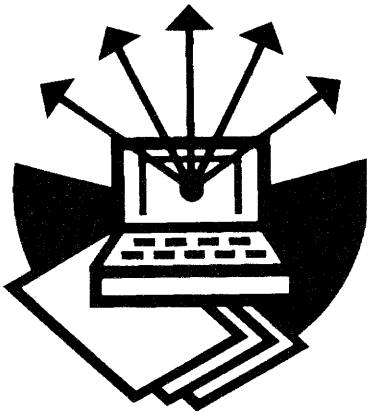


Appendix A - List of Contacts

Groups and Authorities involved in water management in Victoria

- **Environment Protection Authority (EPA)**

  Throughout the State, the EPA sets and monitors water quality standards.

- **Department of Natural Resources & Environment**

  The DNRE is responsible for preserving the conservation value of streams and wetlands and for controlling stream erosion on public lands.

- **Water Authorities**

  These semi-government bodies are responsible for supplying households with water and the treatment and disposal of sewage.

- **River Management Authorities (RMA's)**

  The care and maintenance of certain sections of Victoria's rivers is in the hands of 16 RMA's. These are sometimes called River improvement trusts or river management boards and consist of volunteer community members.

  All these authorities aim to protect and enhance rivers. They are moving towards whole-catchment management and are increasingly involved with community groups such as Landcare in their work of managing streams.

- **Catchment co-ordinating groups**

  These groups have been set up in some parts of Victoria to promote whole-catchment management by co-ordinating land and stream activities within a catchment. They bring together all the groups concerned with land and stream degradation issues.

- **Catchment and Land Protection (CALP) Council and Boards**

  The Catchment and Land Protection Council, established in 1994, is the statewide peak advisory body on the management of the State's land and water resources. There are also ten CALP Boards across Victoria. They have responsibility to develop community awareness programs and to prepare and implement regional catchment strategies. These strategies will build on existing regional Landcare Plans. A map of the CALP regions is shown on the following page.

Regional Waterwatch contacts

Statewide

Waterwatch Co-ordinator
Department of Natural Resources & Environment
6/232 Victoria Pde, East Melbourne 3002
ph: (03) 9412 4663
fax: (03) 9413 4049

Melbourne Metropolitan Area

Community Streamwatch Co-ordinator
Melbourne Parks & Waterways
378 Cotham Rd, Kew 3101
ph: (03) 9816 7038
fax: (03) 9816 6898

Other Victorian Waterwatch Regional Co-ordinators

Corangamite

Geelong ph: (052) 231 603
fax: (052) 295 459

Ballarat ph: (053) 203 157
fax: (053) 203 299

Colac ph: (052) 322 186

Glenelg

Hamilton ph: (055) 723 033 or
(055) 510 400
fax: (055) 725 215

Warrnambool ph: (055) 647 638
fax: (055) 626 670

Goulburn

Shepparton ph: (058) 320 460
fax: (058) 320 491

Mansfield ph: (057) 752 078
fax: (057) 751 484

North Central

Bendigo ph: (054) 393 157
fax: (054) 341 341

Kerang ph: (054) 510 159
fax: (054) 522 990

North East

Wangaratta ph: (057) 218 672
fax: (057) 217 527

West Gippsland

Briagalong ph: (051) 455 500
fax: (051) 456 900

Morwell ph: (051) 342 837

Meniyan ph: (056) 647 556

Warragul ph: (056) 278 532

East Gippsland

Bruthen ph: (051) 575 622

Orbost ph: (051) 542 560

Wimmera

Stawell ph: (053) 582 606 or
ph: (053) 581 588

Warracknabeal ph: (053) 941 273
fax: (053) 941 276

Catchment and Land Protection Regions of Victoria

October 1994

Appendix B - V.C.E. curriculum guide for water quality monitoring

Unit	Area of study	WR	Possible contexts and activities
Environmental Studies			
1	2. Environment impact	2 3	Practical report on statistics related to water quality. Local environment investigation of creek and water quality affected by activities in settlement.
2	2. Impact and conservation	2 3	Select Victorian environment in the catchment. Use catchment data to describe social, political and economic change Apply state government conservation policy to the waterway; or to landuses affecting the waterway.
3	1. Utilisation of the environment 2. Conservation of the environment	1 2 3 3 4	(CAT) The algal slug. } } Water as a resource; use of water; environmental effect. } Dams
4	2. Preservation of genetic diversity	4	Aquatic food chain/ecosystem - benthic - wetland ecosystem - swamps as affected by use, water quality and activities in the catchment.
Geography			
1	1. Natural environments	1 2 3	Drainage basin analysis and landuse. Field investigation of landuse along river. Research activity on segments of streams, aspects of pollution or effects on waterways.
2	1. Living conditions in Australia	1 2 3	History of landuse; change over time. Salinity-affected areas/management sites. Student survey of residents; monitoring data; mapping indicators.
3	1. Natural resource	1 2 3	Historical use of waterway and local geography e.g. settlement. Site visit to management experiment. (CAT 1) Research on one aspect of how landuse affects water quality
4	2. Local issue	1 2	Role play of contending views e.g. Tribunal hearing on a landuse proposal. (CAT 3) Collect field data on changes in landuse and effects on water quality.
Science			
1	2. Agricultural processes	Either 1 2 3	 - agricultural chemical flow into watercourses - erosion and effect on water quality Measuring water content, flow rates etc.
2	3. Microbiological processes	1 2 3	- microbiological activities in catchments - measurement of bacterial action etc. - oxygen level and microbial action

Unit	Area of study	WR	Possible contexts and activities
Biology			
1	1. Life in ecosystems	1	The river system as the major focus for a study of an ecosystem, and associated activities (environmental requirements, food, etc.)
	2. Change in ecosystems	2	Geological history of the basin; effect of human settlement.
		3	A number of issues (soical, technological) with a sound biological basis e.g. redgum regeneration, fish breeding, biological effects of salinity, etc.
2	1. Requirements for life	1	Red gum could be one of the organisms for study. Other river species can't be used to augment the study. Context: effect of salinity on plant transport systems.
	2. Reproduction and development	2	Requirement for reproduction, reproductive strategies of river organisms (flooding, water temperature, flow rates, etc.)
3	1. Cells in their environment	1	microscopic investigation of fresh water unicellular organisms (e.g. cyanobacteria)
	2. Surviving under changing conditions	2	- osmo and ionic regulation in freshwater species: effects of salinity - responses to changing environmental factors (river flow, salt, pollution levels, inundation etc.)
	3. Surviving challenges from organisms that cause disease	3	- fresh water 'nasties' and town water supplies provided by river. - mosquitoes and Murray Valley encephalitis. Ross River fever, etc; effects of drainage, agricultural practices on breeding grounds.
	4. Behaviour that facilitates survival	4	effects of human intervention, interference on behaviour of aquatic species
4	1. Genetic instruction and development	2	Breeding of saline resistant species
	2. Variation, natural selection & evaluation	3	biological versus chemical control of populations (context)
Chemistry			
1	1. River water quality	3	Collection and treatment of river water.
	2. Local water quality	3	Purification techniques - filtration, distillation.
	3. Waste materials	3	Measurement of water - Nitrates, Phosphates etc. in ppm, g/L, ppb via colorimetric means/investigation of types of wastes and their sources - biodegradable / non-biodegradable.
	4. Salinity	3	Monitoring of salinity levels in rivers, creeks, bores, channels.
2	1 Water as a solvent	1	Determination of solubilities
		1	Determination of dissolved oxygen
		2	Units of concentration g/L, g/100g
			Measurements of river water samples at regular intervals via colorimeter
	2. Molarity	2	The mole, concentration in mol/dus^3
			Dilutions.
		2	Conversions of ppm to mol/dus^3
	3. Reactions in water	1	Acids, bases, pH measurement
	4. Balanced equations	1	Precipitation reactions
			Polimetric analysis
	Water treatment	1	Treatment of domestic and industrial wastewater. Treatment of river water for domestic use. Hard and soft water.
	Media file	4	Collection and discussion of news reports on water pollution.
	Possible		Link to investigations of chemical of local importance - paper mill - tests for monitoring associated impacts - environmental controls on production

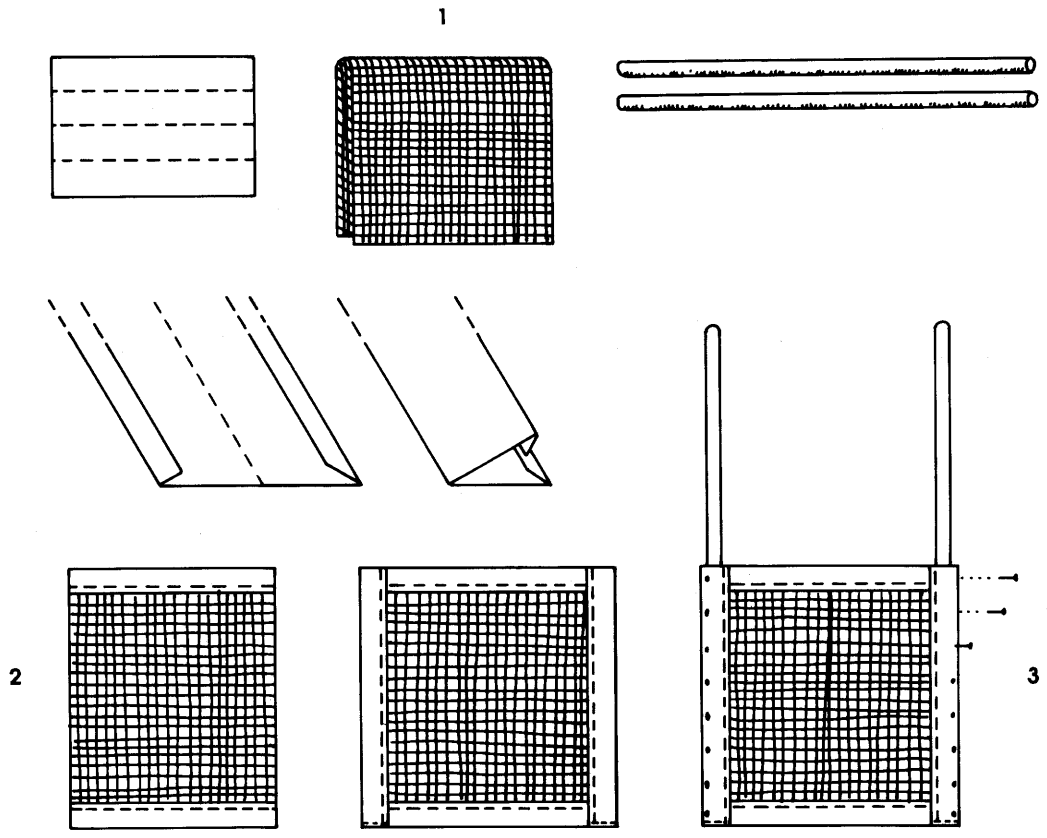
Appendix C - Instructions for making biological nets

Kick sampling net

The materials needed to construct a kick sampling net are:

- 1 m x 2 m piece of flywire screen netting with a gauge of 0.6mm spaces
- 4 strips of heavy canvas (20 cm x 1 m)
- 2 broom handles or wooden dowels (over 1 m length)
- nails, thread, sewing machine, hammer, and an ironing board with iron

1. Fold the flywire screening in half (1 m x 1 m), then fold the edges of all the canvas strips under, 1 cm, and press with the iron.
2. Sew two of the strips at the top and bottom and then use the other two strips to make casings for the broom handles on the left and right sides.
3. Insert the broom handles into the casings and nail into place with nails (see illustrations).

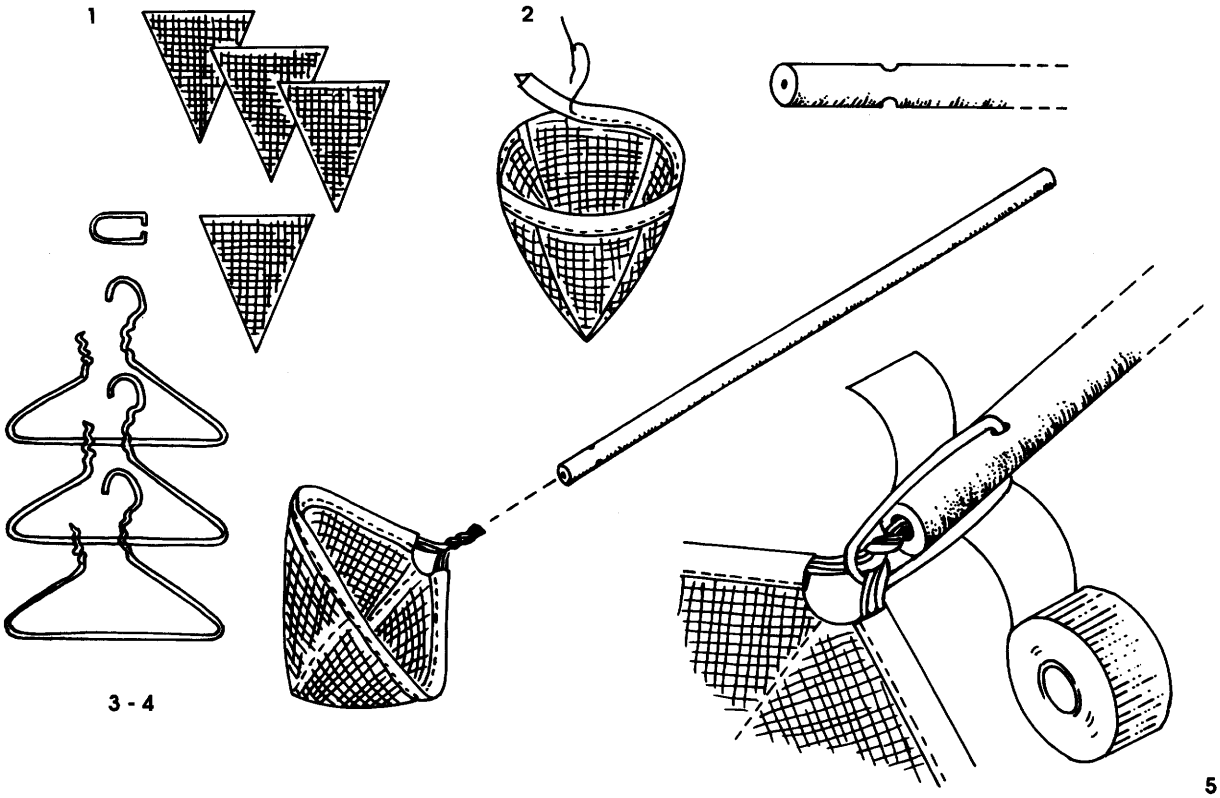


Sweep sampling net

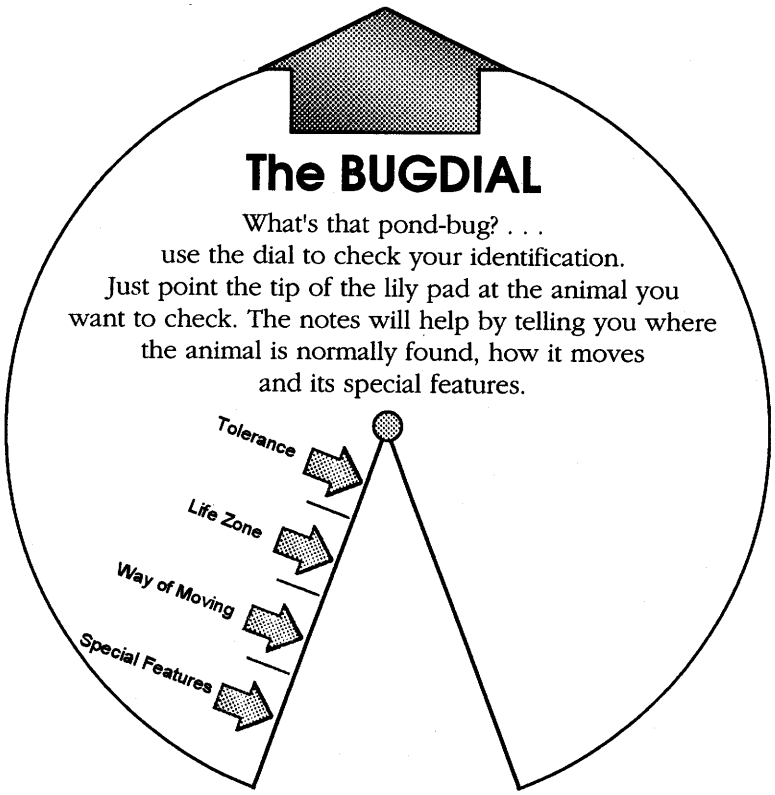
The materials needed to construct a D-frame net for sweep sampling are:

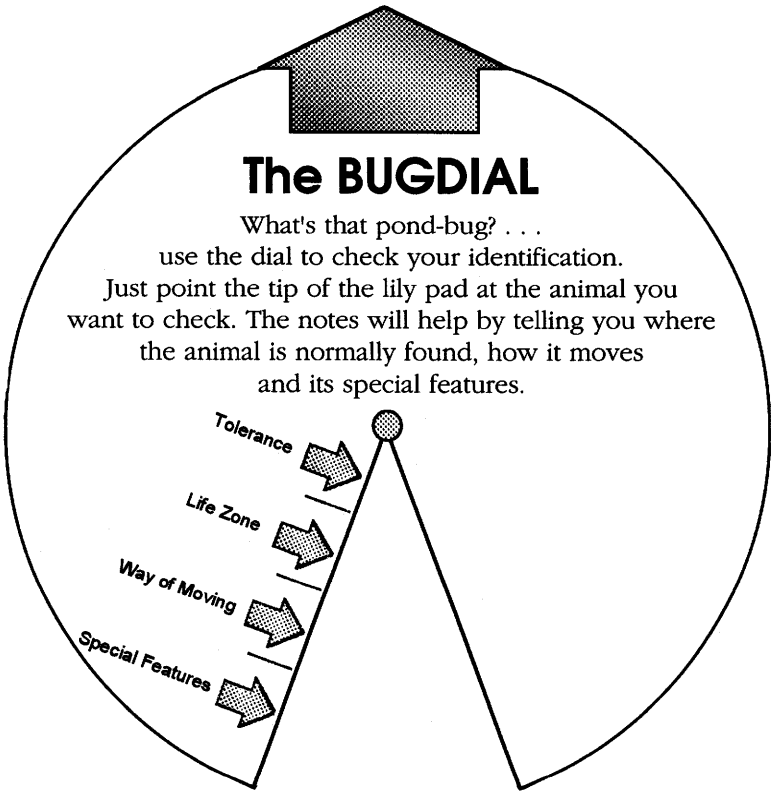
- four 60 cm x 30 cm pieces of flywire netting (250 um mesh)
- 1.5-m piece of bias tape or equivalent fabric scrap (3 cm wide)
- broom handle or wooden dowel (over 1 m long)
- thread, scissors, sewing machine, 3 wire coat-hangers, drill with 0.5-cm wood bit, pliers and binding.

1. To construct the net, cut the netting into four triangular pieces (50 cm high with 30-cm bases) and sew together.
2. Sew the 1.5-m strip of bias tape into the net opening as casing, leaving it open to insert the wires.
3. Take the 3 wire coat-hangers and untwist, cut off and reserve the 'hook', slip the main part into net casing, and retwist.
4. If necessary, cut the twisted stem to 5 cm with the wire-cutters. Drill a hole in the broom handle and insert the stem.
5. Take the remaining 'hook' of the coat hangers and bend it into a U shape, put into position, push into holes and wrap with binding tape to secure the handle (see illustrations).



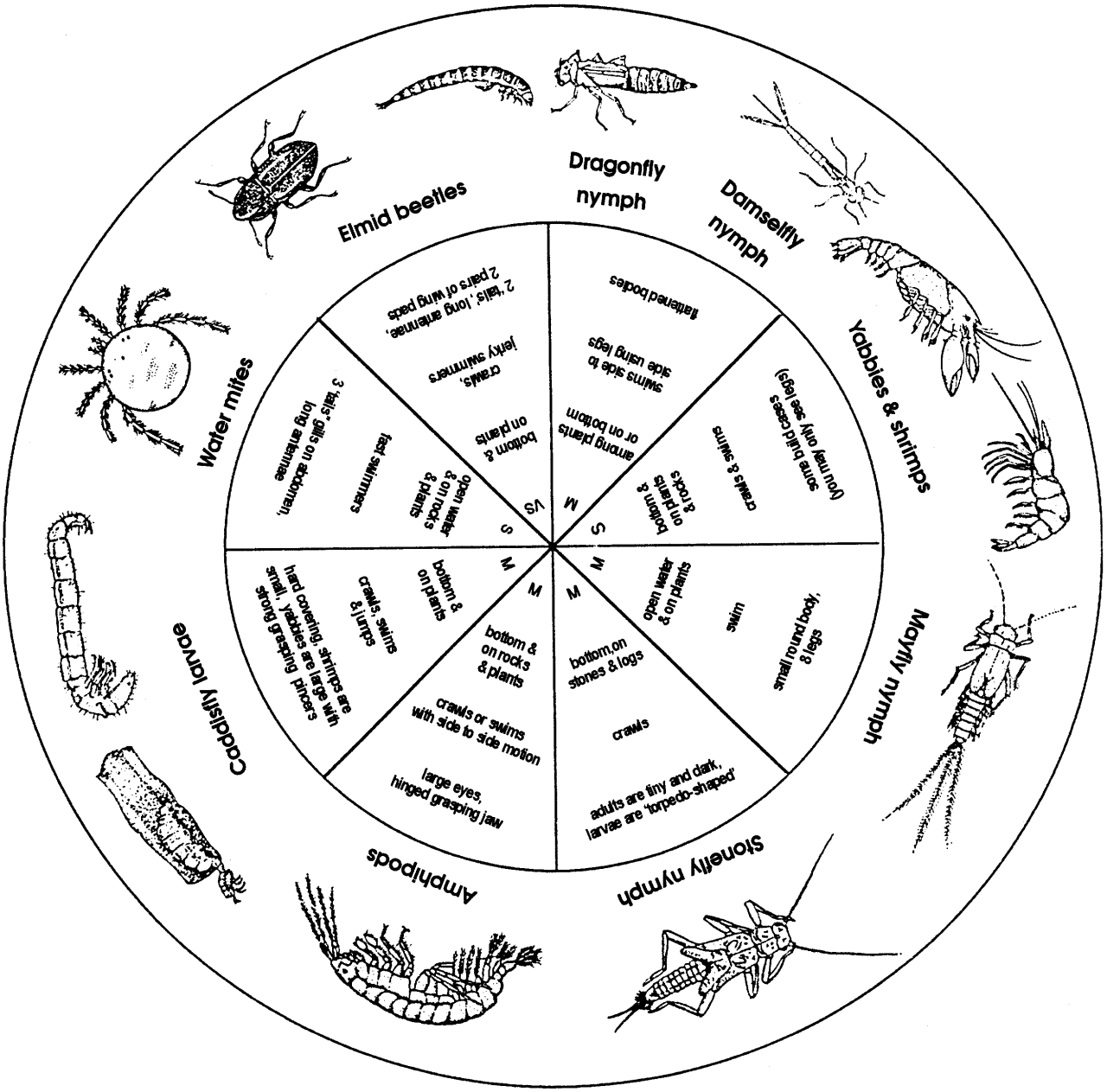
Appendix D - Bugdial*





How to make your Bugdial*

Cut out all of the circles provided. Use a paper clip to attach a small circle to one of the larger ones, through the centre. Turn the arrow to the animal you would like to identify and read the information revealed.



** The Bugdial has been adapted pending permission, from the Pondwatch Bugdial used in the United Kingdom. The Pondwatch program was organised by the wildlife and wetlands trust, supported by Watch, the Wildlife and Environment Club, and sponsored by the Shell Better Britain Campaign*

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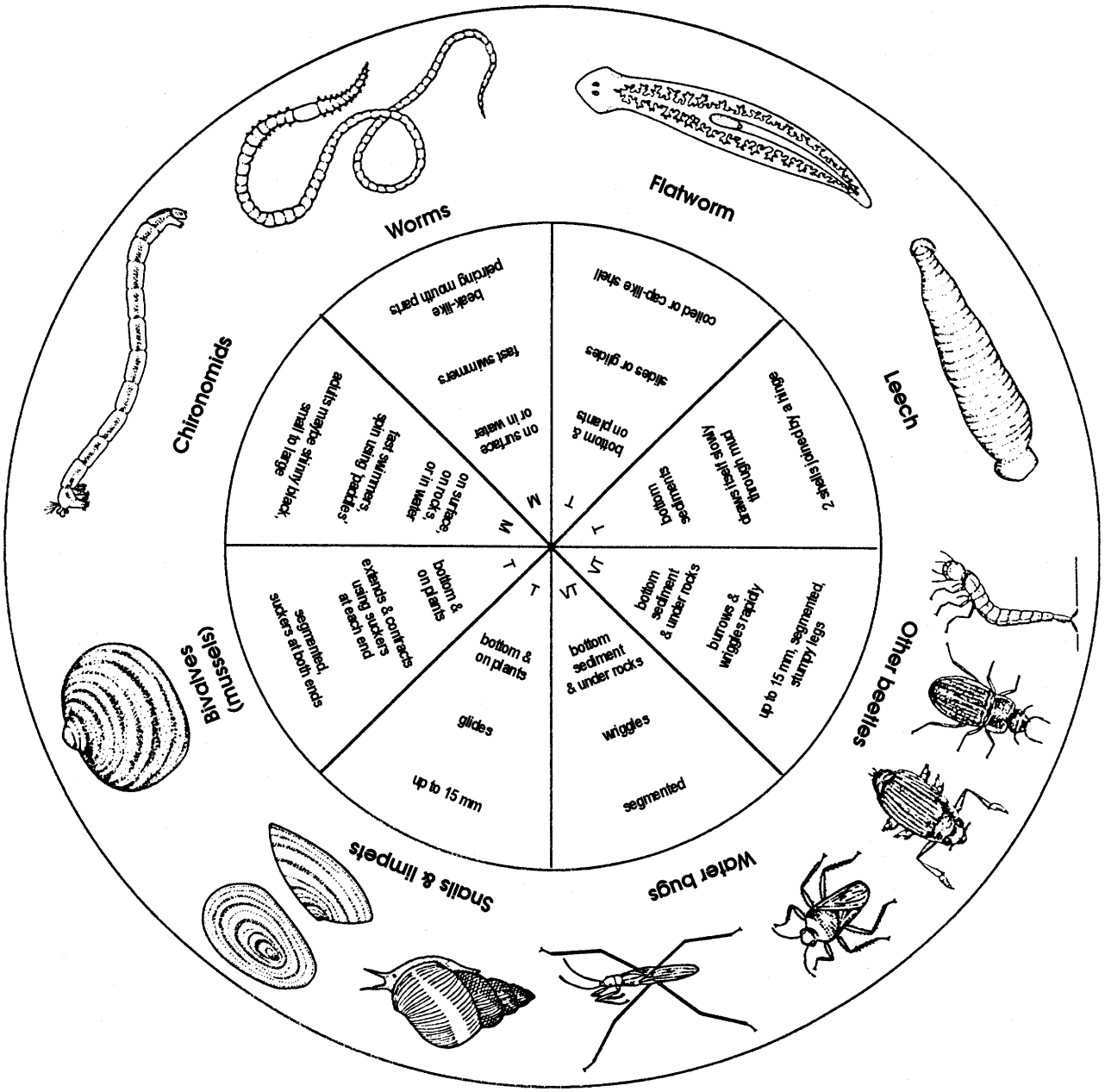

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Appendix E - Making standard solutions for the chemical tests

Be sure to take adequate safety precautions when handling these chemicals and wear safety glasses and gloves.

Standard Potassium Chloride solution (0.01 M)

Dissolve 0.7456 g of potassium chloride (KCl) - dried overnight at 105° C - in freshly boiled distilled water and dilute to 1 litre.

Standard Potassium Chloride solution (0.001 M)

Dissolve 0.0746 g of potassium chloride (KCl) - dried overnight at 105° C - in freshly boiled distilled water and dilute to 1 litre.

Standard Potassium bi-Iodate solution (0.025 N)

Dissolve 0.8124 g of potassium bi-iodate ($KH(IO_3)_3$) in distilled water and dilute to 1 litre.

Sulfuric acid solution (H_2SO_4) (6N)

Add 50 ml concentrated sulfuric acid to 250 ml distilled water in small lots, while stirring. **Beware of the excessive heat generated in the process.**

Standardisation of thiosulfate

Dissolve approximately 2 g potassium iodide in 100 -150 ml distilled water, add 10 mL 6N sulfuric acid and 20 mL bi-iodate solution. Dilute to 250 ml, then titrate liberated iodine with thiosulfate titrant, adding starch towards the end of titration, when a pale straw colour is reached. Continue to the first disappearance of the blue colour.

Dissolved oxygen titration

Collect water samples for this test in Wheaton bottles or 250 ml ground-glass-stoppered bottles. Fill each bottle to overflowing and stopper it without trapping any air bubbles. Next, add 2 ml manganous sulfate solution, followed by 2 mL alkali-iodide-azide reagent, through a pipette or tube inserted into the middle of the sample, taking care to avoid adding any air bubbles. Replace the stopper, again without trapping any air, and shake the bottle at least 15 times. Allow the flocculant to settle then shake again. When you can see at least 100 ml of clear liquid at the top, add 2 ml of concentrated sulfuric acid and mix until you can see a uniform distribution. Decant 200 mL of the solution and titrate this with standard thiosulfate solution until all the colour disappears. You can then calculate the dissolved oxygen in the sample, as follows:

Sample dissolved oxygen (mg per litre) = the number of drops of thiosulfate solution.

Standard for nitrogen

The working standards must be freshly made for the analysis.

Stock nitrate standard solution (100 mg/ litre)

Dissolve 0.7218 g of potassium nitrate (KNO_3) - dried for over 2 hours at 105° C - in freshly boiled distilled water and dilute to 1 litre. Preserve with one pellet of sodium hydroxide (NaOH) added to the solution. Keep refrigerated.

Make an **intermediate standard** by diluting 20 ml **stock standard** (see across) to 100 ml with distilled water.

Make a **working standard** by diluting 10 mL **intermediate standard** (see above) to 100 ml with distilled water.

Standards for analysis in parts per million (ppm)	
0.5 ppm	5 ml **working standard** + 15 ml deionised water
1.0 ppm	10 ml **working standard** + 10 ml deionised water
2.0 ppm	20 ml **working standard**

Standard for phosphorus

The working standards must be freshly made for the analysis.

Stock phosphate standard solution (200 mg/litre)

Dissolve 0.8787 g anhydrous potassium dihydrogen phosphate (KH_2PO_4), - dried for over 2 hours at 105° C - in freshly boiled distilled water and dilute to 1 litre. Keep refrigerated.

Make an **intermediate standard** by diluting 10 ml **stock standard** (see across) to 100 ml with distilled water.

Make **working standard** by diluting 5 ml **intermediate standard** (see above) to 100 mL with distilled water.

Standards for analysis in parts per million (ppm)	
0.2 ppm	2 ml **working standard** + 8 ml deionised water
0.5 ppm	5 ml **working standard** + 5 ml deionised water
1.0 ppm	10 ml **working standard**