N.T. WATERWATCH
EDUCATION KIT

Part 2
Mapping Catchments

NT WATERWATCH EDUCATION KIT

PART 2: MAPPING CATCHMENTS

WATERWATCH Northern Territory

WATERWATCH Australia

A program of the Natural Heritage Trust

Northern Territory Government

Department of Infrastructure, Planning and Environment

Natural Heritage Trust

Helping Communities Helping Australia

A Commonwealth Government Initiative

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PART 2: Mapping Catchments

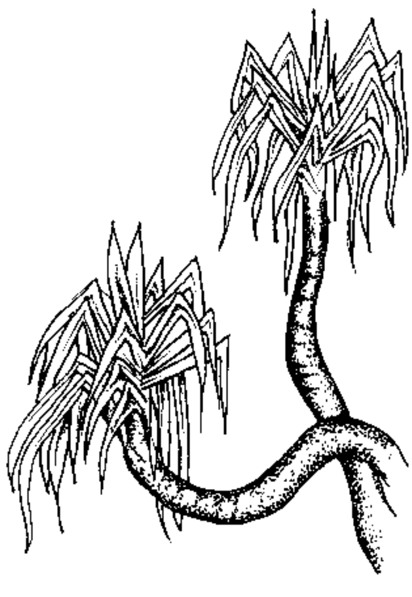
Introduction

The ability to read maps is an important part of catchment monitoring and management. This section provides information needed to read and understand topographic maps. Map reading skills facilitate a greater understanding of catchments, their size, their boundaries and how topographic features and land use capabilities influence waterways.

Maps of Daly River catchment and sub-catchments (Figures 6-10) are provided as regional NT examples. Representative regional maps are also included which identify the location of current *Waterwatch* monitoring sites in the NT (Figures 11-13).

Rationale

Waterwatch accounts for natural processes that drive land management and considers the catchment as a whole when deciding what actions will be feasible locally.



Mapping Catchments

Topographic maps assist in determining catchment boundaries. A topographic map shows all the features of an area including cultural features such as towns, roads, railways, airports, administrative boundaries and reserves. Hydrographic features, such as lakes, rivers, creeks and coastal regions are also shown, as are vegetation features and relief.

Relief or land height is shown as contours, the numbers on the contours show how high it is. The highest land will be between two adjacent catchments; the lowest land will be where the creeks and rivers are.

Topographic Features

Topographic features such as hills or mountains can be represented on maps by a contour pattern. Contour lines are basically imaginary lines drawn onto a map which join places of equal height above a fixed datum, which is usually sea level. Contour lines therefore give an indication of height and in doing so show changes in the shape of the ground (Dept. Environment and Land Management 1997).

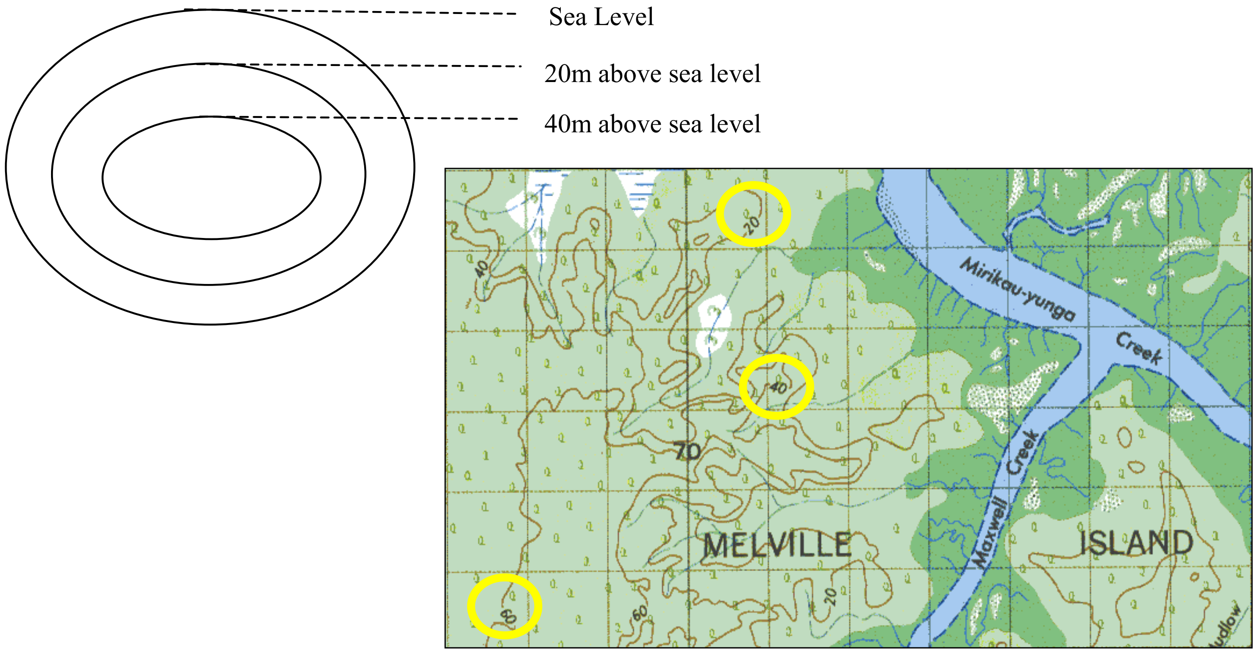


Figure 1 Demonstration of topographic contours, Melville Island

20, 40 and 60 metre contours have been highlighted above. The land height decreases as it nears the creeks.

Grid References

Maps are printed so that north is at the top of the sheet. Grid lines are printed vertically and horizontally on most maps to make them easier to read.

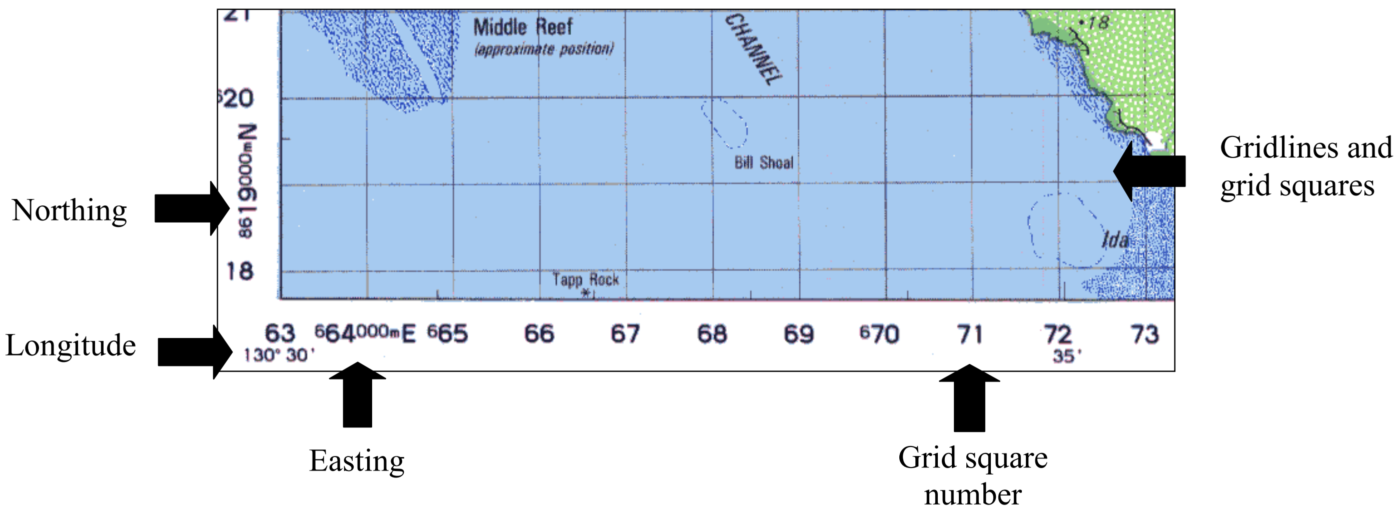


Figure 2 **Demonstration map**

Eastings and Northings

The vertical grid lines are numbered from west to east, with values increasing towards the east. Vertical grid lines are called eastings. The horizontal grid lines are numbered from south to north, with values increasing towards the north. Horizontal grid lines are called northings. The squares that are formed when eastings and northings cross are called grid squares (Dept. Environment and Land Management 1997).

A certain position on grid referenced map can be pinpointed using eastings and northings.

The easting is a six-figure number which determines distance (in metres) east from a predetermined universal origin point. The easting is identified by a capital 'E' at the end of the number and should always come before the northing figure.

The northing is a seven-figure number gives a measurement of distance north from a predetermined universal origin point in metres. This means the further north a point is the higher the northing reading. The northing is identified by a capital 'N' at the end of the number and always comes after the easting number.

For example, a grid reference of 430 700 E and 5788 500 N means that the point on the map is 430 700 metres east of the origin and 5 788 500 metres north of the origin. Depending on the level of accuracy required, the map user can identify a point to within 10 or 100 metres north or east of an actual location.

Latitude and Longitude

Latitude and longitude coordinates provide an alternative way to distinguish a certain point on a map.

Latitude is an angular measurement north (N) and south (S) from the equator. On a globe, lines of latitude are circles of different size. The longest is the equator, whose latitude is zero. The poles have latitudes of 90° north and 90° south (or -90°) (http://www-istp.gsfc.nasa.gov/stargaze/Slatlong.htm).

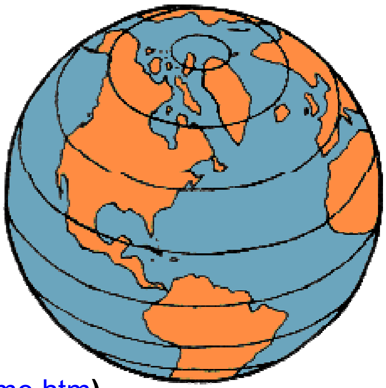
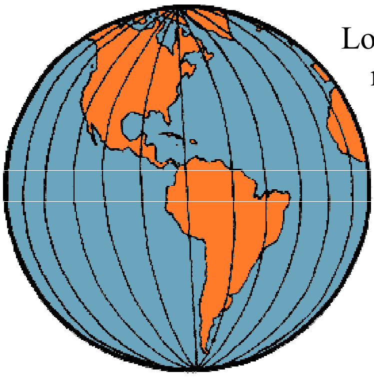


Figure 3 Latitude (http://www.m-w.com/home.htm)



Longitude is an angular measurement east and west from the prime meridian. The prime meridian is an arbitrary starting point. It is located at Greenwich, England. Longitudes are measured from zero to 180° east and 180° west (or -180°), and both 180-degree longitudes share the same line, in the middle of the Pacific Ocean (http://www-istp.gsfc.nasa.gov/stargaze/Slatlong.htm).

Figure 4 Longitude (http://www.m-w.com/home.htm)

Latitude and longitude angles are measured in

- Degrees (denoted by the symbol °)
- Minutes of arc (denoted by the symbol '); and
- Seconds of arc (denoted by the symbol ")

For example 12° 43' 9" represents an angle of 12 degrees, 43 minutes and 9 seconds. Depending on how accurately you need to pinpoint a certain position will determine whether you use one or all of the above measurements (http://www-istp.gsfc.nasa.gov/stargaze/Slatlong.htm).

To identify a city all you need is its degrees latitude and longitude, for example Darwin is located at 12.4° S 130.9° E and Alice Springs is located at 23.8° S 133.9° E. Obviously individual Waterwatch sites require a greater level of accuracy. In the NT to gain this level of accuracy we choose to locate our sites by using eastings and northings (see previous page).

Scale

All maps should be drawn to scale, this allowing the calculation of distances and area. The scale of each map is generally printed on the border of the map. There are many different scales of topographical maps. The most commonly used are:

1:25 000 (with a 4cm by 4cm grid)	4cm equals1000 metres
	$4cm^2$ equals $1km^2$
1:50000 (with a 2cm by 2cm grid)	2cm equals1000 metres (1km)
	$2cm^2$ equals $1km^2$
1:100 000 (with a 1cm by 1cm grid)	1cm equals1000 metres (1km)
	$1cm^2$ equals $1km^2$
1:250 000 (with a 4mm by 4mm.grid)	1cm equals 2500 metres (2.5km)
	$4mm^2$ equals $1km^2$

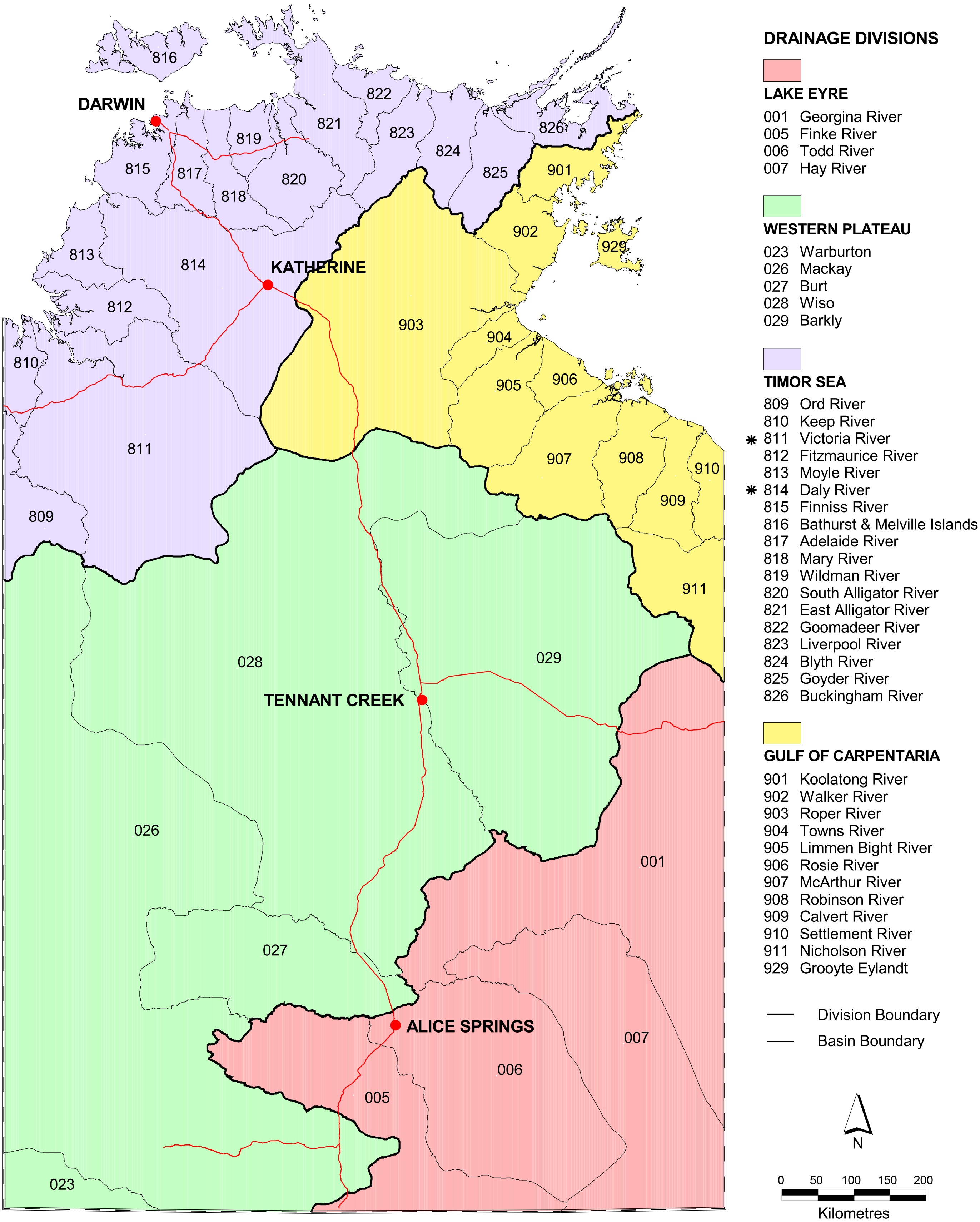
The larger the scale (eg: 1: 25000) of the map, the greater the detail of a given area. For example, a 1: 100000 map shows a larger area, but with less detail than a 1:25000 map.

Knowing the area of a catchment can assist in computer modelling. Computer modelling can help to measure or predict the impact that various land uses may have on a catchment. For example potential soil loss, sedimentation loads and runoff of surface water can be estimated for a given area and time period.

Global Positioning Systems (GPS)

A Global positioning system device, commonly referred to as a GPS, can determine the position of a location and aid navigation by using satellites. The satellites (which are of a known position above the Earth) receive radio transmissions from GPS units on Earth. The satellites then return the signal to Earth, via a ground station, giving a set of location coordinates. The level of accuracy given by a GPS is dependent on the number of available satellites and the level of service provided by the military (DeMers 1997). Easy to use, affordable hand held GPS units are being used more and more often in environmental science.

See Activities 1 to 6 (p 15-23)



✱ Baseline data collected for Top End Waterways Project (1995 - 1997)

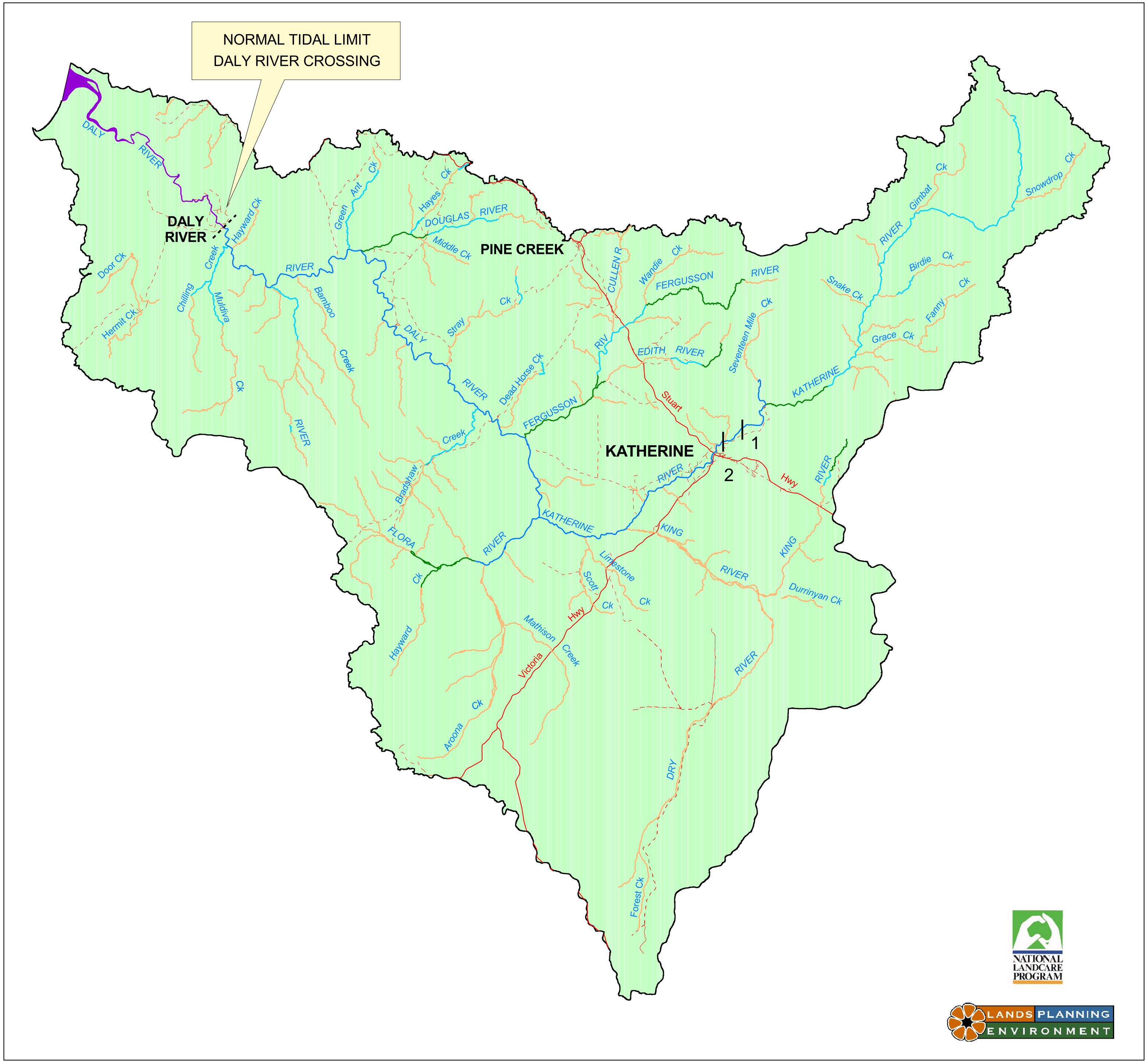
NATIONAL LANDCARE PROGRAM

LANDS PLANNING ENVIRONMENT

NT DRAINAGE DIVISIONS AND BASINS

as defined by the Australian Water Resources Council

Map 1

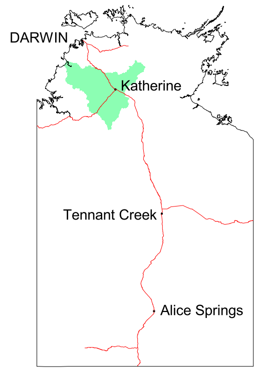


DRY SEASON FLOW REGIME

- Permanent Flow >100 L/s (high)
- Permanent Flow 10 - 100 L/s (medium)
- Permanent Pools and Flow <10 L/s (low)
- Dry (ephemeral)
- Tidal

LEGEND

- Catchment Boundary
- Major Road
- Minor Road
- Weir
  1. Donkey Camp Weir
  2. Knotts Crossing Weir



CATCHMENT LOCATION

N

0 20 40 60 80

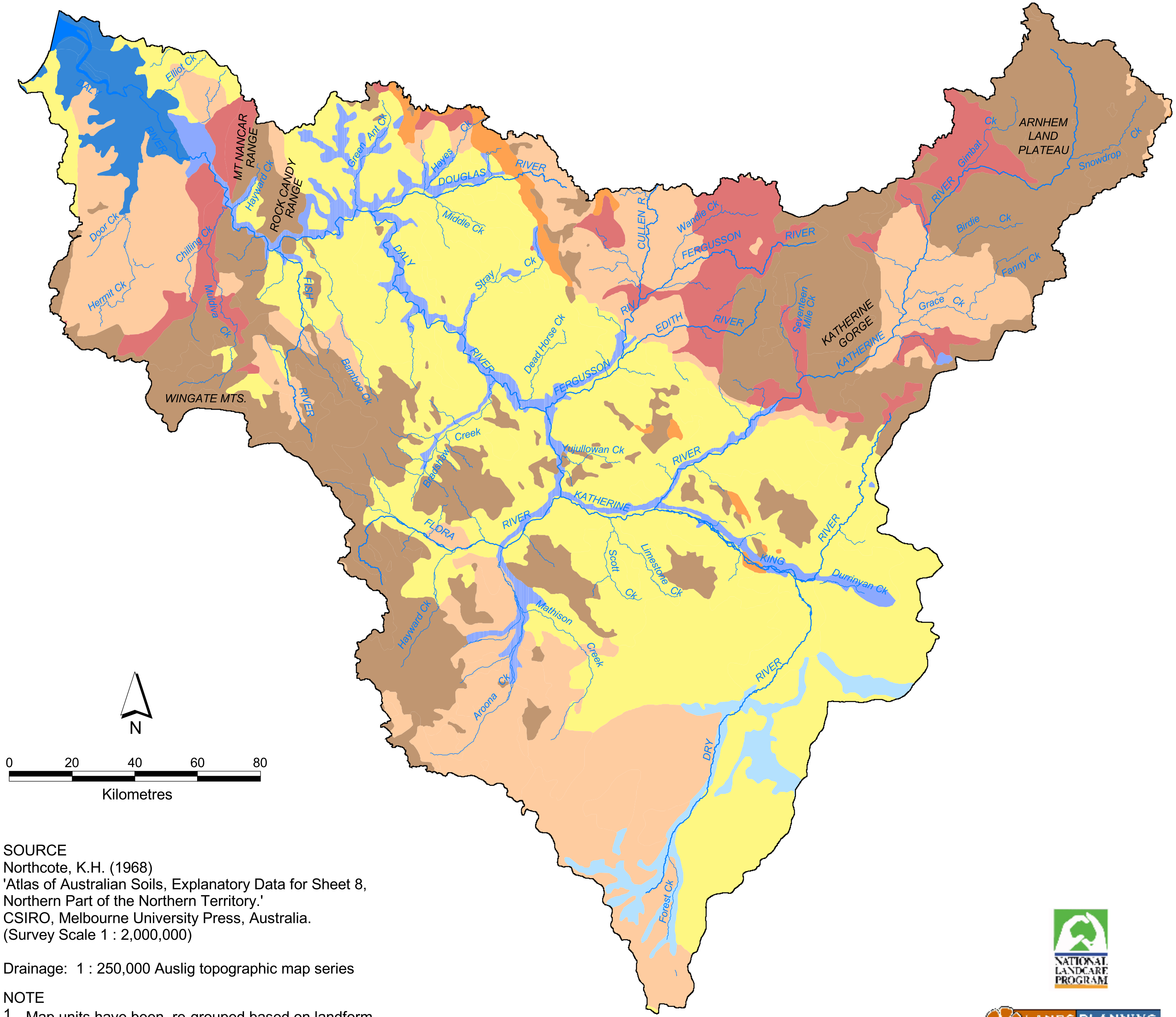
Kilometres

TOP END WATERWAYS PROJECT

DALY RIVER CATCHMENT

LOCALITY PLAN AND DRY SEASON FLOWS

Map 2



SOURCE
Northcote, K.H. (1968)
'Atlas of Australian Soils, Explanatory Data for Sheet 8,
Northern Part of the Northern Territory.'
CSIRO, Melbourne University Press, Australia.
(Survey Scale 1 : 2,000,000)

Drainage: 1 : 250,000 Auslig topographic map series

NOTE
1. Map units have been re-grouped based on landform
2. The soil survey does not fully align with the drainage due to the difference in original mapping scales

LANDFORM DESCRIPTION

- Undulating plains to hilly country with isolated mesas and buttes (Map units AC13, CC56, If4, Mo23, Mo24, My68, SQ1, Wd12, Wd13)
- Plateaus, mesas, buttes, plateau escarpments and adjacent rough rocky hills (Map units AB33, BA6, BA7, JV1, JV2, My83)
- Hilly to steep hilly ranges and strike ridges (Map units LK22, LK23, Mw33, Tb134)
- Flat to undulating terrain (Map units JV3, MJ1, Mt4, Mt5, My67, My70, My71, My72, My73, My74, My79, Wd11)
- Low to steep hills, ridges and cuestas with areas of bouldery outcrop (Map units JJ28, OO4)
- Floodplains and back plains, adjacent sideslopes and stony rises, levees, billabongs and channels (Map units Mb15, OO1, OO2, OO3, OO8)
- Flat to gently undulating plains with either narrow drainage or broad shallow valleys (Map units II5, II8)
- Seasonally flooded coastal plains and adjacent sand dunes (Map units Jw1, NN3, NN5)

LEGEND

- Catchment Boundary
- River
- Creek

NATIONAL LANDCARE PROGRAM

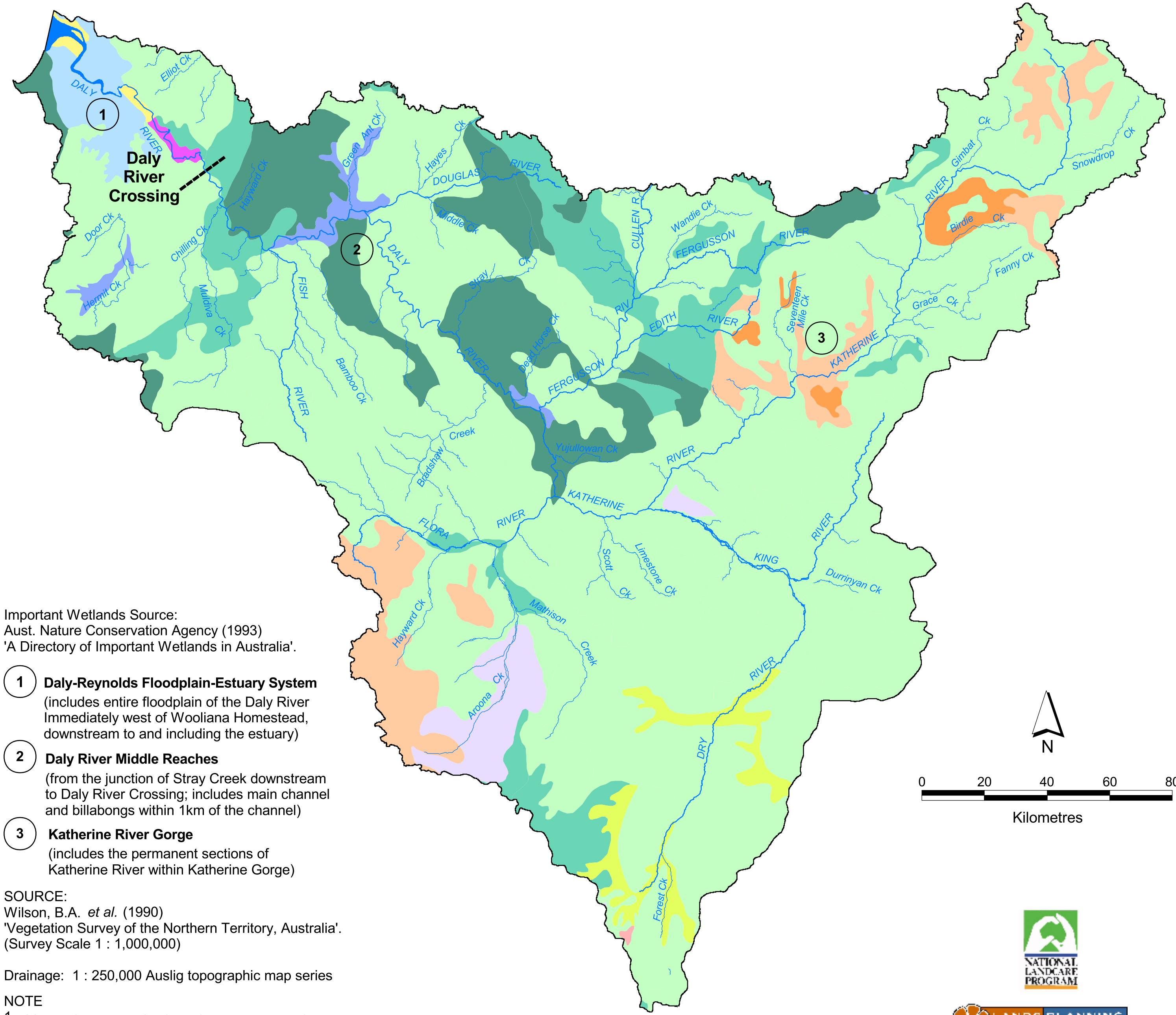
LANDS PLANNING ENVIRONMENT

TOP END WATERWAYS PROJECT

DALY RIVER CATCHMENT

LANDFORM
(Broad scale mapping)

Map 3



Important Wetlands Source:
Aust. Nature Conservation Agency (1993)
'A Directory of Important Wetlands in Australia'.

1. **Daly-Reynolds Floodplain-Estuary System**
   (includes entire floodplain of the Daly River Immediately west of Wooliana Homestead, downstream to and including the estuary)
2. **Daly River Middle Reaches**
   (from the junction of Stray Creek downstream to Daly River Crossing; includes main channel and billabongs within 1km of the channel)
3. **Katherine River Gorge**
   (includes the permanent sections of Katherine River within Katherine Gorge)

SOURCE:
Wilson, B.A. *et al.* (1990)
'Vegetation Survey of the Northern Territory, Australia'.
(Survey Scale 1 : 1,000,000)

Drainage: 1 : 250,000 Auslig topographic map series

NOTE
1. Vegetation categories have been re-grouped
2. The vegetation survey does not fully align with the drainage due to the difference in original mapping scales

VEGETATION DESCRIPTION

CLOSED - FOREST
Mixed species closed-forest
(Monsoon vine forest thicket)

EUCALYPT WITH GRASS UNDERSTOREY

Open - Forest
E. miniata, E. tetradonta with *Sorghum* grassland understorey

Woodland
E. bleeseri, E. dichromophloia, E. ferruginea, E. latifolia, E. miniata, E. papuana, E. patellaris, E. polycarpa, E. tectifica, E. tetradonta, E. terminalis
Grassland understorey
Chrysopogon fallax, Sehima nervosum, Plectrachne pungens, Sorghum

Low Woodland
E. chlorophylla, E. dichromophloia, E. microtheca, E. terminalis, E. tintinnans, Excoecaria parvifolia, E. pruinosa
Grassland understorey
Eulalia aurea, Dichanthium, Chrysopogon fallax, Sehima nervosum, Plectrachne pungens, Sorghum

Low Open - Woodland
E. microtheca with *Eulalia aurea, Dichanthium* grassland understorey

EUCALYPT WITH HUMMOCK GRASS UNDERSTOREY

Low Woodland
E. phoenicia with *Plectrachne pungens* hummock grassland understorey

Low - Open Woodland
E. brevifolia, E. dichromophloia, E. miniata with *Plectrachne pungens* hummock grassland understorey

MIXED SPECIES LOW OPEN-WOODLAND WITH GRASS UNDERSTOREY
E. pruinosa, Lysiphyllum cunninghamii, Terminalia arostrata, with *Eulalia aurea, Dichanthium, Chrysopogon fallax, Sehima nervosum* grassland understorey

MELALEUCA
M. viridiflora, Eucalyptus low open - woodland with *Chrysopogon fallax* grassland understorey

FLOODPLAINS
Mixed closed - grassland / sedgeland (Seasonal Floodplain)

ACACIA WITH GRASS UNDERSTOREY
A. shirleyi open - forest with open - grassland understorey

LITTORAL
Mangal low - closed forest (Mangroves); saline tidal flats with scattered chenopod low shrubland

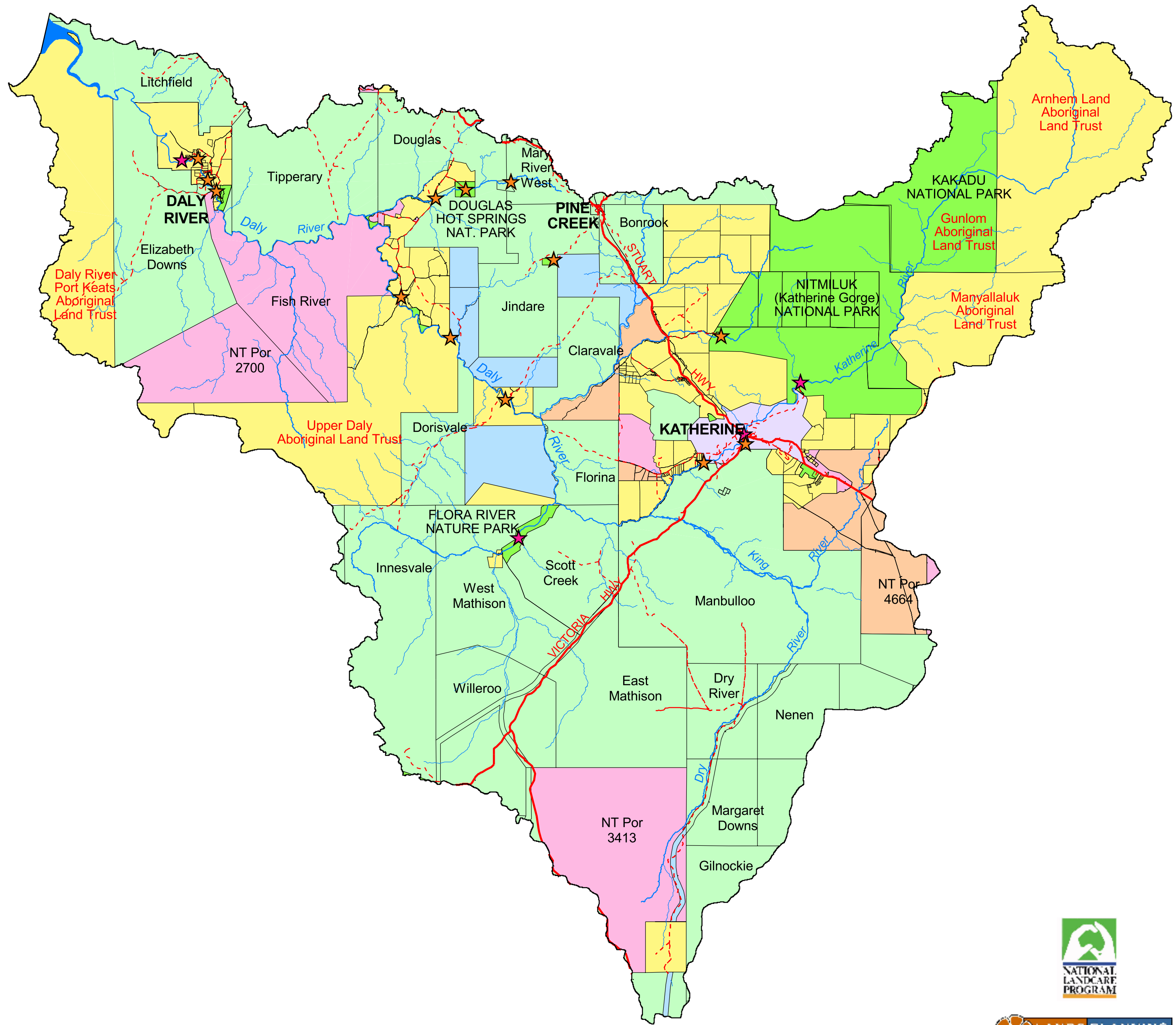
TOP END WATERWAYS PROJECT
DALY RIVER CATCHMENT

VEGETATION AND IMPORTANT WETLANDS

(Broad scale mapping) Map 4

NATIONAL LANDCARE PROGRAM

LANDS PLANNING ENVIRONMENT



LAND CLASSIFICATION

- Katherine Municipal Boundary
- National Park or Reserve
- Pastoral Lease
- Vacant Crown Land
- Private Freehold
- Crown Lease Term
- Crown Lease Perpetual

LEGEND

- Public Recreation Area and Boat Ramp
- Public Recreation Area
- Catchment Boundary
- Cadastral Boundary
- Major Road
- Minor Road
- River
- Creek

NOTE

In general, where waterways form property boundaries the bed and banks of the waterway separating such properties is classified as Crown land. Where a waterway lies within a property the bed and banks of the waterway belong to the property owners but the water rights over such waterways belong to the Crown.

N

0 20 40 60 80

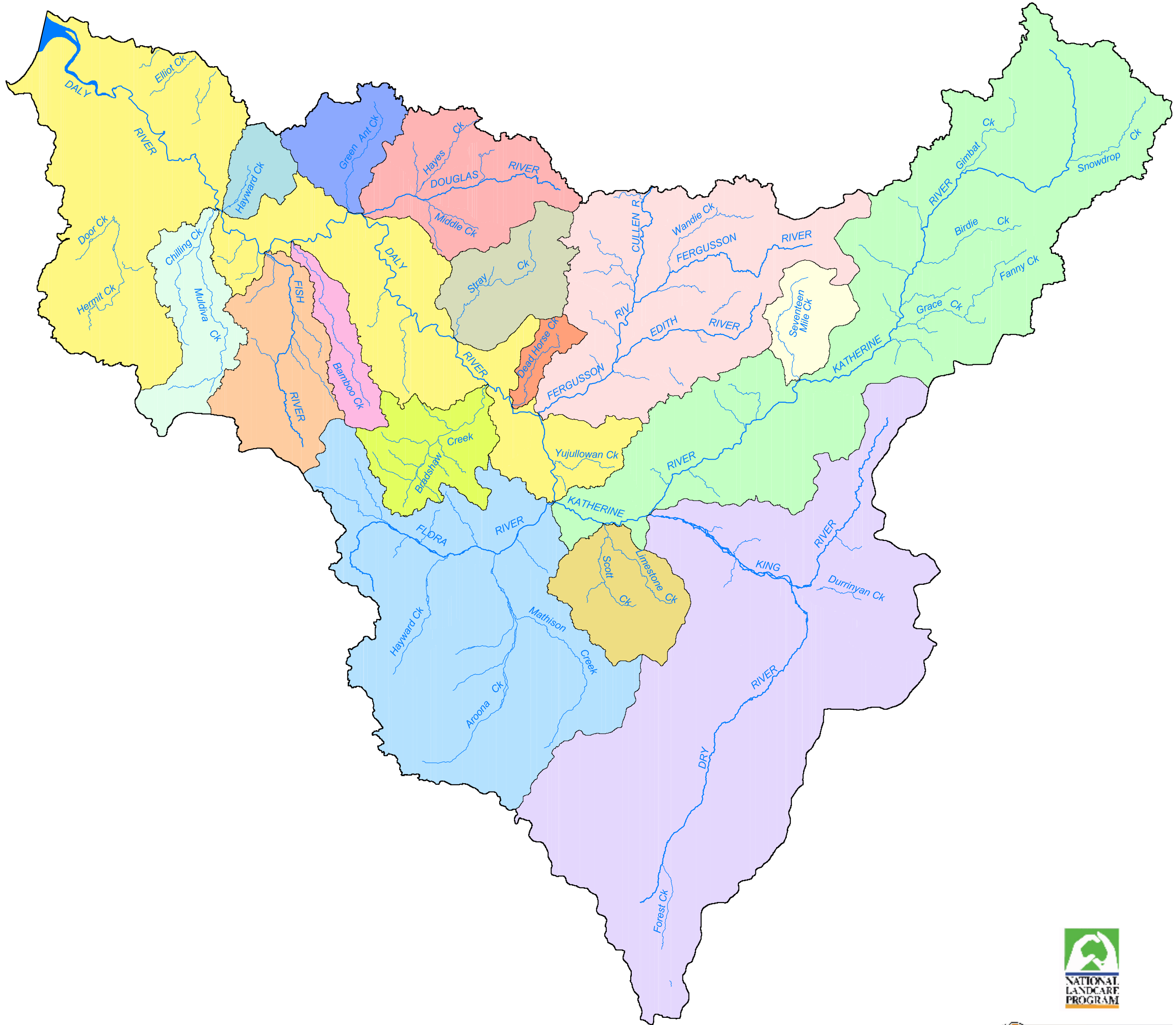
Kilometres

TOP END WATERWAYS PROJECT

DALY RIVER CATCHMENT

LAND TENURE AND LAND USE

Map 5



MAJOR SUB-CATCHMENTS

- Daly River
- Chilling Creek
- Hayward Creek
- Fish River
- Bamboo (Moon Boon) Creek
- Green Ant Creek
- Douglas River
- Stray Creek
- Bradshaw Creek
- Dead Horse Creek
- Fergusson River
- Flora River
- Katherine River
- Limestone Creek
- King and Dry Rivers
- Seventeen Mile Creek

LEGEND

- Catchment Boundary
- Sub-catchment Boundary
- River
- Creek

N

0 20 40 60 80

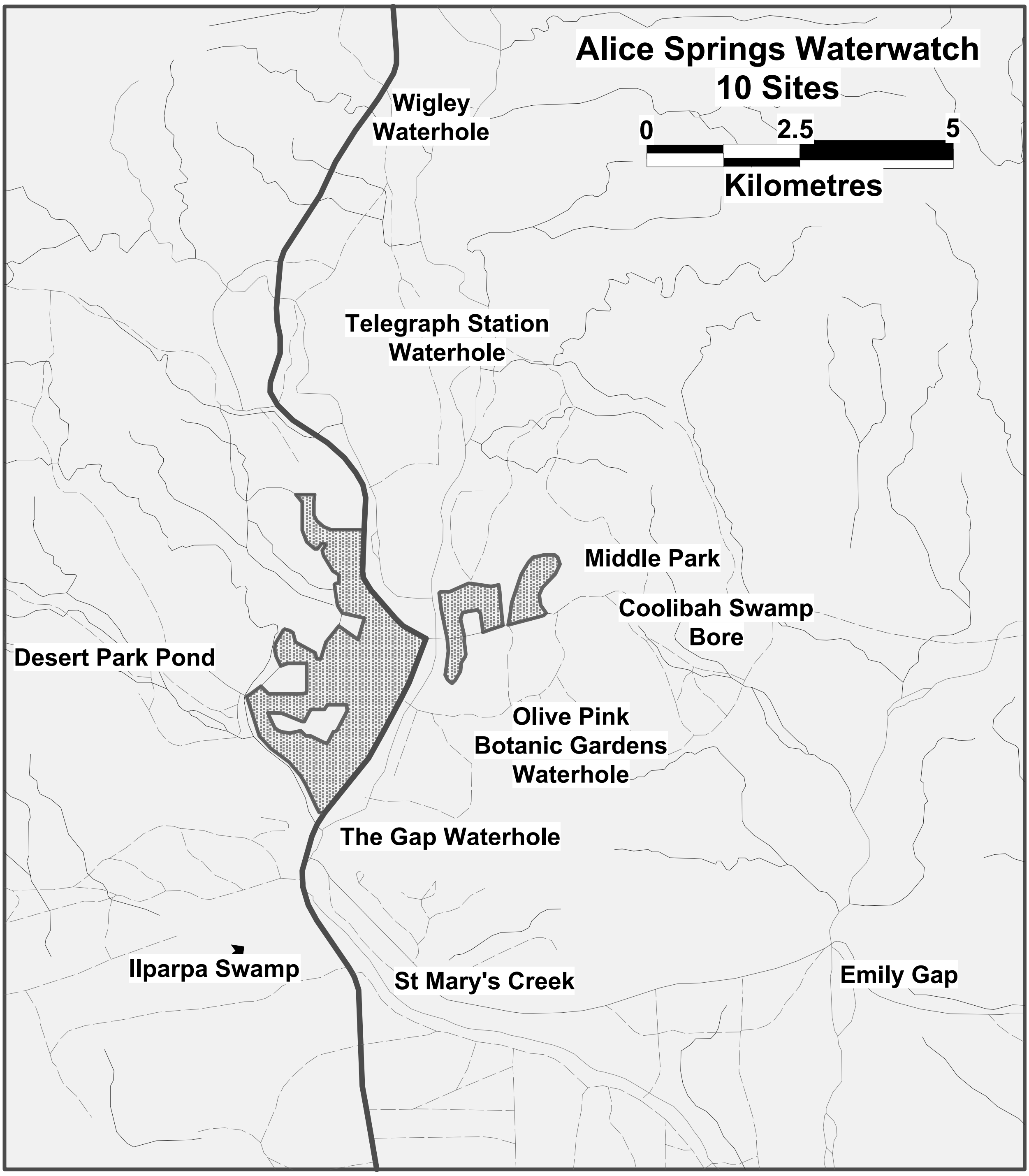
Kilometres

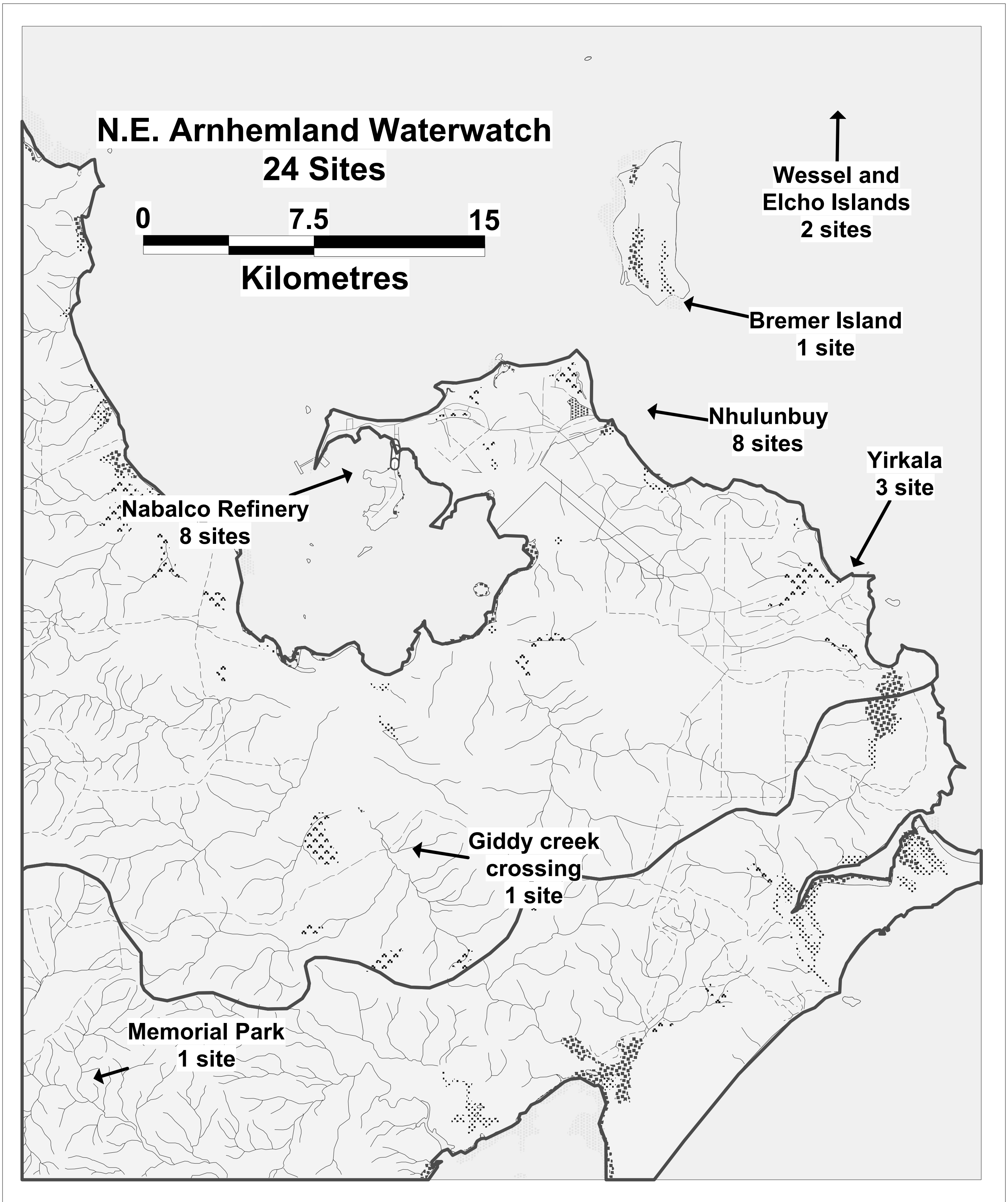
TOP END WATERWAYS PROJECT

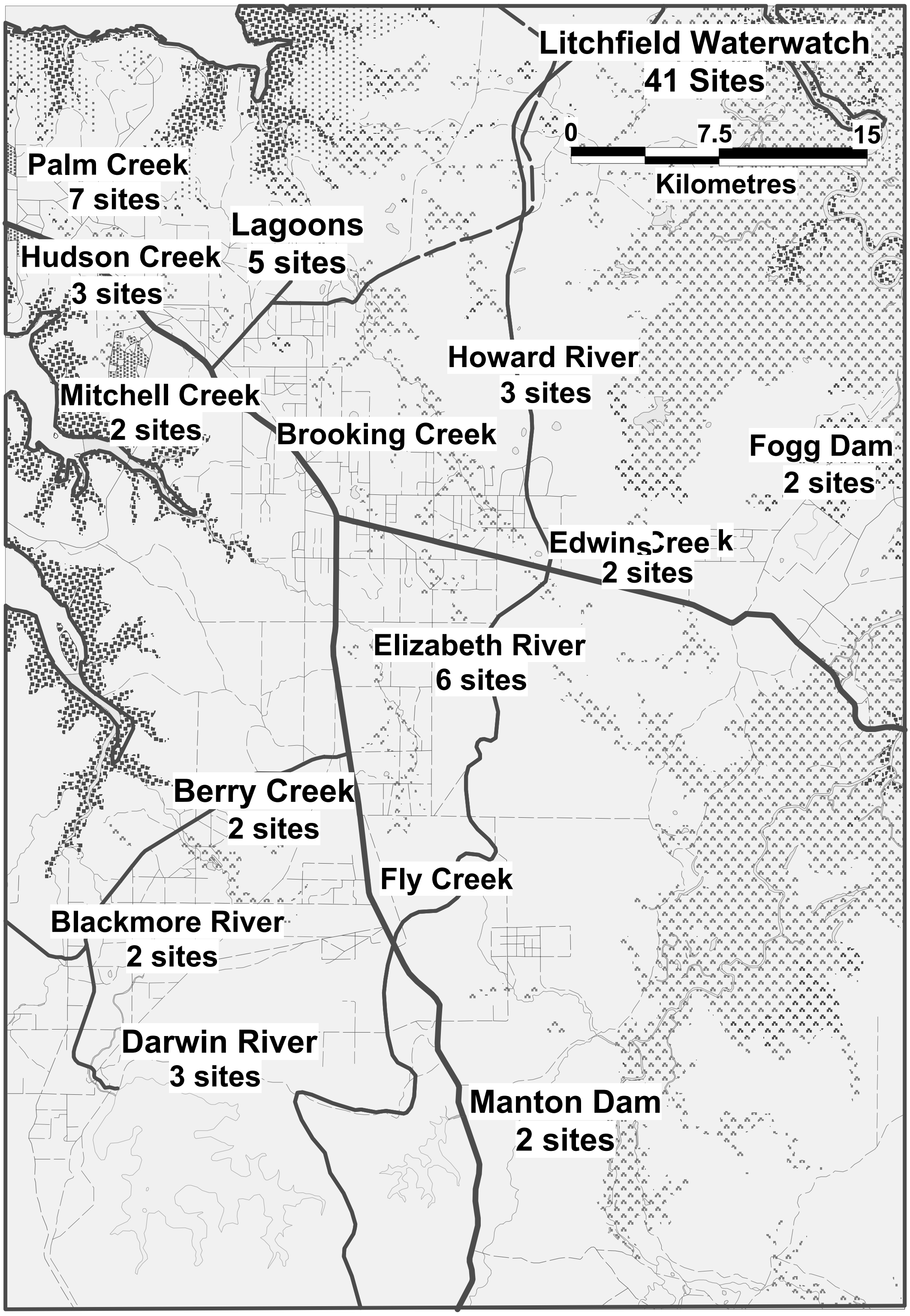
DALY RIVER CATCHMENT

MAJOR SUB-CATCHMENTS

Map 6


Alice Springs Waterwatch
10 Sites
0
2.5
5
Kilometres
Wigley
Waterhole
Telegraph Station
Waterhole
Middle Park
Coolibah Swamp
Bore
Desert Park Pond
Olive Pink
Botanic Gardens
Waterhole
The Gap Waterhole
Ilparpa Swamp
St Mary's Creek
Emily Gap


N.E. Arnhemland Waterwatch
24 Sites
0
7.5
15
Kilometres
Wessel and
Elcho Islands
2 sites
Bremer Island
1 site
Nhulunbuy
8 sites
Yirkala
3 site
Nabalco Refinery
8 sites
Giddy creek
crossing
1 site
Memorial Park
1 site


Litchfield Waterwatch
41 Sites
0
7.5
15
Kilometres
Palm Creek
7 sites
Lagoons
5 sites
Hudson Creek
3 sites
Howard River
3 sites
Mitchell Creek
2 sites
Brooking Creek
Fogg Dam
2 sites
Edwins Creek
2 sites
Elizabeth River
6 sites
Berry Creek
2 sites
Fly Creek
Blackmore River
2 sites
Darwin River
3 sites
Manton Dam
2 sites

WHAT IS A WATERWAY? B1-B3

Activity 1

Curriculum Links:

SOSE Environments / Place, Landforms and Features
Env 2.1, Env 3.1

Focus Question:

- **How do waterways vary across catchments?**

Aim:

To gain an understanding of waterway types, and how they vary across catchments.

Main Ideas:

- The NT has many varied and beautiful wetlands, which can be broken down into three main categories, these being permanent, ephemeral and man made.
- Wetlands in the NT include springs, run offs, creeks, rivers, claypans, billabongs, floodplains, swamp, drains, and estuaries. Wetland formation is strongly influenced by position within a catchment.

Need:

Paper mache materials (clag, newspaper), cardboard and paints OR sandpit.

Consider:

Look at topographical map, which show various waterways.

Analysis:

- Identify high points on the map using hill shading or contour lines.
- Identify all the different types of waterways.
- Make a sequenced flow chart.

Extension:

1. Make a model which shows features such as the small creeks feeding into larger rivers, isolated billabongs and coastal floodplains – You may use a sandpit, plasticine, etc.
2. Make a poster promoting your favourite waterway – You may focus on recreational, environmental or commercial values.

Reflection:

1. Look at road maps and compare similarities, how small roads feed into larger highways.
2. Compare the human circulatory system – specifically the arteries, veins, capillaries.
3. Do all waterways hold the same amount of water and do they flow the same speed?

MODEL A LANDSCAPE B1-B3

(Adapted from the Swan River Education Kit 2000 and the Victorian Waterwatch Education Kit 1997.)

Activity 2

Curriculum Links:

SOSE Environments / Place, Landforms and Features
Env 2.1, Env 3.1

Focus Question:

- **What is a catchment?**

Aim:

To increase understanding of catchments and subcatchments.

Main Idea:

- Models assist in understanding the concept of a catchment, components of a catchment and the flow of water within a catchment

Need:

Paper mache materials, cardboard and paints OR Cardboard box, plastic sheet, sand, sticks, stones and leaves.

Consider:

Ensure that students are familiar with the concept of catchments, subcatchments, and with the range of land-use activities that may occur in a catchment. Conduct a class tour of the school environs and examine the different landscape features in and around it (eg: hillside, creek, gully, plain, rock formations). An excursion to demonstrate catchment components could be arranged.

Discuss the aim of the activity and the steps involved in model-making. Students work to construct and label catchment models.

Include features such as bridges, buildings and roads as well as natural features.

Analysis:

Revise the terms 'catchment' and 'subcatchment' referring to the models.

Describe the physical features (landforms and water features) and cultural features (land uses and structures) that comprise a catchment or subcatchment.

Reflection:

Explain how land-use activities in one subcatchment can impact on other downstream subcatchment.

Extension:

If a catchment can cross several different tenures and political boundaries, who is responsible for management of the water and land within the catchment boundary?

How might people organise themselves to work together for catchment management and to be responsible across boundaries within the catchment?

MAPPING CONTOURS

B3

(Adapted from "Waterwatch and your Catchment" Qld Education Kit)

Activity 3

Curriculum Links:

SOSE Environments / Place, Landforms and Features Env 3.1

Focus Question:

- **How are catchments mapped?**

Aim:

To create awareness that catchment boundaries can be identified using the contour lines of topographic maps.

Main Ideas:

- Topographic features such as hills or mountains can be represented on maps by a contour pattern.
- Contour lines are imaginary lines drawn onto a map which join places of equal height above a fixed datum, which is usually sea level.
- Contour lines therefore show changes in the shape of the ground

Need:

Wooden skewer marked at 1 cm intervals, white wool, catchment models (see Activity 2), ice-cream sticks or ordinary camera, sheets of plastic or glad wrap and marker pens.

Consider:

Step 1: create the base model:

Have your model catchment handy.

Step 2: create the contour lines:

Mark 1 cm graduations along the length of your skewer.

Push the skewer into the soil of the catchment until it touches the bottom. Does the soil come up to the 1 cm level? If not, remove the skewer, cover in the hole and try somewhere else. Keep trying until you have a place where the 1 cm mark is reached. (If you have deep soil you may have to start at 2, 3 or 4 cm).

Leave the hole for the 1 cm mark. Try and identify several other locations which are approximately the same depth.

Now join all of the 1 cm holes with a line drawn in the soil. This is your first contour line. It shows the height above the surface.

Now repeat for 2 cm, 3 cm, 4 cm etc. until the highest point in your catchment is reached.

Wet the wool.

With the continuous height lines completed, place the woollen thread to mark each height level thus marking the contour lines clearly visible.

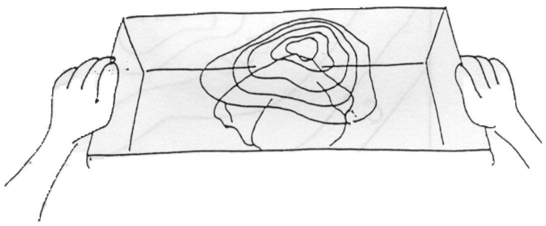
Step 3: transfer the 3D model of contour lines to 2D representation:

Cover the top of the box with clear plastic/food wrap.

Standing directly overhead, close one eye and with a marker pen trace onto the clear plastic sheet the paths created by the white string around each height level. The lines on the clear plastic are called contour lines. These can be then viewed on an over head projector.

Step 4: Interpret the 2D presentations:

Use the contour lines drawn on the clear plastic sheets to try to identify the different models in the classroom. Do this by mixing up the contour maps.

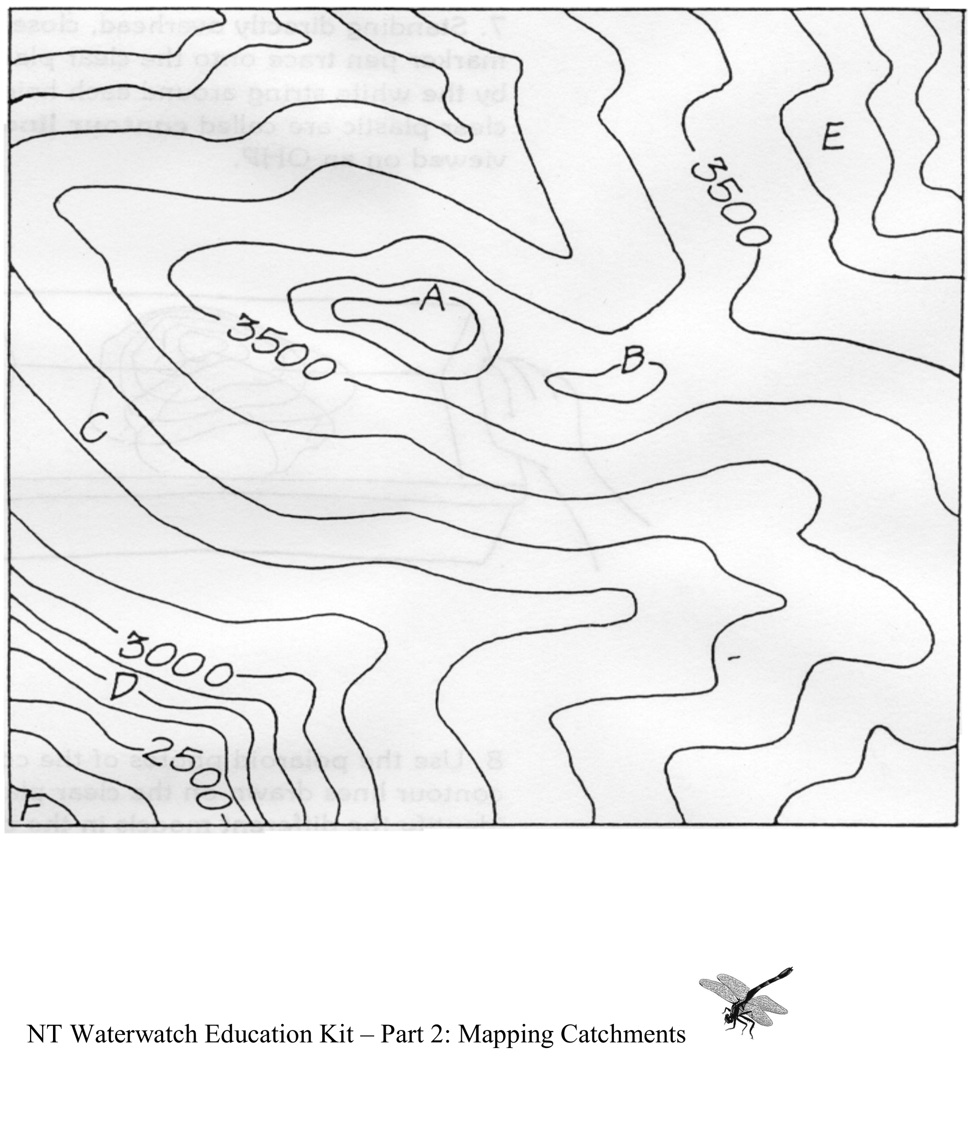


Analysis:

1. Look at the diagram BELOW and complete the following:
2. Which is the highest point (A,B,C,D,E, Or F)?
3. Which is the lowest (A,B,C,D,E, Or F)?
4. Draw in the path of a stream and indicate-with an arrow which way it is flowing.
5. Where is the steepest slope (A,B,C,D,E, Or F)?

Extension:

On a piece of paper draw some contour lines that could indicate a cliff.
On a piece of paper draw some contour lines that could indicate a stream with a waterfall in its path.



MAPPING YOUR LOCAL CATCHMENT B3

Activity 4

Curriculum Links:

SOSE Environments / Place, Landforms and Features Env 3.1

Focus Question:

- **How are catchments mapped?**

Aims:

1. To become familiar with the concept of catchment boundaries by exploring a local example.
2. To become familiar with the interpretation of contour lines on maps and the concepts of stereoscopic viewing.
3. To produce a reference map of the local catchment.

Main Idea:

- A topographic map shows all the features of an area including towns, roads, rivers and landforms.
- The land height is shown as contours, the numbers on the contours show how high it is.
- The highest land will be between two adjacent catchments; the lowest land will be where the creeks and rivers are.

Need:

Maps, whiteboard markers and aerial photos (DIPE staff and stereoscopes will be required for aerial photograph interpretation).

Consider:

Determine which topographic maps are then required (See Maps NT,DIPE, 1st floor Nichols Place, Cavenagh Street, Darwin) Choose maps which are 1:25,000 or 1:50,000 scale. Discuss with students why scale is important and why different scales may be useful for various outcomes.
Get the maps laminated so they can be drawn on with whiteboard markers.

Correctly align adjacent topographic maps to complete the catchment 'picture'.

Ask students to identify and mark the direction of water flow (blue) and catchment/sub catchment boundaries (red) onto the maps.

The maps be used to make a wall poster by tracing over the main boundaries of the catchment, its main drainage system, distinct land features and roads, with a point identifying the location of the school.

Aerial Photograph Interpretation

Obtain aerial photos of the local area suitable for stereoscopic viewing (these can be bought from Maps NT).

Request the assistance of DIPE staff, eg: Landcare or Resource Assessment section, asking them to bring some stereoscopes.

Divide students into small groups to view different sections of the catchment through the stereoscopes.

Now that the students have a picture of the catchment in three dimensions (3D), ask them to relate this to the two dimensional (2D) maps, finding key landmarks to match them up.

Analysis:

Define and explain the terms 'catchment' and 'subcatchment'.

Describe the physical features (landforms and water features) and cultural features (land uses and structures) that comprise a catchment or subcatchment.

Explain what a contour line represents.

Reflection:

Considering the direction of water flow, explain how land-use activities in the upper catchment can impact on areas downstream.

Compare with indigenous concept of qualitative mapping – songs, stories and paintings, eg: desert water maps/paintings.

EXPLORING A CATCHMENT B3-B5

(Adapted from the WA Swan River Education Kit 2000.)

Activity 5

Curriculum Links:

SOSE Environments / Place, Landforms and Features Env 3.1, Env 4.1, Env 5.1 / Natural Systems Env 3.3, Env 4.3, Env 5.3

Focus Question:

- **What are the components of all catchments?**

Aims:

1. To demonstrate links between urban catchments and larger river system catchments.
2. To understand how water flows in local area and in catchments.

Main Idea:

- A catchment is an area of land bounded by natural features such as hills, ridges or rises from which water drains to a collection point such as an estuary, river, waterhole or wetland.

Need:

Local topographical maps, sketching materials, transport, modelling materials and camera.

Consider:

Discuss prior knowledge of the movement of water in your local area ie: where river water comes from and where it goes. Consider movements of rainwater, water in drains, water used on gardens and groundwater.

Discuss or draw the idea of local catchments as areas of land that drain to one point.

Make a simple model of a catchment using sand or plastic in a large tray. Use a watering can to simulate rainfall.

Identify small scale 'catchments', such as those in a suburb or within the school grounds by observing:

- the slope of the land;
- types of surfaces;
- where the water comes from (eg: roofs and land surfaces);
- where it goes (eg: gutters, drains, natural drainage lines and underground); and
- where it eventually ends up.

Produce a map of these features and indicate the flow direction of the water.

Use a topographical map of the area to determine the catchment boundary of the local area near the river.

Define or redefine the term 'catchment' and discuss the idea that water links everything in a catchment.

Brainstorm terms that relate to catchments and river systems. Research their meanings, then develop a glossary. Examples may include catchment, subcatchment, tributary, watershed, drainage basin and estuary.

Determine where the school is positioned in its catchment and then plan and take a short journey of the local area to determine the features of your local catchment.

Determine where water is flowing from and to within the catchment.

Draw a large sketch map or picture of a river system in an imaginary catchment. On this map, label some of the features, eg: coastal plain, hills, mountains, a plateau, areas of sand dunes and coastal cliffs, forest, areas of coastal vegetation and wetlands.

Discuss and illustrate the idea that all people live in a catchment.

Determine the different types of landscapes your catchment traverses. Sketch a map of the catchment to show these features.

Draft a design for a model of a regional catchment and present an annotated sketch of their proposed model, outlining material and methods they will use.

Analysis:

What local features make up the boundary of the catchment?

How many different types of landscape did the catchment traverse?

How many different land uses did you come across within the catchment?

Where did the water flow from and to within the catchment?

How many different types of water bodies did you come across within the catchment?

Extension Ideas:

Recall knowledge of a part of the river/wetland environment and draw a picture of that place. Produce a display of these pictures.

Consider what the area and the wetland environment would have been like before occupation by Europeans.

Consider ways the wetland might have been changed by people in the past.

Compile a file of newspaper clippings about the region's water resources.

Investigate the History of river (interview locals, research news, indigenous stories).

Create a catchment time line of events.

Look at different flora and fauna along river.

Create a mural – in classroom/on school wall, extend to local community to inform on changes.

Have regular monitoring sites (photographic/ scientific) with mapped Eastings and Northings.

Reflection:

Did students note any potential for conflict of interest in terms of land and water use?

Did they notice any signs of rehabilitation works within the catchment, eg: revegetation or erosion control?

DALY RIVER STUDY B3-B5

Activity 6

Curriculum Links:

SOSE Environments / Place, Landforms and Features Env 3.1, Env 4.1, Env 5.1/ Natural Systems Env 3.3, Env 4.3, Env 5.3

Focus Question:

What is a catchment?

Aim:

To develop an understanding of catchments and subcatchments.

Main Idea:

A catchment is an area of land bounded by natural features such as hills, ridges or rises from which water drains to a collection point such as an estuary, river, waterhole or wetland.

Need:

Daly River Catchment maps (Figures 6 to 10) and coloured pens.

Consider:

Looking at the Daly River Catchment locality plan and dry season flows map (Figure 6), identify the different rivers in this drainage system. Colour each one a different colour. You may choose to use local maps for your region instead.

Analysis:

- How many waterways drain into the Daly River?
- Why do you think the Daly River Catchment is named after the Daly River?
- Are there some creeks that drain directly to the sea?
- Is the drainage basin landlocked or does it drain to the sea?
- How many sub-catchments are identified in the Daly River Catchment?

Reflection:

What are some reasons why it is important to understand where our water comes from and travels to?

How do maps assist in obtaining a 'bigger picture' of the water resource in your region?

Figure 9: Land tenure and land use map shows that a large proportion of the Daly River Catchment is under pastoral lease. Using Part 4: 'Uses of catchments' in this education kit research how poorly managed pastoral may impact on water quality. What are some good land management practices which can be adopted to assist in water quality protection.

Extension:

How do indigenous communities collate, present and use this type of information?

How can traditional and scientific knowledge be brought together to plan for wise use of water resources?

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