Queensland fruit fly: an increasing biosecurity risk under a changing climate

A changing climate is likely to increase the occurrence and extend the distribution of Queensland fruit flies in NSW. This poses a threat to the state's horticultural industry.

Developing industry-informed climate planning information

Climate change is altering the biosecurity risks for many agricultural commodities across NSW. Primary producers need evidence-based information about the changing climate and the risks and opportunities it brings.

Through its Vulnerability Assessment Project, the NSW Department of Primary Industries is increasing the resilience of our primary industries by providing information and data to help the sector better plan for, and respond to, climate change. The project has determined climate change impacts for extensive livestock, broadacre cropping, marine fisheries, forestry, horticulture and viticulture, and important cross-cutting biosecurity risks to inform sound planning, risk management and adaptation decisions.

Queensland fruit fly in NSW

Queensland fruit flies (*Bactrocera tryoni*) pose a serious biosecurity risk to horticulture in eastern Australia and can significantly affect international trade. In 2016, fruit flies in Australia were estimated to cost the horticulture industry $300 million per year[1] due to control measures and international trade restrictions.

The flies lay their eggs in fruits, vegetables and native fruiting plants. Eggs are laid under the fruit's skin, where the larvae live and feed, causing the fruit to rot and prematurely fall from the tree.

Fruit fly numbers increase in the warm temperatures of spring, when there is a ready supply of host fruit. During winter the population diminishes, although some adult flies may survive by sheltering in protected areas.

Queensland fruit fly populations extend from the Cape York Peninsula and the Northern Territory through NSW to Victoria. Within NSW, fruit flies are most prevalent in the north and east of the state (Figure 1).

The Fruit Fly Exclusion Zone, shown in Figure 1 as the western region, was established to maintain a fruit fly free area to protect highly productive horticultural areas but was disbanded by NSW and Victoria governments in 2013.

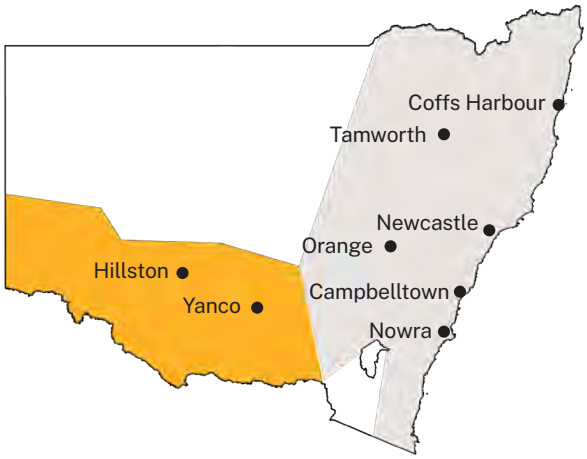

Figure 1. The endemic distribution of Queensland fruit flies across western (yellow) and eastern (grey) regions in NSW. Locations show existing trapping and surveillance sites.

[1] Hort Innovation. (2018) Fruit Fly Fund Managing risk by identifying fruit fly solutions. www.horticulture.com.au/hort-innovation/our-work/hort-frontiers-strategic-partnership-

Climate and Queensland fruit fly

Overall, the likely impacts of Queensland fruit fly by 2050 under a changing climate in NSW are projected to increase in autumn, spring and winter. Changes in climate suitability are likely to occur across all stages of the Queensland fruit fly life cycle.

Climate risks likely to increase the occurrence and distribution of Queensland fruit flies include:

Warmer temperatures and **changes in rainfall** may reduce the dieback of flies during cold weather, increasing their occurrence and allowing them to spread further. However, extreme heat (more than 38–40°C) may reduce the survival of immature stages.

Climate impacts: what to expect

Egg

- **Increased climate suitability** in both regions from April to November and in the eastern region only from December to March due to reduced frost events.
- **Decreased climate suitability** in both regions from December to February due to increased maximum temperatures (*low to high confidence*).

Larvae

- **Increased climate suitability** in both regions from April to October (*low to high confidence*) and in the eastern region only in March and November due to reduced cold days.
- **Decreased climate suitability** in both regions from December to February due to increased mean temperatures.

Pupae

- **Decreased climate suitability** in the eastern region in December to February due to increased mean temperatures.
- **Increased climate suitability** in both regions from June to August, and in the eastern region in April to September, due to reduced cold days.

Adult Fly

- **Increased climate suitability** in both regions from May to October, and in the eastern region in April and November.
- **Decreased climate suitability** in the eastern region from December to March.

Impact on key NSW primary industries

Increased climate suitability under a warmer climate is likely to lead to more frequent outbreaks of Queensland fruit flies in horticultural areas in NSW. Changes in fruit fly numbers and distribution will also depend on the availability of host fruit and vegetables. Climate change may also affect the distribution of some horticultural commodities that the flies depend on.

Fruit fly treatment costs incurred by growers are likely to increase due to the effects of climate change, with warmer temperatures and increased rainfall likely to support the southward and inland movement of the flies. Changes in monthly climate suitability suggest the flies may be active earlier in the year and before current surveillance begins. Queensland fruit fly monitoring and surveillance programs may need to commence earlier in 2050 than currently undertaken.

Methodology and data

Climate projections were sourced from Climate Change in Australia's 'Application Ready Data'. This dataset is comprised of projections from an ensemble of 8 global climate models, each presenting a plausible future climate. The models differ in their projections, giving rise to uncertainty in our modelling. Low confidence in the projected changes due to differences between the models is noted in the text. Care should be taken when interpreting these results.

The Vulnerability Assessment Project is intended to highlight potential industry-or regional-level changes. Intermediate and high emissions scenarios were used in the assessments (RCP4.5 and RCP8.5), but these are not the only future scenarios possible. The inclusion of climate variables important to each biosecurity risk was based on published research, expert knowledge and data quality and availability.

FOR MORE INFORMATION

Please get in touch with vulnerability.assessment@dpi.nsw.gov.au

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