BY THE COMPTROLLER GENERAL

Report To The Honorable James Abdnor House of Representatives

OF THE UNITED STATES

Problems Plagued Department Of Agriculture's Grasshopper Control Program In 1979

The 1979 grasshopper infestation in 17 Western States was the worst since the 1930s. The Department of Agriculture's program to control the grasshoppers was not effective because

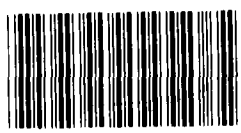
--it was badly managed,

--it was not adequately coordinated among Federal and State officials and local ranchers and farmers, and

--spray aircraft sometimes were not available when needed.

The Department's Animal and Plant Health Inspection Service is taking action to avoid such problems in future programs.

This report says the Department needs to study whether future programs should include cropland and whether participation by all landowners in a control area should be mandatory.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-199586

The Honorable James Abdnor
House of Representatives

Dear Mr. Abdnor:

This report discusses the problems that the Department of Agriculture had in administering the grasshopper control program in 1979, the actions taken or initiated to preclude similar problems in and after 1980, and additional actions that need to be taken. We made this review in response to your June 29, 1979, request and subsequent discussions with your office.

We discussed this report with Agriculture officials who accepted it in general but did not agree with our recommendations to the Secretary of Agriculture that studies be made to determine whether future programs should include cropland and whether participation by farmers and ranchers in infested areas should be mandatory. We believe that such studies should be made and that their results, including recommendations, should be provided to the appropriate legislative committees.

As arranged with your office, we are sending copies of this report to the Secretary of Agriculture and other interested parties and will make copies available to others upon request.

Sincerely yours,

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT
TO THE HONORABLE JAMES ABDNOR
HOUSE OF REPRESENTATIVES

PROBLEMS PLAGUED DEPARTMENT OF AGRICULTURE'S GRASSHOPPER CONTROL PROGRAM IN 1979

D I G E S T

The Department of Agriculture's Animal and Plant Health Inspection Service did not adequately manage the program to control grasshoppers in 17 Western States in 1979. Efforts by Federal and State officials and local participants were not sufficiently coordinated.

Management weaknesses reduced the ability of the Service's local project managers to effectively identify areas to be sprayed to control grasshoppers, schedule spraying operations at the best times, and evaluate the effectiveness of the spraying.

Although grasshoppers cause economic losses in the United States each year, the 1979 infestation reached levels unprecedented since the 1930s. The Service carried out 47 control projects on a total of 7.2 million acres in the 17 States, all west of the Mississippi River. Total program expenditures were $10.7 million, of which $5.1 million was reimbursable by the States or ranchers. (See p. 2.)

IMPROVEMENTS NEEDED IN PROGRAM MANAGEMENT

The Service's local project managers interpreted certain broad Service rules differently. They differed on (1) what constituted a grasshopper infestation, (2) the definition of cropland, (3) the amount of cropland that could be included in a spray area or block, and (4) the minimum-sized block that could be sprayed.

Local project managers also operated other program phases differently--including the help sought from ranchers to identify spray areas, the details included on maps to show boundaries, and whether and when to evaluate the effectiveness of the spraying through post-treatment checks. (See pp. 6 to 14.)

Insufficient Service headquarters support of the control program was a major contributor to these inconsistencies in the control program. Headquarters did not provide specific guidance, sufficient funds (including travel funds) to the field, or enough trained personnel to accomplish various program phases efficiently. (See pp. 10 to 14.)

BETTER COORDINATION NEEDED

Because the program was a cooperative effort by the Service, ranchers, and, in some cases, States, good coordination and cooperation were imperative. But project managers did not require a uniform method of committing funds or computing shared costs and did not always keep ranchers informed of changes in the status of various program aspects. Consequently, some ranchers withdrew from control projects immediately before spraying began, necessitating remapping of spray areas and reevaluation of the remaining spray blocks to determine if minimum criteria for spraying were still being met.

Ranchers sometimes caused problems by not organizing control projects until too late in the season to allow leadtime for specific program actions by the project managers. Some ranchers provided incorrect data concerning the boundaries of their properties. (See pp. 16 to 22.)

AIRCRAFT NOT ALWAYS AVAILABLE WHEN NEEDED

Spraying at grasshopper control projects was sometimes delayed beyond the best time for controlling grasshoppers because the type of aircraft needed had not been ordered or did not arrive on time.

Other delays, especially those caused by unfavorable weather conditions, were beyond the contractors' control. However, some contractors obtained more spraying contracts than they could handle. (See pp. 24 to 27.)

IMPROVEMENTS PLANNED BY THE SERVICE

The Service has initiated some actions to improve program management and has plans for others. These actions include

--developing uniform rules, information, and guidelines for nationwide use in administering and explaining the program;

--clarifying the responsibilities of all participants;

--developing and conducting an annual training program for key personnel;

--establishing a strike force of trained personnel;

--evaluating the extent to which program benefits exceed costs;

--establishing entrance and withdrawal deadlines for participation; and

--encouraging the use of the best types and sizes of aircraft for each project's size and terrain.

GAO believes these corrective actions will help prevent future programs from having the many problems experienced in 1979. (See pp. 14, 22, and 27.)

POSSIBLE CHANGES IN PROGRAM DIRECTION

Two issues which need further study are:

--Should the grasshopper control program include cropland as well as rangeland?

--Should participation by ranchers and farmers in infested areas be mandatory?

The Service has not determined whether expanding the program to include cropland would be economical. Mandatory participation by all landowners within a grasshopper control area could reduce the complexities of coordination and cooperation, but the Service has not

studied the benefits or the problems that would be encountered. (See pp. 29 to 32.)

GAO recommends that the Secretary of Agriculture initiate studies of these issues and that the results, including recommendations, be furnished to the appropriate legislative committees. (See p. 35.)

AGENCY COMMENTS

The Department said that for a number of reasons, including the need for additional staffing, possible pressure to expand other pest control programs, and increased opposition by environmental groups, the program should not be expanded to include cropland and the Department should not require program participation.

GAO is not recommending that these actions be taken but that the issues be studied and the results of the studies, including any recommendations, be provided to the appropriate legislative committees of the Congress. The Department's concerns, of course, should be considered in such studies. (See pp. 33 to 35.)

Contents

ABBREVIATIONS

APHIS	Animal and Plant Health Inspection Service
GAO	General Accounting Office
PPQ	Plant Protection and Quarantine
USDA	U.S. Department of Agriculture

CHAPTER 1

INTRODUCTION

The Federal Government has provided advice and technical assistance to States and farmers for grasshopper control since 1854, when the first entomologist was appointed for the U.S. Patent Office's Bureau of Agriculture. In 1934, a particularly devastating year for grasshopper damage, the Congress recognized that the problem was beyond the ability of individuals or communities to combat and appropriated funds for an organized Federal/State control program. Beginning in 1937, the program was applied to both cropland and rangeland and was funded partly by the Federal Government and partly by individual farmers and ranchers and/or States and counties.

Since 1948, when officials of the States affected by the grasshopper problem recommended that the Federal Government be relieved of the burden of helping farmers combat grasshoppers on cropland, the Federal program has been aimed primarily at rangeland. Although some operational procedures have been changed and refinements of control criteria have been made since then, the program's overall direction and objectives have not changed. Under the current program, the U.S. Department of Agriculture's (USDA's) Animal and Plant Health Inspection Service (APHIS), through the Plant Protection and Quarantine (PPQ) office, furnishes only technical assistance for cropland control while it provides both technical and financial assistance for rangeland control. Legislative authority for the program is contained mainly in 7 U.S.C. 147a and 7 U.S.C. 148.

In 1951 the present arrangement for financing rangeland control on State and private lands was established whereby the costs would be shared--one-third by the Federal Government and two-thirds by participating individuals and/or States and counties (called cooperators). Control costs applicable to Federal lands are paid solely by the Federal Government.

HOW THE PROGRAM OPERATES

Surveys are conducted from midsummer to late summer to establish the potential infestation for the coming year by determining the number of adult grasshoppers that have survived to maturity. These summer, or adult, surveys are made to try to detect and map all known, economically threatening grasshopper populations within the States. The adult surveys are to be timed to coincide with peak populations so that they can be completed before grasshoppers decline appreciably in number. These surveys provide

information on current conditions, the expected time and amount of egg laying, and the localities in which potentially large infestations may be expected.

Survey results are disseminated throughout the States, normally through county extension agents. APHIS employees provide information to ranchers by meeting with them during the winter so that those interested in a control program can be prepared to organize themselves. Organizing activities are carried out by ranchers who volunteer to recruit project participants, collect and be responsible for the ranchers' shares of project costs, schedule rancher meetings, and perform other tasks.

Spring, or nymphal, surveys are carried out in those areas where large numbers of grasshoppers were found during the adult surveys and in additional areas where large numbers have been reported. Ideally, the nymphal surveys involve observation of young populations starting shortly after grasshoppers hatch and continuing until they reach the young adult stage. The object is to determine where immediate control measures may be needed.

Based on the nymphal survey results, either the State, rancher committee, or APHIS contracts for aircraft to do the actual spraying. In some cases local farmers or ranchers help "flag" 1/ or guide the aircraft to the areas that need spraying. Shortly after spraying is completed, a post-treatment survey (kill check) is to be made to determine the effectiveness of the operation.

THE 1979 PROGRAM AND PROSPECTS FOR 1980

In 1978 adult surveys showed a potential for severe infestation in 1979 on 19.1 million acres in 17 States west of the Mississippi River. (See map, p. 3.) In 1979 rangeland infestation in the 17 States reached levels unprecedented since the 1930s. To combat such infestations, APHIS carried out 47 control projects, in cooperation with States and ranchers, on a total of 7.2 million acres, including 1.1 million acres of Federal land.

APHIS' fiscal year 1979 expenditures for the grasshopper program totaled $10.7 million, of which $5.1 million was reimbursable by the States or ranchers. APHIS' share of total costs--$5.6 million--included one-third of the costs

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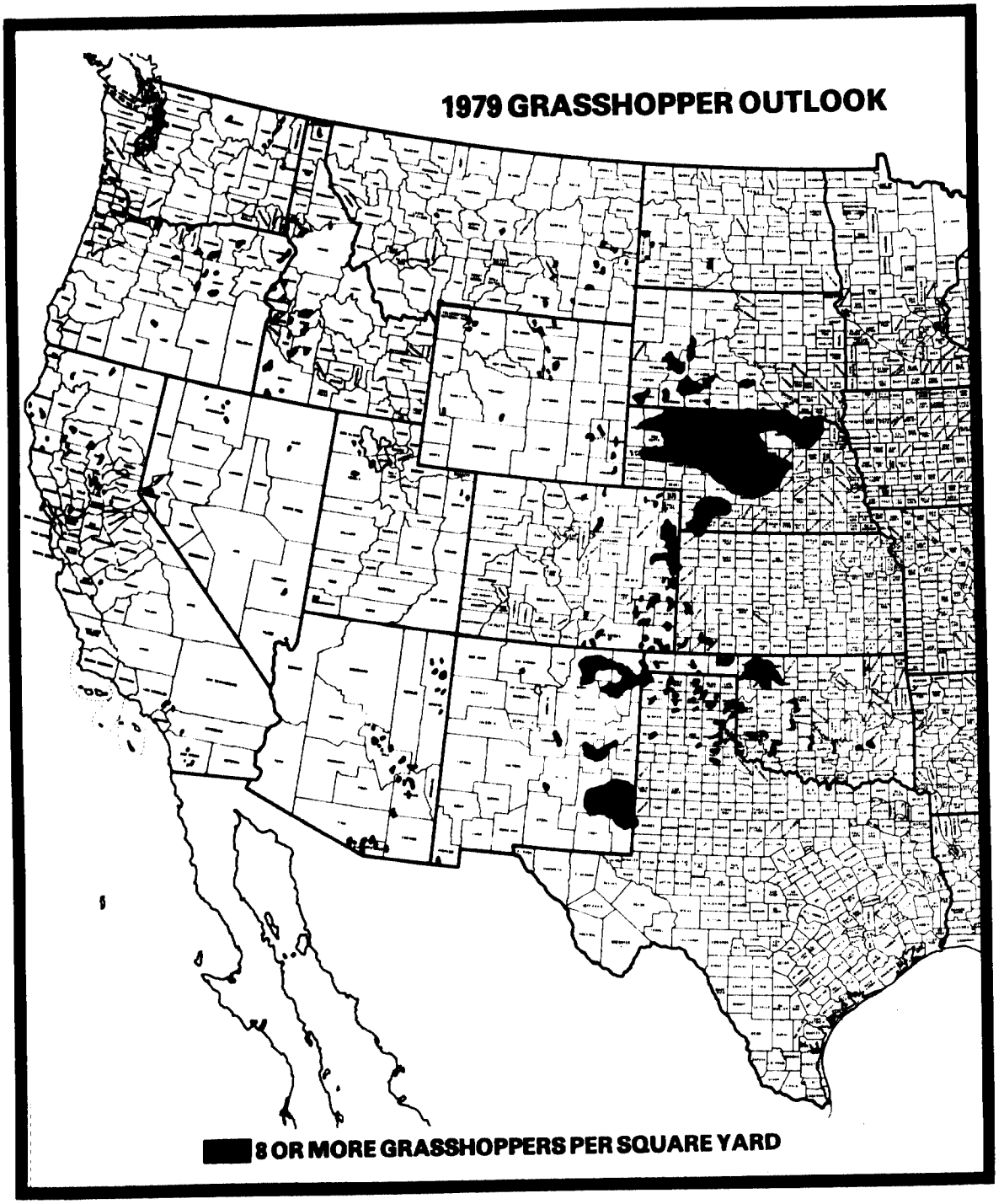
1/Flagging is defined as ground-level identification of spray areas to help guide the spray aircraft.



SOURCE: ADAPTED FROM A USDA MAP

applicable to State and private land, all costs applicable to Federal land, and APHIS' administrative costs.

Because of favorable conditions for egg laying in the fall of 1979, USDA had predicted that as many as 32 million acres might be infested in 1980. However, weather conditions in the spring of 1980 caused USDA to lower its estimates. According to a June 1980 news release, USDA expects that control measures will be carried out on no more than 5 million acres in 1980.

ECONOMIC IMPORTANCE OF GRASSHOPPER CONTROL

The amount of economic damage caused by a given number of grasshoppers on a given area of range depends on temperature and rainfall and on the species prevalent in the area. With an average infestation of six or seven grasshoppers per square yard, the population on each 10 acres of rangeland consumes grass at about the same rate as a cow. During cool weather and abundant rainfall, when grass is likely to be plentiful, the amount consumed by grasshoppers may not be economically significant. In hot, dry weather, however, grass is likely to be scarce and the amount consumed and/or destroyed is serious.

Of the many different species of grasshoppers, some are considered beneficial because they feed only on weeds. Few species prefer to feed on crops, and those that normally do so are considered general feeders. On the other hand, many species prefer to feed on rangeland and these are selective in their diet, preferring grass meant for cattle. Research has shown that if incipient outbreaks of certain species are left unchecked, severe outbreaks can occur, causing extensive and often irreparable damage to range areas.

Grasshopper infestations cause economic losses in the United States each year. In 1972, the last time such estimates were made, APHIS estimated that annual losses due to grasshoppers in the Western and Midwestern States were about $23.6 million with the control program and would have been about $124.4 million without it.

SCOPE OF REVIEW

As requested by Congressman James Abdnor of South Dakota, we evaluated the 1979 cooperative grasshopper control program to determine what problems were encountered and what actions are needed to improve future programs. We selected Nebraska and South Dakota for our more detailed work because of the many complaints and allegations about the program received by the congressional delegations from those States.

We reviewed the program's authorizing legislation and evaluated APHIS' management of the program. We gave particular attention to how (1) areas to be sprayed were identified, (2) spraying actually was done, and (3) program effectiveness was evaluated. In addition, we looked into APHIS' coordination with State and local cooperators.

We also reviewed certain program aspects from a nationwide perspective. These included identification of spray aircraft availability and overall coordination and management considerations. We supplemented our review of these aspects by analyzing an evaluation of the 1979 program made by an APHIS team. Although the team had not visited all 17 States involved in the program, it had interviewed program representatives from each one. Many of the team's findings and conclusions were similar to ours.

Specifically, we reviewed program records and interviewed APHIS officials at headquarters and in Colorado, Louisiana, Minnesota, Nebraska, North Dakota, and South Dakota. We also interviewed State officials; entomologists; and more than 60 ranchers, farmers, and county extension agents in Nebraska and South Dakota and discussed spraying problems with officials of four major aerial spraying contractors.

CHAPTER 2

IMPROVEMENTS NEEDED IN PROGRAM MANAGEMENT

APHIS grasshopper control managers were not prepared to deal effectively with the 1979 grasshopper infestation in some States, such as Nebraska and South Dakota. A uniform, nationwide approach to the problem was lacking, and wide variations existed in the application of general guidelines and criteria at local levels. Although the local APHIS officers-in-charge were looked upon by cooperators as being completely responsible for the program's success or failure, they were often working without specific guidelines and direction and with inadequate resources.

The impact of not being adequately prepared for the magnitude of the 1979 infestation--not having adequate resources available when and where needed--was intensified by communication problems among APHIS headquarters, regional, area, and district offices and between program officials and cooperators. Guidance from APHIS headquarters, regional, and area offices was often not received at the local levels in time to alleviate the problems.

APHIS officials have recognized the need to improve program management and have taken or initiated actions to provide for

--uniform criteria, guidelines, and control practices;

--improved program planning;

--timely, adequate control measures;

--adequate funds, people, and equipment;

--training in program objectives, procedures, and techniques; and

--reevaluation of the infestation level at which control should be initiated.

In commenting on a draft of this report in May 1980, USDA headquarters officials said that the problems disclosed by our detailed review in South Dakota and Nebraska should not be considered typical of the entire program. They said that although problems existed in the other 15 rangeland States, these problems were relatively minor. They pointed out that the APHIS team's evaluation report (see p. 5) concluded that, as a whole, the national program went well in 1979 considering the total number of acres treated.

The program weaknesses may have been greater in South Dakota and Nebraska than in the other rangeland States, but the nature of those weaknesses was such that their correction would improve the national program. For example, as the APHIS team's evaluation report said, "Guidance from area, region, headquarters, or staff offices was untimely or sporadic." Untimely or sporadic guidance may be indicative of local problems when coming from area offices but must be viewed as larger in scope when coming from regional or headquarters and staff offices. Also, the evaluation team said that its recommendations (with which we, for the most part, agreed) were developed from those findings which were common throughout the national program.

UNIFORM CRITERIA NEEDED FOR MANAGING THE PROGRAM

The 1979 program was managed by APHIS officials at district or subordinate offices with little guidance from higher levels. APHIS had not established criteria on some matters, such as the minimum acreage required for a treatment area or the extent to which cropland intermingled with rangeland could be included in the program.

Minimum acreage requirements

Under the 1979 rangeland program, the minimum acreage that could be included in a designated treatment area, called a spray block, was not specifically established. On July 17 and again on July 25, 1979, press releases from APHIS headquarters cited a 10,000-acre minimum, but these releases were issued after aerial spraying contracts had been awarded in all 17 States with control projects. Some grasshopper control experts believe that at least 10,000 acres are needed in each spray block to (1) have sufficient coverage to make the spraying biologically sound and (2) establish a contiguous workable area.

Some APHIS officials refused to treat any block of less than 10,000 acres while others treated much smaller areas. For example, APHIS records showed that 3 of the approximately 11 spray blocks in South Dakota had slightly less than 10,000 acres, while 7 of the approximately 43 blocks in Nebraska had less than 10,000 acres, including 3 having less than 4,000 acres. Conversely, however, many Nebraska areas were dropped from the program because they had under 10,000 acres. Some Nebraska ranchers said that APHIS representatives initially told them that satellite areas (areas separated from a main spray area by a small barrier such as trees) would be sprayed, then later told them those areas would not be sprayed.

Cropland definition and extent of its inclusion in the program

For the 1979 program, "cropland" was defined as any land from which a crop was mechanically harvested. Some APHIS officials interpreted cropland as including alfalfa fields and wet meadows, depending on whether they were either cut or irrigated, while other officials considered these areas to be rangeland. Also, some APHIS officials did not allow any cropland to be included in treatment areas; others allowed up to 30 percent.

Some APHIS officials were concerned about the amount of cropland in treatment areas; others were not. For example, one South Dakota rancher who helped organize a project told us that the amount of cropland the contracting officer's representative (a PPQ official) allowed for that project changed from 40 acres to 80 acres to any amount. In Nebraska many acres were deleted from various control areas because either the PPQ district director, the PPQ area director, or State Department of Agriculture officials determined subjectively that there was "too much" cropland.

Some practices varied widely

Due to lack of communication and support from higher levels, APHIS field staffs and local officials handled the program differently at different locations. In addition to the varying decisions on the amount of cropland allowable in the rangeland program and the minimum size for areas that could be sprayed, the local PPQ officer-in-charge, district director, or contracting officer's representative provided varying information or made varying decisions regarding

--program requirements and procedures, such as what constitutes an economic infestation, the date(s) when the cooperator committee and money should be available, and the date(s) when control should begin;

--the final treatment area to be sprayed;

--the number of personnel needed to carry out various program phases;

--whether to use ranchers to help guide aircraft to the proper spray boundaries; and

--evaluation of spray effectiveness.

APHIS headquarters did not provide adequate direction or support for staff, funding, supplies, and equipment during the 1979 program and subsequent periods. During the program, APHIS headquarters did not provide the needed people or experienced local program directors to effectively survey the grasshoppers and operate the program.

Participants interpreted some APHIS actions as variations from stated policies. In Nebraska, particularly, many ranchers and county extension agents complained that after the ranchers had signed up for the program, the PPQ district director changed the criterion for an infestation from 8 grasshoppers per square yard to 15 because he said 15 nymphs were the equivalent of 8 adult grasshoppers. 1/ Material handed out to ranchers during organizing meetings showed that eight or more adult grasshoppers per square yard were considered enough to warrant control under normal growing conditions. APHIS officials had not stressed in these meetings, however, that 15 nymphs (actually 24 according to the Deputy Administrator, PPQ) are the equivalent of 8 adult grasshoppers.

Rancher participation in spray operations should be encouraged

The extent to which ranchers were used in the program varied by project. In those South Dakota projects where ranchers helped in mapping and flagging, the projects were well coordinated and had few problems with pilots getting lost or spraying the wrong areas.

In two South Dakota projects and in Nebraska where ranchers were not used, maps of some areas to be sprayed were poor, flagging was poor, and both flaggers and pilots got lost. As a result, some areas were sprayed that should not have been and some areas that should have been sprayed were skipped. In Nebraska ranchers were generally not informed of when and where surveys were being made, weekly progress, reasons for acreage deletions, or spray dates. In some cases in both Nebraska and South Dakota, help offered by ranchers was not accepted. Since ranchers should be the most knowledgeable persons about the land features in the localities of their properties, using their knowledge to the maximum extent seems prudent, particularly in view of the shortage of trained APHIS staff, as discussed on page 11.

1/The decrease is caused by grasshoppers' high natural mortality rate.

UNCERTAINTY OF FUNDING LEVELS CONTRIBUTES TO POOR PROGRAM MANAGEMENT

The Congress appropriated $1,404,000 for grasshopper and Mormon cricket 1/ activities for fiscal year 1979. In addition, $3 million was available from APHIS' contingency fund--a fund established to control emergency outbreaks of insects and plant and animal diseases. However, the total Federal share of the 1979 program was $5.6 million. Therefore, $1.2 million had to be reprogramed to grasshopper control from funds appropriated for other programs. Obligations for the grasshopper program in 5 of the last 8 years have been greater by as much as $1.4 million than funds available before reprograming.

Some local APHIS project managers were not provided the funds necessary to (1) hire staffs to make the surveys needed for determining the proper areas to be sprayed or (2) travel to the areas as needed. To help alleviate some staffing problems, South Dakota provided at least 11 persons during a 2-month period and Nebraska provided at least 9 persons to work on various program aspects.

Uncertainty at the field level about the amount of money available for travel was also a problem. For example, area II of APHIS' western region--which covers eight States with grasshopper control programs--had been allocated $119,096 for fiscal year 1979 travel, although area officials had previously estimated a need for $188,486. By May 15, 1979, only $52,867 remained for travel for the rest of fiscal year 1979. This amount included only $7,882 for the APHIS work in North Dakota and South Dakota. Besides grasshopper control, APHIS work in these States includes inspecting plants being moved between North Dakota and Canada. Much of the grasshopper control work in those States was done after May 15--including some rancher meetings, all aerial spraying operations, and the adult surveys for the 1980 program.

In commenting on this matter in May 1980, USDA headquarters officials said that the problem was due to inflexible travel ceilings rather than the uncertainty of funding levels. They said the Department was certain that it had enough money to administer the program but, by the time it had obtained permission to adjust the travel

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1/For budgetary purposes, APHIS groups its grasshopper and Mormon cricket control activities together under one line item.

ceilings, it was too late in some cases to make the grasshopper surveys for which the funds were intended. They attributed the relatively large number of poor surveys to inflexible travel ceilings. The headquarters officials said also that they believed that ceilings on travel for programs in an emergency status were inappropriate and that travel funds transferred from other programs to meet those emergencies should not affect travel for the other programs.

Although headquarters officials may have been certain that they had all the money needed to administer the program, our discussions with APHIS employees at the area and district levels and our review of correspondence showed considerable uncertainty at these levels that travel funds would be adequate. This uncertainty appeared to be justified because travel funds were not provided in some cases in time to do an effective job.

USDA requested even less grasshopper control and contingency funding for 1980 than for 1979. The 1980 budget estimate, which was developed before the 1979 problems became evident, was $1,388,000 for the grasshopper and Mormon cricket program (subsequently increased to $1,431,000) and $2,500,000 for contingencies. For 1981 USDA has proposed that the control portion of the program, for which only limited amounts of direct funding have been used, be funded entirely from the contingency fund. Accordingly, USDA requested $1,223,000 for the grasshopper and Mormon cricket program for 1981--a decrease of $208,000 from the amount available for 1980. USDA's proposed budget for the contingency fund for 1981 is $2,500,000, the same as the amount for 1980.

INSUFFICIENT NUMBER OF TRAINED STAFF ALLOCATED FOR ALL PROGRAM PHASES

APHIS did not provide enough trained people to accomplish all program phases. Trained personnel are needed to conduct informational meetings, make grasshopper surveys, supervise spraying operations, and make effectiveness checks.

The South Dakota congressional delegation and a North Dakota Senator pointed out to the APHIS Administrator in July 1979 the urgent need for additional program staffing in their States. Only one APHIS employee, the PPQ officer-in-charge, is responsible for managing both State programs, as well as for inspecting plants being moved between Canada and North Dakota. Although this manager did a commendable job helping farmers and ranchers in these States, the distance

in miles, the area, and the number of projects involved were too great for one manager to deal with effectively.

In an effort to increase the Nebraska program's effectiveness, the State Director of Agriculture proposed to APHIS on September 20, 1979, that the State take the leadership role in the 1980 program. The proposed State role included providing sufficient staff to handle map preparation for the adult surveys, rancher meetings, establishment of rancher committees, rancher signup, collection of rancher payments, verification of acreage to be sprayed, spring egg surveys, training of field survey crews, final spring surveys, and overall coordination of State/Federal program activities. The State, however, needed timely approval of the proposal to begin the rancher meetings and obtain necessary State legislation. Because APHIS had not responded to the proposal as of December 7, 1979, the State withdrew its offer.

The APHIS evaluation team (see p. 5) reported that when APHIS realized that lack of personnel was causing operational problems, it began assigning temporary employees to the different States. Some of these had previous grasshopper control experience, some had been involved with other pest control programs, and some had little or no pest control experience or training.

The team further reported that even though additional people had been provided, they were not always available when needed. Moreover, even though a personnel pool had been established, some supervisors had their own ideas of how many people were needed to do the work. Consequently, some projects were handicapped by insufficient staff. When personnel did arrive, some were unfamiliar with the program, not fully trained, and not able to function in strange terrain. Too often the results were not enough surveys or effectiveness (kill) checks, poor flagging of treatment blocks, and poor communications with cooperators.

MAPPING PROBLEMS

APHIS' Nebraska control program had major mapping and blocking (designating spray areas) problems from the beginning of the 1979 season. APHIS tried to centralize the mapping in its Lincoln, Nebraska, district office to identify cropland which was ineligible for the program and to plot the land that had been signed up. However, maps were not available at the correct scale to determine how much land was cropland. Also, outline maps, which were to be used to sketch in spray areas, arrived late.

Further, some ranchers, believing it was getting too late to spray, started dropping out of projects--which necessitated redesigning some spray areas and deleting others which were smaller than the minimum 10,000 acres required by the PPQ district director in Nebraska. Mapping was further complicated because at the time of signup, some ranchers submitted incorrect legal descriptions of acreages to be sprayed. The Nebraska Department of Agriculture provided help in mapping, but this effort was not totally successful because of the problems noted above and because department personnel were inexperienced.

NEED FOR REEVALUATING CONTROL CRITERIA

For control activities to be initiated under the 1979 program, rangeland grasshopper populations needed to reach 8 adults (or 24 nymphs) per square yard. This number was referred to as an "economic infestation" and was the level at which the economic impact was considered sufficient to require control.

The 1979 program control strategy when densities reached the economic infestation level was to apply insecticides before eggs were deposited or migrations occurred. The intent was to spray large, contiguous blocks of land and, when feasible, an area sufficient to include an entire infestation. Grasshoppers have a high reproductive capacity, and failure to control an economic infestation could cause much higher populations in the subsequent year (or years) and also increase economically infested acreages.

Some experts questioned the continued use of the criterion of eight adults per square yard to determine whether an economic infestation exists. They believe that other variables, such as moisture conditions, temperature ranges, available forage, the number of cattle the range will support, and grasshopper species, should be considered.

A cost/benefit analysis is very useful in assessing economic impact. However, the latest analysis of the grasshopper program was done by APHIS in 1972. At that time APHIS estimated the program's cost/benefit ratio at 1 to 29. Many factors have changed since that analysis was prepared. In 1971 control costs ranged from about 60 cents to about 87 cents an acre, depending on the type of insecticide used. In 1979 the costs ranged from $1.15 to $1.75 an acre. The 1980 treatment costs are expected to increase substantially because of inflation. Insecticides will cost more and application costs will include substantially greater fuel costs than in 1979. On the other hand, the value of rangeland saved could also increase.

The substantial cost increases indicated the need for more current economic impact studies and cost/benefit analyses. The reevaluation of infestation levels should be an important factor in the analyses. Such studies and analyses would be useful not only for planning and budgeting but also for reassessing and revising--if necessary--the criteria for applying control measures.

CONCLUSIONS

No general agreement was reached on how the 1979 program should be carried out. Part of this disagreement was caused by lack of trained APHIS staff, erroneous information provided by ranchers, and use of erroneous maps to identify spray areas. Also, APHIS' lack of clearly defined program regulations and its division of responsibility resulted in varied interpretations of and variations from policies after the program began. Further, questions existed about whether variables other than, or in addition to, the number of grasshoppers per square yard should be used to determine if economic infestations exist. In addition, greater use of ranchers' voluntary assistance in mapping and flagging would have improved program quality. Mapping problems which hampered the 1979 program could be substantially alleviated in future programs by having county extension agents or rancher committees familiar with the areas provide mapping services.

The many uncertainties make it difficult to estimate precisely how much money will be needed to control grasshoppers in any given year. However, appropriation requests for the program should more realistically reflect recent experience. The 1979 program cost at least $1.2 million more than funds available, before after-the-fact reprograming. Obligations in 5 of the last 8 years have exceeded funds available by as much as $1.4 million.

IMPROVEMENTS PLANNED BY APHIS

APHIS officials told us that they planned or had initiated the following actions to improve future programs.

--Evaluate the program to determine (1) the extent to which benefits exceed costs, (2) the level of operation at which benefits are maximized, and (3) which variables most significantly affect the program's economic success.

--Strengthen and clarify the responsibilities of each management level to increase awareness of the program and ensure its success.

--Test a grasshopper population impact predictive model for use in advising cooperators whether treatment would be beneficial.

--Annually update the program's environmental impact statement and develop strategies to deal with environmental groups.

--Establish a reservoir (or strike force) of trained personnel. They would be available on call to travel to any location and would be considered supplemental resources, remaining under the direction of local line managers. In May 1980 USDA headquarters officials said that to alleviate staffing problems such as those in North Dakota and South Dakota (see p. 11), APHIS had developed a strike force of 60 persons, of whom 35 were already fully trained. They said that this strike force would be available to move quickly to problem areas when needed.

--Plan project staffing needs based on ratios of acres, aircraft, and contracts. Such a plan would provide a guide for requesting personnel from the reservoir.

--Develop and conduct an annual training and/or refresher program for key personnel.

--Train three or four employees in all program phases. Generally, they would be used to evaluate the adequacy and effectiveness of the work being done in the field and ensure national program consistency.

--Require the use of topographic maps--not county highway maps--to delineate spray areas.

In addition, APHIS has redefined "cropland" to mean any area planted with the intent to harvest. APHIS has also determined that, depending on the size of spray aircraft used, only 40 to 160 acres of cropland may be included within a rangeland spray block (eligible for Federal assistance) when omitting such acreage is not feasible. Further, APHIS has established a minimum block requirement of 10,000 acres of base rangeland exclusive of cropland, and will allow treatment of smaller blocks only if the entire infestation can be eliminated thereby.

When implemented, the actions APHIS is taking or plans should greatly improve program management.

CHAPTER 3

IMPROVEMENTS NEEDED IN COORDINATION OF FEDERAL, STATE, AND LOCAL COOPERATORS

A major problem in the 1979 program was lack of coordination within and among cooperator groups. Since the program is a cooperative activity of the Federal Government; ranchers or farmers; and in several States, State governments, all parties must coordinate their efforts if it is to be operated efficiently and effectively.

Communications between and within cooperating groups in the 1979 program, particularly in Nebraska, were poor. The communications breakdown resulted in misconceptions in some cases of the status of the entire spraying program. These misconceptions caused some ranchers to withdraw, further disrupting the program.

INADEQUATE COMMUNICATIONS

Some ranchers complained that they were not adequately informed about program criteria and operations in any program phase--establishment, surveying operations, spraying operations (treatment areas and treatment progress), and effectiveness checks.

Local APHIS officials held many winter meetings with ranchers to explain the program and provide the information ranchers needed to decide if they wanted to participate. However, Nebraska ranchers and county extension agents complained that after the winter meetings and after spring problems began, they could not get APHIS to answer their questions about the program.

During the informational meetings, ranchers were given varying explanations of such matters as what constituted cropland, how much cropland could be included, minimum acreage required, when the rancher committees should be organized, and how cooperator funds should be handled. One reason for this diversity was that the handout material was normally prepared at the local level, where program criteria and operating procedures were subject to individual interpretation. Informational materials did not consistently describe program policies and objectives because APHIS headquarters had not provided uniform program standards.

One complaint by Nebraska officials, county extension agents, and ranchers was that they were not correctly informed by the PPQ district director on such matters as the number of acres signed up, the status of mapping, the specific areas to be sprayed, and the status of aircraft contracting. However, for several projects where spraying dates were changed, the PPQ district director could not provide correct information in a timely manner because he had not been informed that the PPQ area director had decided to delay the projects because he believed that the scheduled treatment was premature. Subsequently, the treatment projects were again delayed while APHIS headquarters had the spray areas in the State resurveyed.

Communications with the public also were not always adequate. The APHIS representative in Nebraska said he saw no publicity in 1979 on the following hazard warnings:

--Persons with allergies should take precautions.

--Beekeepers should either move their hives or cover them. (The insecticides used are toxic to bees.)

--Owners of motor vehicles should keep them under cover or wash them immediately after spraying. (The insecticides damage the paint.)

Coordination within and among organizations

Ranchers in both Nebraska and South Dakota complained that some of their land which needed control could not be sprayed because certain State departments refused to participate in the program. For example, one rancher said that his land was deleted from a spray block because the South Dakota Department of Wildlife, Parks, and Forestry withdrew from the project immediately before spraying was to begin.

Lack of coordination and its effect are also illustrated by the following example. The South Dakota Department of Wildlife, Parks, and Forestry complained to the Secretary of Agriculture on August 30, 1979, that APHIS had sprayed occupied campgrounds in the Angostura Recreation Area on July 8, 1979, without warning. The Federal Bureau of Reclamation, now the Water and Power Resources Service, had requested that this land, which it owns but which is managed by the State, be included in the program. The PPQ officer-in-charge told us that he was not aware that the State managed the land or that it included an occupied campground. Consequently, he did not notify the State parks department when the area was to be sprayed.

Although State parks department officials, including the recreation area manager, were aware that the spraying program was underway, they did not know the specific date the recreation area would be sprayed. Accordingly, they could not notify the campground users of the specific spray time.

Organizing control projects was very time consuming, expensive, and frustrating for some ranchers and county extension agents. Some potential participants either would not sign up so that a workable area could be assembled or signed up only after repeated visits. In some cases ranchers who had signed up threatened to drop out, or did drop out, immediately before spraying was to begin. Also, in some cases ranchers who had said they would help with flagging did not do so.

Controversy over rancher payments

The final settlement of rancher billings in Nebraska became a major problem because project officials did not have adequate control over ranchers' shares of project costs. Also, county extension agents said that in some cases land was sprayed that had not been signed up; in other cases they could not determine exactly what land was sprayed.

APHIS entered into an agreement with the Nebraska Department of Agriculture in June 1979, which provided that non-Federal cooperators contribute two-thirds of the total cost per acre for privately owned rangeland.

Rancher agreements with the State provided that ranchers pay the agreed amounts to their officially designated representatives. No ranchers' funds were to be spent for grasshopper control unless or until all interested cooperators had paid their proportionate share of total project costs.

Although moneys were collected when the rancher agreements were signed, ranchers' checks were sometimes held until time to reimburse APHIS. In the meantime, some ranchers stopped payment on their checks and others had their checks returned to them in response to their complaints.

MISLEADING COMMUNICATIONS

According to some Nebraska ranchers and county extension agents, the PPQ district director told them that

alfalfa fields and wet meadows were rangeland for program purposes. Later, the PPQ area director said that such lands were cropland and would not be sprayed. Other inaccurate information was as follows:

--Ranchers were told that areas of less than 10,000 acres (satellite areas) near a 10,000-acre block would be sprayed, but these areas were subsequently deleted because they did not meet the 10,000-acre requirement.

--All cropland was deleted in some areas although the ranchers had been told that 10 percent of the area could be cropland.

--Some South Dakota ranchers alleged that the State Department of Agriculture had misinformed them about the State's share of total program costs. They thought the State would pay one-third, but the State legislature appropriated somewhat less.

--A press release distributed by a Nebraska State extension entomologist stated that an area was to be sprayed. But it did not meet the program criteria and was subsequently deleted.

--Misunderstandings and misquotes occurred in news articles about the South Dakota program. For example, one county extension agent was quoted as saying the program was ineffective although he actually thought it was effective.

Such incidents further compounded feelings of frustration and may have contributed to rancher withdrawals immediately before spraying was to begin. Some Nebraska ranchers said that because of the ill feelings resulting from this misinformation, it would be hard to get ranchers to participate in 1980.

Disagreements on nymphal survey results

Some ranchers were dissatisfied because, after they had signed up and committed funds, their land was not sprayed because the nymphal surveys showed that it was not economically infested. When they sign up, ranchers generally assume that their land will be treated even though they are told that treatment can be canceled if the grasshopper infestation does not develop to economic proportions.

Many problems were experienced with the 1979 nymphal surveys. Although not enough APHIS personnel were available

in Nebraska to conduct adequate surveys, the PPQ district director, who served as the APHIS program manager for the State, was ordered to stay in his office due to travel fund restrictions and to work on developing maps of infested areas. When APHIS headquarters officials became aware of this problem, additional APHIS personnel were requested for Nebraska. However, neither the APHIS personnel subsequently provided nor the personnel provided by the Nebraska Department of Agriculture were sufficiently trained to do surveys.

Because of the problems in Nebraska and other States, APHIS subsequently employed a private entomologist/consultant to evaluate the program in five States in June and July 1979. The consultant's report raised serious doubts about the adequacy of the Nebraska nymphal surveys and questioned the need to spray some scheduled areas and the eligibility of others because of intermixed cropland. As a result, spraying in the State (except treatment in western Nebraska) was suspended until resurveys could be made. The resurveys showed that many acres scheduled for spraying were not heavily infested. About the same time as the resurveys, the PPQ area director deleted cropland from the program, thereby eliminating entire spray areas. This action, together with the results of the resurveys and rancher withdrawals, caused the Nebraska acreage to drop from over 4 million acres scheduled for spraying to 963,230 acres actually sprayed.

Disagreement on timing of spraying

When to spray is a very important decision, but it is not one on which total agreement is likely. To provide maximum control, APHIS tries to time the spraying to occur after a large portion of the grasshoppers are hatched but before the adults begin laying eggs. However, precisely when these events should occur is subject to varying interpretations.

During the pretreatment period when grasshoppers are hatching, they may do a considerable amount of damage to rangeland and crops. Consequently, some ranchers want the spraying done as early as possible. However, if it is done too early, the later hatch is missed and those grasshoppers mature and lay eggs, causing--if weather conditions are conducive--an infestation the next year.

In both Nebraska and South Dakota, cooperators had various opinions on the correct time to spray, and for various reasons spraying began later than planned. For example:

--Some Nebraska ranchers and county extension agents believed spraying was 1 to 6 weeks late. APHIS officials disagreed and delayed spraying until more grasshoppers hatched so that more could be killed.

--Several surveys done in Custer County, Nebraska, resulted in additions and deletions of spray blocks. Because most ranchers in the county believed it was too late to spray after the last survey was completed, all the ranchers in the county withdrew.

--Other Nebraska ranchers also withdrew right up to the spraying dates, causing last-minute adjustment of maps of areas to be sprayed and in some cases eliminating whole blocks which no longer met the minimum acreage criterion in that State.

--Spraying in Scotts Bluff and Morrill Counties, Nebraska, and Pennington and Meade Counties, South Dakota, was delayed because aircraft arrived late or were unable to fly.

--Some South Dakota and Nebraska ranchers waited to sign up for the program until immediately before spraying was to begin, causing spraying to be delayed past the optimum time.

--Ordering aircraft for some spray blocks in South Dakota was delayed because ranchers were late in providing their shares of the costs.

--In South Dakota three of five projects were delayed because aircraft contracts had not been initiated early enough.

POST-TREATMENT EFFECTIVENESS CHECKS NOT PERFORMED

The APHIS control manual in effect in 1979 required a "kill check" of the entire area to determine the adequacy of treatment at the conclusion of aerial spraying. Primary consideration was to be given to the number of live grasshoppers remaining rather than the percentage of kill. If significant numbers remained over any portion of the spray area, retreatment was to be considered. The reasons for a poor kill were also to be determined. However, APHIS made few routine effectiveness checks because qualified personnel were unavailable.

Instead, most ranchers used their own judgment as to the effectiveness of the spraying and then notified any APHIS representative they could find of alleged misapplications or spotty coverage. When notified of questionable coverage, the APHIS representative normally went to the site and determined the validity of the complaint. However, in many cases the areas could not be resprayed because the aerial sprayers had moved to other locations.

CONCLUSIONS

Complaints by ranchers and others point out the need for adequate and consistent information and better communication about program criteria and operations in each program phase. Because APHIS headquarters had not provided uniform program standards, informational materials were not consistent in describing program policies, objectives, and requirements.

Lack of coordination between State agencies and APHIS caused problems with designating treatment areas, mapping, contracting for aircraft, specifying spraying dates, and checking treatment effectiveness. Some of these problems occurred because of lack of trained personnel and ineffective management, as discussed in chapter 2. They were made more severe by insufficient coordination and inadequate communication.

Ranchers who signed up for or withdrew from the program just before spraying caused several problems. These could be avoided in the future if reasonable deadlines were established for rancher participation. For example, a deadline for entering could be set a short time after the nymphal survey, when the boundaries of the infestation are known and APHIS has determined that an economic infestation exists. The deadline for withdrawing (except when natural factors have eliminated the infestation) could be set at a time far enough in advance of the spraying dates that program planning activities, such as mapping and arrangements for aircraft and insecticides, would not be hindered.

IMPROVEMENTS PLANNED BY APHIS

APHIS officials told us that they planned to take the following actions to improve future programs.

--Develop informational materials that will consistently explain the program, all criteria, and the responsibilities and roles of all participants.

--Establish a mechanism whereby ranchers and cooperating State officials are promptly informed about matters directly affecting them.

--Encourage an active role for the rancher and communicate it to all parties concerned.

--Standardize signup procedures, legal commitment of funds, and computation of shared costs.

--Improve flightpath guidance to prevent or minimize inaccurate application of insecticides.

--Improve the quality and consistency of post-treatment effectiveness checks.

The planned actions, when implemented, should provide improved program coordination among Federal, State, and local cooperators.

CHAPTER 4

AIRCRAFT NOT ALWAYS AVAILABLE WHEN NEEDED

Spraying was sometimes delayed beyond the best time for controlling grasshoppers because the aircraft needed did not arrive on time. Also, field officers did not always order the right-sized aircraft for the areas to be sprayed.

The best time to begin spraying is when all economically infested areas have been identified, the cooperators' share of project costs has been made available, arrangements have been made for the people and materials necessary to carry out the project, the areas to be sprayed have been delineated, most of the grasshoppers have hatched but have not reached maturity, and all the details necessary to get ready for spraying have been accomplished.

Unfortunately, aircraft are not contracted for until most of these conditions have been met, and contractors generally need about 13 days to get aircraft onsite and ready to go after they are ordered. In South Dakota and Nebraska, aircraft arrived an average of 2 days after the contracted starting dates.

USE OF RIGHT-SIZED AIRCRAFT

Cooperators in some areas complained that because the right sizes or categories of aircraft were not ordered, efficient spraying was not possible. Large aircraft are normally used for grasshopper control because large areas must be covered in a short time. The insecticides used can normally be applied for only a short period each day--until the ground temperature rises to equal the air temperature, after which the insecticides do not reach the ground.

In many cases only one type of aircraft was ordered although a mixture of large and small aircraft was available and would have been more appropriate. Aircraft size is especially important in areas which include rough terrain. The spray from large aircraft flying at constant altitudes cannot always reach into ravines and canyons. It is also impractical to spray with large, fast aircraft in areas that are less than 2 or 3 miles in length. However, it is equally impractical to use small aircraft when the number required would congest the airstrip or when they must fly long distances between project areas and the nearest available airport.

Some plots designated for spraying were too small and oddly shaped to allow effective spraying by large aircraft.

One block in Nebraska was reported to have 105 corners. In some cases the unmanageable configurations may have been the result of individualized control plans (spray projects tailored to meet individual ranchers' desires) accepted by project managers. However, the current Federal program is aimed at treating blocks large enough to provide effective control over an entire area. Using large aircraft to spray irregular-sized blocks, along with inadequate staffing and poor flagging, as discussed in chapter 2, reduced the effectiveness of spraying in some areas.

LATE ARRIVAL OF AIRCRAFT

Aircraft did not always arrive at the airports ready to spray at the times required by contracts. Such delays presumably caused the spraying to be done at other than the optimum time.

When APHIS receives an aircraft order from field officers, it normally solicits bids by telegram or mailgram from organizations that can furnish the needed aircraft. In emergencies, the requests for bids can be sent in 2 hours.

The prospectus furnished to aerial spraying organizations states that the contracting officer will notify the contractor at least 5 calendar days before the official starting date unless a shorter interval is mutually agreed on. (Such advance notice had been waived for several 1979 projects.) The availability of aircraft depends on their status when the contractors are notified. Delays can be caused by an overlapping of dates with a previous contract, distance from a site, and weather conditions. Due to these variables, officials of three of the four major aerial spraying contractors interviewed could not provide a precise figure for a reasonable reporting period. The vice president of one organization said 5 days' notice is usually not enough and that 1 month would be ideal. A partner in a second organization and the secretary-treasurer of a third organization said at least 7 days are necessary. The president of the fourth organization said that if weather is not a factor, generally 1 or 2 days are sufficient.

The following table shows the contract starting dates and the actual spraying dates for the 1979 Nebraska and South Dakota projects.

Project	Number of aircraft ordered	Acres sprayed	Contract starting date	Actual starting date
Nebraska:				
A	2	85,728	6/23	6/25
B	2	203,522	6/23	a/7/3
C	2	324,807	7/13	7/13
D	2	175,480	7/14	7/16
E	2	173,693	7/14	7/15
South Dakota:				
A	4	152,640	6/27	b/6/30
B	3	29,411	6/21	6/20
C-1	4	-	6/29	(c)
C-2	2	257,171	7/4	7/5
D	4	221,072	7/5	d/7/7
E	2	290,304	6/30	e/7/1

a/Only one aircraft was available on the contract date. The project director did not start using it until 7/3.

b/One aircraft arrived on 6/30. Two more became available on 7/3.

c/The first contract was terminated on 7/2 because aircraft did not arrive.

d/Weather precluded spraying until 7/7. The contractor was at least one aircraft short until 7/13.

e/Weather precluded spraying on 6/30.

The need for aircraft in all States with control programs within about the same 2-month period can cause some projects to be delayed. When a contractor has two or more contracts to fulfill, an unforeseen delay in completing a project due to unfavorable weather may delay that contractor in starting a subsequent project. While weather-related delays are beyond the contractor's control, certain delays, such as those resulting from overcommitting resources, can be attributed to contractor actions.

In 1979 APHIS did not require aerial sprayers to provide adequate assurance that they could perform. For example, one contractor was the low bidder on five APHIS and two State contracts (including the contract for South Dakota project C-1 shown in the above table) requiring

24 aircraft with various reporting dates between June 18 and June 27. This contractor had direct access to only 13 aircraft. (However, because aerial sprayers may subcontract for aircraft, this is not the maximum number that may have been available.) The contractor reported late on some of the APHIS contracts and did not report on the one contract noted in the table, resulting in the contract being terminated for default.

In some cases when contractors reported with fewer aircraft than specified, project managers were reluctant to begin using the available aircraft because they believed this action would constitute acceptance of the contract in total and the additional aircraft might not be provided. In at least one of these cases, APHIS Field Service Office officials encouraged the project manager to use the aircraft that had reported to at least start on the project. They assumed that if the contract were terminated, a replacement contractor would not be able to spray any sooner.

CONCLUSIONS

Because aircraft cannot be ordered until certain conditions are met, any difficulties in getting them to the spray areas can cause spraying to be done at other than the optimum times. In some cases spraying was delayed past the best times because the size of aircraft needed, considering the types of terrain and block configurations, had not been ordered and because aircraft sometimes did not arrive on time.

Aerial sprayers were not required to provide adequate assurance that they could meet contract requirements before being awarded contracts. Some contractors did not meet these requirements and, consequently, spraying was delayed.

IMPROVEMENTS PLANNED BY APHIS

APHIS officials told us that they planned to take the following actions to improve future programs.

--Use more smaller aircraft, either alone or in a mixed contract with larger ones, giving due consideration to the types of terrain and block configurations.

--Request States to award spraying contracts whenever possible due to advantages (such as streamlined procurement procedures) to be gained by having the States do the contracting.

--Review the following suggestions to improve contract performance:

1. Reassess the possibility of increasing liquidated damages which result from delayed or nonoperative aircraft to include damage done by grasshoppers, State personnel costs, and possibly ranchers' time.

2. Consider a method of precertifying contractor aircraft (especially the larger types) in the off-season to have reasonable assurance that contracts are awarded to those that can perform.

3. To try to reduce contracting time, study the feasibility of using a prebidding system which would allow prospective contractors to place tentative bids on a graduated-acreage basis; that is, one where the rate varies with the acreage to be sprayed by the contractor.

--Consider awarding at least one full-service contract to study the results of holding the contractor responsible for achieving a specified level of control and for furnishing whatever aircraft guidance may be required.

Implementation of these planned actions, along with those mentioned in chapters 2 and 3 (see pp. 14 and 22), should improve the quality and timeliness of spraying.

CHAPTER 5

SHOULD FUTURE PROGRAMS INCLUDE CROPLAND AND SHOULD LANDOWNERS IN INFESTED AREAS BE REQUIRED TO PARTICIPATE?

After about 30 years of steady focus on rangeland, the direction of the grasshopper control program wavered in 1979. Some uncertainty existed about whether the program should continue to be directed at rangeland or be expanded to include cropland. This uncertainty, coupled with the voluntary nature of the program, which allows ranchers to drop out at the last minute or to refuse to participate even though spraying their land may be essential to effective areawide control, contributed to some of the problems experienced in 1979.

The question of expanding the program to include cropland needs to be settled, and the program's voluntary aspects should be evaluated to improve its effectiveness in future years.

SHOULD CROPLAND BE INCLUDED?

Arguments for and against including cropland follow.

Arguments for including cropland

In its September 1979 report, the APHIS evaluation team said that widespread changes in agricultural practices had occurred since 1952, when grasshopper control on cropland became the individual farmer's responsibility. More cropland has been interspersed with rangeland since the advent of deep-well irrigation, making it difficult to treat rangeland without also treating some cropland. The team reported that:

> "The general policy of not treating croplands, alfalfa fields and hay meadows that are mingled with rangeland is being questioned and will continue as a problem as long as current criteria remain unchanged."

During 1979 some cropland owners expressed considerable interest in obtaining Federal support for grasshopper control on cropland. For example, at a meeting in July 1979 in east-central South Dakota, the consensus of about 90 concerned farmers and ranchers was that a Federal program similar to

the rangeland program should be established to help farmers. They said that farmers were just as entitled to Federal help as ranchers.

Just as important, perhaps, is the potential effect of crop losses on food supplies and consumer prices. When food supplies are low, food needed for domestic and foreign consumption could be jeopardized by the failure to control grasshopper infestations of cropland.

During consideration of the USDA 1979 appropriations bill (H.R. 13125), Senator Robert Dole of Kansas presented an amendment to expand the program by $3 million, stating that infestation was certain to cause cropland damage reaching tens of millions of dollars. He said that the amendment would provide enough funding for two separate treatments on 4 to 5 million acres of infested cropland. Senator John Danforth of Missouri said that the additional $3 million would save the U.S. Treasury four to five times that amount in disaster payments during the fiscal year.

By unanimous consent, the amendment was modified to increase the funds provided for cropland control to $5 million instead of $3 million. Senator Thomas Eagleton of Missouri pointed out that since costs of the cropland program would be shared--one-third by the Federal Government and the remainder by the States and landowners--in effect, the $5 million would provide $15 million worth of control.

Senator Edward Zorinsky of Nebraska said that under normal circumstances cropland farmers could cope with the problem themselves but that (1) the hazard of grasshoppers had been increased by 2 years of drought and (2) the more potent and residual pesticides used in the past were no longer available to cropland farmers because the Environmental Protection Agency had prohibited their use as hazardous to the environment and to human health.

Although the Senate adopted the amendment, House and Senate conferees subsequently deleted the additional $5 million for cropland control, noting that APHIS has traditionally operated grasshopper control programs only on rangeland and not on cropland.

Arguments against including cropland

Arguments against including cropland center mainly on the costs and the need for higher insecticide application rates.

Small amounts of cropland are included in the rangeland control program because it is difficult for pilots of aircraft--particularly the larger aircraft--to accurately skip small areas of cropland mingled with rangeland. It is doubtful, however, that applying insecticides on cropland at the same rate they are applied on rangeland would provide the same degree of control. Under the rangeland program, insecticides are applied in very low volume, which would have only a minimal effect in controlling grasshoppers on cropland because the height of the crops would protect them from the spray.

A federally assisted cropland control program would have to be distinct from the rangeland program--using insecticides and application methods that would provide optimum control for the crop being sprayed. The per acre cost of such a program would be greater because a greater volume of insecticides would have to be applied. For example, the recommended rate for malathion on crops is 1 pound per acre compared with 8 ounces per acre on rangeland. Also, the size and shape of some cropland areas would not be conducive to using the larger, more efficient spray aircraft used on rangeland.

APHIS has not performed any cost/benefit analysis of whether a control program for cropland would be economically advantageous.

SHOULD LANDOWNERS IN A DESIGNATED GRASSHOPPER CONTROL AREA BE REQUIRED TO PARTICIPATE?

Some ranchers believe that for the public good, landowners in a designated grasshopper control area should be required to participate in the program and share in program costs. According to proponents, such a program would:

--Eliminate much of the work and expense of rancher committee officials, who must now make repeated calls to convince some ranchers in key locations to join the program.

--Allow for more workable spray areas by including an entire infested area in a single geometric shape.

--Eliminate some uncertainties of the program in both the signup and late withdrawal stages.

--Provide a fairer system for participants. In at least two cases in South Dakota, participating ranchers paid for spraying small amounts of land that it was not feasible to exclude. The land was owned by ranchers who would not participate but had no objection to having their land sprayed.

Colorado has a grasshopper control program under which at least 25 percent of resident owners or lessees can petition to establish a pest district. A pest district can be established if two-thirds of the landowners or lessees in an area vote for it, agree to pay one-third of the costs, and ask the Governor for emergency funds. Colorado law authorizes assessment of all ranchers in a pest district through tax levies for their one-third share of program costs. The PPQ district director responsible for control activities in Colorado said that the program worked well.

CONCLUSIONS

Although we do not know whether cropland farmers are in a better economic position than ranchers to bear the costs of controlling grasshopper infestations on their property, it may be in the Government's interest to encourage cropland control. APHIS could apparently change the program to include cropland without any legislative changes, as it did in 1951 when cropland was dropped from the program. However, no definitive studies have been made. A cost/benefit analysis would be useful in determining whether a cropland control program would be economically advantageous. The results of such an analysis could also help the Congress decide whether federally assisted grasshopper control activities should continue to be directed at rangeland or be expanded to include cropland.

APHIS could require, as a condition of Federal participation, that States provide for a program requiring all affected landowners in an area designated as a grasshopper control area to participate in the program. This would seem to provide a logical, fair, and efficient way to reduce the complexities of coordination and cooperation among the participants and to reduce infestation levels where economic infestations occur. Here again, however, no studies have been made of the benefits of such a mandatory program or the problems that would be encountered in trying to establish one.

AGENCY COMMENTS AND OUR EVALUATION

USDA headquarters officials told us in May 1980 that they did not agree that APHIS should prepare a cost/benefit analysis of including cropland in the grasshopper control program or that it should study the pros and cons of making participation mandatory.

They said that expanding the program to include cropland would

--depart from long-established policy,

--require program protection for the entire United States and be likely to lead to similar expansion of other APHIS programs,

--increase APHIS' personnel ceilings by 500 percent, and

--not be feasible because the type of control treatment effective for rangeland would not be effective for cropland.

They also said that a mandatory program

--is not within Federal authority (such a decision should be made by each State government),

--is not necessary to achieve effective control of grasshopper infestation,

--would exacerbate the opposition of environmental groups to the grasshopper control program,

--would probably lead to pressures to make other APHIS programs mandatory, and

--would greatly increase APHIS' personnel requirements.

The officials added, however, that they would not object if other States adopted mandatory programs similar to Colorado's.

While we recognize USDA's concerns, we are not convinced that USDA has sufficient information--without studies--to make decisions on whether to expand the program to include cropland and to require participation of landowners in infested areas. USDA's concerns, including the need for additional staffing, possible pressure to expand other pest control programs, and increased opposition by environmental groups, of course, should be considered in such studies.

We recognize that including cropland in the program would depart from long-standing policy. As we pointed out on page 1, however, beginning in 1937, the program was applied to both cropland and rangeland. Because circumstances changed with the advent of potent new insecticides, cropland farmers were able to assume the responsibility for controlling cropland infestations beginning in 1951. Since that time circumstances have again changed. For example, some of the more potent and residual--and therefore more effective--pesticides used in the past are no longer available.

Before a decision is made about whether to include cropland in the program, USDA should have such information as (1) the extent of crop losses caused by grasshoppers and (2) the extent that such losses affect the food supply and consumer prices.

We also recognize that the type of control treatment effective for rangeland would not be effective for cropland. As we point out on page 31, a federally assisted cropland control program would have to be distinct from the rangeland program--using insecticides and application methods that would provide optimum control for the crop being sprayed.

Concerning USDA's statutory authority to require participation in grasshopper control programs, general authority in 7 U.S.C. 147a provides that the Secretary of Agriculture, either independently or in cooperation with (1) States or political subdivisions of States, (2) farmers' associations and similar organizations, and (3) individuals, is authorized to carry out operations or measures to detect, eradicate, suppress, control, prevent, or retard the spread of plant pests. More specifically, 7 U.S.C. 148 provides:

> "The Secretary of Agriculture, in cooperation with authorities of the States concerned, organizations, or individuals, is authorized and directed to apply such methods for the control of incipient or emergency outbreaks of insect pests or plant diseases, including grasshoppers, Mormon crickets, and chinch bugs as may be necessary."

Section 148 provides also that the State or local agency shall be responsible for the authority necessary to carry out the operations or measures on all lands and properties within the State other than those owned or controlled by the Federal Government and for such other facilities and means as in the discretion of the Secretary of Agriculture are necessary. Further, section 148c provides:

"In the discretion of the Secretary of Agriculture, no part of any sums appropriated to carry out the purposes of sections 148, 148a, and 148c to 148e of this title shall be expended for the control of incipient or emergency outbreaks of insect pests or plant diseases in any State until the State concerned has provided the organization or materials and supplies necessary for cooperation with the Federal Government."

We recognize that the grasshopper control program is a cooperative program and that States need not participate unless they choose to do so. However, if they do choose to participate, the Secretary of Agriculture clearly has the authority to require them to meet such program conditions as he may require.

Concerning USDA's comment that a mandatory program is not necessary to achieve effective grasshopper control, our review showed that the failure of some ranchers to voluntarily and cooperatively participate in the program was time consuming, expensive, and frustrating for those trying to make the emergency program work. A mandatory control program would eliminate that problem.

Also, although a mandatory program could exacerbate the opposition of environmental groups, such a result is not certain. Further, we have found no evidence that a mandatory grasshopper control program would lead to pressure to make other pest control programs mandatory as well.

RECOMMENDATIONS TO THE SECRETARY OF AGRICULTURE

We recommend that the Secretary direct the APHIS Administrator to

--prepare a cost/benefit analysis of including cropland in the grasshopper control program;

--study the pros and cons of making participation of landowners in infested areas mandatory, including an assessment of the problems that would be encountered in implementing a mandatory program; and

--provide the results of both studies, together with any recommended changes, to the appropriate legislative committees.

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