Swan Canning River System Inquiry

Integrated Science Workbook

Name: _____

Site survey

Group: _____ **Date:** ___/___/_____

Site: _____ **Final score:** _____/ 50

1. Walk around your site using this table to record your observations. The questions in the table can give you important clues on how healthy the ecosystem is.
2. Write (and/or draw) your observations for each category in the column provided.
3. Then, using the scoring column, circle the number on the scale which best describes your site's condition.
4. When all the categories are completed, add up the scores to give you a total out of 50.
5. Use this score to give your wetland an overall rating.
6. If you can, photograph the site so that you have a permanent record and can see changes over time.
7. This is your groups' assessment of your site, and different groups may record different results, therefore, keep the photo/s with a copy of the site check.

Category	Observations	Score
1. Vegetation Look at the banks and the land near the waterbody. Can you see: • rushes or reeds in the water and along the banks • trees and shrubs surrounding the water and/or overhanging the water • large areas of lawn along the banks? Are the plants natural/native or introduced/weeds? (Use the plant ID charts.)		**0.** Lots of introduced plants/weeds, much clearing **1.** and/or lawn. **2.** Mixed native and introduced plants, some **3.** **4.** Mainly native plants. Little sign of **5.** human changes. Note: a common weed is the bulrush. A tall reed with flat leaves. Native reeds usually have
2. Water Record what the water in the waterbody looks like. • What colour is the water? • Does the water look frothy or scummy? • Is the water clear or cloudy (turbid)?		**0.** Milky brown or green colour with particles, **1.** scum or froth. **2.** **3.** Some colour and particles. **4.** Clear (can be colourless or **5.** stained brown).

Category	Observations	Score
3. Smell Sit by the waters edge and record any surrounding smells. If it does have a smell: • is it a natural (earth or plant-like smell) or • unnatural/chemical smell?		**0.** Very strong, unnatural chemical smell. **1.** **2.** **3.** Strong natural decaying (rotting) smell or slight unnatural smell. **4.** **5.** No smell/ natural smell.
4. Banks Look at the banks of your waterbody. • Are they covered by plants and stable or are there patches of bare ground with loose soil? • Are there any man made structures such as walls, concrete, or wooden boards? • Can you see any erosion or undercutting of the bank? If the water is flowing is it: • in a straight channel (like a drain), or • in a natural 'winding' stream with rocks, logs or sticks?		**0.** Bare, eroded (washed away) banks, or concrete walls. Water flows in a straight channel (drain). **1.** **2.** Moderately vegetated, some erosion. Creek channel 'winds'. Some rocks and sticks in the water. **3.** **4.** **5.** Well vegetated, stable banks. Winding creek channel with rocks and logs.
5. Animal Life As you walk around or sit by your waterbody what do you notice about animal life? Can you see/hear any: • insects buzzing around such as dragonflies or damselflies • fish, tortoises or bugs swimming in the water • birds or frogs? Do you notice any 'droppings' on the ground? (They could be from ducks, kangaroos, dogs etc).		**0.** No animal life visible at all, or dead animals visible in water. **1.** **2.** **3.** Only a few different types of animals found. **4.** **5.** Many different types of animals found.

Category	Observations	Score	
6. Litter Record any litter floating on or in the water, or on the surrounding land (this could include dog poo). • Look carefully at any reeds or plants in the water, litter often gets trapped there. • If you see any litter, are there any rubbish/recycling bins (with dog bags) nearby?		**0.** **1.** **2.** **3.** **4.** **5.**	Lots of litter, such as tyres, cans, glass, plastics and domestic animal droppings. Some litter. No litter at all.
7. Pipes and drains Look for pipes or drains leading into your waterbody. • Look at what is coming out of them (by smell and sight: don't touch or taste). • Record how many pipes or drains there are and what you think they are there for.		**0.** **1.** **2.** **3.** **4.** **5.**	Lots of pipes and drains. Some pipes and drains. No pipes or drains.
8. Land Use Look at the bigger area surrounding your waterbody. • How is the land being used that you can see? • What land uses are you aware of in the local area? (Google Earth can help with this, or look carefully as you travel to/from the site).		**0.** **1.** **2.** **3.** **4.** **5.**	Industry, agriculture and/or transport. Housing, commercial, and /or recreational. Low human use, in its natural state.

Category	Observations	Score
9. Human Use What do people often do at this place? Record: • any activities that people are doing in, on and around the waterbody now or • any that you know happen at other times • what people are doing to care for this site (e.g. bins, boardwalks, tree planting)		**0.** Motorised water sports, humans feeding birdlife. Or **1.** no evidence of people caring for it. **2.** Fishing, swimming, exercising domestic animals, picnicking. **3.** Some actions to care for it. **4.** **5.** Walking, rowing, bird watching, low human use. Or well cared for and managed place.
10. How do you feel? After having a good look around your waterbody, describe how it makes you feel. Do you feel that it is: • polluted or unpolluted • pleasant or unpleasant • interesting or boring • lively or dead • happy or sad • natural or degraded?		**0.** This place is a dump! **1.** **2.** **3.** I do not feel really good about this site, but we could make it better. **4.** **5.** A great place to be!
TOTAL SCORE		

The greater the total score, the better the condition of your site. To see what this means, look up your score on the waterbody rating table below.

Score	0-9	10-19	20-29	30-39	40-50
Rating	Very Bad	Bad	Medium	Good	Excellent
Action	This place needs people to get involved and help improve the condition of the waterbody or start an action project.		Further investigation of this place is required and may include a water monitoring program.		We need to make sure this site is looked after for its long-term health.

This survey provides a good start to investigating a wetland or river ecosystem. To gain a more detailed knowledge of your wetland you could conduct studies of water quality, macroinvertebrates and other animals or plants over a longer period.

Water quality testing data sheet

Date: _____   **Time:** _____

Location: _____

Observations

Weather conditions *(circle the most appropriate)*:

cold   warm   hot

sunny   partly cloudy   cloudy   very stormy

still   gentle breeze   Moderately windy   Very windy

Environmental conditions:
Make some notes about the environment. Are there lots of trees and plants? What does the water look like? If it is a creek or river, is the water flowing? Is there much litter around?

_____

_____

_____

_____

Results

TEST	UNITS	SAMPLE A	SAMPLE B
Temperature	°C		
pH			
Salt	mS/cm		
Turbidity	NTUs		
Dissolved Oxygen	%		
Phosphates	ppm / mg/L		
Nitrates	ppm / mg/L		

CONVERSION 1mS = 1000µ

Interpretation

Look at the ANZECC trigger values and describe how your results compare to those.

	ANZECC trigger value for this site*	**How our result compares** (OK, higher, lower?)	**Other information** on ranges and status
pH	7.5 – 8.5[1]		• 6.5 – 8.5[1] = normal • 4 – 6.5 and 8.5 – 9 = may be polluted • ≤ 4 or ≥ 9 = pollution likely
Salt (Electrical conductivity) mS/cm	Not applicable to estuarine environment		• <0.9 = fresh • 0.9 – 2.7 = marginal • 2.7 – 9.1 = brackish • >9.1 = saline
Turbidity - NTU's	1 - 2		< 15 = very clear > 30 = high turbidity; light penetration into water column affected
Dissolved Oxygen % saturation	90 – 110 % saturation		When water is %100 saturated there is equilibrium between amount of oxygen entering and leaving the water
Phosphates ppm mg/L	0.005		WA wetlands are naturally low in nutrients, so small quantities can have large impacts on ecosystems.
Nitrates ppm / mg/L	0.045		WA wetlands are naturally low in nutrients, so small quantities can have large impacts on ecosystems

*ANZECC Trigger Values are set by the Australian Government as a basis to establish ecosystem health
1 – pH of 8.5 is acceptable where there is limestone present

There are no guidelines for **temperature**. It is best to compare your measurements to previous data at this site and consider how the time of day or season may affect your reading. A change of 2°C in a 24 hour period can cause stress to aquatic organisms.

If you get a result that is **higher than the trigger value** it doesn't automatically mean there is a problem. It may mean that further investigation is needed to decide if there really is a problem or that some management is needed to avoid a future problem.

Conclusions

Write two – three sentences describing the water quality of this waterway.

_____

_____

_____

_____

_____

_____

_____

_____

The data you have collected is a "snapshot" of the water quality at this site. How might the results differ with time of day, time of year and presence of algae? Any other factors you think we would need to consider when interpreting our data?

_____

_____

_____

_____

_____

_____

What impacts would high nutrient levels have on the ecosystem at this site? Are there any strategies in place to reduce these impacts?

_____

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Estuarine Macroinvertebrate Sampling – Activity 4

Estuaries are home to many small animals without a backbone, called invertebrates. They include crustaceans, molluscs and worms. The presence and abundance of species adapted to different saltwater habitats provides an indication of the health of the ecosystem.

Abundance is the number of organisms represented in a particular ecosystem. The following rating has been developed to record species abundance:

1 = uncommon (<5 individuals)
2 = common (5–20 individuals)
3 = abundant (>20 individuals)

Diversity refers to the variety of different species found at a particular location. High diversity and species number indicates a healthy site. Low numbers and few species may indicate a problem with the ecosystem.

Name	Classification	Number present	Abundance Rating	Preferred Habitat

How many species did the class find in total? _____

Is this an area high in biodiversity or low in biodiversity? Explain your answer

_____

_____

_____

_____

What are some things that may have affected which macros you found and how many there were? Consider time of year (season); habitat; flow (or lack of flow) in a river; water level; land use in the surrounding catchment.

_____

_____

_____

_____

Macroinvertebrate data interpretation

Macro diversity
How healthy is your site?
These are very general guidelines and the factors listed at the bottom of the page should be considered when interpreting your data.

Number of different types of macroinvertebrates	Site health
0–5	This site is a very poor environment for aquatic macroinvertebrates.
6–10	This site provides an environment that only a few types of macroinvertebrates can live in.
11–15	This site provides a moderately healthy environment for many aquatic macroinvertebrates.
15-23	This site provides a fairly healthy environment for many aquatic macroinvertebrates to live in.

Factors to consider

When interpreting data it is important to consider why you have the result you obtained. Consider the factors which may have influenced what types of macroinvertebrates live at the site, this could include:
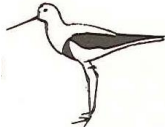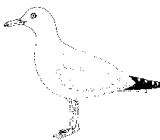- life cycles (some insect species may be in their terrestrial adult form, rather than aquatic larva),
- season (often invertebrates are less active in colder months; or water temperatures may be too high in summer),
- water flow (there may be low numbers in a stream after heavy rain as rapid flow may wash them downstream),
- vegetation (is there enough vegetation, in or near the stream to provide food and or habitat?)
- water quality
- the catchment (are there any possible sources of pollution surrounding the waterbody).

One of the best ways to interpret your data is to compare to:
- data from the same time in previous years
- data from the same site at different times of the year
- data from similar waterbodies in your area (i.e. different sites on the same stream, or nearby wetlands), or
- data from different waterbodies.

Interpretation should always consider which animals are (or are not) found at the site, how many, and try to explain why. Certain types of macroinvertebrates can indicate nutrient rich waters in WA, typically they are water fleas, snails, ostracods (seed shrimps), midge larvae and water boatmen.

Birds of our wetlands and waterways

Type of bird		Species identified (common names)
	Large water birds	
	Large wading birds	
	Ducks and Grebes	
	Water hens	
	Cormorants and darters	
	Small wading birds	
	Gulls / terns	
	Birds of prey	
	Bush birds	

Bringing it all together….

Our focus question: _____

A summary of our findings

Investigation	**Findings** briefly describe what you found out in your research: your conclusions for each investigation.
Site survey	
Water quality testing	
Macroinvertebrate sampling	
Bird survey	
Overall findings What general conclusion can you reach about this site: what is the answer to your focus question?	

Reflection and planning

Positives: what are some of the good things about this place?			
Threats: what are some things that are happening in and around this place that may affect it negatively in future?			
Goal: ten years from now...how would you like this place to be in ten years time?			
Action: what needs to happen to reach this goal?	What can people do as individuals (at home / work etc)?	What can be done by communities (as volunteers etc)?	What can local or state governments do (and how can individuals get them to act)?
Priorities: what are the best things our school (or class) can do to help?	1 2 3		