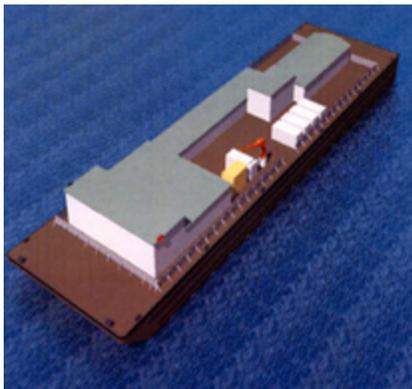




## A Mobile Mass-rearing facility for Screw-worm Fly

### A PROPOSED FEASIBILITY STUDY

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### Background

The Old World Screw-worm Fly, *Chrysomya bezziana* (OWS), is one of the most destructive parasites of livestock, wildlife and humans and is listed by the International Office for Epizootics. The pest occurs in the tropical and subtropical areas of Africa, the Middle East, Asia and Pacific regions of the globe. There was a major outbreak of OWS in Iraq during the mid to late 1990s resulting in the development of a joint initiative by the United Nations Agencies FAO and IAEA and the Arab Organisation for Agricultural Development (AOAD) for the eradication of OWS from the Middle East. See Figure 1 for distribution of OWS in the Middle East.

The momentum for this eradication program has been severely curtailed since the invasion of Iraq which, among other things, resulted in the destruction of the original OWS facility and fly cultures in Baghdad.

Other centres where OWS is or has been reared in recent times (Malaysia and Indonesia) have only small (experimental) rearing capacities, and the prospects for their use in responding to an OWS eradication program in the Middle East or elsewhere would appear negligible.

Plans for a large mass-rearing factory (or a multi-species rearing facility) in the Middle East would seem unlikely in the foreseeable future for economic, political and geographic reasons. Such a factory would have very high capital costs plus the issues of where to locate such a facility, and quarantine and safety concerns.

A more radical approach is required if a response capability for OWS eradication by release of sterile, mass-produced male OWS (SIT) is to be established in the Middle East.

At a meeting of the Technical Committee of the "Joint AOAD/FAO/IAEA Project for the Eradication of Old World Screw-worm Fly in the Middle East" held in 2002, it was proposed that an investigation of OWS rearing options be undertaken, including a mobile, modular system with a view to establishing a pilot rearing facility. This proposal was considered a key element of pre-operational activities.

It is deemed vitally important to maintain initiatives for an area-wide control program in the Middle East. The likely establishment of a modest OWS pilot facility in the region with a capacity of 5 million flies per week would provide initial cultures of screw-worm fly and enable capacity building for local scientists and technologists.

For area-wide eradication in the Middle East, a more substantial facility with at least 50 million per week capacity would be necessary. If such a facility was mobile, it could be located at key ports in the Persian Gulf with control beginning, for example, in Oman then the United Arab Emirates and progress in logical geographical sequence towards Saudi Arabia, Kuwait and Iraq.

Iran would also benefit from progressive strategic area control measures. See Figure 2 for a schematic presentation of a proposed Middle East eradication programme and Figure 3 for deployment of sterile flies from a 50 million fly-rearing facility.

The feasibility study would address the key issues of designing the structural elements and the operational logistics of an OWS rearing facility with a capacity of at least 50 million flies per week that could be accommodated on a dumb barge. Barges up to 90 meters (300 feet) length overall (LOA) are available in the Gulf. The deck area of such a barge would be sufficient for the envisaged facility.

### Objectives of the feasibility study

A detailed exploration of the following components of a modular, mass-rearing facility (with a productivity of at least 50 million flies per week) based on the floor area of a large 'dumb' barge, would be undertaken:

- Capacity (in relation to area-wide SIT operations)
- Design
- Operational logistics
- Costs of construction

Rearing methods for the New World Screw-worm fly, *Cochliomyia hominivorax* (NWS), especially larval rearing and waste disposal, have changed significantly during recent years and visits to the old Tuxtla (Mexico) and new Panama NWS facilities, and also the Melon Fly facility in Okinawa (Japan) would be made by the team to incorporate the latest technologies for rearing, handling, transport and storage of sterile flies.

Prospects for a successful outcome for this proposal are high – to indicate whether a mobile facility is a realistic concept and worth continued support and investment, or not. The

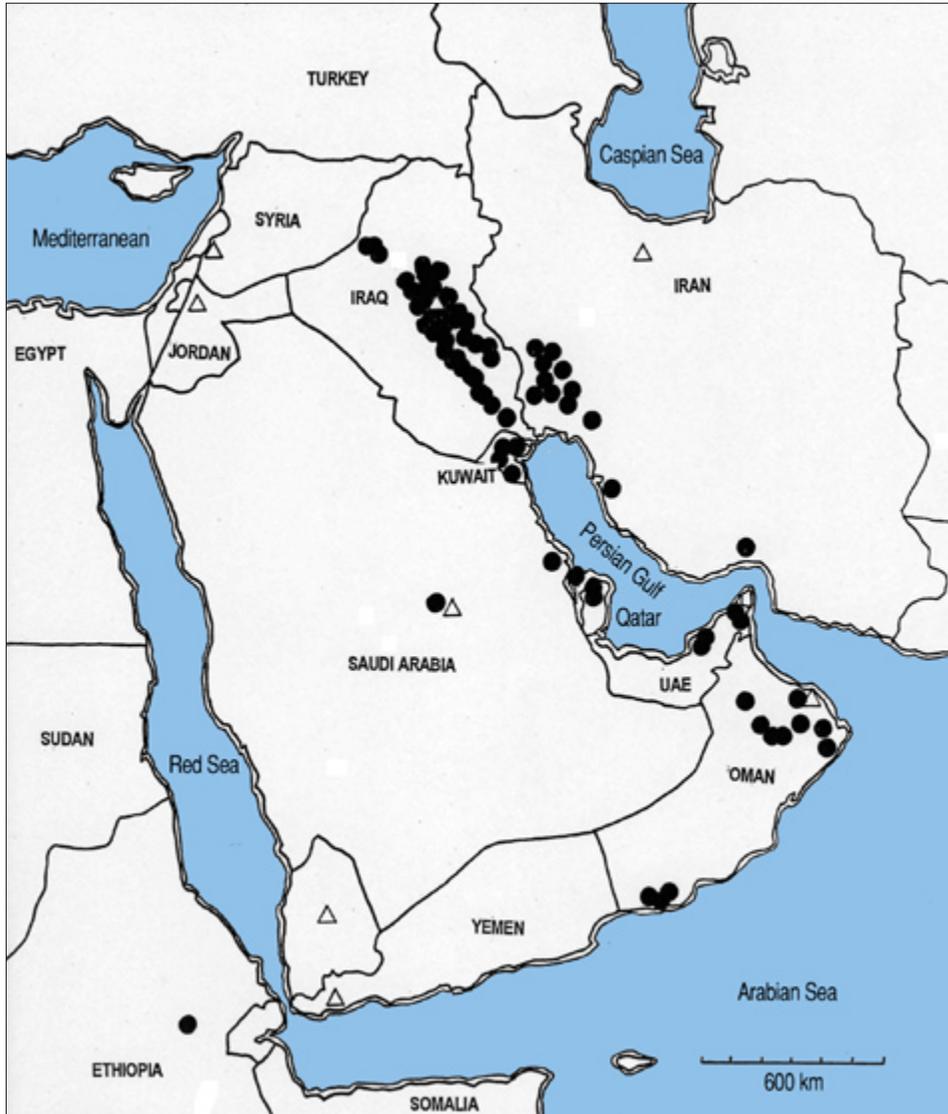


FIGURE 1 – Distribution of Old World Screw-worm fly in the Middle East

proposed facility could, of course, be land-based rather than accommodated on a barge.

## Timetable

The feasibility study would be made over a 12 month period. It would occupy professional staff full time for about 2-3 months each, including travel times. Visits would be made to the following facilities:

- NWS rearing facility in Tuxtla, Mexico
- NWS facility in Panama
- OWS facility in Malaysia together with a visit to Port Kelang and also to nearby Singapore to inspect flat-top dumb barges
- Melon Fly mass rearing facility in Okinawa, Japan.

## Costs of feasibility study

The total cost of the feasibility study would be approximately US\$85,000 of which approximately \$50,000 would be for travel costs.

## Conclusions

If, as a result of this proposed study, such a facility was considered feasible, a prototype could be established and evaluated in an OWS-endemic country in the Middle East such as Muscat in Oman.

A modular prototype could perhaps be assembled on land prior to its re-deployment to a barge. Such a facility, together with the 5 million per week research facility envisaged for Oman, would provide a centre for training and R&D on rearing and SIT, as well as

ecological and surveillance studies in OWS-endemic areas in the Middle East.

The facility could then be tested and then used to systematically eradicate OWS from the Middle East. In the future, a mobile facility with a stand-by colony of OWS would have the capacity to provide sterile flies within a few weeks of a major outbreak of OWS in the region. The prospects of using the technology elsewhere in Africa, Asia or even Australia to suppress and eradicate Old World Screw-worm fly should not be ignored.

## Professional Profiles of Principal Investigators

(with accumulated OWS and NWS experience of more than 60 years):

**Philip Spradbery** BSc, PhD, DSc (University of London). Managing Director of XCS Consulting Pty Ltd and past Senior Principal Research Scientist at the CSIRO Division of Entomology (1963-2003). Established the Screw-worm Fly Unit in Papua New Guinea in 1973 and was Officer-in-Charge until 1985 during which time artificial rearing, sterilization, SIT trials, insecticide evaluations and ecological studies were made on OWS for the first time.

Consultancies on OWS in Australia, Malaysia, Middle East and Mexico including chairing the Technical Committee of the Joint AOAD/FAO/IAEA Project for Eradication of OWS in the Middle East. Led the FAO/AOAD OWS Mission to Iraq in 1998. Author of more than 100 scientific publications, of which nearly half are devoted to screw-worm fly.



FIGURE 2 – A proposed *modus operandi* for eradication of screw-worm fly in Middle East. Using a mobile facility moored at Muscat, eradicate from Oman. This could be followed by UAE, Bahrain and Qatar. Finally, eradication from Iraq and then Iran would complete the programme.

FIGURE 3 (opposite) – Middle East showing areas for treatment with sterile flies. Each grid is 100 x 100 km (=10,000 km<sup>2</sup>). Assuming a facility with an output of 50 million flies per week and using a dose rate of 500 sterile flies per km<sup>2</sup>, there is sufficient capacity to treat 100,000 km<sup>2</sup> (10 grids) at the same time.

**Robert Tozer** BAg (University of Sturt, Wagga campus). Managing Director of Global Agriscience Pty Ltd and Flycam Pty Ltd and past Senior Technical Officer with CSIRO Division of Entomology (1971-93). Key member of Screw-worm Fly Unit in Papua New Guinea from 1978-1982 and acting Officer-in-Charge at times until 1991.

Awarded a Sir Winston Churchill Memorial Fellowship in 1989 to study and participate in the NWS SIT program in Mexico, Guatemala and Costa Rica. Established OWS cultures in Indonesia for an Australian (ACIAR) funded vaccine study in 1996 and consultant to the Queensland Department of Agriculture/Australian Quarantine & Inspection Service (AQIS) study into improved OWS surveillance trapping (1999-present).

**Scott MacGregor** BA(Arch)Hons, Dip Arch (Westminster University, London). Managing Director SMG & Associates and Claymore Design Ltd. Pilot with the Royal Australian Air Force (1968-76). Re-trained as an Architect in London (1977-83).

Founder and managing director of a general architectural practice in London (1983 to 2002) which specialised in building-defect analysis and reconstruction, project management and representation in disputes and arbitrations as an expert witness.

Twenty years architectural, engineering and product design experience in both 2-D CAD (CAD4U, Autocad) and 2 years 3-D real-scale modelling for design and engineering prototyping (Rhino).

Design consultancy projects including engineering prototypes and field trials of Buffalo Fly traps. Design consultant for television documentary (2006) about the historic maritime mystery of the “Mary Celeste” for the Smithsonian Museum. Author/illustrator of four books on architectural/engineering analysis. Designer/illustrator of book on morphology of scorpions and consultant on various television documentaries on engineering, aeronautical and marine subjects.

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