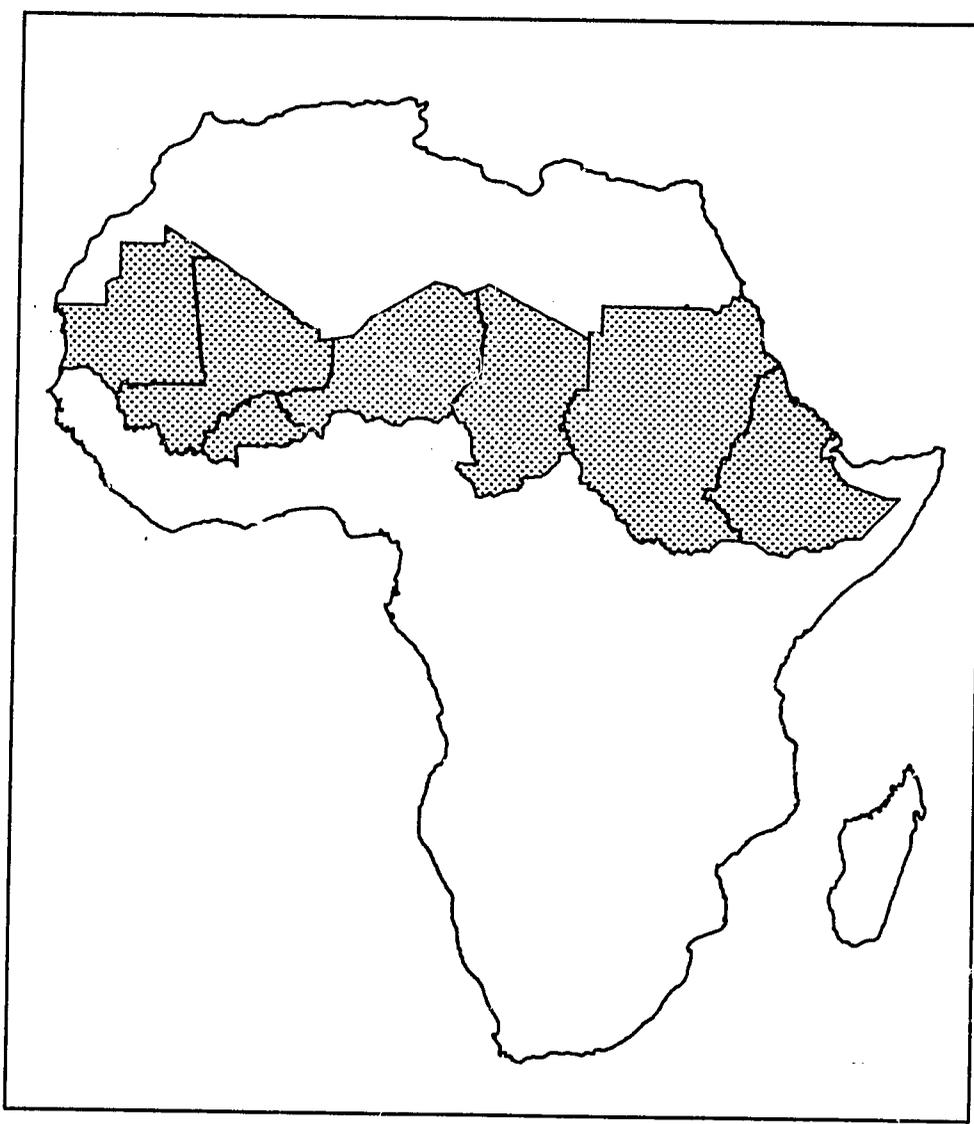


Pre-Harvest Assessment



Contains reports on:

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

Country Assessments prepared by USAID Missions and FEWS Field Representatives in each FEWS-monitored country during the month of September 1991. Published by FEWS/Washington for the Agency for International Development, Bureau for Africa. Project No. 698-0466, Contract No. AFR-0466-C-00-9035-G0.

Pre-Harvest Assessment

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Executive Summary

Although the 1991 harvests in Sudan and Ethiopia will be much improved over last year's poor harvests, both countries will still be in need of substantial emergency aid in 1992. Harvests in Mali, Burkina, Niger and Chad will rival those of 1988, the best harvest year of the 1980s, alleviating much of the food stress in these countries. Most of the remaining small pockets of food stress within these four countries could be addressed by internal relief. Mauritania's 1991/92 harvest will be better than that of 1990/91, but will not be as strong as the other Sahelian FEWS countries' -- Mauritania's 1991/92 rainfed harvest will likely be quite poor.

Mauritania

Late start of rains and recently reported heavy grasshopper infestations in the eastern *wilayas* will likely cause the 1991/92 rainfed crop to be as poor as that of 1990/91. If, however, significant rains continue through September and the Senegal River floods traditional recession lands, then the depression (*bas-fonds*), irrigated, and recession crops may surpass last year's final production totals, making total production as much as 25% higher than last year's. Over 30,000 metric tons (MT) of free food and food-for-work distributions have relieved much of the severest food stress. The total need for donor assistance may be slightly reduced in 1992.

Mali

Generally good agricultural conditions should result in a modest national surplus in cereal production, with total production possibly ranging from 1.7 to 1.9 million MT. Important production shortfalls are expected along the southern border with Mauritania and in western Mopti. Donor assistance may be necessary to reconstitute national security food stocks.

Burkina

National cereal production will be above average. The estimated 85,000 MT difference between domestic cereal production and needs (5% of the 1.8 million ton requirement) can be covered by already-programmed food aid and commercial imports. A few small areas of crop failure will require targeted assistance by the Government of Burkina.

Niger

In most of Niger, the 1991 cereal harvest will be the best since 1988 (a very good year). Pasture and livestock conditions are improving and will be good through mid-1992. Despite the good national outlook, conditions are not good in Diffa, northern Tahoua, eastern Maradi, and eastern Zinder departments. In these areas, up to 1 million people may require assistance to avoid severe food shortages before the 1992 harvest. (Note: The October 15 USAID Food Security Operations Cable estimates Niger's food aid need at 18,000 MT and the net rainfed millet and sorghum harvest at 1.976 million MT, up from the 1.953 million MT cited in this report.)

Chad

Crop prospects are good -- heavy August rains have ensured excellent soil moisture conditions throughout the rest of the growing season. The area planted in cereals has increased and pest damage does not pose a major threat. Any local cereal shortages will be met through trade, existing stocks, and late-arriving aid for 1990 crop failures. No emergency food aid imports are anticipated for 1992.

Sudan

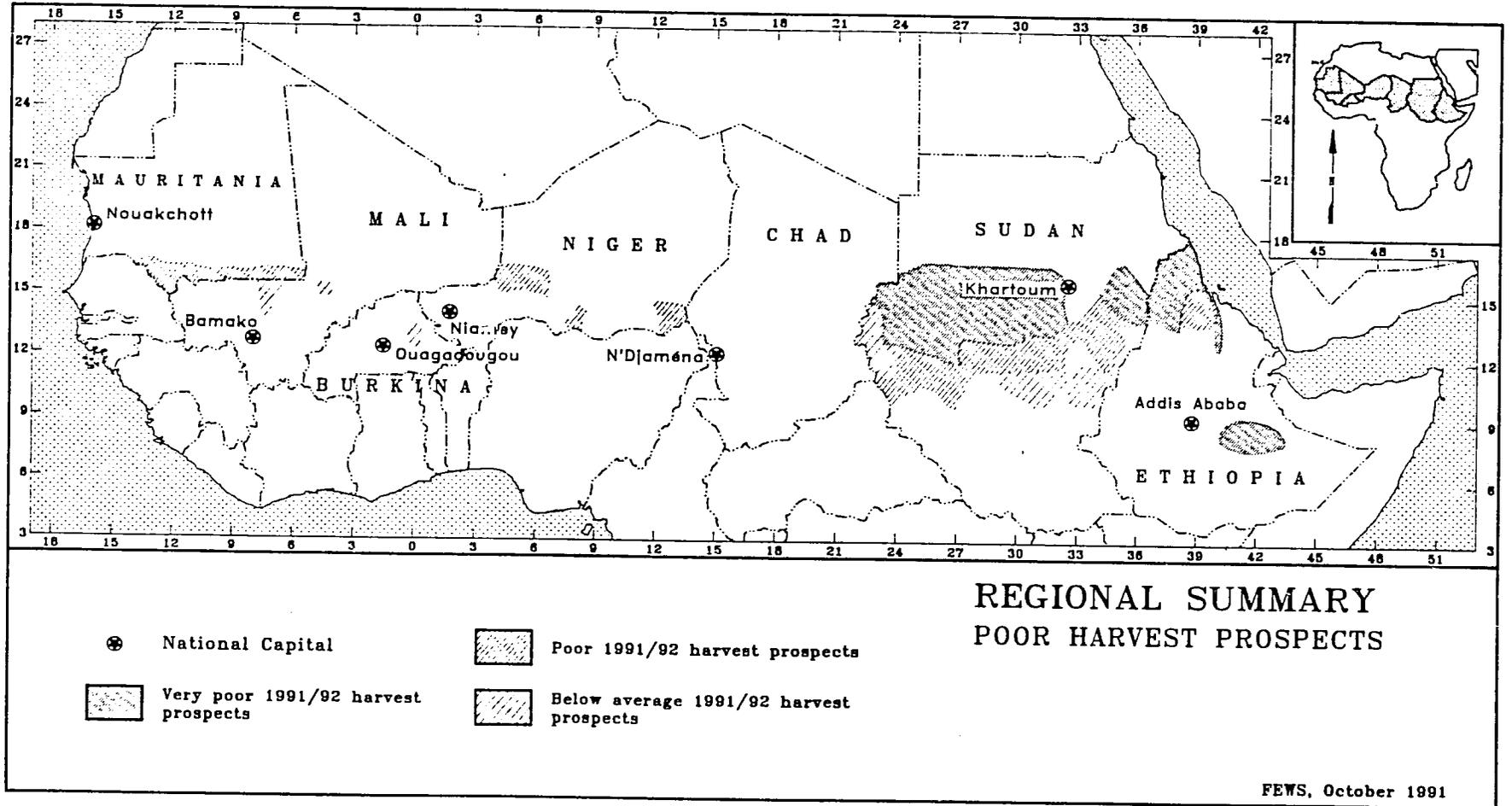
Cereal production will be better than last year but considerably below the 1985-89 average, with a record irrigated harvest, mediocre rainfed mechanized harvest, and very poor traditional-sector harvest. The production deficit may reach 774,000 MT. Production plus commercial and food aid imports could satisfy most consumption needs, depending on how they are distributed. Significant relief needs will still exist for rural populations, urban poor, displaced persons, and refugees. Relief continues to be particularly critical because of severely depleted or exhausted household resources and unprecedented food costs for the target populations.

Ethiopia & Eritrea

Large pockets of drought persist in northern and eastern Ethiopia, while rainfall was average or above in the rest of the country. The end of the civil war will lessen the impact of the North's poor 1991/92 growing season (the second consecutive poor season for some, third or fourth for others). Even so, the disruption of agricultural activities earlier in 1991 and continued pockets of insecurity guarantee that external assistance requirements will remain high for at least another year (up to 9 million people are in need of assistance).

Map 1: Regional Summary Map

Regional Pre-Harvest Assessment



Good News, Bad News, News Behind the News

FEWS/Washington October 20, 1991

Sahel Escapes the Bullet

The 1989 and 1990 harvests in the Sahel were both mediocre-to-poor. They were a major factor in the conclusions of the June 1991 FEWS Vulnerability Assessments, in which USAID/FEWS found approximately 900,000 people in the Sahel to be in a state of extreme vulnerability to famine (see Appendix for FEWS' definitions of vulnerability to and risk of famine). The assessments noted that large numbers of people have had to draw down food stocks and other resources for two consecutive years to make up for production deficits. While this is not problematic if people have the stocks, a smaller number of people had already begun to liquidate resources that are normally held as a last line of defense against irreversible and costly changes in their lives brought on by deepening food shortage. Looking forward to the 1991 harvests, FEWS warned that these countries were precipitously close to having to deal with severe national (rather than only local) food security problems, if there were a third mediocre-to-poor harvest in a row.

The 1991 agricultural season is now ending, and it is apparent that harvests will be relatively good in almost all of the Sahelian countries (see Map 1). Many principal agricultural zones received above-average rainfall early in the season, allowing early planting. Even where rainfall tapered off to average or slightly below-average levels after a rainy May, the spacing and amount of rainfall was generally good enough to sustain very good yields throughout most of the season. With this year's good harvests, the number of vulnerable people will greatly decrease in most of these countries. Where crops did not do well was in areas where farming most often is a marginal activity (generally the more northerly cropping zone running through sahelian Mauritania, Mali, Niger, and Chad). While there will certainly need to be some attention paid to insuring an adequate supply of food in these areas, the quantities needed will be relatively small and may be met by commercial mechanisms or through assisted intra-country transfers of grain.

Severe Local Problems Persist in the Horn

Approximately 18 million people in Ethiopia and Sudan were identified as being in the latter stages of the famine process by the FEWS Vulnerability Assessments of June 1991. Since then, weather and socio-political events have played equal roles in

changing levels of vulnerability. The fall of the Mengistu government and subsequent political events have dramatically altered the geography of Ethiopia's food needs and resources. Increased insecurity in the East and South has greatly exacerbated drought- and displacement-related food stress in those areas, while the cessation of hostilities in Eritrea and Tigray has facilitated relief deliveries to populations stressed by previous years' crop failures. Poor rains in most areas outside of the main agricultural areas of the highlands mean that food needs will still be significant in Eritrea, parts of Tigray and in Hararge and the Ogaden. There will lively discussions, however, not only on how much food was produced this year in these areas, but also on issues of relief-dependence, population numbers, and the viability of marketing systems and non-farm income sources, among others, to vastly complicate a determination of emergency relief needs.

On the other hand, good-to-excellent crops in the center of the country and a transport system less hindered by insecure zones and battle lines mean that food will move more easily to areas of need through both commercial and emergency delivery channels. Although final figures are not yet available on regional and national crop production, look for most estimates of the nation's emergency food aid needs to be only slightly less than last year's 0.75 to 1.1 million metric tons.

In Sudan, the causes of the extensive and severe food insecurity described in the June 1991 Vulnerability Assessment could not have been entirely eliminated even by a spectacular harvest. The harvest will certainly not be that, although it may approach an average harvest on the national scale. The problem now is that the people facing the greatest unmet food needs either live precisely where rainfall was poorest and crops devastated, or will only benefit from the harvest if it lowers grain prices. The expected harvest may make prices fall somewhat, but even then they will still be high enough to prevent tens of millions of wage laborers, displaced, pastoralists, and subsistence farmers from procuring what they need.

The severity of food shortages in large areas of western and southern Sudan is still very difficult to quantify. Arduous logistics and limited access to the area leave a considerable void of information that heightens the alarm nor reassures about conditions. The evidence that does exist (in the form of harvest estimates, traveler's reports, nutrition surveys, and what is known of pre-existing resources), leads many observers to

believe that the lives of hundreds of thousands of people are currently at risk from lack of food and the effects of malnutrition. The question of whether "famine" conditions may be found in these areas is seen by some as simply rhetorical -- semantic blows in an ideological battle. Nevertheless, beyond the question of the appropriate word to apply, the issue of how well, if at all, food needs are being met by current aid or commercial mechanisms in those areas remains largely unanswered. Given the devastated crops in many of these areas, the question becomes now even more urgent.

The Disturbed Air of a Philippine Visitor

The FEWS Project and other early warning agencies make varied uses of the Normalized Difference Vegetation Index satellite imagery (NDVI, "greenness" -- see inside back cover). When used to detect crop development problems within the growing season, current NDVI values are compared with those from a long-term average (1981-90 in the case of FEWS) to display areas where growing conditions are better or worse than "average." This year, however, interpretation of the imagery became very difficult from late June onward. The NDVI began showing extensive areas of Ethiopia and Sudan, as well as Uganda, Central African Republic and parts of Kenya to be seriously below average in growing conditions. This was in direct contradiction to rainfall station reports, which indicated good to excellent rainfall in the same areas. The conflicting indications made FEWS and others disregard the NDVI in analyses, and was a significant loss in early warning information.

What may have caused these problems? Around June 15th, 1991, the Mt. Pinatubo volcano in the Philippines experienced a series of cataclysmic eruptions, throwing more than 2,000 million cubic meters of "ejecta" into the atmosphere. This was an enormous geologic event, rivaling some of the biggest volcanic explosions in history. That part of the "ejecta" that entered the stratosphere (in the upper reaches of the atmosphere) will remain for up to four or five years and will be evident in reddened sunsets. Because NDVI is based on satellite-sensed measurements of reflected radiance off of various ground covers, aerosols (be they clouds, gases or dust) will block some or all of the radiance. An increased amount of aerosols in the atmosphere will thus reduce the NDVI values of current crop imagery and make current conditions appear poorer than in "non-dusty" conditions. One is therefore left with a tantalizing possibility that the impact of the Mt. Pinatubo eruption is behind the corruption of the NDVI imagery.

On the technical level, FEWS and others are investigating both the theoretical and actual impact of such aerosols on the

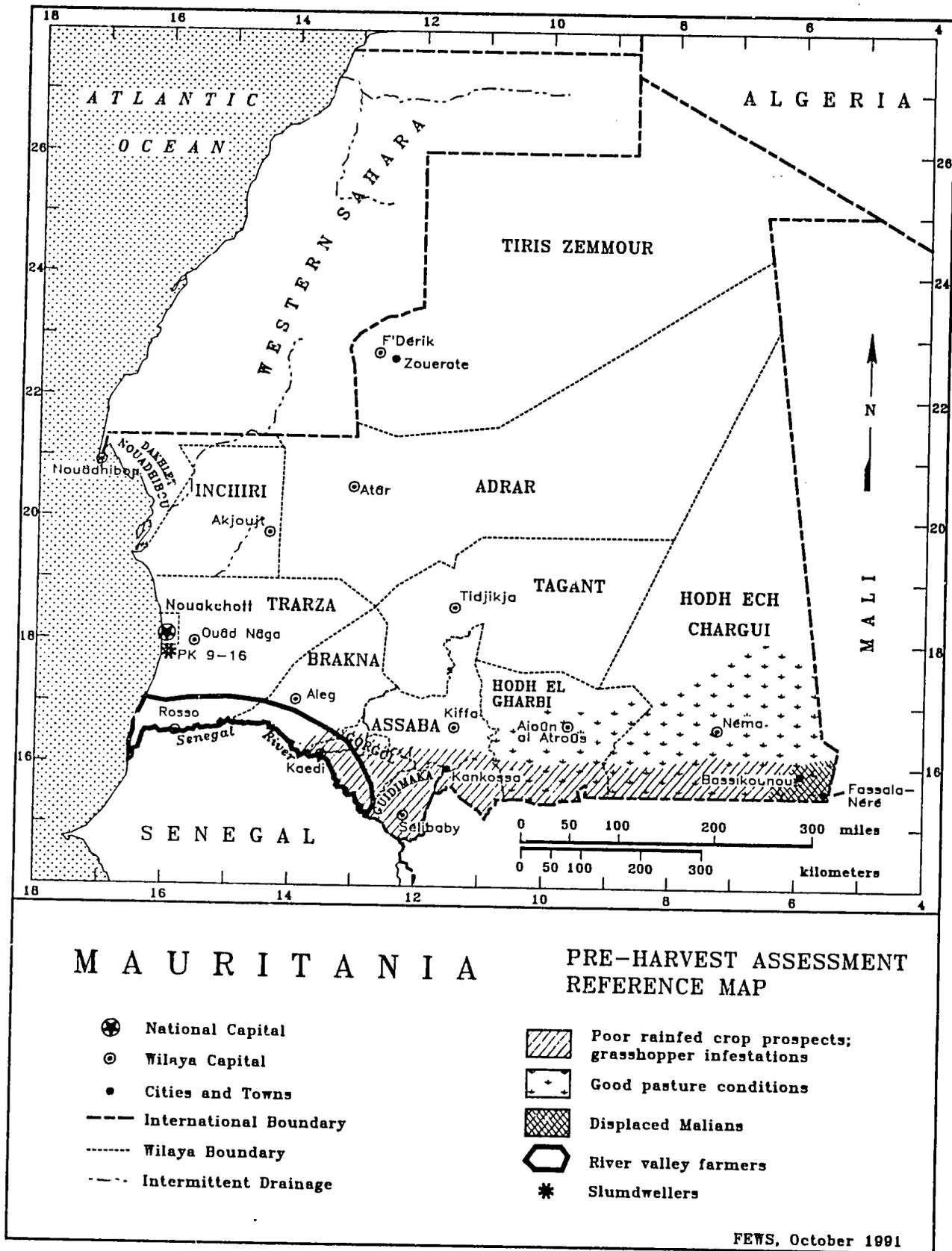
imagery. In theory, NDVI readings over highly vegetated areas would be the most reduced in value, while desert areas would be little affected. These theoretical findings seem to be supported by what is seen in the imagery. Although work is still underway, FEWS therefore believes that there is a high possibility that NDVI data for the second half of 1991 are spuriously low. FEWS is collaborating with scientists in NASA and FAO to understand, quantify, and address the practical implications of the problem. Where used and discussed in the country assessments, extra consideration has been given to the interpretation of the data, including the use of some preliminary correction factors.

How Good Was the Seasonal Forecast, How Good Were the Rains?

The United Kingdom Meteorological Office seasonal rainfall forecast for 1991 in the Sahel, released in late May, forecast that rains would be about 80% of the 1951-80 average. On July 16, the forecast value was revised to 66% of the 1951-80 average. As of the end of September, actual rainfall totals at the stations used in formulating the forecast were running at about 80% of the 1951-80 average. While the forecast was relatively accurate for the Sahel as a whole, the technique still needs refinement. More precision of the forecast in both time and space is required.

Given the generally very positive harvest estimates in the Sahel, an indication that rainfall was generally only 80% of average may run contrary to the perceptions of many people who believe it was a "wet" year. As is often the case with statistics, this apparent contradiction between an event and its supposed impact is not real. There can be a "good" rainy season that will still be below the 1951-80 average of rainfall. Note for example that 80% of 1951-80 is in fact slightly higher than the 1971-90 average rainfall. This is because of the downward shift in rainfall amounts since the late 1960s.

The season was also marked by an unusually wet May in many locations, followed by more seasonal or even below-normal monthly amounts, especially in June and July. Nevertheless, as opposed to other years where rainfall was of roughly similar quantity, rainfall this year was relatively regular and generally provided crops with an adequate and continual water supply throughout the season. Estimated crop yields will probably reflect the beneficial character of this season's rains. A future FEWS Bulletin will contain more information on the final outcome of the 1991 rainy season.



Map 2: Mauritania Reference Map

MAURITANIA

Rainfed Crop Outlook Poor, Total Harvest May Be About Average

Report released by the American Embassy in Mauritania on September 15, 1991

SUMMARY

It is still too early to accurately evaluate crop production or regional food security for 1991/92, but if substantial rains continue throughout September and pest impact can be controlled, FEWS estimates that global cereal production will be close to 105,477 metric tons (MT) net, approximately 25% higher than the final production figure for 1990/91 (75,003 MT net). This estimate remains well below the Ministry of Rural Development's (MDR) reported 1991/92 objective of 160,000 MT net. Current and soon-to-arrive food aid have helped and will continue to help relieve stressed conditions for the slum dwellers and riverine populations previously considered at risk of famine (see Appendix for FEWS' definitions of vulnerability to and risk of famine). Over 30,000 MT of food aid destined for either free distribution or Food-for-Work arrived in-country during 1991. These and other commercial imports came very close to covering the estimated 1990/91 cereal food deficit. Another 20,000 MT of U.S. wheat (being channeled through the United Nations World Food Program) is scheduled to arrive next month, but will probably be included in the 1991/92 cereal accounting figures due to its late arrival.

FACTORS AFFECTING FOOD AVAILABILITY

Agricultural Conditions

Rainfed Agriculture

Apart from selected areas in Hodh el Gharbi, Assaba and Guidimaka wilayas,¹ rains were severely limited and sporadic until late July. Many farmers were forced to plant at least two and even three times, extending planting into August. Rainfall in the southeast picked up significantly during August, but remained well below average in the south-central and south-western wilayas. Unless rains continue into October, the late plantings will ensure not only lower yields, but a significant loss of rainfed crop production (see Map 2). These conditions make

¹In order of precedence, Mauritania's administrative units are wilayas and moukhataas.

it probable that the total rainfed crop (coarse grains) will not surpass last year's dismal total of 23,337 MT net. No official estimates or crop evaluation figures will be released until at least the end of October. The distribution of production over the six agricultural wilayas is shown in Table 1.

Irrigated Agriculture

Planting of the irrigated perimeters (with rice, sorghum and maize) was reported to be late because of farmers' difficulties in obtaining agricultural credit loans this year. FEWS has taken the preliminary 1991/92 estimates of area planted supplied by the national rice parastatal (SONADER) and applied the 1987-90 average yield (4 MT per hectare), arriving at a production estimate of 31,641 MT net. Official estimates of area planted should be out within a couple of weeks, which will permit more reliable estimates of potential production.

Flood Recessional Agriculture (Walo)

River levels continued to rise through mid-September. They were reported to be higher than at the same time last year and similar to those of two years ago. Consequently, traditional river recessional lands began flooding in early September. Substantial rains must continue and the Malian Manantali Dam should be opened in order for flooding to cover optimal surface area. Due to the late date, FEWS believes that walo production (sorghum and maize) will not reach its highest potential, yet it is highly likely to surpass last year's net total of 5,589 MT. Until more specific information becomes available and analysis can be refined, FEWS estimates that walo production may attain levels comparable to the official 1989/90 net total of 15,626 MT. FEWS is using the SONADER statistics for SONADER-sponsored flood recession production (sorghum only). This production should net 7,664 MT, bringing the total net recessional harvest to 13,290 MT.

Depression Agriculture (Bas-Fonds)

As noted above, no official agricultural estimates had been made as of mid-September. It is believed, however, that poor conditions for rainfed crops prompted farmers to plant much more acreage to bas-fonds (low-lying moist, sometimes

dammed, areas) agriculture. If significant rains continue through September and grasshopper densities do not increase significantly in crop areas, this year's *bas-fonds* crop (coarse grains) will most likely surpass last year's total and could compare to the reported 1989/90 season total of 27,209 MT net.

Pests

As of mid-September, the locust situation was relatively calm in Mauritania. A Maghrebian team of experts supported by the United Nations Food and Agriculture Organization (FAO) reported sighting half a dozen isolated, solitary Desert Locusts in the north of Tagant Wilaya. The team will continue to follow the situation until at least the end of October.

Grasshopper infestations have been reported in all eastern pastoral zones, however, most notably in Assaba Wilaya. More than 1,300,000 hectares (ha) are reported to be infested, including 900,000 ha in Assaba. Of the Assaba infestations, 700,000 ha are in Kankossa Moukhataa. Mid-September densities were 60-100 per square meter in crop fields and 100-200 per square meter in pasture zones. The Mauritanian Crop Protection Service (CPS) has calculated that the cost of fighting this menacing infestation will be approximately 1,234,415,200 *ougui*, as (around \$15 million) and has asked for immediate response from the donors. As of mid-September, the CPS and private farmers had treated a total of only 10,770 ha.

While the majority of grasshoppers are currently in pastures, movement to the greener croplands as the grasses dry may cause moderate to high crop damage. The extent of damage and yield loss will depend on the crop stage as pastures dry. If rainfall continues until late in the season, it may be possible to harvest existing rainfed crops with minimal loss, but the *bas-fonds* crops would still be in danger.

Pastoral Conditions

Biomass development in the far east of the country, especially along the Malian border, is at least equal to, and in many areas higher than, average, according to satellite vegetation imagery (see NDVI, inside back cover). Pasturelands in the south-central and western parts of the country, however, are currently suffering from very dry conditions. While the National Livestock Service reports that herds are generally doing well, significant herd movement towards the eastern pastoral zones has been noted. This, combined with additional herds arriving with Malian displaced people, may create potential complications with overgrazing.

Food Stocks and Flows

Although food stress remains high in various central *wilayas* and parts of the Senegal River Valley, it has been reduced significantly by ongoing food aid distributions carried out by the Mauritanian Food Security Commission (CSA).

Table 1: Preliminary Mauritania Agricultural Estimates for 1991/92 (MT)

Wilaya	Rainfed	Walo	Bas-Fonds	Irrigated	Gross Production	Net Production
Hodh ech Chargui	3,169	0	7,710	0	10,879	9,247
Hodh el Gharbi	2,312	0	3,418	0	5,730	4,871
Assaba	2,797	0	498	0	3,295	2,801
Gorgol	5,674	10,587	0	13,274	29,535	21,952
Brakna	1,229	4,433	20,131	9,711	35,504	27,872
Trarza	0	12,160	0	36,202	39,346	26,987
Guidimaka	12,274	219	254	1,489	14,236	11,747
Total	27,455	27,399	32,011	51,660	138,525	105,477

Sources: FEWS/Mauritania; USAID/Mauritania

Rainfed: Due to late rains and possibly serious pest impact FEWS has adopted the same results as the 1990/91 season. *River Recessional (Walo):* Although flooding just began in mid-September and has not yet inundated optimal surface areas, this progression has created hopes that *walo* and other flood recessional production may rival that predicted by the GIRM for 1989/90 (a substantial though not outstanding amount). FEWS has adopted figures from the official *walo* harvest in 1989/90. *Depression (Bas-Fonds):* Late rains caused many farmers to plant more hectares (ha) to this farming method this season (1991/92). If pest impact is not substantial, then final production may approach that predicted by the GIRM for 1989/90. *Irrigated:* Irrigated crops include rice, sorghum and maize. FEWS/Mauritania used the 1991/92 SONADER provisional planting expectation estimates as the base for its estimates. FEWS then adopted 60% of the SONADER estimate of 21,525 ha, factoring in this substantial reduction due to unattainable credit loans. FEWS multiplied this surface area (12,915 ha) by the 1987-90 average of 4 tons per hectare. This will be revised once actual planted perimeters are released. *Net Production:* Total net figures are based on conventional loss percentages. Traditional cereals are calculated with a 15% loss and paddy rice is calculated at a 40% loss.

Another 20,000 MT shipment of U.S. wheat is due in port by mid-October, to be distributed under the auspices of the United Nations World Food Program (WFP). Although originally scheduled for 1991, distribution will probably not be until 1992. In all likelihood, it will be figured in the 1991/92 cereal balance.

Projected Food Consumption Needs

While it is still very early for any formal predictions on the 1991/92 harvest, current indicators such as rainfall patterns, river levels, and pest densities have allowed FEWS to postulate very preliminary estimates of potential crop production. These estimates put national production approximately at 25% higher than 1990/91, or 138,525 MT gross (105,477 MT net). Table 2 (below) presents a very preliminary food needs assessment table for the 1991/92 season.

FACTORS AFFECTING FOOD ACCESS

Not only are cereal prices high in the interior of the country, but locally grown cereals have long since disappeared from markets after two poor harvest years. Only imported cereals and some locally grown rice are for sale. These are reported to be selling in the Senegal River Valley for 20 to 40% higher than normal. In Nouakchott, September cereal prices remained relatively stable compared to September 1990 levels and compared to the previous few months.

UPDATE ON VULNERABILITY

Two thousand displaced Malian families (10-15,000 people) are officially registered in the southeastern corner of Mauritania (300 families in Bassikounou and 1,700 families in Fassala-Néré). United Nations High Commission on Refugees (UNHCR) and Government of the Islamic Republic of Mauritania (GIRM) authorities continue to monitor their conditions and immediate needs, and are providing shelter, food, and medicines. The worst problems are insufficient and polluted water supply in Fassala-Néré and poor public health/hygiene conditions in both camps. Once the rains stop (probably by mid-October), heavy drilling equipment can be transferred to the isolated area. Coopération Française (the French analog to AID) has agreed to finance the drilling of a desperately needed new water source (the current well is 55 meters deep and polluted). In addition, health personnel have been sent to the area to help vaccinate children and take care of medical problems and nine primary school teachers have been identified to help with education. UNHCR has scheduled another site visit for September 24-30 to obtain updated information.

Two groups identified in several previous USAID Food Security Operations Group reports as being at risk of famine have since received free food distributions under the 1990/91 Emergency Needs distribution list, thus reducing their acute food stress. One group was the Nouakchott slum-dwellers residing 9-16 kilometers south of the city (PK9-16), along the road to Rosso. This population still faces many hardships, including an insufficient water supply, but the quality of life is

Table 2: Provisional 1991/92 Cereal Production Balance for Mauritania, by Wilaya (MT)

Wilaya	1992 Population	1992 Cereal Needs	Gross Production	Net Production	Balance	% 1992 Needs Met
Hodh ech Chargui	208,691	34,434	10,879	9,247	-25,187	26.9
Hodh el Gharbi	162,007	26,731	5,730	4,871	-21,860	18.2
Assaba	176,630	29,144	3,295	2,801	-26,343	9.6
Gorgol	190,692	31,464	29,535	21,952	-9,512	69.8
Brakna	208,868	34,463	35,504	27,872	-6,591	80.9
Trarza	260,506	42,983	39,346	26,987	-15,596	62.8
Guidimaka	124,555	20,552	14,236	11,747	-8,805	57.2
Total for Agricultural Wilayas	1,331,949	219,772	138,525	105,477	-114,295	48.0
Rest of the Country	702,803	115,962	0	0	-115,962	0.0
Total	2,034,752	335,734	138,525	105,477	-230,257	31.4

Sources: Population figures were calculated using the official 1987 census figures and an annual growth rate of 2.7%. Cereal needs were calculated using the officially recognized consumption figures of 165 kilograms/person/year.

Notes: A cereal production balance is the amount of cereal needs met by local production before commercial imports and food aid. 1991/92 statistics concerning import quantities and programmed food aid are not yet available (1990/91 commercial cereal imports totalled 177,650 MT, at last count, 1990/91 food aid imports totalled 84,700 MT).

slowly improving, as evidenced by the recently built medical dispensary, new schools and improved transportation into town. The second group is a large majority of the people living in the Senegal River Valley. While their household food stocks have been depleted for some time, food distributions have helped ease the severity of the current situation. There is hope that *walo* and *bas-fonds* production will be much better than last year, even though it is still too early to predict production potential.

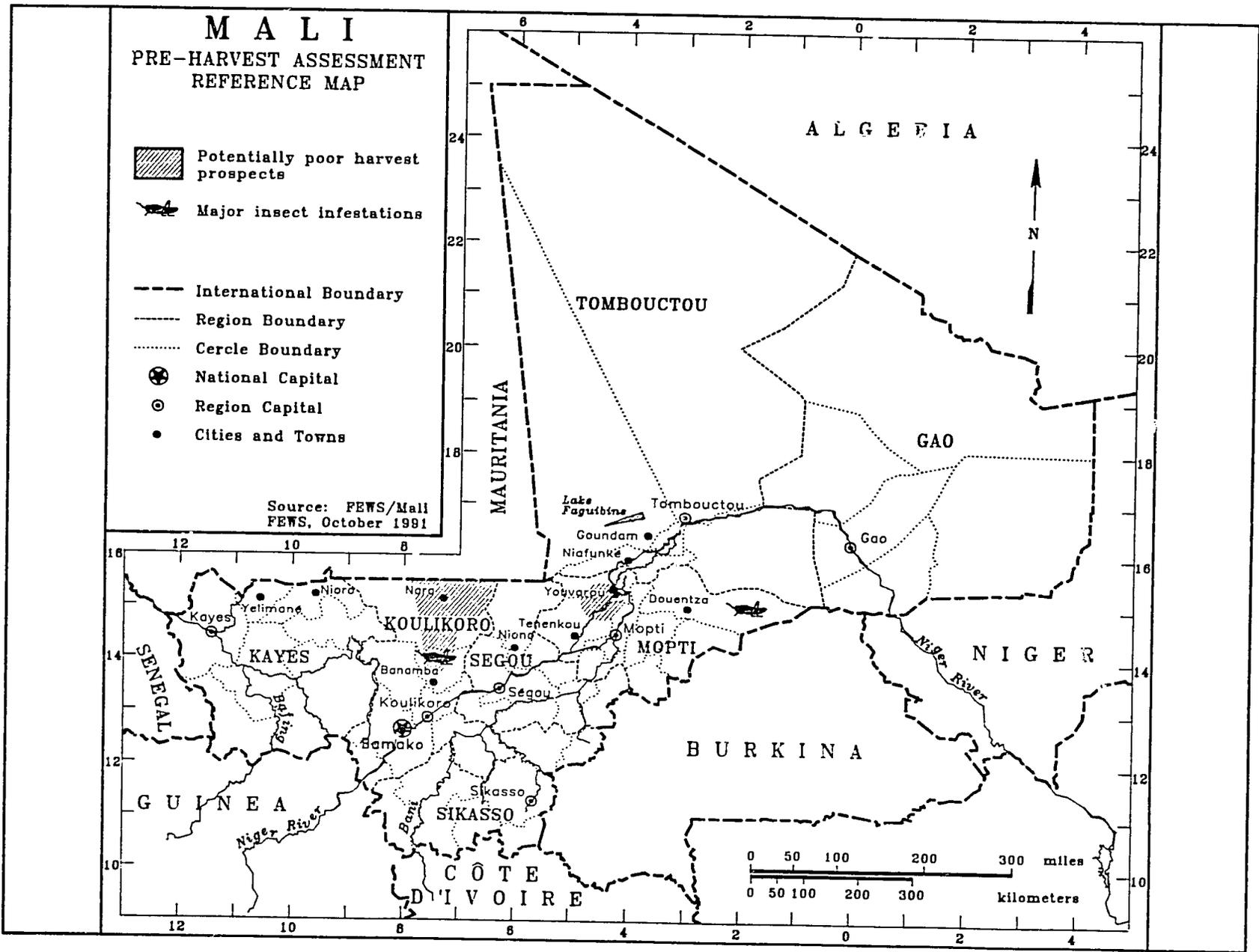
CONCLUSION

Because September is still very early in the growing season with regard to three of the four main farming techniques practiced in Mauritania, it is very difficult to predict the country's prospective food security status. Not even preliminary production estimates can be expected before the end of

October. Since it appears that the rainfed crop will again be as poor as last year's, however, FEWS predicts that net production will not be much higher than 105,477 MT, even if all other sectors produce as well as the official 1989/90 production results.

There is no doubt that donor assistance will be required in the coming year. Only the questions of how much will be needed and what percentage will be destined for emergency distribution remain. Last year, the commercial sector proved its dynamic nature and ability to react quickly to a poor harvest. It imported a total of 177,650 MT of cereals, representing close to 48% of the total cereal needs in this country. Donor contributions totalled 87,326 MT (approximately 30,000 MT destined for free food distribution). Assuming the commercial sector can supply an equal or better percentage of this year's cereal needs, coupled with a potentially better harvest, the total need for donor assistance may be slightly reduced in 1992.

Map 3: Mali Reference Map



MALI

Expected Good Harvest Should Ease Current Shortages

Report released by USAID/Mali on September 20, 1991

SUMMARY

Agricultural conditions are improved over last year. Rains have been generally early and plentiful. This has enabled an increase in surface area planted. A good harvest and modest surplus is expected. Local shortages may occur, however, in northern Kayes, Koulikoro, Ségou and western Mopti regions (see Map 3). In these areas, rains started late and significant dry periods were experienced. All of these areas suffered a poor harvest in 1990 and have exhausted stocks. A poor harvest this year would render them highly vulnerable (see Appendix for FEWS' definitions of vulnerability to and risk of famine). The situation remains critical in Goundam Cercle¹ of Tombouctou Region. Food distributions have thus far been impossible in this cercle because of insecurity. If crop production were prevented by local insecurity, the population would grow more desperate in their need for food. In spite of an overall modest surplus, donor assistance may be necessary to reconstitute national security food stocks. The actual level of such assistance should be known in November, when the result of the harvest becomes clear.

FACTORS AFFECTING FOOD AVAILABILITY

Agricultural Conditions

Agricultural conditions are largely improved over last year. Rainfall throughout the country has been generally good (see Map 3). Rains began earlier than the 1961-90 average in the East and South. The onset of rain was delayed in the west and north-central zones. Effective rains remained regular throughout the major agricultural zones of the country, with the exception of northern Koulikoro and Ségou regions, where rainfall was more intermittent.

The continued favorable weather conditions encouraged continued plowing and planting well into July in the South. The

¹ In order of precedence, Mali's administrative units are regions, cercles, and arrondissements.

surface area plowed in 1991 exceeds that of 1990 in many areas and that of 1989 in some (see Table 3). Reseeding of failed fields was reported in Nara and Banamba cercles (Koulikoro Region) and in northern Kayes Cercle (Kayes Region).

Initial conditions for the rice crop were excellent. At mid-September, the Government of the Republic of Mali (GRM) Hydrological Service reported that wet season river levels were slightly below the 10-year average. However, the flood arrived in a timely manner after initial rains permitted planting. This is particularly important in the Tombouctou Region, where the

Table 3: Crop Area Planted in Mali as of the End of August 1991 (000 hectares)

ODR/DRA	Millet/ Sorghum Maize Rice			Other	Total
DRA Gao	3	0	12	0	15
DRA Kayes	32	19	1	0	52
DRA Koulikoro	26	5	0	2	33
DRA Mopti	260	0	66	19	345
DRA Ségou	269	3	5	5	282
DRA Tombouctou	41	0	30	1	72
CMDT	308	89	27	67	491
ODI Kaarta	83	6	0	0	89
ODIPAC	100	23	3	0	126
Office Haute Vallée	120	11	4	1	136
Office Niger	0	0	17	0	17
Office Riz Mopti	0	0	18	0	18
Office Riz Ségou	0	0	40	0	40
Total	1,242	156	22	95	1,716

Source: Surface areas planted based on Regional Development Office (ODR) and Regional Agriculture Directorate (DRA) reports of progress as of the end of August.

Note: CMDT is the Compagnie Malienne pour le Développement des Textiles, ODI is the Opération de Développement Intégrée, and ODIPAC is the Opération de Développement Intégrée des Productions Arachidières et Céréalières.

1990 rice crop was a near total loss following the failure of initial rains and early arrival of the flood.

GRM Meteorological Service reports and METEOSAT rainfall estimates agree that rainfall has been relatively plentiful and well distributed country-wide throughout the 1991 growing season. Nevertheless, certain areas suffered 10 to 20-day dry periods. The most severely affected areas are Nara and Banamba *cercles* (Koulikoro Region); western Niono Cercle (Ségou Region); and western Youvarou, western Tenenkou, and northern Mopti *cercles* (Mopti Region). End of August NDVI values for many of these areas are lower than the 1982-90 average. Crop yields may be reduced in the affected areas. Crop yields should be near or above average in the remaining areas of the country.

Crop conditions in Tombouctou and Gao regions have been very good. Field observations confirm satellite imagery that indicates excellent vegetative conditions and rainfall. The wild *fonio* harvest began early and was better than the previous two years, and conditions for rice production should be very good. It is unclear, however, what effect local insecurity has had on the planting of fields, as has been alluded to previous FEWS reports (affected crops would include rainfed crops north of the Niger River and some irrigated crops right along the Niger). This may particularly be the case in the Lake Faguibine area of Goundam Cercle.

Climatic conditions have been favorable for significant hatchings of grasshoppers and blister beetles. According to GRM Crop Protection Service reports, 189,000 hectares (ha) have been infested since the beginning of the season. Of this, 62,500 ha have been treated. In spite of the rapidity of the hatching, entomologists feel that actual crop losses should be limited in scope. The most affected areas are Banamba and western Douentza *cercles*. Conditions in the Adrar des Iforas along the border with Algeria are very suitable for Desert Locust hatchings, though no reports of locusts have been received. Conditions are also good for grasshopper infestations stemming from Mauritania.

Barring any significant losses due to pests or unforeseen late season crop damage, the current year production promises to be near the five-year average, 2.1 million MT. Based on the timeliness of the onset of rains, flowering period rainfall, and GRM Agricultural Directorate (DNA) reports, FEWS/Mali estimates that cereal production could be between 1.7 and 1.9 million metric tons^{1,2} (see Map 4).

Pastoral Conditions

Timely and well distributed rains have signaled a general improvement of rangelands and pastures throughout the country. NDVI values over most of the major pasturelands are above the 1982-90 average (see inside back cover for explanation of NDVI). Important areas show below average values however: northwestern Kayes and northern Yelimané *cercles* (Kayes Region); south and central Nara and Banamba *cercles* (Koulikoro Region); southern Niono (Ségou Region); and western Tenenkou and southeastern Mopti (Mopti Region).

The GRM Livestock and Meat Service reports unusual herd concentrations in northern Koulikoro, Ségou and Mopti regions, as well as in Niafunké Cercle of Tombouctou Region. Normally, herds would depart from these areas to Mauritania or the dune pastures of northern Mali during the rainy season. This year, herds have been held back from these areas because of the threat of cattle raids out of Mauritania and insecurity in Tombouctou and Gao regions. The herd concentrations are in pastures used normally as passages between wet and dry season ranges. Their presence will further threaten environmental degradation and poor forage during the period when they would normally be used again (February or March).

Food Stocks and Flows

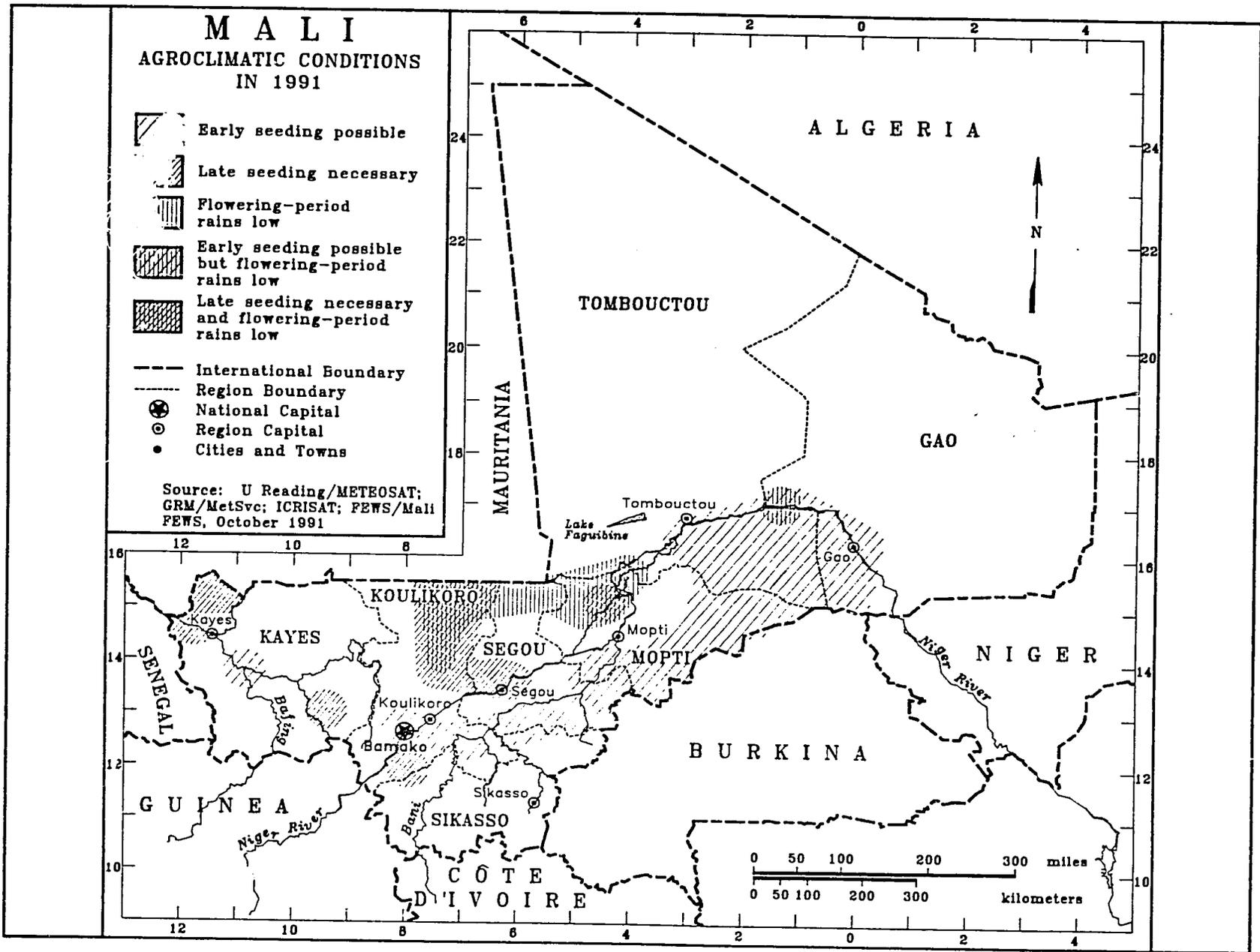
Household stocks are limited as the local population enters the final month of the lean season (the period before the harvest, when food stocks run low). The GRM Statistical Service reported that stocks were low country-wide entering the 1990 harvest. The limited 1990 harvest did not allow households to build reserves as planned. In most of the severely deficit areas, timely food distributions should enable at-risk households to maintain enough food reserves to last until the harvest. A good 1991 harvest is critical to enable households to recover food stocks to satisfactory levels.

Commercial stocks are very limited in severely deficit zones. This is particularly true in those areas of the North suffering from civil unrest. Major grain traders continue to have stocks and maintain about 23,000 metric tons (MT) in Abidjan and Dakar for exportation to Mali, according to the GRM National Transport Office. A further 1,800 MT of commercial grain is held in the GRM Agricultural Produce Marketing Office (OPAM). The OPAM commercial stocks have been falling for several years.

¹ FEWS is using the DNA estimate for 1991/92 maize and rice production. For the estimate of millet and sorghum production, FEWS is multiplying the DNA average yield times the reported area planted, and then multiplying that product by an index derived from timeliness of planting rains and sufficiency of rains during the planting periods. The result is expressed as a range in order to emphasize its provisional character.

² The seeding date is based on an initial 25 millimeter (mm) cumulative dekadal rainfall relative to the dekad in which seeding is normally optimal (a "dekad" is a 10-day period). Rainfall adequacy during the flowering period is based on cumulative dekadal rainfall relative to average Potential Evapo-Transpiration (PET) five dekads after seeding was predicted. Cumulative dekadal rainfall is based on METEOSAT images and confirmed by GRM Meteorological Service where possible. Seasonal norms (seeding date and PET) are based on ICRISAT studies.

Map 4: Mali 1991 Agroclimatic Conditions



National Security Stocks (SNS) are at about 50% of their 53,000 MT capacity at the end of food distributions. As of the end of August, 23,864 MT remained positioned in Kayes, Ségou, Mopti, Tombouctou, and Gao regions. This is about 10,000 MT less than 1990 and 30,000 MT less than 1989 at the same period. A good harvest and associated reductions in cereal prices will be necessary for the reconstitution of security stocks.

Projected Cereal Production Balance

Using a population estimate of 8.72 million people, an annual per capita consumption rate of 185 kg a.r., cereal production estimates of 1.7 and 1.9 million MT, Mali may be expected to enjoy a production surplus¹ of 100 to 300 thousand metric tons. Certain areas of the country will suffer more serious shortfalls in production than normal. Of these, northern Kayes, Nara and Banamba *cercles* should be the most affected. Modest shortfalls may also occur in Nioro, Youvarou and Tenenkou *cercles*. More precise estimates will be made as the harvest comes in.

FACTORS AFFECTING FOOD ACCESS

Millet and sorghum prices are 36 to 49% higher than the average price from October 1988 to September 1989 (see Table 4). August prices leveled off or fell somewhat in most markets. The most significant price decreases were in those markets where food was distributed. Although elevated, rice prices have demonstrated more stability over the same period. October prices should provide a much clearer idea of market perceptions regarding the harvest outcome. A fall in cereal prices will be necessary for vulnerable populations to recover their purchasing power.

Table 4: Millet Price Performance in Major Regional Markets of Mali

Market	August '89	August '90	July '91	August '91	Index
Bamako	72	99	141	142	1.36
Kayes	91	89	165	159	1.41
Koulikoro	63	95	134	142	1.42
Ségou	46	90	122	123	1.43
Sikasso	69	95	124	125	1.30
Mopti	49	93	144	139	1.49
Tombouctou	76	97	168	148	1.38
Gao	71	99	152	149	1.40
Average	67	95	144	141	1.40

Source & Note: Average monthly price based on GRM cereals Market Information System (SIM) Monthly Bulletins. Index equals the August 1991 price divided by the average of prices from October 1988 to September 1989.

¹ A cereal production balance is the amount of cereal needs met by local production before commercial imports and food aid.

Insecurity in Tombouctou and Gao regions has impeded local access to foodstuffs. Banditry, attacks, and ethnic unrest have combined to greatly reduce market activity. Transporters are reluctant to ship to the area. Further, important cross border trade from Algeria and Mauritania has been disrupted. The situation shows signs of improvement in Gao Region, but remains bad in Tombouctou.

Following the harvest of 1990, larger than usual seasonal migrations took place (of individuals in search of wage labor). Both the GRM Famine Early Alert System (SAP) and the Save the Children/UK Delta-Sénou Monitoring System (SADS) report that remittances from migrant labor were lower than normal, perhaps because of increased competition for scarce jobs.

UPDATE ON VULNERABILITY

Food distributions and market interventions served to reduce the level of vulnerability for populations identified in the 1991 Vulnerability Assessment, with the exception of populations living in Goundam Cercle of Tombouctou Region. The expected good 1991 harvest should maintain a low level of vulnerability for most of the populations in the traditionally production deficit zone north of the fourteenth parallel. Vulnerability due to poor harvests are expected for small farmer populations in Kayes Cercle (Kayes Region) and Nara and Banamba *cercles* (Koulikoro Region). The same may possibly be the case for northern Niono Cercle (Ségou Region) and eastern Youvarou and Tenenkou (Mopti Region) *cercles*.

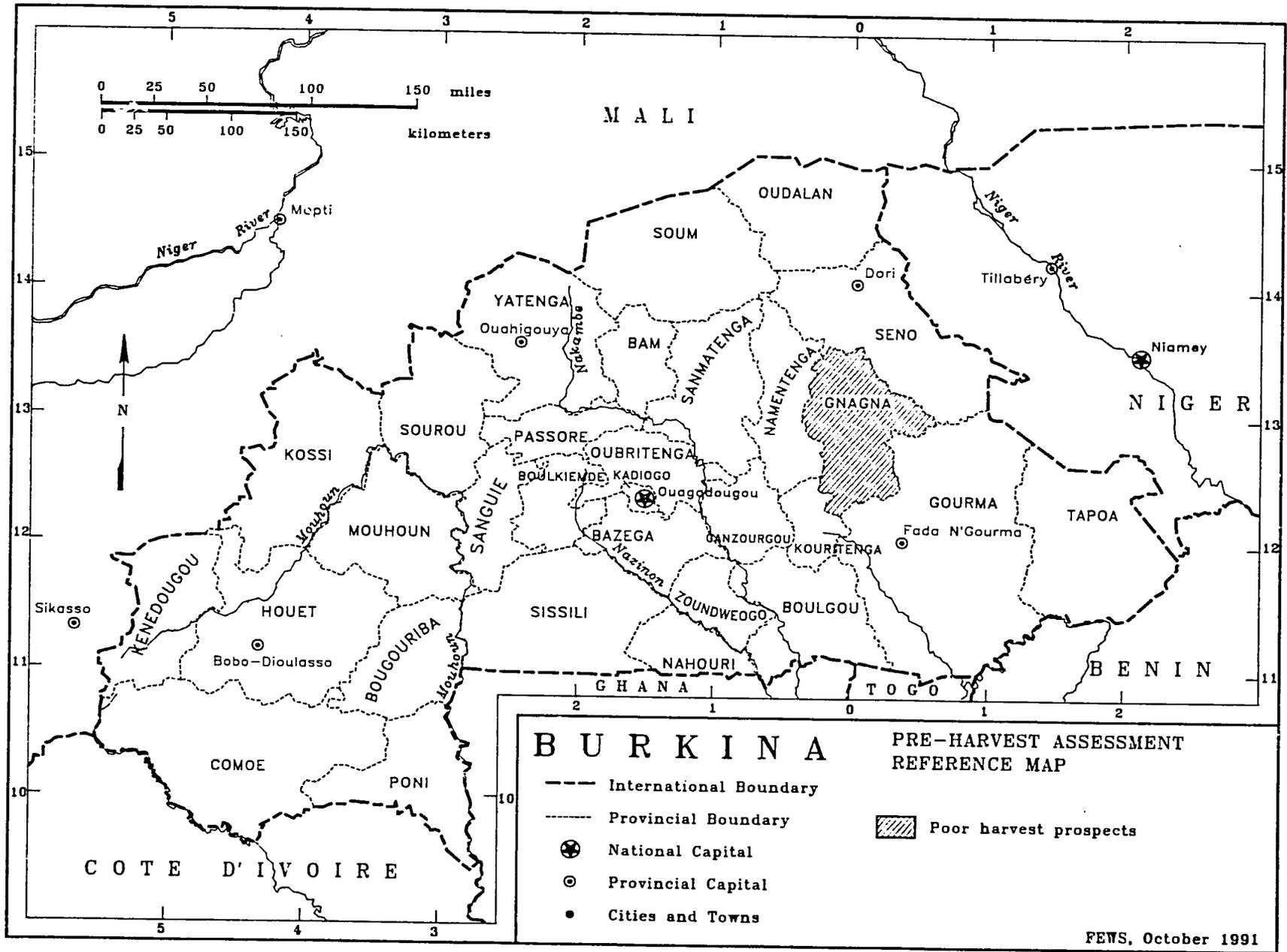
Continuing insecurity may plague populations in Goundam Cercle. It has thus far been impossible to complete food distributions to populations around Lake Faguibine. Food shortages may continue, especially if the insecurity prevents farmers from planting crops in recessional lands around Lake Faguibine.

CONCLUSIONS

The expected good harvest will enable a modest national surplus in cereal production. Adequate harvests should occur in most regions of the country. Significant surplus production will be necessary for the rural population to rebuild their stocks, however. If locally produced grains enter the market, cereal prices should fall, placing cereals within the reach of most of the vulnerable populations. Shortages may necessitate distributions to populations in northern Kayes, Koulikoro, Ségou, and western Mopti regions. Since populations in these areas entered the 1991 lean season with low stocks, it may be necessary to program food distributions in these areas as early as February.

Continued assistance will be necessary in Goundam Cercle. SNS stocks are low after the 1991 food distributions. Donor assistance may be needed to assist in reconstituting SNS stocks, even with a modest national surplus after the harvest.

Map 5: Burkina Reference Map



Good Growing Season Will Reduce Food Stress

Report released by USAID/Burkina on September 19, 1991

SUMMARY

The growing season began earlier than normal and cumulative rainfall has been above average throughout most of Burkina. Millet and red sorghum are in good condition. Several provinces south of Ouagadougou suffered from reduced rainfall during June, however, and the maize crop was lost. North of Ouagadougou, cereals are in very good condition and the harvest outlook is excellent. FEWS/Burkina estimates a national cereal production deficit¹ for 1991/92 of approximately 85,000 metric tons (MT), 70,000 MT less than the 155,000 MT average deficit for Burkina.

The northwestern provinces of Soum, Yatenga and Sourou will have above average production. This will help groups identified as extremely vulnerable in the 1991 FEWS Vulnerability Assessment, who can now begin to rebuild household economic resources lost over two to three consecutive years of below average production (see Appendix for FEWS' definitions of vulnerability to and risk of famine). They will still be moderately vulnerable, however.

FACTORS AFFECTING FOOD AVAILABILITY

Agricultural Conditions

Cereal production is the primary source of food and household income in Burkina. General qualitative indicators of annual cereal production include rainfall distribution (over time and space) and the progression of NDVI during the growing season (see inside back cover for description of NDVI). Decreases in NDVI over an area suggest moisture stress that will reduce cereal production potential. There is a high correlation between maximum NDVI for the season and gross cereal production in Burkina, where the maximum NDVI usually occurs in the third *dekad* (10-day period) of August. Estimates

¹ A cereal production balance is the amount of cereal needs met by local production before commercial imports and food aid.

of cereal production potential by region generally follow the NDVI difference from average.

Cumulative rainfall from May through August 1991 was above the 1951-80 average at all 11 reporting stations. NDVI progression was very regular in the north, except in regions of Gnagna. The early and regular rains resulted in above average NDVI for the third *dekad* of August in the north. NDVI has generally been above average in Bam, Yatenga, Soum, Oudalan and northern Sanmatenga. The very poor early season in Gnagna has probably severely reduced cereal production in that province (see Map 5).

METEOSAT estimates show that rainfall was insufficient for good cereal production over southern Burkina during late June and early July.² The progression of NDVI from *dekad* to *dekad* during the six *dekads* of June and July was very irregular over the southern provinces, and NDVI for the third *dekad* of August was below the 1982-90 average in southern Gourma, southern Tapoa, southern Boulgou, most of Sissili and most of Bougouriba. In the southern provinces, the important maize crop was lost to drought in late June and early July when it was at the critical flowering stage. The drought conditions will have reduced millet and white sorghum yield, and hence production, in this area.

The FEWS/Burkina-estimated cereal production for 1991/92 is approximately 1.98 million MT (see Table 5). This is 260,000 MT above the 1984-90 average of 1.72 million MT. Pests have not yet been a problem and only small areas have been treated. However, the Crop Protection Service reports dry conditions in northern Burkina may lead to an economically significant outbreak of grasshoppers.

Pastoral Conditions

Pasture quality has not been a constraint to livestock production this year. Pastures developed very early and are still in excellent condition throughout the country. The early development of the pastures greatly reduced the vulnerability of agropastoralists in the economically stressed areas of Sourou, Yatenga and southern Soum.

² See inside back cover for description of METEOSAT-based rainfall estimates.

Table 5: Provisional 1991/92 Cereal Production Balance for Burkina, by Province (MT)

Province	June 1992 Population	1991/92 Cereal Needs	Gross 1991/92 Production	Net 1991/92 Production	1991/92 Balance	% of 1991/92 Needs Met	1985-90 Average Balance	'91/92 Balance Less than Average?
Bam	174,200	33,100	40,800	34,700	1,600	105	-8,100	
Bazega	355,000	67,500	78,000	66,300	-1,200	98	-5,400	
Bougouriba	245,000	46,600	66,900	56,900	10,300	122	9,100	
Boulgou	469,700	89,200	100,000	85,000	-4,200	95	-7,200	
Boulkiemde	395,800	75,200	78,900	67,100	-8,100	89	-10,500	
Comoe	300,400	57,100	87,100	74,000	16,900	130	15,900	
Ganzourgou	225,900	42,900	57,300	48,700	5,800	114	3,300	
Gnagna	275,400	52,300	64,600	54,900	2,600	105	1,800	
Gourma	353,600	67,200	89,600	76,200	9,000	113	9,500	yes
Houet	732,000	139,100	182,100	154,800	15,700	111	7,100	
Kadiogo	679,600	129,100	11,800	10,000	-119,100	8	-96,900	yes
Kenedougou	163,500	31,100	54,000	45,900	14,800	148	13,600	
Kossi	393,300	74,700	128,900	109,600	34,900	147	30,500	
Kouritenga	229,100	43,500	29,300	24,900	-18,600	57	-19,200	
Mouhoun	341,100	64,800	91,800	78,000	13,200	120	10,400	
Nahouri	122,500	23,300	16,700	14,200	-9,100	61	-8,800	yes
Namentenga	215,600	41,000	47,100	40,000	-1,000	98	-6,100	
Oubritenga	329,800	62,700	71,800	61,000	-1,700	97	-3,700	
Oudalan	124,700	23,700	16,200	13,800	-9,900	58	-10,400	
Passore	234,400	44,500	57,100	48,500	4,000	109	-3,100	
Poni	261,100	49,600	61,900	52,600	3,000	106	2,600	
Sanguie	235,500	44,700	55,200	46,900	2,200	105	-200	
Sanmatenga	407,800	77,500	91,300	77,600	100	100	-7,100	
Seno	268,900	51,100	60,500	51,400	300	101	-10,700	
Sissili	301,200	57,200	66,400	56,400	-800	99	3,200	yes
Soum	219,400	41,700	37,500	31,900	-9,800	76	-15,500	
Sourou	316,700	60,200	65,300	55,500	-4,700	92	-6,200	
Tapoa	190,900	36,300	42,800	36,400	100	100	2,200	yes
Yatenga	561,800	106,700	91,300	77,600	-29,100	73	-41,900	
Zoundweogo	176,800	33,600	36,200	30,800	-2,800	92	-3,300	
Total	9,300,700	1,767,200	1,978,400	1,681,600	-85,600	95	-155,100	

Sources: Provincial population projections for June of 1992 are exponential extrapolations of 1985 census figures (Institute National de la Statistique et de la Démographie) at province-specific growth rates (average national growth rate is 2.38%). Consumption is assumed to be 190 kilograms per person per year. Net production equals 85% of gross. Cereal production figures for 1985-90 come from Ministry of Agriculture.

Notes: The quality of the growing season was estimated as a function of the number of decreases of NDVI during June and July and the percent difference from average of NDVI for the third dekad of August. For each department (Burkina has 300), the number of dekad to dekad decreases was converted to a correction factor expressed as a percent: no dekad decreases became +100%, one decrease became +50%, two decreases became 0%, three decreases became -50%, and four decreases became -100%. This percentage was added to the percent difference from average of NDVI for the third dekad of August.

Production estimates were obtained by multiplying the standard deviation of average production by the "quality" percent obtained, and then adding the result to average departmental production. Departments were summed to get the provincial estimates presented in Table 5. This gives an estimate of cereal production that considers the annual variability of annual cereal production.

Food Stocks and Flows

An initial assessment of existing stocks, food aid and planned imports for 1991/92 is summarized in Table 6. Because of the very poor 1990/91 growing season, on-farm stocks at the start of harvest are estimated to be totally drawn down. This year's above-average production will help replenish security stocks of the Office National des Céréales (OFNACER) and on-farm stocks in areas that were cereal-production deficit last year. If production, food aid, and commercial import predictions hold true, Burkina's cereal supply will just about balance its cereal requirements in 1991/92. [this last sentence inserted by editor]

Projected Food Consumption Needs

Table 5 presented the FEWS estimated cereal production balance for the 1991/92 agricultural campaign. The net estimated cereal production deficit is 85,000 MT. This is 70,000 MT less than the 1985-90 average deficit of 155,000 MT. Areas

better than average include most of Burkina north of Ouagadougou. Areas south of Ouagadougou are slightly worse than average. This assessment of the quality of the growing season is similar to assessments by the Ministry of Agriculture. However, they note very poor growing conditions in Gnagna – the FEWS estimate for that province may be too high. If so, it will be the third bad year in a row for that province.

Projected Food Aid Needs

If the cereal production balance estimates in Table 5 are accurate, Yatenga, Passore and Soum will have above average production. Smallholder agriculturists can begin the long process of resource reconstitution. These groups will still be moderately vulnerable to food shortages, however, because of last year's deficits.

Food aid or other income support will need to be targeted to those areas where cereal production for several consecutive

Table 6: Provisional 1991/92 National Cereal Balance for Burkina (MT)

1992 Population		9,300,748
Annual per capita consumption rate (kg)		190
1991/92 CEREAL CONSUMPTION REQUIREMENTS		
Expected 1991/92 Cereal Consumption		1,767,142
Replenishment of Stocks (not available for consumption)		100,000
OFNACER	50,000	
On-Farm	50,000	
Total 1991/92 Cereal Requirement		1,867,142
1991/92 CEREAL SUPPLY		
Estimated Net 1991/92 Production		1,680,000
Available In-Country Stocks (OFNACER)		8,000
Stabilization	5,000	
Security	3,000	
Programmed Food Aid for 1991/92		44,500
USA	15,000	
France	5,000	
EEC	8,000	
Italy	10,000	
CATHWEL	5,000	
Others	1,500	
Expected 1991/92 Commercial Imports		135,000
Wheat	35,000	
Rice	100,000	
Total Available Cereal Supply for 1991/92		1,867,500
PROVISIONAL CEREAL BALANCE		358

Source: FEWS/Burkina

years has been below average. Aid would reduce the likelihood that vulnerable groups would have to sell off household assets to purchase cereal. Smallholder agriculturalists in Gnagna will become highly vulnerable because of several consecutive years of below-average production in that province.

FACTORS AFFECTING FOOD ACCESS

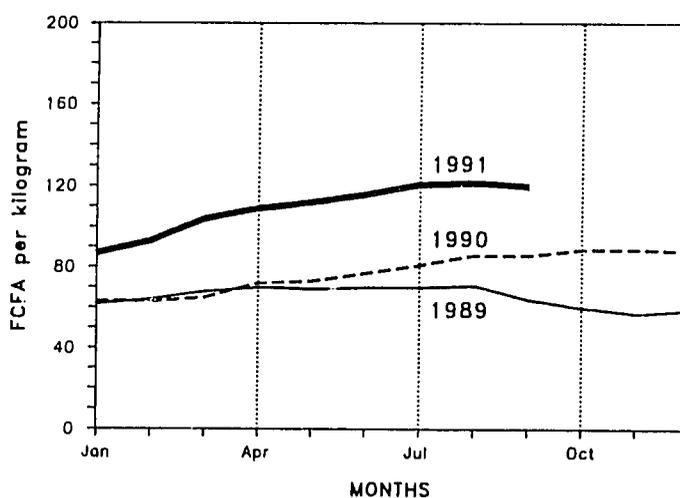
Economic Data

Price data from the OFNACER Market Information System show millet prices have been much higher in 1991 than in 1990 (Figure 1). After increasing steadily since January, prices stabilized in July. Two factors caused the prices to stabilize: a perception that the current cereal production season will have above average production and the distribution of food aid in zones where prices were high. It is very likely prices will drop significantly in November in response to the quality of this year's harvest.

UPDATE ON VULNERABILITY

The FEWS Vulnerability Assessment of June 1991 identified 10,000 smallholder agriculturists and agropastoralists in Yatenga, Sourou and Soum as extremely vulnerable. These groups had suffered from two consecutive years of below average cereal production. It appears that these provinces will have above average cereal production in 1991/92. This will reduce their level of vulnerability from extreme to moderate. In contrast, the cereal deficit in Gnagna could make 20% (55,080) of the population of this province extremely vulnerable (the people of Gnagna were moderately vulnerable last year).

Figure 1: Burkina Millet Prices, Average of Urban Markets

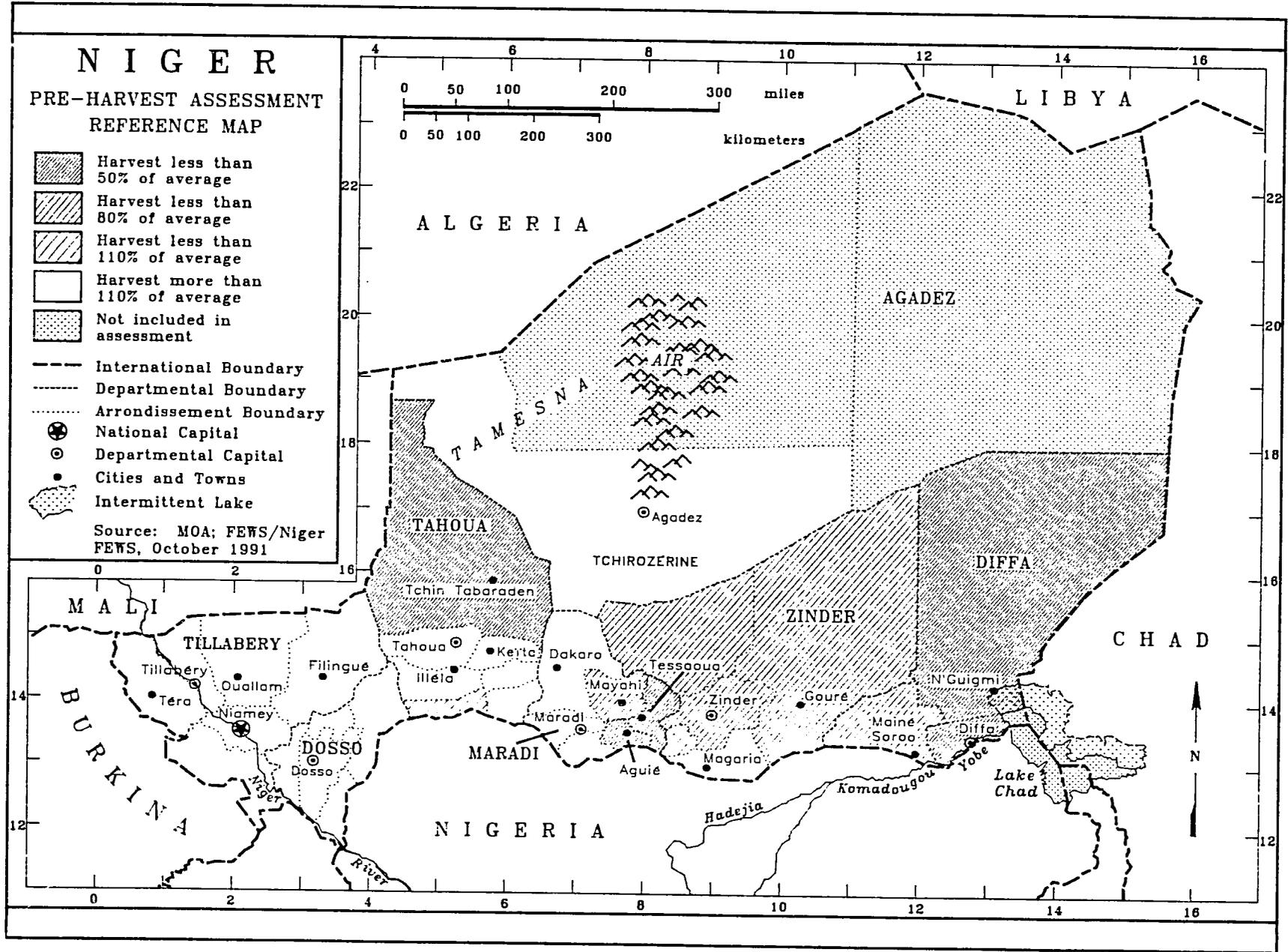


Sources: GOB/OFNACER; FEWS/Burkina

CONCLUSIONS

The FEWS/Burkina-estimated national cereal production balance for 1991/92 is a deficit of 85,000 MT, which is better than average. This will increase food security for the country and is a welcome relief for severely stressed socioeconomic groups. Emergency assistance will continue in targeted provinces of Yatenga, Soum, Gnagna and Boulgou, where cereal deficits were below average for two consecutive years. Food aid from the European Community and others that will arrive too late in 1991 to help the currently economically stressed areas can be used to replenish security stocks.

Map 6: Niger Reference Map



Niger Pre-Harvest Assessment

Local Shortage Amid Plenty

Report Released by USAID/Niger on September 30, 1991

SUMMARY

Despite dry conditions in June and July, the 1991 rainy season appears to have led to the best harvest since 1988 and pasture conditions close to those in 1988 in most of the country (see Map 6). Levels of food security among farmers, herders and agropastoralists have improved significantly since late June, with the exception of populations in Diffa Department, Tchén Tabaraden Arrondissement (Tahoua Department), Mayahi, Aguié, and Tessaoua arrondissements (Maradi Department), and Gouré Arrondissement (Zinder Department). Assistance will be required for up to 1 million people in these latter areas to mitigate moderate to extreme levels of vulnerability during 1992 (see Appendix for FEWS' definitions of vulnerability to and risk of famine). Similar assistance may be required for other areas of the country depending on the final harvest outcome, which may be effected by the apparent end of regular rainfall in early September and by insect damage. Although USAID/Niger hopes that external food aid will not be needed in 1992, it is deferring judgment on that point until the October 15 food security report, when better harvest information is likely to be available.

FACTORS AFFECTING FOOD AVAILABILITY

Agricultural Conditions

In 1991, appreciable rainfall and first plantings began earlier than normal. Even so, dry weather from June to mid-July resulted in crop losses, above normal insect damage, irregular crop development and large scale replanting in many fields. Above-average rainfall in August improved production prospects, but a possible early end of rains, as well as insect damage, may significantly reduce yield in areas with late planted crops.

Cereal production appears to be best in the southern areas of Zinder, Tahoua, Tillabéry and Maradi departments and all of Dosso Department. Because of unusually heavy rainfall, cereal production in Agadez Department is also expected to be above average.

Prospects for a fair to good harvest in the northern parts of Tillabéry, Tahoua, Maradi and Zinder departments depend on adequate rainfall through the end of September. Although crops planted in low areas have adequate moisture and should produce well, dryer conditions since the beginning of September in these parts of Niger may affect the productivity of crops planted on higher, clay soils. Harvest prospects are not good in Diffa Department and could be disastrous if rains do not continue until the end of September.

Pastoral conditions

Fodder production throughout the country has been mostly good to excellent this year. It is expected that there will be a more than sufficient quantity of biomass per animal in the months ahead. Animal health is also reported to be good. In the agricultural zone, sustained livestock feeding is guaranteed by the substantial production of agricultural residues, notably *niebe* straw.

In the pastoral zone, fodder production appears to be at or above average levels, except for a small zone in the northeastern Maradi-western Zinder departments and an adjoining larger zone south of Agadez toward Tanout. Dry season pasture in the Aïr Mountains and Temesna should be good this coming year due to above average rain and significant run off in these areas in August.

Projected Cereal Production and Requirements

In the absence of current figures on area cultivated and yield, the rainfed millet and sorghum production estimate of almost 2 million metric tons (MT) is based on area and yield projection models for millet developed by the USGS project and the French *Projet Espace* located at the AGRHYMET regional center in Niamey. See the notes with Table 7 for further detail. The yield model for millet does not use information on yield reductions caused by pests, and thus probably overestimates production somewhat. It should be noted that late season insect damage and an early end of the rains may revise these projections significantly downward.

The cereal production balance¹ shown in Table 7 reveals a national production surplus, with just over 100% of the 1991/92 consumption requirement likely to be met by this year's rainfed production. It should be noted, however, that the 9% national surplus will not cover important sub-national shortages, as the purchasing power in the deficit areas is poor. Without adequate purchasing power, surpluses will not flow to deficit areas. Only Dosso will produce a significant surplus in all of its arrondissements. The following department-level description does not factor in grasshopper and other insect damage, which could lower the production reported in this assessment somewhat, especially in northern Tillabéry, northern Dosso, eastern Zinder, and western Diffa departments.

production in Diffa and Mainé Soroa arrondissements may offset the poor millet crop.

Production in Zinder Department will range from significantly deficit to moderately surplus. Mirriah and Gouré arrondissements will meet only about half of their respective requirements, and Matameye and Tanout may experience a 5 to 10% shortfall. Rural Mirriah should be able to satisfy 65% of its requirement, however, when the population of Zinder City is taken out of the equation. Despite surplus projections in Magaria, the Ministry of Agriculture reports that up to 30% of the villages will experience severe cereal deficits if the rains do not continue through September.

Departmental Production and Demand Summary

Diffa Department will register Niger's most severe deficit for the third year in a row, with N'Guigmi Arrondissement the hardest hit. Even in the best areas, it is unlikely that production will meet even 25% of the cereal consumption requirement. The Ministry of Agriculture reports, however, that good *niebe*

Maradi Department will more than meet its overall 1991/92 cereal consumption needs, but pockets of poor production will contribute to deficits in Mayahi, Aguié, and Tessaoua arrondissements, which normally produce a surplus. They will meet approximately 75%, 30% and 50% of their cereal needs, respectively. Despite surplus production in Dakoro, the Ministry of Agriculture's latest report indicates that if rains do not

Table 7: Provisional Cereal Production Balance for Niger (Rainfed Millet and Sorghum, MT)

Department	1992 Population	1992 Cereal Needs	Estimated Net 1991/92 Rainfed Production	Balance	% 1991/92 Needs Met	% 1990/91 Needs Met	Average % Needs Met from 1980-90
Niamey City	474,938	90,238	12,068	-78,171	13.4	11.6	3.0
Tillabéry	1,525,742	333,678	437,200	103,522	131.0	65.1	87.0
Dosso	1,181,871	258,212	505,632	247,420	195.8	105.4	118.0
Tahoua	1,455,501	316,909	334,014	17,105	105.4	85.3	95.0
Maradi	1,613,773	349,478	387,173	37,695	110.8	119.6	115.0
Zinder	1,606,934	347,054	268,007	-79,046	77.2	86.5	111.0
Diffa	201,045	42,785	7,223	-35,562	16.9	55.5	46.0
Agadez	254,911	52,833	1,590	-51,243	3.0	2.3	2.0
Total	8,314,716	1,791,187	1,952,907	161,720	109.0	84.7	100.0

Sources: FEWS/Niger population projection from GON 1988 census based on unofficial arrondissement-level population growth rates from GON Census Bureau; USAID/Niger rainfed millet production estimate based on Project Espace yield and USGS project area-planted projection models; GON/MOA statistics for 1990/91 sorghum production; USAID/Niger consumption requirement (190 kg/year for nomad and urban populations, 220 kg/year for farming populations).

Notes: The arrondissement-level data is available at FEWS/W and from the FEWS Representative to Niger (in care of USAID/Niger). All production figures are net of gross by 85%. Production balance equals estimated production minus the consumption requirement. Kilograms per capita equals production divided by population. Percent requirements met equals estimated production divided by cereals requirement. Percent requirements met on average equals the mean of the percent requirements met by each harvest from 1980 to 1990; GON/MOA statistics used for 1980-90 production. Background on millet and sorghum production projections: Yield estimates for millet are projected from a model developed by the Projet Espace at AGRHYMET based on soil moisture, planting dates, and rainfall probabilities. The field data for the model is collected regularly from 35 sites in Niger, with at least one for each arrondissement in the agricultural zone. The latest data used for the model is from the end of August, 1991. The area projections for rainfed millet are drawn from a USGS/AGRHYMET model which uses a linear regression of historical GON data to project area planted. The 1990 GON sorghum production figures are used for the 1991 sorghum production estimates because of a lack of better figures. Weather conditions have led to the conclusion that the 1991 sorghum crop will not be worse than that in 1990.

¹ A cereal production balance is the amount of cereal needs met by local production before commercial imports and food aid. In this case, only rainfed production is included in the production balance. Rainfed millet and sorghum

production comprises 95% of total cereal production in Niger and 70 to 80% of total food intake. The national cereal balance shown in Table 8 adds in irrigated and off-season cereal production as well.

continue through September, approximately 30,000 people will face serious cereal deficits in the eastern part of the arrondissement.

Tchoua Department will also experience an overall cereals surplus, while Birni N'Konni and Tchoua Tabaraden arrondissements will experience mild and severe deficits, respectively. Tchoua Tabaraden is located in a marginal agricultural zone and rarely meets more than 50% of its cereal needs. The deficit is particularly acute this year, however, with only about 20% of the requirement likely to be met. Birni N'Konni, where average production is no longer sufficient to meet rapidly growing demand, will see a shortfall of about 10%.

Tillabéry Department is anticipating the best harvest in several years, with surplus production in all arrondissements except Filingué, where needs will just be met. Despite good prospects in Téra, Tillabéry and Ouallam arrondissements, as many as 15%, 40% and 22% of the villages, respectively, will experience severe shortages if the rains do not continue through September.

Agadez Department will meet only 3% of its cereal consumption requirement, as expected. It lies outside of the agricultural zone and is chronically deficit. Production this year in Tchirozérine, the most agricultural arrondissement, is above average but will only meet about 5% of its cereal requirement.

Projected National Food Supply

The provisional 1991/92 crop estimates show that Niger has a production surplus of almost 200,000 MT, when rainfed, irrigated and off-season production are counted against domestic cereal consumption needs. The overall cereals balance may net a surplus of up to 481,000 MT when in-country stocks and expected imports are considered (see Table 8). As indicated above, this cereal balance includes optimistic cereal production projections as of August 31, 1991. Late season insect damage as well as an early end of rains will likely reduce production. The Niger Mission's October Food Security Operations Cable will provide a cereals balance update based on the outcome of these factors.

FACTORS AFFECTING FOOD ACCESS

Cereal Market Data

Unofficial price information from the beginning of September indicates that prices are falling throughout the country on the prospects for surplus production in Dosso, Tillabéry and Maradi departments and also in Nigeria. Grain merchants throughout the country have not yet begun to replenish their stores, in anticipation of prices falling even lower after the harvest.

Data from the national cereal price information system for the beginning of August indicates that millet prices were higher than the 1986-90 average for August, except in central and southern Maradi and southern Tillabéry departments. Prices appear to be highest with respect to the average in northern Tillabéry and Dosso departments.

Table 8: Provisional 1991/92 National Cereal Balance for Niger (MT)

1991/92 Population	8,314,714
Annual per capita consumption rate (kg)	190/220
1992 CEREAL CONSUMPTION REQUIREMENTS	
Expected 1992 Cereal Consumption	1,791,187
1992 CEREAL SUPPLY	
Estimate¹ Net 1991/92 Production	1,991,180
Net Rainfed Millet and Sorghum	1,952,907
Net Irrigated Production	28,273
Net Off-Season Production	10,000
Available In-Country Stocks	141,039
Public Reserve Stock	45,000
Public Working Stock	1,912
Commercial Stocks	4,827
On-Farm Stocks	83,300
Donor Stocks	6,000
Programmed Food Aid	10,000
Expected Commercial Imports	130,034
Expected Commercial Exports	0
Total Available Cereal Supply for 1992	2,272,253
PROVISIONAL CEREAL BALANCE	481,066

Sources & notes: All production estimates (rainfed and off-season/irrigated) are netted at 85% of gross production to account for feed, seed, and post-harvest loss. Rainfed cereal production is estimated per the note to Table 7. Irrigated and off-season cereal production, which includes rice, wheat, corn, and fonio, is estimated at last year's level as reported by the GON Ministry of Agriculture. The consumption requirement of almost 1.8 Million MT was calculated by applying the USAID consumption rates (190 and 220 kg per person per year for nomadic and farming populations, respectively) to 1991/92 population projections, based on the GON census of 1988 and a national growth rate of 3.3%. Total stocks of approximately 136,000 MT include two-thirds of public reserve stock as reported by department-level grain merchants, on-farm stocks estimated at half the sum of last year's production balance from surplus arrondissements, and donor stocks (approximately 6,000 MT of various cereals held by the United Nations World Food Program (WFP), German Stock Reserve Project and similar donor activities). Anticipated cereal imports of approximately 140,000 MT reflect commercial cereal imports at last year's GON-estimated level and WFP pledges.

Livestock Market Data

Herder terms of trade¹ in arrondissements identified as vulnerable in the June 1991 Vulnerability Assessment worsened from June to July, but then started to improve slowly in August. Goat prices fell from June to July, especially in Diffa, Dosso, Tillabéry, Gouré and Mirriah. This period was also marked by high millet prices, especially in Tchirozérine, Dosso and Gouré. Preliminary data for the first week of September seems to indicate that animal prices have leveled off or increased. With falling millet prices, herders' terms of trade are improving markedly. It is likely that this trend will continue through the end of the harvest and into the coming year.

Economic Summary

There should be a decreased Nigerien reliance on trade with Nigeria to cover cereal needs during 1992. Trade with Nigeria is expected to shift to consumer goods. The good harvest is expected to lead to an upsurge in consumption expenditures related to traditional ceremonies, which were deferred in previous poor harvest years. This upsurge in demand for consumer goods will result in increased unofficial and official imports of Nigerian manufactured goods, as well as a slight increase in imports from Algeria.

Improving foreign trade conditions in Nigeria, particularly vis à vis import financing, may reduce the volume of Nigerian-bound goods transiting Niger — given the better access to parts, tools and equipment, Nigerian industry is better able to produce many goods locally. This production takes place at the expense of goods imported through neighboring countries, with a resulting loss of profits by Nigerien traders on non-"luxury" items. Nonetheless, if Nigerian controls continue on "luxury" goods and vehicles, this import/export segment of the Nigerien economy should continue to prosper.

UPDATE ON VULNERABILITY

Farmers and Agropastoralists

With the exception of northern Tahoua and eastern Diffa departments, conditions have improved for the farmers and agropastoralists reported as "vulnerable" in the June Vulnerability Assessment (see Appendix for FEWS' definitions of vulnerability to and risk of famine). Despite increased food security on the national level, however, some new areas have been identified as vulnerable. Mid-season drought compromised cereal production in central Maradi, eastern Zinder, and western Diffa departments. Populations in these areas have

become moderately vulnerable. Other areas that are susceptible to increased vulnerability if the rains ended in early September are highlighted below.

Areas Most Vulnerable

Deficit cereal production for three years in a row as well as high millet prices in northern Tahoua and eastern Diffa may result in up to 120,000 agropastoralists being highly vulnerable to famine. Despite emergency food aid distributions in Diffa Department over the last few months, the vulnerability status of these populations has not improved since the June Vulnerability Assessment. Owing to poor rainfall, production will meet less than 25% of cereal consumption needs this year, a deficit twice as large as normal. Although the recent food aid prevented population displacement in search of food, it did not decrease vulnerability to another bad harvest.

Agropastoral vulnerability has increased in Tchintabaraden. Unless assistance is provided (e.g., reallocation of internal cereal supplies), a large percentage of these populations may migrate in search of food before the 1992 planting. As is the case in eastern Diffa, household resources are exhausted and purchasing power is low. The ability to buy cereals at even low prices on the market will be extremely limited once current harvest stores are depleted.

Areas Newly Vulnerable

Unusually low and deficit production places 692,000 farmers in the Maradi Department arrondissements of Mayahi, Aguié, and Tessaoua in the moderately vulnerable category. Despite the severity of the projected shortfalls, household reserves from previous years and the probability of low cereals prices will ease the impact of the deficit.

Of populations in Zinder and Diffa departments, 232,000 agropastoralists in Gouré and Mainé Soroa arrondissements have become moderately vulnerable this season due to extremely deficit production. Food aid distributions over the last two years have mitigated this area's marginal production and prevented the exhaustion of household resources. Should millet prices stay high, however, the people in question may not be able to buy cereals once harvest stores are depleted.

Areas Potentially Vulnerable

If rains do not continue through September, the following areas' farmers and agropastoralists will experience an increased vulnerability to food insecurity. The numbers of people affected are estimated by the GON, based on field travel in late August. Vulnerability levels are estimated by FEWS/Niger:

- Niamey urban area, potentially moderately vulnerable — 27% of the rural villages surrounding Niamey (23,000 people).

¹ Terms of trade is defined here as kilograms of millet obtainable per unit adult male goat.

- *Tillabéry Department, potentially highly vulnerable* – 15% of the villages (15,000 people) in Téra Arrondissement; 40% of the villages (30,000 people) in Tillabéry Arrondissement; 22% of the villages (19,000 people) in Ouallam Arrondissement.
- *Tahoua Department, potentially moderately vulnerable* -- 15,000 people in Keïta Arrondissement; 51,000 people in Illéla Arrondissement.
- *Maradi Department* -- 7% of the department's villages, or 94,000 people in localized areas of: eastern Dakoro Arrondissement (*potentially moderately vulnerable*), northern Mayahi Arrondissement (*potentially highly vulnerable*), and northern Tessaoua Arrondissement (*potentially highly vulnerable*).
- *Zinder Department, potentially highly vulnerable* -- 19% of the villages in Gouré Arrondissement.
- *Zinder Department, potentially moderately vulnerable* -- 50% of the villages in Zinder urban area; 27% of the villages in Magaria Arrondissement.
- *Diffa Department* -- 49,000 people in localized areas of: Diffa and N'Guigmi arrondissements (*potentially extremely vulnerable*); and Mainé Soroa Arrondissement (*potentially highly vulnerable*).

Nomadic herders

Herder vulnerability throughout Niger is significantly lower than in May following abundant rains that led to generally excellent grazing and watering conditions. Localized areas of poor pasture production appear to be an inconvenience, but not a setback. Replenishment of the water table should lead to excellent winter grazing on perennial grasses and contribute to

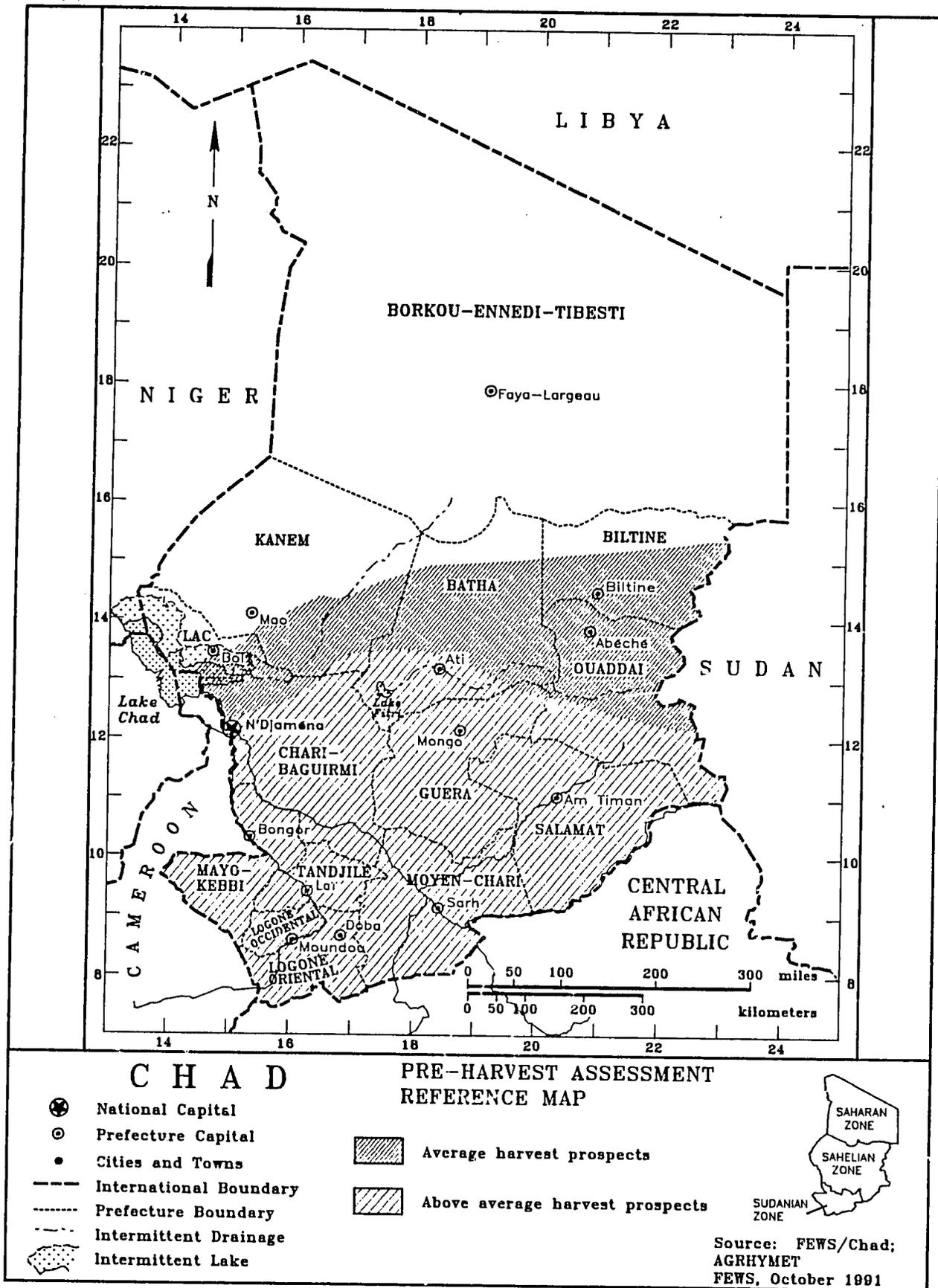
greater milk production. Greater milk production will contribute to improved food security through a better diet and increased income generation.

After a serious deterioration following the June 1991 Vulnerability Assessment, terms of trade for herders have improved dramatically since late August. Should grain prices continue to fall, herder terms of trade could be the best in the last decade.

CONCLUSIONS

Food supplies in Niger during the 1991/92 consumption year (November through October) will be the best since 1988/89. Most Nigeriens will experience minimal food insecurity through the 1992 harvest and should be able to set aside cereal stocks and increase assets as potential coping mechanisms against future poor harvest. Despite this rosy picture, food security conditions in Diffa Department, and in Tchintabaraden Arrondissement of Tahoua Department will be very poor. Other areas in the northern parts of Zinder and Tillabéry departments may also experience a decrease in food security due to an early end of rains and less than expected cereal production.

A reallocation of cereal within the country (e.g., commercial and government stocks) will be required for Diffa Department and, if the best case scenario does not come through, for areas in Tahoua, Tillabéry and Zinder departments. This is consistent with the CILSS/donor food aid charter, which implores donors to meet needs through national and regional markets before importing food. Options for funding internal reallocations of cereal are limited. The GON lacks financial resources to undertake such a program and donors have historically encountered serious difficulties in responding to regional food shortages with financing rather than imported food aid. Conditions in Diffa, Zinder, Tahoua and Tillabéry departments will be monitored closely and response options discussed with the GON and donors as appropriate.



Map 7: Chad Reference Map

Good Harvest Expected in All Zones

Report released by USAID/Chad on September 18, 1991

SUMMARY

Excellent rainfall in late July and August relieved the negative effects of a short June dry spell. By September, cumulative rainfall amounts equaled or exceeded the 30-year (1951-80) normal in central Chad. Area planted in cereals has increased in comparison with the 1990/91 season. Although grasshopper attacks have been reported in many areas, crop damage has not been significant except in areas around Lake Chad. In general, crop conditions are good to excellent (see Map 7). Harvesting of rainfed crops has begun in many areas.

As Chad entered the 1991/92 crop season, cereal prices were at their highest levels in seven years and climbing. Cereal prices peaked in late July and started falling rapidly in early August, by 50% in some places. Falling prices reflect confidence in the current harvest and the consequent release of stored grains by merchants onto the market. All these factors suggest there will be a good 1991/92 harvest.

FACTORS AFFECTING FOOD AVAILABILITY

Agricultural Conditions

The 1991/92 rainy season started early and with heavy rains. By June, a return to normal weather conditions resulted in a temporary dry spell. Rainfall amounts increased again in late July and August, sometimes exceeding the 30-year normal (1951-80 base). Map 8 shows the 1991/92 cumulative rainfall and comparison to the 30-year normal. Rainfall was especially heavy in central and eastern areas, benefitting Guéra, Batha, Ouaddaï and Biltine prefectures. An area of below normal rainfall persists in south central Moyen-Chari Prefecture.

NDVI images show increasing biomass in the Sahelian zone in July and August (see NDVI, inside back cover). The leading edge of emerging vegetation reached as far north as 16° north latitude, covering central Kanem Prefecture, northern Batha Prefecture and extreme-southern Ennedi Sub-prefecture. Similarly, METEOSAT rainfall estimates confirm the abundant

August rains, at times reaching into central Borkou-Ennedi-Tibesti Prefecture (B.E.T.).

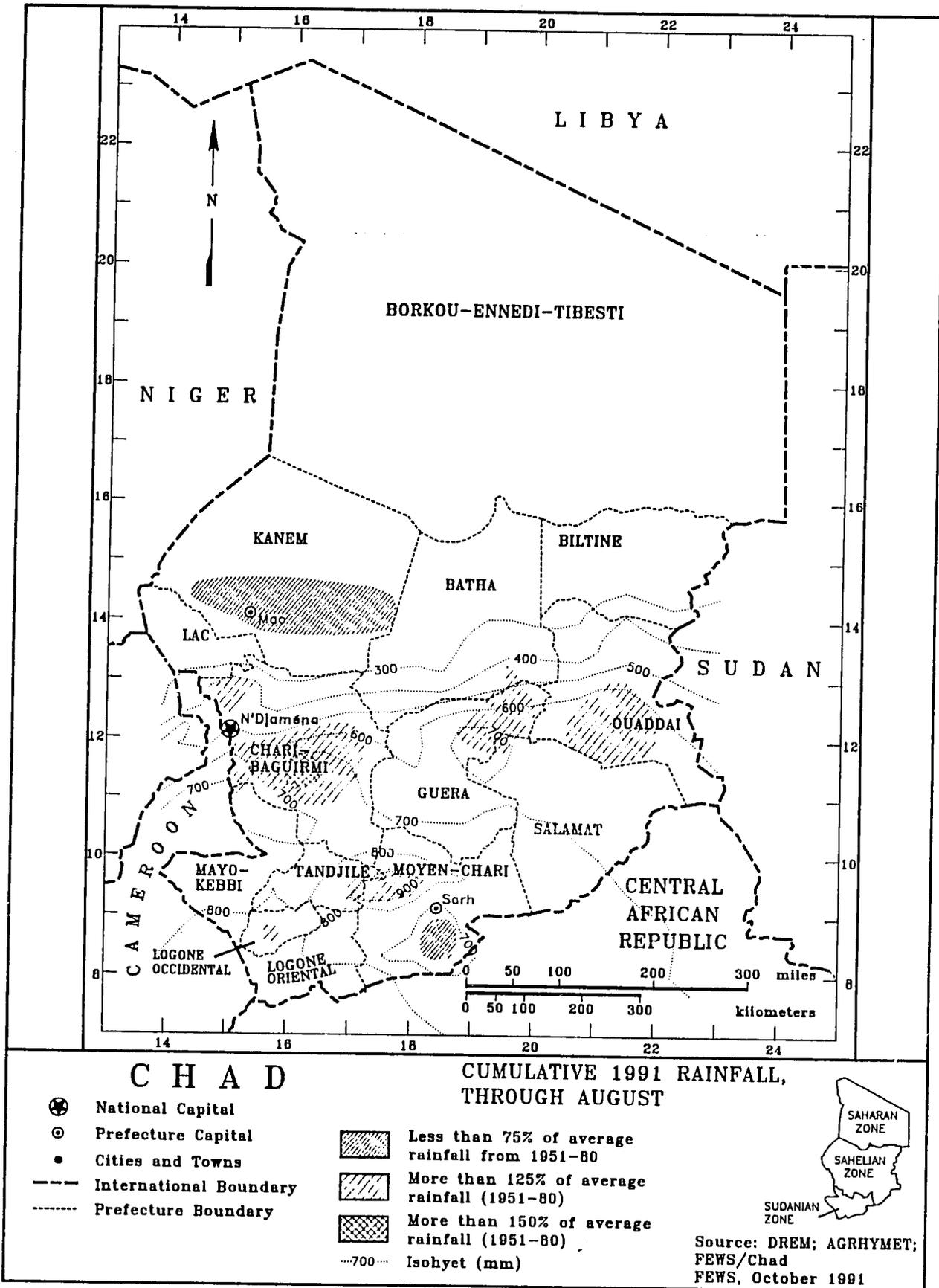
Most farmers planted in May with the early start of the rainy season. Some of these early plantings in the northern Sahelian zone were lost as a result of the June dry spell. Further south, in the Sahelo-Sudanian zone, yields from these early planted crops were diminished but not completely lost. In the Sudanian zone, adequate soil moisture allowed these early crops to reach full maturity.

The second major planting started in late June with the return of rains and was completed by mid-July. The abundant August rains ensured good soil moisture conditions. This second crop is now reaching maturity. Both the Government of Chad (GOC) Agricultural Statistics Bureau (BSA) and National Office of Rural Development (ONDR) estimate an increase in area planted in rainfed cereals. The ONDR estimate for the Sudanian zone of 804,300 hectares planted in cereals is 48% above that planted in 1990/91 (544,700 hectares), 26% above that of the 1989/90 season, and 68% above that of 1988/89 (the unusual factors in 1988/89 were outstanding yields and a near-doubling of the *berbéré*¹ crop).

Conditions are favorable for flood recession and irrigated crops as well (*berbéré* and rice, respectively). River stages were high at mid-September and localized flooding had occurred in many areas.

Grasshopper activity in the Lake Chad vicinity continues as the growing season ends. Hoppers (wingless, juvenile grasshoppers) are moving off pastures (now drying) and rainfed croplands (already harvested) into wadi areas of Lac and Kanem prefectures, where truck gardening and irrigated agriculture take place. With the natural drying of pastures, hoppers are moving south, into northern Chari-Baguirmi Prefecture. If this trend continues without control measures, *berbéré* may be significantly affected in northern Chari-Baguirmi Prefecture. The *berbéré* harvest represents about 5% of the overall cereal crop in this prefecture in an average year.

¹ The Chadim term *berbéré* refers to off-season river recession sorghum of any seed variety.



Map 8: Chad 1991 Rainfall through August

Pastoral Conditions

The Ministry of Livestock's pasture monitoring team is reporting good pastoral conditions throughout the Sahelian zone. However, isolated pockets of dryness have been detected near Moussoro and Oum Hadjer. NDVI images confirm good pastoral conditions up to northern Kanem and southern Ennedi. Biomass development was peaking in late August and early September, one month later and 100 kilometers further north than in 1990. The outlook for dry season fodder is good and no major animal illness has been reported. The good harvest prospect and recovering livestock conditions should significantly decrease the vulnerability status of pastoralists (see Appendix for FEWS' definitions of vulnerability to and risk of famine).

Food Stocks and Flows

Emergency food distributions following the poor 1990/91 harvest are nearing completion. The food security stock was depleted in June, but is being replenished from donor pledges. As of mid-September, it stood at 10,000 metric tons (MT), with another 25,000 MT in the pipeline. There are also 41 containers of excess food rations from Operation Desert Shield scheduled to arrive during October. Finally, local currency generated from the sale of United States wheat flour can be used to buy cereals from surplus regions for emergency distribution and to pay ancillary costs if the need arises.

Projected Food Consumption Needs

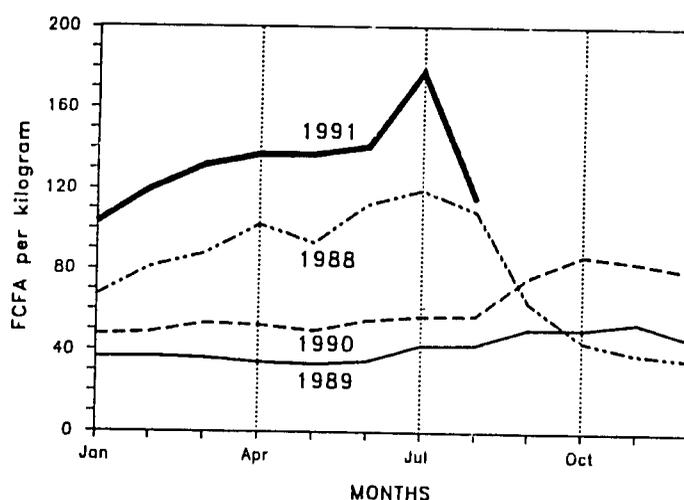
A census has never been conducted in Chad and consumption surveys are lacking. Calculation of a food consumption need is not practical. The World Bank, however, has stated that, "in years of normal or good rainfall, aggregate production is sufficient to meet estimated needs" in Chad. Given the good rainfall conditions and limited grasshopper outbreaks, a good harvest is expected. Any local production deficits will be satisfied by internal cereal trade, commercial imports, or, if necessary, distributions from the security stock.

FACTORS AFFECTING FOOD ACCESS

Economic Data

As Chad entered the 1991/92 crop season, cereal prices were at their highest levels since 1984. Cereals prices continued to climb until July. The European Community-funded early warning project, *Système d'Alerte Précoce (SAP)*, reported the average millet price in the Sahelian zone to be 178 West African francs (FCFA) per kilogram (kg) in July. In August, that price fell to 115 FCFA per kg. Figure 2 shows average millet prices in the Sahelian zone for the last four years. The falling 1991 cereal prices follow the same pattern as in 1988, when the then good harvest prospect built confidence and merchants released

Figure 2: Average Sahelian Millet Prices in Chad, 1988-91



Sources: SAP/Chad; FEWS/Chad

their grain stock onto the market, reflecting similar optimism about the 1991/92 harvest.

UPDATE ON VULNERABILITY

Approximately 164,000 persons were considered extremely vulnerable to food stress following the 1990 harvest. These persons were located mostly in Kanem, Batha, Guéra, Biltine, and Ouaddaï prefectures. These same areas have benefited from satisfactory rainfall and growing conditions in 1991. With good vegetative conditions in most of this zone, an average to good harvest is expected. As a result, the vulnerability status of this population will decrease as the harvest begins in the Sahelian zone. The likelihood of continued refugee repatriation, however, is high as Libya continues to forcibly expel Chadians from the north and as Chadians voluntarily return from Sudan in the east. This situation will require close monitoring to ensure that reintegration and resettlement occur smoothly. The existing food security stock and late food aid arrivals will cover any potential feeding requirements which may occur during the coming year.

CONCLUSIONS

Crop conditions are good to excellent in all agricultural zones, although some localized crop losses due to grasshopper attacks have occurred in the Lake Chad region. Pastoral conditions are similarly good. With a good harvest prospect, food security in Chad should improve significantly following the 1991/92 harvest. No major areas of deficits are expected. Any local shortages will be met through normal commercial exchanges and existing stocks. No emergency food aid imports additional to those currently in the pipeline will be required.

SUDAN

Traditional Farmers Hurt Again

Report released by USAID/Sudan on September 24, 1991

SUMMARY

The 1991/92 agricultural season will be more productive than that of the previous year, but well below average. The irrigated sector, which normally supplies about 22% of national cereal production, will produce a record crop. The rainfed mechanized sector, usually responsible for about 59% of production, will produce a mediocre crop because of late planting and a shortened season. The traditional, subsistence rainfed sector, which averages about 19% of national production, is suffering from severe seed shortages, late planting, poor rain distribution and insecurity, and will produce very poorly, with crop failures in some areas (see Map 9).

Production now depends on the duration of the rainy season. If the rains continue into late September, gross production could be 2.93 million metric tons (MT), leading to a net production of 2.49 MT and a production deficit¹ of 0.5 million MT (see Table 10). If the recent lack of precipitation persists, however, gross production could be only 2.61 million MT, resulting in a 2.22 net production and a 0.77 million MT production deficit. Last year's estimated production was 1.94 million MT.

This level of agricultural production, combined with about 400,000 MT of remaining 1991 commercially imported grain stocks and about 150,000 MT of anticipated relief carryover stocks, should in theory nearly satisfy the total 1992 domestic consumption needs of 2.99 million MT. Severe production deficits and significant food needs will exist throughout the subsistence sector, however. The redistribution from other areas and national stocks necessary to meet these needs has not occurred in the past. The Government of Sudan (GOS) and donors should therefore anticipate emergency relief needs in 1992 for rural populations, particularly in western Sudan, as well as continuing relief needs for displaced people, urban poor, and refugees, and particularly for young children in all of these groups. The need for relief will begin in rural areas experiencing crop failures as early as November 1991.

Populations that have been vulnerable for many years are now in a particularly precarious and threatening condition (see

Appendix for FEWS' definitions of vulnerability to and risk of famine).² Their resources are severely depleted. A large proportion of the population is already destitute after two years of poor harvests and eight years of civil war. Prices are at unprecedented, high levels, and high malnutrition rates are widely reported.

NOTICE: This assessment is based on data from field trips, government, donor, and NGO sources. Official government estimates were not yet released as of early October. Any figures cited here should be considered preliminary estimates.

FACTORS AFFECTING FOOD AVAILABILITY

Agricultural Conditions

The three primary agricultural sectors (irrigated, mechanized rainfed and traditional rainfed) are discussed separately because each has different incentives, access to inputs, and final production destinations. Irrigated farming, and to a lesser degree mechanized farming, are supervised by governmental bodies. Farmers are supplied with inputs through the same governmental bodies. Production is used for urban consumption and export, and only secondarily goes to other rural areas. Subsistence farmers are responsible for their own inputs and their production is primarily for their own use. Special attention is paid to the traditional, or subsistence, sector because it is these households whose ability to eat is most directly related to their own production.

Climate

In northern Sudan, early May rains were followed by a long dry period during June and July that killed early planted crops and delayed normal planting by as much as 30-50 days. August rains were heavier than normal, but September rains have been

¹ A cereal production balance is the amount of cereal needs met by local production before commercial imports and food aid.

² Groups included are drought affected subsistence farmers, nomads, displaced persons, refugees, the urban poor, and particularly young children and elderly in all of these groups

Table 10: High and Low 1991/92 Gross Cereal Production Estimates for Sudan (000 MT)

Agricultural Sector	Average Gross Production Over 1985-89	1990/91 Gross Production	High 1991/92 Production Estimate	Low 1991/92 Production Estimate
Northern Sudan				
Irrigated Sorghum and Millet	469	516	769	769
Irrigated Wheat	257	680	679	679
Mechanized Sorghum and Millet	1,965	545	1,138	922
Traditional Sorghum and Millet	640	197	313	214
North Subtotal	3,331	1,938	2,899	2,584
Southern Sudan	52	7	31	31
Total	3,383	1,945	2,930	2,615

Sources: GOS/Ministry of Agriculture; FEWS/Sudan

Note: Calculations for 1991/92 mechanized crops are based on estimated area planted as of August 15.

far below normal, leaving the outlook for late-planted crops in question. There was localized flooding in central, western, and southern Sudan. Unusually high winds in central and parts of western Sudan have caused severe crop damage in some subsistence areas.

Inputs

The irrigated and mechanized sectors have generally had sufficient material inputs, although some seed, fertilizer, lubricant and spare parts shortages have been reported. A farmer cash shortage (resulting from poor profits last year) combined with significantly increased farming costs could hinder procurement of sufficient agricultural laborers for weeding and harvest, in spite of potential loans and credit.

Throughout the traditional (subsistence) sector, a severe shortage of seeds has caused significantly reduced areas planted. USAID has provided 1,900 MT of cereal seeds for 430,000 northern and southern families (throughout Sudan). Another 2,500 MT of grain and vegetable seeds have been funded and distributed by other donors.

Irrigated Agriculture (Sorghum, Millet and Wheat)

If yield is average or above in this sector, sorghum production could be a record 769,000 metric tons – 33% greater than last year, 40% greater than the five-year average. High farmer incentive and government interest led to planting of about 1.297 million *feddans*,¹ a 36% increase over the five-year average. Almost 300,000 *feddans* have been planted with improved seeds.

The increased sorghum planting is at the expense of cotton and peanuts, which form the basis of the oilseed production for domestic use and export. This could necessitate large food-oil imports.

It is likely that winter wheat planting targets of 1,260,000 *feddans* will be reached, for a production of 679,000 MT. Production would be almost the same as last year and over double the five-year average. However, uncertainty about government wheat marketing intervention could cause disincentives.

Rainfed Mechanized Agriculture (Sorghum and Millet)

If the rains were to continue strongly and then end at their normal time, production could be as much as 1.138 million MT – about 40% less than average, but more than two times greater than last year.² Recent precipitation has been meager, however, and will likely reduce production significantly, particularly in more northern areas, such as Gedaref.³

The area planted by August 15 was estimated by the Mechanized Farming Corporation to be 6.02 million *feddans*.⁴ This is 10% less than last year and slightly less than average, but less than half of this year's government-set target. Late rains, inadequate fuel deliveries in some areas, lack of time to complete targets within the optimum planting season, possible seed shortages, and anticipated high farm labor costs may have all contributed to the failure to meet targets.

² Even in the worst case, 1991/92 yields will be far greater than those of 1990/91.

³ On average, Gedaref supplies about 50% of mechanized crops.

⁴ Optimum yield requires completion of planting by late July. Crops sown after August 15, even early maturing varieties, require rain well into mid-October, which is very unlikely to take place.

¹ One *feddans* equals about one-and-one-quarter acres.

Traditional Subsistence Agriculture (Sorghum and Millet)

A very poor traditional harvest is expected in October and November. With normally-ending rains, production could have been about 313,000 MT or less, compared with an average of 640,600 MT and production last year of 197,000 MT. However, September rains in many areas have been very poor, and crop failures are already being reported in North Darfur and northern Central State. If this pattern continues, production could be as low as 214,000 MT.¹

Seed shortages, particularly in western Sudan, caused reductions in areas planted of up to 50%. In South Darfur, many of an estimated 120,000 people displaced by tribal warfare planted little or nothing. Last year in parts of South Kordofan, insecurity greatly contributed to estimated crop reductions of up to 90%. This year, security problems are less severe, but planting problems are far greater.

Late main rains delayed most planting by 30-60 days, to mid-July and late August. Some areas have also suffered crop damage from, variously, severe localized flooding, high winds, termites, and birds.

Cash crop prospects are currently largely unknown. The income available from gum arabic has declined considerably in recent years because of widescale cutting of trees for firewood and charcoal and the poor condition of remaining trees. Limited information suggests that, in Kordofan, groundnut and sesame may produce well, in contrast to their total failure last year.

Southern Sudan Traditional Agriculture

Far greater cultivation is reported around peri-urban areas than in recent years. Around Juba, about 11,000 *feddans* of various crops have been planted, which people claim could provide the best production in decades. Nonetheless the production, which is now being harvested, will supply only two to three months food for the 288,000 Juba population. Juba grain prices have decreased considerably in response, but still remain beyond the reach of much of the population. In many other areas in the South, however, heavy rains and flooding have damaged or destroyed crops.

National Agricultural Production Projections

There are currently two possible outcomes of the season (see Table 10). In the high estimate, rains will continue strongly and then end at the normal time (late September). In the low estimate, rains will continue their poor recent levels until the

¹ These estimates are significantly different from government predictions. In the Jebel Marra area of South Darfur alone, production of 270,000 MT is predicted, even though total North and South Darfur production averages about 200,000 MT.

end of the season. Given the paucity of recent rains and the lateness of much of the planting, the lower estimate is the more likely scenario.

Pastoral Conditions

After last year's severe drought, the condition of livestock is of great concern. A significant percentage of farmer-owned goats and sheep died or were sold to purchase grain. In some villages almost all small livestock were reportedly lost, while in many others the majority were lost. Widespread death of donkeys occurred. They are essential in the transportation of food, water, and market goods and their loss is particularly damaging to household income potential.

Although late rains caused delayed pasture development, August rains permitted pasture development in many areas. Some nomadic groups were able to move their larger animals (particularly camels) south to better water and pastures. However, greater than usual animal sales and mortality were reported. In more northern areas, particularly Red Sea Hills and Northern Kordofan, nomadic groups suffered much heavier, although unquantified, losses.

Food Stocks and Flows

During 1990/91, 653,154 MT of relief was pledged to Sudan by donors against an estimated relief need of 1.2 million MT. As of September 14, pledged food arrivals in Sudan totaled 408,323 MT, of which 329,186 MT had been despatched or delivered to drought victims, war-displaced persons and refugees. Receipt of pledged food is ongoing.

Although donors had predicted very little import capability, commercial and government grain imports up to September 1991 totaled about 600,000 MT. Given that Sudan's foreign exchange and wealth standing is likely to be no worse in 1992 than it was in 1991, these large-scale imports could occur in 1992 as well. There is no evidence, however, that any more than token quantities of the commercial or government imported food has been or will be used to satisfy relief needs.

Projected Food Balance

Potential food deficits are examined both nationally (Table 11) and regionally (Table 12), because national food stocks and regional surpluses are not usually redistributed to certain deficit areas. Therefore, in spite of sufficient national stocks, regional deficits will have to be addressed with relief. Care is needed, however, in calculating emergency food needs in chronically production deficit areas such as western Sudan, where strategies have been developed to supplement household production by purchasing food and, in times of unusual food scarcity, by eating wild foods. Normally when current deficits become greater than chronic deficits, (i.e., greater than accustomed strategies

Table 11: Various 1991/92 National Cereal Balance Estimates for Sudan (000 MT)

	Low Consumption		High Consumption	
	High Production	Low Production	High Production	Low Production
1991/92 Population (000)	26,215	26,215	26,215	26,215
Annual per capita consumption rate (kg)	120/90	120/90	146/100	146/100
1992 CEREAL CONSUMPTION REQUIREMENTS				
Expected 1992 Cereal Consumption	2,997	2,997	3,549	3,549
1992 CEREAL SUPPLY				
Estimated Net 1991/92 Production	2,490	2,223	2,490	2,223
Available In-Country Stocks				
Commercial Stocks	400	400	400	400
On-Farm Stocks	nil	nil	nil	nil
1991 Relief Stocks Not Yet In-Country	150	150	150	150
Expected Commercial Imports	n/a	n/a	n/a	n/a
Expected Commercial Exports	0	0	0	0
Total Available Cereal Supply for 1992	3,040	2,773	3,040	2,773
PROVISIONAL CEREAL BALANCES	43	-224	-509	-776

Source: FEWS/Sudan

Notes: 1991/92 population was projected from the 1983 census using rates of increase recommended by the Sudan National Population Committee. The United Nations Food and Agriculture Organization (FAO) uses a 120 kilogram per year per capita (kg/yr/capita) of cereal consumption rate in the North and a 90 kg/yr/capita of cereal consumption rate in the South. Last year FEWS used 146 kg/yr in the North, based on a 400 gram per day (gm/day) ration used by local agencies and ministries, and 100 kg/yr in the South because of greater use of non-cereal foods. While 146 kg/yr may be the ideal, studies suggest that actual average cereal consumption is about 120 kg/yr, or 328 gm/day in the North. The two estimates of net 1991/92 production are quantity available for human consumption, derived by subtracting 15% from gross production for seed, feed, and waste losses, using the low and high production scenarios from Table 10, respectively. The 1991 relief stocks are the Portion of expected pledged relief grain undistributed by time of harvest. Estimates for expected 1992 commercial imports are unavailable. In the first eight months of 1991, commercial and government imported food totaled about 600,000 MT. It is not clear how much, if any, of this tonnage reached extremely vulnerable or at-risk households.

Table 12: High and Low 1991/92 Regional Cereal Production Balances for Sudan (000 MT)

State	1992 Population (000)	1992 Cereal Needs	High Net 1991/92 Production Estimate	High 1991/92 Balance	1991/92 Production Estimate Low Net	Low 1991/92 Balance	Average 1985-89 Production Estimate	Average 1985-89 Balance
Eastern	2,872	345	650	305	502	157	880	576
Northern	1,167	140	148	8	148	8	64	-72
Central	5,345	641	1,400	759	1,351	710	1,339	780
Khartoum	4,185	502	0	-502	0	-502	0	-387
Kordofan	3,660	439	120	-319	80	-359	319	-85
Darfur	4,018	482	94	-388	71	-411	170	-255
South	4,968	447	78	-369	71	-376	104	-334
Total	26,215	2,996	2,490	-506	2,223	-773	2,876	223

Sources: GOS/MOA; FEWS/Sudan

Notes: After regional projections were completed, 1.5 million displaced people were subtracted from the South and added to Khartoum for more realistic final regional consumption calculations. The per capita consumption rate used is 120 kg/yr for North and 90 kg/yr for South. Cereal production estimate for the South includes Renk mechanized farming schemes, which is used in the North.

accommodate), additional food needs may exist. However, in 1991, accustomed strategies may have been exhausted and production deficits could equal food needs in 1992.

FACTORS AFFECTING FOOD ACCESS

Market Behavior and Prices

During the past two years, grain prices have continually increased to record levels in response to poor agricultural production, depletion of grain stocks, serious transportation constraints and soaring inflation. In Khartoum, sorghum prices per 90 kg were £S240 in September 1989, £S1,800 in September 1990, and in September 1991, £S2,150. Overall inflation is presently 240% per annum, the highest of all African countries according to the World Bank.

Prices in rural markets have been considerably higher -- prices more than double those in Khartoum have been recorded in Darfur and the South. Furthermore, many markets in western and southern Sudan have had little or no food available during the past year, at any price. Throughout much of the South, the cash economy and markets themselves have disappeared and been replaced by individual barter transactions.

As grain prices have increased, livestock prices have continued to decline dramatically as a result of widespread distress sales and poor animal health. For farmers and pastoralists who depend on the sale of animals for grain, terms of trade are the worst ever recorded. Representative of recent trends throughout Sudan, in Um Ruwaba in January 1990, one sack of grain cost 0.7 goats; by January 1991, one sack cost 13.8 goats. In September 1991, the terms of trade in areas of good crop conditions or good pastures (southern Geneina and En Nahud, respectively) has fallen back to 5 to 7 goats per sack -- much improved since the start of the year, but some 10 times worse than the terms of trade of less than two years ago.

Household Income and Assets

Rural and urban purchasing power and household assets have diminished alarmingly in the past two years. Hundreds of thousands of households (of displaced persons) are already destitute, with virtually no assets, and dependant almost entirely on relief. Countless urban poor are near destitute. Household survival in 1992 will depend on successful agricultural production, greatly reduced market prices, and continued relief.

Few rural households are totally dependent on their own agricultural production anymore. Continually diminishing crop yields have been balanced by increased reliance on food purchased with income from seasonal migratory agricultural labor and other sources. Poor commercial agriculture last year, combined with a large labor surplus, greatly reduced accu-

tomized farm labor income. Marginal income from day labor has also been limited by low wages and excess labor supply. Stocks of small livestock, the traditional emergency assets of farmers and pastoralists in times of food stress, have been decimated. Cash crop production has been minimal for two years. Firewood collection, charcoal production, and water sales have been seriously inhibited by diminished resources, depressed prices because of oversupply, and loss of donkeys for transport. Recent international events associated with the Gulf War may have disrupted important overseas remittances. Family networks, usually a source of support, have been overstrained by severe conditions throughout Sudan and can no longer offer significant assistance. In addition, productive and non-productive assets have been sold in the past year to buy food, or lost through household displacement.

In towns and cities, salaries and wages have not increased proportionately with exorbitant food prices. The monthly mid-level government salary of about £S600 will provide a family of five with one to two weeks of grain at current prices of £S2,000-4,000 per 90 kilogram sack, assuming the money is used exclusively for grain.

UPDATE ON VULNERABILITY

There is evidence that vulnerability has not begun to decline, because neither self-sufficiency nor personal assets have been recovered and malnutrition rates have not decreased. Throughout northern and southern Sudan, subsistence farmers, pastoralists and nomads, urban poor, displaced persons, and refugees remain extremely vulnerable. Massive international emergency relief operations have prevented large scale famine-related mortality. Even so, in certain areas, particularly Darfur, severe problems in relief delivery have threatened to induce famine conditions and increase mortality.

Children throughout Sudan remain at famine-level vulnerability. They have been, and still are, the greatest victims of famine related mortality in 1991, with moderate malnutrition rates in many areas exceeding 60% (weight for height) and 80% (Measured Upper Arm Circumference).¹

According to the United Nations High Commission on Refugees (UNHCR), food security for refugees has improved over recent months because of increased food deliveries and greater food stocks in camps. A drop in malnutrition rates among this population is expected.

¹ For the "weight for height" measure, a child is considered moderately malnourished if its weight is less than 80% of the standard weight for a child of the same height. With Measured Upper Arm Circumference (MUAC), a child is considered malnourished if its upper arm circumference is less than a specific number of centimeters.

CONCLUSIONS

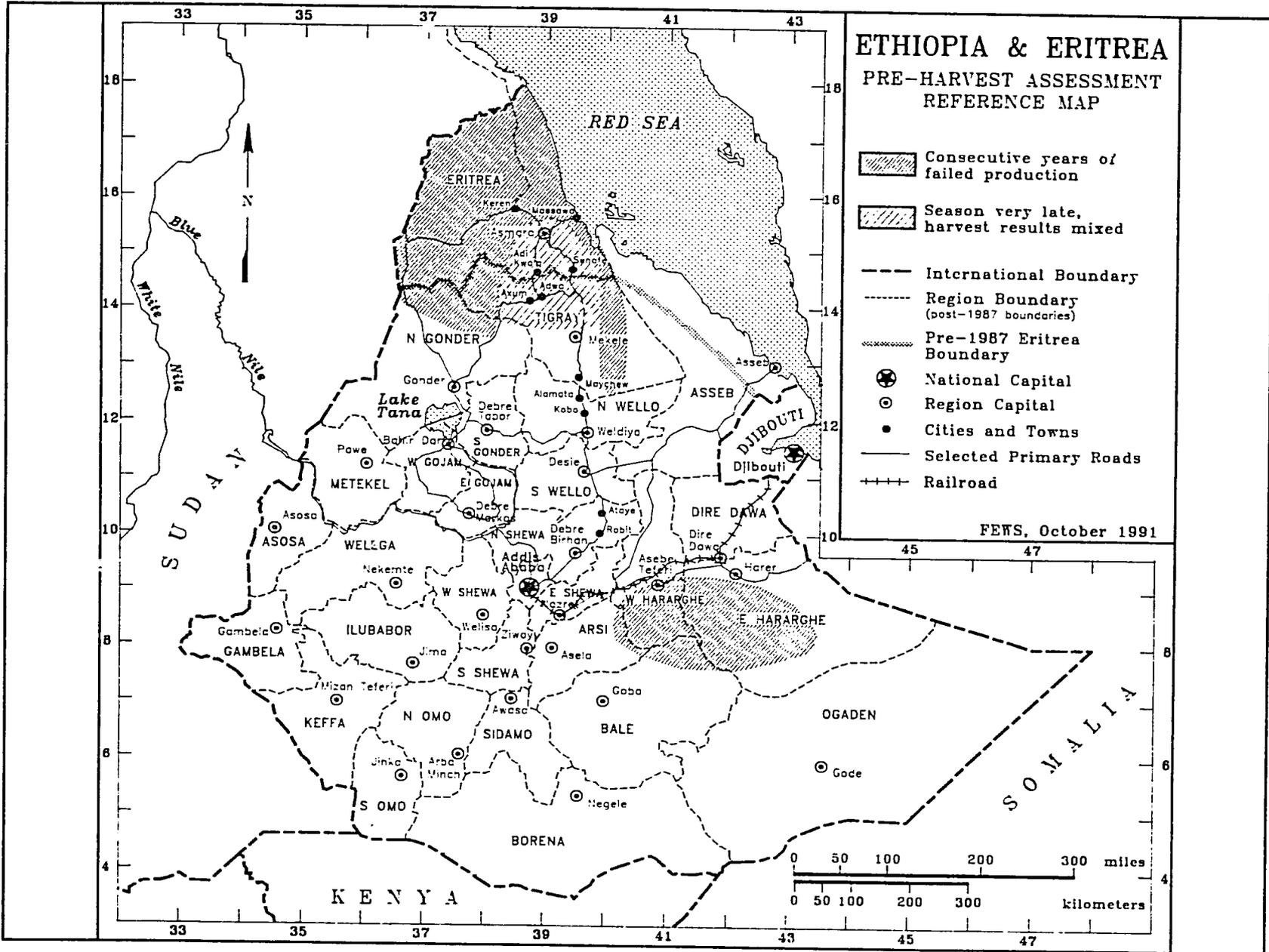
Sudan's national stocks from production and imports could be adequate (with additional commercial imports) to meet national consumption needs, but regional food security will still be precarious. Considerable food production deficits in the subsistence farming areas will mean a requirement for substantial food inputs. These deficits could be met theoretically by redistribution of in-country stocks from other areas, but a seemingly adequate national food stock situation could motivate exportation of cereal rather than redistribution to deficit areas.

The categories of people requiring relief in 1992 are the same as those in 1991 and 1990. Displaced persons and refugees

throughout Sudan will require food assistance for the entire year. Subsistence farmers will require assistance when their own harvest stocks are depleted, which could be as early as November in northern parts of the West and in southern Sudan and as late as February in more southern parts of western and central Sudan. Nomads and pastoralists will require relief depending on additional data about recent stock losses and potential current and future recovery.

Continued monitoring will focus on rainfall, agricultural production, food prices, and livestock conditions and prices. The availability of agricultural labor and wage rates will be monitored, as well as nutrition rates and health data. Movements of displaced persons, and the delivery of relief commodities will be monitored. In addition, grain imports, exports, and government stocks will be closely followed.

Map 10: Ethiopia & Eritrea Reference Map



ETHIOPIA & ERITREA

Large Pockets of Drought Persist Amid Promise of Good Production

Report released by FEWS/Ethiopia on August 31, 1991

SUMMARY

Large areas in Eritrea, Tigray and Harerghe remained seriously drought-affected at mid-August (see Map 10). For some areas, this is the third consecutive year. The drought has resulted in wide-scale crop failure and heightened vulnerability for many people (see Appendix for FEWS' definitions of vulnerability to and risk of famine). In the rest of Ethiopia, the typically more productive highland agricultural areas had, with a few exceptions, an average, if somewhat late, growing season. The end of civil strife in the North and new government policies on trade and agriculture hold promise for reducing the impact of regional food deficits. These factors should also help restore mechanisms by which households supplement food supplies in years of adverse agricultural conditions. In the near term, however, food assistance remains critical to the well being of up to 9 million people.

FACTORS AFFECTING FOOD AVAILABILITY

Agricultural Conditions

Review of the *belg* (early) season:¹ The onset of the 1991 *belg* rainy season in Shewa and to the north was on time and planting was normal. However, from April onward, *belg* rainfall was insufficient, resulting in serious crop reductions -- even failures -- throughout North Shewa, Wello, and southern Tigray. Equally severe was the damage to long-cycle *meher* crops planted during the *belg* season in southern Tigray, Harerghe and Dire Dawa. The rainfall and general development of the *belg* crops in other areas of the country were much better, with both the *belg* harvest and long-cycle crop growth in these areas reported to be favorable.

Summary of *meher* season to date:¹ The main rains were three to four weeks late in the North and were deficient in both

quantity and distribution in lowland areas of Eritrea, Tigray, Gonder, Harerghe and much of the Rift Valley. Rains in the highland cropping areas, although late, were strong and well-balanced from the onset. In those areas, the *meher* crops were well established at mid-August. In the southern and western highlands of Ethiopia, typically the most productive areas of the country, the rains were on time and quite strong throughout the season.

Highlights by Region

Eritrea

The main rains started three to four weeks late. The outlook for all but southern highland areas has not been good. Almost all areas north of Hamasien Awraja² (surrounding Asmara) have had several consecutive years of insufficient rainfall. Crops, pasture, and water supplies have been seriously drought-affected. In pockets of Gash & Setit Awraja (on the border with Tigray and Gonder), western Seraye Awraja, and lowland Akele Guzai Awraja (eastern escarpment -- south-central Eritrea), rainfall levels have also been seriously deficient, with similar consequences to crops and pasture.

Eritrea's most fertile agricultural areas have fared much better. Most highland cropping areas of Akele Guzai and eastern Seraye *awrajas*, though very late, were well established at mid-August and can be expected to provide a reasonable harvest if the rains remain strong and well distributed through mid-September. Pockets of particularly well-developed crops were observed along the road from Asmara to Senafe (Akele Guzai Awraja), while crops along the road from Asmara to Adi Kwala (Seraye Awraja) have had a later start and are likely to have a reduced yield. Pockets of poor or failed production could be seen in all southern areas, but they appear to be the exception this year, not the rule.

¹ Ethiopian agriculture is characterized by two growing seasons: the *belg* (early season), which generally lasts from February to May and the *meher* (main season), which generally lasts from June to December.

² In order of precedence, Ethiopia's administrative units are regions and *awrajas*. Please note that the designations employed in this report do not imply the expression of any opinion whatsoever on the part of FEWS concerning the delimitation of frontiers.

Tigray

Vegetation imagery (see inside back cover for explanation of NDVI) suggests very poor vegetative conditions since the end of June in all of western Tigray, including the traditionally surplus-producing lowlands of Shire Awraja. Field reports confirmed that the main rains started late (July 21) and were interrupted for 10 days in mid-August. Long-cycle crops experienced severe moisture stress, or failure, and short-cycle crops were planted very late. Reports from the area in early September suggested no significant improvement in growing conditions. It is likely that crop failure here will be quite substantial.

In highland Shire (above 1,500 meters altitude) and in the rest of north-central Tigray, the main rains were late but somewhat more consistent from the onset. Apart from some areas of below-average rainfall in Adwa and Axum *awrajas*, the crops here were better established at mid-August, although quite late. An important exception are the lowland areas of Agame, Kilde Awlalo and Enderta *awrajas* (northeastern Tigray), which have been reported to be suffering a third year of drought conditions.

In the traditionally surplus-producing areas of southern Tigray (Rayana Azebo Awraja), lowland maize and sorghum suffered moisture stress as a result of the poor early rains (April-June) and below average rainfall in July. Considerable stalk crop failure has been predicted, with only irrigated maize and some late crops expected to do well. Highland cropping areas have fared much better. Here, the main rains began about on time and were strong and regular thereafter. Agricultural officials in the Maychew area are anticipating the best grain harvest in many years. Exceptions in southern Tigray include pockets of Tembien and Abergele *awrajas*, where the main rains were seriously deficient and adequate cultivation was not possible.

Wello

The main rains began on time and were favorable for crop growth in nearly all areas. NDVI analysis suggests particularly good vegetative conditions in late July/early August in the western highlands, including Wag, Lasia, and Wadla Delanta *awrajas* (northwestern Wello). Mid-August field visits confirmed very good highland crop and pasture conditions from the Tigray border south to the town of Alamata. Despite late and limited deliveries of fertilizer, seeds and other inputs, Ministry of Agriculture officials believe main season production in most parts of the region will be normal or slightly above normal.

Exceptions in Wello include the lowland plains from Alamata to Kobo (Rayana Kobo Awraja), which are usually some of the most productive areas in the region. The main rains began normally but were seriously deficient beginning mid-July. Moisture deficiency at this critical period caused serious damage

to emergent *teff* and stalk crops and exacerbated problems from pests. *Teff* production in this area will be reduced considerably and farmers will try to replant with later variety crops. Only irrigated maize was doing well in this part of Rayana Kobo at mid-August.

Gonder

The rainfall in lowland areas of northern Gonder was seriously deficient from mid-July through early August. Though the rains improved thereafter, significant crop and pasture failures are expected in Setit, Welkayit and Dib-Tselemt *awrajas* (along the border with Eritrea). In other parts of North and South Gonder, the rains have been sufficient and well distributed from the onset. The area cultivated is estimated to be 7-8% above that of last year. Increased area under cultivation and favorable rainfall are expected to just offset the negative impact of reduced input usage.

Gojam

The main rains started on time and were regular and well balanced from the onset. Both long-cycle (maize, sorghum) and short-cycle crops have done well in most areas. Pockets of moisture deficit were observed in the lowlands of the Abbay (Blue Nile) River Gorge in Gojam – maize and sorghum areas which were particularly drought-affected last year. The area cultivated is estimated to be up as much as 8-10% over last year, owing primarily to the cultivation of previous communally-owned grazing lands. Severe shortages of inputs were reported this year throughout Gojam, which is traditionally known for its relatively high use of inputs. In spite of these shortages, the Ministry of Agriculture (MOA) expects overall regional production to be 8-10% higher than that of 1990.

Shewa

In North Shewa, the main rains started on time in the lowlands (vicinity of Robit and Ataye), but crops experienced moisture stress in early July. In the highlands, the rains were somewhat late, but strong and well-distributed thereafter. Highland production is expected to exceed last year's mediocre performance in spite of the fact that inputs arrived too late to benefit early cereals.

Throughout the Rift Valley lowlands of East and South Shewa, the situation is less optimistic. The planting of maize (the main crop) was retarded for up to two months because of the overall poor performance of the early rains. Much of the area allotted originally to maize was replowed, but the lack of fertilizers and short-variety or late-variety seeds proved a major constraint. The Ethiopian Relief and Rehabilitation Commission (RRC) warns that, unless the rains extend the whole month of September, much of the surviving stalk crop in the Rift Valley will be lost. Lowland South Shewa especially should be watched.

Harerghe

The middle and low-elevation areas of Harerghe have experienced major crop failures for a third consecutive year. While the early rains started well, a long dry spell in May and June wrought extensive moisture stress on maize and sorghum, which together account for more than 75% of annual agricultural production in the region. Excessively dry conditions persisted in the lowlands through July and August, when farmers normally would have resown areas of failed stalk crops with late season varieties. Seriously limited supplies of short-variety and late crop seeds, a problem for the past three years in this area, further reduced the farmers' ability to mitigate the consequences of the poor early rainfall. The unusually dry conditions have increased pest populations on the crops, further weakening the condition of the surviving crops. If conditions normalized in September, some sorghum would have been harvested, albeit at greatly reduced yields. Maize, on the other hand, is a total loss.

There have also been reports of drought impact in the Harerghe highlands. Both the early and main rains are reported to have been insufficient in certain areas. Security problems have prevented a thorough investigation of the region, but where these reports prove true, the impact is likely to be quite serious.

Western Highlands, Arsi, Bale

Throughout the western highlands of Welega, Ilubabor and Keffa, growing conditions were above normal for most of the season. In Welega, however, the harvest may not entirely reflect this. Disruptions in the delivery of inputs and continued civil strife have led to an estimated 6-8% reduction in area cultivated this season. In the southern highlands of Arsi and Bale, the RRC reports that early crops were just harvested at mid-August and farmers everywhere are quite pleased with the results. Despite reductions and delays in the deliveries of inputs, some expect production this year to push the record. Main season planting in these latter areas had only just begun at mid-August, but rainfall to that point was reported to be very strong. It is too early to predict the final outcome.

Omos and Sidamo

North and South Omo show much improvement this year. Most areas reported good rains throughout the early rainy season and into the main rainy season to date. Crops and pasture overall were in good condition as of mid-August and the MOA expects an above average harvest, especially in the north. All areas of Sidamo reported good conditions as well. Exceptions to the rule include parts of the northern valley of North Omo, where maize was planted unseasonably late, and the southern lowlands of southeastern South Omo (Hamer Awraja), where the early rains failed to materialize, leaving pasture and animals seriously drought-affected for a consecutive year.

Impact of Seasonal Events

The intensity of the civil strife occurring during the peak period of agricultural activity is certain to have had an impact on 1991 production. The final battles of the civil war and the period of insecurity and confusion that followed strained transport and fuel resources and seriously interrupted the delivery of inputs to farmers. Especially worrisome is the disruption of fertilizer deliveries, particularly in regions where they are used heavily (Shewa, Gojam and Arsi). Fertilizer deliveries in many areas were too late and quantities were often well below the targeted levels.

Equally troublesome was the persistent shortage of seeds, draft-oxen, pesticides and extension services. The progressive collapse of the Ethiopian Seed Corporation over the last two years has had a serious impact on the supply of drought-tolerant, early-maturing seed varieties available to farmers. The supply of oxen has been further curtailed by a second successive year of drought in the lowlands, as well as the reported increase in black-marketing of oxen to neighboring countries, where they attract a higher market price. Finally, the confusion resulting from the complete collapse of the former government interrupted extension activities and sharply curtailed the provision of credit for a second year.

The lateness of the season this year has exaggerated the impact of such shortages by limiting the range of cropping options available. The focus on late-season agricultural activities has also exacerbated the shortage of draft animals by severely reducing the number of plow-days in the season and, therefore, the number of farmers benefitting from animal traction. In northern Ethiopia, where draft animals are in perennially short supply, many hectares of land are unplowed or are discouragingly late as a result.

The pattern of the rains this year (poor early rains and late main rains) has other implications for the 1991 harvest, particularly with respect to crop mix and pests. The 1991 crop mix has a definite bias towards late varieties (barley, wheat, *teff*, and pulses *versus* maize, sorghum and millet), and late varieties are lower yielding. The long period of dryness between the initial early rains and the late main rains was quite favorable for insect infestation, particularly in the case of stalk crops. The extended dry season in some pastoral areas strained pasture and water supplies, weakening animals and reducing the capacity of oxen for plowing at a key point in the agricultural season.

Certain positive trends in agriculture this year will partially offset the negative effects described above. Chief among these is the increase in area cultivated reported in some of the more productive regions (e.g., Gonder and Gojam). The amount of land planted in crops increased significantly in these areas this year, due primarily to the cultivation of former communally-

held rangelands and continued farmer enthusiasm over the March 1990 liberalization of agriculture and trade. All players appear optimistic about the policies yet to be officially set down by the new provisional government.

Pastoral Conditions

The March to May rains were adequate to good in most pastoral areas of the Ogaden, Sidamo and South Omo. Borena was an exception. Serious deficiencies in rainfall after the middle of April resulted in poor water and pasture supplies, unusual migration and many animal deaths. Insufficient rainfall in June and July in lowland pastoral areas of Gonder, Eritrea, Tigray, Harerghe and the Rift Valley placed unusual stress on the herds in these regions as well. However, the strong nature of the main rains after July was probably sufficient for the replenishment of pasture and water supplies alike.

Food Stocks, Flows and Consumption Needs

Non-assistance food stocks throughout the North and East are very low following poor production in the last two years. Stocks in the western and southern highlands, however, are likely to be significant, based on the good season there last year. The continued liberalization of trade and marketing policies under the provisional government, and the good prognosis for the coming harvest in these latter areas, should allow many of these stocks to flow commercially to areas where they can fetch the best price. Except in those areas where security problems persist (Welega, Harerghe and the Ogaden), the increased trade of grains and other food commodities across regional boundaries should help to offset the effects of regional shortages.

FACTORS AFFECTING FOOD ACCESS

According to some estimates, Ethiopia last year produced its largest single harvest ever. Still, both aggregate and disaggregated estimates of the emergency food needs surpassed one million metric tons. Much of this need can only be attributed to structural and "food access" constraints stemming directly from the civil war. While some of these constraints will survive the war by some time (destroyed infrastructure), many are already disappearing (barriers to trade, reduction of market activity) and the upper threshold of food assistance required from this point forward should be reduced.

UPDATE ON VULNERABILITY

Throughout Ethiopia, the relief program was disrupted by the events of May and June 1991. Food deliveries in some areas were interrupted for up to three months. Some one million

Ethiopian returnees, Somali refugees and drought-affected in the Ogaden arguably suffered the most from these disruptions, as the relief program in these areas was not well-established even before the collapse of the old order. Insecurity remains a problem in the area and, because of this, the level of vulnerability of those remaining in camps, dependent on outside relief, remains high.

Up to 400,000 Sudanese refugees formerly in camps in western Ethiopia fled back to Sudan after the May 1991 change of government in Ethiopia. The needs of many of these former refugees are now being addressed within southern Sudan. While there is a slight possibility they may eventually return to Ethiopia, for the time being they must be removed from the tallies of the vulnerable in Ethiopia.

Wello and Tigray also experienced intermittent delays in the delivery of food assistance, thereby increasing the vulnerability of those at the periphery of the Southern Line.¹ Where this corresponds with poor *belg* (Wello) and failed *meher* crops (Shire, lowland eastern Tigray), vulnerability levels are likely to increase. A fair harvest in northern Tigray and a very strong harvest in much of the central and southern highlands could combine to offset much of the impact of the poor season in the lowland areas. However, those households which rely solely on production or wage labor opportunities in Shire Awraja are likely to see their vulnerability worsen.

In Eritrea, a third consecutive year of drought in the lowlands assures the continued vulnerability of many people in these areas. These areas are the least densely populated of the region, however, so the overall number affected and level of vulnerability are likely to decrease. Improved highland production will have a mitigating effect on the poor lowland food supplies.

The end of civil strife in these northern areas means food is more likely to flow from surplus to deficit areas and food aid may be much easier to distribute. It also means that alternative income strategies (wage labor, industrial sector) may begin to return or improve. Nevertheless, in Eritrea and Tigray, one cannot expect miracles in the first year, or years – vulnerability will likely remain elevated and food aid critical for the next several years.

For a third straight year, rainfall in lowland Harerghe and Dire Dawa has been seriously deficient. The impact on crops and livestock has been severe, and local resources not already exhausted have been further stressed by the continued presence of Ethiopian returnees and Somalia refugees. The vulnerability of the region has taken a significant turn for the worse since July.

¹ The Southern Line is the food aid distribution network that extends from Desie (South Wello) into northern Tigray.

Newly vulnerable populations include:

- *Displaced*: Up to 1.2 million former soldiers, civil servants and their dependents, who are completely without the means of survival since they are no longer fed, paid or housed by the military, now require assistance.
- *Failed belg areas*: The poor 1991 *belg* harvest in North Shewa and Wello has increased the vulnerability of many people. The RRC has revised its estimates of relief needs to include 173,000 persons in Menzina Giske, Jarso Abote and Selale *awrajas* of North Shewa, and 530,000 persons in the *belg* cropping areas of North and South Wello.
- *Rift Valley*: A consecutive year of poor maize harvests has pulled several borderline *awrajas* below the minimum threshold of food security. The RRC estimates 32,200 people in Adami Tulo and Haikoch will need food assistance.

CONCLUSION

If the main rains continue to be strong and well-distributed through the normal end of the season, Ethiopia will attain a second year of at least average agricultural production. Given

the lateness of the agricultural season in much of the North, crop yields are likely to be off somewhat. Even so, the harvest should still mark a significant improvement over those of the last two years. In the East, lowland maize has been lost for a second consecutive year and sorghum yields will be seriously reduced. Even more significantly, continued insecurity threatens trade and other commercial activities of the region. In the south, the main rains have just begun. Given the bias this year towards late-season crops, an early retreat of rains here would have a very serious impact on agricultural production and, therefore, the food supplies for the coming year.

Significant areas of poor agricultural and pastoral conditions exist, but their impact is likely to be somewhat less serious this year, as grains and other food crops are much more free to move from areas of surplus to areas of need. Still, access to this food will continue to elude large numbers of marginalized people. With some relief from persistent drought and civil war, traditional deficit areas in the North and East can work on rebuilding household reserves and restoring food supply systems to what they once were -- complex mechanisms of animal-husbandry, off-season migration, wage labor and inter-regional trade that made "farming" a viable occupation in areas not particularly suited to permanent agriculture. While the renewal process has begun, it is going to take time, and continued food assistance (albeit in reduced quantity) will play a critical role.

APPENDIX: FEWS Matrix of Vulnerability

Level of Vulnerability	Conditions of Vulnerability	Typical Coping Strategies and/or Behaviors	Interventions to Consider
SLIGHTLY VULNERABLE	<p>Maintaining or Accumulating Assets</p> <p>and</p> <p>Maintaining Preferred Production Strategy</p>	<p>Assets/resources/wealth: either accumulating additional assets/resources/wealth or only minimal net change (normal "belt-tightening" or seasonal variations in) assets, resources or wealth over a season/year. i.e., coping to minimize risk.</p> <p>Production Strategy: any changes in production strategy are largely volitional for perceived gain, and not stress-related.</p>	Developmental Programs
MODERATELY VULNERABLE	<p>Drawing-down Assets</p> <p>and</p> <p>Maintaining Preferred Production Strategy</p>	<p>Assets/resources/wealth: coping measures include drawing down or liquidating less important assets, husbanding resources, minimizing rate of expenditure of wealth, unseasonal "belt-tightening" (e.g., drawing down food stores, reducing amount of food consumed, sale of goats or sheep).</p> <p>Production Strategy: only minor stress-related change in overall production/income strategy (e.g., minor changes in cropping/planting practices, modest gathering of wild food, interhousehold transfers and loans, etc.).</p>	Mitigation and/or Development: Asset Support (release food price stabilization stocks, sell animal fodder at "social prices", community grain bank etc.)
HIGHLY VULNERABLE	<p>Depleting Assets</p> <p>and</p> <p>Disrupting Preferred Production Strategy</p>	<p>Assets/resources/wealth: liquidating the more important investment, but not yet "production," assets (e.g., sale of cattle, sale of bicycle, sale of possessions such as jewelry).</p> <p>Production Strategy: coping measures being used have a significantly costly or disruptive character to the usual/preferred household and individual lifestyles, to the environment, etc (e.g., time-consuming wage labor, selling firewood, farming marginal land, labor migration of young adults, borrowing from merchants at high interest rates).</p>	Mitigation and/or Relief: Income and Asset Support (Food-for-Work, Cash-for Work, etc.)
EXTREMELY VULNERABLE or AT-RISK	<p>Liquidating Means of Production</p> <p>and</p> <p>Abandoning Preferred Production Strategy</p>	<p>Assets/resources/wealth: liquidating "production" resources (e.g., sale of planting seed, hoes, oxen, land, prime breeding animals, whole herds).</p> <p>Production Strategy: Seeking non-traditional sources of income, employment, or production that preclude continuing with preferred/usual ones (e.g., migration of whole families).</p>	Relief and/or Mitigation: Nutrition, Income and Asset Support (food relief, seed packs, etc.)

Key Terms

At Risk - FEWS Reports employ the term "at risk" to describe populations either currently, or in the near future, expected to have insufficient food, or resources to acquire food, to avert a nutritional crisis (i.e., progressive deterioration in health or nutritional condition below the status quo). "At risk" populations require specific intervention to avoid a life-threatening situation. Food needs estimates are sometimes included in FEWS reports. Famines are the culmination of a slow-onsetting process, which can be extremely complex. The food needs of specific "at risk" populations depends upon the point in this process when the problem is identified and the extent of its cumulative impact on the individuals concerned. The amount of food assistance required, from either internal or external sources, depends upon many considerations.

Vulnerability - FEWS Reports use the term "vulnerability" to indicate relative susceptibility to food insecurity of groups of people or areas. In FEWS usage, vulnerability is always characterized by its degree: slight, moderate, high, or extreme. Extreme vulnerability is synonymous with "at risk." Vulnerability is a dynamic concept that incorporates both chronic and current conditions. Chronic vulnerability involves long-term conditions that predispose a particular group or region to food insecurity. Current vulnerability highlights short-term changes in food security status and their implications. Vulnerability analysis involves three levels of concern: food availability, food access, and food utilization. These levels are linked by a common analytical framework that interprets all relevant information for its food security impact on the diversified income generating possibilities of different groups of households.

ITCZ - The Intertropical Convergence Zone (ITCZ) is equivalent to a meteorological equator; a region of general upward air motion and relatively low surface pressure bounded to the north and south by the northeast and southeast Trade Winds, respectively. The upward motion in the ITCZ forms the rising branch of the meridional Hadley Circulation. The ITCZ moves north and south following the apparent movement of the sun. It is at its most northerly position in the summer months. 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, with local convective activity organized by westward moving "Easterly Waves."

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). The images are derived from Global Area Coverage (GAC) imagery (of approximately seven kilometers 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 five spectral bands. Bands 1 and 2 sense reflected red and infrared wavelengths respectively, and the remaining three bands sense emitted radiation in three 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.

METEOSAT - METEOSAT-based Rainfall Estimates. FEWS uses estimates of current rainfall based on cold cloud duration as measured by thermal infra-red radiometers on the METEOSAT satellite. The estimates are calculated every 10 days by the Department of Meteorology at the University of Reading in the U.K. Cold cloud duration correlates well with thunderstorm generated rainfall and, thus, is suitable for use in the semi-arid Sahel. The method works best on level terrain; hilly areas may produce local enhancements or rain-shadow areas that are not detected. In level areas the method has an accuracy of "rain/no rain" of at least 85% (based on a comparison with ground data). At a dekadal (ten-day) scale, 80% of rainfall amounts under 60 millimeters (mm) are accurate to plus or minus 10 mm, while rainfall over 60 mm is accurate to plus or minus 20 mm. This accuracy is acceptable for use in the FEWS-monitored region given that the method provides near-real-time coverage for a large area at a resolution of less than 10 kilometers.