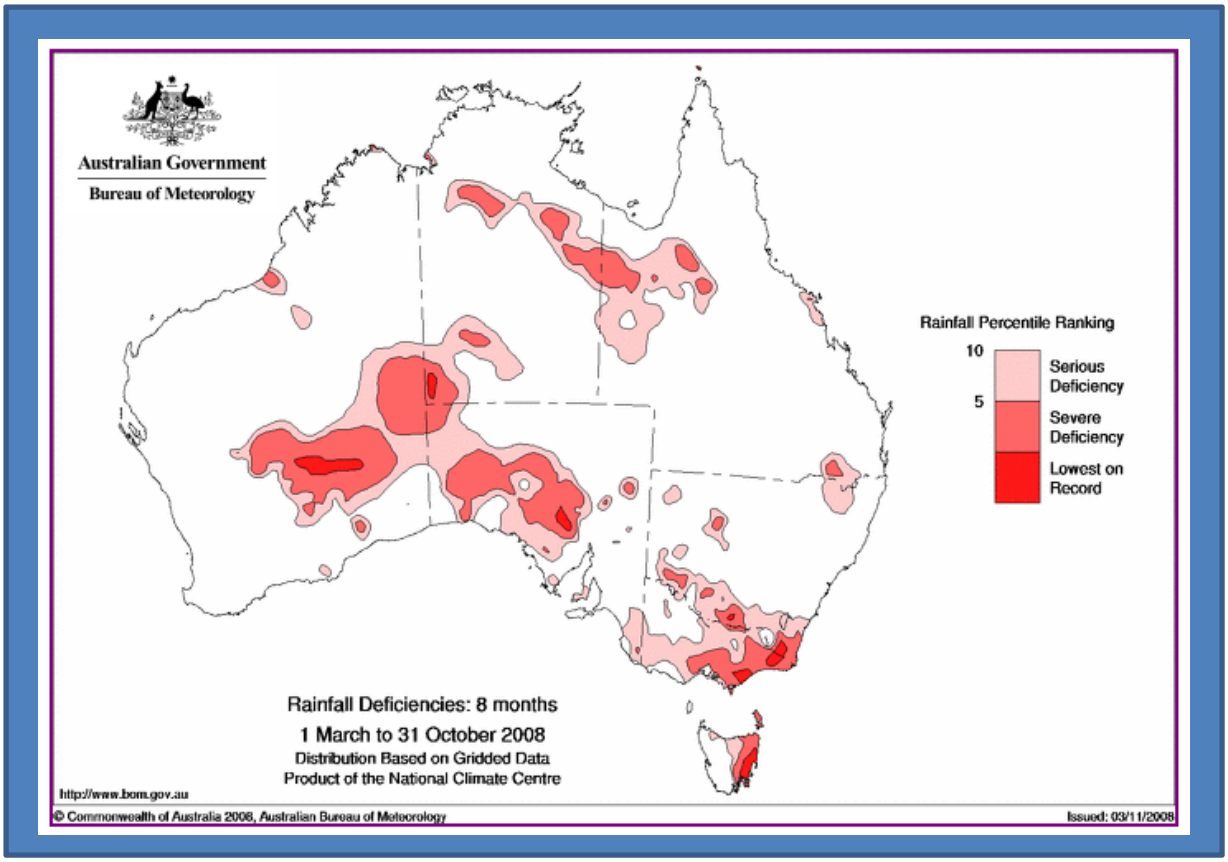
Weather Risks to the Global Food Supply Chain: Australian Wheat

Michael Ferrari, PhD
Vice President, Applied Technology & Commodity Research
Weather Trends International



In a recent WTI white paper, the premise of 'Climate Black Swans' was introduced. This idea is based on the Black Swan concept, popularized by Nassim Taleb[1] in his 2007 book of the same name. Unexpected events, and Weather Trends argues particularly to those with a weather component, can wreak financial havoc on those who are not prepared. Erratic or 'unexpected' weather patterns therefore influence prices of nearly all commodities, and we as consumers bear the brunt of these costs. Whether seen directly via impacts to the realized cost of the food at the market or the price at the pump, or indirectly, such as through relative currency strength or GDP/PPI, the effects of volatile weather can usually be quantified rather easily, but oftentimes only *after* a weather disruption occurs. However, what can the financial community do in order to protect against these extreme events before the weather trigger takes place? If the global financial crisis that we are currently in the midst of has shown us anything, it is that unforeseen risks can have unimaginable consequences, and the commonly accepted measures of assessing fiscal risk are usually built upon shaky fundamentals.

The financial ecology of the global banking system is a complex web, but neither we, nor our hyper-computational infrastructure, are prepared to deal with complexity of this nature. This ecology maintains a fine balance between strength and collapse. Minor and even major disruptions can be covered, due to some redundancy that is built into the system. If some small banks fail, others can pick up their debt. When *a* large lender or two have trouble, the market gets nervous, but the safety net is usually cast wide enough to keep things moving. But when *several* institutions all get sick at the same time, for many of the same reasons, well let's just say that the antidote for that sickness is still in the lab. Emergency stockpile medicines might be rushed out to those who appear to need it most (ie., $700 bln to 9 banks, $34 bln for 3 auto makers, etc…), but this may be a drop in the bucket, and the proper remedy may still be a couple of years away from the market. Many are referencing the parallels to the Great Depression; while there are similarities, we live in a much different world today than the one that caused financial disruption for many of our ancestors in 1929.

Let's take a step back from the banks, and transfer this ecological theme to idea to globalization itself. Sticking with commodities, the global production and distribution of renewable and non-renewable raw materials comprise an intricate system, where problems in one of the major origins can ripple through the market for that particular commodity, as well as those for ancillary commodities, whether they fall under food, fuel or material categories. For example, high oil supports a higher grain complex, which in turn is constructive to sugar. When oil softens, we expect grain to follow. That is until weather problems surface in an origin and serve to limit grain yield potential. This proceeds to reduce anticipated biofuel stocks, thereby supporting higher corn and soybean futures. The higher grain continues to support sugar, even though crude is now where it was 6 months ago. As additional cane derived ethanol pays the South American grower a higher premium than world sugar, there is even more support for higher sugar prices, unless the dollar strengthens, making commodities more expensive for weaker currency countries to tender.. This is a simple illustration highlighting the complexities that are nearly always on the minds of fundamental commodity analysts and traders; the real global supply chain is more complicated by several orders of magnitude. Now try to put all global commodities into a stock and flow model that attempts to represent the global connections and interactions, and it becomes very apparent that even with a simplistic model, small shocks can have huge consequences.

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Adding another layer to this commodity ecology is that the global S-D balance for many raw materials has been stretched dangerously thin in recent years. In the early to mid 1900s, trade was of course prevalent, but the global trade network of the early 20th century represented nothing that we see in today's world. Most countries used what they produced; excess domestic supplies supported cross-border trade. In the economy of the early 21st century, the degree of specialization of domestic production combined with the global demand that is available (and growing as a result of the higher standard of living commanded by a larger global workforce), leads to global S-D balances that are extremely vulnerable to disruption. As soon as a perceived shortage hits the market, volatility in both futures and physical prices is not far behind. With all of the factors in the market that can affect commodity prices, why would we want to focus on the weather, before an event happens? For a straightforward example, look at natural gas futures as a tropical system approaches the Gulf of Mexico. A developing system that is moving westward across the Atlantic Ocean provides steady support to NG futures. When the cone of uncertainty narrows, futures respond accordingly, depending on the projected track. So the first item to discuss is not necessarily the point forecast, rather, it is the broad spectrum of possibilities, including what are commonly dismissed as outliers.

Moving from fuel to food, the Australian wheat market has been going through some very tough times over the last few years. For the 2007/08 crop year, Australia's primary wheat growing belts (NSW & WA) were hit very hard by a severe drought. The lack of water cut wheat (and barley/canola) production, which was well documented in the market. After the poor rains, many started to expect that the condition would improve the following year. A strong La Nina event was driving the global weather patterns, and employing standard statistical analyses, most thought that the rainfall situation would dramatically improve for the 2008/09 crop year. During a 'typical' cold episode La Nina, a wetter pattern materializes for the Asia Pacific/Australia region. However, the Weather Trends outlook for the Australian wheat regions differed from the conventional view that a rainfall rebound was to occur the following year.

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When WTI released our forecast for the May through October 2008 period (note that the long range forecast was issued in 2007), we did expect minor improvements in some wheat regions, but we highlighted many more problems and moisture deficiencies, particularly in the growing regions across New South Wales and Victoria – regions that needed additional rains the most.

The charts below show the Weather Trends International weekly year-ahead precipitation forecast for select cities in NSW/Victoria, for May through October 2008. Note that the forecast was made 11 months prior. The bars show the directional precipitation forecast (mm) vs. the same week of the prior year, and the solid line shows the actual difference. These charts very clearly demonstrate, contrary to what many weather service providers were discussing, that the May through July 2008 period was *not* an improvement over the prior year. This point is a very crucial period for the developing wheat crop, which was in the planting through early vegetative states during the low moisture periods; low rainfall in these stages limit yield potentials. As recently as April, the International Grains Council was expecting[2] a favorable season and higher production numbers. Using the Weather Trends long range forecast, more realistic crop expectations could have been set (for this and other origins), and potential crop problems may have been identified several months in advance, shifting operations from reactionary to proactive.

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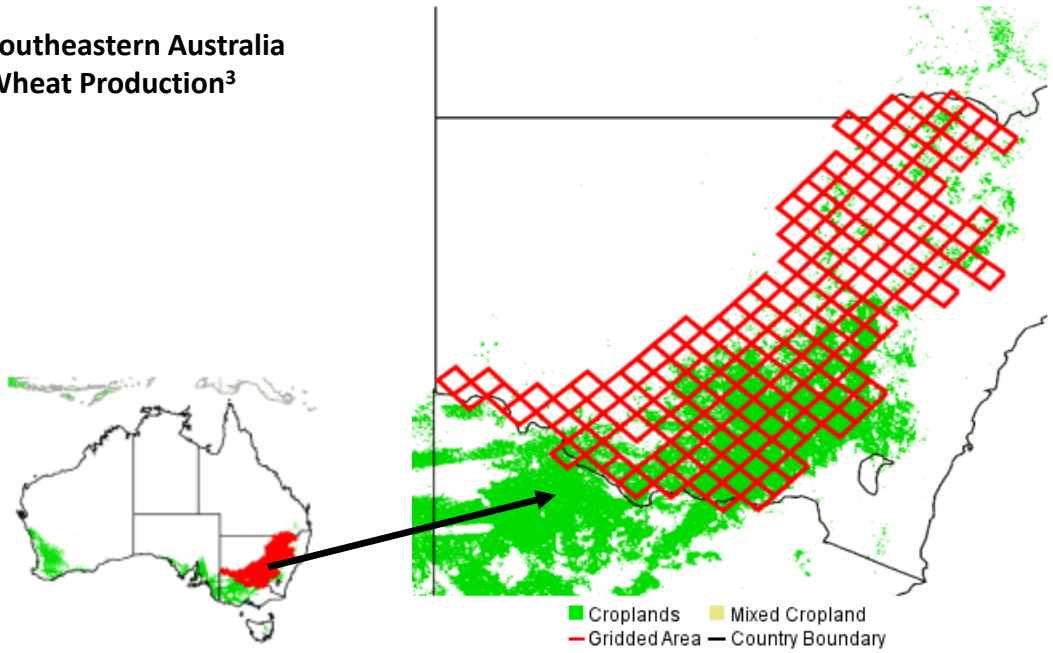
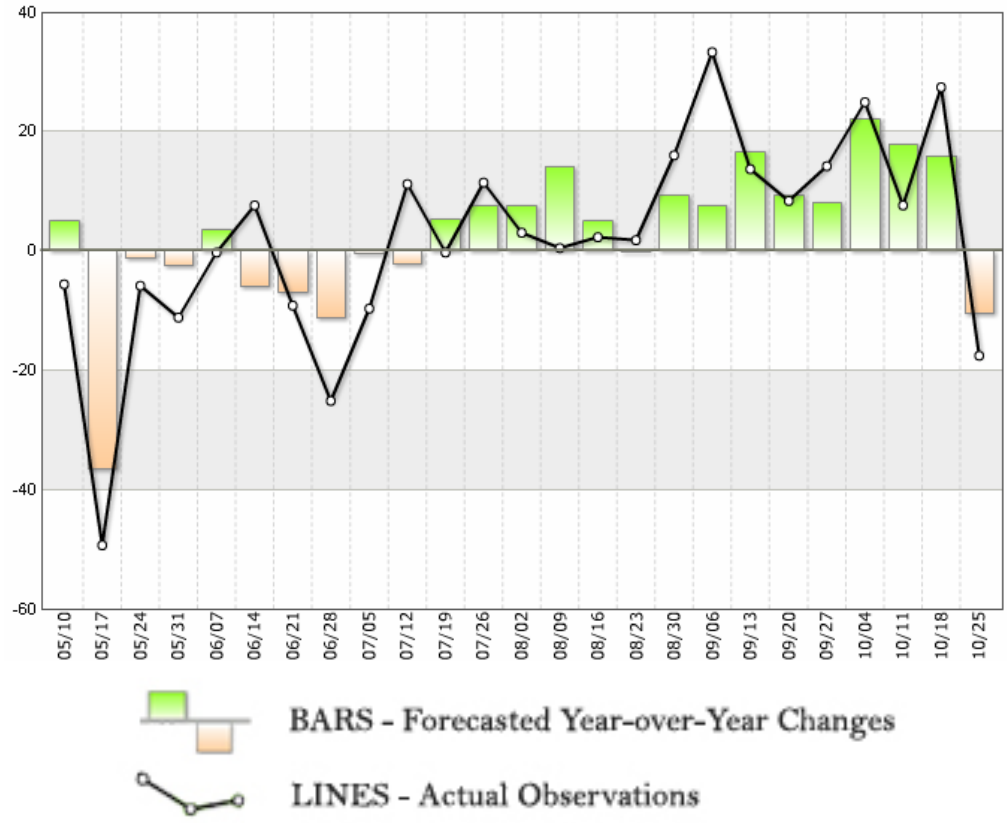
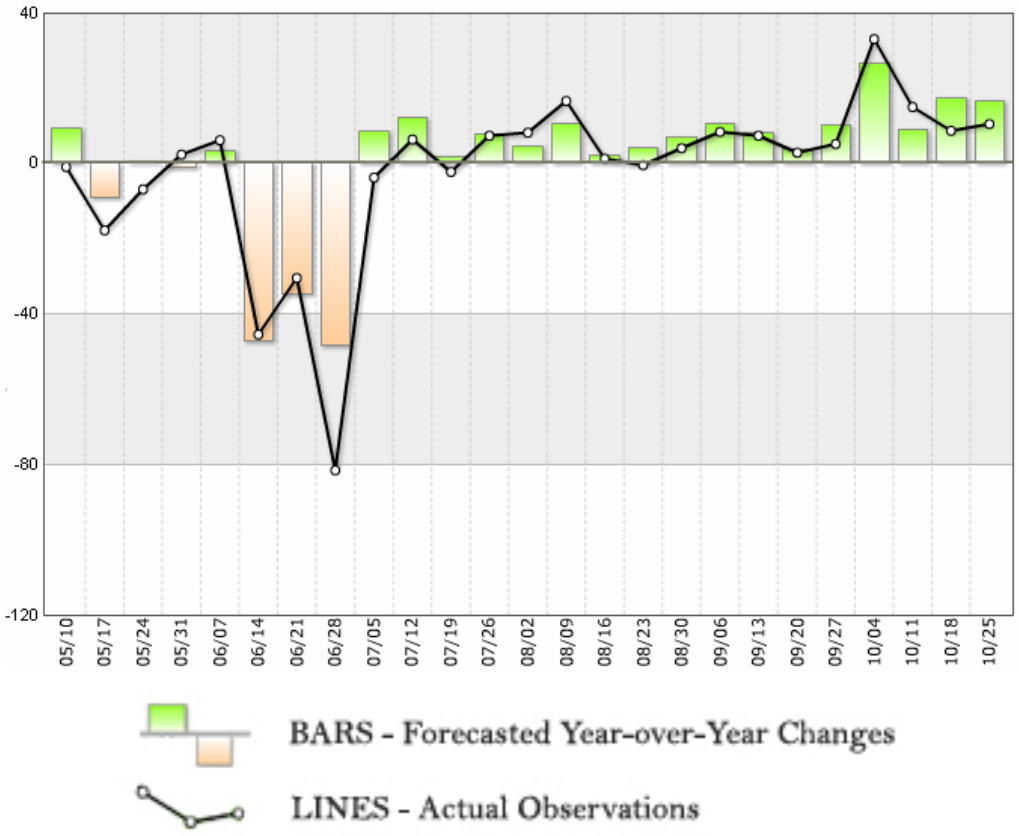
Southeastern Australia Wheat Production[3]



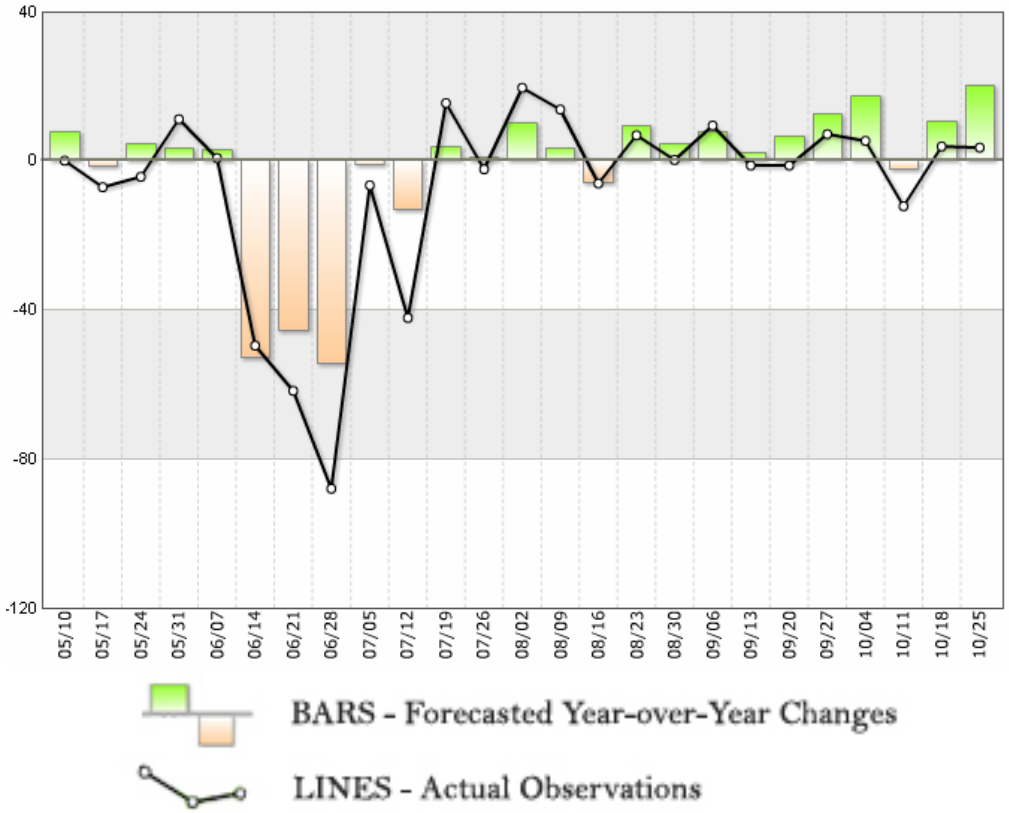
Bathrust, NSW



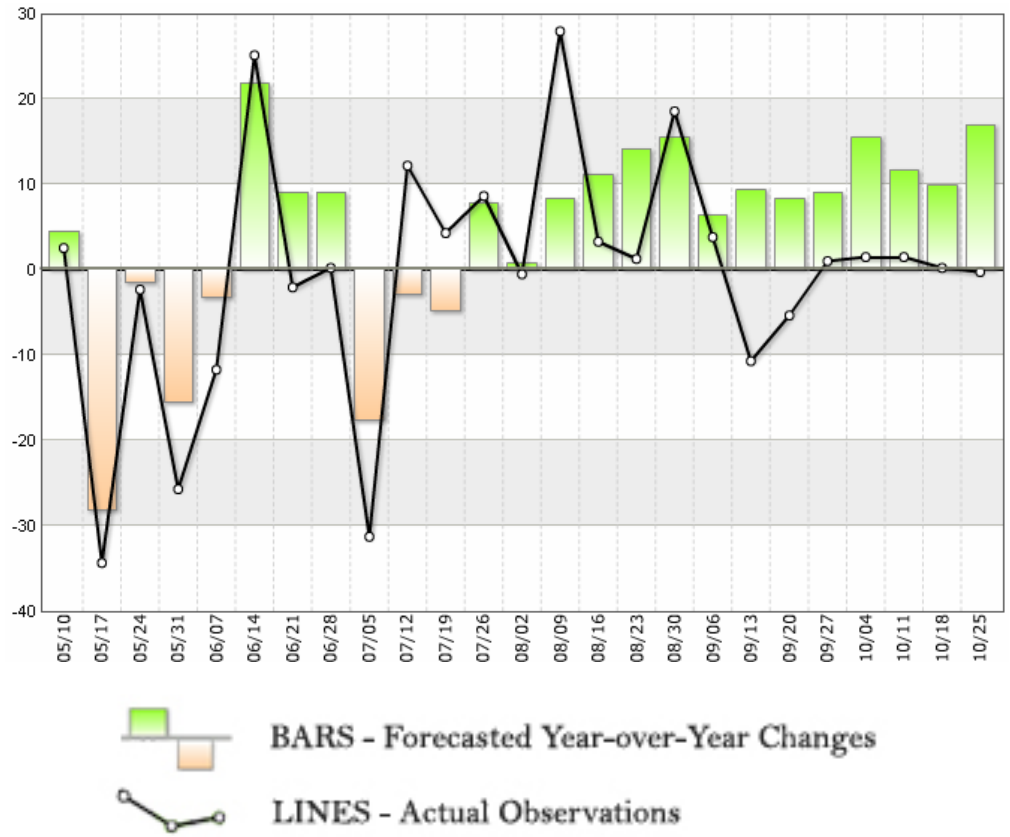
Gouldburn, NSW

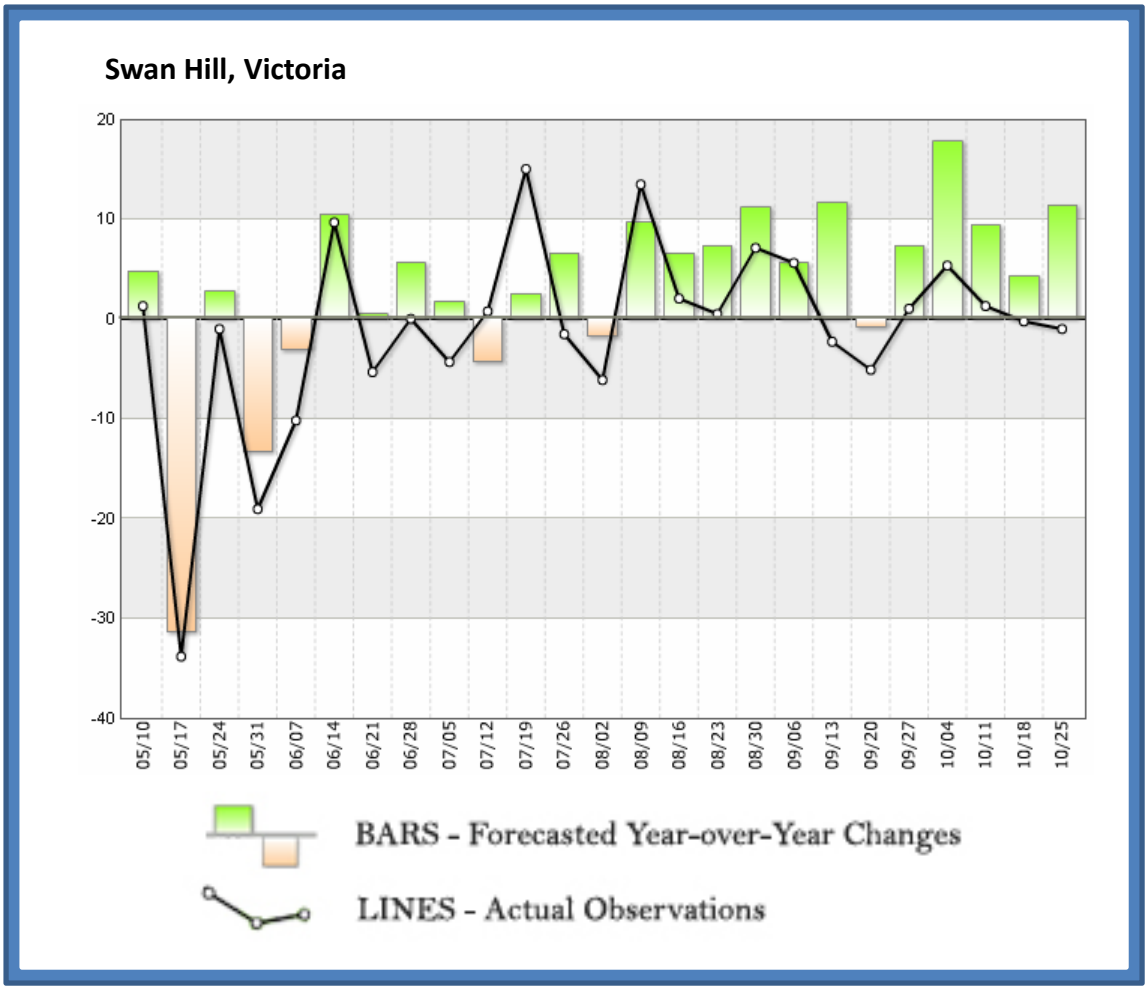


Bombala, NSW



Bendigo, Victoria





Wheat is a global commodity and a staple for nutrition, commerce and health. It is the second largest global commercial agricultural crop, after corn. Its' products are used in many foodstuffs, and are an important source of food, nutrition and income for families around the world. This example that is briefly described in this paper focuses on the Australian wheat crop and highlights just one of the many ways that the Weather Trends International year ahead global weather outlooks can help to estimate global agricultural production.

References:

[1] *The Black Swan*, by Nassim Taleb, 2007

[2] www.foodproductiondaily.com/Supply-Chain/Record-world-wheat-production-forecast-in-2008-09

[3] USDA Foreign Agricultural Service, Crop Explorer (www.pecad.fas.usda.gov/cropexplorer/)