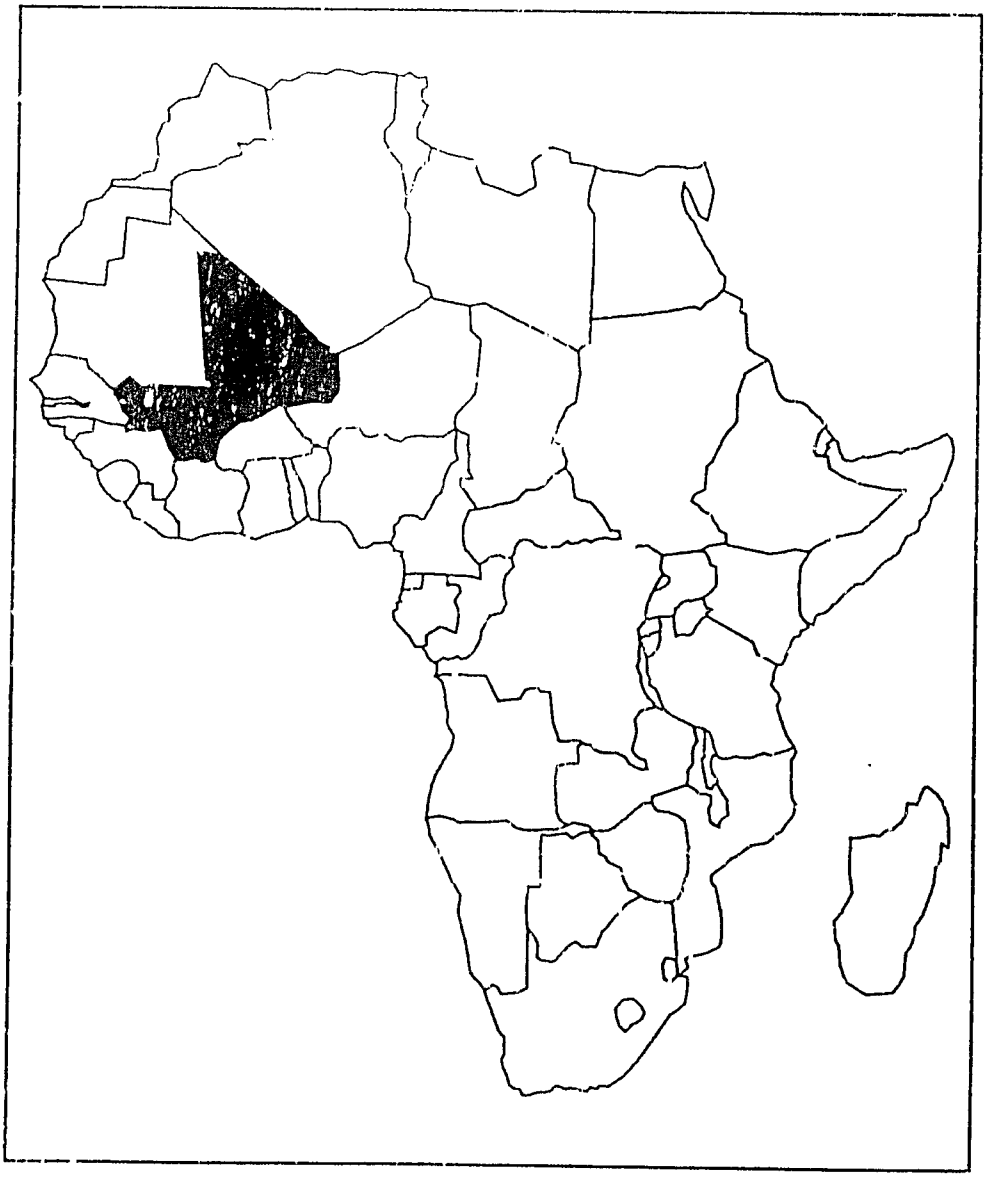
MALI

Record Harvest for Mali

FAMINE EARLY WARNING SYSTEM



Produced by the Office of Technical Resources - Africa Bureau - USAID

FAMINE EARLY WARNING SYSTEM

The Famine Early Warning System (FEWS) is an Agency-wide effort coordinated by the Africa Bureau of the U.S. Agency for International Development (AID). Its mission is to assemble, analyze and report on the complex conditions which may lead to famine in any one of the following drought-prone countries in Africa:

- **Burkina**
- **Chad**
- **Ethiopia**
- **Mali**
- **Mauritania**
- **Niger**
- **Sudan**

FEWS reflects the Africa Bureau's commitment to providing reliable and timely information to decision-makers within the Agency, within the seven countries, and among the broader donor community, so that they can take appropriate actions to avert a famine.

FEWS relies on information it obtains from a wide variety of sources including: USAID Missions, host governments, private voluntary organizations, international donor and relief agencies, and the remote sensing and academic communities. In addition, the FEWS system obtains information directly from FEWS Field Representatives currently assigned to six USAID Missions.

FEWS analyzes the information it collects, crosschecks and analyzes the data, and systematically disseminates its findings through several types of publications. In addition, FEWS serves the AID staff by:

- preparing **FEWS Alert Memoranda** for distribution to top AID decision-makers when dictated by fast-breaking events;
- preparing **Special Reports, maps, briefings, analyses, etc.** upon request; and
- responding to **special inquiries.**

Please note that this is the last monthly Country Report that will be published in this format. A new reporting schedule and format are being prepared.

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FEWS Country Reports, Bulletins, Alert Memoranda, and other special studies are prepared for USAID's Africa Bureau by **Price, Williams & Associates, Inc.**

The work of the FEWS Field Representatives is coordinated by **Tulane University's School of Public Health and Tropical Medicine.**

NOTE: This publication is a working document and should not be construed as an official pronouncement of the U. S. Agency for International Development.

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December 1988

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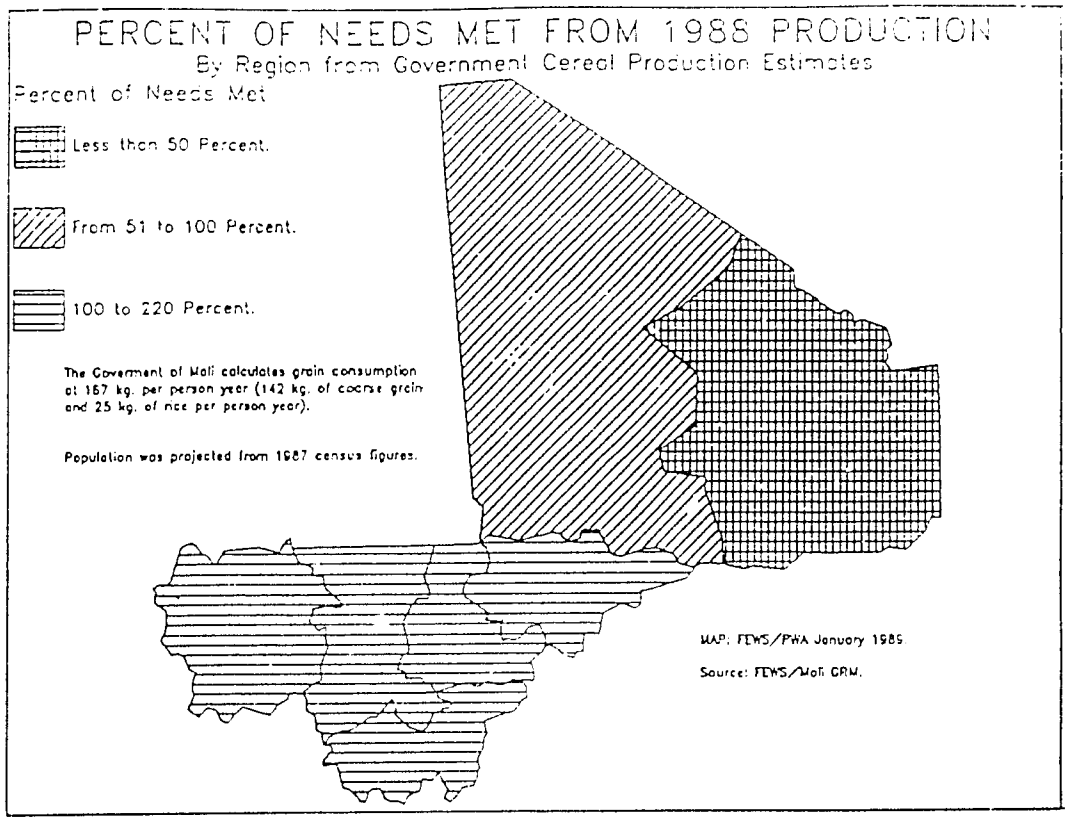
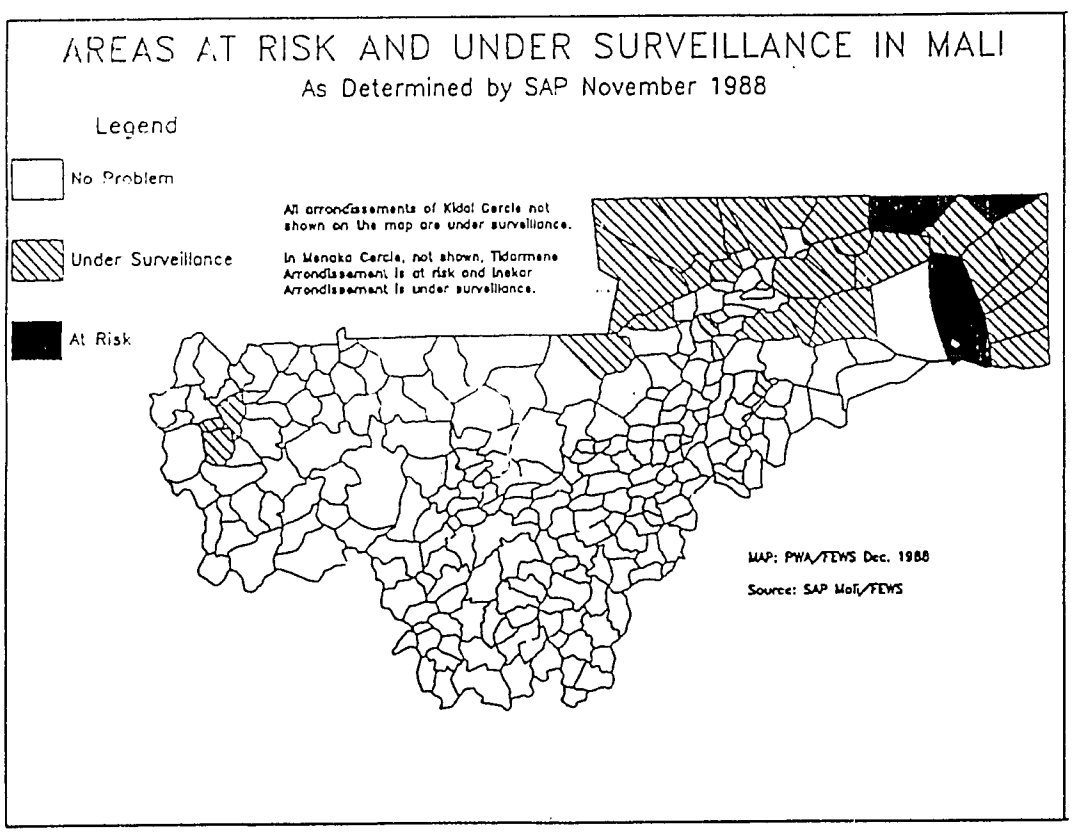
Map 1


PERCENT OF NEEDS MET FROM 1988 PRODUCTION
By Region from Government Cereal Production Estimates
Percent of Needs Met
Less than 50 Percent.
From 51 to 100 Percent.
100 to 220 Percent.
The Goverment of Mali calculates grain consumption at 167 kg. per person year (142 kg. of coarse grain and 25 kg. of rice per person year).
Population was projected from 1987 census figures.
MAP: FEWS/PWA January 1989
Source: FEWS/Mali CRM.

Map 2


AREAS AT RISK AND UNDER SURVEILLANCE IN MALI
As Determined by SAP November 1988
Legend
No Problem
Under Surveillance
At Risk
All arrondissements of Kidal Cercle not shown on the map are under surveillance.
In Menaka Cercle, not shown, Tidarmene Arrondissement is at risk and Inekar Arrondissement is under surveillance.
MAP: PWA/FEWS Dec. 1988
Source: SAP Mali/FEWS

Record Harvest for Mali

Summary

The 1988 harvest is a record one for Mali. The government of Mali estimates net cereal production at 2,391,875 metric tons (MT), an increase of 769,000 MT over last year. USAID Bamako estimates a surplus of at least 500,000 MT. The situation is equally positive for livestock due to abundant pasture and accessible water that persisted throughout the rainy season.

The Système d'Alerte Précoce (SAP) has placed 32 arrondissements under surveillance and identified six arrondissements in the Gao Region as at risk (see Map 1), and has made recommendations for emergency food deliveries. This surveillance by SAP suggests that they believe these areas could eventually have a cereal shortage because of a mediocre harvest even though cereal availability is not currently a problem. SAP recommends that 2,000 MT of National Security Stocks be replenished in the Gao Region by March to be available to areas identified as at risk, should it be necessary.

Emergency food distributions recommended by SAP occurred as early as last February and continued until the recent harvest. A total of 7,370 MT of emergency food was distributed under the auspices of the National Committee on Drought (CNAUR) in 27 arrondissements in northern Mali.

Pre-Harvest Vulnerability

Until the end of the 1988 harvest, 27 arrondissements that had been designated as at risk by the Système d'Alerte Précoce (SAP) were caught in a crisis of high cereal prices and low public stocks. Even before the end of 1987 the Government of Mali had authorized the distribution of 9,925 MT of grain to those areas by February 1988 and later authorized the distribution of an additional 22,000 MT. As the season evolved, SAP revised its schedule of food distributions for areas under surveillance and at risk. Despite its recommendations, emergency food distributions were not accomplished in the amounts or to the schedule proposed. As a consequence, a cereal crisis persisted in some areas of northern Mali until harvest. In fact, cereal availability worsened during the rainy season as transportation routes were cut off by rain and flooding. The persistence of the cereal crisis can be attributed to late pre-positioning of cereal stocks and the late delivery of emergency food according to the schedule recommended by SAP.

Agricultural Production

Preliminary estimates of cereal production in Mali indicate a record harvest in 1988. These estimates show yields above those reported between 1975 to 1987, making this year's harvest exceptional (see Table 1). Government estimates show 5 of Mali's 7 regions have been able to produce a cereal surplus this year (see Map 2). Regions showing a shortfall, Tombouctou and Gao, have never produced a cereal surplus and are primarily dependent on livestock production (which should be good in these areas). All indications are that livestock have benefitted from abundant vegetation in pastures, and abundant sources of surface water brought by this year's good rains. Areas of Mali with cereal surpluses should be able to provide cereal to areas with grain production shortfalls. SAP's concern for those areas with a possible cereal shortfall stems from the difficulty in pre-positioning cereal stocks.

Early this season there was concern that low seed stocks would constrain cereal production. This did not prove to be the case. Most farmers planted only once due to the good timing of rainfall.

This year's good pasture, while beneficial for all livestock, will be particularly good for heifers and young bulls. These animals will start the dry season well fed and in good shape, promising good herds for next year. As a consequence of good forage, milk products are in abundance and should be available for a longer period than usual as the dry season progresses.

Rainfall

Rainfall data for the 1988 growing season shows that this year's rain has been above the long term average virtually everywhere in Mali, with the exception of Goundam arrondissement in Tombouctou Region and southeastern Gao and Ansongo arrondissements. Because of abundant and well timed rains, most areas that had been identified as vulnerable have all ended the season with good harvests and with livestock in excellent condition. This includes the arrondissements that were thought to be particularly vulnerable should the harvest be low due to poor rainfall; Nampala and Sokolo arrondissements in the Segou Region; Tenenkou, Doutenza, Bandiagara, and Mopti arrondissements in Mopti Region; and Goundam and Niafunké Cercles in Tombouctou Region. According to GRM estimates, only Tombouctou and Gao regions (as would be expected) will have a cereal shortfall, though the shortfall in these areas should be less than in recent years. To date, SAP has placed only the arrondissements of Tidarmene, Almoustarat, Bamba, Temera, Talataye, and N'Tillit, in Gao Region, in the at-risk category.

River flood levels have been above those of 1987. Both the Bakoye and the Senegal Rivers have been above the 1961 to 1987 average. This is particularly good news for the operations of the Manantali Dam. The Manantali Dam, which started filling as a result of this year's good rains, has released most of its water to make some final adjustments on sluice gates. The water released for this repair should have increased the flow of water in the Senegal river and been helpful to flood recession agriculture and truck gardens along its banks. Overall, river flows in 1988 were generally greater than last year but maximum flood levels were only maintained briefly and were followed by a more rapid recession than last year. This fact may reflect the generally good distribution of rain throughout the season, and a brief period at the end of the season of extremely important rainfall.

Vegetation

Satellite imagery (NDVI, see inside back cover) shows that vegetation this year was well above the 1982 to 1987 average. As a whole, vegetation levels in Mali were either equal to or above the 1982 to 1987 average. While southeastern Gao Region did not report very good rainfall this season, satellite imagery shows that most of southeastern Mali had vegetation above the 1982 to 1987 average (see Map 3).

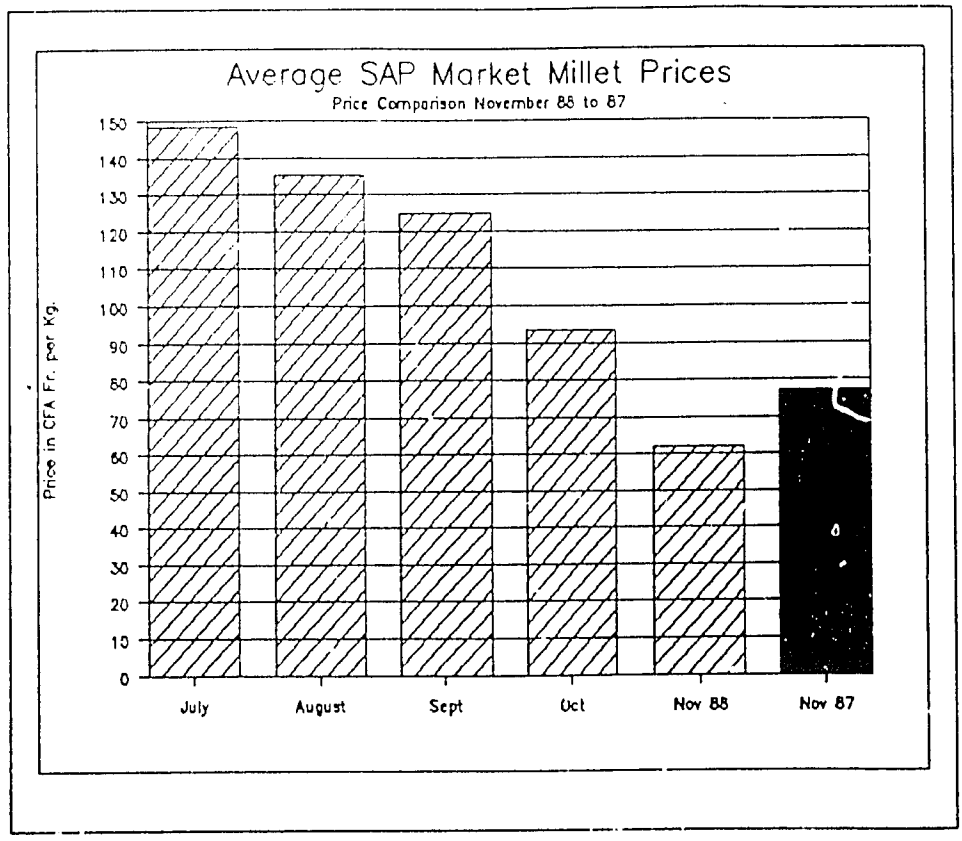
Table 1

1988 CEREAL PRODUCTION AND NEEDS

REGION	Net Production	Population Projection	Percent of Needs Met @ 167 kg.*	Percent of Needs Met @ 188 kg.*	1987 Percent of Needs Met @ 188 kg.*
Kaye	343,732	1,113,034	185%	164%	69%
Koulikoro	293,186	1,240,979	141%	126%	125%
Sikasso	336,922	1,376,161	147%	130%	134%
Segou	513,059	1,396,582	220%	195%	105%
Mopti	391,391	1,326,275	177%	157%	52%
Toumboucto	54,577	476,346	69%	61%	27%
Gao	24,569	403,475	36%	32%	7%
TOTAL	1,957,536	7,332,852	160%	142%	88%

*The 167 kg. figure is used by the GRM and CNAUR. USAID Bamako uses 188 kg. per person year to to calculate consumption.

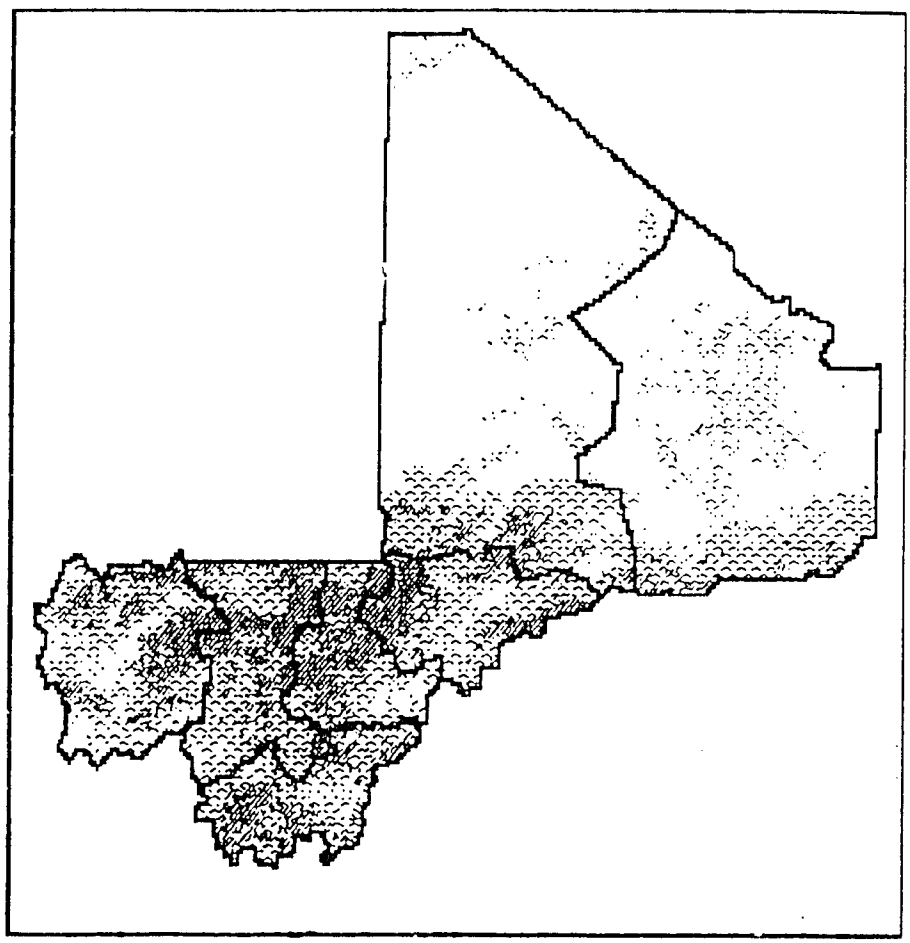
Figure 1



Map 3

Mali: 1988 Average Vegetation Compared to the Historical Average (1982-1987)

(All areas of Mali were at least equal to the historical average)



Above Average

Far Above Average

MAP: PWA/FEWS Dec. 1988

Pests

Damage to crops from locust and grasshoppers was not as serious this year as had been predicted by the FAO and other earlier this season. Two factors account for this outcome. The position of the ITCZ (see inside back cover) kept grasshoppers and locusts further north than usual and away from important cropping areas, and, Crop Protection Services in Mali contributed significantly to the effort to control the damage done by locust and grasshoppers. There were reports of a more southerly extension of locust breeding than usual and, for the first time, an entomologist reported second round locust breeding in the lake zone of Mali south of Goundam, as well as in Niafunké and Gourma-Rharous. Second generation breeding of locusts is a recurring phenomenon in the Adrar mountains of northern Gao, but had not previously been noted as far south as Niafunké. Despite heavy localized damage, by both locusts and grasshoppers (local estimates ranging from 10% of sorghum to 90% of millet), overall damage is estimated at only 2% of national production.

This season's abundant rains provided good vegetation and breeding conditions for Desert Locusts. This implies, especially for Desert Locusts, that if there is a good winter breeding season, there may be a greater threat next year.

Socioeconomic Indicators

Population Movement

A recent survey of the "displaced" population around Douentza, reveals that just over 40% came to Douentza from the Cercle of Gourma-Rharous, immediately to the north, and 30% came from arrondissements within Douentza itself. This migration, over a relatively short distance, may indicate a trend of rural to urban migration rather than drought induced crisis migration. The broad range of economic activities entered into by this "displaced" population also suggests a population seeking economic opportunity. Indeed, only a very small percentage of this population had participated in craft and entrepreneurial activity before migrating to Douentza.

Another study, on the sedentarization of pastoral nomads conducted by the Livestock Office of the Ministry of Livestock and Natural Resources was unable to locate a significant number of transhumant communities. Whether this is the result of poor survey methodology, or a symptom of accelerating sedenterization of transhumant communities, is unclear.

Cereal Prices

Prices of millet in markets monitored by SAP have fallen following the harvest (see Table 2). Prices in November had fallen below November 1987 prices in all markets except Gao and Bourem. The average price of millet in November 1988 has fallen below the 1987 price (see Figure 1). A drastic drop in prices could create a disincentive for producers next year. This would be a particular problem in areas of southern Mali that have traditionally produced a grain surplus.

Post-Harvest Assessment

SAP has listed 32 arrondissements, all but six of which are in Tombouctou and Gao Regions, as requiring continuing surveillance and has listed six arrondissements in Gao Region at risk. However, historically most arrondissements in Tombouctou and Gao Regions have never met local cereal needs and the local economy is based on the sale of livestock. SAP feels cereal stocks are currently adequate in these areas at present and has not made any recommendations for food distribution. However, SAP has recommended that National Security Stocks in Gao Region be replenished. SAP has also recommended that 2000 MT of grain be made available for pre-positioning for those six arrondissements of the Gao Region that have been listed as being at risk of a cereal crisis. Following

Table 2

MILLET PRICES JULY TO NOVEMBER 1988

Cercle	July 88	August 88	Sept 88	Oct 88	Nov 88
Kayes*	140	150	150	140	50
Diema*	83	67	60	50	33
Nioro*	100	100	80	80	60
Yelimane*					67
Koulikoro					
Banamba*	135	125	135	75	40
Kolokani*	125	140	140	50	45
Nara*	160	140	140	80	60
Mopti*	150	135	110	75	55
Bandigara*	200	165	115	80	50
Bankass*	130	125	100	60	30
Djenne*	160	160		75	
Douentza*	160		135	80	50
Koro*	160	130	120	75	40
Tenenkou*	165	125	85	60	35
Youvarou*	165		130	60	25
Tombouctou*	165	165	165	135	100
Dire*	150	155		145	80
Goundam*	120	160	135	140	80
Gourma-*	165	170	140	140	105
Niafunke*	160	160	140	100	50
Gao*	160	150	130	125	95
Asongo*	175	160	160		55
Bourem*			150	175	100
Kidal*					150
Menaka*		150	100	125	75
Segou	80	120	115	40	45
Macina	135	137	68	40	37
Nioro*	130	130	110	100	25

* SAP Markets
Source: SAP December Report.

Table 3

National Security and OPAM Stocks

	National Security Stocks		OPAM Stocks	
Cercle	October	November	October	November
Kayes	1752	1685	2536	2536
Diema			386	386
Nioro			454	290
Yelimane			232	229
Koulikoro				
Banamba			70	52
Kolokani			28	17
Nara			231	228
Segou	14320	10564		
Macina				141
Nioro			56	62
Mopti	0	0	494	2206
Bandigara			159	2143
Bankass				
Djenne			33	30
Douentza			92	5100
Koro			35	
Tenenkou			137	126
Youvarou			224	2228
Tombouctou	0	5253	3472	2808
Dire			562	708
Goundam			397	
Gourma-			695	
Niafunke			399	
Gao	0	0	2096	
Asongo			100	
Bourem			265	
Kidal			1440	
Menaka			514	
Total	16072	12512	12229	20218

Source: SAP November Report
Shaded Areas: Cercles that have arrondissements under surveillance or at risk.

high cereal yields throughout Mali, and good rangeland conditions, it appears that there will be little need for significant emergency food distributions in 1989.

Outlook

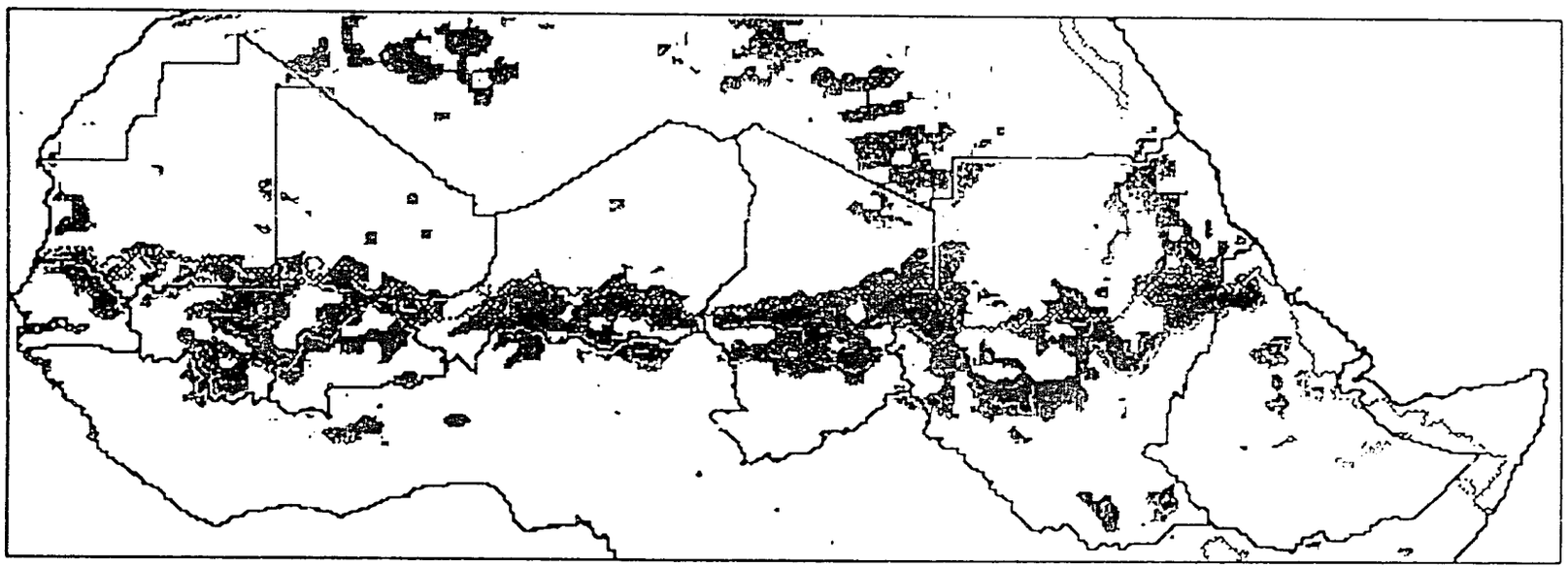
Despite the fact that SAP has placed 32 arrondissements under surveillance and six arrondissements at risk of having a food availability crisis, the results of the 1988 harvest suggest that cereal stocks and availability are better than they have been since Mali's last record breaking harvest in 1986. However, Table 3 shows there are presently no security stocks in the Gao Region and very low stocks in Tombouctou. These are the two regions where most areas, designated as being under surveillance or at risk are located. If a cereal crisis were to develop in these areas, pre-positioning of cereal stocks would avoid a repeat of this year's crisis. The USAID Mission has voiced some concern that the good harvest will depress the grain market and act as a disincentive for farmers to increase and/or maintain production.

Regional Summary

From Mauritania east to Ethiopia, the FEWS-monitored countries report excellent rainfall (in terms of recent history) during the 1988 growing season. Satellite imagery showed vegetative potential to be very good, and in some areas better than the historical (1982-1987) maximum (see Map 4). While estimates vary, record production can be expected in Sudan, Chad, Niger, and Mali. Production is expected to be good or better in Ethiopia and Burkina. The only exception to this good agricultural year may be Mauritania, which is the only country where predictions of significant (at a national level) locust damage might be borne out. Mauritania, however, is a grain-importing nation even in the best of years.

The areas of greatest vulnerability currently lie where war and civil strife limit access to food. There is a famine among displaced people in and around the Southern Region of Sudan. In Ethiopia, civil war in Eritrea and Tigray continues to make populations there extremely vulnerable to famine. Elsewhere, vulnerable populations are more localized.

Regional NDVI Greater than Historical Maximum



Areas where 1988 NDVI reached levels significantly higher than the 1982-87 record

····· Historic northing of the 0.2 NDVI contour (which corresponds very closely with the 1988 contour)

Key Terms

At Risk - FEWS Reports employ the term "at risk" to describe those populations or areas either currently or in the near future expected to be 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.

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.

ITCZ - The Intertropical Convergence Zone (ITCZ) is where the high pressure system originating in equatorial regions of the Atlantic (the St. Helena's High) collides with the Azores High descending from the north. The ITCZ tends to move northward during the spring and summer in response to normal global weather patterns. The position of the ITCZ normally defines the northern limits of possible precipitation in the Sahel; rainfall generally occurs 100 to 300 kilometers south of the ITCZ.

NDVI - Normalized Difference Vegetation Index (NDVI) images are created at the laboratory of the National Aeronautic and Space Administration (NASA) Global Inventory Modeling and Monitoring System (GIMMS). These images are derived from Global Area Coverage (GAC) imagery (of approximately 4 km resolution) received from the Advanced Very High Resolution Radiometer (AVHRR) sensors on board the National Oceanic and Atmospheric Administration (NOAA) Polar Orbiting series of satellites. The polar orbiter satellites remotely sense the entire Earth and its atmosphere once each day and once each night, collecting data in 5 spectral bands. Bands 1 and 2 sense reflected red and infra-red wavelengths respectively, and the remaining 3 bands sense emitted radiation in 3 different spectral bands. The NDVI images are created by calculating

$$(\text{infrared} - \text{red}) / (\text{infrared} + \text{red})$$

for each pixel from the daytime satellite passes. Since chlorophyll reflects more in the infrared band than in the red band, higher NDVI values indicate the presence of more chlorophyll and, by inference, more live vegetation. A composite of daily NDVI images is created for each 10-day period, using the highest NDVI value for each pixel during that period. This technique minimizes the effects of clouds and other forms of atmospheric interference that tend to reduce NDVI values. NDVI is often referred to as a measure of "greenness" or "vegetative vigor." The NDVI images are used to monitor the response of vegetation to weather conditions.