Teacher Notes - Picture Book

Little Shark Lulu Is Sleeping

Dr Charlotte Birkmanis and Josie Montano

Themes

- Conservation
- Marine biology
- Education
- Biodiversity
- Pelagic and coral reef ecosystems
- Adventure
- Accepting differences
- Imagination and Exploring Possibilities
- Friendship
- Working together

Discussion Prompts

- Which sea-creature do you think you are most like? Why?
- Do you think Lulu's adventure was just a dream or was it real?
- If you were Lulu's friend, how would you help her?
- Lulu likes to draw and cuddle Remi before bedtime. What is your bedtime routine?
- What do you do if you can't get to sleep?
- Crab and Octopus are great friends. What do you think they are eating for dinner?
- Plankton float and swim about in the water. Where is your favourite place to swim?
- If there was a school underwater, what do you think they would be learning?
- If Hatchet fish were chasing you, where would you hide?
- Mini Mantis Shrimp's always cleaning his home. What are your chores at home/school?
- Squid has a skateboard. What kind of wheels do you have and are they faster?
- Parrotfish are having a sleepover. Have you ever had a sleepover?
- Sea Snakes are playing in the jungle gym. What's your favourite equipment to play on?
- Jellyfish is tap dancing. What dances do you know?
- Stingrays play in the sand. What's your favourite thing to build in a sandpit/beach?
- Daddy Dolphin reads a bedtime story. What's your favourite bedtime story? Is it Lulu?

Creature	No.	Activity	Suggestions
Lulu	1	Colouring in	Colour in Lulu (page included)
Remora	2	I spy	Where's Remi? Remi appears on every double-page spread. Can you spot her?
Clams	3	Counting/maths	Use real shells to calculate maths equations.
Octopus	4	Word find	How many words can you make from the letters O.C.T.O.P.U.S
Plankton	5	Working together	Pair up and role-play what you think Lulu and the plankton are saying. One person is Lulu, and one person is Plankton.
Hatchet fish	6	Origami	Make an origami Hatchet fish puppet out of coloured paper.
Mantis shrimp	7	Craft	Make a clown mask from a paper plate, coloured paper and coloured utensils.
Nautilus	8	Story writing	Adventure story starter ● If I was wearing a jet propulsion pack like the Nautilus I would fly to …
Sperm whale	9	Drawing	Design new pyjamas for the whales and colour.
Squid	10	Acrostic poem	Using the letters S.Q.U.I.D, write an acrostic poem about how Squid is feeling, pages 16 & 17
Parrotfish	11	Painting	Paint a colourful parrotfish
Sea Snake	12	Message in a bottle	Draw a large sea snake, and cut it out. Write a message/draw a picture for Lulu, place it in a recyclable bottle. Decide with your class where to release your 'message in a bottle'.
Jellyfish	13	Collage	Create a dancing jellyfish using colourful crepe paper and a paper plate cut into half
Stingray	14	Physical game	Just like the game 'duck duck goose' but using the words STING and RAY. Sitting still for STING and escaping for RAY.
Dolphin	15	Song	Write a short song/shanty for the dolphins
Turtle	16	Craft & shapes	Make a turtle with coloured paper and shapes e.g.: the body is circle, legs are rectangles; glue texture for the shell (e.g. sand), etc.

Introducing the Characters and species in the book

1. Lulu

Lulu is one of over 500 species of sharks, and when you add in their relatives the rays, skates and deep-sea chimeras, there are over 1,000 species. Together, they are called Chondrichthyans, or fishes with skeletons made of cartilage – just like our ears and nose. Sharks and shark-like animals have been swimming around in our oceans for over 400 million years. This makes sharks older than trees and even older than the rings of the planet Saturn. Sharks are essential for keeping our oceans and our coral reefs healthy, and they come in many different body shapes and sizes. Some can fit in your hand, while other sharks are bigger than a school bus! There are sharks that glow, pink ones, some have teeth on their eyes and others even have pockets.

What is your favourite shark, and how would you describe it to someone who has never seen it?

Will you dress up as Lulu for Book week?

2. Remi

Remi is a Remora, also called a sharksucker or suckerfish that belongs to the family Echeneidae. Remoras attach to sharks and other large animals in the ocean using the flat oval-shaped sucking disk on top of their head. This suction pad on these hitchhikers is so strong that the remora can stay stuck on even if their host leaps out of the ocean! Remoras not only get a free ride, but they also get protection from predators and an all-you-can-eat buffet as they eat their host's leftovers along with parasites and bacteria on the skin of the shark and even poop! In exchange, the remora keeps the waters around the shark clean and their host healthy.

How do you think Remoras find something to attach to? What do you think is the strangest thing or animal a Remora has attached to?

Did you find Remi? What's your favourite hiding place of hers?

3. Clams

Clams are invertebrates – that means they don't have a backbone. They also don't have a head, arms or legs! They are one of around 200,000 species that belong to the Mollusc grouping of 'soft-bodied' animals. If you have ever seen or eaten a mussel, scallop, cockle, pipi, clam or oyster, you already know what a mollusc looks like. Clams are bivalve shellfish that have their soft body encased in two hard outer shells joined by a hinge and a flexible ligament. Clams are important to keeping our oceans clean. They filter water through their gills to get plankton to eat and eject the clean water back into the ocean. Some species, like the Giant Clam, also have algae that provide them with nutrition. Giant Clams can live for 100 years and grow to 137 cm long and 250 kg – no wonder they are called Giant Clams.

What would our ocean be like if we had no Clams?

What would it be like to live in an empty Giant Clam?

4. Octopus

Octopuses (or Octopi if you prefer) are invertebrates and molluscs as well, but they are one of the 300 species that belong to the Octopoda group. Octopus are famous for their eight legs, but did you know that they also have three hearts, blue blood and nine brains? Two of their hearts pump blood to the gills that they breathe through, and the larger heart circulates blue blood adapted to cold, low-oxygen water to the rest of the body. They are super smart, perhaps due to each of their eight arms having a mini-brain to allow that arm to act independently, and one 'main' doughnut-shaped brain to control everything else. Except for birds and mammals (like us), Octopus have the largest brain for their body size out of all the animals. This means that they can use tools and solve problems – they have even figured out how to unscrew jars to get food. Although Octopus can change colour to blend in with their surroundings, they are smart enough to use two halves of empty coconut shells as armour or to hide in!

What sort of colours would an Octopus use to blend in with different areas in the ocean?

Why does an Octopus have blue blood?

5. Plankton

Plankton means drifter or wanderer and these tiny plants and animals carried by tides and currents have transformed the world as we know it. They not only produce oxygen for us to breathe but are also fundamental to ocean food webs. Plankton can be microscopic plants called phytoplankton, or animals called zooplankton. Phytoplankton are very important to the marine food web as they take in carbon dioxide to make oxygen, just like the plants in your garden. As they need the sun to do this, they are found near the surface of the ocean. Zooplankton are tiny animals, some stay small, but others grow up into much bigger ocean-going animals and are large enough to swim against the current. Although zooplankton are usually microscopic, the group also includes larger species like some crustaceans and jellyfish. Most zooplankton eat phytoplankton, and then larger animals eat the zooplankton. One species of zooplankton, krill, is eaten by the largest animal on the planet – the blue whale! To avoid being eaten, zooplankton tend to stay in deeper waters during the day and come up at night to feed on phytoplankton, descending again before dawn. This diel vertical migration is the largest migration on earth and can even be seen from space!

How would we be able to see Plankton from space?

How can you tell if water has a lot of Plankton in it?

6. Hatchet fish

Hatchet fish belong to the family Sternoptychidae and are found around the world in the Atlantic, Indian, and Pacific oceans. There are 40 species of these deep-sea fish ranging in size from 2.8 cm to 12 cm long. Hatchet fish move almost invisibly through the ocean due to their compressed mirror-like body reflecting the light. Their blade-like body has special light-producing bioluminescent organs called photophores on their belly that produce pale blue light to distract their predators and ensure it can't be seen from below. Hatchet fish are the only fish that can regulate the intensity of this light and focus on objects close or far away. They follow plankton, crustaceans and tiny fish from depths of 1.5 km up to the surface of the

ocean each night, finding their meal with protruding light-sensitive eyes that point upwards. They then retreat with the plankton to the safety of the twilight zone when the sun rises.

What is bioluminescence and how do animals use it?

What other animals have bioluminescence and make their own light?

7. Mantis shrimp

There are over 400 species of Mantis Shrimp that dwell on the reef and belong to the Stomatapod family. Although most are around 10 cm long, they can reach 46 cm long and come in all sorts of colours. One of the most famous is the stunning Peacock Mantis Shrimp with its shell a kaleidoscope of red, blue, green and orange and legs with leopard-like spots. Truly dressed in its colourful clown best! If it feels threatened, the Peacock Mantis Shrimp can whip out its club-like front legs that are folded beneath its body at speeds 50 times faster than the blink of a human eye (over 80 km/hr or 50 miles/hr). This makes it one of the fastest movements of any animal on earth and the strongest self-powered strike by an animal. Peacock Mantis Shrimp are very smart, and their eyes are the most complex of any animal. Their eyes move independently of each other and contain millions of light-sensitive cells. This allows the Peacock Mantis Shrimp to detect 10 times more colour than we can see and even see ultraviolet light.

Why do you think the Peacock Mantis Shrimp can move so fast?

How does seeing so much more than we can, benefit the Peacock Mantis Shrimp?

8. Nautilus

Nautilus are pelagic, or open ocean, marine Molluscs that belong to the Cephalopod family Nautilidae. Their soft body is protected inside a hard external shell with many sealed interior compartments or chambers connected by a tube. This allows the Nautilus to move using jet propulsion! The Nautilus lives in the largest chamber of the shell, with the other chambers working like the ballast tanks of a submarine. By pumping seawater through the living chamber and expelling water by pulling its body into the chamber, Nautilus creates jet propulsion to move backwards and even make turns. Nautilus controls its overall buoyancy when swimming by either sucking seawater into or drawing it out of the smaller sealed chambers. The Chambered Nautilus spends daytime hours in deep ocean waters and ascends to hunt at night. Baby Nautilus eat small prey such as crustaceans, while adults feed on larger crustaceans and fish, as well as scavenge on dead animals.

Can you think of any other animals that use jet propulsion to move about?

Why are there so many different types of Molluscs?

9. Sperm whale

Sperm Whales (*Physeter macrocephalus*) live in the open ocean. They grow to about the size of a school bus and as well as being the largest toothed whales, they are also the largest

toothed predator in our oceans. They also have the largest brain of any animal and can hold their breath for 2 hours while they dive looking for giant squid, a favourite snack. Sperm Whales travel and live in family groups which can have 15 to 20 animals, often females and with their young with male sperm whales often travelling alone. Sperm Whales have been found to snooze gathered together, seemingly motionless and floating vertically in pods. These whales have been seen doing this for minutes to hours at a time. The mothers take a nap while the babies, called calves, are at the surface or diving.

How do Sperm Whales breathe while sleeping?

When Sperm whales dive very deep, how do they hold their breath for so long and cope with the pressure and cold in such deep water?

10. Squid

Squid are marine Molluscs that belong to the Cephalopod family. Squid are very intelligent and skilled hunters, with many species known to be social and work together toward common goals. They are also well known for their ability to squirt ink to create a smokescreen to allow them to jet away from danger. As well as the squid that you might see on your dinner plate often called calamari, you may have heard of the mighty Giant Squid. These deep-sea animals have captured our imaginations from ancient mythology to modern movies, probably because of their size (up to 13 m/43 feet long and 200 kg/440 lb). Like all squid species, the Giant Squid has eight arms and another two longer feeding tentacles with hundreds of powerful sharp-toothed suckers to bring food to their beak-like mouth. Giant Squid are voracious hunters and their food could be fish, other squid or even sharks. They have huge eyes the size of basketballs – the largest of any animal on earth. Although there is still a lot to learn about them, Giant Squids are thought to be visual hunters that stalk their prey before attacking.

Why do you think Giant Squid grow so big?

Does living in water make it easier or harder to grow really big?

11. Parrotfish

There are almost 100 different species of Parrotfish in the Scaridae family, and most are brightly coloured. They are called Parrotfish because their fused teeth look like a beak. Lots of these fish are found on coral reefs around the world, and if you have been snorkelling or diving you might have heard them noisily crunching on algae, corals and sponges. Their distinctive beak lets them scrape algae and crush the hard limestone of corals into a digestible paste. Some species of Parrotfish have a unique way to ensure there is always plenty of fish in the sea – they are sequential hermaphrodites. This means that some are born as females, then later in life become male in response to an environmental cue, such as the loss of the dominant male. These changes can be seen in their colouration. Juveniles tend to look drab, and as they mature distinct additional red tones emerge. Mature males, and females that have recently changed into males, exhibit bright, intricate patterns of greens, blues, and reds. These males then lead harems. These colours can be seen when Parrotfishes continuously feed during the day before seeking shelter in reefs at night. To hide from predators, some Parrotfishes produce a near-invisible mucous bubble to sleep in. This mucous nightgown takes around 30 minutes to make, and, although it allows water to flow

through both the open ends, its foul taste and smell deter would-be predators that use scent to hunt.

Why are Parrotfish important for coral reefs? Hint: think of the importance of removing algae from coral.

How do Parrotfish help create our sandy beaches?

12. Sea Snake

Sea snakes are the most diverse of all marine reptiles. The 70 species of true Sea Snakes belong to the venomous Elapid snake group, are fully adapted to ocean life and do not come ashore. With flattened paddle-like tails, valve-sealed nostrils and glands under their tongues to get rid of excess salt, sea snakes give birth to live young directly into seawater. Sea Snakes use specialised organs called sensilla to sense distant objects by feeling movements and can detect light with their tails! Although they need to come to the surface to breathe oxygen, these snakes have been seen diving to 250 m deep and can routinely stay submerged for over two hours when diving or sleeping on the seafloor. Some species of sea snakes, like the Yellow-bellied Sea Snake (*Hydrophis platurus*), grow up to 88 cm / 35 in long and hunt in an unusual stealthy way. It spends the evening hanging motionless, upside-down in a coiled position at the surface, ready to strike at any unsuspecting fish swimming below. It also ambushes prey behind it by swimming smoothly backwards until the small fish comes within range of its mouth.

How do Sea Snakes get fresh water to drink in the ocean if they do not come on land?

Sea Snakes have a very special sense in their tail – what is it?

13. Jellyfish

Despite not having a brain Jellyfish have pulsed along on ocean currents for millions of years and are found in warm and cold waters, both in the deep ocean and along our coastlines. But don’t be fooled: despite the name jellyfish aren't actually fish but planktonic marine invertebrates that don’t live for very long. Most live for less than a year and some of the smallest live for only a few days. The body of a Jellyfish is over 95 percent water and as there are many different types of Jellyfish, not all of them sting. However, some species have millions of tiny cells in their tentacles called nematocysts that are used to inject toxins to stun or paralyse prey. The Jellyfish then uses its dangling tentacles to bring the food toward a hole at the base of its bell-shaped body which is used to both eat and discard waste – making Jellyfish the original potty mouth! Jellyfish can also squirt water from their mouths to move while tentacles hang down from their body to sting prey. There are over 2,000 described species and we are still finding new ones.

How do you think Jellyfish survive without a brain?

What is a group of jellyfish called?

14. Stingray

Stingrays are curious and playful members of the batoid group also called rays. There are almost 700 species of rays with skeletons made of cartilage, just like sharks. Stingrays have a flat, roundish shape with broad fins running the length of their bodies giving them a flat, roundish shape. Also known as “flat sharks”, some species flap their fins like the wings of a bird to “fly" through the water. With eyes on the top and gill slits and the mouth underneath, these flattened fishes have spiracles behind their eyes to pull water through the gills to help them breathe while resting on the bottom of the ocean. Their tails are generally longer than their body is wide (measured as “disc width”) with at least one saw-like spine. Stingrays like to dine on oysters, clams, mussels and crustaceans which they crush with their strong jaws. Stingrays bury themselves under the sand to hide from predators, such as sharks and larger rays. To do this they flap their fins until the sand is covering everything but their eyes and spiracles. Stingrays can be spotted or shaded, and their colour often reflects the shading of the seafloor, allowing them to blend in with the sand underneath them.

Can Stingrays also live in freshwater?

If so, where would freshwater stingrays be found?

15. Dolphin

Dolphins are very similar to us. They are very smart, they can recognise themselves in a mirror, they have their own language and even get sad when another dolphin dies! There are over 40 species of Dolphins but it gets a little confusing as we are still looking at how to scientifically group them, and the largest species of Dolphin is actually called a Killer Whale or Orca! Dolphins can be black, white, black and white, blueish and even pink! Their colour depends on their diet and where they live. Dolphins eat crustaceans, fish, squid and even hunt sharks! They don’t chew their food but break it into smaller pieces to make swallowing easier. No matter what they are, all Dolphins sleep by resting half their brain at a time, this is called unihemispheric sleep. If they were to sleep deeply like us, they could drown. Dolphins use a lot of different noises or vocalisations including whistles, clicks and squeals to communicate and find their prey and other objects. Dolphins live across the whole world in our oceans and even in some freshwater rivers! Some species like to live near us along the coastline, while others like to live further out to sea. Most Dolphins live in tropical and temperate waters and Orcas are the only Dolphins that live in the cold Arctic and Antarctic waters.

How do Dolphins use echolocation?

Can Dolphins live in freshwater? If they can, where do they live?

16. Turtle

Turtles date back to the time of the dinosaurs and belong to one of the oldest reptile groups in the world. Turtles stand out in the animal world due to their shell, and it is made up of two main sections, the carapace on the top and the plastron on the bottom. But the shell is more than just the Turtle’s home, as well as being armour and protection from predators, it is also part of its skeleton – rib cage, vertebrae and sternum. As they can’t move their rib cage to breathe, they use sheets of muscles to pump oxygen through their mouth. They have another opening for pooping, peeing and laying eggs. In some species, it also acts as gills to suck in water and absorb oxygen, imagine breathing out of your bottom! Turtles are also thought to

cry – they aren't sad though. It's not real tears, but liquid from special glands called lachrymal glands in the corner of each eye that get rid of excess salt. Even though they aren't sad, they still need to sleep. Sea turtles can sleep at the surface when in deep water or on the bottom wedged under rocks or ledges in reefs. Hatchlings are baby turtles, and they typically sleep floating on the surface, usually with their front flippers folded back over the top of their backs.

Do all Turtles have hard shells?

How can you tell if a Turtle is a girl or a boy?

The Sequel

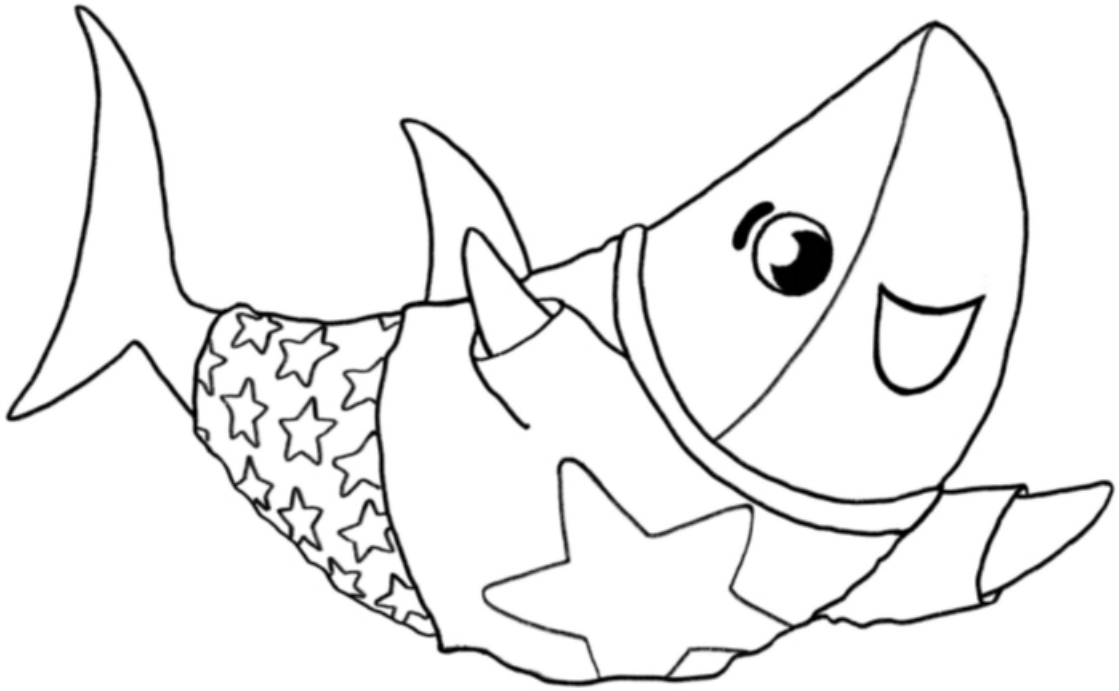
Lulu will be back with more adventures in our next book LITTLE SHARK LULU IS SCARED. What are you afraid of? Let us know – maybe it's the same thing that scares Lulu.

The Creators

Find out more about the authors and illustrator of **Little Shark Lulu is Sleeping.**

Any questions/comments/stories/illustrations? Feel free to send them an email via their website.

Dr Charlotte Birkmanis	www.charlottebirkmanis.com
Josie Montano	www.booksbyjosie.com.au
Carla Hoffenburg	www.carlahoffenberg.com



Little Shark Lulu

Illustrated by
Carla Hoffenberg