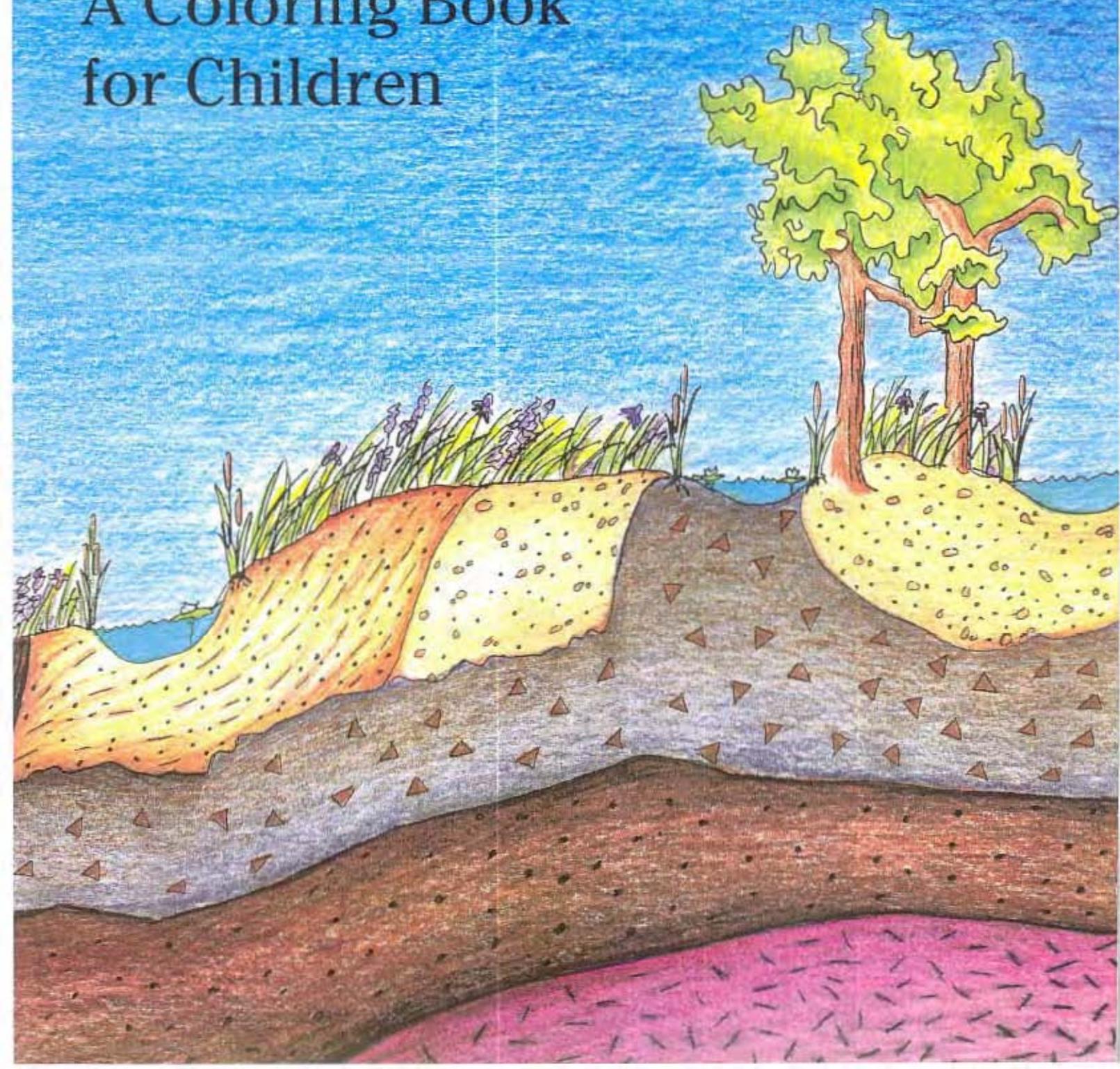


Lake Agassiz Beach Ridges

A Coloring Book
for Children



Note To Teachers and Parents

The beach ridges found throughout the Red River Valley are remnants of Glacial Lake Agassiz. They are made of sand & gravel and form linear ridges on the landscape - slightly higher in elevation than the surrounding lands. Today, the beach ridges support agriculture, gravel mining and native prairie among a variety of other land uses.

The Lake Agassiz beach ridges are economically important in the Red River Valley. The gravel resource that underlies the beach ridges are the primary source of construction aggregate for rural communities and urban centers like Fargo-Moorhead and Grand Forks-East Grand Forks. The gravel mining industry supplies building materials and provides good jobs.

Just as significant, the beach ridges support some of the largest and best remnants of native prairie left in Minnesota and even the entire midwest. Throughout the Red River Valley, the last remnants of native prairie are declining due to pressure from a wide range of land uses. Gravel mining is one of many land uses that can sometimes be viewed as competing with efforts to preserve native prairie. In Clay County, the growth of the Fargo-Moorhead area is driving an expansion of the gravel mining industry on the beach ridges. Questions have been raised about the impact gravel mining might have on the remaining tracts of native prairie.

In 1995, a local forum of landowners, supporters of native prairie, gravel producers, interested public, and governmental agencies convened to discuss - in a proactive setting - the future of the beach ridges in Clay County. The forum strived to be a source of accurate and balanced information about the gravel and prairie resources in the county. The forum felt it was vitally important for our children to understand both the economic and the natural heritage value of the beach ridges found in Clay County.

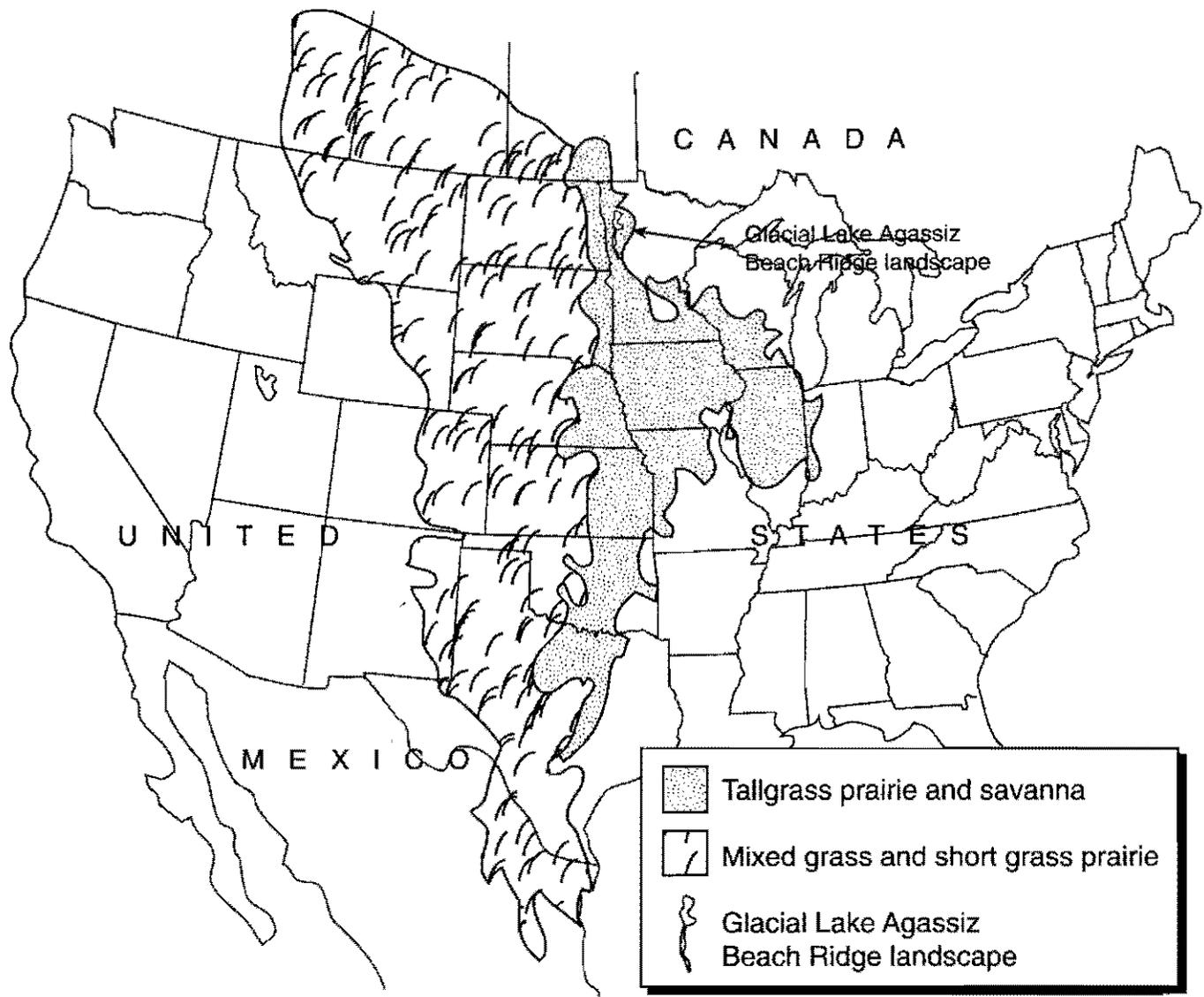
This book is an effort to pass on information to future generations. Although the focus is on Clay County, we believe that the concepts within the book have application throughout the Red River Valley. We sincerely hope you find this volume to be a useful tool in teaching our children about working in partnership to achieve balanced natural resource management.

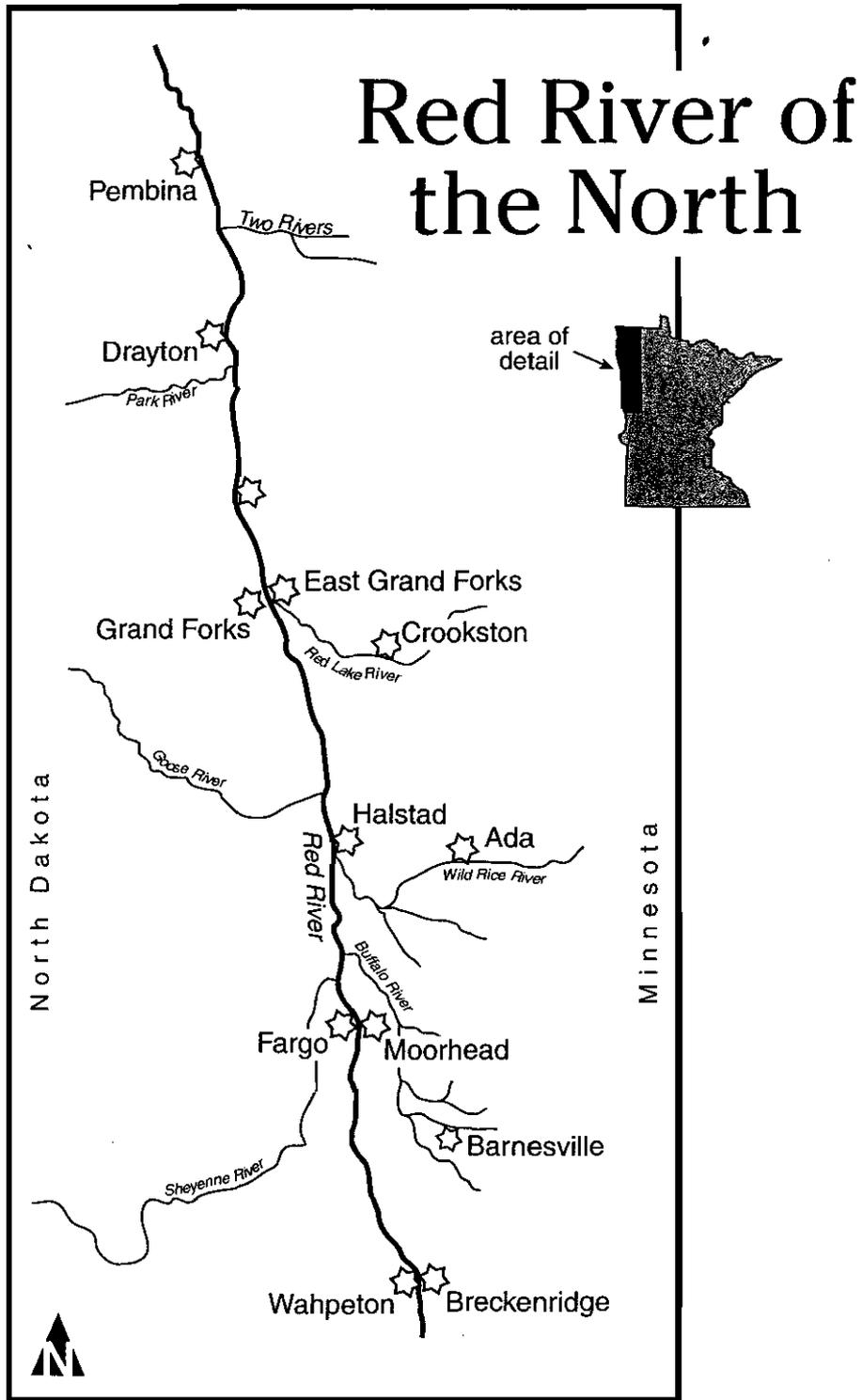
Clay County Beach Ridges Forum, April 1997

Lake Agassiz Beach Ridges

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North American Prairie Regions



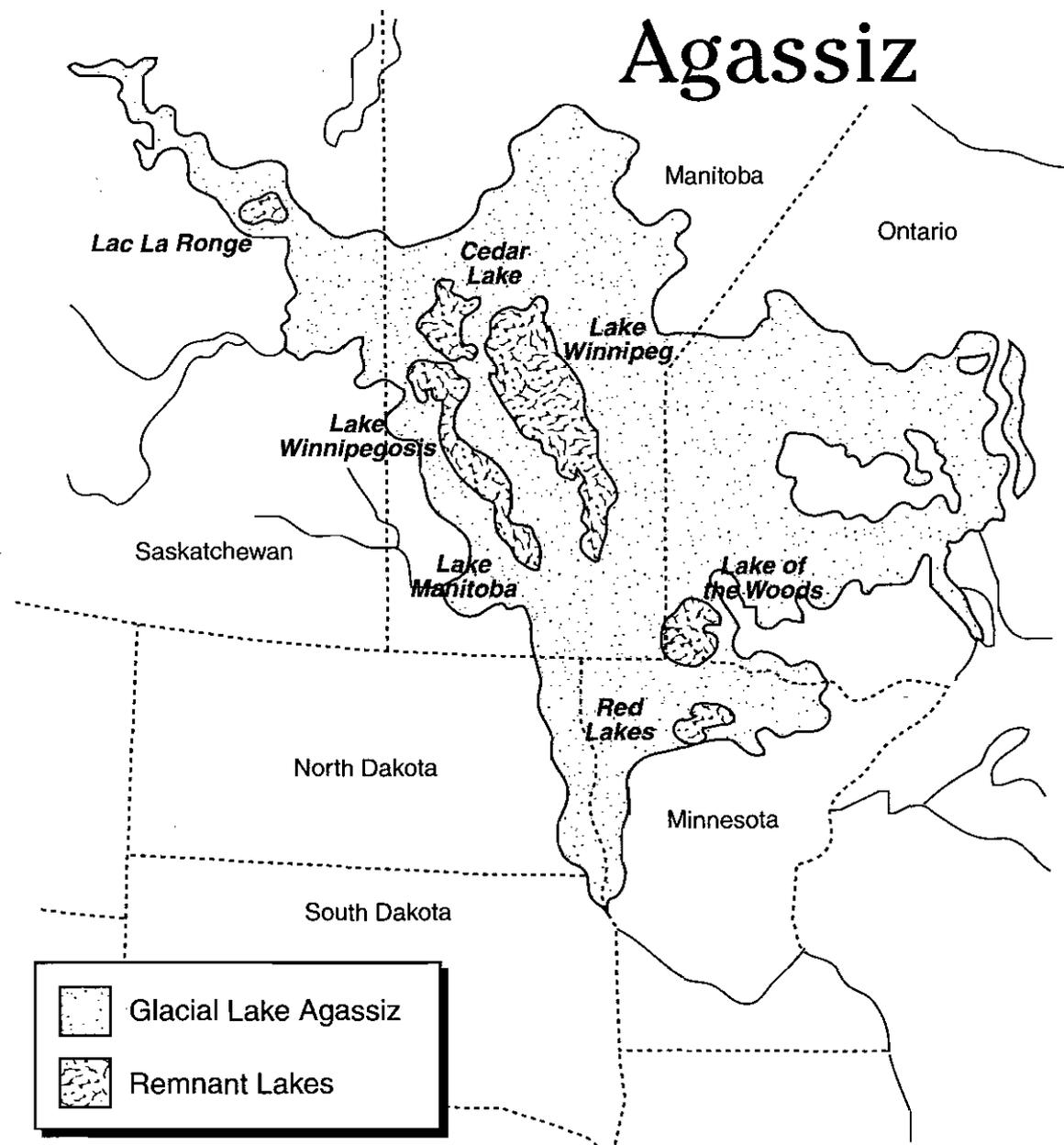


The Red River Valley is a special place to live. The Red River is unusual in the U.S. because it flows north. This is a map of the valley. Put an X on the town nearest to where you live. Try drawing in the boundary of your county.



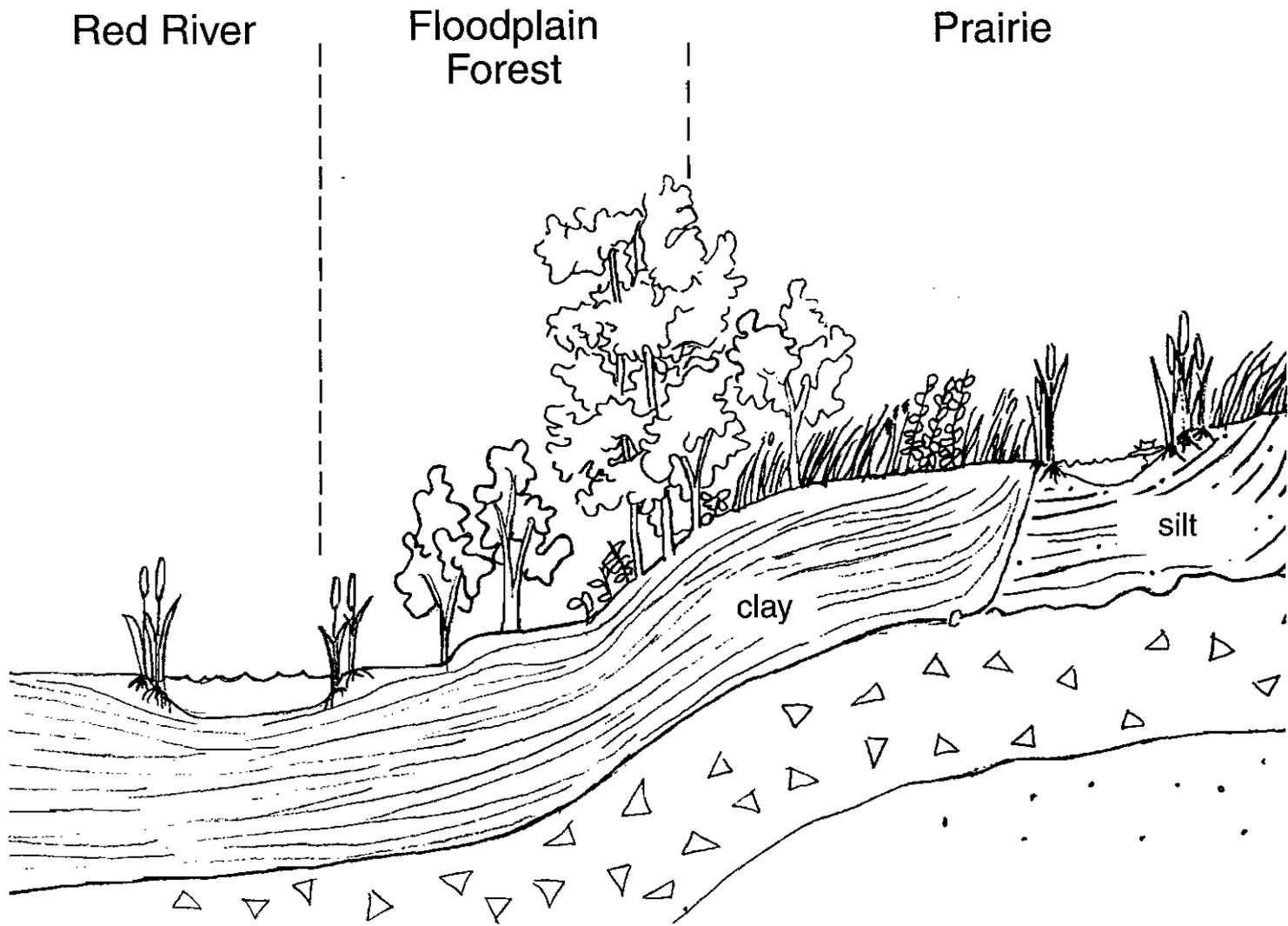
Thousands of years ago, the Red River Valley was a very different place. Then, glaciers covered much of Minnesota. When the glaciers melted, huge lakes were formed. One of those lakes was Glacial Lake Agassiz (AG-uh-see).

Glacial Lake Agassiz



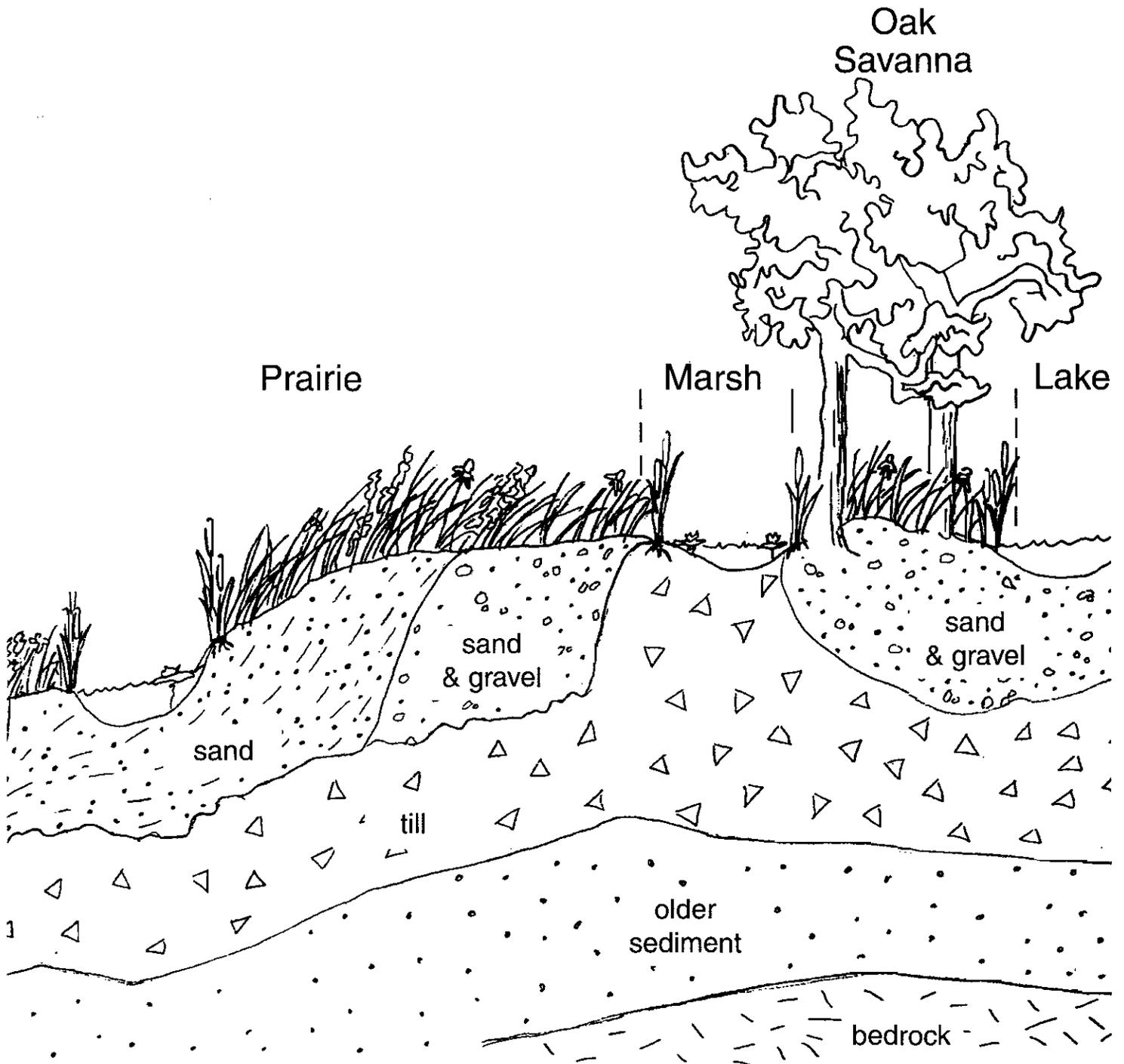
The waters of Glacial Lake Agassiz covered much of the Red River Valley. This is a map that shows how big Glacial Lake Agassiz was. Try drawing in Lake Agassiz with your favorite color.

WEST

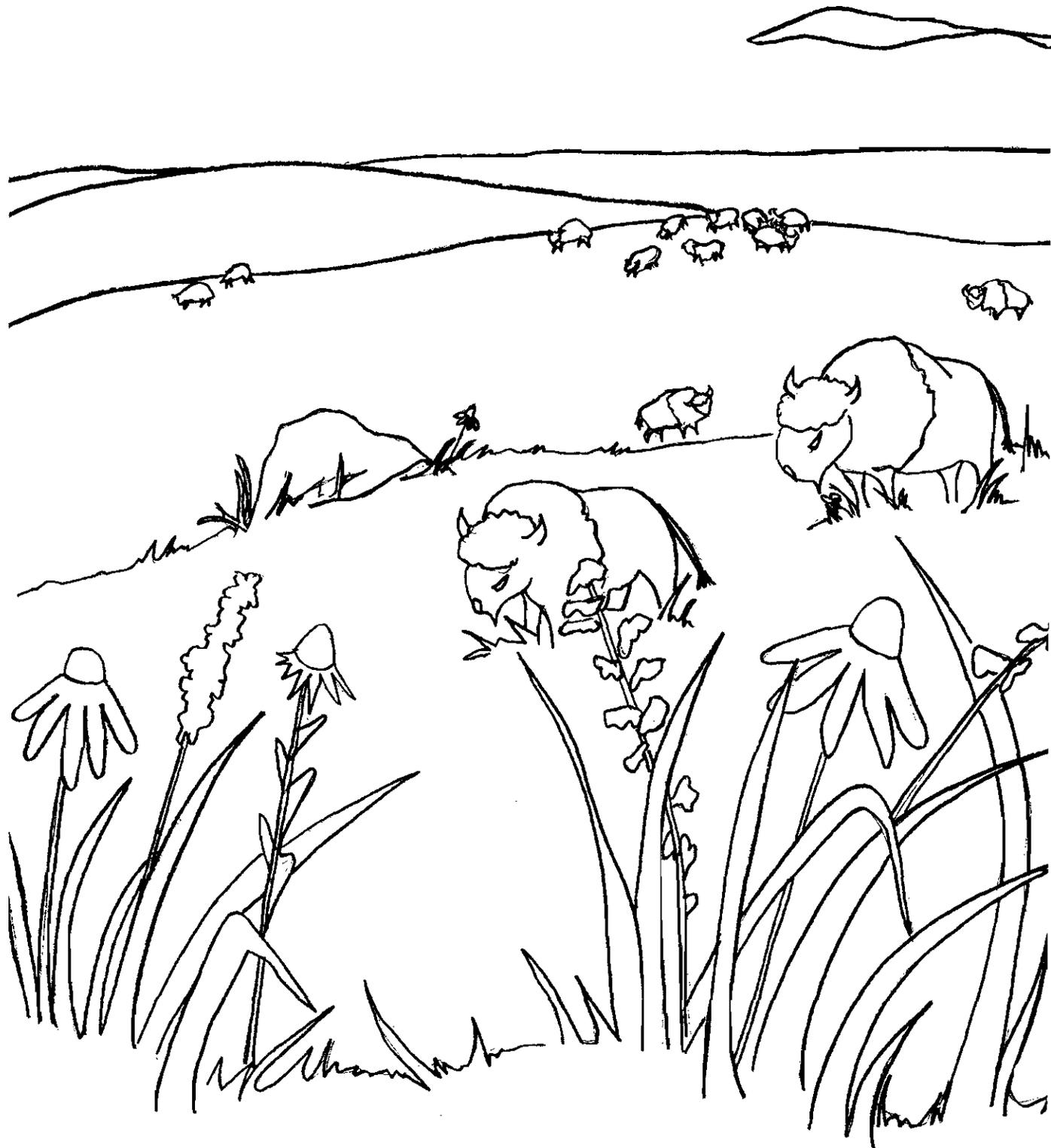


After many years, Glacial Lake Agassiz finally dried up. Today, the area the lake once covered is now flat land with clay soils. The old shoreline of the lake is now seen as a series of ridges containing sand and gravel.

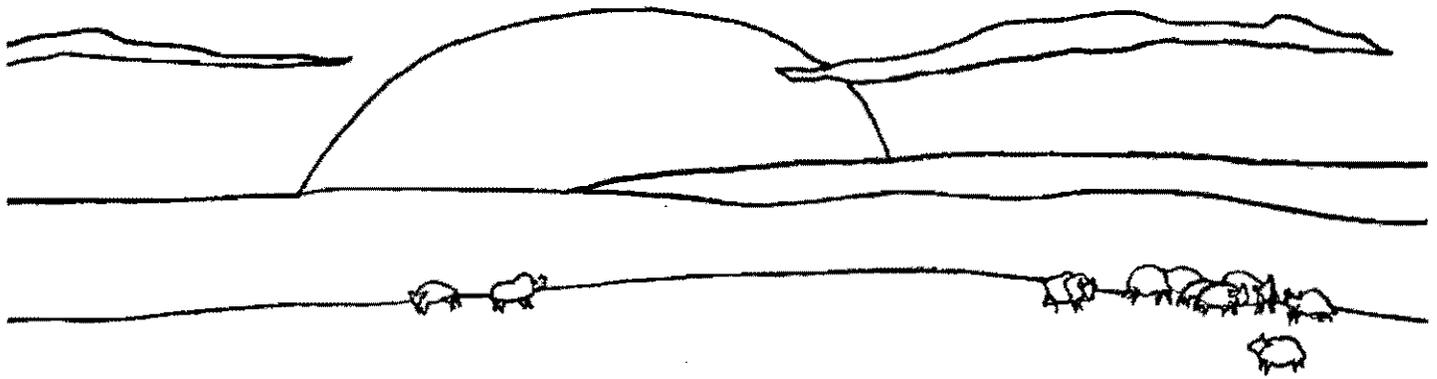
EAST



The water level of Glacial Lake Agassiz changed many times as the lake drained. The old shorelines of Glacial Lake Agassiz are known today as the beach ridges. This is a cross section of the Red River Valley. It shows changes in elevation from the Red River up to the beach ridges. Do you know what “elevation” means?



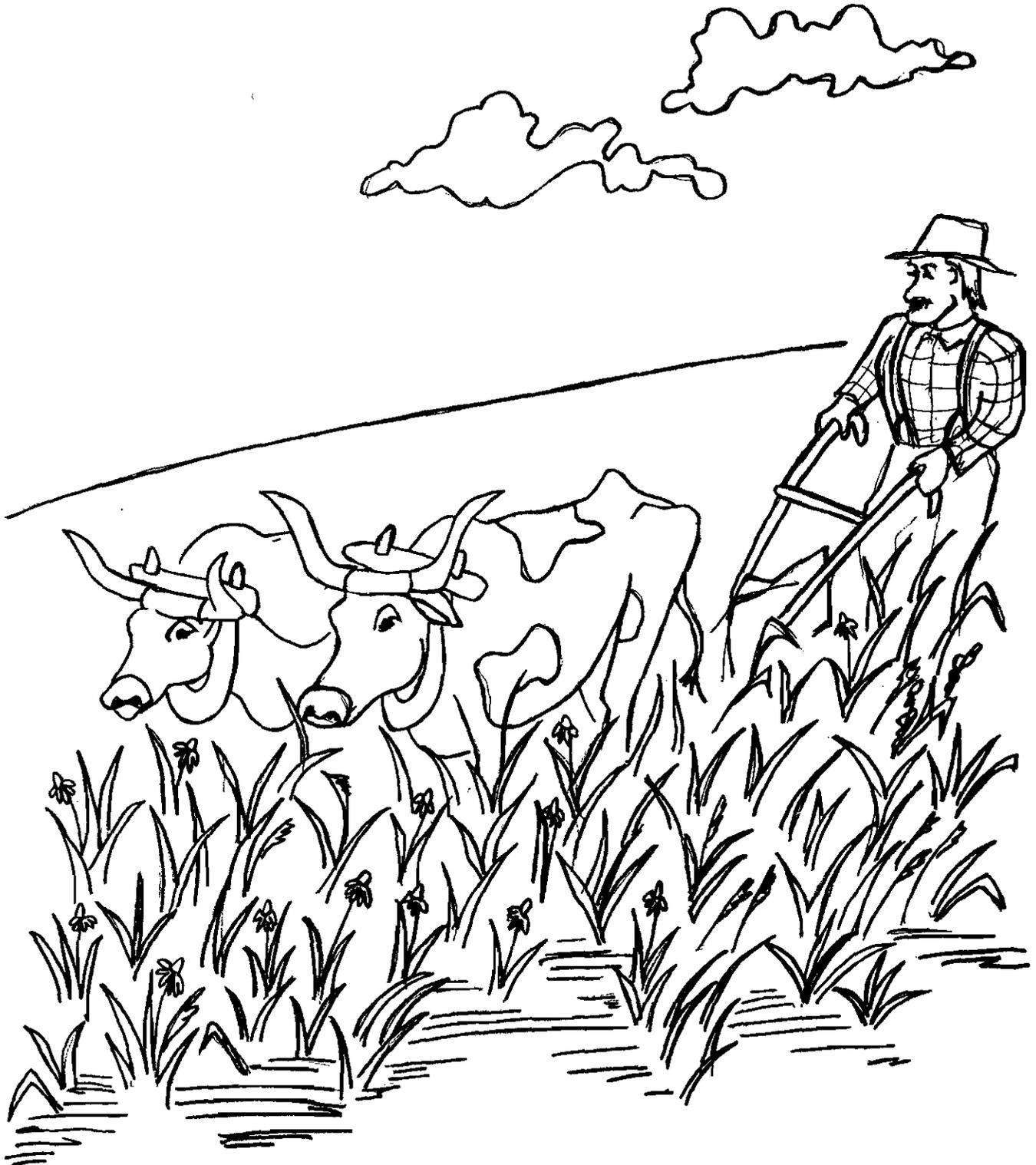
Before European settlers arrived, almost the entire area was covered by tallgrass prairie. The prairie grasses sometimes grew six feet high. Many plants and animals lived on the prairie. This a picture of the prairie as it might have looked 150 years ago. More than 200 different plants and animals can be found on one acre of prairie.



The American Bison (also known as buffalo) once roamed in great herds in the Red River Valley. Today, you can still see the rubbing rocks the buffalo used to scratch themselves. Buffalo were an important source of food to Native Americans who lived in the area before the settlers arrived. Can you find the buffalo rubbing rock? Buffalo don't roam the prairies any more.

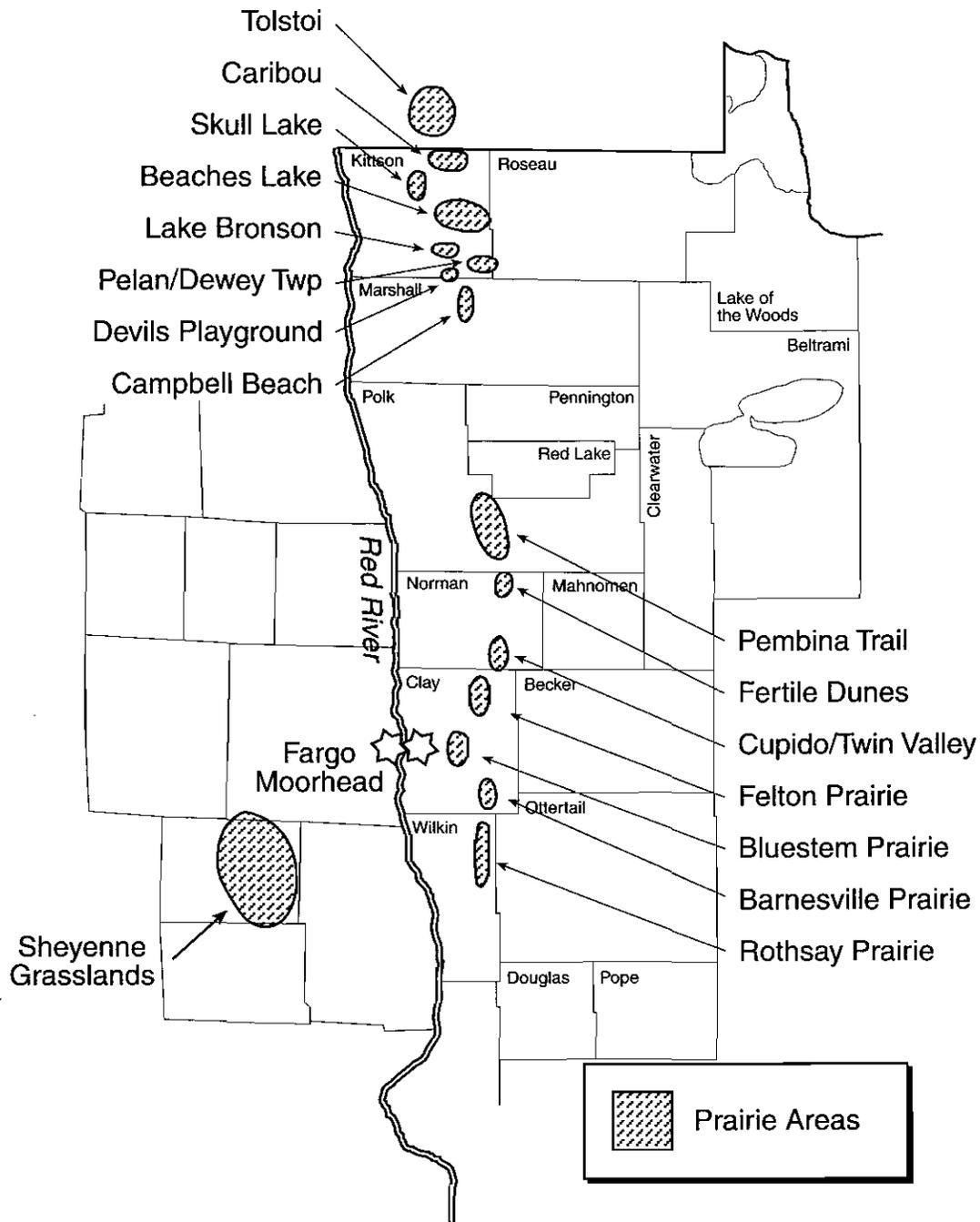


The prairie needs fire to be healthy. Fire keeps out trees and weeds. In the past, prairies used to burn naturally. Today, prairies are burned on purpose.



Over 100 years ago, settlers came to the Red River Valley to homestead. The farmers plowed the prairie for farming. This is a settler clearing the land in about the year 1860. In places like Clay County, almost all of the prairie was eventually plowed except for some land on the beach ridges. The original tallgrass prairie that remains on the beach ridges is called “native prairie” because it has never been plowed. This land probably was not plowed because the soil was sandy and not as good for farming.

Prairie Areas



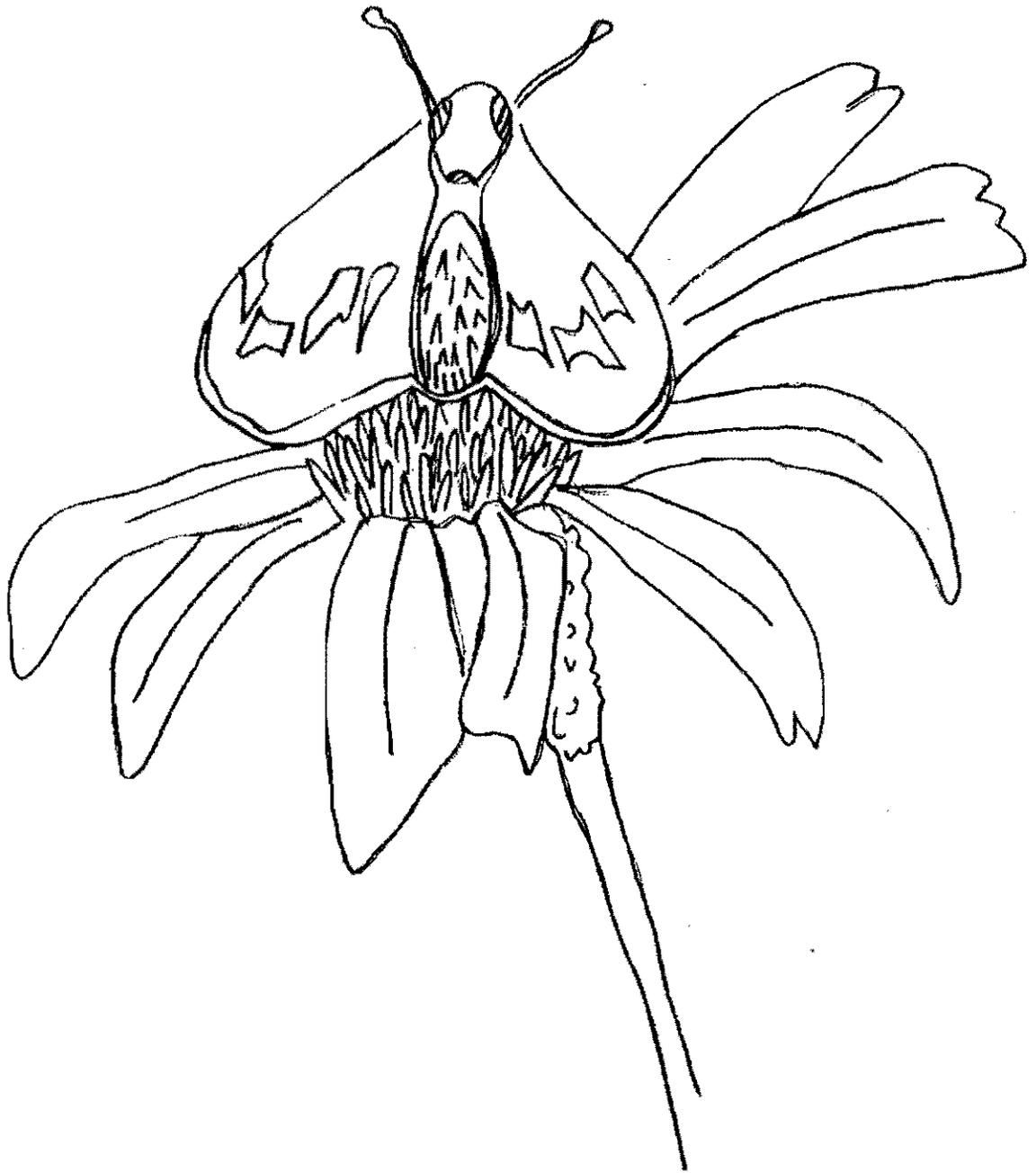
Some of the last examples of tallgrass prairie in Minnesota are found on the beach ridges in the Red River Valley. In Clay County, you can see the prairie at Felton Prairie, Buffalo River State Park and at Bluestem Prairie. Find these places on the map.



Many of the plants and animals that once lived on the prairie are threatened by extinction because so little of the prairie is left. This is a prairie chicken. They boom and dance on the prairie in the springtime during the mating season. Prairie chickens need their prairie booming grounds to survive.

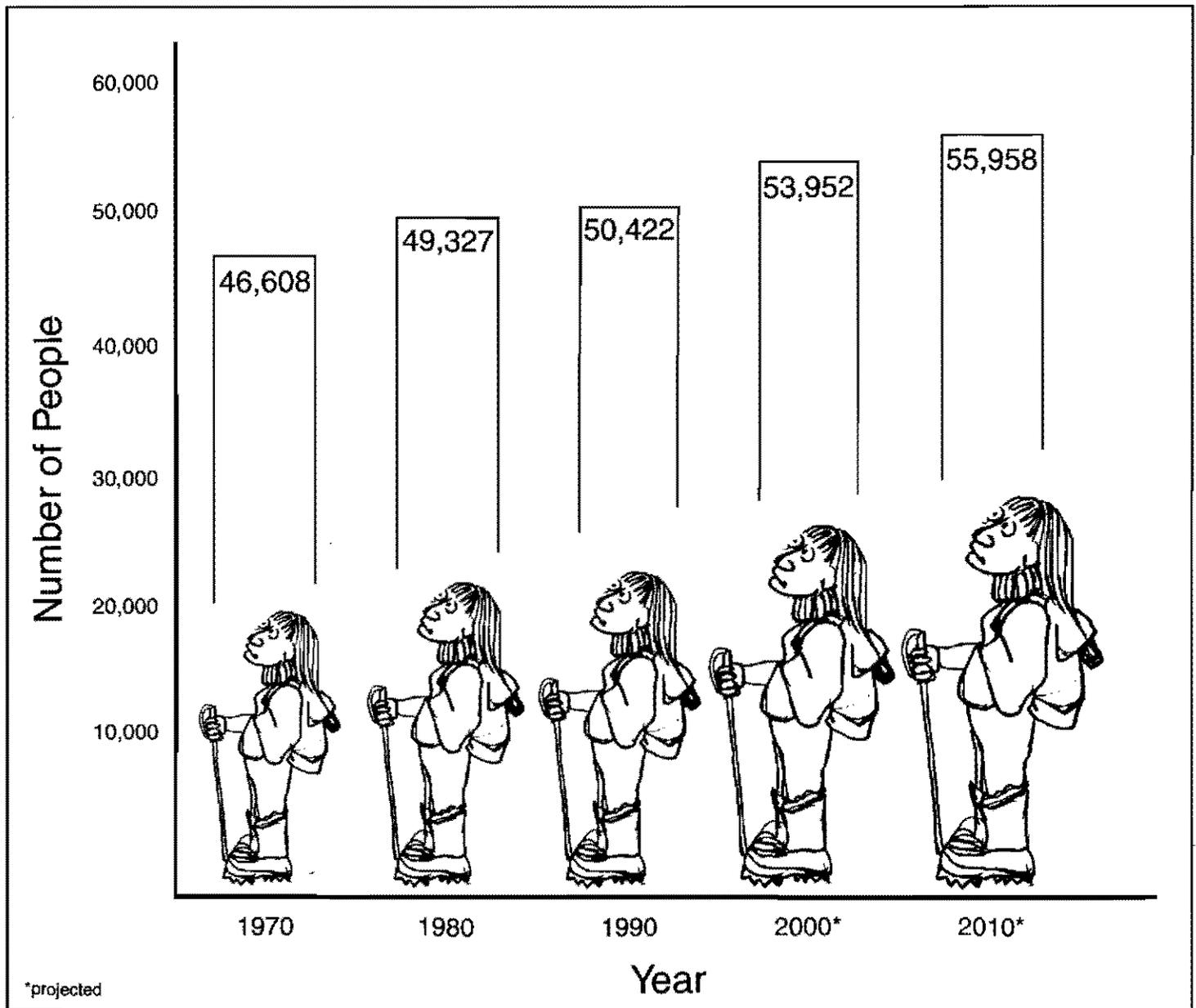


Many people see the prairie as a beautiful place. One thing that makes the prairie beautiful is its flowers. One of those is the prairie fringed orchid. This flower blooms in the early summer and gets to be about 3 feet high. There are only a few places in Minnesota where this plant can still be found. Some of those places are in Clay County.



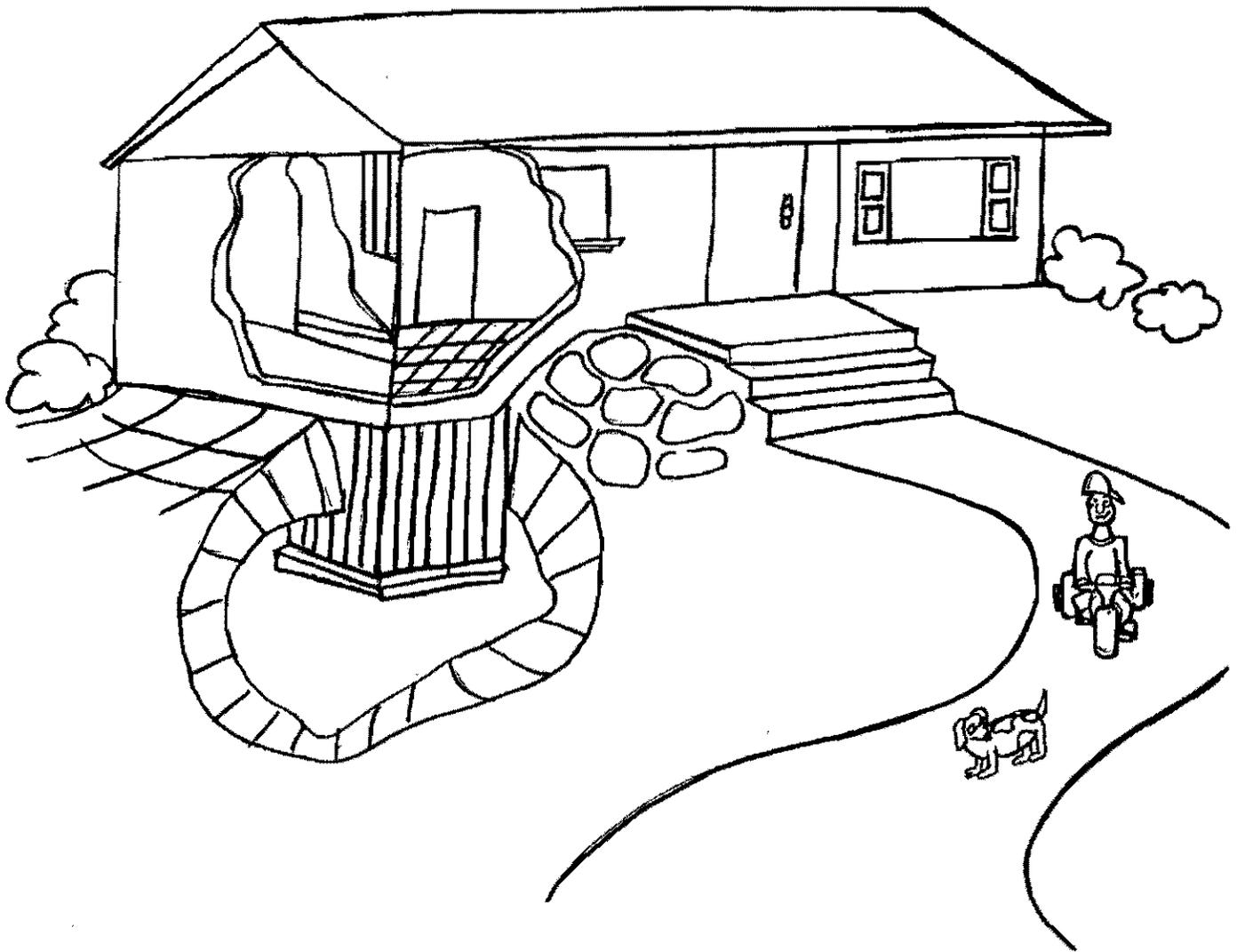
The Dakota Skipper is a rare butterfly that lives on the prairie. It is shown resting on a purple coneflower.

Clay County Population Growth

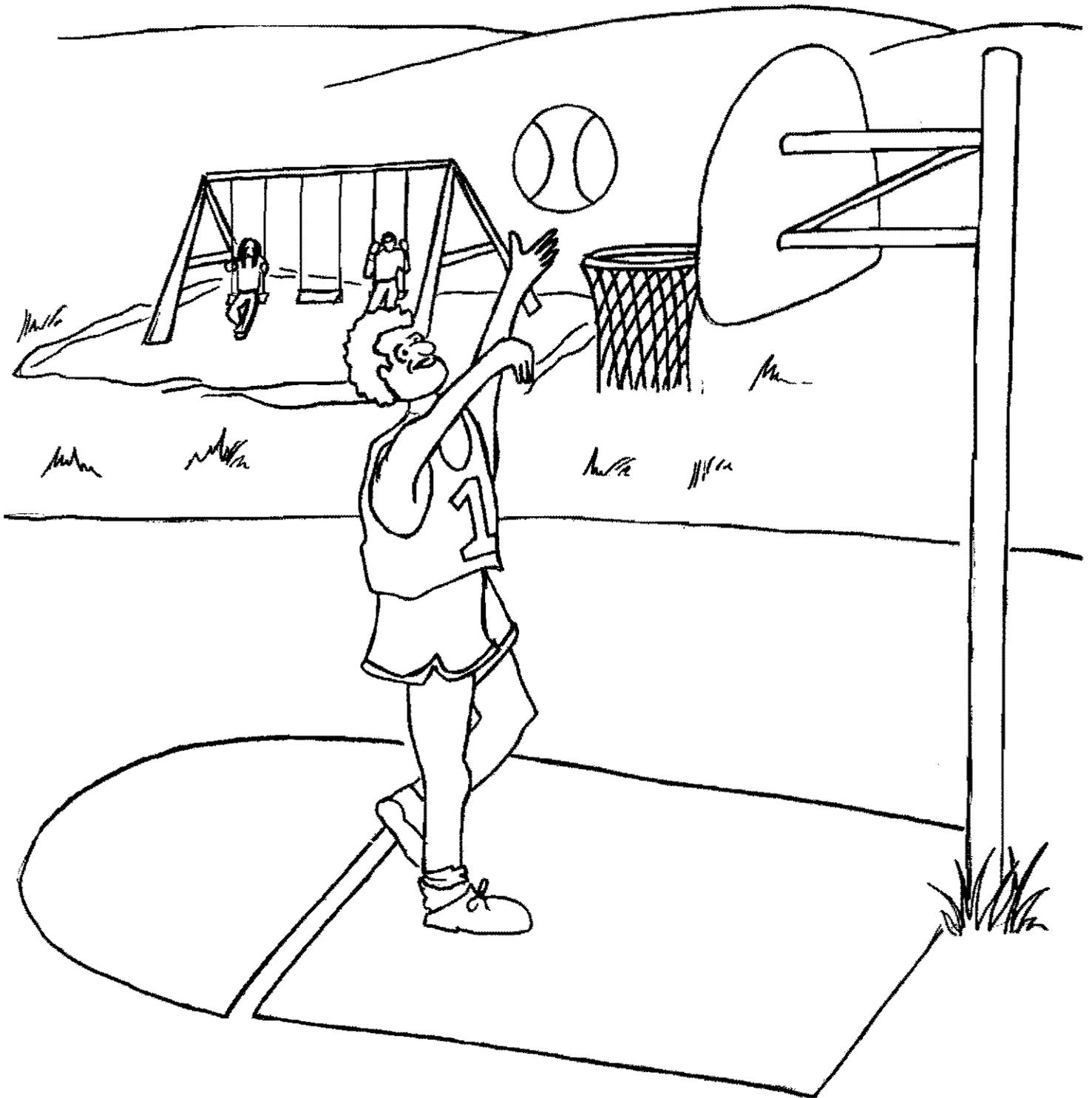


Source: U.S. Census Bureau, Fargo-Moorhead Metropolitan Council of Governments

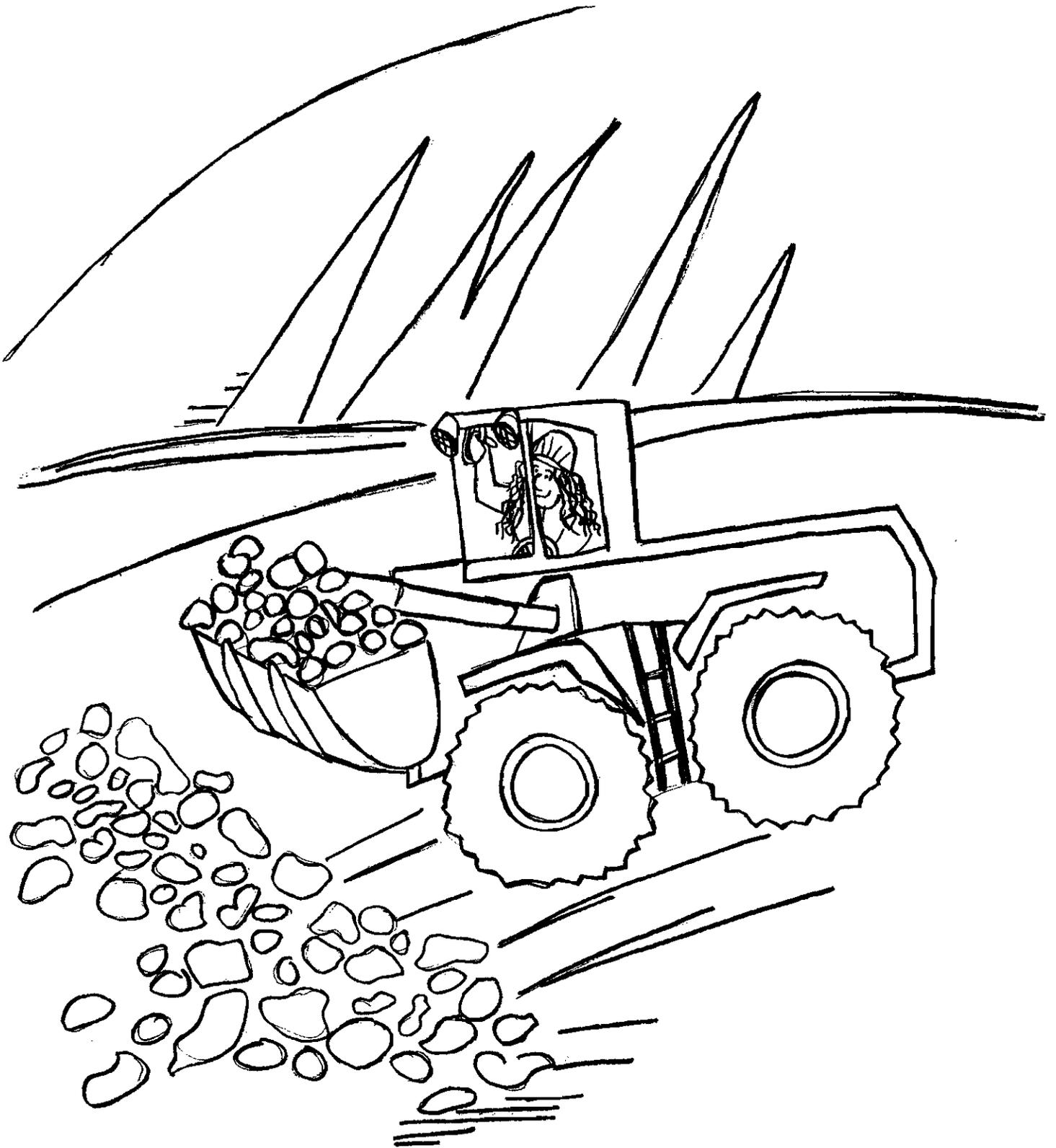
But what about people? The Red River Valley is changing AND growing. This is a chart that shows how the population is changing in Clay County. More people live in Clay County now than 10 years ago and even more people will live there in the future. All the people who live there need houses to live in and good roads to drive on.



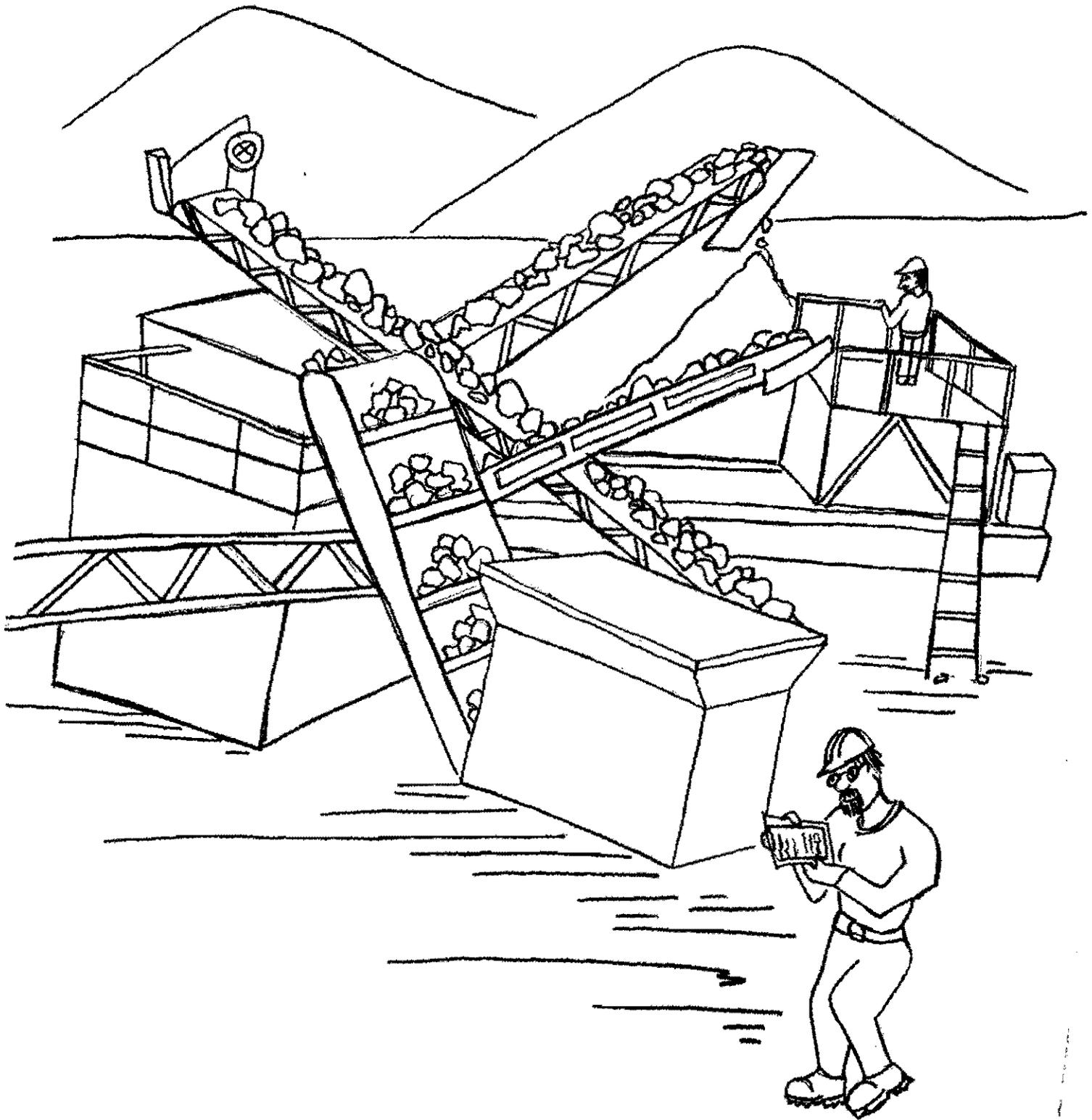
Did you know that most of the building materials in your house, apartment building, or farm are made from minerals mined from the earth? Things like cement, concrete blocks and asphalt - just to name a few! In fact, you and every person in the Red River Valley use about 10 tons of sand and gravel each year without even knowing it!



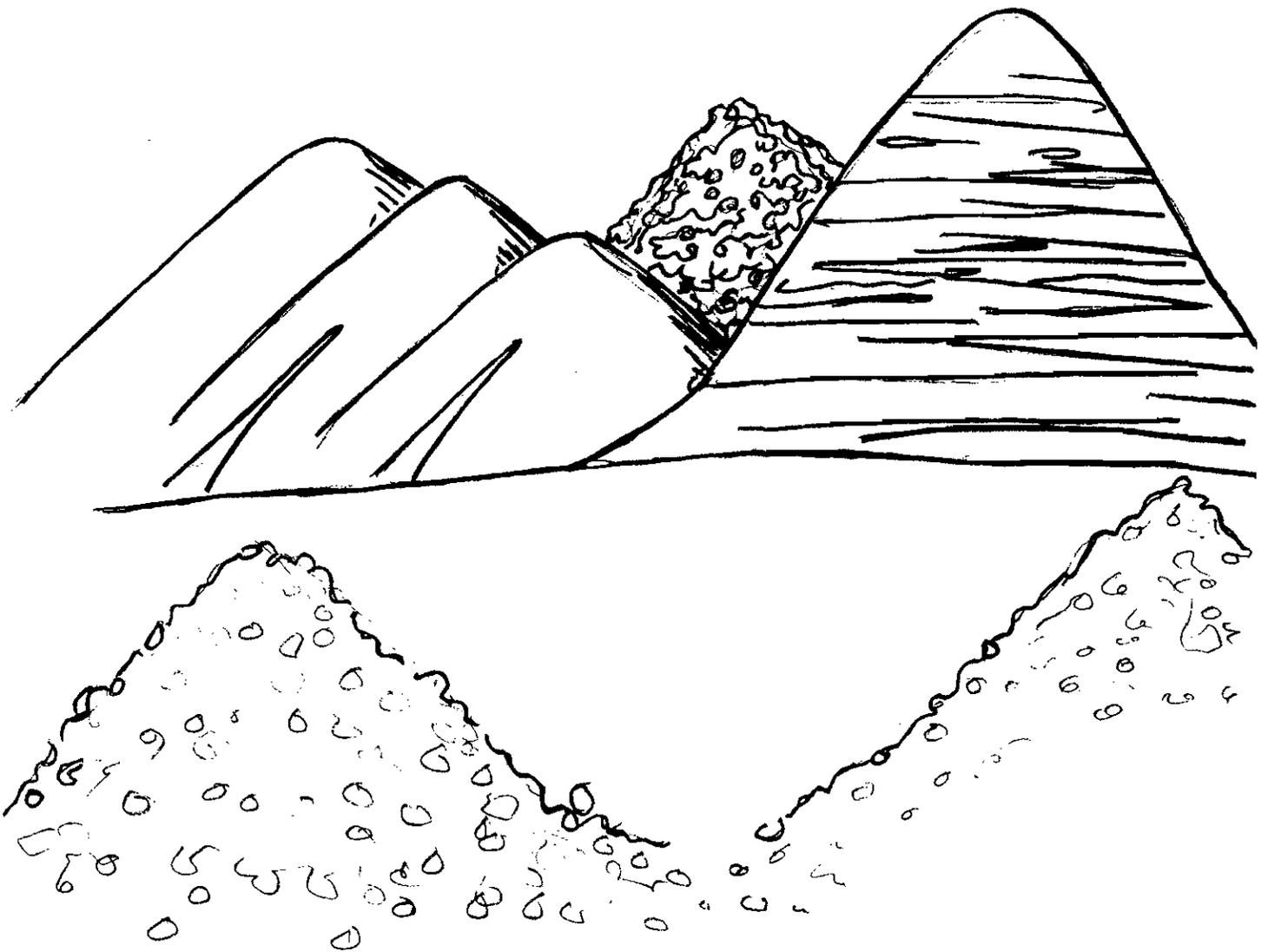
In the Red River Valley, sand and gravel is an important natural resource that is mined on the beach ridges. The people who live in the Red River Valley are fortunate to have a source of sand and gravel to build the things we need like roads, buildings, houses and even playgrounds for children!



Gravel mining on the beach ridges is an important industry to Clay County. The industry supplies building materials and provides about 500 local jobs. Do you know someone who works with gravel or concrete?



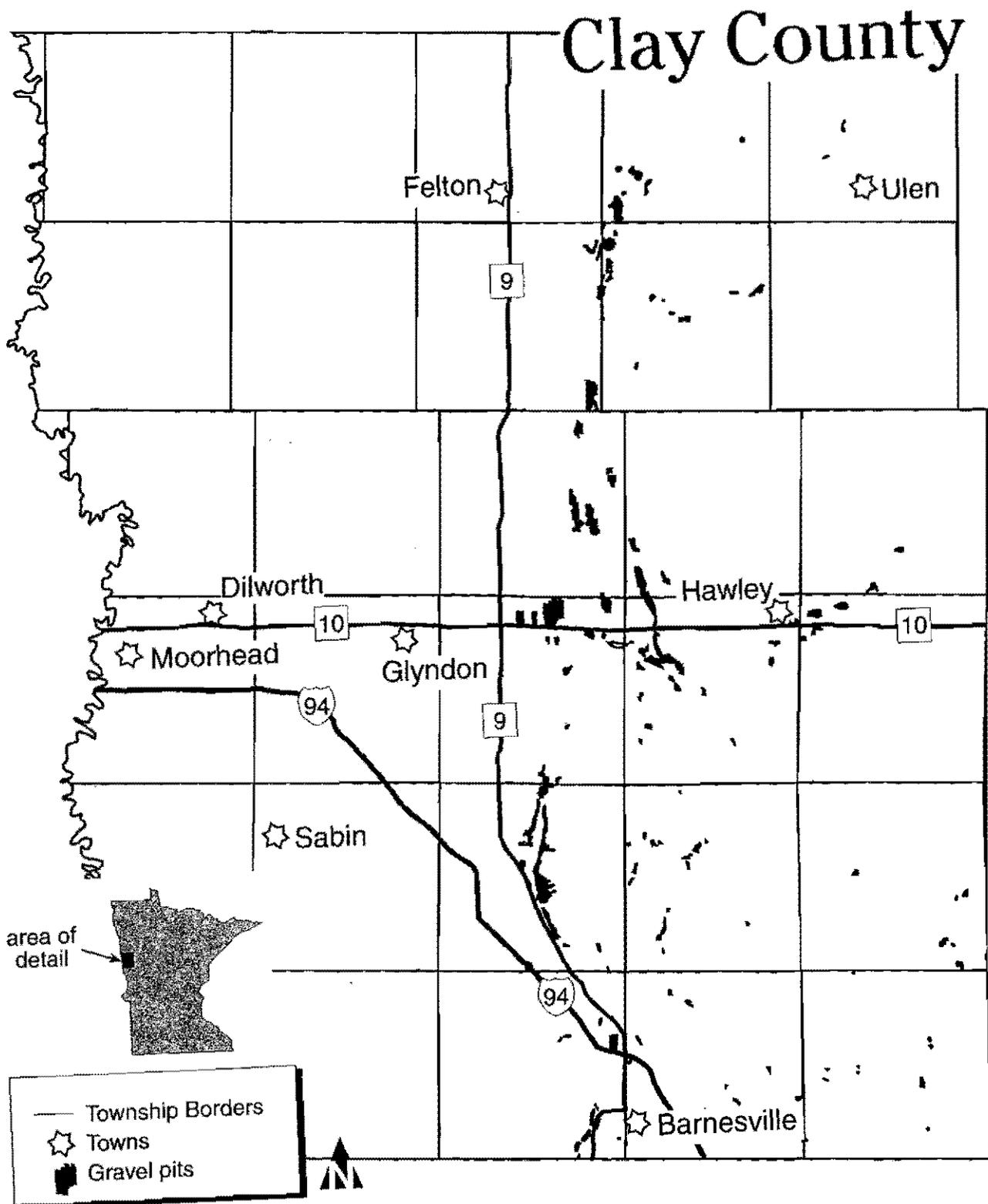
It takes a lot of hard work to mine sand and gravel from the ground. People use special machines like bulldozers, loaders, and conveyors to mine the gravel.



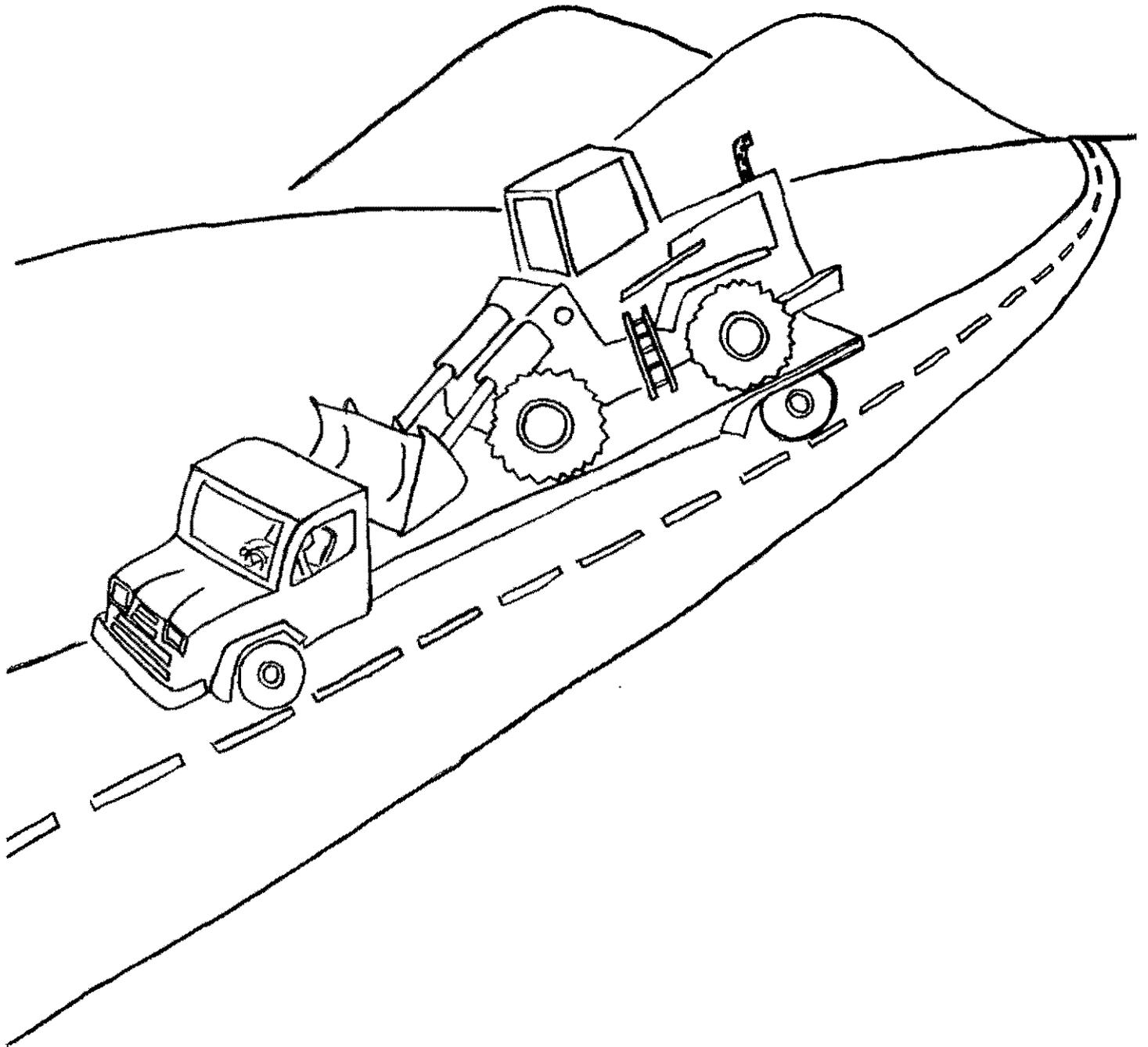
After removing the gravel from the ground, it often has to be washed before it can be used. Sometimes, gravel has to be crushed into different sizes and sorted before it can be used in building projects. The clean crushed gravel is then placed in piles at the mine site.



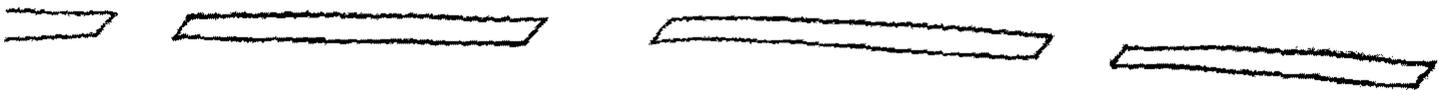
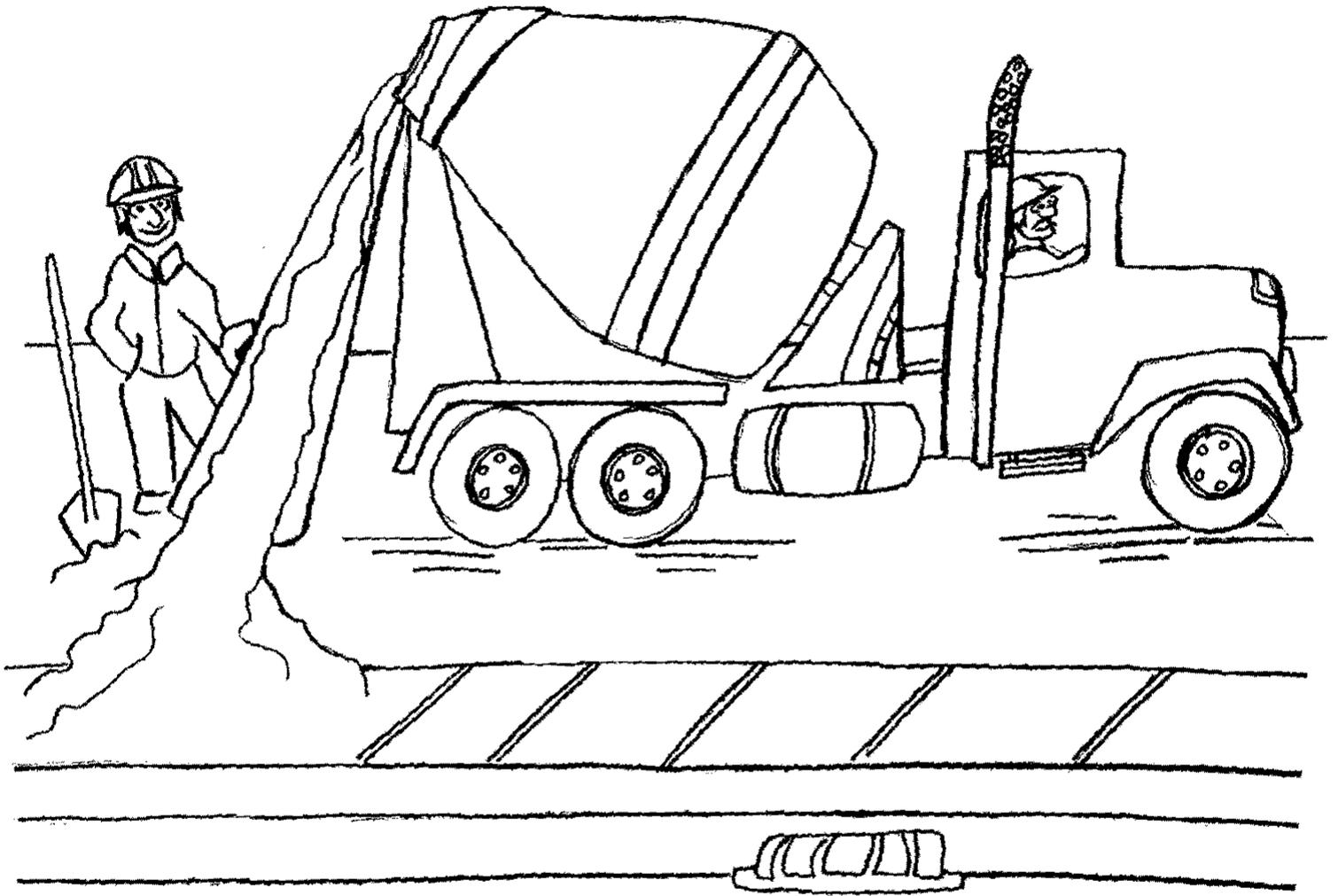
The mining, crushing and washing of the gravel takes place at the mine site. From the mine site, the gravel is loaded into big trucks and hauled to building sites or processing plants.



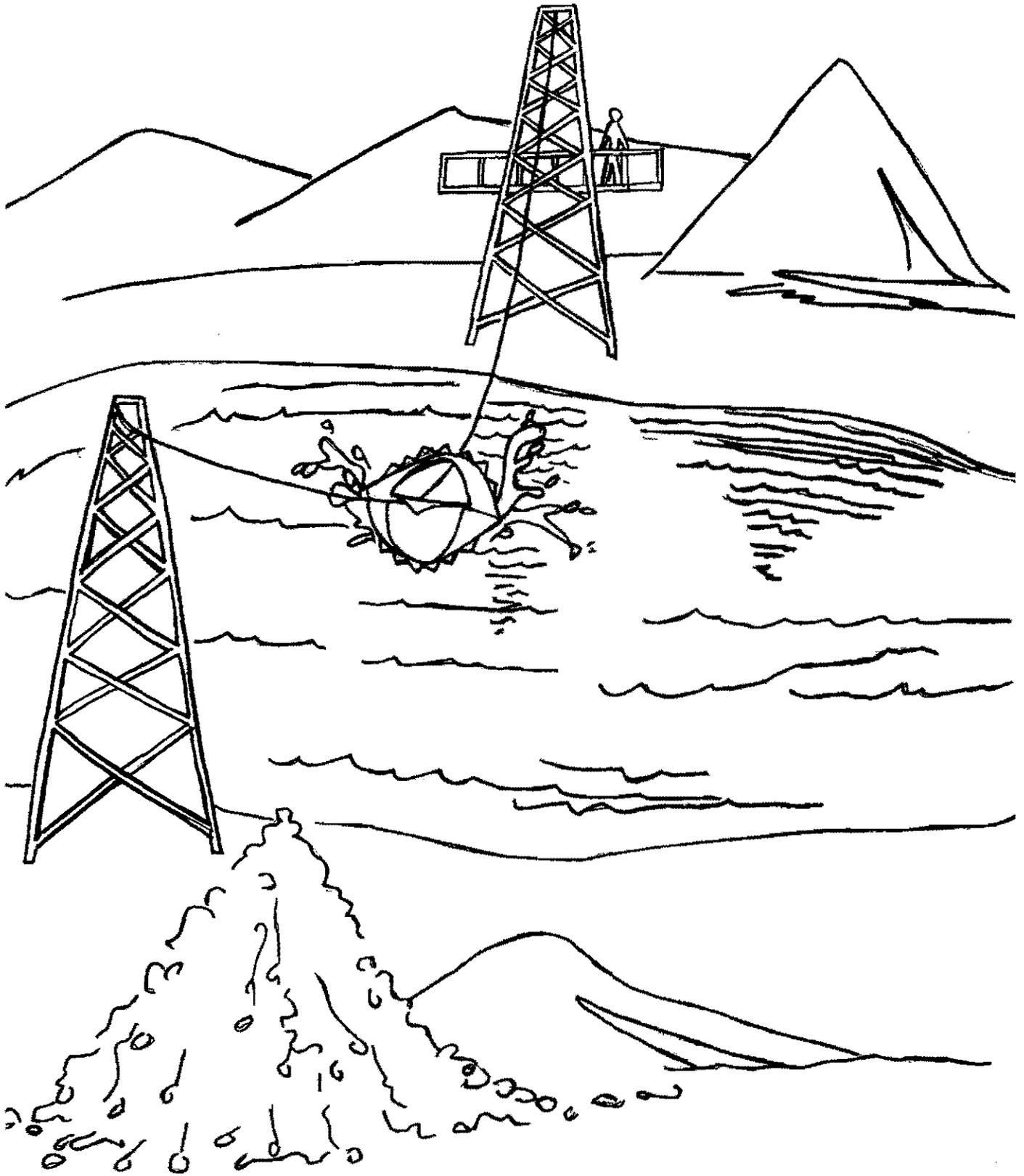
Gravel is very heavy. It is hauled from one place to another in big trucks. It is important to have mines scattered around so that the gravel doesn't have to be hauled so far. There are more than 200 gravel mining sites on the beach ridges in Clay County but only a few are being used at a time. This map shows the gravel mining sites and some of the main highways used to haul gravel.



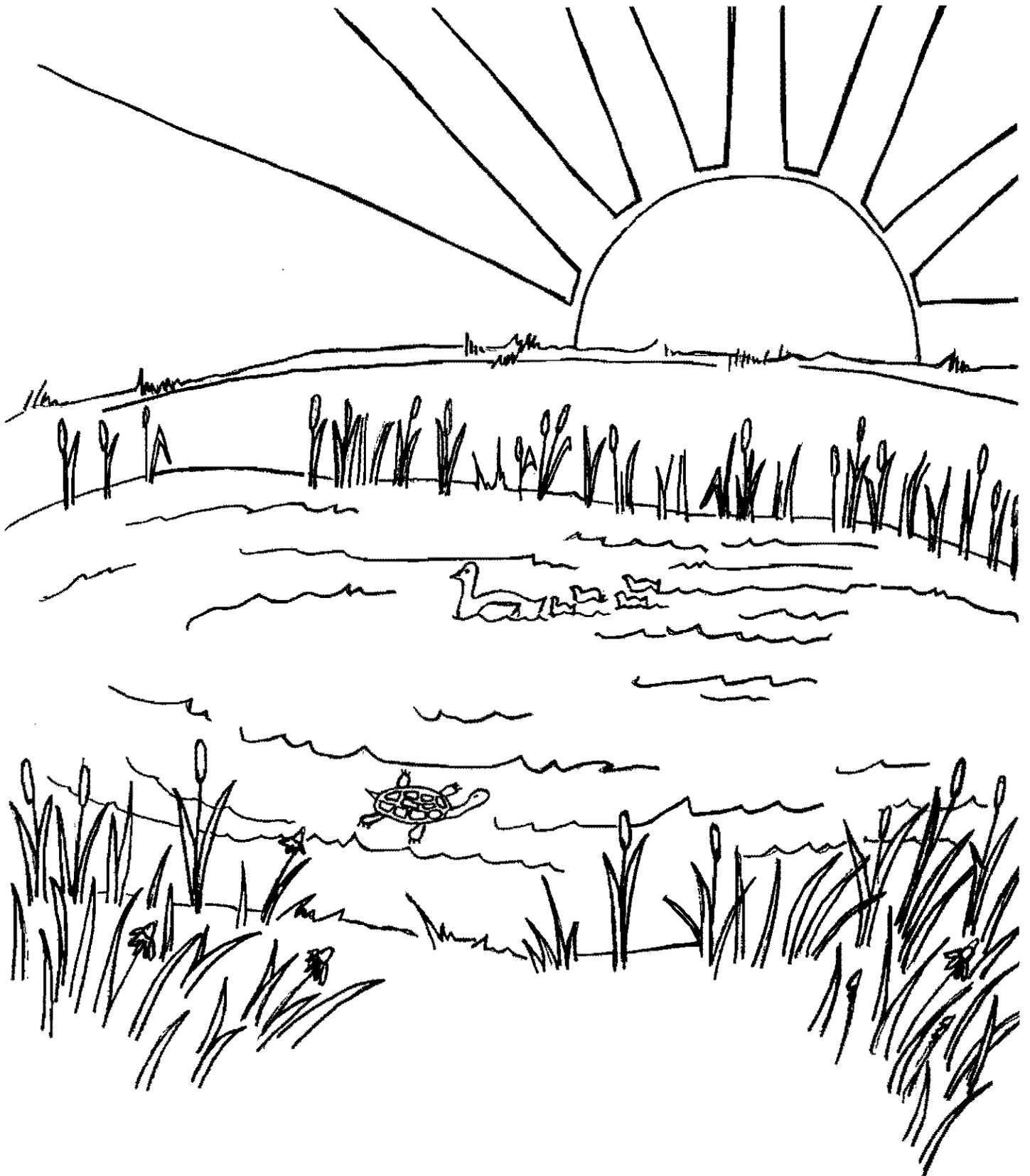
Many people who mine gravel have equipment that can be moved from one gravel mine to another. Having portable equipment helps to save money.



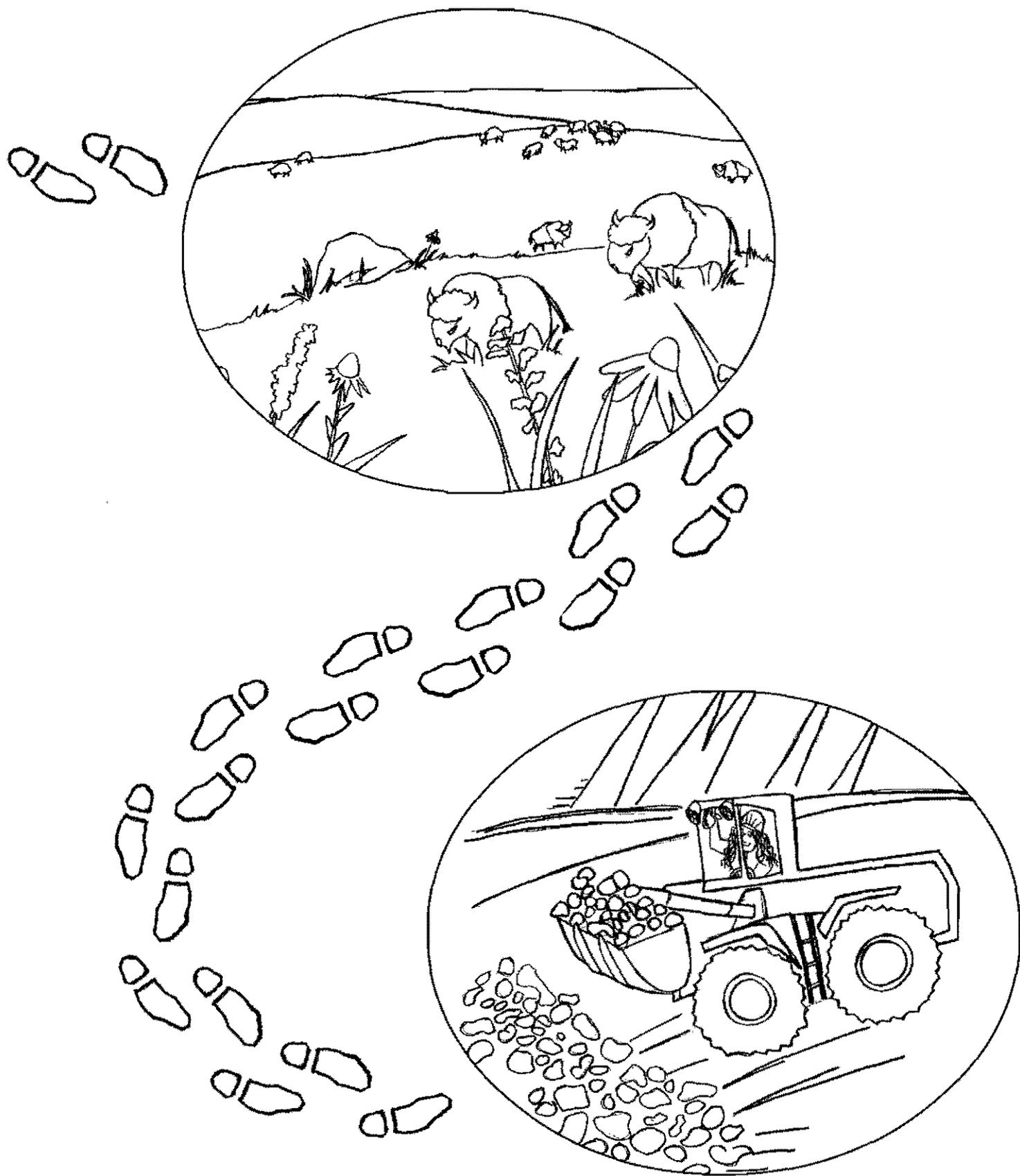
Gravel is not all the same. Some kinds of gravel have qualities that make it extra special. In Clay County, some companies mine a special kind of gravel that is used to make concrete. Concrete is used for sidewalks and building foundations among other uses.



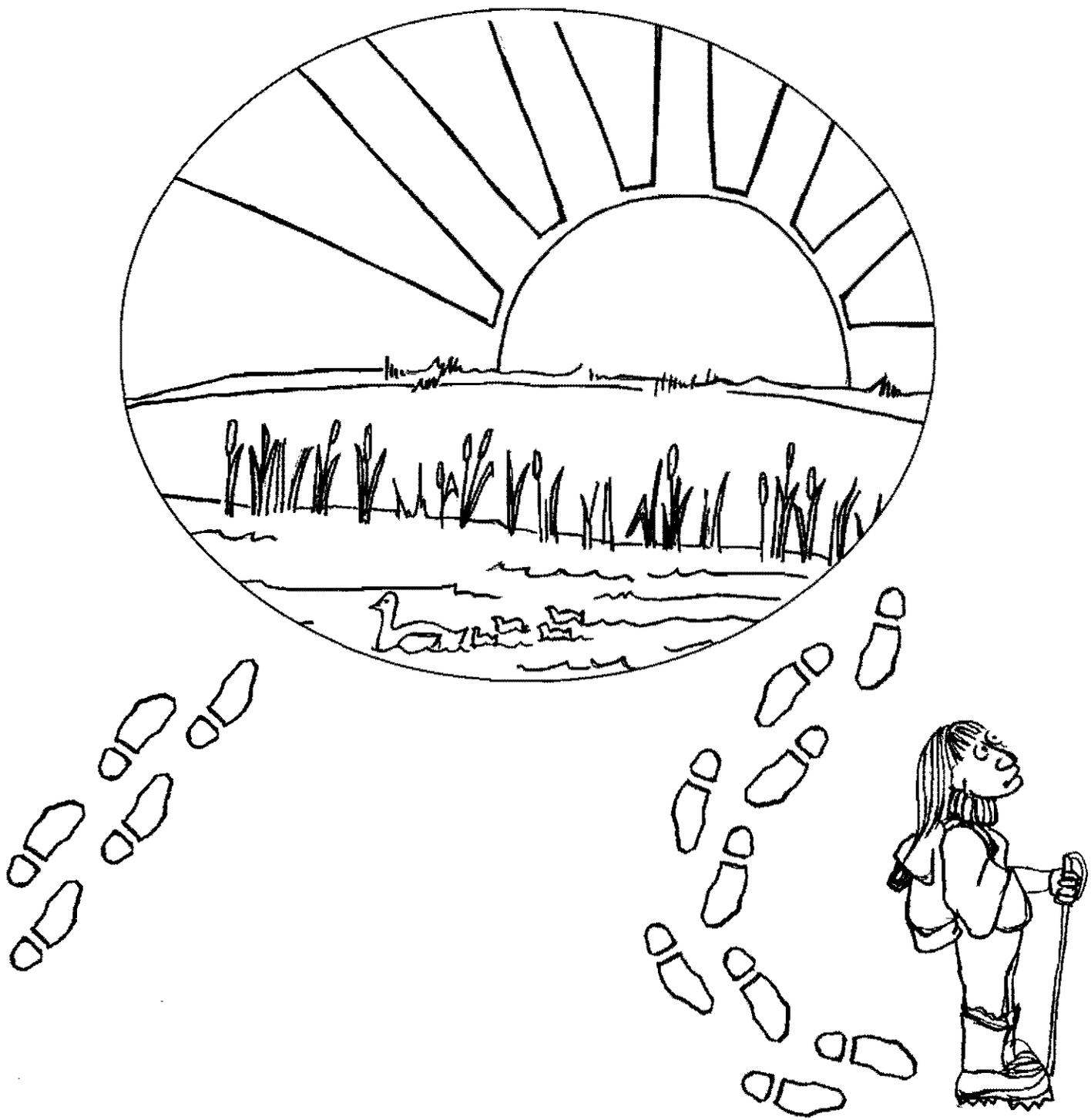
Sometimes, gravel is buried deep in the ground. Big machines called slacklines and draglines are used to mine gravel that is buried within the groundwater. This is a picture of a slackline. The bucket on the slackline is big enough to hold a car. After mining, a lake will remain at this mine site.



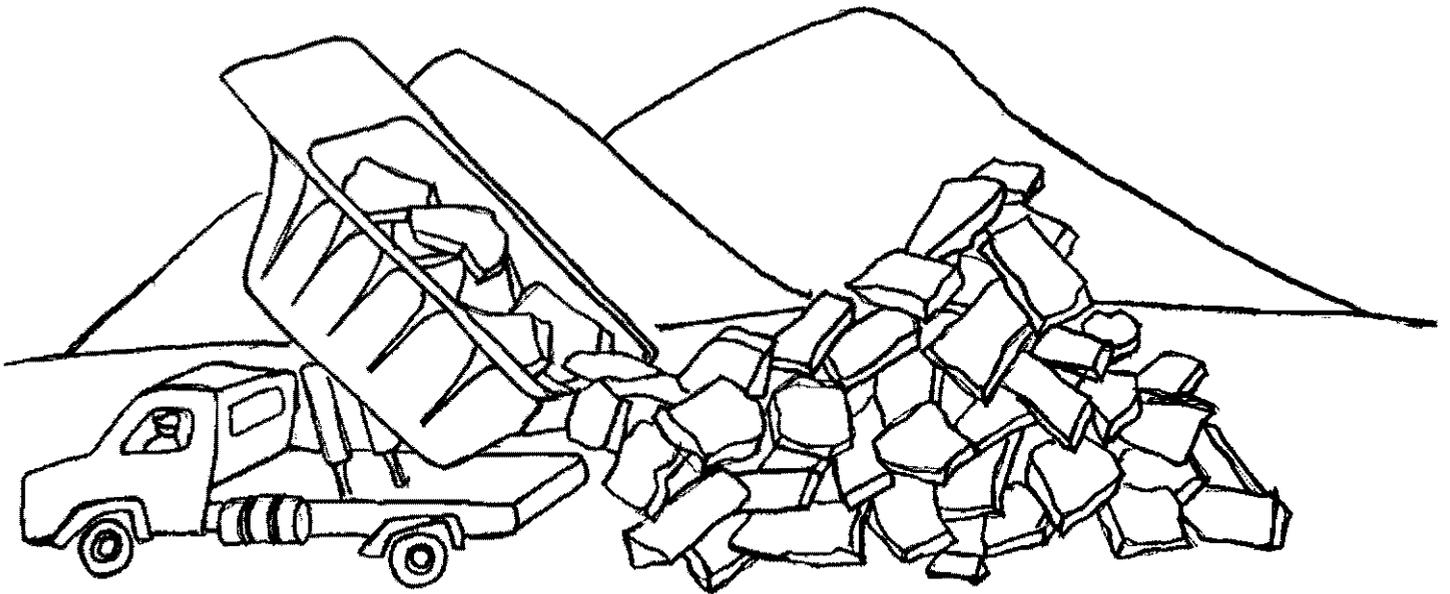
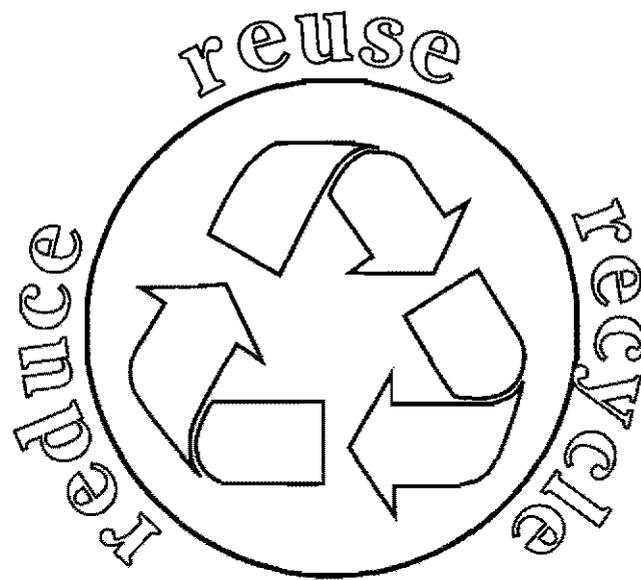
When the gravel is gone, many companies now reclaim the mine site. "Reclamation" means cleaning up a mine site and planting vegetation so that the land can be used again for another purpose.



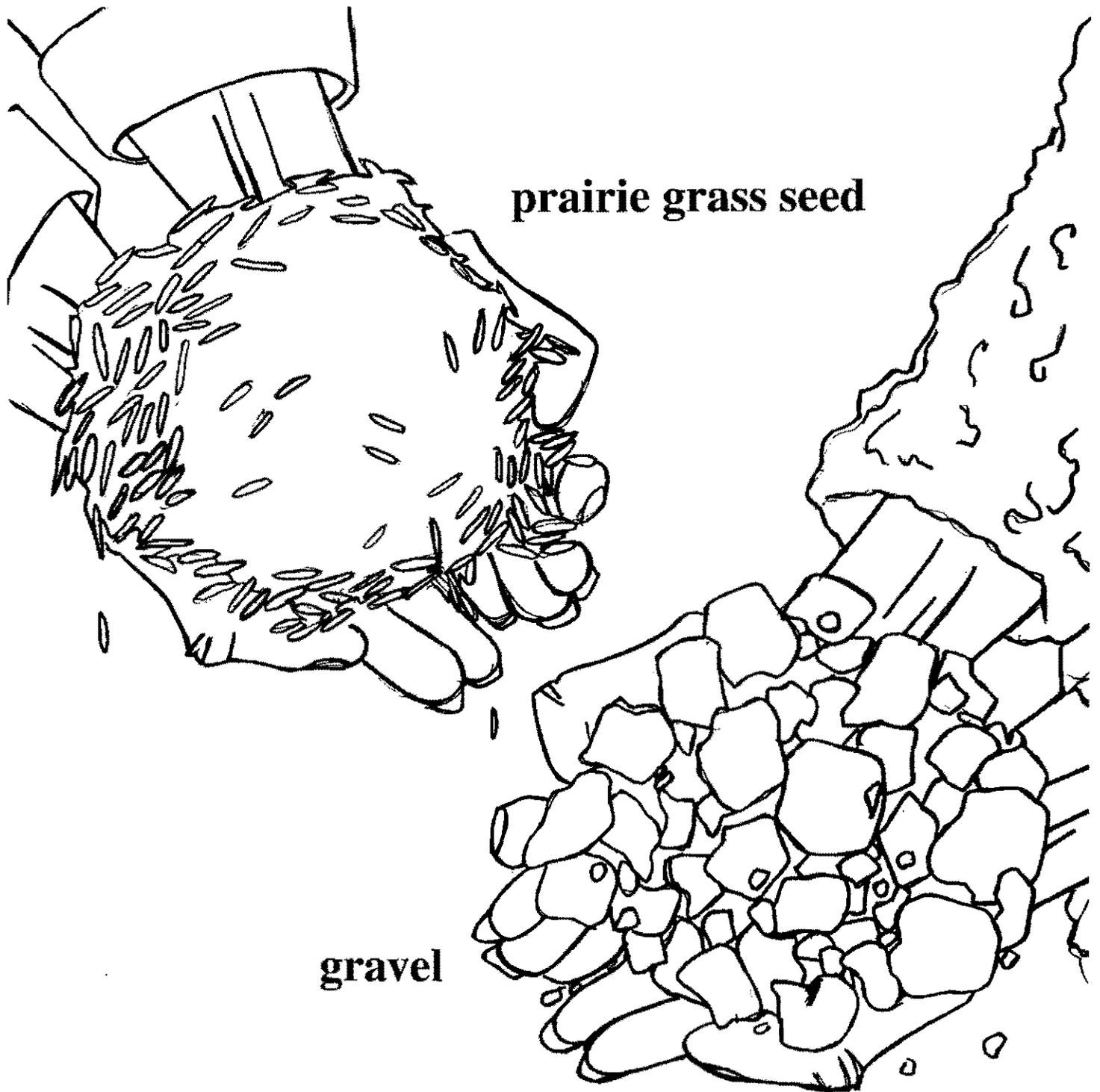
Return of the tallgrass prairie - from prairie to gravel pit back to prairie. Some gravel mining areas on the beach ridges have been reclaimed to prairie grasses.



Even with good reclamation practices, a restored prairie will never have exactly the same characteristics as the native prairie.



Did you know that concrete and asphalt pavement can be recycled? These days, when a building is torn down in your neighborhood or a road is repaved, the rubble is recycled. That means the chunks of old concrete and asphalt are ground up again for use some place else. Recycling is a good way to make the best use of our gravel resources.



The beach ridges found in the Red River Valley contain important natural resources for all the people of Minnesota. Because of the beach ridges, we can enjoy the prairie and the special animals and plants that live there. We also have a source of gravel to provide the building materials people need. Most people think that both prairie and gravel mining are important. Working together as partners, we can continue to have both in the future. What do you think?

Word Find Puzzle



Find these words in the word find puzzle.

TALLGRASS PRAIRIE

GLACIAL LAKE AGASSIZ

FLOWER

RED RIVER

ROCK

CONVEYOR

RECYCLING

BEACH RIDGES

PLOWING

ECONOMY

ELEVATION

BUFFALO

RECLAMATION

BULLDOZER

GLACIER

CEMENT

POPULATION

SLACK LINE

CLAY COUNTY

SOIL

TRUCK

ANIMALS

CRUSHER

BISON

JOBS

ORCHID

CONCRETE

ROADS

MINING

FIRE

BUTTERFLY

EXTINCTION

RESOURCES

Acknowledgments

The Clay County Beach Ridges Forum gratefully acknowledges funding for this project approved by the Minnesota Legislature, ML 1995, Chapter 220, Section 19, Subdivision 5(e), as recommended by the Legislative Commission on Minnesota Resources from the Minnesota Future Resources Fund.

In addition, the Forum would like to recognize the efforts of Rhonda Schrader for line art and Jean Miller for layout and design. Numerous source materials were supplied by staff from the sand and gravel industry of Clay County, the Fargo-Moorhead Metropolitan Council of Governments, the Minnesota Asphalt Pavement Association, the Minnesota Department of Natural Resources, the Minnesota Department of Transportation, Moorhead State University, and The Nature Conservancy.

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