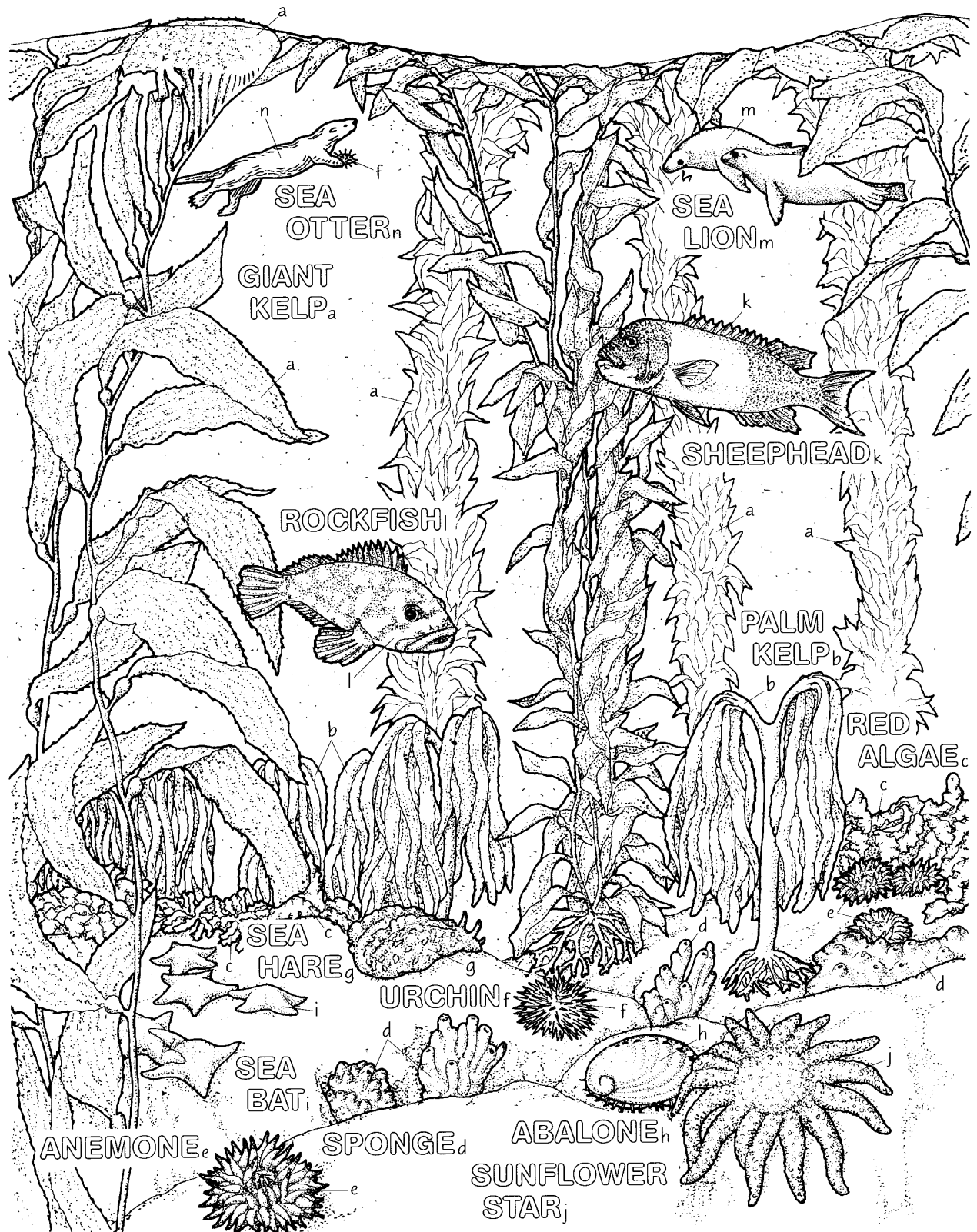


Kelp Bed Ecosystem

Name: _____

Period: _____



Kelp Bed Ecosystem

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Follow the directions below to color-code the diagram and to answer the questions. Use colored pencils, and check off each box as you finish that part of the instructions.

For this exercise, you will be analyzing how different organisms are able to survive in a particular environment. If an organism is able to survive long enough to reproduce, those handy survival traits will get passed on to its offspring. This whole process is referred to as natural selection.

Take a look at the diagram. It shows a kelp bed along the central coast of California. It exists in cold ocean water, in places where there is a rocky bottom.

1. Attached firmly to the rocks on the ocean floor are different types of algae. Color any giant kelp you see (a) and its label brown . Even though the algae is brown in color, it still needs to do photosynthesis to survive. That is why the blades (things that look like leaves) are big and flat. Bulb-shaped air bladders at the base of the blades act like balloons, keeping the giant kelp floating up towards the surface, and the sunlight that the algae needs. On the other end of the giant kelp, parts called stipes act like roots, gripping the rocks below to keep the giant algae from floating away.

Why doesn't the giant kelp float away as waves and swells move it back and forth?

Why doesn't giant algae grow in areas with a sandy ocean floor?

Giant kelp can grow in the ocean in areas up to 100 ft deep. What does this tell you about how far sunlight can penetrate ocean water?

2. Another type of algae found in a kelp bed is much shorter than the giant kelp, yet still requires sunlight. Color any palm kelp you see (b) and its label brown as well. Even shorter than the palm kelp is red algae. Color the red algae (c) and its label red .

Would you expect to find palm kelp or red algae in depths greater than 100 ft? Why or why not?

3. Living on the rocky floor, eating the algae and other things, are a variety of invertebrates (animals without a backbone). Color the sponges (d) yellow , and the sea anemones (e) green . Color their labels the same way .

If these animals are attached to the rocks and can't chase their prey, how do they eat? Hint: think about how the sea anemone catches its food; all of these animals eat the same way.

4. Now let's think about the invertebrates that can move around. Sea urchins (f) are herbivorous, eating chunks of algae that happen to drift by. They have little tube feet (like those of a sea star) that stick out between their sharp spines and grab onto their food, moving their meal to their mouth underneath. Color the sea urchin and its label purple.

Why would natural selection (survival) favor sea urchins with longer spines?

Work: 16 points

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5. Find the sea hare (g) in the diagram. "Sea hare" is a pretty nice name for something that is pretty much an underwater slug. It has tentacles on its head that look like rabbit ears (another word for rabbit is "hare") that it uses for feeding. Like the sea urchin, it is herbivorous, and crawls around on the rocky floor searching for vegetation to eat. Color this creature and its label a deep red color. The sea hare can release purple dye into the water to confuse predators, as well as storing bad-tasting chemicals in its body that it gets from the algae it eats.

What are two ways that a sea hare can defend itself?

1—

2—

6. The abalone (h) is related to snails. It has a shell that is very flat, so waves don't bother it much, and underneath the shell, a huge foot that it uses to move around and search for vegetation. Around the foot are a bunch of small tentacles. If these tentacles are touched, the abalone quickly clamps itself to a rock until danger passes. Color the abalone and its label black.

Why doesn't the abalone have a big tall shell?

What does the abalone do when it senses danger?

7. A common sea star found in kelp beds is the sea bat. It will eat pretty much anything (animal or plant) so it is called omnivorous. Color the sea bats different colors (red, orange, brown, yellow, or green) and its label a mix of these colors.

For natural selection (survival), why would it be an advantage to be omnivorous?

8. The sunflower star (j) is bigger than the sea bats, and will eat them, the sea urchins, and any other animals that are smaller than it. Color the sunflower star and its label pink.

Why is it advantageous for this sea star to have so many arms?

9. The sheephead fish (k) has sharp teeth and a strong jaw that allow it to eat its prey. Color the sheephead's middle section pink , leave the jaw white , and color the rest of the body gray . Color its label with a mix of these colors .

Most animals that crawl through the kelp bed have shells for protection. How can the sheephead eat them?

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10. Rockfish (l) float around in the kelp beds as well, eating smaller fish and various invertebrates.

Rockfish usually have their own little territory within the kelp; they do not hang out in large schools. As they are predators, they need to be camouflaged. Color the rockfish with dark brown over the dots on its body □ , and light brown over the rest of it □ .

Why does having its own small territory help the rockfish to survive? Use the word "compete" in your answer.

11. Now for the mammals in the area. Sea lions (m) use the kelp bed for hunting fish, and the sea otter (n) dives to the bottom to find sea urchins to eat. Color the sea lions lightly with brown □ , then again with yellow □ so the colors blend together. The sea otter's fur should be colored red-brown □ , and the sea urchin it holds should be purple □ .

If the sea lions only have flippers for limbs, how can they catch their prey?

Consider the following:

Sea urchins really like to eat kelp.

Sea otters used to be hunted for their fur.

What do you think happened to kelp beds as the population of sea otters declined from hunting?