Water availability in a changing climate: A survey of irrigated crop growers in the river Lark & Wissey catchments

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The voice of British farming

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Background

In early 2015, the National Farmers' Union agreed to carry out a survey of irrigators in the river Wissey catchment in Norfolk on behalf of the Wissey Partnership[1], and in collaboration with the Wissey Abstractor Group.

Later, the NFU decided to expand the survey by posing identical questions to irrigators in the river Lark catchment in Suffolk, working closely with the Lark Abstractor Group.

The rivers Wissey and Lark are situated in the Great Ouse catchment of the Anglian river basin district.

A telephone survey was conducted amongst abstraction licence holders in both these catchments during March 2015. The following report details the findings of the research.

Method and sample

- Details of licence holders in the two catchments were cross referenced against the NFU database for telephone contact details, and those licence holders where such details were available were contacted up to 3 times by telephone.
- For the Lark catchment we received 37 responses out of 149 licences (25% response rate); and the Wissey 13 responses out of 31 licences (42% response rate)
- Figures are rounded to full integers (0 decimal places) so some totalled percentages may not equal 100%
- Where groups are compared in charts, the number of respondents is shown in the key in brackets
- Average farm size in the survey areas was relatively large at 1321 acres in the Wissey and 1863 acres in the Lark. Irrigated cropped area accounted for over half of total farmed area in both sub-catchments.

[1] http://www.cameopartnership.org/about-us/cameo-partners/wissey/

Executive Summary

Water use in the Lark and Wissey

Farmers in the sub-catchments use two-thirds of the water allocated to them in their abstraction licences during 'average/normal' weather years; rising to three-quarters of their maximum licensed volume in 'dry years' (2006 and 2010-12). Cumulative average use was partly suppressed by farmers with 'sleeper' licences declaring 'nil' returns.

Two-thirds of farmers surveyed in the Lark and half the farmers surveyed in the Wissey said they use 100% of available water in dry years.

There was no dominant source of water used by farmers, with surface water and/or groundwater used relatively equally. Farmers did not use mains water for irrigating crops.

Three quarters of farmers in the Wissey had built a reservoir but less than a half of Lark abstractors had invested in storage. Some farmers had two, three or even four reservoirs. But less than 10% of reservoir construction projects were financially supported by the EU Rural Development Programme.

Perhaps surprisingly, four-fifths of all reservoirs are more than 10 years old, indicating that taking action to increase resilience to water shortage is not a new issue for farmers.

For farmers with one or more reservoirs, the total capacity available to each respondent in the Lark ranged from 4.5 million to 165 million gallons, with an average of just under 58 million gallons. The range for Wissey abstractors was one million to 410 million gallons, with an average of just under 68 million gallons.

Farmers' reasons for building reservoirs varied, but the main drivers for investing in storage focused on ensuring access to water during periods of shortage.

'We have been trying to get a licence for years and winter storage was our only available option. It also enhances the value of the farm and ensures a sustainable crop income' (Lark Abstractor)

'I could not rely on summer water because my licence was subject to a flow constraint. I couldn't guarantee being able to grow high value vegetables and that's no way to run a business' (Wissey Abstractor)

Farmer confidence about water availability

Farmers lack long term confidence in gaining secure access to water for food production. Three-quarters of farmers in both the Lark and Wissey sub-catchments are very or quite confident about water availability for the 2015 irrigation season, but this falls to a third of farmers feeling similarly confident for the outlook in five years' time and a only a quarter of farmers are confident over a 10 year horizon.

A combination of greater drought risk and government proposals for water abstraction licensing reform is believed to be the major contributor to declining confidence.

The vast majority of farmers in the Lark (84%) believed there was sufficient water for existing users during 'average years', while half of farmers thought there was enough water in the system during 'dry years'. By comparison, only one-third of Wissey farmers believed there was enough water in their system during 'dry years'. (The Environment Agency describes the Lark and Wissey as 'over-licensed' sub-catchments).

Impact of dry periods on abstractors

Many of the abstractors surveyed experienced water shortages during the 2010-12 dry period - 46% of respondents in the Wissey (6) and 62% of respondents in the Lark (23).

Actions that farmers took in immediate response to water shortages included:

- All members of both abstractor groups adopted 'voluntary restrictions' - an informal and self-policed promise to reduce actual use by 15% of the annual licensed permitted volume of groundwater abstraction. The pay-off for farmers is that, if the voluntary arrangements succeed (as they did during this period) the need for the Environment Agency to impose more severe mandatory restrictions later in the irrigation season is avoided
- New or increased use of on-farm reservoirs
- Increased use of devices such as probes to monitor soil moisture deficit and calculate optimum water needs of crops with much greater accuracy
- Night time irrigation to mitigate against losses caused by evaporation
- Reduction in planted area of irrigated crops
- Reduced irrigation applications to less profitable crops
- Use of efficient irrigation equipment, such as booms instead of rain guns

'I eked out my licence by irrigating in the dark to stop evaporation and I bought a boom irrigator which is more efficient than a rain gun, it cuts down on evaporation and side wind blow and needs less water pressure' (Wissey Abstractor)

'We extended the use of our reservoir and where we could use the water. We have more booms rather than rain guns which are more efficient. We have more probes to assess water in the soil. We altered the way we grow potatoes so there is not so much surface area in the lower fields. We moved to drought tolerant varieties' (Lark Abstractor)

More than a third of farmers who experienced water shortages (37%) reported that they also saw a decrease in business profitability.

However around half (49%) saw no change in profitability or didn't know if there was any impact and 14% even saw an increase in profitability – presumably due to increased output prices.

'We suffered 20% yield losses. For example our onions didn't 'bulk up' so well, the size loss was noticeable because of reduced irrigation. We can market smaller onions now so that helps to increase the usable tonnage and so offset the yield losses a bit' (Lark Abstractor)

'Combinable crops were not irrigated so were 20-50% down on yield and we were short of available water so we didn't have enough so we partially sacrificed parsnips and carrots with a 20% loss of yield to accommodate this' (Lark Abstractor)

Adapting to a changing climate

The survey found clear evidence that farmers are taking positive action on farm (or intend to) to make their businesses more resilient to future drought events.

The majority of farmers in the sub-catchments are already protecting themselves (or have plans to do so) from future water shortages by:

- Changing their cropping
- Investing in new, better and more efficient irrigation equipment and
- Using new techniques to improve their water efficiency.

However, trading water (a key element of Defra's proposals for abstraction reform) is an unpopular option for water management, with only 10% of Lark farmers and no Wissey farmers engaging in this activity. Most farmers said they would not be trading water in future, perhaps reflecting the practical barriers presented by the current regulatory system.

Future support for abstractors

Asked about the type of support and information that would be beneficial to forward water resources planning at farm level, respondents provided a wide range of suggestions including:

- Information on the value of traded water licences and how to trade water
- Trend information on how much water is licenced, how much is used and who is using it
- How to acquire more water/how to increase licence volume
- Even more advanced warning of abstraction restrictions
- River flow rate information
- Information on Environment Agency plans to mitigate over-licencing
- Outcomes of the abstraction licence review
- A long term policy/long term information about water requirements

'Yes, value of traded water licences. I don't use my licence and could trade it, and would like information on current values' (Lark Abstractor)

"It would be helpful to know more about what the EA plan to do about over licencing. What are the other options for us specifically to secure our water supply?' (Lark Abstractor)

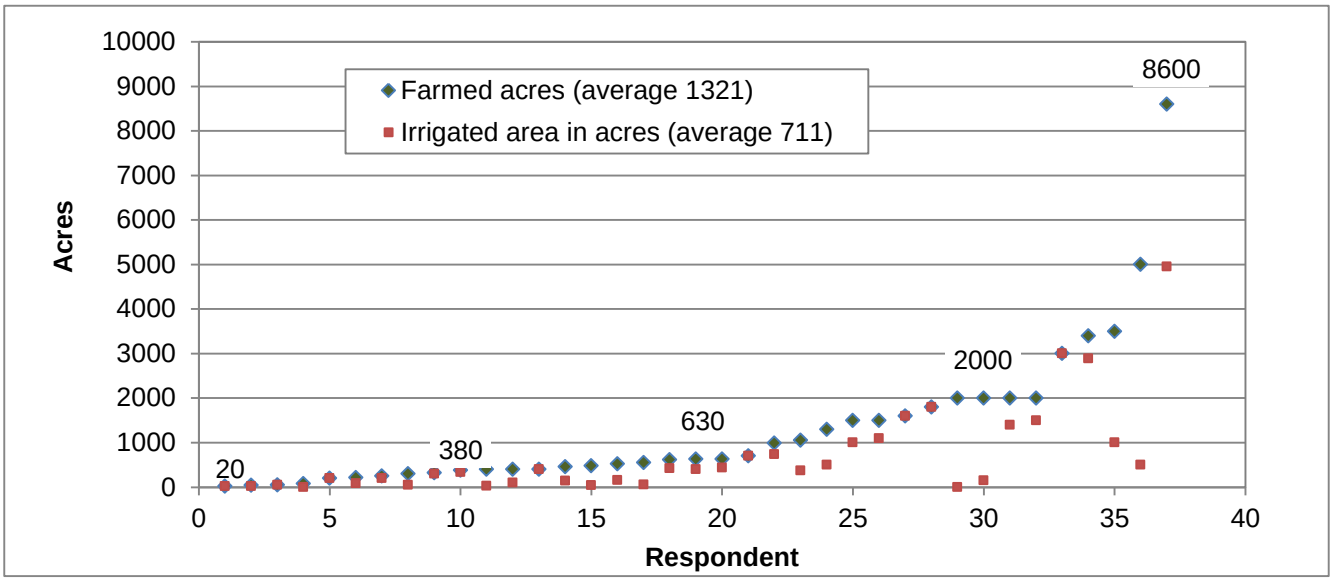
'A long term policy would be useful - reservoirs don't come cheap' (Lark Abstractor)

'We could do with longer term information collection about water requirements. I am trying to cut down sometimes because I think I am being sensible and preserving water for later, but then they restrict the licence anyway which means sometime you feel as if you shouldn't have been so careful! (Wissey Abstractor)

1.0 Respondents' farmed acreage and irrigated area

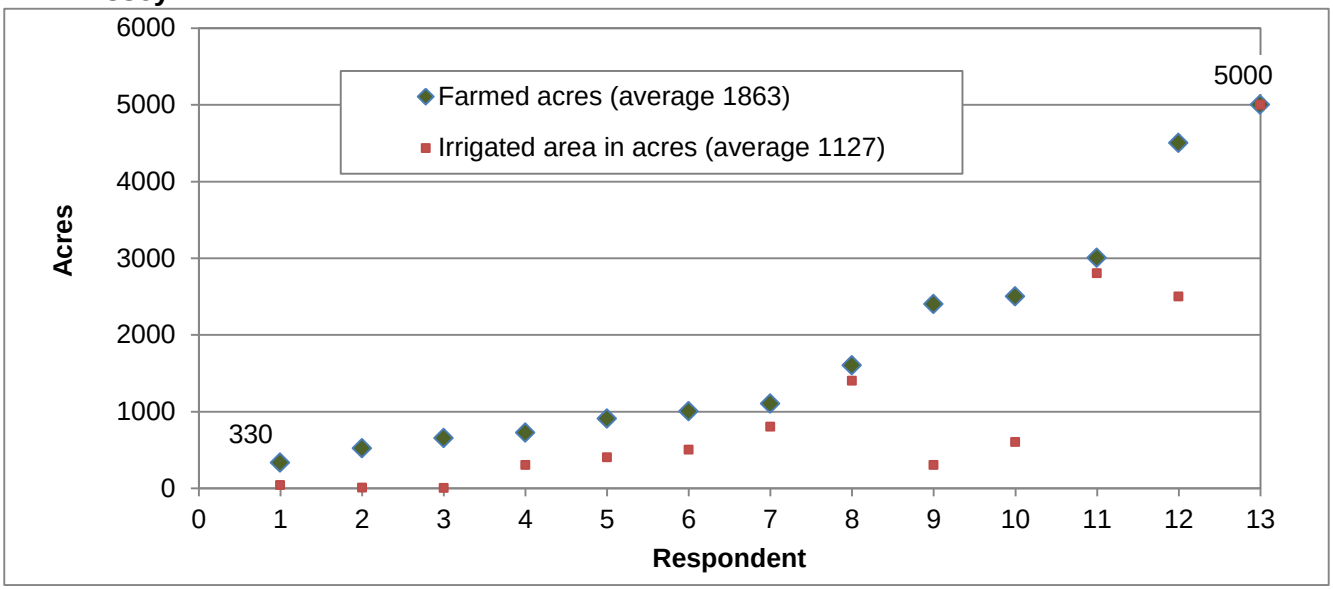
The total area farmed by respondents across both the Lark and Wissey sub-catchments is 73,113 acres and the area irrigated is 41,315 acres.

1.1 Lark



Out of those surveyed, the average area farmed in the Lark is 1321 acres and average area irrigated is 711 acres. This equates to 54% of the area that is irrigated in this sub-catchment. 36 out of 37 respondents carry out irrigation. The total area farmed by respondents in the Lark is 48,890 acres and the area irrigated is 26,670 acres.

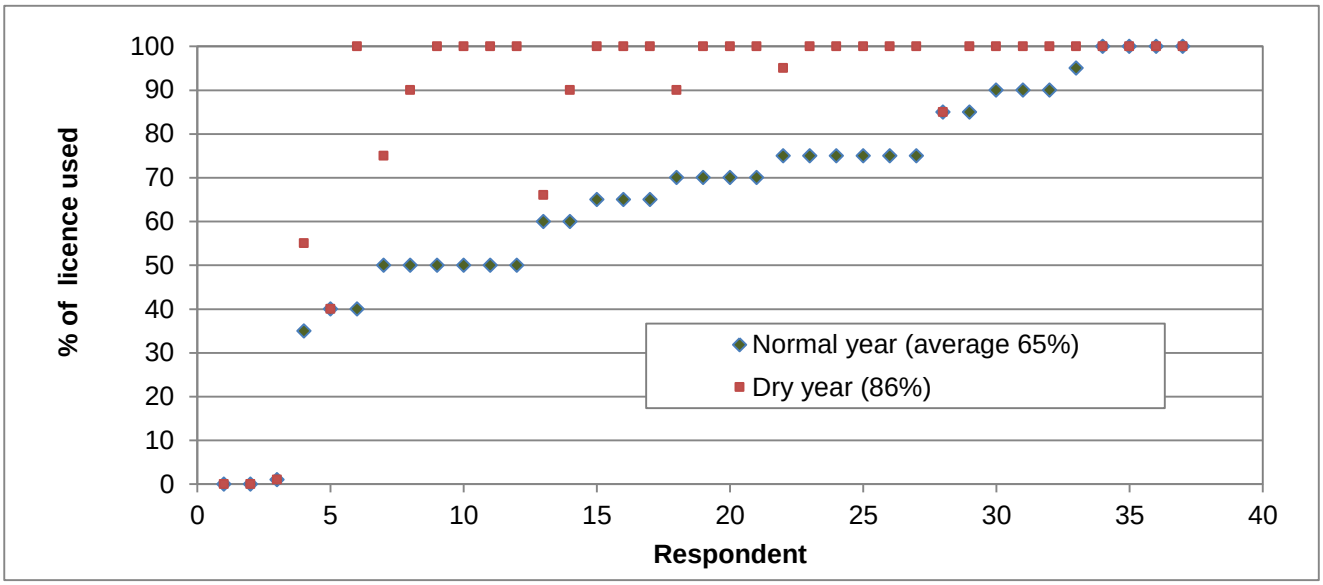
1.2 Wissey



The average area farmed by respondents in the Wissey is 1863 acres and average area irrigated is 1127 acres (equivalent to 60% of total farmed area that is irrigated which is similar to the 54% irrigated in the Lark). 12 out of 13 respondents carry out irrigation in the sub-catchment. The total area farmed by respondents in the Wissey is 24,223 acres and the area irrigated is 14,645 acres.

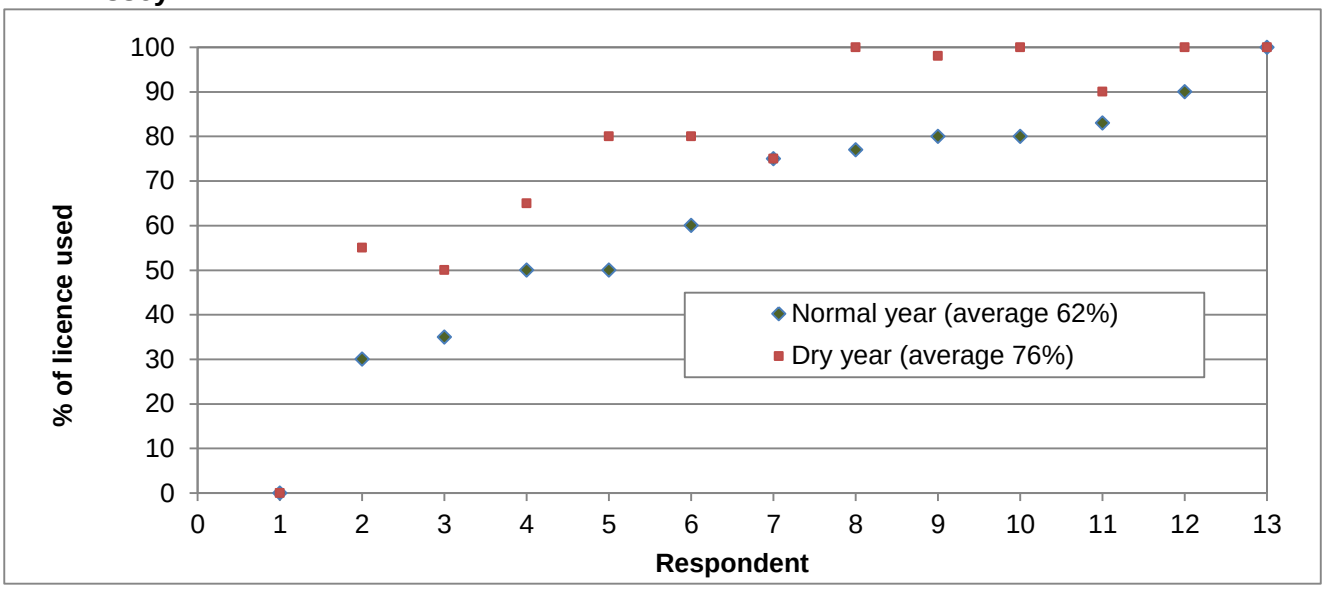
2.0 The percentage of annual volume listed in abstraction licences used in a normal year and in drier years (e.g. 2006, 2010, 2011 or 2012)

2.1 Lark



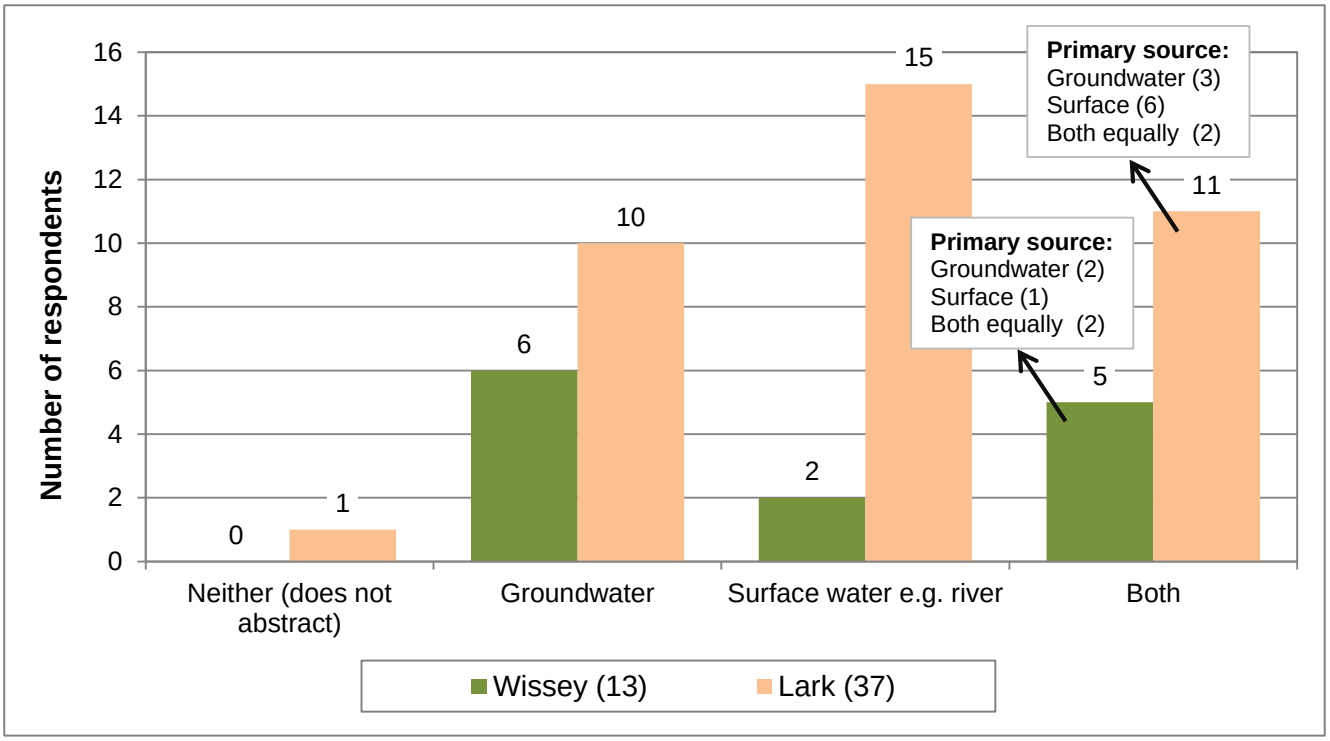
Respondents in the Lark reported that they use an average of 65% of their abstraction licences in normal years and an average of 86% in dry years. It's worth noting that the dry years average is somewhat reduced by three respondents that use very low percentages of their licences in any year. Moreover, 25 out of 37 respondents (68%) use 100% of their licences in dry years.

2.2 Wissey



Those in the Wissey sub-catchment use an average of 62% of their abstraction licences in normal years and 76% in dry years. Six out of 13 respondents (46%) use 90% to 100% of their licences in dry years however.

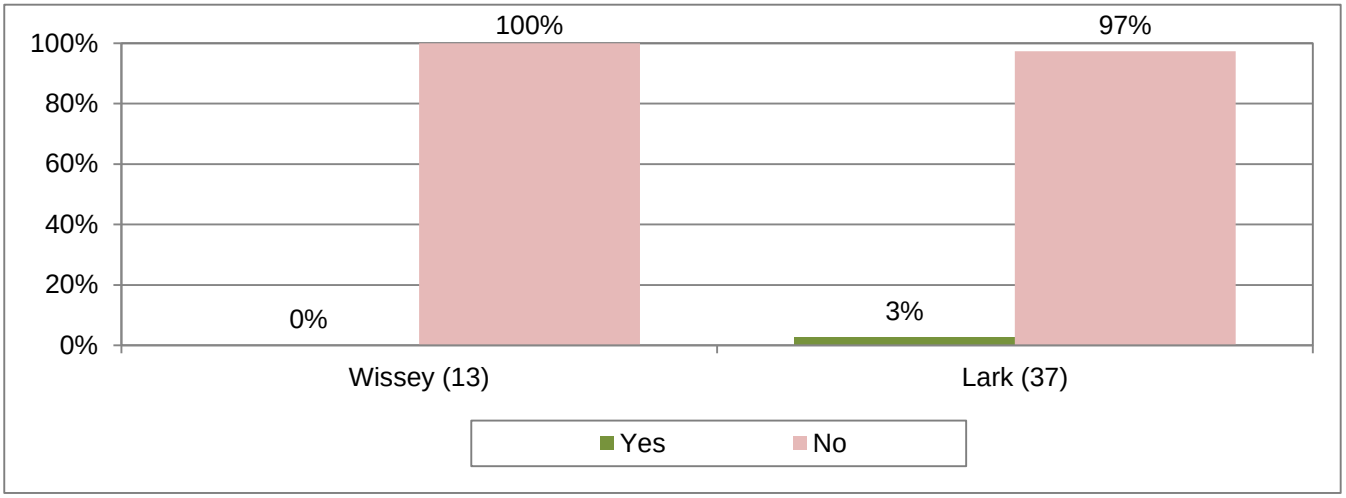
3.0 Do you abstract water from groundwater, surface water, or both?



11 out of 13 farmers in the Wissey abstract from groundwater (only or in combination with surface water), while seven out of 13 farmers abstract from the river (as their primary source or with groundwater).

In contrast, those in the Lark are slightly more likely to abstract from surface water. 15 respondents use surface water only and a further six use it as their primary source where groundwater is also used.

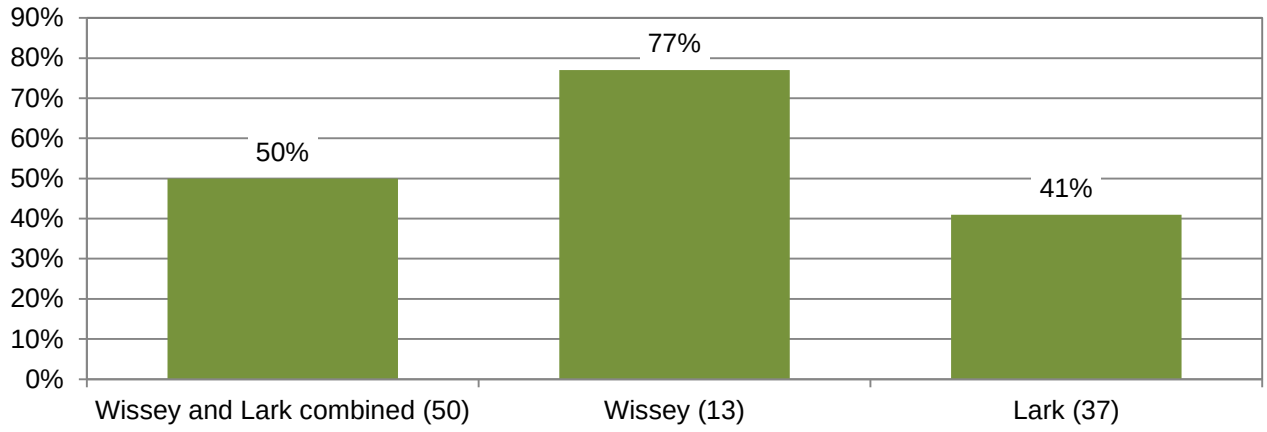
4.0 Have you used the mains supply for crop irrigation since 2010?



None of the respondents in the Wissey have used mains supply for crop irrigation since 2010 and only 3% have done so in the Lark catchment (1 respondent out of 37).

5.0 Reservoirs

5.1 % of respondents with one or more reservoirs on farm



50% of respondents across the Lark and Wissey catchments have one or more reservoirs.

77% of respondents in the Wissey catchment (10 out of 13) have one or more reservoirs compared to only 41% in the Lark catchment (15 out of 37).

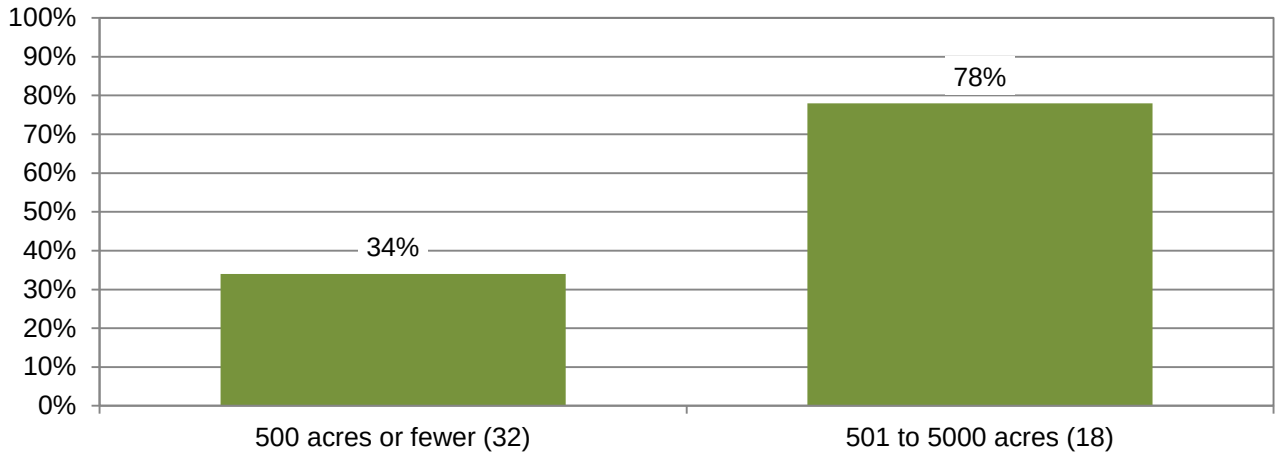
5.1.2 Number of reservoirs on farm

Number of reservoirs	Number of respondents (Lark)	% of respondents (Lark)	Number of respondents (Wissey)	% of respondents (Wissey)
0	22	59%	3	23%
1	4	11%	7	54%
2	5	14%	1	8%
3	5	14%	0	0%
4	1	3%	1	8%
5	0	0%	0	0%
6	0	0%	1	8%
Total	**37**		**13**	

The table above shows that although 59% of those in the Lark have no reservoir, over one in four (28%) has either two or three reservoirs. There are 33 reservoirs in total amongst 37 respondents – an average of 0.9 reservoirs per farmer.

Those in the Wissey are most likely to have one reservoir (54%) and notably, one respondent has six reservoirs. There are 19 reservoirs amongst 13 respondents in the Wissey - an average of 1.46 reservoirs per farmer surveyed.

5.1.3 % of respondents with one or more reservoirs on farm by irrigated area[2]



As one might expect, the results indicate that the greater the irrigated area, the greater the propensity is to have one or more reservoirs – even taking small sample sizes into account. Farmers surveyed who irrigate between 501 and 5000 acres are more than twice as likely to have a reservoir, than those who irrigate 500 acres or fewer.

5.2 Age of reservoirs

		2 years ago or earlier	> 2 years <=5 years	>5 years to <=10 years	More than 10 years ago	Total number of reservoirs
Lark	Number	0	2	5	26	**33**
	%	0%	6%	15%	79%	
Wissey	Number	3	0	2	14	**19**
	%	16%	0%	11%	74%	

The vast majority of reservoirs in both catchments are at least 5 years old with around three quarters being 10 years old or older.

5.3 Capacity of reservoirs

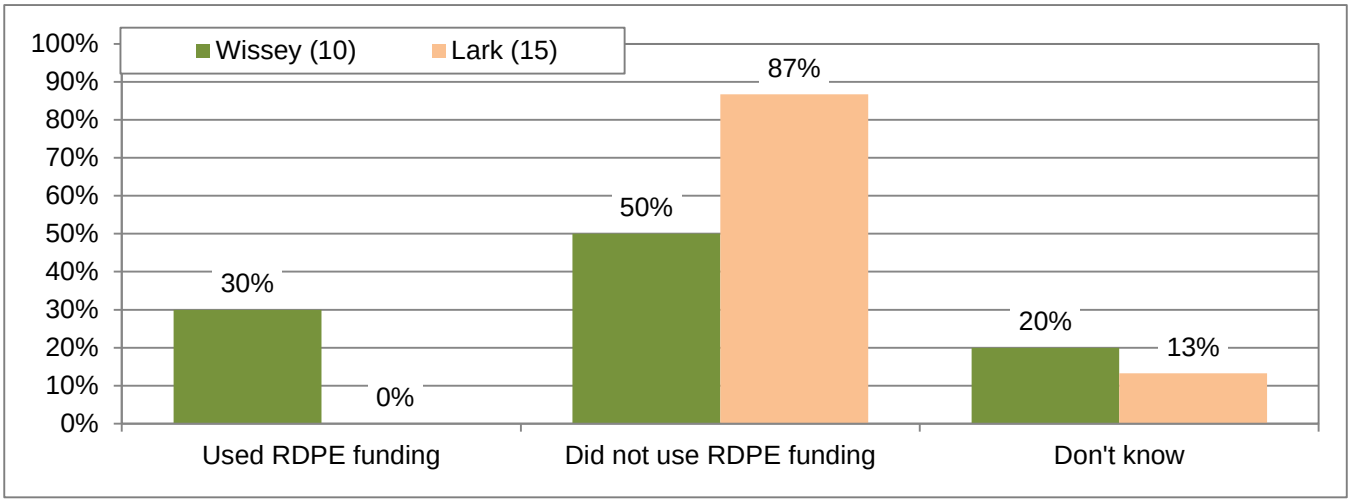
Size of reservoir	Number of reservoirs (Lark)	% of reservoirs (Lark)	Number of reservoirs (Wissey)	% of reservoirs (Wissey)
10m gallons or under	12	36%	6	18%
11m to 20m gallons	6	18%	5	15%
21m to 50m gallons	11	33%	7	21%
51m to 100m gallons	4	12%	0	0%
100m to 350m gallons	0	0%	1	3%
Total	**33**		**19**	

[2] Based on all 50 respondents across both the Lark and Wissey sub-catchments

Individual reservoir capacities in the Lark range from 4.5 million gallons to 90 million gallons with the average being just over 26 million gallons. The majority of reservoirs have a capacity of 50 million gallons or fewer. With regard to the total capacity available to each respondent with one or more reservoirs, this ranges from 4.5 million to 165 million gallons and the average is just below 58 million gallons.

Reservoir capacities in the Wissey range from one million gallons to 330 million gallons with the average being just below 36 million gallons. Nearly all of the reservoirs have a capacity of 50 million gallons or fewer. With regard to the total capacity available to each respondent with one or more reservoirs, this ranges from one million to 410 million gallons and the average is just below 68 million gallons.

5.4 Use of RDPE funding for reservoirs



We asked respondents with one or more reservoirs whether they used rural development programme funding for the last reservoir built.

Three out of the 10 relevant respondents (30%) with one or more reservoirs in the Wissey accessed this funding compared to none of the relevant respondents in the Lark sub-catchment.

5.5 Reasons for investing in a reservoir

Note - If the respondent has more than one reservoir, we asked about the last one built.

5.5.1 Lark (15 respondents)

Comments received included:

'After the droughts of 1992, when we had a 100% ban on irrigation which affected us badly. The only way to manage the situation was to supplement our water with reservoir storage. The extra benefit was 'increased' abstraction from reservoirs as this is pumped independently'

'Can't grow fruit crops without irrigation'

'It helps us with diversification and crop rotation when growing vegetables. When we do water we get increased yields, but we don't irrigate cereals very often, mostly vegetables'

'For potatoes, water is critical'

'It was just cost effective with the amount we were using'

'We wanted to grow potatoes rather than cereals. The land is light and fairly chalky so you need a reliable source of water - a reservoir managed that - winter water from the reservoir is a lot cheaper than summer - an investment in root crops'

'The farm would be unviable without them'

'The reservoirs act as a risk protection tool to buffer water from year to year. If we don't use all our water in any year, we use the backup from our licence to fill the reservoir. We carry previous licence volume through - hence why we abstract close to 100%'

'To ensure we have water in periods of restriction'

'To guarantee water supply during the growing season'

'We didn't have enough summer supply from our abstraction licence'

'We knew there would be pressure on water in the future'

'We use them to abstract in winter and save for the summer dry periods'

'We have been trying to get a licence for years and winter storage was our only available option. It also enhances the value of the farm and ensures a sustainable crop income'

5.5.2 Wissey catchment (10 respondents)

'A grant was available. I ought to have it done 10 years ago but couldn't afford it, so when Defra came up with a grant I took it. I couldn't rely on summer water with the summer licence, because it was subject to flow constraints. If it was dry the river level would drop and I would have to stop'

'We needed a secure access to water. We grow a lot of potatoes and they are 80% water'

'We invested in the reservoir so that we could rotate crop production more effectively across the farm. We can now include more root crops on this land'

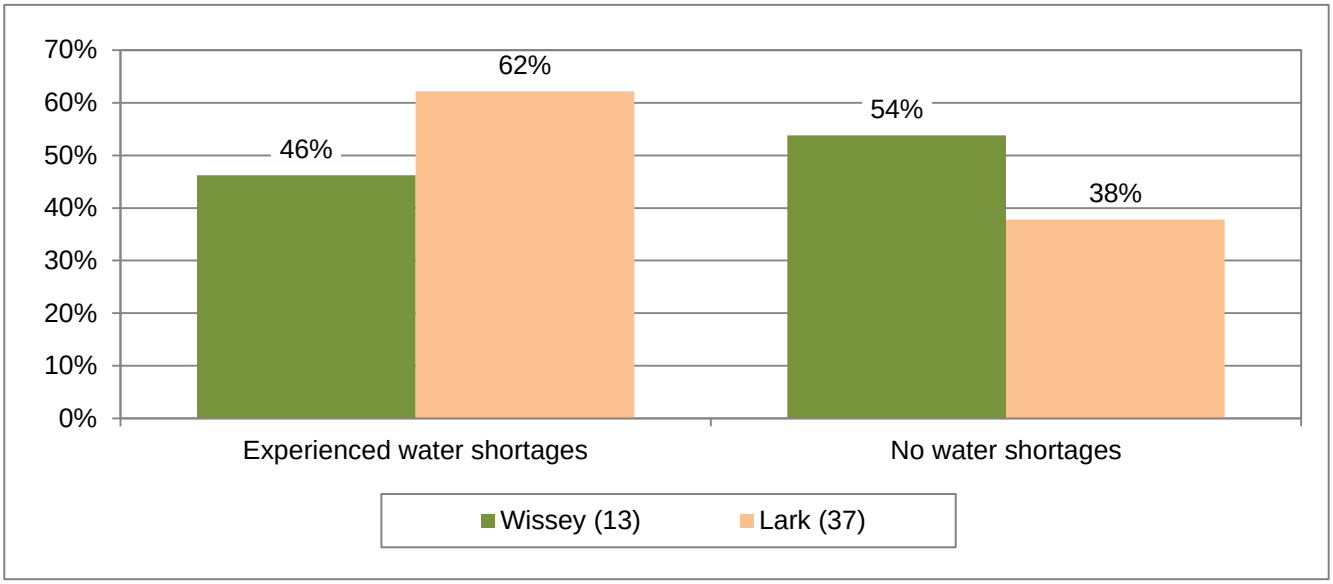
'We could feed it from the river. Where the farm is situated its sand, so we couldn't use boreholes because they kept filling with fine sand'

'We had no choice - we were stopped from using water from other means and boreholes were too expensive'

'We never had enough borehole water and needed to increase our capacity'

6.0 Water shortages during the dry period between 2010 and 2012

6.1 Impact during the dry period between 2010 and 2012



46% of respondents in the Wissey (6) and 62% of respondents in the Lark (23) experienced some form of water shortage during the dry period between 2010 and 2012.

6.2 Actions taken to manage the effects of any water shortage on your farm business during this period?

Some of the actions taken across both catchments to manage water shortages during this dry period are summarised below:

- Increased reservoir usage
- Changed crops
- Downsized crops
- Prioritised irrigation of different crops
- Night irrigation
- Applied voluntary restrictions
- Moved grazing elsewhere
- Used more accurate and efficient equipment, for example booms instead of rain guns
- Reduced application of water given to crops
- Adjusted winter abstraction period/extended licence dates

Respondents' comments for both catchments relating to the actions they took follow.

6.2.1 Lark (23 respondents)

'We extended the use of our reservoir and where we could use the water. We have more booms rather than rain guns which are more efficient. We have more probes to assess water in the soil. We altered the way we grow potatoes so there is not so much surface area in the lower fields. We moved to drought tolerant varieties'

'We had days when we couldn't irrigate and we followed EA advice'

'In 2011 it was very difficult because we reached our limit of available water. All we could do was share water amongst all the acres that needed it. To make sure we could irrigate the whole acreage, we spread out our irrigation; we rationed it. We always monitor moisture, but without water it didn't make much difference knowing it was needed!'

'We irrigated at night. We eked it out and used best practice. We grow fewer crops where irrigation is critical now'

'We looked again at our cropping decisions, we had to stop irrigating which affected crop quality'

'Our reservoirs were almost completely empty. We downsized the crops'

'The water I pump from got low, and we had restrictions'

'There were voluntary restrictions in place, we adhered to them. But when we are working at our maximum irrigation capacity we have so much equipment to manage and move it is difficult to work only at night. When crop need passes its peak and irrigated area drops, we concentrate irrigation at night. Over time we have moved from rain guns to booms that allow us to use less water, but this upgrade not a direct consequence of 2011'

'We had water restrictions, we didn't irrigate in the day, we irrigated in the night. We abided by the restrictions'

'We just had to accept it - nothing much we could do'

'We managed water differently, but we still had some issues. We did a lot more irrigating at night/tea-time onwards with the majority of water going on at night. We put 3/4 inch on rather than 1 inch and tried to rotate faster'

'We moved the grazing elsewhere. At present we only have cattle, no arable'

'We put our water through booms which reduced runoffs, and only irrigated at night to avoid the heat of the day'

'We signed up to the voluntary 85% cap [15% reduction]. We have recently started using more soil moisture indicators'

'We stopped watering voluntarily to preserve water. We watered at night if possible, and we used a boom not a gun'

'We thought we weren't going to have any water left in the reservoirs. There was about 2m left at its lowest. We spread the timing of irrigation wider - instead of 7 days it was 9-10 days between runs'

'We used booms all the time and irrigated at night. Through the worst of it, we only irrigated night, so we didn't lose water to evaporation'

'We were on the Orange status for restrictions with EA. We irrigated at evening and at night to make it possible - I think we were allowed to use about half of our licensed volume. We looked at the crop and sometimes gave a little less water than the crop would ideally like'

'We were put on restrictions. We did some night irrigation'

'We were stopped from using surface water on one source, and our borehole was restricted so we had to prioritise crops that needed to be irrigated, those where we had a choice. We used water from all legal sources available to ensure our priority crops were watered first'

'We would have liked more water! We prioritised our irrigation policy, we felt we had to use the water and we just managed as best we could'

6.2.2 Wissey catchment (6 respondents)

'Water bubbled up out of ground here - if I take it out, it fills by a foot a night; in that summer it was down to inches'

'I eked out my licence by irrigating in the dark to stop evaporation and I bought a boom irrigator which is more efficient than a rain gun, it cuts down on evaporation and side wind blow and needs less water pressure'

'I adjusted my winter abstraction period. I got a temporary extension and I was allowed to increase my licence to fill the reservoir into April and May. This was with restrictions, but I could still abstract. I irrigated at night, and I restricted everything to various degrees and monitored more closely. I reduced amounts I applied a little, and I extended windows between irrigation a little'

'Minimal use on potatoes to get by the problem'

'Voluntary reduction by 50%'

'We bought three boom irrigators; they use less water and deliver more accurately'

6.3 Did you experience any differences in crop yields between 2010 and 2012 as a result of water shortages? If so, what was the approximate % difference compared to usual yields for each affected crop?

6.3.1 Lark catchment

17 out of the 23 farmers who experienced water shortages in the Lark also saw differences in crop yields as follows:

'20% reduction overall, but we weren't concerned enough to irrigate. I can't be sure which crops exactly, but I think it was wheat and oilseed rape'

'2011 was absolutely terrible down to as low as one tonne an acre on sandy land. Normally it would be 2.5 to 2.75 per acre, so it's a huge difference - about a 60% reduction'

'Around a 20% loss. For example the onions didn't bulk up the tonnage of the crop was reduced. The marketing is better now, as smaller onions can be marketed more effectively, so we can use a greater proportion of crop now. So the useable tonnage might actually be higher which masks the effect of lower yields, but the size loss was noticeable in dry years, because of reduced irrigation'

'I can't comment directly, but I think there was either poorer quality or lower yields. I can't make a percentage assessment for sure, but my experience in other similar situations would say that we probably lost 15-25%'

'I know they were lower, but I'm not sure by what amount'

'The crops that didn't get water, when they needed it were down in yield by about 10%'

'The water is prioritised to the vegetables, and they always get the water they need compared to others. The secondary crops suffer at about a 30% loss which is about 70% of the farm area. If I grew more vegetables it would be good for farm income but because of water restrictions it would mean that the overall yield would have to go down, so we manage with what is available. If I use water on vegetables, I don't gain overall if I use too much'

'We had a field of barley that yielded two tones an acre whereas we would usually 3.5 tonnes because we didn't irrigate it. We also lost overall quality of the non-irrigated barley, and this lowered the quality of the crop overall. It was dying so we irrigated what we could, and this was the main run. We wanted to prioritise potatoes and onions which we usually irrigate each year. We rarely irrigate cereals, but in 2011 we had to irrigate cereals'

'We managed it, wasn't too bad in the end. We planned for what we could manage'

'Yes, we had a reduction of 20% downwards on yield'

'Yes, 20% on some products'

'Yes, combinable crops were not irrigated so were 20-50% down on yield and we were short of available water so we didn't have enough so we partially sacrificed parsnips and carrots with a 20% loss of yield to accommodate this'

'Yes, but I don't know percentage'

'Yes, I don't know how much'

'Yes, we had a reduction of 40% on cereals, because we prioritised all vegetables. Vegetables were down about 10%'

'Yes, with spring barley, we were short of water and time, and we had spring barley that we couldn't reach with the booms instead of running the pipe down the fields. We left it irrigated and did it three times. We had well over a tonne and a half drop in yield. Every pull of the reel it was 20m shorter each time because of the angle - you could see easily where it had dried out'

'Yes. 10% mainly on potatoes, cereals suffered 10-15%. We took potatoes as the priority and so cereals suffered at the expense of potatoes'

6.3.2 Wissey catchment (six respondents)

All six farmers who experienced water shortages in the Wissey also saw differences in crop yields as follows:

'10% down on volume'

'20% drop'

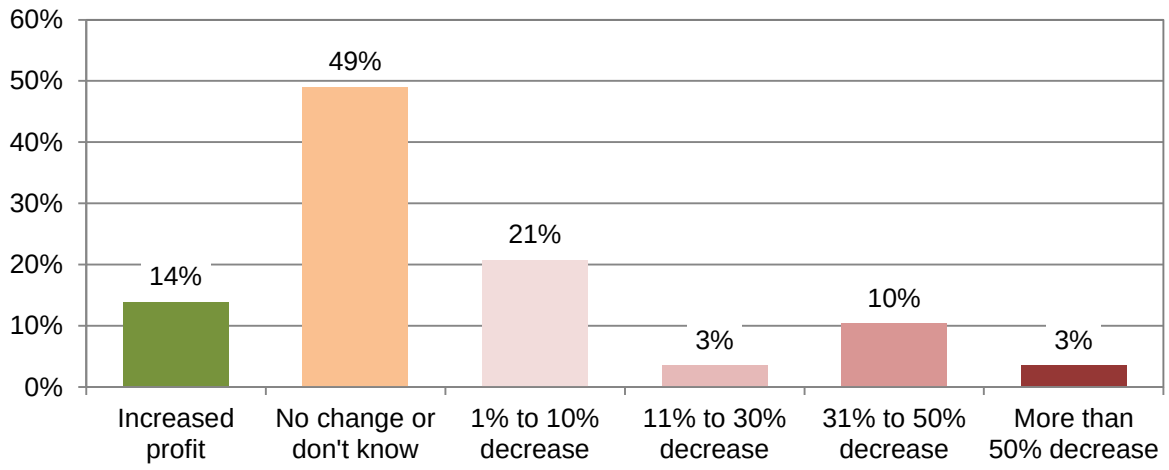
'No difference on irrigated crops, but some of the wheat and cereals were down by about 16%'

'Rhubarb crop down by 30%. Potatoes 15-20%'

'It depends on the crop. With the cereals I irrigated there was 100% difference – the cereals would have been brown or dead without the irrigation. Not the same as irrigating potatoes or carrots. I can't quantify potatoes in the same way as cereals. There would have been deterioration in potatoes, they need to be moist –that's vitally important. Appearance matters – a smooth skin for salad potatoes. So without irrigation they would end up as stock feed'

'Yes, a yield reduction of 12%'

6.4 Did you see any difference in business profitability between 2010 and 2012 as a result of water shortages?[3]



[3] Based on 29 respondents across both the Lark (23) and Wissey (6) catchments that experienced water shortages

37% of farmers who experienced water shortages reported that they also saw a decrease in business profitability.

However around half (49%) saw no change in profitability or didn't know if there was any impact and 14% even saw an increase in profitability – presumably due to increased output prices.

6.5 Which of the following have you carried out or are you planning to carry out as a result of the dry period between 2010 and 2012?

6.5.1 Lark catchment (23 respondents)

	Yes have done this	Is planning on doing this	Will or have done this but not as a result of the dry period	Will not be doing this	Not applicable	Don't know
Changing cropping to account for future dry periods	10	1	1	11	0	0
Investing in new irrigation equipment e.g. pumps, pipes, sprinklers	11	0	7	5	0	0
Improving water efficiency	15	1	1	6	0	0
Investing in reservoir capacity	3	4	0	14	1	1
Trading water into the business	2	0	0	17	1	3

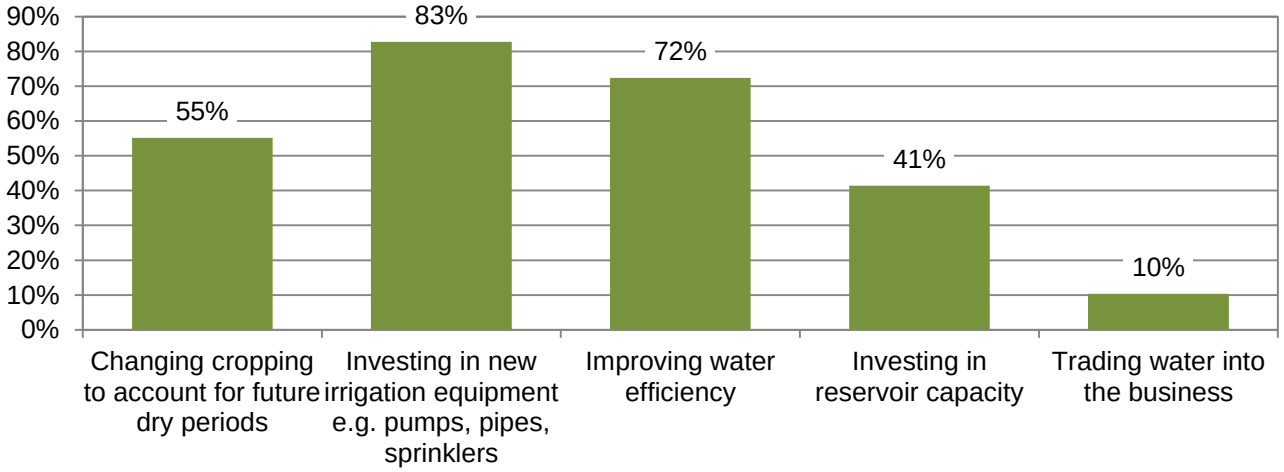
In terms of actions taken or planned as a direct result of the dry period, those affected in the Lark were most likely to have decided to improve water efficiency (16 respondents, equivalent to 70%). In addition, 11 members of this group respectively (48%) decided to change cropping and/or invest in new irrigation equipment.

6.5.2 Wissey catchment (six respondents)

	Yes have done this	Is planning on doing this	Will or have done this but not as a result of the dry period	Will not be doing this	Not applicable	Don't know
Changing cropping to account for future dry periods	0	1	3	1	1	0
Investing in new irrigation equipment e.g. pumps, pipes, sprinklers	3	0	3	0	0	0
Improving water efficiency	2	0	2	1	0	1
Investing in reservoir capacity	2	1	2	1	0	0
Trading water into the business	0	0	1	5	0	0

In terms of actions taken or planned as a direct result of the dry period, those affected in the Wissey were most likely to have decided either invest in new irrigation equipment and/or *invest in reservoir capacity* (three respondents, equivalent to 50%).

6.5.3 Actions planned or carried out across both catchments[4]



The above chart shows the proportion of relevant respondents that are planning on taking actions or have done so, regardless of whether these actions resulted from the dry period.

83% of this group are investing in new irrigation equipment; 72% are improving water efficiency and 55% are changing cropping. A further 41% are investing in reservoir capacity but only 10% are trading in water.

6.5.4 Number of actions planned or carried out across both catchments[5]

Number of listed actions carried out or planned	Number of applicable respondents	% of applicable respondents
None of the actions listed	3	10%
1 action	3	10%
2 actions	5	17%
3 actions	11	38%
4 actions	5	17%
All 5 actions	2	7%

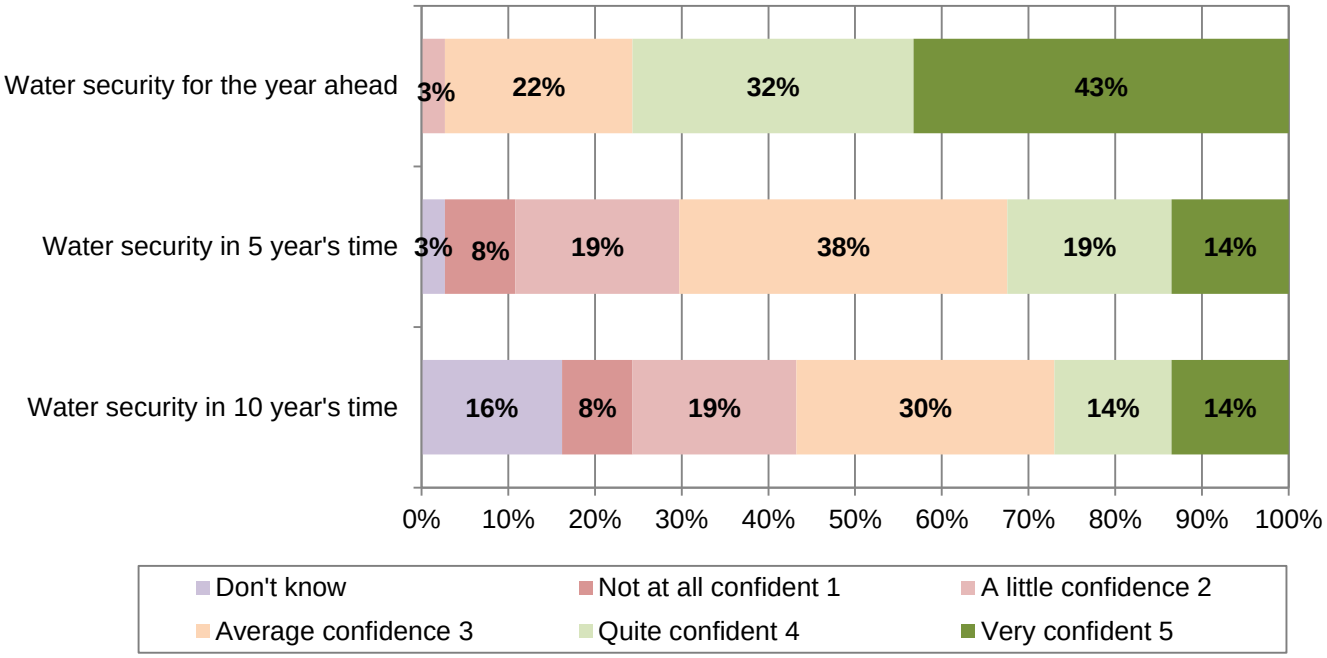
Again, regardless of whether actions resulted from the dry period, 90% of respondents affected at that time have decided to a carry out one or more of the listed actions and 62% have decided to carry out between three and five actions.

[4] Based on 29 respondents across both the Lark (23) and Wissey (6) catchments that experienced water shortages
[5] Based on 29 respondents across both the Lark (23) and Wissey (6) catchments that experienced water shortages

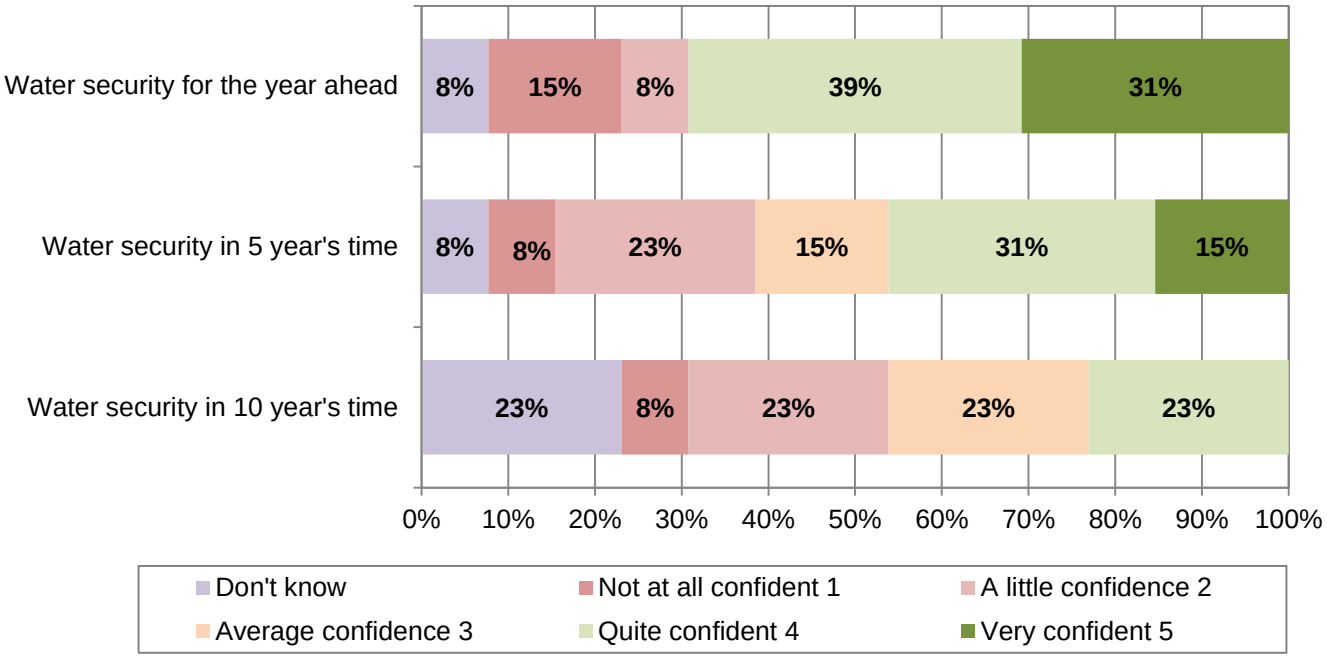
7.0 Water availability

7.1 How would you describe the level of confidence you have in terms of water availability now and in the future?

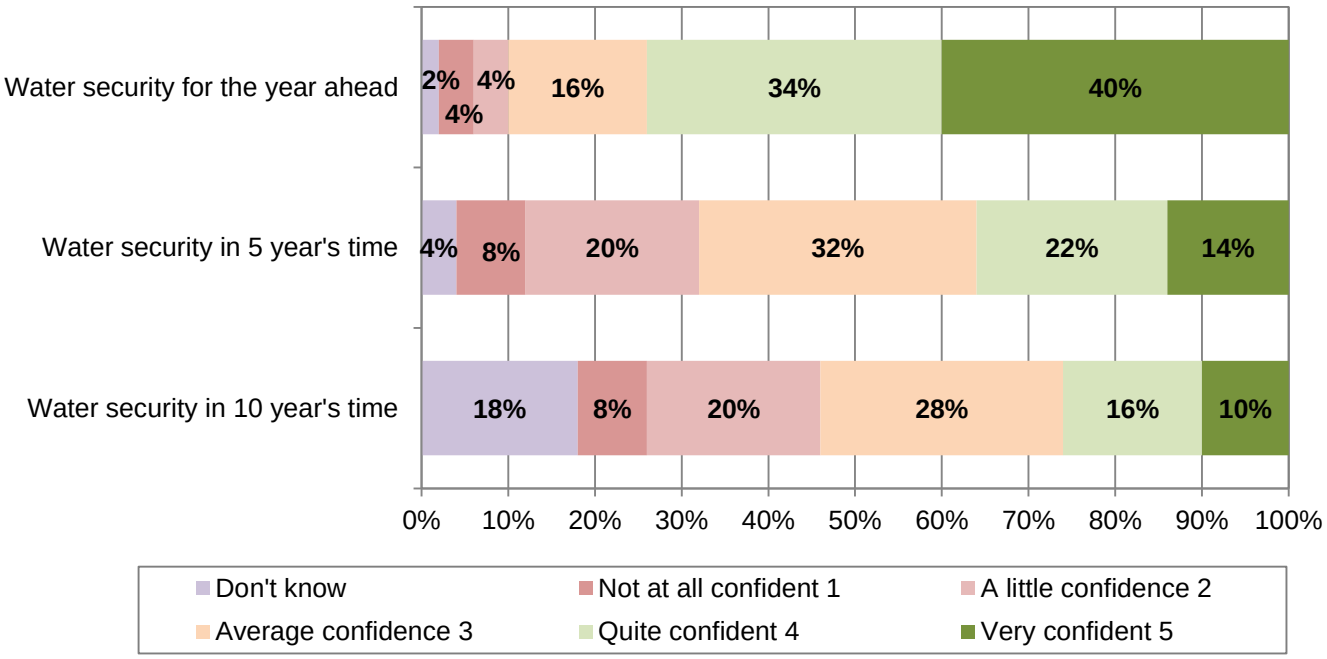
7.1.1 Lark catchment (37 respondents)



7.1.2 Wissey catchment (13 respondents)



7.1.3 Wissey and Lark catchments combined (50 respondents)

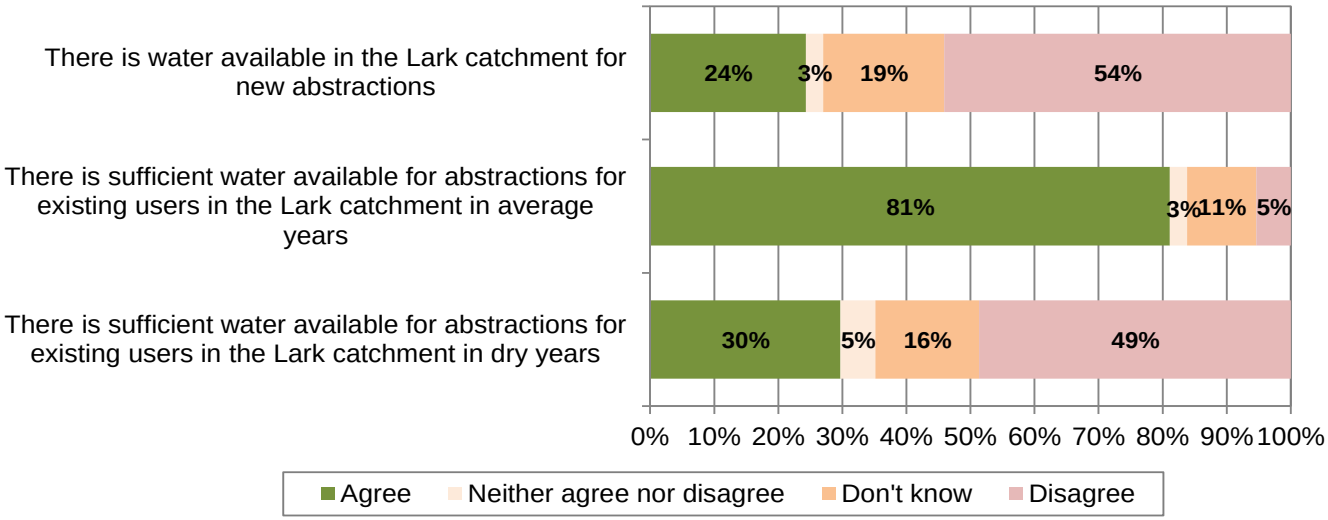


In terms of the year ahead, 74% of respondents across both the Wissey and Lark are quite or very confident about water security for the year ahead.

For five years' time, the proportion of farmers that are quite or very confident in terms of water security drops to 36% and for 10 years' time, this figure drops to 26%.

7.2 Views on water availability in relation to new / existing users and average / dry years

7.2.1 Lark catchment (37 respondents)

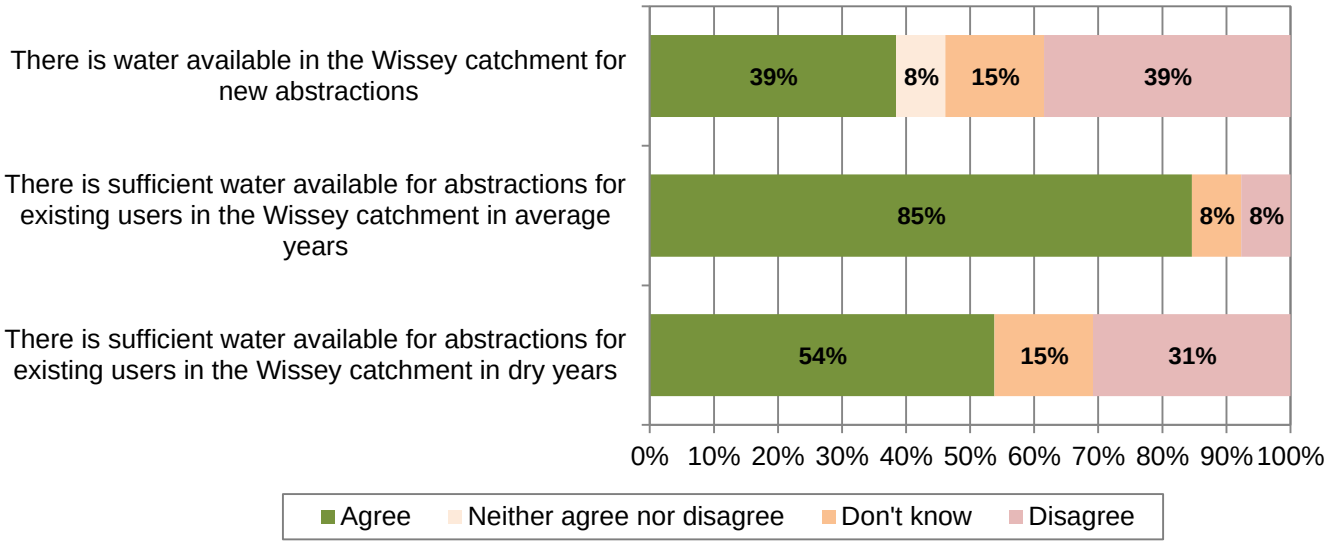


In terms of there being water available for new abstractions, respondents in the Lark were twice as likely to disagree as agree (54% compared to 24% respectively).

For ‘average’ irrigation years, the vast majority agreed (84%) that there is sufficient water for existing users.

For ‘dry’ years, respondents in the Lark were more likely to disagree than agree that there is sufficient water for existing users (49% compared to 30% respectively)

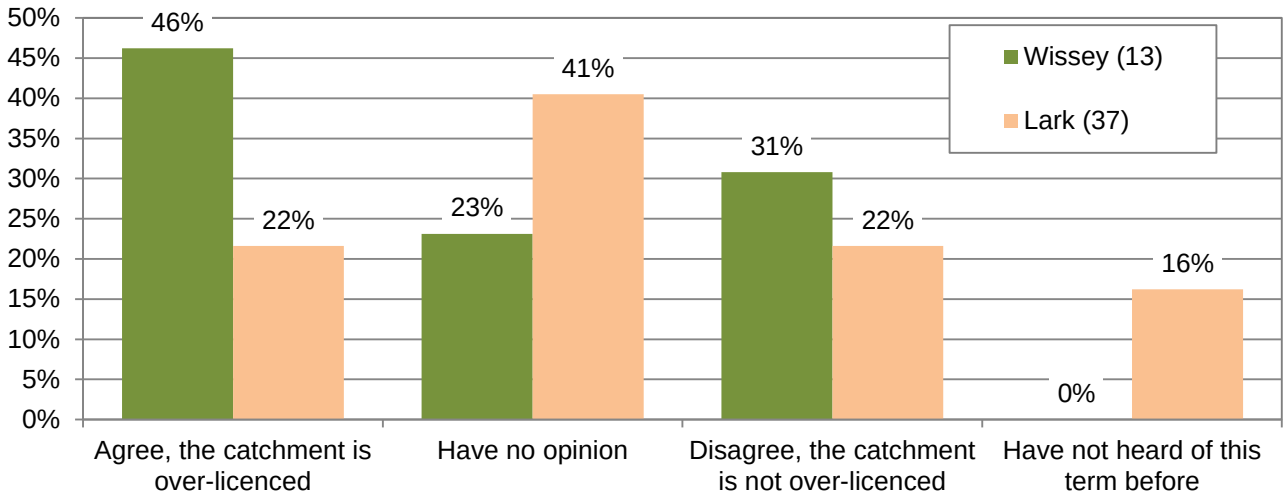
7.2.2 Wissey catchment (13 respondents)



In terms of there being water available for new abstractions, respondents in the Wissey were equally as likely to agree as disagree (39% respectively).

For ‘average’ irrigation years, the vast majority agreed (85%) that there is sufficient water for existing users. For ‘dry’ years, respondents in the Wissey were more likely to agree than disagree that there is sufficient water for existing users (54% compared to 31% respectively).

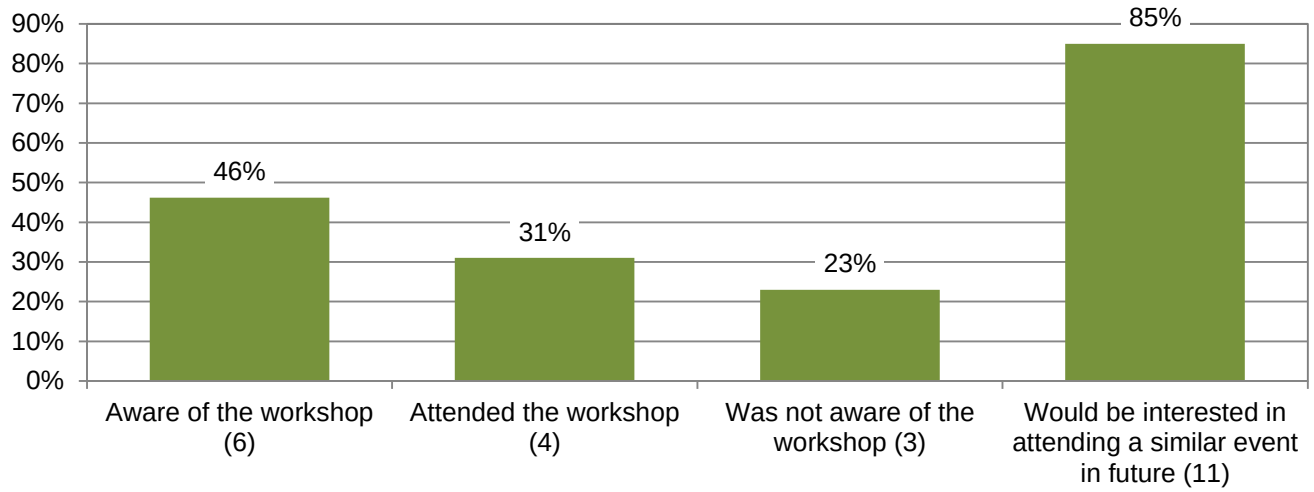
8.0 Views on ‘over-licensed’ status in the catchment



46% of farmers in the Wissey agreed that their catchment is ‘over-licenced’ compared to only 22% in the Lark.

16% of those in the Lark have not heard of the term ‘over-licensed’ before.

9.0 The Wissey Partnership group held an 'Irrigation Efficiency & Best Practice' workshop in May 2014. Were you aware of this workshop taking place & would you be interested in attending a similar event in the future?[6]



77% of respondents in the Wissey were either aware of the workshop (46%) or attended (31%) and nearly all respondents (85%) would be interested in attending a similar event in the future.

10.0 Is there any information you would find beneficial regarding irrigation and abstraction?

Below is a summary of all suggestions given by respondents across both the Lark and Wissey catchments in terms of what information they would find beneficial:

- Information on the value of traded water licences and how to trade water
- Trend information on how much water is licenced, how much is used and who is using it
- How to acquire more water/how to increase licence volume
- Even more advanced warning of abstraction restrictions
- River flow rate information
- Information on Environment Agency plans to mitigate against over-licencing
- Outcomes of the abstraction licence review
- A long term policy/long term information about water requirements

All suggestions are shown in full below for both catchments:

10.1 Lark (22 responses)

'No. The abstractor group is very on top of things and gives us a heads up when they need to. They have been pretty helpful in sorting out licence problems'

'Yes, value of traded water licences. I don't use my licence and could trade it, and would like information on current values'

'We get enough information through'

'It would be helpful to know more about what the EA plan to do about over licencing. What are the other options for us specifically to secure our water supply?'

[6] Based on 13 respondents in the Wissey catchment only

'No, I think you just need a sensible approach. We go on the condition of our fields, rather than blanket irrigation'

'A long term policy would be useful - reservoirs don't come cheap'

'I would like to know what is likely in the licence review'

'We don't have a full enough understanding of how much is used, compared to the full amount that has been licenced to be abstracted. If there is twice as much licenced as used, for example, and the total is too much, and they decide as a result, and they cut licences as a blanket cut, it would mean those that use the water would be disadvantaged. I think there is too much leaning towards environmental protection, and the safety margin is in their directions. There is not necessarily enough evidence, but we have no input into that decision and that makes them somewhat 'judge and jury' over water issues that influence us. In our region there is a general increase in activity and population growth. There seems to be a greater concern that public water supply is protected rather than agriculture being supported in its requirement for water. It feels as if farmers have more by number as licence holders but with smaller amounts and so we are easy pickings when it comes to restrictions and renegotiations. I mean in comparison to the water companies, for example. And so agriculture suffers. Utilising water in a wet year is important. We don't use as much as in a dry year, but we don't have an ability to store unused water. Summer water is relatively expensive, but if the country is short of water it would make sense if some financial incentive is given to constructing reservoirs to store water forward for another year. We find it hard to get financial support and a strategic investment is difficult, but very sensible. I could do with more information on that. An underground source is more expensive in summer and that's the only choice, so a reservoir storing it would be good for it to carry a lower tariff'

'We want to know ways to get more water if we can'

'I just hope they don't stop us from irrigating. If they do, I won't be able to make money from the land'

'We do get information and meetings and that is enough'

'Anything that is relevant I would like to hear more of'

'If we could know further in advance of likely restrictions it would be helpful, but I know it's difficult'

'I would like to more about flow rates - for example fortnightly. For example we haven't had rain for around the last month, and I don't know what the effect is for the long term availability for this year. I would like to know more about this'

'Yes interesting to see trends in water use regularly'

'My perception is that water trading is complex so I have considered it but not gone any further. My impression is that the level of abstraction use is high'

Yes, More information about all aspects of abstraction. I would like to have information about current situation and planning for the future'

'I would like to know more about how to increase the volume of our licence or how we can access more water for our land, as we are up to limit in average years already'

'No more than we already get'

'I don't know how to answer these questions; it is not a major part of our lives'

'There is quite a bit of information about. Season-long plans, but the weather determines what you do - if you know the weather it makes it easier'

'I'm a member of the Lark Abstractors Group which regularly meets with the EA. We have voluntarily restricted our abstractions and EA agrees not to compulsorily restrict our abstractions over and above what we voluntarily do'

10.2 Wissey (10 responses)

'I do everything I can to be efficient. I attended the meeting last May and I would attend another. I am upstream from the public water supply. I feel strongly that the water company gets priority and agriculture comes a poor second. I can only work with the flow I've got'

'Just make better use of water that runs out of towns. The buildings and houses are going up so quickly that water is running off concrete so quickly - I think we need to think about that. The EA have got strength but no legs to do anything - can we do anything about that? They are the authority. I find it very worrying that they can't do anything. We have Himalayan Balsam coming along the river banks- what is happening about that? The river has not been cleaned out for 10 years now.

'The Wissey has to get itself sorted out. The Meadows are flooding here when there are surges and it is not being caught'

'Personally no, but from the Wissey's point of view- the forecast of future deficits and surplus could be better. Getting better, but always can get better. Basically, it comes down to better forecasting'

'We could do with longer term information collection about water requirements. I am trying to cut down sometimes because I think I am being sensible and preserving water for later, but then they restrict the licence anyway which means sometime you feel as if you shouldn't have been so careful! We are pretty good at working out exactly what crops need so we don't waste water. For example, we give potatoes what they need. It's a bit unfair because for my risk management, the EA ask me to plan as if the worst 100 year event might happen, so provision is there for a 100 year pattern, and I have to plan as if the worst scenario will happen. But because EA water use seems to use a 5 year period, my water needs are assessed only on the last five years, and that could exclude a big dry period, so my use could be restricted because I haven't used much water in the last 5 years, then a really dry year could come up. I think the EA should use a longer time period to assess requirements. Where we are, there seems to be plenty of water where I am - we have never had any problem with actual water stopping or levels dropping, just that we are told we can't use it'

'We are in touch with the engineers who maintain our licence so we keep up with what is happening with abstraction, and the abstraction group are good at keeping in touch'

'I would like it to be known publicly how much each individual is pumping. Currently this is confidential. I would like this information to be in the public arena - who has got what?'

'We are well informed on most things to do with irrigation'

'Nothing I can't get from UKIA, they are pretty good'

'We watch the press and see whats going on, we are reasonably comfortable with what's going on'

11.0 Any finally have you any other comments to make about the topics discussed in this survey?

11.1 Lark (16 responses)

'With regard to falling revenue of business, it must have had an effect, but we absorb it and move on. We don't focus on it; we concentrate on the next year. We might use information about that year to change the way we do things in following years. I know that some of the bigger farm companies are using trickle irrigation, but it doesn't seem to pay off unless you are a big operator. We also have made an effort using booms to get a more even spread of water in the wind. Licences are being issued for three years rather than 10 so it concerns me that changes are on their way'

'We are considering building a reservoir, but we need technology to improve as the cost is too high for the benefit at the moment. Market prices went up in dry year, because other farms were affected worse

than us, so in fact there was no effect on us. Our yields were enough for us to make about the same as usual'

'Irrigation is irritation to me. I've every confidence that if I put a borehole down, I will have an abundance of water. I am in an area surrounded by springs. I had a digger for some work on my land and went to flatten a hill and water gushed out so much we had to block it again for fear of flooding the farm, so I don't think there is anything to worry about for me with water'

'Watering at night is difficult for bigger farms to manage because of moving equipment around. In small farms you can decide to do things in different hours'

'Providing they let the water out of the dykes if it is dry, and there is water in the river, and they let us take it instead of from elsewhere then things will be OK. They fill the dykes in the winter right to the top, then we get to the time of year when we need water, they get pumped dry but we are not using it. I am not sure where it goes, as we are not using this water. Several years ago, we saved water as advised to keep water available for the dry periods, but when we needed it, ie about now in the year (April/May) when it was dry, they withdrew the permissions. This seemed unfair as we had been careful not to waste it till then. It was in the dykes, but we were told not to use it when we had been careful precisely so we could use it which was frustrating and felt unfair'

'As the world moves forward, many of the questions regarding water will be less relevant. Big world events may mean that in three years time water might be the most important things for farmers. But then perhaps technology will move on and that won't be the case'

'Greene King brewers know very clearly how much they need year on year. Our need accelerates when there is least water available so we get a double impact in drought years. It would be good to find a way to smooth it. Agriculture has two-thirds of all the licences, but probably only 3% of the volume taken by abstraction, so it's easy to pick off farmers individually even though the impact is relatively small. I've managed to shift water volumes around to some extent which has helped. There is a food versus environment equation. I think the water is there but consideration of its environment impact needs to be considered as well in whether we are allowed to take it. We are using booms to manage irrigation which is saving water'

'The drought caused a potato shortage in many areas, so 2012 was one of our best years. The shortages resulted in increased profit for us'

'We are a diverse business and increases in prices on some crops due to the water shortage smoothed out some of the profitability issues of reduced yields We do more irrigation response trials to predict the best irrigation response for crops. So I can make a decision to irrigate where it has the best financial return. We have more moisture soil tests. The potential unfairness of restrictions of time limited users because of the EA's way of imposing reductions is a worry. There is a perception that they can't approach licence of right holders in the same way they can for time limited. I think they should delay this until abstraction reform happens and is implemented'

'Overall water is going to be one of the big problems in the whole of the Eastern counties, not just due to houses and everything but we are also a low rainfall area'

'My licence is being reviewed, depending what comes back may change my views drastically - if they were to cut me by 50%, for example'

'In the summer the borehole amount may run out, but then we use the winter-fill reservoirs. In dry years, we get so that we have only a small amount left in the winter fill reservoirs, but the borehole amount is used up. We have altered our practice now so that we dare not sell more than 50% of the barley crops in advance. I am only worried about what the EA may do in terms of licences or restrictions in the future'

11.2 Wissey (8 responses)

'Farmers need water to conduct their business and should not be sold to the highest bidder'

'There could be far better organisation than there is. If you contact the EA you are pushed from pillar to post'

'I think the EA are getting better at managing high levels of abstraction. I'm still concerned about public water supply which seems to be relying too much on ground water. We rarely use over 50% of what we are licensed to abstract. If the licensing levels were closer to the abstraction levels then the gap would narrow. It would free up more water to be abstracted elsewhere, and more licensing, but this could lead to over-licensing and over-abstraction'

'I would have bought new irrigation equipment anyway, but the dry period highlighted how essential it can be and this helped a decision to prioritise it over other spends. We are not actively seeking to do trade water, but if an opportunity were offered to me, I would consider it.

'I think more water should be available to agriculture but I can understand the EA needing to licence and to consider it over-licensed. I think agriculture should be a priority rather than the first to be restricted in a drought. I think the environment can be over-protected'

'When the EA looks at water provision, they don't go back to 1976, they work on a five year cycle so they judge that I haven't needed water say for five years, and then they restrict, when dry years can still come up, and the time period is far too short sighted to predict overall average usage'

'I'm more confident of supply from reservoirs in the future than boreholes as they are under a great deal of attack. There has been no public infrastructure for water built for years, that puts more and more of a load on borehole abstractions and there more and more public abstractions to top rivers up or to supply public housing areas'

'I never use full quotas in a wet year; winter pumping would solve all the problems. If we farmers use summer water we should be investing in reservoirs. Future confidence in water availability depends on climate'