Queensland Flying-fox Consultative Committee – formation, outcomes and future strategies

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**ABSTRACT**

The challenge of equitably managing flying-fox populations and fruit production in today’s environment requires balance to align industry, community and environmental needs. The Queensland Flying-fox Consultative Committee provides a forum that brings these interests together to work on identifying potential solutions. This paper outlines the activities, outcomes and future strategies of the Committee in its search to find solutions for management of flying-foxes in orchard production systems.

**Introduction**

Significant damage to fruit crops by flying-foxes is a widespread and continuing problem within Queensland’s $450 m fruit industry (Office of Economic and Statistical Research 2001). The 1998 summer fruit season in Queensland was particularly bad for orchardists, with high levels of crop damage in many growing regions. According to industry estimates some growers lost up to 90% of their crop (Dewhurst 1998). Queensland Fruit & Vegetable Growers (QFVG), estimated that total loss for the entire season may have reached $10 million (S. Dewhurst, pers. comm. 1999, QFVG). No final figure has been produced. Flying-fox damage experienced in the 1998 season, especially in south-east Queensland, elevated the priority of this issue for industry, with government receiving numerous requests for assistance.

**Formation**

The Queensland Flying-fox Consultative Committee (QFFCC) was formed in December 1998 following approaches by QFVG to the Queensland Department of Primary Industries (DPI) and the Environmental Protection Agency (EPA). The Committee is based in Queensland but also links with northern New South Wales as similar issues are experienced with flying-fox management in this region. Potential exists for collaboration between the States. DPI convenes and chairs the committee and provides secretariat support.

**Membership**

Membership is drawn from industry, government, environment and community. The current composition of QFFCC membership is:

- DPI
- EPA, Queensland Parks and Wildlife Service (QPWS) (Representatives from both policy and operational areas of DPI and QPWS are involved. In the case of DPI, members also represent two key regions of north and south Queensland)
- NSW Agriculture
- QFVG (QFVG provide grower representatives from fruit growing regions in north, central and south Queensland, and an environment policy specialist.)
- The Queensland Conservation Council/Queensland Wildlife Preservation Society
- NSW Farmers

QFFCC also has advisors from research and conservation interest areas, which it calls on for information and advice as required.
Purpose

Roles for the Committee are to:

- provide a forum for Government, community and industry consultation on flying-fox damage to fruit crops and management;
- provide DPI, EPA and other organisations with advice on development of policy on managing flying-foxes and their impact on the fruit industry;
- develop strategies to address flying-fox damage to crops, and provide direction for research and extension;
- provide recommendations on the need for and appropriate timing of whole of industry forums as part of assessment, direction setting and/or overall extension activity.

Activities

Initially, the QFFCC conducted an audit of known flying-fox management actions on crops and identified seven areas that relate to management of the problem. A plan was developed with the seven areas providing a focus for the activities of the QFFCC. The areas and specific activities of the QFFCC in relation to each of the areas are as follows:

1. Deterrents

Several deterrent systems were identified in the audit process. These included scarer devices, sound and lighting systems, repellent sprays and electric grids. Little information was available on the use and effectiveness of most of these systems. Better information was required to enable the QFFCC to assess the potential for these systems as alternatives to lethal methods of control. A survey of Queensland fruit growers was conducted in October 1999 for this purpose.

The aims of the survey were:

- to identify the crop protection methods used and their effectiveness,
- to identify the severity and extent of crop losses and
- to investigate the effectiveness of targeting flying-fox ‘scouts’.

A questionnaire was distributed to growers via the industry publication “Fruit and Vegetable News”. Of the estimated 1800 fruit growers potentially affected by flying-foxes, only 105 useable forms were returned. This low response rate prevented statistically valid analysis of the data and only general conclusions could be drawn from the results (Appendix 1), as follows:

Control Methods

- Across all crops, shooting was the most common method used. However, at an individual crop level, some other methods were more prevalent, with drape nets for lychees being an example.
- Exclusion netting was the most effective method of control, with all growers surveyed who used exclusion netting rating this as very effective, providing 100% crop protection.
- Tunnel nets or temporary netting suspended above the tree canopy by some means appeared to be more effective at preventing crop damage than netting draped directly over trees.
- There was variability in the reported effectiveness of other crop protection methods. Some individuals reported good success with electric grids, shooting, lights and scarer systems however others reported only partial or no protection with these systems.
- Little experience was reported with regard to taste and smell deterrents.

Crop Losses

- In 1998 crop losses were two times higher than losses in any of the previous four years (1994–1997).
- The value of crop losses for 60 growers for 1998 was approximately $0.5 million.
- Accurate estimates of crop losses are not easily available.

Targeting Flying-fox Scouts

- Effectiveness of control methods appears to be improved if control is started before arrival of large numbers of flying-foxes.

The survey identified activities that QFFCC should concentrate on and highlighted areas for further investigation. Exclusion netting was considered a highly effective control method, and improving adoption levels of netting systems was an area that QFFCC agreed to pursue. Exclusion netting was not a feasible option for all situations and alternatives needed to be investigated. An area which had not been fully investigated and was worthy of further consideration was the use of smell and taste deterrents.

Smell and Taste Deterrents

A project investigating the potential for smell and taste deterrents for crop protection was
Managing the Grey-headed Flying-fox
developed by QPWS and QFFCC. Funding was provided by the Lychee industry and the Rural Industries Research and Development Corporation (RIRDC). Three overseas commercial products used to repel animals were identified and trials commenced in November 2000. Trials were conducted on captive flying-foxes and at feeding sites of wild flying-foxes. The principal researcher (B. Thomson, pers. comm. 2001, QPWS) provided the following comments on results.

The deterrents tested provided some protection for treated fruits. However, results were not conclusive and none of the deterrent compounds provided complete protection for the samples tested. The trials only tested the flying-foxes' reaction to individual fruits at a known feeding tree. Manufacturers of the deterrents state that effectiveness increases in proportion to the size of the area treated. This suggests some additional deterrent effect is provided when the odour of the deterrent is stronger. Trials involving a rambutan crop near Innisfail were conducted to test this aspect of the deterrents but too few flying-foxes visited the crop to allow any meaningful results to be obtained.

More work is required to test these deterrents on crops when flying-fox activity is high in order to determine the effectiveness of larger scale applications. Field trials are being conducted during the 2001 fruit season for this purpose.

In addition to the commercially produced smell and taste deterrents, a plant secondary compound was tested. So far this has shown promising results. More trials will be undertaken and a subgroup of QFFCC is to provide further direction on implementation of the next stage of the deterrent trial.

2. Conservation Status

Reliable data on crop losses and flying-fox populations are not available. This hinders processes for development of strategies and policies to deal with the problem and is a source of friction between the various stakeholder groups. Population data were available for various species, however these were disputed on the basis that the counting method was not considered scientifically accurate and known flying-fox camps were not being included in counts in some regions.

Options for conducting a census of flying-foxes statewide to obtain better data were considered by QFFCC. Alternatives to the current system of surveying flying-foxes are yet to be identified. This combined with the high cost of conducting a survey and limited funds available, resulted in QFFCC deferring further consideration of a survey until alternatives were available.

QFFCC has sought information on alternative census techniques:

- An infra-red mapping exercise was undertaken as part of a larger aerial scanning project undertaken by James Cook University (JCU) in Townsville. The data collected are yet to be analysed (B. Thomson, pers. comm. 2001, QPWS)
- JCU is also conducting a research project to develop a genetic fingerprint of Spectacled Flying-foxes. The work is expected to help determine distribution of flying-foxes and may assist with estimates of population size (J. Luly, pers. comm. 2001, JCU)

3. Destruction

QFFCC has provided a forum for discussion on the future of Damage Mitigation Permits (DMPs) and concerns industry had with the permit system. QFFCC helped resolve concerns on DMPs and continues to monitor events which influence access to permits.

QFFCC has considered the availability of DMPs for electric grids. At the time of consideration the preferred option was that, if possible, a phase-out period be negotiated to allow industry time to adopt alternative control methods and enable results of current research to be utilised.

4. Protection Systems

A netting project to prepare a model for assessing the economics of netting, different netting systems and possible effects of netting on crops was developed and funded by DPI. Workshops to help growers determine whether to net or not, were held in Queensland and NSW from September 1999 to May 2000. Eleven workshops were held with 148 growers participating. The workshops covered:

- netting options;
- the impacts of netting on the orchard environment, crop growth and management; and
- the cost of netting an orchard.

Participants were told how to evaluate the financial impact netting would have on their business by applying their own data to a tailored economic model.
In addition to the workshops, a publication, “To Net or Not To Net,” was prepared (Rigden et al. 1999). The publication:

- reviews pests which can be controlled by orchard netting,
- details the main netting systems,
- outlines control methods other than netting,
- examines the effect of netting on the orchard environment and management of trees under netting,
- provides guidelines on the cost of netting,
- details more than 20 case studies of grower experiences with the various orchard netting systems, and
- provides contact details for businesses involved in orchard netting and other systems for flying-fox control.

Grower participation in the workshops varied from region to region. According to the workshop presenter (P. Rigden, pers. comm. 2000, DPI), most participants indicated that they were already committed to netting and had attended to find out more about the options available. A few participants indicated they had attended to see if netting was a viable alternative to other systems of control.

Attendance at the north Queensland workshop was low. This may be a result of many growers in this region not considering netting a financially viable option, quoting cyclones, delayed crop ripening and other adverse impacts on crop health as factors against the use of netting. There is a need to investigate these issues further.

QFFCC is considering offering additional workshops, with an improved model for analysis of netting viability.

5. Economic Support

Options for economic assistance for netting have been investigated by QFFCC. These include low interest loans and grants, and taxation incentives.

Low interest loans were available via the Queensland Rural Adjustment Authority. To date this scheme has not provided a significant incentive for netting. Potential for increased tax deductibility of netting is being pursued by industry. Initial costings for an assistance scheme have been investigated and this matter is being pursued.

6. Forecasting

The potential to forecast seasons when flying-fox damage to orchards may be high and provide an early warning system for growers was considered by QFFCC. A meeting to investigate the potential for the development of a forecasting system was held in April 1999 with climate and forestry specialists, flying-fox researchers, beekeepers and industry. A simple correlation that would enable flying-fox activity to be forecast could not be identified. Extensive research into climate impacts on flowering of native tree species would be required before modelling would be possible.

The contacts established with researchers and beekeepers as a result of the forecasting investigations have been used by QFFCC to provide seasonal advice to industry. Pre-season estimates of likely flying-fox reliance on fruit orchards are published in the QFFCC newsletter and regional committee members provide seasonal reports.

7. Communication

QFFCC has developed a plan to deliver information to industry, community, and government. A newsletter provides updates on activities of QFFCC and media releases are issued as required (Appendix 1). Summaries of the newsletter are regularly printed in industry publications.

Other Activities

Identification Poster

A poster identifying the species of flying-fox found in Queensland has been developed and distributed. The poster will assist with correct identification of species, provide information on safety issues, and will be useful for census activities.

Tree Species

A list of flying-fox-preferred tree species has been developed to help those who either wish to avoid use of these species or encourage use of these species. The list will enable growers, tree planting groups and others to better assess suitability of tree species used for windbreaks, revegetation, flying-fox feeding sites and other purposes.

Lyssavirus

Advice was sought from Queensland Health on risks associated with lyssavirus and flying-foxes. This information has been provided to industry.
to help raise awareness on safety of growers and orchard workers. Any consumer concerns on fruit contamination are being addressed through the provision of information resources developed by DPI and Queensland Health.

Outcomes and Future Strategies
The main outcomes of QFFCC activities and future strategies proposed are as follows:

Deterrents
- Netting is not suitable in all situations and there is a need to investigate alternative forms of control or other alternatives to address crop protection or crop losses in these situations.
- Trials to identify potential smell and taste deterrents are underway, with further research proposed. Should an effective compound be identified, it is likely to be incorporated into medium term crop management strategy (2-5 years).
- A trial of non-lethal electric grids is to be undertaken during the 2001-2002 fruit season.

Conservation Status and Damage Mitigation
- With shooting currently the most common method of crop protection utilised, a change in the conservation status of flying-fox species will potentially have a high impact on industry.
- The QFFCC is keeping abreast of developments and decisions taken on the conservation status of flying-fox species, and the implications for DMPs.
- Damage mitigation is likely to be impacted by Commonwealth as well as State legislation.
- Should a change in status occur, there is a need to provide both industry and policy-makers time to investigate non-lethal control methods before changes are made to the availability of DMPs. Both medium term (3 – 5 years) and long term (10+ years) planning needs to be undertaken.
- There is a need to consider alternative census techniques for improved estimation of the status of flying-fox populations.

Protection Systems
- Adoption of exclusion netting is to be encouraged in those situations where netting is feasible.
- Workshops and a model for economic analysis are proposed to help growers determine whether to net or not.
- Economic assistance for adoption of netting is being investigated.

Development of sound future strategies requires answers to some critical questions:
- If we don't know the real extent of the problem, how can we evaluate best solutions?
- How will the changing attitudes of consumers towards animal welfare, and the environment affect options for the future?
- What prevents highly effective control measures from being adopted?
- Will the cost of alternative control methods tip the balance for some growers?
- What are the appropriate roles for industry and government in establishing effective control methods?
- What will be the extent and impact of government intervention to address conservation and environmental aspects?

Conclusion
At this point in time there is no 'one size fits all' method for flying-fox control in orchards. A number of research projects are underway which in time may provide new options for flying-fox management. In the meantime, orchardists will require a variety of options. Ensuring that these options address the reasonable concerns of industry, environment and community requires a collaborative approach between these interest groups. QFFCC has had success in bringing these groups together. With a spirit of cooperation, longer-term strategies and thinking, it is possible that new and innovative solutions to the old problem of managing flying-fox populations and fruit production will emerge.

References
Dewhurst, S. 1998. Correspondence from Queensland Fruit & Vegetable Growers to DPI.
The eighth meeting of the FFCC was held on 30 March. Focus issues were results of the grower survey, future research priorities and progress of the netting project.

- **Grower Survey**

Over 100 survey questionnaires to assess crop damage levels and protection methods were returned by growers. Results of the survey confirmed the focus on activities taken by FFCC and highlighted areas for further action. A short summary of results from the survey is provided on page two of ‘batchat’.

- **Research Priorities**

FFCC assessed priorities for further research and investigation. Given the likely continued aversion to destractive control methods, it was agreed that non-destructive control methods had the greatest potential to provide long-term, sustainable solutions. Repellents were considered to be worth further investigation. A proposal for a pilot screening trial of compounds, which repel or attract flying foxes, is to be developed with a view to identifying compounds with potential for further trialling. A variety of scarer devices and systems exist in the marketplace with varying reports of effectiveness. Trialing of these commercially available systems was not considered to be a priority. A proposal for trials on the electric grid system is still under review.

- **Netting Project**

Workshops for growers are currently underway in Queensland and northern NSW, providing information and assistance with assessing economics of netting orchards. The workshop includes provision of a comprehensive booklet detailing options, pros and cons, and economics of netting along with several case studies. The booklet is also available for purchase separately (Contact Peter Rigden 07 5444 9617).

- **Season Overview**

In the last edition of ‘batchat’, a report was provided on regional damage by flying foxes. Central Queensland problems escalated dramatically shortly after the last FFCC meeting. Unfortunately, by the time ‘batchat’ was distributed, the central Queensland report no longer represented the situation faced in this region. FFCC acknowledge the concerns of growers affected and wish to highlight that ‘batchat’ is based on issues discussed at FFCC meetings and at times, reports presented in ‘batchat’ may be overtaken by events.

- **Banana Bats**

Banana growers may need to take a closer look at their crops to determine whether problems encountered in the industry are due to the Blossom Bat or flying foxes. Blossom Bats are commonly found feeding on flowers in the bell. An identification poster is being produced to assist growers and others with identification of flying foxes and other bats.

- **North Queensland Census**

A meeting of EPA, industry, conservation and DPI representatives was held to discuss results of a Spectacled flying fox census in north Queensland. Whilst the results indicated a concerning decline in numbers, concerns were also raised with regard to the accuracy of the counting method. Potential for improvement of counting techniques is to be investigated.

**Key Outcomes**

- A poster to assist growers and others involved with flying foxes to identify different species is in the final stages of development
- Information on flying fox preferred tree species and their flowering times is being developed to enable growers and tree planting groups to better assess suitability of species used for windbreaks, revegetation and other purposes
- Good potential exists for low interest loans for exclusion netting to be made available via QRRAA
- Additional economic assistance options are being investigated

**Next FFCC meeting - Tuesday 13 June**

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GROWER SURVEY RESULTS

A total of 105 responses were included in the overall analysis.

REGIONS

Most respondents were from north (41%) or south (43%) Queensland with central Queensland accounting for 16% of responses.

CROPS

Main crops reported in the survey were:
- Lychee
- Stonefruit
- Papaw
- Mango
- Rambutan
- Banana

Other crops affected included longan, custard apple, grape, star apple and persimmon.

DAMAGE LEVELS

A majority of respondents experienced crop losses from flying foxes annually (86%).

Of these, most were affected for a period of four months or less (78%).

The highest level of crop losses occurred in 1998, with at least double the losses of any of the previous four years.

Only 60 respondents provided details of value of crop losses. Of these, the greatest losses were reported in lychee and stonefruit.

Total losses for the period 94-98 for these respondents were over $1.2m.

METHODS

Of the 105 respondents, 69 used shooting, 38 used drape nets, 18 used permanent exclusion or tunnel nets, 15 used scarers, 13 used electric grids and 11 used lighting.

Smaller numbers used other methods including bunch covers, repellents, and predators. Over half (58%) of respondents used a combination of methods.

100% of respondents using electric grids also used shooting, while over 80% of respondents using scarers or drape nets also used shooting.

EFFECTIVENESS

Permanent exclusion netting had the highest level of reported effectiveness (all users rated it as '100% effective').

Tunnel nets or temporary netting supported by some means, were also significantly more effective than nets draped directly over trees, with 70% of users rating this method as effective.

All other protection methods were mainly rated as 'partly effective'. Response rates for some methods were too low to enable detailed analysis.

CROP LOSSES

(Note: losses for 1999 are for part-year only as the survey was conducted in October 1999)

METHOD EFFECTIVENESS

SCOUTS

Targeting of scout appears to have a positive impact on method effectiveness. Those who commenced control measures prior to arrival of flying fox scouts had a higher incidence of method effectiveness and lower incidence of method failure. Those who commenced control measures after scouts or significant numbers of flying foxes were present had a higher incidence of method failure and lower incidence of method effectiveness.
SHELLEY BURGIN: There might be time for just one quick question.

DIANNE MACKEY (NSW NPWS): In relation to the conservation status of the different bat species in Queensland that are a problem for orchardists, have there been any changes in recent times to the conservation status of flying-foxes in Queensland, either federally or at the state level, and how has that impacted on methods for management and control?

SANDY TEAGLE: The situation at the moment is that the Spectacled and the Grey-headed Flying-foxes are under review at a state level and also federally. Should there be a change in status at either of those levels then there will be a need for the Environment Protection Agency through the Queensland Parks and Wildlife Service, to look at management. Potentially we’re not far off the situation that New South Wales is facing at the moment. We’re particularly interested to see how the NSW situation goes because it could be something that might be happening in our state fairly soon - sooner than we might expect, perhaps.