DIRECTORATE OF
INTELLIGENCE

Intelligence Memorandum

THE DESERT LOCUST THREAT

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June 1968

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CENTRAL INTELLIGENCE AGENCY
Directorate of Intelligence
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INTELLIGENCE MEMORANDUM

The Desert Locust Threat

Summary

Africa and the Middle East are currently threatened with an outbreak of locust plague. Concentrations of swarming locusts have been reported in northeastern Africa and the Arabian Peninsula, where spring rains have been particularly favorable for breeding. The critical period will occur from July through September. By this time, spring swarms will have arrived in the summer breeding grounds in large numbers.

The region has suffered four major locust plagues in the last 60 years. Local rains and winds sustained the most recent outbreak, which ended in 1962 after 12 years. Insecticides are used successfully to destroy isolated swarms of locusts, but control techniques have not been effective against full-scale plague conditions.

Note: This memorandum was produced by CIA. It was prepared by the Office of Basic and Geographic Intelligence.

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1. The Desert Locust Information Service in London has warned that a maximum desert locust control effort will be needed in Africa and the Middle East to prevent widespread crop destruction in the summer and fall of 1968. For the first time since 1961, the weather favors breeding on a scale that threatens plague conditions. Swarming locusts have been reported in central and western Saudi Arabia, in the northern part of the Somali Republic and adjacent portions of Ethiopia, and in the French Territory of Afars and Issas. Scattered locusts have been reported along the southern coasts of Iran and Pakistan; along the Morocco-Algeria border; in Yemen, Spanish Sahara, Mauritania, Mali, Niger, and Chad; and on the Red Sea coastal plains of Ethiopia and Sudan (see Map 1). Although the locust is one of the most intensively studied insects in the world, and locust-control programs are effective for limited areas, an incomplete understanding of plague dynamics coupled with the vast area of incidence prevents effective control of swarming locusts under plague conditions.

An Intensively Studied Insect

2. The scientific name for the desert locust, Schistocerca gregaria, was first applied in 1793. Only since 1929, however, have areawide data on desert locusts been recorded systematically. Since then, reports of locusts from the field have been indexed and plotted on maps by 1-degree squares. The initial work was done by the Imperial Bureau of Entomology in London, now the Commonwealth Institute of Entomology. In 1945 the Anti-Locust Research Centre of the Institute was made an independent agency, and in 1958 the Desert Locust Information Service was formed within the Centre with financial assistance from the Food and Agriculture Organization of the United Nations. In 1943 the Centre began issuing monthly summaries of current information and monthly desert locust forecasts.

3. Five regional organizations with 29 member nations carry out control programs in Africa and the Middle East. Only India and Pakistan belong to more than one regional grouping. Cooperation in control exists among the countries within each organization, but there is no consistent cooperation between organizations. Control programs and reporting stop at borders, whereas locusts do not. The regional locust-control commissions and their members are listed below.

Commission	Member Countries
Commission for Controlling the Desert Locust in the Eastern Region of the Southwest Asia Distribution Areas	Afghanistan, India, Iran, and Pakistan
United Nations Food and Agriculture Organization Arabian Peninsular Desert Locust Control Sub-Committee	India, Jordan, Kuwait, Pakistan, Saudi Arabia, Sudan, United Arab Republic, and Yemen
Desert Locust Control Organization for Eastern Africa	Ethiopia, French Territory of Afars and Issas, Kenya, Somali Republic, Tanzania, and Uganda
United Nations Food and Agriculture Organization Northwest African Desert Locust Research and Control Sub-Committee	Algeria, Libya, Morocco, and Tunisia
Organization for Locust and Bird Control	Cameroon, Chad, Dahomey, Ivory Coast, Mali, Mauritania, Niger, Senegal, and Upper Volta

Scope of Problem

4. The desert locust has plagued Africa and the Middle East since the beginning of recorded history. It presents an unusual problem not only because it appears in great numbers and has a voracious appetite, but also because it can fly great distances within relatively short periods. Although bands of hoppers may travel no more than several hundred yards per day, swarms in the young adult stage may travel 160 to more than 200 miles per day. Young adults are capable of flying 10 to 12 miles per hour for periods of 16 to 18 hours. In October 1945, swarms reaching Portugal from southern Morocco on a strong southerly wind flew continuously for 24 hours.

5. Today some 60 countries are subject to invasion, and in 30 countries the desert locust presents a serious problem for agricultural development. Bands of young hoppers and swarms of flying adult locusts may cover areas several hundred square yards or several hundred square miles in extent. As a direct result of a locust plague, 5 percent of the population of Algeria died of starvation in 1866. A drastic situation of this nature is not likely to develop today, but a plague would severely strain the domestic food resources of an area populated by more than 700 million people. In August 1957, an estimated 16 billion desert locusts invaded Somaliland. Computed at one-third of a million locusts per ton, and since locusts eat at least their own weight in vegetation per day, these swarms destroyed 50,000 tons of vegetation each 24 hours. In 1958, swarms invading Ethiopia ate enough grain to feed 1 million people. In January 1964, swarms that covered some 500 square miles of Kenya contained up to 50 billion individual insects (see Figures 1 through 3).

6. Natural vegetation is the major source of locust food, since only 3 to 5 percent of the land area subject to locust invasions is cultivated, but cultivated crops may be totally destroyed by locust attack. Cultivated plants that suffer particular damage under attack are alfalfa, tobacco, sorghum, millet, beans, sugarcane, cotton, citrus, and small grains. Man inadvertently assists the locusts when he irrigates new land and produces green crops in areas subject to invasion. Such is the case in southern Yemen, where irrigated fields of cotton provide a convenient feeding area for swarms of locusts moving northward from eastern Africa or southward from Saudi Arabia.

Breeding Pattern

7. A major source of momentum for a plague of desert locusts is the regional pattern of breeding and movement. At any given season of the year, new swarms are being bred on local rains and carried on regional winds to new breeding grounds somewhere in the locust realm (see Maps 2 through 4). Except as adverse natural conditions occur, the cycle of breeding and movement is repeated indefinitely.

8. Rainfall and winds associated with the movement of the Intertropical Convergence Zone (ITCZ) are key elements in the breeding pattern of the desert locust, and variations in the usual time and extent of movement of the ITCZ markedly influence the upsurge and decline of the desert locust cycle. In East Africa, winter breeding coincides with the short rains that result from the southern movement of the ITCZ, whereas spring breeding comes with the long rains, the northern passage of the ITCZ, and the arrival of the southeast monsoon. In northern and northwestern Africa, spring rains are associated with westerly winds and cyclonic disturbances; summer and autumn breeding in these areas coincide with the ITCZ since it lies near its northern limit, July through September. The protracted monsoon rains of the Indian subcontinent provide excellent breeding conditions for the desert locust.

Life Cycle

9. The life cycle of the desert locust is highly dependent upon the coincidence of parent locusts with rainfall. Moist sandy soil is required for laying and maturing the egg and for producing green vegetation essential for feeding the young insect. The egg stage lasts 2 to 10 weeks, depending on temperature. A newly laid egg contains less than half of the water present when the hopper hatches. The young, wingless hopper is about half an inch long at birth and molts five times before reaching the winged adult stage in 5 or 6 weeks. At each molt, changes in form and color pattern occur that can be easily identified. The mature adult is a large insect with body length of 2-1/2 to 3 inches, wingspread of 4 to 6 inches, and weight of 1 to 3 grams (see Figures 4 through 7).

10. One of the most unusual characteristics of the desert locust is that both hopper and winged adult may appear in solitary and gregarious phases and may change from one to the other. Individuals in the solitary phase take on a uniform green coloration and adopt a routine of night movement and day repose. As the name implies, they generally move about singly or in pairs with little regard for other locusts. When large groups of solitary locusts are brought together because of wind conditions or hatching from closely spaced egg clusters, they may become gregarious and take on a different appearance and pattern of living. In the swarm the young adult is pink, and the

mature adult is yellow with a black pattern. Bands of hoppers or swarms of adults move by day and settle at night. Although swarms are produced from a collection of solitary locusts, the number of such swarms is insignificant when compared to the many that result from gregarious breeding.

11. New swarms of locusts usually form at the end of the local rainy season or in the early stages of the dry season. Young locusts leave the area of hatching soon after reaching the winged stage and move on to the next breeding ground in time to lay eggs at the time of the local rain. Where the rainy season is long, as in India and Pakistan, several generations may be produced in one area in the same season.

Plague Cycles

12. There have been four major plagues of desert locusts in this century (see graph, following page 8). The largest of these covered an area of 11.5 million square miles that extends from Senegal to East Pakistan. During the five major recessional intervals within the same period, swarms were active in an area of only 6 million square miles (see Map 5).

13. Plagues occur when rainfall and winds combine in sequence to favor the breeding and movement of locust swarms. To prosper, a locust must find proper breeding conditions, vegetation to eat, and moving air in which to fly. Swarms are carried from one area to another with the local rains. The locust population declines when the highly variable rainfall arrives too early, too late, or not at all, and when winds are out of phase with breeding. Heavy infestation of individual countries may occur, however, even when the total evidence of swarming is low. Swarming in the recession area is a constant threat to cultivated land and is a potential source of plague generation. The recession area contains some of the driest and least hospitable landscapes in the world. Not enough is known about conditions in these vast, inaccessible areas to prevent upsurges of swarming and outbreaks of plague.

Forecasting and Methods of Control

14. Desert locusts have no specific breeding area and may swarm in any of the thousands of wadis spread over the 6 million square miles of the recession area. Because of the migratory habits of the locust, a cooperative effort is essential to the success of reporting, forecasting, and control programs. Forecasts of locust activity made by the Anti-Locust Research Centre in London or by the headquarters of regional organizations are based on regional reconnaissance, analysis of plotted reports, long-range weather forecasts, daily weather reporting, and past performances of locust migrations. Weather forecasting is critical in predicting locust activity, since the location of breeding areas and the activity of swarms are as unpredictable as desert rainfall is unreliable. Tactical forecasting is handicapped by the sketchy reporting network in the largely uninhabited locust territory.

15. Coordinated air and ground reconnaissance on a regional scale offer the best potential for achieving new insights into locust ecology and control methodology. Aircraft searches save much needed time by providing advance information, but locusts often are difficult to detect and to identify from the air and many of the positive data must be gathered by ground teams moving out on leads radioed from search aircraft. Additional support may become available as applications of radar and remote sensing are perfected. Radar tracking of locust swarms was carried out by the British in the Persian Gulf in 1964. Attempts are being made to use information derived from weather satellites to identify breeding grounds and to forecast locust-bearing winds.

16. The Romans in North Africa attempted to control locust invasions by attacking them with branches and driving them into trenches where they were burned. During World War II British troops used smoke and flamethrowers against swarming locusts. The most effective programs today apply insecticides -- aldrin, dieldrin, and benzene hexachloride -- with lowflying aircraft, jeep-mounted turbine blowers, hand dusters, and backpack sprayers. In addition, bran poisoned with insecticides is broadcast by hand over known and suspected areas. Because of the dramatic nature and clearly visible result of locust invasions, locust control programs tend to spark the interest of some local governments almost to the exclusion of other very wasteful insect pest infestations (see Figures 8 through 10).

17. The inadequacy of plague prevention and control programs, however, is typified by the most recent plague, which persisted from 1950 through 1962 in spite of active antilocust programs on a broad regional scale. It was only after deviations from wind and rainfall patterns blunted the thrust of the plague that isolated swarms were effectively eliminated by insecticides applied on the ground and from the air and by natural enemies such as kites and storks.

18. Crop losses in reasonably restricted areas can nonetheless be reduced by persistent control activities. Programs must be pursued actively in recession years as well as when plagues threaten. Unfortunately, when there is no immediate threat some local governments tend to give little support to control organization personnel, equipment maintenance, programs, and chemical inventories. When plagues threaten, interest returns; but the fire-brigade reaction is too late when an upsurge in swarming is taking place on a large scale. The crisis this year is expected to be centered in northeastern Africa during July, August, and September. The degree of success in controlling locust invasion during this period will indicate whether the desert locust cycle will remain in recession or intensify into a plague.

Figure 1. Hoppers climbing field tent. Hoppers cannot fly, but they scale anything encountered.

Figure 2. Feeding adults weighing down a bush.

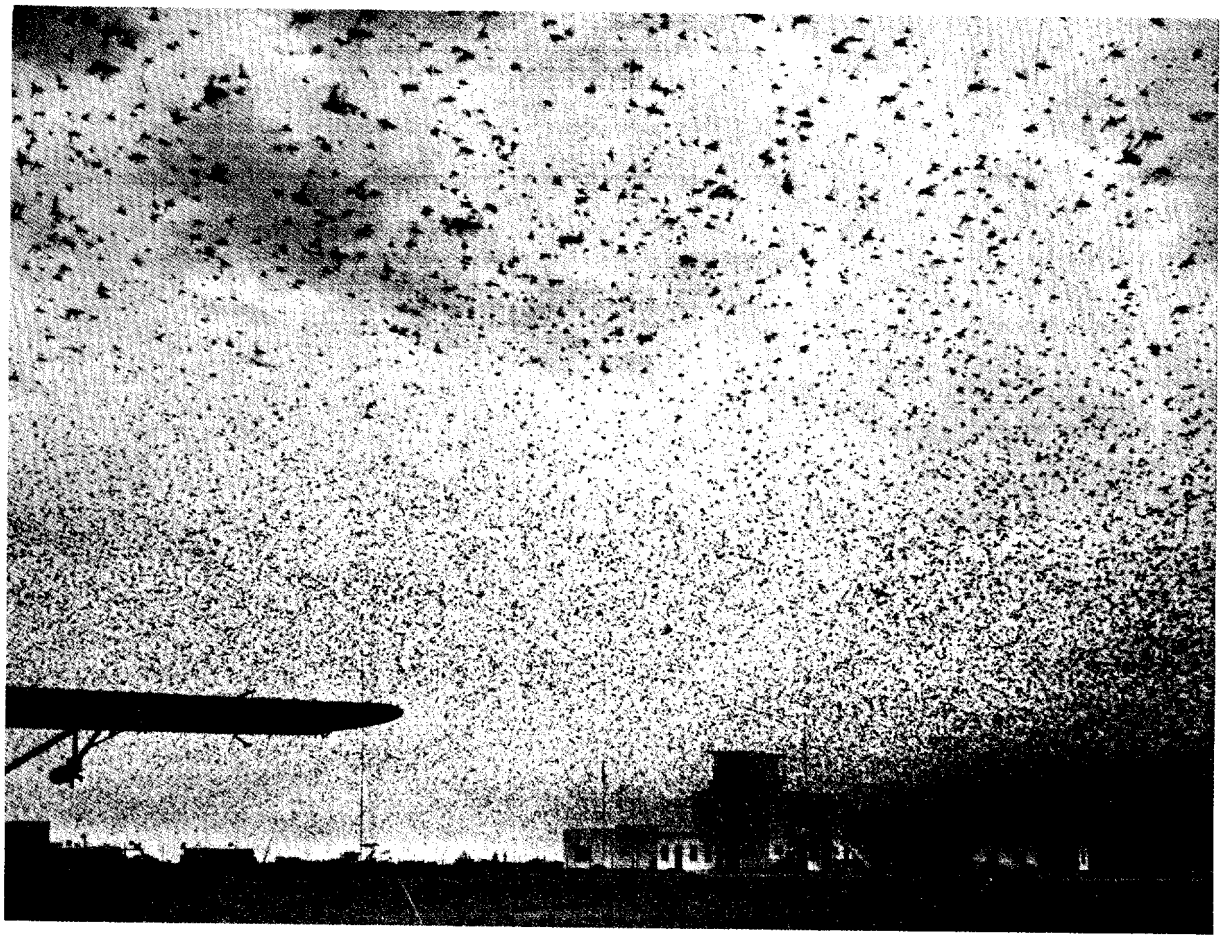

Figure 3. Desert locusts swarming over airport at Hargeisa, Somali Republic, on 3 August 1960.

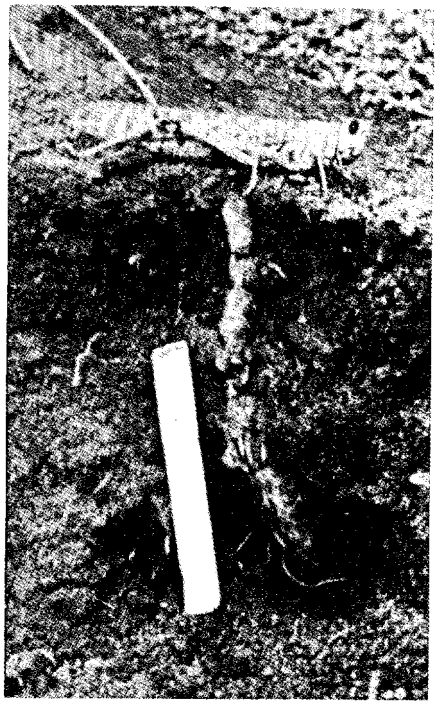

Figure 4. Length of a desert locust egg pod compared to length of a regular cigarette.

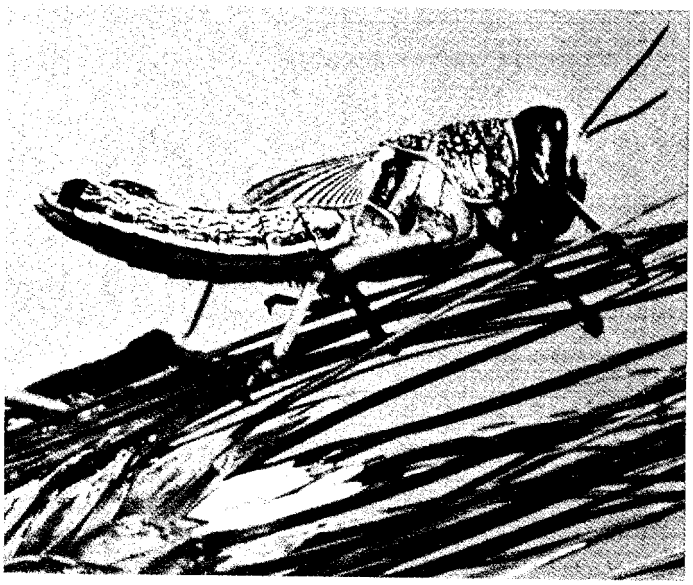

Figure 5. Hopper at rest on head of barley. In this stage, locusts are most vulnerable to insecticides.

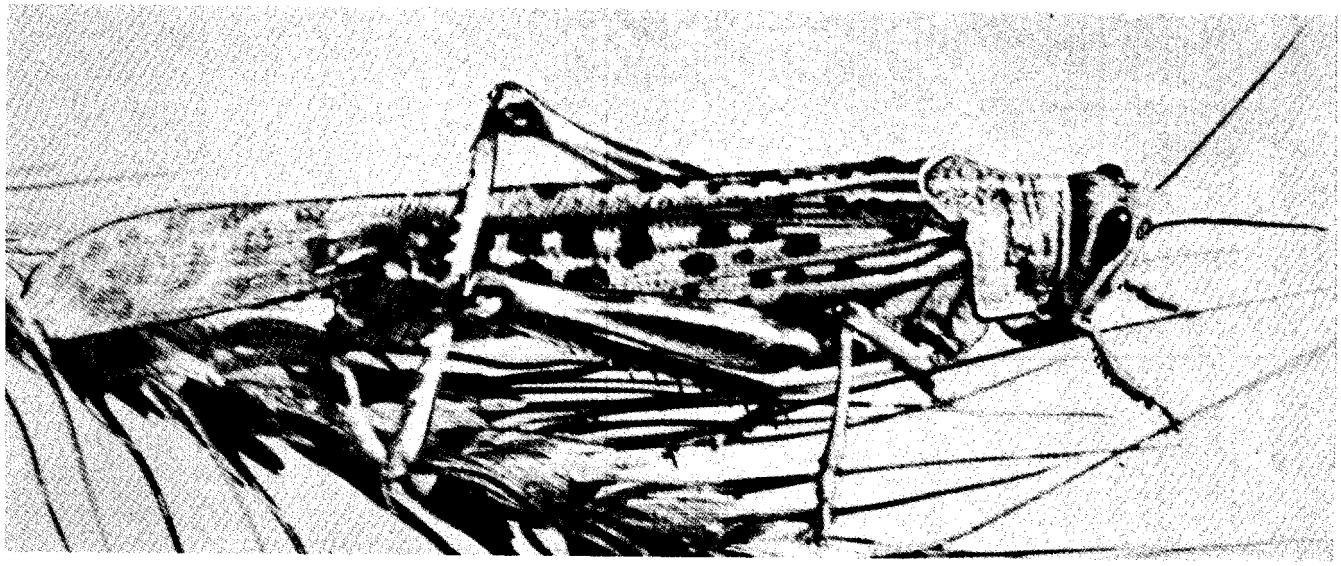

Figure 6. Adult desert locust, Schistocerca gregaria.

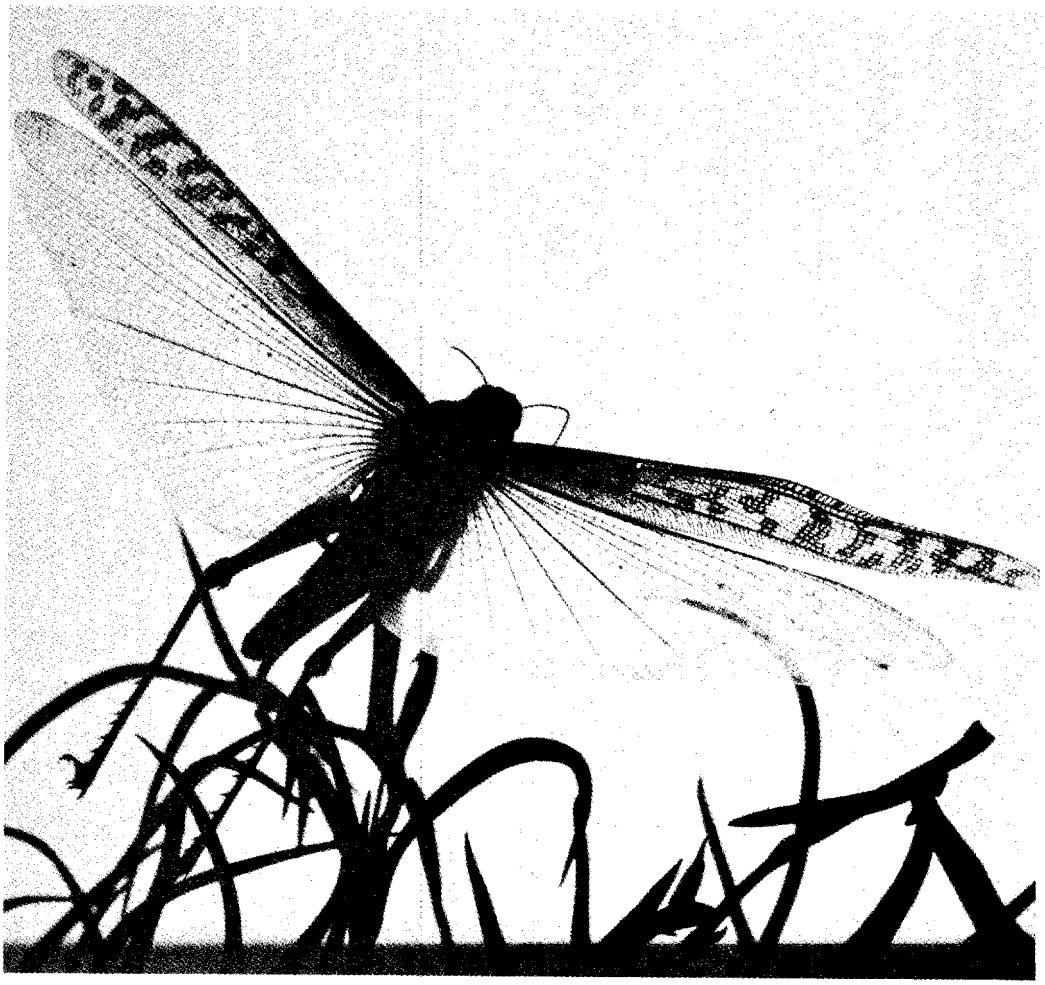

Figure 7. Adult desert locust with wings extended. The wingspread of a fully matured adult ranges from 4 to 6 inches.

Figure 8. Locust control team spreading poisoned bait in Iraq desert.

Figure 9. Jeep with power duster spraying eggfields in India.

Figure 10. A Super Cub on a low-level spray pass near Shiraz, Iran.

Map 1

DESERT LOCUST BREEDING REPORTED APRIL - MAY 1968

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DESERT LOCUST SPRING BREEDING AREAS AND MAJOR MOVEMENT, 1937-63

Map 2

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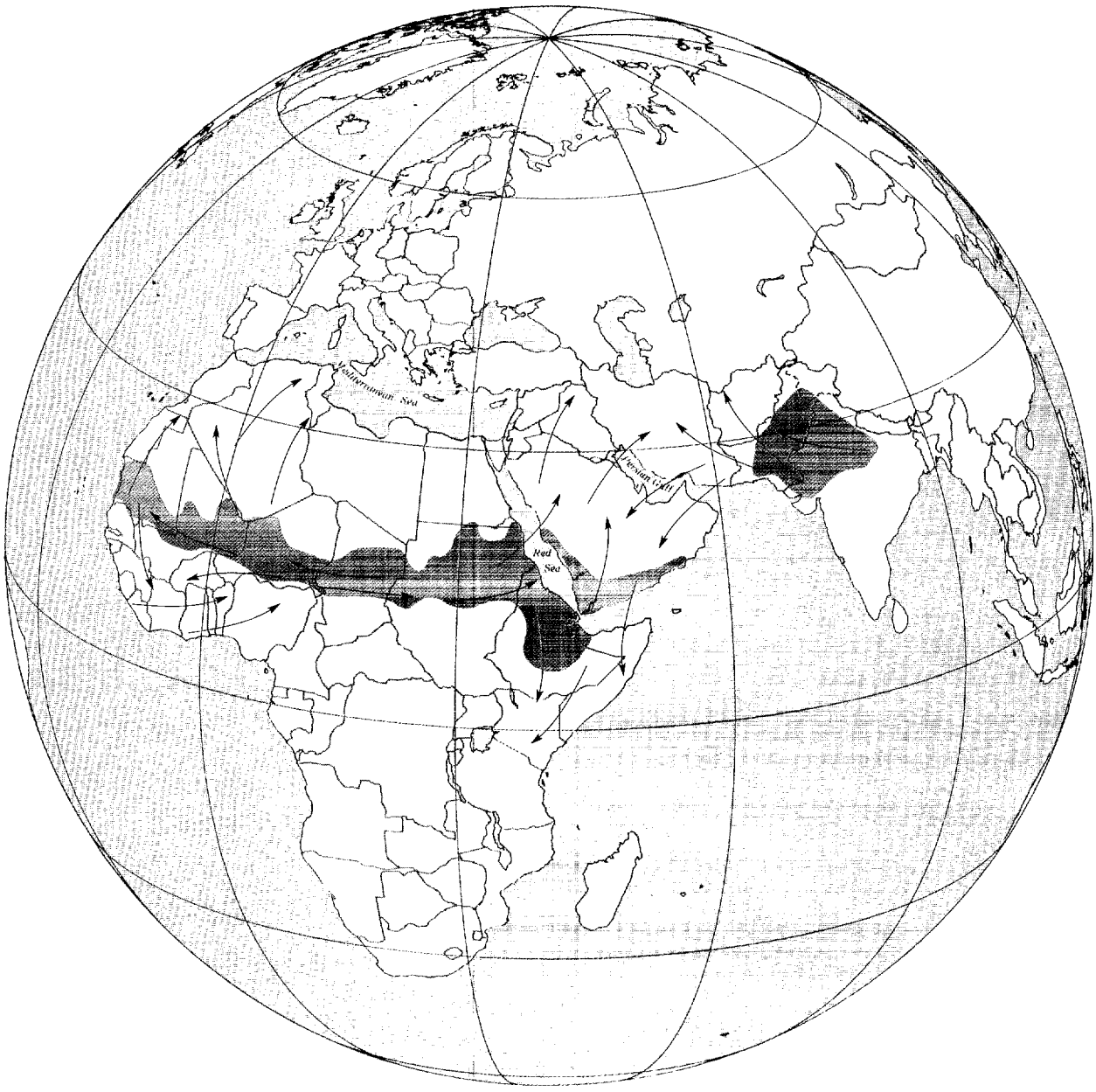
DESERT LOCUST SUMMER BREEDING AREAS AND MAJOR MOVEMENT, 1937-63

Map 3



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DESERT LOCUST WINTER BREEDING AREAS AND MAJOR MOVEMENT, 1937-63

Map 4

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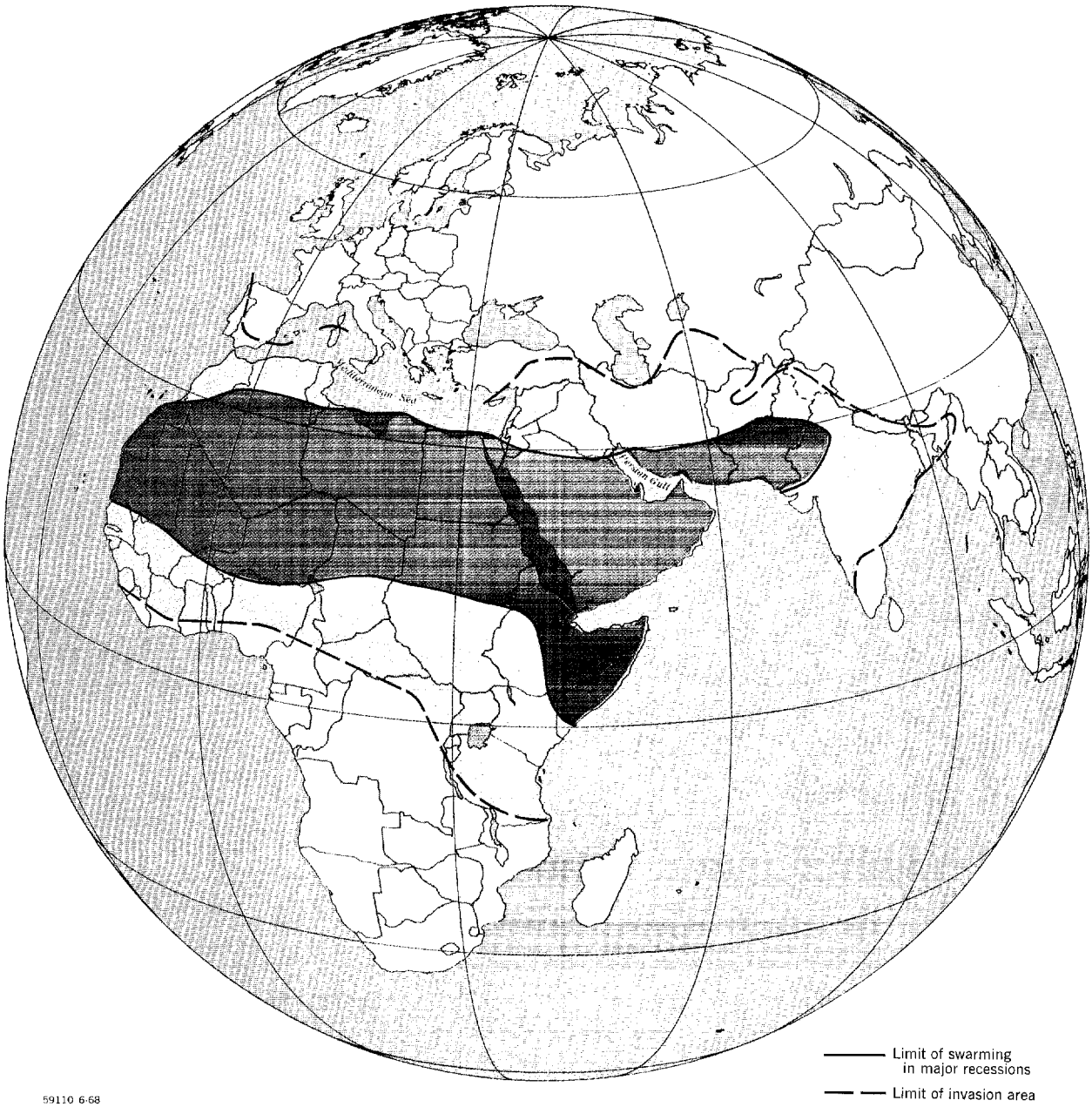
DESERT LOCUST INVASION AND RECESSION AREAS, 1920-64

Map 5



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The 1968 Soviet Invasion [illegible] [redacted]

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Standard Form 63
November 1961
GSA Gen. Reg. No. 27

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TO— [redacted]

☒ YOU WERE CALLED BY— ☐ YOU WERE VISITED BY—

[redacted]

1638 [redacted] 6345

TELEPHONE: Number or code | Extension 2378

☒ PLEASE CALL
☐ WILL CALL AGAIN
☐ RETURNING YOUR CALL
☐ IS REFERRED TO YOU BY:
☐ WAITING TO SEE YOU
☐ WISHES AN APPOINTMENT

[redacted] 4001

LEFT THIS MESSAGE: [redacted]

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