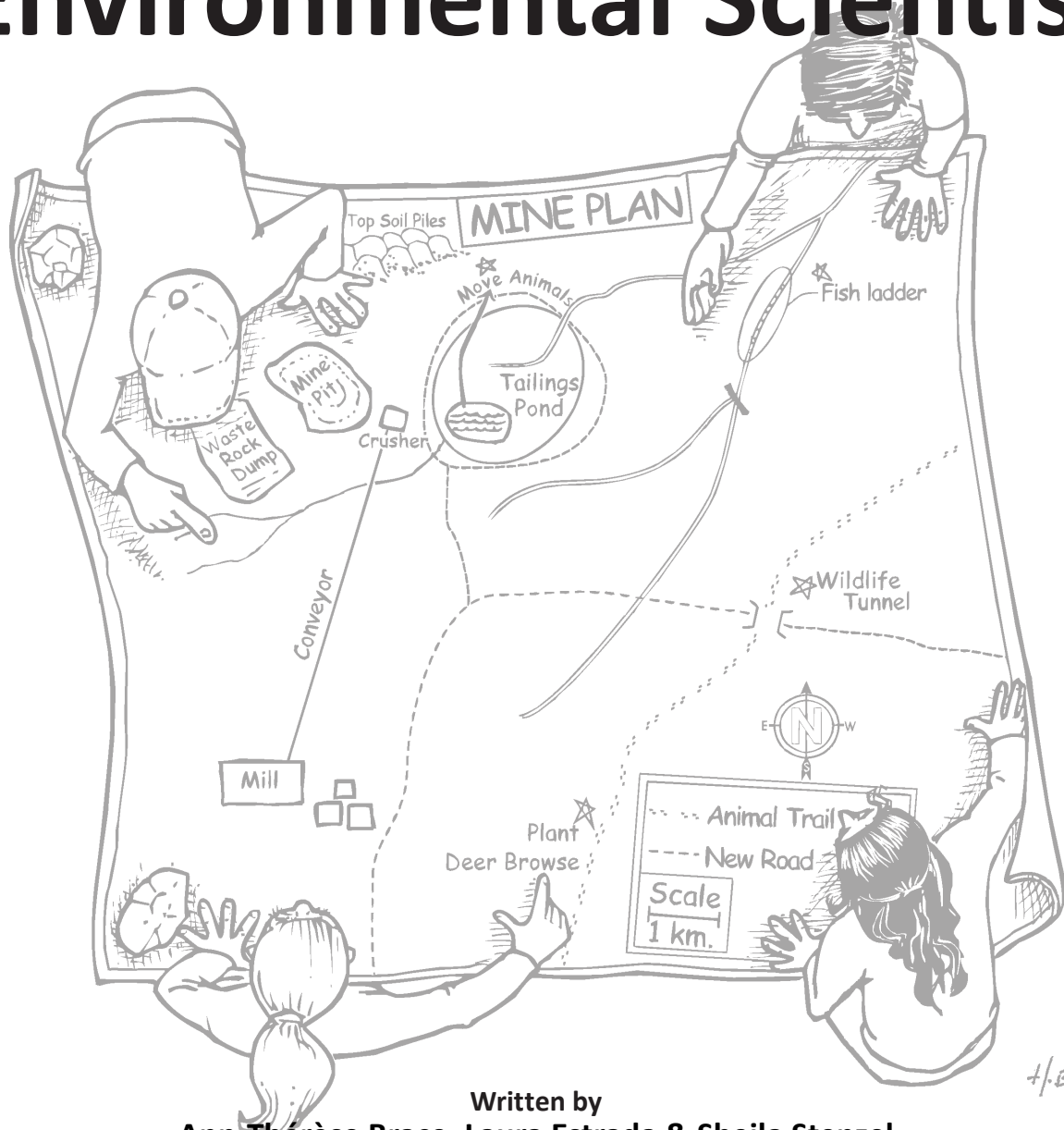


I am an Environmental Scientist



I am an Environmental Scientist



Written by
Ann-Thérèse Brace, Laura Estrada & Sheila Stenzel

Illustrated by
Heather Brown (*heathermarybrown.ca*)

Expertise by Golder Associates Environmental Scientists
Kate Moss, Kristine Novakowski & Linda Kemp

I am an Environmental Scientist is produced by MineralsEd in partnership with Golder Associates.

Preface

Environmental scientists are a group of skilled workers with a variety of educational backgrounds in science. They include biologists, chemists, geologists, geochemists, environmental technicians, environmental technologists, environmental engineers, hydrologists and others - people who help solve problems related to air, water, soil, habitat, plants, animals, or humans.

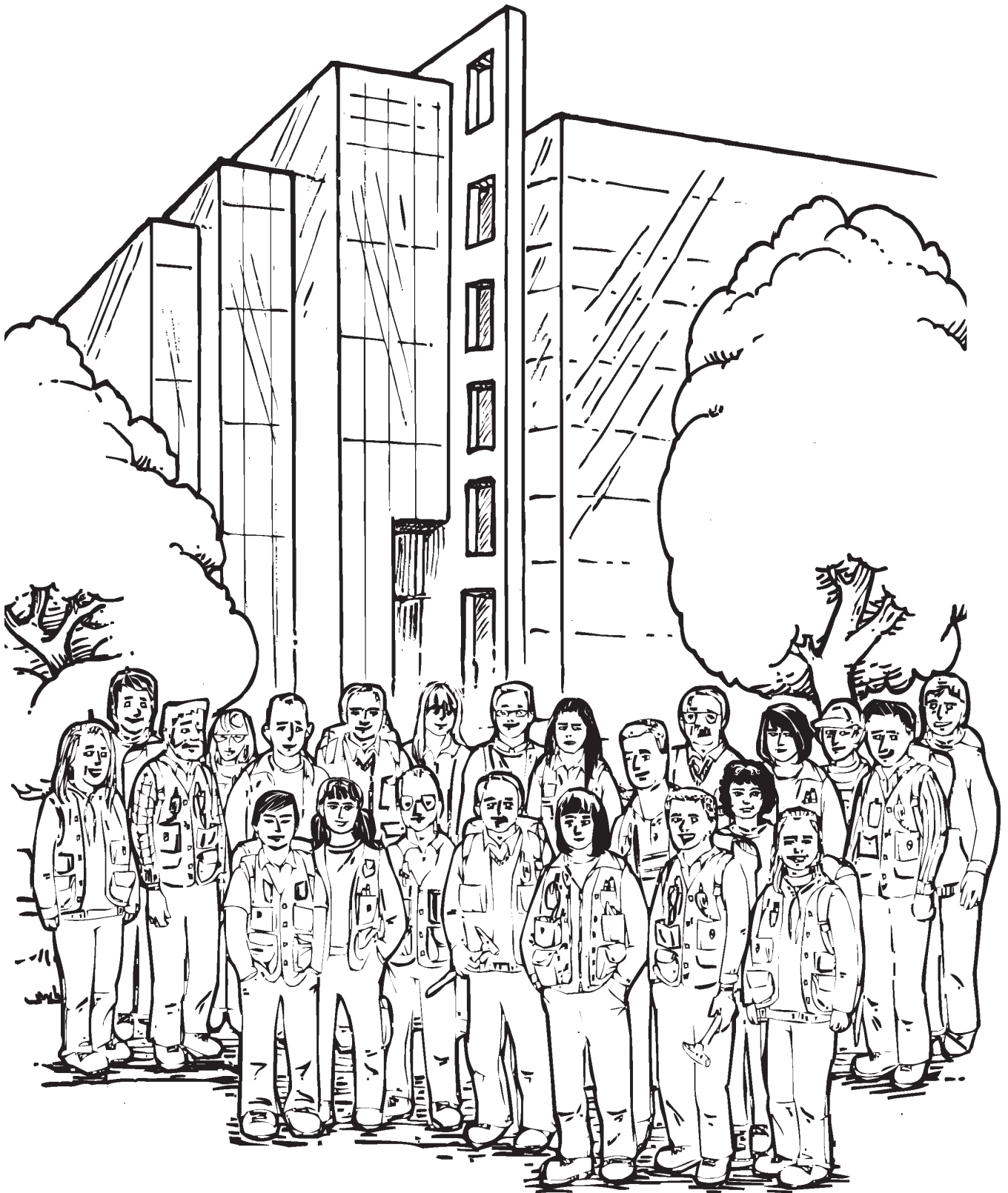
Environmental scientists work on all sorts of projects – any human activity on land, in or across rivers or lakes, along the sea shore, or on the seafloor, from constructing a suburban mall, to expanding an airport, to developing a shipyard, or building a mine. They work with rocks, plants and animals, air and water to prevent or minimize harm to the environment and to design solutions to, or compensations for, unavoidable impacts.

This is a story that focuses on the work of environmental scientists at different stages in mine development, from mineral exploration, to mine construction, to mine operation, and closure.

- Part 1 - Exploration Stage - Baseline Study
- Part 2 - Building and Operating a Mine
- Part 3 - Reclaiming and Closing a Mine

The environmental scientists jobs include: completing a baseline study of the proposed mine site, designing plans to prevent harm and minimize mining's impact on habitat, ongoing monitoring of the effects of mining activity on water, plant and animal life and nearby communities, and devising a complete plan to reclaim the site.

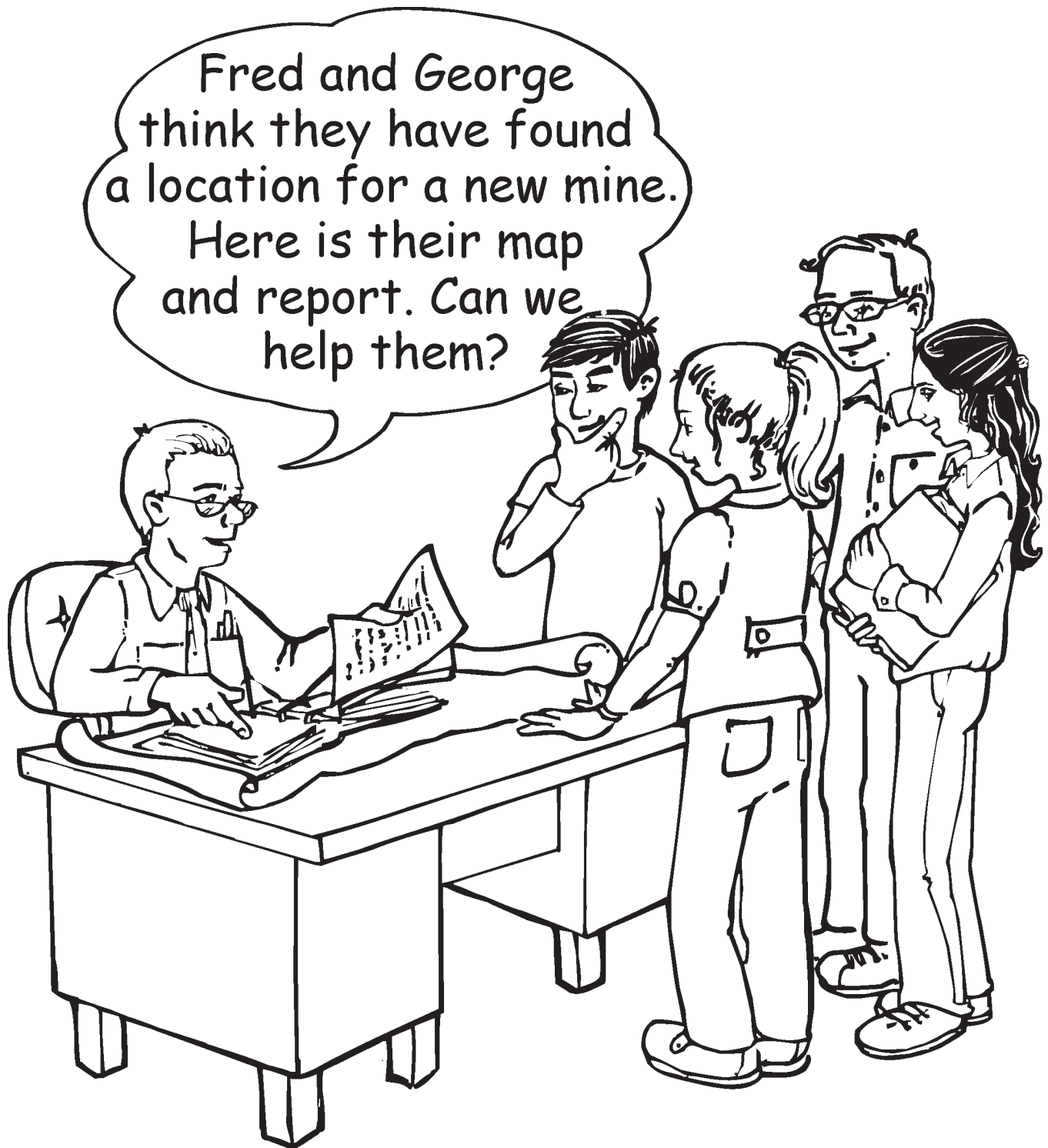
It is important to know that environmental scientists are also key to repairing environmental damage at abandoned mines that were closed during a time when it was not considered an obligation to protect the water ways, restore habitats and return the land for other purposes.



We are all environmental scientists. Our job is to investigate and protect the Earth. We help protect air, water, soil, plants, animals and people.

PART 1 - Exploration Stage - Baseline Study

Geologists explore to find valuable minerals. They discover where people might want to build a mine.



Then, the geologists call us, the environmental scientists, to help them.

PART 1 - Exploration Stage - Baseline Study

The first step is a baseline study of the location.



We go to the place where the mine might be built. We need to learn about the plants, the animals and the water that are there. Each environmental scientist has a different job to do. We all work together. It's called team work!

PART 1 - Exploration Stage - Baseline Study



First, we make a map. We label hills, valleys, trees, grasses, streams and ponds on the map. Then we investigate what kinds of plants and animals live in these areas. We call an area a habitat. We take pictures and videos, too.

We make a plot with stakes and string. Then, we make a list and count all the plants.



Which plants do you see? Count the plants in the plot.

PART 1 - Exploration Stage - Baseline Study



An environmental scientist needs to know about the different kinds of animals that live in the area. Help me count the wildlife (birds and animals) in their habitats.

We also take samples of the water from streams and ponds. We put the water in bottles. The bottles are sent to a lab and are tested to check how clean the water is.



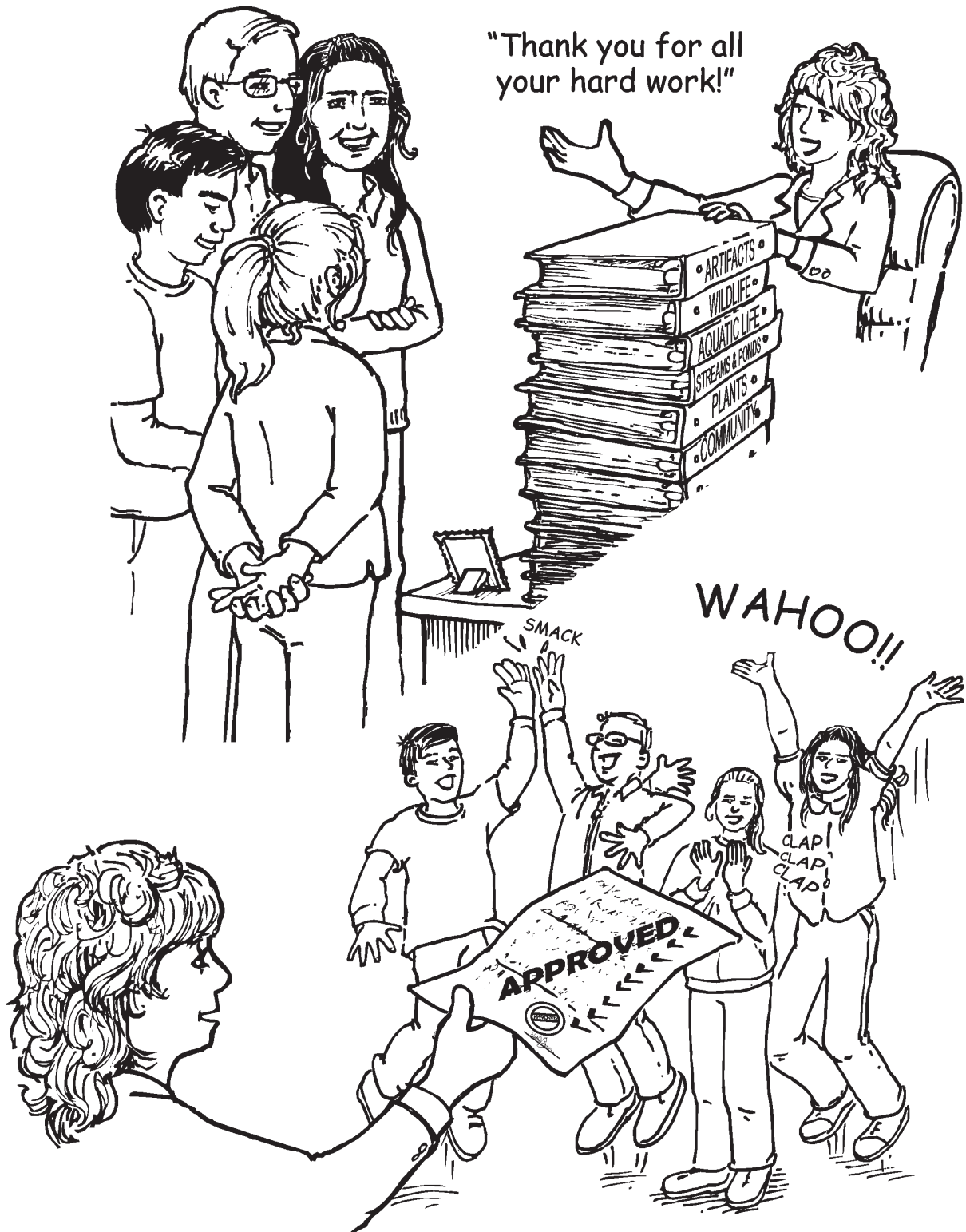
When we count salmon in the streams, we are learning how good the fish habitat is. Help Brian count the fish. How many numbered fish can you find?

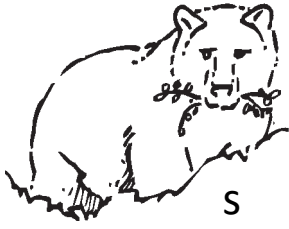
PART 1 - Exploration Stage - Baseline Study



Environmental scientists work together with archeologists. We dig in the soil to uncover artifacts. These artifacts might be animal bones or pieces of pottery. We save everything to remember the history of First Nations people who were here before us. You might see these types of artifacts in a museum.

When our first investigations are done, we send all our reports to the government (Ministry of the Environment). If our plan is good, the government tells everyone the mine can be built.





Wildlife Word Search

s h s b b z r b q w d n s c
m a e r w z e l q g f o k z
w u l r c i v u w r n i u w
c t s a a f a e h m t l n z
t a r s m e e b v v e n k g
d y d o o a b i a g p i m g
e i o c l p n r g l r a k j
d s l i g l i d t w s t z a
e c a y z e e e e o a n h j
e n m o u s e a l r g u a y
s a m o u n t a i n g o a t
g e g i y v b r e e d m h m
c b d l k n u m p i h c q y
p n t x e e r x y x d y s y

bear
chipmunk
moose
mouse
salamander



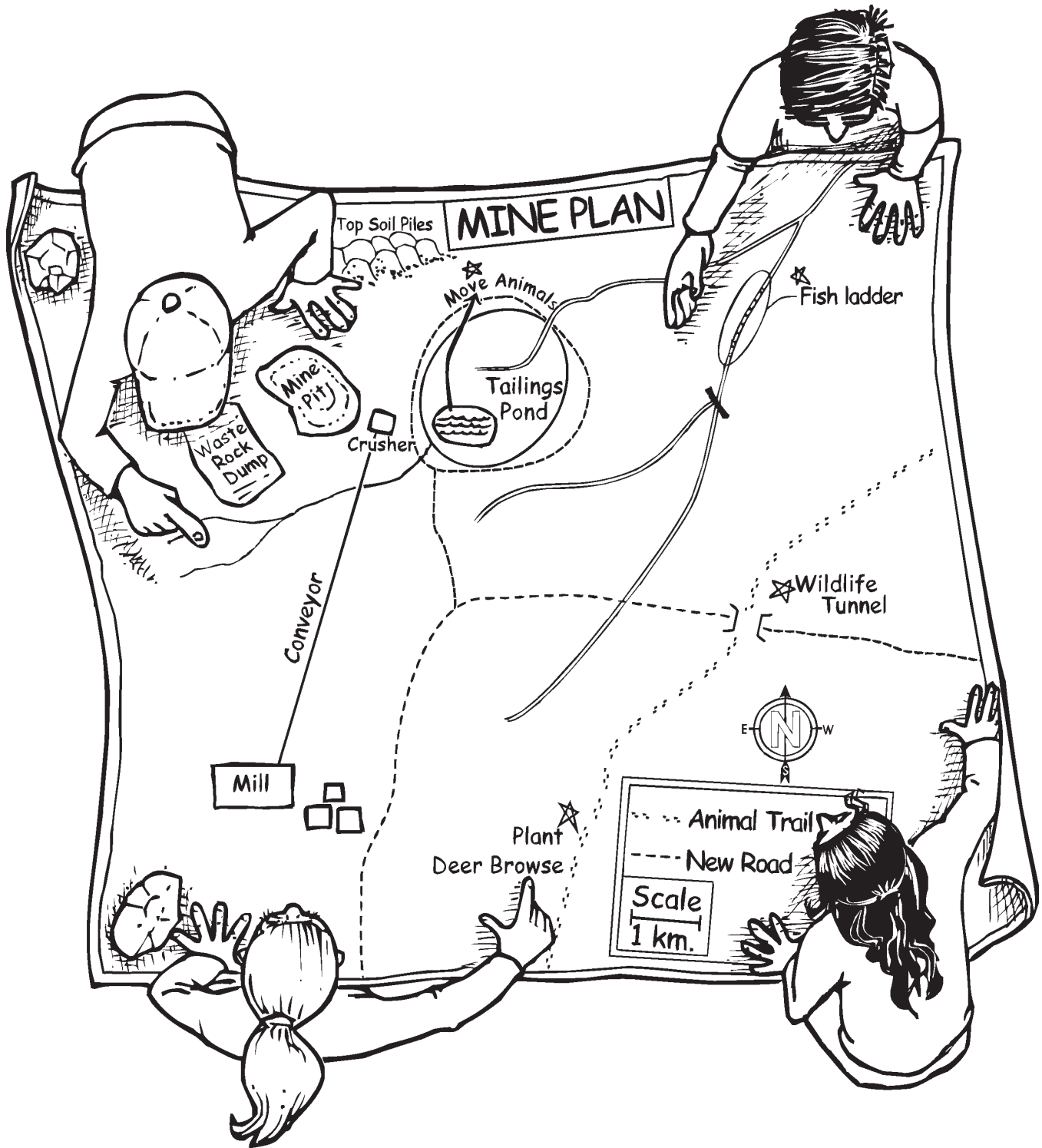
beaver
deer
mountain goat
owl
skunk

bluebird
eagle
mountain lion
possum
snail



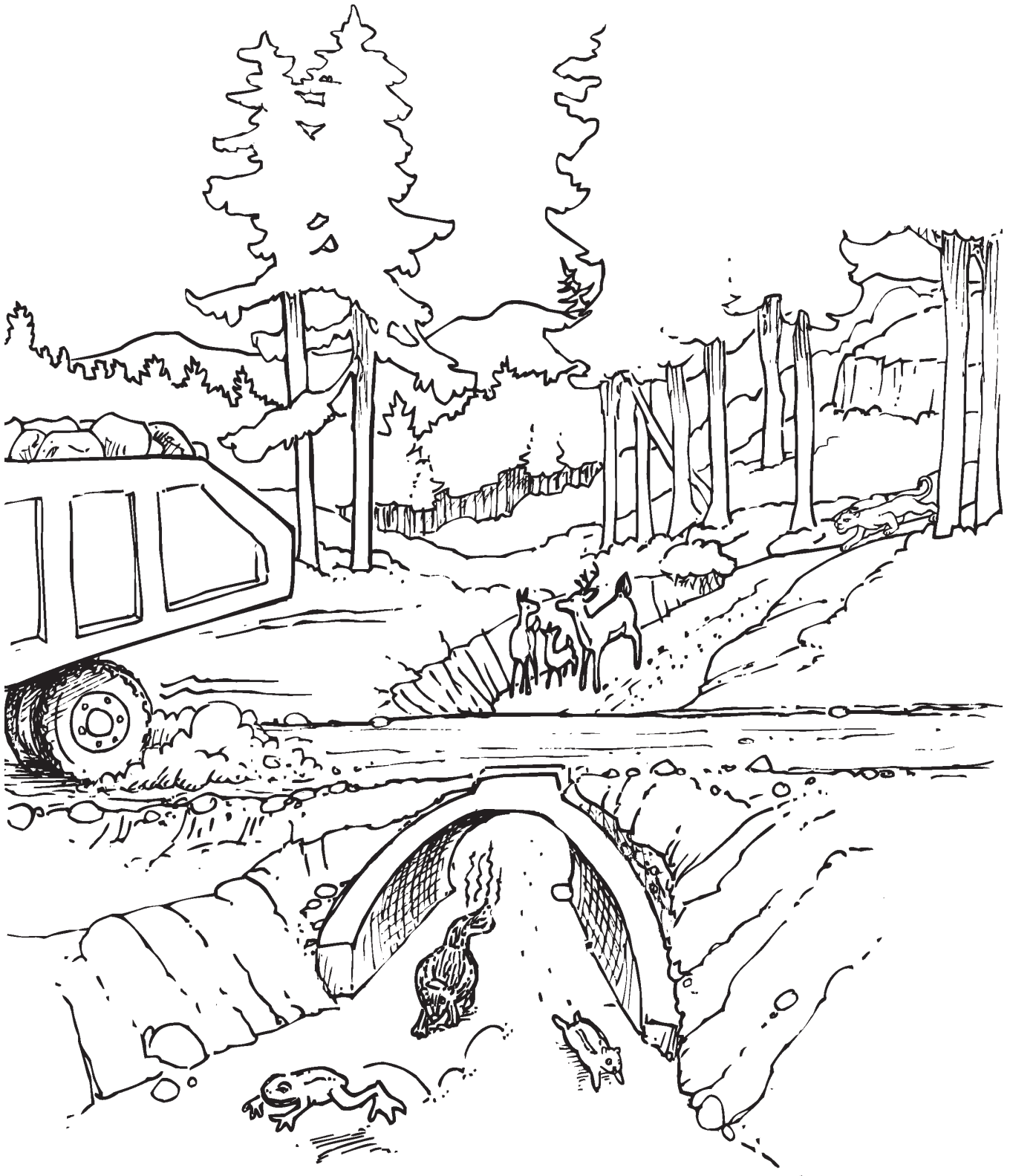
PART 2 - Building and Operating a Mine

Building a mine will take 2 to 5 years!



While the mine is being built, the team of environmental scientists has more work to do.

PART 2 - Building and Operating a Mine



For example, we might make a tunnel under a road to help wildlife get from one side of the mine to the other side of the mine to get food.



To protect some animals on the mine site, we must move the animals! Help me move the frogs from Frog Pond to their new home in Duck Pond! Trace the path with your finger.

PART 2 - Building and Operating a Mine



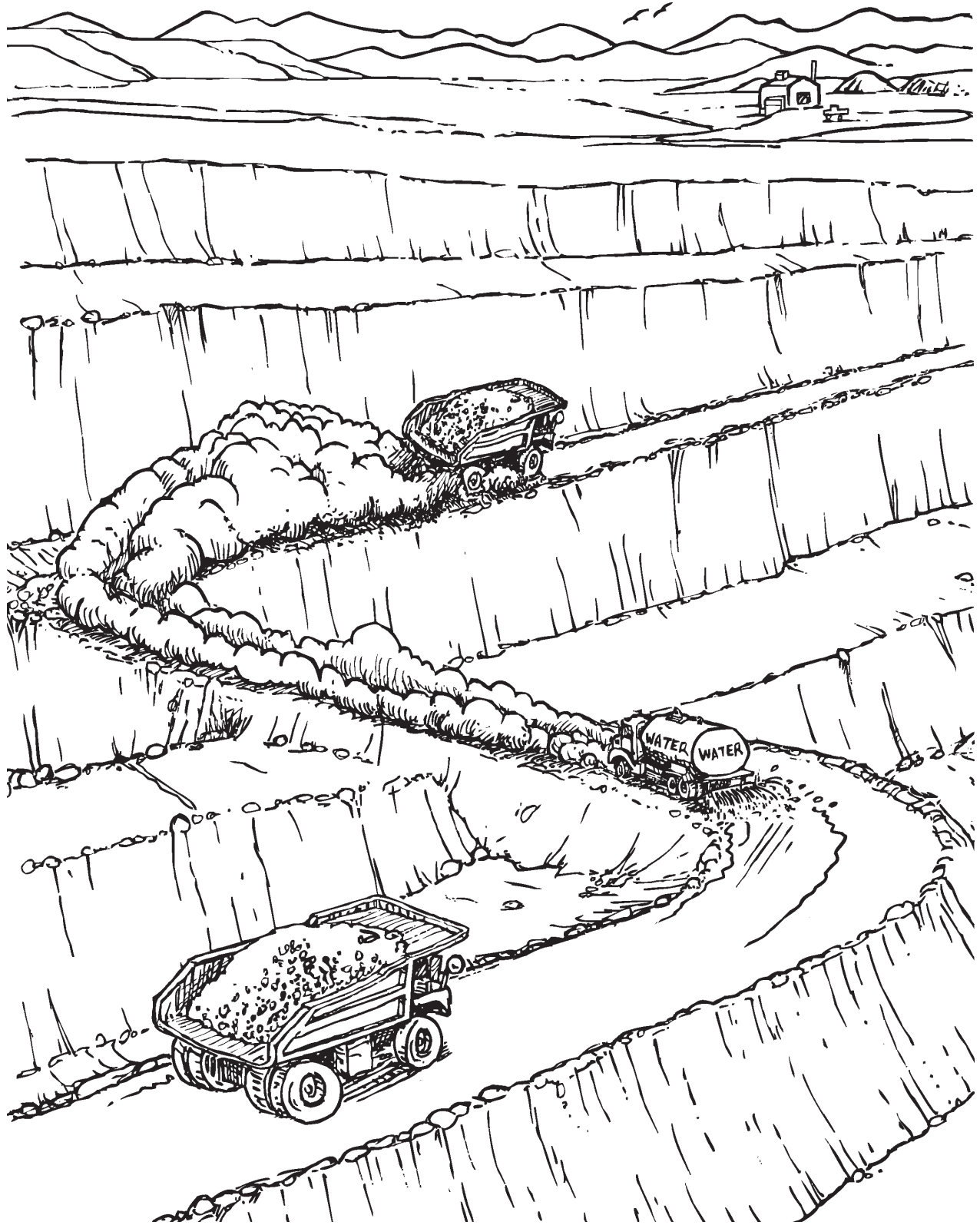
To help salmon lay their eggs environmental scientists build a fish ladder. Connect the numbered wooden stakes to see how a fish ladder looks!

At last the mine is in operation! Do you see the buildings and equipment? The miners are busy!

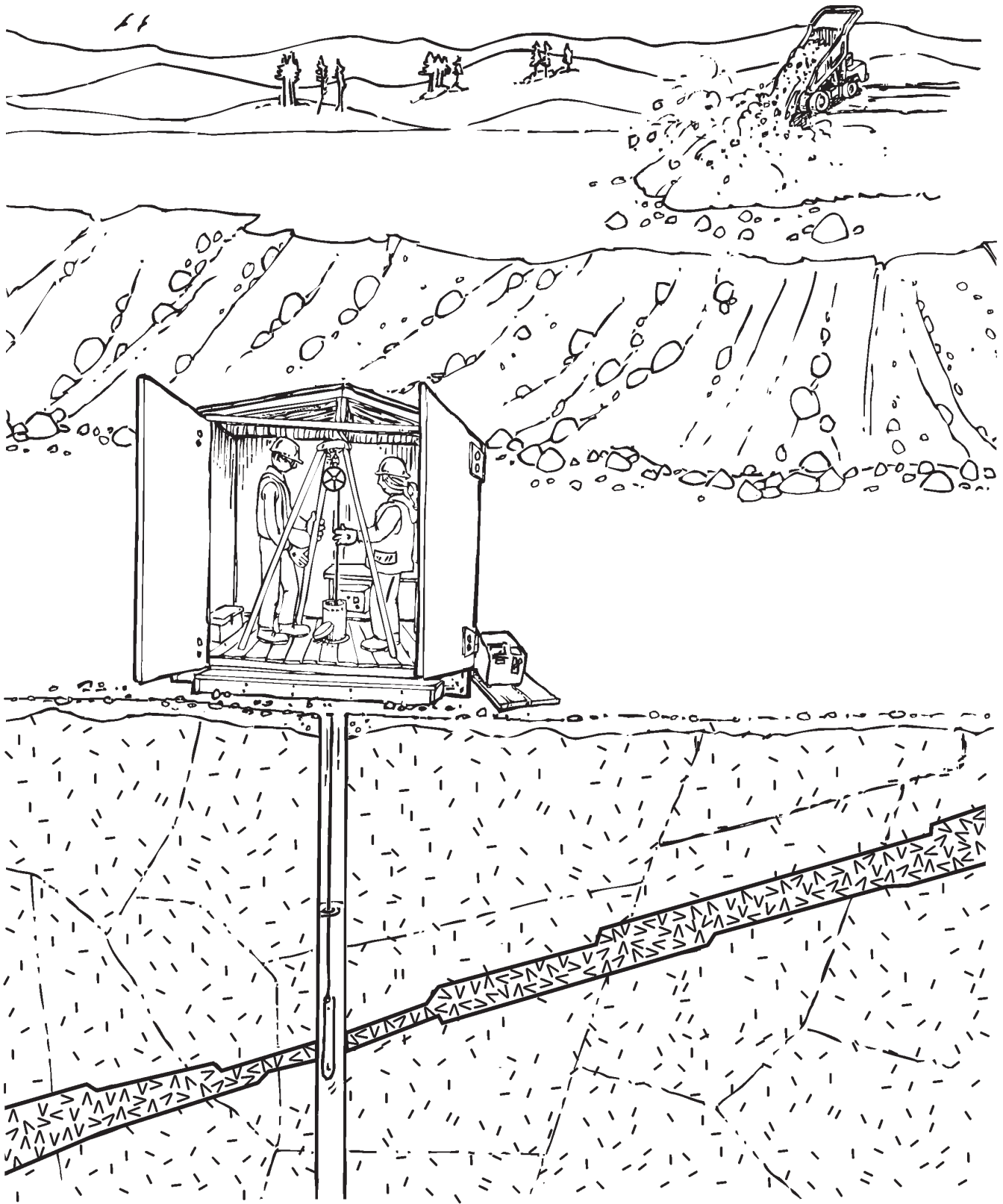


We are too! We have many more difficult jobs still to do. I have started already. I'm planting trees.

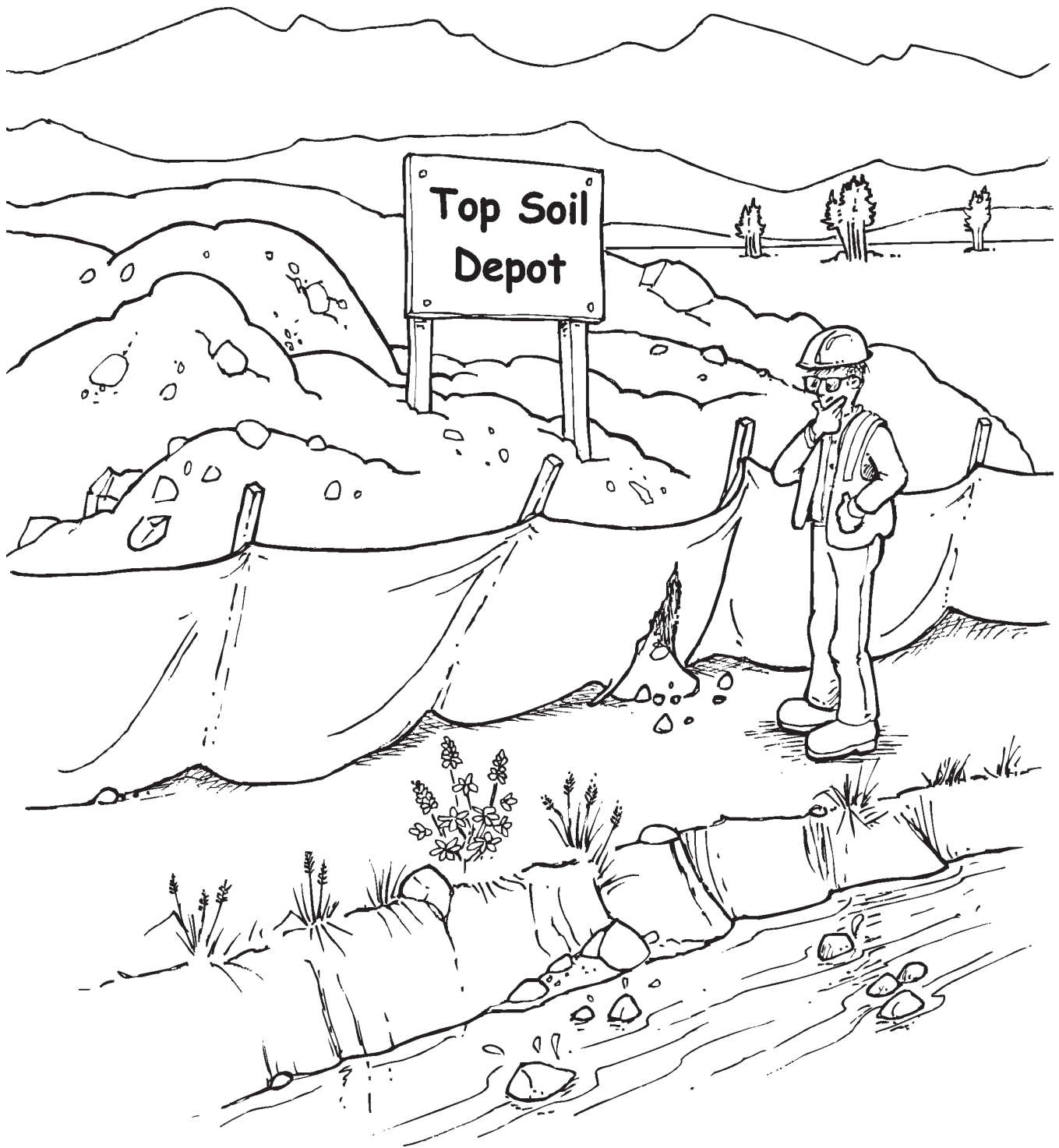
PART 2 - Building and Operating a Mine



Sometimes, we need to solve problems. Big trucks on the mine roads make too much dust! To help keep the air clean we put water on the roads using a water truck.



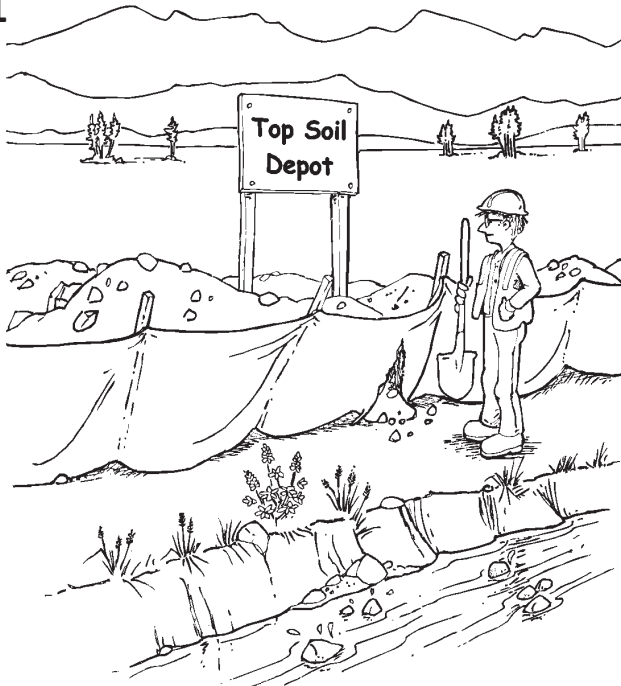
We sample and test the water in the streams and the groundwater every week too. We make sure that no excess sediment or metals are polluting the water.



Sometimes we build sediment fences to help keep streams clean. We are worried about this fence – the dirt pile is too big. The fence is ripping. Can you see the tear in the cloth?

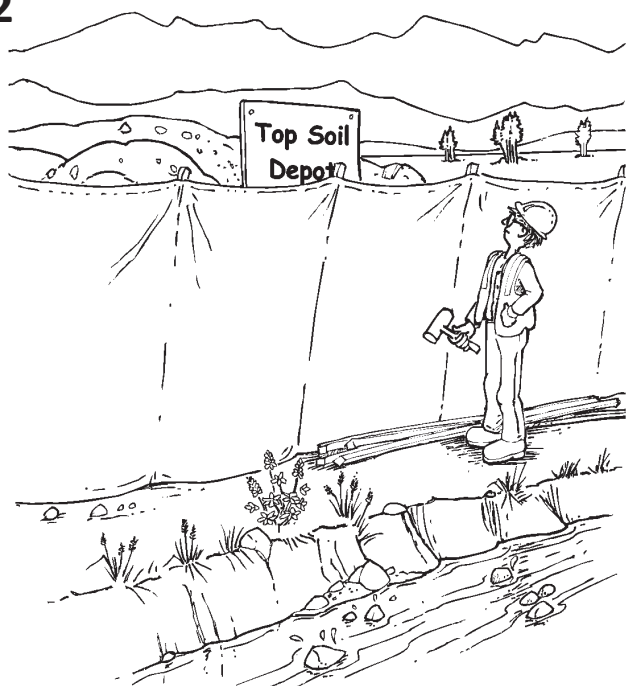
What would you do? Circle your answer(s) to solve this problem.

1



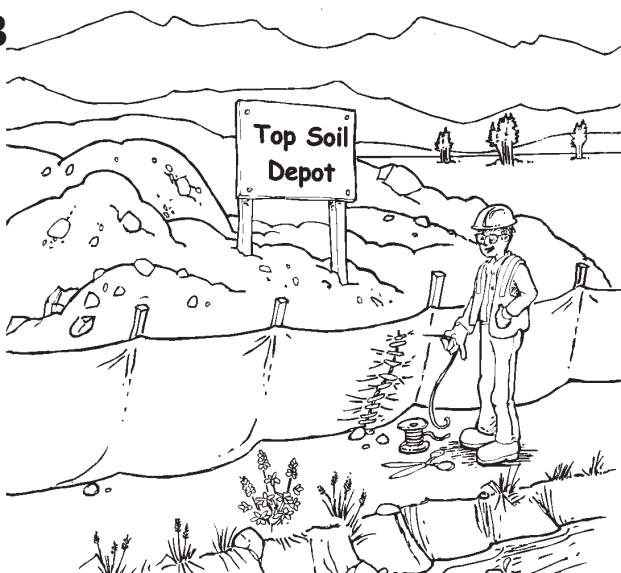
Make the soil pile smaller.

2



Make the fence higher.

3



Fix the hole.

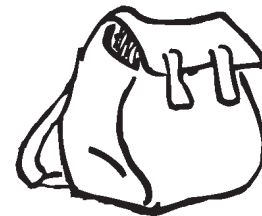
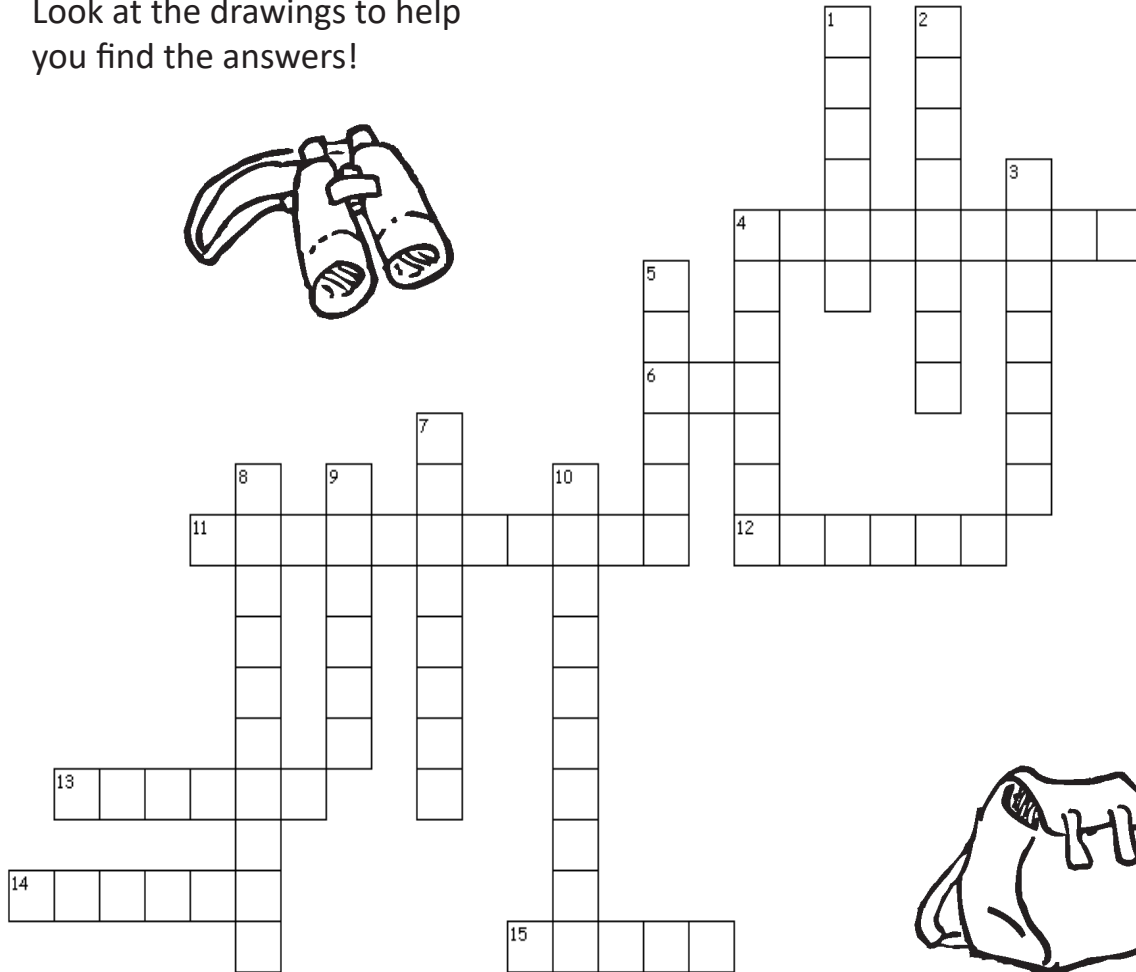
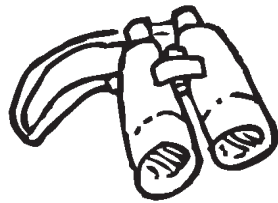
4



Cover the soil pile with a tarp.

Environmental Scientist Gear Crossword

Look at the drawings to help you find the answers!



Across

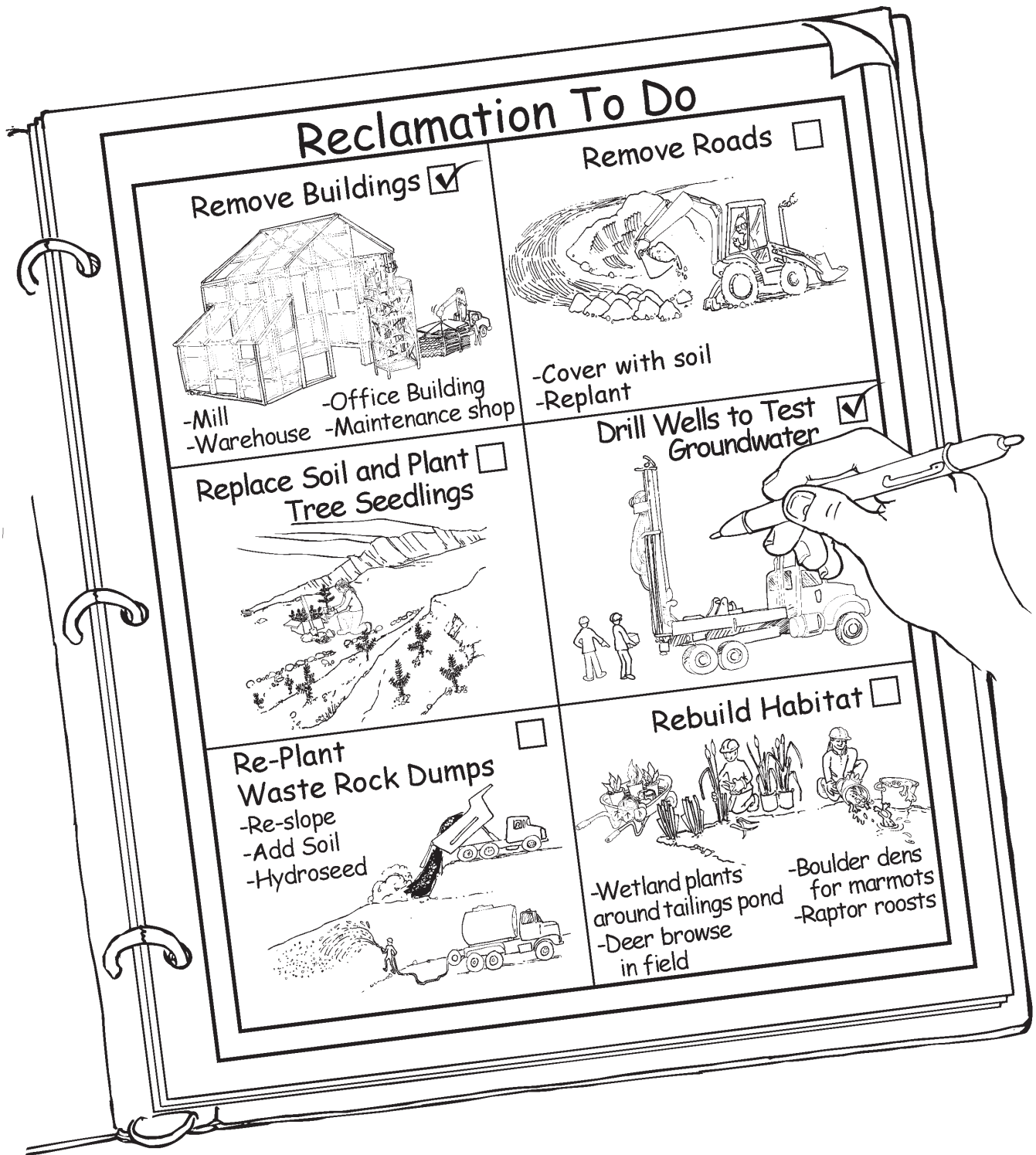
- 4. This holds my paper and makes it easy to take good notes.
- 6. This shows me where things are and helps me travel to where I need to go.
- 11. I used this to record what habitats look like.
- 12. This is my best tool for digging.
- 13. I use this to collect water for testing.
- 14. I use this to break up rocks.
- 15. I use this to dust off any artifacts I may find.

Down

- 1. I use this to write my notes.
- 2. I put my notes in this.
- 3. This protects my head.
- 4. I use this to tell direction.
- 5. I use this to take photos.
- 7. I use this to carry all of my things when I am in the bush.
- 8. These allow me to see wildlife far off in the distance.
- 9. I write this after my studies. It shows all of my findings.
- 10. I use this to travel to remote areas.

PART 3 - Reclaiming and Closing a Mine

When the mine closes, we follow our plan to return the land as much as possible to the way it was before. This is called reclamation.



Reclamation makes it possible to use the mine site in other ways.

PART 3 - Reclaiming and Closing a Mine

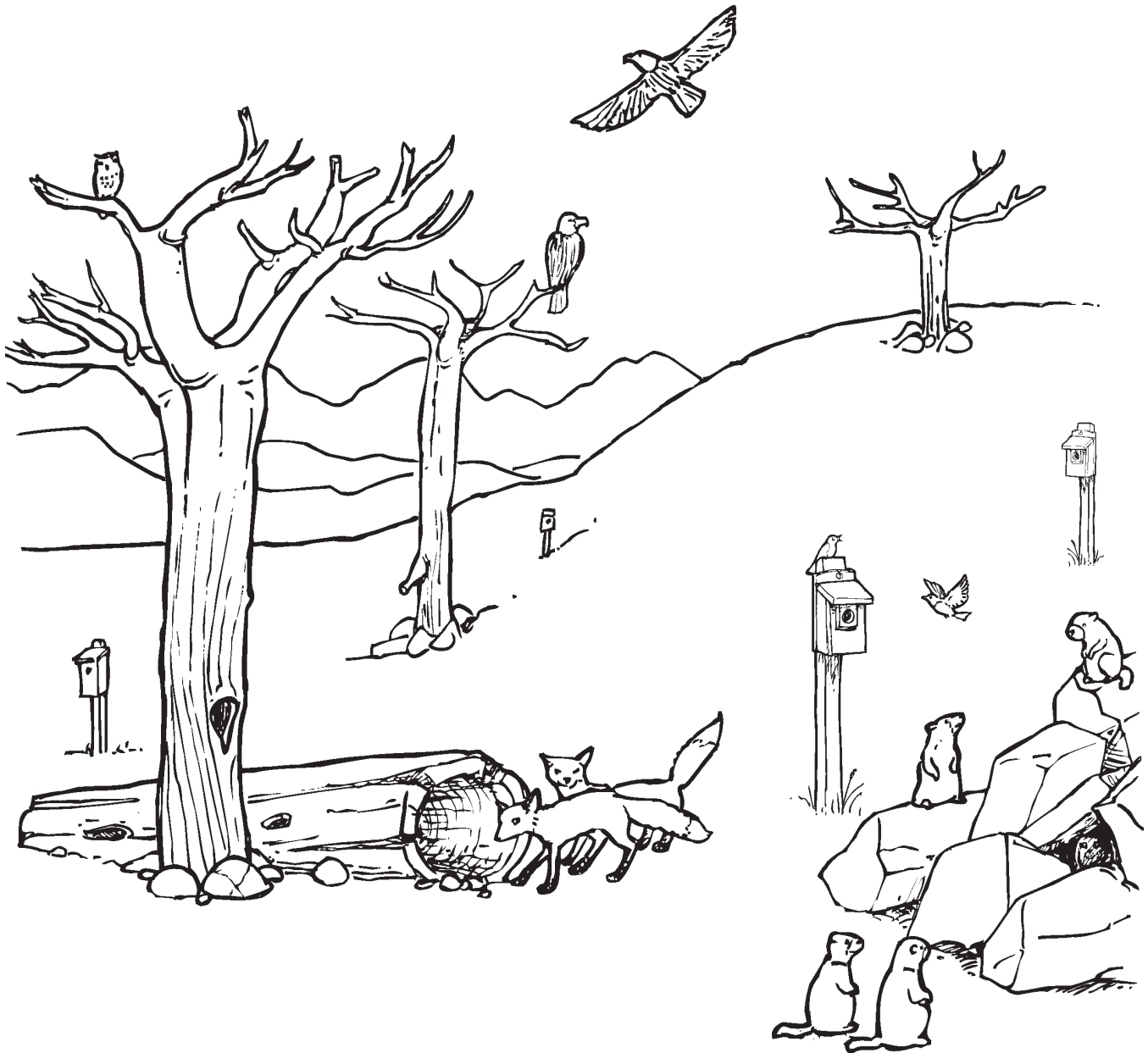
We continue to sample and test water from the ponds, streams and wells again and again.



We want to make sure the water is still safe for everyone and everything.

PART 3 - Reclaiming and Closing a Mine

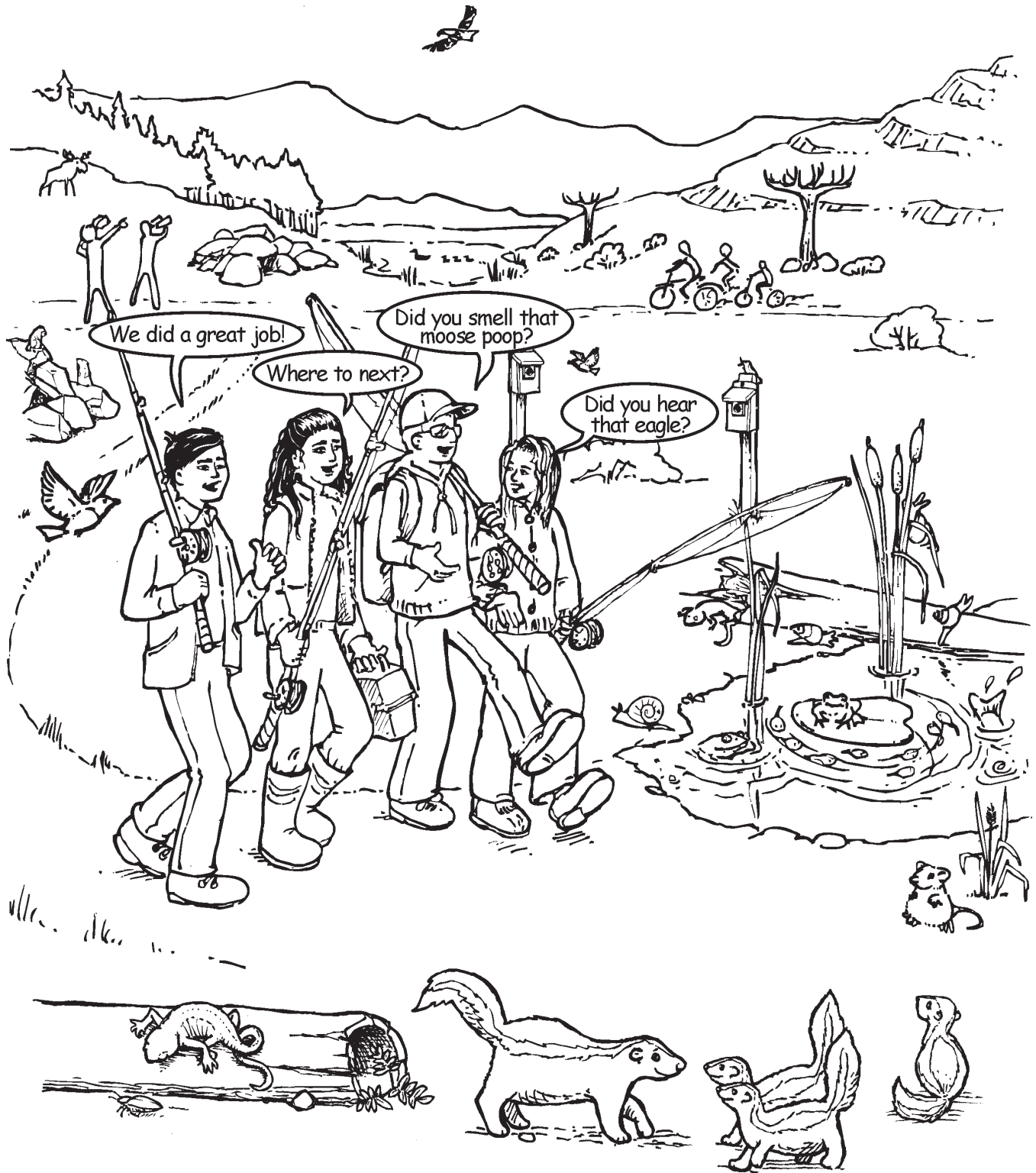
Environmental scientists also rebuild habitat for the animals. We put up bird houses. We plant dead trees upside down for eagles and hawks to land on. We pile boulders for marmot homes.



What would you build if you were an environmental scientist?
Circle your answers.

- A den for bears
- An underground tunnel for rabbits
- A school
- An old hollow log for a fox family
- Add your own idea _____

PART 3 - Reclaiming and Closing a Mine



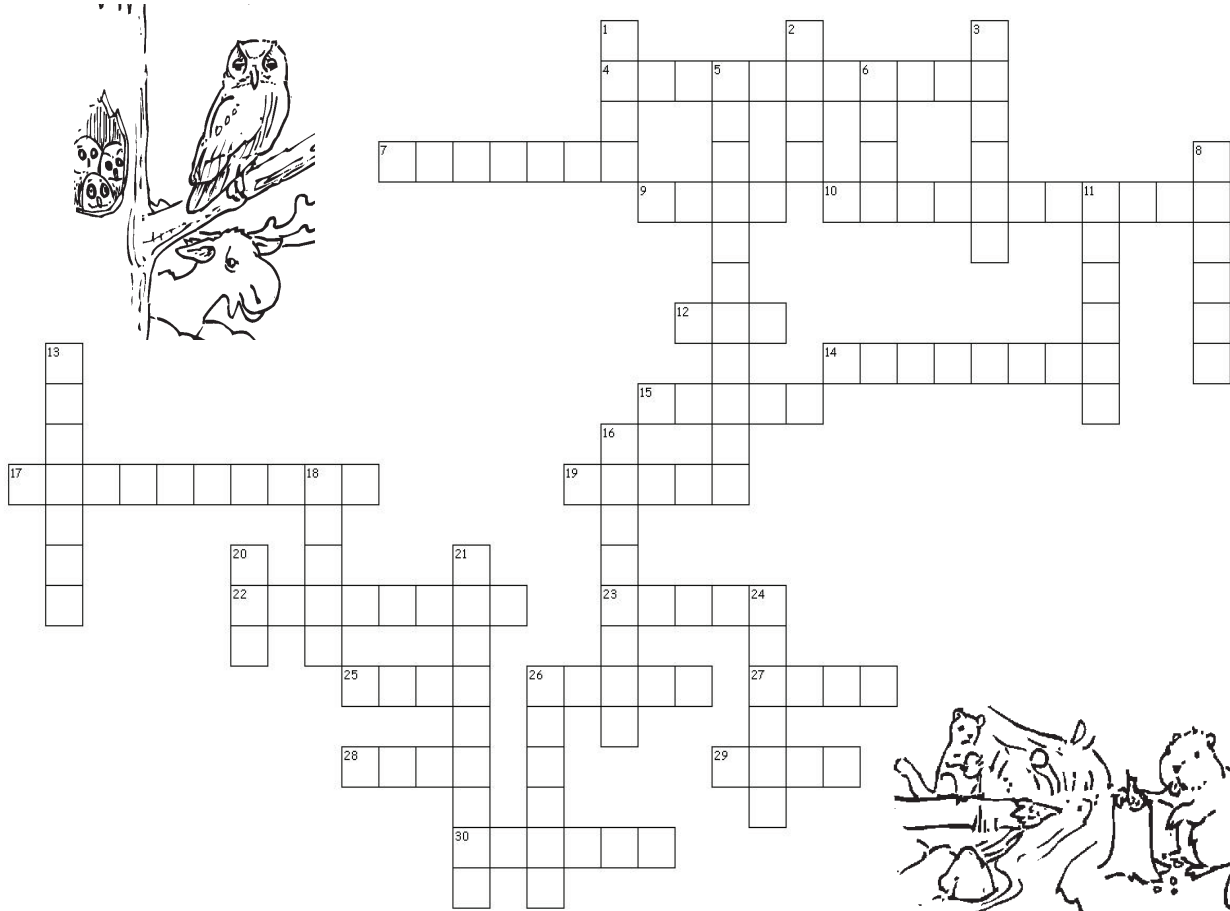
The reclaimed mine site can now be used in many other ways. We are going fishing! Our work is fun and protects our Earth!

Environmental Scientist Word Search

e f a s r a t n a e l c e w s w
 a f e n c e i a z r v n i i a a
 n r t s u d p r t u v s k l m t
 o o t n e m n o r i v n e d p e
 m s i i p e f t r e b p m l l r
 l s p t f l e o c t l a e i e t
 a a o w a a n l c a p p h f n a
 s r n d m m c p n g s d o e a t
 u g d w e e a t f i s h m e e n
 c e o n s z e l s t f n r s p h
 r r t n l m o r c s r r t u t t
 k a a s a p r o t e c t o r b d
 l l o e m m y p v v r u a g n s
 p i r k i i v o y n l e n n u t
 l t b e n n g s c i e n t i s t
 s a r e a e t n e m i d e s m c

air	environment	habitat	plot	sample	test
animal	environmental	investigate	pond	scientist	tree
area	fence	map	protect	sediment	tunnel
artifact	fish ladder	mine	reclamation	shrub	water
clean	frog	people	report	soil	wildlife
dust	government	plan	safe	stream	
Earth	grass	plant	salmon	team work	

Environmental Scientist Crossword



Across

4. the physical and biological world in which we live
7. prevent harm to something
9. where birds build their nest
10. restore landscape to useful purpose
12. what we breathe
14. animals that live in the bush
15. living organism that makes oxygen
17. manmade stream to help salmon lay eggs
19. structure to separate land or contain animals
22. item left behind by earlier people
23. H₂O
25. does not put in danger
26. low plant with a woody stem
27. thoughtful ideas on how to do something
28. small area of land marked off by string to study plants and other things in the area
29. wetland animal
30. tasty fish

Down

1. exam
2. small body of freshwater
3. small body of fresh, flowing water
5. study carefully to uncover truth
6. manmade work place where minerals are taken from the Earth
8. _____, vegetable, mineral
11. manmade structure through solid Earth to connect two places
13. land, soil, water, plants where a living organism thrives
16. tackling a job with everyone assigned different roles
18. our planet
20. drawing that shows an area of land and its features
21. one who investigates how everything works
24. document that records findings of an investigation
26. a portion of a substance collected for testing



MineralsEd

MineralsEd is an educational organization operating in British Columbia that is dedicated to encouraging and supporting Earth science, mineral resources and mining education in school. It is a non-partisan, charitable organization.
www.MineralsEd.ca



GOLDER

Golder Associates

Golder Associates is a global, employee-owned organisation providing independent consulting, design and construction services in our specialist areas of earth, environment and energy.
www.golder.com