumers who have been raised in larger communities (at least 1,200), have a greater likelihood of purchasing trout steaks. The personal preferences category indicates that consumers who buy beef at least once a month have a lower likelihood of purchasing trout steaks.

Multinomial logit analysis on consumer choices pertaining to purchasing fresh and frozen trout steaks are conducted similar to the trout filet case discussed above. The results are also presented in a similar manner and appear in Tables 43 and 44, respectively. Household size, income, "nfishing" and race have a significant influence over some consumer choices. Consumers with larger households have a greater probability of being "very likely" and "somewhat likely" in purchasing fresh trout steaks and have a lower probability of being "not likely" in purchasing frozen trout steaks. Consumers with moderate to high income (at least \$30,000) have a higher probability of being "somewhat

likely", "slightly likely" and "not likely" to purchase frozen trout steaks. Consumers who have not fished as children or adults have a higher probability of being "very likely" and "slightly likely" to purchase fresh trout steaks and of being "somewhat likely", "slightly likely" and "not likely" to purchase frozen trout steaks. Individuals that are white have a lesser probability of being "somewhat likely" of purchasing frozen trout steaks. From the rural/urban background category, consumers who have lived in a metropolitan area for a relatively long time period have a lower probability of being "somewhat likely" to purchase trout steaks and consumers who have grown up in larger communities have a higher probability of being "somewhat likely" to purchase frozen trout steaks. Consumers that consider cooking time as important have a higher probability of being "very likely" to purchase fresh trout steaks and consumers who have eaten shellfish in three or four years prior to the survey date have a lower probability of being "very likely" and "slightly likely" to purchase fresh trout steaks and a higher probability of being "somewhat likely", "slightly likely" and "not likely" to purchase frozen trout steaks.

The above results give some striking similarities between consumer perception of trout filets and trout steaks. From the trout steaks results one can conclude that consumers that are white, with large households and/or raised in larger communities have in general, a greater tendency to purchase trout steaks. This is nearly identical to our conclusion in the trout filet

case. As in the filet case, cooking time is an important consideration that increases a consumer's likelihood of purchasing trout steaks and frequent beef purchasing habit or shellfish consumption history has a decreasing effect on the consumer's likelihood of purchasing trout steaks.

Discussion and Conclusions

The results of this study should assist the trout industry in preparing for the future in terms of attributes and other characteristics that consumers are looking for when they consume trout.

Some of the key findings were: 1) Filleted trout is a desirable item -- both from a convenience standpoint and for those consumers who have concerns about the head, tail and eyes of whole fish; 2) trout steaks would also be a desired product form; 3) while white flesh colored trout continues to be the variety with dominant demand, there is a significant percentage of consumers who desire pink colored trout; 4) taste and freshness are two key qualities which are very important to the fish purchase decision; 5) farm raised trout is perceived as safer than wild trout by a majority of consumers.

In comparing these findings with some other recent studies of trout, support was found for Gempesaw et al's. (1995) findings that suggested that consumers with higher incomes are more likely to purchase trout. This research also supported Block's (1984) conclusions that some consumers have a negative perception regarding bones, eyes and tail of trout. In addition,

substantial support was found in this study supporting Block's findings regarding consumer preference of fresh trout over frozen.

Results from analyzing binary and multiple choice data for trout, trout filet and trout steaks indicate different consumer groups preferring specific food items. In general, individuals that are either older, have rural background, are neither white nor black and/or have moderate to high income prefer trout. The results further indicate, that trout consumers generally consider the fish to be healthful and having a low odor. In contrast, results from analyzing consumer preferences for trout filets and trout steaks indicate that the individuals who tend to purchase these items are predominantly from an urban background, are white; consider cooking time and appearance to be important, may have a large household and/or are not frequent beef consumers.

Table 7. Demographic Characteristics of Consumer Trout Sample

<u>General</u>	
Average Years in Community	27.7
Max	85
Min	0
Household size	3
Average Age	42.9
Max	95
Min	18
<u>Education level</u>	
Less than high school	4.8
High school graduate	28.4
Some college or vocational training	30.8
College graduate	23.7
Advanced degree	12.3
<u>Ethnic Group</u>	
Native American	0.5
Asian/Pacific Islander	4.9
Black or African American	10.4
White or Caucasian	52.7
Hispanic/Latino or Chicano	23.7
Biracial or mixed ethnic	1.4
Other	6.3
<u>Annual Family Income</u>	
Less than \$10,000	4.9
\$10,000 - \$15,000	5.1
\$15,001 - \$20,000	6.9
\$20,001 - \$30,000	18.8
\$30,001 - \$40,000	16.3
\$40,000 - \$50,000	12.8
\$50,001 - \$75,000	17.4
\$75,001 - \$100,000	10.5
More than \$100,000	7.4

Table 8. Respondent Satisfaction with Food Quality

Level of Satisfaction	Percentage of Respondents
Very Satisfied	52.0
Somewhat Satisfied	44.7
Somewhat Dissatisfied	2.3
Very Dissatisfied	0.4

Table 9. Frequency of Visits to Grocery to Buy food

Frequency	Percentage of Respondents
Once a Day	4.0
Once a Week	80.8
Once a Month	14.2
Less than Once a Month	.4

Table 10. Frequency of Beef Consumption

Frequency	Percentage of Respondents
Every day	5.0
Once a week	64.3
Once a month	17.4
Once in 3 months	3.1
Less than once in 3 months	2.5
Vegetarian	2.0
Never eat	5.6

Table 11. Frequency of Pork Consumption

Frequency	Percentage of Respondents
Every day	0.9
Once a week	31.2
Once a month	32.8
Once in 3 months	8.0
Less than once in 3 months	8.8
Vegetarian	0.1
Never eat	15.9

Table 12. Frequency of Dairy Product Consumption

Frequency	Percentage of Respondents
Every day	46.0
Once a week	42.6
Once a month	5.2
Once in 3 months	0.7
Less than once in 3 months	0.5
Vegetarian	0.1
Never eat	2.8

Table 13. Frequency of Poultry Consumption (Including eggs)

Frequency	Percentage of Respondents
Every day	21.1
Once a week	70.6
Once a month	4.9
Once in 3 months	0.3
Less than once in 3 months	0.3
Vegetarian	0.1
Never eat	0.5

Table 14. Frequency of Fish or Seafood Consumption

Frequency	Percentage of Respondents
Every day	1.7
Once a week	43.0
Once a month	39.5
Once in 3 months	5.0
Less than once in 3 months	2.4
Vegetarian	1.2
Never eat	7.2

Table 15. Food Non-Preference as Percent of Sample

Type	Percent of Respondents
Never eat beef	5.6
Never eat pork	15.9
Never eat dairy products	2.8
Never eat poultry	0.5
Never eat fish or seafood	7.2
Vegetarian	1.2

Table 16. Percentage of Respondents Trying Different Fish and Seafood in Past 5 Years

Type	Percentage of Respondents that have eaten in past 5 years
Freshwater Fish	39.5
Bass	29.2
Catfish	41.5
Perch	31.6
Trout	41.1
Shellfish	38.6
Crab	50.4
Lobster	46.7
Oysters	27.7
Shrimp	76.0
Saltwater Fish	39.5
Pollock	31.0
Salmon	59.0
Sole	31.0
Tuna	76.4

Table 17. Importance of Different Attributes to Fish/Seafood Purchase Decision

Attribute	Importance				
	Very	Somewhat	Slightly	Not	Unsure
Taste	91.0	6.6	0.3	1.9	0.3
Freshness	90.8	5.0	1.0	2.5	0.7
Appearance	84.2	11.1	0.9	2.9	0.9
Smell	83.5	8.2	2.6	4.8	0.9
Nutritional value or dietary concerns	58.7	24.5	3.7	12.2	1.0
Ease of preparation	50.7	24.2	5.8	18.7	0.6
Price	46.0	36.8	4.8	12.0	0.4
Cooking time	38.5	27.3	6.3	26.7	1.2
Variety of fish available	38.1	31.0	5.3	15.5	0.9
Children's preferences	28.8	14.5	3.7	51.4	1.6
Holiday or special occasion	28.5	18.1	4.9	47.6	0.9
Recommendations of others	20.7	33.2	11.2	34.0	0.9

Table 18. Percentage of Trout Consumers among Fish Eaters

Attribute	Percentage of Respondents			
	Always	Sometimes	Seldom	Never
Eat Trout	70.0			
Order Trout in Restaurant or Cafe	1.2	27.9	36.1	34.0
Would buy trout products from grocery or fish market	8.4	28.8	34.2	26.1

Table 19. Trout Form Preference Among Trout Consumers

	<u>Likelihood of Purchase</u>			
	<u>Very Likely</u>	<u>Somewhat Likely</u>	<u>Slightly Likely</u>	<u>Not Likely</u>
Fresh trout filet	52.8	31.9	6.9	8.5
Fresh trout steaks	44.9	26.5	10.6	18.0
Fresh whole trout	34.7	27.8	12.1	25.4
Smoked trout	19.3	20.5	9.0	51.2
Frozen trout filet	12.6	23.5	8.5	55.5
Frozen whole trout	4.0	12.9	6.0	77.0
Frozen trout steaks	8.6	20.1	9.0	62.3

Table 20. What Trout Consumers Do With Whole Trout

<u>Preparation</u>	<u>Percentage of Respondents</u>
Filet first	40.4
Cook whole trout	38.0
Varies	21.6

Table 21. Probability of Trout Form Purchase

Product Form	Probability of Purchase			
	Very Likely	Somewhat Likely	Slightly Likely	Not Likely
Breaded trout pattie	10.5	16.9	10.1	62.5
Canned trout	7.5	10.8	9.2	72.5
Trout pate	6.0	11.7	9.3	73.0

Table 22. Perceived Flavor Difference and Preference for Various Trout Flesh Colors

	Yes	No	Have not Eaten Pink			
	White only	Pink only	Red only	White or Pink	Pink or Red	No Preference
Difference between White, Pink & Red	62.4	12.1	25.5			
Color Preference	56.7	27.8	7.8	2.2	1.1	4.4

Table 23. Trout Consumer' Preferences for Serving Size/Grocery Store Presentation and Decision to Purchase

Attribute	Percentage of Respondents
<u>Serving size</u>	
Single serving (8 oz.)	36.1
Double serving (16 oz.)	37.7
Three servings (24 oz.)	14.3
Larger than three servings	8.2
Varies	3.7
<u>Packaging</u>	
Prepackaged	14.7
On ice	79.6
Varies	5.7
<u>Purchase Decision</u>	
Impulse Item	53.8
On Shopping List	34.3
Not on list, but not impulse	11.9

Table 24. Price Comparison of Trout Versus Other Meats and Other Fish

PRICE:	A Lot More Expensive	A Little More Expensive	About the Same	A Little Less Expensive	A Lot Less Expensive
Relative to other MEATS	16.7	44.2	30.5	8.2	.4
Relative to other FISH	3.6	23.6	45.5	22.4	4.8

Table 25. Consumers' Perception of Healthfulness of Trout

	Yes	No			
Read anything about nutritional value of trout?	11.1	88.9			
	Very Healthy	Somewhat Healthy	Slightly Healthy	Not Healthy	
If Yes, how healthy do you think trout is?	56.8	41.0	1.8	.4	

Table 26. Appearance: What Influences Non-Trout Consumers NOT to Buy Trout? (Open-ended question)

	Percent of Respondents who answered question
Whole fish	8.7
Color	7.1
Skin	6.3
Bones	4.7
Eyeballs & Head	4.7
Head	3.2
Head & tail	3.2

Table 27. Trout Preparation at home

	Yes	No	Unsure
Have you eaten trout prepared at home?	88.3	11.2	0.4
Who prepared the trout?	Percentage of Respondents		
Yourself	55.3		
Yourself & someone else	15.7		
Family member	27.4		
Other non-family member	1.5		
TROUT: Difficulty in preparation			
Very difficult	2.1		
Somewhat difficult	9.3		
Slightly difficult	12.1		
Not difficult	76.4		
FISH/SEAFOOD: Difficulty in preparation			
Very difficult	3.9		
Somewhat difficult	13.0		
Slightly difficult	11.3		
Not difficult	71.3		

Table 28. Consumers' Favorite Way to Prepare Trout (Answers volunteered, not prompted)

Method of Preparation	Percentage of Total Respondents
Baking	8.9
Broiling	8.0
Pan frying	7.7
Grilling	7.0
Deep frying	4.4
Frying fish cakes or fish sticks	3.7
Steaming	2.5
Adding to soups or stews	2.3
Poaching	1.9
Trout almondine	0.9
Smoking	0.7
Adding to salads	0.1

Table 29. Importance of Recipe Information

	Very Important	Somewhat Important	Slightly Important	Not Important
Importance of Recipe Information	42.9	26.4	10.7	20.0

Table 29 A. Foods Served with Trout

Type of Food Served W/ Trout	Percentage of Total Respondents
Rice	12.2
Lettuce/spinach salad	10.2
Lemon	9.9
Potatoes	9.5
Mixed vegetables	8.8
Broccoli	6.8
Carrots	5.7
Parsley	5.2
Corn	5.0
Tartar sauce	3.3
Bread	3.1
Pasta/pasta salad	2.9
Peas	2.8
Fruit salad	1.1
Crackers/chips	0.9

Table 30. When Consumers Serve Trout

Served for Which Meal?	Yes (% of Respondents - will not total 100%, as each meal was answered separately)		
Lunch			8.1
Dinner			18.0
Snacks or Appetizers			2.1
Breakfast			2.4
	Everyday Meal	Special Occasion	Both Equally Likely
Likelihood of Serving Trout for:	11.4	4.9	1.9

Table 31. Frequency of Fishing

	Yes (% of Respondents)			
	Yes, always	Yes, sometimes	Catch & Release only	No - others eat
Eat freshwater fish as a child?	62.6			
Go fishing as a child?	58.8			
Ever gone fishing (if no as a child)?	35.4			
Still go fishing?	36.7			
Eat what you catch?	52.7	25.8	11.8	8.1

Table 32. Comparison of Farm Raised Trout to Wild Trout

Attribute (Comparing Farm Raised to Wild)	Better	About the same	Worse than fresh caught
Taste	21.7	34.6	23.2
Freshness	26.4	40.8	31.8
Nutritional value	27.5	51.5	19.8
Safety	49.7	32.4	16.2
Texture	22.9	49.2	25.7

Table 33. Reasons for NOT Eating Trout: Non-Fish-Seafood Eaters and Non-Trout Eaters

Reason	<u>Non-Fish-Seafood/Non-Trout Eaters</u>			
	Very Important	Somewhat Important	Slightly Important	Not Important
Taste	51.1/64.7	4.3/10.1	2.1/2.3	42.6/22.8
Price	17.0/25.0	10.6/35.6	8.5/5.0	63.8/34.4
Appearance	37.0/41.1	8.7/16.7	4.3/5.6	50.0/36.7
Fish odor	61.7/57.3	4.3/11.9	4.3/4.1	29.8/26.7
Concern about fish safety (bones, polluted waters)	40.4/61.8	6.4/15.6	4.3/1.4	48.9/21.2
Children's preferences	10.9/24.7	4.3/13.8	8.7/2.6	76.1/59.0
Concerns about spoilage	29.8/57.5	6.4/9.2	4.3/4.9	59.6/28.4
Nutrition/Diet concerns	34.0/36.9	12.8/22.6	2.1/4.9	51.1/35.7
Package or serving size	13.0/24.8	8.7/26.5	4.3/7.6	73.9/41.1
Preparation	21.7/34.5	8.7/27.0	4.3/7.0	65.2/31.6
Quality fish and seafood not available where I shop	31.1/18.7	8.9/13.0	4.4/7.7	55.6/60.7

Table 34. Regressor Definitions and Categories

Consumer Demographic Category:

Age	Consumer's age
NFishing	Dummy variable; 1 if consumer has never been fishing as a child or adult
Income	Dummy variable; 1 if consumer's income is at least \$30,000
White	Dummy variable; 1 if consumer is white
OthRace	Dummy variable; 1 if consumer is neither white nor black
Household	Consumer's household size

Rural/Urban Background Category:

Years	Number of years that the consumer have lived in the city
SComm	Dummy variable; 1 if consumer's childhood community size was less than 2500
LComm	Dummy variable; 1 if consumer's childhood community size was at least 2500

Consumer Preferences Category:

Freshness	Dummy variable; 1 if freshness of fish is important to the consumer
Cooking time	Dummy variable; 1 if cooking time is important to the consumer
Smell	Dummy variable; 1 if smell of fish is important to the consumer
Appearance	Dummy variable; 1 if appearance of fish is important to the consumer
Price	Dummy variable; 1 if price of fish is important to the consumer
BeefBuy	Dummy variable; 1 if consumer eats beef at least once a month
TryShell	Dummy variable; 1 if consumer had eaten shellfish in the past 3 or 4 years

Table 35. Impact of Selected Variables on the Likelihood of Purchasing Trout (Probit Model)

Independent Variable	Coefficient Estimate	Marginal Effect
Intercept	-1.887*	-0.706
Years	-0.013*	-0.005
Age	0.009*	0.004
SComm	0.313*	0.117
Freshness	0.576	0.216
Income	0.318*	0.119
Othrace	0.539*	0.201
Price	0.033	0.012
Cooking time	0.096	0.036
Smell	0.453*	0.169

Note: * indicates significant influence of the independent variable on the likelihood of purchasing trout. Chi-squared test statistic indicating joint significance of all non-intercept regressors=46.22 (i.e., null hypothesis is rejected).

Table 36. Coefficient Estimates of Independent Variables Affecting Consumer Preferences of Purchasing Trout using a Multinomial Logit Analysis

Regressor	Choice 1	Choice 2	Choice 3
Intercept	-2.855*	-3.382*	-0.797
Years	-0.031*	-0.018*	0.001
Age	0.003	-0.002	-0.029*
SComm	1.018*	0.299	-0.008
Freshness	0.884	2.153*	1.750*
Income	0.680	0.906*	0.567*
Othrace	0.765*	0.399	-0.635*
Price	0.655	0.448	0.734*
Cooking time	-0.370	0.093	-0.246
Smell	0.507	0.958*	0.194

Notes: * indicates significant influence (at the 10% level) of an independent variable on the likelihood of the respondent making a particular choice. Choice 1: the respondent would "definitely buy" trout. Choice 2: the respondent would "probably buy" trout. Choice 3: the respondent would "probably not buy" trout. Choice 4 (numeraire): the respondent would "definitely not buy" trout. Chi-squared test statistic for joint significance of regressors = 98.784 (i.e., reject null hypothesis).

Table 37. Dummy Variable "Correlations"*

Respondents who:	<u>Percentage</u>
Bought trout after reading literature concerning trout	10.3
Bought trout because they consider trout to be a healthful food item	97.6
Bought trout and have eaten freshwater fish as a child	80.5
Buy trout and have incomes of at least \$30,000	68.3

* This table consists of percentage of respondents who bought trout and satisfied certain specific indicated characteristics.

Table 38. Impact on the Likelihood of Purchasing Trout Filet and not Whole Fish (Probit Model)

Independent Variable	Coefficient Estimate	Marginal Effect
Intercept	-1.5216*	-0.507
Years	-0.01	-0.003
Household size	-0.013	-0.004
BeefBuy	-1.005*	-0.335
Cooking time	0.454*	0.151
Income	-0.111	-0.037
Lcomm	0.853*	0.284
NFishing	0.234	0.078
Appearance	0.360	0.120
Price	0.475	0.158
White	0.888*	0.300

Note: * indicates significant influence of the independent variable on the likelihood of purchasing filet and not whole trout. Chi-squared test statistic indicating joint significance of all non-intercept regressors=26.768 (i.e., null hypothesis is rejected).

Table 39. Coefficient Estimates of Independent Variables Affecting Consumer Preferences of Purchasing Fresh Filet Trout using a Multinomial Logit Analysis

Regressor	Choice 1	Choice 2	Choice 3
Intercept	0.289	-29.416	-34.168
Years	-0.018	0.0003	0.057*
Age	-0.018	-0.030	-0.096*
Cooking time	1.087*	0.651	-0.277
Income	-0.204	0.200	2.139*
NFishing	1.418	1.342	0.896
Appearance	1.489	30.168	-2.405
Price	-0.286	-1.372	-1.325
Smell	0.865	2.560*	38.202

Notes: * indicates significant influence (at the 10% level) of an independent variable on the likelihood of the respondent making a particular choice. Choice 1: the respondent would "very likely" buy fresh filet. Choice 2: the respondent would "somewhat likely" buy fresh filet. Choice 3: the respondent would "slightly likely" buy fresh filet. Choice 4 (numeraire): the respondent would "not likely" buy fresh filet. Chi-squared test statistic for joint significance of regressors = 39.84 (i.e., reject null hypothesis).

Table 40. Coefficient Estimates of Independent Variables Affecting Consumer Preferences of Purchasing Frozen Filet Trout using a Multinomial Logit Analysis

Regressor	Choice 2	Choice 3	Choice 4
Intercept	2.392*	1.096	3.364*
Years	-0.031*	-0.030	-0.030*
Household Size	-0.328*	-0.126	-0.281*
Cooking time	-0.396	-0.089	-0.635
Income	1.246*	1.464*	0.768
NFishing	1.609*	1.630*	1.277*
Price	-0.969	-1.837	-1.104
TryShell	1.077*	0.943	1.396*

Notes: * indicates significant influence (at the 10% level) of an independent variable on the likelihood of the respondent making a particular choice. Choice 1 (numeraire): the respondent would "very likely" buy frozen filet. Choice 2: the respondent would "somewhat likely" buy frozen filet. Choice 3: the respondent would "slightly likely" buy frozen filet. Choice 4: the respondent would "not likely" buy frozen filet. Chi-squared test statistic for joint significance of regressors = 26.49 (i.e., null hypothesis is rejected).

Table 41. Further Dummy Variable "Correlations"*

Of respondents who buy filet and not whole trout:	Percentage
Raised in large communities	92.30
Never been fishing	23.07
Consider appearance of fish as important	98.07
White	59.61

* This table consists of percentage of respondent who bought filet (and not whole) trout and satisfied certain specific indicated characteristics.

Table 42. Impact on the Likelihood of Purchasing Trout Steaks and not Whole Fish (Probit Model)

Independent Variable	Coefficient Estimate	Marginal Effect
Intercept	-1.0162	-0.310
Years	-0.009	-0.003
Household size	0.004	0.001
BeefBuy	-1.359*	-0.415
Cooking time	0.430	0.131
Income	-0.107	-0.033
Lcomm	1.019*	0.311
Price	0.616	0.188
TryShell	-0.398	-0.122
White	0.822*	0.251

Note: * indicates significant influence (at the 10% level) of the independent variable on the likelihood of purchasing trout steak and not whole trout. Chi-squared test statistic indicating joint significance of all non-intercept regressors=28.474 (i.e., null hypothesis is rejected).

Table 43. Coefficient Estimates of Independent Variables Affecting Consumer Preferences of Purchasing Fresh Trout Steaks using a Multinomial Logit Analysis

Regressor	Choice 1	Choice 2	Choice 3
Intercept	-0.298	-0.800	-2.455
Years	-0.006	-0.007	0.034
Household Size	0.319*	0.340*	0.009
Cooking time	0.870*	-0.079	0.335
Income	-0.184	-0.432	-0.230
Lcomm	0.285	0.817	1.547
NFishing	2.088*	1.587	2.875*
TryShell	-0.826*	-0.642	-1.543*
White	-0.125	0.228	-0.636

Notes: * indicates significant influence (at the 10% level) of an independent variable on the likelihood of the respondent making a particular choice. Choice 1: the respondent would "very likely" buy fresh steaks. Choice 2: the respondent would "somewhat likely" buy fresh steak. Choice 3: the respondent would "slightly likely" buy fresh steak. Choice 4 (numeraire): the respondent would "not likely" buy fresh steak. Chi-squared test statistic indicating joint significance of all non-intercept regressors=48.868 (i.e., null hypothesis is rejected).

Table 44. Coefficient Estimates of Independent Variables Affecting Consumer Preferences of Purchasing Frozen Trout Steaks using a Multinomial Logit Analysis

Regressor	Choice 2	Choice 3	Choice 4
Intercept	-0.280	0.786	3.468*
Years	-0.041*	-0.012	-0.022
Household Size	-0.291	-0.195	-0.374*
Cooking time	-0.277	-1.299	-1.039
Income	2.106*	2.072*	1.530*
Lcomm	2.193*	-0.419	-0.269
NFishing	2.145*	3.001*	2.359*
TryShell	1.420*	1.493*	1.435*
White	-1.426*	-1.311	-1.096

Notes: * indicates significant influence (at the 10% level) of an independent variable on the likelihood of the respondent making a particular choice. Choice 1 (numeraire): the respondent would "very likely" buy frozen steaks. Choice 2: the respondent would "somewhat likely" buy frozen steak. Choice 3: the respondent would "slightly likely" buy frozen steak. Choice 4: the respondent would "not likely" buy frozen steak. Chi-squared test statistic indicating joint significance of all non-intercept regressors=42.945 (i.e., null hypothesis is rejected).

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