Eastern Research Group, Inc.

Non-Burning Management Alternatives on Agricultural Lands in the Western United States

Volume I:

Agricultural Crop Production and Residue Burning in the Western United States

FINAL

Prepared for:

The Fire Emissions Joint Forum of the Western Regional Air Partnership

May 15, 2002

Enviro-Tech Communications

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NON-BURNING MANAGEMENT ALTERNATIVES ON AGRICULTURAL LANDS IN THE WESTERN UNITED STATES

VOLUME I:

AGRICULTURAL CROP PRODUCTION AND RESIDUE BURNING IN THE WESTERN UNITED STATES

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The Fire Emissions Joint Forum of the
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DISCLAIMER

This document was developed for the Fire Emissions Joint Forum (FEJF) of the Western Regional Air Partnership (WRAP) by Eastern Research Group, Inc., (ERG) and Enviro-Tech Communications. Although the contents of this report have undergone extensive review by the FEJF, the opinions, findings, and conclusions expressed represent those of ERG and Enviro-Tech Communications and not necessarily those of the members of the FEJF.

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ACRONYMS

A_BURN	acres burned
AH	acres harvested
AK	Alaska
AQTF	Air Quality Task Force
Avg	average
Avg_Crop	Crop average percentage burned
Avg_State	State average percentage burned by crop
AZ	Arizona
BAL	bales
BU	bushels
CA	California
CA_Lake	Lake County, California
CA_SJV	San Joaquin Valley, California
CA_South_Coast	South Coast Air Basin, California
CASS	California Agricultural Statistics Service
CDFA	California Department of Food and Agriculture
CO	Colorado
CoFips	County-Federal Information Processing Standards
COMM	commodity
CRP	Conservation Reserve Program
CWT	hundredweight (100 pounds)
EI	emissions inventory
e-mail	electronic mail
ERG	Eastern Research Group, Inc.

ETC	Enviro-Tech Communications
FEJF	Fire Emissions Joint Forum
FIPS	Federal Information Processing Standards
FSA	Farm Service Agency
GIS	geographical information system
HI	Hawaii
ID	Idaho
KBG	Kentucky bluegrass
MT	Montana
NASS	National Agricultural Statistics Service
ND	North Dakota
NM	New Mexico
NRCS	Natural Resources Conservation Service
NV	Nevada
OR	Oregon
PEDB	Published Estimates Data Base
QA/QC	quality assurance/quality control
R_BURN	residue burned (tons)
RES	residue (tons)
RL	residue loading (tons/acre)
SD	South Dakota
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
StFips	State-Federal Information Processing Standards
U.S. EPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture

UT	Utah
WA	Washington
WESTAR	Western States Air Resources Council
WGA	Western Governors' Association
WRAP	Western Regional Air Partnership
WY	Wyoming
YR_HAR	year harvested

EXECUTIVE SUMMARY

The Western Regional Air Partnership and its Fire Emissions Joint Forum (WRAP/FEJF) sponsored this project to investigate the alternatives to agricultural burning. The geographical scope of the project includes the 15 Western states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, North Dakota, New Mexico, Nevada, Oregon, South Dakota, Utah, Washington, Wyoming, and the tribal lands within these states.

The objectives of this project were designed to facilitate the development of crop production and agricultural burning activity data to support analysis of alternatives to burning, and they include:

- Development of a crop production database and an agricultural burning activity database;
- Identification of the "universe" of potential non-burning management alternatives;
- Design of a methodology to assess the impacts of alternatives (e.g., agronomic, environmental, economic, etc.);
- Identification of existing and potential accountability mechanisms for tracking if, and which, non-burning alternatives are used by federal, state, local, and tribal entities, and potential barriers to their implementation; and
- Development of a plan for implementing alternatives in the 15 Western states.

This analysis was supported by a three-tiered approach to research. The three tiers of sources included: (1) federal agencies such as the U.S. Department of Agriculture (USDA) and the National Agricultural Statistics Service (NASS); (2) agencies such as the University Agricultural Extension Services and state air agencies; and (3) private consortiums such as growers, producers, distributors, and information clearinghouses.

The results of this project are documented in two reports under the title "Non-Burning Management Alternatives on Agricultural Lands in the Western United States," Volume I and Volume II.

Volume I: Agricultural Crop Production and Residue Burning in the Western United States

The goal of the crop production database was to compile acres harvested by crop at the county level for all major crops harvested and/or crops known to be burned in each of the 15 Western states. The crop production database was developed from three main sources of information:

1. The NASS database;
2. State agricultural statistics data and reports; and
3. The 1997 Census of Agriculture.

Also, the Farm Service Agency (FSA) website was used to obtain information on lands included in the Conservation Reserve Program (CRP). Although the target year for these data was 1996, it was necessary to include 1997 data when 1996 data were missing for crops that were known to be burned. The crop database underwent an extensive quality assurance/quality control (QA/QC) process to ensure that at least 90 percent of the acres harvested of major (i.e., top 10) crops and 100 percent of all crops burned were accounted for in the database. In total, over 50 different crops were grown in the 15 Western states which amounted to nearly 77,000,000 acres harvested in a single year during the 1996/1997 timeframe. The resulting county-level data were mapped using a geographical information system (GIS) (see Appendix B).

The agricultural burning database was developed for purposes of identifying the extent of burning in the Western states, and to assist with the emissions inventory being developed by the WRAP/FEJF. The burning database was compiled from three types of data representing various geographical areas within the 15 Western states region:

- Burn permits issued or other mechanisms for determining actual burn activity;
- Emissions inventory estimates;
- Anecdotal information from surveys sponsored by the WRAP/FEJF, the Western States Air Resources Council (WESTAR); and
- Data resulting from peer review of the draft agricultural burn activity database prepared for this project.

Although a significant amount of data were obtained, burning was known to occur in certain counties and states for which data were unavailable. A gap filling technique was developed to provide estimates of acres and residues (tonnage) burned at the county level for those unaccounted areas (i.e., North Dakota, New Mexico, and South Dakota). Table ES-1 shows the results of the overall database in terms of average percentage of acres burned by crop. The resulting county-level data were mapped using GIS (see Appendix D).

Although the data that were collected and compiled were subject to specific QA/QC procedures, some of the data and results have inherent uncertainty. These uncertainties are due to such factors as use of "as is" data sets provided by the various sources and an inconsistent definition of "agricultural burning" within these data sets. Also, the gap filling averages used to provide missing data in some states cannot accurately depict actual burn activity that occurred in those states. Even for some areas where gap filling was not used, information originally provided for the draft database was revised with significantly different information obtained during the peer review process (e.g., Utah). While it can be concluded that the peer review process worked in this case, this result is illustrative of the need for a coordinated, systematic process to collect agricultural burning data, establish data quality objectives, and resolve conflicting data.

The researchers and peer reviewers contributing to the final agricultural burn activity database made the following recommendations pertaining to future improvements of this database:

1. Develop a mechanism (e.g., program, regulation, etc.) whereby the relevant state, county, tribal, agricultural, and stakeholder entities establish data quality objectives, define data sources, and compile data on a regular basis to estimate the extent of agricultural burning in the Western United States. Also, this mechanism should provide a consistent definition of the residue types to be included in the agricultural burning category.

2. Conduct research to identify and/or calculate specific yield-based RL factors for each geographical zone or area; and

3. Incorporate the impact of irrigated and nonirrigated land agricultural practices.

Table ES-1. Average Percentage of Acres Harvested that are Burned for Selected Crops in the Western United States

Crop	Acres Harvested[1]	Acres Burned	Overall Average Percentage of Acres Burned
Wheat	31,619,000	905,756	2.9%
Rice	500,000	254,706	50.9%
Corn	5,766,000	10,668	0.2%
Barley	5,696,900	137,872	2.4%
Sugarcane	42,900	30,000	69.9%
Orchards (Trees, Bushes, Vines)	2,497,767	530,100	21.2%
Grasses and Seeds	899,976	394,077	43.8%
CRP	286,174[2]	28,917	10.1%

Notes:

[1] Acres harvested and burned are for the 15 Western states, excluding Nevada because burning in that state was not identified for specific crops .

[2] Value represents number of acres in the Conservation Reserve Program (CRP).

Volume II: Non-Burning Management Alternatives and Implementation Plan Strategies

The majority of information collected and reviewed in this study suggests that states, local agencies, tribal communities, and fire control experts agree that the development and use of non-burning alternatives is desirable. However, identification, development, and use of these alternatives throughout the 15 Western states and tribal communities appears to be in the fundamental research stages. This fact, in combination with the lack in most states of formal requirements to implement non-burning alternatives, made identification and characterization of alternatives a difficult task. Over 20 different non-burning alternatives were identified in the following categories:

1. Leave residues in place either with or without infield residue treatment (e.g., cut, mulch, and drop in place; soil incorporation);

2. Improved management practices and scientific advancements in horticulture (e.g., genetic selection for disease/pest resistance or less fuel residual);

3. Alternative land use (i.e., conservation tillage; land conversion to non-agricultural use; and plant crops with residues that do not need to be burned); and

4. Residue collection and hauling for use offsite (e.g., haul to waste or landfill facility; haul to ethanol production facility).

In order to determine the reasonableness, or feasibility, of implementing non-burning management alternatives, it is important to assess the impacts they have on agriculture, the environment, and other aspects of society. In this study, the impacts to non-burning alternatives were defined and criteria were established for assessing their effects and determining the feasibility of implementation. The range of impacts due to implementation of non-burning alternatives included:

- Agronomic impacts—what happens to the agricultural production unit when an alternative is implemented, what the grower must do on the land and how does that change affect the productivity of the land;

- Environmental impacts—what effect does the alternative have on visibility, air quality, water quality, wildlife, and other vegetation;

- Health and safety impacts—what hazards do alternatives present in the workplace when implemented;
- Energy impacts—what are the impacts due to use of agricultural waste to produce energy;
- Economic impacts—what is the cost of implementation considering the difference in cost of agricultural operations between the traditional burning operation and the new alternative approach;
- Social and equity issues—beyond cost considerations, how are the growers, tribal communities, and other groups, affected by non-burning alternatives, and what is the equity of controlling some burning/crops and not others; and
- Political issues—when promotion of non-burning alternatives tends to antagonize farmers and agricultural interest groups.

Criteria were developed to evaluate each potential impact relative to a particular crop/alternative combination. A rating scheme using feasibility factors was developed that can be applied to the potential impacts relevant to each alternative being evaluated (e.g., 0 = No impact; 1 = Some impact/problem; 2 = Definite problem; and 3 = Major problem). High ratings indicate worse impacts relative to low ratings. This methodology is demonstrated in two case studies (for rice straw and grass seed) in order to show how to quantify some impacts (e.g., cost-effectiveness) and apply feasibility factors. As an example, the results showed for rice straw that the average feasibility factors for the non-burning alternatives ranged from 1.1 (least negative impact) for alternatives such as Cut/Collect and Haul to Ethanol Production Facility, to 2.1 (most negative impact) for Land Conversion to Non-Agriculture.

Accountability mechanisms are procedures used for tracking if, and to what extent, non-burning alternatives are used by local, state, tribal, or federal entities. In-place mechanisms are categorized and discussed. How the mechanisms support or promote the use of non-burning management alternatives is described in the implementation section (Section 7.0 of Volume II). The information gathered on accountability mechanisms came from state, county, local, and tribal environmental authorities representing all 15 Western states. The 17 different accountability mechanisms were identified in the following categories:

a. Accountability initiated at the state or regional level (i.e., exemption or inclusion of agricultural burning in regulations);

b. Accountability at the state or local level that supports active regulation of agricultural burning activities (e.g., existing regulations or rules addressing agricultural burning activities);

c. Accountability at a programmatic level that supports a formal approval and/or permitting process (e.g., smoke management programs);

d. Mechanisms that encourage accountability at the local level and provide information for applying non-burning alternatives to current agricultural burning practices (e.g., fuel types burned, emissions tracking); and

e. Mechanisms that facilitate and encourage the use of non-burning alternatives (e.g., pre-burn permits, financial assistance).

The presence, or in some cases absence, of accountability mechanisms appears to be an indicator of whether non-burning alternatives will be used in the Western states. In general, for states with aggressive mandates to reduce agricultural burning such as Washington, Oregon, and California, many accountability mechanisms are in place. These states also have the largest number of non-burning alternatives in use. An important finding, which served to complicate the identification and interpretation of information on accountability mechanisms, was the inconsistent definition of "agricultural burning" in the 15 Western states. For example, in some areas irrigation ditch, fenceline, and weed or land clearing for range land improvement is included in regulations covering agricultural burning; in other areas these are not addressed.

Non-statutory administrative barriers are those situations, circumstances, activities, or factors that serve to minimize, deter, or prevent the active use of non-burning alternatives. Eighteen barriers that fall into the following four categories were identified:

- *Economic challenges* including labor costs; increased liability; disposal, storage, packaging, or transport costs; availability and/or willingness of investors to provide capital for new technologies or non-traditional methods; market return; crop yield, quality, and production rates;

- *Geographical limits* due to climate or topography;

- *Political, cultural, or religious practices* including activities that center around agriculture/harvest activities or tribal ceremonies; historical promises of land as a lure to relocate;

- *Public acceptance* of a practice or program result (which may be closely tied to aesthetics); and

- *Aesthetics* including visual, olfactory, and auditory impacts, but possibly nuisance due to plant debris or dust in or near homes and businesses.

A strategy for increasing the development and use of non-burning alternatives is described as applicable to the 15 Western states. A detailed discussion lays out the critical elements of an effective implementation plan, including items such as developing a strategic plan, allocating resources, and providing consistent program implementation. Based on the results of this study and the suggested guidelines, recommendations were made for developing an successful non-burning alternatives program at the state, local, and tribal level:

1. Air quality or environmental program entities should conduct a focused review to identify the nature and extent to which agricultural burning contributes to air quality problems in the state, or local, or tribal area. A starting point for this review could be the evaluation of agricultural burning activity such as that presented in Section 3.0 of Volume II. A key element of this review that should be included is a careful consideration of the definition of "agricultural burning". This is important so that accurate comparisons can be made between other state, local or tribal programs.

2. If agricultural burning does not contribute significantly to local or statewide air quality problems which fall under the jurisdiction of the state, local or tribal entity, it is still recommended that the focused program assessment also take into account, to the greatest extent possible, the potential impacts agricultural burning may have on interstate regional air quality.

3. If agricultural burning is not found to be a significant source of air pollution for a given state, local region, tribal entity, or interstate region, it may not be necessary to continue with non-burning alternatives program development.

4. If agricultural burning is found to make a significant contribution to air quality problems on either a local, state, tribal community, or regional level, then the air quality or environmental agencies in authority in the affected areas and the areas contributing to the problems should work together to define solutions and develop non-burning alternatives programs. This will help to ensure success on a regional level.

5. If agricultural burning is found to be a significant source of air pollution for a given state, local region, tribal entity or interstate region, or if a given entity desires to more effectively implement non-burning alternatives, then an overall air quality review should be conducted to determine how to integrate agricultural burning. One goal of this review would be to determine which of the accountability mechanisms identified in Section

5.0 of Volume II are in place and how they are being used. Table 5-2 of Volume II can be used to determine specific accountability mechanisms and tailor the agricultural burning program.

6. For those states, local regions, and tribal entities desiring to more effectively address the use of non-burning alternatives in general, it is recommended that a list of effective and economically viable non-burning alternatives be developed (ideally including non-burning alternatives for use by crop, by season, and by region or area). Table 2-1 of Volume II (listing of non-burning alternatives by crop) can be used to identify specific alternatives. The criteria, methodology, and case studies described in Sections 3.0 and 4.0 of Volume II can be used to determine feasibility.

7. It is further recommended that a list, or in some cases multiple lists, of feasible non-burning alternatives should be maintained and updated periodically by the participating lead public or private entity. The list(s) should be made available using a variety of common effective communication strategies, methods, and technologies.

8. If non-burning alternatives have not been previously identified or have not been characterized for practical use an area, it is recommended that air quality and environmental entities work closely with university and agricultural extension scientists, affected agricultural community stakeholders, and interested members of the public to identify and characterize non-burning alternatives for specific use in their state or region.

9. WRAP member states should form a technical working group or task force to systematically identify and review the current use of non-burning alternatives and to make recommendations, if desired, on how and where the use of these non-burning alternatives may be improved or enhanced in other states, local regions, and tribal communities.

10. WRAP member states should work together to begin to address ancillary non-emission related program implementation issues, such as assisting the affected agricultural community and local business developers with post-residue removal product development, manufacturing, distribution, and marketing. Although this often falls outside the traditional charter of most state air quality and environmental programs, it does not fall outside the realm of services offered by other state agencies, boards and environmental departments. Some states have taken steps to assist in the research and development stages but their efforts have not extended to distribution and marketing.

11. It is highly recommended that the results of this and any of the above mentioned program efforts be carried out in close coordination with a well defined stakeholder outreach, education and communication program.

The agency roles and responsibilities associated with the identification, development, and implementation of non-burning alternatives are not clearly identified for any of the 15 Western states. It is recommended that as non-burning alternatives programs are reviewed and developed in the future, that the air quality or environmental agency responsible for developing the non-burning alternatives program (see Recommendation 4 above) be the agency responsible for monitoring and implementation. Regional approaches to defining responsibility for non-burning alternatives programs are also needed. This is in response to instances such as the relocation of grass seed companies within the last five years from Washington and Oregon to Wyoming where there are relatively less stringent air quality regulations.

A well designed, closely coordinated, and consistently implemented stakeholder involvement, outreach, and communication effort is essential to the success of any non-burning alternatives program. Stakeholder involvement is not only an important way to encourage the use of non-burning alternatives, it will be key in developing future alternatives to infield burning of agricultural residues.

A number of directions for further research and information development are recommended for the Western states and tribal communities in order to increase knowledge and encourage use of feasible non-burning management alternatives:

- Better characterization of agricultural burning activities in the 15 Western states and tribal communities, including development of a consistent definition for “agricultural burning”;
- More thorough collection and evaluation of agricultural burning activity data (e.g., daily acres burned by county, permits records, etc.) by regulatory agencies and stakeholders;
- More thorough assessment of the air quality impacts from agricultural burning;
- On-going investigation into effective non-burning alternatives;

- Effective inclusion of stakeholders in the identification and implementation of non-burning alternatives; and

- Development of a well designed, consistently implemented stakeholder outreach, education, and communication programs that address local, state, tribal, and regional issues pertaining non-burning alternative program implementation.

1.0 INTRODUCTION

Air emissions from burning agricultural residue, primarily consisting of fine particulate matter (CARB, 1996), can impact visibility in Class I areas located near burns, as well as those Class I areas located far away through regional transport. The Western Regional Air Partnership (WRAP) and its Fire Emissions Joint Forum (FEJF) sponsored this study to assess the non-burning alternatives to infield burning of agricultural residues, including their impacts on the environment, economy, health and safety, society, politics, and on the business and productivity of the agricultural industry. This study was performed under the Western Governors' Association (WGA) Contract 30203-31 by Eastern Research Group, Inc. (ERG) and Enviro-Tech Communications (ETC).

In the context of this study, "agricultural burning" is defined as the burning of organic crop residue consisting of field crops, wood, and leaves. Also, the burning of ditch banks adjacent to, or associated with, crop production are included in this evaluation of alternatives to agricultural burning. The geographical scope of the project includes the 15 Western states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, North Dakota, New Mexico, Nevada, Oregon, South Dakota, Utah, Washington, and Wyoming, as well as tribal lands in these states.

The temporal scope of the data collected for this project was 1996, chosen to coincide with the WRAP base year emissions inventory effort. However, as described herein, it was necessary to use data from 1997 or other years in some cases when 1996 data were not available. This use of various years of data is an important limitation of the results of this project. There is no assurance that 1996 crop production acreage, for example, is indicative of 2001 acreage due to factors such as increasing urbanization and regulatory impacts. Also, crop rotations will impact year-to-year variations.

1.1 Study Objectives

The objectives of this study are diverse. They are designed to facilitate development of crop production and agricultural burning activity data to support analysis of the alternatives to burning—which is the main objective of this study. Also, these data are used for

estimating emissions from agriculture burning under another project. The specific objectives of this study are as follows:

1. Identification of crops grown and the extent to which residue is disposed of through burning for the 15 Western states. The goal is to develop county-level estimates of acres harvested and acres (or residues) burned by crop for each of the 15 Western states.

2. Display of the crop and residue burned data using a geographical information system (GIS). The goal is to illustrate the level of crop production (acres harvested) and agricultural burning (acres or residues burned in tons) within the 15 Western states. The GIS maps provide a useful means to compare burning activity county-to-county, and to ensure that all available data are included and that gap-filling procedures provide accurate results.

3. Identification of potential alternatives to agricultural burning and characterization of their agronomic, environmental, health and safety, social, economic, and political impacts. A three-tiered approach to collecting information on the potential impacts to non-burning alternatives is employed. The three tiers include: (1) federal agencies such as the United State Department of Agriculture (USDA); (2) state agencies such as the University Agricultural Extension Services; and (3) private consortiums such as growers, producers, distributors, and information clearinghouses.

4. Development of criteria for selecting reasonable non-burning alternatives, cost-abatement curves (i.e., cost of alternative by crop), and examples of how to apply the criteria and cost-abatement curves (i.e., case studies) to evaluate alternatives. The goal is to develop a global methodology that can be used to assess the reasonableness of non-burning alternatives; thereby, minimizing the need for region-and crop-specific assessment when possible.

5. Identification of existing and potential accountability mechanisms for tracking if, and which, non-burning alternatives are used by federal, state, local, and tribal entities. The goal is to describe the specific mechanisms, mainly statutory and currently in-place (e.g., required burn permits, available financial incentives, agricultural burning exemptions, etc.), that support, promote, or hinder the implementation of non-burning alternatives.

6. Identification of existing and potential barriers to the use of non-burning alternatives including non-statutory barriers (e.g., public acceptance, cultural practices, etc.) and recommendations on how these can be overcome. This objective presents the “flip-side” of Objective 5

(accountability mechanisms) in order to understand the current limitations (i.e., non-regulatory) to new program development and implementation of non-burning alternatives.

7. Development of a plan for implementing a non-burning program based on the analysis, findings, and recommendations developed in this study. The goal of the implementation plan is to give the WRAP/FEJF a "course of action" for implementing the recommendations developed under this project. The plan recommends agency responsibilities for implementation, and methods for disseminating information to stakeholders such as private landowners and others who will ultimately be responsible for implementing non-burning strategies.

1.2 Data Collection Methodology

Data were collected for this project based on a three-tiered approach. The first-tier sources were expected to have the highest quality data; the second-tier sources were expected to have readily available data; and, the third-tier sources were anticipated to provide additional crop-, state-, or regional-specific information pertaining to the identification and use of non-burning management alternatives. The primary data sources used in this project were as follows:

- Tier 1 sources included the Farms Services Agency (FSA), Economic Research Service, National Agricultural Statistics Service (NASS), USDA within each state, several state Natural Resources Conservation Service (NRCS) offices, Federal Agricultural Research Centers;
- Tier 2 sources included land grant universities, joint agency working groups and task forces (e.g., California Advisory Committee on Alternatives to Rice Straw Burning), State Agricultural Research Centers, University Agricultural Extension Services, divisions or departments of pesticide management; and
- Tier 3 sources included various private consortiums, farmers, distributors, professional agricultural organizations, and information clearinghouses.

Specific data sources are discussed as they pertain to crop production and residue burning, and identification and implementation of non-burning management practices.

1.3 Document Organization

This document is organized into two volumes that address all of the objectives of the project. Earlier in-progress work was reported in three draft reports–the Task 1 Draft Report

which addressed Objectives 1, 2, and 3; the Task 2 and Task 3 Draft Report which addressed Objectives 4, 5, and (partially) 6; and, a Draft Final report which provided a complete initial analysis addressing all objectives. A detailed description of the content of the final Volume I and Volume II reports, and how the study objectives are addressed within each report is as follows:

- Volume I: Agricultural Crop Production and Residue Burning in the Western United States:

  — Section 1.0 describes the project background and objectives. This section also explains the data collection methodology and organization and content of the Volume I and Volume II reports.

  — Section 2.0 describes the development and results of the crop production database (Objectives 1 and 2). This section quantifies the level of crop production in each of the 15 Western states, including the number of acres harvested by crop and county. The results are presented in various tables and maps. A detailed quality assurance/quality control (QA/QC) procedure ensures the accuracy of the results.

  — Section 3.0 describes the development and results of the agricultural burning database (Objectives 1 and 2). This section explains the data collection and compilation procedure used to compile the burn activity data (e.g., acres and residues [tons] burned by crop and county). Also, since only limited data on actual burn activity is available in the 15 Western states, a gap-filling procedure is employed to provide estimates in states/counties where burning is known to occur, but records on specific quantities are not tracked. The results are presented in various tables and maps.

  — Section 4.0 provides relevant conclusions and recommendations pertaining to the crop production and agricultural burning databases.

  — Section 5.0 lists the references used in the development of Volume I, including reports, journal articles, websites, and personal communication.

  — Appendix A contains a listing of the crop production data (i.e., acres harvested by crop, county, state).

  — Appendix B contains the crop production GIS maps for each state.

- Appendix C contains listings of the agricultural burning activity data (i.e., residues burned [tons] by crop, county, state).

- Appendix D contains the agricultural burning activity GIS maps for each state.

- Appendix E contains relevant tables from Volume II.

- Volume II: Non-Burning Management Alternatives and Implementation Plan Strategies:

  - Section 1.0 describes the project background and objectives. This section also explains the data collection methodology and organization and content of the Volume I and Volume II reports.

  - Section 2.0 describes the "universe" of non-burning alternatives which are in-use, or have been used in the past in the 15 Western states (Objective 3). The alternatives are listed in a table based on applicable crop and by category (i.e., leave in place, scientific improvements, alternative land use, cut or collection and haul).

  - Section 3.0 presents a methodology for assessing the impacts of non-burning alternatives (Objective 4). First, the different types of potential impacts are described (i.e., agronomic, environmental, health and safety, energy, economics, social and equity issues, and political). Criteria are presented to assist in evaluating the relative feasibility of implementing alternatives (e.g., agronomic–soil compression, increased water use; economic–not cost-effective, substantial farm stress, etc.). A table shows available sources of information and expected outcomes of the analysis for each of the impacts. A methodology that can be used to evaluate these impacts for various crops/alternatives is described.

  - Section 4.0 contains two case studies that illustrate the methodology developed to analyze the impacts of non-burning alternatives (Objective 4). Impacts of non-burning alternatives for two significant crops (rice and grass seed) are described. The criteria developed in Section 3.0 are used to evaluate the impacts. Cost curves display the economic impacts of implementing non-burning alternatives.

  - Section 5.0 presents the accountability mechanisms currently in place, or practiced in the past for implementing and tracking progress of alternatives to agricultural burning (Objective 5). A table lists the 17 mechanisms identified through an extensive research effort, along with the state/county where each mechanism is employed.

— Section 6.0 describes the non-statutory administrative barriers currently existing at the state level for each of the 15 Western states (Objective 6). Where they exist, county- and local-level barriers are discussed, along with barriers affecting tribal communities' ability to implement non-burning alternatives.

— Section 7.0 provides a summary of strategies for increasing the development and use of non-burning management alternatives on agricultural lands in the 15 Western states (Objective 7). A summary of the overall results of the entire project is presented along with conclusions and recommendations for future work. The contents for each section of a "state-specific" implementation plan are described, strategies to address stakeholder involvement are given, and suggestions for further research and information development are made.

— Section 8.0 lists the references used in the development of Volume II, including reports, journal articles, websites, and personal communication.

— Appendix A contains a detailed listing of the participants (i.e., name, affiliation, phone, fax, e-mail) contacted as part of the informal survey conducted for this study.

— Appendix B gives a project case study (Alaska Agriculture Project, Delta Junction) that presents realistic information on the success and challenges encountered when developing and implementing a non-burning program in the West.

— Appendix C contains relevant tables from Volume I.

2.0 CROP PRODUCTION IN THE 15 WESTERN STATES

Information on the amount, type, and location of crops grown in the 15 Western states forms the foundation for quantifying the amount of agricultural burning that occurs, and provides the basis for an analysis of the alternatives to burning and their impacts. Quantification of crop production is followed by identification and quantification of residues, or fuels subject to agricultural burning. This section describes the sources of information used to develop the database of crop production statistics, how they were compiled and checked, and the results of the compilation.

2.1 Sources of Crop Production Data

The three sources of data used to compile a crop production database for the 15 Western states are described next. In general, all of these sources rely on surveys from a sample of farms and ranches within their geographical jurisdiction that result in county-level statistics. Crop production on tribal lands is included in these county-level statistics.

2.1.1 National Agricultural Statistics Service Database

The NASS database was the first data source to be reviewed and compiled. The NASS is under the administrative jurisdiction of the USDA. The NASS annual county data for 1996 were downloaded from the NASS "Published Estimates Data Base" (PEDB) (NASS, 1996a). The county-level data in the PEDB are based on surveys from a sample of farms and ranches. Surveys are conducted in a variety of ways including mailed questionnaires, telephone interviews, face-to-face interviews, and field observations. The types of information that were obtained from the PEDB for use in the project included:

- Commodity (crop type);
- Year (1996);
- State name;
- County name;
- State Federal Information Processing Standards (FIPS) code;

- District code (i.e., three-digit code for state-defined regions comprising multiple counties);
- County FIPS code;
- Harvested acres;
- Planted acres;
- Yield (quantity of crop produced per acre);
- Yield units (e.g., BU = bushels, CWT = hundred weight, BAL = bales, etc.);
- Production (Harvested acres x Yield); and
- Production units (generally the same as yield units).

Priority was given to collecting complete data for harvested acres. No attempt was made to search for and fill data gaps for planted acres, yield, and production since these data are not as relevant to this study as are harvested acres.

The NASS data were chosen to provide the foundation for the crop database for several reasons. First, the NASS data were available for 1996 (target year for the database chosen to support WRAP emissions inventory efforts) and at the county level (level of spatial resolution desired for this study). Second, the NASS data covered the major crops grown in each state (i.e., wheat, barley, oats, rye, corn, rice, cotton, hay, and some vegetables and orchard crops). Third, the NASS data are available electronically thus making them easier to compile than other data sets that must be entered into electronic format from hard-copy reports. The NASS data provided a comprehensive "starting point" for the development of the crop production database. When crops were missing from the NASS data (i.e., crops known to be burned in certain states such as orchard crops in California and grasses and seeds in Oregon, Washington and Idaho), then other data were used to supplement the NASS data for these specific crops. These other data sources are described next.

2.1.2 State Agricultural Statistics and Reports

State agricultural statistics data and reports for 1996 were obtained from state links provided on the NASS website (NASS, 1996b). The state statistics and reports served as a secondary data source for identifying data on crops known to be burned which were not reported by NASS. Additional data for California were obtained from "1996 Agricultural Commissioners' Data Report" (CDFA, 1997) and the reports link found on the California Agricultural Statistics Service (CASS) website (CASS, 1996). The state total production quantities for each crop from the state data were compared to the NASS state totals to help identify incorrect data or errors that may have occurred during data download or manipulation. (This quality assurance step is discussed in detail in Section 2.3.)

2.1.3 1997 Census of Agriculture

The 1997 Census of Agriculture was reviewed (NASS, 1999). The NASS compiles the agricultural census every five years, with 1997 being the most recent year available. The census contains information on the market value of agricultural products sold, farms by market value, land use, selected crops harvested, and production expenses. The census data provided county-level crop data for crops not found in the PEDB or the state statistics publications; however, the census data were least preferred because they represented 1997 instead of 1996, which is the target year for this study.

2.2 Crop Production Data Compilation and Gap Filling

Crop data were collected by downloading electronic files and obtaining hard-copy reports from the NASS and state agricultural services. The steps for collecting crop data, along with filling data gaps were as follows:

1. Crop data for 1996 were downloaded from the NASS website for all crops, at the county level, for each of the 15 states.

2. Microsoft© Excel spreadsheets were developed from the NASS data for each state.

3. In some cases, crop totals were reported as "combined counties" totals. In these cases, the "combined counties" data were disaggregated to the county level according to the following procedure:

a. When a district contained some county-level data and a "combined counties" total, then the harvested/planted/production quantities were distributed over the counties with no production shown. However, if distribution would have resulted in 100 or fewer acres harvested for a given county, then the harvested/planted/production quantities were added to these totals for the county in the combined county's district with the largest number of harvested acres.

b. When a district contained only "combined counties" total (i.e., no county-level data were shown), then the harvested/planted/ production quantities were distributed evenly over all counties in the district. However, if distribution would have resulted in 100 or fewer acres harvested for a given county, then the quantities were distributed evenly over the two, three, or four counties adjacent to counties in neighboring districts having the largest number of harvested acres.

c. Recalculated yields (e.g., bushel/acre, tons/acres) whenever production quantities were distributed.

4. Data from the individual states' databases and/or hard-copy reports were compared to the NASS data to identify missing crops or incorrect values.

5. Data from the 1997 Agricultural Census were used in the absence of 1996 data to fill in data on missing crops for each state that may not have been collected by the NASS or states.

6. Although not technically considered a "harvested crop," information on the acreage planted under the Conservation Reserve Program (CRP) was included. The CRP is a program that provides funding for planting permanent vegetation on idle, highly erodible farmland. The CRP is administered by the Commodity Credit Corporation through the FSA. It is supported by the NRCS, Cooperative State Research and Education Extension Service, state forestry agencies, and the local Soil and Water Conservation Districts. The CRP acres by state and county in 1996 were obtained from the FSA (FSA, 1996) and were added to the crop production database.

7. Crop residues known to have been burned since 1996 were identified from surveys made by the Western States Air Resources Council (WESTAR) and the WRAP/FEJF (WESTAR, 1999; WRAP, 2001a).

8. Spreadsheets were imported into a single Microsoft Access 1997 (hereafter Access) database for use with GIS software for mapping. (Details on the geographic database are described in Section 2.5.)

The following issue should be noted with regard to the individual wheat categories (i.e., all, winter, spring, and durum) and hay categories (i.e., all, alfalfa, and other) contained in the compiled database. The total of wheat/winter, wheat/spring, and wheat/durum acreage may not sum to the wheat/all acreage for a given county. This anomaly is due to the combined effect of two factors. First, some of the NASS data could not be reconciled on the county level. Second, data for "combined counties" were disaggregated to specific counties. The same situation applies to hay. Although the wheat and hay types may not sum to the wheat/all or hay/all at the county-level, they do sum at the district- and state-level. This issue was discussed with the WRAP/FEJF Project Manager and it was agreed that it was adequate to have reconciliation at the district-level (Jenkins, 2001).

Table 2-1 shows the universe of crop production data collected for each of the 15 Western states. Table 2-2 shows the sources of the data used for each crop for each state according to the compilation procedure described above.

2.3 QA/QC Procedures

The QA/QC procedure was developed based on the United States Environmental Protection Agency's (U.S. EPA's) QA/QC document (EIIP, 1997). The purpose of this procedure is to ensure that the following data quality objectives for the crop database for the 15 Western states are met:

- To account for the major crops grown in each state, at the county level for 1996. *Metric*: collect county-level data for the top 10 crops (based on total acres harvested) in each state. For states with fewer than 10 crop types (e.g., Alaska and Hawaii), collect data for all of the crops comprising 90% of all acres harvested.
- To account for all crops subject to agricultural burning in each state, at the county level for 1996. *Metric:* Collect county-level data for all crops that are subject to agricultural burning.
- To account for acres harvested and production quantities for crops meeting data quantity objectives 1 and 2. *Metric:* Acres harvested quantities compare across alternative data sources within ±15% accuracy.

Table 2-1. Crops Harvested During 1996/1997 in the 15 Western States

Crop Types	AK	AZ	CA	CO	HI	ID	MT	ND	NM	NV	OR	SD	UT	WA	WY
Field Crops															
Barley	✔	✔	✔	✔		✔	✔	✔		✔	✔	✔	✔	✔	✔
Beans, Dry Edible			✔	✔		✔	✔	✔					✔	✔	✔
Canola														✔	
Corn for Grain		✔	✔	✔		✔	✔	✔	✔		✔	✔	✔	✔	✔
Corn for Silage		✔	✔	✔		✔	✔	✔	✔			✔	✔	✔	✔
Cotton, Upland and American Pima		✔	✔						✔						
Flaxseed								✔				✔			
Hay, All	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Hay, Alfalfa	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Hay, All Other	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Hops														✔	
Lentils						✔									
Oats	✔		✔	✔		✔	✔	✔			✔	✔	✔	✔	✔
Peas, Dry Edible			✔			✔								✔	
Proso Millet				✔								✔			
Rice			✔												
Rye								✔				✔			
Safflower			✔												
Sorghum		✔	✔	✔					✔			✔			
Soybeans								✔				✔			
Wheat, All		✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Wheat, Durum		✔	✔				✔	✔				✔			
Wheat, Other Spring				✔		✔	✔	✔		✔		✔	✔	✔	✔
Wheat, Winter All		✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Orchard Crops															
Almond			✔												
Apple		✔	✔						✔		✔		✔	✔	
Apricot			✔												
Avocado			✔												
Cherry			✔								✔		✔	✔	
Citrus		✔	✔												
Fig			✔												
Filbert											✔				
Grape		✔	✔								✔			✔	
Kiwi			✔												
Macadamia Nut					✔										
Nectarine			✔												
Olive			✔												
Peach		✔	✔								✔		✔	✔	
Pear		✔	✔								✔			✔	
Pecan			✔						✔						
Persimmon			✔												
Pistachio			✔												

Table 2-1. Continued

Crop Types	AK	AZ	CA	CO	HI	ID	MT	ND	NM	NV	OR	SD	UT	WA	WY
Plum and Prune			✔								✔			✔	
Walnut			✔												
Fruits and Vegetables															
Asparagus			✔											✔	
Blueberries														✔	
Pineapple					✔										
Other[1]	✔	✔	✔		✔				✔	✔	✔		✔		
Grasses and Seeds															
Alfalfa, Seed		✔	✔	✔		✔	✔			✔	✔	✔	✔	✔	✔
KBG, Seed						✔	✔				✔			✔	
Other, Seed[2]		✔	✔	✔		✔	✔				✔	✔	✔	✔	✔
Other															
CRP			✔	✔		✔	✔	✔	✔		✔	✔		✔	✔
Coffee					✔										
Mint						✔					✔				
Peanuts			✔						✔						
Potatoes	✔	✔		✔		✔	✔	✔	✔	✔	✔		✔	✔	✔
Sugarcane					✔										
Sugarbeets			✔	✔		✔	✔	✔			✔			✔	✔
Sunflowers				✔				✔				✔			

Sources: See Table 2-2

[1] Fruits and vegetables "other" = cabbage, carrots, lettuce, tomatoes, green peas, sweet corn, snap beans, dry onions, melons

[2] Grasses and Seeds "other" = bermuda, fescue, red clover, ryegrass

CRP = Conservation Reserve Program
KBG = Kentucky bluegrass

Table 2-2. Sources of Data for Crops Harvested During 1996/1997 in the 15 Western States

Crop Types	AK	AZ	CA	CO	HI	ID	MT	ND	NM	NV	OR	SD	UT	WA	WY
Field Crops															
Barley	1	1	1	1		1	1	1		1	1	1	1	1	1
Beans, Dry Edible			1	1		1	1	1					1	1	1
Canola														4	
Corn for Grain		1	1	1		1	1	1	1		1	1	1	1	1
Corn for Silage		1	1	1		1	1	1	1			1	1	1	1
Cotton, Upland and American Pima		1	1						1						
Flaxseed								1				1			
Hay, All	4	1	4	1	1	1	1	1	1	1	1	1	1	1	1
Hay, Alfalfa	4	1	4	1	1	1	1	1	1	1	1	1	1	1	1
Hay, All Other	4	1	4	1	1	1	1	1	1	1	1	1	1	1	1
Hops														1	
Lentils						4									
Oats	1		1	1		1	1	1			1	1	1	1	1
Peas, Dry Edible			3			4								4	
Proso Millet				4								4			
Rice			1												
Rye								1				1			
Safflower			3												
Sorghum		1	3	1					1			1			
Soybeans								1				1			
Wheat, All		1	1	1		1	1	1	1	1	1	1	1	1	1
Wheat, Durum		1	1				1	1				1			
Wheat, Other Spring		1	1	1		1	1	1		1		1	1	1	1
Wheat, Winter All															
Orchard Crops															
Almond			2												
Apple		4	3						4		4		4	2	
Apricot			3												
Avocado			3												
Cherry			3								4		4	4	
Citrus		4	3												
Fig			3												
Filbert											3				
Grape		2	3								4			4	
Kiwi			3												
Macadamia Nut					2										
Nectarine			3												
Olive			3												
Peach		4	3								4		4	4	
Pear		4	3								4			4	
Pecan			3						4						
Persimmon			3												
Pistachio			2												

Table 2-2. Continued

Crop Types	AK	AZ	CA	CO	HI	ID	MT	ND	NM	NV	OR	SD	UT	WA	WY
Plum and Prune			3											4	
Walnut			2								4				
Fruits and Vegetables															
Asparagus			3											4	
Blueberries														4	
Pineapple					2										
Other	1	4	3		2				4	4	1		4	4	
Grasses and Seeds															
Alfalfa, Seed		4	3	4		4	4			4	4	4	4	4	4
KBG, Seed						4	4				4			4	
Other, Seed		4	3	4		4	4				4	4	4	4	4
Other															
CRP			5	5		5	5	5	5		5	5		5	5
Coffee					2										
Mint						4					4				
Peanuts			3						1						
Potatoes	1	1		1		1	1	1	1	1	1		4	1	4
Sugarcane					1										
Sugarbeets			1	1		1	1	1			1			1	1
Sunflowers				1				1				1			

Data Sources:
1 = 1996 NASS Published Estimates Database (NASS, 1996a)
2 = State statistics database (NASS, 1996b)
3 = Other state data and reports (CASS, 1996; CDFA, 1997)
4 = 1997 Agricultural Census (NASS, 1999)
5 = Conservation Reserve Program (FSA, 1996)

The applicable functions of the types of QA/QC methods employed are shown in Table 2-3. The QA/QC methods shown on Table 2-3 were employed both before and after the crop production spreadsheets were converted into Access. A description of how these methods were used to evaluate the crop data are presented below.

2.3.1 Reality Checks: Compare Data to Standard Reference Value

The crop data compiled from the 1996 NASS were compared to the 1996 data in the state agricultural statistics annual reports. None of the data for crops reported in NASS were more than ±15% different from state data; thus, no changes were made.

For each state, Table 28 of the 1997 Agricultural Census (NASS, 1999) (i.e., "Specified Crops by Acres Harvested") was used to rank the top 10 crops based on acres harvested during 1997. These data were compared to the NASS data to ensure that the top 10 crops for each state were consistent between 1996 and 1997. If any top 10 crops were missing, then data were obtained based on the following data sources (in order of preference):

- State agricultural statistics reports for 1996;
- Other references for 1996; and
- 1997 Census of Agriculture.

The WESTAR agricultural burning survey and FEJF agricultural burning survey (WESTAR, 1999; WRAP, 2001a) were reviewed to determine the types of crops burned since 1996.

2.3.2 Peer Review: Checklist or Written Comments by Reviewer

Notes were kept on the data sources used to compile each state's crop data, gap filling techniques, and corrected errors. Notes were made on hard copies of the draft crop data spreadsheets for future review. A complete listing of data sources used is shown on Table 2-2.

Table 2-3. Summary of QA/QC Methods Used to Evaluate Crop Production Data

Method	Ensure Completeness of Data	Ensure Reasonableness of Data	Ensure Validity of Data and Assumptions	Ensure Mathematical Correctness	Ensure Accuracy of Data
Reality checks	✓	✓			
Peer Review	✓	✓	✓		
Sample Calculations			✓	✓	✓
Computerized Checks			✓	✓	✓
Independent Audits	✓	✓	✓	✓	
Validation	✓	✓	✓		✓

To ensure the completeness and reasonableness of the data collected (i.e., top 10 crops in each state and all crops that could potentially be burned), the database was distributed to members of the FEJF for review of their respective states. A "Peer Reviewers Checklist" was provided to facilitate consistent and useful comments from the reviewers. Checklists were completed and returned by state personnel from the states of Alaska, Arizona, California, Idaho, Oregon, Utah, and Wyoming. Some crop information for the states of Arizona (i.e., harvested acres for apples, citrus, cotton, grapes, hay, peaches, and pears) and Utah (i.e., harvested acres for apples, beans, cherries, peaches, and potatoes) were changed.

2.3.3 Sample Calculations: Replication of One Set of Calculations

Generally, calculations related to the crop data were not performed; however, some simple calculations were performed to ensure mathematical correctness and accuracy of data. For example, county-level crop data were summed to ensure that county totals sum to district and state totals reported in the data sources.

2.3.4 Computerized Checks: Electronic Methods of Checking

Completeness and consistency checks were performed on the crop data. These were conducted on specific data elements as follows:

- County and state names and FIPS codes were checked against those included in the GIS database to ensure consistency of spelling and codes;
- Tables indexing crop names were developed and compared to ensure consistency in crop names among states; and
- After spreadsheets were imported into one database, the totals for acres harvested and production quantity were summed to ensure these totals matched the "State Total" data for each crop by county.

2.3.5 Independent Audits: Systematic Evaluation to Determine Quality

The WRAP/FEJF Project Manager conducted an independent audit of the crop database in order to:

- Evaluate the effectiveness of the technical and quality assurance procedures used to develop the data;

- Help ensure the completeness and accuracy of the data;
- Determine whether data quality objectives were met; and
- Determine the need for additional QA/QC measures.

Based on the review by the WRAP/FEJF Project Manager, data were added for acres of land included in the Conservation Reserve Program in 1996 (FSA, 1996).

2.3.6 Extended Peer Review: Local Knowledge

Validation of the crop data can be conducted in two ways:

1. The crop data could be compared to actual field observations. However, this is not a feasible exercise given the time and budget constraints of this study.
2. The knowledge possessed by many of the state representatives on the FEJF could be used in lieu of actual field observations to:
    a. Ensure the major crops are accounted for;
    b. Ensure the crops that could potentially be burned are accounted for; and
    c. Provide additional reality checks on the values of acres harvested, acres planted, production, and the location of the crops by county.

The review shown in the second step–an extended peer review–was conducted by FEJF and states' representatives. The changes resulting from comments received by the reviewers in Arizona and Utah are described above in Section 2.3.2.

2.4 Results of Compiled Crop Data

Table 2-4 shows the number of acres harvested for the top 10 crops (i.e., largest number of harvested acres) within each of the states. The crops shown on Table 2-4 are grouped by the categories of "Cereals and Grains," "Orchard Crops," "Grasses and Seeds," and "Other."

Table 2-4. Summary of Crop Production of the Top 10 Crops Within the 15 Western States for 1996/1997 (Acres Harvested)

Crops	AK	AZ	CA	CO	HI	ID	MT	ND	NM	NV	OR	SD	UT	WA	WY	TOTAL
Grains and Hay																
Barley	6,900	54,000		92,000		730,000	1,150,000	2,600,000		5,000	150,000	145,000	100,000	440,000	120,000	**5,592,900**
Corn; for Grain		40,000		890,000			15,000	600,000	84,000		37,000	3,650,000	20,000	120,000	50,000	**5,506,000**
Corn; for Silage			275,000	90,000		68,000	39,000		44,000			320,000	40,000		33,000	**909,000**
Hay; Alfalfa	3,801	160,000	944,056	860,000		1,000,000	1,700,000	1,700,000	250,000	250,000	460,000	2,500,000	545,000	490,000	620,000	**11,482,857**
Hay; All Other	20,222	19,000	754,717	650,000		280,000	900,000	1,200,000	100,000	230,000	610,000	1,800,000	160,000	310,000	600,000	**7,353,939**
Oats	700						50,000	380,000			35,000	360,000	9,000		32,000	**866,700**
Proso Millet				125,765												**125,765**
Rice			500,000													**500,000**
Sorghum		45,000		260,000					225,000			145,000				**675,000**
Wheat; All		178,000	688,000	2,268,000		1,560,000	6,360,000	12,515,000	110,000	19,000	920,000	3,854,000	185,000	2,745,000	236,000	**31,638,000**
Orchard																
Almonds			400,692													**400,692**
Apples														154,930		**154,930**
Citrus		38,823	284,790													**322,690**
Grapes			721,505													**721,505**
Pecans									23,188							**23,188**
Grasses and Seeds																
Seeds; Alfalfa										11,731						**11,731**
Seeds; Other											513,246					**513,246**
Other																
Fruits and Vegetables	343	28,800	777,358		13,120				38,375	4,415			6,695	189,269		**1,058,375**
Beans; Dry Edible				125,000		93,000		570,000							31,000	**824,201**
Coffee					5,400											**5,400**
Cotton; Upland		314,000	995,000						55,000							**1,364,000**
Cotton; American Pima		40,300														**41,900**
Lentils																**65,540**
Macadamia Nuts					20,200											**20,200**
Mint											45,221					**45,221**
Peanuts									16,500							**16,500**
Peas; Dry Edible						71,507								126,975		**198,482**
Pineapple					20,000											**20,000**

Table 2-4. Continued

Crops	AK	AZ	CA	CO	HI	ID	MT	ND	NM	NV	OR	SD	UT	WA	WY	TOTAL
Potatoes	630					413,000				6,999	61,000		4,200	161,000		**642,629**
Soybeans								845,000				2,670,000				**3,515,000**
Sugarbeets						184,000	57,500								56,800	**298,300**
Sugarcane					42,900											**42,900**
Sunflower				107,000				1,165,000				690,000				**1,962,000**
Total	**32,596**	**917,923**	**6,341,118**	**5,467,765**	**101,620**	**4,399,507**	**10,271,500**	**21,575,000**	**946,063**	**527,145**	**2,831,467**	**16,134,000**	**1,069,895**	**4,737,174**	**1,778,800**	**76,918,791**

Data Sources:
1996 NASS Published Estimates Data Base (NASS, 1996a)
State statistics databases (NASS, 1996b)
Other state data and reports (CASS, 1996; CDFA, 1997)
1997 Agricultural Census (NASS, 1999)

These categories, which are different than those shown in Table 2-1, are used to facilitate development of fuel categories to be used in later analyses. Table A-1 in Appendix A shows state crop production data in terms of acres harvested for all crops for which data were collected.

As Table 2-4 shows, the greatest production of crops in terms of acres harvested is in the "cereals and grains" category, with hay and wheat varieties comprising the most acres. Although orchard crops and grasses and seeds make up a relatively smaller portion of the top 10 crops harvested, these are important crops to consider with regard to non-burning alternatives since their residues are widely burned in the West. The states of North Dakota, South Dakota, and Montana have the most acres harvested, primarily wheat. Although California ranks fourth in terms of top 10 crops harvested, it is an important state with regard to the individual top 10 crops harvested because their residues are widely burned (e.g., residues from orchard crops, especially almonds and walnuts).

The procedure used to compile the crop production database resulted in a comprehensive set of data depicting agricultural production during 1996/1997. For purposes of facilitating analysis of burn activity and alternatives to burning, this database is felt to be the best available. Also, having undergone qualitative and quantitative review, these data are also supported by the state agencies responsible for compiling and using these data. A limitation of these data is that they represent a combination of 1996 and 1997 activity (although for the most part, they are for 1996), depending on the state and crop grown; thus, these data should not be used to compare activity between states for the same crops. There is no assurance that 1996 crop production is similar to 1997 crop production within a given county due to factors such as increasing urbanization and crop rotation.

2.5 Development of the Geographic Database

The first step in the development of the geographic database was to import the crop production data. As noted in Section 2.2, Excel spreadsheets containing county-level crop production data (based on data from NASS and state agricultural services) were imported into Access. Before they were imported, a check was performed to ensure that all the Excel spreadsheets had the same fields (those listed in Section 2.1), as well as a field indicating whether data had been disaggregated from a district total or combined-counties total to

individual counties. After the files were imported, a check was performed to ensure that the number of records present in the Access database was equal to the number of records in the Excel spreadsheets.

A field called FIPS was then added to each record in the database, representing a concatenation of the two-digit state FIPS code and the three-digit county FIPS code. The reason for this is because the ArcView GIS software associates each state and county with a 5-digit FIPS code. The addition of the 5-digit FIPS code to the Access database allows each record in the database to be linked to ArcView geographic data files representing the locations of each state and county. Then an Access query was used to compare the state name, county name, and 5-digit FIPS codes used in ArcView to the state name, county name, and 5-digit FIPS codes present in the Access database. Discrepancies were corrected using the U.S. EPA's master list of FIPS codes (USEPA, 2001a).

Additional QA/QC procedures that were performed included the following:

- Access queries were used to sum the total acres planted, acres harvested, and production for an individual crop in all the counties within a state and to compare this sum to the record in the database showing the state total acres planted, acres harvested, and production. In cases where discrepancies arose, they were corrected by referring to the source data.
- Access queries were used to verify that only one record for each crop type in each individual county was present in the database. In cases where discrepancies arose, they were rectified based on consulting the source data.

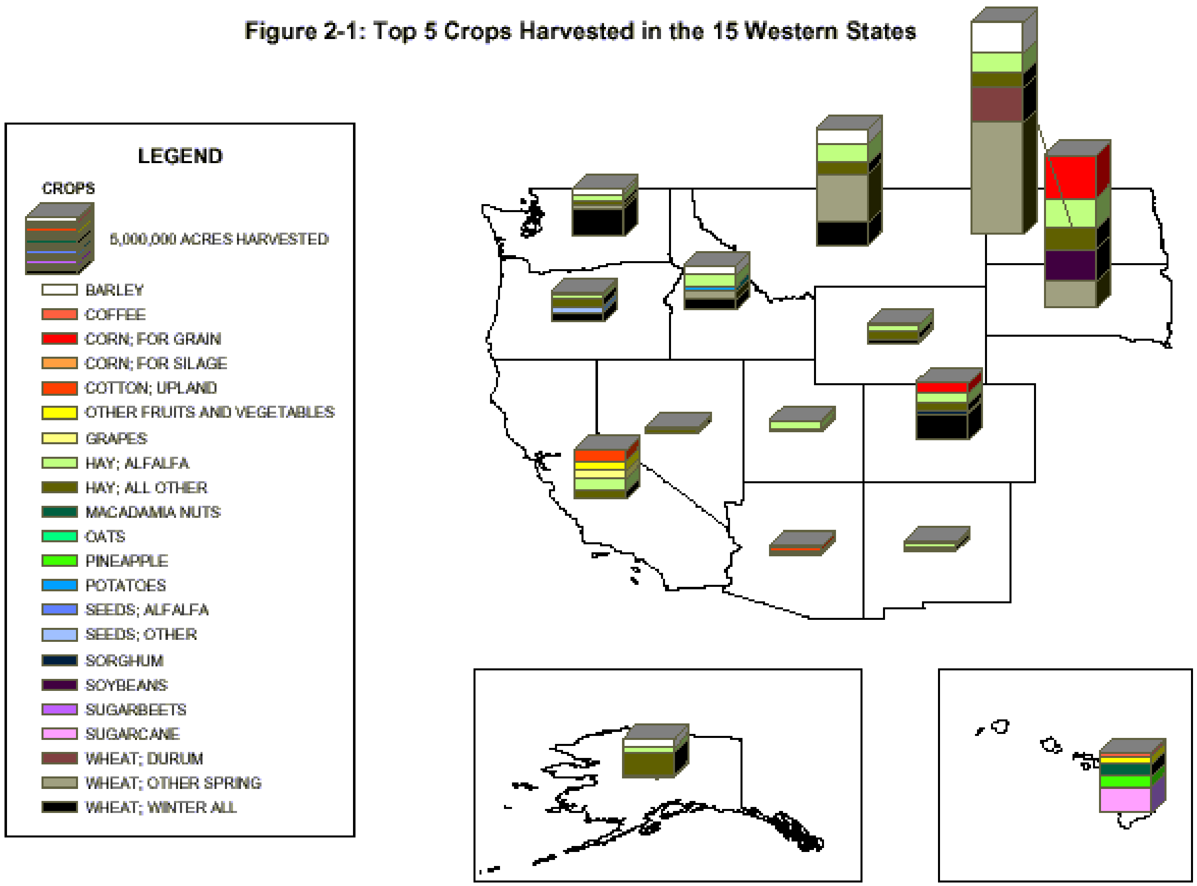
Printouts from the final crop production database are included in Appendix A.

In order to develop maps that would show the top five crops in each state and county, Access was programmed to generate a "GIS crop production summary table" that listed each state and county down the rows and all the available crops for which data was collected across the columns, filling the cells with the number of acres harvested for the appropriate crop in the appropriate county (or state as a whole) with the data present in the Access database. A version of this table (the "GIS Top 5 table") was created that showed only the acres harvested for the Top 5 crops grown in a county (or state as a whole), leaving the remaining cells blank. This

second table was imported into ArcView and linked to the program's geographic data files representing the locations of each state and county based on matching 5-digit FIPS codes.

A map showing the top 5 crops in all 15 Western states is included as Figure 2-1. This map uses the "GIS Top 5 table" to generate legends that show the relative number of acres harvested for each state (or county). Also, Appendix A contains maps of each state indicating the number of total acres harvested on the county level. The GIS tables were submitted to the WRAP/FEJF at the close of the project. These tables can be used to ArcView to make changes to the maps as necessary in the future.

Figure 2-1: Top 5 Crops Harvested in the 15 Western States



Note: Alaska and Hawaii are not to the same scale as the other states. Specifically, the height that represents 100,000 acres in the 13 (continental) states represents 1,000 acres in Alaska and 2,000 acres in Hawaii.

3.0 AGRICULTURAL BURNING ACTIVITY IN THE 15 WESTERN STATES

An important goal of this project is the development of an agricultural burning database for the 15 Western states. This database provides information on crop residues (total generated and total burned) by county for two purposes:

1. To identify the extent to which agricultural burning occurs, types of crops burned, and the location (i.e., county, state) and time (i.e., month, and day if feasible) when burning occurs in order to facilitate the evaluation of alternatives to burning and their impacts; and

2. To provide county-level (and sub-county level if feasible) data on residue burned by crop for estimating emissions from agricultural burning in the 15 Western states.

This section describes the sources of information used to develop the agricultural burning database, and how they were compiled, gap filled, and checked.

3.1 Sources of Agricultural Burning Data

The types of data needed to characterize agricultural burning include amount of residue burned and/or number of acres burned, by crop. For purposes of assessing burning and understanding the impacts of alternatives, monthly activity at the county and crop level are needed; however, to assist with emissions inventory development, daily activity and location-specific data are best. For example, information regarding the day of the burn is most desirable, but the season and/or month of the burn is sufficient. Also, information regarding the address or section (township and range) is best, but county location is sufficient.

Obtaining agricultural burning data presented a significant challenge. First, only a few states had organized smoke management programs that track actual burn activity. Some states provided agricultural burning activity data based on information collected for their emissions inventories. Also, anecdotal information was available for a few other states in the form of responses to surveys conducted by the WESTAR and the WRAP/FEJF (WESTAR, 1999; WRAP, 2001a), and an informal survey conducted by the investigators for this non-burning management alternatives project. Comments received during the review of the draft

database also resulted in new and/or revised estimates of agricultural burning activity in the Western states.

As mentioned above, documented agricultural burning activity data exist for only a portion of the 15-state domain, although agricultural burning is known to occur in nearly every state. Thus, it was necessary to devise a data gap filling procedure to provide the necessary data to complete the database. The results of the data compilation and the gap filling techniques are discussed next.

3.2 Agricultural Burning Data Compilation and Gap Filling

Agricultural burning data were compiled for the 15 Western states using several steps:

- First, actual burn data statistics were obtained as available (i.e., data from states and/or counties that compiled statistics on agricultural burning activity occurring in their jurisdiction).
- Second, a draft database was designed whereby the actual data were compiled into a consistent format. Gaps were "filled" to provide missing information.
- Third, the draft database was reviewed by the WRAP/FEJF members. From each state, including representatives from NRCS and other state-level and county-level agricultural, air quality, and fire departments.
- Based on comments received, changes were made and the database was finalized. This final database of agricultural burning activity data was provided to the WRAP/FEJF emissions inventory contractor for additional review and incorporation into the emissions inventory being performed under a separate project.

All of these steps are described in detail below.

3.2.1 Sources of Agricultural Burning Data

Table 3-1 shows the sources and general characteristics of data used to develop the agricultural burning activity database for the Western states. The burning activity data sets generally fall into three categories: data based on permits issued or other mechanisms for determining actual burn activity; data used to develop emissions inventory estimates; and

Table 3-1. Summary of Agricultural Burning Data Collected for the Western States

Data Set	Type of Data		Temporal Resolution[1]			Spatial Resolution			Sources(s)	Relevant Counties (Crops)
	Acres Burned	Residue Burned (Tons)	Year	Month	Day	State Level	County Level	Sub-County Level		
AZ	✔		2000-2001	✔	✔		✔		Graves, 2002	Graham, Cochise (various)
									Foster, 2002	Yuma (citrus, ditches/weeds, jojoba beans)
									Johnson, 2001	Yuma (citrus)
									Gabrielson, 2002	Pinal (ditches/weeds)
									Conrad, 2002	Pima (ditches/weeds)
									Tickes, 2002	Yuma (wheat, bermuda)
CA_Imperial	✔		1996	✔	✔		✔		ICAPCD, 2001	Imperial (various)
CA_Lake	✔		1997	✔			✔		WRAP, 2001a	Lake (various)
CA_Sac_Valley	✔		1996	✔	✔		✔		Fife, 2002	Sacramento Valley: Butte, Glenn, Colusa, Placer, Sacramento, Shasta, Sutter, Tehama, Yolo, Solano, Yuba (various)
CA_South_Coast	✔	✔	1996	✔			✔		SCAQMD, 2001	South Coast Air Basin: San Bernardino, Riverside (various)
CA_SJV	✔	✔	1999	✔	✔		✔	✔	SJVUAPCD, 2001	San Joaquin Valley Air Basin: Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare, Kern (various)
CO	✔		Avg	✔			✔		Sharkoff, 2002	Mesa (wheat)
HI	✔		1996	✔		✔	✔		WESTAR, 1999	All (sugarcane)
									MacCluer, 2002	All (pineapple)
ID	✔		1996	✔		✔	✔		WESTAR, 1999; IDEQ, 2001; Riley, 2002	All (various)
MT			1996	✔		✔			Coeffield, 2002	All (irrigated wheat)

Table 3-1. Continued

Data Set	Type of Data		Temporal Resolution[1]			Spatial Resolution			Sources(s)	Relevant Counties (Crops)
	Acres Burned	Residue Burned (Tons)	Year	Month	Day	State Level	County Level	Sub-County Level		
ND			Avg	✔		✔	✔		WRAP, 2001a; McDonald, 2002; Shaver, 2002	Pembina, Cavalier, Towner, Ramsey, Walsh, Nelson, Grand Forks, Benson, Eddy, Foster, Stutsman, Griggs, Steele, Traill, Barnes, Cass (wheat)
NM			Avg	✔		✔	✔		WRAP, 2001a; Shaver, 2002	All (wheat stubble); Curry (wheat stubble)
NV	✔		1998	✔		✔	✔		Sergent, 2002	All (unspecified)
OR		✔	1996	✔		✔	✔		WRAP, 2001a; ODEQ, 2001	All (various)
SD			Avg	✔		✔	✔		WESTAR, 1999; Stover, 2002; Shaver, 2002	All (barley, winter wheat)
UT	✔		1996	✔		✔	✔		WESTAR, 1999; UDEQ, 2001; Bernards, 2002; Goodrich, 2002	All (various)
WA	✔	✔	1999	✔		✔	✔	✔	WDOE, 2001a; WDOE, 2001b	All (various)
WY	✔		1996	✔		✔	✔		WESTAR, 1999; Potter, 2002	All (various)
									Grover, 1998	Big Horn, Hot Springs, Park (alfalfa seeds)
									Cunningham, 1998	Fremont (barley)
									Spiering, 1998; Shaver, 2002	Park (alfalfa and grass seed)

✔ Data are available. Blanks indicate that data are not available.

[1] "Avg" year means the specific year of burning could not be determined from the information provided. Months of burning for most states were determined as part of an informal survey conducted by Enviro-Tech Communications. See Appendix E (Tables 5-1 and 5-1a) for a summary of results from that survey. See Volume II for more details.

information obtained from informal telephone interviews and during the draft database review process.

Some data sets were developed based on documentation of actual burning that occurred as tracked by permit records for California (San Joaquin Valley, Imperial County, Sacramento Valley, and South Coast Air Basin), Arizona, and Washington. Other data sets were based on county-level data used to develop emissions inventories for Idaho and Oregon. Data sets that were developed using information obtained from surveys (WESTAR, 1999; WRAP, 2001a) and interviews conducted under this project include: CA_Lake (Lake County, only), HI, and WY. Data sets that were developed from information obtained during the peer review of the draft agricultural burning database prepared under this project include CO, MT, NV, and UT. Data sets developed using gap filling techniques supplemented with anecdotal information obtained during peer review include ND, NM, and SD.

The timeframes for the burn data vary from 1996 only, to data for 1996 through 2001. Data for 1996 were preferred because that is the year of the crop production data and the WRAP's base year emissions inventory. However, in order to provide data for as large of a geographic area as possible, it was necessary to use other years if 1996 data did not exist or were known to be largely incomplete compared to later years. For example, based on conversations with SJVUAPCD it was determined that although 1996 data are available in the CA_SJV data set, 1999 data are much preferred and more complete than the 1996 data due to improvements in data collection and management procedures. In California, the magnitude of agricultural burning appears to have been fairly constant during the years 1996-2000 based on the data sets reporting multiple years. Therefore, mixing years of burn data should not introduce significant error into the resulting emissions calculations. Also, officials in Washington stated that the data for 1999 are probably more indicative of 1996 burn activity contained in their database due to incomplete data in the database for 1996.

Even though the survey of burning activity by tribes in the WRAP region provided insight into the types of burning that occurs on tribal lands (i.e., range, agricultural, and wildland), the survey does not provide sufficient detail to allow quantification of burning in terms of acres or residue. The survey results show that of the 76 tribes that conduct prescribed burning, only 45 conduct agricultural burning (WRAP, 2001b). Of the 45 respondents/

reservations conducting agricultural burning, the survey categorizes the reasons for burning as weed abatement and ditch and canal clearing. Only one survey respondent mentioned a crop type (i.e., "stubble"). Based on this survey alone, it might be concluded that agricultural burning within reservation boundaries is relatively insignificant compared to agricultural burning outside of reservation boundaries. In Northern Idaho, for example, state officials report that more acres of Kentucky bluegrass are burned within reservation boundaries than are burned outside of reservation boundaries (Riley, 2001).

3.2.2 Database Development

A database was designed to provide a consistent format for compiling the existing burning data (i.e., as shown on Table 3-1). Table 3-2 shows the data fields in the agricultural burning database. Database tables were developed and populated with data from the data sets listed in Table 3-1, and data contained in the crop database. Crop data were used to determine county-level burn activity on the basis of crop activity for data sets that contained only state level data (explained below). Lookup tables were developed to appropriately link crop names (from the crop database) to commodity names (in the burn data sets).

Several other steps were applied to the data sets shown in Table 3-1 as they were imported into the new database to ensure ensure consistency and maintain the correct level of spatial and temporal resolution. These steps were:

- For burn activity data reported on a statewide level (e.g., sugarcane in Hawaii, wheat in Montana), the acres burned were assigned to counties based on the acres harvested of those crops burned. For example, for Montana it was estimated that 1% of the irrigated wheat stubble is burned (Coeffield, 2002). Therefore, these acres burned were distributed over the counties where irrigated wheat was harvested based on the percentage of the harvested acres within each county.

- For burn activity data reported for aggregated crops (e.g., cereal grains, orchard prunings, etc.), the acres burned were assigned to counties based on the acres harvested of those crops from the crop database that comprised the aggregated category. For example, the CA_South_Coast (Riverside County) data set included acres burned of "orchards." These residues were linked to the crop data for the orchard crops grown in Riverside County (i.e., almonds, apples, cherries, persimmons, pistachios).

Table 3-2. Description of the Agricultural Burning Database for the Western States

Database Fields		Units/ Format	Data Source or *Calculation*
COMM	Commodity or crop	Text	Crop database
YR_HAR	Year harvested	YY	Crop database
STATE	State name	Text	Crop database
StFips	State FIPS code	##	Crop database
COUNTY	County name	Text	Crop database
CoFips	County FIPS code	###	Crop database
AH	Acres harvested	Acres	Crop database
RL	Residue loading	Tons/Acre	AP-42, ARB, other
RES	Amount of residue	Tons	*AH x RL*
A_BURN	Acres burned	Acres	Actual data
Year	Year burned	YY	Actual data
Month	Month burned	MM	Actual data
Day	Day burned	DD	CA_SJV and WA, only
R_BURN[1]	Residue burned	Tons	*RL x A_BURN*
Avg_State[2]	State average % burned by crop	%	*A_BURN/AH*
Avg_Crop[3]	Crop average % burned	%	Average of all Avg_State by crop

Notes:

[1] R_BURN (residue burned) is reported directly by Oregon; thus, this value is taken as reported and is not calculated according to this procedure for Oregon.

[2] Avg_State is calculated based on actual and anecdotal information for the data sets shown in Table 3-1. Each average is weighted according to the total acres of each crop harvested in each county within each data set. In some cases, this average represents a "data set" average if the data set contains information for areas not comprising an entire state (e.g., CA_SJV).

[3] Avg_Crop is calculated as a weighted average of the Avg_State amounts from each data set. Each average is weighted according to the total acres of each crop harvested within the geographical area covered by each data set.

Italics indicate the data value is *calculated*.
= Indicates 2-digit numerical value
= Indicates 3-digit numerical value

Total orchard residue was disaggregated based on the percentage that each crop represented of the total acres harvested of these orchard crops in Riverside County.

- For burn activity data reported on an annual basis, anecdotal information was used to assign burning activity to specific months. For example, burning of grass seeds and grain field stubble occurs in the months of July, August, and September, in Oregon (WRAP, 2001a). Therefore, the residues burned were distributed (evenly) over these three months.

After all the data sets had been imported and linked with the appropriate data from the crop database, individual tables for each geographic area were imported into Excel spreadsheets for additional processing (e.g., calculating additional averages to be used in gap filling areas where burn data do not exist) and quality checking.

3.2.3 Residue Loading Factors

Another important type of data that was used to estimate quantities of residues burned was residue loading factors. Residue loading (RL) factors were matched to specific crops, and residues were calculated (i.e., acres harvested x RL = residue). A summary of these factors, which are based on various studies and research into the yields of residue of specific crops, is shown in Table 3-3. The factors shown on Table 3-3 come from several sources including AP-42 (USEPA, 1995), CARB (CARB, 2000), Jenkins and Sumner (1986), and others.

As Table 3-3 shows, most of the RL factors chosen for this study are crop-specific, and do not necessarily take into account the differences in yield (which can determine amount of residue generated) based on geographic variability. Also, differences between irrigated (relatively high yield) as compared to non-irrigated land (relatively low yield) are important; these are not evident in the crop-based RL factors shown on Table 3-3. For example, dryland farmers in eastern New Mexico yield 17 to 25 bushels/acre of wheat; in parts of Washington the yield is 90 to 125 bushels/acre. This can make a very big difference in the residues generated (Shaver, 2002).

In the case of wheat yields in Colorado, Table 3-3 shows the difference between a Colorado-specific RL (i.e., 4.0 tons/acre for irrigated, spring wheat) as compared to the AP-42 RL (i.e., 1.9 tons/acre) and the New Mexico RL (i.e., 1.5 tons/acre). The Colorado RL was based

Table 3-3. Residue Loading Factors for Crops Burned in the Western States

Fuel Type	States Where Crops are Burned[1]	Residue Loading (tons/acre)[2]	Comments/Sources of Residue Loading
Grains and Hay			
Barley	CA, ID, OR, SD, UT, WA, WY	1.7	
Corn, Grain	AZ, CA, OR, WA	4.2	
Hay, Alfalfa	CA, WA	0.8	
Hay, All Other	CA, WA	0.8	
Hops	WA	1.9	Wheat RL
Oats	CA, OR, WA	1.6	
Rice	CA	3.0	
Rye	CA	1.9	Wheat RL
Sorghum	CA	2.9	
Wheat	AZ, CA, ID, MT, ND, OR, SD, UT, WA	1.9	
Wheat (spring, irrigated)	CO	4.0	Sharkoff, 2002 (CO only)
Wheat	NM	1.5	Shaver, 2002 (NM only)
Orchard			
Almond	CA	1.0	
Apple	AZ, WA	2.3	
Apple	CA	0.8-1.0	Beyer, 2002[3] (CA only)
Apricot	CA	1.8	
Avocado	CA	1.5	
Cherry	CA, WA	1.0	
Citrus	AZ, CA	1.0	
Date	CA	1.7	Orchard Pruning, Unspecified RL
Fig	CA	1.7	Orchard Pruning, Unspecified RL
Grape	CA, WA	2.5	
Kiwi	CA	1.7	Orchard Pruning, Unspecified RL
Nectarine	CA	1.7	Orchard Pruning, Unspecified RL
Olive	CA	1.7	Orchard Pruning, Unspecified RL
Peach	CA, WA	2.5	
Pear	CA, WA	2.6	
Pecan	AZ, CA	1.7	Orchard Pruning, Unspecified RL
Persimmon	CA	1.7	Orchard Pruning, Unspecified RL
Pistachio	AZ, CA	1.7	Orchard Pruning, Unspecified RL
Plum and Prune	CA, WA	1.2	
Pomegranate	CA	1.7	Orchard Pruning, Unspecified RL
Quince	CA	1.7	Orchard Pruning, Unspecified RL
Walnut	CA	1.2	
Orchard Pruning, Unspec.	AZ, CA, WA	1.7	
Orchard Removal, Unspec.	CA, UT, WA	15.0	Jenkins, 2001
Grasses and Seeds			
Seeds, Alfalfa	ID, WA, WY	0.8	IDEQ, 2001
Seeds, KBG	ID, WA	2.0	IDEQ, 2001
Seeds, Other, Unspec.	AZ, CA, WA, WY	2.0	Assume same as KBG
Bermuda	AZ, CA	2.0	Assume same as KBG

Table 3-3. Continued

Fuel Type	States Where Crops are Burned[1]	Residue Loading (tons/acre)[2]	Comments/Sources of Residue Loading
Grasses, Unspec.	CA, OR	2.0	Assume same as KBG
Fruits and Vegetables			
Asparagus	CA, WA	1.5	
Beans, Dry Edible	CA, WA	2.5	
Berries	CA, WA	1.7	
Canola	WA	1.3	Safflower RL
Mint	ID	0.5	IDEQ, 2001
Other fruits and vegetables	CA, WA	1.5	Jenkins and Sumner, 1986 (average of all vegetables)
Peanuts	CA	1.2	Potatoes RL
Peas, Dry Edible	CA, WA	2.5	
Pineapple	HI		Undetermined
Safflower	CA	1.3	
Sugarcane	HI	14.0	Midpoint of AP-42 RLs
Vegetables, Unspec.	CA	1.5	Jenkins and Sumner, 1986 (average of all vegetables)
Other Agricultural Related Fuels			
CRP	WA	2.6	Midpoint of AP-42 RL for grasslands
Ditches, fence line	AZ	1.6	Gabrielson, 2002 (AZ only)
Ditches, fence line	CA, ID, WY	3.2	Weeds, Unspecified RL
Ditches, fence line	UT	0.75	Goodrich, 2002 (UT only)

CRP = Conservation Reserve Program
KBG = Kentucky bluegrass
RL = Residue loading
Unspec. = Unspecified

Sources:
[1] Table 3-1 summarized for sources of information relating to burning of specific crop residues in states.
[2] AP-42 (USEPA, 1995) except where otherwise noted.
[3] This RL was not obtained in time to be included in the calculation of residues burned for CA as reported in the final database.

on an estimated yield of 110 to120 bushels/acre and an estimated straw (residue) of 70 lbs/bushel. This results in residue loading of 4.0 tons/acre (Sharkoff, 2002). Some USDA NRCS offices have compiled location-specific crop yields and average residue production factors that can be used to estimate crop residues for specific geographic areas. Although it was not feasible to conduct this level of research for this study, this type of work could be done to make improvements to the agricultural burning activity database in the future.

3.2.4 Percent Burned By Crop

The average percentage of acres burned (of total acres harvested) for wheat and barley was calculated using data for counties and states where burning actually occurred (i.e., 5.2% and 8.0%, respectively). These averages were used to estimate the residues burned in the states/counties where burning of these crops was known to occur, but for which no data were available. The states/counties to which these "gap filling" averages were initially applied within the draft agricultural burning database, included Arizona (Pinal county, only), Colorado, Montana, North Dakota, New Mexico, Nevada (all counties excluding Pershing), and South Dakota. However, based on the information obtained during peer review of the draft database, it was possible to replace most of the gap filled data with information provided by the USDA NRCS and other organizations. Only North Dakota, New Mexico, and South Dakota remain with gap filled data.

Also, overall state-level averages were calculated based on total acres burned divided by total acres harvested by crop for each state. Using the state-level percentage acres burned, an overall crop average was calculated for most crops in the agricultural burning database and compared to values provided in a 1997 study by the USDA Air Quality Task Force (AQTF) (USDA, 1997). These averages are shown in Table 3-4. (Acres harvested for Nevada is not included in any average calculation because the burn data were not reported for specific crops).

For wheat and barley, the gap filling averages (i.e., 5.2% and 8.0%, respectively) are larger than the overall state-level averages (i.e., 4.2% and 2.3%, respectively) because the state-level averages are based on state-level acres harvested as compared to the gap filling averages which are based on applicable county-level acres harvested. In this manner, the effect

Table 3-4. Average Percentage of Acres Harvested that are Burned for Selected Crops in the Western United States[1]

Crop	Acres Harvested	Acres Burned	Overall Average Percentage of Acres Burned
Wheat	31,619,000	905,756	2.9%
Rice	500,000	254,706	50.9%
Corn	5,766,000	10,668	0.2%
Barley	5,696,900	137,872	2.4%
Sugarcane	42,900	30,000	69.9%
Orchards (Trees, Bushes, Vines)	2,497,767	530,100	21.2%
Grasses and Seeds	899,976	394,077	43.8%
CRP	286,174[2]	28,917	10.1%

Notes:
[1] Acres harvested and burned do not include Nevada because burning in that state was not identified for specific crops .
[2] Value represents number of acres in the Conservation Reserve Program (CRP).

of any non-reported burning is not incorporated into the gap filling averages. Spreadsheets containing the data used to calculate both averages are located in Appendix C.

3.2.5 Comparison to USDA Air Quality Task Force Study

A comparison was made between the results shown on Table 3-4 and estimated values from a study sponsored by the USDA AQTF (USDA, 1997). The USDA AQTF study provides information on the extent of burning on croplands in the U.S. (plus information on wild fires and prescribed burning). The USDA AQTF document gives percentage of cropland burned by crop for 1992, and estimates quantities for 1997. A comparison of the USDA AQTF findings to the results shown on Table 3-4 is presented below:

- Sugarcane:
  - The USDA AQTF report indicates that 100% of sugarcane acres in Hawaii were burned during 1997.
  - Table 3-4 shows approximately 70% of sugarcane acres in Hawaii were burned (based on 1996 data).

  Differences are likely due to different years of data and methods used to compile results.

- Orchard Crops (fruits, nuts, grapes, berries, citrus):
  - The USDA AQTF report indicates that 5% of these orchards were burned in the U.S. during 1997.
  - Table 3-4 shows that approximately 21% of orchards were burned in the Western states (based on a combination of data from 1996-1999).

  Differences are likely due to different years of data and geographical coverage (i.e., entire U.S. as compared to Western states).

- Rice:
  - The USDA AQTF report indicates that 25% of rice acres were burned in California during 1997, and 19% were burned for the total U.S.
  - Table 3-4 shows that approximately 51% of rice acres were burned in 1996 (entirely in the Sacramento Valley).

Differences are likely due to different years of data. Note that rice straw burning phase-down goals limited burning to 200,000 acres per year for three years starting September 1998 (Senate Bill 218, Statutes of 1997, Chapter 745, Section 2; California Health and Safety Code, Section 41865).

- Small Grains:

  — The USDA AQTF report indicates that 15% of grain acres were burned in the Pacific Northwest during 1997, and 10% were burned in the rest of the U.S.

  — Table 3-4 shows that approximately 3% of wheat and barley were burned in the Western states. The state-level averages located in Appendix C show that the state average of wheat burned was 14% in Oregon (1996), 12.7% in Idaho (1996), and 6.4% in Washington (1999).

  The amount of wheat and barley burned are comparable between the studies. The Oregon and Idaho averages for 1996 (Appendix C) are comparable to the 1997 projection by the USDA AQTF for the Pacific Northwest. The Washington 1999 percentage is more than 50% lower than the USDA AQTF percentage which might indicate less wheat stubble burning in 1999 as compared to 1997. The overall averages for wheat (2.9%) and barley (2.4%) are significantly lower than the USDA AQTF estimate. The relatively low averages for wheat and barley are significantly impacted by burning activity in Colorado, Montana, North Dakota, and South Dakota. The number of estimated (or gap filled) acres burned in these states are fairly small compared to acres harvested.

- Grass Seed:

  — The USDA AQTF report indicates the following percentage of fields burned (no year is given):

    – Washington, 0%.

    – Oregon, 50%.

    – Idaho, 100%.

    – Rest of U.S., 50%.

  — Table 3-4 shows that approximately 44% of grass seed acres are burned in the study domain. Respective percentages for Idaho, Oregon, and Washington are 72%, 53%, and 5% (Appendix C).

  The relative amounts for these states are comparable between the studies.

3.3 QA/QC Procedure

A QA/QC procedure was developed for the agricultural burning data to ensure that the following data quality objectives were achieved:

- To account for all crop residues that were actually burned within states in the WRAP region based on actual burn data compiled by state/county agencies at the county level for 1996 or other years (1997-2000). *Metric:* Collect available county-level data for all crops that are subject to agricultural burning that represent at least 90% of the data available.
- Develop a procedure to estimate crop residues burned within states in the WRAP region for which data do not exist (i.e., gap filling). *Metric*: Estimates of crop residues burned compare to estimate by state peer reviewers within ±25% accuracy.

It should be reiterated that the baseline data available were for different years (e.g., CA_SJV for 1999, ID for 1996, etc.); thus, the various amounts of acres and/or residues burned, and the averages calculated from these acres and/or residues should not be compared. The use of crop data from one year and burning data for a different year (e.g., CA crop data for 1996 and CA_SJV burn data for 1999, etc.) introduces error into the resulting calculation of average percentage burned. Furthermore, there is no assurance that 1996 crop production reflects acreage subject to burning due to such factors as increased urbanization and regulation, and crop rotation.

The QA/QC methods used to evaluate the agricultural burning data, as they were provided by the various agencies and used in this analysis to provide an estimate of the extent of agricultural burning in the 15 Western states, is described next.

3.3.1 Reality Checks: Compare Data to Standard Reference Value

The resulting values of acres burned, residues generated, acres and/or residues burned from each of the source data sets were compared against the values in the spreadsheets generated from the database. Total acres or residues for the entire dataset were compared, and discrepancies were corrected in the spreadsheets and database when found. Random checks were done to compare specific county values in the source data sets to the values in the spreadsheets for residue, acres and/or residue burned, and discrepancies were corrected in the spreadsheets and database when found.

3.3.2 Extended Peer Review by FEJF and Other Stakeholders

The draft agricultural burning activity database was submitted to the WRAP/FEJF and other stakeholders on February 11, 2002, for a detailed review of methods, ancillary data (e.g., RL factors), and results. The database was actually converted into separate spreadsheets for each state to facilitate this review and make it easier for reviewers to provide comments. As a result of this extended review, extensive comments were received from the following stakeholders and incorporated into the final database, and this final report, as appropriate:

- USDA NRCS in the states of California, Colorado, North Dakota, New Mexico, Nevada, South Dakota, Utah, and Wyoming (Shaver, 2002; Beyer, 2002; Goodrich, 2002; Sharkoff, 2002);
- State, county, and local air agencies and fire departments in Arizona, Idaho, Montana, North Dakota, Nevada, South Dakota, Utah, and Wyoming (Tickes, 2002; Johnson, 2002; Graves, 2002; Foster, 2002; Conrad, 2002; Gabrielson, 2002; Coeffield, 2002; McDonald, 2002; Sergent, 2002; Stover, 2002; Bernards, 2002; Grover, 1998; Cunningham, 1998; Spierling, 1998); and
- Agricultural business in Hawaii (MacCluer, 2002).

3.3.3 Sample Calculations and Computerized Checks

Some sample calculations (by hand and using computer software) were performed to ensure mathematical correctness and accuracy of the database and resulting spreadsheets. For example, acres harvested were multiplied by residue loading factors to ensure that the "RES" (residue) amount of selected records were correct.

In some cases on the county level, the reported acres burned in the source data set exceeded the acres harvested (i.e., AH < A_BURN). One example of this was for Yuma County, Arizona, where 1,841 acres of "seeds; other" (i.e., all grasses and seeds not including alfalfa and KBG) were harvested in 1997 (NASS, 1999) and 4,700 acres of bermuda grass were reported as having been burned in 1997 (Tickes, 2002). These types of apparent discrepancies (i.e., it is possible that more acres were burned that were harvested due to such factors as crop loss due to disease, drought, etc.) were not resolved; the burn data were assumed to be the accurate measure of burning activity and a comparison to the acres harvested could not be made.

A QA/QC spreadsheet was developed by compiling subtotals of acres harvested (AH) and residue burned (R_BURN) for each crop, and comparing these against the AH values in the crop database and the R_BURN values in the agricultural burning database tables. Accountable differences in AH occurred when not all counties that grew/harvested a crop reported that crop as being burned. Again, the burn data were assumed to be the accurate measure of burning activity. This occurred mainly when the burn records represented daily activity (i.e., CA_SJV and WA data sets), and was corrected by distributing the AH quantities evenly over the daily burn records.

3.3.4 Independent Audit by Emissions Inventory Contractor

The WRAP/FEJF emissions inventory (EI) contractor conducted an independent audit of the agricultural burning database and spreadsheets to help ensure the completeness and accuracy of the data related to their EI development. Discrepancies (e.g., missing or incorrect month/day) were corrected. The EI contractor used the corrected agricultural burning data to develop an emissions inventory submitted by them under a separate contract (AS, 2002).

3.4 Results of Agricultural Burn Activity Data

Table 3-5 provides a summary of agricultural residues burned by state in the Western U.S. (14 states, not including Alaska which reports no agricultural burning). An overall comparison of states is not valid because these data represent different years; however, data for states with the same years can be compared. The total residues burned, by year and state are as follows (California is not included since it contains a combination of years – 1996, 1997, and 1999):

- 1996:
  - HI: 420,000 tons (all sugarcane residue);
  - ID: 811,018 tons (mainly wheat and barley residues, and ditches);
  - MT: 5,055 tons (all wheat residue);
  - NM: 6,560 tons (all wheat residue);

Table 3-5. Summary of Agricultural Residues Burned within the Western States for Various Years (1996-1999) (Tons)[1]

Fuel/Residue	AZ 2000/01	CA 1996/97/99	CO Avg	HI 1996	ID 1996	MT 1996	ND Avg	NM 1996/Avg	NV[2] 1998	OR 1996	SD Avg	UT 1996	WA 1999	WY 1996/97
Grains and Hay														
Barley		889			167,943					21,429	14,158	4,671	22,223	3,060
Corn, for Grain	1,680	36,380											3,310	
Corn, Unspecified										5,112				
Hay, Alfalfa		7,213											2,882	
Hay, All Other		361											327	
Oats		3,944								7,902			1,021	
Rice		764,293												
Rye		124												
Wheat, All	15,352	224,709			376,010	5,055	410,145	6,560		244,755		17,379	48,121	
Wheat, Spring			2,000										63,125	
Wheat, Winter All											84,140		223,869	
Grasses and Seeds														
Bermuda	9,400	49,224												
Grasses, Propaning										3,204				
Grasses, Stack Burning										38,205				
Seeds, Other		1,604											394	
Seeds, Alfalfa					6,701								1,959	9,600
Seeds, Grasses (Field Burning), Unspecified	3,014									569,616			542	2,000
Seeds, KBG					100,000								750	
Sudan		5,770												
Orchard														
Almond		310,836												
Apple	74	8,071											879	
Apricot		6,603												
Avocado		1,371												
Cherry		7,511											88	
Citrus	548	15,458												
Fig		12,097												
Grape		78,860											513	
Nectarine		6,951												
Olive		8,042												
Pruning, Unspecified	2	5,570											458	
Pruning, Other		2,454												

Table 3-5. Continued

Fuel/Residue	AZ 2000/01	CA 1996/97/99	CO Avg	HI 1996	ID 1996	MT 1996	ND Avg	NM 1996/Avg	NV[2] 1998	OR 1996	SD Avg	UT 1996	WA 1999	WY 1996/97
Removal, Unspecified		84,359										11,265	32,024	
Peach		22,940											52	
Pear		17,748											395	
Pecan	7	3,186												
Pistachio	17	24,136												
Plum, Prune, Pluot		25,152											7	
Walnut		113,223												
Other														
Asparagus		8,819											21	
Beans	300	4,430											245	
Other		3,561			352								555	
Peas		1											495	
Safflower		6,686												
Sugarcane		4		420,000										
Agricultural Related Fuels														
CRP													76,096	
Ditches, Ditch Banks	1,225	25,552			160,013							3,030		
Total[3]	**31,619**	**1,898,134**	**2,000**	**420,000**	**811,018**	**5,055**	**410,145**	**6,560**	**20,952**	**890,223**	**98,298**	**36,345**	**480,349**	**14,660**

[1] AK does not conduct agricultural burning as defined under this project; thus only 14 states are shown. Values on this table represent tons of agricultural residue burned as reported by each state or developed with gap-filling/averaging techniques. As such, values for states should not be compared to each other.

[2] NV reports 20,952 acres burned; since specific crops are not indicated, residue (tons) cannot be estimated (Sergent, 2002).

[3] Sum of individual crops may not be equal total due to rounding.

Seeds, Other = All seeds not including alfalfa and Kentucky bluegrass (KBG).
Pruning, Other = Bushberry, kiwi, date, persimmon, pomegranate, quince
Other, Other = Other fruits and vegetables, unspecified, sorghum, peanuts, mint, jojoba beans, canola, hops
Wheat, All = All wheat not including spring and winter, all

- — OR: 890,223 tons (mainly grass seed field burning, and wheat residue); and
- — UT: 36,345 tons (mainly wheat, residues, and orchard removal).

- 1999: WA: 480,349 tons (mainly wheat and CRP);
- Average years (from gap filling):
  - — ND: 410,145 tons (all wheat residue); and
  - — SD: 98,298 tons (mainly wheat residue).

Of the states with burning activity data for 1996, ID and OR burned the most residues, with grasses being the main source of residues burned overall (569,616 tons). The Washington residues burned during 1999, in addition to wheat and CRP lands, included barley, orchard removal, and other smaller amounts of grains and hay crops.

Gap filling using averages by crop developed from data in areas where burn statistics are available (see Table 3-5) resulted in quantification of residues burned for an "average" year (i.e., it is not possible to assign these quantities to specific years). However, caution should be used when comparing these values to other states having gap filled residue estimates. These gap filled quantities have high levels of uncertainty due to the method used (i.e., combination of anecdotal information to determine counties and crops burned, and average percentages of crops or residues burned developed from data covering multiple years of activity). These gap filled values *provide only rough estimates of residues burned*. They can be used to alert officials as to the need to track agricultural burning activity in order to reduce uncertainties in these estimates in the future.

Two sets of maps depict agricultural burning activity in the 15 Western states. First, Figure 3-1 shows burning activity at the county level. Shading indicates counties where agricultural burning is known to occur. Appendix B contains maps of the individual states where the shading indicates the extent of burning (i.e., tons of residue burned) at the county level. The GIS tables used to generate these maps, were submitted to the WRAP/FEJF at the close of the project. These tables can be used with ArcView to make changes to the maps as necessary in the future.

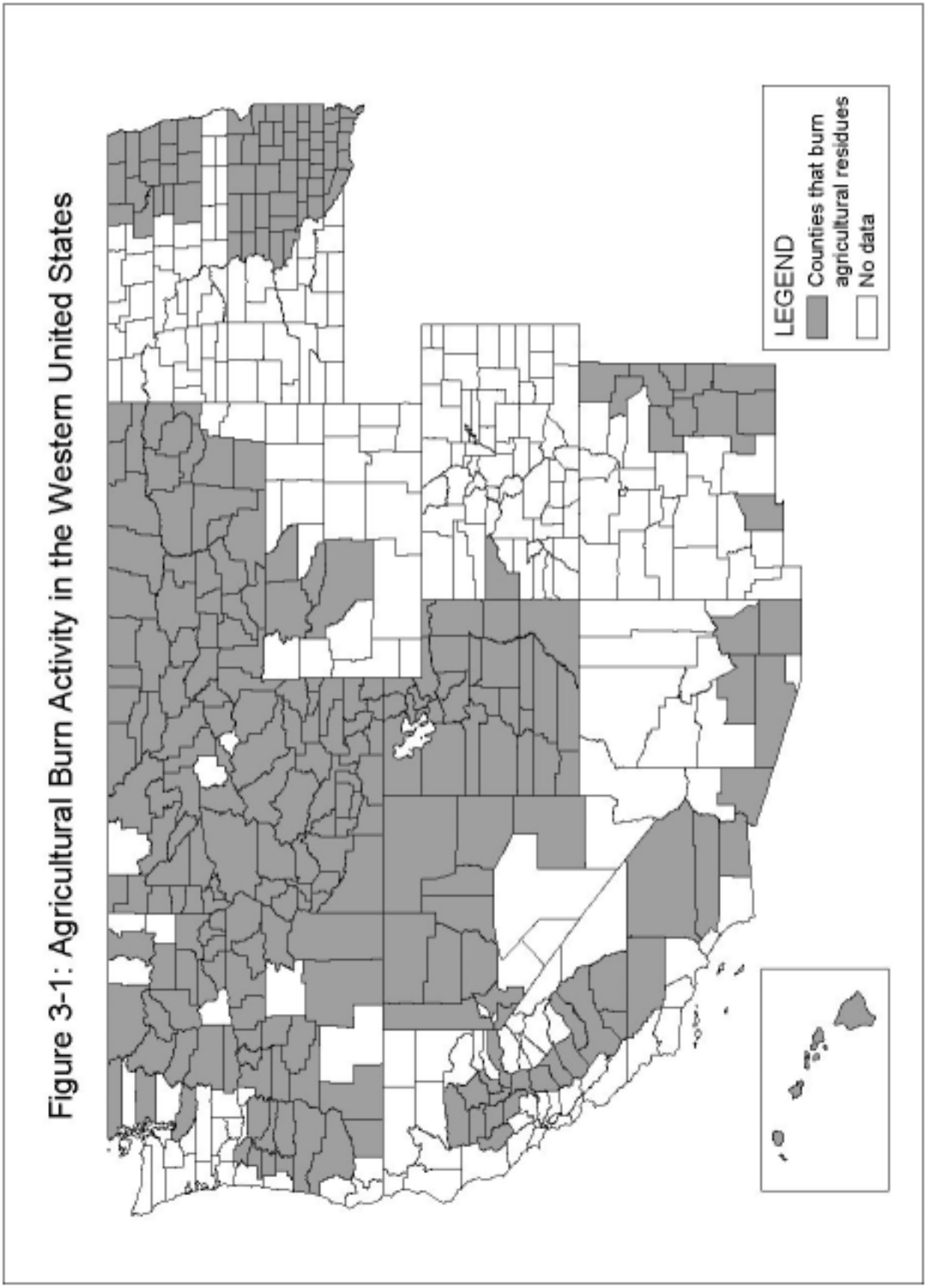


Figure 3-1: Agricultural Burn Activity in the Western United States
LEGEND
Counties that burn agricultural residues
No data

4.0 CONCLUSIONS AND RECOMMENDATIONS

An extensive data collection and review process was undertaken in order to compile databases of agricultural crop production and residue burning activity in the 15 Western states. The objectives of these databases were to provide information for:

1. Evaluating non-burning management alternatives; and
2. Estimating an air emissions inventory conducted under a separate project (AS, 2002).

An indirect objective met by this project was the assessment of data availability (or unavailability) for developing these databases.

4.1 Conclusions

The crop production data were fairly accessible, and somewhat consistent in terms of data fields, data quality, and temporal scope. This is due to a structured, systematic process for developing these data by the National Agricultural Statistics Service, state agriculture departments, and other entities. However, identification and compilation of the agricultural burn activity data presented an immense challenge due to the lack of a consistent mechanism for collecting these data on a national, state, local, or tribal level. In fact, in some states where agricultural burning is exempt from regulation, barriers to collection of these data can be created. (A detailed discussion of the accountability mechanisms pertaining to agricultural burning activities and non-burning alternatives is located in Volume II. A copy of Tables 5-2 and 5-2a listing the 17 accountability mechanisms identified in the West is located in Appendix E of this report).

In order to provide the data for estimating air emissions, it was necessary to gap fill some missing data for states/counties where burning was known to occur but for which data did not exist. As explained in Section 3.2.4 of this report, averages based on burning activity on a statewide or crop basis were calculated. Then, the averages were used in combination with anecdotal information obtained from other studies (WRAP, 2001a; WESTAR, 1999) to estimate the extent of burning for certain crops in North Dakota, New Mexico, and South Dakota. These averages cannot accurately depict actual burn activity that occurred in those states. Even for

some areas where gap filling was not used, information originally provided for the draft database was revised with significantly different information obtained during the peer review process (e.g., Utah). While it can be concluded that the peer review process worked in this case, this result is illustrative of the need for a coordinated, systematic process to collect agricultural burning data, establish data quality objectives, and resolve conflicting data.

Although the data that were collected and compiled were subject to specific QA/QC procedures, some of the data and results have inherent uncertainty due to several factors including the following:

- The use of permit data sets provided by several state air quality agencies that were accepted "as-is" and were not quality assured as part of this project. For example, data in the CA_SJV data set indicated burn permits had been issued for cotton field burning. Peer review comments indicated that these permits were actually issued for burning of ditch banks or fence lines located adjacent to cotton fields. Although the information in this example was corrected for the final database, other errors of this type may still exist in the final database. Also, the data sets do not contain a consistent set of data defined as "agricultural" residue. For example, it is not clear if ditch bank burning is defined as an agricultural residue in every data set.

- The use of crop-specific RL factors that do not take into account geographical variation in residue amounts based on yield or irrigated/nonirrigated agricultural burning practices. Peer review comments indicated that RL factors can vary significantly due to yield, and other factors such as irrigation practices. Although some locally-specific RL factors were incorporated into the final database (e.g., ditchbanks in Arizona and Utah, wheat in Colorado and New Mexico), the use of crop-specific RLs for most crops was carried forward to the final database.

- The use of a combination of calendar year data (i.e., 1996-2001) to depict a single year of burning activity. This was necessary in order to compile a geographically comprehensive set of burn activity data.

4.2 Recommendations

The researchers and peer reviewers contributing to the final database made the following recommendations pertaining to future improvements in the agricultural burning activity database:

1. Develop a mechanism (e.g., program, regulation, etc.) whereby the relevant state, county, tribal, agricultural, and stakeholder entities establish data quality objectives, define data sources, and compile data on a regular basis to estimate the extent of agricultural burning in the Western United States. Also, this mechanism should provide a consistent definition of the residue types to be included in the agricultural burning category (see Volume II for more discussion on this issue).

2. Conduct research to identify and/or calculate specific yield-based RL factors for each geographical zone or area (county, state).

3. Incorporate the impact of irrigated and nonirrigated land agricultural practices.

5.0 REFERENCES

AS, 2002. "Integrated Assessment Update and 2018 Emissions Inventory for Prescribed Fire on Wild Lands and Agricultural Burning"; Prepared for the WGA/WRAP Fire Emissions Joint Forum by Air Sciences Inc., Lakewood, Colorado, and Portland, Oregon. April 27.

Bernards, F., 2002. Revised estimates of agricultural acres burned for Utah in 1996. Provided by Frances Bernards, Utah Department of Environmental Quality, Salt Lake City. April 15.

Beyer, J., 2002. Residue loading factor for apple prunings in California. Provided by John Beyer, USDA Natural Resources Conservation Service, Fresno, California, via telephone call to Paula Fields, ERG. April 16.

CARB, 1996. "Atmospheric Pollutant Emission Factors From Open Burning of Agricultural and Forest Biomass by Wind Tunnel Simulations", Prepared for the California Air Resources Board under Contract #A932-126 by Dr. Bryan Jenkins, University of California Davis.

CARB, 2000. "Agricultural Burning Emission Factors"; Technical Memorandum from Dale Shimp, Manager, Emission Inventory Analysis Section, to Beverly Werner, Manager, Regulatory Assistance Section. California Air Resources Board, Sacramento, California. August 17.

CASS, 1996. Reports for crops grown in California in 1996. Downloaded 3/20/01 from: http://www.nass.usda.gov/ca/rpts. California Agricultural Statistics Service.

CDFA, 1997. "1996 Agricultural Commissioners' Data Report", State of California, Department of Food and Agriculture, and the U.S. Department of Agriculture, Sacramento, California. August.

Coeffield, J., 2002. Acres burned estimate of irrigated wheat acres (estimated as 1% of total acres) statewide in 1996. Provided by John Coeffield, Montana Department of Environmental Quality via telephone call with Paula Fields, ERG. April 11.

Conrad, M., 2002. Burn activity data for weed control based on permit issued Jan 17-April 16, 2001, in Pima county, Arizona. Provided by Mirian Conrad, Pima County Department of Environmental Quality, Tucson, Arizona. March 14.

Cunningham, R., 1998. Acres burned of barley for Fremont County, Wyoming, in 1998. Provided by Ron Cunningham, Cooperative Extension Service, University Extension Agent, in response to WESTAR survey administered by Wyoming DEQ. December.

EIIP, 1997. "General QA/QC Methods, Final Report"; Prepared for the Quality Assurance Committee, Emissions Inventory Improvement Program by Radian Corporation, Research Triangle Park, North Carolina. June.

Fife, 2002. 1996 Acreage Burned by County and Crop for the Sacramento Valley. Database provided by Fife Environmental, Sacramento, California. February.

Foster, C., 2002. Burn activity data for citrus, ditch banks, and jojoba beans compiled from burn permits issued in 2001 in Yuma county, Arizona. Provided by Curt Foster, Rural/Metro Fire Department, Yuma, Arizona. March 15.

FSA, 1996. Conservation Reserve Program (CRP), Acres by State and County. Downloaded 10/8/01 from http://www.fsa.usda.gov/dafp/cepd/crp.htm. Farm Service Agency.

Gabrielson, D., 2002. Burn activity estimates for ditch bank burning in 2001 for Pinal county, Arizona. Prepared by Don Gabrielson, Pinal County Air Quality Control District, Florence, Arizona. March 7.

Goodrich, K., 2002. Estimates of acres of ditches/fenceline, orchard removal wheat stubble burned in Utah (all counties except Box Elder) in 1996. Provided by Kerry Goodrich, USDA Natural Resources Conservation Service, Salt Lake City, to Frances Bernards, Utah Department of Environmental Quality, Salt Lake City. March 20.

Graves, J., 2002. Burn activity data for various crops compiled from permits issued in 2000-2001 in Graham and Cochise counties, Arizona. Compiled for the WRAP/FEJF by John Graves, Interagency Smoke Management Program, Phoenix, Arizona. March 15.

Grover, J., 1998. Acres burned of alfalfa seed for Big Horn Basin, Wyoming, in 1998. Provided by John Grover, Wyoming Seed Certification Committee, Alfalfa Seed and Leaf Cutter Bee Association, Park County, Wyoming, in response to WESTAR survey administered by Wyoming DEQ. December.

ICAPCD, 2001. 1996 Agricultural Burning Data. Provided by the Imperial County Air Pollution Control District, El Centro, California. December 7.

IDEQ, 2001. 1996 Fire Activity. Provided by Michael Dubois, Idaho Department of Environmental Quality, Boise, Idaho. April.

Jenkins, B.M. and H.R. Summer, 1986. "Harvesting and Handling Agricultural Residues for Energy." *Transactions of the American Society of Agricultural Engineers*. Vol. 29, No. 3 pages 824 - 836.

Jenkins, B.M., 2001. Dr. Bryan M. Jenkins, University of California, Davis, *personal communication.* May 24 and October 28.

Johnson, L., 2001. Burn activity data for citrus compiled from permits issued in 2001 in Yuma, Arizona. Provided by Linda Johnson, City of Yuma Fire Department. December.

MacCluer, L. D., 2002. Acres burned of pineapple residue in Hawaii. Provided by L. Douglas MacCluer, Vice President, Agricultural Business Development, Maui Pineapple Company, Ltd., Haliimaile, Maui, Hawaii. February 1.

McDonald, C., 2002. Burn activity estimate for wheat stubble (average year; north of Highway I-94 and east of Jamestown). Provided by Chuck McDonald, North Dakota Health Department, Air Quality Division, via telephone call with Paula Fields, ERG. April 10.

NASS, 1996a. Published Estimates Data Base. Downloaded 1/29/01 – 2/3/01 from: http://www.nass.usda.gov. "On-Line Data Base" providing data for 1996 crops in each of the 15 Western states.

NASS, 1996b. Links to state agricultural statistics data and reports providing data and reports for 1996 and other years crops in each of the 15 Western states. Downloaded 2/15/01 – 4/27/01 from: http://www.nass.usda.gov.

NASS, 1999. "1997 Census of Agriculture". Downloaded for each of 15 Western states for selected crops 4/2/01 – 5/30/01 from: http://www.nass.usda.gov/census/census97.

ODEQ, 2001. 1996 Agricultural Field Emissions Summary Table. Provided by Brian Finneran, Oregon Department of Environmental Quality, Portland, Oregon. May.

Potter, D., 2002. Comments on draft agricultural burning activity database for Wyoming. Provided by Darla Potter, Wyoming Department of Environmental Quality, Cheyenne, Wyoming. April 12, 2002.

Riley, D., 2001. Diane Riley, Idaho Department of Environmental Quality, Boise, Idaho, *personal communication.* August 2.

Riley, D., 2002. Revisions to acres burned for wheat, barley, and Kentucky Blue Grass. Provided by Diane Riley, Idaho Department of Environmental Quality, Boise, Idaho. March 28.

SCAC, 1995. "Advisory Committee on Alternatives to Rice Straw Burning Report", Special California Advisory Committee on Alternatives to Rice Straw Burning.

SCAQMD, 2001. 1996 Agricultural Burning Activity Spreadsheets. Provided by South Coast Air Quality Management District, Information Management, Diamond Bar, California. August 7.

Sergent, C., 2002. Acres burned for Nevada in 1998. Provided by Chester Sergent, Nevada Division of Environmental Protection, Bureau of Air Quality Planning, Carson City. April 12.

Sharkoff, J., 2002. Burn activity estimate for wheat stubble (average year) for Mesa county, Colorado. Provided by James Sharkoff, Agronomist, USDA Natural Resource Conservation Service, Lakewood, Colorado. April 15.

Shaver, P., 2002. Comments on draft agricultural burning activity database. Provided by Patrick Shaver, USDA Natural Resources Conservation Service, Corvallis, Oregon. March 7.

SJVUAPCD, 2001. 1996 Agricultural Burning Database. Provided by David Jones, San Joaquin Valley Unified Air Pollution Control District, Fresno, California. March.

Spiering, K., 1998. Acres burned of grass seed for Park County, Wyoming, in 1998. Provided by Kelly Spiering, Powell, Wyoming, in response to WESTAR survey administered by Wyoming DEQ. December.

Stover, A., 2002. Comments on draft agricultural burning activity database for South Dakota. Provided by Alan Stover, South Dakota Department of Environment and Natural Resources via e-mail to Paula Fields, ERG. March 20.

Tickes, B., 2002. Burn activity estimates for bermuda and wheat/barley in 2001 for Yuma county, Arizona. Provided by Barry Tickes, Yuma County Cooperative Extension, Yuma, Arizona. March 14.

UDEQ, 2001. Utah Fires 1996. Provided by Steven Parkin, Utah Department of Environmental Quality via Mike Ziolko, Oregon Department of Forestry, Salem, Oregon. June.

USDA, 1997c. "Burning on Croplands", Prepared by Dr. Jerry Lemunyon, United States Department of Agriculture Air Quality Task Force, Technical Subcommittee, Bob Odom, Chairman, November 20.

USEPA, 1995. "Compilation of Air Pollutants Emission Factors (AP-42), Volume I: Stationary Point and Area Sources, Fifth Edition", U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. January.

USEPA, 2001a. State FIPS Code Listing. Downloaded 5/25/01 from: http://www.epa.gov/enviro/html/codes/state.html.

WDOE, 2001a. Washington Agricultural Burning Permitting Database. Provided by Shawn Nolph, Washington State Department of Ecology, Spokane, Washington. May.

WDOE, 2001b. 1996-2000 Agricultural Burning Emissions Inventory. Provided by Sally Otterson, Washington State Department of Ecology, Olympia, Washington. June.

WESTAR, 1999. "Western States Agricultural Burning Survey", Western States Air Resources Council, Portland, Oregon. April.

WRAP, 2001a. "Agricultural Burning Smoke Management Program Survey, Draft Final Report"; Prepared for the Western Regional Air Partnership by EC/R, Durham, North Carolina. March.

WRAP, 2001b. "Tribal Emissions Inventories and Air Quality Data Gathering and Assessment Project, Draft", Prepared by the Institute for Tribal Environmental Professionals, Northern Arizona University, Flagstaff, Arizona. April.

APPENDIX A

CROP PRODUCTION DATA

State	Crop(s)	Acres Harvested
AK	barley	6,900
AK	fruits and vegetables; other	343
AK	hay; alfalfa	3,801
AK	hay; all	24,023
AK	hay; all other	20,222
AK	oats	700
AK	potatoes	630
AZ	apples	3,772
AZ	barley	54,000
AZ	citrus	38,823
AZ	corn; for grain	40,000
AZ	corn; for silage	16,937
AZ	cotton; amer. pima	40,300
AZ	cotton; upland	314,000
AZ	fruits and vegetables; other	28,800
AZ	grapes	6,050
AZ	hay; alfalfa	160,000
AZ	hay; all	179,000
AZ	hay; all other	19,000
AZ	peaches	324
AZ	pears	43
AZ	potatoes	9,000
AZ	seeds; alfalfa	2,667
AZ	seeds; other	3,556
AZ	sorghum	45,000
AZ	wheat; all	178,000
AZ	wheat; durum	164,000
AZ	wheat; winter all	14,000
CA	almonds	400,692
CA	apples	39,981
CA	apricots	21,314
CA	asparagus	34,121
CA	avocado	56,335
CA	barley	190,000
CA	beans; all dry edible	123,000
CA	cherries	17,438
CA	citrus	284,790
CA	corn; for grain	220,000
CA	corn; for silage	275,000
CA	cotton; amer. pima	164,000
CA	cotton; upland	995,000

State	Crop(s)	Acres Harvested
CA	CRP	2,400
CA	figs	14,564
CA	fruits and vegetables; other	777,358
CA	grapes	721,505
CA	hay; alfalfa	944,056
CA	hay; all	1,698,773
CA	hay; all other	754,717
CA	kiwi	5,242
CA	nectarines	36,634
CA	oats	30,000
CA	olives	34,409
CA	peaches	71,823
CA	peanuts	750
CA	pears	21,884
CA	peas; dry edible	697
CA	pecans	1,905
CA	persimmons	2,479
CA	pistachio	65,373
CA	plums and prunes	133,068
CA	rice; all	500,000
CA	safflower	156,801
CA	seeds; alfalfa	53,799
CA	seeds; other	77,499
CA	sorghum	18,855
CA	sugarbeets	82,200
CA	walnuts	168,298
CA	wheat; all	688,000
CA	wheat; durum	138,000
CA	wheat; winter all	550,000
CO	barley	92,000
CO	beans; all dry edible	125,000
CO	corn; for grain	890,000
CO	corn; for silage	90,000
CO	CRP	2,080
CO	hay; alfalfa	860,000
CO	hay; all	1,510,000
CO	hay; all other	650,000
CO	oats	35,000
CO	potatoes	87,600
CO	proso millet	125,765
CO	seeds; alfalfa	1,232
CO	seeds; other	6,879
CO	sorghum	260,000

State	Crop(s)	Acres Harvested
CO	sugarbeets	51,100
CO	sunflower	107,000
CO	wheat; all	2,268,000
CO	wheat; other spring	68,000
CO	wheat; winter all	2,200,000
HI	coffee	5,400
HI	fruits and vegetables; other	13,120
HI	macadamia nuts	20,200
HI	pineapple	20,000
HI	sugarcane	42,900
ID	barley	730,000
ID	beans; all dry edible	93,000
ID	corn; for grain	40,000
ID	corn; for silage	68,000
ID	CRP	3,229
ID	hay; alfalfa	1,000,000
ID	hay; all	1,280,000
ID	hay; all other	280,000
ID	lentils	65,540
ID	mint	23,790
ID	oats	25,000
ID	peas; dry edible	71,507
ID	potatoes	413,000
ID	seeds; alfalfa	31,210
ID	seeds; kbg	32,796
ID	seeds; other	17,629
ID	sugarbeets	184,000
ID	wheat; all	1,560,000
ID	wheat; other spring	700,000
ID	wheat; winter all	860,000
MT	barley	1,150,000
MT	beans; all dry edible	10,300
MT	corn; for grain	15,000
MT	corn; for silage	39,000
MT	CRP	33,037
MT	hay; alfalfa	1,700,000
MT	hay; all	2,600,000
MT	hay; all other	900,000
MT	oats	50,000
MT	potatoes	10,200
MT	seeds; alfalfa	13,122

State	Crop(s)	Acres Harvested
MT	seeds; kbg	259
MT	seeds; other	8,965
MT	sugarbeets	57,500
MT	wheat; all	6,360,000
MT	wheat; durum	280,000
MT	wheat; other spring	4,100,000
MT	wheat; winter all	1,980,000
ND	barley	2,600,000
ND	beans; all dry edible	570,000
ND	corn; for grain	600,000
ND	corn; for silage	140,000
ND	CRP	19,180
ND	flaxseed	77,000
ND	hay; alfalfa	1,700,000
ND	hay; all	2,900,000
ND	hay; all other	1,200,000
ND	oats	380,000
ND	potatoes	131,000
ND	rye	16,000
ND	soybeans	845,000
ND	sugarbeets	225,300
ND	sunflower	1,165,000
ND	wheat; all	12,515,000
ND	wheat; durum	2,940,000
ND	wheat; other spring	9,500,000
ND	wheat; winter all	75,000
NM	apples	1,192
NM	corn; for grain	84,000
NM	corn; for silage	44,000
NM	cotton; amer. pima	14,000
NM	cotton; upland	55,000
NM	CRP	3,425
NM	fruits and vegetables; other	38,375
NM	hay; alfalfa	250,000
NM	hay; all	350,000
NM	hay; all other	100,000
NM	peanuts	16,500
NM	pecans	23,188
NM	potatoes	10,300
NM	sorghum	225,000
NM	wheat; all	110,000
NM	wheat; winter all	110,000

State	Crop(s)	Acres Harvested
NV	barley	5,000
NV	fruits and vegetables; other	4,415
NV	hay; alfalfa	250,000
NV	hay; all	480,000
NV	hay; all other	230,000
NV	potatoes	6,999
NV	seeds; alfalfa	11,731
NV	wheat; all	19,000
NV	wheat; other spring	10,000
NV	wheat; winter all	9,000
OR	apples	6,658
OR	barley	150,000
OR	cherries	8,804
OR	corn; for grain	37,000
OR	CRP	13
OR	filberts	26,678
OR	grapes	5,800
OR	hay; alfalfa	460,000
OR	hay; all	1,070,000
OR	hay; all other	610,000
OR	mint	45,221
OR	oats	35,000
OR	peaches	705
OR	pears	15,090
OR	plums and prunes	1,462
OR	potatoes	61,000
OR	seeds; alfalfa	9,465
OR	seeds; kbg	18,798
OR	seeds; other	513,246
OR	sugarbeets	16,300
OR	wheat; all	920,000
OR	wheat; other spring	105,000
OR	wheat; winter all	815,000
SD	barley	145,000
SD	corn; for grain	3,650,000
SD	corn; for silage	320,000
SD	CRP	8,071
SD	flaxseed	9,000
SD	hay; alfalfa	2,500,000
SD	hay; all	4,300,000
SD	hay; all other	1,800,000

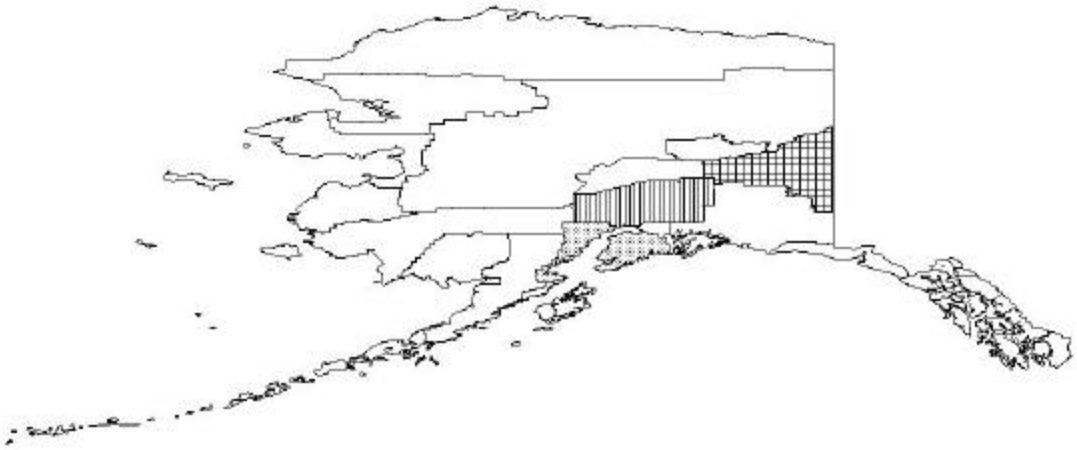
State	Crop(s)	Acres Harvested
SD	oats	360,000
SD	proso millet	122,451
SD	rye	36,000
SD	seeds; alfalfa	12,136
SD	seeds; other	12,900
SD	sorghum	145,000
SD	soybeans	2,670,000
SD	sunflower	690,000
SD	wheat; all	3,854,000
SD	wheat; durum	24,000
SD	wheat; other spring	2,250,000
SD	wheat; winter all	1,580,000
UT	apples	3,699
UT	barley	100,000
UT	beans; all dry edible	600
UT	cherries	4,010
UT	corn; for grain	20,000
UT	corn; for silage	40,000
UT	fruits and vegetables; other	6,695
UT	hay; alfalfa	545,000
UT	hay; all	705,000
UT	hay; all other	160,000
UT	oats	9,000
UT	peaches	1,775
UT	potatoes	4,200
UT	seeds; alfalfa	3,393
UT	seeds; other	3,739
UT	wheat; all	185,000
UT	wheat; other spring	25,000
UT	wheat; winter all	160,000
WA	apples	154,930
WA	asparagus	23,000
WA	barley	440,000
WA	beans; all dry edible	35,000
WA	blueberries	1,311
WA	canola	12,686
WA	cherries	17,700
WA	corn; for grain	120,000
WA	corn; for silage	50,000
WA	CRP	214,073
WA	fruits and vegetables; other	189,269
WA	grapes	35,265

State	Crop(s)	Acres Harvested
WA	hay; alfalfa	490,000
WA	hay; all	800,000
WA	hay; all other	310,000
WA	hops	30,621
WA	oats	14,000
WA	peaches	2,200
WA	pears	23,555
WA	peas; dry edible	126,975
WA	plums and prunes	571
WA	potatoes	161,000
WA	seeds; alfalfa	13,197
WA	seeds; kbg	45,103
WA	seeds; other	13,693
WA	sugarbeets	13,000
WA	wheat; all	2,745,000
WA	wheat; other spring	395,000
WA	wheat; winter all	2,350,000
WY	barley	120,000
WY	beans; all dry edible	31,000
WY	corn; for grain	50,000
WY	corn; for silage	33,000
WY	CRP	666
WY	hay; alfalfa	620,000
WY	hay; all	1,220,000
WY	hay; all other	600,000
WY	oats	32,000
WY	potatoes	704
WY	seeds; alfalfa	3,927
WY	seeds; other	766
WY	sugarbeets	56,800
WY	wheat; all	236,000
WY	wheat; other spring	26,000
WY	wheat; winter all	210,000

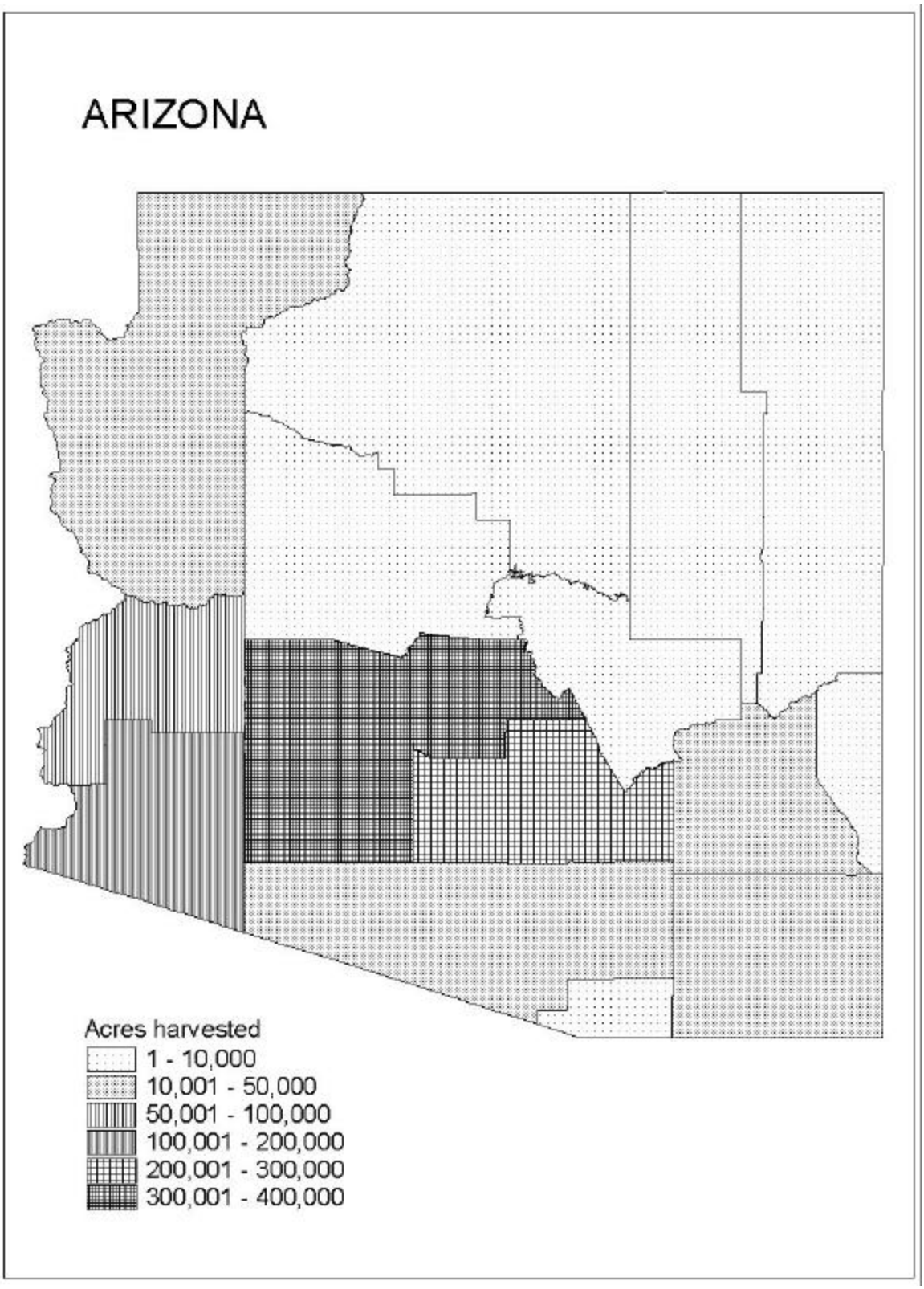
APPENDIX B

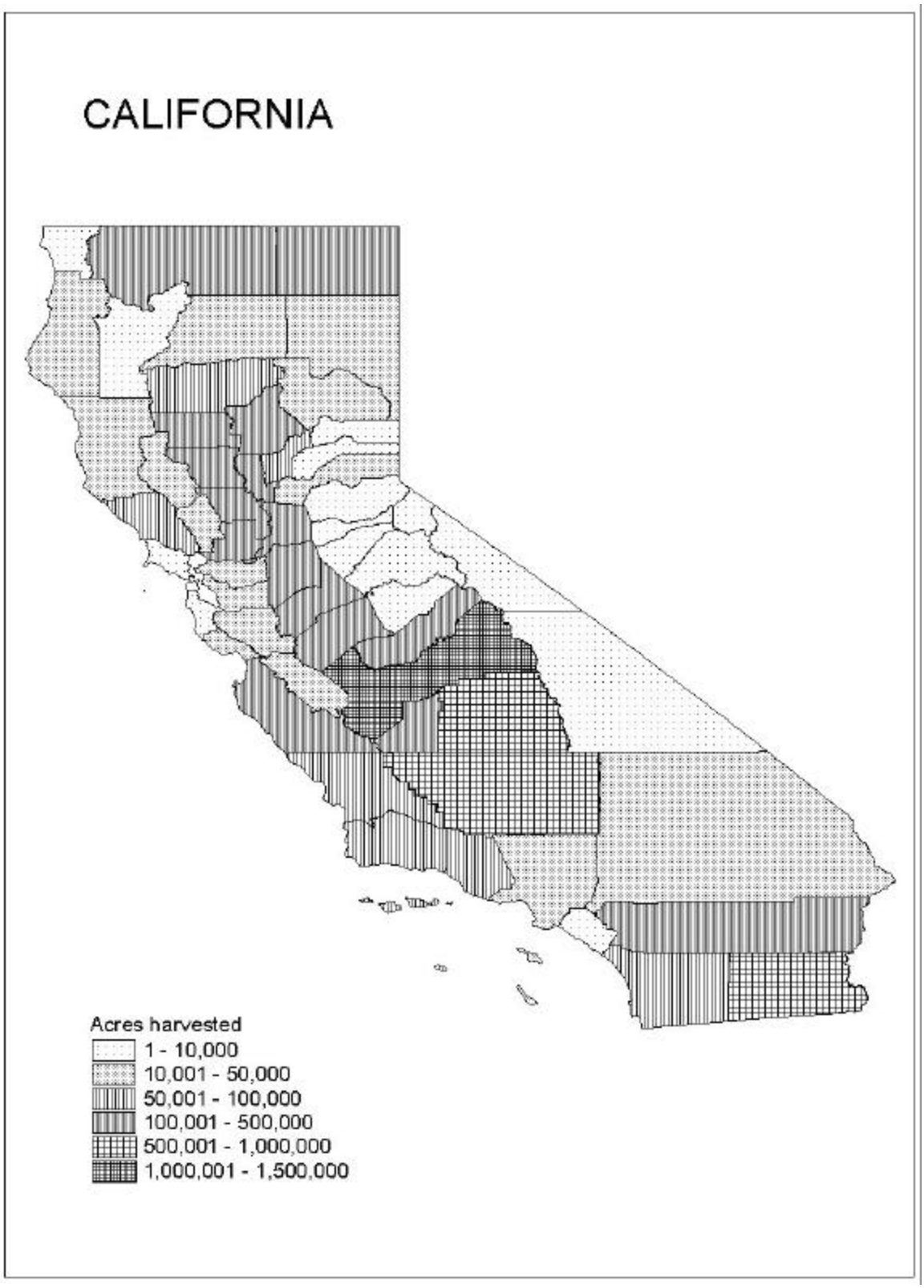
CROP PRODUCTION MAPS

ALASKA

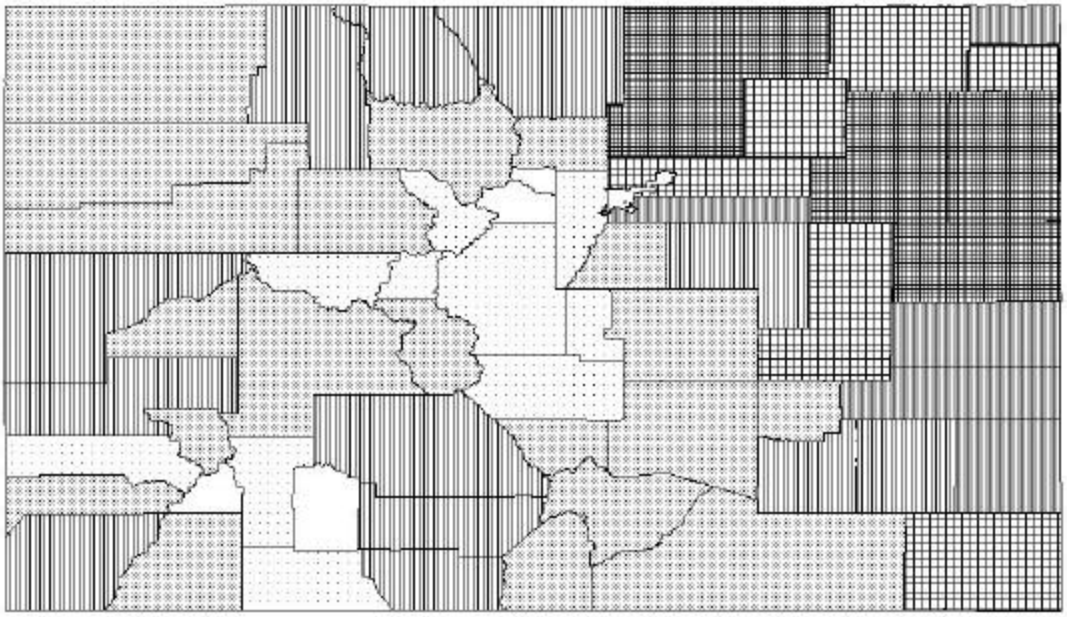


Acres harvested
- 1 - 1,000
- 1,001 - 5,000
- 5,001 - 10,000
- 10,001 - 15,000
- 15,001 - 20,000

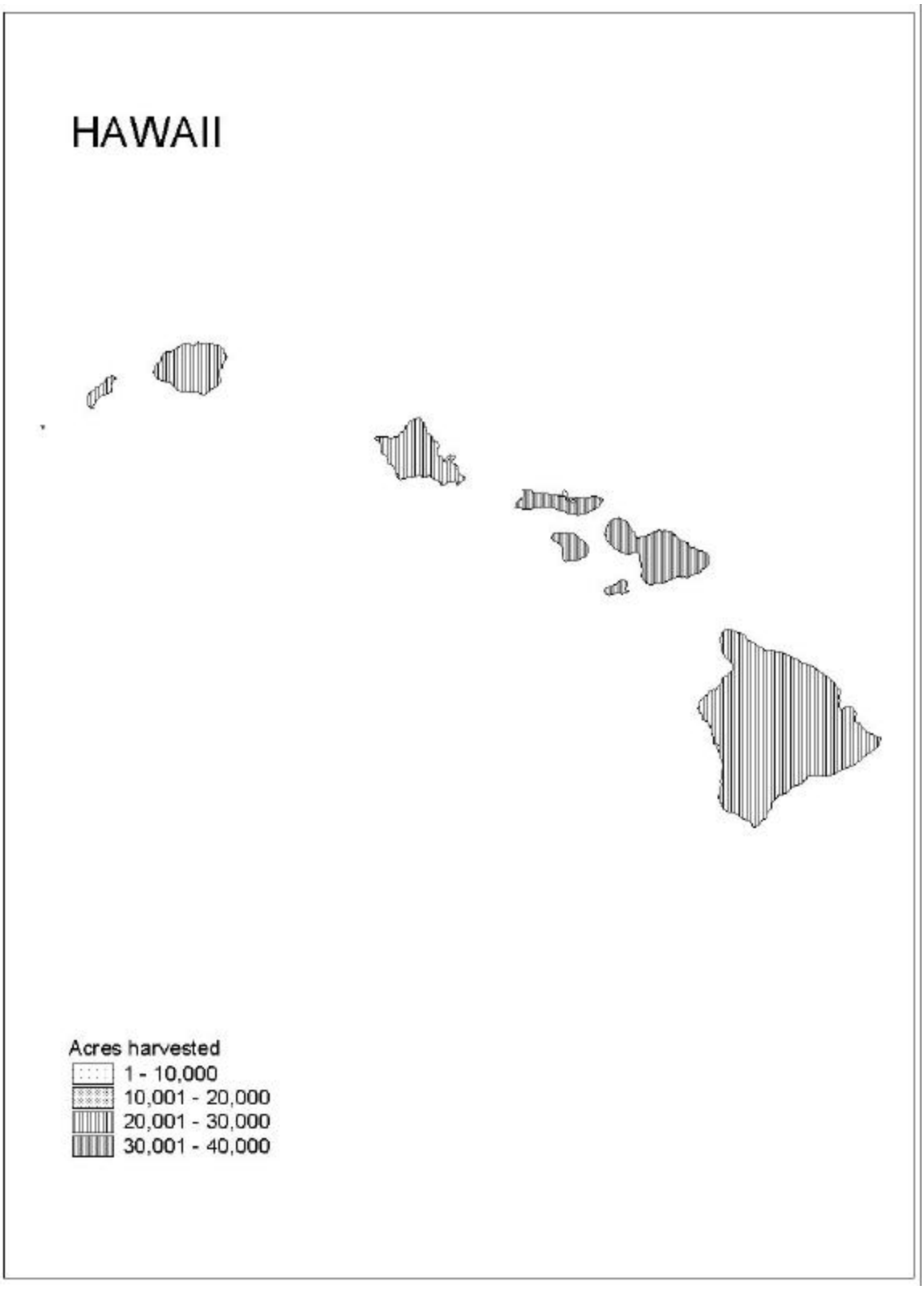

ARIZONA
Acres harvested
1 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 200,000
200,001 - 300,000
300,001 - 400,000

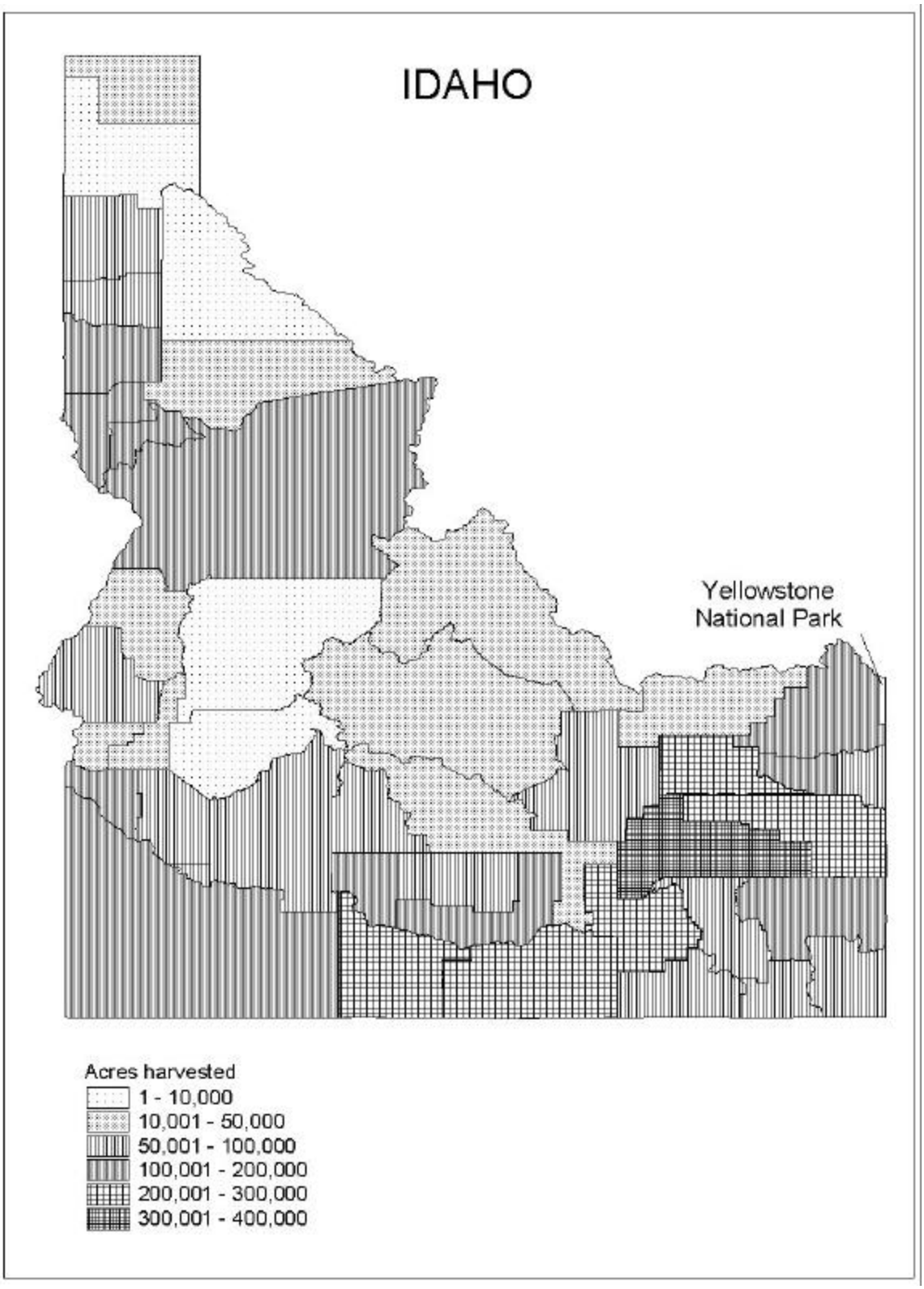

CALIFORNIA
Acres harvested
1 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 500,000
500,001 - 1,000,000
1,000,001 - 1,500,000

COLORADO

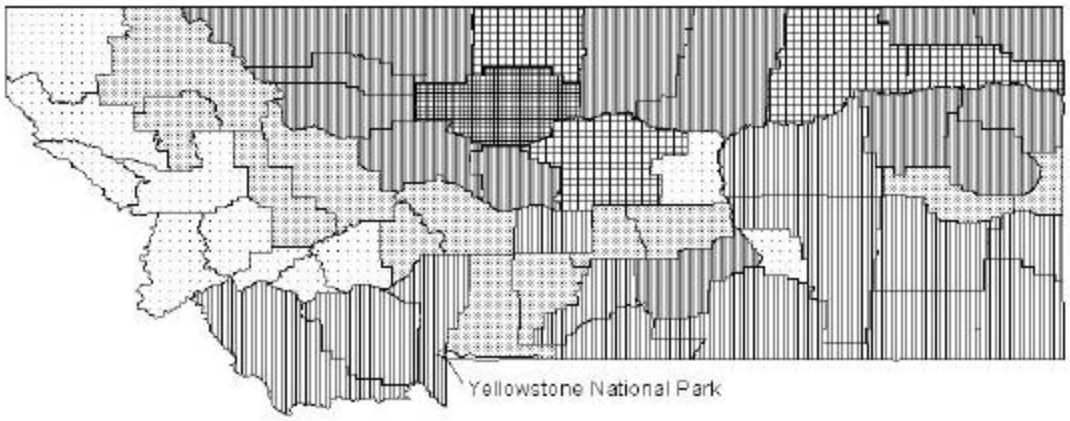


Acres harvested
- 1 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 200,000
- 200,001 - 400,000
- 400,001 - 600,000

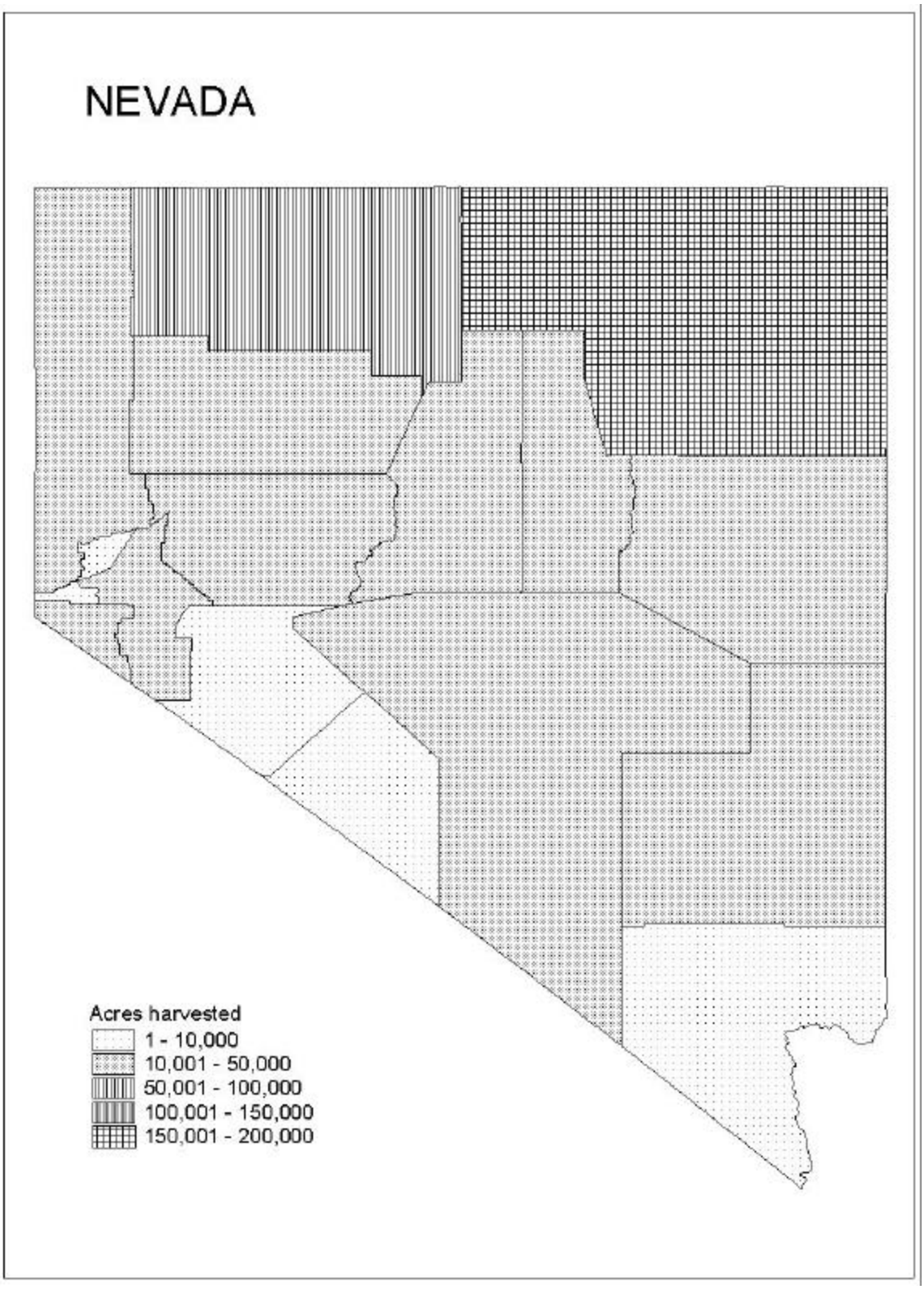

HAWAII
Acres harvested
1 - 10,000
10,001 - 20,000
20,001 - 30,000
30,001 - 40,000


IDAHO
Yellowstone
National Park
Acres harvested
1 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 200,000
200,001 - 300,000
300,001 - 400,000

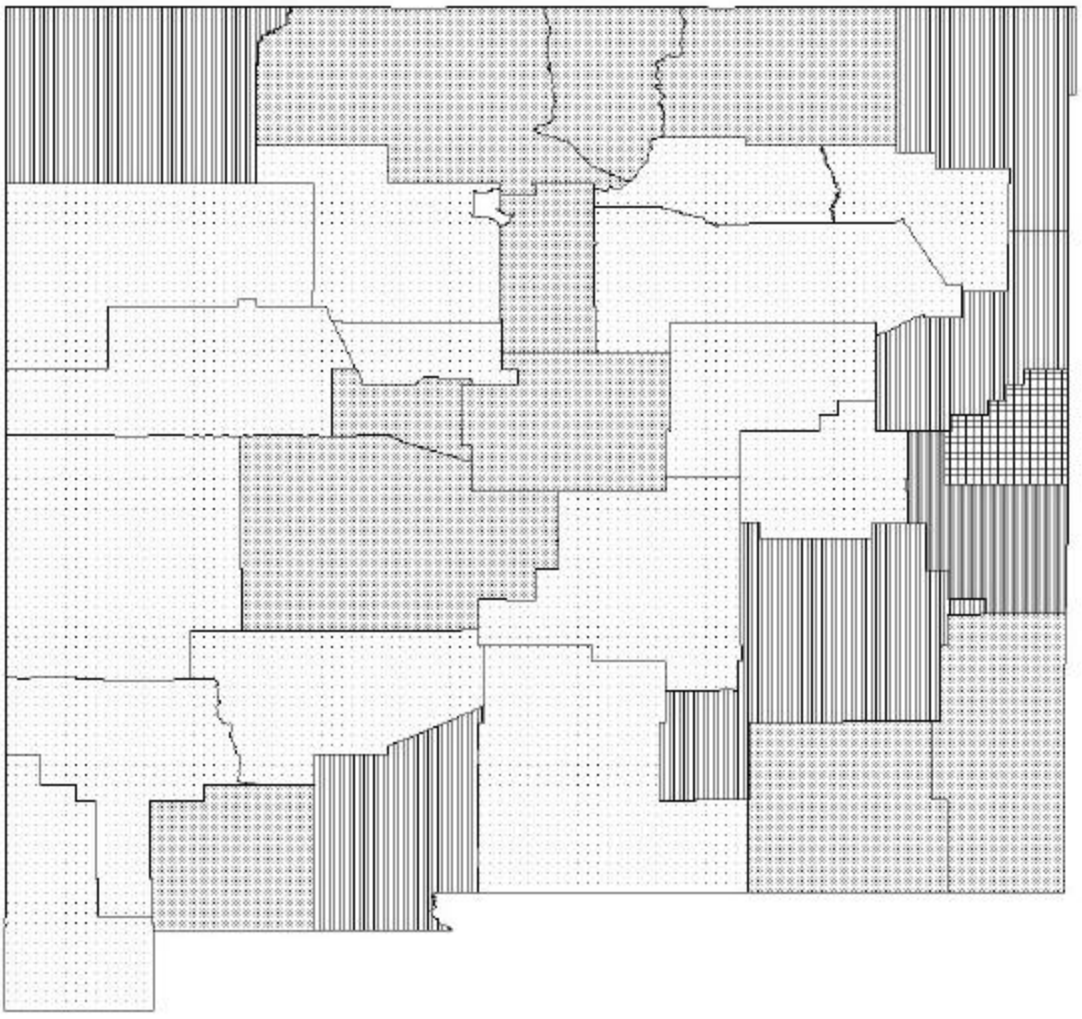
MONTANA



Acres harvested
- 1 - 50,000
- 50,001 - 100,000
- 100,001 - 200,000
- 200,001 - 400,000
- 400,001 - 600,000
- 600,001 - 800,000


NEVADA
Acres harvested
1 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 150,000
150,001 - 200,000

NEW MEXICO

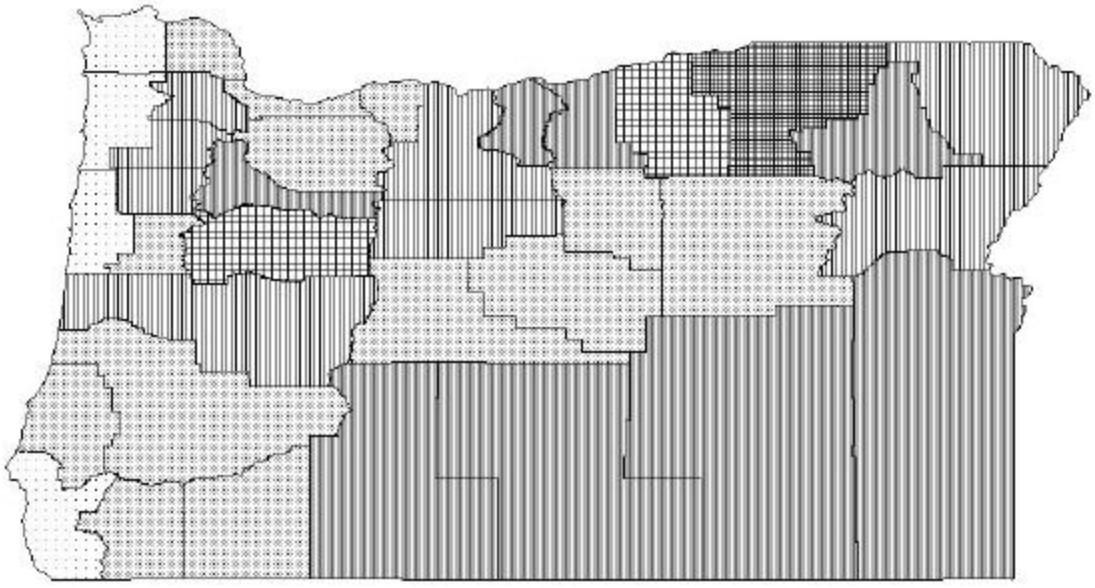


Acres harvested
- 1 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 200,000
- 200,001 - 300,000

NORTH DAKOTA

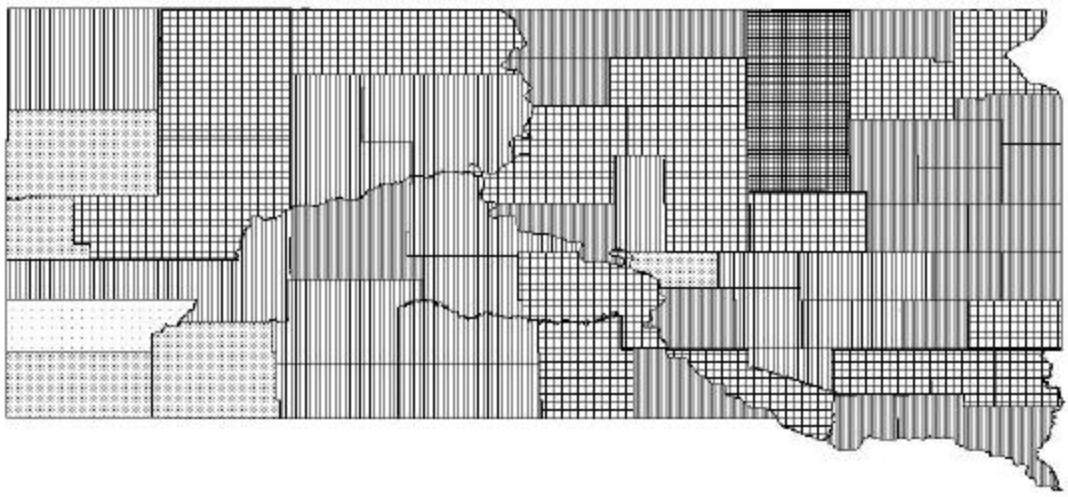
Acres harvested
- 1 - 100,000
- 100,001 - 200,000
- 200,001 - 400,000
- 400,001 - 600,000
- 600,001 - 800,000
- 800,001 - 1,000,000

OREGON

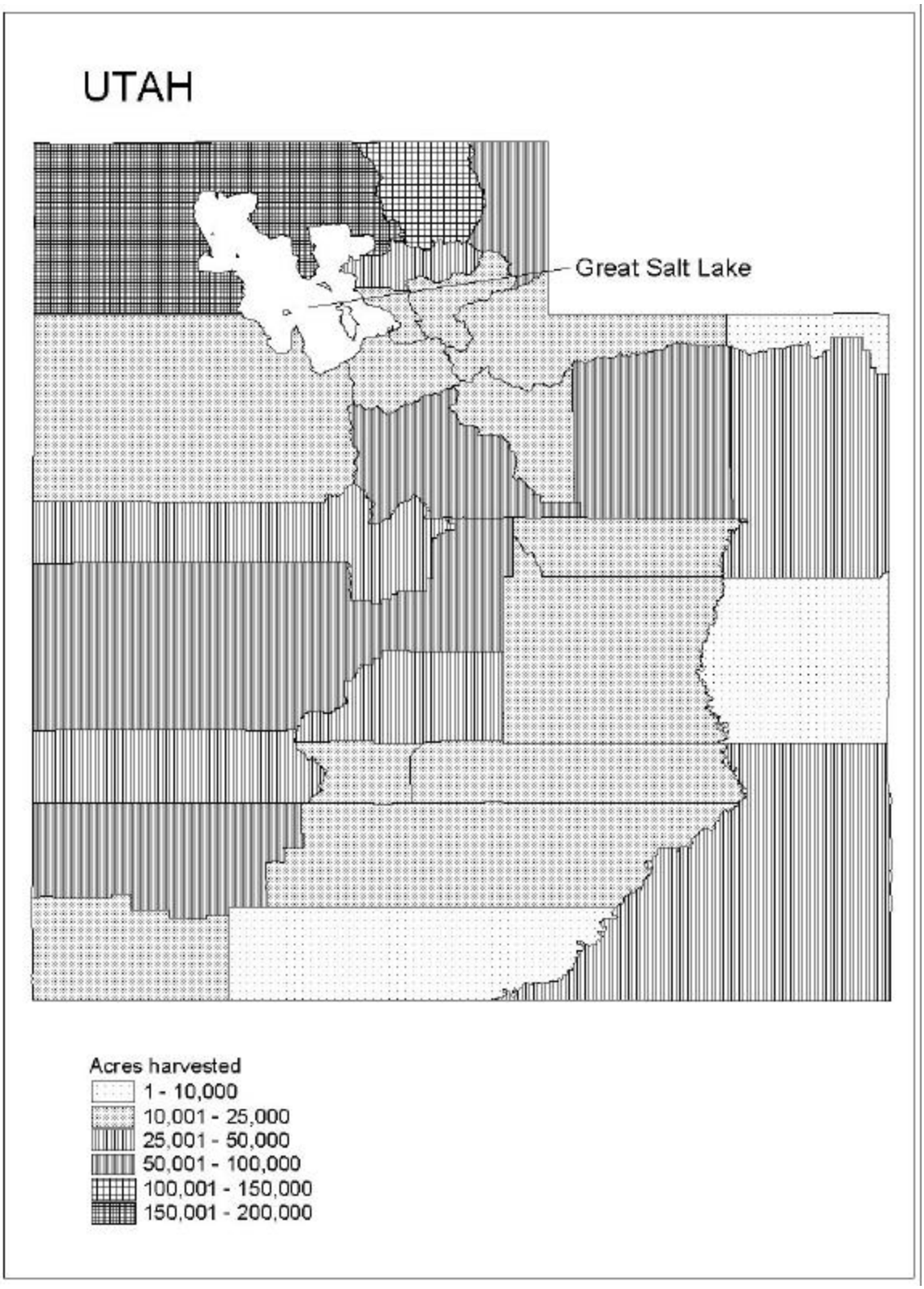


Acres harvested
- 1 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 200,000
- 200,001 - 300,000
- 300,001 - 400,000

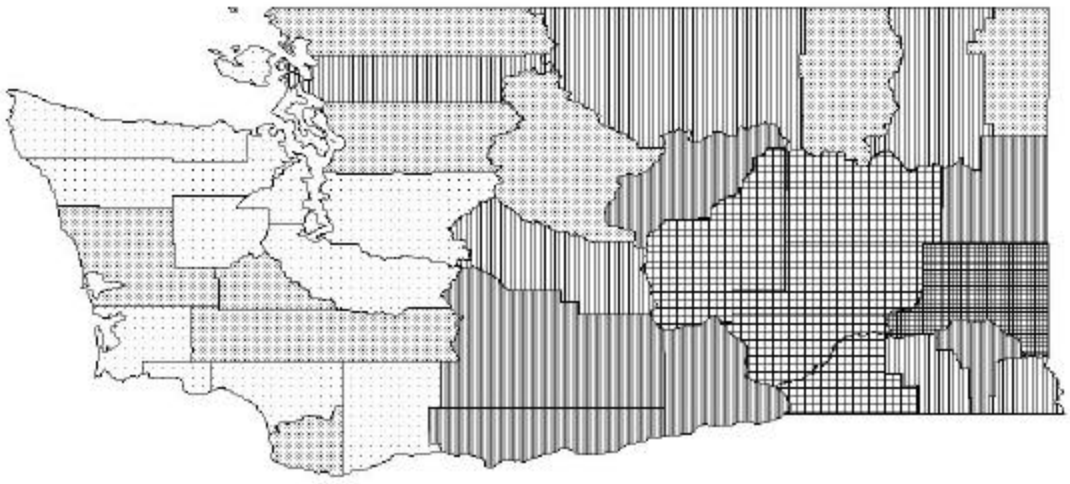
SOUTH DAKOTA



Acres harvested
- 1 - 50,000
- 50,001 - 100,000
- 100,001 - 200,000
- 200,001 - 300,000
- 300,001 - 500,000
- 500,001 - 700,000

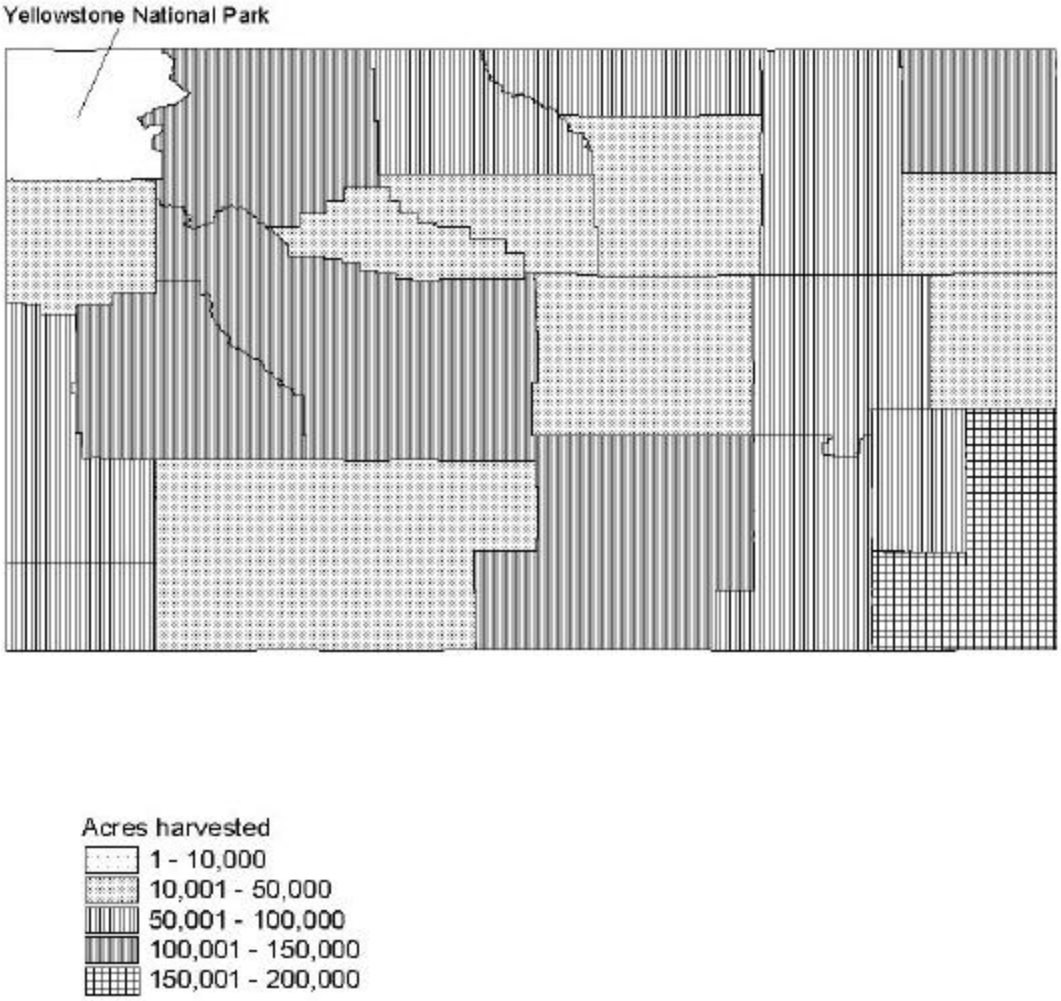

UTAH
Great Salt Lake
Acres harvested
1 - 10,000
10,001 - 25,000
25,001 - 50,000
50,001 - 100,000
100,001 - 150,000
150,001 - 200,000

WASHINGTON



Acres harvested
- 1 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 300,000
- 300,001 - 600,000
- 600,001 - 900,000

WYOMING


Yellowstone National Park
Acres harvested
1 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 150,000
150,001 - 200,000

APPENDIX C

AGRICULTURAL RESIDUE BURN ACTIVITY DATA AND CROP BURN AVERAGES

ARIZONA

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
apple trees	apples	Graham	2.3	32	2001	74	Daily A_BURN compiled by ADEQ (J.Graves)
	apples Total			**32**		**74**	
Jojoba Plant	beans; all dry edible	Yuma	2.5	120	2001	300	A_BURN from C.Foster, Yuma Co. FD
	beans; all dry edible Total			**120**		**300**	
citrus	citrus	Yuma	1	320	2001	320	A_BURN from L.Johnson, City Yuma FD
citrus trees	citrus	Yuma	1	217	2001	217	A_BURN from C.Foster, Yuma Co. FD
citrus trees	citrus	Yuma	1	3	2001	3	A_BURN from L.Johnson, City Yuma FD
citrus trees, 320	citrus	Yuma	1	8	2001	8	A_BURN from L.Johnson, City Yuma FD
	citrus Total			**548**		**548**	
corn stalks	corn; for grain	Graham	4.2	400	2001	1,680	Daily A_BURN compiled by ADEQ (J.Graves)
	corn; for grain Total			**400**		**1,680**	
Mesquite removed for agricultural pu	ditches and ditch banks-AZ	Cochise	1.6	2	2001	3	Daily A_BURN compiled by ADEQ (J.Graves)
Weeds along irrigation ditches	ditches and ditch banks-AZ	Cochise	1.6	1	2001	1	Daily A_BURN compiled by ADEQ (J.Graves)
Weeds along irrigation ditches, mesc	ditches and ditch banks-AZ	Cochise	1.6	1	2001	2	Daily A_BURN compiled by ADEQ (J.Graves)
ditches around 62.8 acres	ditches and ditch banks-AZ	Graham	1.6	4	2001	8	Daily A_BURN compiled by ADEQ (J.Graves)
weeds along fenceline	ditches and ditch banks-AZ	Graham	1.6	1	2001	1	Daily A_BURN compiled by ADEQ (J.Graves)
weeds treelimbs and wood along fen	ditches and ditch banks-AZ	Graham	1.6	3	2001	4	Daily A_BURN compiled by ADEQ (J.Graves)
weeds	ditches and ditch banks-AZ	Pima	1.6	286	2001	458	A_BURN from M.Conrad, Pima Co. DEQ
ditches and ditch banks-AZ	ditches and ditch banks-AZ	Pinal	1.6	144	2000	231	A_BURN from D.Gabrielson, Pinal Co. AQCD
ditches and ditch banks-AZ	ditches and ditch banks-AZ	Pinal	1.6	295	2001	473	A_BURN from D.Gabrielson, Pinal Co. AQCD
ditchbanks	ditches and ditch banks-AZ	Yuma	1.6	27	2001	44	A_BURN from C.Foster, Yuma Co. FD
	ditches and ditch banks-AZ Total			**765**		**1,225**	
tamaracks along ditches	orchard pruning; unspecified	Graham	1.7	1	2001	2	Daily A_BURN compiled by ADEQ (J.Graves)
	orchard pruning; unspecified Total			**1**		**2**	
Pecan limbs from orchard	pecans	Cochise	1.7	4	2001	7	Daily A_BURN compiled by ADEQ (J.Graves)
	pecans Total			**4**		**7**	
Pistachio wood from pruning of orch	pistachio	Cochise	1.7	10	2001	17	Daily A_BURN compiled by ADEQ (J.Graves)
	pistachio Total			**10**		**17**	
Bermuda grass	seeds; other	Yuma	2	4,700	2001	9,400	A_BURN from B.Tickes, Yuma Co. Extension Agent
	seeds; other Total			**4,700**		**9,400**	
Robosa, Lehmann,s love grass, Mesq	seeds; unspecified	Cochise	2	807	2000	1,614	Daily A_BURN compiled by ADEQ (J.Graves)
Robosa, Lehmann,s love grass, Mesq	seeds; unspecified	Cochise	2	700	2001	1,400	Daily A_BURN compiled by ADEQ (J.Graves)
	seeds; unspecified Total			**1,507**		**3,014**	
Wheat stubble	wheat; all	Yuma	1.9	8,080	2001	15,352	A_BURN from B.Tickes, Yuma Co. Extension Agent
	wheat; all Total			**8,080**		**15,352**	
	Grand Total			**16,167**		**31,619**	

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
Almond	almonds	Butte	1	11,411	1996	11,411	Daily A_BURN provided by Fife, 2002
Almond	almonds	COLUSA	1	37	1996	37	Daily A_BURN provided by Fife, 2002
ALMOND PRUNING	almonds	FRESNO	1	64,478	1999	64,776	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ALMOND PRUNING	almonds	KERN	1	27,216	1999	40,315	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ALMOND PRUNING	almonds	KINGS	1	2,288	1999	2,536	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Almonds	almonds	Lake	1	71	1997	71	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
ALMOND PRUNING	almonds	MADERA	1	37,416	1999	38,427	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ALMOND PRUNING	almonds	MERCED	1	37,433	1999	49,159	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Almond	almonds	Sacramento	1	9	1996	9	Daily A_BURN provided by Fife, 2002
ALMOND PRUNING	almonds	SAN JOAQUIN	1	20,131	1999	35,443	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ALMOND PRUNING	almonds	STANISLAUS	1	54,657	1999	56,408	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Almond	almonds	Sutter	1	103	1996	103	Daily A_BURN provided by Fife, 2002
Almond	almonds	Tehama	1	3,079	1996	3,079	Daily A_BURN provided by Fife, 2002
ALMOND PRUNING	almonds	TULARE	1	4,146	1999	6,881	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Almond	almonds	Yolo	1	2,183	1996	2,183	Daily A_BURN provided by Fife, 2002
	almonds Total			**264,657**		**310,836**	
Apple	apples	Butte	2.3	2	1996	3	Daily A_BURN provided by Fife, 2002
APPLE PRUNING	apples	FRESNO	2.3	1,296	1999	3,781	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APPLE PRUNING	apples	KERN	2.3	128	1999	735	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APPLE PRUNING	apples	KINGS	2.3	120	1999	288	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APPLE PRUNING	apples	MADERA	2.3	331	1999	762	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APPLE PRUNING	apples	MERCED	2.3	91	1999	217	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Apple	apples	Placer	2.3	32	1996	74	Daily A_BURN provided by Fife, 2002
apples	apples	Riverside	2.3		1999	7	Annual R_BURN provided by SCAQMD
Apple	apples	Sacramento	2.3	1	1996	1	Daily A_BURN provided by Fife, 2002
apples	apples	San Bernardino	2.3		1999	18	Annual R_BURN provided by SCAQMD
APPLE PRUNING	apples	SAN JOAQUIN	2.3	164	1999	798	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APPLE PRUNING	apples	STANISLAUS	2.3	326	1999	780	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Apple	apples	Tehama	2.3	7	1996	16	Daily A_BURN provided by Fife, 2002
APPLE PRUNING	apples	TULARE	2.3	219	1999	590	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	apples Total			**2,715**		**8,071**	
APRICOT PRUNING	apricots	FRESNO	1.8	72	1999	144	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APRICOT PRUNING	apricots	KERN	1.8	40	1999	121	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APRICOT PRUNING	apricots	KINGS	1.8	100	1999	180	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APRICOT PRUNING	apricots	MADERA	1.8	120	1999	216	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APRICOT PRUNING	apricots	MERCED	1.8	126	1999	419	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Apricot	apricots	Sacramento	1.8	1	1996	1	Daily A_BURN provided by Fife, 2002
APRICOT PRUNING	apricots	SAN JOAQUIN	1.8	254	1999	636	Daily A_BURN and/or R_BURN provided by SJVUAPCD
APRICOT PRUNING	apricots	STANISLAUS	1.8	2,279	1999	4,203	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Apricot	apricots	Tehama	1.8	4	1996	7	Daily A_BURN provided by Fife, 2002
APRICOT PRUNING	apricots	TULARE	1.8	36	1999	89	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Apricot	apricots	Yolo	1.8	326	1996	587	Daily A_BURN provided by Fife, 2002
	apricots Total			**3,356**		**6,603**	
ASPARAGUS	asparagus	FRESNO	1.5	856	1999	1,314	Daily A_BURN and/or R_BURN provided by SJVUAPCD
asparagus	asparagus	IMPERIAL	1.5	4,872	1996	7,307	Daily A_BURN provided by ICUAPCD
ASPARAGUS	asparagus	KERN	1.5	95	1999	143	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ASPARAGUS	asparagus	SAN JOAQUIN	1.5	30	1999	45	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ASPARAGUS	asparagus	STANISLAUS	1.5	7	1999	11	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	asparagus Total			**5,860**		**8,819**	
AVOCADO PRUNING	avocado	FRESNO	1.5	25	1999	38	Daily A_BURN and/or R_BURN provided by SJVUAPCD

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
AVOCADO PRUNING	avocado	KERN	1.5	-	1999	1	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Avocado	avocado	Riverside	1.5		1999	10	Annual R_BURN provided by SCAQMD
Avocado	avocado	San Bernardino	1.5		1999	15	Annual R_BURN provided by SCAQMD
AVOCADO PRUNING	avocado	STANISLAUS	1.5	48	1999	74	Daily A_BURN and/or R_BURN provided by SJVUAPCD
AVOCADO PRUNING	avocado	TULARE	1.5	73	1999	1,234	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	avocado Total			**146**		**1,370**	
BARLEY	barley	FRESNO	1.7	80	1999	136	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BARLEY	barley	KERN	1.7	5	1999	9	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BARLEY	barley	KINGS	1.7	31	1999	57	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BARLEY	barley	MERCED	1.7	69	1999	123	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BARLEY	barley	SAN JOAQUIN	1.7	68	1999	146	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BARLEY	barley	STANISLAUS	1.7	184	1999	313	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BARLEY	barley	TULARE	1.7	62	1999	105	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	barley Total			**499**		**889**	
Bean	beans; all dry edible	COLUSA	2.5	15	1996	38	Daily A_BURN provided by Fife, 2002
BEAN	beans; all dry edible	FRESNO	2.5	480	1999	1,201	Daily A_BURN and/or R_BURN provided by SJVUAPCD
jojoba beans	beans; all dry edible	IMPERIAL	2.5	160	1996	400	Daily A_BURN provided by ICUAPCD
BEAN	beans; all dry edible	KERN	2.5	507	1999	1,272	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BEAN	beans; all dry edible	KINGS	2.5	40	1999	100	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BEAN	beans; all dry edible	MADERA	2.5	140	1999	350	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BEAN	beans; all dry edible	MERCED	2.5	130	1999	327	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BEAN	beans; all dry edible	SAN JOAQUIN	2.5	50	1999	125	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BEAN	beans; all dry edible	STANISLAUS	2.5	6	1999	15	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BEAN	beans; all dry edible	TULARE	2.5	240	1999	602	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	beans; all dry edible Total			**1,767**		**4,430**	
Berry	blueberries	Placer	1.7	14	1996	24	Daily A_BURN provided by Fife, 2002
	blueberries Total			**14**		**24**	
BUSHBERRY	bushberry	FRESNO	1.7	36	1999	61	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BUSHBERRY	bushberry	MADERA	1.7	4	1999	7	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BUSHBERRY	bushberry	MERCED	1.7	46	1999	92	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BUSHBERRY	bushberry	SAN JOAQUIN	1.7	-	1999	5	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BUSHBERRY	bushberry	STANISLAUS	1.7	70	1999	157	Daily A_BURN and/or R_BURN provided by SJVUAPCD
BUSHBERRY	bushberry	TULARE	1.7	1	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	bushberry Total			**156**		**324**	
CHERRY PRUNING	cherries	FRESNO	1	287	1999	288	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CHERRY PRUNING	cherries	KERN	1	25	1999	48	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CHERRY PRUNING	cherries	KINGS	1	2	1999	17	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CHERRY PRUNING	cherries	MADERA	1	200	1999	200	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CHERRY PRUNING	cherries	MERCED	1	-	1999	95	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CHERRY PRUNING	cherries	SAN JOAQUIN	1	2,030	1999	6,211	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CHERRY PRUNING	cherries	STANISLAUS	1	427	1999	455	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CHERRY PRUNING	cherries	TULARE	1	172	1999	199	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	cherries Total			**3,141**		**7,511**	
Citrus	citrus	Butte	1	4	1996	4	Daily A_BURN provided by Fife, 2002
CITRUS PRUNING	citrus	FRESNO	1	4,006	1999	5,022	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CITRUS PRUNING	citrus	KERN	1	731	1999	2,612	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CITRUS PRUNING	citrus	MADERA	1	228	1999	241	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CITRUS PRUNING	citrus	MERCED	1	-	1999	1	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Citrus	citrus	Placer	1	20	1996	20	Daily A_BURN provided by Fife, 2002
Citrus	citrus	Riverside	1		1999	876	Annual R_BURN provided by SCAQMD
Citrus	citrus	Sacramento	1	1	1996	1	Daily A_BURN provided by Fife, 2002

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
CITRUS PRUNING	citrus	STANISLAUS	1	22	1999	22	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CITRUS PRUNING	citrus	TULARE	1	3,597	1999	6,661	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	citrus Total			**8,607**		**15,459**	
Corn	corn; for grain	Butte	4.2	2	1996	6	Daily A_BURN provided by Fife, 2002
Corn	corn; for grain	COLUSA	4.2	43	1996	180	Daily A_BURN provided by Fife, 2002
Corn	corn; for grain	Glenn	4.2	937	1996	3,936	Daily A_BURN provided by Fife, 2002
corn	corn; for grain	IMPERIAL	4.2	249	1996	1,046	Daily A_BURN provided by ICUAPCD
CORN	corn; for grain	MERCED	4.2	20	1999	84	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Corn	corn; for grain	Sacramento	4.2	1,902	1996	7,988	Daily A_BURN provided by Fife, 2002
CORN	corn; for grain	SAN JOAQUIN	4.2	3,292	1999	15,277	Daily A_BURN and/or R_BURN provided by SJVUAPCD
CORN	corn; for grain	STANISLAUS	4.2	154	1999	645	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Corn	corn; for grain	Tehama	4.2	348	1996	1,462	Daily A_BURN provided by Fife, 2002
CORN	corn; for grain	TULARE	4.2	5	1999	23	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Corn	corn; for grain	Yolo	4.2	1,365	1996	5,733	Daily A_BURN provided by Fife, 2002
	corn; for grain Total			**8,316**		**36,380**	
Date	dates	Riverside	1		1999	168	Annual R_BURN provided by SCAQMD
	dates Total			**-**		**168**	
Brush	ditches and ditch banks	Butte	3.2	1,577	1996	5,045	Daily A_BURN provided by Fife, 2002
DITCHBANKS	ditches and ditch banks	Butte	3.2	689	1996	2,204	Daily A_BURN provided by Fife, 2002
Weeds	ditches and ditch banks	Butte	3.2	1,002	1996	3,205	Daily A_BURN provided by Fife, 2002
DITCHBANKS	ditches and ditch banks	COLUSA	3.2	294	1996	937	Daily A_BURN provided by Fife, 2002
Weeds	ditches and ditch banks	COLUSA	3.2	1,578	1996	5,050	Daily A_BURN provided by Fife, 2002
DITCHBANK & CANAL	ditches and ditch banks	FRESNO	3.2	1	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Weeds	ditches and ditch banks	Glenn	3.2	5	1996	16	Daily A_BURN provided by Fife, 2002
BERMS	ditches and ditch banks	MADERA	3.2	1	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
TULES	ditches and ditch banks	MERCED	3.2	30	1999	96	Daily A_BURN and/or R_BURN provided by SJVUAPCD
DITCHBANKS	ditches and ditch banks	Placer	3.2	96	1996	307	Daily A_BURN provided by Fife, 2002
Weeds	ditches and ditch banks	Placer	3.2	146	1996	467	Daily A_BURN provided by Fife, 2002
DITCHBANKS	ditches and ditch banks	Sacramento	3.2	33	1996	106	Daily A_BURN provided by Fife, 2002
Weeds	ditches and ditch banks	Sacramento	3.2	669	1996	2,141	Daily A_BURN provided by Fife, 2002
Weeds	ditches and ditch banks	Sutter	3.2	111	1996	355	Daily A_BURN provided by Fife, 2002
Brush	ditches and ditch banks	Tehama	3.2	1,342	1996	4,294	Daily A_BURN provided by Fife, 2002
DITCHBANKS	ditches and ditch banks	Tehama	3.2	10	1996	32	Daily A_BURN provided by Fife, 2002
BRUSH	ditches and ditch banks	TULARE	3.2	1	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PASTURE/CORRAL TREES	ditches and ditch banks	TULARE	3.2	20	1999	64	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Weeds	ditches and ditch banks	Yuba	3.2	384	1996	1,229	Daily A_BURN provided by Fife, 2002
	ditches and ditch banks Total			**7,987**		**25,552**	
FIG PRUNING	figs	FRESNO	1.7	480	1999	875	Daily A_BURN and/or R_BURN provided by SJVUAPCD
FIG PRUNING	figs	KERN	1.7	32	1999	56	Daily A_BURN and/or R_BURN provided by SJVUAPCD
FIG PRUNING	figs	KINGS	1.7	25	1999	45	Daily A_BURN and/or R_BURN provided by SJVUAPCD
FIG PRUNING	figs	MADERA	1.7	4,160	1999	7,153	Daily A_BURN and/or R_BURN provided by SJVUAPCD
FIG PRUNING	figs	MERCED	1.7	2,101	1999	3,916	Daily A_BURN and/or R_BURN provided by SJVUAPCD
FIG	figs	Sacramento	1.7	1	1996	1	Daily A_BURN provided by Fife, 2002
FIG PRUNING	figs	STANISLAUS	1.7	16	1999	32	Daily A_BURN and/or R_BURN provided by SJVUAPCD
FIG PRUNING	figs	TULARE	1.7	-	1999	21	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	figs Total			**6,814**		**12,097**	
OtherVegetable	fruits and vegetables; other	Butte	1.47	5	1996	7	Daily A_BURN provided by Fife, 2002
VEGETABLE CROPS	fruits and vegetables; other	FRESNO	1.47	5	1999	7	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Vegetable Crops	fruits and vegetables; other	Riverside	1.47		1999	60	Annual R_BURN provided by SCAQMD
	fruits and vegetables; other Total			**10**		**74**	
Grape	grapes	Butte	2.5	1	1996	3	Daily A_BURN provided by Fife, 2002

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
Vines	grapes	Butte	2.5	1	1996	1	Daily A_BURN provided by Fife, 2002
Grape	grapes	COLUSA	2.5	8	1996	20	Daily A_BURN provided by Fife, 2002
GRAPE VINES/CANES	grapes	FRESNO	2.5	7,316	1999	18,368	Daily A_BURN and/or R_BURN provided by SJVUAPCD
GRAPE VINES/CANES	grapes	KERN	2.5	5,159	1999	13,651	Daily A_BURN and/or R_BURN provided by SJVUAPCD
GRAPE VINES/CANES	grapes	KINGS	2.5	298	1999	744	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Grapes	grapes	Lake	2.5	2,561	1997	6,403	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
GRAPE VINES/CANES	grapes	MADERA	2.5	3,940	1999	9,906	Daily A_BURN and/or R_BURN provided by SJVUAPCD
GRAPE VINES/CANES	grapes	MERCED	2.5	3,543	1999	8,961	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Grape	grapes	Riverside	2.5		1999	1,152	Annual R_BURN provided by SCAQMD
Grape	grapes	Sacramento	2.5	69	1996	173	Daily A_BURN provided by Fife, 2002
GRAPE VINES/CANES	grapes	SAN JOAQUIN	2.5	2,501	1999	9,261	Daily A_BURN and/or R_BURN provided by SJVUAPCD
GRAPE VINES/CANES	grapes	STANISLAUS	2.5	1,752	1999	4,476	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Grape	grapes	Tehama	2.5	2	1996	5	Daily A_BURN provided by Fife, 2002
GRAPE STUMPS/STAKES	grapes	TULARE	2.5	2	1999	7	Daily A_BURN and/or R_BURN provided by SJVUAPCD
GRAPE VINES/CANES	grapes	TULARE	2.5	2,081	1999	5,732	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	grapes Total			**29,233**		**78,860**	
ALFALFA	hay; alfalfa	FRESNO	0.8	8,245	1999	6,596	Daily A_BURN and/or R_BURN provided by SJVUAPCD
alfalfa	hay; alfalfa	IMPERIAL	0.8	403	1996	323	Daily A_BURN provided by ICUAPCD
ALFALFA	hay; alfalfa	KERN	0.8	101	1999	90	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ALFALFA	hay; alfalfa	KINGS	0.8	7	1999	6	Daily A_BURN and/or R_BURN provided by SJVUAPCD
hay; alfalfa	hay; alfalfa	Lake	0.8	94	1997	75	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
ALFALFA	hay; alfalfa	MADERA	0.8	76	1999	61	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ALFALFA	hay; alfalfa	MERCED	0.8	6	1999	6	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Alfalfa	hay; alfalfa	Placer	0.8	1	1996	1	Daily A_BURN provided by Fife, 2002
ALFALFA	hay; alfalfa	SAN JOAQUIN	0.8	-	1999	3	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ALFALFA	hay; alfalfa	STANISLAUS	0.8	28	1999	22	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Alfalfa	hay; alfalfa	Tehama	0.8	28	1996	22	Daily A_BURN provided by Fife, 2002
ALFALFA	hay; alfalfa	TULARE	0.8	10	1999	8	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	hay; alfalfa Total			**8,998**		**7,213**	
Hay-Wild	hay; all other	Butte	0.8	1	1996	1	Daily A_BURN provided by Fife, 2002
hay; other	hay; all other	Lake	0.8	400	1997	320	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
Hay	hay; all other	Placer	0.8	50	1996	40	Daily A_BURN provided by Fife, 2002
	hay; all other Total			**451**		**361**	
Kiwi	kiwi	Butte	1.7	64	1996	109	Daily A_BURN provided by Fife, 2002
KIWI PRUNING	kiwi	FRESNO	1.7	22	1999	39	Daily A_BURN and/or R_BURN provided by SJVUAPCD
KIWI PRUNING	kiwi	MADERA	1.7	5	1999	9	Daily A_BURN and/or R_BURN provided by SJVUAPCD
KIWI PRUNING	kiwi	MERCED	1.7	-	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
KIWI PRUNING	kiwi	SAN JOAQUIN	1.7	11	1999	20	Daily A_BURN and/or R_BURN provided by SJVUAPCD
KIWI PRUNING	kiwi	STANISLAUS	1.7	19	1999	32	Daily A_BURN and/or R_BURN provided by SJVUAPCD
KIWI PRUNING	kiwi	TULARE	1.7	83	1999	158	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	kiwi Total			**203**		**369**	
NECTARINE PRUNING	nectarines	FRESNO	1.7	2,129	1999	3,816	Daily A_BURN and/or R_BURN provided by SJVUAPCD
NECTARINE PRUNING	nectarines	KERN	1.7	155	1999	396	Daily A_BURN and/or R_BURN provided by SJVUAPCD
NECTARINE PRUNING	nectarines	KINGS	1.7	152	1999	265	Daily A_BURN and/or R_BURN provided by SJVUAPCD
NECTARINE PRUNING	nectarines	MADERA	1.7	44	1999	75	Daily A_BURN and/or R_BURN provided by SJVUAPCD
NECTARINE PRUNING	nectarines	MERCED	1.7	21	1999	79	Daily A_BURN and/or R_BURN provided by SJVUAPCD
NECTARINE PRUNING	nectarines	SAN JOAQUIN	1.7	5	1999	9	Daily A_BURN and/or R_BURN provided by SJVUAPCD
NECTARINE PRUNING	nectarines	STANISLAUS	1.7	28	1999	48	Daily A_BURN and/or R_BURN provided by SJVUAPCD

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
NECTARINE PRUNING	nectarines	TULARE	1.7	1,020	1999	2,264	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	nectarines Total			**3,554**		**6,951**	
Oats	oats	Butte	1.6	20	1996	32	Daily A_BURN provided by Fife, 2002
OATS	oats	FRESNO	1.6	83	1999	137	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OATS	oats	KERN	1.6	50	1999	80	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Oats	oats	Lake	1.6	82	1997	131	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
OATS	oats	MADERA	1.6	255	1999	408	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OATS	oats	MERCED	1.6	372	1999	622	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OATS	oats	SAN JOAQUIN	1.6	299	1999	478	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OATS	oats	STANISLAUS	1.6	802	1999	1,283	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Oats	oats	Tehama	1.6	90	1996	144	Daily A_BURN provided by Fife, 2002
OATS	oats	TULARE	1.6	391	1999	628	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	oats Total			**2,444**		**3,944**	
Olive	olives	Butte	1.7	340	1996	577	Daily A_BURN provided by Fife, 2002
Olive	olives	COLUSA	1.7	5	1996	9	Daily A_BURN provided by Fife, 2002
OLIVE PRUNING	olives	FRESNO	1.7	181	1999	316	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OLIVE PRUNING	olives	KERN	1.7	41	1999	70	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OLIVE PRUNING	olives	KINGS	1.7	119	1999	202	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OLIVE PRUNING	olives	MADERA	1.7	308	1999	537	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OLIVE PRUNING	olives	MERCED	1.7	30	1999	55	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Olive	olives	Sacramento	1.7	2	1996	3	Daily A_BURN provided by Fife, 2002
OLIVE PRUNING	olives	SAN JOAQUIN	1.7	24	1999	48	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OLIVE PRUNING	olives	STANISLAUS	1.7	3	1999	5	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Olive	olives	Tehama	1.7	2,124	1996	3,610	Daily A_BURN provided by Fife, 2002
OLIVE PRUNING	olives	TULARE	1.7	1,085	1999	2,610	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	olives Total			**4,261**		**8,042**	
OtherPruning	orchard pruning; unspecified	Butte	1.7	229	1996	389	Daily A_BURN provided by Fife, 2002
OtherPruning	orchard pruning; unspecified	COLUSA	1.7	80	1996	139	Daily A_BURN provided by Fife, 2002
OTHER PRUNINGS	orchard pruning; unspecified	FRESNO	1.7	20	1999	36	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OTHER PRUNINGS	orchard pruning; unspecified	KERN	1.7	-	1999	1	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OTHER PRUNINGS	orchard pruning; unspecified	MADERA	1.7	7	1999	12	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OTHER PRUNINGS	orchard pruning; unspecified	MERCED	1.7	73	1999	285	Daily A_BURN and/or R_BURN provided by SJVUAPCD
X-Mas Trees	orchard pruning; unspecified	Placer	1.7	26	1996	44	Daily A_BURN provided by Fife, 2002
OtherPruning	orchard pruning; unspecified	Sacramento	1.7	98	1996	167	Daily A_BURN provided by Fife, 2002
CHRISTMAS TREES	orchard pruning; unspecified	SAN JOAQUIN	1.7	-	1999	12	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OTHER PRUNINGS	orchard pruning; unspecified	SAN JOAQUIN	1.7	600	1999	1,310	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OTHER PRUNINGS	orchard pruning; unspecified	STANISLAUS	1.7	125	1999	319	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OtherPruning	orchard pruning; unspecified	Tehama	1.7	623	1996	1,059	Daily A_BURN provided by Fife, 2002
OTHER PRUNINGS	orchard pruning; unspecified	TULARE	1.7	43	1999	75	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OtherPruning	orchard pruning; unspecified	Yolo	1.7	1,013	1996	1,722	Daily A_BURN provided by Fife, 2002
	orchard pruning; unspecified Total			**2,937**		**5,570**	
OrchardRemoval	orchard removal	Butte	15	207	1996	3,105	Daily A_BURN provided by Fife, 2002
ORCHARD REMOVAL	orchard removal	FRESNO	15	2,453	1999	36,800	Daily A_BURN and/or R_BURN provided by SJVUAPCD
VINEYARD REMOVAL	orchard removal	FRESNO	15	30	1999	450	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ORCHARD REMOVAL	orchard removal	KERN	15	157	1999	2,349	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ORCHARD REMOVAL	orchard removal	KINGS	15	747	1999	11,211	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ORCHARD REMOVAL	orchard removal	MADERA	15	1,270	1999	19,055	Daily A_BURN and/or R_BURN provided by SJVUAPCD
OrchardRemoval	orchard removal	Placer	15	1	1996	15	Daily A_BURN provided by Fife, 2002
OrchardRemoval	orchard removal	Sutter	15	100	1996	1,500	Daily A_BURN provided by Fife, 2002
ORCHARD REMOVAL	orchard removal	TULARE	15	506	1999	7,595	Daily A_BURN and/or R_BURN provided by SJVUAPCD

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
OrchardRemoval	orchard removal	Yuba	15	152	1996	2,280	Daily A_BURN provided by Fife, 2002
	orchard removal Total			**5,624**		**84,359**	
onion seed	other fruits and vegetables	IMPERIAL	1.5	126	1996	191	Daily A_BURN provided by ICUAPCD
	other fruits and vegetables Total			**126**		**191**	
Peach	peaches	Butte	2.5	175	1996	438	Daily A_BURN provided by Fife, 2002
PEACH PRUNING	peaches	FRESNO	2.5	2,922	1999	7,480	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEACH PRUNING	peaches	KERN	2.5	420	1999	1,064	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEACH PRUNING	peaches	KINGS	2.5	894	1999	2,356	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEACH PRUNING	peaches	MADERA	2.5	377	1999	942	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEACH PRUNING	peaches	MERCED	2.5	631	1999	1,678	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Peach	peaches	Placer	2.5	11	1996	28	Daily A_BURN provided by Fife, 2002
Peach	peaches	Sacramento	2.5	8	1996	20	Daily A_BURN provided by Fife, 2002
PEACH PRUNING	peaches	SAN JOAQUIN	2.5	112	1999	454	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEACH PRUNING	peaches	STANISLAUS	2.5	1,146	1999	3,010	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Peach	peaches	Sutter	2.5	139	1996	348	Daily A_BURN provided by Fife, 2002
Peach	peaches	Tehama	2.5	31	1996	78	Daily A_BURN provided by Fife, 2002
PEACH PRUNING	peaches	TULARE	2.5	1,394	1999	4,947	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Peach	peaches	Yuba	2.5	40	1996	100	Daily A_BURN provided by Fife, 2002
	peaches Total			**8,299**		**22,940**	
PEANUTS	peanuts	MERCED	1.2	4	1999	5	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	peanuts Total			**4**		**5**	
Pear	pears	Butte	2.6	13	1996	34	Daily A_BURN provided by Fife, 2002
PEAR PRUNING	pears	FRESNO	2.6	48	1999	124	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEAR PRUNING	pears	KERN	2.6	21	1999	68	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Pears	pears	Lake	2.6	5,249	1997	13,647	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
PEAR PRUNING	pears	MADERA	2.6	1	1999	1	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEAR PRUNING	pears	MERCED	2.6	1	1999	3	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Pear	pears	Placer	2.6	21	1996	55	Daily A_BURN provided by Fife, 2002
Pear	pears	Sacramento	2.6	262	1996	680	Daily A_BURN provided by Fife, 2002
PEAR PRUNING	pears	SAN JOAQUIN	2.6	19	1999	74	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEAR PRUNING	pears	STANISLAUS	2.6	-	1999	3	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PEAR PRUNING	pears	TULARE	2.6	1,170	1999	3,061	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	pears Total			**6,804**		**17,748**	
PEA VINES	peas; dry edible	FRESNO	2.5	1	1999	1	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	peas; dry edible Total			**1**		**1**	
Pecan	pecans	Butte	1.7	11	1996	19	Daily A_BURN provided by Fife, 2002
Pecan	pecans	COLUSA	1.7	41	1996	71	Daily A_BURN provided by Fife, 2002
PECAN PRUNING	pecans	FRESNO	1.7	648	1999	1,106	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PECAN PRUNING	pecans	KERN	1.7	395	1999	673	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PECAN PRUNING	pecans	KINGS	1.7	44	1999	80	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PECAN PRUNING	pecans	MADERA	1.7	53	1999	90	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PECAN PRUNING	pecans	MERCED	1.7	5	1999	13	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PECAN PRUNING	pecans	SAN JOAQUIN	1.7	-	1999	7	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PECAN PRUNING	pecans	STANISLAUS	1.7	29	1999	51	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Pecan	pecans	Tehama	1.7	138	1996	235	Daily A_BURN provided by Fife, 2002
PECAN PRUNING	pecans	TULARE	1.7	455	1999	842	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	pecans Total			**1,819**		**3,186**	
Persimmon	persimmons	Butte	1.7	13	1996	21	Daily A_BURN provided by Fife, 2002
PERSIMMON PRUNING	persimmons	FRESNO	1.7	130	1999	228	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PERSIMMON PRUNING	persimmons	KERN	1.7	1	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
PERSIMMON PRUNING	persimmons	MADERA	1.7	15	1999	26	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PERSIMMON PRUNING	persimmons	MERCED	1.7	1	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Persimmon	persimmons	Placer	1.7	6	1996	10	Daily A_BURN provided by Fife, 2002
PERSIMMON PRUNING	persimmons	SAN JOAQUIN	1.7	-	1999	5	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PERSIMMON PRUNING	persimmons	STANISLAUS	1.7	127	1999	215	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PERSIMMON PRUNING	persimmons	TULARE	1.7	50	1999	123	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	persimmons Total			**342**		**631**	
Pistachio	pistachio	Butte	1.7	74	1996	125	Daily A_BURN provided by Fife, 2002
PISTACHIO PRUNING	pistachio	FRESNO	1.7	543	1999	957	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PISTACHIO PRUNING	pistachio	KERN	1.7	793	1999	1,872	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PISTACHIO PRUNING	pistachio	KINGS	1.7	872	1999	1,530	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PISTACHIO PRUNING	pistachio	MADERA	1.7	8,638	1999	15,828	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PISTACHIO PRUNING	pistachio	MERCED	1.7	1,473	1999	2,643	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PISTACHIO PRUNING	pistachio	SAN JOAQUIN	1.7	-	1999	13	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PISTACHIO PRUNING	pistachio	STANISLAUS	1.7	41	1999	75	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Pistachio	pistachio	Tehama	1.7	21	1996	35	Daily A_BURN provided by Fife, 2002
PISTACHIO PRUNING	pistachio	TULARE	1.7	410	1999	1,060	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	pistachio Total			**12,862**		**24,136**	
Plum	plums and prunes	Butte	1.2	5	1996	6	Daily A_BURN provided by Fife, 2002
Prune	plums and prunes	Butte	1.2	1,708	1996	2,050	Daily A_BURN provided by Fife, 2002
Prune	plums and prunes	COLUSA	1.2	872	1996	1,046	Daily A_BURN provided by Fife, 2002
PLUM PRUNING	plums and prunes	FRESNO	1.2	2,030	1999	3,427	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PLUOT PRUNING	plums and prunes	FRESNO	1.2	28	1999	34	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PRUNE PRUNING	plums and prunes	FRESNO	1.2	1,069	1999	1,300	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PLUM PRUNING	plums and prunes	KERN	1.2	152	1999	245	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PRUNE PRUNING	plums and prunes	KERN	1.2	70	1999	94	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PLUM PRUNING	plums and prunes	KINGS	1.2	129	1999	171	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PRUNE PRUNING	plums and prunes	KINGS	1.2	26	1999	31	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PLUM PRUNING	plums and prunes	MADERA	1.2	113	1999	135	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PRUNE PRUNING	plums and prunes	MADERA	1.2	611	1999	739	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PLUM PRUNING	plums and prunes	MERCED	1.2	38	1999	71	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PRUNE PRUNING	plums and prunes	MERCED	1.2	258	1999	382	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Plum	plums and prunes	Placer	1.2	13	1996	16	Daily A_BURN provided by Fife, 2002
Prune	plums and prunes	Placer	1.2	73	1996	88	Daily A_BURN provided by Fife, 2002
PLUM PRUNING	plums and prunes	SAN JOAQUIN	1.2	3	1999	9	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PLUOT PRUNING	plums and prunes	SAN JOAQUIN	1.2	1	1999	1	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PRUNE PRUNING	plums and prunes	SAN JOAQUIN	1.2	7	1999	49	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PLUM PRUNING	plums and prunes	STANISLAUS	1.2	4	1999	9	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PRUNE PRUNING	plums and prunes	STANISLAUS	1.2	-	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Prune	plums and prunes	Sutter	1.2	346	1996	415	Daily A_BURN provided by Fife, 2002
Prune	plums and prunes	Tehama	1.2	4,821	1996	5,785	Daily A_BURN provided by Fife, 2002
PLUM PRUNING	plums and prunes	TULARE	1.2	2,319	1999	4,408	Daily A_BURN and/or R_BURN provided by SJVUAPCD
PRUNE PRUNING	plums and prunes	TULARE	1.2	1,386	1999	2,403	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Prune	plums and prunes	Yolo	1.2	1,751	1996	2,101	Daily A_BURN provided by Fife, 2002
Prune	plums and prunes	Yuba	1.2	113	1996	136	Daily A_BURN provided by Fife, 2002
	plums and prunes Total			**17,943**		**25,152**	
POMEGRANATE PRUNING	pomegranates	FRESNO	1.7	149	1999	256	Daily A_BURN and/or R_BURN provided by SJVUAPCD
POMEGRANATE PRUNING	pomegranates	KERN	1.7	100	1999	177	Daily A_BURN and/or R_BURN provided by SJVUAPCD
POMEGRANATE PRUNING	pomegranates	KINGS	1.7	22	1999	37	Daily A_BURN and/or R_BURN provided by SJVUAPCD
POMEGRANATE PRUNING	pomegranates	MADERA	1.7	54	1999	99	Daily A_BURN and/or R_BURN provided by SJVUAPCD
POMEGRANATE PRUNING	pomegranates	MERCED	1.7	-	1999	4	Daily A_BURN and/or R_BURN provided by SJVUAPCD

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
POMEGRANATE PRUNING	pomegranates	STANISLAUS	1.7	1	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
POMEGRANATE PRUNING	pomegranates	TULARE	1.7	79	1999	310	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	pomegranates Total			**406**		**885**	
QUINCE	quinces	KINGS	1.7	3	1999	5	Daily A_BURN and/or R_BURN provided by SJVUAPCD
QUINCE	quinces	TULARE	1.7	14	1999	45	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	quinces Total			**17**		**51**	
Rice	rice; all	Butte	3	45,945	1996	137,835	Daily A_BURN provided by Fife, 2002
Rice-Wild	rice; all	Butte	3	753	1996	2,259	Daily A_BURN provided by Fife, 2002
Rice	rice; all	COLUSA	3	53,366	1996	160,098	Daily A_BURN provided by Fife, 2002
RICE	rice; all	FRESNO	3	8,578	1999	25,734	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Rice	rice; all	Glenn	3	50,576	1996	151,727	Daily A_BURN provided by Fife, 2002
Rice, wild	rice; all	Lake	3	60	1997	180	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
RICE	rice; all	MERCED	3	4,110	1999	12,330	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Rice	rice; all	Placer	3	6,623	1996	19,869	Daily A_BURN provided by Fife, 2002
RICE	rice; all	Sacramento	3	6,631	1996	19,892	Daily A_BURN provided by Fife, 2002
RICE	rice; all	SAN JOAQUIN	3	5,151	1999	15,456	Daily A_BURN and/or R_BURN provided by SJVUAPCD
RICE	rice; all	STANISLAUS	3	3,466	1999	10,397	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Rice	rice; all	Sutter	3	42,112	1996	126,336	Daily A_BURN provided by Fife, 2002
Rice	rice; all	Tehama	3	704	1996	2,111	Daily A_BURN provided by Fife, 2002
Rice	rice; all	Yolo	3	7,737	1996	23,211	Daily A_BURN provided by Fife, 2002
Rice	rice; all	Yuba	3	18,953	1996	56,859	Daily A_BURN provided by Fife, 2002
	rice; all Total			**254,763**		**764,293**	
Rye	rye	Placer	1.9	65	1996	124	Daily A_BURN provided by Fife, 2002
	rye Total			**65**		**124**	
Safflower	safflower	Butte	1.3	20	1996	26	Daily A_BURN provided by Fife, 2002
Safflower	safflower	COLUSA	1.3	3,839	1996	4,991	Daily A_BURN provided by Fife, 2002
SAFFLOWER	safflower	FRESNO	1.3	337	1999	438	Daily A_BURN and/or R_BURN provided by SJVUAPCD
SAFFLOWER	safflower	KERN	1.3	2	1999	3	Daily A_BURN and/or R_BURN provided by SJVUAPCD
SAFFLOWER	safflower	KINGS	1.3	6	1999	8	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Safflower	safflower	Sacramento	1.3	54	1996	70	Daily A_BURN provided by Fife, 2002
SAFFLOWER	safflower	SAN JOAQUIN	1.3	367	1999	479	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Safflower	safflower	Sutter	1.3	301	1996	391	Daily A_BURN provided by Fife, 2002
Safflower	safflower	Tehama	1.3	15	1996	20	Daily A_BURN provided by Fife, 2002
Safflower	safflower	Yolo	1.3	201	1996	261	Daily A_BURN provided by Fife, 2002
	safflower Total			**5,142**		**6,686**	
Grass	seeds; other	Butte	2	614	1996	1,228	Daily A_BURN provided by Fife, 2002
Grass	seeds; other	COLUSA	2	130	1996	260	Daily A_BURN provided by Fife, 2002
bermuda	seeds; other	IMPERIAL	2	24,612	1996	49,224	Daily A_BURN provided by ICUAPCD
Clover	seeds; other	Placer	2	40	1996	80	Daily A_BURN provided by Fife, 2002
Grass	seeds; other	Placer	2	16	1996	32	Daily A_BURN provided by Fife, 2002
Grass	seeds; other	Tehama	2	1	1996	2	Daily A_BURN provided by Fife, 2002
GRASS	seeds; other	TULARE	2	1	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
SUDAN	seeds; other	TULARE	2	7	1999	14	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	seeds; other Total			**25,421**		**50,842**	
SORGHUM (MILO)	sorghum	MERCED	2.9	-	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
SORGHUM (MILO)	sorghum	SAN JOAQUIN	2.9	2	1999	6	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Milo	sorghum	Tehama	2.9	60	1996	174	Daily A_BURN provided by Fife, 2002
	sorghum Total			**62**		**182**	
sudan	sudan	IMPERIAL	2	2,283	1996	4,566	Daily A_BURN provided by ICUAPCD
SUDAN	sudan	Sacramento	2	595	1996	1,190	Daily A_BURN provided by Fife, 2002

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
	sudan Total			**2,878**		**5,756**	
SUGAR CANE	sugarcane	FRESNO	14	0	1999	4	Daily A_BURN and/or R_BURN provided by SJVUAPCD
	sugarcane Total			**0**		**4**	
OTHER-MISCELLANEOUS	unspecified	COLUSA		1,206	1996		Daily A_BURN provided by Fife, 2002
Unspecified	unspecified	FRESNO		-	1999	25	Daily A_BURN and/or R_BURN provided by SJVUAPCD
FERT/PESTICIDE SACKS	unspecified	KERN		-	1999	1	Daily A_BURN and/or R_BURN provided by SJVUAPCD
ROSE PRUNING	unspecified	KERN		-	1999	40	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Unspecified	unspecified	KERN		-	1999	3,038	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Unspecified	unspecified	MERCED		-	1999	2	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Miscellaneous	unspecified	Placer		2	1996	-	Daily A_BURN provided by Fife, 2002
FLOOD DEBRIS	unspecified	TULARE		-	1999	5	Daily A_BURN and/or R_BURN provided by SJVUAPCD
SLASH	unspecified	TULARE		-	1999	3	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Miscellaneous	unspecified	Yolo		2,312	1996		Daily A_BURN provided by Fife, 2002
	unspecified Total			**3,520**		**3,114**	
Walnut	walnuts	Butte	1.2	3,044	1996	3,653	Daily A_BURN provided by Fife, 2002
Walnut	walnuts	COLUSA	1.2	384	1996	461	Daily A_BURN provided by Fife, 2002
WALNUT PRUNING	walnuts	FRESNO	1.2	5,055	1999	6,117	Daily A_BURN and/or R_BURN provided by SJVUAPCD
WALNUT PRUNING	walnuts	KERN	1.2	171	1999	318	Daily A_BURN and/or R_BURN provided by SJVUAPCD
WALNUT PRUNING	walnuts	KINGS	1.2	6,027	1999	7,467	Daily A_BURN and/or R_BURN provided by SJVUAPCD
orchard removal	walnuts	Lake	15	700	1997	10,500	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
Walnuts	walnuts	Lake	1.2	6,224	1997	7,469	A_BURN data taken from WRAP/ECR (WRAP, 2001) survey which references "1997 Lake Co. AQMD Agricultural and Opening Burning Report"
WALNUT PRUNING	walnuts	MADERA	1.2	956	1999	1,157	Daily A_BURN and/or R_BURN provided by SJVUAPCD
WALNUT PRUNING	walnuts	MERCED	1.2	1,988	1999	5,914	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Walnut	walnuts	Placer	1.2	131	1996	157	Daily A_BURN provided by Fife, 2002
Walnut	walnuts	Sacramento	1.2	1	1996	1	Daily A_BURN provided by Fife, 2002
WALNUT PRUNING	walnuts	SAN JOAQUIN	1.2	7,838	1999	25,004	Daily A_BURN and/or R_BURN provided by SJVUAPCD
WALNUT PRUNING	walnuts	STANISLAUS	1.2	13,809	1999	20,659	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Walnut	walnuts	Sutter	1.2	418	1996	502	Daily A_BURN provided by Fife, 2002
Walnut	walnuts	Tehama	1.2	3,254	1996	3,905	Daily A_BURN provided by Fife, 2002
WALNUT PRUNING	walnuts	TULARE	1.2	10,884	1999	16,931	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Walnut	walnuts	Yolo	1.2	2,463	1996	2,956	Daily A_BURN provided by Fife, 2002
Walnut	walnuts	Yuba	1.2	45	1996	54	Daily A_BURN provided by Fife, 2002
	walnuts Total			**63,391**		**113,223**	
Other Field Crops	wheat; all	Butte	1.9	109	1996	207	Daily A_BURN provided by Fife, 2002
Wheat	wheat; all	Butte	1.9	2,888	1996	5,486	Daily A_BURN provided by Fife, 2002
Other Field Crops	wheat; all	COLUSA	1.9	1	1996	2	Daily A_BURN provided by Fife, 2002
Wheat	wheat; all	COLUSA	1.9	6,134	1996	11,655	Daily A_BURN provided by Fife, 2002
WHEAT	wheat; all	FRESNO	1.9	1,388	1999	2,637	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Wheat	wheat; all	Glenn	1.9	12	1996	23	Daily A_BURN provided by Fife, 2002
wheat	wheat; all	IMPERIAL	1.9	71,795	1996	136,395	Daily A_BURN provided by ICUAPCD
WHEAT	wheat; all	KERN	1.9	7,145	1999	13,595	Daily A_BURN and/or R_BURN provided by SJVUAPCD
WHEAT	wheat; all	KINGS	1.9	5,719	1999	10,866	Daily A_BURN and/or R_BURN provided by SJVUAPCD
WHEAT	wheat; all	MADERA	1.9	1,879	1999	3,570	Daily A_BURN and/or R_BURN provided by SJVUAPCD
WHEAT	wheat; all	MERCED	1.9	1,476	1999	2,804	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Wheat	wheat; all	Placer	1.9	21	1996	40	Daily A_BURN provided by Fife, 2002
Other Field Crops	wheat; all	Sacramento	1.9	3	1996	5	Daily A_BURN provided by Fife, 2002
Wheat	wheat; all	Sacramento	1.9	1,491	1996	2,832	Daily A_BURN provided by Fife, 2002
WHEAT	wheat; all	SAN JOAQUIN	1.9	2,917	1999	6,315	Daily A_BURN and/or R_BURN provided by SJVUAPCD
WHEAT	wheat; all	STANISLAUS	1.9	182	1999	346	Daily A_BURN and/or R_BURN provided by SJVUAPCD

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
Wheat	wheat; all	Sutter	1.9	414	1996	787	Daily A_BURN provided by Fife, 2002
Wheat	wheat; all	Tehama	1.9	1,215	1996	2,309	Daily A_BURN provided by Fife, 2002
WHEAT	wheat; all	TULARE	1.9	8,367	1999	16,021	Daily A_BURN and/or R_BURN provided by SJVUAPCD
Other Field Crops	wheat; all	Yolo	1.9	721	1996	1,369	Daily A_BURN provided by Fife, 2002
Wheat	wheat; all	Yolo	1.9	3,685	1996	7,002	Daily A_BURN provided by Fife, 2002
Other Field Crops	wheat; all	Yuba	1.9	234	1996	445	Daily A_BURN provided by Fife, 2002
	wheat; all Total			**117,794**		**224,709**	
	Grand Total			**893,405**		**1,898,134**	

COLORADO

Residue Name	Crop Name	County	RL (tons / acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
wheat; other spring (irrigated)	wheat; other spring-CO	Mesa	4	500	Avg	2,000	A_BURN and RL per J.Sharkoffl, NRCS in CO.

HAWAII

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
pineapple	pineapple	Honolulu		7,000	1996		RL on pineapple is undetermined; Maui Pineapple Co. indicates 13,000 acres burned/year
pineapple	pineapple	Maui & Kalwao		6,000	1996		RL on pineapple is undetermined; Maui Pineapple Co. indicates 13,000 acres burned/year
	pineapple Total			**13,000**		**-**	
sugarcane	sugarcane	Hawaii	14	909	1996	12,727	Annual A_BURN from L.Young, HI Dept of Health
sugarcane	sugarcane	Honolulu	14	3,357	1996	46,993	Annual A_BURN from L.Young, HI Dept of Health
sugarcane	sugarcane	Kauai	14	11,678	1996	163,496	Annual A_BURN from L.Young, HI Dept of Health
sugarcane	sugarcane	Maui & Kalwao	14	14,056	1996	196,783	Annual A_BURN from L.Young, HI Dept of Health
	sugarcane Total			**30,000**		**420,000**	
	Grand Total			**43,000**		**420,000**	

IDAHO

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
alfalfa seed	seeds; alfalfa	Ada	0.8	202	1996	162	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Adams	0.8	53	1996	42	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Bannock	0.8	155	1996	124	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Bear Lake	0.8	263	1996	210	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Bingham	0.8	463	1996	370	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Blaine	0.8	143	1996	114	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Boise	0.8	18	1996	14	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Bonneville	0.8	250	1996	200	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Butte	0.8	229	1996	183	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Camas	0.8	370	1996	296	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Canyon	0.8	368	1996	294	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Caribou	0.8	217	1996	174	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Cassia	0.8	445	1996	356	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Clark	0.8	154	1996	123	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Custer	0.8	213	1996	170	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Elmore	0.8	310	1996	248	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Franklin	0.8	362	1996	290	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Fremont	0.8	190	1996	152	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Gem	0.8	121	1996	97	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Gooding	0.8	310	1996	248	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Jefferson	0.8	732	1996	586	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Jerome	0.8	329	1996	263	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Lemhi	0.8	194	1996	155	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Lincoln	0.8	154	1996	123	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Madison	0.8	154	1996	123	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Minidoka	0.8	223	1996	178	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Oneida	0.8	241	1996	193	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Owyhee	0.8	389	1996	311	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Payette	0.8	114	1996	91	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Power	0.8	77	1996	62	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Teton	0.8	135	1996	108	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Twin Falls	0.8	560	1996	448	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Valley	0.8	20	1996	16	Annual A_BURN provided by D.Riley IDEQ
alfalfa seed	seeds; alfalfa	Washington	0.8	218	1996	174	Annual A_BURN provided by D.Riley IDEQ
	seeds; alfalfa Total			**8,376**		**6,701**	
barley	barley	Ada	1.7	501	1996	851	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Adams	1.7	95	1996	161	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Bannock	1.7	1,353	1996	2,301	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Bear Lake	1.7	2,260	1996	3,842	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Benewah	1.7	663	1996	1,127	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Bingham	1.7	3,180	1996	5,406	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Blaine	1.7	2,287	1996	3,888	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Bonner	1.7	162	1996	276	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Bonneville	1.7	8,255	1996	14,034	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Boundary	1.7	826	1996	1,403	Annual A_BURN provided by D.Riley IDEQ

IDAHO

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
barley	barley	Butte	1.7	2,098	1996	3,566	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Camas	1.7	1,326	1996	2,255	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Canyon	1.7	1,123	1996	1,909	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Caribou	1.7	10,677	1996	18,152	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Cassia	1.7	3,519	1996	5,982	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Clark	1.7	149	1996	253	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Clearwater	1.7	798	1996	1,357	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Custer	1.7	433	1996	736	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Elmore	1.7	798	1996	1,357	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Franklin	1.7	2,625	1996	4,463	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Fremont	1.7	8,661	1996	14,724	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Gem	1.7	338	1996	575	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Gooding	1.7	731	1996	1,242	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Idaho	1.7	2,883	1996	4,900	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Jefferson	1.7	5,007	1996	8,512	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Jerome	1.7	2,016	1996	3,428	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Kootenai	1.7	541	1996	920	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Latah	1.7	3,397	1996	5,774	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Lemhi	1.7	95	1996	161	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Lewis	1.7	3,532	1996	6,005	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Lincoln	1.7	1,150	1996	1,956	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Madison	1.7	5,941	1996	10,100	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Minidoka	1.7	4,412	1996	7,500	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Nez Perce	1.7	3,302	1996	5,613	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Oneida	1.7	2,314	1996	3,934	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Owyhee	1.7	961	1996	1,633	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Payette	1.7	122	1996	207	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Power	1.7	1,326	1996	2,255	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Teton	1.7	4,899	1996	8,328	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Twin Falls	1.7	3,640	1996	6,189	Annual A_BURN provided by D.Riley IDEQ
barley	barley	Washington	1.7	392	1996	667	Annual A_BURN provided by D.Riley IDEQ
	barley Total			**98,790**		**167,943**	
bluegrass	seeds; KBG	Benewah	2	8,886	1996	17,771	Annual A_BURN provided by D.Riley IDEQ
bluegrass	seeds; KBG	Idaho	2	1,982	1996	3,965	Annual A_BURN provided by D.Riley IDEQ
bluegrass	seeds; KBG	Kootenai	2	26,223	1996	52,446	Annual A_BURN provided by D.Riley IDEQ
bluegrass	seeds; KBG	Latah	2	3,439	1996	6,877	Annual A_BURN provided by D.Riley IDEQ
bluegrass	seeds; KBG	Lewis	2	7,687	1996	15,375	Annual A_BURN provided by D.Riley IDEQ
bluegrass	seeds; KBG	Nez Perce	2	1,783	1996	3,566	Annual A_BURN provided by D.Riley IDEQ
	seeds; KBG Total			**50,000**		**100,000**	
ditchbank	ditches and ditch banks	Ada	3.2	1,271	1996	4,067	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Adams	3.2	441	1996	1,411	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Bannock	3.2	1,753	1996	5,610	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Bear Lake	3.2	962	1996	3,078	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Benewah	3.2	142	1996	454	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Bingham	3.2	3,156	1996	10,099	Annual A_BURN provided by D.Riley IDEQ

IDAHO

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
ditchbank	ditches and ditch banks	Blaine	3.2	735	1996	2,352	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Boise	3.2	63	1996	202	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Bonner	3.2	125	1996	400	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Bonneville	3.2	2,611	1996	8,355	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Boundary	3.2	126	1996	403	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Butte	3.2	643	1996	2,058	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Camas	3.2	901	1996	2,883	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Canyon	3.2	2,379	1996	7,613	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Caribou	3.2	2,218	1996	7,098	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Cassia	3.2	3,341	1996	10,691	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Clark	3.2	613	1996	1,962	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Clearwater	3.2	70	1996	224	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Custer	3.2	859	1996	2,749	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Elmore	3.2	1,022	1996	3,270	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Franklin	3.2	1,469	1996	4,701	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Fremont	3.2	1,549	1996	4,957	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Gem	3.2	489	1996	1,565	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Gooding	3.2	935	1996	2,992	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Idaho	3.2	419	1996	1,341	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Jefferson	3.2	1,978	1996	6,330	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Jerome	3.2	1,479	1996	4,733	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Kootenai	3.2	222	1996	710	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Latah	3.2	478	1996	1,530	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Lemhi	3.2	981	1996	3,139	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Lewis	3.2	321	1996	1,027	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Lincoln	3.2	743	1996	2,378	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Madison	3.2	1,520	1996	4,864	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Minidoka	3.2	1,690	1996	5,408	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Nez Perce	3.2	477	1996	1,526	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Oneida	3.2	1,778	1996	5,690	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Owyhee	3.2	1,413	1996	4,522	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Payette	3.2	648	1996	2,074	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Power	3.2	2,802	1996	8,966	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Shoshone	3.2	2	1996	6	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Teton	3.2	886	1996	2,835	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Twin Falls	3.2	2,745	1996	8,784	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Valley	3.2	561	1996	1,795	Annual A_BURN provided by D.Riley IDEQ
ditchbank	ditches and ditch banks	Washington	3.2	988	1996	3,162	Annual A_BURN provided by D.Riley IDEQ
	ditches and ditch banks Total			**50,004**		**160,013**	
mint	mint	Ada	0.5	192	1996	96	Annual A_BURN provided by D.Riley IDEQ
mint	mint	Butte	0.5	11	1996	6	Annual A_BURN provided by D.Riley IDEQ
mint	mint	Canyon	0.5	379	1996	190	Annual A_BURN provided by D.Riley IDEQ
mint	mint	Custer	0.5	23	1996	12	Annual A_BURN provided by D.Riley IDEQ
mint	mint	Owyhee	0.5	23	1996	12	Annual A_BURN provided by D.Riley IDEQ
mint	mint	Payette	0.5	71	1996	36	Annual A_BURN provided by D.Riley IDEQ

IDAHO

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
mint	mint	Washington	0.5	4	1996	2	Annual A_BURN provided by D.Riley IDEQ
	mint Total			**703**		**352**	
wheat	wheat; all	Ada	1.9	1,763	1996	3,350	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Bannock	1.9	6,254	1996	11,883	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Bear Lake	1.9	1,154	1996	2,193	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Benewah	1.9	4,047	1996	7,689	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Bingham	1.9	19,397	1996	36,854	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Blaine	1.9	330	1996	627	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Bonneville	1.9	9,464	1996	17,981	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Boundary	1.9	2,207	1996	4,194	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Butte	1.9	1,395	1996	2,651	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Camas	1.9	406	1996	771	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Canyon	1.9	5,848	1996	11,112	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Caribou	1.9	5,607	1996	10,654	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Cassia	1.9	15,210	1996	28,900	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Clark	1.9	1,916	1996	3,640	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Clearwater	1.9	926	1996	1,760	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Elmore	1.9	2,880	1996	5,471	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Franklin	1.9	2,791	1996	5,303	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Fremont	1.9	5,379	1996	10,220	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Gem	1.9	964	1996	1,832	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Gooding	1.9	2,093	1996	3,977	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Idaho	1.9	8,157	1996	15,498	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Jefferson	1.9	6,381	1996	12,124	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Jerome	1.9	5,480	1996	10,413	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Kootenai	1.9	3,108	1996	5,905	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Latah	1.9	11,963	1996	22,729	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Lewis	1.9	8,411	1996	15,980	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Lincoln	1.9	2,588	1996	4,917	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Madison	1.9	6,178	1996	11,738	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Minidoka	1.9	6,698	1996	12,726	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Nez Perce	1.9	12,052	1996	22,898	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Oneida	1.9	5,785	1996	10,991	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Owyhee	1.9	1,256	1996	2,386	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Payette	1.9	1,446	1996	2,748	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Power	1.9	17,608	1996	33,455	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Teton	1.9	1,142	1996	2,169	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Twin Falls	1.9	7,916	1996	15,040	Annual A_BURN provided by D.Riley IDEQ
wheat	wheat; all	Washington	1.9	1,700	1996	3,230	Annual A_BURN provided by D.Riley IDEQ
	wheat; all Total			**197,900**		**376,010**	
	Grand Total			**405,773**		**811,018**	

MONTANA

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
wheat; all (irrigated)	wheat; all	Beaverhead	1.9	80	1996	150	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Big Horn	1.9	130	1996	245	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Blaine	1.9	125	1996	235	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Broadwater	1.9	180	1996	340	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Carbon	1.9	25	1996	45	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Cascade	1.9	90	1996	170	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Chouteau	1.9	35	1996	65	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Custer	1.9	50	1996	95	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Daniels	1.9	5	1996	10	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Dawson	1.9	40	1996	75	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Deerlodge	1.9	15	1996	30	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Fergus	1.9	10	1996	20	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Flathead	1.9	75	1996	145	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Gallatin	1.9	165	1996	315	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Garfield	1.9	5	1996	10	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Glacier	1.9	50	1996	100	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Golden Valley	1.9	20	1996	40	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Hill	1.9	10	1996	20	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Jefferson	1.9	10	1996	20	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Judith Basin	1.9	5	1996	10	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Lake	1.9	135	1996	255	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Lewis And Clark	1.9	25	1996	50	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Liberty	1.9	20	1996	40	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Madison	1.9	80	1996	150	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	McCone	1.9	45	1996	85	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Meagher	1.9	10	1996	20	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Mineral	1.9	5	1996	10	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Missoula	1.9	15	1996	30	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Musselshell	1.9	5	1996	10	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Park	1.9	20	1996	40	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Petroleum	1.9	20	1996	40	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Phillips	1.9	55	1996	105	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Pondera	1.9	210	1996	400	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ

MONTANA

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
wheat; all (irrigated)	wheat; all	Powder River	1.9	10	1996	20	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Powell	1.9	5	1996	10	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Prairie	1.9	50	1996	95	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Ravalli	1.9	15	1996	30	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Richland	1.9	180	1996	340	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Roosevelt	1.9	40	1996	75	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Rosebud	1.9	45	1996	85	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Sanders	1.9	10	1996	20	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Sheridan	1.9	30	1996	55	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Stillwater	1.9	15	1996	30	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Sweet Grass	1.9	10	1996	20	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Teton	1.9	175	1996	330	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Toole	1.9	5	1996	10	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Treasure	1.9	40	1996	75	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Valley	1.9	175	1996	330	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Wheatland	1.9	10	1996	20	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Wibaux	1.9	5	1996	10	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
wheat; all (irrigated)	wheat; all	Yellowstone	1.9	65	1996	125	A_BURN based on estimate of 1% of irrigated wheat burned per J.Coeffield, MTDEQ
	wheat; all Total			**2,655**		**5,055**	
	Grand Total			**2,655**		**5,055**	

NORTH_DAKOTA

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
wheat; all	wheat; all	Barnes	1.9	18,855	Avg	35,826	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Benson	1.9	14,976	Avg	28,455	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Cass	1.9	24,066	Avg	45,726	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Cavalier	1.9	22,360	Avg	42,483	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Eddy	1.9	4,623	Avg	8,784	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Foster	1.9	8,164	Avg	15,513	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Grand Forks	1.9	11,742	Avg	22,311	A_BURN approx.10-12,000 acres (or 75% of gapfilling avg. 5.2% AH burned). Based on comment from NRCS/District Conservationist
wheat; all	wheat; all	Griggs	1.9	6,817	Avg	12,954	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Nelson	1.9	10,244	Avg	19,464	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Pembina	1.9	11,370	Avg	21,600	A_BURN approx.10-12,000 acres (or 75% of gapfilling avg. 5.2% AH burned). Based on comment from NRCS/District Conservationist
wheat; all	wheat; all	Ramsey	1.9	13,208	Avg	25,095	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Steele	1.9	8,928	Avg	16,965	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Stutsman	1.9	23,275	Avg	44,223	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Towner	1.9	14,123	Avg	26,835	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Traill	1.9	10,499	Avg	19,947	A_BURN based on gapfilling average, 5.2% of AH are burned.
wheat; all	wheat; all	Walsh	1.9	12,612	Avg	23,964	A_BURN approx.10-12,000 acres (or 75% of gapfilling avg. 5.2% AH burned). Based on comment from NRCS/District Conservationist
	wheat; all Total			**215,862**		**410,145**	
	Grand Total			**215,862**		**410,145**	

NEW_MEXICO

Residue Name	Crop Name	County	RL (tons / acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
wheat; all	wheat; all	Chaves	1.5	48	Avg	72	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Curry	1.5	2,500	1996	3,752	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	De Baca	1.5	8	Avg	12	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Dona Ana	1.5	140	Avg	212	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Eddy	1.5	4	Avg	8	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Guadalupe	1.5	56	Avg	84	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Harding	1.5	16	Avg	24	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Lea	1.5	124	Avg	188	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Quay	1.5	156	Avg	236	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Roosevelt	1.5	764	Avg	1,148	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
wheat; all	wheat; all	Union	1.5	548	Avg	824	RL per R.Shaw, NRCS (Shaver, 2002); A_BURN based on gap filling avg.,5.2% of AH are burned.
	wheat; all Total			**4,364**		**6,560**	
	Grand Total			**4,364**		**6,560**	

NEVADA

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
unspecified	unspecified	Churchill		195	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Douglas		877	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Elko		144	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Eureka		765	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Humboldt		12,535	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Lander		150	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Lincoln		170	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Lyon		206	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Pershing		5,820	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	Washoe		80	1998		A_BURN by county provided by C.Sergent, NDEP
unspecified	unspecified	White Pine		10	1998		A_BURN by county provided by C.Sergent, NDEP
	Grand Total			**20,952**		**Unknown**	

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
Barley	barley	CLACKAMAS	1.7		1996	18	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	DOUGLAS	1.7		1996	9	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	GILLIAM	1.7		1996	6,183	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	HARNEY	1.7		1996	54	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	KLAMATH	1.7		1996	4,176	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	LINN	1.7		1996	153	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	MALHEUR	1.7		1996	1,179	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	MARION	1.7		1996	306	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	MORROW	1.7		1996	108	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	POLK	1.7		1996	9	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	SHERMAN	1.7		1996	1,035	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	UMATILLA	1.7		1996	4,086	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	UNION	1.7		1996	909	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	WALLOWA	1.7		1996	2,394	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	WASCO	1.7		1996	594	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	WHEELER	1.7		1996	9	Annual R_BURN provided by B.Finneran ODEQ
Barley	barley	YAMHILL	1.7		1996	225	Annual R_BURN provided by B.Finneran ODEQ
	barley Total					**21,429**	
cereal grain; unspecified	corn; for grain	CLACKAMAS	4.2		1996	18	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	GILLIAM	4.2		1996	36	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	KLAMATH	4.2		1996	27	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	LINN	4.2		1996	81	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	MALHEUR	4.2		1996	2,700	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	MARION	4.2		1996	153	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	MORROW	4.2		1996	81	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	UMATILLA	4.2		1996	1,971	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	UNION	4.2		1996	36	Annual R_BURN provided by B.Finneran ODEQ
cereal grain; unspecified	corn; for grain	WASCO	4.2		1996	9	Annual R_BURN provided by B.Finneran ODEQ
	corn; for grain Total					**5,112**	
Oats	oats	CLACKAMAS	1.6		1996	288	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	DOUGLAS	1.6		1996	9	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	GILLIAM	1.6		1996	297	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	HARNEY	1.6		1996	18	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	KLAMATH	1.6		1996	999	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	LINN	1.6		1996	927	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	MALHEUR	1.6		1996	81	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	MARION	1.6		1996	3,645	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	POLK	1.6		1996	126	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	SHERMAN	1.6		1996	9	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	UMATILLA	1.6		1996	18	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	UNION	1.6		1996	45	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	WALLOWA	1.6		1996	36	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	WASCO	1.6		1996	18	Annual R_BURN provided by B.Finneran ODEQ
Oats	oats	YAMHILL	1.6		1996	1,386	Annual R_BURN provided by B.Finneran ODEQ

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
	oats Total					**7,902**	
grasses; unspecified (field burning)	seeds; unspecified	BENTON	2		1996	37,116	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (propaning)	seeds; unspecified	BENTON	2		1996	45	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (stack burning)	seeds; unspecified	BENTON	2		1996	1,728	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	CLACKAMAS	2		1996	9,270	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (propaning)	seeds; unspecified	CLACKAMAS	2		1996	252	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (stack burning)	seeds; unspecified	CLACKAMAS	2		1996	594	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	CROOK	2		1996	45	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	DOUGLAS	2		1996	351	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	HARNEY	2		1996	36	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	JEFFERSON	2		1996	46,899	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	LANE	2		1996	31,662	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (propaning)	seeds; unspecified	LANE	2		1996	9	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (stack burning)	seeds; unspecified	LANE	2		1996	2,430	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	LINN	2		1996	267,897	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (propaning)	seeds; unspecified	LINN	2		1996	1,566	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (stack burning)	seeds; unspecified	LINN	2		1996	4,266	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	MARION	2		1996	139,836	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (propaning)	seeds; unspecified	MARION	2		1996	873	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (stack burning)	seeds; unspecified	MARION	2		1996	14,004	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	POLK	2		1996	15,138	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (propaning)	seeds; unspecified	POLK	2		1996	36	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (stack burning)	seeds; unspecified	POLK	2		1996	11,016	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	UMATILLA	2		1996	1,863	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	UNION	2		1996	6,597	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (propaning)	seeds; unspecified	UNION	2		1996	378	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (stack burning)	seeds; unspecified	WASHINGTON	2		1996	45	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (field burning)	seeds; unspecified	YAMHILL	2		1996	12,906	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (propaning)	seeds; unspecified	YAMHILL	2		1996	45	Annual R_BURN provided by B.Finneran ODEQ
grasses; unspecified (stack burning)	seeds; unspecified	YAMHILL	2		1996	4,122	Annual R_BURN provided by B.Finneran ODEQ
	seeds; unspecified Total					**611,025**	
Wheat	wheat; all	BAKER	1.9		1996	1,998	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	CROOK	1.9		1996	342	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	DESCHUTES	1.9		1996	36	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	GILLIAM	1.9		1996	20,682	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	JACKSON	1.9		1996	8,829	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	JEFFERSON	1.9		1996	85,041	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	KLAMATH	1.9		1996	1,143	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	MALHEUR	1.9		1996	21,771	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	MORROW	1.9		1996	3,276	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	SHERMAN	1.9		1996	9,252	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	UMATILLA	1.9		1996	64,701	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	UNION	1.9		1996	10,179	Annual R_BURN provided by B.Finneran ODEQ
Wheat	wheat; all	WALLOWA	1.9		1996	1,683	Annual R_BURN provided by B.Finneran ODEQ

	Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
Wheat		wheat; all	WASCO	1.9		1996	15,822	Annual R_BURN provided by B.Finneran ODEQ
		wheat; all Total					**244,755**	
		Grand Total					**890,223**	

Residue Name	Crop Name	County	RL (tons / acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
barley	barley	Aurora	1.7	176	Avg	299	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Beadle	1.7	88	Avg	150	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Bon Homme	1.7	88	Avg	150	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Brookings	1.7	56	Avg	95	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Brown	1.7	968	Avg	1,646	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Brule	1.7	128	Avg	218	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Campbell	1.7	560	Avg	952	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Charles Mix	1.7	96	Avg	163	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Clark	1.7	64	Avg	109	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Codington	1.7	400	Avg	680	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Davison	1.7	60	Avg	102	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Day	1.7	528	Avg	898	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Deuel	1.7	80	Avg	136	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Douglas	1.7	88	Avg	150	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Edmunds	1.7	608	Avg	1,034	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Faulk	1.7	448	Avg	762	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Hand	1.7	432	Avg	734	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Hanson	1.7	64	Avg	109	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Hughes	1.7	88	Avg	150	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Hutchinson	1.7	48	Avg	82	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Hyde	1.7	208	Avg	354	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Jerauld	1.7	144	Avg	245	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Kingsbury	1.7	56	Avg	95	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Marshall	1.7	208	Avg	354	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	McPherson	1.7	816	Avg	1,387	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Miner	1.7	60	Avg	102	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Potter	1.7	416	Avg	707	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Roberts	1.7	656	Avg	1,115	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Sanborn	1.7	56	Avg	95	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Spink	1.7	224	Avg	381	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Turner	1.7	40	Avg	68	A_BURN based on gapfilling avg., 8.0% of AH are burned.
barley	barley	Walworth	1.7	376	Avg	639	A_BURN based on gapfilling avg., 8.0% of AH are burned.
	barley Total			**8,328**		**14,158**	

Residue Name	Crop Name	County	RL (tons / acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
wheat; winter all	wheat; winter all	Aurora	1.9	1,492	Avg	2,834	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Beadle	1.9	2,584	Avg	4,910	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Bon Homme	1.9	380	Avg	722	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Brookings	1.9	94	Avg	178	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Brown	1.9	348	Avg	662	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Brule	1.9	2,564	Avg	4,872	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Buffalo	1.9	328	Avg	624	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Campbell	1.9	510	Avg	970	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Charles Mix	1.9	2,678	Avg	5,088	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Clark	1.9	728	Avg	1,384	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Clay	1.9	62	Avg	118	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Codington	1.9	124	Avg	236	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Davison	1.9	1,488	Avg	2,828	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Day	1.9	182	Avg	346	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Deuel	1.9	42	Avg	80	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Douglas	1.9	1,550	Avg	2,946	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Edmunds	1.9	722	Avg	1,372	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Faulk	1.9	858	Avg	1,630	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Grant	1.9	68	Avg	130	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Hamlin	1.9	120	Avg	228	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Hand	1.9	3,308	Avg	6,286	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Hanson	1.9	812	Avg	1,542	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Hughes	1.9	3,504	Avg	6,658	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Hutchinson	1.9	1,180	Avg	2,242	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Hyde	1.9	1,778	Avg	3,378	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Jerauld	1.9	1,004	Avg	1,908	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Kingsbury	1.9	890	Avg	1,692	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Lake	1.9	78	Avg	148	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Lincoln	1.9	52	Avg	98	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Marshall	1.9	162	Avg	308	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	McCook	1.9	72	Avg	136	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	McPherson	1.9	166	Avg	316	A_BURN based on gapfilling avg., 5.2% of AH are burned.

Residue Name	Crop Name	County	RL (tons / acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
wheat; winter all	wheat; winter all	Miner	1.9	162	Avg	308	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Minnehaha	1.9	10	Avg	20	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Moody	1.9	10	Avg	20	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Potter	1.9	3,812	Avg	7,242	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Roberts	1.9	20	Avg	38	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Sanborn	1.9	494	Avg	938	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Spink	1.9	2,116	Avg	4,020	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Sully	1.9	7,150	Avg	13,586	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Turner	1.9	16	Avg	30	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Union	1.9	26	Avg	50	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Walworth	1.9	500	Avg	950	A_BURN based on gapfilling avg., 5.2% of AH are burned.
wheat; winter all	wheat; winter all	Yankton	1.9	36	Avg	68	A_BURN based on gapfilling avg., 5.2% of AH are burned.
	wheat; winter all Total			**44,280**		**84,140**	
	Grand Total			**52,608**		**98,298**	

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Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
barley	barley	Box Elder	1.7	1,476	1996	2,511	A_BURN provided by Veryl Peterson, NRCS
barley	barley	Cache	1.7	1,170	1996	1,998	A_BURN provided by Kerry Goodrich, NRCS
barley	barley	Weber	1.7	99	1996	162	A_BURN provided by Kerry Goodrich, NRCS
	barley Total			**2,745**		**4,671**	
ditches and fenceline	ditches and ditch banks-UT	Beaver	0.75	129	1996	97	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Box Elder	0.75	528	1996	396	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Cache	0.75	372	1996	279	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Carbon	0.75	27	1996	20	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Daggett	0.75	25	1996	19	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Davis	0.75	75	1996	56	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Duchesne	0.75	257	1996	193	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Emery	0.75	96	1996	72	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Garfield	0.75	67	1996	50	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Grand	0.75	13	1996	10	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Iron	0.75	245	1996	184	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Juab	0.75	91	1996	68	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Kane	0.75	14	1996	10	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Millard	0.75	424	1996	318	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Morgan	0.75	36	1996	27	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Piute	0.75	45	1996	34	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Rich	0.75	235	1996	177	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Salt Lake	0.75	46	1996	34	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	San Juan	0.75	28	1996	21	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Sanpete	0.75	250	1996	188	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Sevier	0.75	153	1996	115	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Summit	0.75	84	1996	63	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Tooele	0.75	61	1996	46	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Uintah	0.75	192	1996	144	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Utah	0.75	293	1996	219	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Wasatch	0.75	40	1996	30	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Washingon	0.75	46	1996	35	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Wayne	0.75	62	1996	46	A_BURN provided by Kerry Goodrich, NRCS
ditches and fenceline	ditches and ditch banks-UT	Weber	0.75	105	1996	79	A_BURN provided by Kerry Goodrich, NRCS
	ditches and ditch banks-UT Total			**4,040**		**3,030**	
orchard replacement	orchard removal	Box Elder	15	108	1996	1,620	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Cache	15	6	1996	90	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Carbon	15	3	1996	45	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Davis	15	16	1996	225	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Emery	15	2	1996	45	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches

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Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
orchard replacement	orchard removal	Garfield	15	3	1996	45	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Grand	15	3	1996	45	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Iron	15	3	1996	60	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Kane	15	6	1996	90	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Salt Lake	15	6	1996	90	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	San Juan	15	3	1996	45	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Utah	15	540	1996	8,100	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Washington	15	30	1996	450	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Wayne	15	6	1996	90	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
orchard replacement	orchard removal	Weber	15	15	1996	225	Annual A_BURN provided by K.Goodrich, NRCS (15,000/20years); distributed A_BURN over counties harvesting apples, cherries, peaches
	orchard removal Total			**750**		**11,265**	
wheat	wheat; all	Box Elder	1.9	7,560	1996	14,364	A_BURN provided by Veryl Peterson, NRCS
wheat	wheat; all	Cache	1.9	1,386	1996	2,637	A_BURN provided by Kerry Goodrich, NRCS
wheat	wheat; all	Weber	1.9	198	1996	378	A_BURN provided by Kerry Goodrich, NRCS
	wheat; all Total			**9,144**		**17,379**	
	Grand Total			**16,679**		**36,345**	

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
orchard (maintainence - no removal)	apples	Yakima	2.3	382	1999	879	Daily A_BURN provided in permit database from S.Nolph WDOE
	apples Total			**382**		**879**	
asparagus	asparagus	Franklin	1.5	14	1999	21	Daily A_BURN provided in permit database from S.Nolph WDOE
	asparagus Total			**14**		**21**	
buu - barley - unknown - unknown	barley	Adams	1.7	263	1999	446	Daily A_BURN provided in permit database from S.Nolph WDOE
bsu - barley - spring - unknown	barley	Columbia	1.7	5,509	1999	9,366	Daily A_BURN provided in permit database from S.Nolph WDOE
buu - barley - unknown - unknown	barley	Columbia	1.7	799	1999	1,358	Daily A_BURN provided in permit database from S.Nolph WDOE
bui - barley - unknown - irrigated	barley	Lincoln	1.7	195	1999	332	Daily A_BURN provided in permit database from S.Nolph WDOE
buu - barley - unknown - unknown	barley	Lincoln	1.7	45	1999	77	Daily A_BURN provided in permit database from S.Nolph WDOE
bwd - barley - winter - dryland	barley	Lincoln	1.7	20	1999	34	Daily A_BURN provided in permit database from S.Nolph WDOE
bsu - barley - spring - unknown	barley	Walla Walla	1.7	466	1999	792	Daily A_BURN provided in permit database from S.Nolph WDOE
buu - barley - unknown - unknown	barley	Walla Walla	1.7	200	1999	340	Daily A_BURN provided in permit database from S.Nolph WDOE
bsu - barley - spring - unknown	barley	Whitman	1.7	4,914	1999	8,354	Daily A_BURN provided in permit database from S.Nolph WDOE
buu - barley - unknown - unknown	barley	Whitman	1.7	201	1999	342	Daily A_BURN provided in permit database from S.Nolph WDOE
bwu - barley - winter - unknown	barley	Whitman	1.7	460	1999	782	Daily A_BURN provided in permit database from S.Nolph WDOE
	barley Total			**13,072**		**22,223**	
beans	beans; all dry edible	Grant	2.5	65	1999	163	Daily A_BURN provided in permit database from S.Nolph WDOE
legumes	beans; all dry edible	Lincoln	2.5	33	1999	83	Daily A_BURN provided in permit database from S.Nolph WDOE
	beans; all dry edible Total			**98**		**245**	
canola	canola	Lincoln	1.3	12	1999	16	Daily A_BURN provided in permit database from S.Nolph WDOE
	canola Total			**12**		**16**	
orchard (maintainence - no removal)	cherries	Yakima	1	88	1999	88	Daily A_BURN provided in permit database from S.Nolph WDOE
	cherries Total			**88**		**88**	
corn	corn; for grain	Franklin	4.2	312	1999	1,310	Daily A_BURN provided in permit database from S.Nolph WDOE
corn	corn; for grain	Franklin	4.2	476	1999	1,999	Daily A_BURN provided in permit database from S.Nolph WDOE
	corn; for grain Total			**788**		**3,310**	
crp - Conservation Reserve Program (CRP) conversion	CRP	Adams	2.6	9,573	1999	24,889	Daily A_BURN provided in permit database from S.Nolph WDOE
crp - Conservation Reserve Program (CRP) conversion	CRP	Asotin	2.6	1,347	1999	3,502	Daily A_BURN provided in permit database from S.Nolph WDOE
crp - Conservation Reserve Program (CRP) conversion	CRP	Columbia	2.6	3,366	1999	8,753	Daily A_BURN provided in permit database from S.Nolph WDOE
crp - Conservation Reserve Program (CRP) conversion	CRP	Douglas	2.6	4,490	1999	11,673	Daily A_BURN provided in permit database from S.Nolph WDOE
crp - Conservation Reserve Program (CRP) conversion	CRP	Franklin	2.6	1,342	1999	3,489	Daily A_BURN provided in permit database from S.Nolph WDOE
crp - Conservation Reserve Program (CRP) conversion	CRP	Garfield	2.6	193	1999	502	Daily A_BURN provided in permit database from S.Nolph WDOE
pasture	CRP	Garfield	2.6	40	1999	104	Daily A_BURN provided in permit database from S.Nolph WDOE
pasture	CRP	Grant	2.6	70	1999	182	Daily A_BURN provided in permit database from S.Nolph WDOE
crp - Conservation Reserve Program (CRP) conversion	CRP	Lincoln	2.6	5,062	1999	13,161	Daily A_BURN provided in permit database from S.Nolph WDOE
pasture	CRP	Lincoln	2.6	45	1999	117	Daily A_BURN provided in permit database from S.Nolph WDOE

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
crp - Conservation Reserve Program (CRP) conversion	CRP	Stevens	2.6	40	1999	104	Daily A_BURN provided in permit database from S.Nolph WDOE
crp - Conservation Reserve Program (CRP) conversion	CRP	Walla Walla	2.6	292	1999	759	Daily A_BURN provided in permit database from S.Nolph WDOE
crp - Conservation Reserve Program (CRP) conversion	CRP	Whitman	2.6	3,212	1999	8,352	Daily A_BURN provided in permit database from S.Nolph WDOE
pasture	CRP	Whitman	2.6	94	1999	244	Daily A_BURN provided in permit database from S.Nolph WDOE
pasture	CRP	Yakima	2.6	102	1999	265	Daily A_BURN provided in permit database from S.Nolph WDOE
	CRP Total			**29,268**		**76,096**	
berries - blueberries - raspberries - blackberries	fruits and vegetables; other	Franklin	1.47	3	1999	4	Daily A_BURN provided in permit database from S.Nolph WDOE
berries - blueberries - raspberries - blackberries	fruits and vegetables; other	Pierce	1.47	17	1999	24	Daily A_BURN provided in permit database from S.Nolph WDOE
onions	fruits and vegetables; other	Walla Walla	1.47	51	1999	75	Daily A_BURN provided in permit database from S.Nolph WDOE
	fruits and vegetables; other Total			**71**		**104**	
grapes	grapes	Yakima	2.5	205	1999	513	Daily A_BURN provided in permit database from S.Nolph WDOE
	grapes Total			**205**		**513**	
hau - hay - alfalfa - unknown	hay; alfalfa	Adams	0.8	55	1999	44	Daily A_BURN provided in permit database from S.Nolph WDOE
hai - hay - alfalfa - irrigated	hay; alfalfa	Grant	0.8	80	1999	64	Daily A_BURN provided in permit database from S.Nolph WDOE
hau - hay - alfalfa - unknown	hay; alfalfa	Grant	0.8	10	1999	8	Daily A_BURN provided in permit database from S.Nolph WDOE
hai - hay - alfalfa - irrigated	hay; alfalfa	Lincoln	0.8	58	1999	46	Daily A_BURN provided in permit database from S.Nolph WDOE
hau - hay - alfalfa - unknown	hay; alfalfa	Walla Walla	0.8	3,399	1999	2,719	Daily A_BURN provided in permit database from S.Nolph WDOE
	hay; alfalfa Total			**3,602**		**2,882**	
hti - hay - timothy - irrigated	hay; all other	Kittitas	0.8	51	1999	41	Daily A_BURN provided in permit database from S.Nolph WDOE
hui - hay - unknown - irrigated	hay; all other	Kittitas	0.8	120	1999	96	Daily A_BURN provided in permit database from S.Nolph WDOE
hud - hay - unknown - dryland	hay; all other	Lincoln	0.8	45	1999	36	Daily A_BURN provided in permit database from S.Nolph WDOE
htd - hay - timothy - dryland	hay; all other	Whitman	0.8	73	1999	58	Daily A_BURN provided in permit database from S.Nolph WDOE
huu - hay - unknown- unknown	hay; all other	Whitman	0.8	120	1999	96	Daily A_BURN provided in permit database from S.Nolph WDOE
	hay; all other Total			**409**		**327**	
hops	hops	Yakima	1.9	229	1999	435	Daily A_BURN provided in permit database from S.Nolph WDOE
	hops Total			**229**		**435**	
oats	oats	Columbia	1.6	628	1999	1,005	Daily A_BURN provided in permit database from S.Nolph WDOE
oats	oats	Franklin	1.6	10	1999	16	Daily A_BURN provided in permit database from S.Nolph WDOE
	oats Total			**638**		**1,021**	
christmas trees	orchard pruning; unspecifie	Pierce	1.7	270	1999	459	Daily A_BURN provided in permit database from S.Nolph WDOE
	orchard pruning; unspecified Total			**270**		**459**	
orchard tree removal	orchard removal	Chelan	15	232	1999	3,476	Daily A_BURN provided in permit database from S.Nolph WDOE
orchard tree removal	orchard removal	Douglas	15	394	1999	5,915	Daily A_BURN provided in permit database from S.Nolph WDOE
orchard tree removal	orchard removal	Franklin	15	90	1999	1,346	Daily A_BURN provided in permit database from S.Nolph WDOE
orchard tree removal	orchard removal	Garfield	15	40	1999	600	Daily A_BURN provided in permit database from S.Nolph WDOE
orchard tree removal	orchard removal	Grant	15	337	1999	5,052	Daily A_BURN provided in permit database from S.Nolph WDOE
orchard tree removal	orchard removal	Kittitas	15	20	1999	300	Daily A_BURN provided in permit database from S.Nolph WDOE

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
orchard tree removal	orchard removal	Okanogan	15	5	1999	72	Daily A_BURN provided in permit database from S.Nolph WDOE
orchard tree removal	orchard removal	Yakima	15	1,018	1999	15,263	Daily A_BURN provided in permit database from S.Nolph WDOE
	orchard removal Total			**2,135**		**32,024**	
orchard (maintainence - no removal)	peaches	Yakima	2.5	21	1999	52	Daily A_BURN provided in permit database from S.Nolph WDOE
	peaches Total			**21**		**52**	
orchard (maintainence - no removal)	pears	Yakima	2.6	152	1999	395	Daily A_BURN provided in permit database from S.Nolph WDOE
	pears Total			**152**		**395**	
peas	peas; dry edible	Walla Walla	2.5	50	1999	125	Daily A_BURN provided in permit database from S.Nolph WDOE
peas	peas; dry edible	Whitman	2.5	148	1999	370	Daily A_BURN provided in permit database from S.Nolph WDOE
	peas; dry edible Total			**198**		**495**	
orchard (maintainence - no removal)	plums and prunes	Yakima	1.2	6	1999	7	Daily A_BURN provided in permit database from S.Nolph WDOE
	plums and prunes Total			**6**		**7**	
hasi - hay - alfalfa seed - irrigated	seeds; alfalfa	Franklin	0.8	993	1999	794	Daily A_BURN provided in permit database from S.Nolph WDOE
hasi - hay - alfalfa seed - irrigated	seeds; alfalfa	Grant	0.8	326	1999	260	Daily A_BURN provided in permit database from S.Nolph WDOE
hasu - hay - alfalfa seed - unknown	seeds; alfalfa	Walla Walla	0.8	1,130	1999	904	Daily A_BURN provided in permit database from S.Nolph WDOE
	seeds; alfalfa Total			**2,449**		**1,959**	
gsbu - grass seed - bluegrass - unknown	seeds; KBG	Garfield	2	73	1999	146	Daily A_BURN provided in permit database from S.Nolph WDOE
gsbu - grass seed - bluegrass - unknown	seeds; KBG	Whitman	2	302	1999	604	Daily A_BURN provided in permit database from S.Nolph WDOE
	seeds; KBG Total			**375**		**750**	
gsbru - grass seed - brome - unknown	seeds; other	Columbia	2	62	1999	124	Daily A_BURN provided in permit database from S.Nolph WDOE
turnip - seed	seeds; other	Franklin	2	25	1999	50	Daily A_BURN provided in permit database from S.Nolph WDOE
turnip - seed	seeds; other	Grant	2	3	1999	6	Daily A_BURN provided in permit database from S.Nolph WDOE
gcd - grass cover - dryland	seeds; other	Klickitat	2	107	1999	214	Daily A_BURN provided in permit database from S.Nolph WDOE
	seeds; other Total			**197**		**394**	
gsuu - grass seed - unknown - unknown	seeds; unspecified	Columbia	2	64	1999	128	Daily A_BURN provided in permit database from S.Nolph WDOE
gsuu - grass seed - unknown - unknown	seeds; unspecified	Garfield	2	20	1999	40	Daily A_BURN provided in permit database from S.Nolph WDOE
gsuu - grass seed - unknown - unknown	seeds; unspecified	Walla Walla	2	59	1999	118	Daily A_BURN provided in permit database from S.Nolph WDOE
gsuu - grass seed - unknown - unknown	seeds; unspecified	Whitman	2	128	1999	256	Daily A_BURN provided in permit database from S.Nolph WDOE
	seeds; unspecified Total			**271**		**542**	
spot burning	unspecified	Adams		298	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
spot burning	unspecified	Asotin		60	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
CAUTION: not listed on internal permit	unspecified	Columbia		44	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
CAUTION: not listed on outside permit	unspecified	Columbia		500	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
spot burning	unspecified	Columbia		55	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
spot burning	unspecified	Douglas		4	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
CAUTION: not listed on internal permit	unspecified	Grant		105	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
CAUTION: not listed on outside permit	unspecified	Grant		24	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
spot burning	unspecified	Grant		25	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
spot burning	unspecified	Lincoln		63	1999		Daily A_BURN provided in permit database from S.Nolph WDOE

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
CAUTION: not listed on outside permit	unspecified	Snohomish		11	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
CAUTION: not listed on internal permit	unspecified	Walla Walla		280	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
CAUTION: not listed on outside permit	unspecified	Walla Walla		350	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
spot burning	unspecified	Whatcom		10	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
CAUTION: not listed on internal permit	unspecified	Whitman		581	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
CAUTION: not listed on outside permit	unspecified	Whitman		375	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
spot burning	unspecified	Whitman		3,395	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
spot burning	unspecified	Yakima		853	1999		Daily A_BURN provided in permit database from S.Nolph WDOE
	unspecified Total			**7,032**		**-**	
wsu - wheat - spring - unknown	wheat; other spring	Adams	1.9	52	1999	99	Daily A_BURN provided in permit database from S.Nolph WDOE
wsd - wheat - spring - dryland	wheat; other spring	Asotin	1.9	99	1999	188	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - spring - unknown	wheat; other spring	Columbia	1.9	1,717	1999	3,262	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - spring - unknown	wheat; other spring	Douglas	1.9	903	1999	1,716	Daily A_BURN provided in permit database from S.Nolph WDOE
wsi - wheat - spring - irrigated	wheat; other spring	Franklin	1.9	3,591	1999	6,823	Daily A_BURN provided in permit database from S.Nolph WDOE
wsi - wheat - spring - irrigated	wheat; other spring	Grant	1.9	1,613	1999	3,065	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - spring - unknown	wheat; other spring	Grant	1.9	743	1999	1,412	Daily A_BURN provided in permit database from S.Nolph WDOE
wsd - wheat - spring - dryland	wheat; other spring	Lincoln	1.9	105	1999	200	Daily A_BURN provided in permit database from S.Nolph WDOE
wsi - wheat - spring - irrigated	wheat; other spring	Lincoln	1.9	457	1999	868	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - spring - unknown	wheat; other spring	Lincoln	1.9	189	1999	359	Daily A_BURN provided in permit database from S.Nolph WDOE
wsd - wheat - spring - dryland	wheat; other spring	Walla Walla	1.9	90	1999	171	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - spring - unknown	wheat; other spring	Walla Walla	1.9	355	1999	675	Daily A_BURN provided in permit database from S.Nolph WDOE
wsi - wheat - spring - irrigated	wheat; other spring	Whitman	1.9	293	1999	557	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - spring - unknown	wheat; other spring	Whitman	1.9	23,017	1999	43,732	Daily A_BURN provided in permit database from S.Nolph WDOE
	wheat; other spring Total			**33,224**		**63,125**	
wsu - wheat - unknown - unknown	wheat; unspecified	Adams	1.9	2,219	1999	4,216	Daily A_BURN provided in permit database from S.Nolph WDOE
wsd - wheat - unknown - dryland	wheat; unspecified	Asotin	1.9	70	1999	133	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Asotin	1.9	773	1999	1,468	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Columbia	1.9	1,488	1999	2,827	Daily A_BURN provided in permit database from S.Nolph WDOE
wsd - wheat - unknown - dryland	wheat; unspecified	Douglas	1.9	1,183	1999	2,248	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Douglas	1.9	1,454	1999	2,762	Daily A_BURN provided in permit database from S.Nolph WDOE
wsi - wheat - unknown - irrigated	wheat; unspecified	Franklin	1.9	948	1999	1,801	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Franklin	1.9	40	1999	76	Daily A_BURN provided in permit database from S.Nolph WDOE
pre-6/2/1999 value - wheat - dryland	wheat; unspecified	Grant	1.9	1,081	1999	2,054	Daily A_BURN provided in permit database from S.Nolph WDOE
pre-6/2/1999 value - wheat - irrigated	wheat; unspecified	Grant	1.9	65	1999	124	Daily A_BURN provided in permit database from S.Nolph WDOE
wsi - wheat - unknown - irrigated	wheat; unspecified	Grant	1.9	20	1999	38	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Grant	1.9	763	1999	1,450	Daily A_BURN provided in permit database from S.Nolph WDOE
wsi - wheat - unknown - irrigated	wheat; unspecified	Lincoln	1.9	25	1999	48	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Lincoln	1.9	170	1999	323	Daily A_BURN provided in permit database from S.Nolph WDOE

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
pre-6/2/1999 value - wheat - dryland	wheat; unspecified	Okanogan	1.9	10	1999	19	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Walla Walla	1.9	1,973	1999	3,749	Daily A_BURN provided in permit database from S.Nolph WDOE
pre-6/2/1999 value - wheat - dryland	wheat; unspecified	Whitman	1.9	2,450	1999	4,655	Daily A_BURN provided in permit database from S.Nolph WDOE
wsi - wheat - unknown - irrigated	wheat; unspecified	Whitman	1.9	80	1999	152	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Whitman	1.9	10,426	1999	19,808	Daily A_BURN provided in permit database from S.Nolph WDOE
wsu - wheat - unknown - unknown	wheat; unspecified	Yakima	1.9	90	1999	171	Daily A_BURN provided in permit database from S.Nolph WDOE
	wheat; unspecified Total			**25,327**		**48,121**	
wwu - wheat - winter - unknown	wheat; winter all	Adams	1.9	573	1999	1,089	Daily A_BURN provided in permit database from S.Nolph WDOE
wwd - wheat - winter - dryland	wheat; winter all	Asotin	1.9	148	1999	280	Daily A_BURN provided in permit database from S.Nolph WDOE
wwu - wheat - winter - unknown	wheat; winter all	Asotin	1.9	453	1999	860	Daily A_BURN provided in permit database from S.Nolph WDOE
wwi - wheat - winter - irrigated	wheat; winter all	Columbia	1.9	110	1999	209	Daily A_BURN provided in permit database from S.Nolph WDOE
wwu - wheat - winter - unknown	wheat; winter all	Columbia	1.9	44,672	1999	84,877	Daily A_BURN provided in permit database from S.Nolph WDOE
wwi - wheat - winter - irrigated	wheat; winter all	Douglas	1.9	115	1999	219	Daily A_BURN provided in permit database from S.Nolph WDOE
wwi - wheat - winter - irrigated	wheat; winter all	Franklin	1.9	1,809	1999	3,437	Daily A_BURN provided in permit database from S.Nolph WDOE
wwu - wheat - winter - unknown	wheat; winter all	Garfield	1.9	288	1999	546	Daily A_BURN provided in permit database from S.Nolph WDOE
wwi - wheat - winter - irrigated	wheat; winter all	Grant	1.9	2,061	1999	3,916	Daily A_BURN provided in permit database from S.Nolph WDOE
wwu - wheat - winter - unknown	wheat; winter all	Grant	1.9	254	1999	483	Daily A_BURN provided in permit database from S.Nolph WDOE
wwd - wheat - winter - dryland	wheat; winter all	Lincoln	1.9	11,980	1999	22,761	Daily A_BURN provided in permit database from S.Nolph WDOE
wwi - wheat - winter - irrigated	wheat; winter all	Lincoln	1.9	1,813	1999	3,445	Daily A_BURN provided in permit database from S.Nolph WDOE
wwu - wheat - winter - unknown	wheat; winter all	Lincoln	1.9	125	1999	238	Daily A_BURN provided in permit database from S.Nolph WDOE
wwd - wheat - winter - dryland	wheat; winter all	Walla Walla	1.9	90	1999	171	Daily A_BURN provided in permit database from S.Nolph WDOE
wwu - wheat - winter - unknown	wheat; winter all	Walla Walla	1.9	792	1999	1,505	Daily A_BURN provided in permit database from S.Nolph WDOE
wwu - wheat - winter - unknown	wheat; winter all	Whatcom	1.9	60	1999	114	Daily A_BURN provided in permit database from S.Nolph WDOE
wwi - wheat - winter - irrigated	wheat; winter all	Whitman	1.9	85	1999	162	Daily A_BURN provided in permit database from S.Nolph WDOE
wwu - wheat - winter - unknown	wheat; winter all	Whitman	1.9	52,399	1999	99,559	Daily A_BURN provided in permit database from S.Nolph WDOE
	wheat; winter all Total			**117,825**		**223,868**	
	Grand Total			**238,356**		**480,349**	

Residue Name	Crop Name	County	RL (tons/acre)	A_BURN (acres)	Year Burned	R_BURN (tons)	Comments
barley	barley	Fremont	1.7	1,800	1998	3,060	A_BURN from WESTAR, 1999 (from Ron Cunningham, Coop Ext. Service)
	barley Total			**1,800**		**3,060**	
seeds; alfalfa	seeds; alfalfa	Big Horn	0.8	8,994	1998	7,195	WESTAR, 1999 (from Fred Hopkin, Pres., WY Alfalfa Seed & Leaf Cutter Bee Asssn.
seeds; alfalfa	seeds; alfalfa	Hot Springs	0.8	99	1998	79	WESTAR, 1999 (from Fred Hopkin, Pres., WY Alfalfa Seed & Leaf Cutter Bee Asssn.
seeds; alfalfa	seeds; alfalfa	Park	0.8	2,907	1998	2,326	WESTAR, 1999 (from Fred Hopkin, Pres., WY Alfalfa Seed & Leaf Cutter Bee Asssn.
	seeds; alfalfa Total			**12,000**		**9,600**	
seeds; other	seeds; other	Park	2	1,000	1998	2,000	A_BURN from WESTAR, 1999 (from Kelly Spiering)
	seeds; other Total			**1,000**		**2,000**	
	Grand Total			**14,800**		**14,660**	

State	Wheat			
	AH	A_BURN	Average	Comments
AZ	178,000	8,080	4.5%	A_BURN for Yuma Co.
CA	688,000	117,794	17.1%	A_BURN counties: Imperial, Colusa, Kern, Kings, Fresno, Madera, Merced, San Joaquin, Stanislaus, Tulare.
CO	2,268,000	500	0.0%	A_BURN for Mesa Co.
ID	1,560,000	197,900	12.7%	
MT	6,360,000	2,650	0.0%	est. of 1% of irrigated wheat is burned
ND	12,515,000	215,862	1.7%	A_BURN based on gap filling
NM	110,000	4,364	4.0%	A_BURN based on gap filling
OR	920,000	128,816	14.0%	
SD	3,854,000	44,280	1.1%	A_BURN based on gap filling (winter wheat, only)
UT	185,000	9,144	4.9%	
WA	2,745,000	176,366	6.4%	
WY	236,000	-	0.0%	None burned
otal or Average	**31,619,000**	**905,756**	**2.9%**	

State	Barley			
	AH	A_BURN	Average	Comments
AK	6,900	0	0.0%	None burned
AZ	54,000	-	0.0%	None burned
CA	109,000	523	0.5%	A_BURN counties: Fresno, Tulare, Merced, Stanislaus, Kings, San Joaquin, Kern
CO	92,000	-	0.0%	None burned
ID	730,000	98,790	13.5%	
MT	1,150,000	-	0.0%	None burned
ND	2,600,000	-	0.0%	None burned
OR	150,000	12,614	8.4%	
SD	145,000	8,328	5.7%	A_BURN based on gap filling
UT	100,000	2,745	2.7%	
WA	440,000	13,072	3.0%	
WY	120,000	1,800	1.5%	
otal or Average	**5,696,900**	**137,872**	**2.4%**	

State	Sugarcane			
	AH	A_BURN	Average	Comments
HI	42,900	30,000	69.9%	
otal or Average	**42,900**	**30,000**	**69.9%**	Only HI burns

State	Corn (for grain)			
	AH	A_BURN	Average	Comments
AZ	40,000	-	0.0%	None burned
CA	220,000	8,663	3.9%	Glenn, Sacramento, Tehama, Yolo, San Joaquin,
CO	890,000	-	0.0%	None burned
ID	40,000	-	0.0%	None burned
MT	15,000	-	0.0%	None burned
ND	600,000	-	0.0%	None burned
NM	84,000	-	0.0%	None burned

OR	37,000	1,217	3.3%	
SD	3,650,000	-	0.0%	None burned
UT	20,000	-	0.0%	None burned
WA	120,000	788	0.7%	
WY	50,000	-	0.0%	None burned
otal or Average	**5,766,000**	**10,668**	**0.2%**	

State	**Ditches and Ditchbanks**	
	A_BURN	Comments
AZ	765	Yuma and Pinal counties
CA	7,988	Butte, Colusa, Fresno, Glenn, Madera, Merced, Placer, Sacramento, Sutter, Tehama, Tulare, Yuba counties
ID	50,000	
UT	4,040	Estimated based on 1% of irrigated crop land
otal or Average	**62,793**	

State	**Conservation Reserve Program (CRP)**			
	Acres in CRP in 1996	A_BURN	Average	Comments
CA	2,400	-	0.0%	None burned
CO	2,080	-	0.0%	None burned
ID	3,229	-	0.0%	None burned
MT	33,037	-	0.0%	None burned
ND	19,180	-	0.0%	None burned
NM	3,425	-	0.0%	None burned
OR	13	-	0.0%	None burned
SD	8,071	-	0.0%	None burned
WA	214,073	28,917	13.5%	
WY	666	-	0.0%	None burned
otal or Average	**286,174**	**28,917**	**10.1%**	Only WA burned in 1996

State	**Orchards (includes trees, bushes, vines)**			
	AH	A_BURN	Average	Comments
AZ	45,240	-	0.0%	None burned
CA	2,097,734	523,269	24.9%	A_BURN counties include:Butte, Colusa, Sacramento, Sutter, Tehama, Placer, Yolo, Lake, Riverside, San Bernardino, Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare
HI	20,200	-	0.0%	None burned
NM	24,380	-	0.0%	None burned
OR	65,197	-	0.0%	None burned
UT	9,484	-	0.0%	None burned
WA	235,532	6,831	2.9%	
otal or Average	**2,497,767**	**530,100**	**21.2%**	

State	**Rice**			
	AH	A_BURN	Average	Comments

CA	500,000	254,706	50.9%	A_BURN counties include: Butte, Colusa, Glenn, Placer, Sacramento, Sutter, Tehama, Yolo, Yuba, Fresno, Merced Stanislaus, San Joaquin
otal or Average	**500,000**	**254,706**	**50.9%**	

State	**Grasses and Seeds**			
	AH	A_BURN	Average	Comments
AZ	6,223	4,700	75.5%	A_BURN (bermuda) includes Yuma Co.
CA	131,298	28,299	21.6%	A_BURN counties include: Imperial (bermuda and sudan); Butte, Colusa, Placer, Tehama, Sacramento (grasses, sudan); Tulare (grasses)
CO	8,111	-	0.0%	None burned
ID	81,635	58,376	71.5%	alfalfa seed, KBG burned
MT	22,346	-	0.0%	None burned
NV				Burning occurs, but no A_BURN data are available
OR	541,509	286,410	52.9%	A_BURN includes field burning and propaning; does not include stack burning (~ 38,200 tons/year)
SD	25,036	-	0.0%	None burned
UT	7,132	-	0.0%	None burned
WA	71,993	3,292	4.6%	alfalfa seed, KBG, other burned
WY	4,693	13,000	277.0%	AH<A_BURN
otal or Average	**899,976**	**394,077**	**43.8%**	

Notes: AH = Acres Harvested
A_BURN = Acres Burned
Average = A_BURN/AH for each state
Total or Average = Total AH or A_BURN; or (Total A_BURN)/(Total AH) for each crop

Averages **do not include Nevada** since burned data were not reported for that state on a crop-specific basis.

Gapfilling averages use data from areas where burning is known to occur. Acres harvested include crop production in areas where burning occurs and excludes states and counties (CA, only) where burning does not occur. For example, WY produces wheat (236,000 acres harvested statewide in 1996); however, WY data are not included in the gapfilling average calculation since they do not burn wheat stubble.

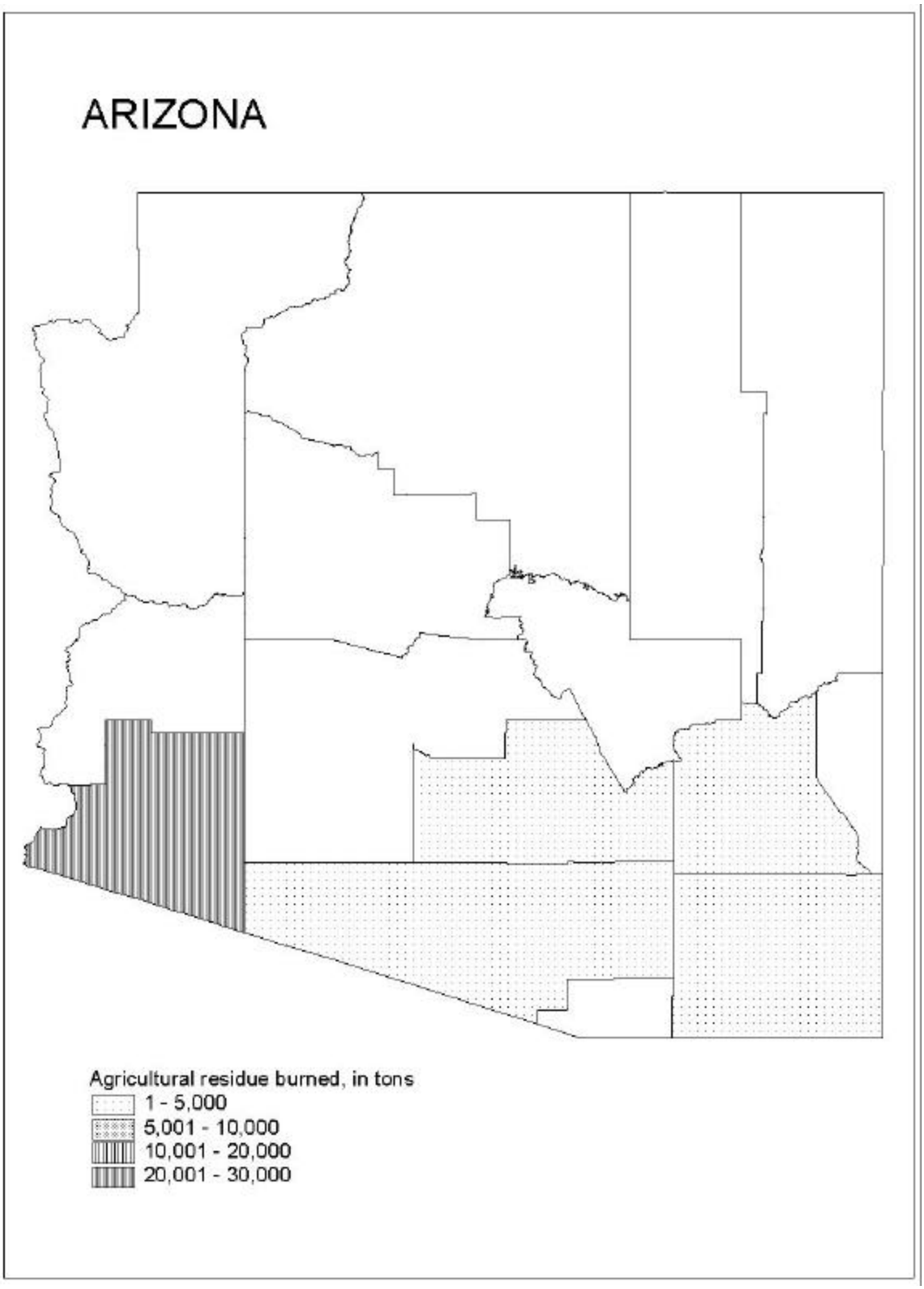
State/County	Wheat			
	AH	A_BURN	Average	Comments
AZ	50,000	8,080	16.2%	Yuma Co.
CA_Imperial	113,000	71,795	63.5%	
CA_Sac_Valley	195,500	16,926	8.7%	
CA_SJV	263,000	29,073	11.1%	
CO	3,000	500	16.7%	Mesa Co.
ID	1,560,000	197,900	12.7%	
MT	6,360,000	2,650	0.0%	est. of 1% of irrigated wheat is burned
ND				No data available
NM				No data available
NV				No data available
OR	920,000	128,816	14.0%	
SD				No data available
UT	185,000	9,144	4.9%	
WA	2,745,000	176,366	6.4%	
Total or Average	**12,394,500**	**641,250**	**5.2%**	

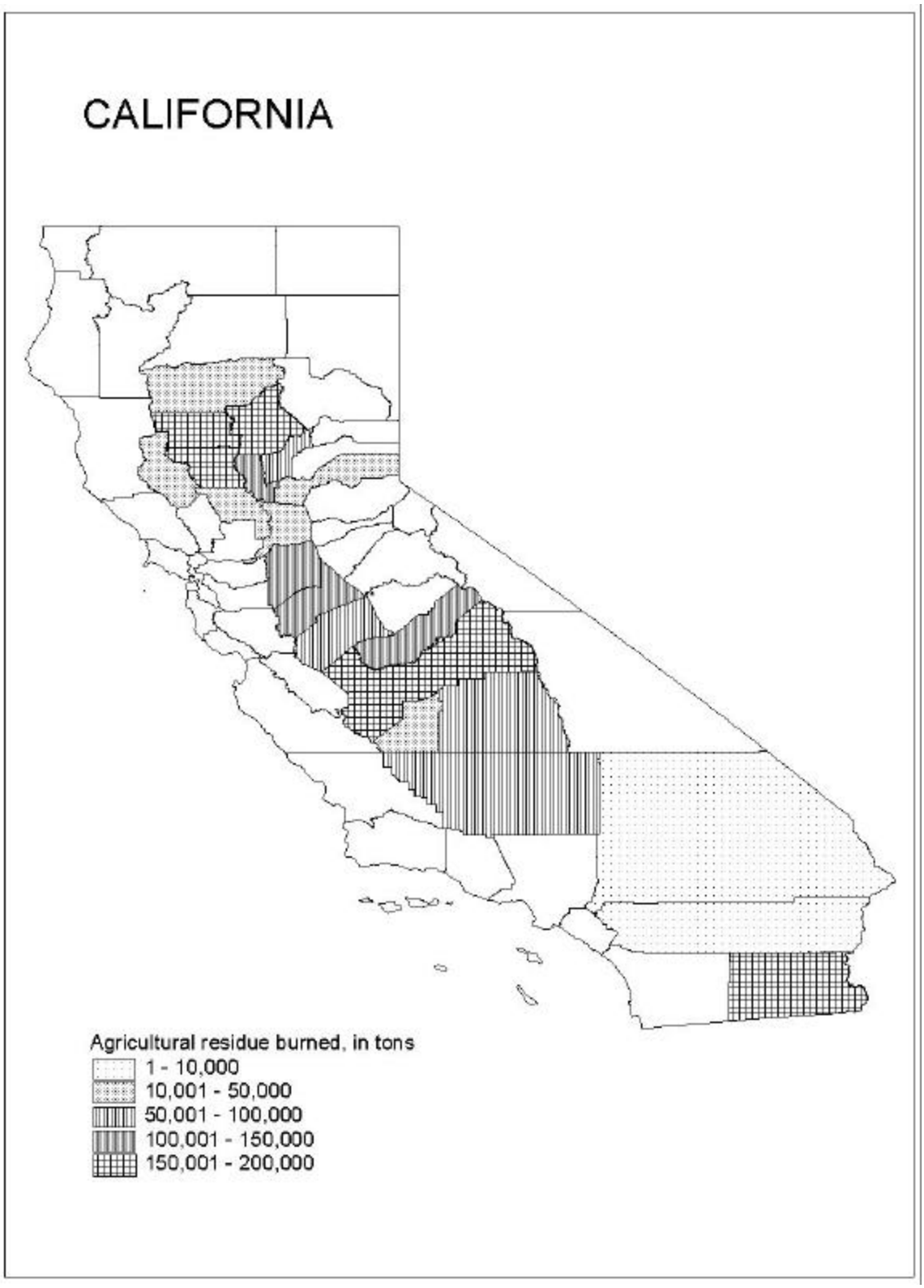
State/County	Barley			
	AH	A_BURN	Average	Comments
AZ				None burned
CA_Imperial				None burned
CA_Lake				None burned
CA_Sac_Valley				None burned
CA_So_Coast				None burned
CA_SJV	85,000	523	0.6%	1996 AH; 1999 burn data
CO				None burned
HI				None burned
ID	730,000	98,790	13.5%	
MT				None burned
ND				None burned
NM				None burned
OR	150,000	12,614	8.4%	
SD				No data available
UT	100,000	2,745	2.7%	
WA	440,000	13,072	3.0%	
WY	120,000	1,800	1.5%	
Total or Average	**1,625,000**	**129,544**	**8.0%**	

AH = Acres Harvested
A_BURN = Acres Burned
Average = A_BURN/AH for each state/county
ALL_AVG_%BURN = (sum of A_BURN)/(sum of AH)

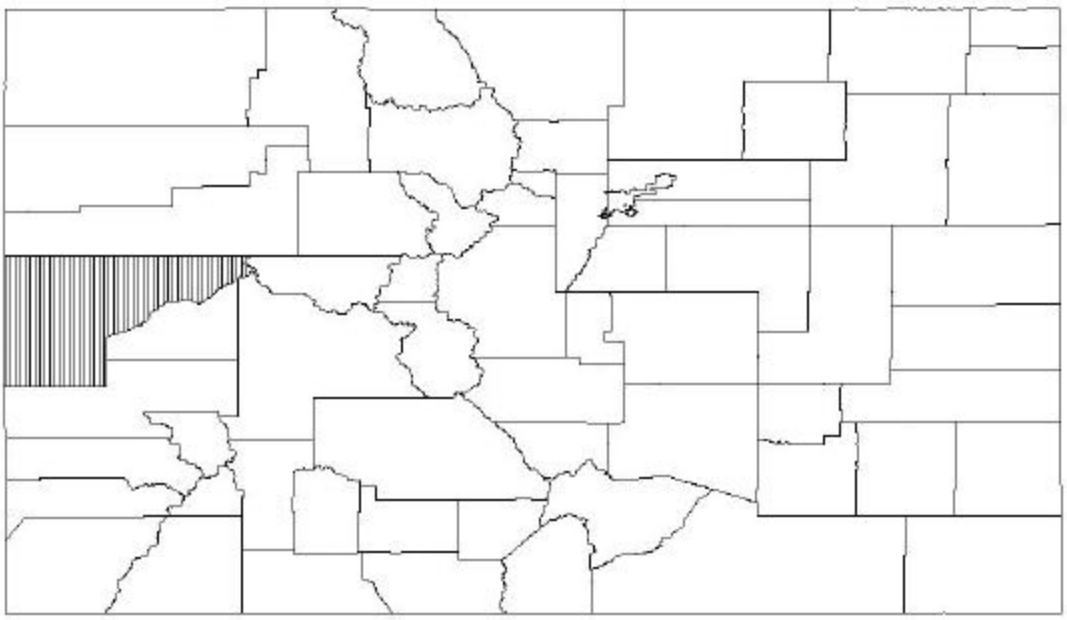
APPENDIX D

AGRICULTURAL RESIDUE BURN ACTIVITY MAPS


ARIZONA
Agricultural residue burned, in tons
1 - 5,000
5,001 - 10,000
10,001 - 20,000
20,001 - 30,000

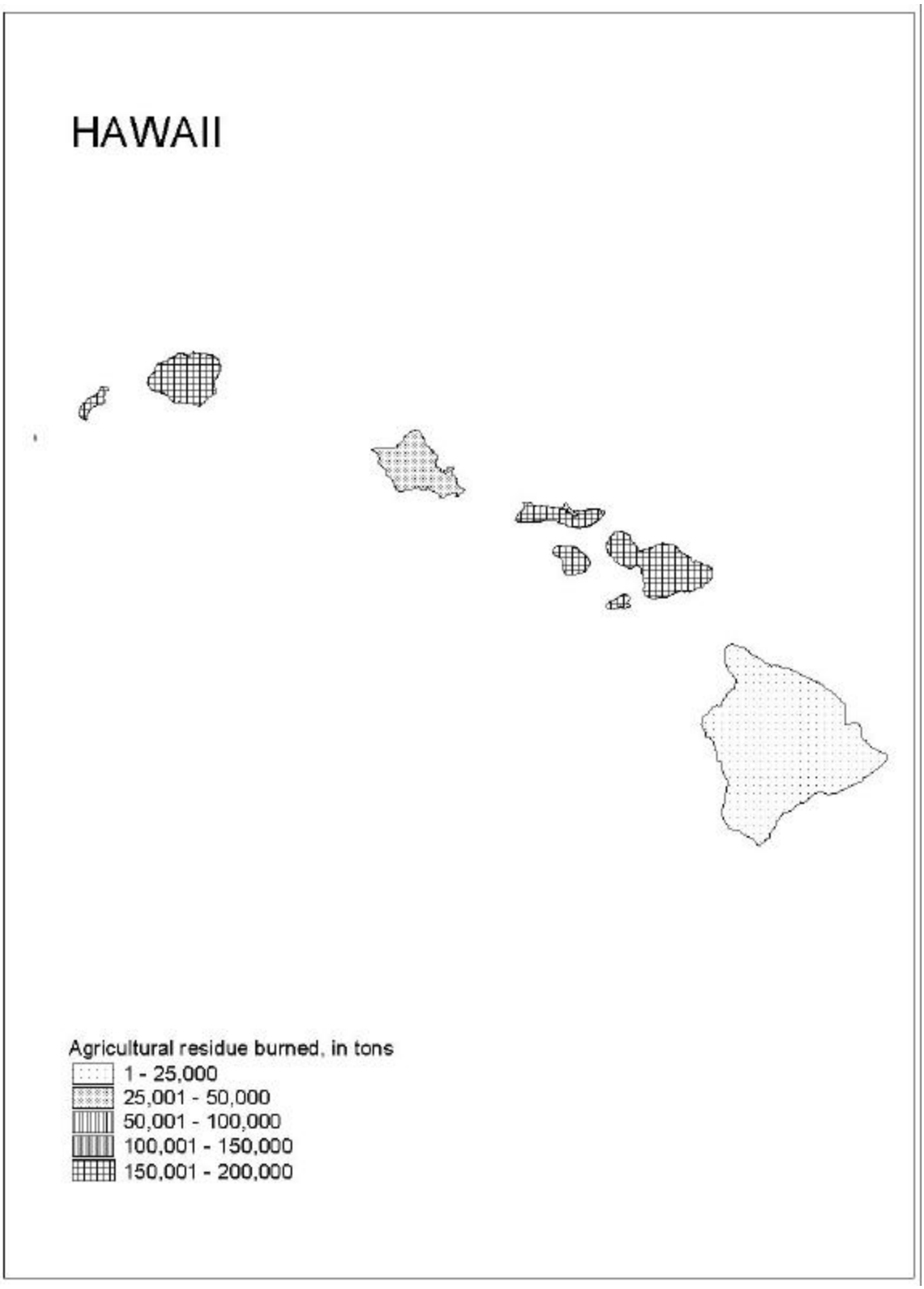

CALIFORNIA
Agricultural residue burned, in tons
1 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 150,000
150,001 - 200,000

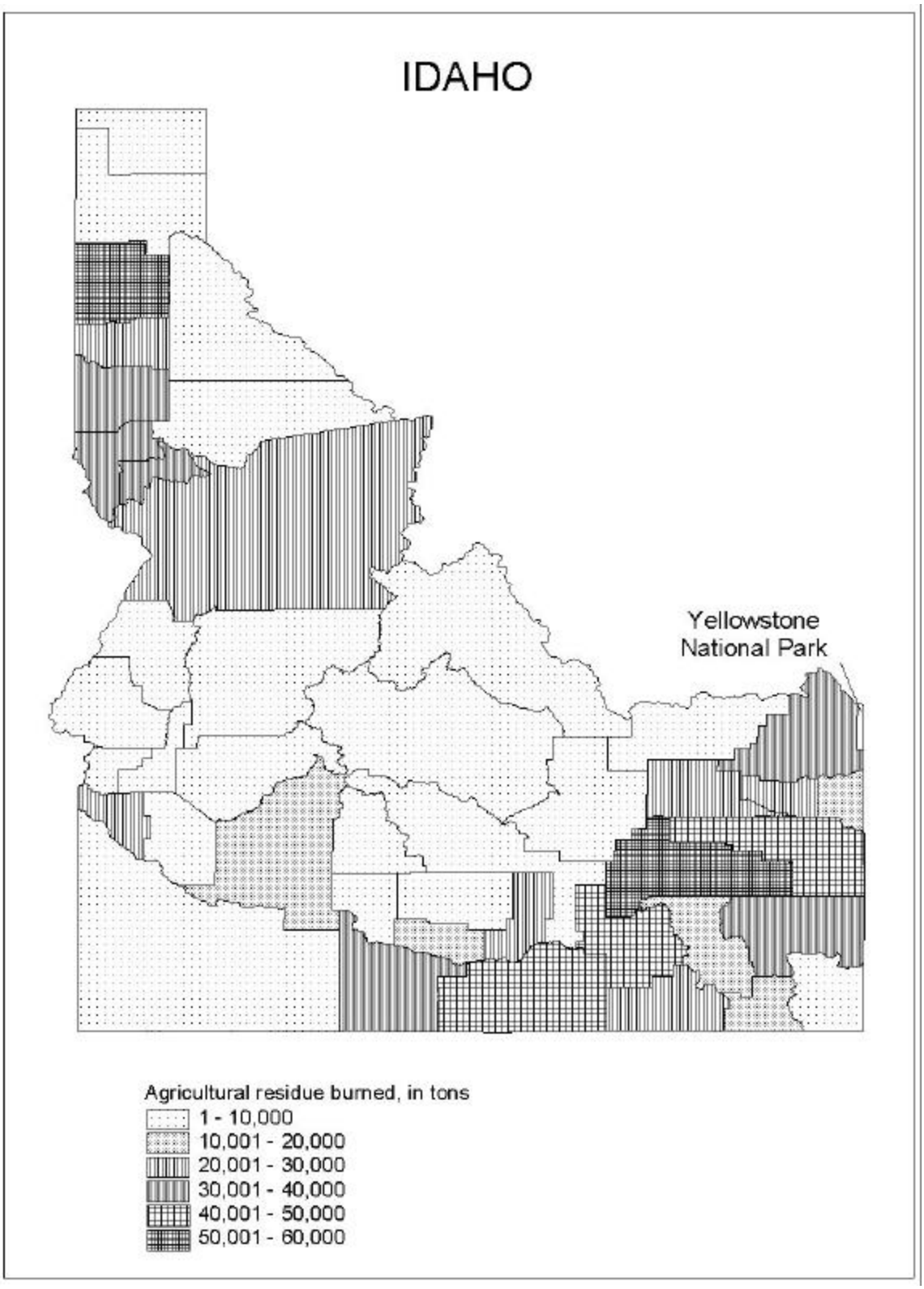
COLORADO



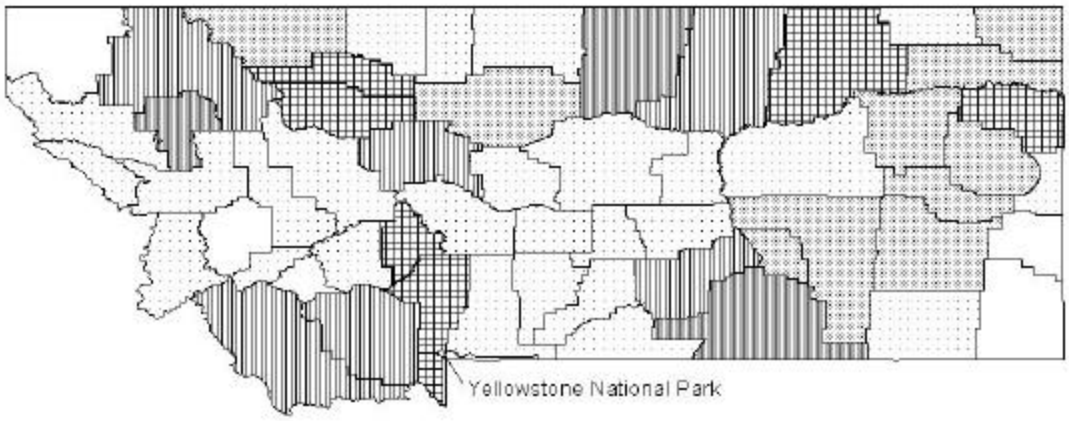
Agricultural residue burned, in tons

- 1 - 1,000
- 1,001 - 2,000
- 2,001 - 3,000
- 3,001 - 4,000


HAWAII
Agricultural residue burned, in tons
1 - 25,000
25,001 - 50,000
50,001 - 100,000
100,001 - 150,000
150,001 - 200,000

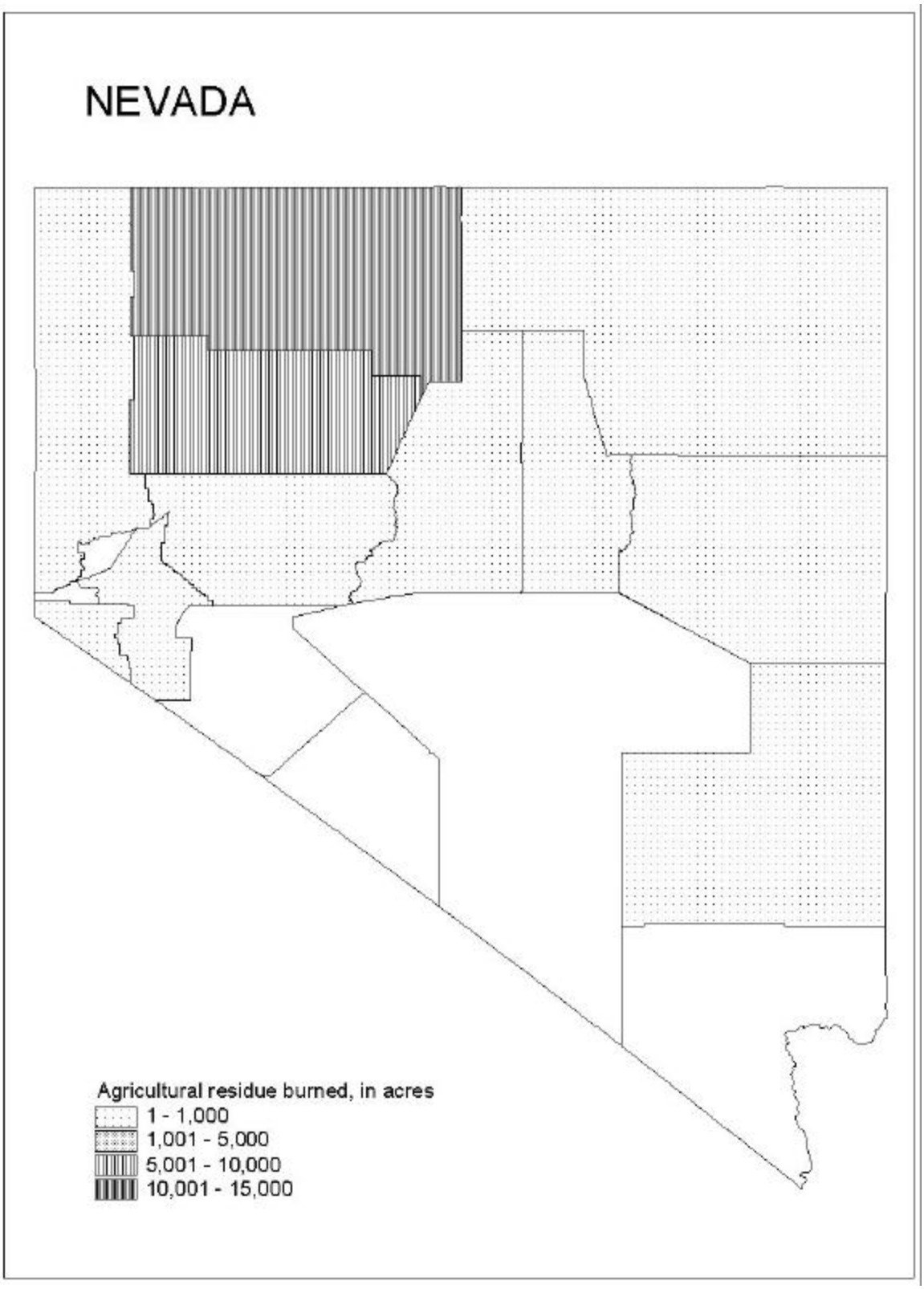

IDAHO
Yellowstone
National Park
Agricultural residue burned, in tons
1 - 10,000
10,001 - 20,000
20,001 - 30,000
30,001 - 40,000
40,001 - 50,000
50,001 - 60,000

MONTANA

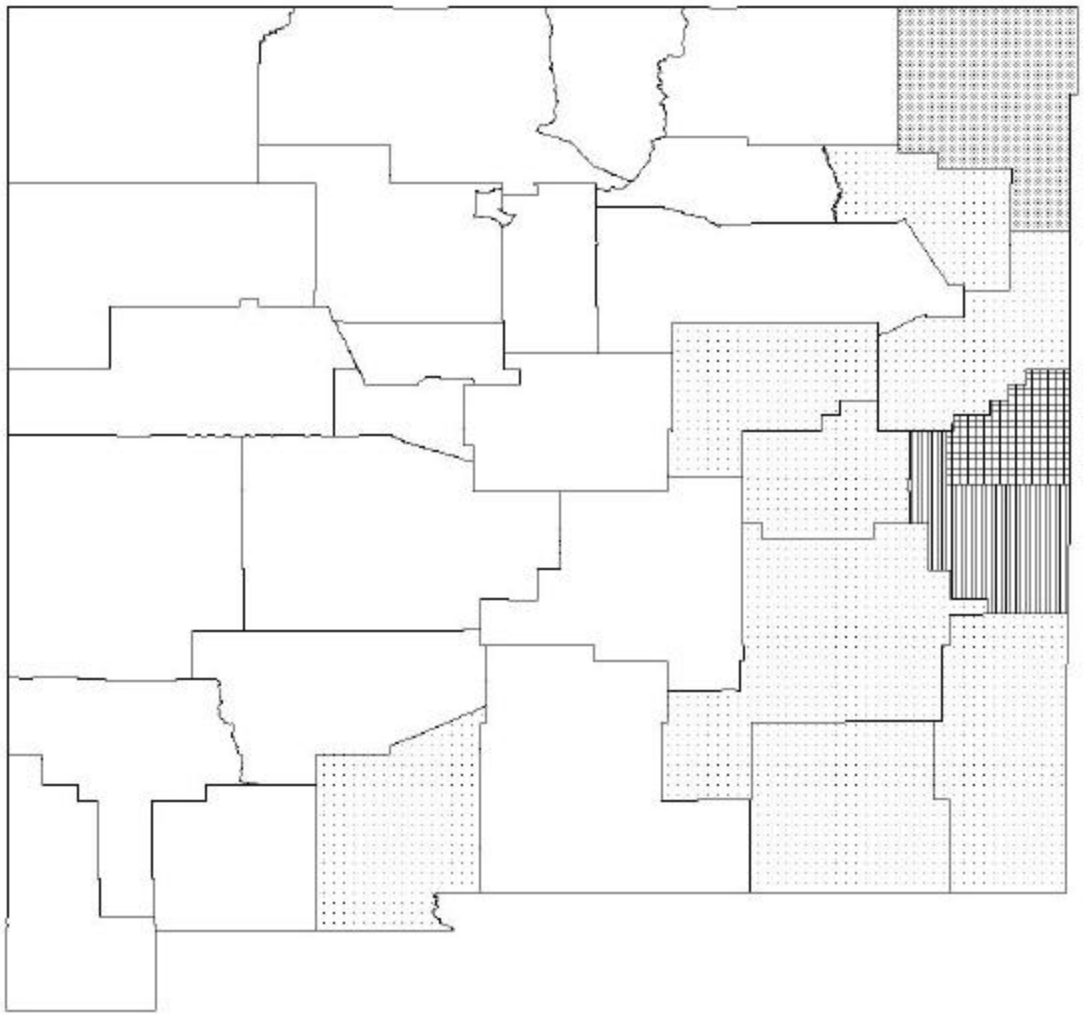


Agricultural residue burned, in tons

- 1 - 50
- 51 - 100
- 101 - 200
- 201 - 300
- 301 - 400


NEVADA
Agricultural residue burned, in acres
1 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 15,000

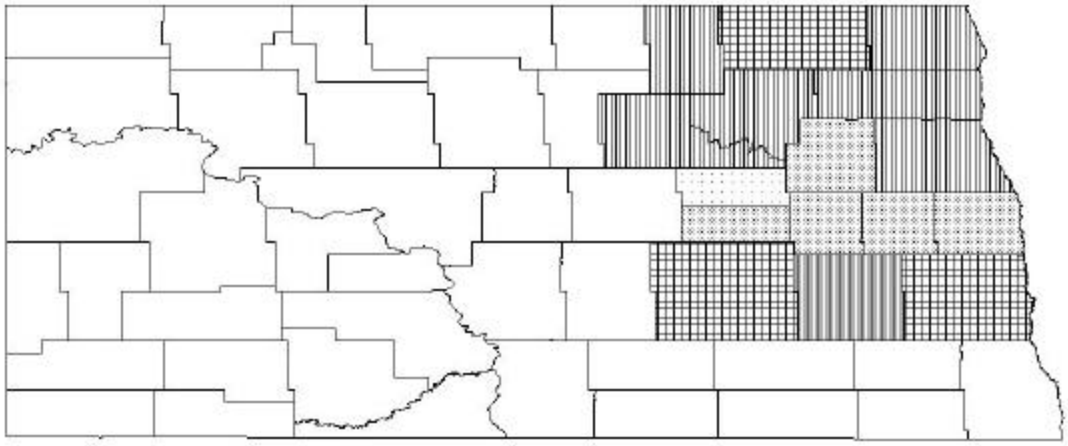
NEW MEXICO



Agricultural residue burned, in tons

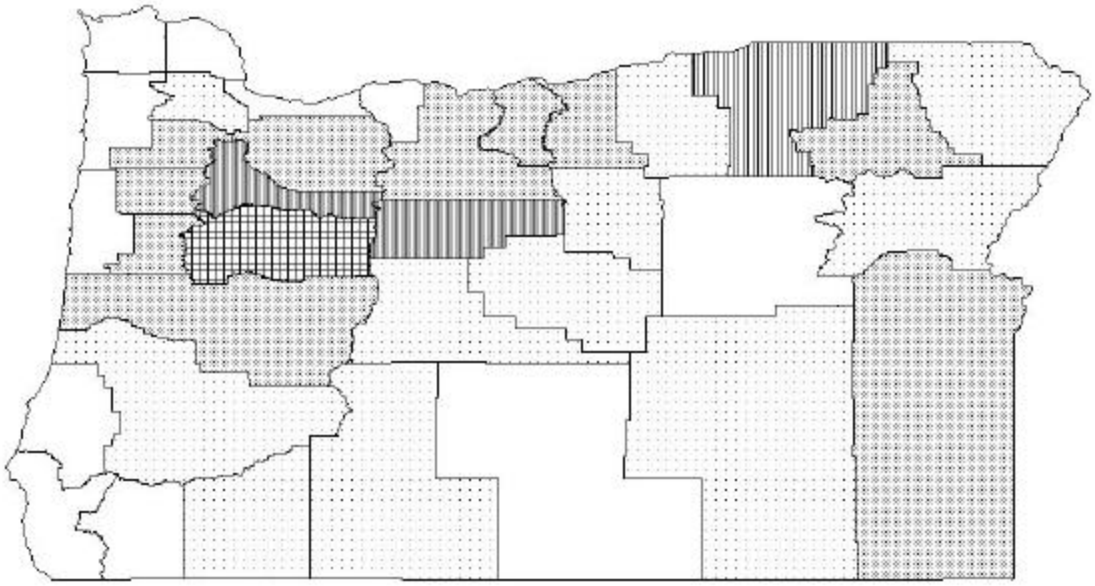
- 1 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 3,000
- 3,001 - 4,000

NORTH DAKOTA



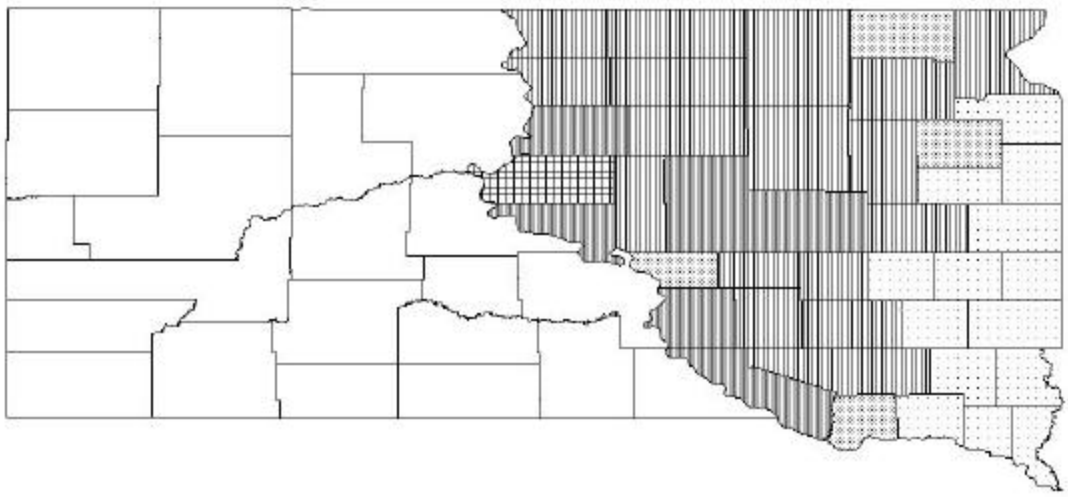
Agricultural residue burned, in tons
1 - 10,000
10,001 - 20,000
20,001 - 30,000
30,001 - 40,000
40,001 - 50,000

OREGON



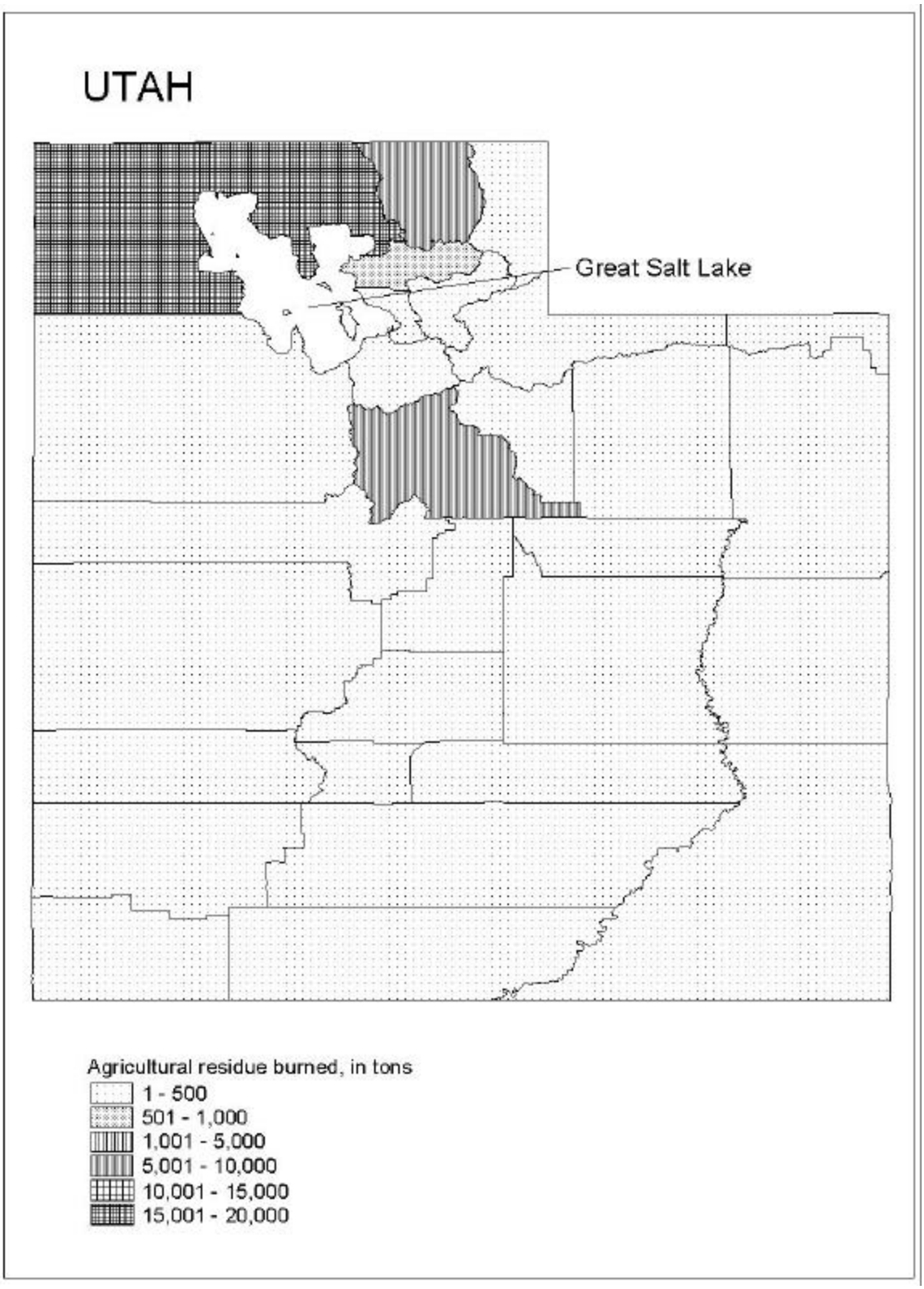
Agricultural residue burned, in tons
- 1 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 200,000
- 200,001 - 300,000

SOUTH DAKOTA

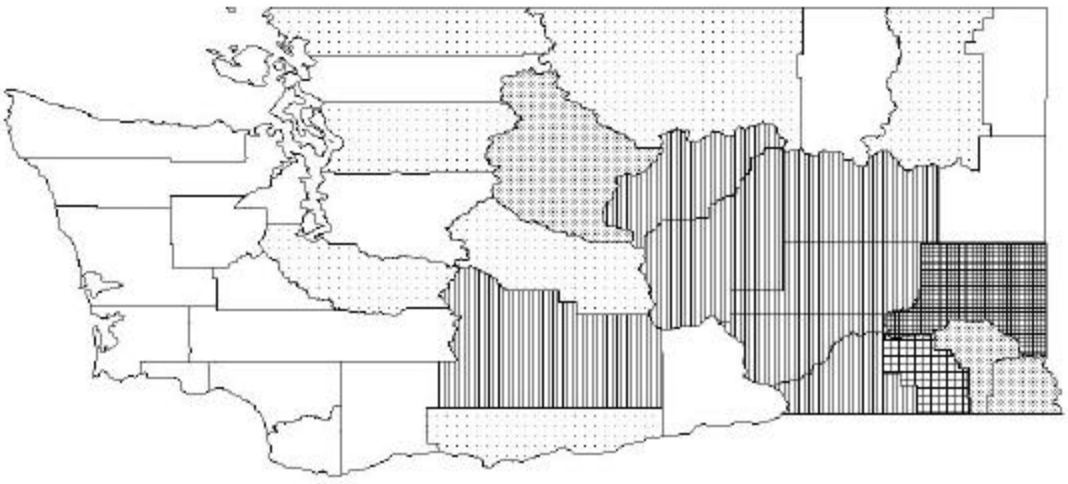


Agricultural residue burned, in tons

- 1 - 500
- 501 - 1,000
- 1,001 - 5,000
- 5,001 - 10,000
- 10,001 - 15,000


UTAH
Great Salt Lake
Agricultural residue burned, in tons
1 - 500
501 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 15,000
15,001 - 20,000

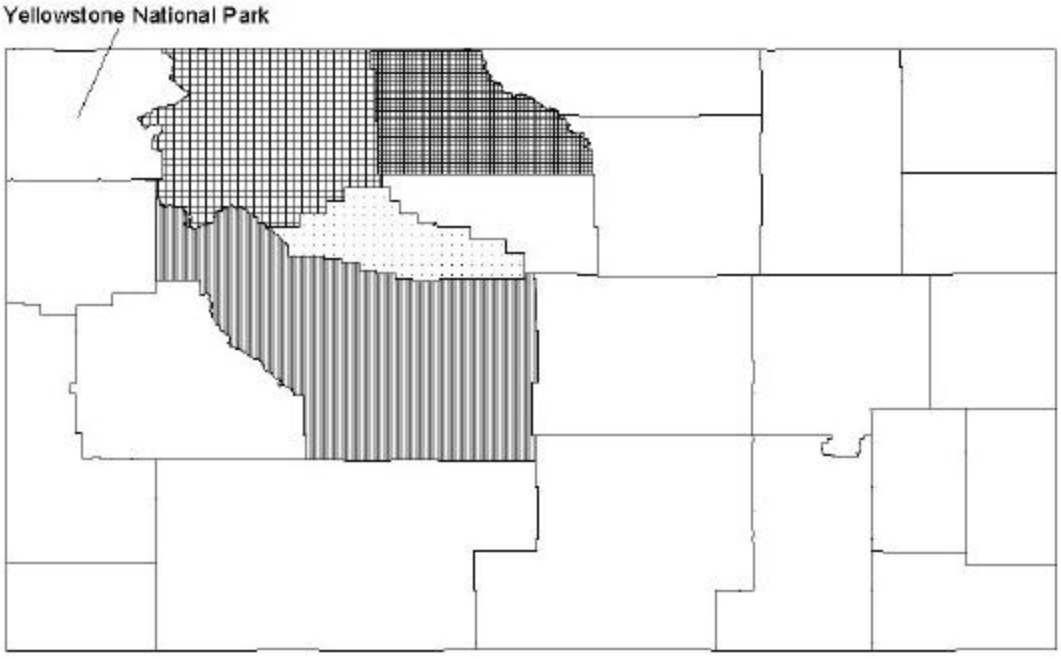
WASHINGTON



Agricultural residue burned, in tons

- 1 - 1,000
- 1,001 - 10,000
- 10,001 - 50,000
- 50,001 - 100,000
- 100,001 - 150,000
- 150,001 - 200,000

WYOMING



Agricultural residue burned, in tons

- 1 - 500
- 501 - 1,000
- 1,001 - 2,000
- 2,001 - 4,000
- 4,001 - 6,000
- 6,001 - 8,000

APPENDIX E

RELEVANT VOLUME II TABLES

Table 5-2. Accountability Mechanisms Important to the Use of Non-Burning Alternatives

State-County(ies) or Area	Accountability Mechanisms that Support Identification and Use of Non-Burning Alternatives																References	Comments
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
	Agricultural Burning is Exempt from all Regulations or Rules	Agricultural Burning is Effectively Exempt from Regulations or Rules	Agricultural Burning is Included in Regulations or Rules	Specific Agricultural Burning Regulation or Rule	General Open Burning Regulation or Rule	Other Burning Sources More Important	Formal Agricultural Burn Approval Process	Agricultural Burning Permit is Required	Agricultural Burning Permit Fees are Charged	Smoke Management is Required	Agricultural Burn Activity Enforcement Process Exists	Requirement to Estimate Fuels, Acreage, & Emissions: Pre-Burn Permit	Requirement to Confirm Fuels, Acreage, & Emissions: Post Burn Report	Agricultural Burn Activity Data is Reviewed & Included in an Inventory	Requirements to Consider Use of Alternatives	Financial Incentive(s) are Available for Using Alternatives	List of Alternatives is Available		
AK		✓	✓		✓		✓[2,3]	✓					✓		✓			WRAP, 2001a	1, 27
AZ		✓	✓		✓						✓	✓		✓					2, 28
AZ-Pima			✓[1]		✓[1]		✓[1]	✓[1]	✓[1]		✓[1]								3
AZ-Pinal			✓[1]		✓[1]		✓[1]	✓[1]	✓[1]										4
AZ-Yuma			✓[2]		✓[2]		✓[2]	✓[2]	✓[1]		✓[1]	✓[2]							5
AZ-Maricopa		✓			✓[1]														6
CA			✓		✓[1]			✓[1]	✓[1]	✓[1]	✓[1]			✓	✓	✓		WRAP, 2001a	7, 43
CA-Lake			✓[1]		✓[1]		✓[1]	✓[1]	✓[1]	✓[1]	✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	44
CA-Sacramento Valley Counties			✓[1]	✓[1]			✓[1]	✓[1]	✓[1]	✓[1]	✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	45
CA-San Joaquin Valley Counties			✓[1]		✓[1]		✓[1]	✓[1]	✓[1]	✓[1]	✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	46
CA-South Coast Counties			✓[1]		✓[1]		✓[1]	✓[1]	✓[1]	✓[1]	✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	8, 47
CO	✓					✓													9
HI			✓		✓			✓	✓		✓	✓			✓				10
ID			✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓			WESTAR, 1999	11, 30
MT		✓	✓		✓	✓		✓	✓		✓								12, 31

Table 5-2. Continued

State-County(ies) or Area	1	2	Accountability Mechanisms that Support Identification and Use of Non-Burning Alternatives															References	Comments
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
	Agricultural Burning is Exempt from all Regulations or Rules	Agricultural Burning is Effectively Exempt from Regulations or Rules	Agricultural Burning is Included in Regulations or Rules	Specific Agricultural Burning Regulation or Rule	General Open Burning Regulation or Rule	Other Burning Sources More Important	Formal Agricultural Burn Approval Process	Agricultural Burning Permit is Required	Agricultural Burning Permit Fees are Charged	Smoke Management is Required	Agricultural Burn Activity Enforcement Process Exists	Requirement to Estimate Fuels, Acreage, & Emissions: Pre-Burn Permit	Requirement to Confirm Fuels, Acreage, & Emissions: Post Burn Report	Agricultural Burn Activity Data is Reviewed & Included in an Inventory	Requirements to Consider Use of Alternatives	Financial Incentive(s) are Available for Using Alternatives	List of Alternatives is Available		
ND		✓	✓		✓		✓[1]				✓								13, 32
NM		✓	✓		✓										✓				14, 42
NV	✓													✓				WRAP, 2001a	15, 33
NV-Pershing	✓											✓						WRAP, 2001a	
OR			✓		✓			✓	✓	✓	✓	✓			✓	✓			16, 34, 35
OR-Jefferson			✓[1]		✓[1]			✓[2]	✓[1]	✓[1]	✓[1]	✓[1]				✓[1]		WRAP, 2001a	36
OR-Umatilla			✓[1]		✓[1]			✓[1]	✓[1]	✓[1]	✓[1]	✓[1]				✓[1]		WRAP, 2001a	36
OR-Union			✓[1]		✓[1]			✓[1]	✓[1]	✓[1]	✓[1]	✓[1]				✓[1]		WRAP, 2001a	36
OR-Willamette			✓[1]		✓[1]			✓[1]	✓[1]	✓[1]	✓[1]	✓[1]				✓[1]		WRAP, 2001a	36
SD	✓																		17, 37
UT	✓																	WESTAR, 1999	18, 38
WA			✓		✓			✓	✓		✓		✓	✓	✓		✓	WRAP, 2001a; WESTAR, 1999	19
WA -Benton			✓[1]	✓[1]				✓[1]	✓[1]		✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	20, 40
WA-Columbia			✓[1]	✓[1]				✓[1]	✓[1]		✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	21, 40
WA-NW region			✓[1]	✓[1]				✓[1]	✓[1]		✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	22, 40
WA-SW region			✓[1]	✓[1]				✓[1]	✓[1]		✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	23, 40
WA-Walla Walla			✓[1]	✓[1]				✓[1]	✓[1]		✓[1]	✓[1]		✓[1]	✓[1]			WRAP, 2001a	24, 40

Table 5-2. Continued

State-County(ies) or Area	1	2	Accountability Mechanisms that Support Identification and Use of Non-Burning Alternatives															References	Comments
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
	Agricultural Burning is Exempt from all Regulations or Rules	Agricultural Burning is Effectively Exempt from Regulations or Rules	Agricultural Burning is Included in Regulations or Rules	Specific Agricultural Burning Regulation or Rule	General Open Burning Regulation or Rule	Other Burning Sources More Important	Formal Agricultural Burn Approval Process	Agricultural Burning Permit is Required	Agricultural Burning Permit Fees are Charged	Smoke Management is Required	Agricultural Burn Activity Enforcement Process Exists	Requirement to Estimate Fuels, Acreage, & Emissions: Pre-Burn Permit	Requirement to Confirm Fuels, Acreage, & Emissions: Post Burn Report	Agricultural Burn Activity Data is Reviewed & Included in an Inventory	Requirements to Consider Use of Alternatives	Financial Incentive(s) are Available for Using Alternatives	List of Alternatives is Available		
WY		✓			✓	✓													25, 41
Tribal	✓	✓[3]; ✓[4]; ✓[5]				✓[1]; ✓[2]; ✓[3]; ✓[4]; ✓[5]	✓[1]; ✓[2]; ✓[3]; ✓[4]; ✓[5]											WRAP, 2001b	26

Notes:

✓ = State Level
✓[1] = County or Local Authority
✓[2] = Rural Fire District
✓[3] = Natural Resources Authority
✓[4] = Tribal Authority
✓[5] = Federal Land Management Authority

AK = Alaska
AZ = Arizona
CA = California
CO = Colorado
HI = Hawaii
ID = Idaho
MT = Montana
ND = North Dakota
NM = New Mexico
NV = Nevada
OR = Oregon
SD = South Dakota
UT = Utah
WA = Washington
WY = Wyoming

Table 5-2a. Comments Key for Table 5-2

No.	Comments
1	Ann Lawton, AK State Dept. Env. Quality, ERG/ETC Informal Survey 2001 (see Appendix A): No agricultural crops burned. Limited burning conducted to date is for land clearing; may be more in future. Limited to fall and spring because of climate, tourism, and fire danger. Burning occurs in Delta Junction area only. Rest of AK no agricultural burning at all. Permits are required for burns greater than 40 acres in size only. Most of the smoke issues occur with non-permitted burns.
2	Varma Sunil, AZ State Dept. Env. Quality, ERG/ETC Informal Survey 2001: Typically agricultural burning is not addressed in statewide open burning smoke management program. Most burning occurs in Yuma county. 8,000 acre/yr limit via State Implementation Plan. Non-agricultural open burning is allowed in Yuma and Maricopa Counties.
3	Bill Maxwell, Pima County Dept Env. Quality, ERG/ETC Informal Survey 2001: Most burning is tumbleweeds, year round via open burn permit. Based on burn/no-burn days program. No smoke management plan is required and emissions are not tracked.
4	Donald Gabrielson, Pinal County Dept. Env. Quality, ERG/ETC Informal Survey 2001: Principal agricultural burning is for irrigation ditch bank clearing. Occurs in Spring. Most other permitted burning is for residential use burn barrels. Some rural agricultural burning. If okayed for agricultural, annual permit to burn anything up to 320 contiguous acres.
5	Varma Sunil, AZ State Dept. of Env. Quality and Kurt Foster, Yuma County Fire Dept, ERG/ETC Informal Survey 2001: Most burning is limited by the State Implementation Plan up to 8,000 acre/yr. It typically includes citrus and other orchard fuels burning for orchard retirement and removal. Often use a curtain air destructor.
6	Rick Hado, Maricopa County, ERG/ETC Informal Survey 2001: No burning for agricultural residues occurs in county. Majority of burning is for ditch banks, tumbleweeds, fenceline clearing and land clearing. Do often use high temperature propane burners for ditch banks and best management practices.
7	WRAP, 2001a: Agricultural burning is allowed under state law. It is typically permitted at the county air authority level. Many crops are burned, especially rice, wheat and other grains. Orchard prunings are also burned by permit. The newly adopted statewide Title 17 Smoke Management Guidelines for Agricultural and Prescribed burning in CA provides authority, direction and guidance to the local air authorities (air quality management and/or control districts) for the regulation and management of burning. Smoke management plans are required of each local air authority. There is considerable variability in the implementation of local rules and regs and little systematic statewide review of programs or emissions estimates.
8	WRAP, 2001a: Almost any crop can be burned any time of the year.
9	Coleen Campbell, CO State Dept. of Public Health and Phyllis Woodford, CO State Dept. of Public Health, ERG/ETC Informal Survey 2001: Burning occurs only of range land and irrigation ditches. Regulations exempt agricultural residues but do encourage good burning practices. Some spring wheat, corn and sunflower burning may occur in Western counties/Grand Junction area. Approval to burn via courtesy burn/no-burn calls.
10	Lisa Young, HI State Dept. of Health and Janet Ashman, HI Agricultural Research Center; ERG/ETC Informal Survey 2001: Two year crops, roughly half of the acres planted in any year would be burned the following year for both sugar cane and pineapples. Estimate 40,000 to 50,000 acres of sugarcane are in production. Roughly 30,000 acres sugarcane is burned in any given year. Acreage burned for pineapples is unknown. Sugarcane industry is having economic difficulties due to competition with sugarbeet production in other states. Sugarcane burning will likely decrease the future.
11	Diane Riley, ID State Dept. Env. Quality, ERG/ETC Survey 2001; Dan Redline, Coeur d'Alene Regional Office, ERG/ETC Informal Survey 2001; Curt Thornberg, ID Dept. of Agriculture, ERG/ETC Informal Survey 2001, Robert Wilkosz, ID Dept. Env. Quality, WESTAR (1999): Data not available for most of the state. Some data on grass and cereal grains is available for the Kootenai and Benewah counties. Voluntary smoke management plans are used in Kootenai and Benewah counties. Grass seed and cereal crops are burned in the fall (Aug-Sept). Alfalfa, mint and other perennial forage crops are burned in both the spring and fall. Ditch banks are burned in the spring. Individual burners make the burn/no-burn decisions. Open burning rule specifically allows burning of orchard clippings and burning for weed control.

Table 5-2a. Continued

No.	Comments
12	Bob Habeck, MT State Dept Environmental Quality, ERG/ETC Informal Survey 2001: Data on acreage burned are not tracked. State has permit authority Sept-Feb otherwise burner gets to decide when to burn and not burn. Program is geared toward wildlands and forest management, not agricultural. Rarely allowed to burn in summer months because of fire danger. Burning that does occur addresses ditches and sagebrush land conversion.
13	Chuck McDonald, ND State Health Dept., ERG/ETC Informal Survey 2001: Wheat is burned in fall and only in northeastern areas of Red River Valley. Yields are high, similar to rice in CA. Do not track emissions at all. Agriculture is exempt. Open burning is prohibited but variances are issued for prescribed burning of forest lands. One particle/fiberboard plant is highly successful in the state.
14	Brad Musick, NM State Dept of Environment, ERG/ETC Informal Survey 2001: Orchard prunings are the main issue. No emissions data is kept. Wheat is burned in eastern portion of the State. Pecans are the main crop. Prunings, hulls etc. are burned in the Dona Ana (Rio Grande) areas of state. Tumbleweeds and irrigation ditches are burned routinely as a way of life in some areas to supply pecan orchards with water.
15	Colleen Cripps, NV State Dept. Env. Quality, ERG/ETC Informal Survey 2001 and WRAP, 2001a: Agricultural burning is essentially not regulated. Some self regulation occurs in parts of the state with greater community concerns. This includes the Lovelock Valley.
16	Brian Finneran, OR State Dept. Env. Quality, ERG/ETC Informal Survey 2001: Grains burned July-Sept. Basically track emissions through three separate geographically distinct field burning programs. All three programs publish annual emissions reports. Largest source of burning is the Willamette Valley. Complex state run program. Orchard burning is typically allowed statewide.
17	Chris Hansen, SD Dept of Environment and Natural Resources, ERG/ETC Informal Survey 2001; Tim Rogers, SD State Dept of Environment and Natural Resources, ERG/ETC Informal Survey 2001: agricultural burning is not regulated in the state. No Tracking, no records kept, and no permits required for agricultural burning in the state. Grasses burned in spring (March - May) and fall (Sept - Oct). Grain is burned in March and April. Open burning of rubbish, treated woods, wastes, etc. is prohibited.
18	Francis Bernards, UT State Dept. Env. Quality, ERG/ETC Informal Survey 2001; Steven Parkin, UT State Division of Air Quality, WESTAR (1999): State does not track acres burned. Large agri-farming occurs in nearly every county. No burning occurs during Ozone season, (June - Aug). Burn season is Sept-May.
19	Grant Pfeifer, WA State Dept of Ecology, Agricultural Burn Task Force, ERG/ETC Informal Survey 2001; Chad Akins, WA State Dept of Ecology, WESTAR, 1999: Burning occurs in Benton, Columbia, Island, Skagit and Whatcom counties. Wheat is burned in March, April and July-Nov. Fall burning occurs Aug-Nov. Spring burning occurs March-May. Crops burned include wheat, barley, grass seed, pasture and alfalfa seed. A post-burn "Report Card" is required. Emissions from these sources are tracked. Burning incidental to agricultural residue is allowed without a permit. This type of burning includes orchard prunings, fencelines, irrigation and drainage ditches. Emissions are not tracked from these sources. State of WA does support research to explore alternatives to burning.
20	WRAP 2001a: Most of the burning in the county is orchard removal.
21	WRAP 2001a: Spring burning in March through April; Fall burning in Mid-Sept through October
22	WRAP 2001a: Very small amount of acreage burned. 475 total acres in year 2000.
23	WRAP, 2001a: Little agricultural burning occurs in this county. Less than 50 acres in 2000, none were grain or grass seed crops. Burning is allowed year round because so little occurs in the county.
24	WRAP, 2001a: Most burning is done in spring. Fall burning is being phased out.
25	Darla Potter, WY Dept. Env. Quality, ERG/ETC Informal Survey 2001: Emissions are not tracked at all. Burn permits are required for forestry and rangeland. Recently grass seed companies from OR and WA have been relocating to WY which may increase burn emissions from these sources.

Table 5-2a. Continued

No.	Comments
26	WRAP, 2001b: There are 240 Indian reservations in the Western Regional Air Partnership (WRAP) region representing more than 54 million acres of land. Historically each tribal entity manages their own lands independently. No centralized agricultural burning activity data presently exisits. Historically burning occurs on approximately 50% of the reservations within the WRAP region of the 15 Western states. Types of burning include wildland, rangeland and agricultural. Often burns are part of an overall annual burn or land management plan but some are completely independent. Most tribal entities do not have a formal smoke management program although some do. Coordination with other off-site land management entities and air quality authorities is highly variable among the tribes.
27	State of Alaska, Department of Environmental Conservation, Open Burning Policy and Guidelines document. http://www.state.ak.us/dec/dawq.
28	State of Arizona, Department of Environmental Quality, Arizona Guidelines for Open Burning and Permit Application Form, Title 49. http://www.adeq.state.az.us/environ/air.
29	State of Hawaii, Administrative Rules, 11-60.1-51: Open Burning, and Application for Agricultural Burning Permit, http://www.state.hi.us/doh/rules/emd/11-60.PDF.
30	State of Idaho, Statute Title 22, Agriculture and Horticulture, Chapter 48, Smoke Management and Crop Residue Disposal, http://www.state.id.us/idstat
31	State of Montana, Department of Environmental Quality, Rules Title 17, Chapter 8, Air Quality, Open Burning. http://www.deq.state.mt.us/dir/legal
32	State of North Dakota Air Pollution Control Rules, Chapter 33-15-04, Open Burning Restrictions, http://www.health.stat.nd.us/ndhd/environ
33	State of Nevada, Division of Environmental Protection, Smoke Management Program, NAC 445B.381 Open Burning, http://www.state.nv.us/ndep/bao/smoke1.htm.
34	State of Oregon, Department of Agriculture, "Field Burning Rules", http://arcweb.sos.state.or.us/rules
35	State of Oregon, Department of Agriculture Natural Resources Division, http://www.oda.state.or.us/Natural_Resources/smoke.htm.
36	State of Oregon, Administrative Rules, Department of Environmental Quality, "Pollution Control Tax Credits", http://arcweb.sos.state.or.us/rules/OARS_300/OAR_340/340_tofc.html
37	State of South Dakota, Department of Environment and Natural Resources, "Air Quality Guidelines for Open Burning", http://www.state.sd.us/denr/DES/airquality/regulations
38	State of Utah, Administrative Code, Title R307, "Environmental Quality, Air Quality", Section 307-202-1, http://www.rules.state.ut.us/publicat/code
39	State of Utah, Statute, Title 19, "Environmental Quality code" Chapter 2, "Air Conservation Act", http://www.le.state.ut.us
40	State of Washington, Department of Air Quality, Best Management Practices and Administrative Code, "Agricultural Burning", RCW 70.94.656 Open Burning, http://www.ecy.wa.gov
41	State of Wyoming, Air Quality Standards and Regulations, Chapter 10, Section 2, "Open Burning Restrictions", http://deq.state.yw.us.
42	State of New Mexico, Environmental Protection Air Quality, "Open Burning", Title 20, Chapter 2, Part 60.
43	State of California, Title 17 "Smoke Management Guidelines for Agricultural Burning and Prescribed Burning", California Code of Regulations, Section 80100, et. Seq. California Air Resources Board, http://www.arb.ca.gov
44	State of California, Lake County Air Quality Management District, Rules and Regulations: Chapter VIII, Agricultural Burning, http://www.arb.ca.gov/DRDB/lak/CURHTML/LKRulebook7-13-01-PDF
45	State of California, Sacramento Metropolitan Air Quality Management District, Rule 407: Open Burning, http://www.arb.ca.gov/DRDB/SAC/CURHTML/R407.htm and Rule 501: Agricultural Burning, http://www.arb.ca.gov/DRDB/SAC/CURHTML/R501.htm
46	State of California, San Joaquin Valley Unified Air Pollution Control District, Rule 4103: Open Burning, http://www.arb.ca.gov/DRDB/SJU/CURHTML/R4103.PDF
47	State of California, South Coast Air Quality Management District, Rule 444: Open Fires, http://www.arb.ca.gov/DRDB/SC/CURHTML/R444.htm