

Burrowing Crayfish

4. Freshwater Meadows



What are freshwater meadows?

How do burrowing crayfish help this ecosystem?

What environmental and evolutionary changes have occurred to help the crayfish adapt?

Lesson Overview:

In this activity the students learn about freshwater meadows. Freshwater meadows are important ecological communities. In Southwest Victoria these habitats provide temporary (ephemeral) ecosystems for 4-6 months of the year. This session highlights the importance of these ecosystems and how the burrows of the Burrowing Crayfish provide an important ecological role in keeping these systems healthy. Students create a cross section diagram of the Burrowing Crayfish habitat and explore the ecological role of the burrow as a part of a functioning ecosystem.

Key concepts: Ecological relationships, interdependence, ecological roles, ephemeral habitats.

Teaching strategies: 5 E model, group interactive strategies, cross section diagrams, annotated diagrams.

Equipment & Resources: cross section diagrams.

AUSVELS Curriculum Linkages: refer to the curriculum matrix for specific links from levels F – 10.

Activity Sequence:

- Engage:** Use the freshwater meadow picture to start the session. The typical freshwater meadow is sometimes described as the wet end of a paddock but is actually a functioning wetlands system. Scientists refer to it as Ephemeral meaning that it is sometimes wet and sometimes dry. This is a seasonal cycle and can vary from year to year. **Discuss** why might a freshwater meadow dry out? What other changes might impact on the moisture that the freshwater meadow can hold?
- Explore:** Divide the students into small groups of 3, provide each group with a copy of the freshwater meadow picture. Each team is to find different features of the freshwater meadow the categories they are investigating are:
 - The area/zone where plants are found?
 - The edge of the wet zone?
 - Burrows of the crayfish?
 - Places for aquatic creatures to live?Each group is to make a key to mark these areas into the freshwater meadow.
- Explain: As a whole class share** What did your group find out about the freshwater meadow? Could you identify the different features of the meadow? How did you mark this onto your map? Why do you think the burrow system is important in the freshwater meadow habitat?
- Elaborate:** Using the freshwater meadow picture as a guide, students create their own cross section diagram of the freshwater meadow. Including the key features identified in the previous activity. The students are to annotate their pictures to explain what is happening in the freshwater meadow ecosystem.
 - Burrowing Crayfish burrow. The burrow features are to be focused on as they contain the important ecological role. The role of the burrow is discussed in the Bookend trust Youtube clip.
 - <https://www.youtube.com/watch?v=-E5A5Ojs10Y>
 - Replay the clip to the students to give depth to their understanding about the role of the burrow.
 - Students draw a cross sectional diagram of the freshwater meadow.
- Evaluate:** Share the cross sectional diagrams and discuss key features and ecological role of the crayfish habitat.

ICT Extension: Explain Everything can be used as a digital tool to share student knowledge and integrated ICT skills.

Teachers working example:

Freshwater meadows background information:

The typical freshwater meadow is sometimes described as the wet end of a paddock but is actually a functioning wetlands system. Scientists refer to it as Ephemeral meaning that it is sometimes wet and sometimes dry. This is a seasonal cycle and can vary from year to year. This is the habitat of the Burrowing Crayfish.

Read the information sheet to familiarise yourself with the concept of freshwater meadows. The students are to complete one task in drawing the freshwater meadow with a cross section view to explore the interactions of the ecosystem.

Cross sectional Diagram:

The students are to draw a cross sectional diagram of a freshwater meadow adding in different components of the meadow and highlight the burrow structure of the burrowing crayfish. The template for the cross sectional diagram is contained in the unit.

Annotated diagrams:

The diagram will be annotated to show the students knowledge of the different parts of the ecosystem and provide a linkage with ecosystem processes. The process of annotation provides a way for students to explain their understanding of the ecosystems processes as they see them occurring.

Extension: Using the Educational App: Explain Everything after the students have completed their cross sectional diagram and the annotations have been discussed with the teacher.

Information sources: Freshwater meadow information sheets:

<http://www.ghcma.vic.gov.au/imageandfileuploads/Freshwater%20meadow.pdf>

Ecological functioning of the freshwater meadow:

Freshwater meadows act as biological havens for wildlife of all shapes and sizes, big and small. The amount of different living things in the freshwater meadow contributes to the biodiversity (number of different living things) of the area. Most species living in freshwater meadows have adapted to the seasonal variation that occurs in these habitats. They all have their different types of survival strategies, from laying eggs when the water begins to dry up so they eggs lay dormant in the soil until next rains (shield shrimp), flying away as most bird species do, or burrowing underground as the Burrowing Crayfish do. All of these adaptations provide an opportunity for biologically diverse communities to exist. In a non-permanent or ephemeral ecosystem.

One of the main creatures that remain in the freshwater meadow permanently through out these seasonal cycles is the Burrowing Crayfish. Underground the crayfish as carefully constructed burrow systems that are in -tune with the natural seasonal cycles and require continual maintenance. The burrowing crayfish need a moist environment to live as they have gills not lungs to breath. However the burrowing crayfish cannot live in a full aquatic ecosystem as the gills have adapted over evolutionary time to function optimally when moist not wet. The extraction of oxygen over the gills is optimal in moist environments. This biological feature requires the crayfish to live in a stable moist environment throughout the year. Over time natural selection has played a part in a defining an ecological niche specifically filled by the Burrowing Crayfish . The burrowing crayfish has is adapted to a life underground.

The network of burrows allows the crayfish to excavate, aerate and move soil as the moisture levels in the burrow chambers change. If the ground water is rising the crayfish begin move to upper parts of the chambers. The burrowing crayfish begins to build mud pellets pushing them up to the burrow entrance and forming a chimney to stop water from coming into their burrow chambers as rain increases over catchment areas. This process allows an ecological function improving soil health, recycling and decomposing plant matter adding essential nutrients to the plants of the freshwater meadow.

Freshwater meadow: Cross section diagram

Your task is to create the features of the freshwater meadow and an appropriate key to show these features.

Key:

