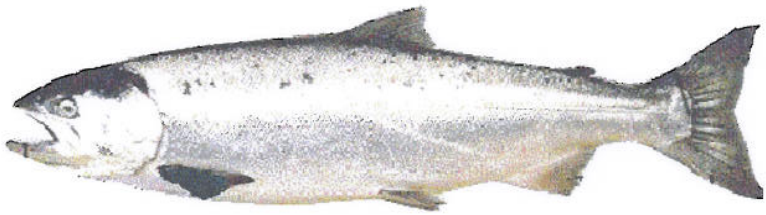
Biology [33 marks]

Read the following passage:

The King of the Fish

The seas bathing the eastern shores of Russia are rich feeding grounds for hundreds of millions of **migratory** salmon, many of which are ultimately eaten by **terrestrial** creatures on the Siberian mainland. The fish spend most of their lives fattening themselves up in the North Pacific and Bering Sea and when they mature, they return to the rivers of their birth, resplendent in their **nuptial colours,** where they **spawn** and die.



During the salmon run the fish swarm in such numbers that they can even block rivers, causing them to overflow their banks. Five **species** of salmon occur in western Russia, the most common being the Sockeye Salmon, the Pink Salmon and the Chum Salmon. The largest and tastiest is the King Salmon, which can reach 1.9m long and is used to make 'red caviare'. The fifth species is the Silver Salmon, also known as the Jack or Coho Salmon.

As the salmon make their way in from the sea, they run the gauntlet of **predators**, eager for their flesh. At the end of the summer, when the salmon migration reaches its peak, thousands of Harbour seals laze around on sandbars near the mouths of rivers. When they feel hungry they simply have to heave themselves into the water and snatch a passing salmon. Local fishermen also net the salmon in the estuaries. Salmon fishing is big business and nowadays the stocks are **managed** by a programme of rearing and releasing young fish.

The spawning salmon provide a bonanza of **nutrients**, derived from the sea, which help to nourish the plant and animal communities that live on Western Russia's poor volcanic soil. Even in death, salmon bequeath the goodness in their exhausted bodies to the rivers in which they breed. The flush of fertilizing minerals from the **putrefying** fish stimulates the growth of aquatic invertebrates on which the newly hatched salmon depend.

The dead and dying fish are also consumed by larger animals like bears – indeed, they are crucial to their survival during winter. About 9,000 Brown Bears live in the area, and the largest males can stand nearly 3m tall and weigh 800kg. When putting on fat in the autumn a hungry bear can eat 20,000 berries or nearly 50kg of fish in a day! In Alaska, Grizzly Bears often gather in impressive groups to feast on the glut of fish but Russian bears keep their distance from each other, tolerating only other **scavengers**, such as Steller's Sea Eagle.

Adapted from *Realms of the Russian Bear* by John Sparks

Using the information in the passage and your own knowledge, answer these questions:

1. What is meant in the passage by the words indicated in bold as follows:

i.	Migratory	vi.	Predators
ii.	Terrestrial	vii.	Managed
iii.	Nuptial colours	viii.	Nutrients
iv.	Spawn	ix.	Putrefying
v.	Species	x.	Scavengers

[10]

2. Why do Salmon spend most of their lives in the sea? [1]

3. Name the five species of salmon [1]

4. The scientific name of the fifth species is *Oncorhynchus kisutch*. Describe and explain (i) and advantage and (ii) a disadvantage of this name. [3]

5. All the animals mentioned in the passage are vertebrates.
What are the five main types of vertebrate?
Which two classes of vertebrate are not mentioned in the passage? [2]

6. Name the two main predators of salmon in river estuaries. [2]

7. Fishermen used to use home-made baskets for salmon fishing but now they use big manufactured nets. What are the (i) advantages and (ii) disadvantages of this? [3]

8. Discuss what is sustainable harvesting and why the salmon might be an example of this. [2]

9. In the sea salmon eat microscopic animals called zooplankton. These eat microscopic plants called phytoplankton. Write out a food chain to show this. [2]

10 Salmon do not feed in rivers. Draw a food web to link the land animals and plants mentioned in the passage. [2]

11. Bears are omnivores because they eat both berries and fish. Name:
i. Another omnivore mentioned in the passage.
ii. An omnivorous mammal living in the English countryside. [2]

12. There are more Steller's Sea Eagles than bears in Russia but they both eat the same total mass of fish. Explain why. [1]

13. Dead salmon decay or putrefy and this process is caused by microorganisms. Name two types of microorganism. [2]