

Habitat Readings

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Habitat Illustration Note: The habitat illustrations are general and do not represent all the plant and animal species found in each habitat.

As students learn more about these habitats, they can draw in new species and habitat differences. Students could also explore a local wetland or grassland and add the plants and animals they find.



What Is a Wetland?

What do you think of when you hear the word *wetland*? Do you picture mud squishing between your toes, mosquitoes buzzing in your ear, or a good place to catch a frog? What kind of plants do you think of--trees, grass, or something in between?

To understand a wetland, break the word in two. A wetland is both wet and land! Wetlands are places where water and land meet. Here, plants are adapted to wet, soggy conditions. Wetlands are usually found in the area between deep water (a lake, pond, river, or ocean) and dry land. Wetlands are low spots within a *watershed* where water collects. If the water is too deep for plants to grow (more than six feet deep), then wetland scientists call these areas deep-water habitats. If the land is too dry for wetland plants to grow, then it is called upland.

What Makes a Wetland

Wetlands are all about water. *Hydro* is the Latin word for water, and it can be found in the scientific words that describe wetlands. Can you find the water (hydro) in the following description? (Hint: Look at the words in the parentheses). All wetlands have: 1) water (*hydrology*), 2) wet (*hydric*) soils, and 3) water-loving plants (*hydrophytic* vegetation).

Water

Wetlands get their water in several different ways, including rain water and runoff from higher ground, groundwater coming to the surface from deep underground, and flooding from nearby rivers, streams or ocean tides. Some wetland may be wet all the time, such as estuaries. Other wetlands may only be wet for short periods of time like prairie potholes. Wetlands, whether wet temporarily or year-round, provide vital habitat for plants and wildlife.

Soil

The way a wetland soil looks and feels indicates its watery surroundings. Dig up a small amount of soil in a wetland, and it will either be wet (dripping water off the end of your shovel) or saturated. Saturated soils will drip if you squeeze them tightly in your hand. Wetland soil is dark brown or black near the surface and shades of gray deeper down (a foot or two). Rub the soil between your fingers, and it will feel either slick or sticky. Slick means the soil is rich in decaying plant matter or silt (fine inorganic material that settled out from flood waters). Sticky means the soil has a lot of clay in it. These soils hold lots of water and will not dry very fast. Some of the soils will smell like rotten eggs. Then you know you are in a really wet wetland!

Plants

Wetland plants have special adaptations to grow in wetland soil. Some plants, such as water lilies and bald cypress trees, grow in shallow water. Others, like cottonwood trees and many grasses, grow in wetlands where the water is visible for only part of the year. Wetland plant names can sometimes give you a hint that they grow in wet places--swamp rose, pondweed, duck potato, alligator weed, river birch, water lily, northern bog orchid, salt marsh cordgrass, sea lavender, and marsh fern.

Many Types of Wetlands

There are many different types of wetlands, and they come in all sizes. Wetlands can be as small as your bedroom or as large as the Florida Everglades which originally covered 2.3 million acres!

Freshwater marshes are the type of wetland most people think of first when someone says "wetland." They mainly have herbaceous

(non-woody) plants such as cattails growing up out of the water. These plants are called emergents. Many other types of wetlands have trees growing in them and are called forested wetlands. Swamps are a type of forested wetland. All wetlands with fresh water are in a group called *palustrine* wetlands. All wetlands with a mixture of fresh and salt water are in a group called *estuarine* wetlands.

Are There Wetlands Near You?

To find your closest wetland, first look on a map for the nearest water source. Maps will show you creeks, streams, rivers, oceans, ponds, and lakes. Some maps even have little symbols that show wetland areas. Once you have found your closest water source on the map, go out to that area and look around. Where is the ground soggy? What kinds of plants are growing there? What does the soil look, feel, and smell like? If you have water, wet soil, and water-loving plants, then you have found a wetland!



What Is Grassland?

What do you think of when you hear the word *grassland*? Do you picture grasses rolling like waves, tossed by a brisk wind? Do you see herds of bison grazing under an almost endless blue sky? Do you feel the sun beating down on you as grasshoppers buzz around your head?

Grasslands were once a vast *ecosystem* that covered much of the central and western part of the United States. Large herds of bison roamed and grazed freely. Huge colonies of prairie dogs dug through the soil, making it easier for grasses and wildflowers to sprout and grow. These creatures and the others living in the grasslands were adapted to extreme climates—cold, hard winters and blazingly hot summers. Great floods often followed droughts that dragged on for years. Wildfire, sparked by intense storms, killed the bushes and shrubs that threatened to take over the open grassland, but the deeply rooted grasses quickly grew back.

What Makes a Grassland

Just as the name suggests, grasslands are mostly made up of grass, but not the kind you find outside your front door. Big Bluestem, one of the tallest grassland grasses, grows over six feet tall and could easily hide a man on horseback. There are three types of grasslands, each named for the height of the grasses found there.

Plants

Tallgrass prairies are the wettest and run through the center of North America. They are dominated by big bluestem, little bluestem, Indian grass, switchgrass, prairie cordgrass, and wheat grass.

The *short-grass prairie* is the driest and most westerly type of

grassland, stretching east and south from the Rocky Mountains. Here you find mainly buffalo grass along with some blue grama grass, needle grass, and wheatgrass.

In between these two types of grasslands—in part of the Dakotas, south to northern Texas, and through parts of Oklahoma, Kansas, and Nebraska—the plants of the tall- and short-grass prairies mix. The *mixed grass prairie* is where you find the most plant and animal diversity.

Water

While it may seem that there is little water in grasslands, the area is dotted with shallow, temporary wetlands. These areas provide vital water and habitat for many grassland songbirds, shorebirds, and waterfowl and drinking areas for prairie mammals.

Soil

Grassland soils are dark and rich with humus (dead and decaying plant material). It was fertile soil for farming. Farmers quickly learned how to break down through the dense carpet of grass roots with their plows. The majority of prairie grasslands are now farmed.

Grasslands Today

Many of the original grasslands and temporary wetlands have disappeared today. Some states have lost over 99 percent of their tall-grass prairies. Among North American birds, grassland birds have shown the steepest population declines of any bird group and are now considered the highest conservation priority. These important ecosystems have been replaced by the needs of a growing population for development and farming. As a result, many species are doing their best to adapt to the changing habitat conditions. American Golden-Plovers and

Buff-breasted Sandpipers now use agricultural fields, highly grazed pastures, and burned fields that mimic their natural habitat. It is good they are adapting, but they are now exposed to new threats such as pesticides. Nesting shorebirds like the Mountain Plover are threatened by mowing during their breeding season. Biologists are investigating what long-term impacts these habitat changes may have on prairie-dependent species. They are also looking for ways to promote good land stewardship that will benefit landowners and shorebirds. There are many organizations working to conserve this ecosystem for the good of all species.

Are There Grasslands in Your Backyard?

Finding true grassland in your neighborhood may be harder than you think. Of all the grassland habitat that once stretched across the United States, less than 1 percent is left today. Most of the prairie we still have is missing some of the very elements that made it true grassland: bison and prairie dogs. Was your state part of the grassland ecosystem? How much is left today?

Stream and River Corridors

In many parts of the world, wetlands undergo a natural change with the seasons. In the spring, snow and ice melts in the mountains. This melt water rushes downstream causing streams and rivers to overflow their banks and fill nearby lowlands. Sometimes this seasonal flooding makes it all the way to *estuaries* where fresh and saltwater meet the sea.

This melt water carries *nutrients* that fertilize the plants growing alongside streams and rivers. These plants provide food for many different kinds of *zooplankton*, *invertebrates*, insects, and insect larvae, which are, in turn, food for the area's fish, mammals, and birds.

Inland stream and river corridors (also called riparian habitat) are good wetland habitat for shorebirds in the spring. Shorebirds, like the Solitary and Spotted Sandpiper and Yellowlegs, stop on their northward migration to *breeding grounds* south of the Arctic to probe in the mud for snails, worms, and insect larvae.

From July to September, depending on where you live, the spring melt water has all run downstream and soon the water levels drop. The plants and animals that live along these river corridors must be adapted to survive a couple of months of dry conditions. Eventually, fall rains come and the rivers and streams rise and flood the lowlands once more before winter. Is there a river near where you live? Look carefully for shorebirds and other birds using the banks of streams and rivers.

Looking at the illustration, list the names of the plants and animals you recognize that live in the stream and river corridor habitat. Some of these might not be found in your area. What other species of wildlife might you expect to see in your area of the country?



Stream and River Corridors

(Source of illustration: *Wetlands and Wildlife*)



Tundra

The *tundra* is a vast, treeless land found in northern and western Alaska and northern Canada. Here it is very cold in the winter, cool in the summer, and the wind almost always blows. Because of the cold and the wind, no trees grow on the tundra. Plants that do survive here grow very close to the ground where it is warmer.

Many people think that the tundra is flat. In fact, the tundra is made up of lots of little mounds of grasses and sedges that grow together like little cushions in the hard, cold ground. Low spots are wet, or even filled with water, and form little ponds or lakes that make the ground squishy. Even where it looks high and dry, it often is not.

Although very little rain or snow falls here each year the tundra always feels wet. This is because permanently frozen ground lies just under a thin layer of topsoil. This permafrost does not allow rain or snow to drain away, so moisture continues to collect on or near the surface of the tundra all year. The *permafrost* does not thaw even in summer.

Permafrost changes the way tundra plants grow. Because the ground is hard and frozen, plant roots, like those of the Dwarf Willow, grow sideways (prostrate) instead of straight down. Centuries of decaying vegetation have produced a thick, spongy layer of organic material called *peat*.

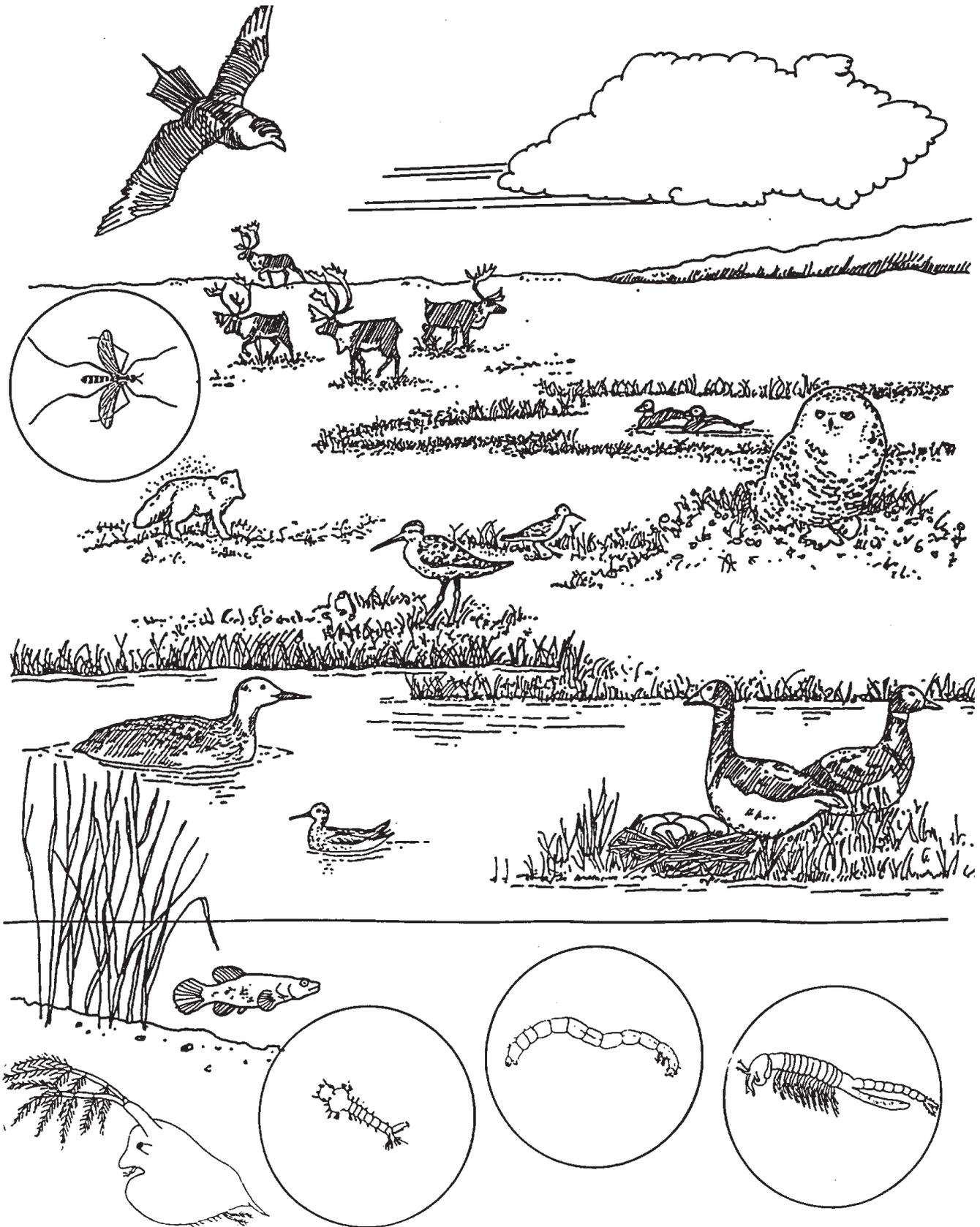
Fungi and lichens are very important tundra organisms that grow across the tundra and provide food to herds of caribou. Berry-producing plants like cloudberry and bearberry also provide food to tundra wildlife. Millions of shorebirds nest each year on the tundra. They feed on the billions of larvae, hatching insects, and on aquatic prey like copepods and fairy shrimp that appear each summer.

Looking at the illustration, list the names of the plants and animals you recognize that live in the tundra habitat.



Tundra

(Source of illustration: Wetlands and Wildlife)



Saltwater Marsh Habitat

Saltwater marshes are open, wet, treeless, grassy wetlands. They may be found along ocean coasts or inland. The rocks and soils of inland saltwater marshes are naturally high in salt. There are also inland salt lakes such as the Great Salt Lake in Utah. Coastal saltwater marshes are fed by the rise and lowering of the salty ocean tide.

Most coastal saltwater marshes are near *estuaries*, areas where salt water mixes with freshwater, such as where a river meets the ocean. A salt marsh is a transition habitat found between the water and dry land of the estuary. Tidal flooding causes the soils here to become very salty, making it difficult for most plants to grow.

Some plants have adapted to these high levels of salt. They are called *halophytes*, meaning “salt loving.” Because these plants spend so much of their energy trying to get rid of the salt in their cells and drawing water into their roots, they are not able to grow very large. They tend to be short with smaller leaves than plants found in freshwater marshes. Plants of the salt marsh grow in zones, depending on the amount of flooding they can tolerate. Here are some common zones in North American saltmarshes:

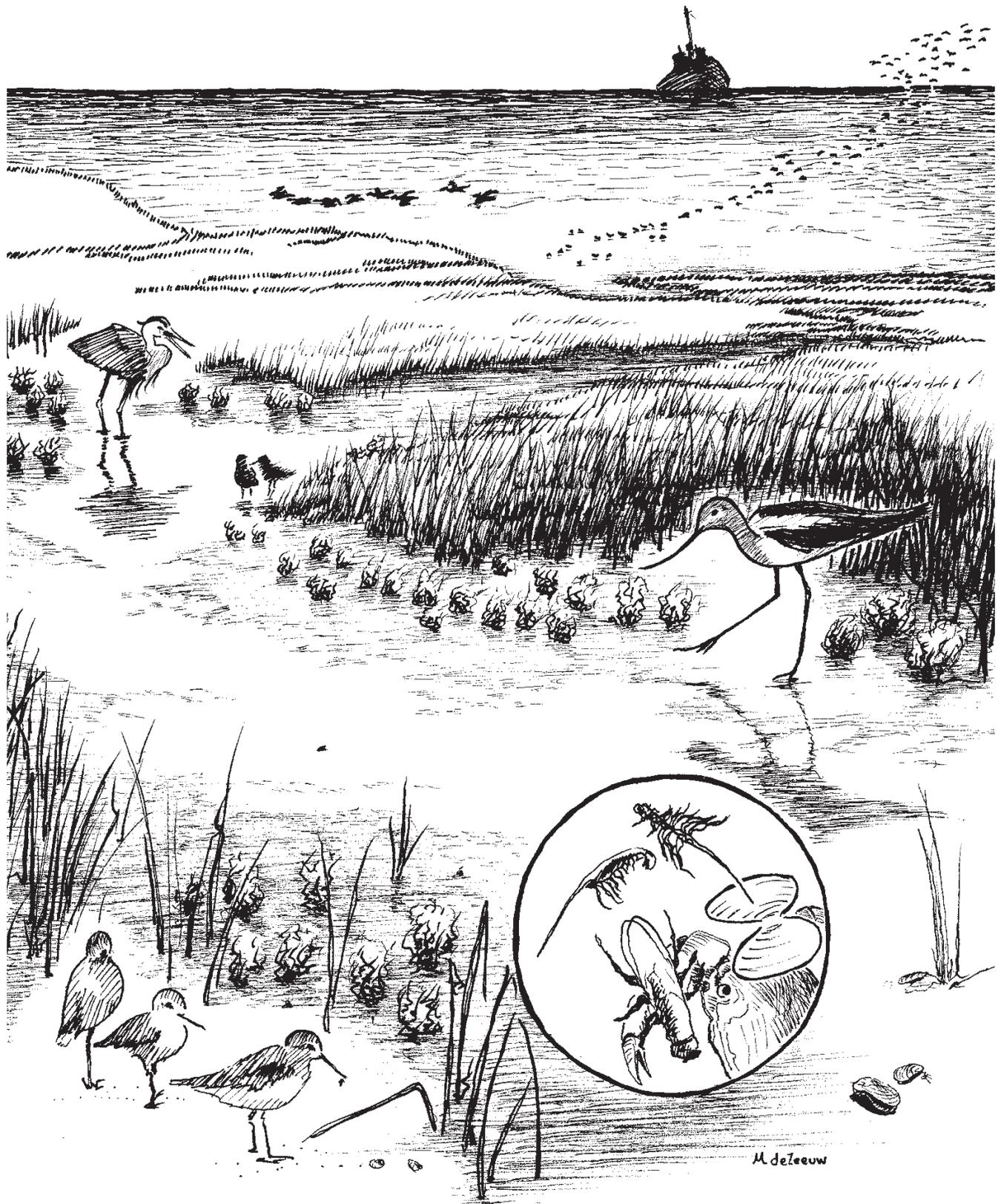
- Cordgrass grows in the lower marsh zone. It can tolerate being completely under water for as long as 22 hours. When it dies, it decomposes into detritus, an important food for small estuarine animals.
- The middle marsh zone is made up mostly of pickleweed. While this plant is also very salt-tolerant, it can not survive being under-water for long periods of time like cordgrass. Pickleweed gets rid of the salt that collects in its cells by moving it to the tips of its stems. The tips eventually turn red and break off.
- The most plant diversity is found in the upper salt marsh zone. Here you will find alkali heath, Australian salt bush, and salt grass. These plants sweat the extra salt out of their pores where it crystallizes on their leaves.

The salt marsh is also home to many different types of animals that are adapted to the salty conditions. Salt-tolerant bacteria, protozoa, brine flies, and brine shrimp thrive in salt marshes. Shorebirds such as Avocets and Black-necked Stilts probe the mud at low tide, searching for brine shrimp and the eggs and larvae of brine flies.

Looking at the illustration, list the names of the plants and animals you recognize that live in saltwater marshes. Some of these might not be found in your area. What other species of wildlife might you expect to see in the salt marshes in your area of the country?



Saltwater Marshes



Freshwater Marshes

Freshwater marshes are open, wet, grassy wetlands fed by creeks and streams or by rain and snow. They can fill broad, flat areas or tiny pockets that are surrounded by higher land. Freshwater marshes are often found along the edges of ponds, lakes, or rivers. Stream water or *runoff* continuously brings nutrients into them. Freshwater marshes come in many shapes and sizes, and there are many kinds, including swamps, bogs, and prairie potholes.

Freshwater marshes are very nutrient-rich. They support a great variety of plant communities that in turn support a wide variety of wildlife within this vital wetland ecosystem. In addition to their great habitat value, marshes help absorb floodwaters and filter excess nutrients from surface runoff. They are excellent natural water purifiers.

Plants that grow in a marsh are *adapted* to being wet. Their roots are always under water and grow where water is shallow and slow-moving. The sedges, rushes, and grasses that grow in the freshwater marshes of western North America resemble a wet meadow. Small shrubs and delicate, flowering herbs can also grow in freshwater marshes.

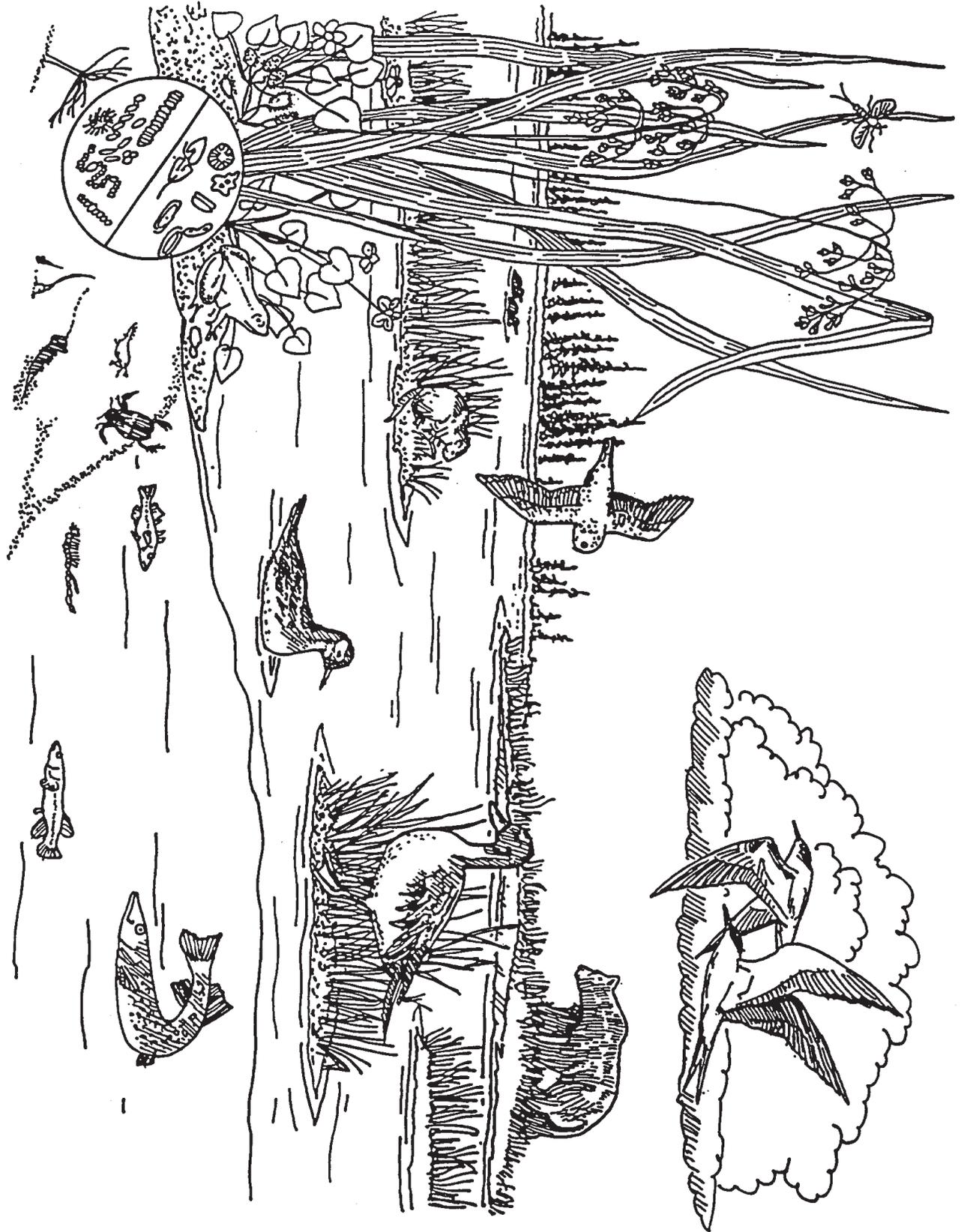
Insects, snails, and other small animals thrive among these plants in the slow-moving water. Fish and aquatic insects find shelter in the underwater parts of the plants. Shorebirds and other birds find plenty of food in a marsh and can hide from predators in the tall grass. Have you ever seen a Common Snipe, a yellowlegs, a dowitcher, or a phalarope in a freshwater marsh?

Looking at the illustration, list the names of the plants and animals you recognize that live in freshwater marshes. Some of these might not be found in your area. What other species of wildlife might you expect to see in the freshwater marshes in your area of the country?



Freshwater Marshes

(Source of illustration: *Wetlands and Wildlife*)



Rocky-Intertidal Habitat

The *intertidal zone* is the part of the ocean shoreline that is covered by saltwater when the tide is high and exposed to the air when the tide is low. Life here has both challenges and rewards. Plants, animals, and other organisms like *algae*, often called seaweed, must be very tough and able to adapt to changing water levels, salinity, and pounding surf!

Plants and animals that live in this intertidal habitat have to survive being covered and then uncovered by water once or twice a day. These plants must be able to get oxygen from the air and from the water. They must also keep from drying out when the tide is low. The *salinity* (or level of saltiness) of the water constantly changes here too. As the last drops of water evaporate at low tide, salt is left behind. This can make small tidal pools even saltier than when they were completely underwater. When it rains, on the other hand, these same plants and animals must adjust to pools diluted with fresh water.

Salt marshes, sandy beaches, and mudflats can all be found within the intertidal zone. The part of this zone made up of boulders, cliffs, gravel, shale, or just plain rocks is called the *rocky-intertidal* habitat. While this rocky-intertidal zone has no soil, pools or crevices that hold water, *tidepools*, are teeming with life just like any other wetland habitat!

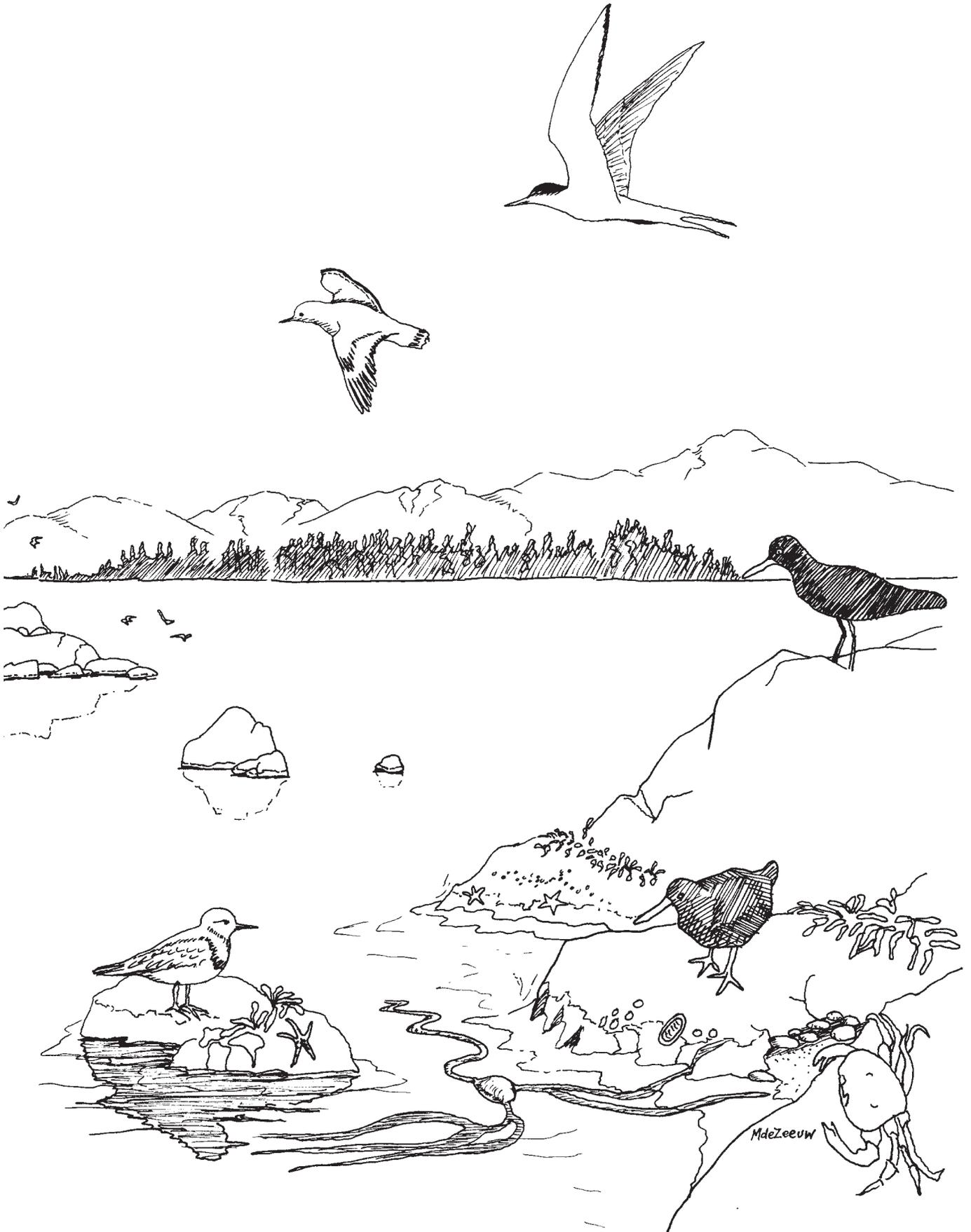
There is another challenge facing tidepool animals--rolling or even pounding ocean waves! Many have developed ways to cling to the exposed rocks and walls. Almost no plants grow here; there is no soil for their roots. Wave action keeps soil from collecting on the exposed rocks. However, large seaweed and kelp take the place of plants in the food web. They capture the sun's energy, grow, and then provide food and shelter for tiny marine animals.

The larger *predators* and *scavengers* of the rocky intertidal habitat have a hard time finding shelter from the sun, surf, and wind but are well *adapted* to find food among the rocks. Many shorebirds use the rocky-intertidal habitat. The Black Oystercatcher feeds almost nowhere but here most of the year. Its strong, red bill is specially designed for prying hard-shelled animals off rocks or cracking them open. Turnstones and surfbirds also live here during migration and winter.

Looking at the illustration, list the names of the plants and animals you recognize that live in the rocky-intertidal habitat. Some of these might not be found in your area. What other species of wildlife might you expect to see in this habitat in your area of the country?



Rocky-Intertidal Habitat



Mudflat and Sandy Beach Habitats

Mudflats and sandy beaches are important shorebird habitats. Both habitats can be found inland, bordering lakes and streams, and along the coasts within the *intertidal zone*. What else do mudflats and sandy beaches have in common?

They are both very open areas with few plants, subjected to constant change. *Organisms* that live here have to be hearty to survive! Plants and animals of coastal mudflats and sandy beaches are *adapted* to the cycle of high and low tides. They must tolerate changes in wetness and *salinity* twice a day. Water levels at inland mudflats and sandy beaches change too. Rainfall, flooding, and evaporation change water levels and nutrient concentrations. In some areas, water is actually pumped out of lakes to provide irrigation and drinking water.

Both inland and coastal mudflats and sandy beaches are nutrient-rich habitats. Salts and minerals are carried by rainwater and snowmelt into rivers. They are then swept downstream where they eventually mix with ocean or lake water. This constant input of nutrients makes mudflats and sandy beaches some

of the most *productive* areas on the earth, rich in *invertebrate* foods. If you scooped up one pail of wet mud or sand and examined it with a microscope, you would see hundreds or thousands of tiny snails, worms, and invertebrate eggs and larva. There would be larger animals like clams, shrimp, and long worms as well.

The high numbers of invertebrate foods make mudflats and sandy beaches critical to shorebird *migration*. Hundreds of thousands of shorebirds will concentrate here, sometimes feeding and resting for days before moving on. Shorebirds rely on these *stopover sites* for energy-rich foods to make it to their next stop, which might be hundreds or even thousands of miles away!

Mudflats and sandy beaches are also critical *breeding grounds* for several shorebird species. Snowy Plovers nest along the sandy beaches of the West Coast. Wilson's Plover, another sandy beach nester, is found in the east. Black Oystercatchers prefer the coastal and inland mudflats of Alaska while their counterparts, American Oystercatchers, nest on eastern mudflats.

Looking at the illustration, list the names of the plants and animals you recognize that live on mudflats and sandy beaches. Some of these might not be found in your area. What other species of wildlife might you expect to see in these habitats in your area of the country?

Mudflats and Sandy Beaches

(Source of illustration: *Wetlands and Wildlife*)



Prairie Potholes

Dotted across the northern grasslands of the United States are thousands of shallow, temporary wetlands called prairie potholes. Glaciers scraping over the landscape during the Pleistocene, thousands of years ago, formed the *prairie potholes* of Canada and the United States. They are found in North and South Dakota, Nebraska, Wisconsin, and Minnesota. They fill in the spring with snowmelt and rainwater.

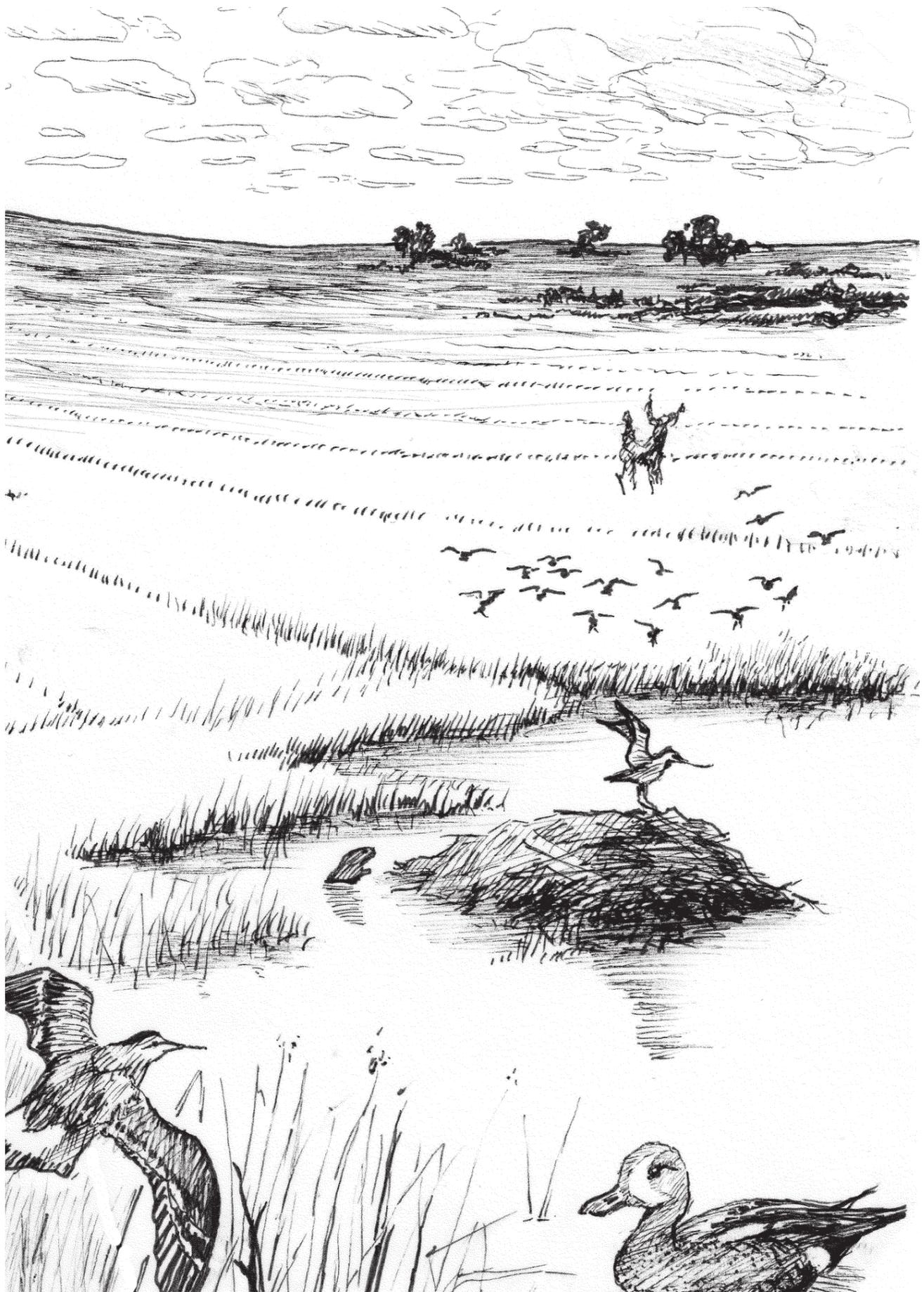
Because of the numerous shallow lakes and marshes, rich soils, and warm summers, the prairie pothole region is described as being one of the most important wetland regions in the Central Pacific Flyway. This region provides birds with a feast of insects, worms, clams, snails, and other invertebrate foods for both breeding and migrating birds. Because most prairie potholes are fed by rain and snow, they vary greatly in their sizes and water levels. This also means the suitable habitat for shorebirds is unpredictable from year to year. Because these wetlands are unpredictable, shorebirds disperse across the region wherever suitable potholes can be found instead of concentrating at predictable areas as they do along the Atlantic and Pacific Coasts.

This region provides refuge for approximately 36 species of migrating and breeding shorebirds, such as the White-rumped Sandpiper, Long-billed Dowitcher, and Lesser Yellowlegs. Many of the shorebirds that occur here are found in shallow wetlands, wet pastures, flooded agricultural fields, and lake shores. The area is home to over 50 percent of North American migratory waterfowl, with many species dependent on the potholes for breeding and feeding. In addition to supporting a great diversity of wildlife, prairie potholes also absorb excess rain, snowmelt, and floodwaters, reducing downstream flooding.

Looking at the illustration, list the names of the plants and animals you recognize that live in and around the prairie potholes of the grassland habitat. Some of these might not be found in your area. What other species of wildlife might you expect to see in your area of the country?



Prairie Pothole



Playa Lakes

Scattered across the grasslands of West Texas, Oklahoma, New Mexico, Colorado, and Kansas are thousands of round, shallow, temporary wetlands called *playa lakes*. These special wetlands are lined with a watertight layer of bedrock. They fill with water only after spring rainstorms when freshwater collects in the round depressions of the mostly flat landscape. There are many theories as to the origin of playas, but the most widely accepted are that playas are either carved by wind or formed by sinkholes. Whatever their origin, playas are important to humans, animals, and plants.

Playas are important because they store water in a part of the country that receives as little as 20 twenty inches of rain a year and where there are no permanent rivers or streams; so playas are the main support for an astounding array of wildlife. An estimated 15 million birds migrate through the playa lakes, and one-third commonly winter there. Mayflies, dragonflies, salamanders, bald eagles, endangered whooping cranes, jackrabbits, and raccoons also can be found at playa lakes. Because

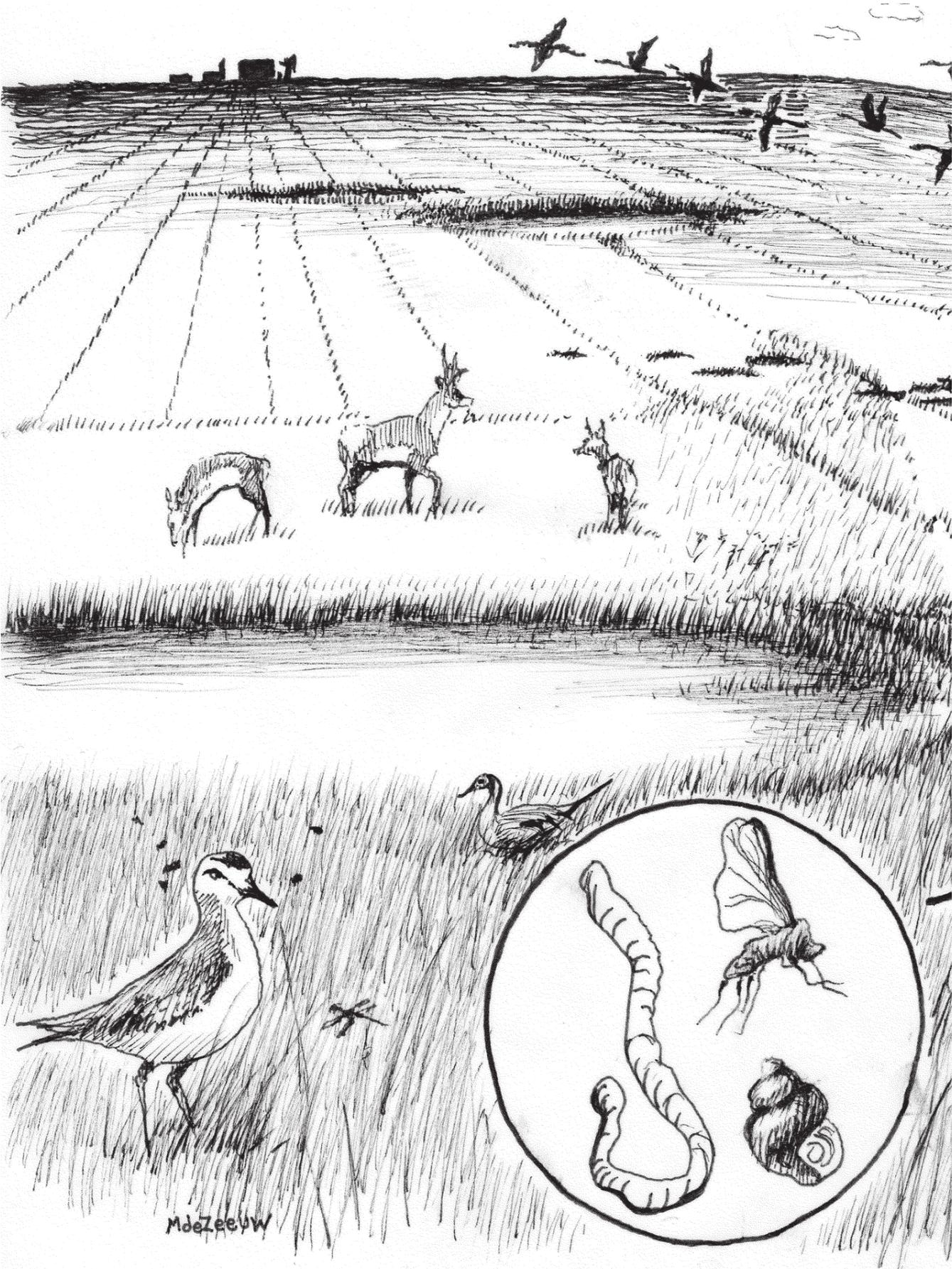
playa lakes support such a wide variety of animals, they contribute significantly to the biodiversity of this grassland region. Playas also help support the surrounding agriculture by providing irrigation water and seasonally recharging underground water sources called aquifer. The Ogallala Aquifer is North America's largest aquifer that underlies the Southern High Plains¹ and is being used for irrigation and drinking water faster than it is being replenished. Aquifers are like huge underground sponges made of porous sediments of sand and gravel that catch the water as it percolates through the grassland soils

Some shorebird species, such as the Long-billed Curlew, Mountain Plover, and Snowy Plover, nest in the playa lakes region. Curlews breed in grassy areas often associated with playas, while Snowy Plovers nest on saline lake beds with little water and often no vegetation. Mountain Plovers prefer the sparse shortgrass prairie area near the playas.

Looking at the illustration, list the names of the plants and animals you recognize that live in and around the playa lakes of the grassland habitat. Some of these might not be found in your area. What other species of wildlife might you expect to see in your area of the country?

¹ Southern High Plains: This is a distinct geographic region of the United States that extends from West Texas, Oklahoma, New Mexico, Colorado, and Kansas. This region is made up of shortgrass and mixed grass and ranges in elevation from 900 to 6000 feet.

Playa Lake



Grasslands

Grasses roll in waves, tossed by a brisk wind. Winters can be very cold and summers very hot. Droughts can drag on for years and can be followed by great floods. The creatures and plants living in grasslands are adapted to an extreme climate.

There are three types of grasslands that are defined by the typical height of the grass. Tallgrass prairies are the wettest and run through the center of North America. They occur in the southern Canadian province of Manitoba, down through eastern North Dakota, western Minnesota, and parts of Oklahoma, South Dakota, Kansas, and Nebraska. The dominant grasses in the tallgrass prairie are big bluestem, little bluestem, Indian grass, switchgrass, prairie cordgrass, and wheat grass. Upland Sandpipers nest and feed within tallgrass prairies.

The shortgrass prairie is the driest and most westerly type of grassland. It stretches from the Rocky Mountains east and south through parts of the Canadian province of Saskatchewan, Montana, the Nebraska panhandle, Wyoming, Colorado, Kansas, Oklahoma, New Mexico, and Texas. Buffalo grass is the dominant grass with some blue grama grass, needle grass, and wheatgrass. Mountain Plovers and Long-billed Curlews nest and feed here.

The mixed-grass prairie covers part of the Dakotas and extends south to northern Texas and through parts of Oklahoma, Kansas, and Nebraska. Here, the plants of the tall- and shortgrass prairies mix. The vegetation in these areas is more diverse than in either of the other two types of grasslands. During migration, Buff-breasted Sandpipers and American Golden-Plovers rest and feed in pockets of highly grazed and freshly tilled farm fields and other grassy areas within mixed-grass prairies.

Playa lakes in the south, prairie pot holes in the north, and farms are all part of the grasslands. Looking at the illustration, list the names of the plants and animals you recognize that live in and around grassland habitat. Some of these might not be found in your area. What other species of wildlife might you expect to see in your area of the country?



Grassland

