

**Survey of Redfish Bay Anglers
with Emphasis on Their
Shallow-Water Boating
Practices and Knowledge
of Seagrass Habitat**

by
**Jeremy Leitz
Faye Grubbs**

**Management Data Series
No. 263
2011**



COASTAL FISHERIES DIVISION
4200 Smith School Road
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Table of Contents

	<u>Page</u>
List of Tables	ii
List of Figures	iii
List of Appendices	iv
Abstract	1
Introduction	1
Materials and Methods	2
Sample Frame	2
Survey Instrument	2
Survey Methodology	2
Survey Analysis	2
Response Rate	3
Results	3
Boating Practices	3
Seagrass Knowledge	3
Shallow-Water Management Preferences	3
Angler Characteristics	4
Angler Participation	4
Species Preference	4
Angler Satisfaction	5
Angler Motivations and Attitudes	5
Discussion	5
Acknowledgements	7
Literature Cited	8
Tables	9
Figures	12
Appendices	15

List of Tables

	<u>Page</u>
Table 1. Distribution (%) of Redfish Bay angler responses to how often they use methods other than motoring to reach deeper water when their boat encounters shallow water over a grass flat.....	9
Table 2. Distribution (%) of Redfish Bay angler responses to how often they use the following techniques to reach deeper water when their boat encounters shallow water over a grass flat.....	9
Table 3. Distribution (%) of Redfish Bay angler responses to whether or not they have seen scarring of seagrasses.....	9
Table 4. Distribution (%) of Redfish Bay angler responses to statements related to seagrass knowledge.....	10
Table 5. Distribution (%) of Redfish Bay angler responses to statements related to seagrass management.....	11

List of Figures

	<u>Page</u>
Figure 1. Redfish Bay State Scientific Area location map	12
Figure 2. Angler satisfaction with saltwater fishing in Texas.	13
Figure 3. Angler satisfaction with saltwater fishing in Redfish Bay.	13
Figure 4. Residential location for Redfish Bay anglers who lived in Texas.....	14

List of Appendices

	<u>Page</u>
Appendix A. Questionnaire	
Survey of Redfish Bay Users.....	16
Appendix B. Cover Letters and Reminder/Thank You Postcard	
First Cover Letter.....	24
Second Cover Letter.....	25
Third Cover Letter.....	26
Reminder/Thank You Postcard.....	27
Appendix C: Summary of Responses to Survey Questions.....	28

Abstract.—A mail survey was sent to 2,087 boat owners intercepted at boat ramps surrounding Redfish Bay State Scientific Area to collect baseline information on their shallow-water boating practices and knowledge of seagrass habitat. Additional information was collected on angler preferences and motivations for saltwater fishing to allow for characterization of the anglers. Almost all anglers (93%) indicated they used methods other than motoring to reach deeper water when over a shallow grass flat with drifting (96%), poling (85%), and wading/pushing (80%) the top techniques sometimes or always employed. Over three-quarters (76%) of anglers reported seeing seagrass scarring. Nearly all anglers agreed that seagrass: (1) provides nursery areas (95%), (2) coverage is important to the bays (90%), (3) is important for water quality (90%), and (4) is a source of food (83%). More anglers disagreed (42%) than agreed (35%) that Texas Parks and Wildlife Department should close certain areas of the bay when seagrass has been damaged. Overall, anglers are aware of the negative impacts caused by boats on seagrasses. They also recognize the importance of seagrasses and the many ecosystem services they provide. Although Redfish Bay anglers tend to be more avid anglers, they share similar characteristics to saltwater anglers statewide.

Introduction

The development of shallow-running boats in the mid-1980s resulted in damage to seagrasses by boat propellers, which prompted state resource agencies to begin discussing management actions. By 1999 the Seagrass Conservation Plan for Texas (Anonymous 1999) was published. This plan formulized future research needs, management issues, and education efforts for the three state resource agencies (Texas Parks and Wildlife Department, Texas Commission for Environmental Quality, and the Texas General Land Office) with regulatory authority or statutory jurisdiction pertaining to seagrass.

In an effort to reduce propeller scarring, on June 1, 2000, the Texas Parks and Wildlife Commission established the Redfish Bay State Scientific Area (RBSSA) and three voluntary no-prop areas were marked with signs (Figure 1). State scientific areas are created to give enhanced protection for the purpose of education, scientific research, and preservation of flora and fauna of educational or scientific value. This particular state scientific area included a five-year sunset provision.

A mail survey was conducted in 2001 to gauge angler support for various management options to conserve seagrass beds and to determine angler opinion towards seagrass habitat (hereafter referred to as the 2001 survey) (Leitz and Grubbs 2008). Additional information was collected to establish rates of participation and species preference. These anglers were intercepted at boat ramps surrounding Redfish Bay and Nine-Mile Hole to obtain mailing addresses.

In 2005 the RBSSA designation was renewed for an additional five years. As the voluntary measures proved unsuccessful, a regulation prohibiting the uprooting of seagrass with a submerged propeller became effective May 1, 2006, for the entire 32,000-acre area.

TPWD wanted to assess changes in angler knowledge of seagrass habitat and their shallow-water boating practices that may have resulted from the regulation. These results would help determine if the designation would be renewed after the five year period. To measure these changes, TPWD conducted a survey before enactment of the regulation for comparison to a subsequent survey in order to assess possible regulation impacts. Additional information was collected on angler motivations and preferences towards fishing to allow for characterization of the anglers. Comparisons were made to results from similar questions asked in a survey of Redfish Bay anglers conducted in 2001 and a statewide angler survey conducted in 2005 (Leitz and Grubbs 2008, Tseng et al. 2006, respectively).

Materials and Methods

Sample Frame

Boat registration numbers collected during routine Texas Parks and Wildlife Department (TPWD) creel surveys for Aransas Bay and Corpus Christi Bay between January 1, 2003, and September 30, 2005, were queried (Green and Campbell 2005). From that query, only those private boat-owners who indicated in the creel survey that they made trips into north Redfish Bay (minor bay 280), south Redfish Bay (minor bay 284), and South Bay (minor bay 285) were included in the final sample frame.

Survey Instrument

A mail questionnaire was developed by the TPWD Coastal Fisheries Division to collect information on Redfish Bay angler shallow-water boating practices, knowledge of seagrass habitat, and shallow-water management preferences. Other information was collected on angler's avidity, species preferences, satisfaction levels, and motivations and attitudes for saltwater fishing (Appendix A). Certain questions were repeated from the 2001 survey and the 2005 statewide angler survey to allow for comparison (Leitz and Grubbs 2008, Tseng et al. 2006, respectively).

Survey Methodology

Mail survey procedures followed those recommended by Dillman (1978). Specifically, individuals were mailed a cover letter describing the project and its purpose along with the questionnaire. A post card reminder was mailed one week later. A second mailing of the cover letter and questionnaire was sent three weeks after the initial mailing to individuals who had not responded. The final mailing of the cover letter and questionnaire to individuals who had not responded occurred six weeks after the initial mailing (Appendix B).

Survey Analysis

Survey analysis was completed using SAS[®] software. Frequency counts and their associated percentages were conducted on all questions (Appendix C). Pearson's Chi-

square tests were performed on seagrass-related questions that were replicated from the 2001 survey to test for differences in levels of agreement between survey years (Tables 3-5).

Response Rate

Following the strict mailing procedures mentioned above, the survey achieved a 63% effective response rate. Of the 2,087 questionnaires mailed, 1,229 were returned completed and 146 were sent back due to incorrect addresses.

Results

Boating Practices

While more than half of anglers (56%) reported having a trolling motor on their boat, most anglers (93%) indicated they “sometimes” or “always” use methods other than motoring to reach deeper water when they encounter shallow water over a grass flat (Table 1). When asked what method they use to reach deeper water, the majority of anglers (96%) indicated they sometimes or always drift (Table 2). The second most commonly used method was poling (85%), followed by wading/pushing (80%). More than one-third of anglers indicated they “never” troll (38%) or motor (38%).

Seagrass Knowledge

The majority of Redfish Bay anglers (76%) reported seeing scarring of seagrasses during their fishing or boating experience. This percentage has decreased since the 2001 survey (97%), and groups (respondents in the 2001 study and respondents in the 2006 study) differed significantly in their responses (Table 3).

The majority of anglers agreed with the following statements: “seagrass coverage in bays is important” (90%), “seagrasses are important to water quality” (90%), and “seagrasses provide important nursery areas” (95%). Results differed significantly between this study and the 2001 study for each statement (Table 4).

Most anglers (83%) agreed that “seagrass is an important food source for various aquatic species.” Only 20% of the anglers agreed that “seagrasses recover quickly from propeller scarring.” These results differed significantly from the 2001 study (Table 4). In addition, when asked if seagrass acreage is increasing, only 20% agreed that it was. Close to half (47%) of all anglers were neutral. Again, results were significantly different from the 2001 study.

Shallow-Water Management Preferences

Less than half of anglers (46%) agreed that “boating through shallow bays, estuaries, or grass flats should be restricted in some way.” Respondents in 2006 differed significantly in their responses from anglers in 2001 (Table 5) when just over half (52%)

agreed with that statement. More anglers disagreed (42%) than agreed (35%) that “TPWD should temporarily close certain bays, estuaries, or grass flats when seagrass has been damaged.”

Angler Characteristics

When study results were compared with those from the 2001 survey (Leitz and Grubbs 2008) and a 2005 statewide angler survey (Tseng et al. 2006), overall demographics of Redfish Bay anglers were quite similar. Most Redfish Bay anglers were male, and the average age was 54. Approximately one-third (31%) of anglers had paid to go fishing with a guide in saltwater within the past two years. These anglers spent an average of three days with a guide (Appendix C).

Approximately one-third (30%) of all anglers had taken a boater education course. Of those anglers, 49% took a boater education course taught by the United States Coast Guard (USCG), and another 19% took a course taught by the TPWD.

One-third (33%) of anglers were members of a fishing club or organization. Of that one-third, nearly all (88%) were members of the Coastal Conservation Association.

Angler Participation

Redfish Bay anglers averaged 41 days fishing in Texas during the previous year, with the majority of those days (30) fishing in saltwater bays from a motorized boat. Specifically, anglers spent 22 days fishing in the Redfish Bay area. These numbers are lower than the 2001 survey where anglers averaged 57 days fishing in Texas and 34 days fishing in Redfish Bay. However, Redfish Bay anglers reported more days saltwater fishing (41) than reported in the 2005 statewide angler study (20).

Of the anglers who indicated they fished in saltwater bays in Texas, the majority of days (20) were fished in Aransas Bay, followed by Corpus Christi Bay (13). Fewer days were spent in the Upper Laguna Madre (3), San Antonio Bay (2), Galveston Bay (1), Lower Laguna Madre (1), Matagorda Bay (1), and Sabine Lake (< 1).

Species Preferences

The most preferred species among Redfish Bay anglers was red drum (*Sciaenops ocellatus*). Approximately 58% indicated red drum as their first choice and 36% listed it as their second choice. The second most preferred species was spotted seatrout (*Cynoscion nebulosus*), listed by 37% as their first choice and by 53% as their second choice. Flounder (*Paralichthys sp.*) was the third most sought after species with 2% indicating it as their first choice and 5% indicating it as their second choice. However, more than half of all anglers (59%) indicated flounder as their third choice. These results mirror results from the 2005 statewide angler study, and differ slightly from the 2001 study.

While the first preferred species choice (red drum) stayed the same from the 2001 Survey of Redfish Bay and Nine Mile Hole Anglers, spotted seatrout increased in popularity. In the 2001 survey, only 16% listed it as their first choice, 17% listed it as their second choice, and 2% listed it as their third choice. Flounder also saw an increase, albeit smaller, in popularity: in 2001 only 0.5% of anglers indicated it as their first choice.

Angler Satisfaction

Satisfaction with saltwater fishing has increased since the 2001 survey (Figure 2). More than two-thirds (67%) of Redfish Bay anglers were very or extremely satisfied with saltwater fishing in Texas, while 95% were “moderately” to “extremely” satisfied. Less than 5% of all Redfish Bay anglers were “not at all” or “slightly” satisfied. More anglers indicated they were “very satisfied” to “extremely satisfied” than in the 2001 survey.

When asked how satisfied they were with saltwater fishing in Redfish Bay, 48% indicated they were “very” to “extremely” satisfied, while close to 90% were “moderately” to “extremely” satisfied (Figure 3). Less than 3% of all Redfish Bay anglers were “not at all satisfied”.

Angler Motivations and Attitudes

Anglers participate in fishing for generic reasons (activity-general) provided by various outdoor recreation activities as well as for reasons specific to recreational fishing (activity-specific) (Tseng et al. 2006). The top three activity-general items rated by Redfish Bay anglers as either “very important” or “extremely important” were: “for relaxation” (87%), “to be outdoors” (86%), and “to be close to the water” (75%). Overall, nine activity-general reasons for fishing were considered “very important” or “extremely important” by a majority of anglers. Only one activity-general motivation, “to experience new and different things”, was not viewed by the majority of anglers as “very important” or “extremely important”. These results are consistent with the 2005 statewide angler study.

Three activity-specific items were viewed by the majority of anglers as “very important” or “extremely important”: “for the fun of catching fish” (85%), “for the experience of the catch” (78%), “for the challenge of the sport” (66%). A majority of anglers felt that three activity-specific items, “to test my equipment” (55%), “to obtain a trophy fish” (60%), and “to win a trophy or prize” (81%), were “not at all important” or “slightly important.” Again, these results are consistent with the 2005 statewide angler study.

Discussion

The main objective of this survey was to gather baseline information on Redfish Bay anglers’ shallow-water boating practices and knowledge of seagrass habitat. Additional information was collected on angler preferences and motivations towards

fishing. Few questions were included regarding management scenarios to avoid confusion as the no-uprooting regulation had been only recently approved by the TPW Commission.

Although this survey was conducted prior to initiation of the regulation, it should be noted that some community outreach had been completed before the survey was mailed out. These events included presentations to the local chambers of commerce and elected officials as well as several fishing organizations and newspaper articles.

By monitoring changes in anglers' boating behavior and equipment, resource managers can better understand angler awareness and adaptations made to comply with the regulation. Angler responses to questions about boating through shallow bays suggest they are conscious of the negative impacts powered propellers can have on seagrasses and as a result use alternative methods to reach deeper water. In fact, drifting, poling, and wading were preferred over the two methods (trolling and motoring) that involved use of powered motors. With over half of angler boats equipped with trolling motors prior to the regulation taking effect, repeating this question in a subsequent survey would provide further information on changes in boating equipment. Including an additional question asking boaters if they utilize a push pole to navigate through shallow water areas could also be used as an indicator of change in boater behavior. A distinction should be made between trolling and motoring to minimize confusion as some respondents may consider trolling a form of motoring.

Angler understanding of the importance of seagrasses has increased since the 2001 survey. Along with increased agreement by anglers that seagrass coverage is important, they also understand that seagrasses play a role in improving water quality as well as providing protection as nursery areas and as forage for various marine organisms. This increase in recognizing the importance of seagrass is encouraging as it may give anglers more of a reason to avoid damaging seagrasses and further educate other unaware anglers. In addition, anglers recognize scars do not recover quickly which may also lead to better boating practices through shallow-water seagrass areas. As information on seagrass acreage estimates becomes available, it should be included in outreach material as anglers seem to be unaware of the status of changes in seagrass coverage. A 20% decrease in angler observations of propeller scars since the 2001 survey (Leitz and Grubbs 2008) may be attributed to increased education efforts during that period of time.

Anglers generally dislike area closures as a management approach to protecting seagrasses. Responses to questions regarding temporarily closing certain bays, estuaries, or grass flats when seagrass has been damaged were similar to results from the 2001 survey. Responses were also similar to a survey conducted by Anderson and Ditton (2001) in which the least preferred management methods were to close an area for one to two years and to close areas seasonally. Additional questions asked in the Anderson and Ditton (2001) survey regarding angler opinion on management options indicated that all scenarios involving closures were the least preferred. The decrease in anglers agreeing that boating through shallow grass flats should be restricted in some way also reaffirms angler disagreement with limiting boating access as a means of management. A question

regarding angler opinion of the no-uprooting regulation in a subsequent survey would reflect how anglers regard this approach to managing seagrass habitat compared to other options such as area closures and increased education efforts.

To increase awareness of the regulation and the importance of seagrasses, boater education instructors should be provided with brochures to hand out to their students as 30% of anglers responded they had taken a boater education course administered through the USCG or TPWD. Presentations to local fishing clubs and organizations would provide another effective venue to inform anglers as 33% noted they were a member of a conservation group. In addition, information obtained regarding angler city of residence can be used to focus education efforts. Anglers from the San Antonio area represent the highest usage for Redfish Bay (Figure 4). In addition, this information could be used to identify concentrations of Redfish Bay anglers from surrounding cities that may not have been reached through previous outreach efforts.

Redfish Bay anglers share many similar characteristics with the average Texas saltwater angler. Their motivations for fishing and their species preference are very similar to results in the statewide survey conducted by Tseng et al. (2006). One notable difference between these two groups is in their avidity. Redfish Bay anglers spent more than twice as many days fishing in saltwater than the average saltwater angler. This could help explain why Redfish Bay anglers were slightly more motivated to fish for the fun and experience of catching fish than for obtaining fish for eating. Saltwater anglers statewide may also share similar opinions and attitudes towards seagrass management as their characteristics were similar to those of Redfish Bay anglers. Including management related questions in a subsequent statewide survey would aid in determining if this is accurate.

Results from this survey will be compared to similar questions asked in a subsequent survey to determine if anglers have changed their boating practices over time as a result of the regulation. In addition, information gathered on changes of anglers' knowledge of seagrasses in a subsequent survey will determine if TPWD education and outreach efforts have been successful. Survey results provide valuable information for assessing the efficacy of TPWD's seagrass conservation efforts in the RBSSA. Findings from the survey will be used to better manage the resource and to maintain the support of the constituents who utilize the resource.

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TABLE 1.—Distribution (%) of Redfish Bay angler responses to how often they use methods other than motoring to reach deeper water when their boat encounters shallow water over a grass flat.

Response	2006 ^a
Never	7.4
Sometimes	55.4
Always	37.2

^a Includes anglers from the 2006 survey (this study)

TABLE 2.—Distribution (%) of Redfish Bay angler responses to how often they use the following techniques to reach deeper water when their boat encounters shallow water over a grass flat.

Technique	Response ^a		
	Never	Sometimes	Always
Poling	14.8	67.2	18.0
Trolling	37.8	51.4	10.8
Drifting	4.1	76.8	19.2
Wading (pushing)	19.37	71.2	9.1
Motoring	37.7	59.6	2.5

^a Includes anglers from the 2006 survey (this study)

TABLE 3.—Distribution (%) of Redfish Bay angler responses to whether or not they have seen scarring of seagrasses^a.

Response	2001 ^b	2006 ^c
Yes	96.9	76.4
No	3.2	23.6

^a Results differed between 2001 and 2006 respondents; $\chi^2(1) < 28.33$, $P < 0.001$, $V < -0.15$

^b Includes anglers from the 2001 survey who indicated they had fished in Redfish Bay

^c Includes anglers from the 2006 survey (this study)

TABLE 4.—Distribution (%) of Redfish Bay angler responses to statements related to seagrass knowledge^a.

Statement	Response				
	Survey Year ^b	Neutral	Agree	Strongly Agree	N
Seagrass coverage in bays is important ^c	2006	8.9	50.8	38.9	1,197
	2001	8.3	25.8	65.5	145
Seagrasses recover quickly from propeller scarring ^d	2006	36.4	16.6	3.8	1,166
	2001	23.2	19.0	15.5	142
Seagrasses are important to water quality ^e	2006	9.5	49.2	40.3	1,190
	2001	10.1	29.7	59.5	145
Seagrasses provide important nursery areas ^f	2006	4.5	47.3	47.3	1,196
	2001	7.6	21.4	70.3	145
Seagrass acreage is increasing ^g	2006	46.8	16.4	3.5	1,178
	2001	43.1	18.1	13.2	144

^a Chi-square analyses were run only on the categories of Neutral, Agree, and Strongly Agree as the expected counts for both Disagree and Strongly Disagree were less than five for each statement.

^b 2006 = Survey of Redfish Bay Users (this study); 2001 = Survey of Redfish Bay and Nine-Mile Hole Anglers (Leitz and Grubbs 2008) with the Nine-Mile Hole anglers eliminated

^c Results differed between 2001 and 2006 respondents; χ^2 (2) <39.07, P < 0.001, V < 0.17

^d Results differed between 2001 and 2006 respondents; χ^2 (2) <40.56, P < 0.001, V < 0.23

^e Results differed between 2001 and 2006 respondents; χ^2 (2) <22.00, P < 0.001, V < 0.13

^f Results differed between 2001 and 2006 respondents; χ^2 (2) <35.79, P < 0.001, V < 0.16

^g Results differed between 2001 and 2006 respondents; χ^2 (2) <24.05, P < 0.001, V < 0.16

TABLE 5.—Distribution (%) of Redfish Bay angler responses to statements related to seagrass management.

Statement	Survey Year ^a	Response					N
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
Boating through shallow bays, estuaries, or grass flats should be restricted in some way ^b	2006	10.9	15.7	21.6	30.6	11.7	1188
	2001	15.5	16.2	16.9	27.5	23.9	142
TPWD should temporarily close certain bays, estuaries, or grass flats when seagrass has been damaged	2006	18.6	23.6	22.7	25.4	9.7	1183
	2001	ND ^c	ND	ND	ND	ND	ND

^a 2006 = Survey of Redfish Bay Users (this study); 2001 = Survey of Redfish Bay and Nine-Mile Hole Anglers (Leitz and Grubbs 2008) with the Nine-Mile Hole anglers eliminated

^b Results differed between 2001 and 2006 respondents; χ^2 (4) < 20.44, P < 0.001, V < 0.12

^c ND = No data



FIGURE 1.—Redfish Bay State Scientific Area location map.

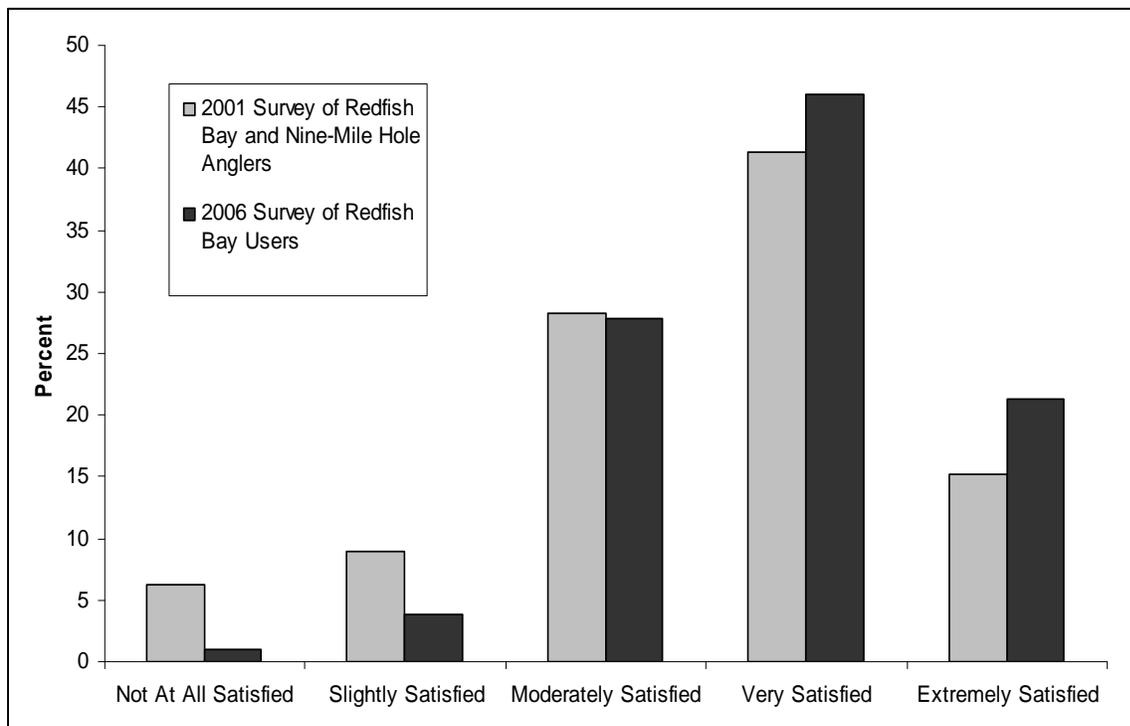


FIGURE 2.—Angler satisfaction with saltwater fishing in Texas.

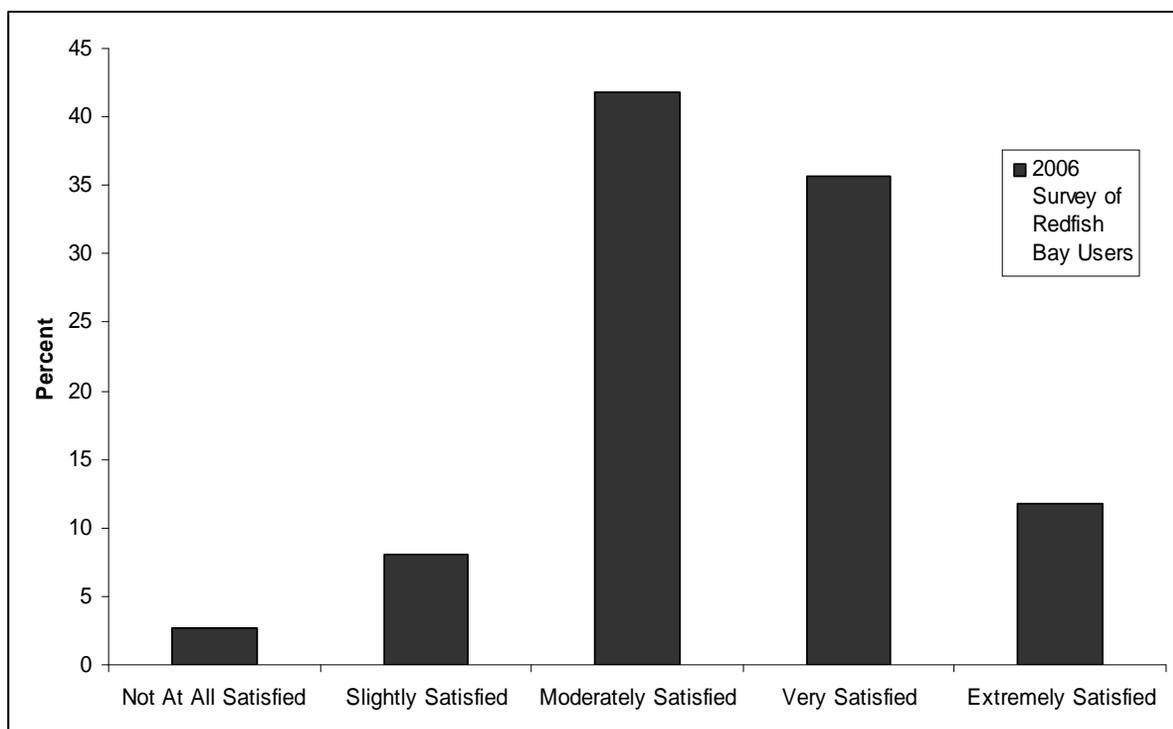


FIGURE 3.—Angler satisfaction with saltwater fishing in Redfish Bay.

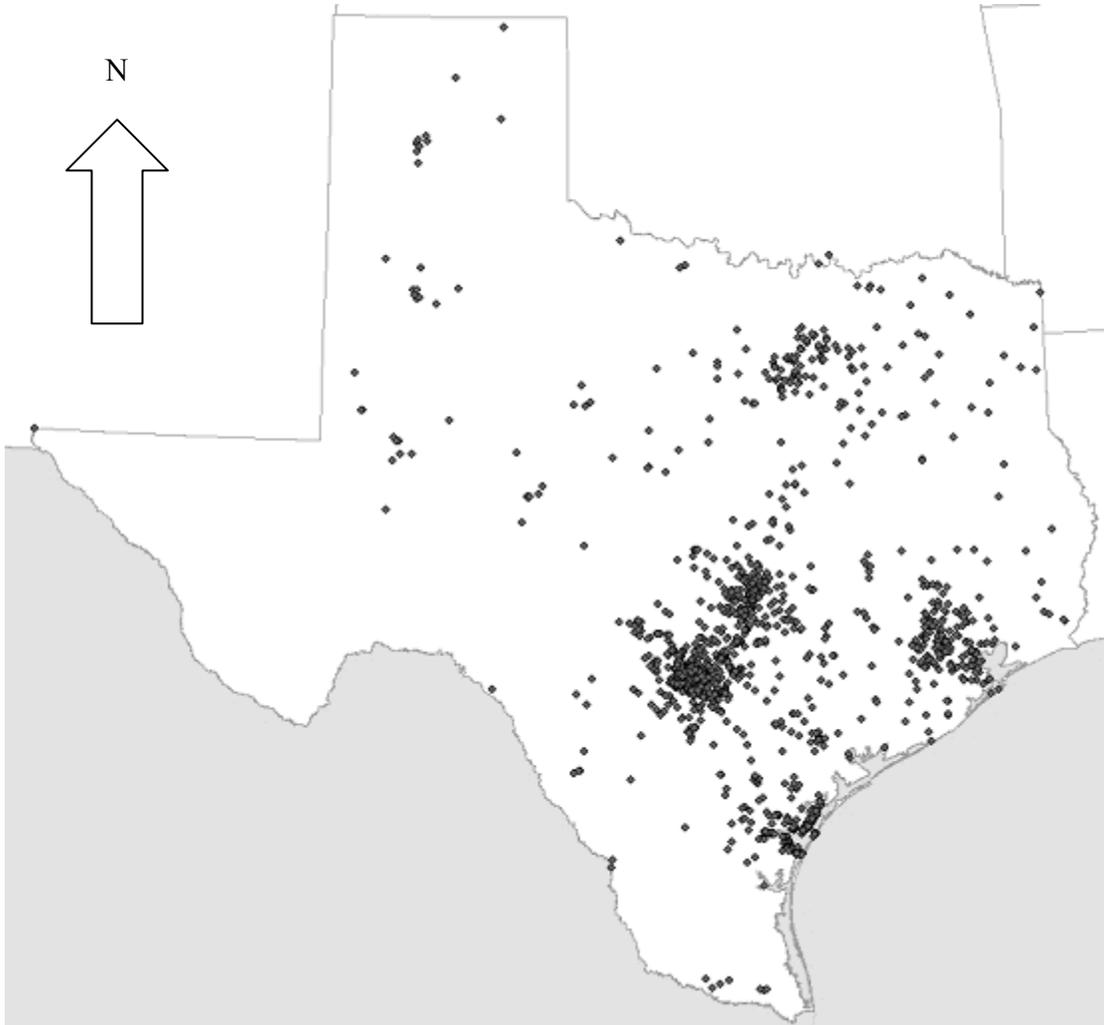
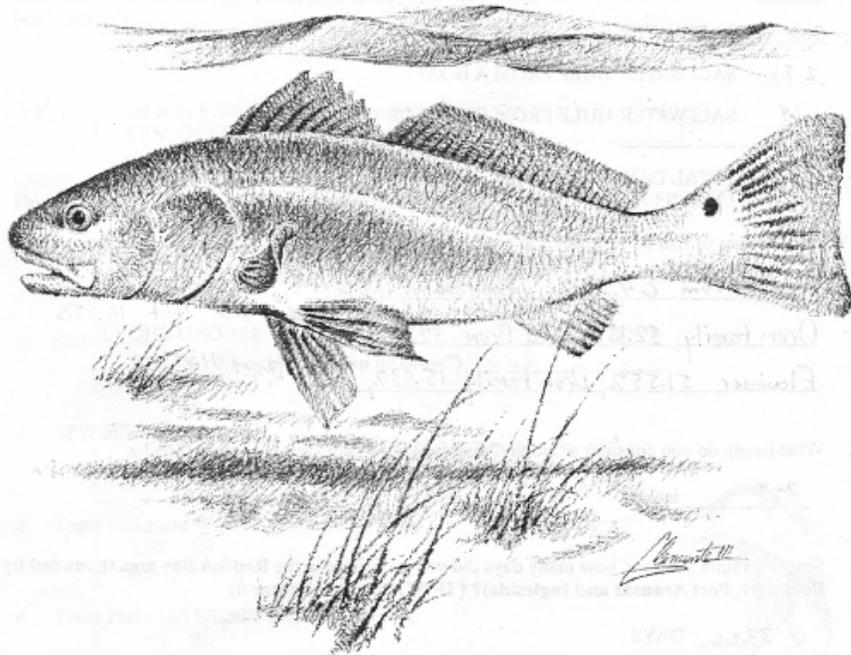


FIGURE 4.—Residential location for Redfish Bay anglers who lived in Texas.

Appendix A: Questionnaire

Survey of Redfish Bay Users



The information you provide on this survey will remain strictly confidential and you will not be identified with your answers.

1. Since this time last year, how many days did you go fishing in Texas? (If NONE, please enter 0)

_____ Freshwater
 _____ Saltwater Bays from a Motorized Boat (airboats and jet prop included)
 _____ Saltwater Bays from a Paddle Craft (kayak, canoe, etc.)
 _____ Saltwater Bays from Shore or Pier
 _____ Saltwater Gulf from a Boat
 _____ Saltwater Gulf from Shore or Piers

_____ Total Days Fished Since this Time Last Year

2. Since this time last year, how many days have you fished in each of the bay systems listed below? (If NONE, please enter 0)

_____ Sabine Lake
 _____ Galveston Bay (East Bay, West Bay, Trinity Bay, Christmas Bay, etc.)
 _____ Matagorda Bay (Lavaca Bay, Tres Palacios, etc.)
 _____ San Antonio Bay (Espiritu Santo Bay, Hynes Bay, etc.)
 _____ Aransas Bay (Copano Bay, Redfish Bay North of Hwy 361, Mesquite Bay, etc.)
 _____ Corpus Christi Bay (Port Aransas Pass, Nueces Bay, Redfish Bay South of Hwy 361, etc.)
 _____ Upper Laguna Madre (the Land Cut, Baffin Bay, Alazan Bay, etc.)
 _____ Lower Laguna Madre (All bays south of Land Cut)

_____ Total Days Fished Since this Time Last Year

3. Since this time last year, how many days did you go fishing specifically in the Redfish Bay area (bounded by Rockport, Port Aransas, and Port Ingleside)? (If NONE, please enter 0)

_____ DAYS

4. What species of fish do you prefer to catch while fishing in the **Redfish Bay area**?

_____ FIRST CHOICE

_____ SECOND CHOICE

_____ THIRD CHOICE

5. During your fishing or boating experience in Redfish Bay, have you seen what you would consider to be scarring of seagrasses (areas in seagrass beds that look as though lanes had been cut through them by boat propellers)?

- 1. YES
- 2. NO

6. Have you ever taken a boater education course?

- 1. YES
- 2. NO (If NO, please skip ahead to question 7)

If YES, who administered the course?

- 1. TEXAS PARKS AND WILDLIFE DEPARTMENT (TPWD)
- 2. UNITED STATES COAST GUARD
- 3. OTHER

7. When your boat encounters shallow water over a grass flat, indicate how often you use methods other than motoring to reach deeper water.

Never	Sometimes	Always
1	2	3

8. Does your boat have a trolling motor?

- 1. YES
- 2. NO

9. Below is a list of reasons why people fish. Please circle the number that indicates how important each item is to you as a reason for fishing.

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
a. To be outdoors	1	2	3	4	5
b. For family recreation	1	2	3	4	5
c. To experience new and different things	1	2	3	4	5
d. For relaxation	1	2	3	4	5
e. To be close to water	1	2	3	4	5
f. To obtain fish for eating	1	2	3	4	5
g. To get away from the demands of people	1	2	3	4	5
h. For the experience of the catch	1	2	3	4	5
i. To test my equipment	1	2	3	4	5
j. To be with friends	1	2	3	4	5
k. To experience unpolluted natural surroundings	1	2	3	4	5
l. To win a trophy or prize	1	2	3	4	5
m. To develop my skills	1	2	3	4	5
n. To get away from the regular routine	1	2	3	4	5
o. To obtain a "trophy" fish	1	2	3	4	5
p. For the challenge of the sport	1	2	3	4	5
q. For the fun of catching fish	1	2	3	4	5
r. To experience adventure and excitement	1	2	3	4	5

10. Are you a member of a fishing club or organization?
1. YES (If YES, please identify: _____)
 2. NO

11. Within the past 2 years have you paid to go fishing with a guide in saltwater?
1. YES (If YES, how many days? _____)
 2. NO

12. When your boat encounters shallow water over a grass flat and you need to reach deeper water, indicate how often you use the following techniques to get to deeper water.

	Never	Sometimes	Always
a. POLLING	1	2	3
b. TROLLING	1	2	3
c. DRIFTING	1	2	3
d. WADING (pushing)	1	2	3
e. MOTORING	1	2	3

13. Please circle your level of satisfaction for each statement:

	Not at all satisfied	Slightly satisfied	Moderately satisfied	Very satisfied	Extremely satisfied
a. Overall how satisfied are you with saltwater fishing in Redfish Bay?	1	2	3	4	5
b. Overall how satisfied are you with saltwater fishing in Texas?	1	2	3	4	5

14. Please indicate whether you agree or disagree with each of the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. Boating through shallow bays, estuaries, or grass flats should be restricted in some way.	1	2	3	4	5
b. TPWD should temporarily close certain bays, estuaries, or grass flats when seagrass has been damaged.	1	2	3	4	5
c. Seagrass coverage in bays is important.	1	2	3	4	5
d. Seagrasses recover quickly from propeller scarring.	1	2	3	4	5
e. Seagrasses are important to water quality.	1	2	3	4	5
f. Seagrasses provide important nursery areas.	1	2	3	4	5
g. Seagrass acreage is increasing.	1	2	3	4	5
h. Seagrass is an important food source for various aquatic species.	1	2	3	4	5

15. Are you?

1. MALE
2. FEMALE

16. What is your age? _____ YEARS

17. Was this survey completed by the person to whom it was addressed?

1. YES
2. NO

«ID»

«AddressBlock»

Thank you for completing this questionnaire. Please return the completed questionnaire in the enclosed postage-paid reply envelope as soon as possible.

**Texas Parks and Wildlife Department
Coastal Fisheries Division
4200 Smith School Road
Austin, TX 78744**

*Questions regarding the questionnaire should be directed to Jeremy Leitz, jeremy.leitz@tpwd.state.tx.us;
Phone: (512) 389-4333*

Appendix B: Cover Letters and Reminder/Thank You Postcard

First Cover Letter

ID Number

Date

First Name, Last Name

Address

City, State, Zip

Dear

The Texas Parks and Wildlife Department is conducting a study of people who use the Redfish Bay area for recreation. Your name was randomly chosen from a list of people who have recreated in the Redfish Bay area over the past three years.

The enclosed survey is designed to tell us about your general fishing activities in both Texas and specifically to Redfish Bay, your motivations for fishing, opinions in regard to habitat issues, and fishing and boating behaviors. The information will be used in evaluating fishery and habitat management along the Texas coast and will help the Texas Parks and Wildlife Department provide a more satisfying recreational experience.

You are one of a number of Redfish Bay users selected to participate in this study. It is important that you and no one else complete the questionnaire. All responses will remain strictly confidential, and you will not be identified with your answers. There is an identification number on the questionnaire for mailing purposes only.

After you complete the questionnaire, please return it in the postage-paid, business reply envelope as soon as possible. If you have any questions, please feel free to contact me at (512) 389-4333, or by email at jeremy.leitz@tpwd.state.tx.us.

Thank you for your assistance.

Sincerely,

Jeremy Leitz
Human Dimensions Analyst
Coastal Fisheries Division
Texas Parks and Wildlife Department

Second Cover Letter

ID Number

Date

First Name, Last Name

Address

City, State, Zip

Dear

About three weeks ago I wrote to you seeking information on your fishing in the Redfish Bay area. As of today we have not yet received your completed questionnaire. If you have recently mailed it, please accept our sincere thanks and disregard this letter and enclosed questionnaire.

The enclosed questionnaire is designed to tell us about your general fishing activities in both Texas and specifically to Redfish Bay, your motivations for fishing, opinions in regard to habitat issues, and fishing and boating behaviors. The information will be used in evaluating fishery and habitat management along the Texas coast and will help the Texas Parks and Wildlife Department provide a more satisfying recreational experience.

I am writing to you again because of the significance each questionnaire has to the usefulness of this study. You are one of a number of Redfish Bay users selected to participate in this study. It is important that you and no one else complete the questionnaire. All responses will remain strictly confidential, and you will not be identified with your answers. There is an identification number on the questionnaire for mailing purposes only.

In the event your questionnaire has been misplaced, a replacement is enclosed. After you complete the questionnaire, please return it in the postage-paid, business reply envelope as soon as possible. If you have recently mailed your completed questionnaire back to us, please disregard this letter and enclosed questionnaire. Your cooperation is greatly appreciated.

Sincerely,

Jeremy Leitz

Human Dimensions Analyst

Coastal Fisheries Division - Texas Parks and Wildlife Department

Third Cover Letter

ID Number

Date

First Name, Last Name

Address

City, State, Zip

Dear :

I am writing to you about our study of recreating in Redfish Bay. As of today we have not yet received your completed questionnaire. If you have recently mailed it, please accept our sincere thanks and disregard this letter and enclosed questionnaire.

The large number of questionnaires returned is very encouraging. But, whether we will be able to describe accurately how Redfish Bay users feel on these important issues depends upon you and the others who have not yet responded. This is because our past experiences suggest that those of you who have not yet sent in your questionnaire may hold quite different opinions about recreation in Redfish Bay than those who have.

The enclosed questionnaire is designed to tell us about your general fishing activities in both Texas and specifically to Redfish Bay, your motivations for fishing, opinions in regard to habitat issues, and fishing and boating behaviors. The information will be used in evaluating fishery and habitat management along the Texas coast and will help the Texas Parks and Wildlife Department provide a more satisfying recreational experience.

In the event your questionnaire has been misplaced, a replacement is enclosed. After you complete the questionnaire, please return it in the postage-paid, business reply envelope as soon as possible. If you have recently mailed your completed questionnaire back to us, please disregard this letter and enclosed questionnaire. Your cooperation is greatly appreciated.

Sincerely,

Jeremy Leitz
Human Dimensions Analyst
Coastal Fisheries Division
Texas Parks and Wildlife Department

Reminder/Thank You Postcard

Dear Redfish Bay User:

Last week a survey seeking information on your fishing in the Redfish Bay area was mailed to you.

If you have already completed and returned the survey to us, please accept our sincere thanks. If not, please do so today.

If you should have any questions, please contact me using the information provided below.

Thank you.



Jeremy Leitz
Texas Parks and Wildlife Department
Coastal Fisheries Division
4200 Smith School Road
Austin, Texas 78744
(512) 389-4333
jeremyleitz@tpwd.state.tx.us



Appendix C: Summary of Responses to Survey Questions

Q5. During your fishing or boating experience, have you seen what you consider to be scarring of seagrasses?

N=1,137	Frequency	Percent
Yes	866	76.3
No	268	23.7

Q8. Does your boat have a trolling motor?

N=1,194	Frequency	Percent
Yes	663	55.5
No	531	44.5

Q7. When your boat encounters shallow water over a grass flat, indicate how often you use methods other than motoring to reach deeper water?

N=1,152	Frequency	Percent
Never	84	7.4
Sometimes	639	55.4
Always	429	37.2

Q12. When your boat encounters shallow water over a grass flat and you need to reach deeper water, indicate how often you use the following techniques to get to deeper water? Numbers represent the percentage of respondents.

	Never	Sometimes	Always	N
Polling	14.8	67.2	18.0	1,106
Trolling	37.8	51.4	10.8	1,039
Drifting	4.1	76.8	19.2	1,132
Wading/Pushing	19.7	71.2	9.1	1,074
Motoring	37.7	59.6	2.5	1,076

Q14a-h. Please indicate whether you agree or disagree with each of the following statements. Numbers represent percentage of respondents.

Statement	Disagree ¹	Neutral	Agree ²
Boating through shallow bays, estuaries, or grass flats should be restricted in some way	29.8	24.2	46.0
TPWD should temporarily close certain bays, estuaries, or grass flats when seagrass has been damaged	42.2	22.7	35.1
Seagrass coverage in bays is important	1.5	8.9	89.6
Seagrasses recover quickly from propeller scarring	43.2	36.4	20.4
Seagrasses are important to water quality	0.9	9.5	89.5
Seagrasses provide important nursery areas	0.8	4.5	94.6
Seagrass acreage is increasing	33.4	46.8	19.9
Seagrass is an important food source for various aquatic species	2.7	14.7	82.7

¹ Includes individuals who reported they “Strongly Disagree” or “Disagree”

² Includes individuals who reported they “Strongly Agree” or “Agree”

Q15. Are you?

N=1,199	Frequency	Percent
Male	1,151	96.0
Female	48	4.0

Q16. What is your age?

N=1,203	Mean	Min.	Max.
	54	18	74

Q11. Within the past two years have you paid to go fishing with a guide in saltwater?

N=1,208	Frequency	Percent	Mean # of Days
Yes	369	30.5	3.1
No	839	69.5	

Q6a. Have you ever taken a boater education course?

N=1,142	Frequency	Percent
Yes	338	29.6
No	804	70.4

Q6b. If YES, who administered the course?

N=346	Frequency	Percent
Texas Parks and Wildlife Dept.	65	18.7
United States Coast Guard	169	48.7
Other	112	32.6

Q10. Are you a member of a fishing club or organization?

N=1,207	Frequency	Percent
Yes	399	32.9
No	808	67.7

Q1. Since this time last year, how many days did you go fishing in Texas?

	Mean	Min.	Max.	N
Freshwater	7.6	0	200	1,257
Bay – motorized boat	30.1	0	300	1,136
Bay – paddle craft	2.1	0	175	649
Bay – shore/pier	4.3	0	150	733
Gulf – boat	3.4	0	100	764
Gulf – shore/pier	1.7	0	150	666

Q3. Since this time last year, how many days did you go fishing specifically in the Redfish Bay area (bounded by Rockport, Port Aransas, and Port Ingleside)?

N=1,194	Mean	Min.	Max.
	22.3	0	365

Q2. Since this time last year, how many days have you fished in each of the bay systems listed below?

	Mean	Min.	Max.	N
Sabine Lake	0.1	0	30	706
Galveston Bay	1.3	0	60	732
Matagorda Bay	1.1	0	60	726
San Antonio Bay	2.4	0	70	769
Aransas Bay	19.8	0	274	1,063
Corpus Christi Bay	13.2	0	200	961
Upper Laguna Madre	2.8	0	120	766
Lower Laguna Madre	1.1	0	79	699

Q4. What species of fish do you prefer to catch while fishing in saltwater in the Redfish Bay area? Numbers represent percentage of respondents.

Species	First Choice N=1,154	Second Choice N=1,139	Third Choice N=961
Red drum	58.8	35.9	5.6
Spotted seatrout	36.7	52.9	7.4
Flounder	2.6	5.4	59.0
Black drum	0.6	1.9	10.3
Drum family	0.5	1.6	6.8
Red snapper	0.5	0.3	0.3
King mackerel	0.3	0.3	0.2
Sheepshead	--	0.3	3.0

Q13b. Overall, how satisfied are you with saltwater fishing in Texas? Numbers represent the percentage of respondents.

N=1,191	NS	SS	MS	VS	ES
	0.9	3.9	27.8	46.0	21.4

NS=Not at all satisfied SS=Somewhat satisfied MS=Moderately Satisfied
VS=Very Satisfied ES=Extremely Satisfied

Q13a. Overall, how satisfied are you with saltwater fishing in Redfish Bay? Numbers represent the percentage of respondents.

N=1,159	NS	SS	MS	VS	ES
	2.7	8.0	41.8	35.7	11.8

NS=Not at all satisfied SS=Somewhat satisfied MS=Moderately Satisfied
VS=Very Satisfied ES=Extremely Satisfied

Q9. Below is a list of reasons why people fish. Please circle the number that indicates how important each item is to you as a reason for fishing. Numbers represent percentage of respondents.

Reason Why People Fish	Not at All Important to		Moderately Important	Very Important to	
	Slightly Important	Extremely Important		Extremely Important	Very Important
Activity-general items					
For relaxation	3.8		9.7		86.6
To be outdoors	2.8		11.2		86.0
To be close to the water	7.2		18.3		74.5
To experience unpolluted natural surroundings	9.4		16.6		74.0
To get away from the regular routine	10.9		16.2		72.8
To be with friends	10.3		19.5		70.3
To experience adventure and excitement	8.6		22.1		69.3
For family recreation	12.7		18.8		68.5
To get away from the demands of others	16.9		16.2		66.9
To experience new and different things	21.7		29.7		48.6
Activity-specific items					
For the fun of catching fish	3.4		12.0		84.6
For the experience of the catch	4.9		17.3		77.8
For the challenge of the sport	11.2		23.2		65.6
To develop my skills	30.8		29.5		39.7
To obtain fish for eating	31.6		34.1		34.2
To obtain a "trophy" fish	59.8		22.1		18.1
To test my equipment	55.1		28.3		16.6
To win a trophy or prize	80.8		12.2		6.9

Q17. Was this survey completed by the person to whom it was addressed?

N=1,201	Frequency	Percent
Yes	1,167	97.2
No	34	2.8

