

Final Report

Apple and Pear Crop Estimate

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Fruit Help 2020-2021

AgFirst 2017-2020

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Project:

Apple and Pear Crop Estimate AP16002

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Content

Content	3
Summary	4
Public summary	4
Keywords	5
Introduction	6
Methodology	7
Outputs	8
Outcomes	9
Monitoring and evaluation	10
Recommendations	11
Refereed scientific publications	12
References	13
Intellectual property, commercialisation and confidentiality	14
Acknowledgements	15
Appendices	16

Summary

The Apple and Pear Crop Estimate project started in November 2016 with the main objective of accurately estimating the Australian apple and pear crop each season for the period 2017-2021. By detailing information on the volume, quality and likely fruit size profile of the harvested crop, growers are empowered with data to assist their decision making process in regards to determining storage intervals and marketing plans for their fruit maximising its value.

The estimate was compiled in each year via grower data collection surveys in which participating orchardists provided their actual harvested volumes for the previous two seasons as well as their estimated crop for the coming harvest. This data was then compiled each year to ascertain the percentage change for each variety and was supplemented with grower and other stakeholder interviews in each region to a

Given that there is no final harvested crop volume figure available to the apple and pear crop industry, the Australian Bureau of Statistics (ABS) commodity figures for each state were used to adjust season 'actual' volumes as they became available. This data was typically received 18 months after each season finished (ie. 2019 ABS crop data is available in June 2020)

Key outputs that have been produced in this project include:

- Preliminary Apple and pear Crop Estimate (released December each year via APAL - Apple and Pear Australia Limited)
 - 2017, 2018, 2019, 2020, 2021 harvested crops
- Apple and Pear Crop Estimate (released January each year via APAL - Apple and Pear Australia Limited)
 - 2017, 2018, 2019, 2020, 2021 harvested crops

Keywords

apple; pear; crop estimate; crop volume; crop forecast;

Introduction

Access to accurate crop estimates are critical to allow informed storage and logistics decision-making throughout the apple and pear supply chain. Crop forecasting can provide growers and other key industry members key insights into various aspects of the supply chain informing them of; storage intervals, marketing plans, packaging requirements, labour demands and insights into changes in varietal mix to inform orchard redevelopment or establishment decisions. In addition to seasonal information, continual forecasting efforts provide insights into industry growth characteristics, changes in orchard productivity and identification of volume changes and the likely effect on market prices and growth opportunities.

As a key component of the Apple and Pear Industry's strategic investment plan, annual forecasting is recognised as equipping growers for long term sustainability both in the domestic market and future growth into apple and pear exports through understanding seasonal variation, likely volumes and the expected quality of the incoming crop.

The current level of data available to the apple and pear industry in regards to crop volumes, planted area and variety mix is somewhat limited with the last significant census project undertaken as part of AP13035: Apple and Pear industry data collection (2015) in which the current project's estimation methodology was produced and evaluated.

Prior to this project, industry data was largely limited to Australian Bureau of Statistics commodity data, levy data, Nielsen retail sales data and regional datasets (such as the Goulburn Valley Tree Census)

The Australian apple and pear crop estimate project aimed to:

- Collect data required for national apple and pear crop estimates
- Deliver a preliminary crop estimated report in December each year to Hort Innovation and APAL
- Deliver a final crop estimate in January each year to Hort Innovation and APAL

This information was then distributed and communicated to growers by APAL via AP15007 – National apple and pear grower communications program to the apple and pear industry's levy-paying growers and marketers.

This project funded AgFirst (2017-2020 estimates) and Fruit Help (2021 estimate) to collect, collate and produce a national dataset from which the preliminary and final crop estimates were derived each year. Using a network of regional project advisors in each growing region, individual apple and pear growers were surveyed on historical actual production and their forecast production for the relevant season for that estimate. During each data collection cycle, growers were asked to provide their:

- Harvested volumes
- Packout % (class 1)
- Average fruit size (grams or count)

for the previous two years as well as the upcoming harvest.

Data collection throughout the project comprised an average of 24.2% of total estimated planted area in Australia across the 2017-2021 data collection periods representing grower data across 3000ha per annum.

Without a reliable national dataset on total planted area (total or by variety) the accuracy of the estimate process has been questioned throughout the life of the project and some major adjustments have been made in-line with Australian Bureau of Statistics commodity data releases. Whilst the absolute crop volume varies between years, the percentage change underpinning the estimation process remained largely consistent between surveyed years.

Whilst challenges to forecasting have remained present throughout the life of the project, the annual crop estimate reports have allowed APAL to release timely communications to the industry to assist in their crop marketing and storage decisions across the life of the project.

Methodology

Crop estimation

The methodology used to produce the apple and pear crop estimates was based on a subsampling methodology where growers in each region were surveyed on their previous and current crops to generate percentage change between successive years for each variety. To facilitate data collection across the geographically spread regions, regional project advisors were utilised to liaise with growers in addition to direct communications in industry newsletters and direct reminders undertaken as part of annual interviews with a selection of growers across the nation.

In each year the following activities were carried out:

- Evaluation of crop estimate process in relation to Australian Bureau of Statistics data
 - This was used to establish baseline dataset and 'reset' gross volume
- Growers and other key stakeholders (consultants, front line advisors, technical staff, marketing personnel) were interviewed to discuss current seasonal trends including:
 - pest and disease risk
 - bloom timings for each variety
 - quality of bloom and fruit set
 - success (or lack thereof) of chemical thinning approaches
 - likely harvest dates
 - major changes to planted area in the region
- Grower data collection
 - growers were surveyed in November-January each year on volumes for the previous two and current years volumes for:
 - each variety they grow
 - their planted area
 - class 1 packout
 - average fruit size
- Preliminary estimate published
 - varieties reported on in each estimate were; Pink Lady, Royal Gala, Red Delicious, Granny Smith, Fuji, Sundowner, Golden Delicious and Jonathan apples as well as Packham and WBC pears.
 - all other varieties were grouped as 'other apples' or 'other pears' given the limited knowledge of total planted area for each and varying levels of willingness of managed variety owners to publish their data in isolation
- Draft review panel
 - a selection of growers and marketers were convened prior to the release of the estimate to discuss results and provide minor changes
- Final estimate published

The relative change the grower panel predicts from previous seasons was applied to historical data, to arrive at a regional and national crop estimate for the current season. Average fruit size for each variety was estimated utilising the total Australian OrchardNet database (AgFirst's orchard management system). Grower data (where requested) was entered into this database as a reward for their participation to allow benchmarking of their data.

The methodology for the crop estimate process is outlined in Figure 1.

Crop estimate report distribution was controlled by Apple and Pear Australia Limited (APAL) as part of National apple and pear industry communications program (AP15007 and AP18000).

Monitoring and Evaluation

Monitoring and evaluation activities for this project were based on comparative analysis to Australian Bureau of Statistics (ABS) datasets. For each year, statistical analysis was undertaken to compare the difference between the project estimate and ABS estimate. This data was used to inform areas for additional focus in the upcoming estimation cycle as well as confirm methodology accuracy was acceptable.

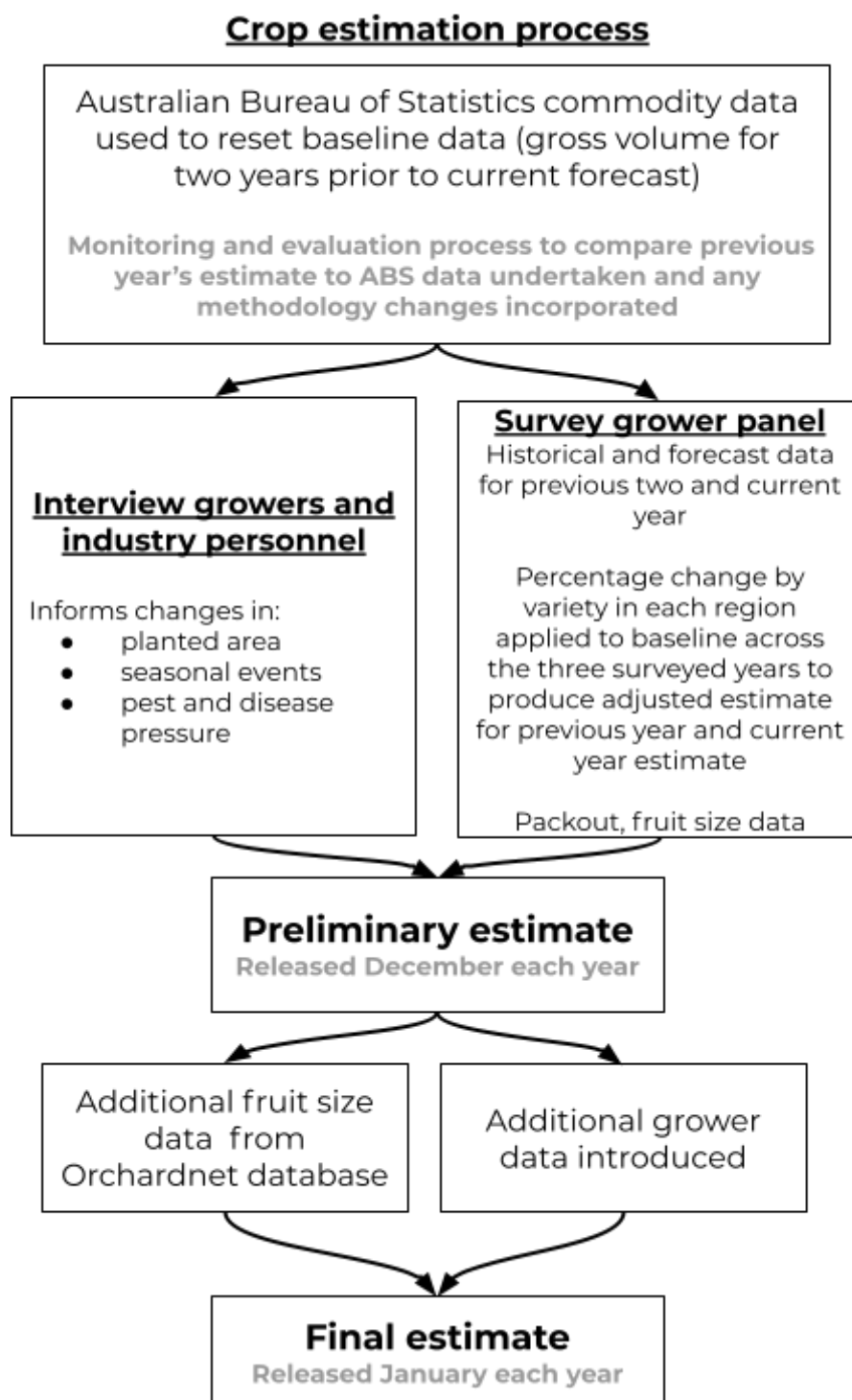


Figure 1 A flow chart of the annualised crop estimate process. Varietal mix data is brought forward from the previous estimate in each given year.

Outputs

- Preliminary Apple and Pear Crop Estimate 2017
- Apple and Pear Crop Estimate 2017
- Preliminary Apple and Pear Crop Estimate 2018
- Apple and Pear Crop Estimate 2018
- Preliminary Apple and Pear Crop Estimate 2019
- Apple and Pear Crop Estimate 2019
- Preliminary Apple and Pear Crop Estimate 2020
- Apple and Pear Crop Estimate 2020
- Preliminary Apple and Pear Crop Estimate 2021
- Apple and Pear Crop Estimate 2021

Outcomes

<Insert content – approximately 1000 words. Detail the end-of-project outcomes. Use monitoring data collected to provide evidence of outcomes as per the project's M&E Plan. For more advice, refer to Attachment A3: Final Report guide>

In this section, detail the project outcomes (intermediate and/or end-of-project outcomes). Refer to monitoring data collected to provide evidence of outcomes as per the project's M&E Plan. Intermediate outcomes are short- to medium-term outcomes brought about through project activities. They include changes in grower knowledge, attitudes, skills and aspirations. End-of-project outcomes are the desired final result of the project and represent the project's unique contribution to the relevant Strategic Investment Plan. They include practice or behavioural changes, adoption, access to new information/protocol/technology, improved product quality, incremental improvements stimulated through R&D.

The apple and pear crop estimate project has provided an annual estimate for both apples and pears across major varieties. The estimate was developed for each region and took into account local conditions, local fruit quality and fruit sizing information to enable insights in a wide variety of scenarios and for different goals/outcomes.

This information has provided growers, marketers and other industry stakeholders with key information in regards to the seasonal crop and allowed them to use this data to facilitate crop storage/marketing activities as well as potential areas of over/undersupply within the country. In addition to grower benefits, this project has also allowed key industry partners (eg APAL) to undertake labour supply analysis in relation to coronavirus and provide an insight into longer term trends in the apple and pear industry in terms of varietal mix and regional growth or shrinkage of the crops.

The key outcomes of this project have been:

- provided national and regional crop estimates for growers to use in their decision making processes including:
 - the timing of product release to market and length of storage (the latter of which may impact harvest dates)
 - replanting and orchard development decisions
 - potential volumes for export markets
- a data based understanding of crop volume variability in each growing region by year
- a dataset to base labour modelling and other industry level data analysis on
- identification of data shortcomings within the industry (eg. planted area, varietal mix, absolute crop volume)

Whilst not a direct objective of this project, significant data shortcomings for the industry have also been identified and highlighted which are limiting its ability to provide greater accuracy, deeper data insights and longer term forecasting (see recommendations).

Annualised reviews of this project's methodology has demonstrated that compilation for grower estimates supplemented with regions interviews provides relatively accurate crop estimate capability, however, absolute crop volumes vary considerably without a formal survey of total production volume with very high participation rates.

Monitoring and evaluation

Ongoing evaluation of the key project outputs occurred on an annual basis comparing past crop estimate performance against Australian Bureau of Statistics (ABS) data for gross apple and pear volumes. The data gathered by the ABS formed the core of the project M&E process. Additional industry data sources, such as the Goulburn Valley tree census, Infopome and sales statistics where available. This comparative analysis was reported on in September each year to guide changes in project methodology and key areas for improvements (ie. individual states or commodities where further data collection may be necessary). Comparative analysis of this process is summarised in Figure 2 for apples and pears respectively.

In addition to the process above, a survey was undertaken during the 2020 year to ask growers for their feedback toward the project and how its activities may be used. In total, 4 responses were received and these results are available in Appendix B “Monitoring and Evaluation Report for 2018 Apple and Pear Crop Estimate” Section 3.3.4.

All respondents participated and were aware of the project. Grower usage of the crop estimate reports varied with some using the data “as a guide to finalise budgets” and “assess which varieties may need extra inputs...”. Two other respondents suggested that the project makes no changes to their decision making process. The value of the project was generally recognised however, criticism that a lack of data regarding total planted area and actual crop volumes made the crop estimate process lack reliability without the ability to ever confirm what is actually present across the nation (ie. relying on the ABS data which is generally considered by growers to have questionable accuracy).

Moreover, grower comments on the project would suggest that whilst value is seen in undertaking the crop estimate process, without additional data (including actual volumes harvested nationwide and total planted area) the forecast provided limited usability. General sentiment was directed toward significantly greater data insights across all varieties, planted area, stock volumes and with full industry participation.

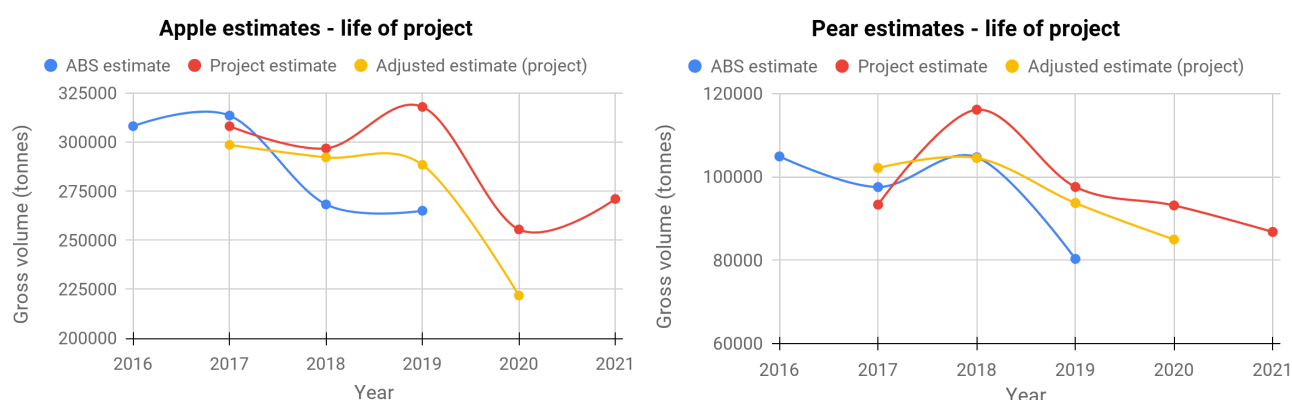


Figure 2 Annual apple and pear estimates (gross volume) relative to ABS dataset. The ABS dataset was available 18 months after each year (ie. for 2021 an adjusted 2020 estimate was produced using the 2019 ABS dataset as a gross volume baseline before applying percentage changes to create the 2021 estimate)

Recommendations

The lack of available data to inform the estimation process has been continually highlighted throughout the project.

The key components that were missing to allow accurate crop estimation were highlighted in a report to the Apple and Pear Strategic Investment Advisory Panel (SIAP) “Australian Apple and Pear Industry: Industry data – What’s missing?” with the below key areas highlighted:

- The total planted area for apple and pears is largely unknown
- The variety mix (planted and actual production) for apple and pears is largely unknown
- The age of trees within each variety class is largely unknown.

Throughout the life of this project, the lack of national statistics on planted area, variety mix and tree age have limited the ability to ascertain total crop volumes and longer term forecasting ability.

It is recommended that:

- Any future crop estimate projects incorporate methodology to capture actual crop volumes on national scale.
 - This is likely to be achieved through a combination of major packhouse surveying, market data analysis and, with likely participation rates, extrapolation using a national database on planted area by variety and tree age (this resource does not currently exist)
 - This dataset would ideally capture:
 - Gross kilograms produced by variety
 - Packout volume by category (C1, C2, juice)
 - Fruit size profile
 - Market (domestic, export)
- A database of apple and pear planted area by age, variety and location is developed and maintained on an annual basis to facilitate the above extrapolation activities and longer term forecasting.
 - This dataset would also provide significant responsiveness in the areas of biosecurity, natural disaster management (eg bushfires, flooding) and regional planning (labour etc)
- Industry data projects are consistently grouped and maintained in a central database available for all industry projects on a multi-tier access level (ie. with and without identification characteristics) with simple reporting to growers provided annually on crop volumes, planting trends and other key insights

Refereed scientific publications

Nil

Intellectual property, commercialisation and confidentiality

No project IP, project outputs, commercialisation or confidentiality issues to report

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- the many Australian apple and pear growers and packhouse owners who have contributed data to this project. Without their support this project would not have been possible.
- Apple and Pear Australia Limited (APAL) for their assistance with grower communications throughout the project
- the regional project advisors throughout the project:
 - Fruit Growers' Victoria (NVIC)
 - Anna Steinhauser (TAS)
 - Jabbah Khan (SVIC)
 - Orchard Services (QLD)
 - Pomewest (WA)
 - Batlow Fruit Company (Batlow)
 - NSW DPI (Orange)
 - Apple & Pear Growers Association of SA (SA)
 - Marcel Veens (National)
- AgFirst Hawke's Bay for their delivery of the project from 2017-2020 and their assistance with fruit size profiling using the OrchardNet database in 2021
- Hort Innovation for their management of funding for this project and assistance in communicating project issues/risks to the Apple and Pear Strategic Investment Advisory Panel

Appendices

Appendix A - Crop estimate reports

- [2017 Preliminary Apple and Pear Crop Estimate](#)
 - Published December 2016
- [2017 Final Apple and Pear Crop Estimate](#)
 - Published January 2017
- [2018 Preliminary Apple and Pear Crop Estimate](#)
 - Published December 2017
- [2018 Final Apple and Pear Crop Estimate](#)
 - Published January 2018
- [2019 Preliminary Apple and Pear Crop Estimate](#)
 - Published December 2018
- [2019 Final Apple and Pear Crop Estimate](#)
 - Published January 2019
- [2020 Preliminary Apple and Pear Crop Estimate](#)
 - Published December 2019
- [2020 Final Apple and Pear Crop Estimate](#)
 - Published January 2020
- [2021 Preliminary Apple and Pear Crop Estimate](#)
 - Published December 2020
- [2021 Final Apple and Pear Crop Estimate](#)
 - Published January 2021

Appendix B - Monitoring and evaluation reports

- [Monitoring and Evaluation Report for 2016 Apple and Pear Crop Estimate](#)
 - Published September 2017
- [Monitoring and Evaluation Report for 2017 Apple and Pear Crop Estimate](#)
 - Published September 2018
- [Monitoring and Evaluation Report for 2018 Apple and Pear Crop Estimate](#)
 - Published September 2019
- [Monitoring and Evaluation Report for 2019 Apple and Pear Crop Estimate](#)
 - Published September 2020