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Exploring Quarterly Agricultural Survey Questionnaire Version Reduction Scenarios

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EXECUTIVE SUMMARY

The United States Department of Agriculture (USDA), National Agricultural Statistics Service's (NASS) Agricultural Survey Program (ASP) collects national agricultural data from farmers and ranches quarterly and annually to estimate the size of local and national crop production and stock inventories using the Quarterly Agricultural Survey Questionnaire (QAS). The QAS provides a basis for estimating seasonal and annual crop production, supplies, and grain storage. The farming industry uses QAS estimates for both short-term and long-term crop planning.

Currently the QAS collects data on a variety of crops and stocks across all 50 states anywhere from one to four times a year. Variations in the crop data collection from state to state are believed to reduce respondent burden (e.g., Maine farmers are not surveyed for soybeans and Georgia farms are not surveyed for alfalfa); however, such customization in turn creates a number of QAS versions, which is both time-consuming and more costly to administer. Therefore, this report explores multiple scenarios for reducing the number of QAS versions.

A table consisting of all 31 crops and stocks surveyed by each state was analyzed using hierarchical clustering to identify possibilities for regional versions. The number of clusters was limited to 20 in order to reduce the number of potential QAS versions. The resulting clusters' (regions') crop/stock survey frequencies were determined by comparing the crop/stock survey frequency across states within the given cluster.

RECOMMENDATIONS

1. There are no current plans to pursue regionalizing the QAS. However, should regionalization be pursued in the future, this report demonstrates a useful methodology for doing so. This approach should also be explored when proposing regionalization of questionnaires in other surveys.

Exploring Quarterly Agricultural Survey Questionnaire Version Reduction Scenarios

Morgan Earp, Scott Cox, Jody McDaniel, & Chadd Crouse[1]

Abstract

The United States Department of Agriculture's National Agricultural Statistics Service (NASS) conducts the Agricultural Survey Program (ASP), which consists of crop/stocks and livestock surveys. The Quarterly Agricultural Survey (QAS) questionnaire serves as a primary data collection instrument for the Agency's estimates of seasonal and annual crop production, supplies, and grain storage, which are used by the farming industry for both short and long term planning. The QAS is administered in all 50 states and collects data on 31 different crops and stocks, in varying combinations and frequencies throughout the year depending on the state. Such variation allegedly reduces respondent burden; however, it greatly increases the complexity of the survey administration process. Hierarchical clustering was done to investigate the potential of creating 20 regional QAS versions. Such an approach, if implemented operationally, would reduce the number of QAS versions by 60 percent (50 to 20). The research explored further clustering the QAS into only five regional versions, which, if implemented, would reduce the number of QAS versions by 90 percent (50 to 5).

Key Words: Quarterly Agricultural Survey Questionnaire; Questionnaire Version Reduction; Item Reduction

1. BACKGROUND

In September of 2007, the United States Department of Agriculture's (USDA) National Agricultural Statistics Service (NASS) created a team to improve the efficiency of the Quarterly Agricultural Survey Program through a general review of survey content and by reducing the number of questionnaire versions. The Quarterly Agricultural Survey (QAS) Questionnaire Reduction and Review Team was established to improve the efficiency of the quarterly agricultural survey program through a reduction in the number

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Jaki McCarthy provided assistance with this research while the Chief Cognitive Research Methodologist with the USDA/NASS/RDD.

of questionnaire versions and a general review of survey content (National Agricultural Statistics Service, 2008). The desired result of this team was to facilitate standardization and regionalization of NASS data collection efforts and produce the following benefits: allow maximization of resources within Data Collection Centers, promote consistency of data collection within regions, ensure consistent standards between the Agricultural Survey and Census Program, guarantee the quality of estimates, potentially reduce survey cost and respondent burden, reduce processing time for headquarters units and gain efficiency in survey training.

The team hoped to produce the following deliverable after the work was completed:

1. Draft regional Quarterly Agricultural Survey instruments that meet NASS questionnaire design standards and improve the overall efficiency of the data collection process. (Goal was dropped).

2. Complete review of Quarterly Agricultural Survey instruments to determine if all items are needed for the NASS estimation program and to determine if efficiencies can be gained by either changing the format or number survey items collected. (Goal was achieved).

3. Review all modes of collection (paper, Blaise, EDR) for the Quarterly Agricultural Survey program to ensure that questions are standardized across each mode of data collection. (Goal was achieved).

4. Ensure that all Quarterly Agricultural Survey paper instruments are 12 pages or less to ensure that NASS standard survey mailing procedures can be utilized. (Goal was achieved).

Each above deliverable focuses on improving the overall efficiency of the QAS. The relative success of each deliverable affected the efficiency of the QAS program. The collective success of all four ultimately was expected to provide the greatest opportunity for improving efficiency of the QAS program. Deliverables two through four were completed and are contributing towards the efficiency of the QAS program.

The last three deliverables are being used to make the QAS program more efficient; however, deliverable one was not completed. The goal of drafting regional QAS survey instruments was dropped after much discussion with CSD management. This was due to the realization that the continued use of the Questionnaire Repository System (QRS) provides many of the efficiencies that would be gained by regionalizing QAS survey instruments. Specifically, it was determined that the benefits achieved by using the QRS for questionnaire development outweighed potential gains of using regional questionnaires, when it came to reducing respondent burden, in the QAS program. The original intent of having regional questionnaire versions was to improve the overall efficiency of the QAS program. This includes but is not limited to the following items: reducing respondent burden, improving the quality of estimates, potentially reducing survey cost, improving survey training, and better utilizing DCCs. However, the change

in objectives for the team did not allow completion of all steps (such as testing, etc.) that would have been completed if the regional questionnaires had been adapted. Furthermore, this report should be a starting point for any future discussions regarding the regionalization of QAS questionnaires (or any other survey instruments). The main principals discussed could probably be applied to other survey programs without any major changes in the methodology.

2. INTRODUCTION

This report documents options for reducing the number of QAS versions administered by the Agricultural Survey Program (ASP). The QAS is administered in all 50 states and collects data on 31 different crops and stocks throughout the year, in varying combinations and frequencies depending on the state.

The QAS provides clear indications of the potential production and supply of major commodities in the United States. NASS surveys producers on their total acres operated, acres planted and harvested of specific commodities, and quantities of grains and oilseeds produced and stored on-farm, in order to set national and state estimates. NASS publishes the results of the QAS in a series of reports, including the annual acreage and quarterly grain stocks reports. The entire agricultural community including producers, buyers, providers, processors, state and federal agencies, and policymakers depends on the estimates set using the QAS. Users of these estimates include commodity markets, educational institutions, state and federal agencies, and the farming and ranching operations themselves.

In an effort to reduce respondent burden and maintain high response rates, state-specific versions of the QAS are used in the ASP data collection process. The content of these QAS versions varies by state and the time of year the questionnaire is administered.

1.1 Problem

Currently, each state utilizes its own version of the QAS. Although this process is thought to reduce respondent burden, it requires considerable resources to develop the survey instruments, administer the survey, and summarize the data.

1.2 Purpose

This report describes the potential for regionalizing the QAS. It is merely an exploratory summarization of current QAS survey frequencies across states, and does not account for state preferences. The purpose of the report is to improve the efficiency of the quarterly agricultural survey program by reducing the number of QAS versions. It provides insight into possibilities for reducing the number of QAS versions and, thus, the associated survey administration burden.

3. METHOD

3.1 Data

Crop and stock survey frequencies were assessed and compared across all states using hierarchical clustering. Appendix A shows all crops and stocks included in one or more QAS questionnaires across the column headings. The table cells are coded by sampling frequency, not publication frequency. The QAS surveying frequencies of crops and stocks are coded using the Field Crops Section classifications: annual (A), full season (F), "included" (I), all other states (AOS), silage (S) or not surveyed (NS) (Table A-1). The notation used to classify states does not necessarily reflect the crop/stock specifically sampled for the QAS. For the purposes of this analysis, "annual" crops/stocks are considered to be surveyed annually, "full season" crops/stocks are considered to be surveyed quarterly, "included" crops/stocks are special crops considered to be surveyed at least annually[2], "all other states" crops/stocks are grouped and published together with other crops by state (survey frequency varies), "silage" corn is considered to be surveyed annually to estimate silage (not grain), and "not surveyed" crops/stocks are not surveyed. All six survey frequencies were generated for purposes of analysis; however, they were consolidated as follows for purposes of summary: crops and stocks identified as annual, included, or silage were considered annual; crops and stocks identified as full season, all other states, or not surveyed were left as is. The analytical data set consists of 50 states and 31 variables: Each variable represents one of the 31 crops/stocks surveyed.

3.2 Procedure

States sharing similar crops and stocks surveyed were dynamically grouped together using a dendogram to form clusters that were ultimately referred to as regions. A dendogram is a tree with individual elements at one end, building (agglomeratively) into a single cluster containing every element at the other end (JMP, 2008). Dendograms may be cut at any point to provide a specific number of clusters. For the purposes of this report, two target numbers of clusters were specified as follows: 1) the QAS 20 regions (versions) were identified using 20 clusters; and 2) the QAS 5 regions (versions) were identified by consolidating all 20 original clusters into 5 clusters.

4. RESULTS

Clustering was used to reduce the number of QAS versions by 60 percent (50 to 20) and then ultimately by 90 percent (50 to 5). Survey administration frequency data, comprised of indicator variables as to whether specific items are surveyed as well as the frequency at which they are surveyed across states, were combined with state sampling data to create regional state groupings known as clusters using JMP's hierarchical clustering algorithm. Using hierarchical clustering, these data were compared across states to create clusters of like states in terms of survey administration frequency. Clusters were first limited to 20 and then to 5 to identify regional survey version scenarios. The initial hierarchical clustering, using the 20 cluster cutoff, revealed 20 regions (*Figure* 1).

[2] Special crops included in the full program are not necessarily sampled quarterly; therefore, they are classified as annual for purposes of this study given that they are surveyed at least annually.

The frequency (annually, seasonally, all other states or not surveyed) at which crops/stocks were surveyed within each cluster was examined and used to determine the frequency at which they would be surveyed for a given region. When the survey frequency was tied, annual, full season, or all other survey trumped not surveyed, and seasonal trumped annual. When survey frequency was not tied between annual, full season, all other survey, or not surveyed, the frequency at which the majority of states within the cluster surveyed specific crops/stocks was used (even if it meant reclassifying crops/stocks from surveyed to not surveyed)

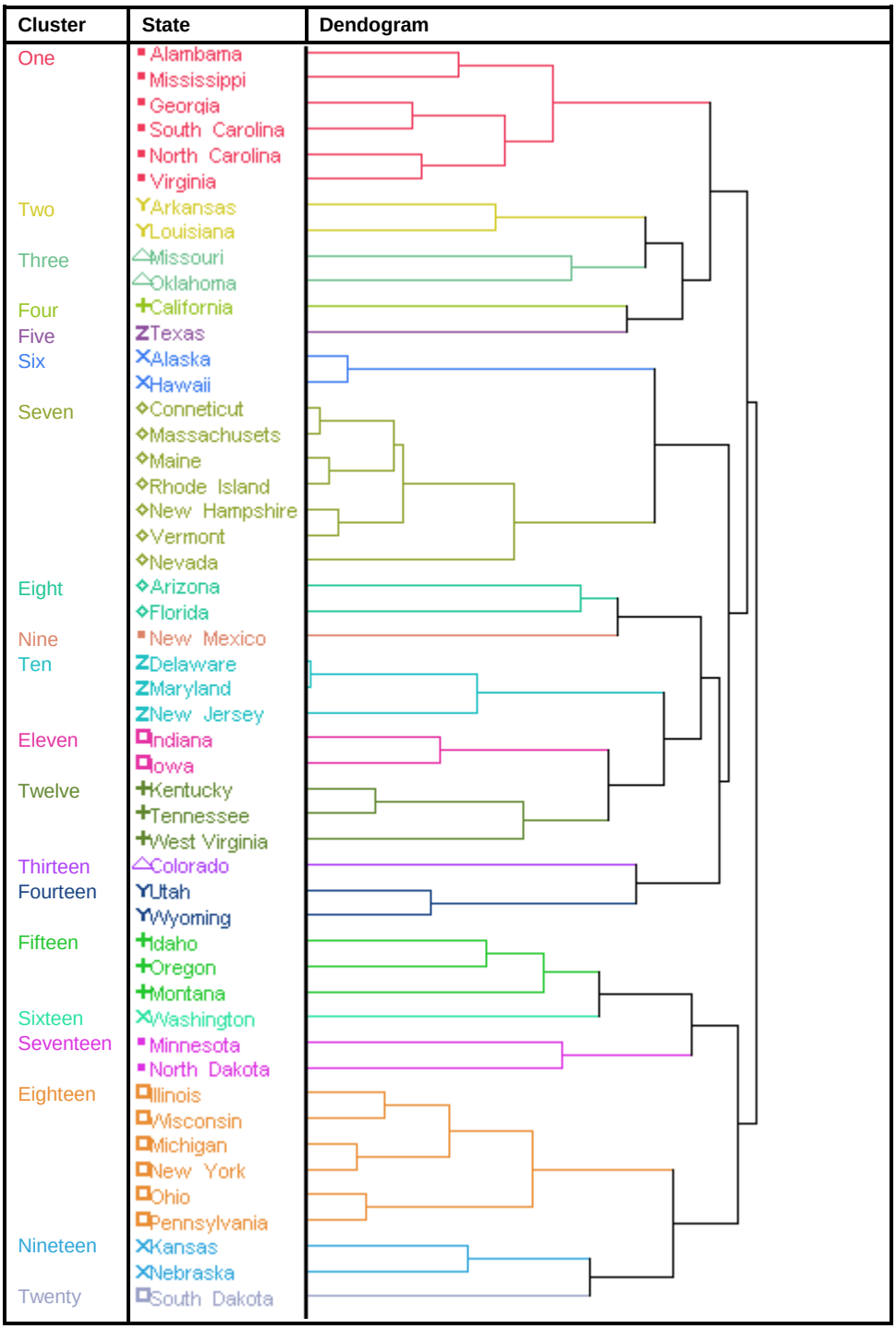

Figure 1. State Cluster Dendogram

4.1 Twenty Region Survey Design

4.1.1 Region 1: Alabama, Mississippi, Georgia, South Carolina, North Carolina, & Virginia

The first cluster identified Region 1, which includes six states: Alabama, Mississippi, Georgia, South Carolina, North Carolina, and Virginia (*Figure* 2). Analysis of individual crops/stocks survey frequency within Cluster 1 indicates that Region 1 would survey oats, potatoes, sorghum, sweet potatoes, tobacco, and watermelons annually; and corn, cotton, other hay, peanuts, soybeans, and winter wheat seasonally (Table 1).

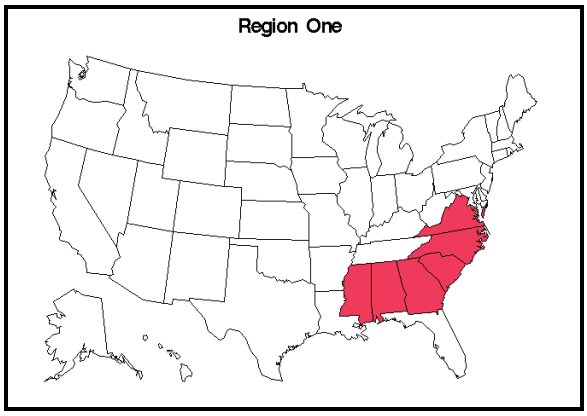

Figure 2. Region 1 States

Table 1: Region 1 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Oats Potatoes Sorghum Sweet Potatoes Tobacco Watermelons
Seasonal	Corn Cotton Other Hay Peanuts Soybeans Winter Wheat

4.1.2 Region 2: Arkansas & Louisiana

The second cluster identified Region 2, which includes two states: Arkansas and Louisiana (*Figure* 3). Analysis of individual crops/stocks survey frequency within Cluster 2 indicates that Region 2 would survey alfalfa, potatoes, sweet potatoes, and watermelons annually and corn, cotton, other hay, rice, sugar cane, sorghum, soybeans, and winter wheat seasonally (Table 2).

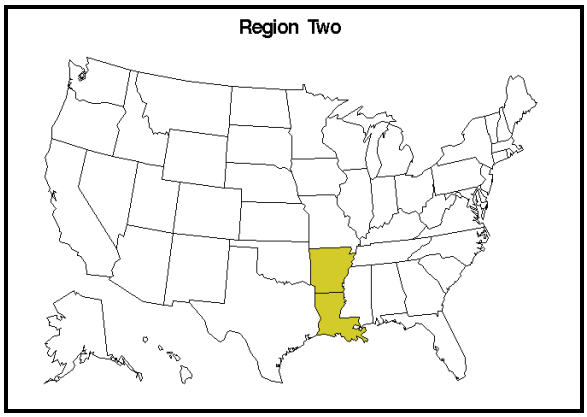

Figure 3. Region 2 States

Table 2: Region 2 Crops/Stocks Survey Frequency

Survey Frequency	**Crops/Stocks**
Annual	Alfalfa Potatoes Sweet Potatoes Watermelons
Seasonal	Corn Cotton Other Hay Rice Sugar Cane Sorghum Soybeans Winter Wheat

4.1.3 Region 3: Missouri & Oklahoma

The third cluster identified Region 3, which includes two states: Missouri and Oklahoma (*Figure* 4). Analysis of individual crops/stocks survey frequency within Cluster 3 indicates that Region 3 would survey forage, oats, potatoes, rye, tobacco, and watermelons annually; alfalfa, corn, cotton, other hay, peanuts, rice, sorghum, soybeans, and winter wheat seasonally; and canola and sunflower in unison with other crops/stocks as the region sees fit (Table 3).

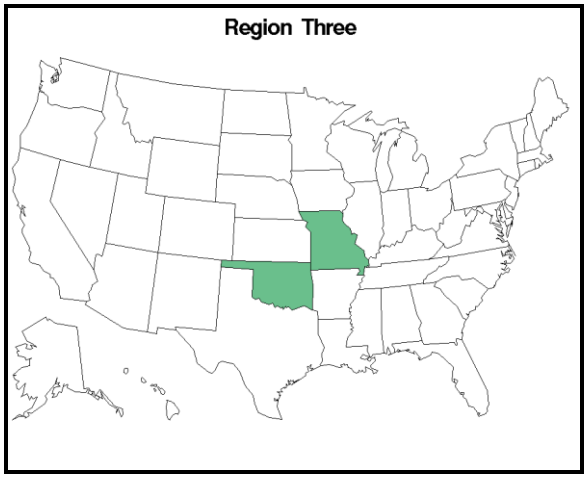

Figure 4. Region 3 States

Table 3: Region 3 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Forage Oats Potatoes Rye Tobacco Watermelons
Seasonal	Alfalfa Corn Cotton Other Hay Peanuts Rice Sorghum Soybeans Winter Wheat
All Other States	Canola Sunflower

4.1.4 Region 4: California

The fourth cluster identified Region 4, which includes one state: California (*Figure* 5). Analysis of individual crops/stocks survey frequency within Cluster 4 indicates that Region 4 would survey dry edible beans, forage, garbanzo beans, potatoes, safflower, sorghum, sweet potatoes, and watermelons annually; alfalfa, corn, cotton, durum wheat, oats, other hay, rice, and winter wheat; and sunflower in unison with other crops/stocks as California sees fit (Table 4).

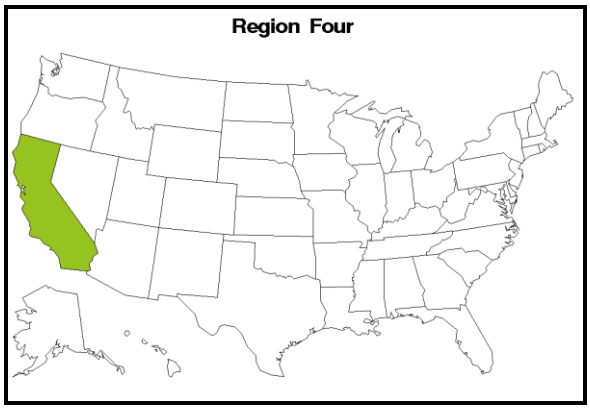

Figure 5. Region 4 States

Table 4: Region 4 Crops/Stocks Survey Frequency

Survey Frequency	**Crops/Stocks**
Annual	Dry Edible Beans Forage Garbanzo Beans Potatoes Safflower Sorghum Sweet Potatoes Watermelons
Seasonal	Alfalfa Corn Cotton Durum Wheat Oats Other Hay Rice Winter Wheat
All Other States	Sunflower

4.1.5 Region 5: Texas

The fifth cluster identified Region 5, which includes one state: Texas (*Figure* 6). Analysis of individual crops/stocks survey frequency within Cluster 5 indicates that Region 5 would survey dry edible beans, forage, potatoes, sweet potatoes, and watermelons annually; alfalfa, corn, cotton, oats, other hay, peanuts, rice, sugar cane, sorghum, soybeans, sunflower, and winter wheat seasonally; and rye in unison with other crops/stocks as Texas sees fit (Table 5).

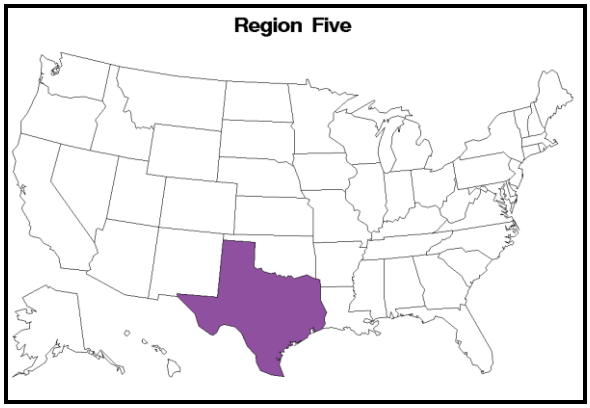

Figure 6. Region 5 States

Table 5: Region 5 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Dry Edible Beans Forage Potatoes Sweet Potatoes Watermelons
Seasonal	Alfalfa Corn Cotton Oats Other Hay Peanuts Rice Sugar Cane Sorghum Soybeans Sunflower Winter Wheat
All Other States	Rye

4.1.6 Region 6: Alaska & Hawaii

The sixth cluster identified Region 6, which includes two states: Alaska and Hawaii (*Figure* 7). Analysis of individual crops/stocks survey frequency within Cluster 6 indicates that Region 6 would survey oats annually and sugar cane seasonally (Table 6).

Figure 7. Region 6 States

Table 6: Region 6 Crops/Stocks Survey Frequency

Survey Frequency	**Crops/Stocks**
Annual	Oats
Seasonal	Sugar Cane

4.1.7 Region 7: Connecticut, Maine, Massachusetts, Nevada, New Hampshire, Rhode Island, & Vermont

The seventh cluster identified Region 7, which includes seven states: Connecticut, Maine, Massachusetts, Nevada, New Hampshire, Rhode Island, and Vermont (*Figure* 8). Analysis of individual crops/stocks survey frequency within Cluster 7 indicates that Region 7 would survey alfalfa, corn (silage), other hay, and potatoes annually (Table 7).

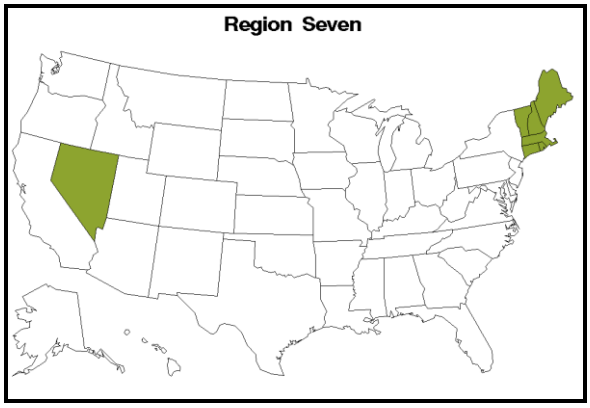

Figure 8. Region 7 States

Table 7: Region 7 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Alfalfa Corn (Silage) Other Hay Potatoes

4.1.8 Region 8: Arizona & Florida

The eighth cluster identified Region 8, which includes two states: Arizona and Florida (*Figure* 9). Analysis of individual crops/stocks survey frequency within Cluster 8 indicates that Region 8 would survey corn, other hay, potatoes, sorghum, soybeans, tobacco, watermelons, and winter wheat annually; alfalfa, cotton, durum wheat, peanuts, and sugarcane seasonally; and safflower in unison with other crops/stocks as the region sees fit (Table 8).

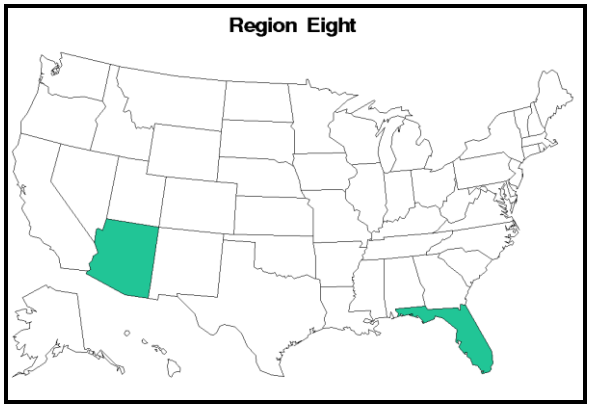

Figure 9. Region 8 States

Table 8: Region 8 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Corn Other Hay Potatoes Sorghum Soybeans Tobacco Watermelons Winter Wheat
Seasonal	Alfalfa Cotton Durum Wheat Peanuts Scane
All Other States	Safflower

4.1.9 Region 9: New Mexico

The ninth cluster identified Region 9, which includes one state: New Mexico (*Figure* 10). Analysis of individual crops/stocks survey frequency within Cluster 9 indicates that Region 9 would survey dry edible beans, forage, other hay, potatoes, and winter wheat annually; and alfalfa, corn, cotton, peanuts, and sorghum seasonally (Table 9).

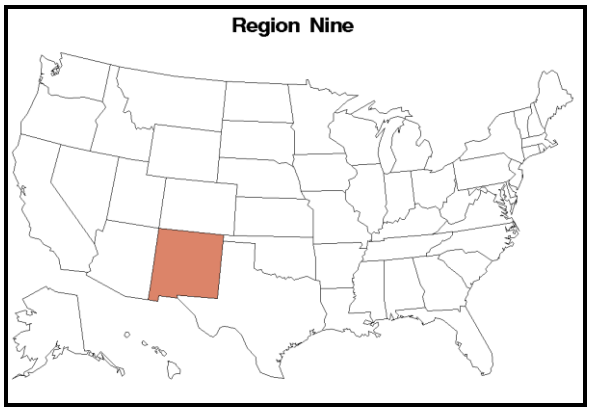

Figure 10. Region 9 States

Table 9: Region 9 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Dry Edible Beans Forage Other Hay Potatoes Winter Wheat
Seasonal	Alfalfa Corn Cotton Peanuts Sorghum

4.1.10 Region 10: Delaware, Maryland, & New Jersey

The tenth cluster identified Region 10, which includes three states: Delaware, Maryland, and New Jersey (*Figure* 11). Analysis of individual crops/stocks survey frequency within Cluster 10 indicates that Region 10 would survey alfalfa, other hay, potatoes, and watermelons annually; and corn, soybeans, and winter wheat seasonally (Table 10).

Figure 11. Region 10 States

Table 10: Region 10 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Alfalfa Other Hay Potatoes Watermelons
Seasonal	Corn Soybeans Winter Wheat

4.1.11 Region 11: Indiana & Iowa

The eleventh cluster identified Region 11, which includes two states: Indiana and Iowa (*Figure* 12). Analysis of individual crops/stocks survey frequency within Cluster 11 indicates that Region 11 would survey forage and watermelons annually; and alfalfa, corn, other hay, soybeans, and winter wheat seasonally (Table 11).

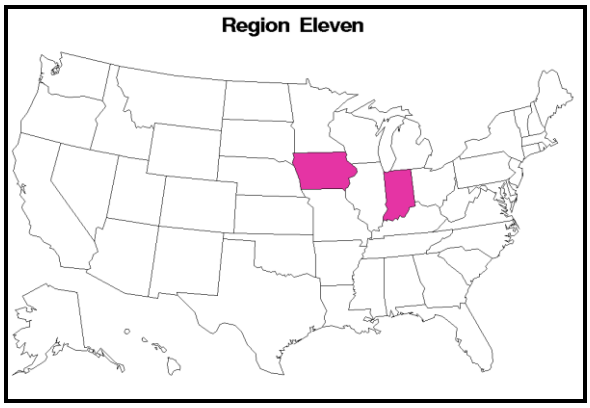

Figure 12. Region 11 States

Table 11: Region 11 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Forage Watermelons
Seasonal	Alfalfa Corn Other Hay Soybeans Winter Wheat

4.1.12 Region 12: Kentucky, Tennessee, & West Virginia

The twelfth cluster identified Region 12, which includes three states: Kentucky, Tennessee, and West Virginia (*Figure* 13). Analysis of individual crops/stocks survey frequency within Cluster 12 indicates that Region 12 would survey alfalfa, sorghum, and tobacco annually; and corn, other hay, soybeans, and winter wheat seasonally (Table 12).

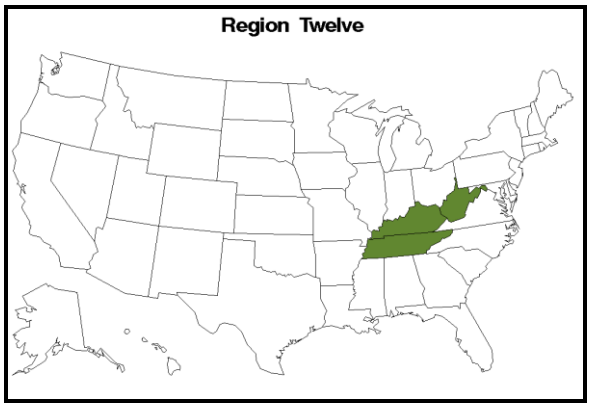

Figure 13. Region 12 States

Table 12: Region 12 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Alfalfa Sorghum Tobacco
Seasonal	Corn Other Hay Soybeans Winter Wheat

4.1.13 Region 13: Colorado

The thirteenth cluster identified Region 13, which includes one state: Colorado (*Figure* 14). Analysis of individual crops/stocks survey frequency within Cluster 13 indicates that Region 13 would survey dry edible beans, oats, potatoes, proso millet, and spring wheat annually; alfalfa, corn, other hay, sorghum, sunflower, and winter wheat seasonally; and canola and sunflower in unison with other crops/stocks /stocks as Colorado sees fit (Table 13).

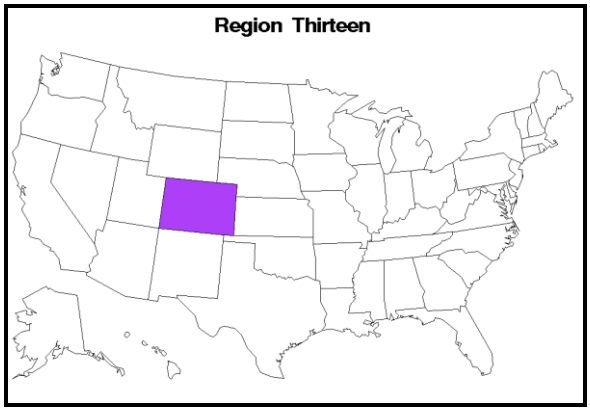

Figure 14. Region 13 States

Table 13: Region 13 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Dry Edible Beans Oats Potatoes Proso Millet Spring Wheat
Seasonal	Alfalfa Corn Other Hay Sorghum Sunflower Winter Wheat
All Other States	Canola Safflower

4.1.14 Region 14: Utah & Wyoming

The fourteenth cluster identified Region 14, which includes two states: Utah and Wyoming (*Figure* 15). Analysis of individual crops/stocks survey frequency within Cluster 14 indicates that Region 14 would survey corn, dry edible beans, oats, spring wheat, and winter wheat annually; alfalfa and other hay seasonally; and safflower and sunflower in unison with other crops/stocks as the region sees fit (Table 14).

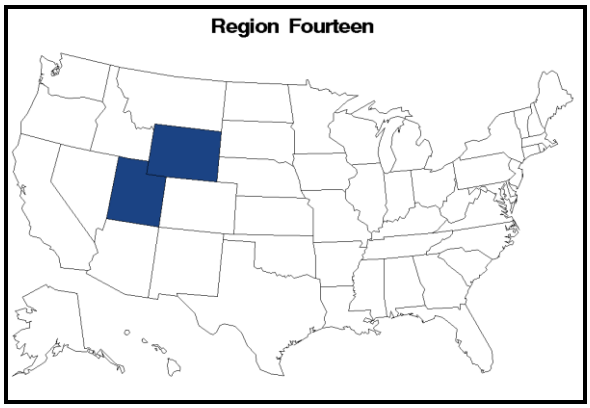

Figure 15. Region 14 States

Table 14: Region 14 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Corn Dry Edible Beans Oats Spring Wheat Winter Wheat
Seasonal	Alfalfa Other Hay
All Other States	Safflower Sunflower

4.1.15 Region 15: Idaho, Montana, & Oregon

The fifteenth cluster identified Region 15, which includes three states: Idaho, Montana, and Oregon (*Figure* 16). Analysis of individual crops/stocks survey frequency within Cluster 15 indicates that Region 15 would survey Austrian winter peas, corn, dry edible beans, dry edible peas, garbanzo beans, lentils, and potatoes annually; alfalfa, durum wheat, oats, other hay, spring wheat, and winter wheat seasonally; and canola, rapeseed, and mustard seed in unison with other crops/stocks as the region sees fit (Table 15).

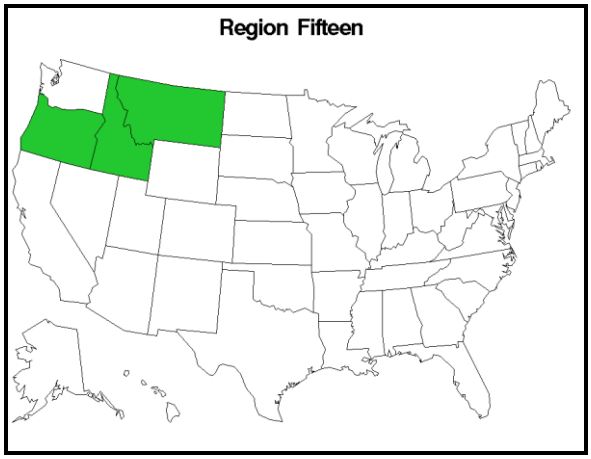

Figure 16. Region 15 States

Table 15: Region 15 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Austrian Winter Peas Corn Dry Edible Beans Dry Edible Peas Garbanzo Beans Lentils Potatoes
Seasonal	Alfalfa Durum Wheat Oats Other Hay Spring Wheat Winter Wheat
All Other States	Canola Rapeseed Mustard Seed

4.1.16 Region 16: Washington

The sixteenth cluster identified Region 16, which includes one state: Washington (*Figure* 17). Analysis of individual crops/stocks survey frequency within Cluster 16 indicates that Region 16 would survey dry edible beans, dry edible peas, forage, garbanzo beans, lentils, oats, and potatoes annually; alfalfa, corn, other hay, spring wheat, and winter wheat seasonally; and canola and mustard seed in unison with other crops/stocks as Washington sees fit (Table 16).

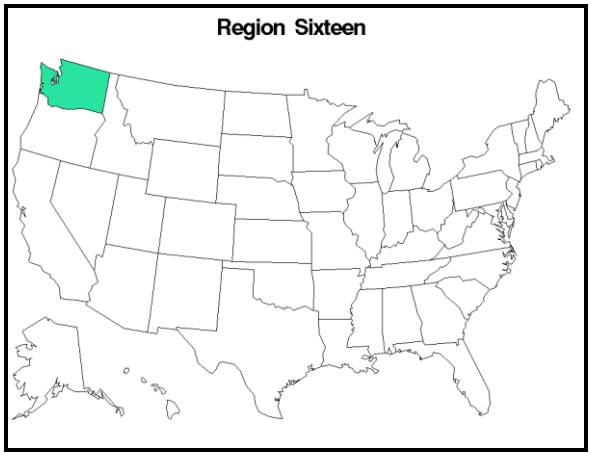

Figure 17. Region 16 States

Table 16: Region 16 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Dry Edible Beans Dry Edible Peas Forage Garbanzo Beans Lentils Oats Potatoes
Seasonal	Alfalfa Corn Other Hay Spring Wheat Winter Wheat
All Other States	Canola Mustard Seed

4.1.17 Region 17: Minnesota & North Dakota

The seventeenth cluster identified Region 17, which includes two states: Minnesota and North Dakota (*Figure* 18). Analysis of individual crops/stocks survey frequency within Cluster 17 indicates that Region 17 would survey dry edible beans, dry edible peas, flaxseed, forage, garbanzo beans, lentils, potatoes, and winter wheat annually; alfalfa, canola, corn, durum wheat, oats, other hay, soybeans, spring wheat, and sunflower seasonally; and rapeseed, mustard seed, rye, safflower in unison with other crops/stocks as the region sees fit (Table 17).

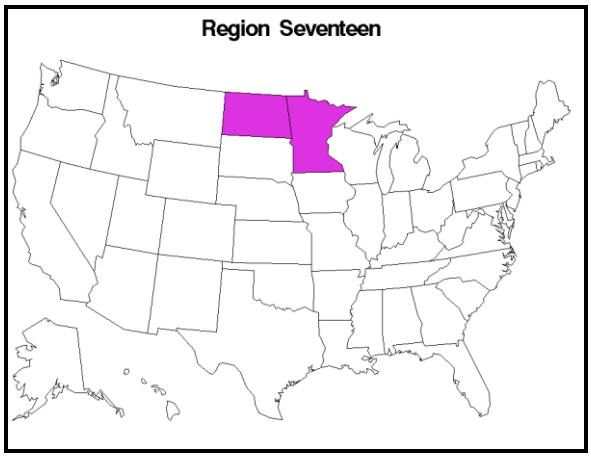

Figure 18. Region 17 States

Table 17: Region 17 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Dry Edible Beans Dry Edible Peas Flaxseed Forage Garbanzo Beans Lentils Potatoes Winter Wheat
Seasonal	Alfalfa Canola Corn Durum Wheat Oats Other Hay Soybeans Spring Wheat Sunflower
All Other States	Rapeseed Mustard Seed Rye Safflower

4.1.18 Region 18: Illinois, Michigan, New York, Ohio, Pennsylvania, & Wisconsin

The eighteenth cluster identified Region 18, which includes six states: Illinois, Michigan, New York, Ohio, Pennsylvania, and Wisconsin (*Figure* 19). Analysis of individual crops/stocks survey frequency within Cluster 18 indicates that Region 18 would survey forage and potatoes annually; alfalfa, corn, oats, other hay, rye, soybeans, sunflower, and winter wheat seasonally; and rye and sunflower in unison with other crops/stocks as the region sees fit (Table 18).

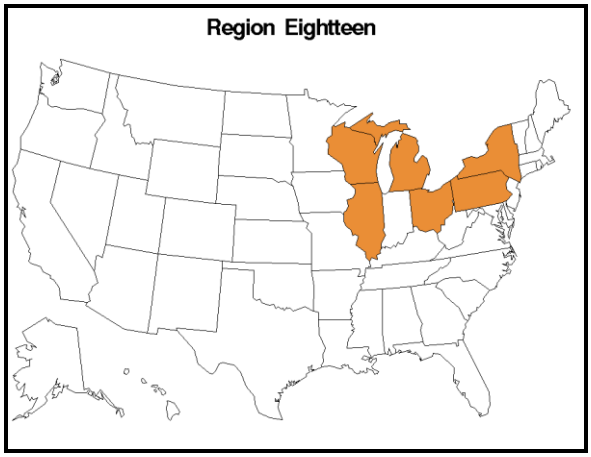

Figure 19. Region 18 States

Table 18: Region 18 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Forage Potatoes
Seasonal	Alfalfa Corn Oats Other Hay Soybeans Winter Wheat
All Other States	Rye Sunflower

4.1.19 Region 19: Kansas & Nebraska

The nineteenth cluster identified Region 19, which includes two states: Kansas and Nebraska (*Figure* 20). Analysis of individual crops/stocks survey frequency within Cluster 19 indicates that Region 19 would survey dry edible beans, forage, garbanzo beans, lentils, potatoes, and proso millet annually; alfalfa, corn, cotton, oats, other hay, sorghum, soybeans, sunflower, and winter wheat seasonally; and canola and rye in unison with other crops/stocks as the region sees fit (Table 19).

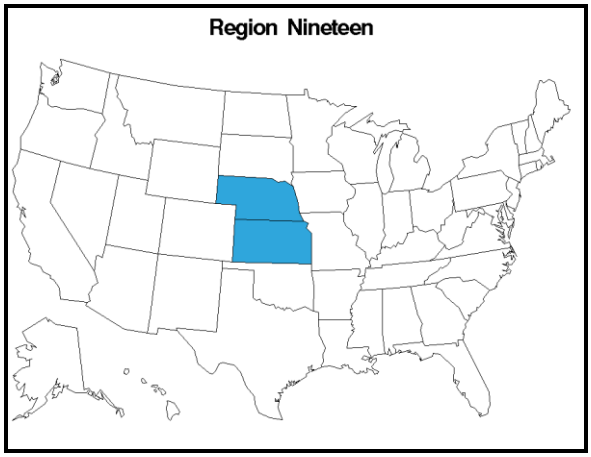

Figure 20. Region 19 States

Table 19: Region 19 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Dry Edible Beans Forage Garbanzo Beans Lentils Potatoes Proso Millet
Seasonal	Alfalfa Corn Cotton Oats Other Hay Sorghum Soybeans Sunflower Winter Wheat
All Other States	Canola Rye

4.1.20 Region 20: South Dakota

The twentieth cluster identified Region 20, which includes one state: South Dakota (*Figure* 21). Analysis of individual crops/stocks survey frequency within Cluster 20 indicates that Region 20 would survey dry edible beans, durum wheat, flaxseed, forage, garbanzo beans, and proso millet annually; alfalfa, corn, oats, other hay, sorghum, soybeans, spring wheat, sunflower, and winter wheat seasonally; and rye and safflower in unison with other crops/stocks as South Dakota sees fit (Table 20).

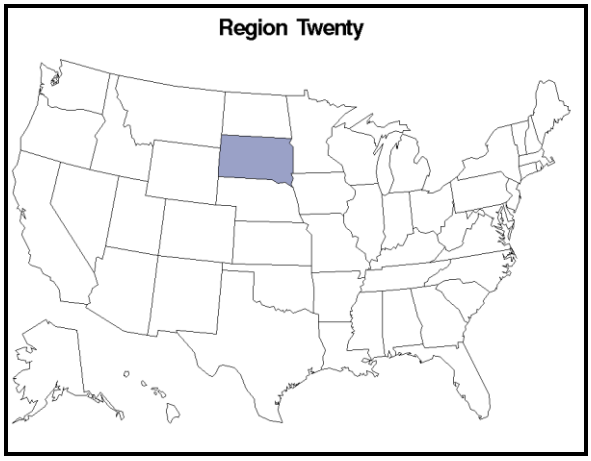

Figure 21. Region 20 States

Table 20: Region 20 Crops/Stocks Survey Frequency

Survey Frequency	**Crops/Stocks**
Annual	Dry Edible Beans Durum Wheat Flaxseed Forage Garbanzo Beans Proso Millet
Seasonal	Alfalfa Corn Oats Other Hay Sorghum Soybeans Spring Wheat Sunflower Winter Wheat
All Other States	Rye Safflower

4.2 Five Region Survey Design

Hierarchical clustering was also done using five clusters, which created five QAS regions, ultimately reducing the number of versions by 90 percent (from 50 to 5).

3.2.1 Region One: Alabama, Arkansas, California, Georgia, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Texas, & Virginia

Clusters 1 through 5 were merged to identify the first consolidated region, Region 1, which includes twelve states: Alabama, Arkansas, California, Georgia, Louisiana, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Texas, and Virginia (*Figure* 22 & 23). Analysis of individual crops/stocks survey frequency across clusters 1 through 5 indicates that Region 1 would survey oats, sorghum, potatoes, sweet potatoes, and watermelons annually; and alfalfa, corn, cotton, other hay, peanuts, rice, soybeans, and winter wheat seasonally (Table 21).

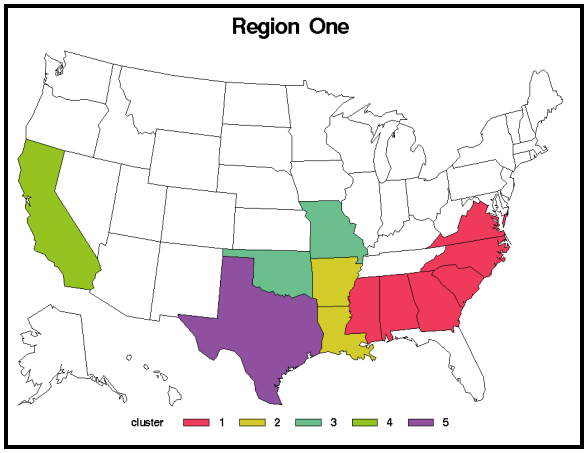

Figure 22. Region 1 States

Table 21: Region 1 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Oats Sorghum Potatoes Sweet Potatoes Watermelons
Seasonal	Alfalfa Corn Cotton Other Hay Peanuts Rice Soybeans Winter Wheat

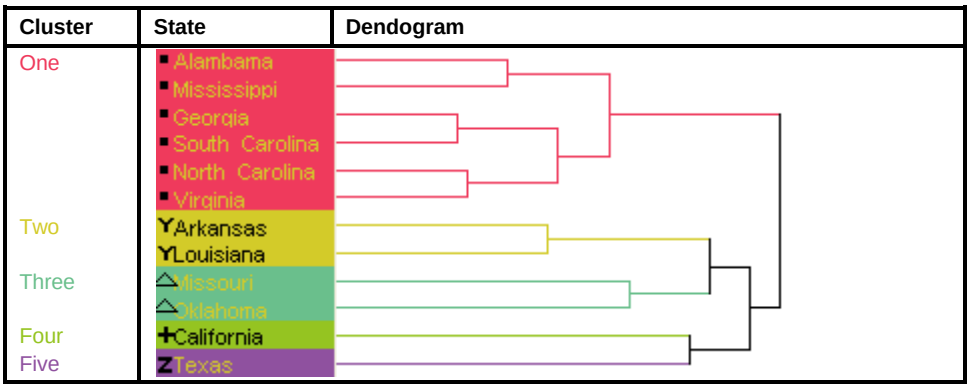

Figure 23. Five Region Dendogram: Region 1 States

4.2.2 Region Two: Alaska, Connecticut, Hawaii, Maine, Massachusetts, Nevada, New Hampshire, Rhode Island, & Vermont

Clusters 6 and 7 were merged to identify the second consolidated region, Region 2, which includes nine states: Alaska, Connecticut, Hawaii, Maine, Massachusetts, Nevada, New Hampshire, Rhode Island, and Vermont (*Figure* 24 & 25). Analysis of individual crops/stocks survey frequency across clusters 1 through 5 indicates that Region 2 would survey alfalfa, corn (silage), and other hay annually (Table 23).

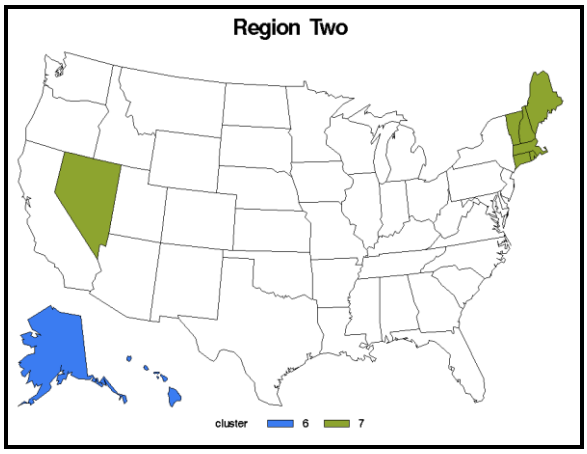

Figure 24. Region 2 States

Table 22: Region 2 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Alfalfa Other Hay Corn (Silage)

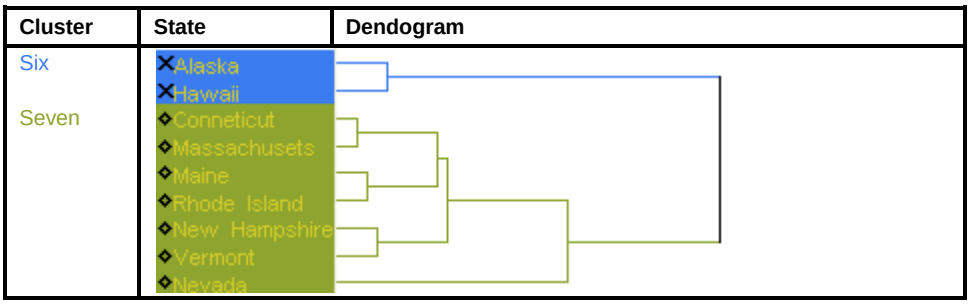

Figure 25. Five Region Dendogram: Region 2 States

4.2.3 Region Three: Arizona, Florida, New Mexico, Delaware, Maryland, New Jersey, Indiana, Iowa, Kentucky, Tennessee, West Virginia, Colorado, Utah, & Wyoming

Clusters 8 through 14 were merged to identify the third consolidated region, Region 3, which includes fourteen states: Arizona, Florida, New Mexico, Delaware, Maryland, New Jersey, Indiana, Iowa, Kentucky, Tennessee, West Virginia, Colorado, Utah, and Wyoming (*Figure* 26 & 27). Analysis of individual crops/stocks survey frequency across Clusters 8 through 14 indicates that Region 3 would survey potatoes and winter wheat annually; and alfalfa, corn, other hay, and soybeans seasonally (Table 23).

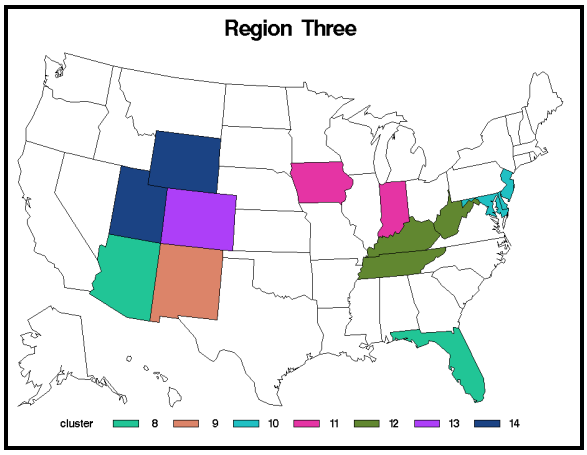

Figure 26. Region 3 States

Table 23: Region 3 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Potatoes Winter Wheat
Seasonal	Alfalfa Corn Other Hay Soybeans

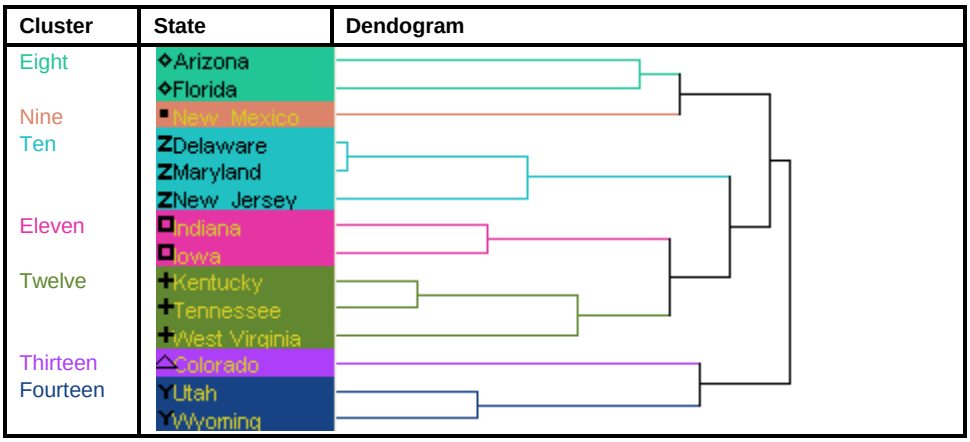

Figure 27. Five Region Dendogram: Region 3 States

4.2.4 Region Four: Idaho, Oregon, Montana, Washington, Minnesota, & North Dakota

Clusters 15 through 17 were merged to identify the fourth consolidated region, Region 4, which includes six states: Idaho, Oregon, Montana, Washington, Minnesota, and North Dakota (*Figure* 28 & 29). Analysis of individual crops/stocks survey frequency across Clusters 15 through 17 indicates that Region 4 would survey Australian winter peas, dry edible beans, dry edible peas, flaxseed, forage, garbanzo beans, lentils, and potatoes annually; alfalfa, canola, corn, oats, other hay, spring wheat, and winter wheat seasonally; and canola, rapeseed, and mustard seed in unison with other crops/stocks as the region sees fit (Table 24).

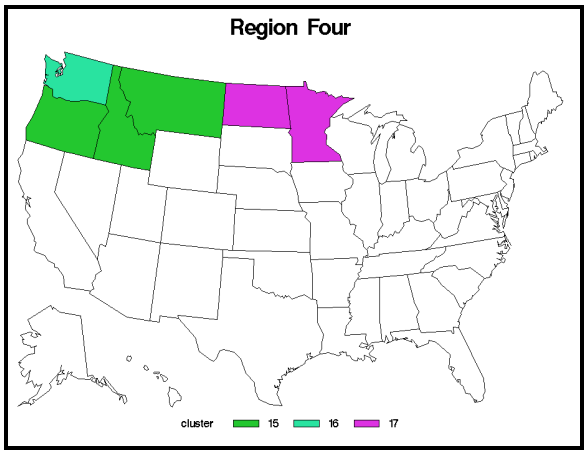

Figure 28. Region 4 States

Table 24: Region 4 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Australian Winter Peas Dry Edible Beans Dry Edible Peas Flaxseed Forage Garbanzo Beans Lentils Potatoes
Seasonal	Alfalfa Canola Corn Oats Other Hay Spring Wheat Winter Wheat
All Other Surveys	Canola Rapeseed Mustard Seed

Cluster	State	Dendogram
Fifteen	Idaho Oregon Montana	
Sixteen	Washington	
Seventeen	Minnesota North Dakota	

Figure 29. Five Region Dendogram: Region 4 States

4.2.5 Region Five: Illinois, Wisconsin, Michigan, New York, Ohio, Pennsylvania, Kansas, Nebraska, & South Dakota

Clusters 18 through 20 were merged to identify the fifth consolidated region, Region 5, which includes nine states: Illinois, Wisconsin, Michigan, New York, Ohio, Pennsylvania, Kansas, Nebraska, and South Dakota (*Figure* 30 & 31). Analysis of individual crops/stocks survey frequency across Clusters 18 through 20 indicates that Region 5 would survey dry edible beans, forage, and potatoes annually; alfalfa, corn, oats, other hay, soybeans, and winter wheat seasonally; and rye in unison with other crops/stocks as the region sees fit (Table 24).

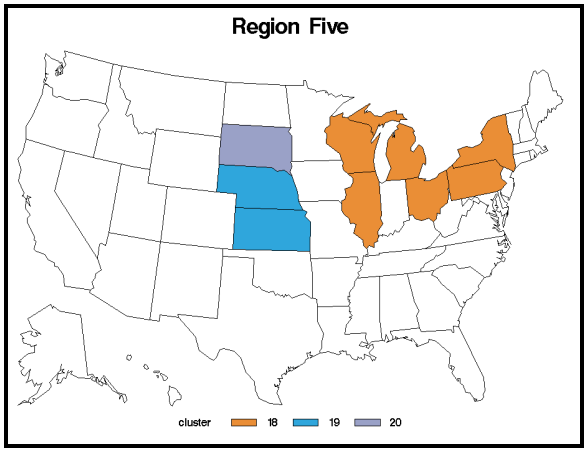

Figure 30. Region 5 States

Table 25: Region 5 Crops/Stocks Survey Frequency

Survey Frequency	Crops/Stocks
Annual	Dry Edible Beans Forage Potatoes
Seasonal	Alfalfa Corn Oats Other Hay Soybeans Winter Wheat
All Other Surveys	Rye

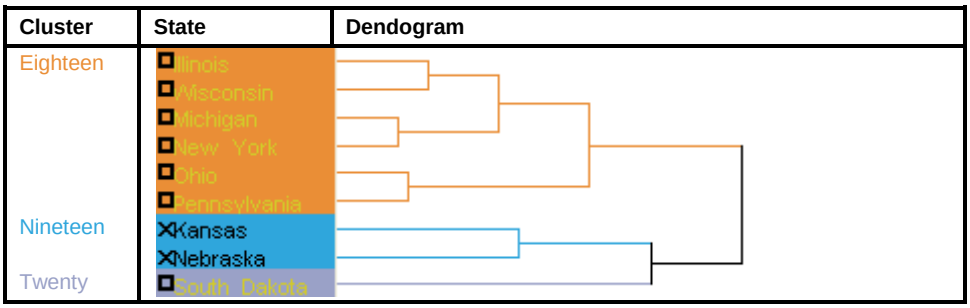

Figure 31. Five Region Dendogram: Region 5 States

5. DISCUSSION

The QAS is used to collect data on up to 31 crops and stocks anywhere from one to four times a year, depending on the state. Since no two states are identical in their questionnaire content, national data collection and summary is highly complex. It appears that the survey administration process could be greatly simplified by regionalizing the QAS. Creating 20 QAS regions reduces the amount of questionnaire versions by 60 percent, helping standardize questionnaire administration and summaries, and ultimately allowing states to share in printing costs and data editing tools. Creating five QAS regions further reduces the number of questionnaire versions by 90 percent, further standardizing questionnaire administration and summary code, and allowing numerous states to share in printing costs and data editing tools. Regionalizing the QAS also reduces survey administration burden and helps simplify the process for setting national estimates.

6. LIMITATIONS

Obviously, by reducing the number of QAS versions, states lose some autonomy and respondent burden may be slightly increased. It is expected that the respondent burden will be minimal using the 20-region design and only slightly increased by using the 5-region design. However, respondent burden should be assessed by each state individually. States need to compare the number of items as well as the frequency at which they are asked before and after regionalization.

7. RECOMMENDATIONS

There are no current plans to pursue regionalizing the QAS. However, should regionalization be pursued in the future, this report demonstrates a useful methodology for doing so. This approach should also be explored when proposing regionalization of questionnaires for other surveys.

8. REFRENCES

JMP. (2007). Clustering. *Statistics and Graphics Guide* . SAS Institute Inc.

National Agricultural Statistics Service. (2008, January 15). *Charter for the Quarterly Agricultural Survey Questionnaire Reduction and Review Team.* Retrieved from nassnet: http://nassnet/library/info/teams/qas/index_qas_response.html

7. APPENDIX A

Table A-1: Crops/Stocks Questionnaire Reduction Team Data

State	Corn	Cotton	Flaxseed	Alfalfa	Other Hay	Forage	Oats	Peanuts	Rice	Rye	Sorghum	Soybeans	Scane	Winter Wheat	Durum Wheat	Spring Wheat
Alabama	F	F	NS	NS	F	NS	A	F	NS	NS	A	F	NS	A	NS	NS
Alaska	NS	NS	NS	NS	NS	NS	A	NS	NS	NS	NS	NS	NS	NS	NS	NS
Arizona	A	F	NS	F	A	NS	NS	NS	NS	NS	A	NS	NS	A	F	NS
Arkansas	F	F	NS	A	F	NS	NS	NS	F	NS	F	F	NS	F	NS	NS
California	F	F	NS	F	F	A	F	NS	F	NS	A	NS	NS	F	F	NS
Colorado	F	NS	NS	F	F	NS	A	NS	NS	NS	F	NS	NS	F	NS	A
Connecticut	S	NS	NS	A	A	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Delaware	F	NS	NS	A	A	NS	NS	NS	NS	NS	NS	F	NS	F	NS	NS
Florida	A	F	NS	NS	A	NS	NS	F	NS	NS	NS	A	F	A	NS	NS
Georgia	F	F	NS	NS	F	NS	A	F	NS	A	A	F	NS	F	NS	NS
Hawaii	NS	NS	NS	NS	NS	NS	NS	NS	NS	A	NS	NS	F	NS	NS	NS
Idaho	A	NS	NS	F	F	A	F	NS	NS	NS	NS	NS	NS	F	A	F
Illinois	F	NS	NS	F	F	A	F	NS	NS	AOS	F	F	NS	F	NS	NS
Indiana	F	NS	NS	F	F	NS	A	NS	NS	NS	NS	F	NS	F	NS	NS
Iowa	F	NS	NS	F	F	A	F	NS	NS	NS	NS	F	NS	A	NS	NS
Kansas	F	F	NS	F	F	A	F	NS	NS	AOS	F	F	NS	F	NS	NS
Kentucky	F	NS	NS	F	F	NS	NS	NS	NS	NS	A	F	NS	F	NS	NS
Louisiana	F	F	NS	NS	F	NS	NS	NS	F	NS	F	F	F	A	NS	NS
Maine	S	NS	NS	A	A	NS	A	NS	NS	NS	NS	NS	NS	NS	NS	NS
Maryland	F	NS	NS	A	A	NS	NS	NS	NS	NS	NS	F	NS	F	NS	NS
Massachusetts	S	NS	NS	A	A	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Michigan	F	NS	NS	F	F	A	F	NS	NS	AOS	NS	F	NS	F	NS	NS
Minnesota	F	NS	A	F	F	A	F	NS	NS	AOS	NS	F	NS	A	NS	F
Mississippi	F	F	NS	NS	F	NS	NS	F	F	NS	A	F	NS	A	NS	NS
Missouri	F	F	NS	F	F	A	A	NS	NS	NS	F	F	NS	F	NS	NS
Montana	A	NS	A	F	F	NS	F	NS	NS	NS	NS	NS	NS	F	F	F
Nebraska	F	NS	NS	F	F	A	F	NS	NS	AOS	F	F	NS	F	NS	NS
Nevada	S	NS	NS	F	A	NS	NS	NS	NS	NS	NS	NS	NS	A	NS	A
New Hampshire	S	NS	NS	A	A	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
New Jersey	F	NS	NS	A	A	NS	NS	NS	NS	NS	NS	F	NS	A	NS	NS
New Mexico	F	F	NS	F	A	A	NS	F	NS	NS	F	NS	NS	A	NS	NS
New York	F	NS	NS	F	F	A	F	NS	NS	AOS	NS	F	NS	F	NS	NS
North Carolina	F	F	NS	A	F	NS	A	F	NS	AOS	A	F	NS	F	NS	NS
North Dakota	F	NS	A	F	F	NS	F	NS	NS	AOS	NS	F	NS	A	F	F
Ohio	F	NS	NS	F	F	A	F	NS	NS	NS	NS	F	NS	F	NS	NS
Oklahoma	F	F	NS	F	F	NS	A	F	NS	A	F	F	NS	F	NS	NS
Oregon	A	NS	NS	F	F	A	F	NS	NS	NS	NS	NS	NS	F	NS	F
Pennsylvania	F	NS	NS	F	F	A	F	NS	NS	AOS	NS	F	NS	F	NS	NS
Rhode Island	S	NS	NS	A	A	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
South Carolina	F	F	NS	NS	A	NS	A	F	NS	AOS	A	F	NS	F	NS	NS
South Dakota	F	A	F	A	F	A	F	NS	NS	AOS	F	F	NS	F	A	F
Tennessee	F	F	NS	A	F	F	NS	NS	NS	NS	A	F	NS	F	NS	NS
Texas	F	F	NS	F	F	A	F	F	F	AOS	F	F	F	F	NS	NS
Utah	A	NS	NS	F	A	A	A	NS	NS	NS	NS	NS	NS	A	NS	A
Vermont	S	NS	NS	A	A	A	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Virginia	F	F	NS	F	F	NS	A	F	NS	NS	NS	F	NS	F	NS	F
Washington	F	NS	NS	F	F	A	A	NS	NS	NS	NS	NS	NS	F	NS	NS
West Virginia	A	NS	NS	A	F	A	NS	NS	NS	NS	NS	A	NS	A	NS	NS
Wisconsin	F	NS	NS	F	F	NS	F	NS	NS	AOS	NS	F	NS	F	NS	A
Wyoming	A	NS	NS	F	F	NS	A	NS	NS	NS	NS	NS	NS	A	NS	A

[3] Note: A = Annual, F = Full Season, I = "Included", AOS = All Other States, S = Silage, and NS = Not Surveyed (classifications are based on sampling frequency, not on publication frequency).

Table A-1: Crops/Stocks Questionnaire Reduction Team Data (Continued)

States	Sunflower	Canola	Mustard Seed	Rapeseed	Safflower	Proso Millet	Potatoes	Sweet Potatoes	Watermelons	Tabocco	Dry Edible Beans	Garbanzo Beans	Lentils	Dry Edible Peas	Australian Winter Peas
Alambama	NS	NS	NS	NS	NS	NS	I	I	I	NS	NS	NS	NS	NS	NS
Alaska	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Arizona	NS	NS	NS	NS	AOS	NS	I	NS	I	NS	NS	NS	NS	NS	NS
Arkansas	NS	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS
California	AOS	NS	NS	NS	A	NS	I	I	I	NS	I	I	NS	NS	NS
Colorado	F	AOS	NS	NS	AOS	A	I	NS	NS	NS	I	NS	NS	NS	NS
Conneticut	NS	NS	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS
Delaware	NS	NS	NS	NS	NS	NS	I	NS	I	NS	NS	NS	NS	NS	NS
Florida	NS	NS	NS	NS	NS	NS	I	NS	I	I	NS	NS	NS	NS	NS
Georgia	NS	NS	NS	NS	NS	NS	NS	NS	I	I	NS	NS	NS	NS	NS
Hawaii	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Idaho	NS	AOS	AOS	AOS	AOS	NS	I	NS	NS	NS	I	I	I	I	I
Illinois	AOS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS	NS	NS
Indiana	NS	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS
Iowa	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Kansas	F	AOS	NS	NS	NS	NS	I	NS	NS	NS	I	NS	NS	NS	NS
Kentucky	NS	NS	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS
Louisiana	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS	NS
Maine	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS	NS	NS
Maryland	NS	NS	NS	NS	NS	NS	I	NS	I	NS	NS	NS	NS	NS	NS
Massachusets	NS	NS	NS	NS	NS	NS	I	NS	NS	I	NS	NS	NS	NS	NS
Michigan	AOS	AOS	NS	NS	NS	NS	I	NS	NS	NS	I	NS	NS	NS	NS
Minnesota	F	F	NS	AOS	NS	NS	I	NS	NS	NS	I	NS	NS	NS	NS
Mississippi	NS	NS	NS	NS	NS	NS	NS	I	I	NS	NS	NS	NS	NS	NS
Missouri	AOS	NS	NS	NS	NS	NS	I	NS	I	I	NS	NS	NS	NS	NS
Montana	AOS	F	AOS	AOS	A	NS	I	NS	NS	NS	I	I	I	I	I
Nebraska	F	NS	NS	NS	NS	A	I	NS	NS	NS	I	I	NS	NS	NS
Nevada	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS	NS	NS
New_Hampshi	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
New_Jersey	NS	NS	NS	NS	NS	NS	I	I	NS	NS	NS	NS	NS	NS	NS
New_Mexico	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	I	NS	NS	NS	NS
New_York	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	I	NS	NS	NS	NS
North_Carolin	NS	NS	NS	NS	NS	NS	I	I	I	I	NS	NS	NS	NS	NS
North_Dakota	F	F	AOS	AOS	AOS	NS	I	NS	NS	NS	I	I	I	I	NS
Ohio	NS	NS	NS	NS	NS	NS	I	NS	NS	I	NS	NS	NS	NS	NS
Oklahoma	AOS	AOS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS
Oregon	NS	AOS	AOS	AOS	NS	NS	I	NS	NS	NS	I	I	NS	I	I
Pennsylvania	NS	NS	NS	NS	NS	NS	I	NS	NS	I	NS	NS	NS	NS	NS
Rhode_Island	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS	NS	NS
South_Carolin	NS	NS	NS	NS	NS	NS	NS	I	I	I	NS	NS	NS	NS	NS
South_Dakota	F	NS	NS	NS	AOS	A	NS	NS	NS	NS	I	I	NS	NS	NS
Tennessee	NS	NS	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS
Texas	F	NS	NS	NS	NS	NS	I	I	I	NS	I	NS	NS	NS	NS
Utah	NS	NS	NS	NS	AOS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS
Vermont	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Virginia	NS	NS	NS	NS	NS	NS	I	I	I	I	NS	NS	NS	NS	NS
Washington	NS	AOS	AOS	NS	NS	NS	I	NS	NS	NS	I	I	I	I	NS
West Virginia	NS	NS	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS
Wisconsin	AOS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS	NS	NS	NS	NS
Wyoming	AOS	NS	NS	NS	NS	NS	NS	NS	NS	NS	I	NS	NS	NS	NS