



September 29, 2016

The Honorable Joseph Byrne, Chair
California Water Commission
PO Box 924836,
Sacramento, CA 94236-0001

Submitted via email: WSIPcomments@cwcc.ca.gov

Regarding: Draft WSIP Regulations, dated September 2, 2016

Dear Chair Byrne and Commission Members:

As a potential applicant under the voter-approved Water Storage Investment Program (“WSIP”) to implement the Sites Reservoir Project, the Sites Project Authority (“Authority”) appreciates the opportunity to submit these comments to the draft regulations dated September 2, 2016 as Title 23, Division 7, Chapter 1 of the California Code of Regulations (“Draft Regulations”). Further, the Authority commends the efforts of the Water Commission and staff to develop these regulations in an open and transparent manner.

- 1. Funding for Environmental Documentation:** The Authority appreciates the incorporation of the full requirements of California Water Code (CWC) §79755(c), which gave the Water Commission the discretion to consider funding the completion of the environmental documentation (along with funding activities that support the permit acquisition process). This item was expressed as item 1 in our March 8, 2016 comment letter to the January 11, 2016 Draft Quantification Regulations. The Commission’s action (a) helps to reduce the finance cost, which reduces total project costs and (b) is a step towards implementing the WSIP as a partnership between the applicant and the State to maximize benefits.
- 2. Shortened Evaluation Process:** The Authority appreciates the actions taken to reduce the time before the Water Commission intends to make its initial funding decision. While the revised schedule has reduced the time to prepare the application, which has increased the Authority’s cost, this time savings, combined with a shortened Water Commission evaluation period, will secure the benefits associated with selected projects sooner. The Water Commission’s actions address item 3 of the Authority’s March

8, 2016 comment letter to the January 11, 2016 Draft Quantification Regulations.

3. **Environmental Mitigation and Compliance Obligation:** The January 11, 2016 draft Quantification Regulations correctly incorporated the requirements of CWC §79753(b), which allows the Water Commission to fund specific public benefits that will improve the ecosystem and water quality. It is of significant concern that the current Draft Regulations have removed this key element of Chapter 8 and further have significantly changed the intent of the legislature (and voters) by attempting to introduce a concept to differentiate “existing” from “new” environmental mitigation and compliance obligations. Procedurally, the substantive changes approved by the Water Commission in advance of the Draft Regulations was to (a) revise the two-step application process into a single-step process and (b) revise how the regulations are organized. Neither change should have included the removal of text that incorporated the requirements of CWC §79753(b). Attachment A includes revisions the Authority proposes to restore the intent of CWC §79753(b).

4. **Draft Regulations Increase the Cost to Prepare the Application:** Between the requirements in the Draft Regulations and those included in the Technical Reference document (TR), which by reference becomes an integral part of the Draft Regulations, the application requirements (a) appear to be overly prescriptive, (b) add cost to prepare the application, and/or (c) require extensive supporting documentation in topic areas that are not a part of the primary evaluation criteria. This concern was also expressed as items 2, 4, and 5 in our March 8, 2016 comment letter to the January 11, 2016 Draft Quantification Regulations.
 - a. **Overly Prescriptive:** The simple fact that the current draft TR with its technical appendices is 430 pages (plus the 1.5 gigabyte CALSIM model) is a compelling indicator that the application requirements are complex. As an illustration, the Ecosystem Priorities Application Worksheet requires species-specific analysis for Priority 6 to increase attraction flows for anadromous fish. A list of the requirements is included in Attachment B.

 - b. **Increase Costs:** The most notable illustration of how the Draft Regulations are increasing the applicant’s cost is associated with the CALSIM and subsidiary modeling, which are now a mandatory requirement. Given the complexity of the CALSIM model and each of

the subsidiary models (e.g. SALMOD), multiple iterations are anticipated and necessary, especially since these results will be the primary metric to be used by the Water Commission to make its initial funding decision.

- c. **Supporting Documentation:** The applicant is required to provide all publicly available environmental documentation. For the Sites Reservoir Project, the current draft EIR/S with technical appendices is estimated to be over 7,500 pages in length and represents a synthesis of all of the prior study materials, such as cultural resource studies and observed locations of listed species that are traditionally not made publicly available. Given the Water Commission's application evaluation schedule, it is unlikely that the staff will review more than the executive summary and selected key chapters to render a pass/fail determination. Similarly, the request for all documents related to the project's feasibility will result in the gathering and submittal of thousands of pages and given the schedule, it is unlikely that all of the documents we submit will be reviewed to render a pass/fail determination. While the Authority appreciates the Water Commission's desire to have as complete a record of the documentation as possible, an attempt should be made to identify what information will realistically be used in the evaluation process. It is recommended that a list of key documents and references that will be used as the basis of evaluating each application be provided.

Additionally, there are ambiguities in the TR that affect how the application should be prepared. For example, the Ecosystem Priorities Application Worksheet, REV 3 requires the applicant to provide the amount of cold water for salmonid eggs and fry for "current conditions" yet the CALSIM model provided by the Water Commission only defines the conditions for years 2030 and 2070. The current conditions should be defined. Via separate letter, the Authority will request clarifications to these, more technical, items and request that applicants be allowed to continue to pose technical questions beyond the October 3rd close of public comment period.

5. **Monetizing the Value of Water:** The proposed unit water values (shown in Table 5-5 of the TR) appear to be largely based on agency projections of water transfers resulting from fallowing of rice as an output from the Statewide Agricultural Production model (SWAP). While this process and underlying assumption may be appropriate for short-term estimates, the Authority's experience in recent years has been that the actual purchase

prices for water transfer sales have been substantially higher (20 to 30 percent) than those proposed as Sacramento Valley 2030 unit values for the same water year type. Given the amount of water needed to achieve measurable ecosystem and water quality benefits as contemplated in Proposition 1's Chapter 8, reliance on transfers from rice producers is, in the Authority's opinion, unsustainable on a long-term basis. As an illustration, the Sites Reservoir Project has the ability to provide over 200,000 acre-ft. of water on a long-term annualized basis for Proposition 1-eligible public benefits. If rice fallowing will be used as the alternative for estimating the water's value, then over 40,000 acres of rice fields in the Sacramento Valley would need to be fallowed over the long-term average. This represents over 16% of the rice production in Glenn and Colusa counties and these two counties represent 45% of the state's total acreage of rice production (refer to Attachment C). Further, these counties are home to both the Sacramento National Wildlife Refuge Complex and a number of Wildlife Management Areas, both of which will be adversely affected should a long-term rice fallowing program be pursued in this region.

If rice fallowing is used as the alternative water source to meet the state's future water supply needs, then it is the Authority's opinion that all of the economic costs resulting from the long-term loss of a significant acreage and proportion of California's rice production be used to determine the full value of the opportunity costs for the transferred water. A 2010 Texas A&M study (see Attachment C) identifies both direct economic impacts (i.e. lost net earnings for farmers from land which typically has limited alternative agricultural use potential, employment losses and county tax revenues) and major indirect and induced economic costs to related industries that support the region's rice industry.

In addition, the environmental mitigation costs associated with such a long-term regional rice fallowing program needs to be accounted for. Specifically, rice fields also provide habitat for giant garter snake and foraging habitat for birds using these lands during their migration along the Pacific Flyway. Mitigation for these effects, which will place additional burdens on the adjacent lands of the Sacramento National Wildlife Refuge Complex do not appear to be accounted for in the values provided in the TR. The entire economic and environmental consequences of alternative use of a long-term agricultural fallowing program needs to be incorporated in the unit benefit values to ensure fair comparisons with proposed new water supply projects.

Furthermore, the rice fallowing-based values do not appear to include a full consideration of either (a) the impact that implementation of the Sustainable Groundwater Management Act (SGMA) will have on the future water values; (b) any climate change mitigation/adaption costs to water delivery to non-fallowed rice farming and other agricultural producers, and/or (c) take into account the value associated with operational flexibility that will be needed over the long-term to respond to changes in priorities affecting the respective environmental and water quality benefits.

6. **Over-Reliance on Climate Change in the Evaluation Process:** The Authority agrees that climate change should be a factor used by the Water Commission to evaluate eligible projects, but its significance should be limited to estimating the resilience of the proposed Proposition 1-eligible public benefits and not be used as the basis for determining the benefits to be included in the return on public investment calculation. The science being used to predict the effects of climate change continues to evolve and the parameters being applied by the Water Commission as inputs to the CALSIM only represent a scenario of what a future with climate change could look like. There are many other plausible variations or scenarios that would need to be considered in order to properly establish a basis for predicting a likely range of Proposition 1-eligible public benefits a project could provide with any sense of accuracy. Further, the inherent uncertainty in these inputs to CALSIM get amplified by the inherent uncertainty in the CALSIM modeling, which is a relative model, whose outputs are then required to be used as inputs to subsidiary models that in turn are used to try to predict either a biological response or water quality condition. Each of the subsidiary models has its own uncertainty in their respective ability to accurately predict a corresponding response. SALMOD (along with other models) will be used to estimate the response of winter-run salmon and DSM2 will be used to estimate water quality conditions. The net result of this compounding of uncertainties is a reduced accuracy in the estimate of public benefits, which will also affect the calculated return on investment.

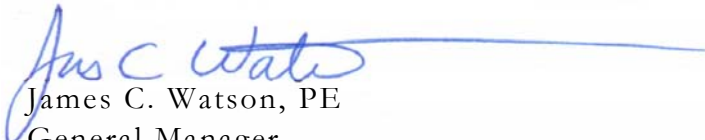
Further, the process ignores how the other agencies involved in operating the state's water system would adapt their respective operations in response to climate change while meeting their respective compliance obligations. Given the highly interdependent nature of the state's water system, the response to climate change (and other future uncertainties) will occur through a more-integrated adaptation response involving more

than an applicant changing their respective project's operations. Basing the evaluation of long-term public benefits solely on the applicant's response may aid in identifying a project's Proposition 1-eligible benefits, but it underestimates the total expected benefits associated with such a system-wide response.

The Authority thanks you and the other Water Commissioners for the opportunity to participate and to provide these comments. Additionally, please also note that we share the concerns being expressed by other potential applicants, some of whom are providing more-detailed written explanations than we've provided in this letter (e.g. climate change, scoring process).

The Authority plans to continue to work with the Water Commissioners and staff towards ensuring the regulations can be implemented in a meaningful and cost-effective manner and will foster the type of partnership needed to truly achieve the objectives contemplated in Proposition 1, Chapter 8. While challenging, the roadmap provided in Chapter 8 creates a unique opportunity to advance the co-equal goals as the state's policy into actions creating long-term and measurable improvements that are long over-due. Approval of a revised set of regulations in December is the quintessential first step. Please contact us if you need any further information or we can be of assistance.

Sincerely,



James C. Watson, PE
General Manager
(530) 410.8250

Cc: Rachael Ballanti, Acting Executive Officer

Attachment A: Environmental Mitigation & Compliance obligations
(California Water Code §79753(b))

Chapter 8 allows the State to take actions to implement the co-equal goals by:

- “Improve[ing] the operation of the state’s water system” (97950(b)) and
- “advance[ing] the long-term objectives of restoring ecological health and improving water management for beneficial uses of the Delta” (79755(a)(5)(B)).

Section 79753 specifies the types of public benefits the state can participate in a project to acquire under contract, which includes Ecosystem and Water Quality. Section 79753(b) stipulates that “Funds shall not be expended pursuant to this chapter for the costs of environmental mitigation measures or compliance obligations except for those associated with providing the public benefits as described in this section” (emphasis added). Ignoring the requirements of 79735(b) ignores the legislatures intent and significantly limits the magnitude of public benefits the state can acquire to achieve the objectives.

The following redline-strikeout changes to the Draft Regulations align with the intent of Section 79753:

Section 6001: Definitions:

- (32) “~~Existing~~ Eenvironmental mitigation or compliance obligations” means legally enforceable requirements or conditions in existing statutes, regulations, permits, contracts, licenses, or grants, or orders and decisions from courts or state agencies intended to protect the human or natural environment.”

Comment: By using the word “existing” creates a temporal aspect that is not used in Section 79753(b)

- (53) “Non-public benefit” means a benefit provided by a proposed project other than the public benefits identified in Water Code section 79753~~(a)(1-5)~~.”

Comment: The full text of Section 79753 should be reflected in the definition, not the narrow list of benefits the state can participate in a project to acquire.

- (63) “Public benefit(s)” ~~for purposes of this chapter, has the same meaning as includes those public benefits associated with water storage projects outlined provided in Water Code section 79753(a), and include ecosystem improvements, water quality improvements, flood control benefits, emergency response, and recreational purposes.~~”

Comment: The full text of Section 79753 should be reflected in the definition, not the narrow list of benefits the state can participate in a project to acquire.

Attachment A: Environmental Mitigation & Compliance obligations
(California Water Code §79753(b))

Section 6004: Quantification of Benefits

(a)(7) Cost Allocation to Beneficiaries. The applicant shall provide a proposed allocation of total project costs to all project beneficiaries, including the Program, and an explanation of how the allocation was calculated, consistent with Technical Reference section 8.

(A) Public benefit cost shares for the five public benefit categories may be allocated to the State of California, the United States, local governments, or private interests. The total requested Program cost share is the portion of the public benefit cost shares allocated to the Program, and:

4. Shall not be associated with existing environmental mitigation or compliance obligations except for those associated with providing the public benefits as described in this Water Code Section 79753; and

5. Shall consider the cost share of new environmental mitigation or compliance obligation costs associated with providing the public benefits, which shall not exceed the percentage of the public cost allocation for the related public benefit category.

Comment: Section (a)(7)(A)(5) should be removed because the Legislature did not include any language identifying a distinction in new versus existing environmental mitigation measures in §79753. It is important to note that in other sections of Proposition 1, the Legislature clearly emphasizes when funds shall only be available to projects that go beyond their existing environmental mitigation requirements. Sections 79732(b) and 79737(f) of Chapter 6 limit funds to “projects that will provide fisheries or ecosystem benefits or improvements that are greater than required applicable environmental mitigation measures or compliance obligations.” This is essentially the same exception, which the new Draft Regulations attempt to rephrase using “new” versus “existing”.

This re-characterization is contrary to well-established statutory interpretation principles. In interpreting statutes, one should “construe all provisions of a statute together, significance being given—if possible—to every word, phrase, sentence and part of an act in pursuance of the legislative purpose.”¹ Interpretations rendering some words surplusage are to be avoided.² Finally, statutes are to be applied according to their actual terms, as it is improper to read in “exceptions or

¹ Turner v. Board of Trustees (1976) 16 Cal.3d 818, 826; Moyer v. Workmen's Comp. Appeals Bd. (1973) 10 Cal.3d 222, 230

² Lopez v. Superior Court (2010) 50 Cal.4th 1055, 1066); McCarther v. Pacific Telesis Group (2010) 48 Cal.4th 104, 110

Attachment A: Environmental Mitigation & Compliance obligations
(California Water Code §79753(b))

qualifications that are not supported by the language of the provision.”³ Water Code sections 79732(b) and 79737(f) demonstrate that the Legislature was aware of the possibility that funds can be used to fulfill existing environmental mitigation obligations, and at times has chosen to create a prohibition on such uses by using “greater than required” language. The fact that the Legislature deliberately left any similar language out of section 79753(b) demonstrates that no such prohibition or limitation on Proposition 1 funds was intended.

Other sections also implicated in the change in direction where the “exception” of Section 79753(b) is not properly recognized are 6001(32) (definition of Existing Environmental mitigation and compliance), 6001(53) (definition of Non-Public Benefit), 6001(63) (definition Public Benefits), and possibly others.

Section 6012: Agency Findings

(b) CDFW and State Water Board shall base their respective findings on:

(1) The technical review of the ecosystem and water quality public benefits, respectively;

(2) The requirements of Water code section 79753; and

(3) The agency’s assessment of a project’s relative environmental value in achieving the priorities identified by the agency.

Comment: Section 6012(b) as written in the Draft Regulations, correctly aligns with the intent of §79753 and should not be modified.

³ Rossi v. Brown (1995) 9 Cal.4th 688, 694; Vallerga v. Dept. Alcoholic Bev. Control (1959) 53 Cal.2d 313, 318

Attachment B: Illustration of Overly Prescriptive Regulations

To increase attraction flows for anadromous fish as an ecosystem benefit eligible to be funded for under Proposition 1, The Ecosystem Priorities Application Worksheet requires species-specific analysis for Priority 6, requires the applicant to perform the following analysis:

- The magnitude of project benefits needs to be provided on a species by species basis.
- Evaluation of spatial and temporal effects under both current and 2030 conditions. Aside from the provided CALSIM hydrology, 2030 conditions are highly speculative. This will require CALSIM evaluation and SALMOD runs under current conditions in addition to evaluations under 2030 and 2070 conditions.
- Providing an adaptive management strategy for each individual priority will lead to conflicts between individual priorities in the implementation of adaptive management measures. Developing management and monitoring protocols for each individual priority is unrealistic. A single, integrated strategy would be more straightforward and useful.
- REV 7 under Priority 6 requires an extensive evaluation of the projected benefits against a minimum of 8 plans with a specific review of which goals would be met. It would be more appropriate for State staff to perform these evaluations.
- REV 8 under Priority 6 requires significant mapping and the submittal of kmz files.

NOTE: While kmz files tend to be small, the applicant is required to use the Department's Grants Review and Tracking System (GRanTS), which limits the size of attachments to be no greater than 50 megabytes and no more than 5 attachments per question. This GRanTS process is not large enough to accommodate the publicly available environmental document as five attachments since the Technical Appendices for the Delta Modeling and River Modeling are each over 30 megabytes.

Agricultural and Food Policy Center
Texas A&M University
August 2010

ECONOMIC CONTRIBUTIONS OF THE US RICE INDUSTRY TO THE US ECONOMY



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Attachment C: Monetizing the Value of Water, 2010 Texas A&M Study

This research was funded in part by the USA Rice Federation.

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Research Report 10-3

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**ECONOMIC CONTRIBUTIONS OF THE US RICE
INDUSTRY TO THE US ECONOMY**

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Introduction

Over the past three years the number of rice planted acres increased from 2.76 million acres to 3.04 million acres (Table 1). U.S. rice production reached a four year high of 219.9 million cwt in 2009. The value of U.S. rice production at the farm level exceeded \$3 billion in 2009.

Given the recent growth in the U.S. rice industry it is time to update estimates of the economic impacts and contributions of the industry on the local and state economies. The purpose of this report is to estimate the economic contributions of rice farmers, millers, and selected end users on the U.S. economy and, to the extent possible, the state economies.

Methodology

The latest version of the Minnesota IMPLAN Group, Inc. model, IMPLAN V3, was used for the analysis. IMPLAN is an input/output model that traces the economic contributions of an industry's production, costs and receipts on 440 other industries in the U.S. economy. By summing the contributions of the rice industry to all other U.S. industries one can estimate rice's impacts on the U.S. economy and a state's economy.

IMPLAN uses data from the latest (2007) Survey of Manufacturers to develop the necessary multipliers for the 440 industries at all the state and U.S. levels. For the present study we coupled the state and national multipliers in IMPLAN V3 with the 2009 economic activity for the U.S. rice industry. This combination of model, multipliers, and economic activity gives one the most current estimate of economic contributions for the U.S. rice industry.

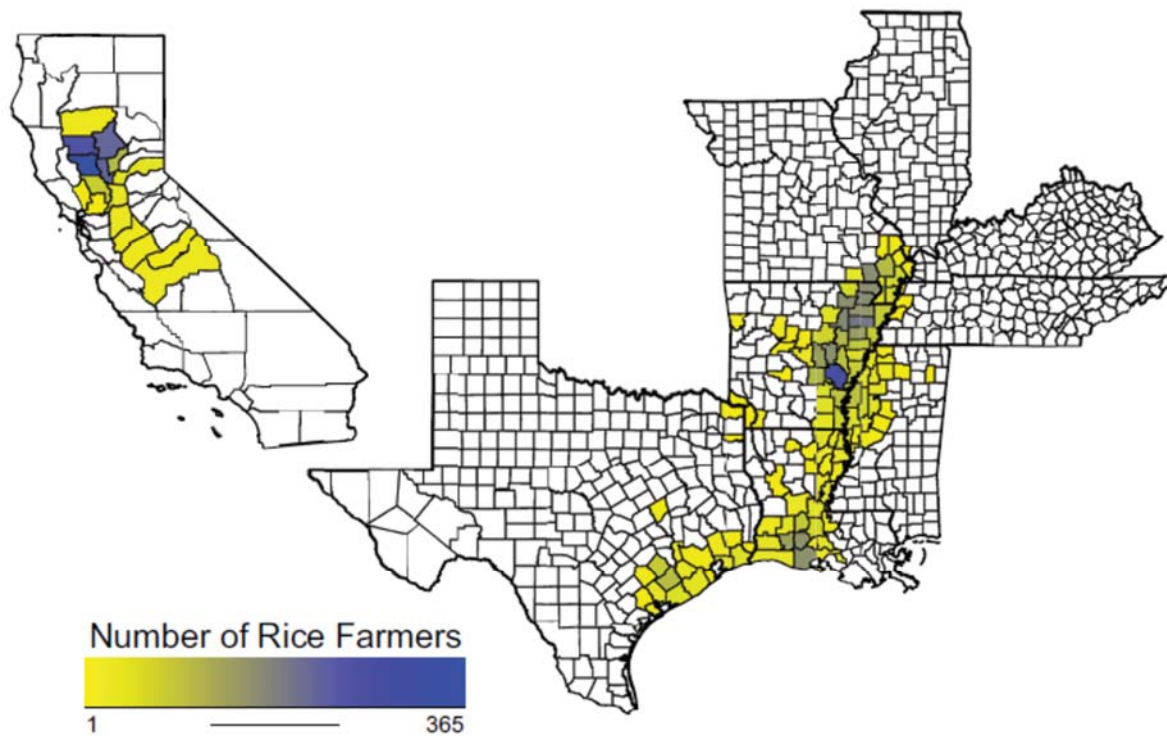


Figure 1: Number of Rice Farmers, by County.

Attachment C: Monetizing the Value of Water, 2010 Texas A&M Study

Table 1. US Rice Industry Summary Information, 2006-2009.

States	Planted Acres (1) (Acres)	Harvested Acres (1) (Acres)	Average Yield (1) (CWT/Acre)	Production (Cwts.)	Average Price Rough Rice (1) (\$/CWT)	Farm Operators (2) (No.)	Base Acres (3) (M.Ac.)	Rice Mills (4) (No.)	Milled Rice (1) (Cwts.)	Average Price Milled Rice (1) (\$/CWT)
2006										
Arkansas	1,406,000	1,400,000	69.00	96,600,000	9.43				63,852,583	18.23
California	526,000	523,000	76.60	40,061,800	13.00				30,021,057	23.56
Louisiana	350,000	345,000	58.80	20,286,000	9.83				13,479,223	18.26
Texas	150,000	150,000	71.70	10,755,000	10.00				7,638,421	17.53
Mississippi	190,000	189,000	70.00	13,230,000	9.38				6,955,701	18.23
Missouri	216,000	214,000	64.00	13,696,000	9.38				10,402,999	18.23
Total	2,838,000	2,821,000	68.35	194,628,800					132,349,983	
2007										
Arkansas	1,331,000	1,325,000	72.30	95,797,500	12.10	4,602		16	63,322,130	20.64
California	534,000	533,000	82.00	43,706,000	16.20	2,518		17	32,751,906	26.08
Louisiana	380,000	378,000	61.40	23,209,200	12.70	1,303		7	15,421,571	21.00
Texas	146,000	145,000	65.50	9,497,500	12.40	667		10	6,745,319	21.10
Mississippi	190,000	189,000	73.50	13,891,500	12.60	621		2	7,303,486	20.64
Missouri	180,000	178,000	69.00	12,282,000	11.90	720		1	9,328,974	20.64
Total	2,761,000	2,748,000	70.62	198,383,700		10,431		53	134,873,386	
2008										
Arkansas	1,401,000	1,395,000	66.60	92,938,000	15.00				61,432,001	29.33
California	519,000	517,000	83.20	43,030,000	27.50				32,245,333	32.34
Louisiana	470,000	464,000	58.30	27,037,000	15.40				17,964,989	28.44
Texas	175,000	172,000	69.00	11,868,000	15.70				8,428,896	29.58
Mississippi	230,000	229,000	68.50	15,687,000	15.40				8,247,474	29.33
Missouri	200,000	199,000	66.20	13,173,000	13.80				10,005,746	29.33
Total	2,995,000	2,976,000	68.63	203,733,000					138,324,439	
2009										
Arkansas	1,486,000	1,470,000	68.00	99,960,000	13.40		1,851,328		66,073,542	38.32
California	461,000	556,000	86.00	47,816,000	18.60		615,919		35,831,811	50.62
Louisiana	470,000	464,000	63.00	29,232,000	12.60		792,724		19,423,477	36.05
Texas	171,000	170,000	77.70	13,209,000	12.50		590,052		9,381,302	33.01
Mississippi	245,000	243,000	67.00	16,281,000	12.80		395,699		8,559,770	38.32
Missouri	202,000	200,000	67.10	13,420,000	13.10		218,756		10,193,359	38.32
Total	3,035,000	3,103,000	71.47	219,918,000					149,463,261	

Sources:

- (1) Values come from various NASS-USDA reports
- (2) Values come from 2007 Census of Agriculture
- (3) Values come from USDA-FSA
- (4) Values come from 2007 Census of Manufactures

Scope of the Industry

The USDA census reports that in 2007 there were 10,431 rice farm operators¹ with 44% of them in Arkansas (Table 1). About 24% of rice farmers are in California with the remainder in Louisiana, Mississippi, Missouri and Texas. Figure 1 shows the concentration of rice farmers by county and Table A1 presents the numbers for Figure 1. Planted acres of rice correspond closely to where rice farmers are located (Figure 2). Base acres of rice indicate historical production of rice (Figure 3). For example, Texas is presently under planting base acres of rice so the planted acres and base acres for Texas do not show the same concentration. County base acres are presented in Table A1 and state level base acres are presented in Table 1.

Rice millers are located in all six rice producing states (Table 1). The number of rice mills reported in Table 1 comes from the 2007 U.S. Survey of Manufacturers. Locations of millers and merchants are summarized in Figure 4.

¹ A farm operator is the person who runs the farm, making the day-to-day decisions.

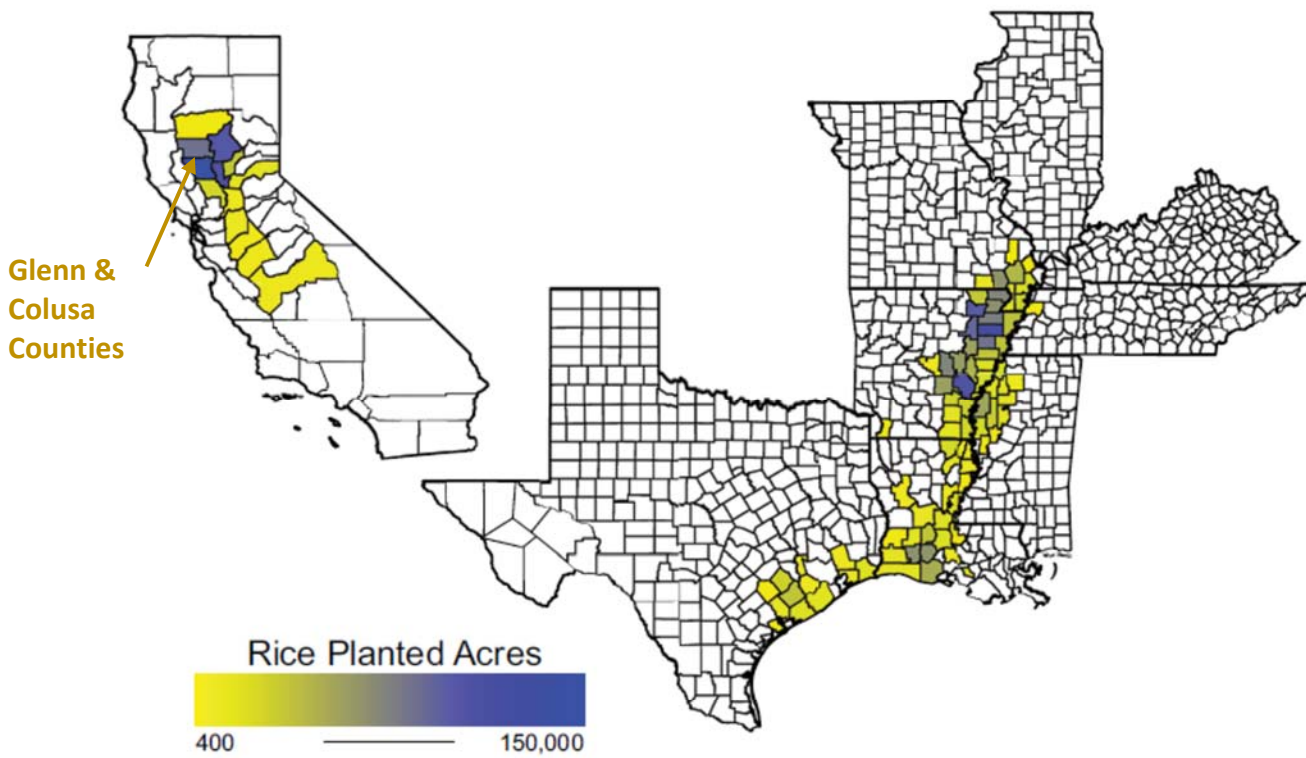


Figure 2: Planted Rice Acres, by County.

Attachment C: Monetizing the Value of Water, 2010 Texas A&M Study

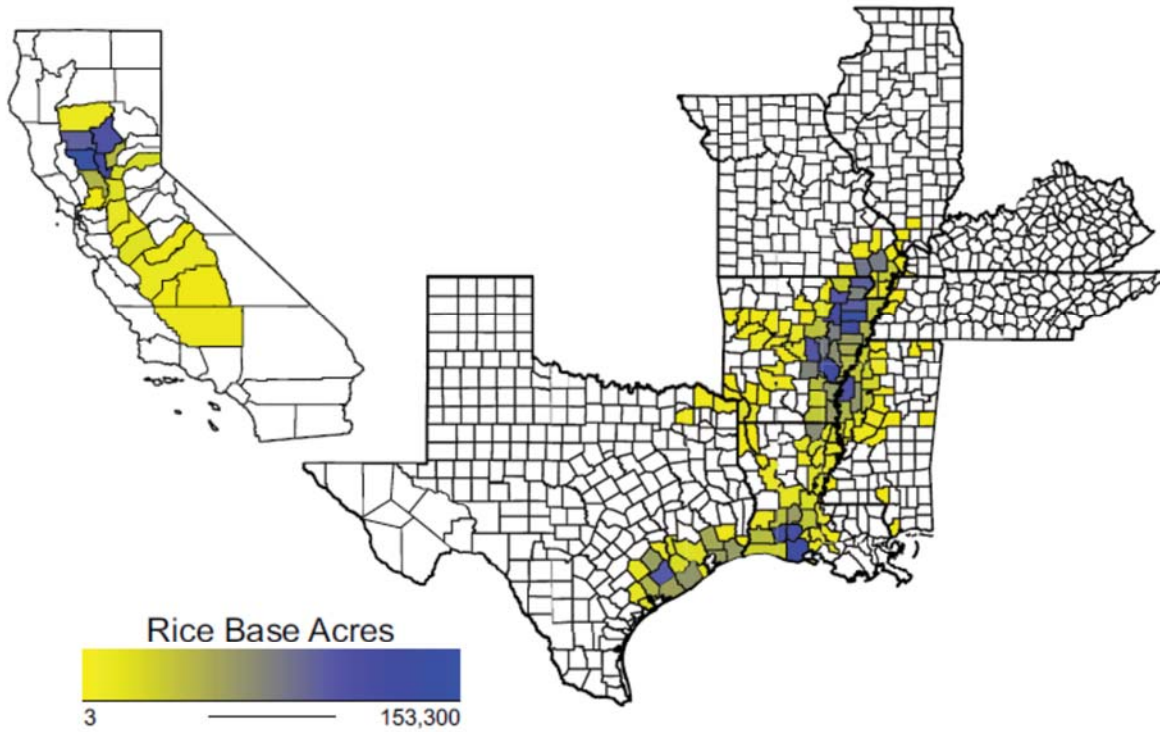


Figure 3: Rice Base Acres, by County.

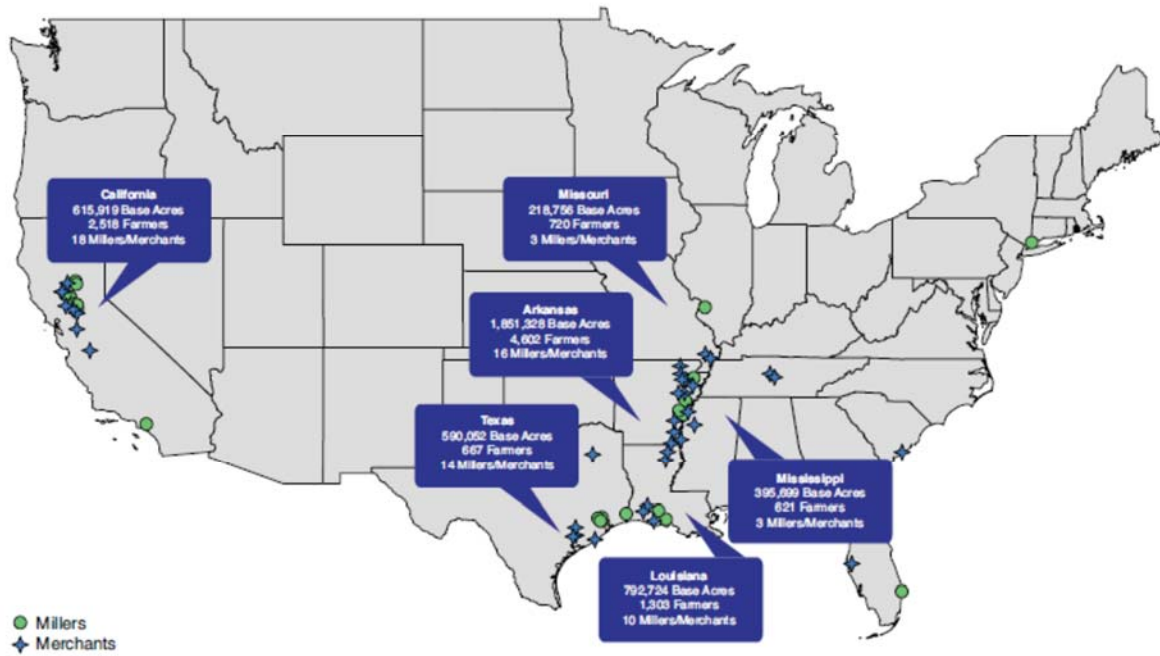


Figure 4: Location of US Rice Mills and Merchants.

Economic Contributions

The economic contributions of the U.S. rice industry are presented in three parts: farmers, millers, and end users. For each sector of the industry we reported estimates for: output, value added, and number of jobs supported. To provide further detail the contributions are disaggregated into four types of effects: direct, indirect, induced, and total.

Direct effects amount to the sum of contributions that are directly attributable to farmers, millers, or end users. In the case of employment, the direct effect is the number of jobs supported by farmers, millers, or end users. The indirect effects are the economic activity and jobs supported by businesses that supply inputs to farmers, millers, or end users. The induced effect is the economic activity created through purchases and jobs created by the employees of input suppliers and their suppliers.

The three main economic contribution categories (output, value added, and jobs) are defined in the box below.

Definitions for IMPLAN Economic Contribution Categories

Output is a measure of the value of goods and services produced in the State as a result of the increased demand created by expenditures by rice farms and rice mills. Output is measured by purchases of all intermediate production inputs and value added.

Value Added is the total wages and salaries plus business profits generated by the economic activities of a particular industry. In this case value added is the direct and indirect wages, salaries and profits generated in a state by the activities of buying inputs and production products by rice farmers, rice millers, or end users.

Number of Jobs is the number of all wage and salary employees as well as self-employed jobs resulting from total expenditures by rice farmers and mills. The number of jobs does not accumulate, because it is an annual measure.

Farmer Contributions

The net economic contributions of rice farming on the local and U.S. economies are summarized in Table 2. The total output effect on the U.S. economy was \$5.347 billion in 2009. The total number of jobs supported by rice farmers was 36,480 and the value added amounted to about \$2.6 billion.

At the state level, Arkansas rice farmers support about the same number of direct jobs as California (7,845 vs. 7,772) and more indirect jobs (1,952 vs. 1,381). California has a much greater (3,503 vs. 2,500) induced employment contribution resulting in the California rice farmers supporting 12,656 jobs while Arkansas farmers support 12,297 jobs. Louisiana rice farmers support about 4,320 jobs while, Missouri, Mississippi, and Texas support 2,062, 2,423, and 2,723 jobs, respectively.

Total output contributions for Arkansas and California of \$1.89 billion and \$1.79 billion, respectively, are three times greater than Louisiana's output contribution. Due in part to lower production 29.2 billion cwt. vs. 99.9 billion cwt. for Arkansas and 47.8 billion cwt. for California. Another factor that reduces Louisiana's output is lower prices reported for rice in 2009 (Table 1). The 2009 output contributions for Missouri, Mississippi, and Texas were in the \$283 to \$394 million range.

The farmer contributions through value added to the state's GDP show California leads with \$997 million in 2009. Arkansas was second with \$746 million in value added. The remaining states' contributions to their states' value added is in the \$128 million to \$279 million range.

Millers Contribution

Economic contributions of rice millers in 2009 to the U.S. economy were estimated to be \$6.4 billion in value added, 38,092 jobs, and \$10.97 billion in increased output (Table 3). These large economic contributions were attributed to the six states with rice mills. The greatest economic contributions from millers was in Arkansas where the industry supported output of \$4.19 billion, employment of 13,538 jobs, and value added of \$2.5 billion. California rice millers contributed about \$2.1 billion in value added to the state's economy. Louisiana rice millers contributed almost \$750 million while Mississippi and Texas millers contributed about \$358 million each.

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**Table 2. Economic Contributions of Rice Production by State and US for 2009,
Calculated Using the 2010 IMPLAN Model for 2008 Business Census Data**

	Output (Millions \$s)	Employment (Number)	Total Value Added (Millions \$s)
Arkansas			
Direct Contributions	1,320.84	7,845	441.14
Indirect Contributions	307.64	1,952	153.84
Induced Contributions	264.88	2,500	151.66
Total Contributions	1,893.37	12,297	746.65
California			
Direct Contributions	910.85	7,772	528.33
Indirect Contributions	322.07	1,381	151.51
Induced Contributions	557.60	3,503	317.90
Total Contributions	1,790.52	12,656	997.73
Louisiana			
Direct Contributions	392.67	2,787	160.03
Indirect Contributions	140.55	628	58.61
Induced Contributions	105.67	905	60.19
Total Contributions	638.90	4,320	278.83
Missouri			
Direct Contributions	174.89	1,319	71.43
Indirect Contributions	55.51	300	26.72
Induced Contributions	52.88	443	30.56
Total Contributions	283.28	2,062	128.71
Mississippi			
Direct Contributions	222.52	1,348	145.90
Indirect Contributions	39.75	254	17.54
Induced Contributions	84.86	821	48.47
Total Contributions	347.14	2,423	211.92
Texas			
Direct Contributions	211.05	1,622	134.76
Indirect Contributions	65.96	250	32.55
Induced Contributions	117.54	851	67.72
Total Contributions	394.55	2,723	235.03
Total			
Direct Contributions	3,232.82	22,692	1,481.59
Indirect Contributions	931.49	4,765	440.77
Induced Contributions	1,183.44	9,023	676.50
Total Contributions	5,347.74	36,480	2,598.86

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Table 3. Economic Contributions of Rice Milling by State and US for 2009, Calculated Using the 2010 IMPLAN Model for 2008 Business Census Data

	Output	Employment	Total Value Added
	(Millions \$s)	(Number)	(Millions \$s)
Arkansas			
Direct Contributions	2,960.40	2,240	1,773.35
Indirect Contributions	510.96	4,538	289.57
Induced Contributions	715.86	6,760	409.95
Total Contributions	4,187.22	13,538	2,472.86
California			
Direct Contributions	2,022.63	1,629	1,211.75
Indirect Contributions	726.30	5,096	378.76
Induced Contributions	883.44	5,560	503.82
Total Contributions	3,632.37	12,285	2,094.33
Louisiana			
Direct Contributions	818.11	1,648	490.13
Indirect Contributions	284.74	1	121.90
Induced Contributions	236.05	2,023	134.48
Total Contributions	1,338.90	5,308	746.51
Mississippi			
Direct Contributions	423.89	854	253.95
Indirect Contributions	98.75	793	44.37
Induced Contributions	103.46	1,003	59.12
Total Contributions	626.10	2,649	357.44
Texas			
Direct Contributions	355.05	715	212.71
Indirect Contributions	127.08	756	66.20
Induced Contributions	137.58	998	79.26
Total Contributions	619.71	2,468	358.18
Missouri			
Direct Contributions	403.33	305	241.60
Indirect Contributions	69.61	618	39.45
Induced Contributions	97.53	921	55.85
Total Contributions	570.47	1,844	336.91
Total			
Direct Contributions	6,983.42	7,390.33	4,183.49
Indirect Contributions	1,817.44	11,801.24	940.26
Induced Contributions	2,173.91	17,265.14	1,242.48
Total	10,974.78	38,092.39	6,366.22

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Table 4. Summary of Economic Contributions for Rice Farmers and Millers, by State in 2009.

States	Output (Million \$s)	Employment Jobs	Value Added (Million \$s)
Arkansas	6,081	25,835	3,220
California	5,423	24,941	3,092
Louisiana	1,978	9,627	1,025
Missouri	854	3,906	466
Mississippi	973	5,073	569
Texas	1,014	5,191	593
Total	16,323	74,572	8,965

- Output is total goods and services produced due to the increased demand created by purchases by rice farmers and millers
- Employment is total number of jobs supported directly and indirectly by rice farmers and millers.
- Value Added is total wages and salaries plus business profits generated directly and indirectly by economic activities of rice farmers and millers.

State Level Contributions by Farmers and Millers

The total economic contribution of rice farmers and millers to each state's economy is summarized in Table 4. By state, Table 4 shows the sum of the total output, job creation, and value added for rice farmers and millers. The values come from the total contributions reported in Tables 2 and 3. Total contribution to economic production in Arkansas was \$6.081 billion, 25,835 jobs were supported, and total wages, salaries and profits earned in the state amounted to \$3.22 billion in 2009. California is second with their rice farmers and millers supporting 24,941 jobs, adding \$5.423 billion to economic output, and \$3.092 billion to the state's wages, salaries and profits. The national contribution from rice farmers and millers in 2009 was \$16.323 billion in increased economic output, 74,572 jobs, and \$8.965 billion of wages, salaries, and profits.

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**Table 5. US Economic Contributions for Rice Exporters, Food Processors, Brewers, and Pet Foods
Calculated Using the 2010 IMPLAN Model for 2008 Business Census Data**

Sector/Impact	Output (Million \$s)	Employment Jobs	Total Value Added (Million \$s)
Exporters			
Direct Contributions	2,477	1,982	1,977
Indirect Contributions	714	4,616	421
Induced Contributions	2,890	7,680	1,543
Total Contributions	6,082	14,277	3,942
Processed Food			
Direct Contributions	2,146	1,502	467
Indirect Contributions	2,869	14,074	1,272
Induced Contributions	1,832	6,224	979
Total Contributions	6,848	21,800	2,717
Brewery Industry			
Direct Contributions	405	217	126
Indirect Contributions	525	1,985	217
Induced Contributions	262	1,686	140
Total Contributions	1,192	3,888	483
Pet Food			
Direct Contributions	395	349	77
Indirect Contributions	593	2,544	224
Induced Contributions	243	1,561	130
Total Contributions	1,231	4,454	430
Other Users			
Direct Contributions	892	630	215
Indirect Contributions	1,230	5,325	504
Induced Contributions	629	3,277	336
Total Contributions	2,751	9,232	1,055
Total			
Direct Contributions	6,315	4,680	2,862
Indirect Contributions	5,932	28,544	2,638
Induced Contributions	5,857	20,428	3,128
Total Contributions	18,103	53,651	8,628

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Table 6. Summary of Economic Impacts of the US Rice Industry on the US Economy.

	Output (M\$)	Jobs Supported	Value Added (M\$)
Farming Sector	5,348	36,480	2,599
Milling Sector	10,975	38,092	6,366
Final Users	18,103	53,651	8,628
Total	34,426	128,224	17,593

End User Contributions

There are numerous end users for rice, however, the quantities of rice used becomes quite small after we consider exporters, processed food manufacturers, brewers, and pet food manufacturers. The 2009 economic contributions for exporters, food processors, brewers, and pet food, in terms of contributions directly related to the rice they purchased and processed, are reported in Table 5.

Rice exporters purchased, transported, warehoused, and exported about 90.5 million cwts in 2009. For this level of trade the IMPLAN economic contributions were estimated at: \$6.1 billion of economic output, 1,982 direct jobs and 14,277 total jobs supported, and about \$4 billion of value added to the U.S. economy (Table 5).

The processed food sector had a smaller direct jobs impact (1,502 jobs) but the sector has much greater indirect jobs multipliers (Table 5). The indirect jobs contribution result comes from the industry purchasing other inputs from many more industries than the export sector. The processed food sector in total supported 21,800 jobs that can be traced to its purchasing and processing of rice. Value added to the U.S. economy from food processors was \$2.7 billion.

The brewery industry contributed 3,888 jobs and a value added of \$483 million that is attributable to its use of rice in 2009. Pet food manufacturers use rice but like breweries, their labor efficiency is so great that the number of jobs directly attributable to rice was small (349) in 2009. Total U.S. economic output from rice use by pet food manufacturers is small at \$1.2 billion, as well as the total value added contribution of \$430 million.

These four end users for rice do not account for all rice used by end users. To account for the many other end users we created a residual or other users sector and assumed the average multipliers for the processed food, brewery and pet foods sectors. The economic contributions for all other rice end users is reported in Table 5. After accounting for the other users an estimate of the total 2009 economic contributions of rice end users was \$18 billion of output, 53,651 jobs and \$8.6 billion in value added.

Summary

The impacts of the U.S. rice industry on the United States' economy are summarized in Table 6. More than 128,000 jobs were supported directly and indirectly by rice production in 2009. Rice contributed more than \$17.6 billion to U.S. wages, salaries, and profits. Rice was also responsible for more than \$34 billion of economic output nationally.

Appendix Table

Table A1. County Values for the Number of Rice Farmers, Rice Planted Acres and Rice Base Acres.

State	County	Farmers	Planted Acres	Base Acres
Alabama	Baldwin	0	0	49
Arkansas	Arkansas	275	106,000	128,225
Arkansas	Ashley	21	11,200	32,484
Arkansas	Chicot	56	25,100	59,013
Arkansas	Clark	0	0	3,253
Arkansas	Clay	158	73,500	94,882
Arkansas	Cleburne	0	0	53
Arkansas	Conway	1	0	1,446
Arkansas	Craighead	150	78,200	96,720
Arkansas	Crawford	1	0	364
Arkansas	Crittenden	73	36,800	45,302
Arkansas	Cross	140	85,200	119,492
Arkansas	Dallas Cleveland	0	0	197
Arkansas	Desha	83	27,600	59,974
Arkansas	Drew	34	10,300	21,567
Arkansas	Faulkner	2	0	5,686
Arkansas	Franklin	0	0	275
Arkansas	Greene	165	67,700	73,931
Arkansas	Hempstead	0	0	419
Arkansas	Hot Spring	1	0	1,307
Arkansas	Independence	36	0	12,357
Arkansas	Jackson	170	92,500	119,732
Arkansas	Jefferson	102	58,200	72,844
Arkansas	Johnson	0	0	46
Arkansas	Lafayette	9	2,100	8,320
Arkansas	Lawrence	157	98,500	99,901
Arkansas	Lee	46	17,900	47,849
Arkansas	Lincoln	45	26,600	38,782
Arkansas	Little River	2	0	2,539
Arkansas	Logan	0	0	681
Arkansas	Lonoke	134	73,700	101,654
Arkansas	Miller	2	0	13,610
Arkansas	Mississippi	75	37,500	34,077
Arkansas	Monroe	89	46,700	67,027
Arkansas	Nevada	0	0	152
Arkansas	Perry	1	0	2,782
Arkansas	Phillips	66	19,900	38,533
Arkansas	Poinsett	192	117,500	151,439
Arkansas	Pope	4	0	1,039
Arkansas	Prairie	158	60,000	79,376
Arkansas	Pulaski	14	3,800	8,676
Arkansas	Randolph	52	32,600	30,294
Arkansas	Saline	0	0	20
Arkansas	Sevier	0	0	18
Arkansas	Sharp	0	0	26
Arkansas	St Francis	76	34,300	58,992
Arkansas	Stone	0	0	11
Arkansas	Unassigned	0	31,100	0
Arkansas	White	60	0	36,285
Arkansas	Woodruff	102	56,500	76,378
Arkansas	Yell	0	0	3,300

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Table A1. Contiued

State	County	Farmers	Planted Acres	Base Acres
California	Butte	217	102,000	106,530
California	Colusa	365	155,000	153,302
California	Fresno	7	2,900	3,304
California	Glenn	249	86,500	93,482
California	Kern	0	0	2,128
California	Kings	0	0	213
California	Madera	1	0	46
California	Merced	5	2,600	12,720
California	Napa	1	0	0
California	Placer	26	10,500	18,798
California	Sacramento	15	3,700	14,622
California	San Joaquin	12	4,800	6,583
California	Solano	1	0	75
California	Stanislaus	6	1,700	2,652
California	Sutter	222	106,000	115,086
California	Tehama	6	800	3,503
California	Tulare	0	0	455
California	Yolo	69	23,800	43,304
California	Yuba	102	33,700	39,116
Florida	Glades	0	0	779
Florida	Gulf	0	0	20
Florida	Hendry	0	0	6
Florida	Palm Beach	7	11,376	16,870
Illinois	Alexander	3	0	182
Illinois	Union	0	0	6
Illinois	Williamson	0	0	8
Kentucky	Fulton	0	0	146
Louisiana	Acadia	154	64,800	114,730
Louisiana	Allen	27	11,300	36,584
Louisiana	Avoyelles	25	14,700	17,522
Louisiana	Beauregard	4	1,100	4,308
Louisiana	Bossier	0	0	108
Louisiana	Caddo	0	0	118
Louisiana	Calcasieu	23	12,600	38,646
Louisiana	Caldwell	1	0	3,000
Louisiana	Cameron	15	11,400	27,505
Louisiana	Catahoula	9	2,400	11,457
Louisiana	Concordia	12	11,700	16,005
Louisiana	East Carroll	25	6,600	23,420
Louisiana	Evangeline	78	35,400	57,918
Louisiana	Franklin	2	0	3,534
Louisiana	Iberia	5	0	2,956
Louisiana	Iberville	0	0	109
Louisiana	Jefferson Davis	134	66,800	112,881
Louisiana	Lafayette	11	0	9,290
Louisiana	Lincoln	4	0	0
Louisiana	Madison	12	5,200	10,503
Louisiana	Morehouse	35	21,900	67,814
Louisiana	Natchitoches	2	3,800	5,581
Louisiana	Ouachita	3	0	10,830
Louisiana	Pointe Coupee	2	2,400	4,265

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Table A1. Continued

State	County	Farmers	Planted Acres	Base Acres
Louisiana	Rapides	13	7,600	9,031
Louisiana	Red River	0	0	457
Louisiana	Richland	12	9,500	19,183
Louisiana	St Landry	55	18,700	32,795
Louisiana	St Martin	18	4,700	8,329
Louisiana	Tensas	2	1,100	6,714
Louisiana	Unassigned	0	12,500	0
Louisiana	Vermilion	157	50,000	126,272
Louisiana	West Carroll	8	3,700	10,858
Mississippi	Adams	0	0	97
Mississippi	Alcorn	0	0	8
Mississippi	Attala	0	0	11
Mississippi	Bolivar	86	54,500	106,604
Mississippi	Carroll	1	0	19
Mississippi	Coahoma	25	12,200	32,040
Mississippi	Desoto	5	0	1,921
Mississippi	Grenada	0	0	3,011
Mississippi	Hancock	0	0	130
Mississippi	Holmes	2	0	2,503
Mississippi	Humphreys	10	2,100	12,865
Mississippi	Issaquena	1	0	3,778
Mississippi	Lafayette	1	0	0
Mississippi	Lee	1	0	0
Mississippi	Leflore	29	10,800	31,962
Mississippi	Madison	0	0	400
Mississippi	Marion	0	0	42
Mississippi	Noxubee	0	0	31
Mississippi	Panola	7	3,800	3,645
Mississippi	Quitman	24	13,900	26,325
Mississippi	Sharkey	2	1,200	10,919
Mississippi	Sunflower	56	30,000	63,155
Mississippi	Tallahatchie	24	11,400	23,950
Mississippi	Tate	3	0	1,050
Mississippi	Tippah	0	0	3
Mississippi	Tunica	24	21,500	26,783
Mississippi	Unassigned	0	5,600	0
Mississippi	Washington	38	23,000	42,679
Mississippi	Yazoo	2	0	1,767
Missouri	Bollinger	2	800	870
Missouri	Butler	161	65,000	82,669
Missouri	Cape Girardeau	2	0	0
Missouri	Dunklin	36	16,200	7,849
Missouri	Mississippi	6	0	1,132
Missouri	New Madrid	57	19,900	29,931
Missouri	Pemiscot	55	26,300	10,917
Missouri	Ripley	14	6,200	5,594
Missouri	Scott	5	900	1,099
Missouri	Stoddard	97	43,800	78,677
Missouri	Unassigned	0	900	0
Missouri	Wayne	0	0	18

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Table A1. Continued

State	County	Farmers	Planted Acres	Base Acres
Oklahoma	Leflore	0	0	341
Oklahoma	Mccurtain	0	0	2,372
Oklahoma	Sequoyah	3	0	51
South Carolina	Kershaw	0	0	3
South Carolina	Marlboro	0	0	20
Tennessee	Dyer	3	1,267	985
Tennessee	Lake	2	0	627
Tennessee	Lauderdale	1	0	271
Texas	Austin	0	0	4,418
Texas	Bowie	1	0	3,423
Texas	Brazoria	24	11,700	62,709
Texas	Calhoun	10	2,100	11,357
Texas	Chambers	29	8,400	57,276
Texas	Colorado	74	27,000	58,284
Texas	Fort Bend	16	5,000	19,913
Texas	Galveston	2	0	10,477
Texas	Hardin	1	0	1,871
Texas	Harris	3	0	17,074
Texas	Hopkins	0	0	1,481
Texas	Jackson	23	10,300	44,761
Texas	Jefferson	35	14,300	59,395
Texas	Lavaca	5	1,100	7,622
Texas	Liberty	7	4,500	50,604
Texas	Marion	1	0	0
Texas	Matagorda	43	17,200	54,732
Texas	Orange	1	0	1,713
Texas	Red River	0	0	1,063
Texas	Robertson	1	0	0
Texas	Unassigned	0	2,800	0
Texas	Victoria	1	0	7,011
Texas	Waller	14	6,100	15,474
Texas	Wharton	94	35,500	99,394

SOURCE:

Number of farmers come from the 2007 Census of Agriculture, State and County Reports. The full report can be found at: http://www.agcensus.usda.gov/Publications/2007/Full_Report/index.asp

Planted acres by county come from USDA NASS, Quick Stats, Annual Statistics by Subject and can be found at: http://quickstats.nass.usda.gov/by_commodity

Base acres come from the USDA, ERS Data Sets for Farm Program Acres and is available at: <http://www.ers.usda.gov/Data/BaseAcres/>

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