

Part 5

Birds

and animals

around the lagoons

Signs of animal life:

Many animals are **nocturnal**; they only come out at night to feed. Others are crepuscular, feeding at dusk. You have to be a careful detective to observe clues of animal life:

1. Animal tracks

Footprints in mud or soil

2. Scat:

Animal droppings

Rabbit pellets are abundant.

3. Nests or holes in the ground:

Animal homes

4. Animal coverings:

Fur, feathers, shells, or snake sheds

Crabs shed their exoskeleton as they grow.

5. Broken nuts or seeds:

Signs of an animal's meal

6. Bones or dead animals:

Signs of a struggle or illness

7. Raptor pellets:

Owls, hawks and eagles swallow their prey whole, then regurgitate a pellet of indigestible fur and bones

Animal Tracks

Coyote



Bobcat



Raccoon



Rabbit



Mallard Duck



Sandpiper



Ground squirrel



Deer



What animals live around the lagoon?

The lagoon and surrounding coastal sage scrub provide homes for a wide diversity of animals.

Invertebrates: fiddler crab clam & mussel grass shrimp bay shore crab horn snail sea hare	Insects: dragonfly wasp spittlebug bee ant darkling beetle
Large mammals: coyote bobcat gray fox mule deer	Smaller mammals: raccoon opossum rabbit ground squirrel wood rat
Fish: topsmelt mullet pacific herring smoothhound shark turbot halibut	Birds: red-tailed hawk coot mallard great blue heron tern swallow
Reptiles: California whipsnake garter snake rattlesnake Western fence lizard orange-throated whiptail	Amphibians: horned toad Western toad southwestern arroyo toad

Biodiversity around the Lagoon

There is an incredible diversity of animal life in the lagoon area.

Classify the animals below into the following categories:

Vertebrates (animals with backbones)

Invertebrates (animals without backbones)

Mollusks are soft-bodied, and may have a shell, e.g. mussels.

Crustaceans are joint-legged, with an exoskeleton, e.g. lobsters.

Invertebrates		
Crustacean	Mollusk	Insect

Vertebrates		
Mammal	Bird	Fish
Reptile		Amphibian

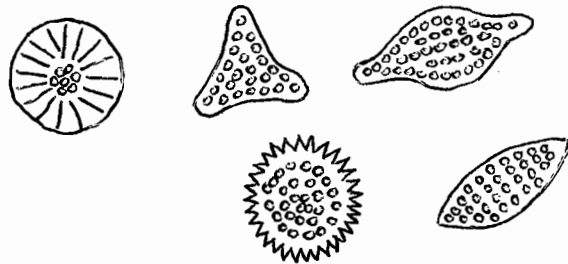
fox	heron	snake	lizard
egret	blackbird	pipefish	goby
halibut	raccoon	coyote	toad
crab	shrimp	dragonfly	snail
clam	butterfly	frog	

A Microscopic Menagerie

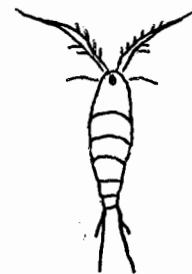
Tiny specks of life drift through the waters of the lagoons. Too small to be seen with your eye, these floating plants and animals form the basis of ocean food chains, eaten by small fish, clams and even some whales.

The simplest are **phytoplankton**, or microscopic algae. Each of these single-celled plants contains green chlorophyll, which lets them use the sun's energy to make food. A waste product of photosynthesis is oxygen gas, essential to life on earth. Half of the oxygen we breathe may be produced by phytoplankton.

Though simple, phytoplankton show amazing properties. Some have whip-like flagella that allow them to move around. Some produce their own light (bioluminescence). Some bloom to produce red tides in the ocean. Others, the diatoms, are protected by a silica shell, like miniature glass greenhouses. They can exhibit remarkable shapes, with protruding spines.

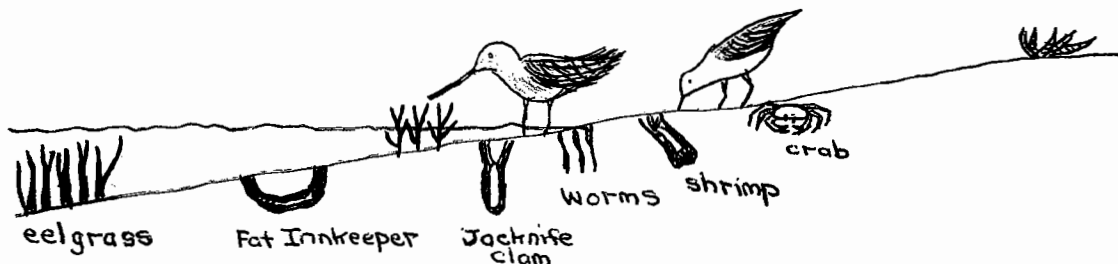


Microscopic animals, **zooplankton**, feed upon phytoplankton. Most of these tiny animals float with the current, though some can propel themselves. They may have tiny hair-like cilia to draw water and food toward their mouth. Larger plankton include the juvenile forms of sea animals such as crabs, lobsters and starfish. Tiny crustaceans, such as copepods and krill, swim freely through the water, feeding on plankton.



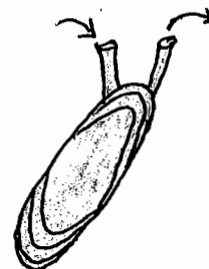
What lives in the mud?

Numerous invertebrates, such as clams, crabs, worms and shrimp live in the intertidal mudflats. Eaten by wading birds, fish and mammals, they are an important link in wetland food chains. Shorebirds have elongated bills perfectly suited to reach invertebrates in their mud tunnels.



Mud creatures have adapted to survive extreme changes in temperature, salinity and water level, as ocean tides ebb and flow. They are alternately baked by the sun's heat at low tide, then flooded at high tide. Clams and snails resist drying out by burrowing into the mud, sealing their shells tightly shut.

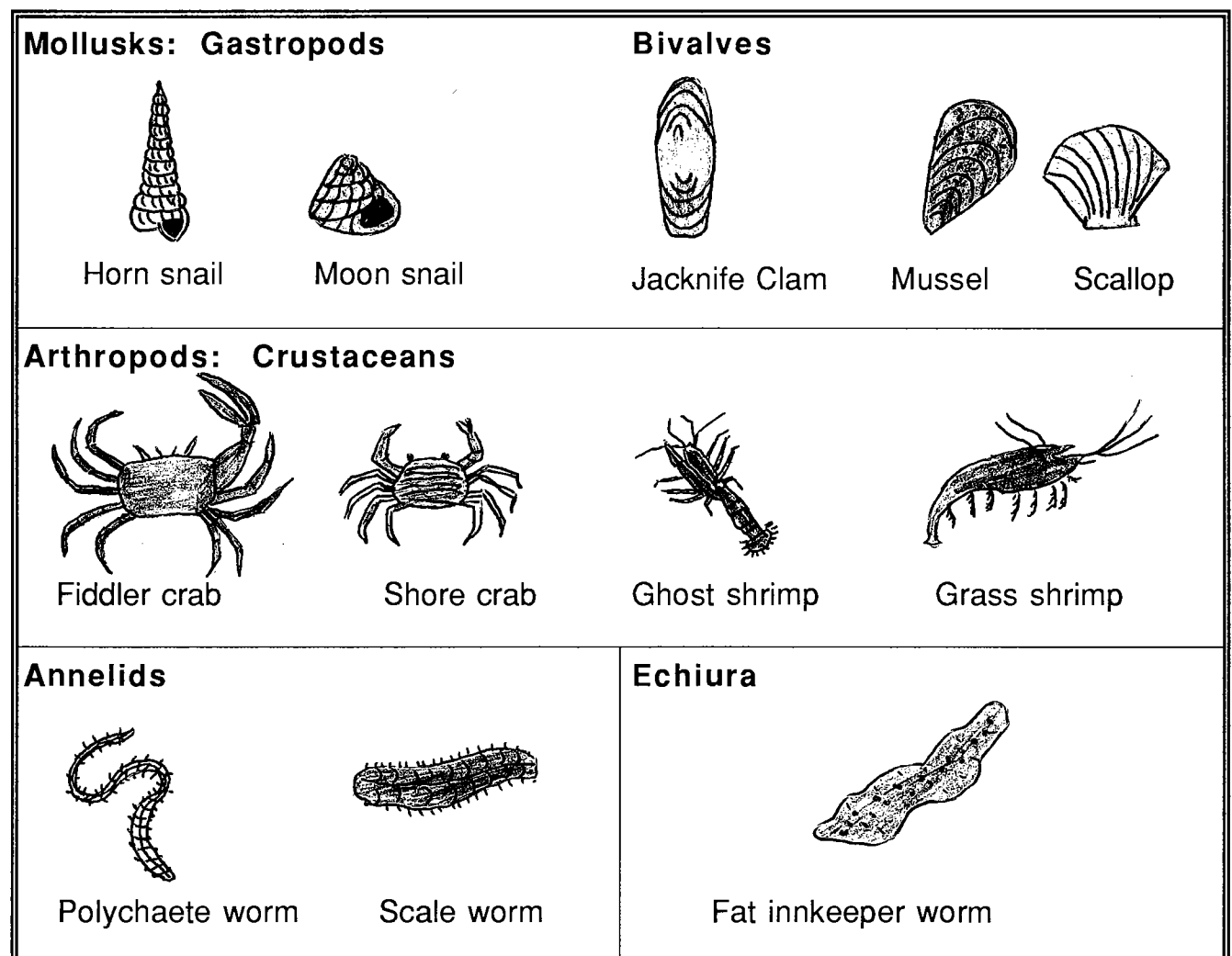
Ocean tides bring food to **filter feeders**, such as clams, which extract nutrients from water. Clams draw water into a tube called a siphon; their gills extract food particles, then water and wastes are forced out through a second siphon.



Snails are predators, feeding on clams. A snail uses a toothed tongue called a radula to drill a hole into a clam shell. Then the snail sucks up the clam's soft insides.

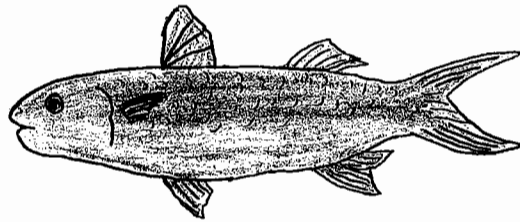
Bottom-dwelling worms aren't picky eaters. They ingest large amounts of mud, from which their digestive system extracts nutrients from decaying matter. This action churns the bottom sediments and enriches mud in the lagoon.

Each invertebrate has a specialized way of obtaining food. After burrowing as deep as 1 or 2 feet into the mud, the nearly transparent ghost shrimp has tiny claws on its legs to capture plankton or algae from the nutrient-rich water. Similarly, a fiddler crab sifts through mud with its claws to find food. Males have one enlarged claw. Useless for feeding; it serves to attract females or drive off other males.



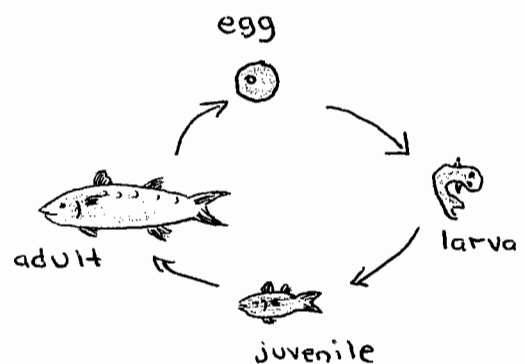
Fish of the lagoons

Walking along the lagoon shore, you may observe fish leaping from the water. These fish are most likely mullet. Mullet are bottom feeders, and may jump to clear their gills of silt or algae. Jumping may also increase oxygen in their body; biologists have observed that mullet jump more frequently from waters with lower oxygen levels.



Coastal estuaries serve as nurseries for many fish; juveniles seek these shallow, sheltered waters with abundant food. Striped Mullet live along the coast, and their young thrive in the lagoons.

Mullet often travel in large schools. To spawn, mullet migrate to deeper ocean water, where females lay thousands of eggs, fertilized externally by males. These jelly-like eggs attach to plants. Eggs hatch within two days, and millimeter-sized larvae emerge. Larvae feed on plankton. As they grow, larvae move toward shallow estuaries and lagoons.



Mullet feed by sucking algae and decaying plant matter from bottom sediments. While feeding, they also swallow sand, which helps grind food in their stomach. Full-grown Mullet may be as large as 47 inches, weighing up to 18 pounds. They may live to be 16 years old.

A Fish with a Migrating Eye

The larvae and juveniles of California halibut also shelter within shallow estuary waters. After hatching, halibut larvae look like normal fish, with one eye on each side of their head. These swimming larvae feed on floating plankton. Within two weeks, one eye begins to move across the head, until both eyes are on the same side. This allows the flat-fish to bury itself in sand, and use both eyes for spotting prey.

California halibut have sharp teeth that allows them to feed on squid or small fish, such as anchovies.

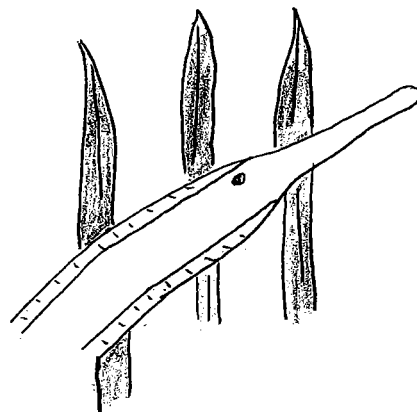
Halibut can grow as long as 5 feet in a life that may span 30 years.



A Fish Father Gives Birth

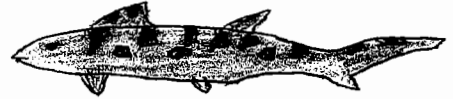
Relatives of the Seahorse, Pipefish have an unusual way of reproducing. Females deposit a couple hundred eggs into the male's brood pouch. The male incubates the eggs for about two weeks, then gives birth to larvae.

Pencil-thin, these tubular fish are well camouflaged among beds of eelgrass, where they lie in wait, until a shrimp swims by. The pipefish has no teeth, but uses its elongated snout to suck up the shrimp, and swallow it whole. Pipefish can grow 6 to 13 inches in length.



Sharks and Rays

The largest fish in the lagoons are sharks, growing up to seven feet long. These predators include Smoothhound and Leopard sharks that feed upon fish, crabs and shrimp. The Leopard shark has a distinctive pattern of leopard-like spots that help to camouflage the shark.

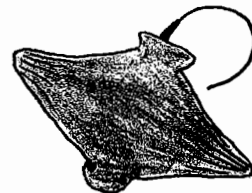


Sharks differ from fish in having flexible skeletons made of cartilage, not bone. While some lay eggs, most shark species give birth to live young. Fish take oxygen from water through a single gill opening on each side; sharks have five to seven gills.

Comparing Fish and Sharks

	Fish	Sharks
Skeleton	Made of bone	Made of flexible cartilage
Gill openings	One gill on each side	5 to 7 gills on each side
Skin	Covered with scales	Covered with tiny teeth, called denticles
Reproduction	Young hatch from eggs.	Some lay eggs. Most give birth to live babies.
Teeth	Single row of teeth	Multiple rows of teeth

Rays are related to sharks, and also give birth to live young. Bat rays and sting rays feed along the bottoms of the lagoons, seeking crabs, clams and worms. They have specialized grinding teeth to crush the shells of crustaceans and clams. Bat rays can reach sizes up to four feet, and can weigh over 100 pounds.

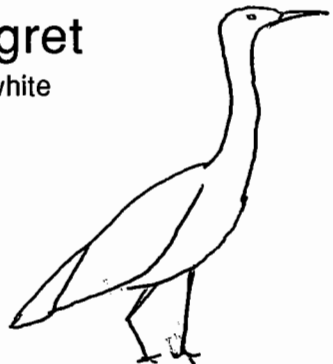


Birds around the lagoon

Some birds live year-round in the lagoon; others pass through during annual migrations, seeking food and refuge. The **Pacific Flyway** is network of wetlands along the coastline, used by birds for migration.

Great egret

Long-necked white wading bird.



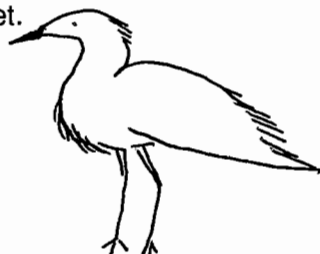
Great blue heron

Large gray-blue wading bird.



Snowy egret

Smaller white wading bird.
Black legs with yellow feet.



Mallard

Males have a green head.



Western Sandpiper

Small shorebird, brownish with spots below.



American avocet

Brown head during breeding season. Black & white feathers.
Long slender bill.



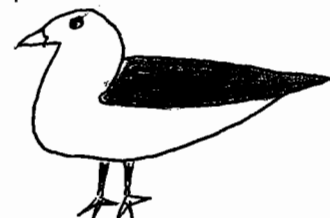
Western grebe

Black head with long yellow bill.



Western gull

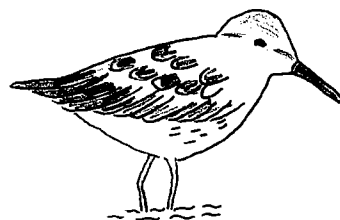
White head with gray wings;
yellow bill with red spot.



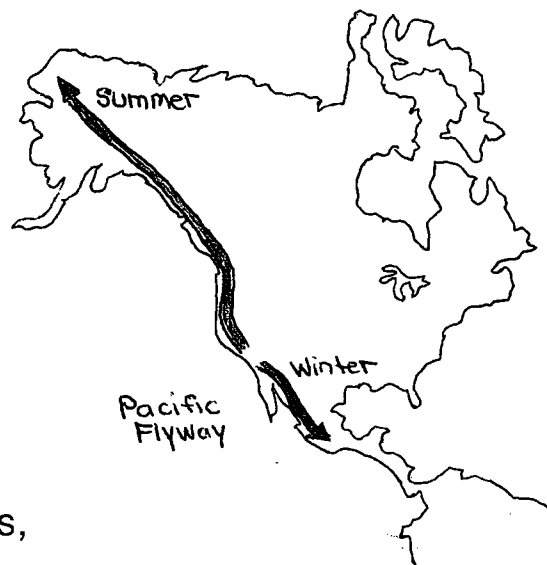
Why do birds migrate?

Each year, millions of birds make an extraordinary journey of several thousand miles, flying from as far as the Arctic down to Mexico. These birds respond to the seasons by instinct, sensing changes in temperature and sunlight. Along their way, birds must be able to find frequent stops for rest, food and shelter. This is exactly what wetlands have to offer.

One shorebird, the Western Sandpiper, nests on the ground, along the tundras of northern Alaska. Here, the long days of summer sunlight allow them to find abundant insects, invertebrates and fish. Females lay eggs, leaving the males to raise the young. The birds must eat well, storing energy as layers of fat that will fuel them through their long journey.



As autumn approaches, the shortening days, cooler temperatures and decreased sources of food prick a restlessness that drives the birds to head south. The sandpipers fly south along the Pacific coast, stopping regularly along a chain of wetlands, bays, lakes, and lagoons. Landing, they wade in shallow water and mudflats, poking their bills into soft mud, seeking worms, crabs or insects.



The sandpipers may spend the winter in San Diego, or further south in Mexico or Central America. When the days grow longer, they will head north again. An ancient journey repeated year after year.

Bird Adaptations

Birds have a wide variety of bills and feet for eating different types of food. Ducks have webbed feet for swimming, raptors have razor-sharp talons for puncturing flesh, while shorebirds have long legs for wading into shallow water.

Birds have bills specialized for the type of food they eat:

Spearing fish



Great Blue Heron

Cracking seeds



House Finch

Capturing insects



Flycatcher

Sipping nectar



Anna's Hummingbird

Probing deeply in mud
for worms



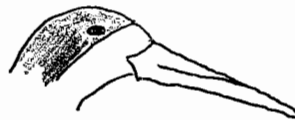
Godwit

Ripping flesh



Red-tailed Hawk

Catching fish



Black Skimmer

Collecting tiny invertebrates
below the surface of water



American Avocet

Identifying Birds: What are they doing?

Type of bird	What are they doing?	Examples
Shorebirds	Running along mudflats, probing in mud	Sandpiper, Avocet
Large waders	Wading in shallow waters	Great egret, Great blue heron
Birds of prey	Soaring over lagoons to hunt	Red-tailed hawk, Osprey
Waterfowl	Swimming on surface, diving underwater	Grebe, Cormorant
Dabbling ducks	Swimming on surface, poking head underwater	Mallard duck, American wigeon, Northern pintail
Plunge divers	Flying over lagoon, diving headfirst into water to fish	Tern, gull, Black skimmer, Pelican
Song birds	Hiding in bushes or marsh grasses	Sparrow, Black phoebe

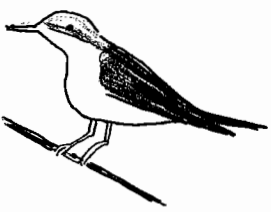
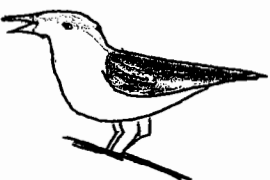
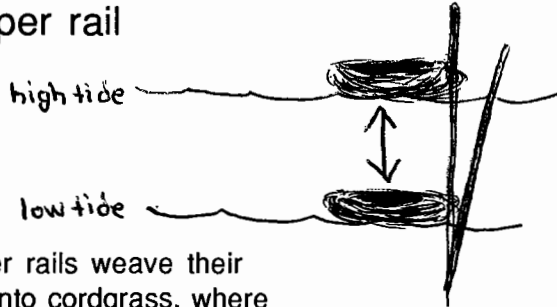

Threatened Wildlife

The lagoons host many species which are rare or threatened; many may be unable to survive elsewhere.

The major threat to wildlife is loss of habitat, as cities and roads encroach upon wild areas. Other threats come from pesticides, insecticides or pollution.



There are some success stories. The Brown Pelican was endangered in the 1960's, due to the presence of the pesticide DDT in the food chain. DDT causes a weakening of the egg shell, so fewer chicks survived. After DDT was prohibited, pelican populations have increased.

<p>California gnatcatcher</p> 	<p>Least Bell's vireo</p> 
<p>Clapper rail</p>  <p>high tide</p> <p>low tide</p> <p>Clapper rails weave their nests into cordgrass, where they rise and fall with the tide.</p>	<p>Western snowy plover</p> 

Cordgrass only grows in a healthy salt marsh. If the salt marsh is destroyed, cordgrass dies, and clapper rails suffer.

What links the animals in the lagoon?

A **Food chain** is a link between plants and animals showing energy passed as animals eat plants, and animals eat others.

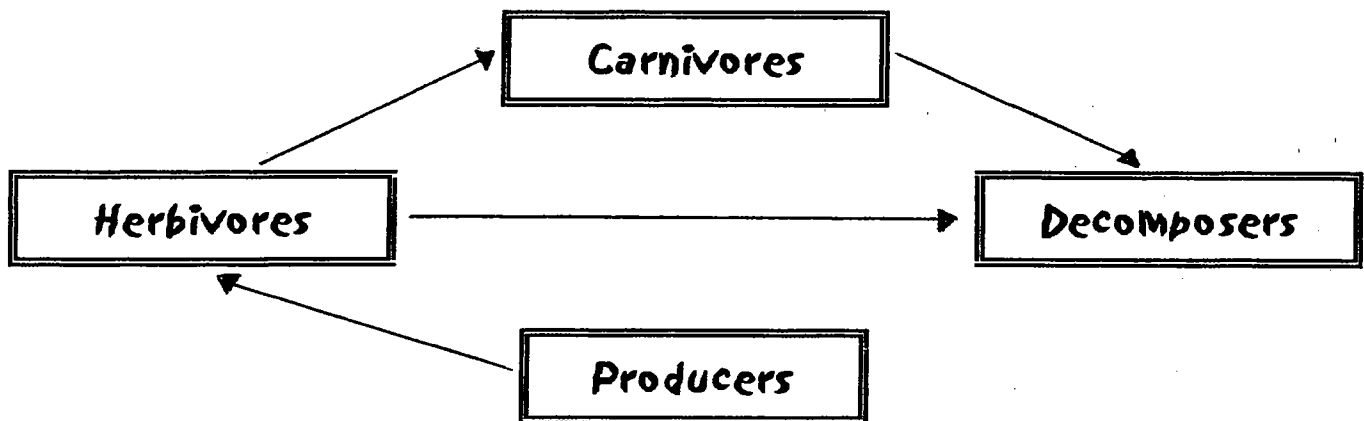
Producers: plants produce their own food. Photosynthesis allows plants to take energy from the sun to form sugars.

Herbivores: Animals that eat plants. First-order consumers.

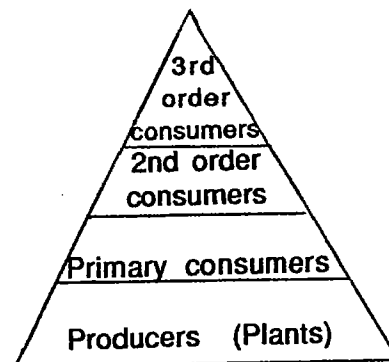
Carnivores: Animals that eat meat. Second or third-order consumers.

Decomposers: bacteria and fungi that break down dead, decaying material (**detritus**), returning nutrients to the soil .

Scavengers: animals that feed upon dead animals.

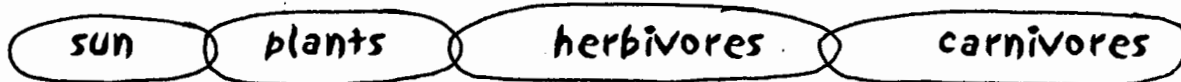


An ecosystem supports a large number of producers to provide energy to a smaller number of primary consumers, then an even smaller number of second or third-order consumers.

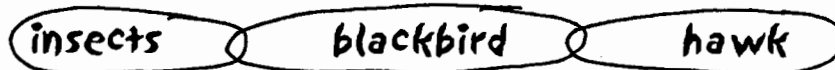
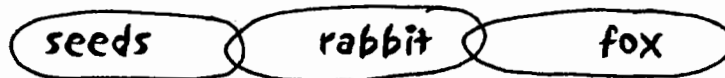


Food Chains around the Lagoon

A food chain shows the transfer of energy within an ecosystem. All food chains begin with energy from the sun. The sun provides energy to plants (producers), eaten by herbivores (primary consumers), in turn eaten by carnivores (secondary consumers).



Sample food chains include:

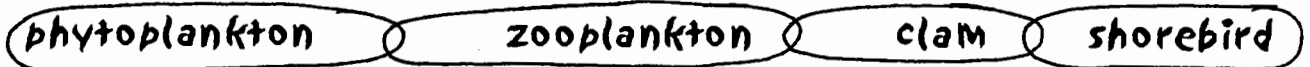


Food chains can involve both land and water.

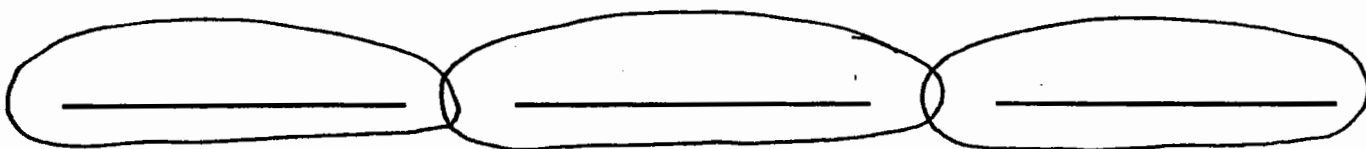
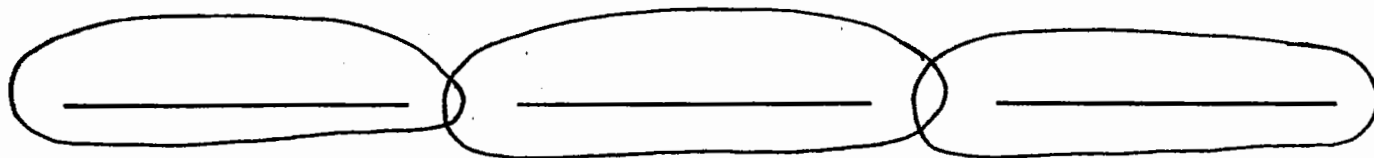
Plankton are tiny plants or animals floating in the water.

Tiny plants (phytoplankton) are producers.

Tiny animals (zooplankton) are consumers.

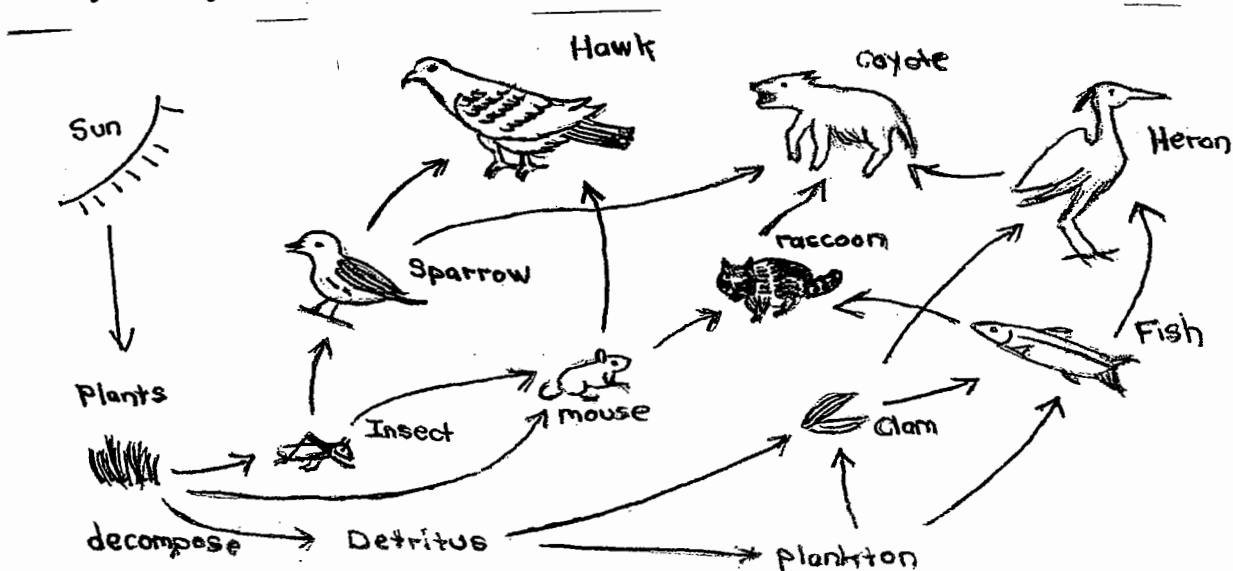


Write your own food chains:



Detritus is dead or decaying matter, broken down by bacteria into nutrients which can be used by plants and animals. Detritus is an important link in many wetland food chains. Cordgrass, which grows abundantly along the edges of the marsh, is inedible to most animals. However, it decays to detritus to enrich the marsh.

Food chains are not usually as simple as those illustrated, but more complicated, interconnected **food webs**. Food webs show how each animal depends on the survival of other animals. Imagine if one animal, such as the crab, were removed from the ecosystem. Its effects would be felt by many other creatures.



Make a Food Chain:

Cut the links below. Roll each into a ring to make three sets of overlapping chains.

Fox

Hawk

Coyote

Ground squirrel

Mouse

Rabbit

Berries

Flowers

Seeds