

**EFFECTS OF FOLLOW-UP CONTACTS
ON SAMPLE CHARACTERISTICS AND SUSTANTIVE RESEARCH FINDINGS
IN SURVEYS:
AN EXPLORATORY ANALYSIS**

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Introduction

Despite the use of multiple types of incentives, imaginative reformatting of survey forms, and enhanced introductory materials, response rates to mail and online surveys have declined in recent years. Today, response rates of 10-15% are commonly presented in the literature. In an effort to increase the number of survey respondents, researchers routinely solicit participation from non-responding sample members by using one or more follow-up contacts. Data from these “late additions” (i.e., respondents who reply after one or more follow-up contacts) are then simply added to the data from the “initial” respondents to increase the number of cases available for analysis. Generally, little or no attention is paid to the potential effects of these additional data on the sample characteristics and/or observed relationships.

The current analysis explored the following research questions:

- *Research Question 1: What are the effects of different contacts on the number of survey responses received?*
- *Research Question 2: How do the socio-demographic characteristics of the cases available for analysis differ depending upon when respondents completed the survey form?*
- *Research Question 3: Do the relationships of subjects' socio-demographic/personal characteristics to their reported attitudinal and/or behavioral characteristics differ depending upon which contact elicited their response to the survey?*

The Surveys

Data to explore these research questions were drawn from three separate, previously-administered surveys. All three surveys were carried out by initially contacting sample members, providing a questionnaire, and requesting their participation in the survey (Wave 1). Those who failed to respond were sent two or more follow-up reminders (Wave 2, Wave 3, etc.), including duplicate copies of the questionnaire. The analysis considered the response rates obtained for each wave, the characteristics of the responding subjects, and selected relationships between subject characteristics and attitudinal/behavioral responses of the participants.

The Pennsylvania Study

The Pennsylvania study sought to assess the views of residents living in areas of the state impacted by natural gas drilling during the early years of the emerging industry. A total of 21 counties located in the Marcellus Shale natural gas area were chosen as the study sites. An addressed-based sample of 4,496 cases was drawn at random from these counties by a commercial sampling organization (GENESYS). The initial mailing in October 2009 included a \$1.00 cash incentive. Three follow-up mailings were used, with findings from the last two combined for this analysis. A total of 421 survey forms were returned as “undeliverable.” Of the remaining 4075 questionnaires mailed, 1459 provided usable data – a 32.4% response rate (Alter. et al., 2010).

The Texas Community Survey

The Texas Community Survey assessed residents’ views on a variety of issues, including their feelings of attachment to their communities and the degree to which they were satisfied with the way of life in their communities in terms of public services and community amenities, environmental hazard issues, medical and healthcare services, and perceptions of food, agriculture, and the natural environment. A sample of 5,608 households was drawn by Survey Sampling, Inc. to represent persons living in 22 selected small and rural places in Texas. Questionnaires were mailed in June 2013 with two follow-up mailings during July and August. The combined contacts yielded 697 completed questionnaires — a response rate of 12.4%.

The Texas Boating Survey

The Texas Boating Survey assessed licensed boaters' beliefs and behaviors related to aquatic invasive species (AIS) occurrence and mitigation in Texas inland freshwaters. The study assessed aspects of boaters' recreational boating activity in these waters over the past 12-months and their awareness, knowledge, attitude, and normative beliefs related to AIS. A random sample of 9,500 individuals was drawn from the Texas Parks and Wildlife Department's license database. Participants were solicited via email to complete an online questionnaire in May 2016 with four follow-up reminders sent during May and June. After accounting for undeliverables and opt-outs, 8,609 participants were eligible and a total of 2,330 questionnaires were completed — a 27.0% response rate (Wallen & Kyle, 2018).

Analysis: Research Question 1

What is the effect of differing numbers of contacts on the number of survey responses received?

The Data

For the Pennsylvania mail survey, nearly half (48,8%) of the total completed questionnaires received were in response to the initial solicitation for participation. (Wave 1). For the Texas Community Survey (also a mail survey), that percentage was even higher (55.2%) (Table 1). Subsequent contacts (Waves 2, 3 and 4) each yielded decreasing increases in the numbers of responses, indicating that the net or marginal “payoff” in terms of received data declined with increasing Waves. As a result, additional follow-up contacts were discontinued.

For the Texas Boating Survey, which was conducted entirely online, the initial solicitation (Wave 1) yielded just 564 completed surveys (24.2% of the final number received). In response to Wave 2 (the first follow-up reminder), an additional 841 completed questionnaire were received – an increase of nearly one and a half times the number of Wave 1 responses. Subsequent follow-ups (Waves 3, 4, and 5) each provided between 200 and 300 additional completed questionnaires.

Discussion

For both of the postal mail surveys (the Pennsylvania Study and the Texas Community Study), follow-up contacts with the sample members increased the number of usable sample members, but at a decreasing rate. That is, after the third contact the number of additional responses numbered less than 100 in both cases and further contacts were discontinued. However, for the Texas Boating survey, conducted online, continuing follow-ups continued to provide sizable numbers of additional responses until the survey was discontinued on other grounds, suggesting that additional follow-up contacts might have continued to increase the number of cases available for analysis.

What can be concluded from these data? First, it seems clear that follow-up contacts with sample members do substantially increase the total number of cases available to the researcher for analysis. In both the Pennsylvania Survey and the Texas Community Study, after the initial contact (Wave 1), the usable samples approximately doubled in size with follow-up contacts (Wave 2 and Wave 3). However, the number of newly added cases, decreased between Wave 2 and Wave 3, suggesting that the marginal receipt from additional contacts would be expected to continue to decline. Similarly, in the on-line Texas Boating Study, follow-up contacts were useful in increasing the number of survey participants.

Analysis: Research Question 2

Do the socio-demographic characteristics of respondents differ depending upon WHEN they completed the survey form?.

The Data

For this analysis, the distributions of the characteristics of sample members who responded to the initial invitation for survey participation (Wave 1) were compared with those who responded to subsequent follow-up waves.

In the Pennsylvania study, data were available on each subject's gender, age, marital status, education, years the person had lived in the area, income level, employment status, and self-reported liberal vs. conservative political views (Table 2). For none of these variables did the distributions of these characteristics differ significantly at the .05 level among the three "response waves." Thus, regardless of *when* the subject answered the survey, males were more likely than females to be included in the data. Furthermore, responses were most likely from those aged 44-79, the married, the employed, long-time residents, and those who reported that their political views were "conservative." There was a tendency for earlier (i.e., Wave 1) respondents to be slightly more likely than those who answered later to have at least some post high school education, but these educational differences were not statistically significant at the .05 level ($p=.07$).

Similarly, the response rates for the Texas Community Survey did not vary significantly by subjects' gender, age, marital status, years in the area, income level, employment status, or political beliefs (Table 3). However, there were significant wave differences in subjects' educational level. The percentage of surveys returned in the first wave by subjects with post high school education was greatest (70.1%) and declined somewhat in Wave 2 (56.4%) and Wave 3 (58.2%), suggesting that those with higher educations responded somewhat more quickly to the survey than those with less schooling. However, this difference was negligible after the first follow-up (i.e., Wave 2). None of the other respondent characteristics varied significantly across the three waves of contact. Thus, except for educational level, follow-up requests increased the total usable sample size, but did not significantly alter the distributions of gender, age, marital status, years lived in the area, income level, or political beliefs. The sole exception involved respondent's education, where response rates declined only between Wave 1 and Wave 2.

In the online Texas Boating Survey, only the distribution of Frequency of Boating Use during the past year varied significantly ($p=.03$) by Wave (Table 4). The proportion of respondents reporting "no" boat uses during the past year increased from 23.6% in Wave 1 to 32.0% in Wave 5. There were no significant differences in among waves in the distributions of gender, age, ethnicity, education, income, and whether or not the respondent reporting having taken a boating course. The proportion of females responding did increase slightly between Wave 1 and Wave 5, but this increase was not statistically significant ($p=.06$) and the numbers of females included in all waves were small.

Discussion

The current analysis found the distributions of demographic characteristics of subjects who answered the initial request for survey participation differed little from those who responded to the second or third solicitation regarding gender, age, marital status, years in the area, income level, employment status, or political beliefs. Exceptions to this generalization suggested that those who responded to

the initial mailing (Wave 1) were somewhat more likely than the Wave 2 or 3 respondents to have at least some post high school education. Although these overall differences were statistically significant ($p < .05$) only for the Texas data, and occurred only between the Wave 1 and Wave 2 distributions in the Pennsylvania study, they support the conclusion (suggested by previous research) that that responses to surveys likely disproportionately reflect the views of the more educated subjects. Efforts to employ mixed mode surveys using postal or e-mail contacts combined with follow-up telephone, e-mail or online modes have sometimes been used to increase overall response rates, but these methods too would be expected to be selective for more educated subjects, thus exacerbating the educational bias of the resulting sample.

Not only can selective response rates bias the representativeness of the researcher's data, but even the initial acquisition of a "representative," probability-based sample is fraught with difficulty. If the desired population consists of the members of an organization or group for which membership rolls are maintained (and purged when members leave), a random draw from this listing would represent an appropriate "random" sample. However, when conducting a general population survey – whether that be in rural Pennsylvania or the community of Mudville – current and complete population listings of individuals (i.e., the sampling frame) are almost never available. Postal addresses are often used to sample households for mail surveys. However, address-based listings define households, not individuals. If personal views or characteristics are the focus of study, the designation of one member of the household (e.g., "oldest male," "youngest female," "person with the most recent birthday," etc.) as the desired respondent means that individuals in smaller households will be over-represented in the sample relative to those in larger household, resulting in sampling errors of unspecified size.

The combined effects of imprecision in sample selection, biasing in response rates, and possible measurement errors in question formulation present multiple challenges for social scientists and all can contribute to imprecision and errors in estimating parameters for the target population of interest,

Analysis: Research Question 3

Do the *relationships* of subjects' demographic/personal characteristics to reported attitudes and/or behaviors characteristics differ depending upon the Wave in which they responded to the survey?

The previous analysis considered whether the distributions of individual variables were inconsistent across different response waves. This section addressed the question of whether the relationships between variables differed depending upon *when* (Wave 1, 2, 3, etc.) subjects responded to the survey? Answers to this latter question can be explored regardless of whether the overall distributions of one's sample data differ from their distributions in an empirical population. Certainly, researchers in many other fields (e.g., medicine, psychology, nutrition, genetics, etc.) do not depend on the use of probability samples derived from specific definable populations. Rather, drawing upon empirical data, they measure the nature and degree of observable differences or relationships in their data and conclude (using significance tests) whether the observed differences are greater than chance (with a specified probability of error). Subsequent analysis of sample data can then explore the limits of the findings by controlling for other variables and/or assessing the same relationship in other data sets drawn from the same or differing populations.

The following analysis assessed whether relationships between various independent and dependent variables differed depending upon the levels (and waves) of response to the survey. Put otherwise, does using information from differing response waves present consistent or differing conclusions concerning the nature and importance of the relationships between independent and dependent variables of interest?

The Pennsylvania Data

For the Pennsylvania analysis, four dependent variables were considered: (a) a 9-item scale measuring the subject's assessment of his/her Knowledge of Natural Gas Drilling,¹ and (b) the respondent's reply to a single item requesting his/her Support of Natural Gas Extraction.² Bivariate correlations were calculated relating the independent variables of respondent's gender, age, marital status, education, years in the area, income, employment status, and political beliefs to each of these two dependent variables. were calculated for: (1) the Total (final) sample; (2) Wave 1 respondents (i.e., those who received only the first solicitation with no follow-up reminders); and (3) each additional contact (Wave 2 and Wave 3), Table 5.

¹ On a scale of 0 ("non or almost none") to 4 ("a great deal"), respondents were asked: How much do you know about: a) economic impacts of the natural gas industry; b) social impacts of natural gas well development on communities; c) effects of gas drilling on the natural environment; d) implications of natural gas drilling for water quality and quantity; e) gas drilling procedures and practices; f) procedures and legal implications of leasing mineral rights; g) impact of Gas well development on local governments; h) government regulations relating to gas drilling; i) jobs and job training opportunities related to gas development. (Cronbach's Alpha = .952)

² On a scale from 1 to 5 how do you feel about natural gas extraction from the Marcellus Shale? 1=strongly oppose; 2=somewhat oppose; 3=neither oppose nor support; 4=somewhat support; 5=strongly support.

For the Knowledge variable, by far the largest correlations for the Total sample, the initial contact (Wave 1), and each of the following waves, were consistently gender, income and education. Males were more knowledgeable than females; income and education were both positively correlated with Knowledge Scores.

The largest correlates of the item assessing the respondents' Support for Gas Drilling in the Total Sample, and for Wave 1 and Wave 2 were political beliefs, gender, and income. Males, the married, those with conservative political beliefs, and those with higher incomes were more likely than their opposites to support natural gas drilling.

The Texas Community Study

Analysis of the Texas Community Study data focused on two dependent variables: (a) the subject's feelings of Attachment to their communities as measured by a 10-item Likert Scale³, and (b) a single question asking about the individual's Satisfaction with the Quality of Life in the Community.⁴ These measures were correlated with the independent variables of: subject's gender, age, marital status, education, years in the area, income, employment status, and reported political beliefs (liberal vs. conservative) (Table 6).

The relative magnitude of the correlations for the Total sample and for the Wave 1 data were similar for the Community Attachment Scale where the largest *r-values* (in order from high to low) were years in the area, conservatism of political beliefs, and age. Political beliefs, income, and marital status had the highest correlations with the indicator of Community Satisfaction in the Total sample, and in the Wave 1 and Wave2 data.

The Texas Boating Study

The previous two studies used mail surveys with two follow-up contacts at 2-3 week intervals. The Texas Boating Survey was carried out online with an initial mailing (Wave 1) followed by four on-line follow-up contacts at approximately one-week intervals -- Waves 2, 3, 4, and 5. Three dependent behaviors (frequency of boat usage, perception of threat from invasive species, and participation in positive actions to control/reduce the dangers of invasive water species) were each correlated with subjects' gender, age, ethnicity,

³ Community Attachment was assessed using ten 4-category Likert items where 1=SD; 4=SA: as follows: Overall I am very attached to this community; I feel like I belong in this community; The friendships and associations I have with people in this community mean a lot to me; If the people in this community were planning something, I'd think of it as something WE were doing rather than THEY were doing; If I needed advice about something, I could go to someone in this community; I think that I agree with most people in this community about what is important in life; I feel loyal to the people in this community; I plan to remain a member of this community for a number of years; I like to think of myself as similar to the people who live in this community; The future success of this community is very important to me. (Cronbach's Alpha=.926.

⁴ In general, how satisfied are you with the quality of life in this community? 1=very dissatisfied; 2= somewhat dissatisfied; 3= neither satisfied nor dissatisfied; 4=somewhat satisfied; 5=very satisfied.

education, and income (Table 7). The negative correlations of frequency of boat usage with the respondents' ethnicity and income were small, but consistent predictors for the Total Sample and Waves 1-3. The negative correlation between age and participation in positive protective behaviors were consistent across all waves and the total sample. Educational attainment was inversely related to the subject's participation in behaviors to reduce the spread of invasive species for Wave 1, Wave 2, and the Total sample.

Discussion

Although there were fluctuations among the waves of contact, there were also important consistencies in both of the mail studies -- the Pennsylvania and the Texas Community Surveys. Indeed, conclusions concerning the most important correlates of the dependent variables in the Total sample were so similar to those from the initial mailing (Wave 1), that one could question whether the time, cost, and energy to carry out the additional follow-up contacts (Wave 2 and Wave 3) in the mail surveys were warranted! Although somewhat less consistent, the online Texas Boating Study provided some support for these conclusions. However, the online Texas Boating study continued to add a fair number of cases even through Waves 4 and 5. Given the relatively low costs of additional follow-up contacts online may be warranted.

Conclusions

The current analysis was exploratory. It drew upon research studies conducted by three different researchers, working in different locales, with differing target population, dealing with different topics, and using different modes of data collection (two mail and one online). Additional studies are needed to assess the applicability of the findings to other settings.

We invite others with information on various waves and respondent contact methods (mail, telephone, internet or some combination of these) to further explore various issues related to the current report:

References

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Table 1. Numbers of Questionnaires Received by Wave of Contact for the PA Survey, the Texas Community Survey, and the Texas Boating Survey.

WAVE	PENNSYLVANIA SURVEY		TEXAS COMMUNITY SURVEY		TEXAS BOATING SURVEY	
	Questionnaires Received		Questionnaires Received		Questionnaire received	
	Total Number	Percent	Total Number	Percent	Total Number	Percent
1	712	48.8	385	55.2	564	24.2
2	390	27.1	247	35.5	841	36.1
3	276 ^a	24.1	65	9.3	294	12.6
4	81 ^a				362	15.5
5					269	11.5
TOTALS	1459	100.0	697	100.0	2330	100.0

^a Waves 3 and 4 for the Pennsylvania Survey were combined for the remaining analysis.

Table 2. Sociodemographic attributes of respondents to the PENNSYLVANIA Study by Response Wave. .

Variable	TOTAL SAMPLE		WAVE 1		WAVE 2		WAVE 3		ChiSq	P-value
	Number	%	Number	%	Number	%	Number	%		
Gender										
Male	788	55.1	405	57.9	202	52.5	181	52.6	4.09	.13
Female	641	44.9	295	42.1	183	47.5	163	47.4		
Age										
Less than 45	285	20.4	142	20.7	68	18.1	75	22.4	4.58	..60
45-59	495	35.4	240	34.9	131	34.9	124	37.0		
60-79	515	36.9	255	37.1	150	40.0	110	32.8		
80 & over	102	7.3	50	7.3	26	6.9	26	7.6		
Marital Status										
Not married	462	32.3	224	32.0	118	30.6	120	34.8	1.52	.47
Married	968	67.7	475	68.0	268	69.4	225	65.2		
Education										
Less than HS grad	502	35.3	227	32.8	140	36.4	135	39.4	8.77	.07
HS grad	478	33.6	228	32.9	139	36.1	111	32.4		
Some post HS	441	31.0	238	34.3	106	27.5	97	28.3		
Years lived in the area										
Life/ 20 yrs or more	1164	81.0	567	80.7	329	84.1	268	78.1	4.40	.11
Less than 20 yrs	273	19.0	136	19.3	62	15.9	75	21.9		
Income										
<\$25,000	325	25.8	150	23.8	90	27.1	85	28.5	7.70	.26
\$25,000-49,999	391	31.1	207	32.9	107	32.2	77	25.8		
\$50,000-74,999	272	21.6	136	21.6	63	19.0	73	24.5		
\$75,000 or more	271	21.5	136	21.6	72	21.7	63	21.1		
Employment status										
Not employed	614	43.3	308	44.8	175	45.2	131	38.2	4.88	.09
Employed	803	56.7	379	55.2	212	54.8	212	61.8		
Political Beliefs										
Liberal	259	19.7	137	20.7	75	22.0	47	15.2	7.07	.13
Neither	472	35.9	231	34.8	115	33.7	126	40.6		
Conservative	583	44.4	295	44.5	151	44.3	137	44.2		

TABLE 3. Sociodemographic attributes of respondents to the TEXAS COMMUNITY survey by Response Wave.

Variables	TOTAL SAMPLE		WAVE 1		WAVE 2		WAVE 3		ChiSq	P-value
	Number	%	Number	%	Number	%	Number	%		
Gender										
Male	282	43.5	171	46.8	91	40.6	20	33.9	4.63	.10
Female	366	56.5	194	53.2	133	59.4	39	66.1		
Age										
Less than 45	99	15.4	44	12.2	39	17.6	16	27.1	11.58	.07
45-59	179	27.9	104	28.9	61	27.5	14	23.7		
60-79	302	47.1	180	50.0	97	43.7	25	42.4		
80 & over	61	9.5	32	8.9	25	11.3	4	6.8		
Marital Status										
Not married	200	31.0	120	33.0	67	30.3	13	21.7	3.15	.21
Married	445	69.0	244	67.1	154	69.7	47	78.3		
Education										
Less than HS grad	55	9.0	25	7.2	25	11.8	5	9.1	12.24	.016
HS grad	164	26.7	79	22.7	67	31.8	18	32.7		
Some post HS	395	64.3	244	70.1	119	56.4	32	58.2		
Years lived in the area										
Less than 20 years	344	54.0	187	52.1	125	56.6	32	56.1	1.22	.54
20 years or more	293	46.0	172	47.5	96	43.3	25	43.9		
Income										
<\$30,000	199	33.1	109	32.2	72	35.1	18	31.6	1.07	.98
\$30,000-59,999	161	26.8	89	26.3	56	27.3	16	25.1		
\$60,000-89,999	111	18.5	65	19.2	36	17.6	10	17.5		
\$90,000 or more	130	21.6	76	22.4	41	20.0	13	22.8		
Employment status										
Not employed	324	52.4	184	53.2	108	50.7	32	54.2	.41	.815
Employed	294	47.6	162	46.8	105	49.3	27	45.8		
Political Beliefs										
Liberal	22	3.6	9	2.6	12	5.7	1	1.8	6.20	.18
Neither	317	52.3	173	50.6	115	55.0	29	52.7		
Conservative	267	44.1	160	46.8	82	39.2	25	45.5		

Table 4. Sociodemographic attributes of respondents to the TEXAS BOATING Study by Response Wave.

Variables	TOTAL SAMPLE		WAVE 1		WAVE 2		WAVE 3		WAVE 4		WAVE 5		ChiSq	P-value
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%		
Gender														
Male	1466	89.9	368	92.2	538	90.1	192	91.0	217	88.6	151	84.4	9.21	.06
Female	165	10.1	31	7.8	59	9.9	19	9.0	28	11.4	28	15.6		
Age														
Less than 45	258	16.9	47	12.7	96	16.9	35	17.9	44	19.6	36	21.3	12.68	.39
45-54	366	24.0	82	22.2	139	24.5	51	26.0	52	23.1	42	24.9		
55-64	512	33.5	133	35.9	191	33.6	65	33.2	69	30.7	54	32.0		
65 & over	392	25.7	108	29.2	142	25.0	45	23.0	60	26.7	37	21.9		
Ethnicity														
Not Hispanic	1438	93.0	356	95.4	533	92.5	180	90.5	212	91.8	157	93.5	6.14	.19
Hispanic	109	7.0	17	4.6	43	7.5	16	9.5	19	8.2	11	6.5		
Education														
HS grad or less	353	21.7	76	19.2	131	21.9	55	26.1	55	22.6	36	20.1	6.83	.87
Some post HS	406	25.0	95	24.0	149	24.9	48	22.7	65	26.7	49	27.4		
4yr college grad	568	34.9	148	37.4	208	34.89	67	31.8	83	34.2	62	34.6		
Post grad	300	18.4	77	19.4	110	18.4	41	19.4	40	16.5	32	17.9		
Income														
<\$80,000	363	24.5	93	25.4	133	24.8	43	22.5	51	22.8	43	28.5	5.18	.95
\$80,000-119,999	387	26.2	98	26.8	144	26.9	50	26.2	58	25.9	37	22.8		
\$120,000-159,999	257	17.4	64	17.5	82	15.3	36	18.8	42	18.8	33	20.4		
\$160,000 or more	472	31.9	111	30.3	177	33.0	62	32.5	73	32.6	49	30.2		
Boat Usage Past Yr														
None	656	28.2	133	23.6	234	27.8	89	30.3	114	31.5	86	32.0	22.91	.03
1-5 times	583	25.0	131	23.2	216	25.7	73	24.8	91	25.1	72	26.8		
6-14 times	562	24.1	137	24.3	211	25.1	70	23.8	86	23.8	58	21.6		
15 or more times	529	22.7	163	28.9	180	21.4	62	21.1	71	19.6	53	19.7		
Had Boater Course														
Yes	523	23.0	122	22.4	185	22.4	61	21.2	90	25.6	65	25.1	2.86	.58
No	1747	77.0	423	77.6	642	77.6	227	78.8	261	74.4	194	74.9		

Table 5. Bivariate Correlations of Sociodemographic Characteristics of PENNSYLVANIANS to Reported Knowledge of Gas Drilling and Support for Gas Drilling by Response Wave.

Variables	Total Sample	WAVE 1	WAVE 2	WAVE 3
	Bivariate r	Bivariate r	Bivariate r	Bivariate r
Knowledge of Gas Drilling				
Gender	-.244	-.279	-.224	-.185
Age	-.009	.039	-.066	-.068
Marital Status	.089	.100	.135	.023
Education	.200	.211	.199	.173
Years in Area	.024	.042	.068	-.049
Income	.243	.222	.270	.267
Employment status	.108	.064	.167	.156
Political beliefs	.083	.056	.109	.117
N of cases	1131	579	289	262
Support for Gas Drilling				
Gender	-.185	-.216	-.216	-.074
Age	.056	.115	-.092	.045
Marital Status	.122	.154	.096	.060
Education	.003	.052	-.068	-.051
Years in Area	-.041	-.006	-.118	-.031
Income	.136	.141	.164	.093
Employment status	.029	-.057	.196	.074
Political beliefs	.215	.232	.270	.123
N of cases	1121	576	285	259

Measurement of the variables:

Knowledge of Gas Drilling: Based on a 9-item-scale. Subjects reported on a 5-point scale how much they knew about the effects/procedures of gas drilling (Alpha= .952).

Support for Gas Drilling: Based on one item with 5-response scale where 1= Strongly oppose; 5=Strongly support.

Gender: 0=Males; 1=Females

Age: 1=<45 yrs.; 2=45-59 yrs.; 3= 60-79 yrs.; 4= 80 yrs. & over

Marital status: 0=Not married; 1=Married

Education: 1=Less than high school; 2=HS grad; 3=Some post high school education

Years in area: 1=all my life; 2=20 years or more; 3=10-19 years; 4=6-9 years; 5=2-5 years; 6=Less than 2 years

Income: 1=Less than \$15,000; 2=\$15,000-24,999; 3=\$25,000-34,999; 4=\$35,000-49,999; 5=50,000-74,999; 6=75,000 or more

Employment status: 0=Unemployed; 1=Employed

Political beliefs: 1=Liberal; 2=Neither liberal nor conservative; 3=Conservative

Table 6. Bivariate Correlations of Sociodemographic Characteristics of Respondents to Community Attachment and Community Satisfaction in the TEXAS COMMUNITY study.

Variables	Total Sample	WAVE 1	WAVE 2	WAVE 3
	Bivariate r	Bivariate r	Bivariate r	Bivariate r
Community Attachment				
Gender	.062	.103	.036	-.331
Age	.109	.156	.088	-.104
Marital Status	-.008	.011	-.034	.099
Education	-.044	-.039	-.108	.163
Years in Area	.229	.248	.208	.201
Income	.059	.062	.078	.142
Employment status	-.002	.029	-.027	-.140
Political beliefs	.180	.163	.163	.430
N of cases	518	274	157	44
Satisfaction with the Quality of Life in the Community				
Gender	-.012	-.007	-.018	-.010
Age	.038	.073	.045	-.027
Marital Status	.117	.096	.129	.273
Education	-.019	.017	-.111	.048
Years in Area	.093	.016	.015	.058
Income	.131	.115	.203	-.049
Employment status	.004	.001	.028	-.199
Political beliefs	.142	.171	.122	.246
N of cases	536	287	164	45

Measurement of the Variables:

Community Attachment: Based on ten 4-category Likert items where 1=SD; 4=SA. Alpha=.926.

Satisfaction with QOL: Based on a single item where 1=very dissatisfied; 5=very satisfied.

Gender: 0=male; 1=female

Age: 1=LT 45, 2=45-59, 3=60-79, 4= 80+

Marital status: 0=not married; 1=married

Education: 1=Less than HS Grad; 2=HS grad; 3=Some Post HS

Year lives in the area: 0=Less than 20 years; 1=20 years or more

Income: 1= <\$30,000; 2=\$30,000-\$59,999; 3=\$60,000-\$89,999; \$90,000 & over

Employment status: 0=Not employed; 1=Employed

Political Beliefs: 7-point scale from 1=Very liberal to 7=Very conservative.

Table 7. Bivariate Correlations of Respondents' Sociodemographic Characteristics to Frequency of Boat Use in the Past Year, Perceived Threat of Invasive Species, and Respondents' Participation in Positive Behaviors in the TEXAS BOATING survey.

Variables	Total Sample	WAVE 1	WAVE 2	WAVE 3	WAVE 4	WAVE 5
	Bivariate r	Bivariate r	Bivariate r	Bivariate r	Bivariate r	Bivariate r
Frequency of Usage						
Gender	-.073	-.077	-.059	-.125	-.019	-.092
Age	-.072	-.056	-.105	.070	-.032	-.280
Ethnicity	-.114	-.076	-.108	-.116	-.183	-.047
Education	.050	-.004	.100	.077	.059	.007
Income	.137	.095	.181	.112	.074	.230
N of cases	2330	564	841	294	362	.269
Perceived Threat						
Gender	-.006	.011	.035	-.062	-.008	-.064
Age	.077	.135	.052	.074	.031	.089
Ethnicity	-.024	.025	-.012	.040	.020	-.239
Education	-.030	.002	.057	.038	-.078	-.033
Income	-.070	.005	-.140	-.027	-.107	-.012
N of cases	2220	536	804	286	344	250
Positive Behavior						
Gender	.007	.012	.004	-.021	-.040	.080
Age	-.184	-.113	-.170	-.132	-.293	-.282
Ethnicity	.076	.030	.095	.022	.130	.069
Education	-.126	-.183	-.152	-.017	-.109	-.071
Income	-.082	-.045	-.135	-.015	-.113	-.064
N of cases	2043	506	730	259	316	232

Measurement of the variables:

Frequency of Usage: Response to a single item: In the past 12 months, how often have you used your boat? 1=not at all; 2=only once; 3=2-5 times; 4=6-9times; 5=10-14 times, 6=15or more times.

Perceived Threat: Attitude Score based on 4 items; How common are invasive species, how much threat are they to the environ, the economy, recreation. (Alpha=.783).

Positive Behavior: Score based on 4 ites indicating how often respondent cleaned, washed, drained, and dried boat and trailer after/ before use. Alpha = .890.

Gender: Male=1; Female=2

Age: 1=LT 45yr; 2=45-54yr; 3=55-64yr; 5=65+yr

Ethnicity: 1=Not Hispanic; 2=Hispanic

Education: 1=HS or less; 2=Trade/2 yr college; 3=4-yr college; 4=college grad

Income: 1=LT \$80,000; 2=\$80,000-119,999; 3=\$120,000-\$159,999; 4=GE 160,000