

SPATIAL CONNECT

Environmental management in rural catchments

Answers

Part 1: What are the geographic characteristics of the Woody Yaloak catchment?

Using data layers

1. Turn on the *Landcare networks* layer from the *Boundaries* category.


a) What is the name Landcare network represented in pink?

Woody Yaloak Catchment Group

b) Turn on the *Landcare groups (2015)* layer from the *Boundaries* category. Write down four Landcare groups that are found within this Landcare network (1a). Use the transparency slider to help you.

- Werneth Landcare Group
- Rokewood Landcare Group
- Misery-Moonlight Landcare Group
- Grenville Landcare Group

2. Turn on the *Corangamite soil-landforms (2003)* layer from the *Natural values* category and the *Group Boundary* layer from the *Background Information* category within the *Woody Yaloak Catchment Group (WYCG)* folder.

a) Click on the  icon and write down the owner of the *Corangamite soil-landforms (2003)* layer.

Department of Environment and Primary Industries (Vic)

b) Click on the various coloured regions within the catchment of the Woody Yaloak Catchment Group. Write down three of the landforms found within this region. Hint: Reducing the transparency of the *Corangamite soil-landforms (2003)* layer will help to see which landforms are located within the region boundary.


- Rolling low hills and ridges (e.g. Ross Creek)
- Gently undulating plains (Bradvale)
- Undulating plains and rises associated with Ordovician hills (e.g. Durham Lead)

Navigating the map and using the toolbar

3. Turn on the *Group Boundary* layer from the *Background Information* category within the *Woody Yaloak Catchment Group (WYCG)* folder. Using the area measuring tool, trace a polygon around the catchment boundary and calculate its area (figure 2).

Approximately 119000 Ha.

4. Turn on the *Imagery* map view. Zoom in to different parts of the catchment. What different types of land uses are visible from the satellite image?
- Rectangular blocks of land throughout the catchment representing agricultural land.
 - A large forested area in the centre of the catchment.
 - Tree lines following a linear pattern, most likely growing on the bank of creeks.
 - Sparse clusters of buildings in the north and south of the catchment.
5. Turn on the *Land use of Australia – 2016* layer from the *Background layers* category and open the legend from the toolbar (figure 3).

- a) Click on the  icon and write down the resolution of the data.

50 metres by 50 metres.

- b) When was the data published?

Wednesday June 22 2016.

- c) List five different types of land use found within the Woody Yaloak catchment.

- Rural residential and farm infrastructure
- Transport and communication
- Urban residential
- Nature conservation
- Cropping

- d) Describe the spatial distribution of these land uses. Consider how the types of land use vary throughout the catchment and which ones are grouped near each other.

The dominant land use within the catchment is cropping, dominating the western region and the southern half of the catchment. Transport and communication is distributed linearly throughout the catchment, representing the road network. There are three clusters of urban residential land use at Linton, Scarsdale and Smythesdale in the northern part of catchment and Rokewood in the south. Rural residential and farm infrastructure surround each of these urban residential clusters. There are three large regions of nature conservation in the northern and northeastern parts of the catchment.

- e) Compare land uses within this catchment with other nearby catchments. Discuss whether or not the distribution is similar.

The Leigh catchment is also dominated by cropping and other agricultural land uses. It contains similar sized clusters of plantation and production forestry. However, the Leigh catchment has a much larger urban residential and rural residential area in the northern region, focussed around the city of Ballarat.

Part 2: Environmental management in the Woody Yaloak catchment

6. Turn on the *Stream condition rating* layer from the *Background Information* category and open the legend. Describe how the condition of streams vary throughout the Woody Yaloak catchment.

Stream condition in the Woody Yaloak catchment varies from excellent to very poor condition. The majority of the streams are rated as moderate condition, especially in the lower part of the catchment. There are some pockets of excellent and good, especially in the upper reaches, however, the condition in the western and eastern part of the catchment is very low.

7. Choose two different streams in the Woody Yaloak catchment that contain a variety of different condition ratings.
- a) In the table below, list the name of the creek and the land uses associated with regions of different stream health from the *Stream condition sites* layer.

| | Stream 1: Pinchgut Creek | Stream 2: Woody Yaloak River |
|------------------|--------------------------|------------------------------|
| Stream Condition | Land use | Land use |
| Excellent/Good | Rural residential/bush | Rural residential |
| Moderate | Grazing sheep | Rural residential |
| Poor/Very poor | Grazing goats | Grazing cattle |


- b) Based on your findings, does there appear to be an association between land use and stream condition?

There does not seem to be a definite association between land use and stream condition. The higher water qualities both were found in areas where the land use was rural residential or bush and the lower water qualities were in areas of grazing. However, moderate condition occurred in both areas of grazing and rural residential which did not match this association.

- c) What additional information would help you confirm your answer to part b)?

An assessment of more of the sites and additional data for sites not included. Also, the nature of rivers flowing downstream means pollutants will be carried downstream, meaning downstream areas are likely to be more polluted irrespective of land use.

8. Turn on the *CWS reaches (CCMA 2014)* layer from the *Waterways and wetlands* category within the *Regional priorities* folder. The dark blue lines represent priority reaches. Environmental management activities have taken place within these reaches (figure 5).

- a) What does CWS stand for? Hint: Click on the  icon.

Corangamite Water Strategy

- b) Click on one of the priority reaches and view details. List:

i. The name of the reach

Little Woody Yaloak Creek

ii. Two threats to the reach (answers will vary according to stream and section chosen)

- Loss of Instream Habitat (Sediments)
- Invasive Fauna (Terrestrial)

iii. Two management activities that have taken place.

- Establish terrestrial pest animal control
- Establish native indigenous vegetation

c) Within the details section, click on *Full details from CWS* and open the PDF. What was the cost of these management activities?

\$1,861,000

9. Turn on the Waterwatch sites (Active) layer from the Monitoring category (figure 5).

- Choose two Waterwatch sites, one from a CWS priority reach and one from a non-priority reach.
 - Click on the two Waterwatch sites and visit the weblink to access the data portal.
- a) Use the data at the bottom of the website to fill out the following table summarising the site's water quality. If there are multiple measurements for this site then take the average of each column. (answers will vary according to stream and section chosen).

| Reach name | CWS Priority (Y/N) | Dissolved Oxygen (%) | EC $\mu\text{S/cm}$ | pH | rP mg/L P | Turbidity FTU |
|--|--------------------|----------------------|---------------------|----------|-----------|---------------|
| Misery Creek | Y | 88.15 (H) | 3265 (M) | 7.65 (H) | 0.08 (H) | 63.5 (M) |
| Woody Yaloak River @ Wilgul Werneth Crossing | N | 68.24 (H) | 4480 (M) | 7.5 (H) | 0.073 (H) | 26.3 (M) |

b) Based on the ranges, indicate whether each of the water quality measurements in your table indicate a high, moderate or low water quality by writing a H, M or L beside each value. High would be in the healthy range, low would be in the range that would cause damage to ecosystems and medium would be between those two levels.

See table above

c) Discuss whether the two reaches you have investigated have a high, medium or low water quality overall.

In most categories, both reaches were in the high range except for electrical conductivity and turbidity where both sites were in the medium range. However, when comparing them both, overall Misery Creek had a higher water quality, indicated by a higher percentage of dissolved oxygen and a lower level of electrical conductivity (salinity).

d) Based on these results, does the management undertaken in the priority reach appear to have had an effect on water quality?

The stream that has undergone environmental management does have slightly better water quality.

e) What additional information would help you confirm your answer to part d)?

Specific water quality data would need to be collected for more of the CWS priority and non-priority reaches and over a longer time period in order to get a more accurate representation of the catchment. Water quality data before and after the environmental management for specific sites over a long time period would also help assess whether the management has been successful.

Part 3: Environmental management in the Leigh catchment

- In one paragraph, summarise the geographic characteristics of the Leigh catchment. Include:
 - the size of the catchment and its location within the Corangamite region
 - examples of land use within the catchment and the way these land uses are spatially distributed
 - the shape of the landscape, referring to topography using the *LCG_Countours_10m* layer
 - major landforms found in the catchment including rivers and lakes.

The Leigh catchment covers over 167,900 Ha in the northern part of the Corangamite region. Land use in the catchment varies considerably. The northern part is dominated by a large urban area, Ballarat, surrounded by rural residential and farm infrastructure. There are pockets of plantation and production forestry throughout the central region but the majority of the middle and lower parts of the catchment is agricultural land. Shelford, Bannockburn and Inverleigh are small rural towns at the southern part of the catchment. Topography also varies throughout the catchment, with the northern part surrounding Ballarat being quite hilly while Ballarat itself is quite flat. Most of the central and lower parts of the catchment are relatively flat. The Yarrowee Leigh river runs through the centre of the catchment and smaller streams such as the Mia Mia Creek and Warrambine Creek are found on the western side. Einfield State Park and Ross Creek State Forest are located in the northeast of the catchment.

- Invasive weeds are a major issue for catchment management groups across Australia.
 - What are the common names of the two major weeds found in the Leigh catchment?

Blackberry and Gorse.

- In what part of the catchment are they found?

Predominantly in the northern part of the catchment although they do follow along rivers in the central part of the catchment.

- Does the location of these weeds appear to be associated with any particular type of landform or land use?

In the central part of the catchment they are associated with streams, distributed in a linear pattern along the banks of rivers and creeks.

- Choose one of these weeds and research the impact that it can have on the agricultural industry and the natural environment.

Gorse is a perennial shrub that grows up to four metres high and three metres in diameter. It reproduces prolifically by seed spread by seed ejection, transportation of soil, sand or gravel, livestock, birds, ants and water. Gorse has a negative impact on the natural environment, competing with young trees and shrubs and hindering the growth of native understorey species. A long-term effect of the plant's presence is that the soil becomes more acidic and loses nutrients. Gorse also has a large impact on agriculture, invading all pasture types and reducing grazing capacity. Furthermore, gorse is a haven for pest species such as rabbits, foxes and feral cats. Other impacts include reducing the value of land and increasing fire risk due to its flammability. Gorse is managed using a number of techniques including the application of herbicides, cultivation, physical removal and mulching.

- Read about the impacts of weeds and their management in the Leigh catchment here:

<http://www.leighcatchmentgroup.org/attachments/article/150/Weeds.pdf>

- In December 2015, a bushfire occurred within the Leigh catchment.
 - Turn on the layer representing the spatial extent of the Scotsburn fire and measure its area using a polygon.

4565 Ha

b) Read the following two articles about the fire and record five key facts such as the cause of the fire and the extent of the impact:

- <http://www.abc.net.au/news/2016-01-05/other-victorian-bushfire-aftermath-of-the-scotsburn-fire/7069426>
- <http://www.theage.com.au/victoria/victorian-fires-homes-lost-at-scotsburn-after-fires-tear-through-victoria-20151219-glrp0o.html>

- Grass fire at Scotsburn, 15 kilometres south of Ballarat
- 12 houses destroyed, 23 sheds destroyed as well as cars, tractors, trailers, fences and chookyards
- The fire was started accidentally by a landowner using a slasher on a very hot day
- 4000 Ha were burnt
- 300 firefighters were deployed along with 12 aircraft

c) Visit <http://www.leighcatchmentgroup.org/bushfire-recovery> and choose one of the management priorities following the fire such as fences, agriculture or river health.

d) What is the potential threat to one of these priorities following the fire?

The risk of weed invasion increases after a bushfire as it provides a window of opportunity for competitive weeds to take advantage of extra light, space, nutrients and moisture caused by the absence of desirable plants such as native vegetation, crops or pasture.

e) What management needs to be undertaken by landholders to reduce these potential impacts?

1. Monitor for new weed outbreaks.
2. As imported hay can carry in weeds, feed stock in small and localised areas so they can be regularly checked.
3. Take the opportunity to treat new weed growth that was previously difficult to access prior to the fire.