



# THE MEADOWS CENTER FOR WATER AND THE ENVIRONMENT

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## TEXAS STATE UNIVERSITY

### **Thoughts on Water in Texas: An Informal Survey Summer 2012**

#### **Introduction**

In a recent informal survey performed by the Meadows Center for Water and the Environment, Texans who were subscribed to the organization's email list were asked to provide opinions regarding current water issues. This survey was sent to a sample of 1,050 people who had previously been active in Texas water issues or who had asked to be kept informed on the subject of water in Texas. Of those surveyed, 579 participants replied, which gives the survey a response rate of 55.14%. This survey was not designed to be representative of the entire state, but rather was intended to raise awareness regarding the general opinions and beliefs held by those who have identified themselves as concerned about water issues to the Meadows Center for Water and the Environment. Additionally, the data gathered from this survey will provide insight into potential future survey study designs.

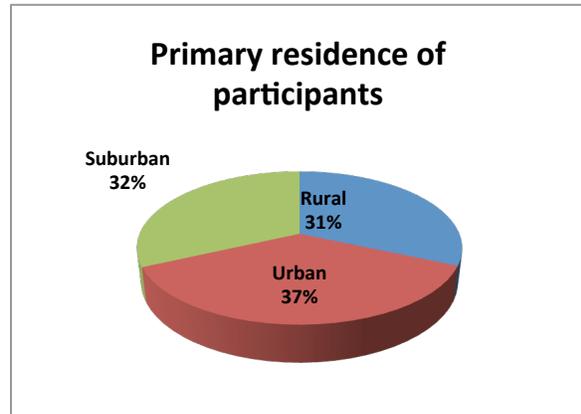
#### **Methodology**

The survey was administered in email form through Constant Contact and results were exported into Microsoft Excel (CSV format) for analysis. Researchers then used logical statements in Excel to format the results into a data style that the Statistical Package for the Social Sciences (SPSS), could import. Once imported, "other" and "I do not know" options were recoded into the missing system, Lickert scale questions were recoded so that "Agree" and "Somewhat agree" were collapsed into "Agree" and "Somewhat disagree" and "Disagree" were recoded into "Disagree." Additionally, the variable of "Race" was recoded into "White" and "Non-white" responses, though was heavily biased towards "white" based on the ratio of participants. Data was analyzed for frequencies, descriptive statistics, and basic inferential statistics. Using these results, Chi squared tests were then performed to summarize the differing perspectives based on gender and the impact of location on attitudes toward water. For the answers to the survey in their entirety, please review "Appendix A" located at the end of the document.

## Results

### Descriptive Statistics Highlights

Of those who returned the survey, the majority sampled was reportedly middle-aged and had an annual income of \$80,000 or more. Nearly 90% of participants were listed as Caucasian. Out of all participants, 55.8% were men and 42.8% women. The population was relatively split between residing in rural, suburban, and urban centers. More than half of the participants (53.7%) reported living in mixed climates. Another 32.5% live in arid climates, and 12.3% live in water-rich climates. Approximately 40% of the population sampled has participated in the state-wide water planning process, while 49.7% have not.



As would be expected from concerned citizens, nearly everyone (97.9%) surveyed believe that water conservation is a key part of protecting our water supply. Furthermore, the vast majority (over 80%) believe that government should play a role in conservation by encouraging private owners to conserve water through incentives. Eighty-six percent of participants also said that having an adequate water supply is important to their livelihood (Table 1).

**Table 1: Participant involvement in the Planning Process and Importance of Water**

|   | Having enough water is important to my livelihood. |               |               |
|---|--|---------------|---------------|
|   | Agree  | Neutral       | Disagree      |
| <b>I have participated in the Texas statewide water planning process.</b> |  |               |               |
| <b>Agree</b>  | 215<br>(47.1%)                                     | 16<br>(42.1%) | 5<br>(17.9%)  |
| <b>Disagree</b>   | 241<br>(52.9%)                                     | 22<br>(57.9%) | 23<br>(82.1%) |

Not surprisingly, over three fourths of (79.8%) think that the Texas Legislature needs to review current water policies.

With regard to an assessment of water management in Texas, the results seem to indicate mixed reviews. A little over half (56.7%) of participants believe Texas manages water well in some ways but not in others. Sixty-one percent of people believe

that the price of water does not adequately cover the costs associated with it. Approximately 60% (59.6%) of the participants believe that management of groundwater and surface water should be united. Furthermore, 51.6% of the sample population believes that technology will increase available water supply in the future.

Overall, the general sentiment regarding water policy is that management of groundwater and surface water should be united; the government should use incentives to encourage conservation; the price of water is not currently adequate to cover costs; and conservation is very important for the protection of our water supply. Not surprisingly, over three-fourths (79.8%) of those sampled think that the Texas Legislature should review current water policies.

A majority (53.5%) of participants believe that rainwater is owned by the individual who captures it. However, nearly 25% of participants believe that captured rainfall belongs to the watershed in which it falls. Over 10% believe that it should belong to the state, which is responsible for managing all public goods. Furthermore, more than half of participants (52.3%) believe that Texas should suspend water rights during droughts. While overall trends are useful for assessing general feelings towards water and water policy, in-depth analysis looking at predictor variables (e.g. gender and residency) will provide information about the general public opinions of water issues in Texas. This next section will discuss some of the interesting and statistically significant differences in perception reflected in the survey results.

## **Analysis looking at the differing viewpoints of Gender, Age, and Income**

### ***Gender***

The gender of participants may possibly affect their response to a number of the survey questions such as the price of water, perceptions of technology, water rights, and perceptions of conservation. Overall, a majority of both men (70.5%) and women (68.2%) believe that the price of water does not adequately cover all costs associated with it. However, results from this survey show that females are more likely to agree that the price of water is adequate than men are (Table 2). Men reported feeling neutral about the topic 4.7% of the time compared to 10.9% of females. A roughly equal proportion of both groups do not think that the price of water in Texas adequately covers the associated costs.

**Table 2: Water Price and Associated Costs**

| <b>The Price of Water in Texas Adequately Covers Associated Costs</b> |                |                |
|---|----------------|----------------|
|   | <b>Male</b>    | <b>Female</b>  |
| <b>Agree</b>  | 74<br>(24.8%)  | 42<br>(46.7%)  |
| <b>Neutral</b>  | 14 (4.7%)      | 22<br>(10.9%)  |
| <b>Disagree</b>   | 210<br>(70.5%) | 137(68.2<br>%) |

In addition to water price, a significantly higher percentage of men (61.9%) than women (43.7%) reported feeling optimistic about the ability of new technology to increase future water supply. Women appear to express more neutral (13.9%) or opposing (42.4%) beliefs towards technology's ability to increase water supply than men (7.9% neutral and 30.2% disagree).

When asked about issues pertaining to water rights, slightly more men (60.9%) than women (59.5%) think that rain water is owned by the individual who captures it. Moreover, a significantly higher percentage of men (15.6) than women (6.5%) think that rain water belong to the state, while more women (34.0%) than men (23.5%) believe that rain water belongs to the watershed it falls into (Table 3).

**Table 3: Chi Square—Observed Values and Percentages Gender by Ownership of Rain Water**

| <b>Rainwater is owned by:</b>                | <b>Gender</b>  |                |                |
|--|----------------|----------------|----------------|
|  | <b>Male</b>    | <b>Female</b>  | <b>Total</b>   |
| <b>The individual who captures it</b>        | 179<br>(60.9%) | 128<br>(59.5%) | 307<br>(60.3%) |
| <b>The watershed into which it falls</b>     | 69<br>(23.5%)  | 73<br>(34.0%)  | 142<br>(27.9%) |
| <b>The state, which manages public goods</b> | 46<br>(15.6%)  | 14<br>(6.5%)   | 60<br>(11.8%)  |
| <b>Total</b>                                 | 294<br>(100%)  | 215<br>(100%)  | 509<br>(100%)  |

Pearson Chi Squared = 13.721\*\*\*

Df = 2 \*\*\* p ≤ 0.001

A significantly higher percentage of women (63.6%) than men (47.2%) sampled hold the belief that environmentalists understand the rights and challenges of Texas farmers and ranchers (Table 4).

Table 4: Perceptions of Environmentalists

| <b>Do environmentalists understand the rights and challenges of Texas farmers and ranchers?</b> | <b>Male</b>    | <b>Female</b>  |
|---|----------------|----------------|
| <b>Yes</b>  | 120<br>(47.2%) | 110<br>(63.6%) |
| <b>No</b>   | 134<br>(52.8%) | 63<br>(36.4%)  |

### ***Age and Income***

The average age of participants was reportedly “middle-aged” (between 46 yrs. and 65 yrs. old) and nearly 90% of individuals sampled were Caucasian. Average annual income of an individual in this study was \$80,000. Although this survey did not capture a wide range of diversity, it is useful in demonstrating some of the differing opinions regarding water.

It is important to recognize that 40% of individuals who contributed to this study reported being involved in the water planning process and 49.7% were not. Interestingly, those who reported having participated in the planning process have been found, in general, to be higher paid than those who did not participate in the process. Individuals with a higher annual income affirm that they do not feel as though environmentalists understand the rights and challenges of farmers. More than half (53.5%) of participants believe that rainwater is owned by the individual who captures it. Out of the nearly 25% of people who believe that rainfall belongs to the watershed in which it falls and the 10.5% who think that rainfall belongs to the state, those receiving higher pay appeared more inclined to identify the state as the owner. Those on the lower end of the income spectrum generally identified the watershed as the owner. The group of individuals making less money also typically elected to have watershed groups as decision makers, while those making more tended to select the state as the decision maker for water issues. Those who expressed concern that the current water pricing system was not adequate to cover associated costs (61%) were, in general, on the higher end of the income spectrum. Persons who reported being neutral (6.2%) or disagreed (20%) tended to have a lower annual income.

Younger individuals in this study generally reported living in urban settings, while older participants were in rural areas. Older study participants tended to agree with the idea there is not enough water in Texas, while younger participants appear to be more optimistic. Younger individuals also believe that though there was not enough water currently, better management could result in enough water. Additionally, this group

tends to have less faith in the ability of technology to improve the water situation when compared older individuals. Out of the 32.3% of participants that felt that watershed groups should make decisions for water issues, the majority who responded positively were older. The 31.1%, who identified regional groups as ideal decision makers were on the younger end of the spectrum.

In general, the older study participants were more disposed to be rurally located, have more faith in technology, believe that there is not enough water, and identify watershed groups or the state as an ideal decision maker. Younger participants tended to be more urban and less likely to depend on technological advances for increased water supply. This group was also more likely to identify increased water management as a viable solution.

### **Analysis of the Differing Viewpoints of Urban, Rural, and Suburban Residency**

A majority of people sampled believe that landowners have a right to pump groundwater, regardless of whether the respondent is from a rural (76.5%), urban (55.6%), or suburban area (53.6%). People from urban (32.4%) and suburban areas (35.8%) are more likely than people from rural areas (19.6%) to disagree that pumping rights are inherent in landownership. Those living in rural locations are much more likely (76%) to believe that landowners have a right to pump groundwater.

**Table 4: Chi Square—Observed Values and Percentages of Area of Residence by Views on Landowners’ Pumping Rights**

|   | <b>Area of Residence</b> |                |               |                |
|---|--------------------------|----------------|---------------|----------------|
|   | Urban                    | Rural          | Suburban      | Total          |
| <b><i>Landowners have a right to pump groundwater</i></b> |                          |                |               |                |
| <b>Agree</b>  | 115<br>(55.6%)           | 137<br>(76.5%) | 96<br>(53.6%) | 348<br>(61.6%) |
| <b>Neutral</b>  | 25<br>(12.1%)            | 7<br>(3.9%)    | 19<br>(10.6%) | 51<br>(9.0%)   |
| <b>Disagree</b>   | 67<br>(32.4%)            | 35<br>(19.6%)  | 64<br>(35.8%) | 166<br>(29.4%) |
| <b>Total</b>  | 207<br>(100%)            | 179<br>(100%)  | 179<br>(100%) | 565<br>(100%)  |

Pearson Chi Squared = 23.369 \*\*\*  
 Df = 4 \*\*\* p ≤ 0.001

People from urban areas (49.8%) appear to have a stronger tendency to believe that water decisions should be made by local or regional groups than do people from suburban (38.6%) or rural (32.7%) areas. While there is moderate support for

watershed groups as decision-makers from participants across urban (37.9%), rural (37.4%), and suburban (41.1%) areas, participants from suburban and rural areas gave stronger support for watershed organizations as a decision-maker water issues. These individuals expressed a marginally lower percentage of support for local or regional organizations as decision-makers. Participants in rural areas (20.4%) reportedly show more support for landowners as decision-makers than did participants from urban (8.6%) or suburban areas (7.6%). Support for one single state group as a decision-maker received the lowest response rate from participants in rural areas (9.5%) (Table 4).

**Table: 4 Chi Square—Observed Values and Percentages of Area of Residence by Who Should Make Decisions about Water**

| <i><b>Water decisions should be made by</b></i> | <b>Area of Residence</b> |               |               |                |
|---|--------------------------|---------------|---------------|----------------|
|   | Urban                    | Rural         | Suburban      | Total          |
| <b>Landowners / individuals</b>                 | 15<br>(8.6%)             | 30<br>(20.4%) | 12<br>(7.6%)  | 57<br>(11.9%)  |
| <b>Local / regional organizations</b>           | 71<br>(40.8%)            | 48<br>(32.7%) | 61<br>(38.6%) | 180<br>(37.6%) |
| <b>Watershed groups</b>                         | 66<br>(37.9%)            | 55<br>(37.4%) | 65<br>(41.1%) | 186<br>(38.8%) |
| <b>One single state group</b>                   | 22<br>(12.6%)            | 14<br>(9.5%)  | 20<br>(12.7%) | 56<br>(11.7%)  |
| <b>Total</b>                                    | 174<br>(100%)            | 147<br>(100%) | 158<br>(100%) | 479<br>(100%)  |

Pearson Chi Squared = 15.632\*  
Df = 6 \* p ≤ 0.05

Those in urban areas reportedly believe that environmentalists understand the rights and challenges of Texas farmers and ranchers more than any other group (61.0%). Suburban participants expressed the second highest percentage of agreement (52.6 %). Participants in rural areas have a slightly higher level disagreement with the notion that environmentalists are in touch with the needs of farmers (53.6%) than agreement (46.4%). These results may not be surprising, but they are useful for demonstrating widely held opinions regarding how individuals perceive water rights and challenges based on residency (Table 5).

**Table 5: Chi Square—Observed Values and Percentages of Area of Residence by Attitude towards Environmentalists**

| Environmentalists understand the rights and challenges of Texas farmers and ranchers | Area of Residence |               |               |                |
|--|-------------------|---------------|---------------|----------------|
|  | Urban             | Rural         | Suburban      | Total          |
| <b>Yes</b>   | 96<br>(61.9%)     | 65<br>(46.4%) | 72<br>(52.6%) | 233<br>(53.9%) |
| <b>No</b>  | 59<br>(38.1%)     | 75<br>(53.6%) | 65<br>(47.4%) | 199<br>(46.1%) |
| <b>Total</b>   | 155<br>(100%)     | 140<br>(100%) | 137<br>(100%) | 432<br>(100%)  |

Pearson Chi Squared = 7.273 \*  
Df = 2 \* p ≤ 0.05

The majority of participants in urban (55.8%), rural (69.1%), and suburban (56.2%) areas believe that rainwater is owned by the individual who captures it. Participants from rural areas (6.2%) are the least likely to think that rainwater is owned by the state (Table 6).

**Table 6: Perceptions of Rainwater Ownership**

| Who owns rainwater                           | Urban          | Rural          | Suburban      |
|--|----------------|----------------|---------------|
| <b>The individual who captures it</b>        | 106<br>(55.8%) | 112<br>(69.1%) | 91<br>(56.2%) |
| <b>The watershed it falls into</b>           | 53<br>(27.9%)  | 40<br>(24.7%)  | 51<br>(31.5%) |
| <b>The state, which manages public goods</b> | 31<br>(16.3%)  | 10<br>(6.2%)   | 20<br>(12.3%) |

Participants in urban (68.4%) and suburban (66.7%) areas expressed the strongest belief that water rights should be suspended during droughts (Table 7). Individuals in rural areas reported a greater level support for suspending water rights (53.3%) than for honoring water rights (41.3%). The mixed response is indicative of a general divide in opinion in rural communities.

**Table 7: Opinions of Water Right Privileges during Drought**

| <b>During droughts, water rights should be</b> | <b>Urban</b>   | <b>Rural</b>  | <b>Suburban</b> |
|--|----------------|---------------|-----------------|
| <b>Suspended</b>                               | 121<br>(68.4%) | 80<br>(53.3%) | 102<br>(66.7%)  |
| <b>Revoked</b>                                 | 7<br>(4.0%)    | 8<br>(5.3%)   | 2<br>(1.3%)     |
| <b>Honored</b>                                 | 49<br>(27.7%)  | 62<br>(41.3%) | 49<br>(32.0%)   |

Most participants in urban, rural, and suburban locations reported believing that reservoirs will help supply water during droughts (69.3%, 80.1%, and 74.2%, respectively). The greatest numbers of people with this view live in rural areas. Participants in urban areas (21.0%) were the most likely to disagree that reservoirs will help supply water during droughts.

**Table 6: Chi Square—Observed Values and Percentages of Area of Residence by Reservoir’s Ability to Supply Water in Drought**

|   | <b>Area of Residence</b> |                |                |                |
|---|--------------------------|----------------|----------------|----------------|
|   | Urban                    | Rural          | Suburban       | Total          |
| <b><i>Reservoirs will help supply water during droughts</i></b> |                          |                |                |                |
| <b>Agree</b>  | 142<br>(69.3%)           | 141<br>(80.1%) | 132<br>(74.2%) | 415<br>(74.2%) |
| <b>Neutral</b>  | 20<br>(9.8%)             | 4<br>(2.3%)    | 13<br>(7.3%)   | 37<br>(6.6%)   |
| <b>Disagree</b>   | 43<br>(21.0%)            | 31<br>(17.6%)  | 33<br>(18.5%)  | 107<br>(19.1%) |
| <b>Total</b>  | 205<br>(100%)            | 176<br>(100%)  | 178<br>(100%)  | 559<br>(100%)  |

Pearson Chi Squared = 10.306\*

Df = 4 \* p ≤ 0.05

### **Concluding Remarks**

While this survey is not intended to represent the views of all Texans, results gathered may indicate important subject areas that should be addressed in future studies. Taking into account that all participants in this survey are on the e-mailing list of Meadows Center for Water and the Environment, it is safe to assume that the sample population contributing data to this study is at least somewhat familiar with the issues of water rights and water policy in Texas. There are notable differences in opinion, primarily in the areas of gender and rural versus urban perceptions. The results from this survey provide insight into the current public perceptions of water policy in Texas.

These results will serve as a solid foundation for future survey study design. Potential future analysis should consider the connection between attitude and water based on the following variables:

- Arid, semi-Arid, water-rich climate
- Rural, suburban, urban
- Employment sector (Agricultural, Industrial, etc.)
- Traditional vs. alternative water rights and water polices

The majority of participants in this preliminary study stated that water was important to their livelihoods and conservation was vital to future water management. When questioned on potential policy options for groundwater and surface water, the majority of participants believe that those resources should be managed as one. Generally, contributors to this study appear to believe that the current water management system in Texas is satisfactory in most ways but needs work in specific areas. Given this result, the fact that the majority of participants believe that the Texas Legislature needs to review and reform water policy is unsurprising.

## Appendix A: Answers and Descriptive Statistics

| Question   | Number | Percent |
|--|--------|---------|
| <b>Age in years</b>                                  | 576    | 99.5    |
| 18-25  | 7      | 1.2     |
| 26-35  | 57     | 9.8     |
| 36-45  | 72     | 12.4    |
| 46-55  | 139    | 24.0    |
| 56-65  | 184    | 31.8    |
| 66-75  | 100    | 17.3    |
| 75 or older  | 17     | 2.9     |
| <b>Gender</b>  | 571    | 98.6    |
| Male   | 323    | 55.8    |
| Female   | 248    | 42.8    |
| <b>Race</b>  | 509    | 87.9    |
| White  | 509    | 87.9    |
| Non-white  | 55     | 9.5     |
| <b>Income</b>  | 537    | 92.7    |
| Under \$23,000                                       | 14     | 2.4     |
| \$23,001 - \$40,000                                  | 33     | 5.7     |
| \$40,001 - \$60,000                                  | 86     | 14.9    |
| \$60,001 - \$80,000                                  | 81     | 14.0    |
| \$80,001 - \$100,000                                 | 97     | 16.8    |
| \$100,001 - \$125,000                                | 80     | 13.8    |
| \$125,001 - \$150,000                                | 56     | 9.7     |
| \$150,001 - \$200,000                                | 46     | 7.9     |
| \$200,001 or over                                    | 44     | 7.6     |
| <b>I primarily reside in an</b>                      | 576    | 99.5    |
| Urban area   | 212    | 36.6    |
| Rural area   | 181    | 31.3    |
| Suburban area  | 183    | 31.6    |
| <b>I primarily reside in</b>                         | 570    | 98.4    |
| An arid climate                                      | 188    | 32.5    |
| A water-rich climate                                 | 71     | 12.3    |
| A mixed climate                                      | 311    | 53.7    |
| <b>Does Texas have enough water?</b>                 | 437    | 75.5    |
| Yes  | 106    | 18.3    |
| Yes, but not enough for the future                   | 0      | 0       |
| No, but better water management would make it enough | 138    | 23.8    |

|   |     |      |
|---|-----|------|
| No  | 193 | 33.3 |
| <b>Decisions about water are best made by</b>   | 480 | 82.9 |
| Landowners or other invested individuals  | 57  | 9.8  |
| Local or regional organizations   | 180 | 31.1 |
| Watershed groups  | 187 | 32.3 |
| One single state group  | 56  | 9.7  |
| <b>I have participated in the statewide water planning process</b>                              | 525 | 90.7 |
| Agree   | 237 | 40.9 |
| Disagree  | 288 | 49.7 |
| <b>The statewide water plan uses an appropriate mix of restrictions and incentives.</b>         | 441 | 76.2 |
| Agree   | 150 | 25.9 |
| Neutral   | 63  | 10.9 |
| Disagree  | 228 | 39.4 |
| <b>Do environmentalists understand the rights and challenges of Texas farmers and ranchers?</b> | 432 | 74.6 |
| Yes   | 233 | 40.2 |
| No  | 199 | 34.4 |
| <b>Management of groundwater and surface water should be</b>                                    | 560 | 96.7 |
| Independent   | 73  | 12.6 |
| United  | 345 | 59.6 |
| Combined on a case-by-case basis  | 139 | 24.0 |
| Not managed   | 3   | 0.5  |
| <b>Having enough water is important to my livelihood</b>  | 574 | 98.4 |
| Agree   | 501 | 86.5 |
| Neutral   | 41  | 7.1  |
| Disagree  | 32  | 5.5  |
| <b>Technology will increase the water supply in the future</b>                                  | 554 | 95.7 |
| Agree   | 299 | 51.6 |
| Neutral   | 58  | 10.0 |
| Disagree  | 197 | 34.0 |
| <b>Conservation is a key part of protecting our</b>   | 573 | 99.0 |

|   |            |             |
|---|------------|-------------|
| <b>water supply</b>   |            |             |
| Agree   | 567        | 97.9        |
| Neutral   | 1          | 0.2         |
| Disagree  | 5          | 0.9         |
| <b>Rainwater is owned by</b>  | <b>515</b> | <b>88.9</b> |
| The individual who captures it  | 310        | 53.5        |
| The watershed into which it falls   | 144        | 24.9        |
| The state, which manages public goods   | 61         | 10.5        |
| <b>The price of water adequately covers the costs associated</b>                              | <b>505</b> | <b>87.2</b> |
| Agree   | 116        | 20.0        |
| Neutral   | 36         | 6.2         |
| Disagree  | 353        | 61.0        |
| <b>The government should use incentives to encourage private landowners to conserve water</b> | <b>563</b> | <b>97.2</b> |
| Agree   | 468        | 80.8        |
| Neutral   | 47         | 8.1         |
| Disagree  | 48         | 8.3         |
| <b>Desalination is</b>  | <b>470</b> | <b>81.2</b> |
| An effective way to increase the water supply   | 260        | 44.9        |
| Not an effective way to increase the water supply   | 210        | 36.3        |
| <b>Landowners should have a right to pump groundwater</b>                                     | <b>566</b> | <b>97.8</b> |
| Agree   | 348        | 60.1        |
| Neutral   | 51         | 8.8         |
| Disagree  | 167        | 28.8        |
| <b>Reservoirs will help supply water during droughts</b>                                      | <b>560</b> | <b>96.7</b> |
| Agree   | 416        | 71.8        |
| Neutral   | 37         | 6.4         |
| Disagree  | 107        | 18.5        |
| <b>Does Texas manage its water effectively?</b>   | <b>545</b> | <b>94.1</b> |
| Yes   | 13         | 2.2         |
| Yes in some ways, but no in others  | 327        | 56.5        |
| No  | 205        | 35.4        |
| <b>Should the Texas Legislature review water policy?</b>                                      | <b>522</b> | <b>90.2</b> |
| Yes   | 462        | 79.8        |

|  |            |             |
|--|------------|-------------|
| No   | 60         | 10.4        |
| <b>In times of drought, water rights should be</b> | <b>480</b> | <b>82.9</b> |
| Suspended  | 303        | 52.3        |
| Revoked  | 17         | 2.9         |
| Honored  | 160        | 27.6        |