Appendix A.
Statistical Methodology

THE SURVEY POPULATION

Sample Design

The target population for the 2013 Farm and Ranch Irrigation Survey (FRIS) was composed of all farms irrigating in the reference year 2013. From the 2012 Census of Agriculture, 197,456 records were identified for the U.S. level FRIS population on the basis of having irrigation activity on their farm or ranch. This excluded 1,283 institutional, research, or experimental farms from the total number of irrigators that reported in the 2012 census.

The FRIS sample was a State level sample and drawn for all 50 States. This sample design targeted a U.S. level sample size of 35,000. A certainty stratum, with farms selected with probability one, was included in each State to ensure that the major irrigators in each State were sampled. The remaining strata were sampled systematically by acreage. The stratification boundaries varied among the States and were dependent on the distribution of total acres irrigated within the State. The stratified design ensured that the sample was reflective of the FRIS population and achieved the appropriate coefficients of variation (CV) levels at both the U.S. and State levels.

The final national sample size was 34,966 farms; 2,095 of these farms were selected from the certainty strata and the remaining 32,871 farms were systematically selected from the noncertainty strata. Table A provides the State sample counts for FRIS, including acres associated with those counts, final reports processed and tabulated both unexpanded and expanded, and 2012 census counts.

DATA COLLECTION

Method of Enumeration

The 2013 Farm and Ranch Irrigation Survey was conducted primarily by mail. Data were also collected by Electronic Data Reporting (EDR) via the Internet, telephone enumeration, and personal enumeration. Enumeration methods used in the 2013 survey were similar to those used in the 2008 survey.

Report Form

A single 20-page report form was created to consolidate what was collected on two report forms in the 2008 FRIS (the 2008 FRIS and the 2008 Horticultural Irrigation Survey). This combined report form was used to collect irrigation data from farm and ranch operators and horticultural producers. The report form was mailed to all the producers in the FRIS sample that reported irrigation in the 2012 Census of Agriculture. See Appendix B for a copy of the report and instruction booklet and also for information regarding changes between the 2008 and 2013 forms.

Report Form Mailings and Respondent Follow-up

The initial mailout took place in January 2014. Mail packets were mailed to approximately 31,300 farm and ranch operations, including horticultural operations. The initial mail packets included a labeled report form, an instruction booklet, a letter requesting a prompt response, and a return envelope. Mailout packet preparation, initial mailout, and one follow-up mailing to nonrespondents were handled by the U.S. Census Bureau's National Processing

Center (NPC) in Jeffersonville, IN. Telephone follow-up from a NASS Data Collection Center began April 2014 to nonrespondents who were mailed a report form from NPC.

Data were collected for a select group of operations by the NASS field offices. To minimize the number of agency contacts, operations were included in this group if they were scheduled for contact by NASS for other agricultural surveys. Report forms were labeled at NPC and sent to the field offices in December 2013. Field office staff collected data by personal enumeration or by phone from January 2014 through May 2014. For a description of the adjustment for nonresponse, see Estimation.

REPORT FORM PROCESSING

Data Capture

All report forms returned to NPC were immediately checked in, using bar codes printed on the mailing label, and this check-in process removed them from follow-up mailings. All forms were reviewed prior to data keying to identify inconsistencies and ensure that the data could be keyed. Major inconsistencies, respondent remarks, blank report forms, and large irrigation cases were reviewed by analysts and adjusted prior to data keying as needed. All forms with any data were scanned and an image was created for each page of a report form.

Data Editing and Analysis

Data from each report form were processed through a computer edit which flagged inconsistent entries. Each flagged entry was reviewed by staff. In some cases, respondents may have failed to provide all of the information requested, only indicating the presence of an item but not the amount. For those data that would not be machine imputed they were estimated by the analyst based on other responses in the geographic area and by similarly sized farms. After the initial edit, an imputation program supplied missing data and made adjustments based on responses of similarly sized farms within the same geographic area. Data entries of large magnitude and data items that were changed significantly in the computer edit process were reviewed and verified by analysts.

Prior to publication, tabulated totals were reviewed to identify and resolve remaining inconsistencies and potential coverage problems. Comparisons were made with 2012 census data, 2008 Farm and Ranch Irrigation Survey data, and other available check data. The data were processed through a disclosure program to prevent data from being published that could be sourced back to an individual operation.

Imputation

After the initial edit, imputations were made for missing data on quantity of water applied, well and pump characteristics, energy cost of well pumps, individual crop yields and quantity of water used, horticulture water sources, maintenance and repair costs, and expenditures listed in report form section 15.

ESTIMATION

Data were summarized for the Nation as a whole, for each of the 50 States, and for the geographic domains known as Water Resources Regions (WRR) (see Appendix B for detailed description). The estimation methodology consisted of two weighting components that made up the total FRIS weight. The first component was the fully adjusted weight pulled in from the 2012 Census of Agriculture. This weight accounted for any list incompleteness and undercoverage from the 2012 census. The second component was the sampling rate used for the FRIS. This expansion factor was the inverse of the selection probability for the sample farms in a stratum. This expansion factor was reweighted at the stratum level to account for whole-farm nonresponse. The nonresponse adjustment factor used to reweight the expansion factor was the ratio of the number of sample farms in a stratum to the number of sample farms that responded to the survey in that stratum. The assumption underlying this weighting approach to survey nonresponse was that survey respondents and nonrespondents within a stratum constitute a homogeneous population, thus allowing respondents to represent nonrespondents. An expanded data value for a sample record was obtained by multiplying the data value by the total FRIS weight. State totals for a characteristic were estimated by summing the expanded data values from all responding sample records across all strata within the State. National estimates were obtained by

summing across all States. The WRR estimates were obtained by summing the expanded data values for the portion of the sample falling into the WRR.

RESPONDENT CONFIDENTIALITY

In keeping with the provisions of Title 7 of the United States Code, no data are published that would disclose information about the operations of an individual farm or ranch. All tabulated data are subjected to an extensive disclosure review prior to publication. Any tabulated item that identifies data reported by a respondent or allows a respondent's data to be accurately estimated or derived, was suppressed and coded with a 'D'. However, the number of farms reporting an item is not considered confidential information and is provided even though other information is withheld.

DATA COMPARABILITY

The 2013 Farm and Ranch Irrigation Survey data were weighted for incompleteness of the mail list. For Tables 7 through 18, 22, and 24 through 26, the State level FRIS data are not comparable between the 2013 and 2008 surveys. In the 2013 survey, the data included operations that reported horticultural sales during the previous census year. In 2008, data for operations with horticultural sales were included in Chapter 2, Horticultural Operations Data tables. To provide a measure of comparability, where possible, the published 2008 U.S. level data were adjusted to include the horticulture operations' data.

Differences exist between the expanded results of the 2013 Farm and Ranch Irrigation Survey and published data from the 2012 Census of Agriculture. Some of these are as follows:

1. The survey includes data only for operations that irrigated in both 2012 and 2013. Operations in some areas, especially the eastern States, irrigate intermittently according to moisture needs. Operations with irrigation capabilities may not irrigate depending on the amount of rainfall for a particular year or geographic area. The number of operations that irrigated in 2012 but discontinued irrigation in 2013 is tabulated in Table 27 for all farms and in Table 44 for horticultural operations by reason of discontinuance.

2. Some operators reported that they had been misclassified as irrigators and did not irrigate in either 2012 or 2013. An estimated 9,522 operations with 743,333 acres irrigated were misclassified as irrigated in the 2012 Census of Agriculture. In addition to errors in processing census data, some operators misreported or misinterpreted the questions. Most of the operators misreporting irrigation in the 2012 census reported irrigation of small acreages of vegetables, fruits and nuts, tobacco, field crops, or berries.

3. Some respondents indicated they had retired, moved, sold or rented the land, etc., since 2012. After analytical review of the 2013 receipts, an estimated 17,022 operations accounting for 2,107,745 acres irrigated in 2012, after expansion, were dropped from processing because they were no longer farming. Special care was taken with large operations to ensure that they were not erroneously dropped due to reorganization or name change rather than discontinuing agricultural operations.

4. New irrigators in 2013 (not included in the 2012 census) did not have a chance of being selected in the sample and, therefore, were excluded from the survey. It is believed that the impact of new irrigators is probably minimal. This conclusion is supported by comparisons between the 2007 and 2012 Census of Agriculture irrigation data which show little change in irrigated acres.

Table B shows acres irrigated in the 2013 FRIS (expanded) compared with U.S. totals from the 2012 Census of Agriculture. The expanded survey accounts for 99.1 percent of all land reported as irrigated in the 2012 census and all irrigation characteristics associated with that land.

MEASURES OF SURVEY QUALITY

The statistics in this report are estimates derived from a sample survey. There are two types of errors possible in an estimate-based sample survey: sampling and nonsampling. Sampling error is the error caused by observing only a sample instead of the entire population. The sampling error is subject

to sample-to-sample variation. Nonsampling errors include all other errors and can arise from many different sources. These sources may include respondent or enumerator error or incorrect data keying, editing, or imputing for missing data. Nonsampling error due to mail list incompleteness and duplication, as well as misclassification of records on the mail list, is referred to as coverage error.

Undercoverage existed in the frame population to the extent that there were farms that either erroneously reported not irrigating in the 2012 census, started irrigating in 2013, or had succeeding irrigators in 2013 (i.e., an operator who, since 2012, took over control of an irrigating farm through sales, rental, or other arrangements). Overcoverage existed in the frame because some operations were misclassified as irrigated and did not irrigate in 2012 or had either stopped farming or irrigating in 2013. Farms in these groups that were selected into the sample were identified during the survey and estimates of their number and acres irrigated are provided above under Data Comparability, items 2 and 3.

Survey Response Rate

The reponse rate is one indicator of the quality of a data collection. It is generally assumed that if a response rate is close to a full participation level of 100 percent, the potential for nonresponse bias is small, although this has been questioned recently in the literature. Because the FRIS contains both farm and nonfarm records, the response rate is an indicator of replying to the FRIS data collection effort, but does not reflect whether those responding met the farm definition or had the items of interest for the survey. The response rate for the 2013 Farm and Ranch Irrigation Survey is 77.8 percent. This compares to 79.4 percent for the 2008 Farm and Ranch Irrigation Survey.

MEASURES OF PRECISION

The survey sample was one of a large number of possible samples of the same size that could have been selected using the same sample design. Survey estimates derived from the different samples will differ from each other.

The relative standard error is used as an indicator of the precision in the survey estimates and is reported for major survey items in Table C and Table D. The relative standard error expresses the standard error of an estimate as a percent of the estimated value. The standard error of a survey estimate is a measure of the variation among the estimates from all possible samples. It is a measure of the precision with which an estimate from a particular sample approximates the average result of all possible samples.

The relative standard errors given in Table C and Table D can be used to construct confidence intervals for the major survey items. Confidence intervals are another way to express the precision of an estimate by calculating the upper and lower bounds for a level of confidence. This confidence interval is designed to contain the true value being estimated. If all possible samples were selected, each of the samples were surveyed under essentially the same conditions, and an estimate and its standard error were calculated from each sample, then:

1. Approximately 67 percent of the intervals from one standard error below the estimate to one standard error above the estimate would include the average value of all possible samples.

2. Approximately 90 percent of the intervals from 1.65 standard errors below the estimate to 1.65 standard errors above the estimate would include the average value of all possible samples.

The computations necessary to construct the confidence intervals associated with these statements are illustrated in the following example: Assume that the estimated number of irrigated acres of a certain item is 669,813 and the relative standard error of the estimate is 1.6 percent (0.016). Multiplying 669,813 by 0.016 yields 10,717, the standard error. Therefore, a 67-percent confidence interval is 659,096 to 680,530 (i.e., 669,813 + 10,717). If corresponding confidence intervals were constructed for all possible samples of the same size and design, approximately 2 out of 3 (67 percent) of these intervals would contain the figure obtained from a complete enumeration. Similarly, a 90-percent confidence interval is 652,130 to 687,496 (i.e., 669,813 + 1.65 x 10,717).

Table A. **Irrigated Farms: 2013 Farm and Ranch Irrigation Survey and the 2012 Census of Agriculture**

Geographic area	2013 FRIS						2012 Census			
	Sample Count		Final reports processed and tabulated				Published totals		Sample universe[1]	
			Unexpanded		Expanded					
	Farms	2012 census irrigated acres	Farms	Acres irrigated	Farms	Acres irrigated	Farms	Acres irrigated	Farms	Acres irrigated
United States	34,966	23,279,303	20,109	16,602,965	229,237	55,319,417	296,303	55,822,231	197,456	45,314,109
Alabama	631	92,690	289	65,293	1,022	101,178	1,747	113,008	1,186	98,800
Alaska	83	1,737	53	848	181	1,071	230	2,451	207	1,923
Arizona	562	640,052	331	463,674	4,380	851,861	5,839	880,613	2,738	741,334
Arkansas	1,132	2,093,699	616	1,307,761	4,212	4,950,053	5,084	4,803,902	3,644	3,822,451
California	2,078	2,623,173	1,200	1,755,610	44,347	7,549,161	53,546	7,861,964	33,699	6,363,276
Colorado	786	657,533	476	411,546	12,501	2,309,543	15,547	2,516,785	10,796	2,062,732
Connecticut	211	6,222	113	2,728	715	5,371	1,011	9,272	623	8,093
Delaware	265	108,036	149	74,381	396	114,769	533	127,272	399	113,595
Florida	1,614	1,135,530	908	862,513	8,120	1,364,559	11,744	1,493,320	7,330	1,365,246
Georgia	1,075	670,338	549	417,044	3,545	1,196,947	5,230	1,125,355	3,404	845,439
Hawaii	567	73,816	378	63,089	1,919	76,459	2,498	81,813	1,538	76,718
Idaho	905	1,393,829	613	1,131,021	14,092	3,511,839	15,732	3,365,292	9,642	2,790,395
Illinois	913	393,622	598	325,276	1,807	541,818	2,644	522,479	2,028	454,642
Indiana	886	329,664	558	259,003	1,893	454,712	2,598	437,445	1,975	380,709
Iowa	621	137,112	379	117,287	1,090	175,847	1,525	171,656	1,173	144,174
Kansas	613	804,906	350	556,470	5,243	2,851,317	6,205	2,881,292	4,418	2,132,967
Kentucky	720	64,223	250	32,867	1,212	51,126	2,910	73,573	2,164	74,726
Louisiana	897	696,929	499	506,326	2,130	1,096,381	3,015	1,092,881	2,043	862,431
Maine	231	27,422	128	17,037	946	20,817	1,365	30,887	731	28,934
Maryland	453	86,943	284	64,660	890	100,909	1,220	104,910	994	95,596
Massachusetts	293	12,780	177	9,150	1,398	27,230	1,746	23,433	1,193	20,997
Michigan	1,103	448,326	683	314,086	3,662	587,850	5,025	592,243	3,810	541,554
Minnesota	873	379,177	522	279,555	2,162	516,724	2,853	524,016	2,119	441,498
Mississippi	893	1,340,288	544	998,855	1,843	1,701,587	2,454	1,651,978	1,700	1,430,105
Missouri	1,037	896,022	598	648,959	2,569	1,235,334	3,727	1,180,886	2,827	1,078,287
Montana	753	600,884	483	446,613	7,384	1,872,389	9,451	1,903,019	6,700	1,447,369
Nebraska	696	1,146,305	439	835,813	15,747	8,297,560	17,136	8,296,573	12,380	6,725,075
Nevada	385	418,686	244	253,684	2,149	689,953	2,512	687,790	1,274	502,061
New Hampshire	183	1,463	91	1,001	528	4,020	686	2,630	387	1,934
New Jersey	568	71,681	336	50,036	1,255	80,777	1,769	88,376	1,527	83,748
New Mexico	597	354,404	363	283,965	8,733	694,632	11,430	680,318	5,934	516,728
New York	669	33,265	341	19,298	1,936	48,705	3,404	59,807	2,321	49,903
North Carolina	674	88,929	368	50,484	2,710	136,721	4,699	174,526	3,102	149,513
North Dakota	367	164,816	160	106,101	533	213,728	744	218,407	571	179,750
Ohio	697	36,811	345	21,898	1,453	41,776	2,462	46,569	2,020	43,199
Oklahoma	614	333,478	314	200,228	1,672	426,602	2,500	479,750	1,765	382,765
Oregon	1,298	770,075	818	553,117	12,299	1,554,173	14,975	1,629,735	10,891	1,393,719
Pennsylvania	865	21,239	478	9,410	3,126	24,027	4,539	38,990	2,988	31,445
Rhode Island	78	2,453	45	998	294	3,042	325	3,954	179	2,879
South Carolina	442	131,221	212	78,516	1,046	133,927	1,973	159,239	1,279	139,251
South Dakota	403	207,198	266	159,737	1,274	369,864	1,656	378,678	1,179	303,802
Tennessee	814	136,512	367	108,951	1,108	146,932	2,146	146,442	1,775	144,116
Texas	1,415	1,510,019	742	1,013,921	13,259	4,491,987	18,169	4,489,163	12,021	3,521,975
Utah	674	330,664	469	272,193	10,357	1,125,106	12,296	1,104,257	7,677	775,676
Vermont	185	1,408	97	612	567	2,324	766	3,565	409	2,293
Virginia	439	46,595	212	26,064	1,342	50,100	2,456	68,651	1,613	61,596
Washington	1,146	912,225	662	733,227	10,575	1,623,389	14,736	1,633,571	10,357	1,438,541
West Virginia	138	1,327	71	815	297	1,453	466	2,064	330	1,724
Wisconsin	905	355,130	581	318,830	2,427	473,483	3,240	421,721	2,572	397,307
Wyoming	519	488,446	360	372,414	4,891	1,418,284	5,739	1,435,710	3,824	1,041,118

[1] Excludes institutional, research, and experimental farms.

Table B. **Farms with Irrigation by Acres Irrigated: 2012 Census of Agriculture Compared with 2013 FRIS**

Item		2012 census United States totals	2013 FRIS		Item		2012 census United States totals	2013 FRIS	
			United States total (expanded)	Percent of 2012 census totals				United States total (expanded)	Percent of 2012 census totals
Farms	number	296,303	229,237	77.4	200 to 499 acres	farms	28,120	25,956	92.3
	acres	55,822,231	55,319,417	99.1		acres	8,832,682	8,391,260	95.0
1 to 49 acres	farms	190,068	135,931	71.5	500 to 999 acres	farms	15,322	14,723	96.1
	acres	1,854,674	1,441,866	77.7		acres	10,601,007	10,252,156	96.7
50 to 99 acres	farms	24,302	19,400	79.8	1,000 to 1,999 acres	farms	8,849	8,928	100.9
	acres	1,688,711	1,365,432	80.9		acres	12,042,408	12,133,801	100.8
100 to 199 acres	farms	24,956	19,298	77.3	2,000 acres or more	farms	4,686	5,001	106.7
	acres	3,428,850	2,660,802	77.6		acres	17,373,899	19,074,100	109.8

Table C. **Relative Standard Error (percent) for Selected General Irrigation Data: 2013**

[Excludes institutional, research, and experimental farms and farms with horticulture. For meaning of abbreviations and symbols, see introductory text]

Geographic area	Irrigated farms	Land in farms	Acres irrigated		Acre-feet applied	Energy expense for pumps	Expenditure expenses	Pumps, all types	Well pumps
			Total	Cropland harvested					
United States	1.0	4.5	1.3	1.3	1.7	2.0	3.6	1.5	1.8
Alabama	3.6	6.8	6.2	6.2	6.7	12.6	9.3	6.0	8.7
Alaska	6.2	17.3	6.8	6.9	7.5	15.1	27.5	14.2	(D)
Arizona	6.7	33.4	4.5	4.7	4.7	9.0	20.1	8.9	9.6
Arkansas	4.2	6.3	6.4	6.4	6.7	7.1	10.1	6.3	6.4
California	3.6	12.7	4.5	4.4	5.0	5.8	11.5	5.4	6.1
Colorado	4.5	11.2	4.6	4.7	5.8	8.3	23.5	7.6	8.7
Connecticut	5.6	20.8	9.5	9.5	15.1	23.9	24.8	9.1	11.0
Delaware	5.0	6.3	6.4	6.5	7.5	8.1	10.2	5.8	(D)
Florida	3.7	7.8	6.1	5.3	7.3	5.9	18.1	5.1	5.7
Georgia	4.5	9.2	5.8	5.7	6.3	7.2	12.6	5.3	5.7
Hawaii	2.6	10.9	6.6	(D)	6.2	6.5	22.0	11.1	18.7
Idaho	3.5	7.9	4.6	4.8	4.8	6.5	13.2	5.9	8.5
Illinois	3.7	6.0	6.0	6.0	7.2	5.9	19.3	5.1	5.4
Indiana	3.5	4.9	4.3	4.3	4.9	5.2	9.1	4.1	4.4
Iowa	3.6	6.2	4.9	4.9	5.7	5.8	9.8	4.8	5.1
Kansas	3.8	7.6	4.5	4.5	4.9	6.6	14.2	4.7	4.9
Kentucky	4.6	9.8	8.6	8.6	9.4	11.9	20.0	7.6	10.3
Louisiana	3.9	4.9	4.5	4.5	5.3	5.8	28.7	4.5	5.0
Maine	6.5	12.3	16.9	(D)	14.3	19.0	19.1	8.3	10.3
Maryland	4.8	4.9	4.5	4.5	5.6	9.6	9.1	4.9	(D)
Massachusetts	7.4	9.2	12.5	12.5	7.9	14.1	32.2	8.6	16.0
Michigan	3.9	4.3	4.0	4.0	4.7	5.0	10.2	7.2	9.0
Minnesota	4.1	6.9	6.3	6.3	5.9	5.8	11.1	5.7	5.9
Mississippi	5.2	5.9	5.1	5.1	5.2	5.9	8.3	4.9	4.9
Missouri	4.8	4.8	5.7	5.7	8.3	5.3	9.7	4.9	5.2
Montana	4.2	9.6	5.3	5.4	6.1	8.1	19.0	8.7	22.9
Nebraska	3.4	9.8	4.5	4.5	5.0	5.5	10.6	4.8	4.9
Nevada	5.1	12.1	7.3	7.3	7.7	10.1	15.0	9.5	9.7
New Hampshire	4.4	18.0	41.6	(D)	30.2	27.5	57.9	11.5	10.4
New Jersey	4.6	6.7	5.4	5.4	5.2	5.2	12.3	5.5	5.1
New Mexico	4.9	19.2	5.6	5.4	5.2	7.4	14.0	6.9	7.6
New York	5.2	12.7	9.9	10.0	12.3	9.0	14.4	7.0	7.9
North Carolina	6.2	10.1	8.3	8.3	9.4	12.7	16.4	7.6	11.9
North Dakota	6.2	9.6	6.0	6.0	6.4	8.6	14.5	7.2	(D)
Ohio	4.4	7.4	11.9	11.9	11.6	12.3	14.6	5.4	7.0
Oklahoma	6.4	11.2	7.1	7.2	7.0	8.3	11.1	7.1	7.5
Oregon	3.2	12.2	4.1	4.5	5.0	6.6	15.1	8.2	8.1
Pennsylvania	4.5	17.4	6.4	6.4	7.5	8.7	16.8	5.3	6.1
Rhode Island	6.5	10.1	15.1	15.5	18.3	29.9	32.7	12.1	16.0
South Carolina	9.0	7.5	7.3	7.4	8.6	7.5	40.5	8.5	10.5
South Dakota	5.4	10.5	5.3	5.3	6.2	8.5	14.4	6.0	6.8
Tennessee	4.1	6.1	4.8	(D)	4.8	9.1	8.6	6.1	5.3
Texas	4.8	25.2	5.0	5.1	5.4	5.8	10.9	5.8	5.9
Utah	3.3	10.1	4.3	4.5	5.1	9.1	15.5	7.9	11.1
Vermont	4.5	13.0	21.3	16.8	13.5	34.6	32.0	10.5	14.3
Virginia	7.0	8.7	8.3	(D)	11.6	9.4	29.5	8.3	10.3
Washington	5.4	14.9	4.7	4.8	4.7	5.6	8.9	5.6	10.0
West Virginia	6.2	29.7	11.1	11.1	19.2	17.3	33.3	12.5	15.6
Wisconsin	4.0	5.6	5.4	5.4	6.5	6.2	8.2	4.7	4.8
Wyoming	3.2	17.5	4.4	4.8	5.3	9.5	26.5	10.8	16.2
Water Resources Regions									
Region 01 New England	3.1	6.4	8.1	(D)	6.3	10.6	23.1	5.1	6.8
Region 02 Mid-Atlantic	2.5	5.0	2.5	2.5	3.0	3.4	6.0	2.6	2.8
Region 03 South Atlantic-Gulf	2.3	4.7	2.9	2.4	4.2	3.5	12.0	3.0	3.6
Region 04 Great Lakes	2.6	2.9	2.4	2.4	3.0	3.4	8.1	5.0	6.4
Region 05 Ohio	2.7	4.1	3.8	3.8	4.7	5.2	10.2	3.5	3.7
Region 06 Tennessee	8.4	8.4	8.0	(D)	10.2	17.5	12.4	10.2	(D)
Region 07 Upper Mississippi	2.3	2.9	2.1	2.1	2.8	2.3	9.1	2.2	2.2
Region 08 Lower Mississippi	2.2	1.8	1.9	1.9	2.4	2.8	6.6	2.1	2.1
Region 09 Souris-Red-Rainy	9.7	9.0	5.7	5.7	5.6	9.1	17.0	7.6	7.6
Region 10 Missouri	2.6	6.3	2.0	2.1	2.4	3.5	7.5	2.8	3.1
Region 11 Arkansas-White-Red	5.9	7.5	3.5	3.6	4.1	4.6	12.3	4.4	4.2
Region 12 Texas-Gulf	6.2	19.1	4.4	4.5	5.0	6.0	12.8	5.7	5.9
Region 13 Rio Grande	7.2	45.9	8.0	7.5	8.2	9.2	15.7	8.7	9.3
Region 14 Upper Colorado	7.8	11.0	6.0	6.2	7.3	13.8	21.0	16.9	(D)
Region 15 Lower Colorado	8.0	30.8	3.3	3.4	3.8	8.1	19.8	8.9	9.6
Region 16 Great Basin	6.0	7.0	3.9	4.0	3.8	6.1	10.8	6.7	7.1
Region 17 Pacific Northwest	2.5	6.8	1.7	1.7	2.0	2.9	7.3	3.7	5.0
Region 18 California	3.3	12.3	2.5	2.4	3.2	4.2	11.1	4.9	5.8
Region 19 Alaska	6.2	17.3	6.8	6.9	7.5	15.1	27.5	14.2	(D)
Region 20 Hawaii	2.6	10.9	6.6	(D)	6.2	6.5	22.0	11.1	18.7

Table D. **Relative Standard Error (percent) for Selected Horticultural Irrigation Data: 2013**

Geographic area	Horticultural operations	Irrigated area	
		Square Feet Under Protection	Acres in the open
United States	1.8	4.9	4.5
Alabama	6.8	32.9	8.6
Alaska	8.0	58.4	38.8
Arizona	11.9	38.4	16.9
Arkansas	16.6	42.6	72.0
California	11.1	10.7	17.4
Colorado	27.5	52.1	9.6
Connecticut	6.7	23.1	12.7
Delaware	9.7	29.8	11.4
Florida	4.5	11.8	6.1
Georgia	7.9	21.6	8.4
Hawaii	4.0	15.8	7.9
Idaho	8.2	55.3	(D)
Illinois	6.4	26.3	7.0
Indiana	6.0	18.9	24.6
Iowa	7.0	25.8	9.0
Kansas	9.1	44.2	5.8
Kentucky	6.1	29.1	19.9
Louisiana	7.4	18.6	21.9
Maine	6.3	24.3	9.6
Maryland	7.9	21.5	9.2
Massachusetts	8.6	20.7	13.0
Michigan	7.4	18.1	24.5
Minnesota	6.8	21.4	10.4
Mississippi	14.4	40.5	29.0
Missouri	9.6	25.4	8.2
Montana	24.0	34.5	11.6
Nebraska	9.8	29.2	10.5
Nevada	46.9	70.9	9.9
New Hampshire	7.0	21.4	17.1
New Jersey	6.2	19.0	7.5
New Mexico	20.9	25.1	18.3
New York	4.5	32.7	8.1
North Carolina	6.5	20.5	8.5
North Dakota	1.0	60.5	61.7
Ohio	5.3	18.0	10.4
Oklahoma	12.4	29.9	6.9
Oregon	4.3	17.8	(D)
Pennsylvania	5.3	28.8	11.1
Rhode Island	9.8	37.4	21.5
South Carolina	8.0	30.6	16.4
South Dakota	16.1	30.1	14.0
Tennessee	5.7	42.7	8.5
Texas	13.4	30.4	12.4
Utah	10.5	33.3	10.7
Vermont	7.8	22.4	24.0
Virginia	8.2	26.5	25.5
Washington	19.3	17.6	17.6
West Virginia	8.3	20.9	15.8
Wisconsin	6.5	21.4	25.8
Wyoming	13.3	43.0	4.3
Water Resources Regions			
Region 01 New England	2.7	16.7	14.5
Region 02 Mid-Atlantic	3.0	12.3	6.3
Region 03 South Atlantic-Gulf	2.8	10.0	4.0
Region 04 Great Lakes	3.7	14.8	20.8
Region 05 Ohio	3.5	28.0	9.3
Region 06 Tennessee	8.0	23.3	13.9
Region 07 Upper Mississippi	3.7	12.2	12.2
Region 08 Lower Mississippi	8.7	21.1	14.6
Region 09 Souris-Red-Rainy	20.8	61.2	79.1
Region 10 Missouri	12.9	28.3	8.9
Region 11 Arkansas-White-Red	8.9	20.6	35.7
Region 12 Texas-Gulf	13.3	31.7	15.1
Region 13 Rio Grande	15.0	24.4	34.2
Region 14 Upper Colorado	13.0	32.7	18.0
Region 15 Lower Colorado	12.0	42.5	17.7
Region 16 Great Basin	12.7	39.4	12.0
Region 17 Pacific Northwest	7.7	16.3	8.5
Region 18 California	11.1	10.9	17.3
Region 19 Alaska	8.0	58.4	38.8
Region 20 Hawaii	4.0	15.8	7.9