The New World screwworm eradication programme

analysis and the creation of graphs and charts as well as Harvard Graphics.

NWS and weather

Two comparative studies by the epidemiology unit produced results that had enabled SECNA to conclude that, while low winter temperatures slowed NWS activity, climatic conditions did not account for the early suppression of the population. The NWS had survived three winters in Libya, indicating that it was well adapted to local conditions and that weather alone was not enough to eradicate the pest.

Having survived the winter, the population would normally have expanded in March and April. However sterile flies were already being dispersed over the entire infested zone by early

34. Libyan people, including children, were encouraged to assist with fly dispersal by opening any boxes of sterile flies that failed to open automatically after dispersal from the aircraft.
February. These flies would therefore have been available for mating with newly emerged indigenous flies.

In 1991, 35 wild females were captured in wind-oriented traps. Using standard population estimation methods (the Lincoln Index) this indicated that in excess of 100 000 wild females were present in Libya during March and early April. The last wild fly was captured on April 27, indicating that substantial numbers of adults emerged from pupae that had overwintered in Libya.

Many cases of myiasis caused by species other than screwworm were discovered in 1991, which suggested that the screwworm population had been selectively eliminated. Only six NWS cases were found in 1991.

The relationship of weather to screwworm survival and reproduction was reviewed by Dr E.S. Kraus of the department of entomology of Iowa State University, in a report commissioned by FAO, *A Phenological Analysis of Screwworm in Libya* (see box on page 119).

### Communication and information

The cooperation of the public, in particular livestock owners, is another essential factor in a successful SIT programme and, in Libya, a carefully planned multimedia communications campaign ensured that Libyan people were extremely well informed about the screwworm and the use of the sterile insect technique.

A wide range of information materials were prepared and distributed to livestock owners throughout the country, concentrating on the infested zone, to gain their cooperation in surveillance, treatment, quarantine and animal movement control activities.

The public was kept informed about the programme through radio, television and face-to-face meetings, as well as through the broad distribution of printed materials. During the SIT operation the public was also encouraged to assist the campaign by opening any boxes that had failed to open during dispersal (see Photo 34). The com-
munication and information campaign is detailed in Chapter seven.

**SIT coordination in Mexico**

To streamline the process of transporting the sterile flies from Mexico to Tripoli, and to ensure the consistent communication and coordination with MACES and the Tuxtla Gutierrez production plant, SECNA posted representatives in Mexico. A site coordinator was based in Mexico City, and a programme representative was based at the production plant. These positions were merged during the programme, and the coordinator/representative was stationed at the production plant.

The FAO/SECNA coordinator/representative was for the most part required to liaise with MACES and German Cargo Services during the programme, handling administration and reporting and compiling data for presentation to SECNA headquarters and the field programme.

During the preparation of each shipment, the coordinator/representative was required to verify that the flies were sterile and to confirm the quality of the flies. Reports were then made to SECNA on the results. SECNA was also notified of the departure times of each flight and the estimated time of arrival in Tripoli.

**Technical evaluation**

Independent technical evaluation of the programme was carried out by a Technical Advisory Committee (TAC), which was made up of three experts who visited Libya twice during the programme, in May and September. The committee was required to review the programme and recommend specific actions (see box on this page). Following the visits to Libya, the TAC produced two reports which provided a valuable overview of the programme's progress.

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**The Technical Advisory Committee**

The TAC's responsibilities were specified in the Action Plan for the eradication programme. The experts were to:
- review the technical operations of the screwworm eradication programme in Libya and surrounding countries;
- review physical facilities available to the SECNA field programme;
- evaluate results of the eradication programme to the date of reporting;
- recommend a specific programme of action to be followed after the eradication of the screwworm.
Ongoing activities

Although the SIT campaign ended in October 1991, the SECNA programme did not stop. To ensure that the country was in fact screwworm-free, surveillance, treatment, animal movement control and quarantine activities had to be maintained for at least eight to nine NWS life cycles.

Emergency restart plan

These activities continued at an intensive pace throughout 1991 and into 1992. An emergency SIT restart plan was prepared, which would enable the resumption of sterile fly releases within four days of any positive identification of NWS infestations.

Within 24 hours of any positive identification of screwworm larvae, the case was to be reported to SECNA in Rome, samples sent to the FAO reference laboratory in London, and a request made to the Mexico-US Commission for the supply of flies (3.5 million initially together with an order for 14 million flies per week for 14 weeks).

On the same day, surveillance and trapping activities would be initiated, and all animals in the immediate area of the screwworm case treated as a preventive measure.

Backed up by intensified ground activities, flies would be released using hotspot treatment. The emergency SIT operation would then continue for at least 84 days if no further cases were detected.

SECNA therefore continued its activities in North Africa until the official declaration that the region was screwworm-free on June 22, 1992, when responsibility for the maintenance of the preventive programme, the final phase of the eradication campaign, was handed over to Libyan veterinary authorities.
Chapter five

Managing the campaign

35. The distribution centre and aviation unit team
There had never been any doubt that the presence of NWS in North Africa represented an emergency and that the only way to prevent this devastating insect pest from spreading throughout the Eastern Hemisphere was through immediate and decisive action.

Prompt action by the Libyan authorities in the early stages of the crisis had been crucial in containing the NWS. Close liaison was maintained by FAO with the Libyan government, the governments of neighbouring countries, and the relevant international organizations; within months of receiving notification of the NWS presence in the Libyan Arab Jamahiriya, FAO had approved and financed technical cooperation projects worth more than US$2 million for Libya and other threatened North African countries.

The Libyan government took prompt action to set up the appropriate management structures to deal with the screwworm problem, establishing a National Screwworm Committee under the direction of the Secretary of Agriculture in May 1989.

In June 1990, as work in North Africa moved toward the implementation of a formal eradication programme, FAO’s Director-General formed the Screwworm Emergency Centre for North Africa (SECNA) with wide-ranging authority to handle all of FAO’s responsibilities and activities in response to the emergency situation.

**Initial phase**

Responsibility for the programme during the initial phase had been taken by FAO’s Agriculture Department, headed at the time by Assistant Director-General, Dr Bonte-Friedman. All activities were coordinated by the department’s Animal Production and Health Division, headed at the time by Director Dr Jasiorowski. Within that division, the animal health service and its veterinary services group were largely responsible for planning and development work in the early stages of the emergency.

The animal health service worked in close cooperation with the Agricultural Operations Division, specifically its regional operations service.

Numerous other FAO divisions and services were involved in the complex process of planning and development, approval of finances and contracts throughout the programme.

**The Action Group**

The FAO Screwworm Action Group (later the FAO/IAEA/IFAD/UNDP Action Group) was formed on April 27, 1989 to act as a coordinating body in the North African screwworm campaign.

Original members of the group included representatives of the FAO Animal Production and Health Division, the Agricultural Operations Division, the Information Division and the Joint FAO/IAEA Division.

IFAD, which had also received a request for assistance from the Libyan government, joined the action group on July 31, 1989; UNDP joined on November 16, 1989.

The main role of the action group was to act as the central coordinating body during the early stages of the screwworm programme. It functioned in this capacity until the formation of SECNA in June 1990, and its weekly meetings were attended by representatives of the various FAO divisions and
other organizations involved in the programme.

**The Libyan national NWS infrastructure**

In the early stages of the crisis, the Libyan government had established the infrastructure for surveillance, control and prevention activities, based on its vast network of veterinary facilities spread throughout the country. There were 104 clinics in the infested area alone, operating within a government structure headed by the Secretariat of Agriculture and coordinated by the Department of Veterinary Services.

The National Screwworm Committee, formed to oversee all surveillance, quarantine and control activities, was first chaired by Dr Ali Guma, the national coordinator for FAO projects in Libya. After one month, the chair was transferred to the director of veterinary services, Dr Masood Abusowa. The committee comprised the chairmen of the animal health divisions in the five municipalities in the infested zone; representatives of the Veterinary Services.

*Figure 20. The National Screwworm Committee*
services Department, the Faculties of Human and Veterinary Medicine of Al-Fateh University and the National Farmers Association (see Figure 20).

The national committee reported directly to the Secretary of Agriculture and Land Development. It received weekly reports from the municipal committees, which in turn received daily reports from the inspection teams working in the infested areas. The chief veterinary officers in the seven NWS-free municipalities were also required to undertake surveillance activities and report to the committee.

This structure was supported by the Department of Veterinary Services, which provided the required veterinarians and technicians. The service employed approximately 300 veterinarians and 1,200 technicians and veterinary assistants, who worked at the central animal health and veterinary laboratories in Tripoli and in the network of veterinary clinics distributed throughout the country. They all combined their normal work with screwworm campaign activities.

The central committee formed inspection teams to undertake prevention, control and surveillance work in the infested municipalities. There were

36. The late Mr. Bachir Said El-Mabrouk, former Libyan ambassador to FAO (far left), chairing a screwworm action group meeting.
94 teams operating by August 1989 under the supervision of the municipal committees and working from the veterinary clinics.

In Rome, the Libyan ambassador to FAO, the late H.E. Mr Bashir Said El-Mabrouk, was instrumental in coordinating his government’s effort with the activities of FAO and donors. He took several initiatives which contributed to the success of the preliminary stages of the campaign. Mr Bashir Said died in a car accident in Libya, on November 12, 1990, after chairing one of the most critical action group meetings of the programme (see Photo 36).

**SECNA**

The FAO Director-General formed the Screwworm Emergency Centre for North Africa (SECNA) on June 15, 1990, instructing all FAO departments, divisions, regional and field officers to give the highest priority to any requests by the centre for support.

**SECNA structure and functions**

In line with the emergency nature of the screwworm situation in North Africa, Figure 21. Organization of the Screwworm Emergency Centre for North Africa (SECNA)
FAO created SECNA with special authority, designed to avoid any delays in implementing the eradication programme.

The centre operated under the instructions of FAO’s Director-General and dealt directly with donors, countries at risk of NWS infestation and other relevant organizations.

Its director was given extensive delegated authority to permit fast decisions and to expedite operations for the programme, including the procurement of supplies.

SECNA’s structure — management headquarters in Rome and a field programme in Libya (see Figure 21) — was designed to facilitate a rapid flow of command and action. It was complemented by two committees:

- an independent Technical Advisory Committee, which undertook two missions to Libya to monitor and evaluate the technical aspects of the eradication programme;
- a Coordination Committee, comprising representatives of all involved UN agencies (FAO, IFAD, UNDP and IAEA), donors and the affected countries. The committee was responsible for the coordination of all activities and for reviewing the progress of the programme, over-viewing policy, endorsing any major changes to the programme and advising on administrative and financial considerations.

Staffing of SECNA

Initially, SECNA was placed under the direction of Dr Lucas Brader, then director of the FAO Plant Production and Protection Division; he was considered the most appropriate person to head the new body since it was modelled on FAO’s Emergency Centre for Locust Operations (ECLO), which he had directed with considerable success. On November 1, 1991, after Dr Brader left FAO to take up the position of director-general of the International Institute for Tropical Agriculture (IITA), SECNA was transferred to the FAO Animal Production and Health Division, and the division’s new director, Dr E.P. Cunningham, was appointed SECNA director. The immediate priorities for the new director were to continue the complex negotiations to finalize a contract with the Mexico-United States Commission and maintain efforts to ensure funding for the eradication programme.

Headquarters

SECNA headquarters in Rome comprised the director and two full-time specialists, senior operations officer Dr A.E. Sidahmed and technical officer Dr M. Vargas-Terán. Later, the team was joined by a computer data management officer, an information officer and a part-time media liaison officer (see box on page 133).

The headquarters team was responsible for coordination of the technical and managerial aspects of the programme, including all financial matters, liaison with other FAO divisions and units, the recruitment of consultants and coordination with donors and the countries at risk of infestation.

It was also responsible for meetings of the Coordination Committee and the Technical Advisory Committee and for the preparation of detailed progress reports on the eradication programme.

Management meetings, chaired by the SECNA director and attended by the senior operations officer, the technical officer and the field programme

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director and co-director, together with other senior staff as appropriate, were held every two to three months throughout the programme. They were held both in Tripoli and in Rome and were designed to streamline decision-making on programme activities (see Photos 37 and 38).

Mexico site coordinator

A SECNA representative was appointed to the Mexico-US Commission, based at Tuxtla Gutiérrez, Mexico, to assist in the coordination of the SIT component of the eradication programme (see box on page 133).

Initially two SECNA staff members were posted in Mexico, one as a special programme representative at the sterile fly production plant in Tuxtla Gutiérrez and another as site coordinator, based in Mexico City. The two positions were merged during the programme into the role of site coordinator, based at Tuxtla Gutiérrez, responsible for general supervision and coordination of the weekly sterile NWS shipments to Libya and for the link between MACES and SECNA during the eradication programme. The site coor-
The New World screwworm eradication programme

dinator was also required to verify the sexual sterilization of the NWS flies sent to Libya and to confirm the quality of the flies.

The field programme

The SECNA field programme was established in Libya in August 1990, and a director, Dr D.A. Lindquist, appointed on August 17. Dr M. Abusowa was appointed co-director of the field programme in September.

In Libya, the SECNA field programme staff of international experts was ostensibly in place by the end of 1990 (see box opposite).

As is normal practice in United Nations field programmes, all senior international staff worked with local counterparts who were funded by the Libyan government.

The field programme structure

The field programme director reported directly to the SECNA director at FAO headquarters and was responsible for all field activities, including management of all resources, programme
SECNA professional staff

SECNA headquarters, Rome

Dr E.P. CUNNINGHAM, Director AGA/SECNA (Ireland)
Dr A.E. SIDAHMED, Senior Operations Officer (Sudan)
Dr M. VARGAS-TERAN, Technical Officer (Mexico)
Mr S. BARNES, Information Officer (Australia)
Ms M. KASSA, Computer Data Management Officer (Ethiopia)
Mr P. MCCORMICK, Media Liaison (United Kingdom)

Field programme

Director's office
Dr D.A. LINDQUIST, Director (USA)
Dr M. ABUSOWA, Co-Dir. (Libya)

Administration
Mr Fernando SALVATORI (Italy)

Aviation
Capt. Larry MESSICK (USA)
Mohammed EL-SHAWSH (Libya)

Communication and information
Dr Mohammed HUSNI (Libya)
Mr Fourat DRIDI (Tunisia)

Distribution centre
Dr Eduardo RIOS (Mexico)
Dr Omar EL-RAIS (Libya)
Dr Miguel Arturo CRUZ (Mexico)

Epidemiology
Dr Robert E. REICHARD (USA)
Dr Mohammed ABU-DIAH (Libya)
Dr Lennart SJOELAND (Sweden)
Mr Harry LAME (Netherlands)
Dr F.A. POUDEVIGNE (France)
Dr Adele BENGERE (Libya)

Field
Dr Luis F. LIERA (Mexico)
Dr Abubaker BELAZI (Libya)
Dr Arturo MARTINEZ (Mexico)
Dr Musadek AMARA (Libya)
Dr Juma HALOUN (Libya)
Dr Lutfi TUNISI (Libya)
Mr Saydı-Mouktiar TOURE (Senegal)

Laboratory
Dr René GARCIA (Mexico)
Dr Khalifa MUGHADMI (Libya)
Dr Jan CHIRICO (Sweden)
Mr Mamdouh TAHIR (Jordan)

Mexico

Dr Salem EL-AYAN, Special Representative to Commission (Libya)
Mr Fabio RODRIGUES-TORRES, FAO/SECNA Site Coordinator (Colombia)
strategy and its implementation. He also maintained close contact with the Libyan government on all matters related to the eradication programme.

The co-director (who was also chairman of the Libyan National Screwworm Eradication Committee), was jointly responsible for supervising the field activities and for ensuring the availability and coordination of Libyan government inputs to the eradication programme.

The co-director also helped to streamline activities in Libya, by advising on matters involving Libyan authorities and ensuring that effective and continuous communication was maintained with the Libyan government at the highest levels.

The field programme team

The SECNA field programme operated from a base in the central veterinary laboratories in Tripoli, with facilities including a diagnostic laboratory, a laboratory for quality control and a research and development department.

As detailed in Chapter four, the field programme was divided into seven units, each headed by an international expert and his or her Libyan counterpart. A number of Libyan professional staff also worked in the units (see box on page 133).

The staffing of the units was as follows:

- Field unit: staffed by a senior surveillance officer, a trapping and collection officer and two quality control experts;
- Laboratory: headed by a senior laboratory research and development officer and staffed by a quality control chief and a quality control laboratory development expert;
- Epidemiology: headed by a senior epidemiologist and staffed by an epidemiologist and two associate professional officers — an agricultural engineer and a junior epidemiologist;
- Distribution centre: based at Tripoli airport and headed by a senior officer and various staff including dispersers (see Photo 35, the chapter opener);
- Aviation: headed by an aviation officer, who was responsible for coordinating the aerial dispersal operations;
- Communication and information: headed by a Libyan communications officer;
- Administration: headed by an administrative officer.

The Coordination Committee

This committee was established, as stipulated in the plan of operation for the screwworm eradication programme, to coordinate all activities of the programme, overview policy, endorse any major changes to the programme and advise on administrative and financial matters.

The committee’s meetings were chaired by Assistant Director-General (Agriculture) Dr H. de Haen, and the SECNA director Dr F.P. Cunningham, with the SECNA senior operations officer Dr A. Sidahmed acting as secretary. It comprised representatives of all involved UN agencies, donors and affected countries (see Annex 3 for a full list of representatives). The committee met four times during the programme — on June 11 and October 15, 1991 and on February 12 and June 25, 1992.

Reports documenting the progress of the eradication programme in detail and providing up-to-date information on the programme’s budget and fund-
ing status were presented to participants at each meeting.

These reports in fact form an important chronological summary of the eradication programme, detailing all activities relating to the distribution of sterile flies, surveillance, control and quarantine activities, research and development work, the information and communication campaign and activities in neighbouring countries.

The progress report detailing the period from February 1 to May 31, 1991 was accompanied by a Technical Advisory Committee report and a special report on surveillance and prevention activities in neighbouring countries. The progress report for the period June 1 to August 31, 1991 was accompanied by the second report of the Technical Advisory Committee. Participants were also given executive summaries of three special studies on specific matters relating to the programme: A Phenological Analysis of Screwworm in Libya; Computerization and Analysis of SECNA Technical Data; and Economic Impact of NWS Eradication from North Africa.

Apart from the printed reports, members of the committee were given verbal presentations on the progress of the programme and were given the opportunity to ask questions and discuss any relevant matters.

In this respect the meetings were an important opportunity to clear up any concerns held by the representatives of donor countries and organizations about the programme.

The Technical Advisory Committee (TAC)

This committee acted as an independent body to monitor and evaluate the progress of the eradication programme in Libya. It conducted two missions to Libya and prepared reports for presentation to the coordination committee.

The members of the Technical Advisory Committee were:

Dr N. Pineda Vargas, former director, Screwworm Eradication Programme in Mexico; Dr W. Takken, department of entomology, Wageningen Agricultural University, the Netherlands; and Dr D.W. Anderson, former MACES general subdirector, Mexico.

The committee's first mission to Libya was from May 5 to 10 and the second from August 31 to September 6, 1991.

Following its first mission the TAC commented that SECNA, working in collaboration with the Libyan government, had done an excellent job in establishing an effective management structure in a short time and in implementing the many technical tasks necessary for the programme. The TAC recommended that the fly release programme be maintained at least until October of that year and that a full surveillance and quarantine programme should continue until at least May 1992. Based on observations of the field programme's operations the TAC made various recommendations on how its activities could be strengthened.

After the second mission, based on the excellent progress made in the eradication programme, the team concluded that evidence was sufficient to justify ending sterile fly releases in October of that year.

Data analysis

The emergency nature of the SECNA programme meant that comprehensive
data analysis was retrospective, since
time was insufficient during the actual
campaign to conduct anything more
than basic and essential work in this
area. A vast database was accumulated
during the programme, ranging from
census and environmental data
through precise records of all surveil-
sance, quarantine and laboratory activi-
ties.

As both hardware and software be-
came available, computers were used
for data analysis relating to the prepa-
ration of weekly and monthly re-
ports by the field programme.

Staff

In Tripoli, the epidemiology unit had
two experts working on computer data
analysis and, in Rome, the computer
data management officer was respon-
sible for compiling data for inclusion in
reports.

Software

The SECNA programme used three
main software packages for data analy-
sis: Lotus 1-2-3 and dBASE IV for nu-
merical analysis and creation of graphs
and charts; and ILWIS GIS (Integrated
Land and Water Management Informa-
tion System Geographical Information
System) for spatial analysis.

To avoid the necessity of re-entering
data for every single analysis, master
data bases were created using dBASE
IV, which enabled the transport of data
to other software packages, using cus-
tom-written applications or standard
software.

Additional software used by SECNA
included AutoCAD, to make high-
quality output maps possible; Harvard
Graphics, to enhance the quality of Lo-
tus 1-2-3 graphs; and WordPerfect, for
report writing. Custom software was
written to handle such tasks as the clas-
sification of data and the transfer of
real-world coordinates to ILWIS coor-
dinates.

Data

Data were gathered for inclusion in
dBASE IV in late 1991 from the SECNA
programme (case, trapping and quar-
tantine data, for example) and from ex-
ternal sources including the Libyan
Ministries of Planning and Agriculture,
regional development plans and
agricultural census reports for 1987 as
well as from satellite images and vari-
ous topographical and navigational
maps.

Staff were confronted with a major
problem in the area of spatial analysis
because of the lack of a consistent no-
menclature in the information available
on geographical and administrative
units in Libya.

They found that, in Libya, there was
no common denominator for the differ-
ent administrative subdivisions, apart
from areas called “branches” (the
largest sub-unit of each municipality); a
single branch could cover an area of
several hundred square kilometres and
stretch from coastline into the desert.

Staff at the SECNA field programme,
however, managed to adapt the branch
system to create a series of maps that
detailed the number of NWS
myiasis cases by animal species per
year, using ILWIS GIS.

Using GIS, maps were also pro-
duced which combined data on the loca-
tion and number of NWS myiasis
cases with data on the status of the
land.
Managing the campaign

Reporting system

Technical information, compiled on a weekly basis, was crucial to the effective planning, management and implementation of the SECNA field programme operations. Data were produced by the field programme’s individual units and submitted to the epidemiology unit for analysis; a final, weekly summary was sent to SECNA headquarters in Rome for tabulation, analysis and preparation of reports.

Based on these reports, monthly summaries were prepared, which then provided the basis for the preparation of the main progress reports on the programme, produced every four months for submission to the Coordinating Committee.

The type of data produced on a weekly basis by the field programme is summarized as follows:

Field unit
- number of animals inspected weekly in the surveillance areas, by species and municipality;
- number of larva samples submitted by inspection teams for laboratory identification (whether positive or negative for screwworm) by species and municipality;
- date, host species and location (using municipality and map coordinates) of positive and negative larva samples (done monthly);
- all details on quarantine activities, including the number of animals entering and leaving the control areas, by species and inspection post, the number of animals sprayed, the number of wounds detected and treated;
- reports on fly catches, including data on the total number of male and female screwworm flies, number of traps operating and data on temperature and rainfall.

Laboratory
- results of quality control tests on fly emergence, sex ratio, malformed adults, longevity tests (with and without food and water), sterility and total longevity by shift (meaning the shift of workers handling the flies in Mexico);
- results of pre- and post-release mortality and mobility tests by date, shift, release area and flight time;
- transportation data, including pupation date, irradiation date, packaging date, number of boxes and pupae, date of transportation, duration of transportation, maximum and minimum temperature during transportation (all by shift);
- graphs of temperature against time during transportation, by pallet position in aircraft;
- numbers of positive and negative egg masses collected;
- numbers of sterile and fertile female flies dissected;
- numbers of negative and positive larvae identified;
- results of research and development activities.

Aviation and distribution
- map of distribution grids showing densities of sterile flies dispersed;
- detailed data on distribution flights, including kilometres flown, time of flight, altitude, boxes flown and frequency of dispersal by grid.

Epidemiology

These weekly reports consisted basically of additional analyses of data provided by the other units and the production of relevant maps and charts, including:
- maps and charts of animal census data;
- maps showing surveillance areas and distribution of surveillance teams, fly traps and control posts;
- maps showing geographical
distribution of screwworm and non-screwworm myiasis cases by time period;
- maps of trap catches of fertile and infertile NWS flies by time period;
- maps showing dispersal grids and densities of flies dispersed;
- analysis of myiasis cases by species and municipality;
- analysis of the relationship between climate and screwworm cases;
- analysis of ratios of sterile and wild female flies captured by trap group.

The unit was also involved in:
- analysis of data from quarantine posts to give more precise information on the sources and destinations of animals moving into and out of the control area;
- revision and review of reporting formats;
- preparation of contingency operational control plans under different outbreak scenarios within and outside the control area, and under different degrees of operational difficulty.

Following the end of the main eradication programme, the unit undertook a comprehensive analysis of all data generated during the programme.

Contracts

Following the decision to eradicate the NWS in North Africa using the sterile insect technique, it was necessary to determine which aspects of the eradication programme could be performed by FAO and which needed to be subcontracted to outside bodies.

It had become clear that three major components of the programme should be undertaken by contractors: the production of sterile flies; the transport of the flies to Libya; the dispersal of the flies over the infested area in Libya. The preparation of contracts for these activities was handled by the contracts branch of FAO's Administrative Services Division. The branch was headed at the time by Mr Anton Doeve.

The Mexico-US Commission agreement

The Commission's sterile fly production plant at Tuxtla Gutierrez, Mexico, was the only place in the world which produced sterile flies. At the time the Mexico-United States agreement was signed, in 1972, the NWS had never been found outside its natural range in the Americas, thus it stipulated that sterile flies could not be sold or sent outside the Americas.

FAO had made an initial approach to the US government in November 1989, requesting the provision of sterile flies from the plant for use in a North African eradication programme. Consequently, in March 1990, US President George Bush signed legislation permitting the sale of the flies anywhere in the world.

The achievement of a contract which was suitable to both FAO and the joint Mexico-US Commission was a time-consuming process, involving complicated and protracted contractual negotiations from July to November 1990. It was necessary to have the agreement of not only the two organizations, but also of the US State Department, the US Department of Agriculture (USDA) and the US Treasury, as well as the equivalent bodies in Mexico.

Since the Commission was jointly funded by the United States and Mexican governments, it was necessary to determine how it would deal with
funds being provided by a third source (FAO) before a final agreement could be reached.

A contract was originally drawn up by FAO’s contracts branch and submitted to the Commission. After considering this draft, the Commission drew up another contract, which, after several months of negotiations and modifications, became the final agreement between the two bodies.

Under the agreement, the Mexico-US Commission agreed to provide the maximum number of sterile NWS flies required for the eradication programme per week, at cost price. Formulae for the calculation of this cost price were agreed upon.

The Tuxtla Gutiérrez plant was also responsible for packaging the flies and performing predeparture quality control tests. Records were to be provided to FAO on production, sterilization, quality control, packaging and transportation of the flies.

FAO agreed to fund the necessary remodelling of the Tuxtla Gutiérrez plant and the purchase of equipment, to enable it to increase sterile fly production to the required level.

Complex negotiations

As contractual negotiations continued into November, the need to finalize and sign the agreement became urgent, and the situation took on an air of high drama. The pilot release of sterile flies in Libya had originally been scheduled to begin in November 1990 to take advantage of the naturally low screwworm population during the cooler months of the year.

Screwworm cases had been very high from July to November, peaking in September at 2,932 confirmed infestations; SECNA staff were extremely worried about the impact on the programme’s effectiveness if the commencement date for the pilot programme was further delayed.

In November, a final version of the agreement was presented to FAO by the Mexico-US Commission, with the proviso that no further alterations could be made. However, the contract contained a clause in which MACES specifically disclaimed liability in the event that a screwworm fly was not sterilized, thus resulting in the release of a fertile screwworm fly in Libya.

The issue of liability posed a significant obstacle to achieving a final agreement as all three parties — MACES, FAO and the Libyan government — in effect refused to accept legal responsibility for the release of a fertile fly.

Concerned at the prospect of vexatious litigation by a country with which it had no legal or diplomatic relations, the United States government had ensured that the liability disclaimer was inserted into the contract.

The Libyan authorities, concerned that there may not be 100 percent sterility, also stood firm on the issue and refused to accept liability. This created significant problems for FAO, which normally operated projects with indemnities by national governments against legal claims and therefore could not accept liability under the MACES contract.

Confronted with the reality that urgent action needed to be taken in Libya, FAO’s Director-General instructed that the contract be finalized, despite the serious concerns about the liability issue. He stipulated, however, that there had to be an agreement with the Libyan government on the matter.
Agreement reached

Following two days of intensive discussion in Tripoli between SECNA and Libyan authorities, including the late Libyan ambassador to FAO, Mr Bashir Said El-Mabrouk, the liability issue was resolved on November 12, 1990 to the extent that an agreement could be reached.

In a major show of diplomacy, Mr Bashir Said suggested that the programme should go ahead on the basis of the contract document as it stood, which meant in effect that the Libyan government accepted liability. Mr Bashir Said was killed in a car accident following the meeting. His contribution was later described by the SECNA director as “a victory for common sense”.

Problems continue

The problems were not yet over, as FAO discovered when the signatures of the relevant authorities in the United States and Mexico were required.

FAO had already set the date for the first shipment of sterile flies to leave Mexico on December 1, 1990, and all arrangements were in place for their transport from Tuxtla Gutierrez to Tripoli. Following the agreement with the Libyan authorities on November 12, the contract went back to the United States, where it remained for some weeks in Washington, D.C., waiting for signatures from the US State Department and the USDA.

It was then sent to Mexico for signatures from the Ministries of Agriculture and Foreign Affairs, FAO’s representative in Mexico obtained the final signature on November 30, one day before the first shipment of flies was to leave Tuxtla Gutierrez by truck for Mexico City airport. The only further requirement was that the fully signed document be registered with the appropriate officer at the United States Embassy in Mexico City.

A major, last-minute hitch occurred when it was discovered that the officer had left the city and could not be contacted. At this stage the truck carrying the first shipment, which was half-way between Tuxtla Gutierrez and Mexico City, was called back to the production plant and the shipment cancelled because the agreement had not been finalized.

The action was greeted with incredulity at FAO in Rome. Frustrated by the delay to the start of the eradication programme, FAO ensured that the shipment could be transported to Tripoli the following week.

Two days after all bureaucratic obstacles were finally overcome, on December 12, 1991, the first shipment of flies left the Mexico plant, arriving in Libya on December 14.

German Cargo Services

The massive and complex task of transporting the sterile flies to Libya was put to international tender by FAO. A major consideration in awarding the contract was that the successful tender submitted the right specifications for transport of the flies.

Two tenders were called, one for the pilot project of the preparatory phase and another for the main eradication programme. For the first contract, three firms submitted bids, and for the second 22 firms from 14 countries. German Cargo Services was eventually awarded both contracts to transport the sterile flies to Libya.
Contract details

To ensure the quality of the flies arriving in Tripoli, their transportation according to exact specifications was critical. The contract therefore outlined requirements regarding loading and unloading time, the manner in which the flies were loaded on to and stored in the aircraft, the temperature within the aircraft, the duration of the flight and other considerations.

Under the contract, the contractor was also required to provide details to FAO on the conditions under which each flight took place — information which would be useful in determining the causes of any reduction in the quality of the flies.

Transport arrangements

During the pilot phase and the first months of the main eradication programme, German Cargo Services was responsible for the charter transport of the sterile flies only from Frankfurt to Tripoli, the first leg of the journey being by regular scheduled air freight. From May 3, it was responsible for their transportation directly from the plant at Tuxtlas, Mexico to Tripoli airport.

The Libyan Aeroclub

The Aeroclub was awarded the contract for the aerial dispersal of the sterile flies in Libya after responding to the call for international tenders with the lowest bid.

Contract details

The contract outlined exact specifications for the actual aircraft, the qualifications of the crew, the conditions of dispersal (including handling of the boxed flies and the method of dispersal), the frequency of flights, the necessity of maintaining detailed flight records and modifications to the aircraft to accommodate the dispersal chutes.
Chapter six

Money matters
The outstanding and rapid success of the screwworm eradication programme in North Africa not only saved the Eastern Hemisphere from the threat of a dangerous pest, but it also saved the international community millions of dollars.

Originally estimated to cost US$117.5 million in 1990, the actual eradication programme was completed in one year instead of two at a cost of US$66.6 million. The entire programme, including the initial and preparatory phases, the eradication programme, the continuation of ground operations until June 1992, an emergency restart plan and a preventive programme, cost US$75 million (plus an additional US$5.1 million in bilateral donations to Libya and neighbouring countries) (see Table 7).

In addition to these major savings, an independent study on the economic impact of the screwworm in North Africa put the annual regional benefit of eradication at more than US$300 million at a benefit/cost ratio of 50:1 (see box on opposite page).

Revised budgets for the programme were prepared in planned stages, with summaries of expenditure and estimates presented to donors at each meeting of the Coordination Committee.

### Funding arrangements

Funding sources for the programme were divided into three main groups: multidosor (including governments and institutions), United Nations agencies and the Libyan government, which contributed both in cash and in kind to each phase of the programme. Neighbouring countries contributed in kind for their own surveillance and control programmes.

### TABLE 7: NEW PROGRAMME BREAKDOWN OF OVERALL FUNDING SOURCES (in US$)

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial phase (FAO, Libya, UNDP)</td>
<td>3 700 000</td>
</tr>
<tr>
<td>Pilot phase* (Libya, IFAD, ADB, UNDP, IAEA, FAO)</td>
<td>10 700 000</td>
</tr>
<tr>
<td>Eradication programme</td>
<td>60 600 000</td>
</tr>
<tr>
<td>Multidonor funds**</td>
<td>32 600 000</td>
</tr>
<tr>
<td>Libyan contribution (cash)</td>
<td>14 000 000</td>
</tr>
<tr>
<td>Libyan contribution (in kind)</td>
<td>2 000 000</td>
</tr>
<tr>
<td>Neighbouring countries (in kind)</td>
<td>75 000 000</td>
</tr>
</tbody>
</table>

* The major share of this cost (equivalent to $7.3 million) was the Libyan government contribution which also included some expenses incurred during the initial phase.

** Does not include bilateral donations: The EC allocated an additional $1.1 million to Egypt; $1.1 million to Tunisia and $438 000 to Algeria; JCB allocated an additional $1 million to Libya and $1.5 million divided equally among the neighboring countries — Algeria, Chad, Egypt, the Niger, Morocco, the Sudan and Tunisia; the USA allocated an additional $1 million to Egypt.

### TABLE 8: TECHNICAL COOPERATION PROGRAMME PROJECTS FOR NWS CONTROL/ERADICATION (in US$)

<table>
<thead>
<tr>
<th>Country</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>250 000</td>
</tr>
<tr>
<td>Chad</td>
<td>305 000</td>
</tr>
<tr>
<td>Egypt</td>
<td>250 000</td>
</tr>
<tr>
<td>Libya</td>
<td>345 000</td>
</tr>
<tr>
<td>Niger</td>
<td>250 000</td>
</tr>
<tr>
<td>Sudan</td>
<td>150 000</td>
</tr>
<tr>
<td>Tunisia</td>
<td>250 000</td>
</tr>
<tr>
<td>Regional project</td>
<td>400 000</td>
</tr>
<tr>
<td>Burundi</td>
<td>225 000</td>
</tr>
<tr>
<td>Cameroon</td>
<td></td>
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<tr>
<td>Djibouti</td>
<td></td>
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<tr>
<td>Ethiopia</td>
<td></td>
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<tr>
<td>Malawi</td>
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<tr>
<td>Mauritania</td>
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<tr>
<td>Morocco</td>
<td></td>
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<tr>
<td>Nigeria</td>
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<tr>
<td>Senegal</td>
<td></td>
</tr>
<tr>
<td>Somalia</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2 425 000</td>
</tr>
</tbody>
</table>