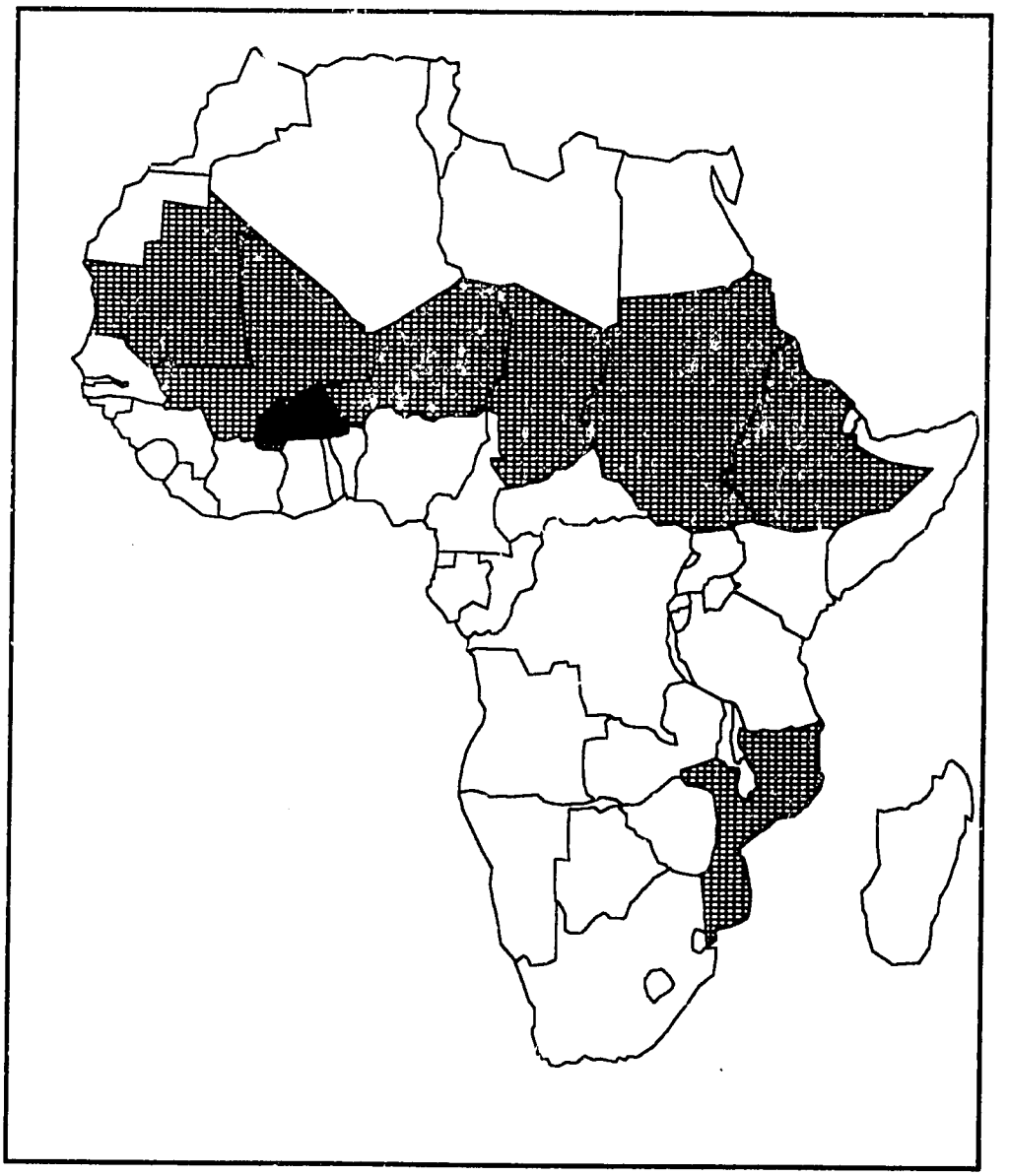
Report Number 1
October 1986

FEWS Country Report

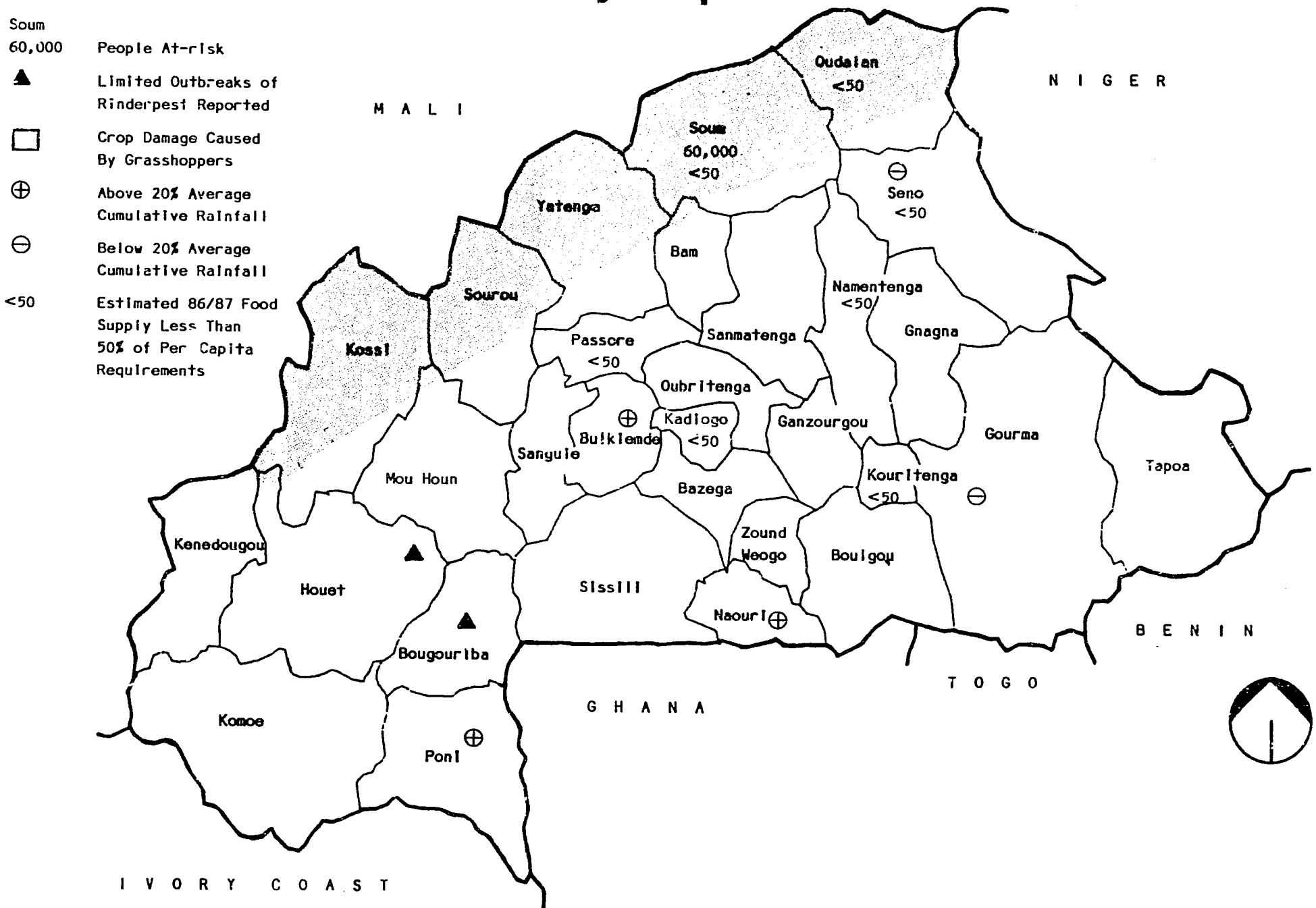
BURKINA



Africa Bureau
U.S. Agency
for International
Development

Map I

BURKINA FASO: Summary Map



Map: FEWS/PWA, October, 1986

Famine Early Warning System Country Report

BURKINA

Preliminary 1986 Crop Forecast

Prepared for the
Africa Bureau of the
U.S. Agency for
International Development

Prepared by
Price, Williams & Associates, Inc.
October 1986

Contents

INTRODUCTION

This is the first of a series of monthly reports issued by the Famine Early Warning System (FEWS) on Burkina. It is designed to provide decisionmakers with current information and analysis on existing and potential nutrition emergency situations. Each situation identified is described in terms of geographical extent and the number of people involved, or at-risk, and the proximate causes insofar as they have been discerned.

Use of the term "at-risk" to identify vulnerable populations is problematical since no generally agreed upon definition exists. Yet it is necessary to identify or "target" populations in-need or "at-risk" in order to determine appropriate forms and levels of intervention. Thus for the present, until a better usage can be found, FEWS reports will employ the term "at-risk" to mean...

> ...those persons lacking sufficient food, or resources to acquire sufficient food, to avert a nutritional crisis, i.e., a progressive deterioration in their health or nutritional condition below the status quo and who, as a result, require specific intervention to avoid a life-threatening situation.

Perhaps of most importance to decisionmakers, the process underlying the deteriorating situation is highlighted by the FEWS effort, hopefully with enough specificity and forewarning to permit alternative intervention strategies to be examined and implemented. Food assistance strategies are key to famine avoidance. However, other types of intervention can be of major importance both in the short-term and in the long run, including medical, transport, storage, economic development policy change, etc.

Where possible, food needs estimates are included in the FEWS reports. It is important to understand, however, that no direct relation exists between numbers of persons at-risk and the quantity of food assistance needed. This is because famines are the culmination of slow-onset disaster processes which can be complex in the extreme.

The food needs of individual populations at-risk depend upon when in the disaster process identification is made and the extent of its cumulative impact on the individuals concerned. Further, the amount of food assistance required, whether from internal or external sources, depends upon a host of considerations. Thus the food needs estimates presented periodically in FEWS reports should not be interpreted to mean food aid needs, e.g., as under PL480 or other donor programs.

Acknowledgment is given to the FEWS Public Health Advisory team in Burkina for the timely and detailed data which are used in the analysis of food production and estimated food requirements.

FEWS is operated by AID's Office of Technical Resources in the Bureau for Africa in cooperation with numerous USG and other organizations.

SUMMARY

Rainfall has generally been adequate for crop requirements in southern and central provinces of Burkina. Except for several isolated areas of below average rainfall, cumulative rainfall amounts generally match or exceed a twenty year average. Vegetation indices from satellite imagery indicate an overall improvement in vegetation between the first two ten day intervals, or decades, of September (1-10 and 11-20). An emergency grasshopper spraying program is underway with 85,500 ha treated by aerial spraying, and 866 ha treated by ground teams. While the problem is serious, the threat of a plague this year appears to be subsiding. Cereal crops are maturing, and the forecast for the 1986 crop year is that overall cereal production will be approximately 6 percent less than the 1985/1986 crop year. The estimated gross production of cereal crops in sorghum equivalents is 1,493,400 mt. After accounting for waste and milling losses, net production is 389,500 mt less than Burkina's total need. Approximately 60,000 people are receiving food assistance through a LICROSS Feeding Program in Soum Province. The UNOEOA reports there are 105,000 affected rural farmers and pastoralists the northern and central Sahelian region, and 14 percent of these are displaced people.

Key Issues

- o Lack of regional cooperation for treating grasshopper-infested border areas between Mali and Burkina threatens to reduce the effectiveness of an emergency spraying program within Burkina.
- o If the grasshopper control program is successful, indications are that Burkina can expect an above average harvest of cereal crops.
- o Although Burkina can expect a good harvest, the nation will not produce the amount of food needed to meet the needs of its population. Regional deficits are expected for the crop year 1986.
- o The Government of Burkina is requesting international economic assistance for the purchase of 40,000 mt of surplus grains in the agriculturally productive southern provinces for redistribution in food deficit northern provinces.

October Indicators

- o The rains, which normally reach a maximum in August, will continue to taper off throughout October.

RAINFALL

Except for localized areas within Burkina, the 1986 rainfall has been adequate for agricultural needs. Nationally, the cumulative rainfall as of September 20 matched the twenty year average for 1961-1980. The distribution of rainfall throughout the rainy season, however, has been irregular. Rainfall at ten rain stations in Burkina was, in general, below average throughout the months of June, July and August, and above average in May and the first 20 days of September (Map 2). Six of ten stations experienced rainfall amounts in excess of the 20 year average during May, but only three stations exceeded the average in July and August. During the first 20 days of September, eight stations recorded above average rainfall. In the southern provinces, above average rainfall in May enabled early planting of cereal crops, but below average rainfall in June and early July required some localized replanting of moisture-stressed crops.

Although seven of ten rain stations recorded cumulative rainfall which match or exceed the twenty year average, three stations are well below average. The lowest cumulative rainfall for 1986 was recorded at Dori, Seno Province, as a result of five consecutive months (May-Sept. 20) of below average rainfall. Dori recorded only 69 percent of its 20 year average. Significant moisture stress is reported for crops around Dori. As of September 20, Fada N'Gourma recorded 51 mm less than the cumulative rainfall in 1984, and only 75 percent of the average cumulative rainfall. The rain station at Bobo-Dioulasso in Houet Province recorded 61 mm less than 1984, and only 83 percent of the 20 year average. Although rainfall around Bobo was below average, the distribution of rainfall throughout the growing season was adequate for crops planted late in the season. Areas around these rain stations should be monitored for low water tables during the dry months since they received less than average rainfall throughout most of the rainy season.

VEGETATION

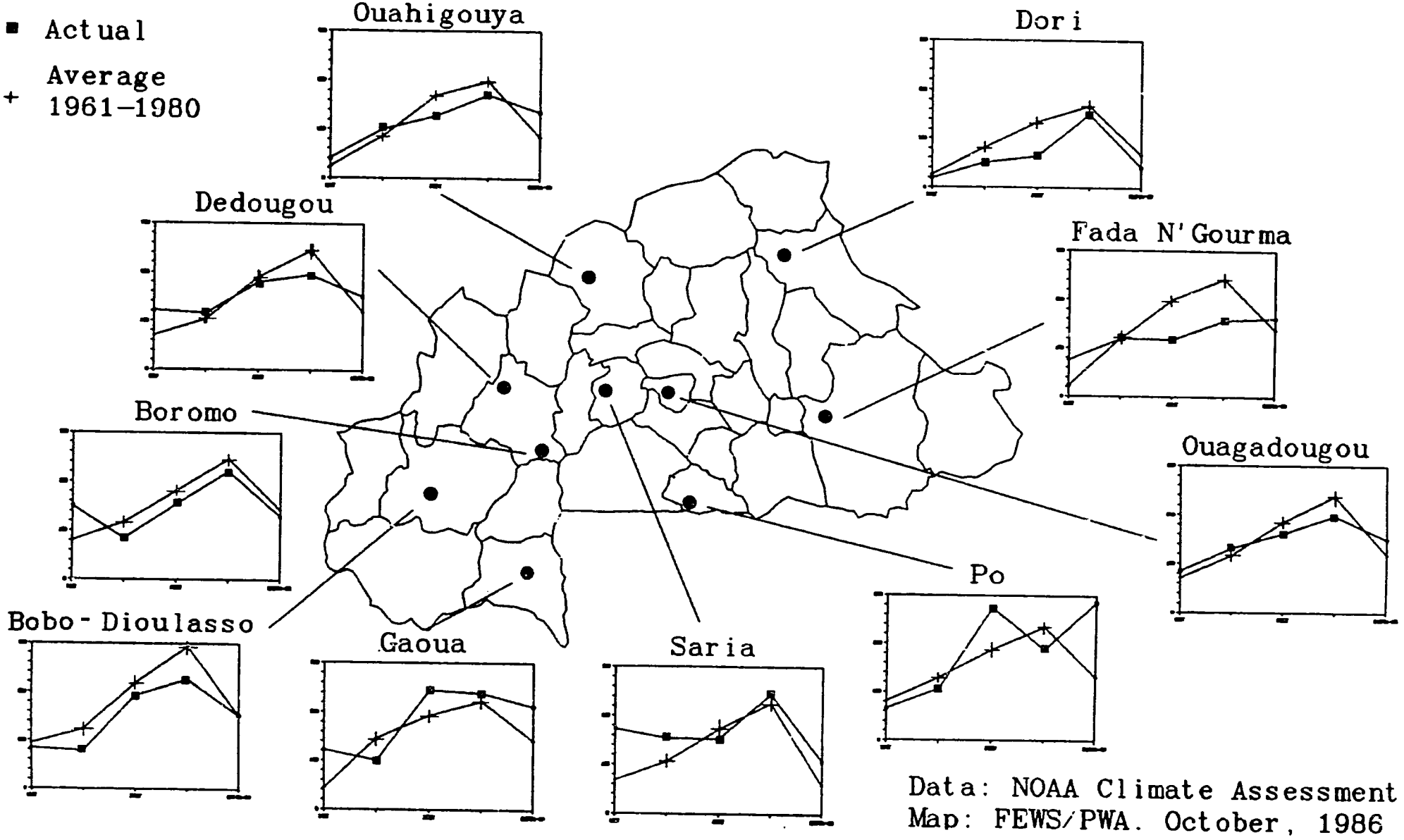
Satellite images of Burkina for September 1-10 show the healthiest concentrations of vegetation in southeastern Gourma and eastern Tapoa provinces (Image 1a). The northern region of Burkina from approximately 13 degrees N. Latitude northward contains sparse vegetation. In Oudalan Province, areas of exposed soils are evident. The rest of the country consists of vegetation classified as being normal in vegetative vigor according to the Natural Vegetative Index (NVI) of the National Oceanic and Atmospheric Administration (NOAA).

MAP 2

BURKINA

1986 RAINFALL SUMMARY BY RAIN STATION

For The Months May Through September 20.



Data: NOAA Climate Assessment
Map: FEWS/PWA. October, 1986

During the second decade of September (11-20), satellite imagery shows heavy vegetation is still present in the southern portions of Gourma and Tapoa provinces. In addition, a new flush of vegetative vigor has appeared in northern Sissili and the common border area of Houet, Bougouriba, Poni, and Comoe provinces (Image 1b). There was general improvement in the health of vegetation throughout most of the southern portion of Burkina between the two decades, whereas the northern region experienced either no change, or a slightly negative change in vegetative health (Images 2a and 2b).

Compared with the second decade of September (11-20) 1985, imagery for the same period this year shows an overall improvement in the health of vegetation in the southeast region of Burkina (Image 3a). In particular, the area south of 13 degrees N. Latitude and east of 2 degrees W. Longitude shows healthier vegetation this year compared with 1985. Negative changes in vegetation can be noted in southern Sourou, northern Mou Houn and Oudalan provinces (Image 3b).

AGRICULTURE

The 1986 growing season in Burkina began early with generally above average rains recorded in May. As a result, farmers in southern provinces were able to plant the maize and sorghum crops in May. By June, however, a large zone extending through southern Gourma, Kouritenga, and Boulgou provinces was replanted due to moisture stress. Cumulative rainfall in 1986 has been sufficient to benefit maturing crops in the agriculturally productive southern and central regions of Burkina.

The 1986 harvest outlook is good, with millet and sorghum flowering and maturing. In southern Seno Province, millet and sorghum crops are flowering and forming heads. Crops in areas around Fada N'Gourma and Ouagadougou are also flowering and forming heads. In the western provinces, the harvesting of maize has begun. Millet is ripening in fields planted early in the season in the provinces of Naouri and Tapoa.

Poor harvests are expected in the north and northeastern provinces which experienced below average rainfall in the middle of the growing season. As of August, crops within areas of Yatenga, Soum, Gnagna and northern Seno provinces suffered acute moisture stress.

The gross 1986 cereal crop production in Burkina is forecast to be approximately 6 percent less than the production in 1985, but 35 percent greater than the 1984 harvest. Analysis of the National Oceanic and Atmosphe-

ric Administration (NOAA) crop yield estimates for 1986 and the GOB estimated 1986 crop areas under cultivation suggests that Burkina will produce 1,480,700 mt of cereal crops in the crop year 1986 (Table 1). This production figure is equivalent in tonnage to 1,493,400 mt of sorghum (sorghum, millet, maize and rice converted to sorghum equivalents based on the caloric value of each crop). The millet crop is expected to be approximately 4 percent less than 1985, the maize crop will be 13 percent less, and the rice crop is expected to be 35 percent less than last year. The maize and rice crops are expected to produce approximately 40 percent more than the 1984 harvest.

Table 1 Burkina Annual Crop Production.
(Thousands of Metric Tons, Gross Production)

Crop	1984	1985	est. 1986	% Of 1984	% Of 1985
Sorghum	597.9	796.5	756.3	126.5	94.9
Millet	416.8	586.6	560.8	134.4	95.6
Maize	62.2	142.6	125.8	202.3	88.2
Rice	16.1	50.9	37.8	234.5	74.3
Total	1,093.0	1,576.6	1,480.7	135.5	93.9

Sources:
FEWS/BURKINA August Report, 1986
Burkina Faso Yield Forecast. NOAA/NESDIS/AISC. Assessment No. 1/86, Sept. 1986.

Thirteen of the thirty provinces are expected to have better harvests this year than 1985 (Appendix I). Gourma, Kadiogo, Namentenga, Soum, and Yatenga provinces are each expected to produce at least 40 percent more in sorghum equivalent cereals this year compared with the 1985 harvests. Conversely, the provinces of Bougouriba, Boulgou, Ganzourgou, Kouritenga, Passore and Poni are expected to reap harvests at least 40 percent less than 1985.

The highest crop production in sorghum equivalents is expected in Houet, Bazega, Yatenga and Gourma provinces (Map 3). Provinces with low estimated harvests include Kadiogo, Kouritenga and Oudalan.

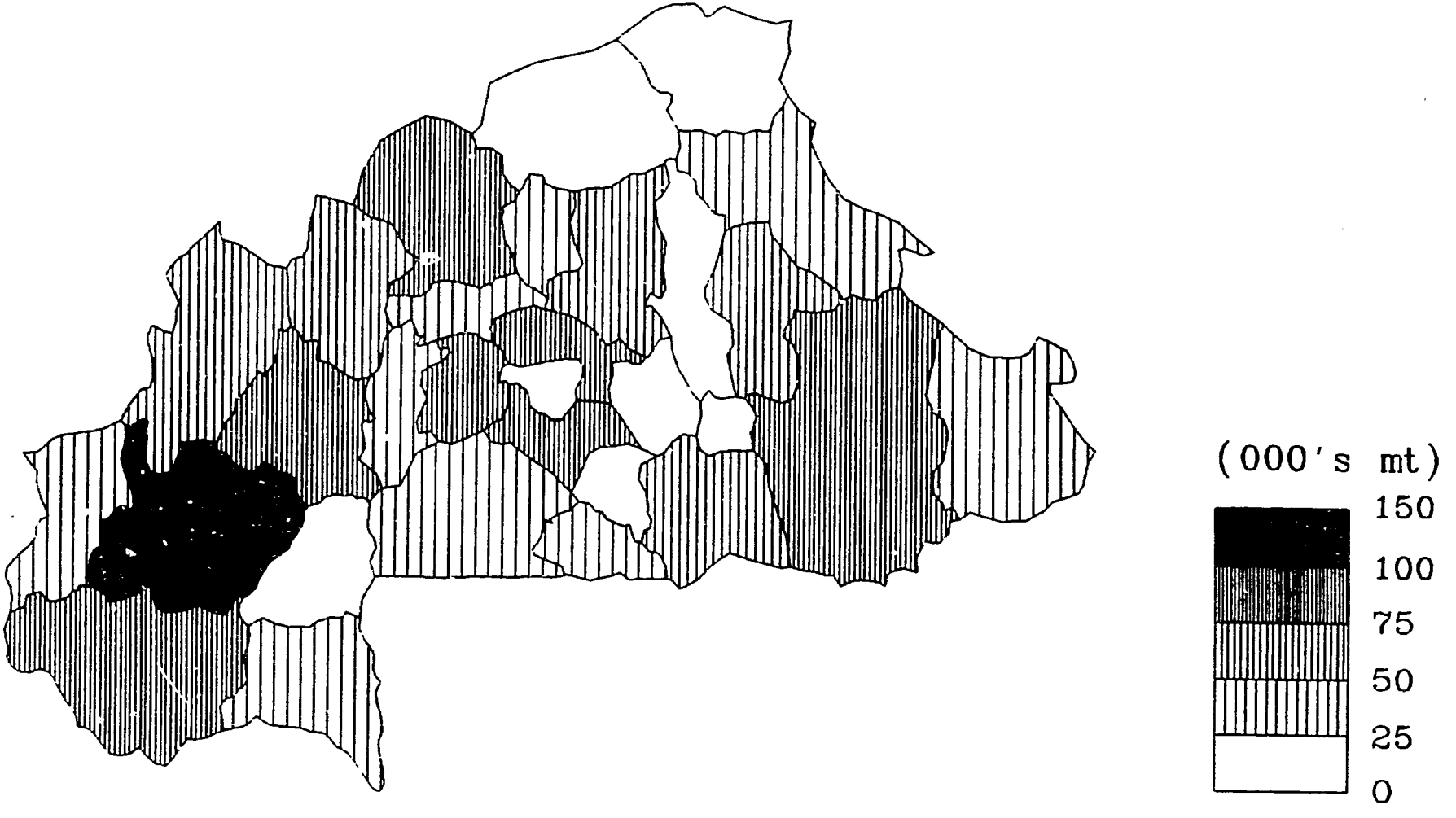
Differences between the projected 1986 harvest and the harvests of 1984 and 1985 are due primarily to the differences in the areas under cultivation, and secondarily to the expected yields. For example, Oudalan, Seno,

MAP 3

BURKINA

ESTIMATED 1986/1987 CROP PRODUCTION

Sorghum Equivalents



Map: FEWS/PWA. October. 1986.

and Soum did not have sorghum crops in 1984 whereas they are expected to have sizeable areas under sorghum cultivation this year (Appendix II). Bougouriba, Kadiogo, Kouritenga, Naouri and Passore have experienced relatively large decreases in areas under sorghum cultivation over the last two years.

FOOD SUPPLY/ FORECAST

Burkina will require approximately 1,643,000 mt of cereals to feed an estimated 1986 population of 8,556,000 people during the crop year 1986/1987 (Appendix III). This requirement is based on a national average consumption of 192 kg per person as estimated by the USAID Mission in Ouagadougou. The gross production of 1,493,400 Mt, when adjusted for waste and milling losses (16%), is estimated to result in a net production of 1,253,000 Mt of sorghum equivalents. The expected production deficit (without accounting for stocks and commercial imports) is approximately 390,000 mt. After including the 100,700 official GOB food stocks in the available food supply, the food deficit is estimated to be 289,300 mt (Appendix IV).

There are estimated to be 340,000 mt of food stocks in the form of private, donor, and on-farm stocks (Table 2). In Burkina, the donor stocks are comprised of WFP and CATHWELL reserves. After accounting for an anticipated commercial import of 50,000 mt and an additional donor import of 10,500 mt, the total estimated food supply results in a positive balance of 110,970 mt for the crop year 1986.

The estimated food balance does not account for potential crop damage from pests such as grasshoppers. The grasshopper situation in Burkina is serious, but there is no available information on the extent of crop damage. In extreme situations, the damage from pests can result in sizeable reductions in overall production.

Table 2a Burkina Food Needs, 1986/1987.

Estimated Population	8,556,039
Per Capita Consumption	192 kg/person/year
Total Needs	1,643,000 mt

Table 2b Estimated Food Supply, 1986/1987.
(Metric Tons)

Estimated Net Production (Sorghum Equivalent)		1,253,000
Stocks		
GOB	100,800	
Private	30,000	
Donor	10,000	
On-Farm	300,000	
Subtotal		440,800
Imports		
GOB Wheat	30,000	
GOB Rice	20,000	
Private Donor	10,500	
Subtotal		60,500
Total Estimated Supply		1,754,300
Total Estimated Needs		1,643,330
Estimated Food Balance		110,970

Source:
FEWS/Burkina August Report, 1986.
NOAA Crop Assessments for Estimated Yields

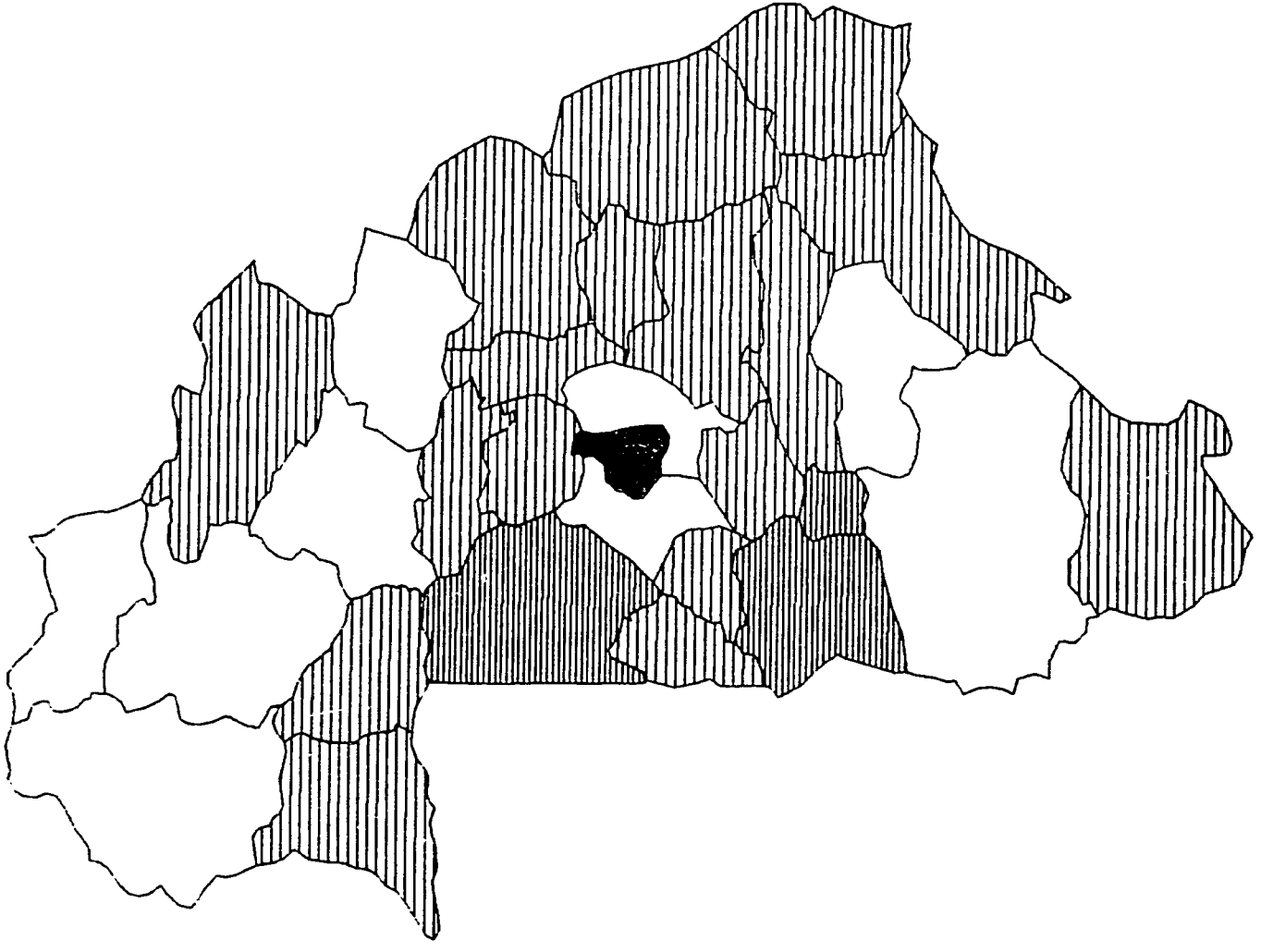
The national food supply, when including estimated stocks and projected food imports, suggests a surplus for the 1986 crop year. There will, however, likely be provincial food deficits even after accounting for the GOB cereal stocks within the provinces (Map 4). According to current forecasts, 21 provinces will have cereal deficits in 1986. Kadiogo Province appears to have the highest potential cereal deficit owing to the agriculturally unproductive urban population in the capital of Ouagadougou. Conversely, 9 provinces are forecast to have adequate cereal production and government cereal stocks to meet food requirements within the province (Appendix IV).

The southern provinces of Poni, Bougriba, and Sissilli are projected to have deficits of between 40 and 80 percent of cereal requirements in 1986 (Map 5). The people in these provinces, however, have diets which traditionally include other non-cereal crops such as yams. Of more concern are the projected food deficits of between 20 and 80 percent in the provinces of Passore, Kadiogo, Soum, Oudalan, Seno, Sanmatenga, and Namentenga.

MAP 4 BURKINA

ESTIMATED 1986/1987 CEREAL SURPLUS & DEFICIT

Sorghum Equivalents, GOB Stocks Included

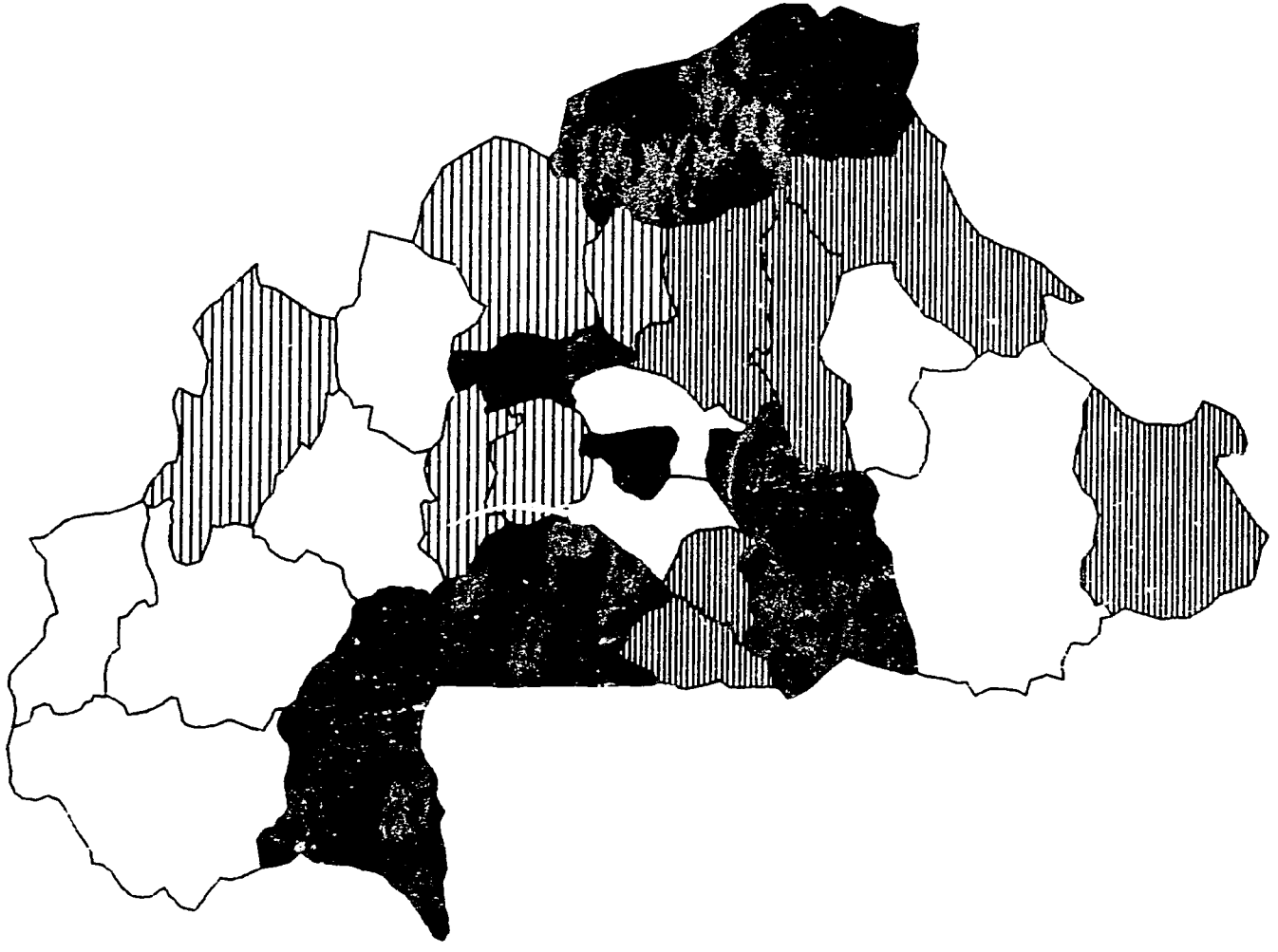


(000's Mt)

25
0
-25
-50
-75

Map: FEWS/PWA. October. 1986

MAP 5 BURKINA
ESTIMATED 1986/1987 FOOD DEFICITS
Deficit Expressed As A % Below Food Requirements



Percent Deficit
- >0
- 0 %
- -20 %
- -40 %
- -80 %

Map: FEWS/PWA. October. 1986

Kadiogo Province has an urban population largely dependent on the surplus agricultural production of other provinces. The climate in the northern provinces of Soum, Oudalan, Seno, Sanmatenga, and Namentenga is quite arid, and the land is better suited for livestock grazing than for crop production. Since these populations have fewer alternative crops to supplement their diets, they are more seriously impacted by poor cereal harvests.

POPULATIONS AT-RISK

Approximately 60,000 people (54,000 adults and 6,000 childern are recipients of a LICROSS Feeding Program (International League of Red Cross) in Soum Province. Inhabitants of several villages in Yatenga and Soum provinces are reported to be moving southwest into Sourou Province in search of food.

The UNOEOA categorizes 105,000 rural farmers and pastoralists as "affected" populations in the northern and central Sahelian regions of Burkina. Of the 105,000 affected people, 15,000 are displaced. Provinces which contain these affected populations have not been identified, but it is likely that Oudalan and Soum contribute the majority of at-risk people within Burkina. The northern provinces are marginally productive due to an arid climate, and slight fluctuations in moisture levels can adversely affect crops and rangelands resulting in shortages of available food.

The Government of Burkina is requesting international economic assistance for the purchase of 40,000 tons of surplus coarse grains in the agriculturally productive southern provinces for redistribution in food deficit northern provinces. As of August, the northern provinces of Oudalan, Soum and Bam did not have any official GOB reserve stocks. Since these provinces are estimated to require 38,000 Mt of additional food in 1986/1987, the GOB should consider these provinces as targets for the redistribution. The estimated import requirement of 70,000 tons of wheat and rice for the crop year 1985/1986 has been met.

LIVESTOCK

The number of animals in Burkina has not recovered to pre-1985 levels. Animal prices are high, particularly in the north, and a shortage of animals for the slaughterhouse in Ouagadougou has received press coverage.

Cattle and other animals appear to be in good physical shape. Due to the reduced number of animals in the north during the last 18 months, and sporadic but sufficient rains, pasture conditions have generally improved. There have been limited outbreaks of rinderpest at Hounde

(Houet Province) and Diebougou (Bougouriba Province), but overall animal health is reported to be satisfactory.

CROP PESTS

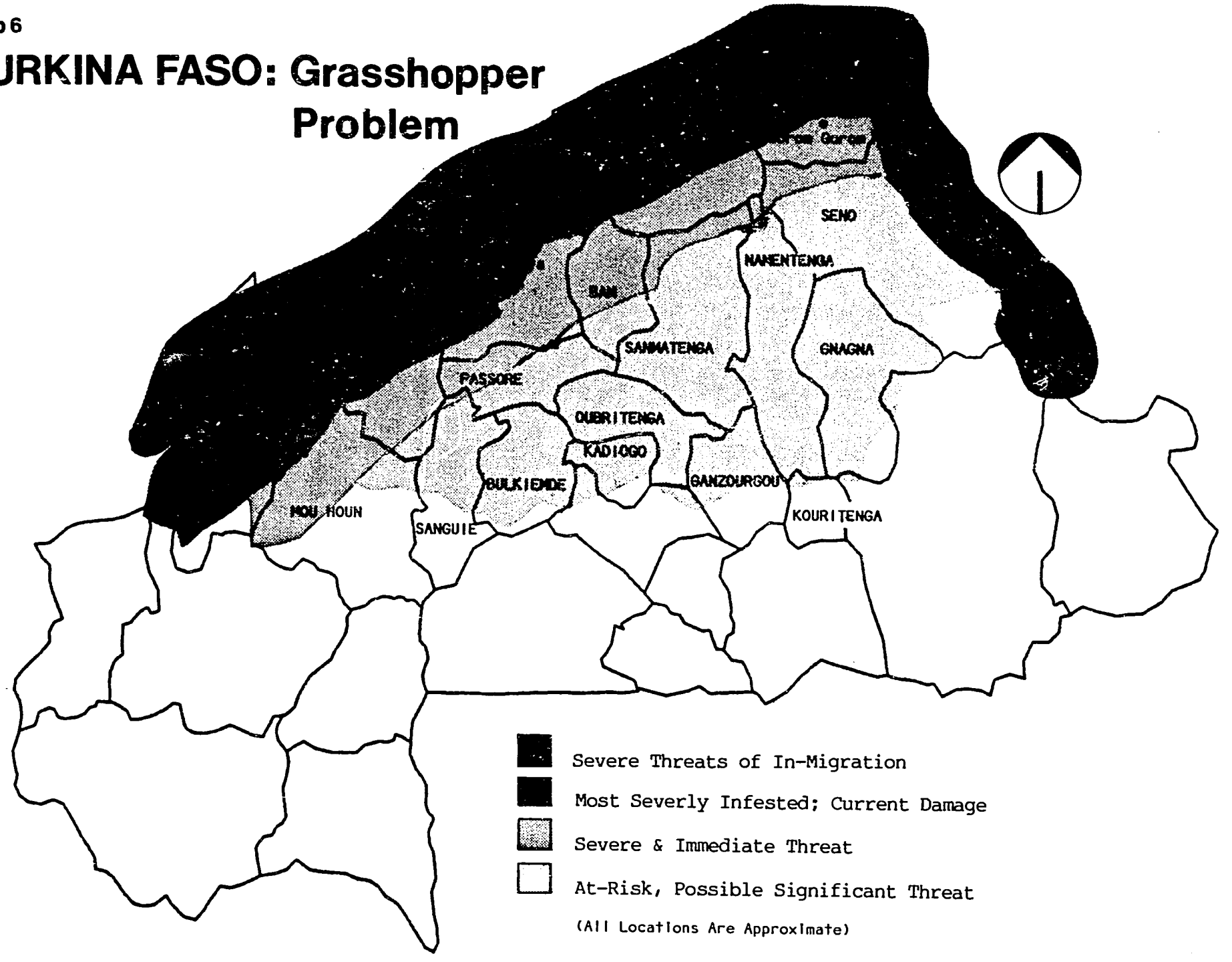
Burkina faces a potentially serious threat of crop damage from grasshoppers as a result of outbreaks from localized hatching, as well as migrations from Mali and Niger. Provinces which have been particularly affected include Kossi, Sourou, Yatenga, Soum, Oudalan, and Seno (Map 6). Reports indicate that Senegalensis grasshoppers may be reproducing a fourth generation around the fourteenth parallel (i.e. Djibo area of Soum Province). In mid-September, there was an area 18 km by 80 km southeast of Dori in Seno Province infested with grasshoppers. Field surveys conducted in early October north of Dori report densities of over 150 grasshoppers per meter, while lower densities of between 8 and 25 grasshoppers per meter have been counted south of Sebba (Seno Province). The crop area at-risk from immediate and severe grasshopper damage is estimated to be at least 200,000 ha. A real concern is the potential threat which the egg masses laid this year pose to the cereal crops of 1987.

USAID/Burkina, FAO, and the GOB are implementing a program using ground teams to treat 100,000 ha, and small aircraft to aerially spray 100,000 ha. But problems surrounding available aircraft and spraying equipment, trained personnel, and lack of regional coordination with Mali and Niger have exacerbated the situation. An area 30 km wide (15 km on each side of the Burkina/Mali border) will not be treated as the zone is considered "unsafe". This zone has been the most seriously affected by the grasshoppers on the Burkina side of the border, and failure to treat the border zone will directly affect the overall ability to control grasshopper damage in Burkina.

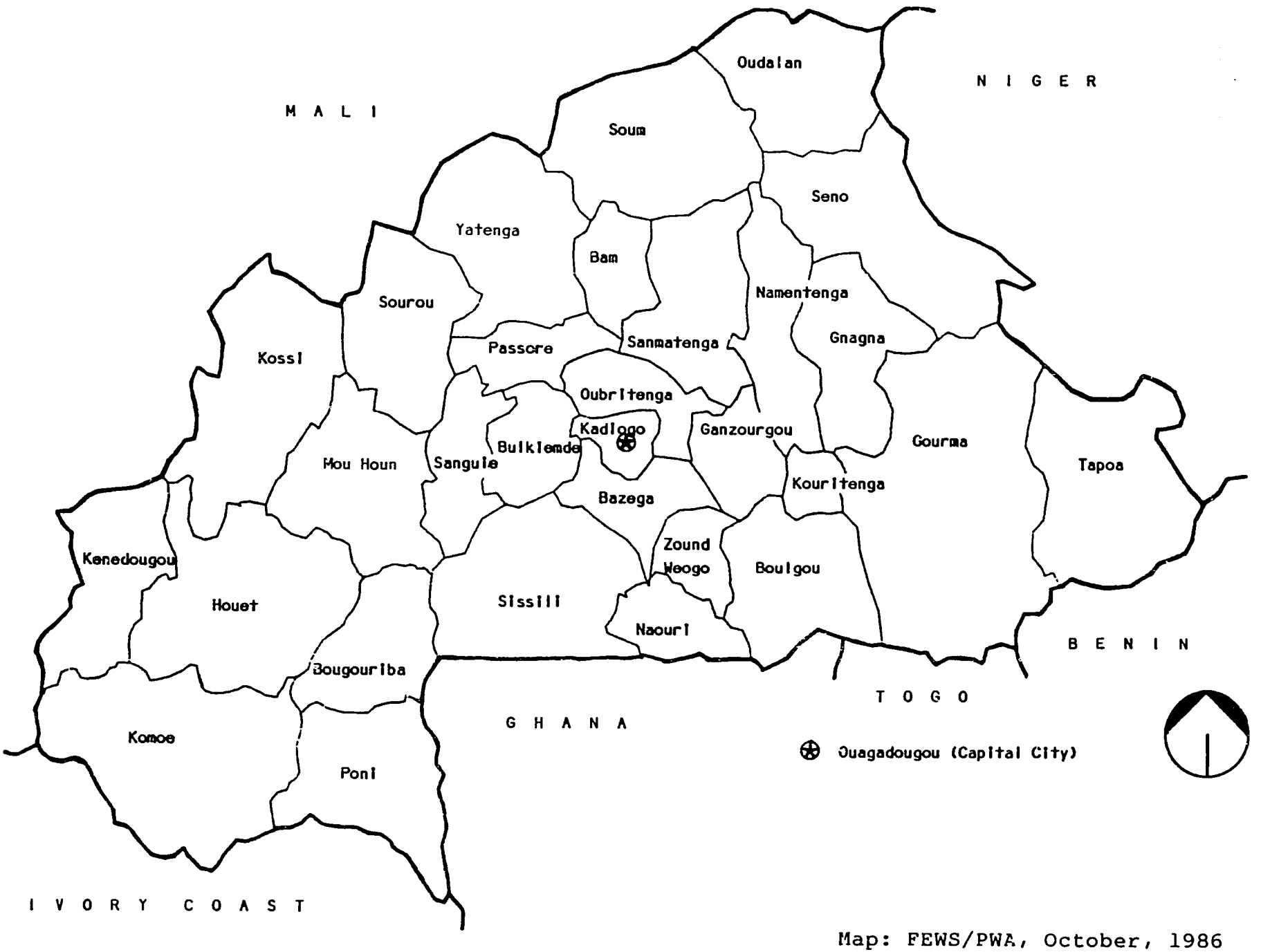
The Government of Burkina, Plant Protection Service (PPS) identified 15,888 ha as under attack by locusts in late August, and had treated approximately 15,400 ha. The PPS claims a 80-90% kill rate of grasshoppers in the larval stage. As of mid-October, the GOB had aerially treated 37,590 ha around Djibo (Soum Province), 26,640 ha near Ouahigouya (Yatenga Province), and 22,300 ha around Dori (Seno Province) for a total of 85,530 ha. In addition, 866 ha were treated by ground crews. Initial kill rates for aerial spraying vary between 10 and 90 percent near Dori, with low kill rates in some areas attributed to delays of several days between field targeting and actual treatment of infested areas.

Map 6

BURKINA FASO: Grasshopper Problem



Map 7



Map: FEWS/PWA, October, 1986

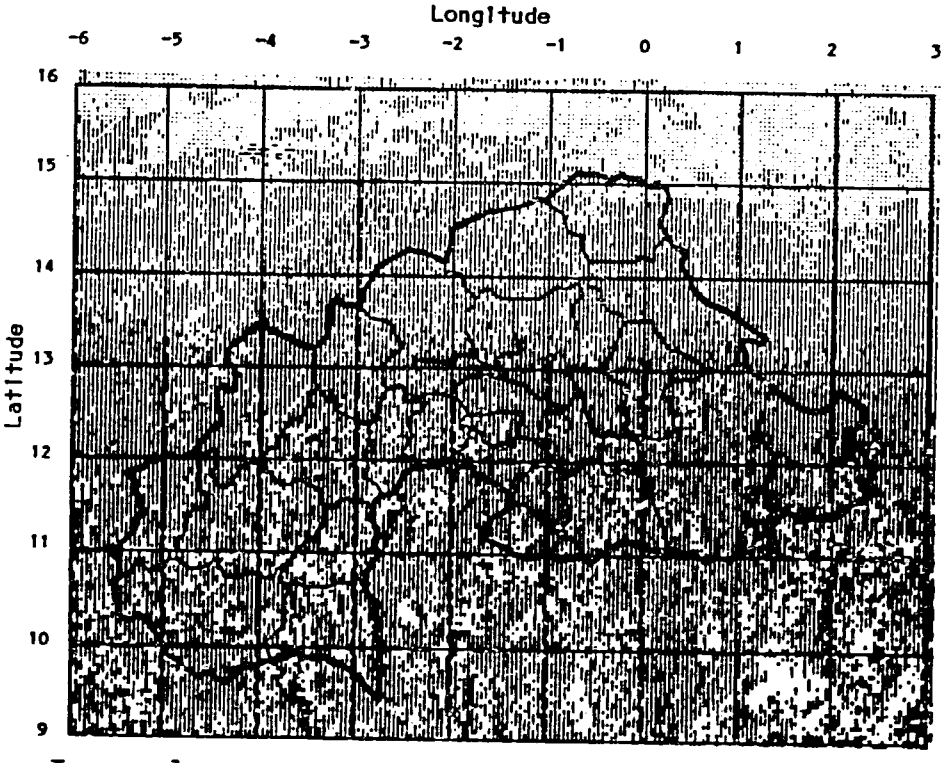


Image 1a
Burkina Faso Vegetation Image,
September 1-10, 1986

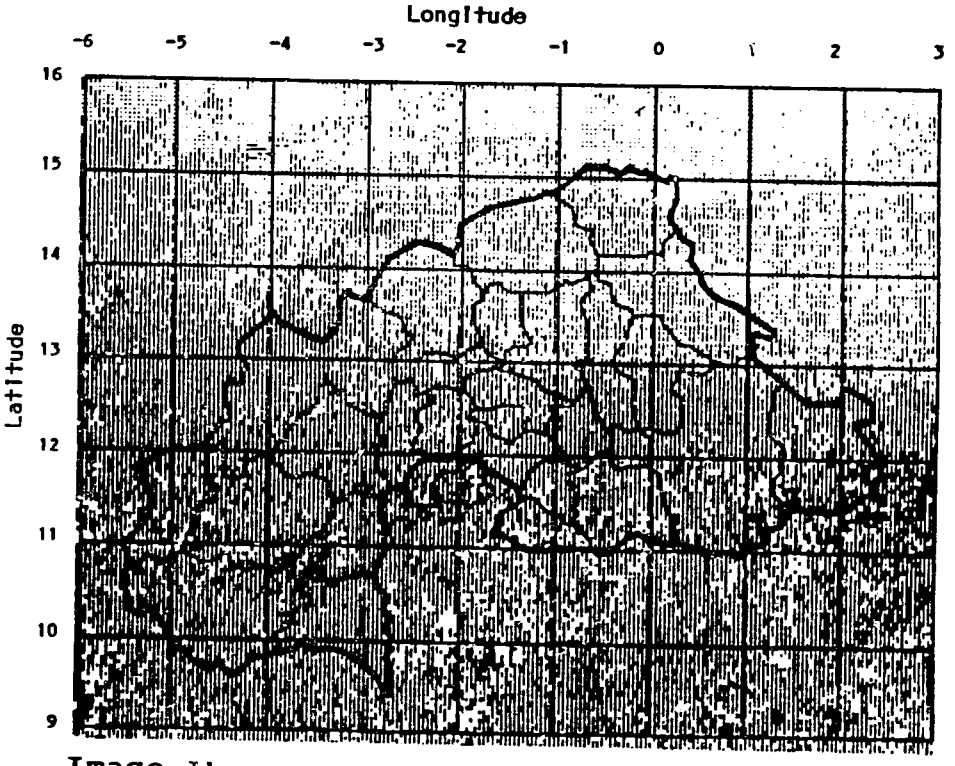
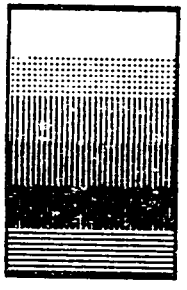


Image 1b
Burkina Faso Vegetation Image,
September 11-20, 1986



1931	6.2516%	Clouds
3605	11.6712%	Bare Soil
8539	27.6450%	Sparse Vegetation
15042	48.6985%	Vegetation
1754	5.6786%	Heavy Vegetation
17	0.0550%	Water, Mud

Source: NOAA Satellite Image Classified by NVI

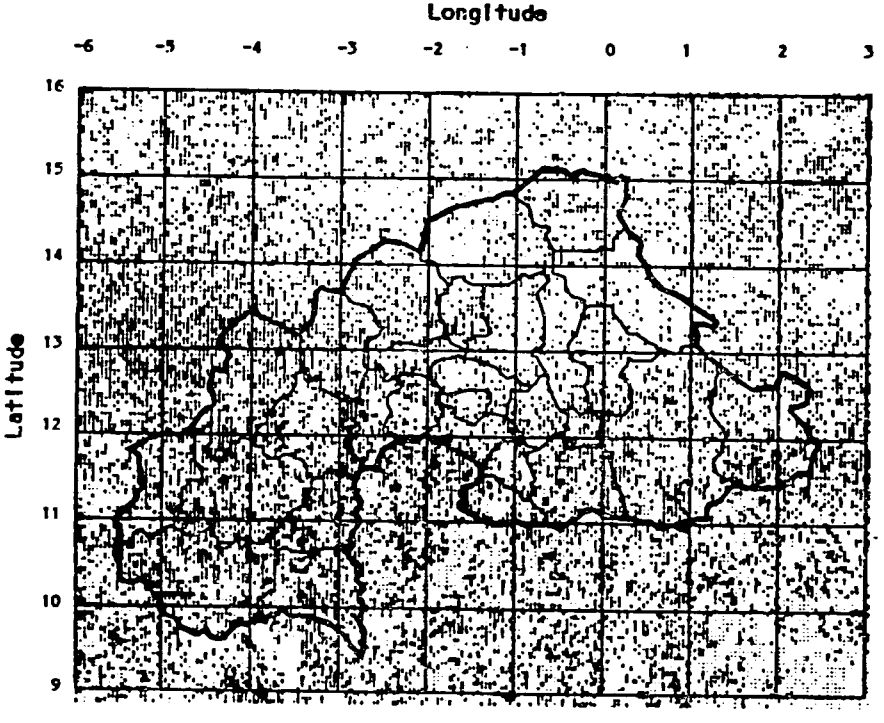


Image 2a
Positive Changes In Vegetation,
September 1-20, 1986

15031	48.6629%	No Change, or Negative Change
5260	17.0293%	Clouds in Either Image
6186	20.0272%	1 Category Improvement
2703	8.7510%	2
1102	3.5677%	3
419	1.3565%	4
187	0.6054%	5 or more Category Improvement

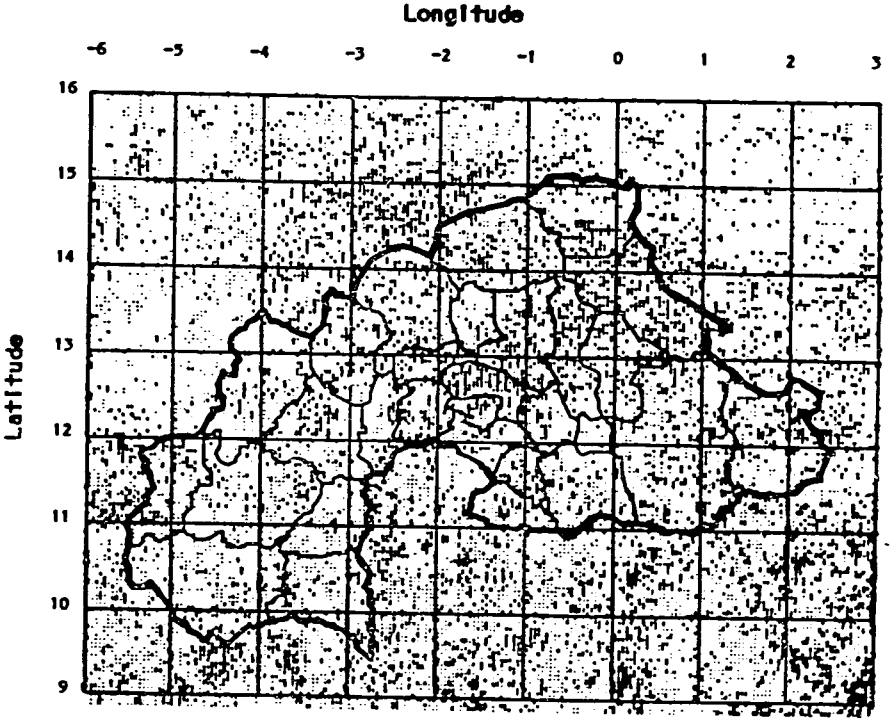
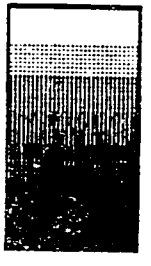


Image 2b
Negative Changes In Vegetation,
September 1-20, 1986



19649	63.6137%	No Change, or Positive Change
5260	17.0293%	Clouds in Either Image
4038	13.0730%	1 Category Decline
1319	4.2703%	2
427	1.3824%	3
143	0.4630%	4
52	0.1684%	5 or more Category Decline

Source: NOAA Satellite Image Classified by NVI

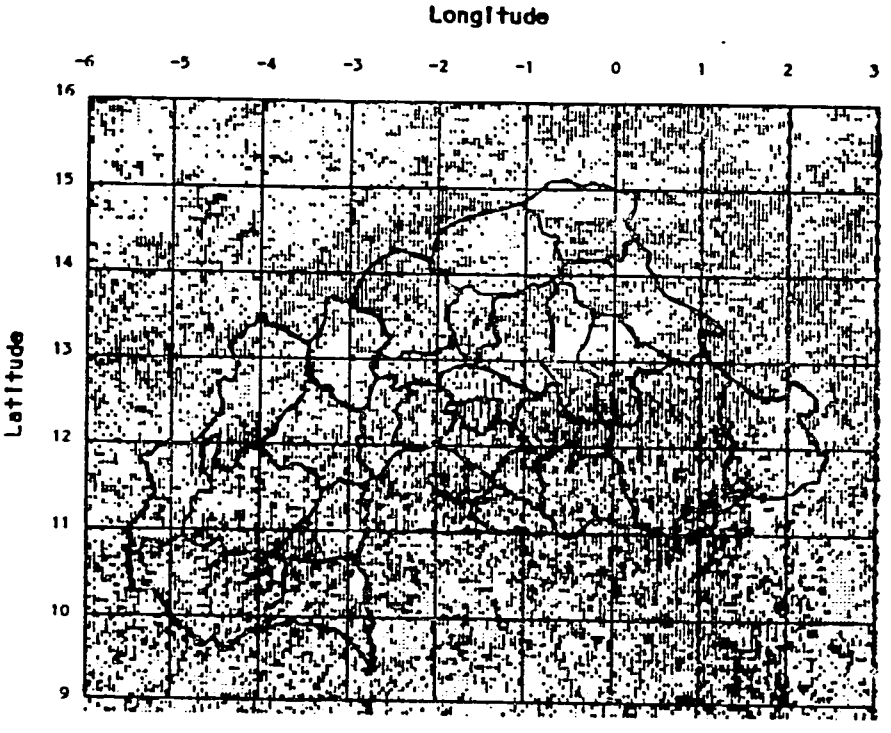


Image 3a
Positive Changes In Vegetation,
September 11-20, 1985 & 1986

14169	45.8722%	No Change, or Negative Change
3640	11.7845%	Clouds in Either Image
6991	22.6334%	1 Category Improvement
3536	11.4478%	2
1542	4.9922%	3
599	1.9393%	4
411	1.3306%	5 or more Category Improvement

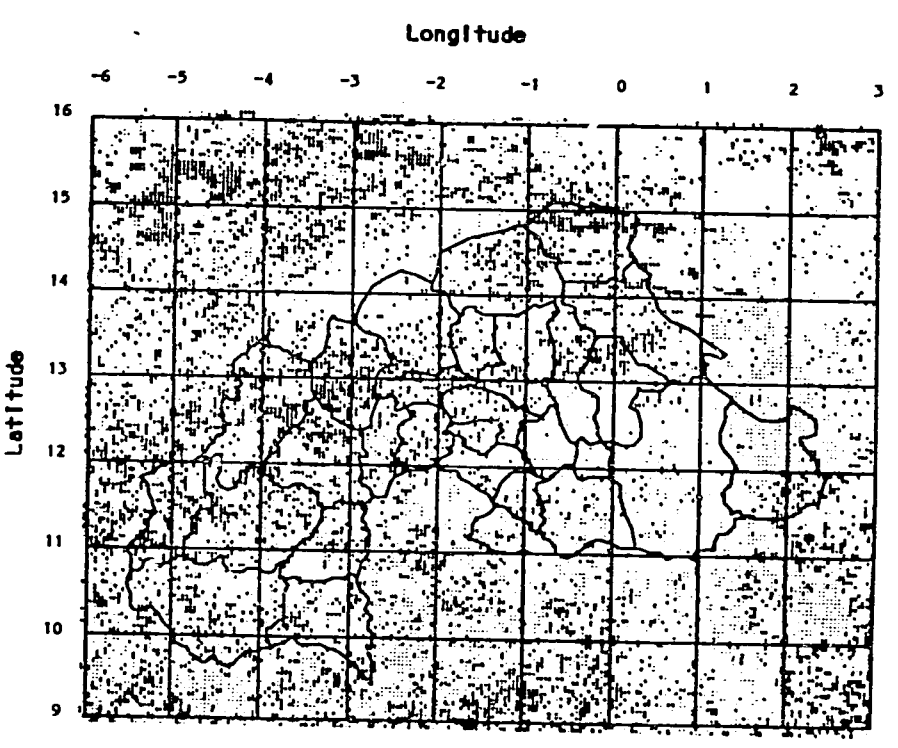


Image 3b
Negative Changes In Vegetation,
September 11-20, 1985 & 1986

21331	69.0592%	No Change, or Positive Change
3640	11.7845%	Clouds in Either Image
4042	13.0860%	1 Category Decline
1377	4.4580%	2
380	1.2303%	3
89	0.2881%	4
29	0.0939%	5 or more Category Decline

Source: NOAA Sateilite Image Classified by NVI

APPENDIX I

BURKINA 1986 ESTIMATED CROP PRODUCTION (000 mt)

In Sorghum Equivalence

Province	(1) 1984 PROD	(1) 1985 PROD	(2) '84/'85 AVE.PROD. ('86 Area)	(3) '81-'85 AVE.PROD. ('86 Area)	(4) 1986 FORECAST	% OF '81-'85 PROD	% OF 1985 PROD	% OF 1984 PROD
BAM	18.8	33.3	30.4	31.2	35.0	112.3	105.2	186.4
BAZEGA	56.5	81.3	82.4	72.9	91.5	125.6	112.5	162.0
BOUGOURIBA	44.3	68.7	22.5	20.0	25.0	125.1	42.6	56.4
BOULGOU	45.2	102.5	53.6	47.2	53.7	113.7	52.4	118.8
BULKIEMDE	47.8	80.2	66.3	65.4	76.5	116.9	95.3	160.2
COMOE	77.2	81.9	71.6	52.0	75.8	145.7	92.5	98.2
GANZOURGOU	20.5	46.5	21.8	18.9	23.7	125.5	50.9	115.7
GNAGNA	7.4	57.2	55.4	54.6	63.0	115.3	110.1	856.3
GOURMA	34.3	51.1	112.1	76.6	88.6	115.7	173.5	258.4
HOUET	87.9	140.9	132.8	118.1	143.8	121.7	102.1	163.6
KADIOGO	21.4	5.3	7.7	7.9	9.9	124.9	186.2	46.3
KENEDOUGOU	38.7	40.7	42.9	45.6	46.2	101.3	113.6	119.4
KOSSI	63.8	86.0	79.6	71.5	71.3	99.8	82.9	111.8
KOURITENGA	25.6	35.3	7.9	7.4	8.2	111.2	23.2	32.0
MOU HOUN	68.2	78.2	82.9	77.3	77.2	99.9	98.7	113.1
NAOURI	15.8	18.2	14.2	12.2	15.5	127.1	85.3	98.0
NAMENTENGA	26.3	15.6	34.3	29.0	32.5	112.3	208.6	123.6
OUBRITENGA	37.0	71.7	54.9	60.0	75.2	125.4	104.9	203.5
OUDALAN	0.9	12.2	9.5	MD	9.4	MD	77.2	1044.4
PASSORE	42.7	56.3	28.3	22.0	25.3	114.8	45.0	59.2
PONI	46.6	53.3	23.2	21.0	26.4	125.7	49.6	56.7
SANGUIE	24.5	46.6	41.2	39.7	46.6	117.3	100.1	190.1
SANMATENGA	58.3	67.8	63.7	58.0	67.2	115.9	99.2	115.3
SENO	11.4	37.1	32.1	MD	32.0	MD	86.2	280.7
SISSILI	27.1	39.7	34.8	20.9	31.4	116.8	79.0	115.8
SOUM	17.7	10.6	17.6	MD	22.4	MD	211.1	126.6
SOUROU	36.4	58.6	63.9	72.3	71.5	98.9	122.1	196.6
TAPOA	30.4	33.7	27.6	22.3	26.2	117.3	77.7	86.1
YATENGA	29.4	60.7	69.9	68.0	97.9	144.0	161.2	333.3
ZOUNDWEOGO	36.5	31.5	28.4	19.4	24.5	126.3	77.9	67.2
BURKINA	1,098.4	1,592.7	1,413.6	1,217.4	1493.4	122.7	93.8	136.0

SOURCES

(1) 1984 and 1985 crop production for Maize, Millet, Sorghum, Rice, FEWS/BURKINA Report, August, 1986.

(2) 1986 crop areas for Maize, Millet, Sorghumn, and Rice. Ibid

(3) 1986 crop areas from FEWS/BURKINA August Report. 1981-1985 average yields from BURKINA FASO YIELD NOAA/NESDIS/AISC, Assessment No. 1. Average Rice yields for 1981-1985 not available.

(4) 1986 crop forecast in Sorghum Equivalence using FEWS/BURKINA 1986 Crop Areas and NOAA 1986 yield fo Estimated rice production calculated by province as a percent of average gross production for 1984- of the average gross production 1984/1985 and 1986 NOAA production forecast for maize, millet, and converted to sorghum equivalents (1986 areas held constant). The percent change for all crops in s equivalents was applied to the 1984/1985 average rice production to forecast 1986 production. rice production for each province by the overall crop increase or decrease as forecast by NOAA.

APPENDIX II

BURKINA 1986 ESTIMATED CROP PRODUCTION

	SORGHUM			MILLET			MAIZE			RICE		
PROVINCE	Est. Yield kg/ha	Est. Area ha	Est. Prod (000 mt	Est. Yield kg/ha	Est. Area ha	Est. Prod. (000 mt	Est. Yield kg/ha	Est. Area ha	Est. Prod. (000 mt	Est. Yield kg/ha	Est. Area ha	Est. Prod. (000 mt
BAM	520	35,254	18.3	500	31,091	15.5	600	1,567	0.9	760	138	0.1
BAZEGA	710	66,652	47.3	660	62,221	41.1	650	4,266	2.8	690	317	0.2
BOUGOURIBA	780	17,530	13.7	640	13,420	8.6	820	2,850	2.3	730	335	0.2
BOULGOU	710	30,820	21.9	550	50,230	27.6	730	2,125	1.6	860	2,444	2.1
BULKIEMDE	650	78,178	50.8	560	41,596	23.3	500	3,970	2.0	690	353	0.2
COMOE	1,050	20,068	21.1	910	13,460	12.2	1,330	26,012	35.4	800	5,841	4.8
GANZOURGOU	710	18,532	13.2	660	14,490	9.6	650	1,332	0.9	490	67	0.0
GNAGNA	650	49,750	32.3	600	46,120	27.7	930	2,710	2.5	910	330	0.3
GOURMA	650	65,900	42.8	600	65,880	39.5	930	6,060	5.6	640	542	0.3
HOUET	1,080	67,760	73.2	750	21,460	16.1	1,200	21,960	26.4	2,240	10,060	22.5
KADIOGO	710	8,421	6.0	660	5,610	3.7	650	222	0.1	1,090	30	0.0
KENEDOUGOU	1,080	20,240	21.9	750	7,540	5.7	1,200	14,040	16.8	900	1,085	1.0
KOSSI	800	46,400	37.1	680	39,600	26.9	930	7,100	6.6	1,100	290	0.3
KOURITENGA	710	6,786	4.8	550	5,674	3.1	730	348	0.3	1,300	29	0.0
MOU HOUN	800	65,050	52.0	680	29,400	20.0	930	4,980	4.6	890	360	0.3
NAMENTENGA	520	32,407	16.9	500	30,064	15.0	600	536	0.3	1,800	110	0.2
NAOURI	710	9,398	6.7	660	12,079	8.0	650	1,168	0.8	400	293	0.1
OUBRITENGA	710	52,931	37.6	660	54,584	36.0	650	2,095	1.4	730	238	0.2
OUDALAN	500 *	2,170	1.1	260	32,100	8.3	0	0	0.0	0	0	0.0
PASSORE	650	20,005	13.0	560	20,069	11.2	500	1,975	1.0	470	35	0.0
PONI	780	20,340	15.9	640	7,340	4.7	820	6,300	5.2	860	470	0.4
SANGUIE	650	47,645	31.0	560	25,751	14.4	500	1,728	0.9	830	299	0.2
SANMATENGO	520	72,386	37.6	500	51,042	25.5	600	2,930	1.8	2,500	724	1.8
SENO	500 *	25,880	12.9	260	73,130	19.0	0	360	0.0	240	5	0.0
SISSILI	650	30,511	19.8	560	16,273	9.1	500	4,165	2.1	610	427	0.3
SOUM	164 *	24,150	4.0	260	71,010	18.5	0	350	0.0	90	55	0.0
SOUROU	800	47,950	38.4	680	47,950	32.6	930	430	0.4	830	103	0.1
TAPOA	650	26,360	17.1	600	12,650	7.6	930	910	0.8	1,340	340	0.5
YATENGA	510	65,140	33.2	650	94,470	61.4	440	4,075	1.8	1,390	855	1.2
ZOUND WEOGO	710	20,722	14.7	660	13,246	8.7	650	984	0.6	830	379	0.3
Totals	690	1,095,336	756.3	560	1,009,540	560.8	980	128,136	125.8	1,430	26,494	37.8

SOURCES:

(1) 1986 crop areas from FEWS/BURKINA August 1986 Report.

(2) Estimated crop yields from BURKINA FASO YIELD FORECAST, NOAA/NESDIS/AISC, Assessment No. 1/86, 1986.

(3) Rice yields calculated as average 1984/1985 yields adjusted by percent increase or decrease production of sorghum, millet and maize in sorghum equivalents between 1984/1985 average and estimated 1986 yields forecast by NOAA.

(4) Sorghum yields for Sahel Department estimated as 83 percent of 1985

APPENDIX III
ESTIMATED CEREAL REQUIREMENTS, BURKINA 1986/1987

Province	Population Dec. 1985	1985 Growth Rate	Estimated 1986 Population	Cereal Required (000 mt)
BAM	169,405	0.012	171,438	32.9
BAZEGA	320,255	0.027	328,901	63.1
BOUGOURIBA	230,962	0.018	235,119	45.1
BOULGOU	419,293	0.027	430,614	82.7
BULKIEMDE	374,177	0.014	379,416	72.8
COMOE	261,251	0.032	269,611	51.8
GANZOURGOU	204,895	0.025	210,018	40.3
GNAGNA	239,629	0.032	247,298	47.5
GOURMA	307,995	0.032	317,851	61.0
HOUET	621,137	0.040	645,982	124.0
KADIOGO	498,600	0.068	532,505	102.2
KENEDOUGOU	145,309	0.027	149,233	28.7
KOSSI	347,364	0.029	357,437	68.6
KOURITENGA	204,698	0.025	209,815	40.3
MOU HOUN	303,317	0.029	312,114	59.9
NAMENTENGA	204,733	0.014	207,599	39.9
NAOURI	109,469	0.026	112,315	21.6
OUBRITENGA	312,376	0.014	316,749	60.8
OUDALAN	111,261	0.028	114,377	22.0
PASSORE	230,768	0.008	232,615	44.7
PONI	242,466	0.018	246,831	47.4
SANGUIE	224,060	0.014	227,196	43.6
SANMATENGO	382,381	0.018	389,264	74.7
SENO	242,961	0.028	249,764	48.0
SISSILI	260,881	0.036	270,273	51.9
SOUM	202,666	0.028	208,341	40.0
SOUROU	281,221	0.029	289,376	55.6
TAPOA	166,470	0.032	171,797	33.0
YATENGA	551,932	0.008	556,348	106.8
ZOUND WEOGO	162,274	0.022	165,844	31.8
Totals	8,334,207		8,556,039	1,642.8

NOTES AND SOURCES:

Per Capita Consumption 192 kg/person/year

(1) 1985 Population, Growth Rates, Per Capita Consumption from FEWS/BURKINA August Report, 1986

APPENDIX IV

ESTIMATED CEREAL BALANCE, BURKINA 1986/1987

	ESTIMATED NET PRODUCTION (000 mt)				PRODUCTION BALANCE (Deficit or Surplus)			G.O.B. Cereal	BALANCE ADJUSTED (G.O.B. Stocks Included)		
Province	Sorghum/ Millet	Maize	Rice	Sorghum Equivalent	(000 s) mt	kg/ person	% Of 192 kg	Stocks (000 mt)	(000 s) mt	kg/ person	% Of 192 kg
BAM	28.8	0.8	0.1	29.7	-3.2	-18.8	-9.8%	0.0	-3.2	-18.8	-9.8%
BAZEGA	76.1	2.4	0.1	77.7	14.6	44.3	23.1%	0.0	14.6	44.3	23.1%
BOUGOURIBA	18.9	2.0	0.1	21.1	-24.0	-102.1	-53.2%	3.0	-21.0	-89.4	-46.5%
BOULGOU	42.1	1.3	1.1	44.7	-37.9	-88.1	-45.9%	2.7	-35.2	-81.9	-42.6%
BULKIEMDE	63.0	1.7	0.1	64.9	-8.0	-21.0	-10.9%	2.4	-5.6	-14.6	-7.6%
COMOE	28.3	30.1	2.4	62.4	10.6	39.6	20.6%	1.4	12.0	44.7	23.3%
GANZOURGOU	19.3	0.7	0.0	20.1	-20.2	-96.3	-50.2%	0.0	-20.2	-96.3	-50.2%
GNAGNA	51.0	2.1	0.2	53.4	5.9	24.0	12.5%	0.0	5.9	24.0	12.5%
GOURMA	70.0	4.8	0.2	75.2	14.2	44.6	23.2%	6.1	20.3	63.7	33.2%
HOUET	75.9	22.4	11.2	112.7	-11.3	-17.5	-9.1%	12.5	1.2	1.8	1.0%
KADIOGO	8.2	0.1	0.0	8.4	-93.9	-176.3	-91.8%	32.4	-61.5	-115.4	-60.1%
KENEDOUGOU	23.4	14.3	0.5	38.8	10.2	68.3	35.6%	0.0	10.2	68.3	35.6%
KOSSI	54.4	5.8	0.2	60.5	-8.2	-22.9	-11.9%	0.0	-8.2	-22.9	-11.9%
KOURITENGA	6.7	0.2	0.0	7.0	-33.3	-158.7	-82.6%	3.0	-30.3	-144.4	-75.2%
MOU HOUN	61.2	3.9	0.2	65.5	5.6	17.9	9.3%	12.1	17.7	56.6	29.5%
NAMENTENGA	27.1	0.3	0.1	27.5	-12.4	-59.5	-31.0%	0.0	-12.4	-59.5	-31.0%
NAOURI	12.4	1.2	0.0	13.7	-7.9	-70.0	-36.4%	1.3	-6.6	-58.4	-30.4%
OUBRITENGA	62.6	0.6	0.1	63.3	2.5	8.0	4.1%	0.0	2.5	8.0	4.1%
OUDALAN	8.0	0.0	0.0	8.0	-13.9	-121.9	-63.5%	0.0	-13.9	-121.9	-63.5%
PASSORE	20.0	0.8	0.0	21.5	-23.2	-99.7	-51.9%	0.0	-23.2	-99.7	-51.9%
PONI	17.5	4.4	0.2	22.3	-25.1	-101.7	-53.0%	4.7	-20.4	-82.7	-43.1%
SANGUIE	38.6	0.7	0.1	39.5	-4.1	-16.2	-9.5%	0.0	-4.1	-16.2	-9.5%
SANMATENGO	53.7	1.5	0.9	56.3	-18.4	-47.3	-24.6%	3.4	-15.0	-38.6	-20.1%
SENO	27.2	0.0	0.0	27.2	-20.8	-83.3	-43.4%	6.8	-14.0	-56.0	-29.2%
SISSILI	24.6	1.8	0.1	26.6	-25.3	-93.6	-48.7%	0.0	-25.3	-93.6	-48.7%
SOUM	19.1	0.0	0.0	19.1	-20.9	-100.5	-52.3%	0.0	-20.9	-100.5	-52.3%
SOUROU	60.3	0.3	0.0	60.7	5.2	17.8	9.3%	0.0	5.2	17.8	9.3%
TAPOA	21.0	0.7	0.2	22.0	-10.9	-63.7	-33.2%	0.0	-10.9	-63.7	-33.2%
YATENGA	80.4	1.5	0.8	82.7	-24.1	-43.3	-22.6%	8.9	-15.2	-27.3	-14.2%
ZOUND WEOGO	19.9	0.5	0.2	20.7	-11.2	-67.2	-35.0%	0.0	-11.2	-67.2	-35.0%
Totals	1,119.5	108.9	18.9	1,253.3	-389.5	-45.5	-23.7%	100.7	-288.8	-33.8	-17.6%

NOTES AND SOURCES:

	Sorghum Millet	Maize	Rice
Milling and Waste Loss Rates:	15%	15%	50%

(1) Government of Burkina (GOB) Stocks from FEWS/BURKINA August Report.

(2) Sorghum equivalent calculated based on calroic content:

Sorghum	Csg=3052	Maize	Cmz=3167
Millet	Cml=3052	Rice	Crl=3687

Tons Sorghum=((Psg*Csg)+(Pml*Cml)+(Pmz*Cmz)+(Prl*Crl))/Csg