Broadacre cropping

Climate Vulnerability Assessment
Dryland & Irrigated Wheat Factsheet

Growing wheat in New South Wales: preparing for a changing climate

Dryland and irrigated wheat growing regions are likely to maintain moderate to high climate suitability under a changing climate.

Developing industry-informed climate planning information

Climate change is altering the growing conditions for many agricultural commodities across NSW. Primary producers need evidence-based information about the changing climate, and the risks and opportunities it may bring.

Through its Vulnerability Assessment Project, the NSW Department of Primary Industries is enhancing 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 assessed climate change impacts for extensive livestock, broadacre cropping, marine fisheries, forestry, horticulture and viticulture, and important cross-cutting biosecurity risks associated with these industries to inform sound planning, risk management and adaptation decisions.

Wheat in NSW

Wheat was one of the first crops sown in Australia following European settlement. It has become one of Australia's largest and most valuable agricultural commodities. Australian wheat accounts for around 10–15% of global wheat exports.

Wheat development is primarily driven by temperature, with crops growing faster in warmer regions in the north. Wheat yields are limited by insufficient rainfall, extreme heat and cold events, high average temperatures and soil constraints such as low nutrition, salinity or acidity.

Wheat in NSW is grown as both dryland and irrigated crops. Dryland wheat depends on rainfall to meet the moisture needs of the crop. Irrigation increases production where seasonal rainfall is inadequate. The area of irrigated wheat grown in NSW is increasing, especially in southern NSW.

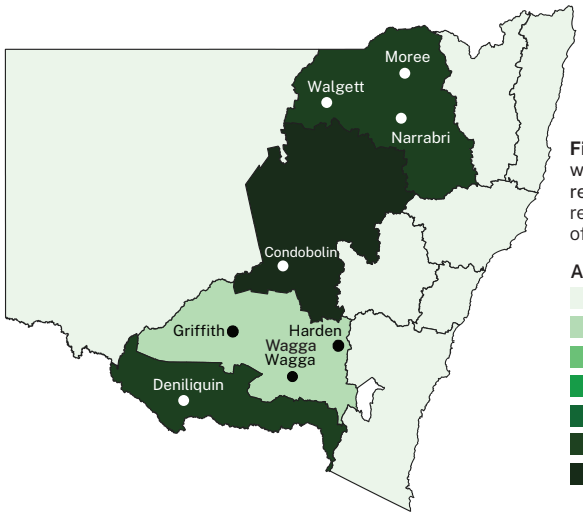

Figure 1. Major NSW wheat growing regions. Darker colours represent larger areas of wheat grown.

Department of Primary Industries

NSW GOVERNMENT

Climate and the wheat industry

Dryland and irrigated wheat growing regions are likely to maintain moderate to high climate suitability by 2050 under a changing climate.

Climate risks and opportunities include:

Changes in rainfall during the summer fallow period are likely to impact climate suitability for dryland wheat production, particularly in the north. However, it is uncertain whether climate suitability will increase or decrease (*low confidence*). Germination reliability could also be impacted due to reduced cool season rainfall in the north of the growing region (*moderate confidence*).

Increased temperatures could become an increasing issue in the northwest of the current growing region (*low confidence*). Growing season length will likely become shorter across the state due to higher temperatures (*high confidence*).

Climate impacts: what to expect

Germination reliability is likely to remain very high across most of the state (*moderate confidence*), except in the far west (*low confidence*).

Vegetative growth will likely maintain high to very high climate suitability across the state. Shifts in mean temperatures may reduce climate suitability along the coastal regions and north of Moree during this phase (*high confidence*).

Reproductive phases will likely maintain high climate suitability (*high confidence*). Heat and frost are likely to have a minimal impact on this phase (*moderate to high confidence*).

Length of growing season

The growing season for dryland and irrigated wheat will likely be shorter under a future climate, particularly under a high emissions scenario (*high confidence*).

Irrigation water requirements

Irrigation water requirements are unlikely to change in future as greater plant water use due to warmer temperatures is likely to be counteracted by a shorter growing season (*low to moderate confidence*).

FOR MORE INFORMATION

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

This work has been produced by the NSW Primary Industries Climate Change Research Strategy funded by the NSW Climate Change Fund.

Adapting to the changing climate

Dryland wheat

Increasing temperatures may reduce the length of the growing season and grain yield without adaptation strategies. Selecting or breeding 'longer season' varieties could represent an adaptation action for the projected shorter seasons. Mulching and stubble retention can help overcome rainfall declines.

There may be less frost damage in future. The quality of wheat may increase, giving a market advantage.

Irrigated wheat

Growing dryland summer crops may be an adaptation option for the decline in fallow rainfall in the northeast of the irrigated wheat growing region.

Heat damage will likely increase in the northern growing region, reducing yield. Changing planting dates and selecting varieties with phenology that avoids flowering when temperatures are damaging are adaptation options. Breeding drought-resistant varieties and water-saving practices such as mulching may also help to increase the resilience of irrigated wheat under a changing climate.

Methodology and data

The model describes a 'Gregory' spring wheat variety. A dynamic phenology was used to model this crop, with a fixed sowing date of May 1st, after which germination is initiated when 15 mm or more of rain falls in any period of 14 consecutive days. Following germination, the model applies thermal time thresholds to define the start and end dates of each phenological stage of plant development. As a result, these dates varied across the state, with crops maturing faster in warmer areas.

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 which is reflected in the confidence statements given in brackets 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 the commodities production was based on published research, expert knowledge and data quality and availability.