E82-10118

AgRISTARS

FC-L1-04120
JSC-17401

NASA-CR-167439

A Joint Program for Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing

August 1981

N82-21655

Unclas
00118

G3/43

Foreign Commodity Production Forecasting

SAMPLE SELECTION IN FOREIGN SIMILARITY REGIONS FOR MULTICROP EXPERIMENTS

J. T. Malin

(E82-10118) SAMPLE SELECTION IN FOREIGN SIMILARITY REGIONS FOR MULTICROP EXPERIMENTS (Lockheed Engineering and Management) 44 p
HC A03/MF A01

CSCL 02C

This draft document consists of technical working material that has not been formally reviewed. It has been prepared in this manner in order to provide timely documentation to personnel supporting the Foreign Commodity Production Forecasting project of the Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing program and to provide others in the technical community with a means of staying informed of project tasks.

Lockheed Engineering and Management Services Company, Inc.
1830 NASA Road 1, Houston, Texas 77058

Lyndon B. Johnson Space Center
Houston, Texas 77058

00118
NASA CR-167439
1N12

N82-21655

26 October 1981

TO: DISTRIBUTION LIST ATTACHED

FROM: SH3/Documentation Control

REF: AgRISTARS Document FC-L1-04120/JSC-17401, "Sample Selection in Foreign Similarity Regions for Multicrop Experiments"

Please insert the attached page, 5-10/5-11, in your copy of the referenced document.

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
JSC-17401; FC-L1-04120		

4. Title and Subtitle	5. Report Date
Sample Selection in Foreign Similarity Regions for Multicrop Experiments	August 1981
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
J. T. Malin	LEMSCO-16663
	10. Work Unit No.
9. Performing Organization Name and Address	11. Contract or Grant No.
Lockheed Engineering and Management Services Company, Inc. 1830 NASA Road 1 Houston, Texas 77058	NAS 9-15800
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	Technical Report
National Aeronautics and Space Administration Lyndon B. Johnson Space Center Houston, Texas 77058 Technical Monitor: J.L. Dragg	14. Sponsoring Agency Code

15. Supplementary Notes
The Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing is a joint program of the U.S. Department of Agriculture, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration (U.S. Department of Commerce), the Agency for International Development (U.S. Department of State), and the U.S. Department of the Interior.

16. Abstract

This report describes the selection of sample segments in the U.S. foreign similarity regions for development of proportion estimation procedures and error modeling for Argentina, Australia, Brazil, and USSR in AgRISTARS. Each sample was selected to be similar in crop mix to the corresponding indicator region sample. Data sets, methods of selection, and resulting samples are discussed.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Sampling Landsat Crop distribution Foreign similarity region Indicator region	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	46	

*For sale by the National Technical Information Service, Springfield, Virginia 22161

FC-L1-04120
JSC-17401

SAMPLE SELECTION IN FOREIGN SIMILARITY REGIONS FOR MULTICROP EXPERIMENTS

Job Order 72-434

This report describes Sampling activities of the Foreign Commodity Production Forecasting project of the AgRISTARS program.

PREPARED BY

J. T. Malin

APPROVED BY

M. D. Pore, Supervisor
Statistical Analysis Section

B. L. Carroll, Manager
Crop Applications Department

LOCKHEED ENGINEERING AND MANAGEMENT SERVICES COMPANY, INC.

Under Contract NAS 9-15800

For

Earth Resources Applications Division

Space and Life Sciences Directorate

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TEXAS

August 1981

LEMSCO-16663

PREFACE

The Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing is a multiyear program of research, development, evaluation, and application of aerospace remote sensing for agricultural resources, which began in fiscal year 1980. This program is a cooperative effort of the U.S. Department of Agriculture, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration (U.S. Department of Commerce), the Agency for International Development (U.S. Department of State), and the U.S. Department of the Interior.

The work which is the subject of this document was performed within the Earth Resources Applications Division, Space and Life Sciences Directorate, at the Lyndon B. Johnson Space Center, National Aeronautics and Space Administration. Under Contract NAS 9-15800, personnel of Lockheed Engineering and Management Services Company, Inc., performed the tasks which contributed to the completion of this project.

The following personnel contributed to this work:

B. S. Nowakowski, G. E. Miller, T. K. McLean, and C. R. Reed of Lockheed Engineering and Management Services Company, Inc., and R. L. Patterson, C. R. Hallum, F. J. Herbert, D. L. Henninger, and R. McKinney of the National Aeronautics and Space Administration.

CONTENTS

Section		Page
1.	INTRODUCTION	1-1
2.	SUMMARY OF THE PROCEDURE	2-1
3.	SORTING PROCEDURE	3-1
	3.1 DATA SET AND VARIABLES USED	3-1
	3.2 METHODS OF RANKING AND SORTING	3-3
4.	SEGMENT SELECTION	4-1
5.	RESULTS OF SORTING AND SEGMENT SELECTION	5-1
6.	CONCLUSION AND RECOMMENDATIONS	6-1

TABLES

Table		Page
3-1	CROPS AND CROP GROUPS IN FSR AND IR COMPARISONS.....	3-2
5-1	ARGENTINA CROP DENSITIES FOR FSR AND IR COUNTIES.....	5-8
5-2	AUSTRALIA CROP DENSITIES FOR FSR AND IR COUNTIES.....	5-12
5-3	BRAZIL CROP DENSITIES FOR FSR AND IR COUNTIES.....	5-15
5-4	USSR BELORUSSIA/CENTRAL HIGH BARLEY AREA CROP DENSITIES FOR FSR AND IR COUNTIES.....	5-17
5-5	USSR ROSTOV WINTER SMALL GRAINS AREA CROP DENSITIES FOR FSR AND IR COUNTIES.....	5-18
5-6	USSR ORENBURG SPRING SMALL GRAINS AREA CROP DENSITIES FOR FSR AND IR COUNTIES.....	5-19
5-7	FSR SEGMENT LOCATIONS.....	5-20

FIGURES

Figure		Page
5-1	Summary of Argentina joint ranking and sorting results.....	5-2
5-2	Summary of Australia joint ranking and sorting results.....	5-3
5-3	Summary of Brazil joint ranking and sorting results.....	5-4
5-4	Summary of USSR Belorussia/central high barley area joint ranking and sorting results.....	5-5
5-5	Summary of USSR Rostov winter small grains area joint ranking and sorting results.....	5-6
5-6	Summary of USSR Orenburg spring small grains area joint ranking and sorting results.....	5-7
5-7	Argentina FSR county locations.....	5-27
5-8	Australia FSR county segment locations.....	5-28
5-9	Brazil FSR county segment locations.....	5-29
5-10	USSR FSR county segment locations.....	5-30

ACRONYMS AND ABBREVIATIONS

AgRISTARS	Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing
FSR	Foreign similarity region
IR	Indicator region
nmi	Nautical mile
PC	Pseudocounty count
SRS	Statistical Reporting Service of the USDA
USDA	U.S. Department of Agriculture
USSR	Union of Soviet Socialist Republics

1. INTRODUCTION

In the Agriculture and Resources Inventory Surveys Through Aerospace Remote Sensing (AgRISTARS), a major objective is to develop, test, and evaluate satellite-based crop production forecasting procedures for a range of countries and crops. To support development for foreign areas, target areas in Argentina, Australia, Brazil, and the Union of Soviet Socialist Republics (USSR) have been identified. The target areas within these countries are indicator regions (IR's) that are representative of important production areas. After IR's were identified in these four countries, a corresponding foreign similarity region (FSR) was identified in the United States for each IR, based on similarity of crops, cropping practices, and agronomic conditions. These FSR's make it possible to use, for development and testing, ground observations and other data resources not available in the IR's.

For each IR, a sample allocation was made to support area estimation procedures development. Thus, each sample was selected to represent the variety of distributions of crops of interest in the IR. This type of sample was not designed to support aggregated estimates.

In each FSR, sampling was required to support error model development and area estimation procedures development. Techniques developed through error modeling will permit the estimation of errors in proportion estimation and will support accuracy assessment in the IR's. FSR's may be used also to support sensitivity studies of area estimation performance and simulation modeling of crop inventory systems.

This report describes the details of the sample selection made in the U.S. FSR's for location of 1981 sample segments. The sample segments are 3.5- by 6-nmi sites for which Landsat data, aerial photography, and ground data are to be collected. Each FSR sample was selected to be similar in crop mix to the corresponding IR sample. This type of sample was not designed to support aggregated estimates.

2. SUMMARY OF THE PROCEDURE

Sample allocation and segment selection were a multiphased procedure. First, crop statistics were gathered at the county (or county-counterpart) level in each FSR and its corresponding IR. Similar crops and crop groups were identified, and data bases of crop densities were created. These data bases were sorted in order to identify the FSR counties with mixes of the crops of interest that were most similar to the IR county-counterparts where segments had been previously located. Finally, segments were located within counties to maximize use of appropriate previous segment locations and to assure at least 20 percent agricultural lands. The selection was random when possible [when the subpopulation under consideration (counties or segments) had more than one eligible element].

TABLE 3-1.- CROPS AND CROP GROUPS IN FSR AND IR COMPARISONS

ARGENTINA
1. Winter Wheat
2. Corn (corn for grain and corn for silage)
3. Soybeans
4. Crop group: sorghum, sunflowers, peanuts, flax (IR only); rice (FSR only); sugarbeets (FSR only)
AUSTRALIA
1. Wheat (winter wheat in FSR)
2. Barley
3. Oats
NOTE: In the FSR, no oats are reported in Oklahoma; oats are reported in Texas only in 1979. When a crop was not reported, it was assumed to be 1 percent in these counties, the average of the FSR counties.
BRAZIL
1. Corn (corn for grain; corn for silage)
2. Soybeans
3. Crop group: cotton, peanuts; potatoes, rice, beans, manioc, and sugarcane (IR only); tobacco and sorghum (FSR only)
NOTE: None of crop group 3 was reported in several municipios in São Paulo. Density of these crops was assumed to be zero in these municipios.
USSR
1. Barley
2. Winter wheat and rye (winter small grains)
3. Spring wheat, durum, oats (spring small grains)
4. Crop group (summer crops): corn, sugarbeets, sunflower, flax; buckwheat, millet, rice, potatoes, pulses, and vegetables (IR only); soybeans (FSR only)

The FSR data used in the sorting were county estimates for 1977 to 1979, acquired by the Statistical Reporting Service (SRS) of the USDA. The IR data used were county-counterpart data from government records. For Argentina, 1979 crop statistics were used; for Australia, 1975 data in New South Wales and 1976 data in Western Australia; for Brazil, 1977 data; and for the USSR, 1973 to 1978 data. All data were acres harvested, except for Australia where acres planted were the available data.

County locations of randomly selected segments in the FSR's from prior years and segments selected for the 1981 AgRISTARS Supporting Research project in the FSR's were also noted. Where available, information on crop proportions in these segments from ground-truth screening reports was also noted.

3.2 METHODS OF RANKING AND SORTING

The purpose of the ranking and sorting procedures was to identify, for segment location, candidate FSR counties that had mixes of crop densities similar to the crop mixes in the previously selected IR county-counterparts. To achieve this, counties and their crop densities (as previously defined) from each IR and its corresponding FSR were concatenated into one data set. Each data set was put in rank order for each crop or crop group of interest. Each ranked set was divided into quartiles on the basis of the position of the IR county-counterparts in the ranking. On the basis of this multicrop ranking, each FSR was given a multiple-digit code signifying the relative density of each of the crops of interest. For example, "421" for a Brazil FSR county signifies densities corresponding to the highest IR quartile for corn, the second lowest quartile for soybeans, and the lowest quartile for the group of possible confusion crops (see table 3-1).

Additional codes of 0 and 5 were created to signify crop densities outside the range of IR densities. A code of 5 was assigned for crop densities which were >0.10 above that in the densest IR county-counterpart. A code of 0 was assigned for crop acreage <4000 acres. (If the least dense IR county-counterpart had <4000 acres for acreages, 0 was assigned to acreages lower than the least dense IR county-counterpart.)

The USSR rankings varied from this procedure. Because of the small number of oblasts in the Russian IR's, the ranking distribution was divided into three ranges rather than four quartiles.

Once multicrop codes were assigned, FSR and IR counties were sorted into groups with the same multicrop code. FSR counties with identical codes to IR codes were selected first. If there were more FSR counties than IR counties in a group, counties with prior-year segments were selected first and then the remainder of the required number of FSR counties were randomly selected from the group. If there were no FSR counties corresponding to an IR code, a county was randomly selected from the group(s) with the closest codes (with a preference for prior-year segments). When exact matches were rare between FSR and IR counties for a country, exactly matching FSR counties were oversampled. When the group with the closest codes seemed too dissimilar to the IR code, no counties were chosen to correspond to that IR code.

4. SEGMENT SELECTION

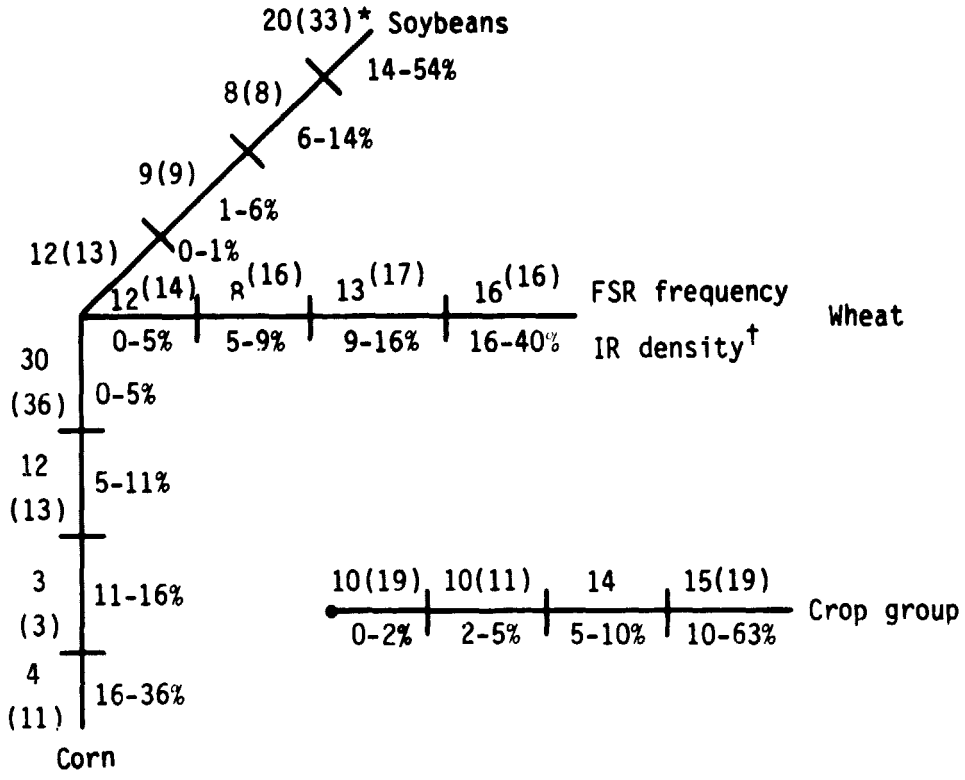
In each identified county, segments previously and randomly selected (prior-year sites) were considered first. Each segment was required to have at least 20 percent agricultural area and a crop mix corresponding roughly to the county or related IR densities. This was determined on the basis of ground-truth screening reports. Where good prior-year sites were not available, segments were located randomly in the counties with the requirement that the segments have at least 20 percent agriculture. If there were no segments with at least 20 percent agriculture in a county, a new county was selected, if possible. In the case of Australia, FSR counties were used. In California, a different strategy was used. Because instances of dry-land wheat are relatively infrequent, county agents in California were contacted to help locate segments in dry-land wheat areas.

5. RESULTS OF SORTING AND SEGMENT SELECTION

Schematic diagrams summarizing the county-level results of the ranking and sorting procedures are shown in figures 5-1 through 5-6. Because of the low representation of corn in the Argentina FSR counties and less than the desirable amount of overlap with prior-year acquisitions, a supplemental set of 14 counties was identified to meet these goals. The set of counties with these supplemental counties added are characterized by even higher soybean densities than the original set. The characteristics of this supplemented set are shown in figure 5-1 (in parentheses).

Additional segments which were ordered in North Dakota and South Dakota by Supporting Research are included as supplemental for the USSR FSR's. Segments in Saskatchewan, Canada, are being considered for USSR FSR segments but were not included in the U.S. sorting. A segment in Alaska located in an experimental barley farming area is also included, although it was not in the county-level sorting.

The locations of the counties are shown in figures 5-7 through 5-10. Detailed crop densities in the FSR's and IR's are presented in tables 5-1 through 5-6. Segment numbers and locations are presented in table 5-7.



(a) FSR frequencies and IR densities in quartiles

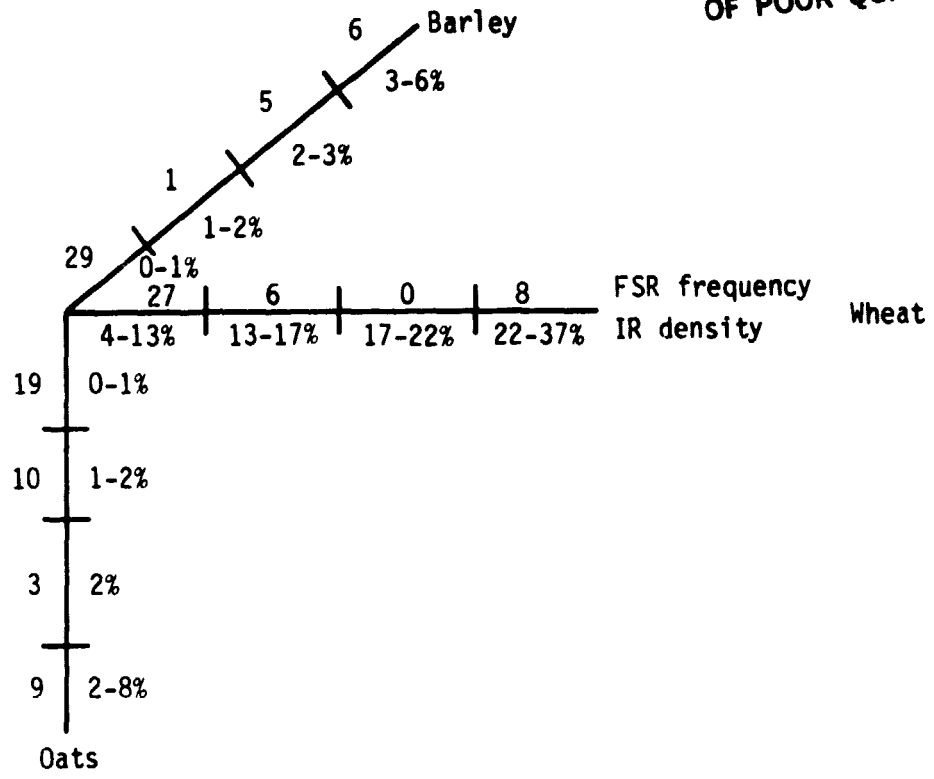
Crop	FSR		IR
	$\bar{X}$ All counties	$\bar{X}$-Selected counties	$\bar{X}$ County-counterparts
Wheat	0.12	0.14 (.12)*	0.13
Corn	.07	.07 (.08)	.11
Soybeans	.16	.17 (.20)	.12
Crop group	.04	.07 (.08)	.07

(b) Densities of IR and FSR counties

*Numbers in parentheses characterize the supplemented set that includes 14 additional segments.

†Density is approximate and is usually an underestimate.

Figure 5-1.- Summary of Argentina joint ranking and sorting results.



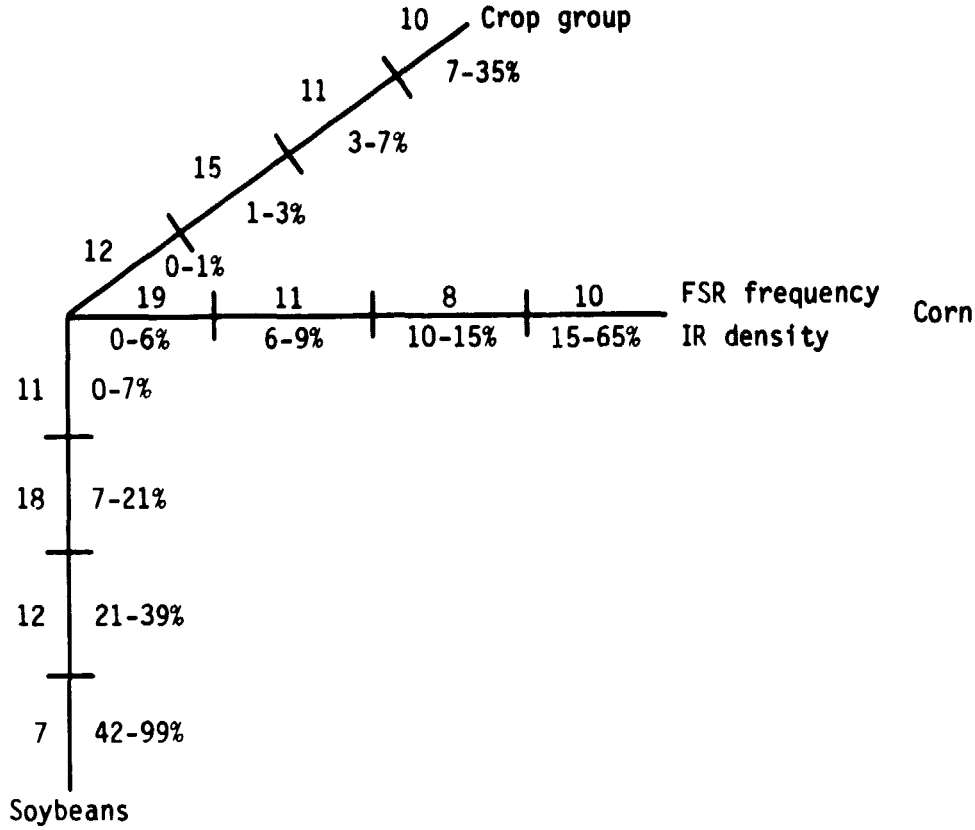
(a) FSR frequencies and IR densities in quartiles

Crop	FSR		IR
	$\bar{X}$ All counties	$\bar{X}$-Selected counties	$\bar{X}$ County-counterparts
Wheat	0.13	0.13	0.18
Barley	.01	.02	.02
Oats	.01	.02	.02

(b) Densities of IR and FSR counties

NOTE: "Density" is approximate and is usually an underestimate.

Figure 5-2.- Summary of Australia joint ranking and sorting results.



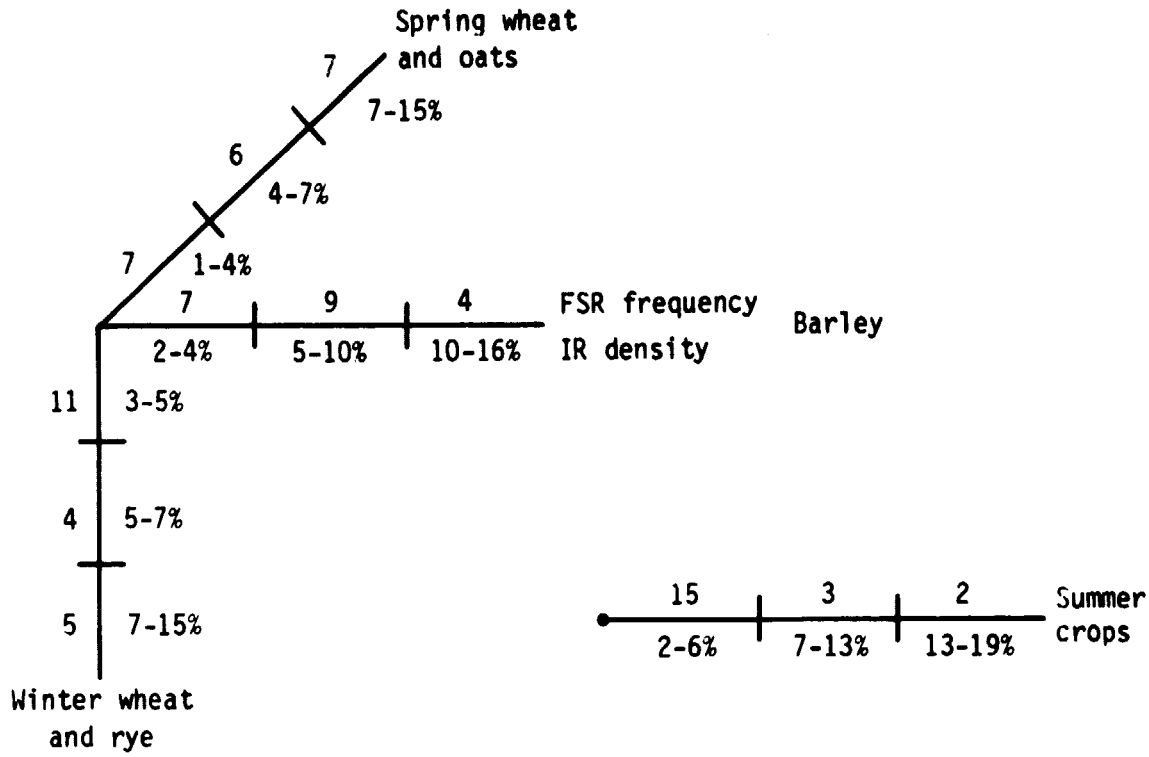
(a) FSR frequencies and IR densities

Crop	FSR		IR
	$\bar{X}$ All counties	$\bar{X}$-Selected counties	$\bar{X}$ County-counterparts
Corn	0.04	0.09	0.13
Soybeans	.07	.20	.26
Crop group	.02	.05	.06

(b) Densities of IR and FSR counties

NOTE: "Density" is approximate and is usually an underestimate.

Figure 5-3.- Summary of Brazil joint ranking and sorting results.



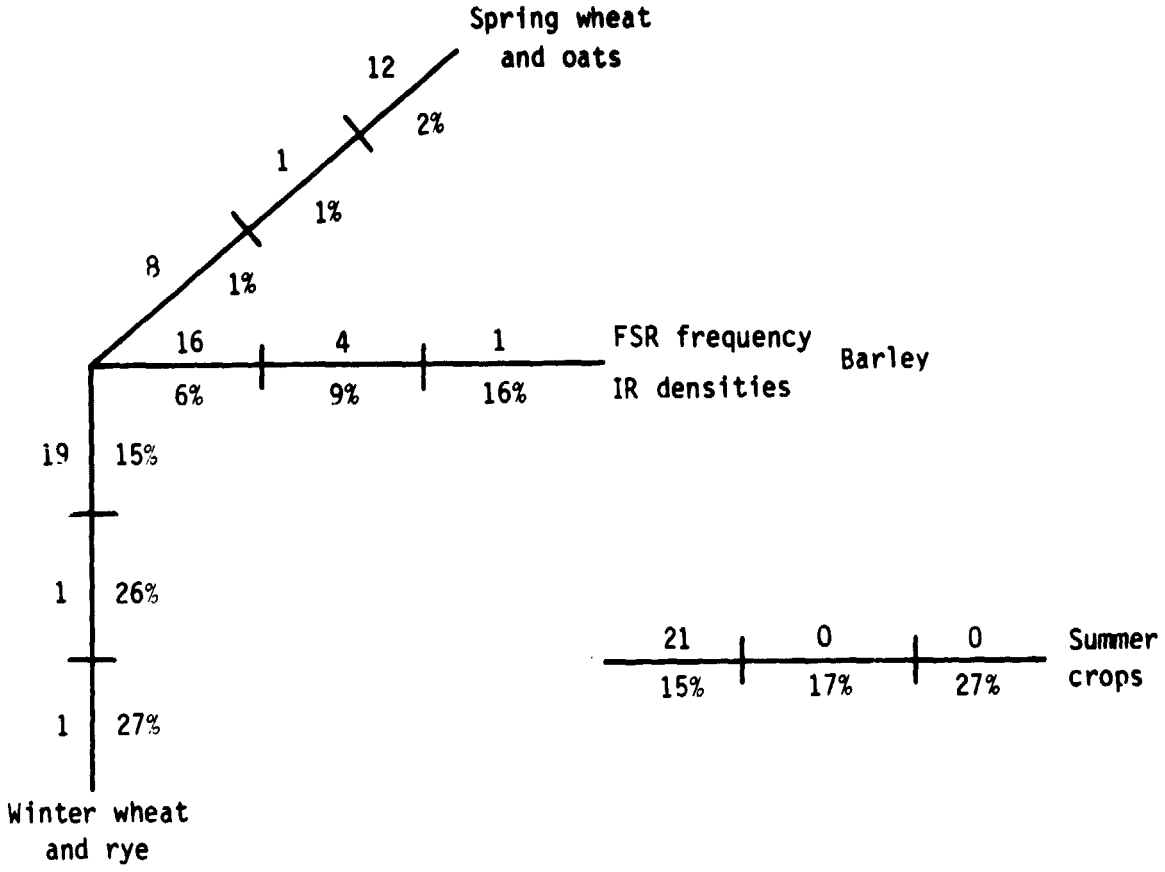
(a) FSR frequencies and IR densities

Crop	FSR		IR
	$\bar{X}$ All counties	$\bar{X}$-Selected counties	$\bar{X}$ County-counterparts
Barley	0.06	0.07	0.08
Winter small grains	.04	.05	.06
Spring small grains	.13	.11	.06
Summer crops	.06	.03	.10

(b) Densities of IR and FSR counties

NOTE: "Density" is approximate and is usually an underestimate.

Figure 5-4.- Summary of USSR Belorussia/central high barley area joint ranking and sorting results.



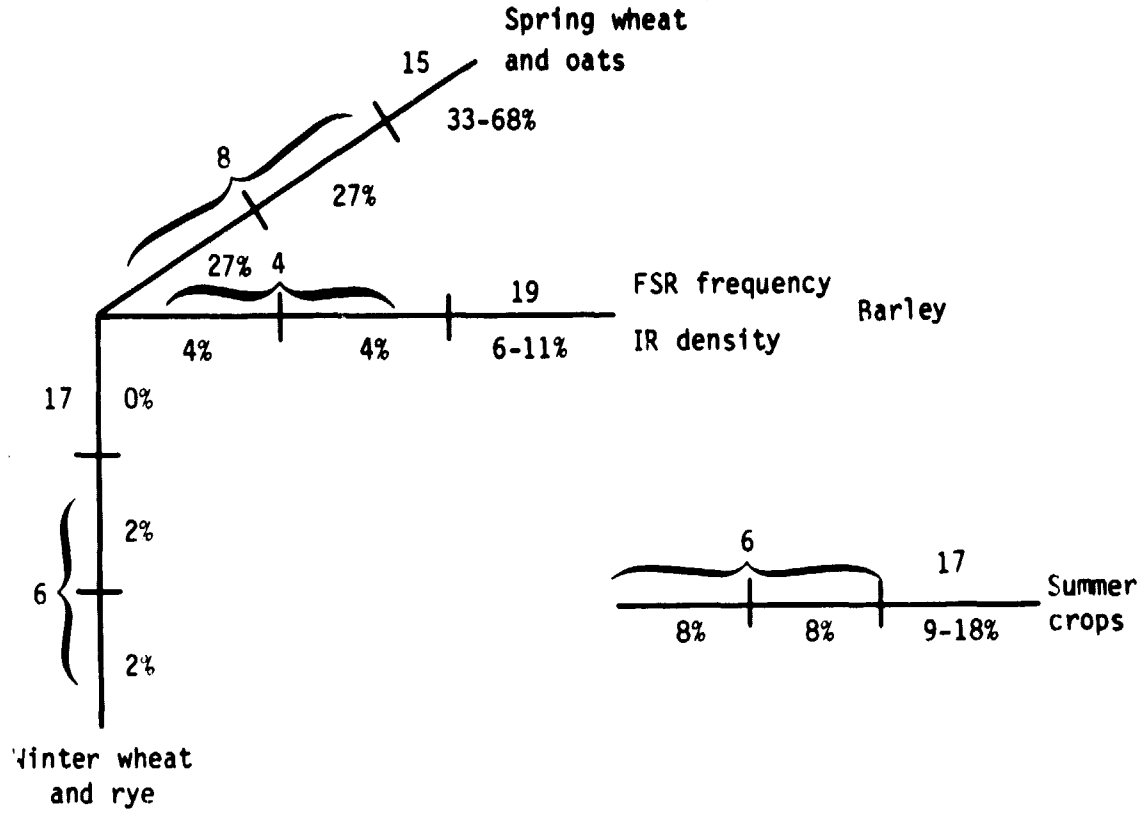
(a) FSR frequencies and IR densities

Crop	FSR		IR
	$\bar{X}$ All counties	$\bar{X}$-Selected counties	$\bar{X}$ County-counterparts
Barley	0.06	0.04	0.11
Winter small grains	.04	.11	.21
Spring small grains	.13	.03	.01
Summer crops	.06	.00	.19

(b) Densities of IR and FSR counties

NOTE: "Density is approximate and is usually an underestimate.

Figure 5-5.- Summary of USSR Rostov winter small grains area joint ranking and sorting results.



(a) FSR frequencies and IR densities

Crop	FSR		IR
	$\bar{X}$ All counties	$\bar{X}$-Selected counties	$\bar{X}$ County-counterparts
Barley	0.06	0.10	0.05
Winter small grains	.04	.01	.02
Spring small grains	.13	.30	.32
Summer crops	.06	.18	.09

(b) Densities of IR and FSR counties

NOTE: "Density" is approximate and is usually an underestimate.

Figure 5-6.- Summary of USSR Orenburg spring small grains area joint ranking and sorting results.

TABLE 5-1.- ARGENTINA CROP DENSITIES FOR FSR AND IR COUNTIES

[Density is approximate and is usually an underestimate.]

State	County or county-counterpart	Region	Number of segments	Wheat	Corn	Soybeans	Crop group
Arkansas	Arkansas*	FSR	1	0.00	0.00	0.32	0.15
Arkansas	Clay	FSR	1	.08	.01	.47	.20
Arkansas	Craighead	FSR	1	.05	.00	.35	.15
Arkansas	Greene*	FSR	1	.07	.00	.37	.20
Arkansas	Mississippi*	FSR	1	.10	.00	.57	.01
Arkansas	Poinsett*	FSR	1	.05	.00	.47	.21
Arkansas	St. Francis*	FSR	1	.05	.00	.42	.08
Buenos Aires	Adolfo Alsina	IR	1	.15	.02	.00	.05
Buenos Aires	Baradero	IR	1	.04	.15	.05	.17
Buenos Aires	Bartolome Mitre	IR	1	.05	.17	.08	.04
Buenos Aires	Bragado	IR	1	.04	.14	.03	.06
Buenos Aires	Chacabuco	IR	1	.04	.22	.03	.03
Buenos Aires	Chivilcoy	IR	1	.04	.13	.02	.03
Buenos Aires	Colon	IR	1	.04	.15	.06	.01
Buenos Aires	Coronel Suarez	IR	1	.18	.01	.00	.07
Buenos Aires	General Arenales	IR	2	.15	.29	.06	.04
Buenos Aires	General Villegas	IR	1	.05	.01	.01	.13
Buenos Aires	Guamini	IR	1	.08	.03	.00	.05
Buenos Aires	Junin	IR	1	.07	.11	.04	.03
Buenos Aires	Neufve de Julio	IR	1	.04	.07	.00	.06
Buenos Aires	Pehuajo	IR	1	.08	.07	.00	.11
Buenos Aires	Pergamino	IR	1	.07	.23	.11	.04
Buenos Aires	Puan	IR	1	.36	.00	.00	.02
Buenos Aires	Ramallo	IR	1	.04	.06	.10	.02
Buenos Aires	Rojas	IR	1	.08	.22	.07	.03
Buenos Aires	Salto	IR	1	.06	.36	.16	.05
Buenos Aires	San Antonio Areco	IR	1	.06	.16	.09	.11
Buenos Aires	San Pedro	IR	1	.09	.19	.22	.09

*This county is in the supplemental set of 14 FSR counties.

TABLE 5-1.- Continued.

State	County or county-counterpart	Region	Number of segments	Wheat	Corn	Soybeans	Crop group
Buenos Aires	Tornquist	IR	1	0.39	0.00	0.00	0.02
Buenos Aires	Veinticinco de Mayo	IR	1	.02	.06	.00	.04
Buenos Aires	Villarino	IR	1	.38	.00	.00	.00
Cordoba	Juarez Celman	IR	1	.01	.03	.02	.18
Cordoba	Marcos Juarez	IR	2	.20	.13	.05	.06
Cordoba	Rio Cuarto	IR	2	.00	.13	.00	.10
Cordoba	San Justo	IR	1	.04	.00	.00	.14
Cordoba	Tercero Arriba	IR	1	.05	.04	.14	.63
Cordoba	Union	IR	2	.16	.05	.03	.11
Entre Rios	Parana	IR	1	.09	.07	.01	.13
Santa Fe	Belgrano	IR	1	.23	.12	.27	.04
Santa Fe	Caseros	IR	2	.30	.25	.54	.00
Santa Fe	Constitucion	IR	2	.13	.11	.40	.00
Santa Fe	General Lopez	IR	2	.16	.17	.11	.06
Santa Fe	Triondo	IR	2	.21	.09	.34	.01
Santa Fe	Rosario	IR	1	.19	.06	.54	.00
Santa Fe	San Jeronimo	IR	1	.14	.03	.07	.09
Santa Fe	San Lorenzo	IR	2	.16	.09	.34	.00
Santa Fe	San Martin	IR	1	.07	.03	.06	.10
Illinois	Johnson	FSR	2	.02	.10	.08	.02
Illinois	Pope	FSR	1	.01	.05	.05	.01
Illinois	Pulaski	FSR	1	.05	.08	.23	.04
Indiana	Adams	FSR	1	.13	.32	.44	.00
Indiana	Hamilton*	FSR	1	.06	.31	.28	.00
Indiana	Whitley*	FSR	1	.06	.22	.18	.00
Iowa	Pottawattamie	FSR	1	.01	.36	.19	.00
Kansas	Bourbon	FSR	1	.04	.02	.09	.07
Kansas	Butler	FSR	2	.11	.00	.02	.12
Kansas	Crawford	FSR	1	.08	.02	.20	.14

*This county is in the supplemental set of 14 FSR counties.

TABLE 5-1.- Continued.

State	County or county-counterpart	Region	Number of segments	Wheat	Corn	Soybeans	Crop group
Kansas	Ford	FSR	1	0.36	0.04	0.00	0.04
Kansas	Grant	FSR	1	.24	.13	.00	.22
Kansas	Gray	FSR	1	.34	.19	.01	.07
Kansas	Kiowa	FSR	1	.21	.02	.01	.05
Kansas	Meade	FSR	1	.22	.05	.00	.07
Kansas	Montgomery	FSR	2	.11	.01	.07	.08
Kansas	Neosho	FSR	1	.11	.02	.17	.11
Kansas	Stanton	FSR	1	.32	.12	.01	.12
Kansas	Stevens*	FSR	1	.16	.05	.01	.35
Kentucky	Ballard	FSR	1	.02	.11	.34	.05
Kentucky	Crittenden*	FSR	1	.02	.10	.19	.00
Kentucky	Fulton	FSR	1	.05	.10	.48	.00
Kentucky	Graves	FSR	1	.04	.21	.36	.01
Kentucky	Todd*	FSR	1	.06	.16	.30	.00
Missouri	Barton	FSR	1	.18	.02	.32	.08
Missouri	Boone	FSR	1	.03	.03	.11	.01
Missouri	Butler	FSR	1	.08	.03	.31	.19
Missouri	Callaway	FSR	2	.03	.04	.09	.02
Missouri	Gentry	FSR	1	.03	.11	.20	.03
Missouri	Grundy	FSR	1	.03	.09	.27	.03
Missouri	Mississippi	FSR	1	.12	.13	.70	.03
Missouri	New Madrid	FSR	1	.11	.05	.67	.05
Missouri	Platte	FSR	1	.12	.10	.21	.09
Missouri	Scott	FSR	2	.18	.11	.52	.06
Missouri	Stoddard	FSR	1	.11	.08	.37	.11
Ohio	Delaware*	FSR	1	.05	.18	.26	-
Ohio	Fulton*	FSR	1	.10	.41	.31	-
Ohio	Logan*	FSR	1	.08	.24	.22	-
Ohio	Wyandot*	FSR	1	.15	.20	.32	-

*This county is in the supplemental set of 14 FSR counties.

TABLE 5-1.- Concluded.

State	County or county-counterpart	Region	Number of segments	Wheat	Corn	Soybeans	Crop group
Oklahoma	Blaine	FSR	1	0.32	0.00	0.00	0.01
Oklahoma	Canadian	FSR	1	.43	.00	.00	.01
Oklahoma	Nowata	FSR	1	.06	.01	.02	.02
Texas	Briscoe	FSR	1	.08	.01	.01	.02
Texas	Carson	FSR	1	.29	.04	.01	.17
Texas	Gray	FSR	2	.20	.01	.00	.06
Texas	Hutchinson	FSR	1	.15	.03	.00	.11
Texas	Moore	FSR	1	.17	.07	.00	.12
Texas	Ochiltree	FSR	1	.35	.01	.00	.11
Texas	Roberts	FSR	1	.15	.01	.01	.05
Texas	Sherman	FSR	1	.12	.04	.00	.11

TABLE 5-2.- AUSTRALIA CROP DENSITIES FOR FSR AND IR COUNTIES

[Density is approximate and is usually an underestimate.]

State	County or county-counterpart	Region	Number of segments	Wheat	Barley	Oats
California	Colusa	FSR	1	0.05	0.02	0.00
California	Glenn	FSR	1	.03	.02	.00
California	Kings	FSR	2	.03	.14	.00
California	Riverside	FSR	1	.01	.01	.00
California	Sacramento	FSR	1	.04	.01	.00
California	San Joaquin	FSR	1	.03	.03	.01
California	San Luis Obispo	FSR	2	.02	.03	.00
California	Solano	FSR	1	.06	.02	.01
California	Tulare	FSR	1	.01	.02	.00
California	Yolo	FSR	1	.12	.05	.00
New South Wales	Bland	IR	1	.20	.02	.02
New South Wales	Boolooro	IR	1	.19	.01	.00
New South Wales	Carratho	IR	1	.11	.01	.01
New South Wales	Coolamon	IR	1	.23	.04	.02
New South Wales	Coonabar	IR	1	.08	.01	.01
New South Wales	Coonamble	IR	1	.13	.00	.01
New South Wales	Corowa	IR	1	.16	.06	.01
New South Wales	Gilgandr	IR	1	.17	.01	.01
New South Wales	Goobang	IR	1	.18	.01	.01
New South Wales	Jemalong	IR	1	.13	.01	.01
New South Wales	Lachlan	IR	1	.13	.01	.01
New South Wales	Liverpoo	IR	1	.22	.03	.00
New South Wales	Lockhart	IR	2	.08	.03	.02
New South Wales	Mitchell	IR	1	.16	.03	.02
New South Wales	Namoi	IR	2	.17	.01	.00
New South Wales	Narrabur	IR	2	.19	.02	.02
New South Wales	Narrande	IR	1	.21	.03	.02
New South Wales	Timbrebo	IR	2	.16	.01	.02
New South Wales	Wakool	IR	1	.11	.02	.01

TABLE 5-2.- Continued.

State	County or county-counterpart	Region	Number of segments	Wheat	Barley	Oats
New South Wales	Weddin	IR	1	0.15	0.01	0.01
New South Wales	Yallaroi	IR	1	.20	.01	.00
Western Australia	Beverley	IR	1	.11	.04	.04
Western Australia	Bruce Ro	IR	1	.30	.03	.01
Western Australia	Chapman	IR	1	.15	.02	.01
Western Australia	Corrigin	IR	1	.27	.03	.03
Western Australia	Dalwalli	IR	1	.28	.01	.02
Western Australia	Dumbleyu	IR	1	.19	.03	.02
Western Australia	Esperanc	IR	1	.03	.03	.01
Western Australia	Gnowange	IR	1	.13	.06	.02
Western Australia	Kellerbe	IR	1	.37	.03	.02
Western Australia	Kent	IR	1	.11	.02	.01
Western Australia	Kulin	IR	1	.22	.02	.02
Western Australia	Lake Gra	IR	1	.13	.01	.01
Western Australia	Merredin	IR	1	.33	.01	.02
Western Australia	Morawa	IR	1	.27	.02	.02
Western Australia	Mount Ma	IR	1	.29	.01	.02
Western Australia	Mukinbud	IR	1	.29	.02	.03
Western Australia	Mullewa	IR	1	.16	.01	.01
Western Australia	Narembee	IR	1	.30	.03	.03
Western Australia	Narrogin	IR	1	.08	.05	.08
Western Australia	Perenjor	IR	1	.25	.01	.02
Western Australia	Wagin	IR	1	.10	.04	.07
Western Australia	Wickepin	IR	1	.18	.03	.04
Western Australia	Wongaw B	IR	1	.34	.02	.01
Western Australia	Yilgarn	IR	1	.16	.00	.01
Western Australia	York	IR	1	.11	.03	.04
Oklahoma	Blaine	FSR	2	.32	.01	-
Oklahoma	Canadian	FSR	2	.43	.02	-
Oklahoma	Kingfisher	FSR	2	.44	.01	-
Oklahoma	Noble	FSR	2	.36	.01	-

TABLE 5-2.- Concluded.

State	County or county-counterpart	Region	Number of segments	Wheat	Barley	Oats
Texas	Archer	FSR	1	0.11	-	0.01
Texas	Baylor	FSR	2	.16	0.01	.00
Texas	Bosque	FSR	1	.02	-	.03
Texas	Brown	FSR	1	.03	.00	.02
Texas	Coleman	FSR	1	.04	.00	.02
Texas	Cooke	FSR	1	.09	.00	.03
Texas	Coryell	FSR	1	.07	-	.05
Texas	Denton	FSR	2	.15	.00	.03
Texas	Gillespie	FSR	1	.01	.00	.02
Texas	Hamilton	FSR	1	.01	.00	.02
Texas	Hill	FSR	1	.02	.00	.01
Texas	McCulloch	FSR	1	.03	.00	.01
Texas	Runnels	FSR	1	.09	.00	.01
Texas	San Saba	FSR	1	.05	.00	.08
Texas	Tarrant	FSR	1	.09	.00	.05
Texas	Taylor	FSR	2	.14	.00	.01
Texas	Uvalde	FSR	1	.05	.00	.03
Texas	Wise	FSR	1	.01	.00	.01

TABLE 5-3.- BRAZIL CROP DENSITIES FOR FSR AND IR COUNTIES

[Density is approximate and is usually an underestimate.]

State	County or county-counterpart	Region	Number of segments	Corn	Soybeans	Crop group
Mato Grosso	Dauradas	IR	1	0.01	0.21	0.13
Mato Grosso	Maracaju	IR	1	.01	.15	.20
Mato Grosso	Iturama	IR	1	.06	.00	.07
Para	Assis Chateaubriand	IR	1	.11	.66	.25
Para	Bandeirantes	IR	1	.15	.09	.35
Para	Castro	IR	1	.05	.06	.03
Para	Formosa	IR	1	.14	.42	.15
Para	Guara Ruava	IR	1	.08	.08	.03
Para	Guaria	IR	1	.09	.55	.12
Para	Ivai	IR	1	.11	.01	.08
Para	Lapa	IR	1	.08	.01	.08
Para	Mangulirinha	IR	1	.07	.12	.06
Para	Medianerra	IR	1	.08	.26	.04
Para	Toledo	IR	1	.16	.45	.04
Para	Vectorino	IR	1	.16	.19	.05
Rio Grande do Sul	Campinas do Sol	IR	1	.10	.28	.02
Rio Grande do Sul	Candussu	IR	1	.17	.06	.03
Rio Grande do Sul	Dom Feliciano	IR	1	.26	.01	.05
Rio Grande do Sul	Esmeralda	IR	1	.02	.00	.00
Rio Grande do Sul	Frederico Westphaler	IR	1	.50	.52	.13
Rio Grande do Sul	Getulio Vargas	IR	1	.16	.39	.03
Rio Grande do Sul	Ibiruba	IR	1	.06	.42	.02
Rio Grande do Sul	Marau	IR	1	.10	.33	.02
Rio Grande do Sul	Palmeira das Missoes	IR	1	.14	.61	.04
Rio Grande do Sul	Passo Fundo	IR	1	.05	.39	.01
Rio Grande do Sul	Santa Maria	IR	1	.01	.04	.05
Rio Grande do Sul	Santiago	IR	1	.01	.10	.00
Rio Grande do Sul	Santa Antonio das Missoes	IR	1	.04	.21	.02
Rio Grande do Sul	Selbach	IR	1	.08	.99	.06
São Roque Cape	Campos Novos	IR	1	.10	.07	.02
São Roque Cape	Chapeco	IR	1	.33	.16	.09
São Roque Cape	Descanso	IR	1	.65	.29	.06
São Paulo	Aracatuba	IR	1	.06	.00	-
São Paulo	Candido Mota	IR	1	.09	.42	-
São Paulo	Guaira	IR	1	.28	.50	-
São Paulo	Ipua	IR	1	.29	.32	-
São Paulo	Itaperva	IR	1	.00	.00	.00
São Paulo	Miquelopalis	IR	1	.12	.15	-
São Paulo	Morro Agudo	IR	1	.08	.28	-
São Paulo	Orlandia	IR	1	.11	.24	-
Georgia	Bacon	FSR	1	.08	.02	.00
Georgia	Brooks	FSR	1	.18	.12	.04

TABLE 5-3.- Concluded.

State	County or county-counterpart	Region	Number of segments	Corn	Soybeans	Crop group
Georgia	Bulloch	FSR	1	0.11	0.12	0.03
Goergia	Crisp	FSR	1	.12	.16	.14
Georgia	Dougherty	FSR	1	.05	.02	.03
Georgia	Laurens	FSR	1	.06	.07	.02
Georgia	Miller	FSR	1	.18	.06	.14
Georgia	Mitchell	FSR	1	.13	.05	.07
Georgia	Screven	FSR	1	.06	.17	.02
Georgia	Sumter	FSR	1	.06	.11	.06
Georgia	Tattnall	FSR	1	.16	.08	.01
Georgia	Terrell	FSR	1	.07	.07	.10
Georgia	Thomas	FSR	1	.08	.09	.02
Georgia	Tift	FSR	1	.16	.07	.11
North Carolina	Davidson	FSR	1	.03	.02	.01
North Carolina	Duplin	FSR	1	.15	.11	.00
North Carolina	Edgecombe	FSR	1	.19	.09	.07
North Carolina	Greene	FSR	1	.24	.05	.00
North Carolina	Halifax	FSR	1	.09	.08	.08
North Carolina	Johnston	FSR	1	.12	.10	.00
North Carolina	Pitt	FSR	1	.17	.10	.02
North Carolina	Robeson	FSR	1	.15	.17	.02
North Carolina	Sampson	FSR	1	.12	.09	.01
North Carolina	Vance	FSR	1	.01	.06	.04
South Carolina	Allendale	FSR	2	.08	.22	.01
South Carolina	Darlington	FSR	1	.03	.27	.01
South Carolina	Jasper	FSR	1	.02	.03	.00
South Carolina	Lee	FSR	1	.05	.24	.13
South Carolina	Marlboro	FSR	1	.03	.16	.09
South Carolina	Orangeburg	FSR	1	.08	.18	.01
South Carolina	Richland	FSR	1	.01	.05	.00
Tennessee	Chester	FSR	1	.04	.34	.03
Tennessee	Crockett	FSR	1	.02	.32	.27
Tennessee	Dyer	FSR	1	.03	.62	.03
Tennessee	Fayette	FSR	1	.02	.24	.06
Tennessee	Gibson	FSR	2	.10	.49	.05
Tennessee	Hardeman	FSR	1	.01	.23	.02
Tennessee	Hardin	FSR	1	.03	.13	.00
Tennessee	Haywood	FSR	1	.02	.32	.13
Tennessee	Lauderdale	FSR	1	.01	.55	.03
Tennessee	Madison	FSR	1	.01	.26	.06
Tennessee	Obion	FSR	2	.18	.50	.01
Tennessee	Tipton	FSR	1	.01	.62	.13
Tennessee	Weakley	FSR	2	.09	.25	.00

TABLE 5-4.- USSR BELORUSSIA/CENTRAL HIGH BARLEY AREA
CROP DENSITIES FOR FSR AND IR COUNTIES

[Density is approximate and is usually an underestimate.]

State	County or county-counterpart	Region	Number of segments*	Barley	Winter small grains	Spring small grains	Summer crops
Brest Litovsk		IR	1	0.04	0.07	0.01	0.08
Bryansk		IR	1	.06	.07	.05	.13
Gomel		IR	1	.04	.04	.02	.07
Grodno		IR	1	.07	.07	.02	.09
Ivanovo		IR	1	.02	.06	.05	.04
Kalinin		IR	2	.03	.03	.04	.02
Kaluga		IR	1	.05	.15	.07	.13
Minsk		IR	1	.08	.07	.02	.11
Mogilev		IR	1	.08	.05	.02	.07
Moscow		IR	1	.04	.05	.01	.06
Orel		IR	3	.13	.07	.15	.17
Ryazan		IR	2	.14	.07	.08	.16
Smolensk		IR	2	.04	.04	.06	.05
Tula		IR	1	.16	.05	.07	.14
Vitebsk		IR	1	.13	.07	.04	.09
Vladimir		IR	1	.04	.05	.04	.05
Idaho	Bannock	FSR	1	.04	.04	.04	.00
Idaho	Oneida	FSR	1	.04	.03	.05	.00
Minnesota	Red Lake	FSR	1	.10	.00	.24	.09
Minnesota	Roseau	FSR	1	.14	.00	.40	.19
Minnesota	Traverse	FSR	1	.03	.01	.16	.07
Montana	Blaine	FSR	1	.02	.06	.04	.00
Montana	Broadwater	FSR	1	.06	.04	.04	.00
Montana	Cascade	FSR	1	.04	.04	.01	.02
Montana	Carbon	FSR	1	.06	.13	.03	.00
Montana	Fergus	FSR	1	.07	.10	.02	.00
Montana	Flathead	FSR	1	.03	.01	.00	.00
Montana	Gallatin	FSR	1	.07	.06	.02	.00
Montana	Garfield	FSR	1	.03	.07	.05	.00
Montana	Glacier	FSR	1	.10	.03	.07	.00
Montana	Judith Basin	FSR	1	.05	.07	.01	.00
Montana	Pondera	FSR	1	.12	.13	.06	.00
Montana	Teton	FSR	1	.09	.11	.04	.00
Montana	Toole	FSR	1	.06	.09	.13	.00
North Dakota	Bottineau	FSR	1	.09	.01	.33	.12
North Dakota	Pembina	FSR	1	.13	.01	.39	.16

*Number of segments is a projection proportional to frequency of prior segments in the Oblasts.

TABLE 5-5.- USSR ROSTOV WINTER SMALL GRAINS AREA CROP DENSITIES FOR FSR AND IR COUNTIES

[Density is approximate and is usually an underestimate.]

State	County or county-counterpart	Region	Number of segments*	Barley	Winter small grains	Spring small grains	Summer crops
Krasnodar		IR	5	0.09	0.27	0.01	0.27
Rostov		IR	8	.16	.15	.01	.15
Stavropol		IR	6	.06	.26	.02	.17
Montana	Big Horn	FSR	1	.02	.06	.00	.00
Montana	Blaine	FSR	1	.02	.06	.04	.00
Montana	Cascade	FSR	1	.06	.13	.03	.00
Montana	Chouteau	FSR	1	.05	.17	.04	.00
Montana	Cluster	FSR	1	.01	.05	.01	.00
Montana	Fergus	FSR	1	.07	.10	.02	.00
Montana	Gallatin	FSR	1	.07	.06	.02	.00
Montana	Garfield	FSR	1	.03	.07	.05	.00
Montana	Golden Valley	FSR	1	.02	.08	.01	.00
Montana	Hill	FSR	1	.02	.21	.08	.00
Montana	Judith Basin	FSR	1	.05	.07	.01	.00
Montana	Liberty	FSR	1	.03	.15	.08	.00
Montana	McCone	FSR	1	.02	.07	.07	.00
Montana	Pondera	FSR	1	.12	.13	.06	.00
Montana	Powder River	FSR	1	.02	.07	.01	.00
Montana	Prairie	FSR	1	.01	.07	.00	.00
Montana	Stillwater	FSR	1	.03	.09	.00	.00
Montana	Teton	FSR	1	.09	.11	.04	.00
Montana	Toole	FSR	1	.06	.09	.13	.00
Montana	Yellowstone	FSR	1	.02	.08	.00	.01
Washington	Whitman	FSR	1	.07	.31	.01	-

*Number of IR segments is a projection proportional to frequency of prior segments in the Oblasts.

TABLE 5-6.- USSR ORENBURG SPRING SMALL GRAINS AREA
CROP DENSITIES FOR FSR AND IR COUNTIES

[Density is approximate and is usually an underestimate.]

State	County or county-counterpart	Region	Number of segments*	Barley	Winter small grains	Spring small grains	Summer crops
Chelyabinsk		IR	4	0.06	0.00	0.33	0.09
Kurgan		IR	2	.11	.00	.68	.18
Orenburg		IR	14	.04	.02	.27	.07
Minnesota	Clay	FSR	1	.12	.00	.31	.25
Minnesota	Kittson	FSR	1	.09	.00	.39	.07
Minnesota	Marshall	FSR	1	.09	.00	.31	.09
Minnesota	Norman	FSR	1	.14	.00	.31	.21
Minnesota	Polk	FSR	1	.15	.00	.32	.18
Minnesota	Red Lake	FSR	1	.14	.00	.39	.19
Minnesota	Roseau	FSR	1	.03	.01	.16	.07
Minnesota	Traverse	FSR	1	.10	.00	.34	.38
Minnesota	Wilkin	FSR	1	.16	.01	.36	.42
Montana	Toole	FSR	1	.06	.09	.13	.00
Montana	Valley	FSR	1	.02	.01	.17	.00
North Dakota	Barnes	FSR	1	.13	.00	.33	.19
North Dakota	Bottineau	FSR	1	.09	.01	.33	.12
North Dakota	Cass	FSR	1	.16	.00	.32	.34
North Dakota	Cavalier	FSR	1	.23	.00	.36	.05
North Dakota	Pembina	FSR	1	.13	.01	.39	.16
North Dakota	Ransom	FSR	1	.05	.01	.23	.23
North Dakota	Richland	FSR	1	.07	.00	.24	.40
North Dakota	Sargent	FSR	1	.06	.01	.28	.22
North Dakota	Stutsman	FSR	1	.03	.00	.27	.12
North Dakota	Towner	FSR	1	.17	.00	.36	.06
North Dakota	Walsh	FSR	1	.15	.00	.36	.15
South Dakota	Roberts	FSR	1	.03	.02	.22	.19

*Number of IR segments is a projection proportional to frequency of prior segments in the Oblasts.

TABLE 5-7.- FSR SEGMENT LOCATIONS

[Areas in parentheses indicate supplementary segments.]

State	County or district	Segment number	Latitude	Longitude	FSR
Alaska	Delta Junction	9500	64°00'00"	145°15'00"	USSR 1
Arkansas	Arkansas	305	34°12'45"	91°22'19"	(Argentina)
Arkansas	Clay	9501	36°25'00"	90°28'00"	Argentina
Arkansas	Craighead 1	9502	35°55'00"	90°36'00"	Argentina
Arkansas	Greene	102	36°11'10"	90°43'12"	(Argentina)
Arkansas	Mississippi	306	35°45'23"	90°05'24"	(Argentina)
Arkansas	Poinsett	304	35°29'47"	30°50'08"	(Argentina)
Arkansas	St. Francis	302	34°55'19"	91°00'12"	(Argentina)
California	Colusa	9504	39°06'00"	122°10'00"	Australia
California	Glenn	260	39°35'51"	122°00'31"	Australia
California	Kings 1	9505	35°54'00"	119°50'00"	Australia
California	Kings 2	9506	35°49'00"	119°51'00"	Australia
California	Riverside	9508	33°49'00"	117°10'00"	Australia
California	Sacramento	9509	38°22'00"	121°25'00"	Australia
California	San Joaquin	9510	38°09'00"	121°05'00"	Australia
California	San Luis Obispo 1	9511	35°25'00"	120°06'00"	Australia
California	San Luis Obispo 2	9512	35°20'00"	120°03'00"	Australia
California	Solano	9513	38°09'00"	121°48'00"	Australia
California	Tulare	9514	35°52'00"	119°00'00"	Australia
California	Yolo 2	9507	38°45'00"	121°58'00"	Australia
Georgia	Bacon	9515	31°33'00"	82°31'00"	Brazil
Georgia	Brooks	335	30°50'56"	83°29'49"	Brazil
Georgia	Bulloch	331	32°25'56"	81°52'50"	Brazil
Georgia	Crisp	9516	31°52'00"	83°49'00"	Brazil
Georgia	Dougherty	9517	31°32'00"	84°04'00"	Brazil
Georgia	Laurens	311	32°33'22"	83°00'51"	Brazil
Georgia	Miller	9518	31°06'00"	84°51'00"	Brazil
Georgia	Mitchell	9519	31°12'00"	84°16'00"	Brazil
Georgia	Screven	330	32°47'57"	81°41'00"	Brazil

TABLE 5-7.- Continued.

State	County or district	Segment number	Latitude	Longitude	FSR
Georgia	Sumter	333	31°57'03"	84°08'34"	Brazil
Georgia	Tattnall	9520	31°53'00"	81°56'00"	Brazil
Georgia	Terrell	9521	31°46'00"	84°31'00"	Brazil
Georgia	Thomas	334	30°48'24"	83°43'22"	Brazil
Georgia	Tift	312	31°27'40"	83°31'15"	Brazil
Idaho	Bannock	1977	42°56'13"	112°27'35"	USSR 1
Idaho	Oneida	1975	42°04'07"	112°28'53"	USSR 1
Illinois	Johnson 1	9522	37°29'00"	88°58'00"	Argentina
Illinois	Johnson 2	9523	37°24'00"	88°58'00"	Argentina
Illinois	Pope	9524	37°28'00"	88°41'00"	Argentina
Illinois	Pulaski	9525	37°14'00"	89°12'00"	Argentina
Indiana	Adams	833	40°37'14"	85°02'00"	Argentina
Indiana	Hamilton	123	40°08'42"	86°04'01"	(Argentina)
Indiana	Whitley 1	133	41°08'49"	85°40'20"	(Argentina)
Iowa	Pottawattamie	886	41°17'44"	95°21'29"	Argentina
Kansas	Bourbon	9526	37°53'00"	95°01'00"	Argentina
Kansas	Butler 1	9527	37°29'00"	97°03'00"	Argentina
Kansas	Butler 2	9528	37°54'00"	97°03'00"	Argentina
Kansas	Crawford	1177	37°34'57"	94°51'06"	Argentina
Kansas	Ford	9529	37°31'00"	99°50'00"	Argentina
Kansas	Grant	9530	37°31'00"	101°11'00"	Argentina
Kansas	Gray	9531	37°31'00"	100°18'00"	Argentina
Kansas	Kiowa	1173	37°34'52"	99°10'28"	Argentina
Kansas	Meade	1041	37°18'31"	100°15'44"	Argentina
Kansas	Montgomery 1	9532	37°19'00"	95°55'00"	Argentina
Kansas	Montgomery 2	9533	37°03'00"	95°40'00"	Argentina
Kansas	Neosho	9534	37°33'00"	95°09'00"	Argentina
Kansas	Stanton	9535	37°41'00"	101°48'00"	Argentina
Kansas	Stevens	323	37°13'53"	101°24'21"	(Argentina)
Kentucky	Ballard	146	37°08'13"	88°58'13"	Argentina
Kentucky	Crittenden	153	37°14'58"	88°09'08"	(Argentina)

TABLE 5-7.- Continued.

State	County or district	Segment number	Latitude	Longitude	FSR
Kentucky	Fulton	9536	36°34'00"	89°06'00"	Argentina
Kentucky	Graves	9537	36°43'00"	88°35'00"	Argentina
Kentucky	Todd	328	36°43'52"	87°05'48"	(Argentina)
Minnesota	Clay	1512	47°01'17"	96°22'09"	USSR 3
Minnesota	Grant	1566	45°51'22"	95°50'12"	USSR 3
Minnesota	Kittson	1513	48°51'53"	97°05'49"	USSR 3
Minnesota	Marshall	1514	48°20'21"	96°06'36"	USSR 3
Minnesota	Norman	1825	47°15'07"	96°10'27"	USSR 3
Minnesota	Pennington	9539	48°08'00"	96°23'00"	USSR 3
Minnesota	Polk	1987	47°49'13"	96°40'39"	USSR 3
Minnesota	Red Lake	1830	47°55'14"	96°25'38"	USSR 1
Minnesota	Roseau	1518	48°35'20"	96°14'40"	USSR 1, 3
Minnesota	Traverse	1521B	45°48'00"	96°33'00"	USSR 1
Minnesota	Wilkin	1523	46°30'52"	96°24'49"	USSR 3
Missouri	Barton	9540	37°29'00"	94°07'00"	Argentina
Missouri	Boone	203	39°13'29"	92°11'13"	Argentina
Missouri	Butler	9541	36°44'00"	90°20'00"	Argentina
Missouri	Callaway 1	204	38°58'21"	92°02'06"	Argentina
Missouri	Callaway 2	9542	38°52'00"	92°05'00"	Argentina
Missouri	Gentry	209	40°17'56"	94°26'25"	Argentina
Missouri	Grundy	211	40°10'23"	93°23'22"	Argentina
Missouri	Mississippi	9543	36°54'00"	89°20'00"	Argentina
Missouri	New Madrid	9544	36°44'00"	89°36'00"	Argentina
Missouri	Platte	217	39°27'22"	94°48'34"	Argentina
Missouri	Scott 1	9631	36°59'00"	89°28'00"	Argentina
Missouri	Scott 2	9545	37°04'00"	89°27'00"	Argentina
Missouri	Stoddard	9546	36°40'00"	89°59'00"	Argentina
Montana	Big Horn	9547	45°12'00"	107°05'00"	USSR 2
Montana	Blaine	1929	48°49'57"	108°19'39"	USSR 1, 2
Montana	Broadwater	9548	46°17'00"	111°32'00"	USSR 1
Montana	Cascade	1742	47°23'32"	110°59'37"	USSR 1, 2

TABLE 5-7.- Continued.

State	County or district	Segment number	Latitude	Longitude	FSR
Montana	Chouteau	1731	47°57'42"	111°06'10"	USSR 2
Montana	Custer	1103	46°21'00"	105°04'38"	USSR 2
Montana	Carbon	9549	45°12'00"	108°39'00"	USSR 1
Montana	Fergus	1948	47°36'40"	109°20'26"	USSR 1, 2
Montana	Flathead	1725	48°19'46"	114°11'45"	USSR 1
Montana	Gallatin	1750	45°35'48"	111°06'48"	USSR 1, 2
Montana	Garfield	1536	47°08'30"	106°25'39"	USSR 1, 2
Montana	Glacier	1968			USSR 1
Montana	Golden Valley	9550	46°07'00"	109°30'00"	USSR 2
Montana	Hill	1734	48°20'05"	110°41'43"	USSR 2
Montana	Judith Basin	1747	46°53'59"	109°59'22"	USSR 1, 2
Montana	Liberty	9551	48°30'00"	111°11'00"	USSR 2
Montana	McCone	9552	47°15'00"	105°50'00"	USSR 2
Montana	Pondera	1937	48°09'26"	111°50'45"	USSR 1, 2
Montana	Powder River	1389	45°40'28"	105°26'16"	USSR 2
Montana	Prairie	9553	47°10'00"	106°00'00"	USSR 2
Montana	Stillwater	9554	46°03'00"	108°56'00"	USSR 2
Montana	Teton	1938	47°48'14"	112°04'23"	USSR 1, 2
Montana	Toole	9555	48°42'00"	111°29'00"	USSR 1, 2, 3
Montana	Valley	1945	48°02'58"	106°35'40"	USSR 3
Montana	Yellowstone	1102	45°55'46"	108°20'20"	USSR 2
N. Carolina	Davidson	9557	35°58'00"	80°19'00"	Brazil
N. Carolina	Duplin	341	35°06'04"	77°55'00"	Brazil
N. Carolina	Edgecombe	9558	36°02'00"	77°42'00"	Brazil
N. Carolina	Greene	9559	35°31'00"	77°44'00"	Brazil
N. Carolina	Halifax	340	36°14'00"	77°34'01"	Brazil
N. Carolina	Johnston	342	35°22'03"	78°18'00"	Brazil
N. Carolina	Pitt	332	35°29'02"	77°25'54"	Brazil
N. Carolina	Robeson	9560	34°44'00"	79°10'00"	Brazil
N. Carolina	Sampson	344	35°05'00"	78°19'00"	Brazil
N. Carolina	Vance	9561	36°17'00"	78°20'00"	Brazil

TABLE 5-7.- Continued.

State	County or district	Segment number	Latitude	Longitude	FSR
N. Dakota	Barnes 2	1472	46°42'35"	98°07'24"	USSR 3
N. Dakota	Bottineau 3	1611	48°51'34"	101°22'36"	USSR 1, 3
N. Dakota	Cass 2/3	817/818	46°57'00"	97°03'00"	USSR 3
N. Dakota	Cavalier	1617	48°55'27"	98°48'50"	USSR 3
N. Dakota	Dickey	1658	46°04'42"	98°18'43"	(USSR) 3
N. Dakota	Grand Forks	1619	48°05'06"	97°29'37"	(USSR) 3
N. Dakota	Grant	1918	46°18'18"	101°18'00"	(USSR) 3
N. Dakota	Kidder	1909	47°04'30"	99°42'29"	(USSR) 3
N. Dakota	Pembina	1584	48°48'02"	97°15'26"	USSR 1, 3
N. Dakota	Pierce 1	1461	48°13'00"	99°59'28"	(USSR) 3
N. Dakota	Ransom	1974	46°23'58"	97°51'19"	USSR 3
N. Dakota	Richland	1663	46°23'08"	96°43'30"	USSR 3
N. Dakota	Sargent	1664	46°11'30"	97°24'25"	USSR 3
N. Dakota	Stutsman	1637	47°15'45"	99°19'00"	USSR 3
N. Dakota	Towner	1467	48°42'47"	99°22'32"	USSR 3
N. Dakota	Walsh	1899	48°32'34"	97°17'00"	USSR 3
Ohio	Delaware	230	40°13'14"	82°50'22"	(Argentina)
Ohio	Fulton	231	41°32'07"	84°17'29"	(Argentina)
Ohio	Logan	234	40°28'08"	83°37'36"	(Argentina)
Ohio	Wyandot	238	40°51'34"	83°21'42"	(Argentina)
Oklahoma	Blaine 1	9574	35°42'00"	98°18'00"	Australia/ Argentina
Oklahoma	Blaine 2	9575	35°42'00"	98°31'00"	Australia/ (Argentina)
Oklahoma	Canadian 1	1242	35°27'06"	98°05'25"	Australia/ Argentina
Oklahoma	Canadian 2	9576	35°37'00"	98°16'00"	Australia/ (Argentina)
Oklahoma	Kingfisher 1	1956	35°49'00"	97°50'17"	Australia
Oklahoma	Kingfisher 2	9577	35°58'00"	97°37'00"	Australia
Oklahoma	Noble 1	9578	36°28'00"	97°25'00"	Australia

TABLE 5-7.- Continued.

State	County or district	Segment number	Latitude	Longitude	FSR
Oklahoma	Noble 2	9579	36°28'00"	97°10'00"	Australia
Oklahoma	Nowata	9580	36°44'00"	95°40'00"	Argentina
S. Carolina	Allendale 1	9581	33°02'00"	81°07'00"	Brazil
S. Carolina	Allendale 2	9582	32°57'00"	81°14'00"	Brazil
S. Carolina	Darlington	9583	34°16'00"	79°53'00"	Brazil
S. Carolina	Jasper	9584	32°37'00"	81°00'00"	Brazil
S. Carolina	Lee	339	34°14'40"	80°18'26"	Brazil
S. Carolina	Marlboro	338	34°31'32"	79°33'21"	Brazil
S. Carolina	Orangeburg	337	33°29'34"	81°12'19"	Brazil
S. Carolina	Richland	9585	34°03'00"	81°06'00"	Brazil
S. Dakota	Deuel	241	44°58'24"	96°34'37"	(USSR)
S. Dakota	Dewey	1485	45°27'00"	100°52'18"	(USSR)
S. Dakota	Hand	1687	44°34'48"	98°57'45"	(USSR)
S. Dakota	Jerauld	1755	44°03'42"	98°53'39"	(USSR)
S. Dakota	Roberts	1960	45°39'36'	97°00'09"	USSR 3
Tennessee	Chester	9586	35°23'00"	88°39'00"	Brazil
Tennessee	Crockett	295	35°45'45"	89°09'11"	Brazil
Tennessee	Dyer	9587	36°05'00"	89°30'00"	Brazil
Tennessee	Fayette	9588	35°14'00"	89°31'00"	Brazil
Tennessee	Gibson 1	9589	35°54'00"	89°00'00"	Brazil
Tennessee	Gibson 2	9590	36°09'00"	89°00'00"	Brazil
Tennessee	Hardeman	9591	35°19'00"	89°09'00"	Brazil
Tennessee	Hardin	9592	35°13'00"	88°17'00"	Brazil
Tennessee	Haywood	9593	35°44'00"	89°23'00"	Brazil
Tennessee	Lauderdale	9594	35°54'00"	89°23'00"	Brazil
Tennessee	Madison	9595	35°44'00"	88°54'00"	Brazil
Tennessee	Obion 1	9596	36°28'00"	89°10'00"	Brazil
Tennessee	Obion 2	9597	36°18'00"	89°10'00"	Brazil
Tennessee	Tipton	9598	35°25'00"	89°53'00"	Brazil
Tennessee	Weakley 1	9599	36°13'00"	88°36'00"	Brazil
Tennessee	Weakley 2	9600	36°09'00"	88°52'00"	Brazil

TABLE 5-7.- Concluded.

State	County or district	Segment number	Latitude	Longitude	FSR
Texas	Archer	1267	33°33'00"	98°29'00"	Australia
Texas	Baylor 2	9601	33°32'00"	99°05'00"	Australia
Texas	Baylor 3	9628	33°37'00"	99°19'00"	Australia
Texas	Bosque	9602	31°47'00"	97°31'00"	Australia
Texas	Briscoe	9603	34°30'00"	101°23'00"	Argentina
Texas	Brown	9604	32°05'00"	99°04'00"	Australia
Texas	Carson	9605	35°15'00"	101°24'00"	Argentina
Texas	Coleman	1325	31°31'50"	99°18'28"	Australia
Texas	Cooke	9607	33°33'00"	97°10'00"	Australia
Texas	Coryell	9606	31°30'00"	97°33'00"	Australia
Texas	Denton 1	9608	33°13'00"	97°16'00"	Australia
Texas	Denton 2	9609	33°03'00"	97°16'00"	Australia
Texas	Gillespie	9610	30°15'00"	98°50'00"	Australia
Texas	Gray 1	9611	35°35'00"	100°56'00"	Argentina
Texas	Gray 2	9612	35°35'00"	100°48'00"	Argentina
Texas	Hamilton	9613	31°35'00"	98°07'00"	Australia
Texas	Hill	9614	31°57'00"	97°03'00"	Australia
Texas	Hutchinson	9615	35°55'00"	101°33'00"	Argentina
Texas	McCulloch	9626	31°18'00"	99°26'00"	Australia
Texas	Moore	9616	35°55'00"	101°47'00"	Argentina
Texas	Ochiltree	9629	36°10'00"	100°55'00"	Argentina
Texas	Roberts	9617	35°40'00"	100°48'00"	Argentina
Texas	Runnels	9618	32°00'00"	100°01'00"	Australia
Texas	San Saba	9619	31°15'00"	98°35'00"	Australia
Texas	Sherman	285	36°19'36"	102°03'36"	Argentina
Texas	Tarrant	9620	32°58'00"	97°24'00"	Australia
Texas	Taylor 2	9627	32°20'00"	99°42'00"	Australia
Texas	Taylor 3	9621	32°21'00"	99°50'00"	Australia
Texas	Uvalde	9622	29°19'00"	99°38'00"	Australia
Texas	Wise	9623	33°13'00"	97°38'00"	Australia
Washington	Whitman 4	9630	46°50'20"	117°48'50"	USSR 2

ORIGINAL PAGE IS
OF POOR QUALITY

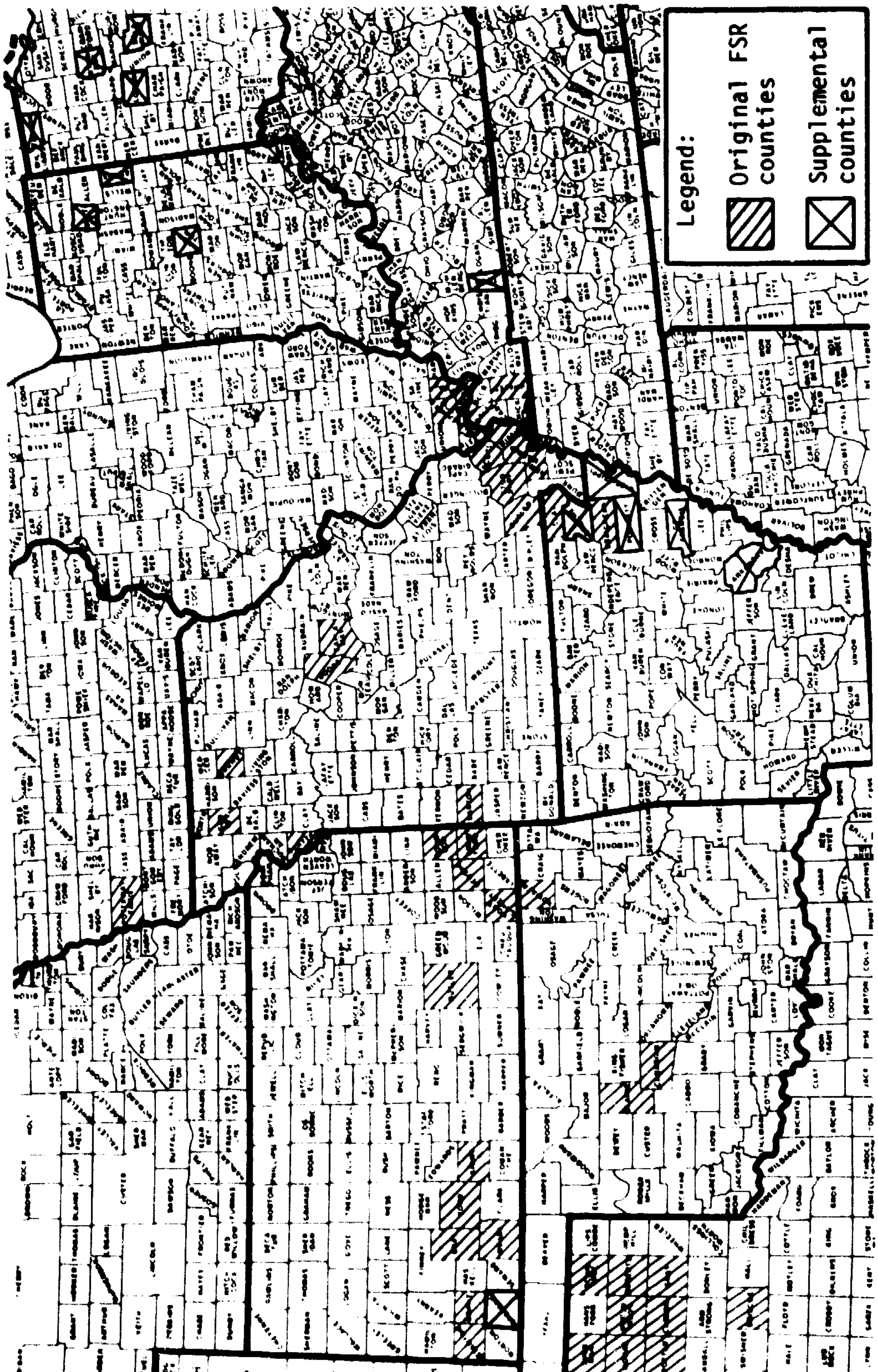


Figure 5-7.- Argentina FSR county locations.

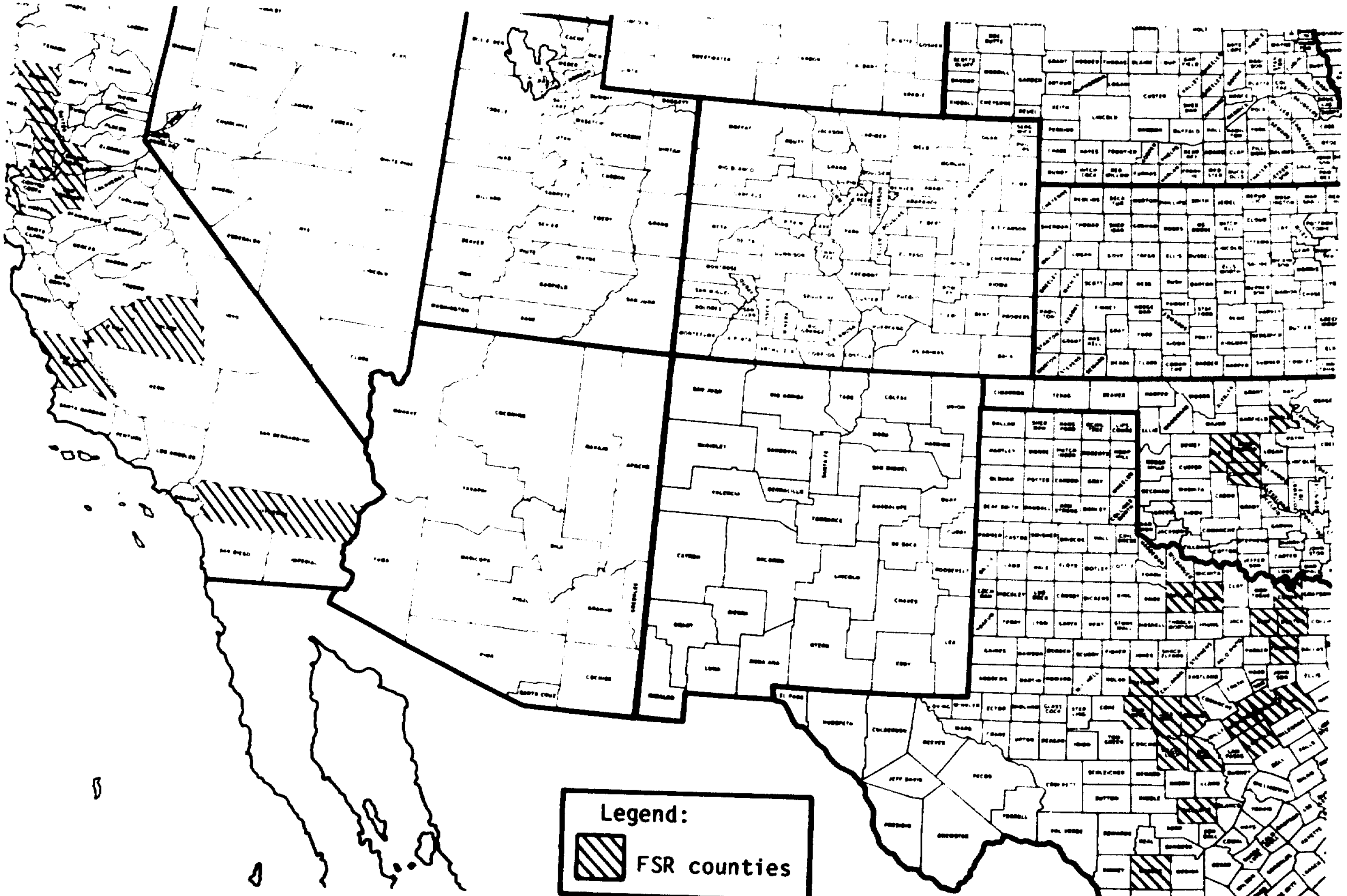
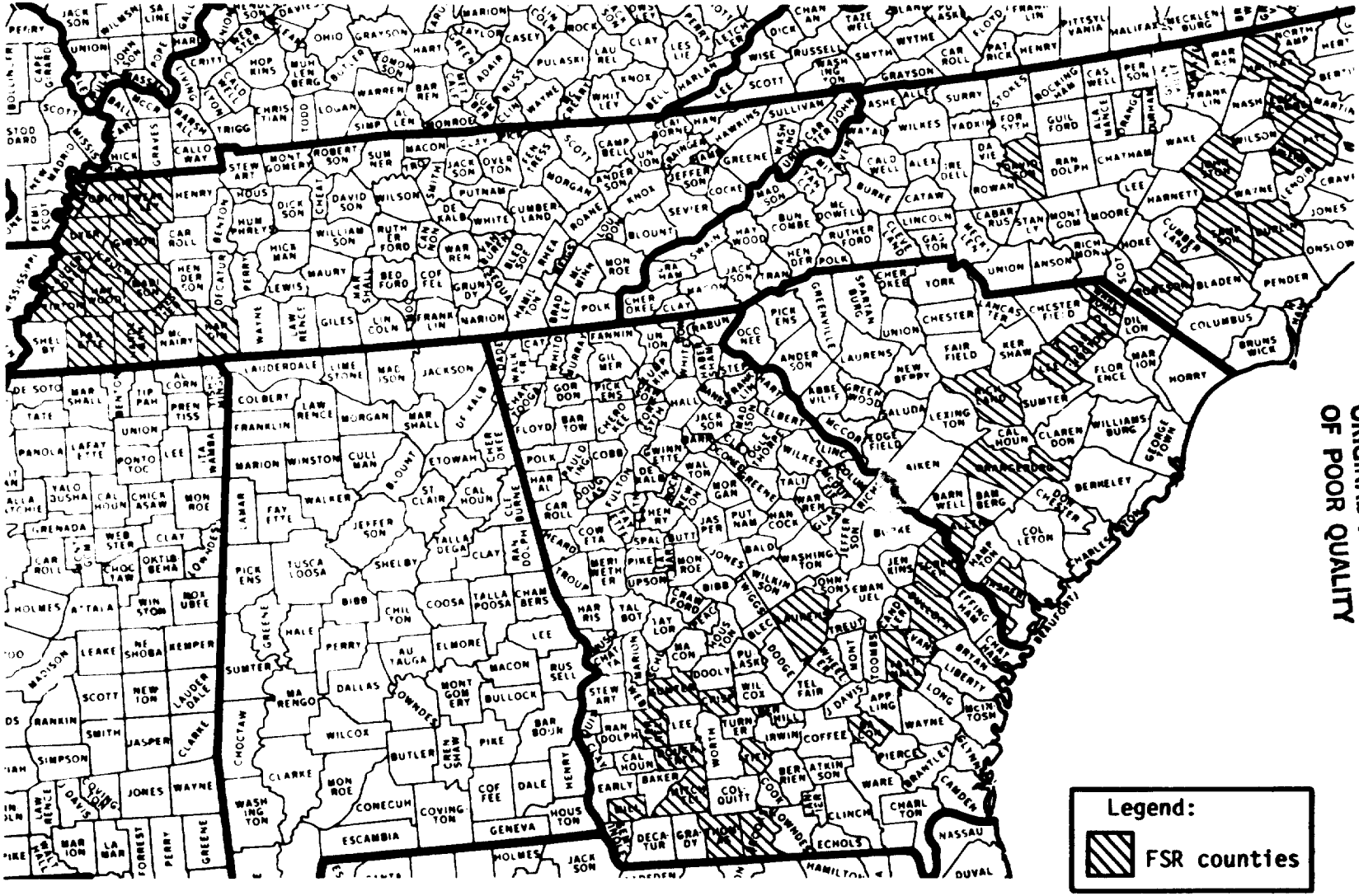
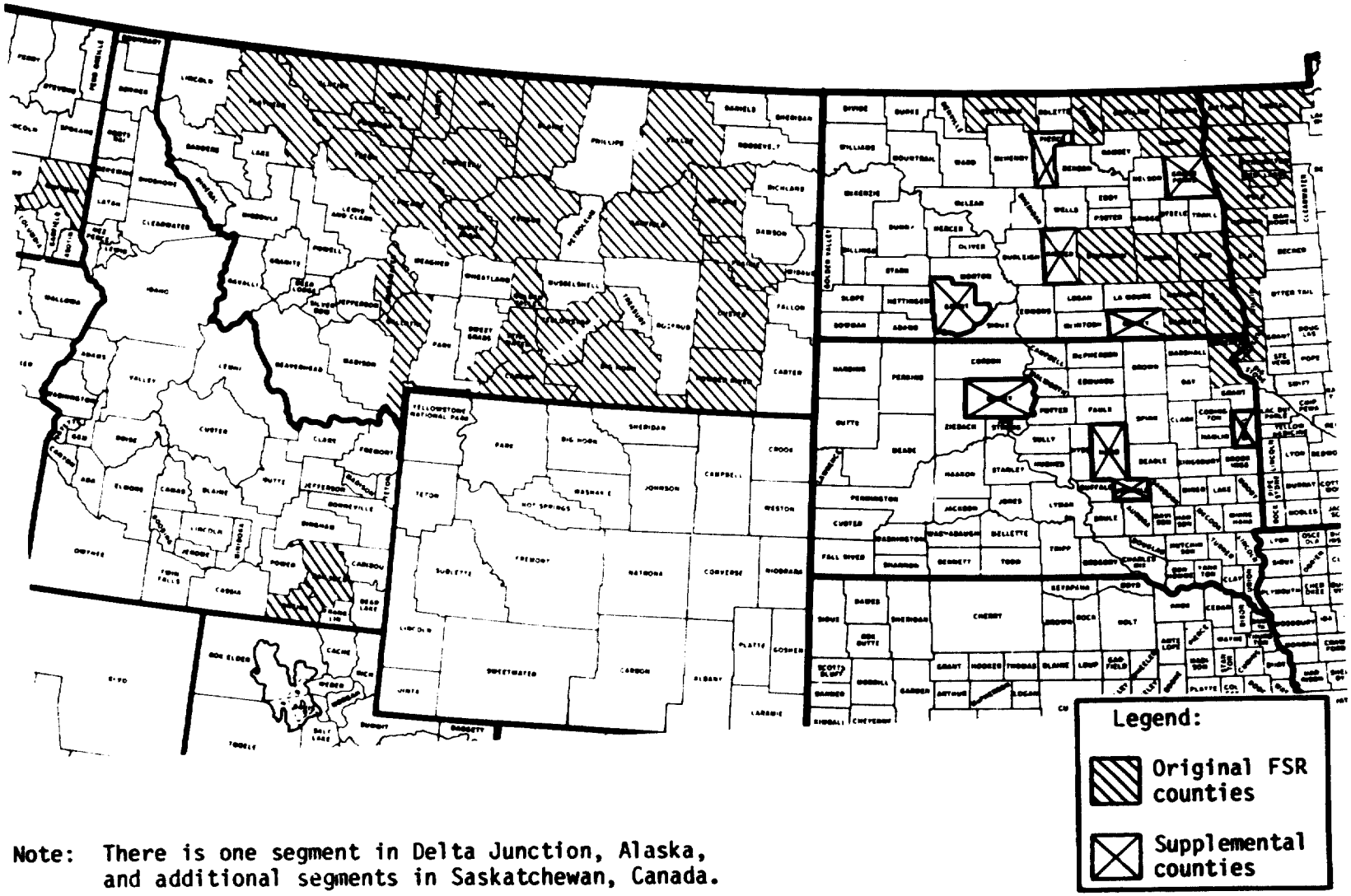


Figure 5-8.- Australia FSR county segment locations.



ORIGINAL PAGE IS
OF POOR QUALITY

Figure 5-9.- Brazil FSR county segment locations.



Note: There is one segment in Delta Junction, Alaska, and additional segments in Saskatchewan, Canada.

Figure 5-10.- USSR FSR county segment locations.

6. CONCLUSION AND RECOMMENDATIONS

Inspection of county statistics indicates varying similarity among sets of FSR counties and corresponding IR counterparts. The sorting procedure served to identify FSR counties that seemed most promising in their similarity to county-counterparts where IR segments were located. The suitability of these FSR segments for developmental work will depend on similarity of the crops and cultural practices at the segment level.

U S GOVERNMENT PRINTING OFFICE 1981 - 771-014/2000