Teaching and Learning Resource Kit
For early, primary and middle years

www.nt.gov.au/becrocwise
The *Be Crocwise Teaching and Learning Resource Kit* has been produced by the Department of Natural Resources, Environment, The Arts and Sport, Education for Sustainability Unit.

The activities were developed by the following staff from the unit: Allison Borgelt, Megan Cossar, Jennifer Cunningham.

Department of Natural Resources, Environment, The Arts and Sport, Education for Sustainability Unit. Palmerston NT 0831.

Website: www.nt.gov.au/becrocwise

To book a Crocwise presentation at your school, or to provide feedback on the *Be Crocwise Teaching and Learning Resource Kit*, please contact the Education for Sustainability Unit on:

- Darwin (08) 8999 4565
- Katherine (08) 8973 8865

Crocodile sightings can be reported to Parks and Wildlife on:

- Darwin (08) 8999 4691 or 0419 822 859
- Katherine (08) 8973 8888 or 0407 958 405

© 2010 Department of Natural Resources, Environment, The Arts and Sport

The text and illustrations can be photocopied without permission for non-profit educational purposes only. If text is reproduced separately it must not be altered and the Department of Natural Resources, Environment, The Arts and Sport must be acknowledged as the source.

**ACKNOWLEDGEMENTS**

We would like to thank the following staff from the Department of Natural Resources, Environment, The Arts and Sport for their advice, comments and contributions: Anna Cooke, Brett Easton, Anne Walters, Tom Nichols, Robbie Risk, Joey Buckerfield, Jasmine Jan, Kate Duigan, Pam Wickham, Yusuke Fukuda, Rady Lim, Jarrod Archibold and Parks and Wildlife Rangers.

We would also like to thank Charlie Manolis from Crocodylus Park for providing comments on the draft kit.

Feedback and ideas for activities were provided by staff and teachers from the Department of Education and Training: Natalie McMasters, Vanessa Haw, Donna Harding, Cathy Huggett, Katie Gregory and Val Momaut.

We would also like to thank Parks Australia - Kakadu National Park for providing the crocodile satellite tracking data used in Activity 9. This data was collected through a collaborative project with Wildlife Management International.
CONTENTS

Be Crocwise 3
We are a Crocwise Classroom 5
Teacher Notes 6
Resources 11
Curriculum Links 13
Early Years Activities 15
   Activity 1:  Be Crocwise 17
   Activity 2:  Build a croc 21
   Activity 3:  Salties and freshies 23
   Activity 4:  Who eats who?  25
Primary Years Activities 27
   Activity 5:  Trapping crocs 29
   Activity 6:  Croc breeding cycles 32
   Activity 7:  Ultimate predator 34
   Activity 8:  A day in the life of…  36
Middle Years Activities 37
   Activity 9:  Keeping track of Moline & friends 39
   Activity 10: Croc captures 42
   Activity 11: Creating and destroying a food web 45
   Activity 12: Community meeting 48
   Activity 13: Risky business 50
   Activity 14: Croc culture 51
Appendix I 53
   Parks and Wildlife – crocodile safety signs
BE CROCWISE

The Territory Government Crocodile Management Program aims to ensure the long-term conservation of the saltwater crocodile and its habitat in the Northern Territory, while also maintaining public safety. The plan incorporates active crocodile management through surveys, trapping and seasonal closures of waterbodies, with a public safety and education strategy, called ‘Crocwise’.

The Be Crocwise Teaching and Learning Resource Kit has been developed by the Department of Natural Resources, Environment, the Arts and Sport as part of the public awareness and education strategy. The kit is intended for use by early, primary and middle year teachers. The activities can either be completed as standalone lessons or as part of a larger unit of work. The activities also have the potential to be modified to suit other year levels.

The principles behind Crocwise are:

- Saltwater crocodiles are common in the Territory and pose a significant risk to human life;
- People live and participate in recreational activities in or near waterways where saltwater crocodiles live;
- In areas where saltwater crocodiles live, there are no guarantees that a natural waterway is 100% safe;
- Only swim where there are designated safe swimming signs; and
- Your personal safety is your responsibility.

The Crocwise strategy also includes safety signage around waterways to inform the public of designated safe swimming areas (examples of Parks and Wildlife crocodile safety signs can be found in Appendix I, pg 53).

Crocodile safety

The Territory Government recommends the following to ensure people stay safe in areas that may have saltwater crocodiles:

- Never swim where crocodiles may live. **Only swim in designated safe swimming areas.**
- Always keep a look out for crocodiles.
- Never provoke, harass, interfere with or feed crocodiles.
- Be extra vigilant at night and during the breeding season.
- Avoid approaching the water’s edge.
- Stay well back from crocodile slide marks.
- Always stand a minimum of five metres from the water’s edge when fishing.
- Obey all crocodile warning signs.
- Be vigilant when launching or retrieving your boat.
- Do not lean over the edge of a boat or stand on logs overhanging water.
- Avoid returning regularly to the same spot at the water’s edge.
- Dispose of food scraps, fish offal and other waste properly and away from your campsite.
- Never prepare food, wash dishes or pursue activities near the water’s edge or adjacent to sloping banks.
- Camp at least 2 metres above the high water mark and at least 50 metres from the water’s edge.
- Do not interfere with crocodile traps.
To teach school-aged children about crocodile safety, the principles behind Crocwise have been simplified to five key messages. Each of the activities in this kit has been developed to address one or more of these messages:

1. Be Crocwise
2. Crocs are common
3. Crocs move around
4. Crocs are deadly
5. Read and obey all signs

Introducing Crocwise to your classroom

The following text can be used to introduce the Crocwise messages to your class. You can also organise for a Crocwise presentation at your school and work towards becoming a crocwise classroom (certificate on pg 5).

Crocodiles love the Top End! They can be found living in all kinds of waterways: shallow ones, deep ones, ones with lilies on top, muddy ones, and ones where we like to fish and swim. Rangers from the Parks and Wildlife crocodile management team are kept very busy removing crocodiles from areas close to where humans live because crocs are common.

There are 75,000 – 100,000 crocodiles in the Top End, that’s a lot – that’s more than the population of Darwin or ten times the population of Katherine! You can find two types of crocodiles here in the Top End: saltwater crocodiles also known as “salties” and freshwater crocodiles also known as “freshies”. That saltwater name is a tricky one. Don’t let it confuse you though because salties can also be found in freshwater.

Crocodiles can be found in any Top End waterway at anytime because crocs move around. They might be looking for food, a mate or territory. Crocodiles move around easily in the wet season because lots of rain means the rivers, creeks and billabongs start to join together – it’s like a super highway for crocodiles!

So be careful when you’re near the water because crocs are deadly. They can grow really big and are excellent hunters. Some deadly features include:

• Big powerful jaws that snap shut
• Another set of eyelids to help see underwater
• A great sense of smell
• Ability to sense movement in the water through their skin
• A strong tail to move quickly in and out of water

So remember to Be Crocwise if you’re near the water and always read and obey all signs. They are there for your safety.

If you can remember all these messages, then you will “Be Crocwise”.
WE ARE A CROCWISE CLASSROOM

WE ARE PROUD TO HAVE COMPLETED THE FOLLOWING ACTIVITIES AND KNOW MORE ABOUT CROCODILES AND HOW TO STAY SAFE AROUND THEM

Student/Class: __________

Date completed: __________

☐ Watched the Be Crocwise DVD
☐ Made a poster using one or more Crocwise messages
☐ Hosted a Crocwise talk at our school
☐ Completed at least one activity from the Teaching and Learning Resource Kit
☐ Visited the Be Crocwise website
ALL ABOUT CROCODILES IN THE NORTHERN TERRITORY

Classification

There are two species of crocodiles (Order Crocodilia; Family Crocodylidae) in Australia: the saltwater or estuarine crocodile, *Crocodylus porosus*, and the freshwater crocodile, *Crocodylus johnstoni*. Worldwide, there are a total of 12 species of crocodiles in the genus *Crocodylus*, and many of them are endangered.

<table>
<thead>
<tr>
<th>Saltwater crocodiles</th>
<th>Freshwater crocodiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have a broad snout with stout teeth</td>
<td>Have a long, narrow, tapered snout with needle-like teeth</td>
</tr>
<tr>
<td>Live for more than 70 years</td>
<td>Live for more than 50 years</td>
</tr>
<tr>
<td>Grow to 6 metres in length</td>
<td>Grow to 2.5-3.5 metres in length</td>
</tr>
<tr>
<td>Breed during the Wet season; they are mound builders</td>
<td>Breed during the Dry season; they are hole diggers</td>
</tr>
<tr>
<td>Aggressive, will attack unprovoked, including humans, cattle and horses</td>
<td>Usually timid but will attack humans in defence</td>
</tr>
<tr>
<td>Will eat anything it can catch from fish and reptiles to large mammals</td>
<td>Mainly feeds on fish, crustaceans, insects, frogs, snakes and small waterbirds</td>
</tr>
<tr>
<td>Found across northern Australia (NT, QLD, WA) and south-east Asia</td>
<td>Found across northern Australia (NT, QLD, WA); endemic to Australia</td>
</tr>
<tr>
<td>Occur in both freshwater and saltwater areas; billabongs, rivers, swamps, estuaries, beaches</td>
<td>Occur in freshwater lakes, streams and billabongs</td>
</tr>
</tbody>
</table>

Conservation and management in Australia

Unrestricted hunting of crocodiles was allowed during 1940-60s. This was very lucrative for those involved, but saw the population crash to unsustainable levels; fewer than 5,000 individuals were thought to be left in the wild when hunting was stopped.

Saltwater crocodiles were declared a protected species in 1971 (freshwater crocodiles were declared protected in 1964) and by the 1980s the population had increased to 30-40,000 individuals. As the population increased, so did the number of crocodile related attacks.

Following this increase in crocodile and human interactions there were public calls for a stop to the conservation programs and widespread culling was promoted. In response to this, in the early 1980s the Territory Government implemented an “incentive-driven conservation” strategy which aimed to educate the public about the environmental and economic benefit of crocodile conservation. Positive incentives included commercial crocodile activities such as tourism, crocodile farming and ranching. Negative incentives included a ‘problem crocodile’ control program.

Today it is estimated there are 75,000 – 100,000 saltwater crocodiles in the Northern Territory. The Territory Government uses a risk-based strategic management approach to determine the level of management activity for a given area. This approach is based on an assessment of:

- **FREQUENCY:** How often crocodiles are found in the area.
- **PROXIMITY:** How close an area is to known crocodile breeding source areas.
- **POPULATION:** The number and frequency of people living or recreating in an area.
- **PROBABILITY:** The likelihood or chance of a human-crocodile interaction occurring.
- **PRACTICALITY:** The accessibility of an area, the risk to staff and the likelihood of a human entering the area.
Current crocodile control involves maintaining three types of management areas – 1. Exclusion; 2. No Tolerance; 3. Problem Crocodiles Removed (‘problem’ crocodiles are those that have attacked a person, are acting aggressively or affecting commercial activities).

<table>
<thead>
<tr>
<th></th>
<th>Exclusion</th>
<th>No Tolerance</th>
<th>Problem Crocodiles Removed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Management objective</strong></td>
<td>To prevent crocodiles from entering an area such that the level of risk is low enough to recommend swimming eg. Wangi Falls, Litchfield National Park.</td>
<td>To significantly reduce the risk of attack by removing any crocodiles that enter the area eg. Darwin Harbour and outer Darwin residential areas.</td>
<td>To only remove problem crocodiles eg. Fogg Dam Conservation Area.</td>
</tr>
<tr>
<td><strong>Water based activities</strong></td>
<td>Safe for swimming and other water based activities.</td>
<td>Not safe for swimming except in patrolled areas; other water based activities allowed with care.</td>
<td>Not safe for swimming; other water based activities allowed with extreme caution.</td>
</tr>
<tr>
<td><strong>Signage</strong></td>
<td>May be closed periodically, eg. during Wet season or if a crocodile has been sighted. ‘Swimming Open’ or ‘Swimming Closed’ signs.</td>
<td>‘Crocodile Safety’ signs – NB. not all areas have signage; if there is no safe swimming sign then crocodiles may be present.</td>
<td></td>
</tr>
</tbody>
</table>

The Territory Government does not manage all areas in the Northern Territory, eg. Kakadu National Park is managed by Parks Australia, so management zones and signage may vary. Examples of Parks and Wildlife crocodile safety signs can be found in Appendix I, pg 53.

**Commercial uses**

Crocodiles, particularly the saltwater crocodile, are a huge draw card for tourists in the Top End. This can either be through direct tourism, such as jumping crocodile cruises and crocodile farms, or indirectly through other water-based tourism enterprises.

Although protected in the wild, crocodiles are farmed in the Top End and provide employment for hundreds of people in farms, tanneries and support businesses. The farms produce high quality skins and meat for both the Australian and overseas markets. Products made from crocodile skins include belts, wallets, handbags and shoes. This industry relies on harvesting of wild populations to support captive stocks.

The Crocodile Management Program allows for harvesting of up to 50,000 crocodile eggs from the wild each Wet season. Approximately half of this harvesting is undertaken by Indigenous communities and provides a valuable source of income to remote areas.

**Evolution**

- *350 million years ago* - Reptilia first appeared. Reptiles are most closely related to birds.
- *245-228 million years ago* - Crocodilians first appeared. These animals were lightly built animals, had long limbs and were bipedal (walked upright) – this is still evident today as hind limbs are longer than the front limbs.
- *161-99 million years ago* - Known as ‘crocodile time’ because it is the period of greatest diversity of crocodilians with over 150 named fossil species recovered so far. These crocodiles ranged from giant dinosaur eaters, extremely long-snouted fish eaters, nearly toothless duck-billed forms, marine crocodiles with fish-like tails, dwarf crocodiles and land crocodiles. The basic crocodilian body plan has changed little over 200 million years.
Biology
Like all reptiles, crocodiles are cold-blooded. This means that they are not able to thermoregulate ie. they can't maintain a constant internal body temperature. Instead they must rely on an external heat source, the sun, to maintain their body temperature (30-33°C). Crocodiles are commonly observed basking with their mouths open. It is not known exactly why crocodiles do this, but it is thought that by doing so they are able to prevent their brain from overheating while the rest of the body continues to absorb heat.

A crocodile's skin is made up of a network of interconnected scales of different types and sizes. The scales on the flanks and the neck tend to be round with a raised centre, while along the back and upper surfaces of the tail the scales are raised in a very pronounced way. These raised tail scales may occur in a double or single row and are called scutes. All of the scales are provided with a rich blood supply that transports heat back into the body when basking; they act like solar panels. On the belly surface scales tend to be square and flat. This is the skin that is commonly used in the leather industry.

Saltwater crocodiles live in both fresh water and salt water and their colour can change depending on the environment. Animals that have lived in freshwater rivers for most of their life tend to be darker in colour, while sea going crocodiles can have barnacles growing on their bellies.

In addition to being excellent swimmers, crocodiles can walk on land at a speed of about 1-2km/hr. They can have short bursts of speed but these are rarely greater than 10km/hr and the animal will tire quickly.

Female saltwater crocodiles nest during the Wet season and will aggressively protect their nest and babies. A male crocodile may breed with several females and will actively prevent other males from entering his territory. Females will lay around 50 eggs with hatchlings emerging 75 -106 days later, depending on the incubation temperature. The sex of hatchlings is also determined by the average temperature within the nest: 32°C produces only males, while temperatures a little lower (at or below 31°C) or higher (at or above 33°C) produces all females.

Feeding and diet
Saltwater crocodiles will eat anything they can catch. Usually this is fish, turtles and crustaceans, but horses, buffalo, dogs and humans are also prey. Crocodiles have 66 teeth that are designed to secure and hold prey (if a tooth is lost a replacement is waiting underneath). These teeth are not designed for cutting so they must break off pieces by performing a ‘death roll’; this roll can also be used to subdue prey.

Crocodiles have really strong muscles for closing their jaws so once closed, you cannot prise them open. However, the muscles to open the jaws are relatively weak; this is why a crocodile cannot open its jaws if they are held closed.

Surprisingly, crocodiles have a relatively small stomach (a 3m crocodile may have a stomach the size of a basketball) so they cannot eat a large prey all at once. They may leave their prey and come back to feed on it over several days. Some crocodiles may swallow hard items such as stones to assist in digestion (some birds do a similar thing). The stones may also aid with buoyancy in the water.
<table>
<thead>
<tr>
<th>Type of adaptation</th>
<th>Feature</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioural</td>
<td>Tuck feet to side when swimming</td>
<td>Less water resistance</td>
</tr>
<tr>
<td></td>
<td>Open mouths while basking</td>
<td>Thought to prevent brain from overheating</td>
</tr>
<tr>
<td></td>
<td>Float with only eyes, ears and nostrils exposed</td>
<td>Cannot be detected by prey</td>
</tr>
<tr>
<td></td>
<td>Protective parental behavioural</td>
<td>Increases offspring survival rate</td>
</tr>
<tr>
<td></td>
<td>Territorial</td>
<td>Reduces competition for food/mates</td>
</tr>
<tr>
<td>Physiological</td>
<td>Rigid tissue at back of the mouth</td>
<td>Closes off throat and prevents water entering when submerged</td>
</tr>
<tr>
<td></td>
<td>Closes nostrils</td>
<td>Prevents water entering when submerged</td>
</tr>
<tr>
<td></td>
<td>Muscles allow fast burst of movement on land or in water</td>
<td>Able to surprise and catch prey</td>
</tr>
<tr>
<td></td>
<td>Four-chambered heart, with valves that can redirect flow</td>
<td>Can increase flow to important areas, eg. senses, and/or away from non-essential areas to reduce oxygen use</td>
</tr>
<tr>
<td></td>
<td>Raised scales on back and tail with rich blood supply</td>
<td>Act like solar panels to warm up body</td>
</tr>
<tr>
<td></td>
<td>Reduces heart rate to 2-3 beats per minute</td>
<td>Allows them to spend a long time under water to wait for prey</td>
</tr>
<tr>
<td></td>
<td>Layer of guanine crystals behind retina</td>
<td>Allows crocodiles to see well in low light levels</td>
</tr>
<tr>
<td></td>
<td>Excellent hearing/smell</td>
<td>Can locate prey in low visibility conditions and from long distances</td>
</tr>
<tr>
<td></td>
<td>Have reserve teeth underneath external teeth</td>
<td>Can replace lost teeth</td>
</tr>
<tr>
<td></td>
<td>Transparent second eye-lid</td>
<td>Enables them to swim with eyes open</td>
</tr>
<tr>
<td>Structural</td>
<td>See labelled image below</td>
<td></td>
</tr>
</tbody>
</table>

![Crocodile Adaptations Diagram](image-url)
Indigenous people and crocodiles

Indigenous people of northern Australia have a long history with crocodiles and have learnt to live with them. This is demonstrated through stories, customs, songs and movies from across the Top End. Crocodiles also commonly feature in rock and bark paintings, as well as in more contemporary artworks.

It’s difficult to give a general overview of the relationship between crocodiles and Indigenous people due to clan differences. In addition, crocodiles are known by many names throughout the Top End, eg. Kumoken (Naborn people), Marrachila (Burarra people) and Ginga (Gagadju people).

When talking about Indigenous connections to crocodiles with your students, try to find out what crocodiles mean for the Indigenous groups in your local area - What’s the word for crocodile in the local language? Do you know of any Indigenous art or movies that feature crocodiles? Are there any crocodile dreaming stories in your local area? Discover why crocodile meat is eaten by some clans while for others killing of crocodiles is not permitted, or is only allowed at certain times.

Some examples of Indigenous connections to crocodiles are:

**Larrakia**

For Larrakia people, the crocodile is a totemic animal that features in the logo of Larrakia Nation Aboriginal Corporation. Crocodile safety messages are embedded in the culture of daily life: never turn your back to the sea; the Old People watch while people go swimming; stay away from the water’s edge; and you can smell those big crocodiles.

**Yolngu**

For the Gumatj clan of the Yolngu people in north east Arnhem Land, Baru, crocodile, is a spiritual guardian and is akin to the power of fire. The way fire rushes across the land is likened to the way a crocodile rushes to seize its victim.

Baru features in the movie ‘Yolngu Boy’ as the totem, emphasising the importance of the boy’s tribal culture as they are taught Baru will protect them, make them strong and guide them through life.

**Gagadju**

For the Gagadju people, the traditional owners of Kakadu National Park, the crocodile is such an important icon that the Gagadju Dreaming association used it as inspiration for a major hotel within the Park. Visitors enter the hotel through the crocodiles gaping jaws and sleep within the belly, while maintenance and service areas are located in the tail section.

**Telstra National Aboriginal & Torres Strait Islander Art Awards**

The 24th Telstra National Aboriginal & Torres Strait Islander Art Awards in 2007 showcased several pieces of work featuring crocodiles, one of which was the overall winner.

Denis Nona’s bronze statue *Ubirikuburi* depicts a legend from the Mai Kusa (river) on the western coast of Papua New Guinea. The moral of the story is: if people remove animals from their natural environment they must be properly cared for.

Joshua Bonson’s painting *Skin* uses a circular design to represent the connections between the stones of the earth, the scales of a crocodile and his family including his Jawoyn connections.
The following resources are meant as a guide only and are by no means an exhaustive list of possible resources. We encourage you to find resources that are specific to your local area, particularly those relating to Indigenous culture. Local newspapers across the Top End also regularly contain articles related to crocodiles.

WEBSITES

(Classification, Conservation and Management, Commercial Uses, Biology, Feeding and Diet, Adaptations, Safety, Photos)

(Classification, Conservation and Management, Biology, Feeding and Diet, Adaptations, Safety)

(Classification, Conservation and Management, Commercial Uses, Biology, Feeding and Diet, Adaptations)

Crocodilians: Natural History & Conservation - www.flmnh.ufl.edu/cnhc/
(Classification, Evolution)

NOVA Online: Crocodiles - www.pbs.org/wgbh/nova/crocs/clickable/
(Classification, Evolution)

Convention on International Trade in Endangered Species (CITES) - www.cites.org/
(Conservation and Management, Commercial Uses)

(Conservation & Management, Commercial Uses)

(Commercial Uses)

Crocodylus Park - www.crocodyluspark.com/
(Commercial Uses)

Crocosaurus Cove - www.crocosauruscove.com/
(Commercial Uses, Research)

Big Gecko - http://big-gecko.com/
(Pictures, Research)

MESA Living Safely with Crocodiles - www.mesa.edu.au/friends/croc_kit/default.asp
(Classroom Activities)

National Geographic - www.nationalgeographic.com/coloringbook/crocodiles.html
(Classroom Activities)
NON-FICTION BOOKS


FICTION BOOKS

**Early Years**


**Primary Years**


**Cultural**


## CURRICULUM LINKS

<table>
<thead>
<tr>
<th>Key Learning Areas</th>
<th>Maths</th>
<th>English</th>
<th>Science</th>
<th>SOSE</th>
<th>Inner Learner</th>
<th>Creative Learner</th>
<th>Collaborative Learner</th>
<th>Constructive Learner</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Space (S)</td>
<td>Listening &amp; Speaking (LS)</td>
<td>Science as Inquiry (SI)</td>
<td>Social Systems &amp; Structures (SSS)</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td></td>
<td>Measurement (M)</td>
<td>Reading &amp; Viewing (RV)</td>
<td>Life &amp; Living (LL)</td>
<td>Environments (E)</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td></td>
<td>Number (N)</td>
<td>Writing (W)</td>
<td>Earth &amp; Beyond (EB)</td>
<td></td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td></td>
<td>Chance &amp; Data (CD)</td>
<td></td>
<td></td>
<td></td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
</tbody>
</table>

### EARLY YEARS (KGP1 to Band 2)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Learning Areas</th>
<th>Essential Learnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be Crocwise</td>
<td>LS, RV, W</td>
<td>E</td>
</tr>
<tr>
<td>Build a croc</td>
<td>M, W</td>
<td>LL</td>
</tr>
<tr>
<td>Salties and freshies</td>
<td>M, RV, W</td>
<td>SI, LL, EB</td>
</tr>
<tr>
<td>Who eats who?</td>
<td>SI, LL</td>
<td>E</td>
</tr>
</tbody>
</table>

### PRIMARY YEARS (Band 1 to Band 4)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Learning Areas</th>
<th>Essential Learnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trapping crocs</td>
<td>S, LL, EB</td>
<td>E</td>
</tr>
<tr>
<td>Croc cycles</td>
<td>S, M, N, RV</td>
<td>LL</td>
</tr>
<tr>
<td>Ultimate predator</td>
<td>W, LL</td>
<td>E</td>
</tr>
<tr>
<td>A day in the life of…..</td>
<td>W, LL</td>
<td>☑️</td>
</tr>
</tbody>
</table>

### MIDDLE YEARS (Band 2 to Band 5)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Learning Areas</th>
<th>Essential Learnings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keeping track of Moline and friends</td>
<td>S, M, LS</td>
<td>LL, EB</td>
</tr>
<tr>
<td>Croc captures</td>
<td>S, CD, LL, EB</td>
<td>E</td>
</tr>
<tr>
<td>Creating and destroying a food web</td>
<td>RV, LL, EB</td>
<td>E</td>
</tr>
<tr>
<td>Community meeting</td>
<td>LS, RV, W</td>
<td>SSS, E</td>
</tr>
<tr>
<td>Risky business</td>
<td>RV, SSS</td>
<td>✓</td>
</tr>
<tr>
<td>Croc culture</td>
<td>LS, RV, W</td>
<td>SSS</td>
</tr>
</tbody>
</table>

**Note:** The ✓ symbol indicates the activity has been completed or is part of the curriculum.
EARLY YEARS ACTIVITIES

Suggested Year Levels

Transition to Year 3
(NB. Activities can be modified up or down to suit other levels)

Teacher Notes

The Teacher Notes (pg 6) provides an overview of crocodile biology, adaptations, management in the NT and Indigenous connections. This forms the background knowledge a teacher needs to be able to effectively use these activities.

Activities

<table>
<thead>
<tr>
<th>Early Years Activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 1: Be Crocwise: Learning the key safety messages</td>
<td>15</td>
</tr>
<tr>
<td>Activity 2: Build a croc: Introducing the shape and adaptations of a crocodile</td>
<td>17</td>
</tr>
<tr>
<td>Activity 3: Salties and freshies: Finding out the difference - adaptations, habitats, diets and nests</td>
<td>21</td>
</tr>
<tr>
<td>Activity 4: Who eats who?: Exploring a crocodile food chain</td>
<td>23</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Years Activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 5: Trapping crocs: Mapping crocodile trap locations and captures</td>
<td>25</td>
</tr>
<tr>
<td>Activity 6: Croc breeding cycles: Showing seasonal changes for a crocodile and its habitat</td>
<td>27</td>
</tr>
<tr>
<td>Activity 7: Ultimate predator: Learning about adaptations through design</td>
<td>29</td>
</tr>
<tr>
<td>Activity 8: A day in the life of...: Understanding crocodiles through stories</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Middle Years Activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 9: Keeping track of Moline and friends: Using real life data to map and explore how crocodiles move around</td>
<td>34</td>
</tr>
<tr>
<td>Activity 10: Croc captures: Graphing and analysing crocodile capture data over time</td>
<td>36</td>
</tr>
<tr>
<td>Activity 11: Creating and destroying a food web: Researching interconnectedness within Top End ecosystems</td>
<td>38</td>
</tr>
<tr>
<td>Activity 12: Community meeting: Acting out a debate about crocodile management</td>
<td>40</td>
</tr>
<tr>
<td>Activity 13: Risky business: Assessing risk and proposing solutions to some common behaviours</td>
<td>42</td>
</tr>
<tr>
<td>Activity 14: Croc culture: Researching crocodiles, culture and the community</td>
<td>44</td>
</tr>
</tbody>
</table>
Be Crocwise Messages

These activities have been designed to reinforce the Crocwise messages about crocodile safety:

<table>
<thead>
<tr>
<th></th>
<th>Be Crocwise</th>
<th>Crocs are common</th>
<th>Crocs are deadly</th>
<th>Crocs move around</th>
<th>Read and obey all signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 1</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Activity 2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Activity 3</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity 4</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ideas for Units of Work

The activities can be done as standalone activities or incorporated into other units of work. Some unit topic ideas include:

- We are a Crocwise classroom (see certificate, pg 5)
- Dangerous marine animals
- Living with crocodiles
- Iconic Australian animals
- Reptiles
- Living in the bush
- People who help me (ie. rangers, police, paramedics etc)
Activity 1 - Early Years

BE CROCWISE
LEARNING THE KEY SAFETY MESSAGES

Introduction:
• Watch “Be Crocwise” DVD and/or organise a Crocwise talk for your school (contact the Education for Sustainability Unit: Darwin - (08) 8999 4565; Katherine - (08) 8973 8865).
• Look at pictures of freshwater and saltwater crocodiles (refer to Be Crocwise website).
• Review a recent newspaper article about crocodiles.

Activity:

You will need:
- Be Crocwise safety scene (pg 19)
- Be Crocwise trace messages (pg 20)

Use the following narrative and the ‘Be Crocwise’ safety scene (pg 19) to introduce the Crocwise messages:

The sun is shining brightly and it’s another beautiful day in the Top End. Ranger Jay is whistling a catchy tune while patrolling the Park. He stops suddenly when he comes across this scene (show the safety scene, pg 19).

“Woah!” he thinks, “These people are in real danger here; it’s really unsafe in this area with that big mob of crocs in there. I better teach these people something about how to Be Crocwise around our waterways.”

Ranger Jay calls everyone over to sit on the lawn well away from the water’s edge. “Everyone looks like they are having a great time enjoying the Park.” People nod in agreement. “But you have to be super careful around our waterways in the Top End. There could be a croc anywhere, in any waterway at anytime. How many crocs can you see in there?” (Answer: 3).

“That’s right. Crocs are common in the Top End because they like living in this kind of tropical environment. There are lots of places for them to live, like this river here.” He points to the water. “They may also like living in billabongs and creeks, even the ocean.”

Someone puts their hand up:
“Ranger Jay, how many crocs are there in the Northern Territory?”
“We estimate there are up to 100,000 crocs in the NT.”
“That’s more than the population of Darwin! Wow! How come there are so many?”
“Since crocs were protected in the early 70s, numbers have increased in the wild. That’s why crocs are common”

Ranger Jay continues “There’s something else you might not know. Those crocs, they move around. They swim from place to place looking for food, a mate and territory. It’s really easy for crocs to move around in the wet season when the waterways swell from all the rain. So crocs are showing up in places they haven’t been before. This is another reason why it is really important to Be Crocwise around our waterways.”

Continued over page…..
“Saltwater crocodiles are great hunters and rule our waterways. They have a number of adaptations that make them the ultimate predator *(act out the adaptations)*. They have big powerful jaws with sharp teeth that snap shut when they catch some food, a strong tail, a second set of eyelids to help see underwater, and a good sense of smell. All these features means **crocs are deadly**. Even if we can’t see them, they will know we are nearby and they may attack.” The audience is amazed by Ranger Jay’s story.

“So when you see this sign *(point to sign in picture or Appendix I, pg 53)* on our Parks, make sure you take notice and **read and obey all signs**. It means there may be crocodiles in these waters so don’t go swimming. If you can remember all these messages than you will **Be Crocwise**.

Generate class discussion about what the people in the picture could do to Be Crocwise.

Students colour in the scene (pg 19) and then trace out the Be Crocwise messages (pg 20).

**Going further:**

- Create a role play using the narrative above.
- Come up with a jingle or song to help students remember the Crocwise messages.
- Use photos (refer to Be Crocwise website), videos, models etc to talk about the body parts and behaviour that make crocodiles dangerous/deadly, especially saltwater crocodiles.
- Look at different safety signs in your area and read their messages, eg. road signs, beach safety, school signs (examples of crocodile safety signs can be found in Appendix I, pg 53).
- Using one of the Crocwise messages, students can make their own sign with pictures of crocodiles.
BE CROCIWSE
BE CROCWISE

1. Trace over the words to show the messages
2. Write the messages

Be Crocwise

Croc are common

Croc move around

Croc are deadly

Read and obey all signs

By _____________________
**Activity 2 - Early Years**

**BUILD A CROC**

**INTRODUCING THE SHAPE AND ADAPTATIONS OF A CROCODILE**

**Introduction:**

- Review “Crocs are deadly” message (refer to Be Crocwise, pg 4). What does this mean?
- Introduce the concept of adaptations. Discuss what a crocodile needs to be able to hunt and catch its prey (refer to Teacher Notes, pg 9).
- Measure out the length of a typical crocodile using a tape measure (refer to Teacher Notes, pg 6).

**Activity:**

<table>
<thead>
<tr>
<th>You will need:</th>
<th>Begin by familiarising students with what a crocodile looks like by using photos, books, videos (refer to Be Crocwise website and Resources, pg 11). Students write the main features (eyes, teeth, tail, legs, snout etc) on the Crocodile picture (pg 22).</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Build a croc sheet</td>
<td></td>
</tr>
<tr>
<td>(pg 21)</td>
<td></td>
</tr>
<tr>
<td>- Images of crocodiles</td>
<td></td>
</tr>
<tr>
<td>- Craft materials</td>
<td></td>
</tr>
</tbody>
</table>

Make a life size (3-4m) model of a crocodile. Use craft materials such as cardboard, egg cartons (skin), foam, fabric, ping pong balls (eyes), bubble wrap (skin), stockings (webbed feet), paint, broken pencils (teeth) and crepe paper. Students make labels for the different body parts.

Example of a life size crocodile made by Year 1 students at Stuart Park Primary School.

Photo courtesy of Donna Harding

**Going further:**

- Students create a model of a crocodile out of plasticine. Give students pre-labelled flags, eg. jaws, leg, eye etc, stuck onto toothpicks to label body parts on their crocodile.
- Look at pictures of crocodile traps (refer to Be Crocwise website) and talk about what they look like and why they are needed. Students draw a plan for their trap and then make a trap for their plasticine crocodile.
- Look at the differences between saltwater and freshwater crocodiles (Teacher Notes, pg 6, and Activity 3, pg 23).
- Create “a day in the life of a croc” story (modify Activity 8, pg 36), eg. give students a story, jumble it up, and have the students put the story in order from when the crocodile wakes up until it goes to sleep.
BUILD A CROC

1. Colour in the crocodile
2. Write the name of the crocodile body parts

By ____________________
Activity 3 - Early Years

SALTIES AND FRESHIES
FINDING OUT THE DIFFERENCE - ADAPTATIONS, HABITATS, DIETS AND NESTS

Introduction:

• Look at skulls/skins/models/pictures of each species (refer to Teacher Notes, pg 6, Be Crocwise website, Resources, pg 11, or your local Rangers).

• Get to know crocodile body parts (Activity 2, pg 21).

Activity:

You will need:
- Salties and freshies images (pg 24)
- Plastic cups
- Fresh and salt water
- Tape measure
- Crocodile food images (pg 46-47)
- Poster paper
- Natural materials for building nest
- Ping pong balls or similar for eggs
- Scissors
- Glue

Set up plastic cups with fresh water and salt water, students taste the water and say what type of water it is and which type of crocodile lives there (NB. saltwater crocodiles live in both fresh and salt water but freshwater crocodiles only live in fresh water).

Measure out the length of each species of crocodile (largest saltwater crocodile caught in the Top End was 6.2m; freshwater crocodiles typically grow to 2.5-3.5m). Students lie down end to end to compare their length (can make this into a chart to display in the classroom with an image of a crocodile and several small images of a child lined up).

Students create two posters – one about freshwater crocodiles and one about saltwater crocodiles – to show the differences between the two species (refer to Teacher Notes, pg 6). Use descriptions and/or a series of images (refer to images on pg 24 and Be Crocwise website). Things to include are: snout size and shape, body lengths, egg sizes, breeding calendar, diet (see Activity 11, pg 46-47, for pictures of food items), and distribution.

Using materials such as sand, twigs, leaves, hay, soil and ping pong balls, students build each type of crocodile nest outside (refer to Teacher Notes, pg 6, and Be Crocwise website for images):
- Saltwater crocodiles lay eggs in a nest of vegetation and soil which can be up to 80cm high: she lays about 50 eggs, and will aggressively guard the nest for three months and help release the hatchlings.
- Freshwater crocodiles lay eggs in a dry sandy riverbank, she will dig down until the sand is damp then lay about 13 eggs. She will leave the nest for three months before returning to help release the hatchlings.

Going further:

• Compare crocodile nests and eggs to other egg laying animals (eg. chicken, turtles, penguin, snake).

• Create a habitat diorama for either a freshwater or saltwater crocodile showing what a crocodile would need to be able to survive eg. mud, water, trees, food source. Materials that students could use include coloured paper, cellophane, sand, shredded paper, bark, leaves, plasticine, egg cartons. Students could also use their model crocodile in their habitat (see Activity 2 ‘Going further’, pg 21).
Activity 4 - Early Years

WHO EATS WHO?
EXPLORING A CROCODILE FOOD CHAIN

Introduction:
- Brainstorm why food is a necessity.
- Discuss how crocodiles catch their food. Introduce some basic adaptations (refer to Teacher Notes, pg 9).
- Talk about what a crocodile eats (refer to Teacher Notes, pg 8).
- Introduce the concept of a herbivore and carnivore. Is a crocodile a herbivore or a carnivore?
- Introduce the term ‘food chain’ and talk through a simple one that humans are a part of.

Activity:

You will need:
- Who eats who? pictures (pg 26)
- Coloured pencils
- Scissors
- Glue
- Blank paper

Students colour in and then cut out the pictures of a crocodile, turtle, fish and prawn (pg 26).

There are two options for completing this activity:
1. Paste the pictures on top of each other to show where the food is going, ie. the turtle on top of the crocodile, fish on top of the turtle, prawn on top of the fish.

OR
2. The pictures can be put into a conventional food chain format, ie.
   prawn → fish → turtle → crocodile

NB. The direction of the arrow shows where the food is going.

Going further:
- Draw some other short food chains in the Top End, eg. grass→wallaby→crocodile; fly→frog→snake→eagle.
- Students keep a food diary of what they are eating and compare their diet to other animals.
- Create a food web using wool:
  - Assign each student an animal or plant involved in a crocodile diet (see Activity 11, pg 46-47, for ideas). The names/pictures of each animal can be hung around the students neck.
  - The ‘crocodile’ has a ball of wool and has to ‘catch’ his/her most likely food source eg. the wallaby. He/she holds one end of the wool, and passes the ball to the wallaby who then catches their food, eg. grass, and so on.
  - Add more balls of wool as needed until the food web is complete.
- Talk about the adaptations of a crocodile that make them good hunters (refer to Teacher Notes, pg 9). Compare to other hunters, eg. lion, shark.
- Talk through what adaptations each animal in the food chain needs to be able to catch its food, eg. underwater breathing, fast swimming, big teeth.
- Build a mobile to show a food chain or web for a crocodile.
WHO EATS WHO?

1. Colour in the pictures
2. Cut them out
3. Paste the pictures in order to show who is eating who
# PRIMARY YEARS ACTIVITIES

## Suggested Year Levels

Year 4 to Year 6  
(NB. Activities can be modified up or down to suit other levels)

## Teacher Notes

The Teacher Notes (pg 6) provides an overview of crocodile biology, adaptations, management in the NT and Indigenous connections. This forms the background knowledge a teacher needs to be able to effectively use these activities.

## Activities

### Early Years Activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 1</td>
<td>Be Crocwise: Learning the key safety messages</td>
</tr>
<tr>
<td>Activity 2</td>
<td>Build a croc: Introducing the shape and adaptations of a crocodile</td>
</tr>
<tr>
<td>Activity 3</td>
<td>Salties and freshies: Finding out the difference - adaptations, habitats, diets and nests</td>
</tr>
<tr>
<td>Activity 4</td>
<td>Who eats who?: Exploring a crocodile food chain</td>
</tr>
</tbody>
</table>

### Primary Years Activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 5</td>
<td>Trapping crocs: Mapping crocodile trap locations and captures</td>
</tr>
<tr>
<td>Activity 6</td>
<td>Croc breeding cycles: Showing seasonal changes for a crocodile and its habitat</td>
</tr>
<tr>
<td>Activity 7</td>
<td>Ultimate predator: Learning about adaptations through design</td>
</tr>
<tr>
<td>Activity 8</td>
<td>A day in the life of...: Understanding crocodiles through stories</td>
</tr>
</tbody>
</table>

### Middle Years Activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 9</td>
<td>Keeping track of Moline and friends: Using real life data to map and explore how crocodiles move around</td>
</tr>
<tr>
<td>Activity 10</td>
<td>Croc captures: Graphing and analysing crocodile capture data over time</td>
</tr>
<tr>
<td>Activity 11</td>
<td>Creating and destroying a food web: Researching interconnectedness within Top End ecosystems</td>
</tr>
<tr>
<td>Activity 12</td>
<td>Community meeting: Acting out a debate about crocodile management</td>
</tr>
<tr>
<td>Activity 13</td>
<td>Risky business: Assessing risk and proposing solutions to some common behaviours</td>
</tr>
<tr>
<td>Activity 14</td>
<td>Croc culture: Researching crocodiles, culture and the community</td>
</tr>
</tbody>
</table>
Be Crocwise Messages
These activities have been designed to reinforce the Crocwise messages about crocodile safety:

<table>
<thead>
<tr>
<th></th>
<th>Be Crocwise</th>
<th>Crocs are common</th>
<th>Crocs are deadly</th>
<th>Crocs move around</th>
<th>Read and obey all signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 5</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Activity 6</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Activity 7</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity 8</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Ideas for Units of Work
The activities can be done as standalone activities or incorporated into other units of work. Some unit topic ideas include:

• We are a Crocwise classroom (see certificate, pg 5)
• Apex predators
• Native animals
• Seasonal cycles
• Crocodile evolution
Activity 5 – Primary Years

TRAPPING CROCS
MAPPING CROCODILE TRAP LOCATIONS AND CAPTURES

Introduction:

- Discuss the seasonality of Top End waterways, eg. water levels, flow rates. Use photos of your local area where possible.
- Talk about reasons why crocodiles move around – to find food, territory or a mate.
- Look at adaptations that crocodiles have that make them good swimmers (refer to Teacher Notes, pg 9, and Activity 7, pg 34).
- Discuss why humans and crocodiles are interacting more now than they used to and reasons why crocodiles are trapped (refer to Teacher Notes, pg 6-7).
- Review a crocodile management plan (refer to Be Crocwise website).

Activity:

The map provided (pg 31) shows Darwin Harbour and surrounding rural areas and makes up the Darwin Crocodile Management Zone.

1. Write the following landmarks/towns and grid references on the board. Students label these to help get orientated with the map. Alternatively, students could use an atlas, street directory or Google Maps to label the same landmarks.

   Territory Wildlife Park D7   Gunn Point E1
   Cox Peninsula/Mandorah B4   Lee Point C3
   Darwin C4   Manton Dam E9
   Darwin River Dam D8

2. Give students the grid coordinates (below) of the permanent traps within the Darwin Crocodile Management Zone and have them mark these on the map. Students will also need to refer to a map of the Darwin region.

   Berry Creek D7   Hudson Creek D4   Mitchell Creek D5
   Berry Springs 1 D7   Jones Creek C5   Pioneer Creek B6
   Berry Springs 2 D7   Kings Creek D3   Sadgroves Creek C4
   Bleesers Creek C4   Manton Dam F9   Southport D7
   Buffalo Creek C3   Manton Dam West E9   Tree Point E3
   Darwin River D7   Mickett Creek D3   West Arm B6
   Howard River E3   Middle Arm D6   Woods Inlet B5

Note. These are not all of the traps within the Darwin Crocodile Management Zone. There are also many temporary traps that are maintained by the Parks and Wildlife Service.
3. As an ongoing activity, add the locations of crocodile captures over the year to your map using the information published on the Be Crocwise website and in the NT News. If your school is not in the Darwin region, then use a map of your local area to also track the captures that are relevant to your students.

**Discussion points**
- Why do you think that Parks and Wildlife chose these locations to put traps?
- In some areas there are a lot of traps close together. Why?
- We often see pictures of people standing on top of crocodile traps in the NT News. Is this appropriate behaviour? Why/why not?

**Going further:**
- Use the data in Table 3 from Activity 10 (pg 44) showing the crocodiles caught in the NT in 2009, to compare difference in crocodile captures between years.
- Modify Activity 9 (pg 39) or use a teacher produced map to promote discussion about the movement of crocodiles.
- Visit a crocodile farm. Ask about the history of where the crocodiles came from.
- Invite a Ranger to come and talk about trapping crocodiles.
- Look at photos of crocodile traps (refer to Be Crocwise website). Make a model or draw a picture of the trap. Can you design a better crocodile trap? Look at other trap designs to help, eg. Elliott traps, mouse traps, possum traps.
TRAPPING CROCS

Instructions

1. Label the seven landmarks/towns marked with a ‘*’.

2. Plot the location of the 21 permanent crocodile traps.

   - Berry Creek
   - Berry Springs 1
   - Berry Springs 2
   - Bleezers Creek
   - Buffalo Creek
   - Darwin River
   - Howard River
   - Hudson Creek
   - Jones Creek
   - Kings Creek
   - Manton Dam
   - Manton Dam West
   - Mickett Creek
   - Middle Arm
   - Mitchell Creek
   - Pioneer Creek
   - Sadgroves Creek
   - Southport
   - Tree Point
   - West Arm
   - Woods Inlet

3. Plot crocodile captures on the map using information published on the Be Crocwise website (www.nt.gov.au/becrocwise)
Activity 6 - Primary Years

CROC BREEDING CYCLES
SHOWING SEASONAL CHANGES FOR A CROCODILE AND ITS HABITAT

Introduction:

• Talk about crocodile adaptations (refer to Teacher Notes, pg 9, and Activity 7, pg 34).
• Talk about the breeding biology of crocodiles (refer to Teacher Notes, pg 8).
• Create a quiz with facts about crocodiles using the information in the Teacher Notes (pg 6-10). You could structure like a game show, eg. Who Wants to Be a Millionaire.

Activity:

Using an annual calendar (pg 33) (you could also use a linear calendar), students show the following breeding milestones for a saltwater crocodile:
- October to December is mating season
- November to February is nesting/egg laying season
- February to June is hatching season
- July to September is inactive time (basking behaviour)

When talking about the breeding cycle of a saltwater crocodile, make students aware of the following facts:
- It can take females up to two weeks to build nests
- Eggs are laid four to six weeks after mating
- Up to 50 eggs are laid per clutch
- Eggs incubate for about three months
- Hatchlings spend the first couple of months in a ‘crèche’ with Mum

Research local Indigenous calendars and local climatic conditions. Add in other events (seasons, plants flowering, monthly rainfall, minimum and maximum temperatures, burning, migration of key species) to the crocodile calendar.

Going further:

• Add in similar key events for another animal the saltwater crocodile shares its habitat with (eg. barramundi, freshwater crocodile).
• Create a series of mosaic tiles that depict the life cycle or history of crocodiles.
CROC BREEDING CYCLES

1. Cut out the calendar and paste it in the middle of a large piece of paper
2. Write in the months of the year in the twelve small segments
3. Add the Wet and Dry season in the outer circle
4. Add the breeding milestones for a saltwater crocodile year
5. Research and add other events/conditions relevant to your local area
   (You may need to draw in additional circles inside or outside of the calendar)
   a. Indigenous seasons
   b. Monthly rainfall
   c. Minimum and maximum temperatures
   d. Burning seasons
   e. Migration of key species
   f. Other relevant information
**Activity 7 - Primary Years**

**ULTIMATE PREDATOR**

LEARNING ABOUT ADAPTATIONS THROUGH DESIGN

**Introduction:**

- Look at the body structure of ‘dinosaur crocodiles’. Talk about why the basic body plan hasn’t changed over time (refer to Teacher Notes, pg 7).
- Introduce the concept of adaptations and discuss why they are necessary (to hunt and catch food, to reproduce, for the climate/environment) (refer to Teacher Notes, pg 9).
- Discuss behavioural, physiological, and structural adaptations (refer to Teacher Notes, pg 9).
- Discuss what a predator is. A simple food chain might help (Activity 11, pg 45).

**Activity:**

Students begin by deciding if the crocodile (pg 35) is a saltwater or freshwater crocodile (NB. it is a saltwater crocodile, refer to Teacher Notes, pg 6). Students then label features on the crocodile picture (pg 35). Write an explanation of what the adaptation helps the crocodile to do.

Summarise in the following table:

<table>
<thead>
<tr>
<th>Adaptation</th>
<th>Describe what this feature is like on a crocodile</th>
<th>How does this help the crocodile to survive?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin/Body covering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eyes (location/shape)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ears (location/shape)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mouth (location/shape)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nose (location/shape)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body shape</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behaviour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habitat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limbs (fore and back)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Create a table similar to the one above to compare two different animals, eg. an aquatic and terrestrial animal such as dingo/seal; eagle/penguin; wallaby/possum; termite/frog. How do their adaptations differ? How are they similar?

Design the ultimate predator. Use the table above to guide students to think about different adaptations. Create another table (as above) for their predator to explain its features.

**Going further:**

- Create a chart classifying the different types of adaptations into behavioural, physiological and structural (refer to Teacher Notes, pg 9).
- Compare crocodile adaptations to other apex predators, eg. sharks, lions, bears.
- Discuss adaptations of plants and animals to avoid predation (camouflage, mimicry, warning signs).
1. **Label** the adaptations that have made crocodiles so deadly.

2. **Describe** why these adaptations have helped the crocodile to survive.

Type of crocodile ___________________________
**Activity 8 – Primary Years**

**A DAY IN THE LIFE OF......**

**UNDERSTANDING CROCODILES THROUGH STORIES**

**Introduction:**

- Run through the following three key Crocwise messages – Crocs are Common, Crocs Move Around, Crocs are Deadly (refer to Be Crocwise, pg 4).
- Ask if any students have seen a crocodile and ask them to describe the environment where they saw it.
- Check your library for story books with crocodiles in them (refer to Resources, pg 11).
- Research crocodiles in Top End habitats - brainstorm notes on the board.

**Activity:**

You will need:  
- Sentence starters

Write a story about a day in the life of a crocodile. Use all or some of the following sentence starters to help – they are a good way to start off a paragraph.

- “As the dawn broke over the ________________”
- “He/she used his/her powerful tail to ________________”
- “From where he/she was, he/she could see the ________________”

**Going further:**

- Come up with a name for your crocodile. Try for a first name and surname that describe crocodiles eg. Cheeky Chapman, Snappy Chops.
- Write a story that tells aspects of the key messages ie. that ‘crocs are deadly’ and that ‘crocs move around’ (see Activity 1, pg 17 as an example).
- Draw a picture to illustrate the story.
- Share stories with a classmate and work together to write a new story that has the two crocodiles meeting.
- Turn the story into a cartoon.
  - “Robbie/Mel woke up at ________ and grabbed his/her ________________”
  - “He/she knew at this time of the year that the_________________________”
  - “The ___________ was common in this area because______________________”
  - “Ranger Tommy spotted a crocodile amongst the____________________”
- Share crocodile dreaming stories with the class (refer to Teacher Notes, pg 10, and Resources, pg 11).
- Write a crocodile diary or journal from the perspective of a crocodile.
MIDDLE YEARS ACTIVITIES

Suggested Year Levels

Year 7 to Year 9
(NB. Activities can be modified up or down to suit other levels)

Teacher Notes

The Teacher Notes (pg 6) provides an overview of crocodile biology, adaptations, management in the NT and Indigenous connections. This forms the background knowledge a teacher needs to be able to effectively use these activities. These notes may also be useful as reference material or readings for older Science and Biology students.

Activities

Early Years Activities

Activity 1: Be Crocwise: Learning the key safety messages
Activity 2: Build a croc: Introducing the shape and adaptations of a crocodile
Activity 3: Salties and freshies: Finding out the difference - adaptations, habitats, diets and nests
Activity 4: Who eats who?: Exploring crocodile food chain

Primary Years Activities

Activity 5: Trapping crocs: Mapping crocodile trap locations and captures
Activity 6: Croc breeding cycles: Showing seasonal changes for a crocodile and its habitat
Activity 7: Ultimate predator: Learning about adaptations through design
Activity 8: A day in the life of...: Understanding crocodiles through stories

Middle Years Activities

Activity 9: Keeping track of Moline and friends: Using real life data to map and explore how crocodiles move around
Activity 10: Croc captures: Graphing and analysing crocodile capture data over time
Activity 11: Creating and destroying a food web: Researching interconnectedness within Top End ecosystems
Activity 12: Community meeting: Acting out a debate about crocodile management
Activity 13: Risky business: Assessing risk and proposing solutions to some common behaviours
Activity 14: Croc culture: Researching crocodiles, culture and the community
Be Crocwise Messages

These activities have been designed to reinforce the Crocwise messages about crocodile safety.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Be Crocwise</th>
<th>Crocs are common</th>
<th>Crocs are deadly</th>
<th>Crocs move around</th>
<th>Read and obey all signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 9</td>
<td>✓</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Activity 10</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Activity 11</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity 12</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Activity 13</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Activity 14</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

Ideas for Units of Work

The activities can be done as standalone activities or incorporated into other units of work. Some unit topic ideas include:

- **Science/Biology**
  - Ecosystems
  - Adaptations
  - Energy flow/Food webs
- **SOSE**
  - Conservation
  - Environmental issues
  - Significance of crocodiles to Indigenous culture
- **English**
  - Issues
  - Media watch
Activity 9 - Middle Years

**KEEPING TRACK OF MOLINE AND FRIENDS**

**USING REAL LIFE TRACKING DATA TO MAP AND EXPLORE HOW CROCODILES MOVE AROUND**

**Introduction:**

- Discussion topics:
  - Why do scientists track animal movements?
  - What methods do scientists use to track animals? Eg. tagging of turtles, bird banding etc.
  - Why do crocodiles move around? (To find food, territory or a mate).
- Review map conventions. Look at the effect of map type and scale; practice reading longitude and latitude.
- Use a GPS to collect coordinates of different locations around the school grounds and then plot these on a map.

**Activity:**

This activity uses data from three saltwater crocodiles who were captured in Kakadu National Park. Satellite trackers were attached to the crocodiles to enable their movements to be tracked.

<table>
<thead>
<tr>
<th>You will need:</th>
<th>This activity uses data from three saltwater crocodiles who were captured in Kakadu National Park. Satellite trackers were attached to the crocodiles to enable their movements to be tracked.</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Keeping track of Moline and friends map (pg 41)</td>
<td></td>
</tr>
<tr>
<td>- Lead pencils</td>
<td></td>
</tr>
<tr>
<td>- Google Earth (optional)</td>
<td></td>
</tr>
</tbody>
</table>

Introduce Moline the crocodile by reading the story below.

"Moline is a 4.3m male saltwater crocodile who lived in the freshwater section of Mary River, near the Mary River Roadhouse, from 2005 to 2009. From October 2009 to January 2010, Moline made some dramatic changes. First he went downstream along the Mary River, out of the freshwater system and into the tidal part of the river. He then travelled out to sea and headed east into the South Alligator River system and up into the freshwater system of Nourlangie Creek where he stayed for a month or so near Nourlangie Camp. Moline is a very brave crocodile because his journey took him through numerous territorial zones of other crocodiles."

Students use the map (pg 41) and coordinates provided to create a map showing where Moline travelled. Once finished, students can calculate how far Moline travelled (depending on student’s accuracy, total distance travelled is approximately 210km).
Variation

Use Google Earth to map the movements of the three crocodiles - Moline, Koolpin and Jacob.

This variation encourages more accuracy when plotting the data (NB. it will not be possible to plot Koolpin and Jacob’s movements on the map provided as there is not enough detail).

By zooming in and out using Google Earth students will be able to see how different river systems join and the type of environments the crocodiles move through and topographic features. Students can also write a description of the environments that each crocodile moved through on its journey.

“Koolpin is a 3.8m male saltwater crocodile who was trapped in the South Alligator River near Koolpin Road crossing on 7 December 2009. During the start of 2010, after the creek flooded from Wet season rains, he moved in and out of Koolpin Gorge three times. This result is very significant for Park Rangers in terms of managing swimming in the Koolpin Gorge and other areas.”

<table>
<thead>
<tr>
<th>Date</th>
<th>Coordinates</th>
<th>Date</th>
<th>Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>07.12.2009</td>
<td>13°33’S 132°33’E</td>
<td>08.02.2010</td>
<td>13°34’S 132°35’E</td>
</tr>
<tr>
<td>31.01.2010</td>
<td>13°33’S 132°20’E</td>
<td>11.02.2010</td>
<td>13°31’S 132°33’E</td>
</tr>
<tr>
<td>04.02.2010</td>
<td>13°33’S 132°34’E</td>
<td>15.02.2010</td>
<td>13°00’S 132°34’E</td>
</tr>
</tbody>
</table>

“Jacob is a 4.2m male saltwater crocodile. He was originally captured at Cahill’s Crossing on 14 May 2009. Since Wet season flooding started, he began to move long distances upstream and downstream (up to 30km downstream) from the Cahill’s Crossing capture site. As of February 2010, he was living in an Arnhem Land Billabong a few kilometres east of where he was originally captured at Cahill’s Crossing.”

<table>
<thead>
<tr>
<th>Date</th>
<th>Coordinates</th>
<th>Date</th>
<th>Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.05.2009</td>
<td>12°26’34’S 133°59’12”E</td>
<td>07.02.2010</td>
<td>12°24’53”S 132°58’26”E</td>
</tr>
<tr>
<td>31.01.2010</td>
<td>12°26’50”S 132°59’08”E</td>
<td>11.02.2010</td>
<td>12°25’45”S 132°57’27”E</td>
</tr>
<tr>
<td>03.02.2010</td>
<td>12°24’31”S 132°59’28”E</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Going further:

- Explain the process and technology behind satellite tracking.
- Investigate other uses for satellites.
- Invite a scientist to come and talk about tracking of animals. Try contacting scientists at the Department of Natural Resources, Environment, The Arts and Sport, Charles Darwin University or CSIRO.
- Explore other ways to track animals – footprints, scats and other traces.
KEEPING TRACK OF MOLINE AND FRIENDS

Satellite tracking in Kakadu National Park

Instructions
Plot Moline’s movements from October 2009 to January 2010 using the coordinates below:

<table>
<thead>
<tr>
<th>Date</th>
<th>Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.10.2009</td>
<td>13°36’S 132°09’E</td>
</tr>
<tr>
<td>15.10.2009</td>
<td>13°34’S 132°09’E</td>
</tr>
<tr>
<td>23.10.2009</td>
<td>13°32’S 132°04’E</td>
</tr>
<tr>
<td>31.10.2009</td>
<td>13°21’S 131°57’E</td>
</tr>
<tr>
<td>18.12.2009</td>
<td>12°34’S 131°50’E</td>
</tr>
<tr>
<td>22.12.2009</td>
<td>12°34’S 131°43’E</td>
</tr>
<tr>
<td>07.01.2010</td>
<td>12°16’S 131°56’E</td>
</tr>
<tr>
<td>07.01.2010</td>
<td>12°17’S 132°01’E</td>
</tr>
<tr>
<td>11.01.2010</td>
<td>12°31’S 132°25’E</td>
</tr>
<tr>
<td>11.01.2010</td>
<td>12°35’S 132°28’E</td>
</tr>
</tbody>
</table>

Data provided by Parks Australia – Kakadu National Park
Activity 10 - Middle Years

CROC CAPTURES

GRAPHING AND ANALYSING CROCODILE CAPTURE DATA OVER TIME

Introduction:

- Discussion topics (refer to Teacher Notes, pg 6-7, and Be Crocwise website):
  - What is the current management of crocodiles in the NT?
  - Why are humans and crocodiles interacting more than they used to?
  - How does the seasonality of water levels affect crocodile movements? (use maps and images of Top End river systems to help)
  - Why are crocodiles trapped and what happens to them after they are caught?
  - What is a ‘problem crocodile’?

- Review a crocodile management plan (refer to Be Crocwise website).

- Review newspaper reports of crocodile captures (graph and map recent captures).

Activity:

You will need:
- Croc captures data (pg 44)
- Graph paper

All data tables needed for this activity are provided on pg 44. This data was collected by the Parks and Wildlife crocodile management team from 1998 to 2009.

NB. This data only shows the saltwater crocodiles captured by Parks and Wildlife.

Table 1 - Yearly captures

Students prepare a line or bar graph showing changes in saltwater crocodile numbers. Discuss reasons why more crocodiles are being caught in recent years.

Table 2 - Seasonal captures

Options:
  a. Graph each year on separate graphs
  b. Graph all years on one set of axes. Then calculate the mean number of crocodiles captured and add this to the graph.

Determine trends in the data and propose reasons why numbers are increasing or decreasing over the year and at different times of the year.

Example graphs:
Table 3 - Location
Shows the number of male and female saltwater crocodiles captured in different locations across the Top End during 2009.

Options:
  a. Prepare a bar graph or pie chart showing the number of crocodiles captured in different areas
  b. Show differences in sex ratios captured.

Going further:

- Create a map showing the location of the traps (Activity 5, pg 29).
- Conduct a community meeting regarding culling of crocodiles (Activity 12, pg 48).
- Examine media reports about people interacting with crocodile traps (the NT News and local papers regularly publish articles relating to crocodiles). Discuss inappropriate behaviour around crocodile habitats and crocodile traps (Activity 13, pg 50).
- Contact Parks and Wildlife to find out about crocodile management in your local area.
### CROC CAPTURES

#### Table 1. Yearly captures
Number of problem saltwater crocodiles removed by Parks and Wildlife each financial year between 1998-2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Problem crocs</th>
<th>Year</th>
<th>Problem crocs</th>
</tr>
</thead>
</table>

#### Table 2. Seasonal captures
Total number of saltwater crocodiles caught in Darwin, Katherine, Litchfield and Nhulunbuy 2005-2009
(NB. includes crocodiles caught by hand, in traps and harpooned)

<table>
<thead>
<tr>
<th>Location</th>
<th>No. crocs</th>
<th>Female</th>
<th>Male</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Berry Creek/Springs</td>
<td>13</td>
<td>6</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Blesers Creek</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Buffalo Creek</td>
<td>12</td>
<td>4</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Darwin River</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Darwin River Dam</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Fogg Dam</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Goanna Park</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Howard River</td>
<td>18</td>
<td>4</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Hudson Creek</td>
<td>8</td>
<td>0</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Jones Creek</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Katherine District</td>
<td>7</td>
<td>0</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Katherine - Gulf District</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Kings Creek</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Knuckeys Lagoon</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Leanyer Drain</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Leeders Creek</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Manton Dam</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Micket Creek</td>
<td>13</td>
<td>2</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Middle Arm</td>
<td>10</td>
<td>2</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Mitchell Creek</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Near Tree Point</td>
<td>12</td>
<td>3</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Pioneer Creek</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Rapid Creek</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Sadgroves</td>
<td>7</td>
<td>1</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Southport</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Wangi Creek/Falls</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>West Arm</td>
<td>11</td>
<td>0</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Woods Inlet</td>
<td>8</td>
<td>2</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>5</td>
<td>14</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Table 3. Location
Saltwater crocodiles caught in the Top End (excluding Kakadu National Park) in 2009
Activity II - Middle Years
CREATING AND DESTROYING A FOOD WEB
RESEARCHING INTERCONNECTEDNESS WITHIN TOP END ECOSYSTEMS

Introduction:

- Brainstorm adaptations of crocodiles (particularly related to feeding and hunting) (refer to Teacher Notes, pg 9, and Activity 7, pg 34).
- Discuss differences between food chains and food webs.
- Write out simple food chains (Activity 4, pg 25).

Activity:

To help build a picture of what a saltwater crocodile habitat is like, brainstorm a list of plants and animals involved in its food web.

Pages 46 and 47 provide students with some of the plants and animals involved in the food web and a description of their diet. For older students, remove the diet description and have students research this.

Students use the pictures (pg 46-47) and create a food web on A3 paper to show that all elements in the ecosystem are connected.

Discuss how many individuals of each species are necessary for the food chain/web to function – eg. shade the animals red if there are 1-10 individuals; orange if 10-20 individuals; and yellow if 20+ individuals. Doing this begins to explore the concept of the biomass pyramid (some Science or Biology textbooks may help).

Discussion points

- Where does the energy in the food web come from?
- Through which organism/s and process does the energy enter the food web?
- What organisms, involved in recycling, have not been included in the food web?
- What impact would removing all saltwater crocodiles have?
- What would happen to the food web if crocodile numbers were to double?
- What would happen if one of the crocodiles major food sources was removed?
- What other sorts of things could happen to threaten the functioning of this ecosystem?

Going further:

- Look at the food web in an ecosystem that doesn’t include crocodiles – what is the apex predator?
- Further explore the concepts of trophic levels (producer, first order consumers through to higher order consumers), energy flow through ecosystems and loss of energy through the food chain:
  - Classify the organisms in the food web as producers, first order consumers, second order consumers, third order consumer, etc.
### Creating and Destroying a Food Web

<table>
<thead>
<tr>
<th>Organism</th>
<th>Picture</th>
<th>Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agile wallaby</strong> <em>(Macropus agilis)</em></td>
<td><img src="image1" alt="Picture" /></td>
<td>Feeds on native grasses, including spear grass, grass roots and some leaves.</td>
</tr>
<tr>
<td><strong>Arafura file snake</strong> <em>(Acrochordus arafurae)</em></td>
<td><img src="image2" alt="Picture" /></td>
<td>Forage for prey at night and use body coils to subdue prey. Diet is primarily made up of small fishes and crustaceans, eg. prawns.</td>
</tr>
<tr>
<td><strong>Barramundi</strong> <em>(Lates calcarifer)</em></td>
<td><img src="image3" alt="Picture" /></td>
<td>Eats a variety of prey, depending on the size. Generally will eat any smaller fish and prawns.</td>
</tr>
<tr>
<td><strong>Feral buffalo</strong> <em>(Bubalus bubalus)</em></td>
<td><img src="image4" alt="Picture" /></td>
<td>Feeds on a wide variety of grasses and water plants.</td>
</tr>
<tr>
<td><strong>Feral pig</strong> <em>(Sus scrofa)</em></td>
<td><img src="image5" alt="Picture" /></td>
<td>Opportunist and finds food by rooting or digging. Diet typically includes roots, grasses, frogs, snakes, eggs of birds and reptiles and carrion.</td>
</tr>
<tr>
<td><strong>Grasshopper</strong> <em>(Order Orthoptera)</em></td>
<td><img src="image6" alt="Picture" /></td>
<td>On average, can eat 16 times its own body weight per day. Feeds on vegetation.</td>
</tr>
<tr>
<td><strong>Human</strong> <em>(Homo sapiens)</em></td>
<td><img src="image7" alt="Picture" /></td>
<td>Both Indigenous and non-Indigenous people eat a large variety of food, including wallaby, file snakes, barramundi, buffalo, pig, magpie geese, turtles, prawns, and crocodiles.</td>
</tr>
<tr>
<td><strong>Jabiru</strong> <em>(Ephippiorhynchus asiaticus)</em></td>
<td><img src="image8" alt="Picture" /></td>
<td>Wades in shallow water regularly stabbing and jabbing at prey. Will eat fish, crustaceans and aquatic insects.</td>
</tr>
<tr>
<td>Organism</td>
<td>Picture</td>
<td>Diet</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Magpie goose</strong></td>
<td></td>
<td>Feeds on a variety of aquatic vegetation with spike-rush forming most of its diet.</td>
</tr>
<tr>
<td><em>(Anseranas semipalmata)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mayfly nympha</strong></td>
<td></td>
<td>Only feed as larvae (nymphs). Will eat dead or living algae from the bottom of the water.</td>
</tr>
<tr>
<td><em>(Order Ephemeroptera)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Northern snaked-neck turtle</strong></td>
<td></td>
<td>Uses its long neck like a snake to strike at passing prey including fish, tadpoles, frogs and crustaceans.</td>
</tr>
<tr>
<td><em>(Chelodina rugosa)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plankton and algae</strong></td>
<td></td>
<td>Ranging from microscopic to macroscopic, obtain energy to grow from sunlight.</td>
</tr>
<tr>
<td><strong>Rocket frog</strong></td>
<td></td>
<td>Uses sticky tongue to capture terrestrial insects.</td>
</tr>
<tr>
<td><em>(Litoria nasuta)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prawns</strong></td>
<td></td>
<td>Feeds primarily at night with other crustaceans and aquatic insects making up most of their diet.</td>
</tr>
<tr>
<td><em>(Class Crustacea)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Saltwater crocodile</strong></td>
<td></td>
<td>Excellent predator will eat anything it can catch including wallabies, snakes, fish, buffalo, pigs, birds, turtles and even people.</td>
</tr>
<tr>
<td><em>(Crocodylus porosus)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Seven-spot archer fish</strong></td>
<td></td>
<td>Shoots water at insects resting on vegetation to knock them into the water, will also feed on aquatic insects.</td>
</tr>
<tr>
<td><em>(Toxotes chatareus)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spear grass</strong></td>
<td></td>
<td>A common native grass in the Top End, growing to 3m tall in the Wet season. Gets its name from the ‘spear-like’ seeds which stick into the ground. Produce energy by photosynthesis.</td>
</tr>
<tr>
<td><em>(Sorghum spp.)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spike-rush</strong></td>
<td></td>
<td>Typically grow around waterways and can be either fully or partly submerged. Provide habitat for many macro-invertebrates which provide food for fish etc. Produce energy by photosynthesis.</td>
</tr>
<tr>
<td><em>(Eleocharis spp.)</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Activity 12 - Middle Years

COMMUNITY MEETING

ACTING OUT A DEBATE ABOUT CROCODILE MANAGEMENT

Introduction:

- Discussion topics (refer to Teacher Notes, pg 6-7):
  - Why are humans and crocodiles interacting more than they used to?
  - Why was hunting of crocodiles stopped?
  - Why are crocodiles a threatened species?
  - How are crocodiles currently managed in the NT?
- Review newspaper articles about crocodile attacks. Distinguish between opinions and facts.
- Look at different questioning and debate techniques by watching a debate, eg. Q&A on ABC.
- Discuss different ways that people interact with the environment, such as ‘greenie’, businessman, fisherman, traditional owner etc, and where they are useful.

Activity:

Highlight to students that the opinions expressed on page 49 do not necessarily represent the views of individuals, groups or organisations.

Divide the class into the ten different roles (pg 49) and choose one or two chairpersons (this may be the teacher). Conduct a community meeting around the topic:

“All saltwater crocodiles should be culled”

To get started, give each student/group cards with an overview of their stakeholder’s position. Allow time for students to research and prepare their case. Have students dress up as their stakeholder or get them to wear hats with a label so everyone remembers who everyone else is.

At the end of the meeting, have other students vote on who presented the best case. Follow up by writing a media article covering the debate or an opinion piece to send to a politician. Write up any potential management solutions that come out of the debate.

Variations

Give students a recent newspaper article as a stimulus for the community meeting, or make the topic specific to your local area, eg. “All crocodiles within 50km of Darwin should be culled” or “All crocodiles in Katherine River should be culled”. Other related debate topics could include “Crocodiles should be kept as pets” or “A hunting season for crocodiles should be introduced” – these topics would need different stakeholders to be chosen.

Going further:

- Write a letter to the editor or argumentative/opinion piece around the culling of crocodiles.
- Research and discuss the commercial uses of crocodiles – pros/cons.
- Propose solutions to irresponsible behaviour around crocodile habitats (Activity 13, pg 50).
- Debate other relevant ecological topics, eg. traditional hunting, cane toads, water quality.
<table>
<thead>
<tr>
<th><strong>Ranger</strong></th>
<th>“Crocodiles are part of the natural environment. They are meant to be there and if they were removed then the whole system would be thrown out of balance. If people learn to Be Crocwise then they should be able to live with crocodiles harmoniously.”</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Crocodile farm manager</strong></td>
<td>“There are too many large crocodiles in the wild because they are no longer being controlled. If crocodiles were culled then the skin and meat could be used for commercial purposes. Culling of crocodiles will not put the species at risk as there are so many being bred in captivity.”</td>
</tr>
<tr>
<td><strong>Traditional owner</strong></td>
<td>“Crocodiles are an important part of Aboriginal way of life. There are dreaming stories as well as songs and dances about crocodiles. Crocodiles also provide a source of income for the community through harvesting crocodile eggs for farms.”</td>
</tr>
<tr>
<td><strong>Crocodile tour operator</strong></td>
<td>“Tourism employs and generates income for a large number of people in the NT. One of the major drawcards for tourists in the Top End is to get a picture of a saltwater crocodile. If culls were to be introduced, then one of the major attractions would disappear and so would our tourists.”</td>
</tr>
<tr>
<td><strong>Water sports tour operator</strong></td>
<td>“The presence of large crocodiles in popular tourist spots means that we are limited in the areas that we can take people. The risk from crocodiles also means that activities we do in some areas are limited, like canoeing, swimming and tubing.”</td>
</tr>
<tr>
<td><strong>Animal activist</strong></td>
<td>“Every animal has a right to be there and we (humans) don’t have the right to choose what animals live and what don’t. Do we then kill all lions in Africa just because they have the potential to harm people?”</td>
</tr>
<tr>
<td><strong>Local resident 1</strong></td>
<td>“I grew up in Darwin and I do not think that it is safe for humans to be around NT waterways anymore because crocodiles are no longer controlled. I want to be able to take my kids swimming where I did as a kid. I also want to be able to walk my dog off-leash and let him go swimming wherever he wants.”</td>
</tr>
<tr>
<td><strong>Local resident 2</strong></td>
<td>“I enjoy recreational activities around waterways such as fishing and camping, but I also believe that crocodiles are part of the “great Territory lifestyle”. If a crocodile attacks a human then it’s just because we are entering their environment, their home, and they are just doing what comes naturally to them.”</td>
</tr>
<tr>
<td><strong>Fishing enthusiast</strong></td>
<td>“I think that we are being controlled by crocodiles instead of us controlling them. I do not like that I can only safely go fishing from a boat, but even that isn’t really safe as I’ve had crocodiles jump at my boat to try and get my fish. Crocodiles are eating all the fish that should be there for people to catch.”</td>
</tr>
<tr>
<td><strong>Chairperson (student or teacher)</strong></td>
<td>The role of the chairperson is to keep the meeting flowing, to make sure other participants are not talking over the top of each other and that everyone is given a chance to talk. The chairperson should remain neutral (not take sides).</td>
</tr>
</tbody>
</table>

Note: The above opinions are meant as stereotypes and do not necessarily represent those of individuals, groups or organisations.
Activity 13 - Middle Years

RISKY BUSINESS

ASSESSING RISK AND PROPOSING SOLUTIONS TO SOME COMMON BEHAVIOURS

Introduction:

• Use personal experiences and media articles to list the ways in which people interact with Top End waterways (highlight those that are irresponsible behaviours).
• Brainstorm what a ‘risk’ is and ensure that the concept of consequence is included.

Activity:

You will need:
- Be Crocwise safety scene (pg 19) (optional)
- Newspaper articles (optional)

Generate a list of irresponsible ways people behave around waterways. You could use the image from Activity 1 (pg 19) or articles from the NT News to stimulate discussion. The following list contains some behaviours but students may be able to come up with more:

- Cleaning fish at the waters edge
- Walking in the water to launch boats
- Standing on a crocodile trap
- Swimming in areas that are not designated safe swimming areas
- Fishing by standing waist deep in water
- Walking across creeks
- Tying a dog up next to a river
- Young kids playing next to the water
- Camping close to the water’s edge

Brainstorm all of the ways that crocodiles are managed in the NT (refer to Teachers Notes, pg 6-7, and crocodile management plans on the Be Crocwise website).

Create a table like the one below with a description of the activity/behaviour and the likely consequence (relate these to crocodile behaviour). Assign a risk to each activity (low/medium/high). Students then propose how the behaviour can be controlled or managed, eg. signs, fines, infrastructure etc. Assign a new risk level taking the management techniques into account.

<table>
<thead>
<tr>
<th>Activity/Behaviour</th>
<th>Consequence</th>
<th>Risk (L/M/H)</th>
<th>Risk Management</th>
<th>Revised risk (L/M/H)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaning fish at the waters edge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking in the water to launch boats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standing on a crocodile trap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming in areas that are not designated safe swimming areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishing by standing waist deep in water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walking across creeks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tying a dog up next to a river</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young kids playing next to the water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camping close to the water’s edge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Design one or more elements of a crocodile safety campaign, eg. video, poster, presentation/talk, sign, brochure etc.

Going further:

• In teams, produce a 30 second TV commercial about crocodile safety. Critique the commercials in a format similar to The Gruen Transfer on ABC.
• Explore behaviour change strategies used now and in the past, eg. smoking, drinking, speeding. Have they been successful?
• Explore how media persuade people to change their behaviour. What works/what doesn’t?
• Choose a magazine, journal or newspaper to write an article about behaviour around crocodiles. The story can either be factual or fiction; take photos to support the story.
Activity 14 - Middle Years

CROC CULTURE

RESEARCHING CROCODILES, CULTURE AND THE COMMUNITY

Introduction:

• Explain the steps that should be taken when doing research (some SOSE textbooks will help):
  - Identify an aim (to compile information about how people in the community relate to crocodiles).
  - Identify some key questions to answer (see below).
  - Identify sources of information. Discuss the difference between and advantages of primary and secondary sources.
  - Decide how information will be presented.
• Practice advanced Google searches on other topics to refine information eg. using .au as a domain.
• Brainstorm people and organisations in the local community who may have knowledge or stories about crocodiles. Some examples are local ranger groups, traditional owners, elders, Parks & Wildlife Rangers, fishers, boaters and canoeists, tour companies, zoo keepers, artists.
• Discuss cultural connections to crocodiles (refer to Teacher Notes, pg 10).

Activity:

Brainstorm key questions about crocodiles, culture and the community.

Some key questions are:
  - When was the last time anyone saw a crocodile near here?
  - How has the risk of crocodiles changed over the years?
  - Is there a dreaming story about a crocodile from this country?
  - Why were crocodiles hunted in the NT by indigenous and/or non-indigenous hunters?
  - Are there any groups in the local community or elsewhere in Australia that use crocodiles in their name, logo, or emblem?

Allocate each student a key question, then using the sources provided under Resources (pg 11) as a starting point, students conduct further research that aims to answer their question.

Students present their information about crocodiles, community and culture. Formats could include posters (good to share the information with the wider school), PowerPoint presentations, films, animations, documentaries, illustrated stories etc.

Optional

Compose an email, letter or transcribe a phone conversation asking a guest speaker to meet the class to talk about their experiences with crocodiles. Try to be flexible with the time and date and offer a choice of meeting in the classroom or outside in the school grounds. Ensure they are aware that their stories may be presented to the rest of the school.
Going further:

- Design an emblem for a local sports team or community group which includes a crocodile.
- Research how crocodiles have been incorporated into art, culture and rituals from other countries, compare this with Australian Indigenous and non-Indigenous culture, eg. Egyptian, African, Asian and Oceania culture.
- Create a poster exhibition of the various forms of art that have been inspired by or used crocodile imagery.
APPENDIX I

PARKS AND WILDLIFE

CROCODILE SAFETY SIGNS
WARNING
Only swim in designated areas.
DANGER

Crocodiles inhabit this area. Attacks cause injury or death.

- Keep away from the water’s edge.
- Do not enter the water.
- Take extreme care when launching and retrieving boats.
- Do not clean fish near the water’s edge.
- Remove all fish and food waste.
- Camp well away from the water.
Swimming Open

CROCODILE MANAGEMENT ZONE

Management practices reduce the risk of Estuarine (Saltwater) Crocodiles entering this area.

- Surveys conducted prior to opening area.
- Trap(s) set outside the swimming area.
- Saltwater Crocodiles removed when detected.
- Report any sightings to Parks and Wildlife, phone 0419 822 859 or use the Emergency Call Device in the carpark.