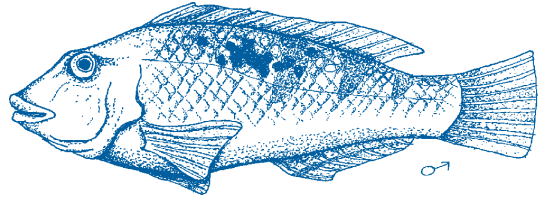


# Do Fish Sleep?

As fish have no visible eyelids (and closed eyes generally imply sleep) and we see them usually by day when they are in motion, this question is always the source of some debate.



The following account of Spotties (*Notolabrus celidotus*), written by David Graham, sheds some light on the nightlife of fish in captivity. He was the biologist at the Portobello Marine Laboratory in the 1930's and was responsible for looking after all the fish in the Aquarium at that time. The following notes are from his book *A Treasury of New Zealand Fishes* (Reed, 1953).

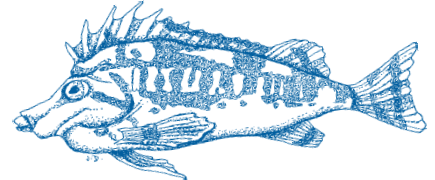
“... At that particular time we had no electric lights in the Aquarium and when I would walk in my rubber soled sand-shoes no noise resulted. One night to my amazement I found all the Spotties in their tank lying on the floor as though dead. When I switched on my electric torch, every Spotty jumped and darted madly about the water, some even leaping about the surface in their excitement. This made me curious to know more about the possibility that they had been sleeping or resting. So the next night when all was dark again I approached their glass tank, taking care to make no noise. When my eyes became used to the darkness I could see each Spotty quietly swimming to the surface and then sink, lower and lower, until each fish was resting on the concrete floor of the tank. Soon all were stretched out on their sides. Sometimes the resting position would be changed for a few minutes especially if the largest fish had not settled down for his sleep... After a while the Spotties gradually quietened down, all with back fins outstretched until they seemed settled for the night... On one occasion a large Spotty was found to be asleep standing on its tail. He had his back fins in the corner of the tank and to all intents and purposes slept soundly. For upwards of an hour I watched him one night and he never moved until I switched on the electric light. What happened? The Spotty almost flung himself into a horizontal position and swam rapidly around the tank as though alarmed at being 'caught napping'.”

Adelle Heineman, the current Senior Aquarist, says that she too has seen the Spotties sleeping. But a rare sight it is: the slightest sound or too much light will jolt the Spotties into activity. Spotties are a very alert fish, capable of moving quickly in short bursts of swimming activity that help them avoid predators.

Do they really sleep? Why don't you join our *Aquarium After Dark* programme to find out for yourself!



## Asleep on the Ocean Bed - a fish sleep study



**Objectives:** To investigate if the behaviour of marine fish and invertebrates changes from day to night

### Curriculum Links:

#### Science

*Making Sense of the Living World* – Level 1 to 5

#### English

*Written language:*  
*Reading* – Level 1 to 5

### Methods:

Stages 1 & 2 should be done in the classroom prior to your visit to the NZ Marine Studies Centre. The actual collection of data would be done during the *Aquarium After Dark* programme. This project could also be done using a fish tank at home or in the classroom.

1. **Research:** Read the story about the Spotties sleeping in the Aquarium. Then as a class brainstorm all the questions that you have about what happens in the Aquarium at night. Who sleeps? Where do they sleep? How do we know they are sleeping? Who doesn't sleep and why not?

2. **Design:** Plan an investigation to find out how the behaviour of marine animals differs from day to night. Think about how you could observe the animals in the dark, how you will record your observations, etc.
3. **Carry out:** Conduct your investigation during the day and night ( and/or with lights on and off) – remember you will need to compare your results to see how the animal's behaviour changes under different environmental conditions.
4. **Report:** Summarise your findings as a table, graph or mural and present to the rest of the class
5. **Discuss:** Why is it important to know how an animal's behaviour changes from day to night?

### Listed below are animals that would be interesting to study:

Fish - spotties, pigfish, moki, trumpeter, seahorses, thornfish  
Molluscs - Octopus  
Crustaceans - crabs, crayfish, shrimp  
Cnidarians - wandering sea anemone



**Night Arrows** During the day Arrow squid are found at depths of 200-500m but at night they migrate to the surface to feed. They are active nocturnal hunters and form large schools to feed on crustaceans, small fish, octopus and some times other squid! Squid fishing boats target these large feeding schools and use very bright lights and squid jigs to catch them. Some people think that the squid are attracted to the lights, while others think that the squid are already there and move into the shadow of the boat to avoid the light and are caught by the squid jigs there.



**Night Wanderers** One octopus in the Aquarium discovered how to sneak into the adjacent tanks to plunder the crayfish on display. Before the Aquarium staff arrived each morning this octopus would slither back to his own tank. It wasn't until the octopus was spotted hunting in the wrong tank late one night that the Aquarium staff realised why the crayfish were disappearing. This octopus was eventually released because his night-time raids couldn't be stopped.

## Data Collection Form

Animal Name: \_\_\_\_\_



NEW ZEALAND  
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### Predictions

How do I think this animal behaves...

During the day? \_\_\_\_\_

During the night? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Aquarium Observations

(over a 5 minute period): Record what the animal did, where it went, what animals it was friendly with, what animals it avoided, how fast and how far it moved etc.

Night - Lights Out: \_\_\_\_\_

\_\_\_\_\_

Night - Lights On: \_\_\_\_\_

\_\_\_\_\_

Morning - Lights On: \_\_\_\_\_

\_\_\_\_\_

### Conclusions

Do you think your animal sleeps? Explain your answer \_\_\_\_\_

\_\_\_\_\_

Is your animal nocturnal (active at night and rests during the day)? Why are some animals nocturnal? \_\_\_\_\_

\_\_\_\_\_

Was it the light levels that affected the activity level of your animal or the time of day? \_\_\_\_\_

\_\_\_\_\_

Why do you think it is important to study the day/night behaviour of animals? \_\_\_\_\_

\_\_\_\_\_

**Night Lights** The ocean is rich with squid, fish, worms, shrimp, jellyfish, sponges, sea pens and a great variety of plankton which are luminescent – they can emit visible light. It has long been known that many living organisms carry out biochemical reactions in which some of the chemical energy of the reaction is released as light – a process called bioluminescence. So why do they do it – probably to signal their mates, attract their food or fool their predators.



**Bedtime Colours** Some fish change colour depending on the colour of their surroundings, the stage of their life cycle or even their state of excitement. Trumpeter and Moki change their colour pattern between day and night – almost as if they are putting on pyjamas!



"Diving Deeper - Exploring Marine Conservation"

**seaweek 2002**

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