

Year 12 Geography

Ecosystem @ Risk in the Nepean River

First hand investigation ('on water' and land based)

Key inquiry question : Is the Nepean River ecosystem at Risk @ Devlins Lane?

Students:

- assess conditions for canoeing in the Nepean River @ Devils Lane (risk management)
- conduct an investigation into at the risks to the Nepean River @ Devlins Road, including:
 - water quality testing
 - invertebrate survey
 - 'on water' observation of ecosystem features - flora and fauna
 - 'on water' observation of potential risks to ecosystem - flora and fauna.
- make conclusions about their findings to decide if the Nepean River @ Devlins Lane is at risk?

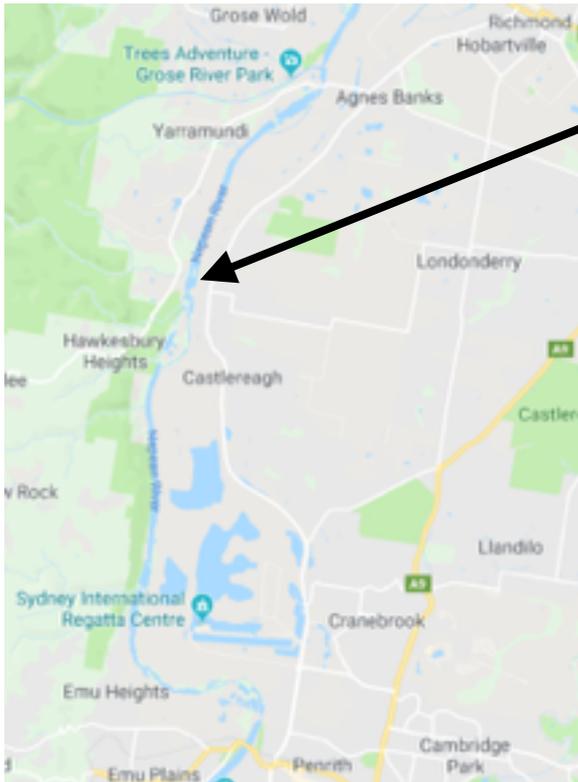
Student Name: _____

Case Study: Nepean River @ Devilns Lane

Investigation into at the local ecosystem. Primary research is undertaken on 'water' (in a kayak) and on land.



1. Introduction and Risk Management (in the classroom)



The site : Devlins Lane is located midway between Richmond and Penrith. We are investigating health of and risks to the Nepean River at the end of Devlins Lane.

Activities around site: The water is used for recreation e.g. fishing and paddling. Farms always use the water for irrigation. Further downstream, Water is taken from the river to supply water to households and businesses in North Richmond.

Assessing risks for paddling today (use BOM website- Penrith weather station) :

When was the last rainfall? _____
 How much rainfall fell? _____
 What is the current temperature ? _____
 What the current wind speed and direction? _____
 What is todays general weather forecast? _____

 Is it safe for paddling today? _____

2. Is Salvinia, an introduced floating plant, a risk to this ecosystem? (investigation on land)

Preferred abiotic conditions for Salvinia growth (not all factors need to be present)	
Phosphate	Greater than 2 ppm.
Temperature	Between 20°C and 30°C. Not less than 10°C or greater than 40°C
pH	Between 6 and 7.7
Conductivity (Salts)	Less than 1000 ppm. Low salt content but can tolerate brackish water.
Light	High light intensity - above 10.000 lux
Flow rate	Still or slow moving water

Measuring abiotic (non living) data : Use the following instruments to conduct abiotic tests. Record results. Use these results to determine a 'risk' point score and rating for Salvinia.

Abiotic Factor	Instrument	Abiotic Factor	Instrument
Phosphate	Test tablet kit (ppm)	Conductivity	Total Dissolved Solids Scan (ppm)
Water Temperature	Thermometer (°C)	Light	Lux Meter
pH	Universal indicator paper (a number)	Flow rate	Observation (use your eyes)

Salvinia Risk Assessment Sheet									
Phosphate (nutrients): _____ ppm					Conductivity (salts): _____ ppm				
0 - 0.05	>0.05 - 1	>1 - 1.5	>1.5 - 2	>2	<500	501-600	601-750	751-1000	>1000
8	6	4	2	0	0	1	2	3	4
Water Temperature: _____ °C					Light : _____ Lux				
< 10	10-19	20 - 29	30 -40	>40	< 900	901-5000	5001-10000	10001-30000	> 30000
8	4	0	4	8	4	3	2	1	0
pH: _____					Flow Rate : Observation				
< 5.9	5.5 - 5.9	6.0 - 7.7	7.7 - 8.4	>8.4	Still	Little Flow	Steady Flow	Fast Flow	Rapid
4	2	0	2	4	0	1	2	3	4

Salvinia Risk Rating	
Total Point Score (TPS)	Salvinia Risk Rating (SRR)
24 - 32	Low
18 - 23	Moderate
12 - 17	High
7 - 11	V. High
0 - 6	Extreme

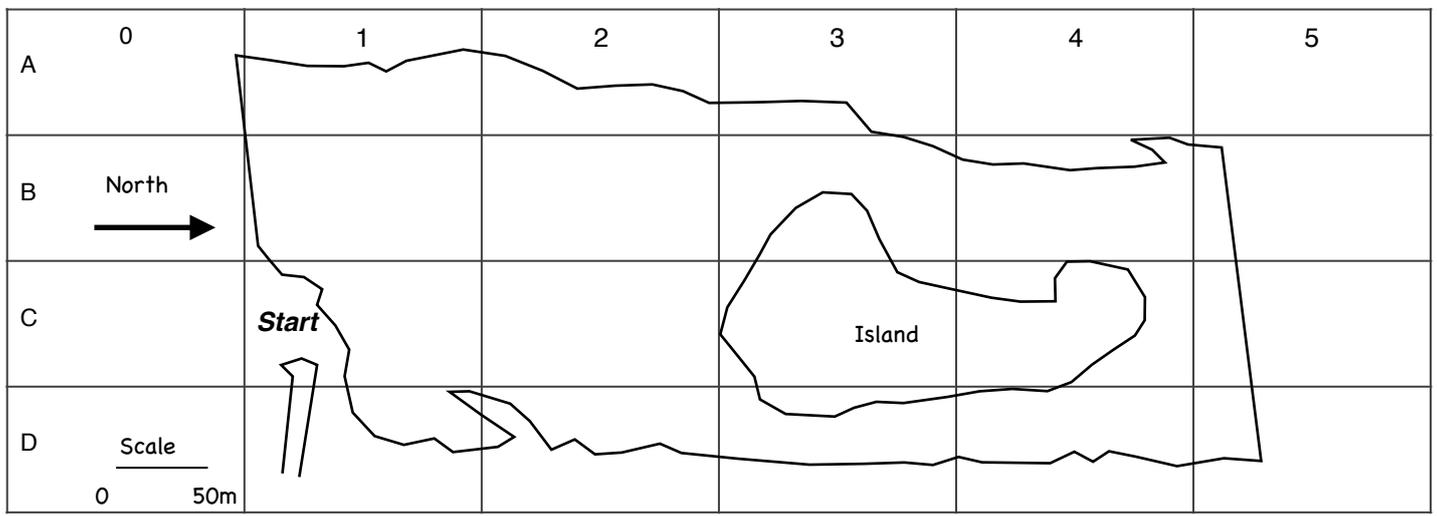
Your results

TPS	SRR

3. Dipnet along river bank to assess health of invertebrate life.

4. Paddle and Observation: (Results from this will be covered in wrap-up in classroom).

Using the sketch map of Nepean River at Devlins Lane and the key, mark in features observed on your kayak trip.



KEY		
Salvinia - S = 1-10 plants	Approx. Depth (m): <1 1 2 >2	Emergent plants - ep
Submerged plants - sp	Floating attached plants - fa	Other free floating plants - ff

Factors observed in the Biosphere

i) Tick, ✓, the **flora** identified during the trip (**N** indicates natives, and **I**, introduced):

- | | | |
|--|---|---|
| <input type="checkbox"/> Dense waterweed (I) | <input type="checkbox"/> Salvinia (I) | <input type="checkbox"/> Willows (I) |
| <input type="checkbox"/> Honey Locust (I) | <input type="checkbox"/> Pecan (I) | <input type="checkbox"/> Box Elder (I) |
| <input type="checkbox"/> Water Hyacinth (I) | <input type="checkbox"/> Balloon Vine (I) | <input type="checkbox"/> Caster Oil Plant (I) |
| <input type="checkbox"/> Alligator Weed (I) | <input type="checkbox"/> Lantana (I) | <input type="checkbox"/> Prickly Pear (I) |
| <input type="checkbox"/> She Oaks (N) | <input type="checkbox"/> Ribbonweed (N) | <input type="checkbox"/> Water Primrose (N) |
| | | <input type="checkbox"/> Azolla (N) |

Others _____

ii) Tick, ✓, the **fauna** identified during the trip (**N** indicates natives, and **I**, introduced):

- | | | |
|---|--|---|
| <input type="checkbox"/> Cormorant (N) | <input type="checkbox"/> Darter (N) | <input type="checkbox"/> Pacific Black Duck (N) |
| <input type="checkbox"/> Dusky Moorhen (N) | <input type="checkbox"/> Black Swan (N) | <input type="checkbox"/> Pelican (N) |
| <input type="checkbox"/> Eurasian Coot (N) | <input type="checkbox"/> Sea Eagle (N) | <input type="checkbox"/> White-faced Heron (N) |
| <input type="checkbox"/> Great Egret (N) | <input type="checkbox"/> Purple Swamphen (N) | <input type="checkbox"/> Mullet (N) |
| <input type="checkbox"/> Grey-headed Flying Fox (N) | <input type="checkbox"/> Carp (I) | <input type="checkbox"/> Mosquito fish (I) |

Others _____

iii) How many invertebrate species were found when dipnetting?

- None (*Poor*) 1-2 species (*Fair*) 3-6 species (*Good*) 7+ species (*Excellent*)

iii) What can the above tell us about the health of the river?

Nepean River at Devlins Lane - IMPACTS LOG			
Threats	Sources	Effects	Management (current or possible)
High nutrients - phosphates, nitrates	Fertiliser, soaps(car washing), overflow from septic tanks.	Algal blooms Invasion of weeds e.g. salvinia	Flow Reduce sources
Pollution - litter, petrochemicals, heavy metals, coliform bacteria	Urban areas, roads, domestic animals, overflow from septic tanks.	Compromised human, aquatic animal and aquatic plant health	Flow Treat at source/intercept flow e.g. Water Sensitive Urban Design
Aquatic weeds - e.g. salvinia, dense waterweed	Escape from farm dams/ponds and disused aquariums	Chokes out water bodies Excludes native plants Dead plants strip O ₂	Flow Reduce phosphate levels Harvesting, spraying
River Regulation - change to flow regime	Irrigation, dams and weirs, sewerage release	Reduces wetting and drying sequences, stagnation	Flow More regular flooding
Salinity	Irrigation raising the water table	Freshwater flora and fauna will not survive	Flow, reduce irrigation and plant trees