ST ALBANS SCHOOL

13+ Examination 2016

GEOGRAPHY (90 minutes)

Surname	First Name

Date of Birth

Score Total

Instructions:

1. Answer **all** the questions in the spaces provided.
2. You are advised to spend approximately 30 minutes reading through the resource booklet. You may make notes if you wish.
3. Your written answers should take you approximately 60 minutes.
4. The number of marks available is shown in ( ) at the end of each question.
5. The paper is split into three sections:

   - ***Section A*** - shorter skills and knowledge-based questions.
   - ***Section B*** - consists of slightly longer questions
   - ***Section C*** - involves making geographical decisions. You are encouraged to evaluate options and give detailed justifications for your choice of option.

Answer ALL questions.

1 Study Section 1 (pages 2, 3 and 4) of the Resource Booklet and answer the following questions.

(a) (i) Define the term **aquifer**.

(2)

(ii) Outline how the Ogallala aquifer was formed.

(2)

(b) Study Figure 1a.

Describe the distribution of settlements in the Ogallala aquifer region.

(3)

(c) Study Figures 1a and 1b.

Examine the relationship between height and precipitation in the Ogallala aquifer region.

(4)

(d) Study Figures 1b and 1c.

Suggest why some states in the region are more dependent on the Ogallala aquifer than others.

(4)

(e) Explain how future climate change might affect the Ogallala aquifer.

(4)

(Total for Question 1 = 19 marks)

2 Study Section 2 (pages 5, 6, 7 and 8) in the Resource Booklet and answer the following questions.

(a) Study Figures 2a and 2b.

Outline **one** impact of centre-pivot irrigation on the environment of Nebraska.

(2)

(b) Study Figure 2c.

Describe the changes in the use of corn between 2001 and 2011.

(4)

(c) Explain the impact of irrigation on the economy of the region.

(4)

*(d) Resources are defined as renewable, sustainable or non-renewable.

Which type of resource is the water in the Ogallala aquifer?

Explain your choice.

(6)

Type of resource .....

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(Total for Question 2 = 16 marks)

*3 Study Section 3 (page 9) in the Resource Booklet.

Explain why the attitudes expressed vary so greatly.

(Total for Question 3 = 6 marks)

Spelling, punctuation and grammar will be assessed in your answer to this question.

***4** Study the three options for the United States government shown below.

Option 1: Encourage further development of intensive agriculture in the Ogallala aquifer region.

Option 2: Prevent any further development of intensive agriculture in the Ogallala aquifer region.

Option 3: Replace intensive methods of agriculture with more traditional approaches such as cattle ranching in the Ogallala aquifer region.

Select **one** option you think would be the best for both the **people** of the USA and the **environment** of the **Ogallala region**.

Justify your choice.

Use information from the Resource Booklet and your knowledge from Units 1 and 2 to support your answer.

(9)

Chosen option .....

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(Total for spelling, punctuation and grammar = 3 marks)

(Total for Question 4 = 12 marks)

TOTAL FOR PAPER = 53 MARKS

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13+ Examination 2016

GEOGRAPHY (90 minutes)

RESOURCE BOOKLET: 'The Ogallala Aquifer'

Instructions:

1. Read the information on the problem first.

2. You are advised not to write for the first 30 minutes, read and make pencil notes only during this time.

The problem

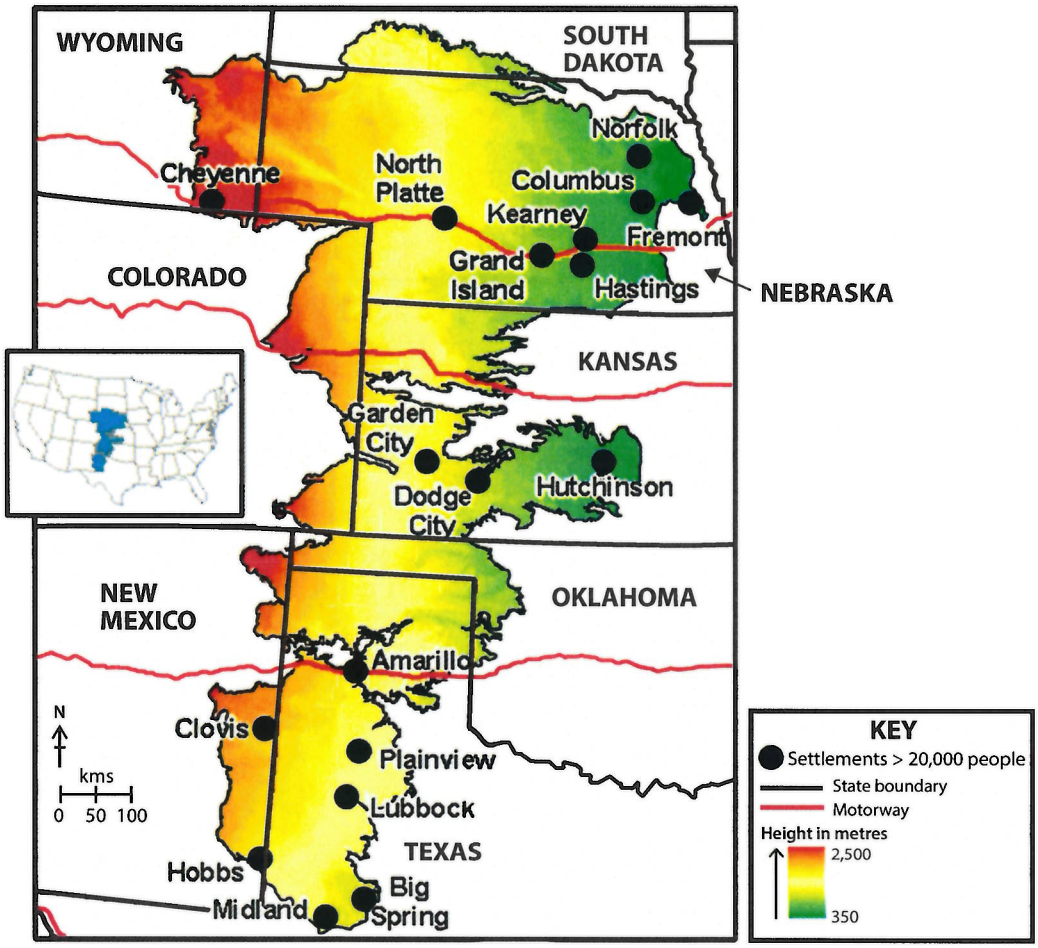
How should the United States government deal with its largest groundwater resource, the Ogallala aquifer?

- One view would be to increase the use of this resource.
- Another view would be to continue to use it at current rates without further development.
- Some people believe that use should be reduced to allow it to recover.

Information on the problem

SECTION 1 – An introduction to the Ogallala aquifer

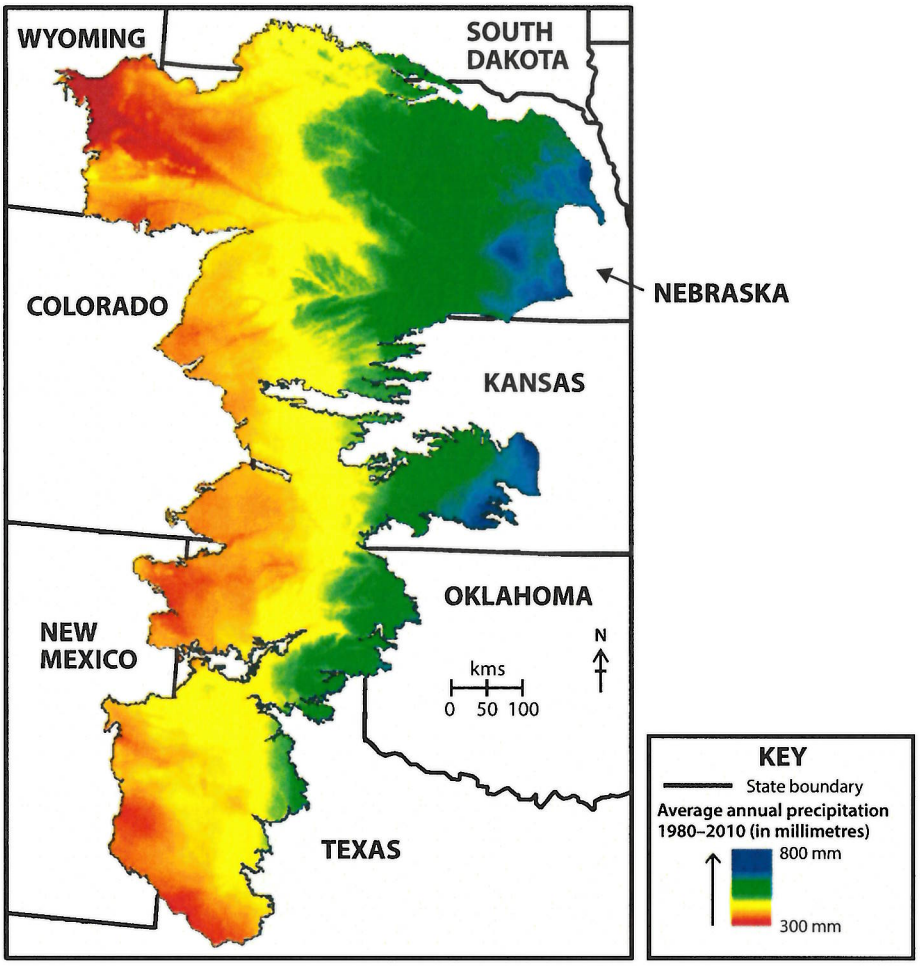
- The Ogallala aquifer is a large area of rock containing groundwater.
- It covers 450,000 km^2 in 8 states of the USA which is less than 1/20th of the land area of the USA but twice the size of the UK.



- At current rates of use the aquifer will disappear this century.
- With no use it would take 600 years to recharge completely.

Figure 1a

The Ogallala aquifer, its relief and its settlements

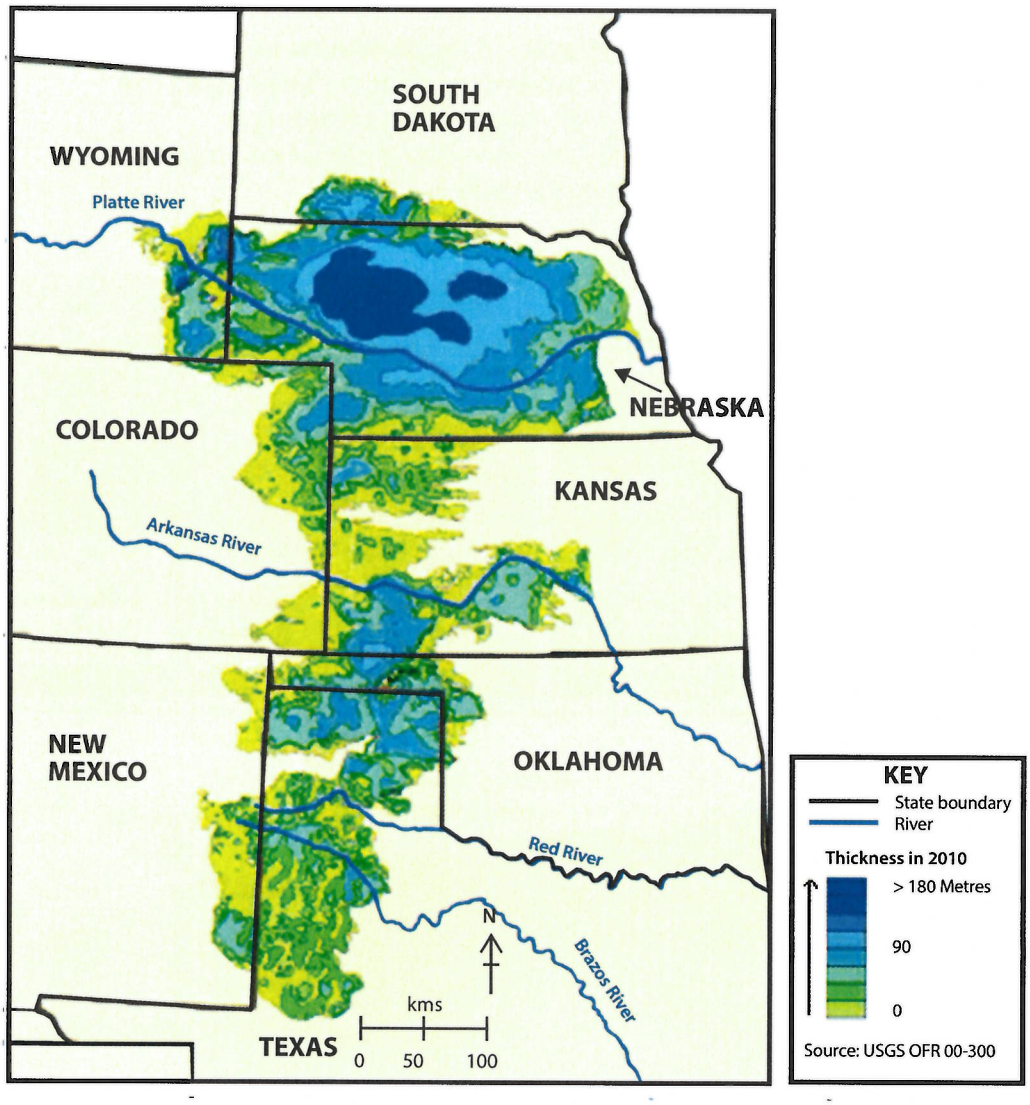


- The Rocky Mountains to the west of the aquifer region act as a barrier to weather systems from the Pacific.
- This means that the west of the Ogallala aquifer region is in a rain shadow.
- Future climate change is likely to reduce rainfall but increase temperatures over much of the area.

(Source: © USGS, © NASA Data)

Figure 1b

Average annual precipitation



- The top of the aquifer is between 30 and 100 metres below the surface.
- Its thickness varies between a few metres and over 350 metres.
- The water has been there since the last Ice Age when the climate was much wetter than today.

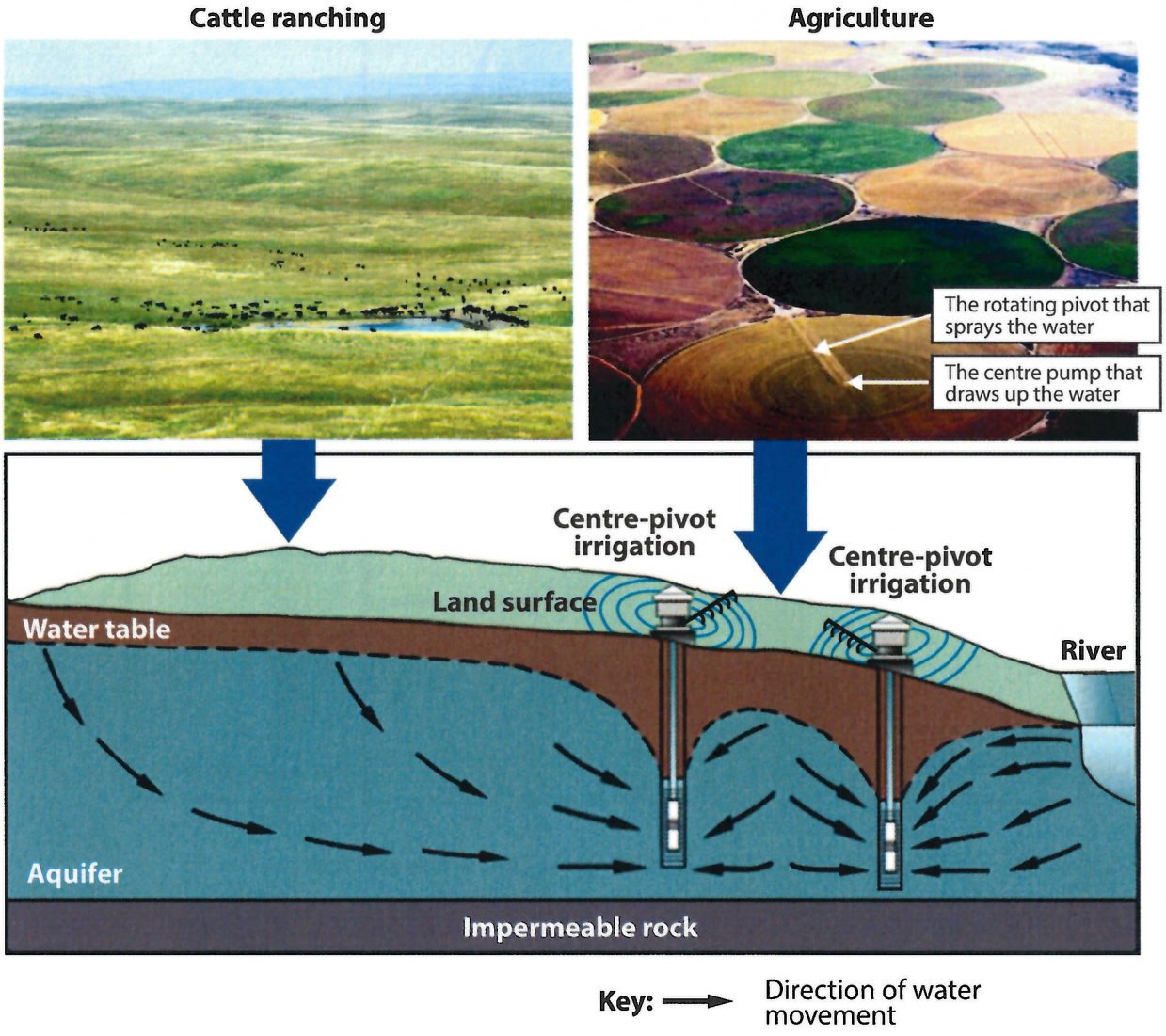
(Source: © USGS)

Figure 1c

The thickness of the Ogallala aquifer

SECTION 2 – The use of the aquifer

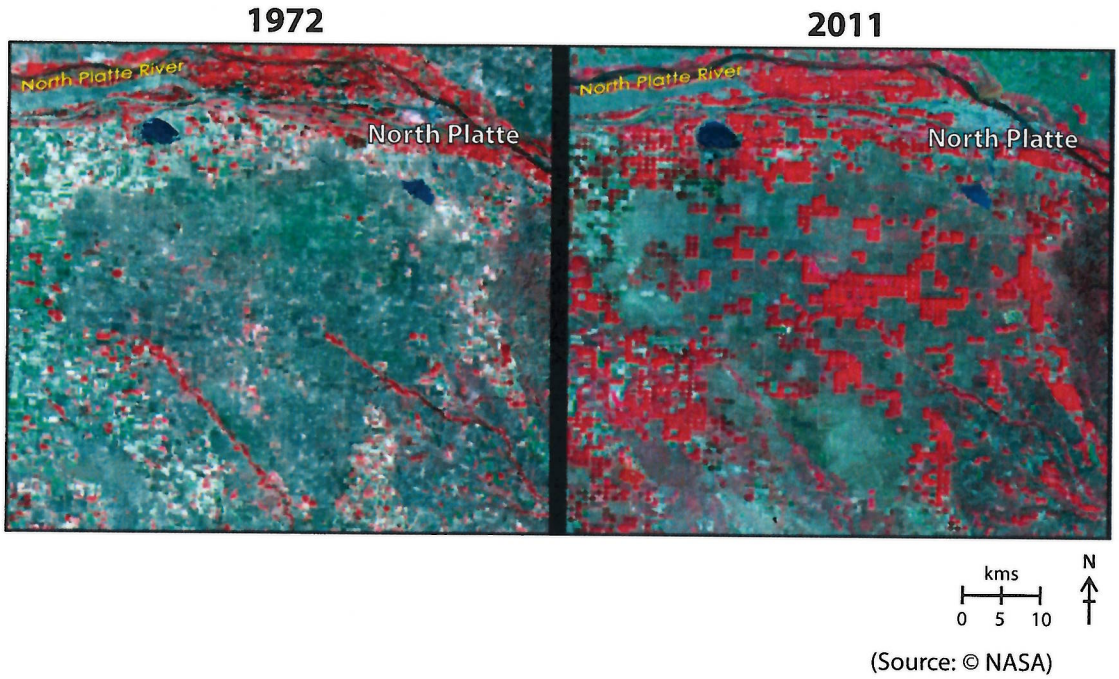
- Most of the towns were founded before the water in the aquifer was available.
- Until the 1960s cattle ranching on natural grasslands was the dominant land use.
- Today, land use is equally divided between ranching and arable farming.
- About 1.9 million people live in the Ogallala aquifer region and depend on its water.
- Income from arable farming is approximately $20 billion a year.



(Source: © US Department of Agriculture)

Figure 2a

The impact of centre-pivot irrigation in Nebraska



(Source: © NASA)

Figure 2b

The growth of centre-pivot irrigation in central Nebraska between 1972 and 2011 (each red dot is one centre-pivot irrigating up to 20 hectares)

- The US government heavily subsidises much of the agricultural production, especially corn and cotton.
- Some of the crops produced, such as cotton, are exported whilst most of the corn is used as cattle feed or made into ethanol, a biofuel (see Figure 2c).
- Most US beef cattle are raised on intensive 'feedlots' and not on traditional ranches.
- 25 million tonnes of corn would feed 100 million people for a year.

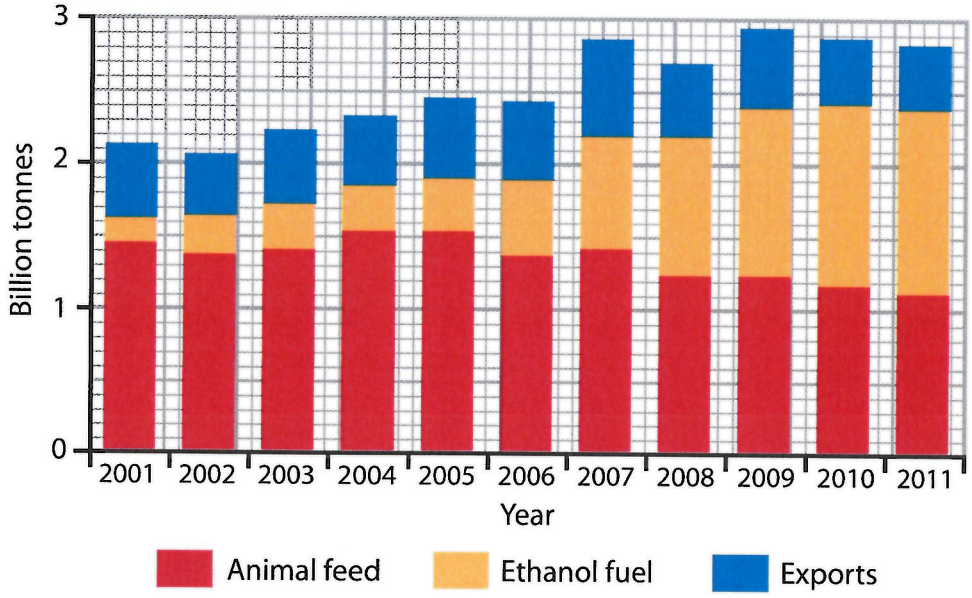


Figure 2c

The changing use of corn, 2001–2011

Product	Percentage (%) of total USA production
Corn (Maize)	20
Wheat	20
Cotton	19
Beef	18

Figure 2d

The contribution of the Ogallala aquifer region to total US production of selected agricultural products



Figure 2e

An ethanol fuelled 'Hummer', only 2% of cars in the US use ethanol



Figure 2f

A 'feedlot' raising cattle, which are fed on corn.
In the USA, people eat about half a pound of meat every day

Section 3 – Attitudes of local people to using the Ogallala aquifer

'If the water is there then we should use it – who knows what will happen in the future to solve these problems and who cares. It makes the USA a lot of money, keeps our cars running and puts meat on our plates.'

Clark – a shop owner and businessman from Dodge City in Kansas.

'It's a scandal – what we've done to this land. It was so beautiful and we've made it into a vision of hell, just look at the feedlots. We've spoilt the earth for those who follow us. We should stop now.'

Nancy – a school teacher and environmentalist from Cheyenne in Wyoming.

'The problem is the big corporations just grabbing the land to make more profits from crops that we don't even use right. Ranchers like me and local people don't benefit at all. In fact both the population and the aquifer is falling because of it.'

Wayne – a traditional rancher from North Platte in Nebraska.

'This is God's own country and he will look after us, the Lord will provide. We have to work as hard as we can to make money in this world with whatever we can use – water, oil, any resource. That is our duty.'

Jolene – a feedlot worker from Lubbock in Texas.