W.O. & P.O. Jolly

Using D-Risk to inform irrigation management at W.O. & P.O. Jolly (Norfolk)

Business profile

Location	Roudham, Norfolk
Main irrigated crops	Potatoes, onions, parsnips, carrots, asparagus and cereals
Irrigated area	320 ha
Dominant soil type	Breckland soils
Licensed abstraction	574,000 m^3/year
Storage capacity	0 m^3

W.O. & P.O. Jolly - business overview

A family owned business growing high-value vegetables on the light Breckland soils extending over 400 ha. The main irrigated crops include maincrop potatoes, onions, carrots, parsnips and asparagus. Due to the droughty nature and low water holding capacity of the sandy soils, production is entirely dependent on a reliable supply of groundwater. The business is acutely aware of local and regional water pressures on agriculture and the environment, and actively engaged with the local agricultural water abstractors as well as involvement in the NFU Water for Food Group (WfFG). Tim Jolly is regularly invited to represent the wider farming interests and comment on the impacts of water regulation and abstraction reforms on both his business and farming neighbours. Tim is an ex-Chairman of the UK Irrigation Association (UKIA) and has developed strong links with environmental bodies in the region to discuss the challenges in reconciling competing demands between agriculture with the environment, and also works closely with universities supporting relevant research.

Managing future irrigation abstraction and drought risks

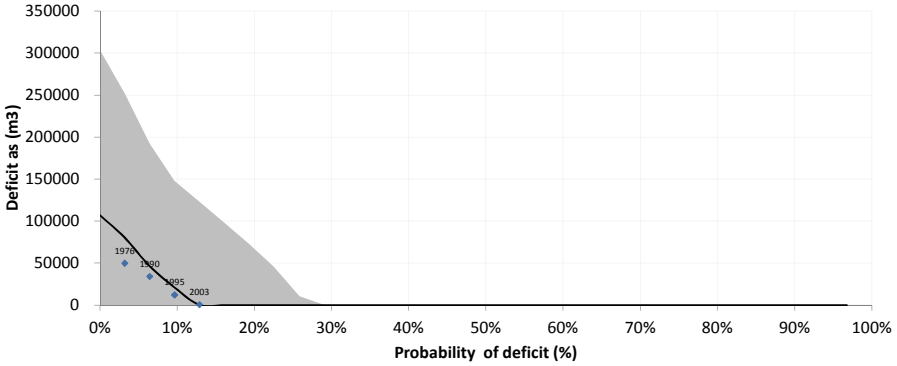
Securing water for irrigated production is a critical business issue. Due to a reasonably reliable groundwater supply the farm was not severely impacted by the 2011-2012 drought. However, the business is concerned about future changes in abstraction and the risk that groundwater licensed allocations and/or headroom could be reduced. All the irrigated crops on the farm are destined for the retail sector or are on contract where quality assurance and continuity of supply are critical and any reductions in water availability could have a severe economic impact on the business, particularly since the farm has no alternative sources of supply. The major concern now is how they can deal with the future risk of droughts within a new regime of abstraction licensing that is likely to reduce their current licence. The main challenges includes knowing how to plan future planting programmes for both rainfed and irrigated crops, understanding how rainfall uncertainty might impact on irrigation demand (likelihood of back to back droughts) and how these multiple water risks then translate into planting programmes the following year.

D-Risk – underpinning decisions with evidence

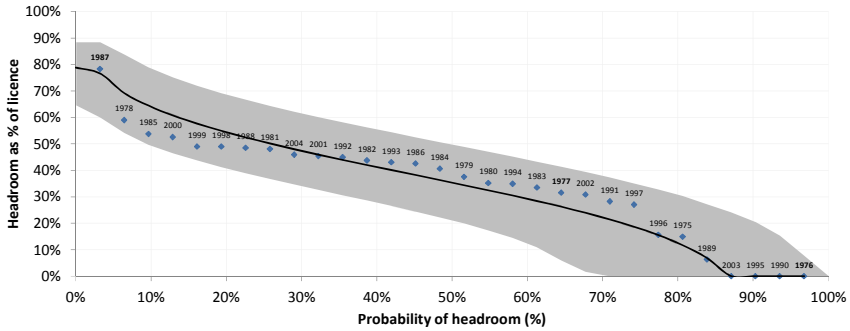
D-Risk uses a dataset of equally probable weather series to calculate multiple estimates of annual irrigation demand for the farm site, and its reliability considering current abstraction licence limits. A monthly time-step water balance model is then used to assess how irrigation demands compare

against the licensed abstraction for the farm. From this, it is possible to assess any annual irrigation deficit and changes in licensed abstraction 'headroom'. Examples are shown below.

Using D-Risk to assess potential irrigation deficits and changes in abstraction 'headroom"



An irrigation deficit is assumed to be any proportion of demand that was not met by available supply either due to annual or monthly licence limits and/or not being able to supply water from reservoirs. Licensed 'headroom' is defined as the proportion of licensed volume that is not used in any given year. It is calculated from the sum of all available licences (both direct and storage). Assuming no abstraction restrictions, if the distribution of annual irrigation need follows the long-term average, then there is a 1 in 10 year probability to have a deficit above 17,000 m^3. If the coming years are generally drier and/or more variable than the long-term average, then the worst-case probability of having an annual irrigation deficit in a given year could increase to about 1 in 10 years with associated annual irrigation deficit of more than 145,000 m^3 (see figure above).



If the distribution of annual irrigation need follows the long-term average, then there is a 1 in 8 year probability of abstracting the total licenced volume in a given year. Under the worst-case conditions, this increases to an estimated 30% annual probability.

Using D-Risk to inform agribusiness decision-making

Trying to understand the water resource impacts and economic consequences of possible changes in abstraction licensing for W.O. & P.O. Jolly is a significant challenge. Not only will they need to assess the likely consequences of changes in water allocation on timing and demand for irrigation; they will also have to contend with managing areas of irrigated and rainfed crops with less certainty about their licensed resource and dependence on rainfall to buffer drought periods. In addition, they will have to consider the possible effects of environmental restrictions to their abstraction licence during dry spells that may threaten nearby environmentally sensitive areas.

Managing a system where the business had a known licensed volume and abstracted each year depending on their cropping pattern and the weather will no longer be the case. In the future, they will need to manage water in a very different way, with more flexible business plans, plantings and water demand. The burden of dealing with changing water availability is likely to shift disproportionately onto the business, affecting on how they will invest in irrigated production. In this context, D-Risk can help inform the business on how their headroom and deficit is likely to change. It can also provide valuable insights on how modified irrigated crop mixes may reduce vulnerability, and the effect of investing in new or enlarged on-farm storage capacity.

"Managing risk is a major part of business strategy and D-Risk will be a very useful tool in enabling us to do that."

Tim Jolly, Farm Owner, January 2018

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