**Blue Planet – Seasonal Seas**

**Background**

The first thought that comes to mind in considering seasons are the changes in deciduous forests as the leaves fall in autumn, then return in the spring. However, seasons can also apply to oceans in temperate latitudes. This episode of the BBC series Blue Planet will explore some of the aquatic ecosystems that change with the seasons.

**Questions**

These questions are written in sequence with the seasonal seas episode. *Ask about any missed questions at the end of the video.*

1. What advantage does giving birth in the harshest part of winter give to the grey seal pups?
2. What are phytoplankton, and how are they affected by the change in seasons?
3. A food chain is shown between the phytoplankton, sea-nettle jellyfish, and copepods. Identify the **producer, primary consumer,** and **secondary consumer** in this food chain.
	1. Producer –
	2. Primary consumer –
	3. Secondary consumer –
4. Describe a predatory adaptation of the *basking shark*.
5. Benthos is the community of organisms that dwells on the bottom of the sea. Many are permanently attached to the ocean floor. Give an example.
6. Describe an adaptation of the *bull kelp* for gathering sunlight.
7. The presence of kelp (brown algae) is vital for the survival of blacksmith fish and the Californian sea otter. Explain how each uses the algae.
8. Describe an adaptation of the *bat ray*.
9. A predator-prey relationship is shown between two sea slugs: *janolus* and *navanox*. Describe an adaptation each has either for hunting or escaping.
10. Compare the diets of larva and adult crabs. What adaptations do the adult crabs gain that allow them to have this diet?
11. Describe an adaptation of the *salmon shark*.
12. Identify the **producer, primary consumer,** and **secondary consumer** in this food chain: *plankton, auklet, rockfish, and herring.*
13. The immature shark hatches in autumn, when the plankton blooms are dying off. With this source of food disappearing, how does it survive?
14. Describe an adaptation of the *hooded sea slug*.
15. Describe an adaptation of the *handfish.*
16. How does the male *leafy sea-dragon*help the eggs of its female mate have the highest survival rate possible?
17. What cause the huge release of air bubbles from the school of herring hunted by the killer whales?
18. Herring are smaller and faster than killer whales. How do the predators overcome this disadvantage?

**Analysis**

Answer on your own after watching the entire episode.

1. A **keystone species** is an organism that serves as a foundation for an entire food web of an ecosystem. If this organism were not present, the other species that depend on it would have to migrate elsewhere or die off. What species in this video would you describe as a keystone species? Justify your answer.
2. The behavior of harbor seals is timed with the change of the seasons. In the summer, males will compete with each other for territory and access to females. In the late summer / early autumn, breeding occurs. Then, birth is given to the pups in late winter. Relate the living conditions during each season to these behaviors. Why have the seals evolved this kind of timing?
3. Sea otters were described by the narrator as the “guardians of the kelp forest”. Explain their relationship with the kelp. Is this an accurate analogy to use?