

Marine Biology

Worksheet IV

Selected Answers

(Oceanic Provinces, Ocean Resources, Marine Pollution)

1. **Matching:**

- | | | | |
|---------|---|------|-------------------|
| I__a. | Black colored lichens | I. | Splash zone |
| III__b. | California mussel | II. | Upper intertidal |
| II__c. | Buckshot barnacle (<i>Chthalamus</i>) | III. | Middle intertidal |
| II__d. | Goose barnacle | IV. | Lower intertidal |
| IV__e. | Sea palm | | |
| II__f. | Acorn barnacle (<i>Balanus</i>) | | |
| I__g. | Periwinkle snail | | |
| IV__h. | Octopus | | |
| IV__i. | Brown sea hare | | |
| IV__j. | Sea urchin | | |
| IV__k. | Sea star | | |
| IV__l. | Sea Anemone | | |
| IV__m. | Feather Boa Kelp | | |

2. List **3** reasons that the rocky intertidal of the Pacific Coast of North America has such high species diversity.

- Temperatures in winter are mild and usually above freezing
- Summer heat is moderated by coastal fog
- Upwelling creates nutrient rich waters which supports a high density of phytoplankton

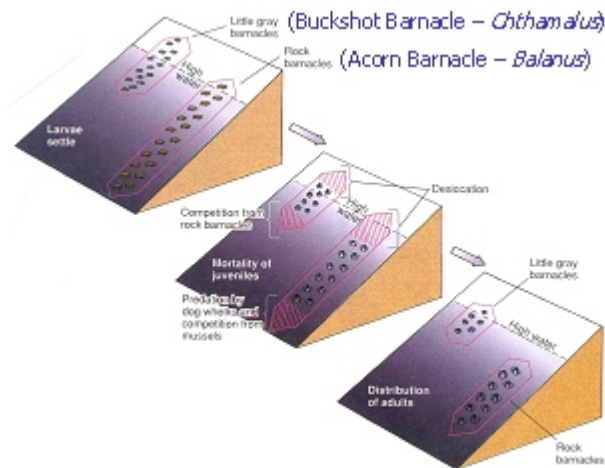
3. What is a *Keystone Species*? Why is the sea star considered a keystone species in intertidal regions in California?
- A keystone species is a species that other organisms in the environment depend on for their survival
 - Sea stars are predators of mussels. If sea stars are removed from an area, mussels move down onto the lower intertidal and displace the organisms that live there. Thus removal of sea stars decreases species diversity in the lower intertidal.
5. Using the diagram below, explain why there is a difference in the distribution of acorn and buckshot barnacles from the time of larval settlement to the time when the barnacles are adults. What factors that influence the zonation adult buckshot and acorn barnacles?

Buckshot barnacles grow slower and are smaller than acorn barnacles.

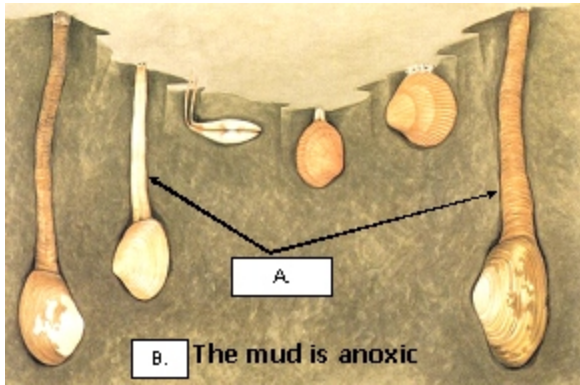
Buckshot barnacles can withstand higher temperatures and longer periods of exposure to air than acorn barnacles.

Acorn barnacles can out compete buckshot barnacles at lower elevations in the intertidal since they grow faster and as they grow they push buckshot barnacles off the rocks.

Thus physical factors (tolerance to heat and air) determine the upper limit for both buckshot and acorn barnacles. Competition for space determines the lower limit of buckshot barnacles. Acorn barnacles can out compete them in areas where acorn barnacles are not exposed for extreme periods. The lower limit of acorn barnacles is determined by predation and competition for space by mussels.



6. Examine the diagram below:



A. Structure A is: Siphon

B. What is meant by the term anoxic?

Without oxygen

C. How does structure A enable clams to live in anoxic muds?

Clams are filter feeders. They use their siphons to bring water into their body and filter feed using cilia on their gills.

7. Examine the diagrams below.
Diagram A

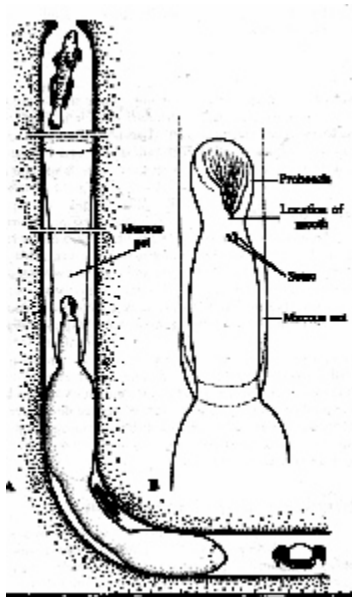
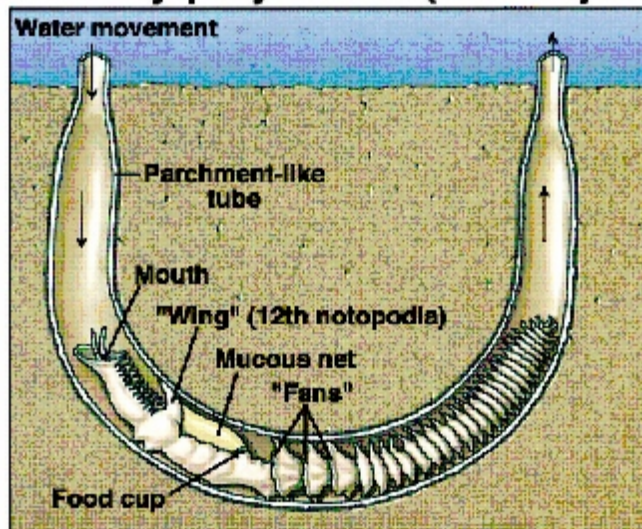


Diagram B

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A sedentary polychaete (*Chaetopterus*)

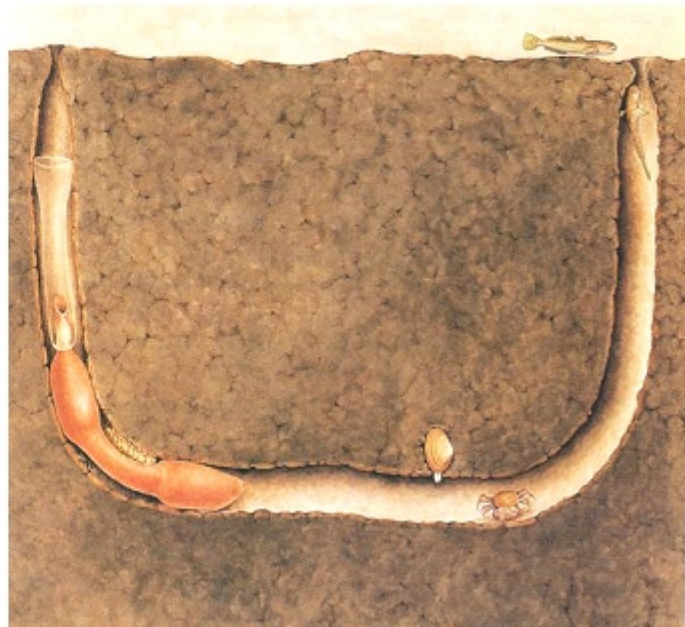


A. What is the common name of the worm in diagram A? How does it feed?

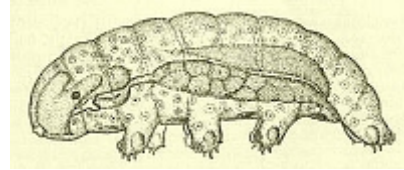
- The "Fat Innkeeper Worm". It is called an *innkeeper* because it shares its "U" shaped burrow with a polychaete worm, a crab, and one or more fish.
- It is a filter feeder. It creates a mucus net and pumps water through this net using muscular contractions of its fat body.
-

- B. What is the common name of the worm in diagram B? How does it feed?
- The Parchment Worm. It is a type of polychaete worm that live in burrows in mud flats.
 - Like the fat innkeeper worm, it creates a mucus net to filter organisms from the water column. It uses enlarged parapodia, “fans”, to create a current that moves water through the mucus net.
- C. If you wanted to collect specimens of these worms where would you go?
- An estuary at low tide so that the mudflats would be exposed

Fat Innkeeper Worm (*Urechis caupo*)



8. Identify the two organisms below. Where are these organisms found in the marine environment?



A. Name: Kinorynch

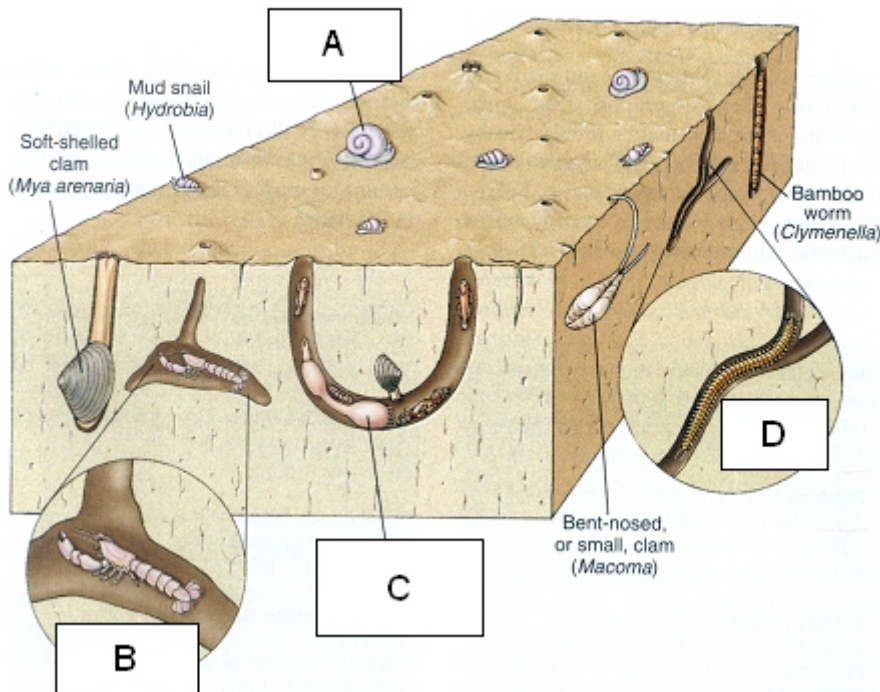
B. Name: Tardigrade or water bear

Location: Meiofauna

Location: Meiofauna

Meiofauna a microscopic organisms that are found between the grains of sediment.

9. The organisms in the diagram below are found on mud flats in estuaries. Identify the organisms A - D.



- A. _____
- B. _____
- C. _____
- D. _____

10. What is the feeding strategy of the organisms in the diagram?

A. Predator B. Deposit feeder C. Filter feeder D. Predator

11. Give two examples of each of the following:

- A. Infauna: _____
- B. Epifauna: _____
- A. Meiofauna: _____

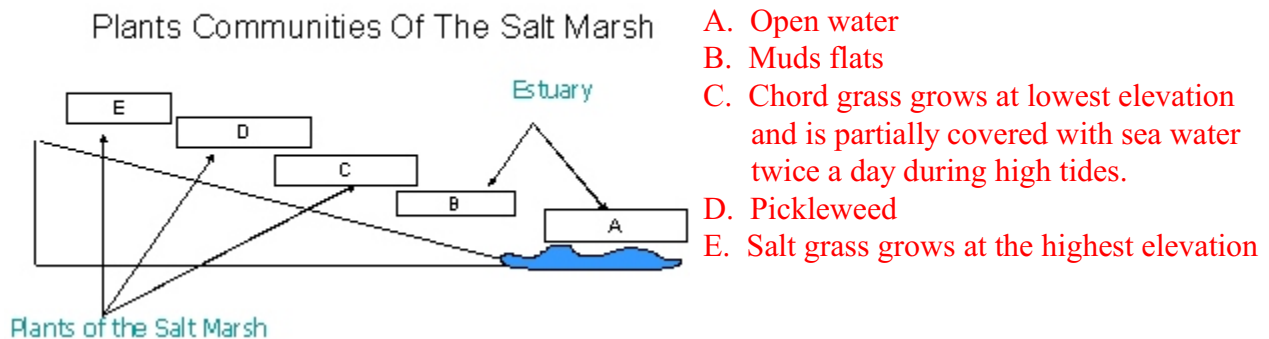
12. How do sand crabs (mole crabs) feed?

They are filter feeders (suspension feeders). They grab particles from the water column as waves wash over the sand.

13. List 4 reasons why estuaries are important coastal ecosystems.

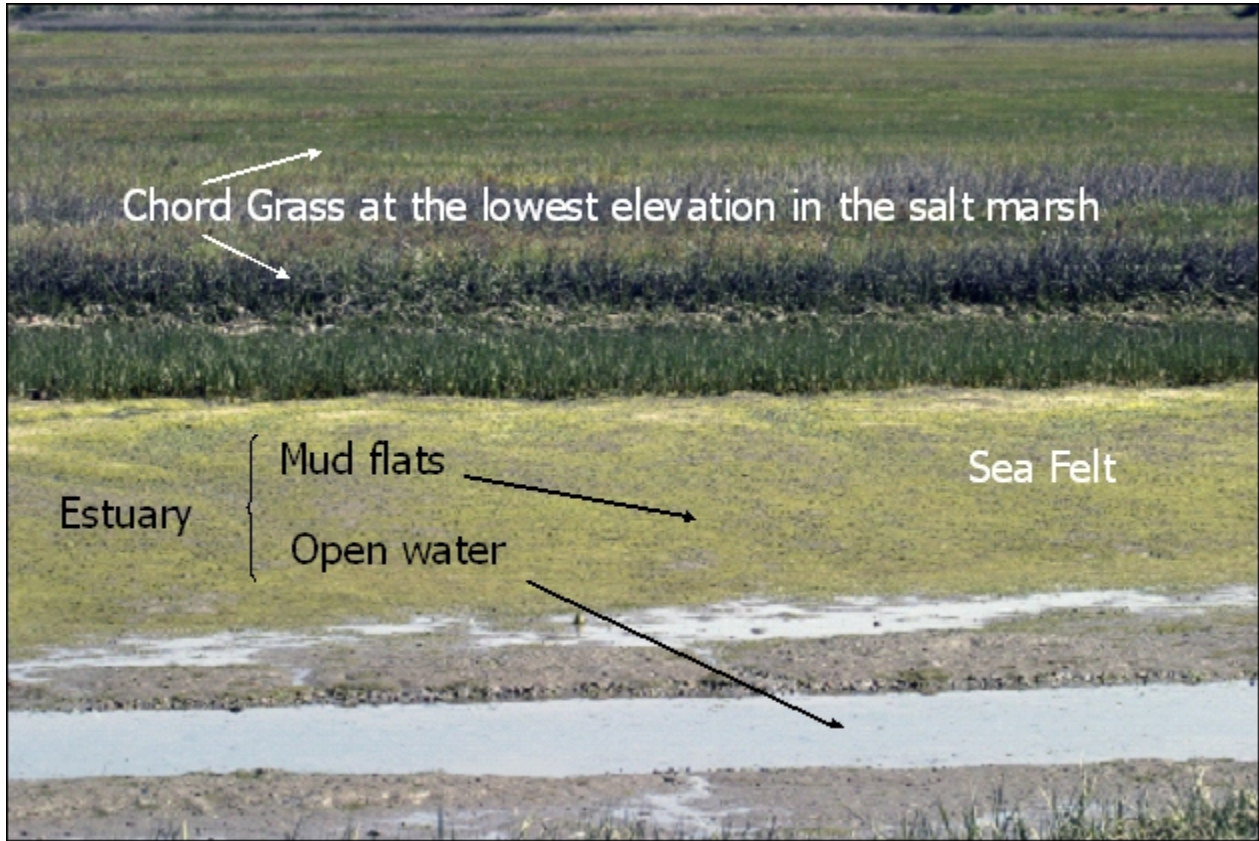
- A. Resting and feeding areas for migratory birds
- B. Provide homes and habitat for endangered species
- C. Flood control. The energy from storm waves is reduced as they move through estuaries. Part of the reason hurricane Katrina was so devastating in New Orleans is that most of the wetlands between the coast and the city were destroyed.
- D. Water filtration and purification. The bacteria in the muds detoxify lots of poisons and breakdown components of sewage.
- E. Act as nurseries for juvenile fishes. It gives them places to hide from predators.

14. Identify regions A - E on the diagram below:



15. How do the plants found in salt marshes tolerate being covered with salty sea water?

Chord grass and salt grass have salt glands that excrete salt. Pickleweed is a succulent that concentrates salt in its tips and then drops off its salty tips.



California Horn Snail

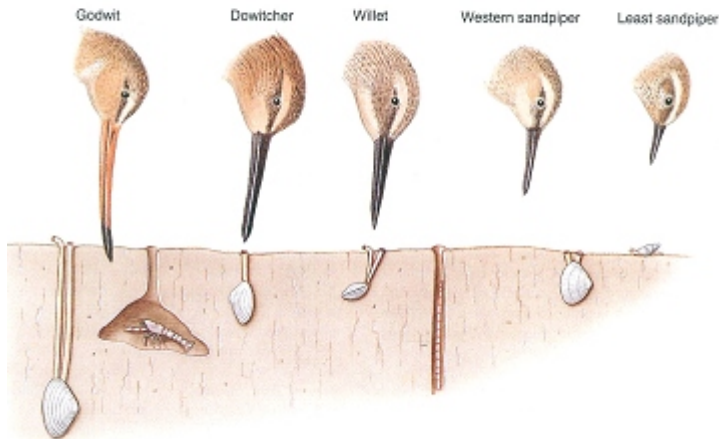


16. List two organisms in Phylum Chlorophyta that are found on the mud flats of estuaries.

Sea felt (*Enteromorpha*) and sea lettuce

17. Shorebirds are found at very high densities in estuaries. What are some physical features of shore birds that helps prevent them from competing for the same food resources? Why are estuaries important habitats for shorebirds?

Birds: Length of bill determines depth of penetration in the mud: Resource Partitioning



Estuaries are resting and feeding areas for migratory birds

Red Arrows: Fly from Arctic to South America during the Northern Hemisphere Winter

Green Arrows: Fly from South America to Breeding Areas in The Arctic during the Northern Hemisphere Summer

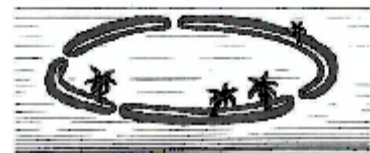
19. Matching:

- I ___ a. Mud shrimps
- V ___ b. Birds
- III ___ c. Black muds
- I ___ d. Clams
- IV ___ e. Tardigrades
- I ___ f. Sand Crabs
- IV ___ g. Kinorhynchs
- I ___ h. Ghost Shrimps
- V ___ i. Moon Snail
- I ___ j. Sand Dollars
- III ___ k. Rotten Egg Smell
- VI ___ l. Benthic Diatoms
- VI ___ m. Sea Lettuce
- II ___ n. Sea Cucumber

- I. Animals that burrow
- II. Deposit Feeders
- III. Hydrogen Sulfide
- IV. Meiofauna
- V. Predators
- VI. Primary Production

20. The diagram on the right shows three types of coral reefs.

- A. The top drawing is a ? Fringing reef
- B. The middle drawing is a/an? Barrier reef
- C. The bottom drawing is a/an? Atoll



21. List two toxic organisms that can be found on the reef flat.

Cone snail and stone fish

22. What are three physical conditions required for the formation of coral reefs? Why are these conditions necessary for reef formation?

Warm water, shallow water, and clear nutrient poor water

23. Corals belong to Phylum _____, Class _____. How does this class differ from other classes within the phylum?

24. What do corals feed on? Zooplankton - thus they are carnivores

25. Describe the relationship between corals and zooxanthellae. What is coral bleaching?

26. **Matching**

- | | | | |
|-----------|---|-------|--------------|
| II___a. | Herbivorous Gardeners | I. | Anemone Fish |
| V___b. | Important to beach formation | II. | Damsel Fish |
| V___c. | Eat Zooxanthellae within coral | III. | Eel |
| VI___d. | Toxic ambush predator | IV. | Lion Fish |
| VII___e. | Water column stalker | V. | Parrot Fish |
| III___f. | Crevice feeder | VI. | Stone Fish |
| I___g. | Mutualistic relationship with Cnidarian | VII. | Trumpet Fish |
| VIII___h. | Sets up cleaning stations | VIII. | Wrasse |

27. What are 5 threats to coral reef ecosystems?
- A. Over fishing: Removal of herbivorous fish results in algal bloom on the reef which kills the corals
 - B. Tourist and gift trade
 - C. Global warming - High water temperatures stress the corals and cause them to expel their zooxanthellae. This is called **coral bleaching**.
 - D. Pollution
 - E. The aquarium trade - cyanide, explosives

28. List 4 characteristics of the epipelagic zone.

Lit by sunlight, enough light for photosynthesis, lack of habitat diversity, and vast expanses of nutrient poor water

29. List three characteristics of the mesopelagic zone

The twilight zone (lit only by dim light), not enough light for photosynthesis, many animals in this zone are bioluminescent.

30. Why do a number of mesopelagic organisms migrate to the surface at night and then migrate down to deeper region during the day?

There is more food near the surface. There are also more predators near the surface. The animals migrate to the surface at night to feed and then move down to the mesopelagic zone at dawn to avoid predators.

31. Give two examples of phytoplankton, zooplankton, and nekton that are found in the epipelagic zone.

Phytoplankton

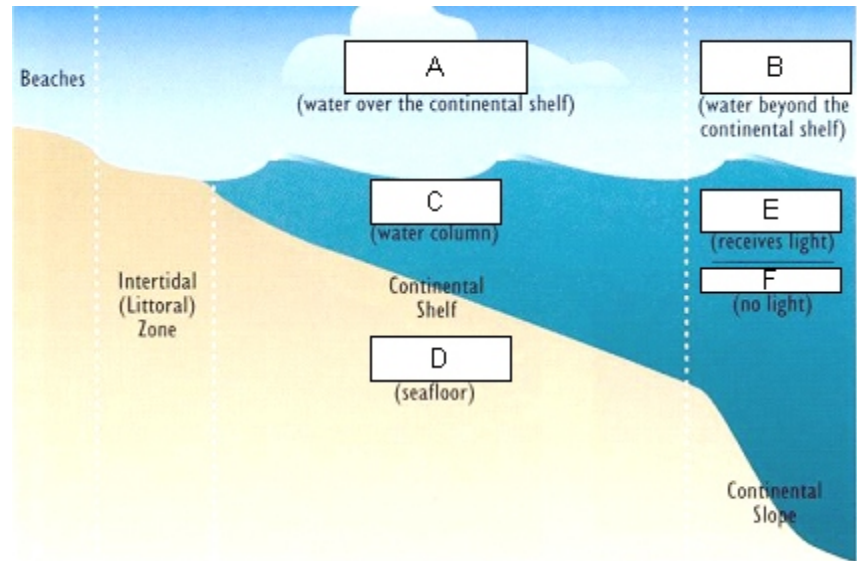
Zooplankton

Nekton

See my online power point quiz for examples of epipelagic organisms.

33. Identify regions A - F on the diagram below:

- A. Neritic Province
- B. Oceanic Province
- C. Pelagic Zone
- D. Benthic Zone
- E. Photic Zone
- F. Aphotic Zone



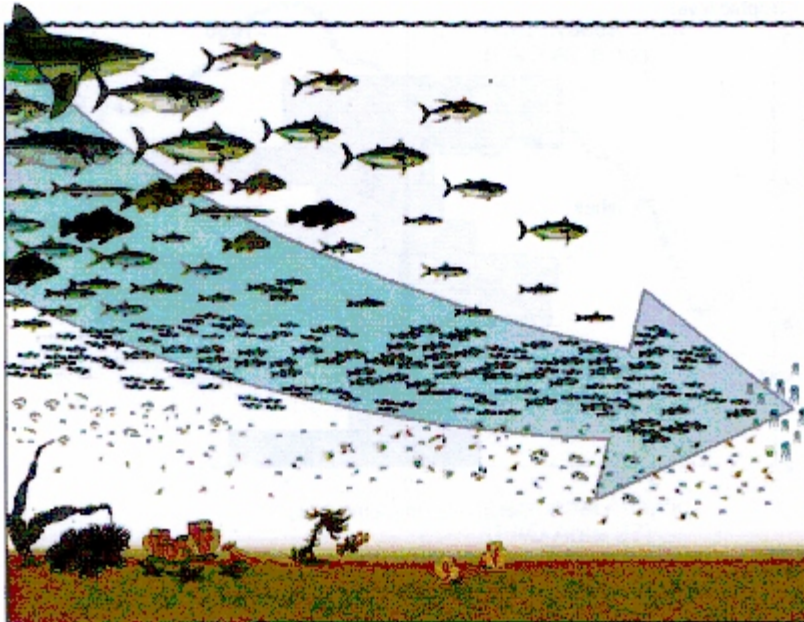
42. List three structural or behavior features of anchovy, herring, and other clupeoid fish that explain why they account for such a large portion of the world fish catch.

- Clupeoid fishes are plankton feeding fishes such as anchovies and sardines. Since they are small, and feed at low trophic levels, they are abundant and account for the largest catches in the world.
- Most of these fish are not used directly for food but are converted to fish meal and fish oil.

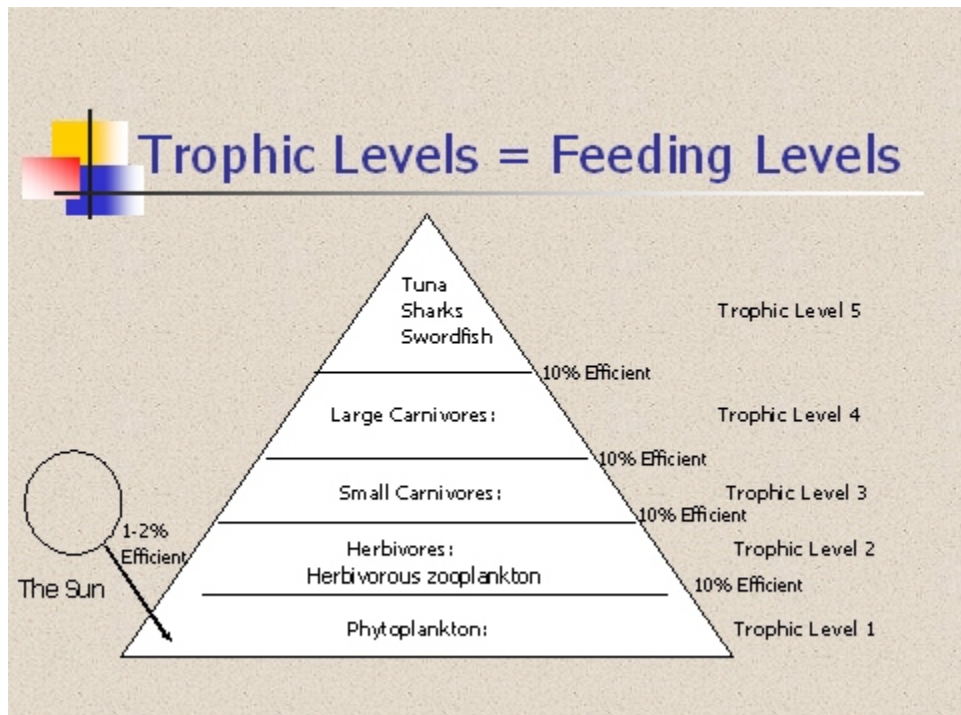
44. Why are oil spills so harmful to marine mammals and birds?

- Mammals and birds use fur and feathers for insulation. Fur/ feathers traps air to increase the boundary layer around and animal and reduces heat loss. Oil destroys the ability of fur/feathers to trap air. Thus oiled birds and mammals suffer extreme drops in body temperature die of hypothermia.

48. What is meant by “Fishing Down The Food Web”?



Fishing down marine food webs means that fisheries (blue arrow), having first removed the larger fishes at the top of the food chain, must target fishes at lower and lower trophic levels. They ultimately end up targeting very small fishes and plankton, including jellyfish.



49. What are two consequences of fishing down the food web?

- Decreased species diversity and loss of stability
- The largest fishes are able to produce the greatest number of eggs. When the largest fishes are removed reproductive output declines

50. Most fish are at what trophic level? Trophic levels 2 and 3

Fishing Down The Food Web

