



What Are the Characteristics of the Great Lakes Exotic Species?

Trip at a Glance

This puzzle activity is designed to help students review facts and information about the characteristics of the Great Lakes exotic species. They also learn about origin and introduction methods.

Destination

Students will be able to match an exotic species with its characteristics, classification, origin, and introduction to the Great Lakes.



Adventure Levels

Grades 6–8

Areas of Interest

Science and Social Studies

Locale

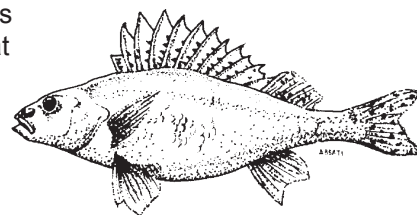
Classroom with movable desks, tables, countertops, or floor areas

Length of Stay

One or two class periods

Invader Background Check

Knowledge of Great Lakes exotic species is important if students are going to make educated decisions about them and the Great Lakes environment in the future. The zebra mussel (*Dreissena polymorpha*) originally came from the Caspian Sea and entered our waterways at Lake St. Clair in 1985. Zebra mussels are bivalve mollusks that were carried in ship ballast tanks. They filter water by feeding on plankton. Their growth, however, is out of control; and zebra mussels attach to any object, including underground water pipes.



Sea lamprey (*Petromyzon marinus*) came from the Atlantic Ocean attached to hulls of boats. They are classified as primitive fish. They spawn up freshwater tributaries and are a parasite on freshwater fish.

The spiny water flea (*Bythotrephes cederstroemi*) is native to northern Europe. They entered Lake Huron in 1984 and were in all Great Lakes by 1987. They are found in ballast water and mud of boats, and they feed on smaller plankton.

Ruffe (*Gymnocephalus cernuus*) came from freshwater and brackish water of northern Europe. They were discovered in Lake Superior in 1986 and had “hitchhiked” in ballast waters. They have dark spots on dorsal fins and are perchlike fish.

The alewife (*Alosa pseudoharengus*) came from the Atlantic Ocean. It entered the Great Lakes through the Welland and Erie Barge Canal. It is a herringlike fish with one dorsal fin. White perch (*Morone americana*) had the same method of entry. This fish does not have dark spots on dorsal fins.

Purple loosestrife (*Lythrum salicaria*) is native to northern Europe and was intentionally imported for its hardiness and beautiful flowers. Eurasian watermilfoil (*Myriophyllum spicatum*) is native to Europe, Asia, and Africa. This aquatic plant was introduced as an aquarium plant, and it forms thick mats that choke out native aquatic plants.

Foreign Language

Alewife	Exotic species	Sea lamprey
Characteristic	Origin	Spiny water flea
Classification	Purple loosestrife	White perch
Common name	Ruffe	Zebra mussel
Eurasian watermilfoil	Scientific name	

Amenities Provided

Answer Sheet 18.1
Puzzle Templates found in “Posters and Games”

Things to Pack

Envelope with colored puzzle pieces for each group
8 $\frac{1}{2}$ " x 11" colored paper (eight sheets per group, one color per group)
Scissors



Passport for Success

Students should have studied or researched specific exotic species of the Great Lakes. If research did not cover all of the categories used for the puzzle, have students do the necessary research before doing the puzzles.

Itinerary

Preparing for the activity

1. Copy the included puzzles on colored paper. Each group of students should have a different color, and all the puzzle pieces for a group should be the same color.
2. Using scissors, cut out the puzzles. Each exotic species has six pieces, and there should be 48 pieces when complete, if all the species are used.
3. Shuffle puzzle pieces in each group's envelope. Copy the puzzle template with category name for each group.
4. Have students use resources to locate any information that is represented in the puzzle and has not been previously researched: origin, introduction to the Great Lakes, characteristics, or classification.

Conducting the activity

5. Divide students into cooperative learning groups of two or three students. Give each group an envelope with the shuffled puzzle pieces.
6. Provide each group with the puzzle template that contains the category names so they know what each of the numbered puzzle pieces represents.
7. Have students sort the puzzle pieces by number and then try to separate and match the pieces, in order by number. For example, have students first lay out all the pieces numbered as “1,” which is the common and scientific name. Then have them match each of the pieces numbered “2,” the pictures, with each of the corresponding names. Then go to the pieces numbered “3” to match the species origin to the correct puzzle and so on.

8. Let students use their notes the first time through the puzzle. Check to see that they have made the right choices, then scramble the pieces and let them try the puzzle without their notes. Switch group members, if time allows, and try the puzzle again.

Travel Tips

- ✿ You may want to limit the number of exotic species you put into each envelope. Four or six exotic species may be a better way to start, depending on the group's ability level. The activity may take longer than one class period if you use all eight puzzles.
- ✿ Make sure that the puzzles are all the same color and are shuffled in each individual envelope.
- ✿ Have the students take turns choosing puzzle pieces, but have them work together as a team deciding on the proper placement of the puzzle pieces.
- ✿ Preparing the puzzles and cutting them out takes some time; however, the activity is well worth the time when you see the students' enthusiasm after completing the puzzles accurately.
- ✿ The teacher should move between groups questioning the students on their progress. It may be helpful to ask:
What is the number of the puzzle piece?
What category does the number represent?

Debriefing

The information from the puzzles could be used to design an objective test if a formal method of evaluation is desired. For an informal evaluation, teachers can determine grades for each group based on their success with completing the puzzles and doing the activity.

Extending the Visit

Students can create their own puzzles for other exotic species using the blank puzzle template.

Places to Go

Web sites

Great Lakes Fishery Commission Web site: <http://www.glfc.org>

The Great Lakes Information Network (GLIN)

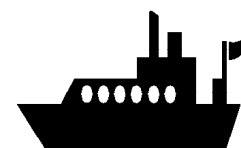
Main Web site: <http://www.great-lakes.net>

Exotic Species Web site: <http://www.great-lakes.net/envt/flora-fauna/invasive/invasive.html>

Sea Grant Nonindigenous Species (SGNIS) Web site: <http://www.sgnis.org>

Multimedia

Great Lakes Solution Seeker CD-ROM and activity guide. The Ohio State University. 1996.



Travel Agent

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Answer Sheet

1. **Exotic Species #1**
Zebra Mussel
Dreissena polymorpha
2. Picture
3. Came from the Caspian Sea
4. Entered Lake St. Clair in 1985 from ship ballast tanks.
5. Filter feeds on plankton
6. Mollusk (bivalve)

1. **Exotic Species #2**
Sea Lamprey
Petromyzon marinus
2. Picture
3. Came from Atlantic Ocean
4. Attached to hulls of boats; spawn up freshwater tributaries
5. Sucker-like mouth and parasitic on fish, especially Lake Trout
6. Primitive fish

1. **Exotic Species #3**
Spiny Water Flea
Bythotrephes cederstroemi
2. Picture
3. Native of northern Europe
4. Entered Lake Huron in 1984, and in all Great Lakes by 1987. Found in ballast water and mud of boats.
5. Large plankton form that feeds on smaller plankton
6. Invertebrate

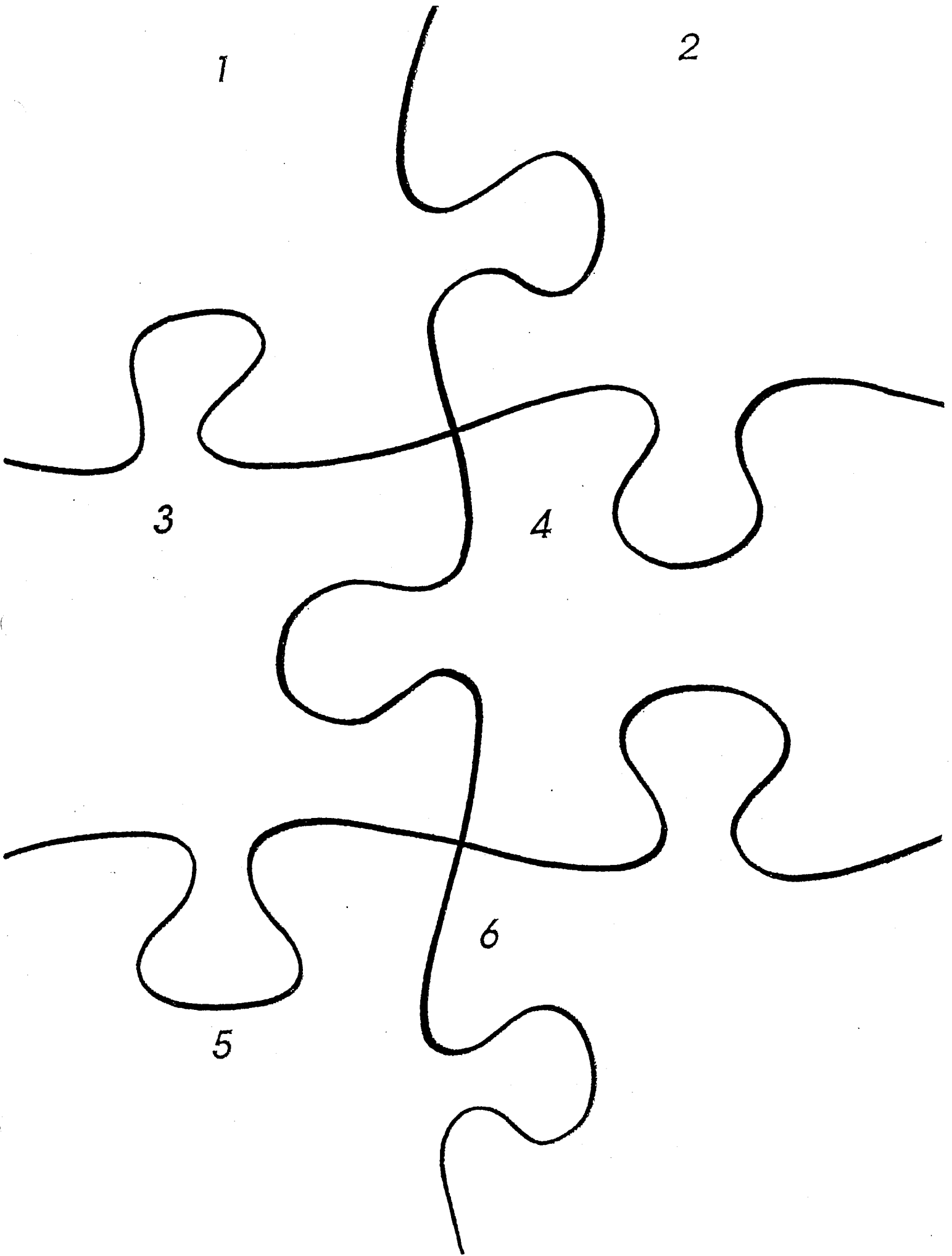
1. **Exotic Species #4**
River Ruffe
Gymnocephalus cernuus
2. Picture
3. Freshwater and brackish water of Northern Europe
4. 1986 discovered in Lake Superior; “hitchhiked” in ballast waters
5. Dark spots on dorsal fin, 15 cm as adult; bottom feeder
6. Perchlike fish

1. **Exotic Species #5**
Alewife
Alosa pseudoharengus
2. Picture
3. Atlantic Ocean
4. Swam to upper Great Lakes before 1931, through Welland and Erie barge canal
5. 13 cm as adult, one dorsal fin
6. Herring-like fish

1. **Exotic Species #6**
White Perch
Morone americana
2. Picture
3. Atlantic Ocean
4. Swam through various canal systems
5. 20–30 cm, no dark spots on dorsal fins
6. Fish

1. **Exotic Species #7**
Purple Loosestrife
Lythrum salicaria
2. Picture
3. Northern Europe
4. Imported for its hardiness and beautiful flowers
5. “The beautiful killer”—crowds out other plants, .5–2 m tall
6. Flowering plant

1. **Exotic Species #8**
Eurasian Watermilfoil
Myriophyllum spicatum
2. Picture
3. Europe, Asia, and Africa
4. Introduced as an aquarium plant
5. Forms thick mats that choke out native aquatic plants
6. Aquatic plant



1

COMMON NAME
SCIENTIFIC NAME

2

EXOTIC SPECIES
PICTURE

3

ORIGIN

4

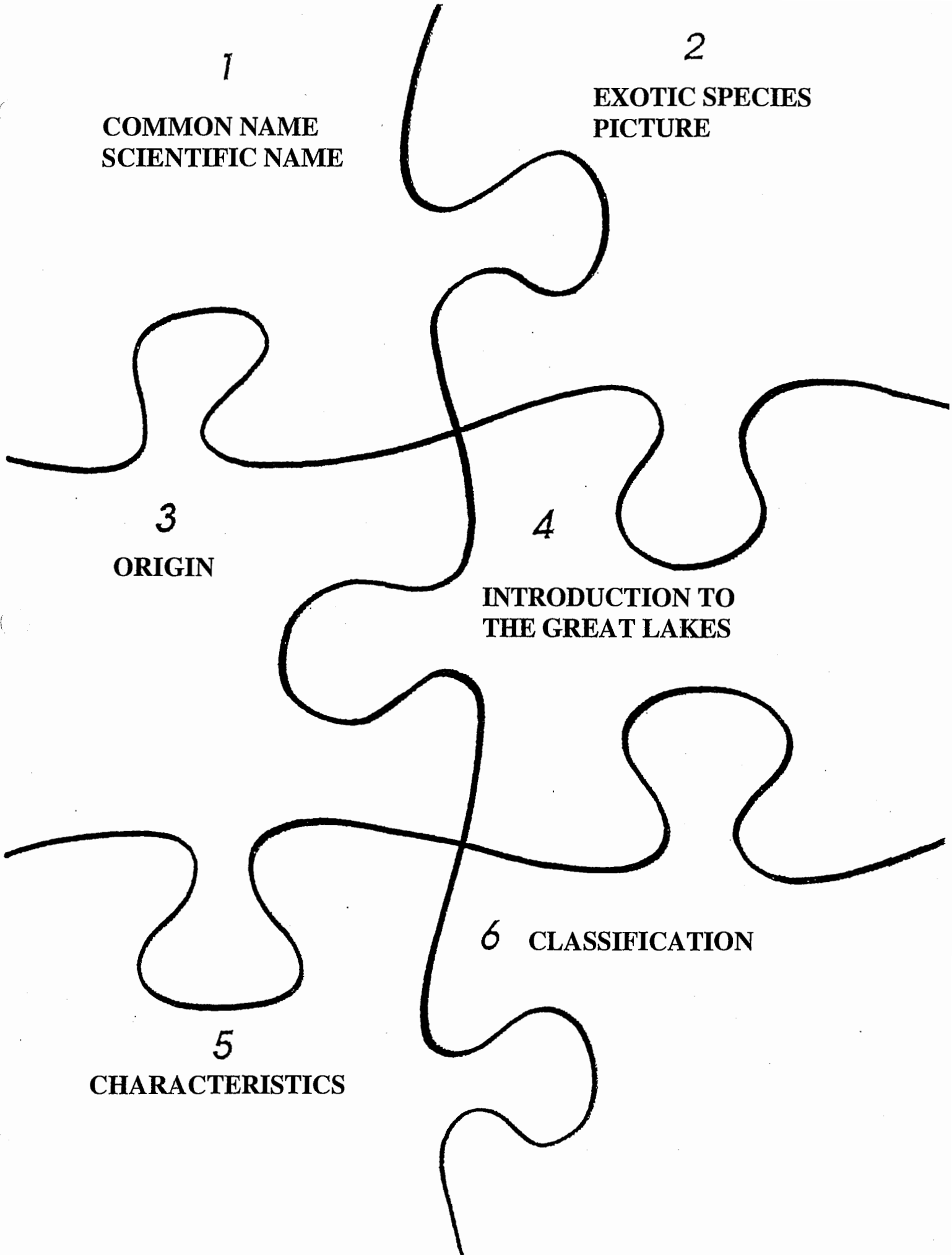
INTRODUCTION TO
THE GREAT LAKES

6

CLASSIFICATION

5

CHARACTERISTICS



1

2

Exotic Species #1
Zebra Mussel (*Dreissena polymorpha*)



3

4

Came from the Caspian Sea

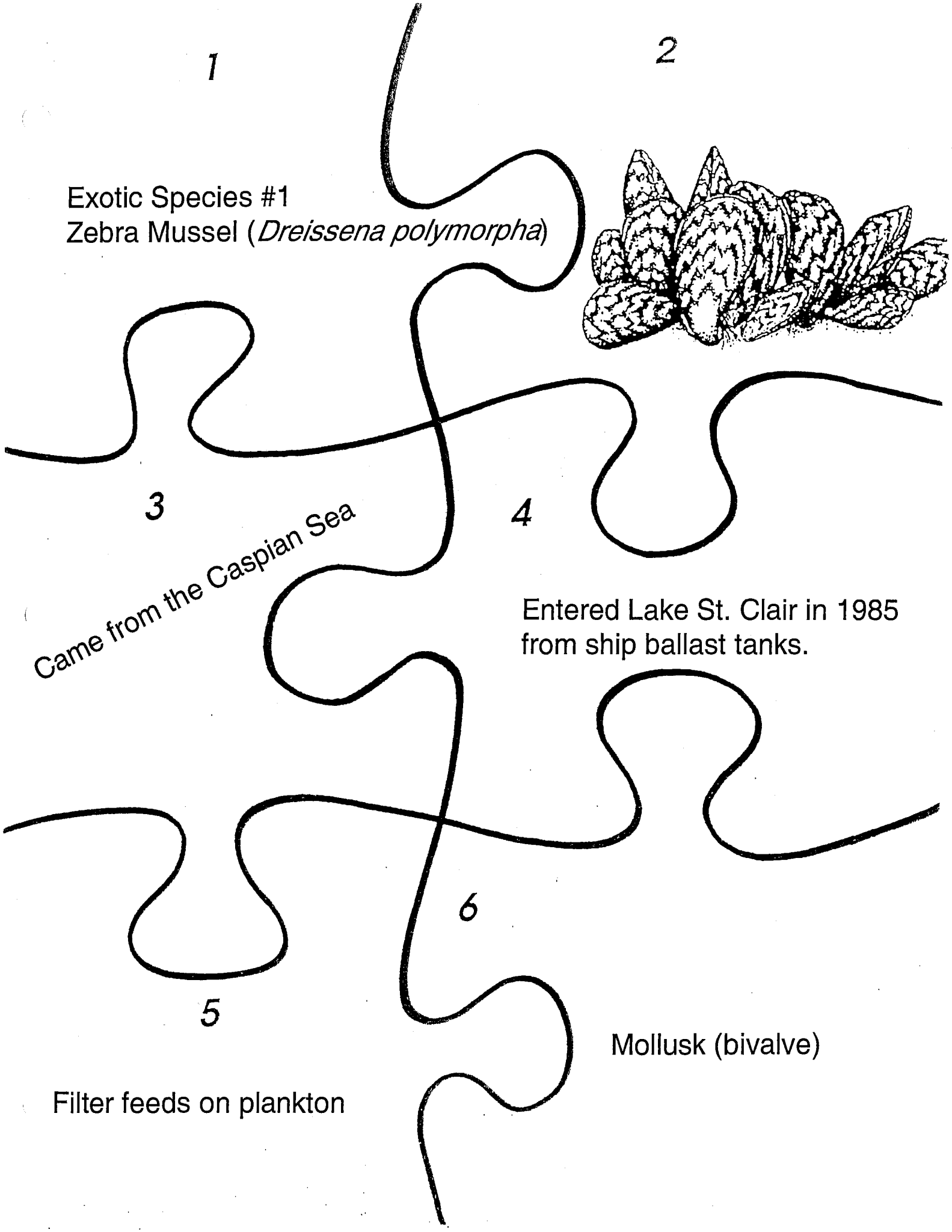
Entered Lake St. Clair in 1985
from ship ballast tanks.

5

6

Mollusk (bivalve)

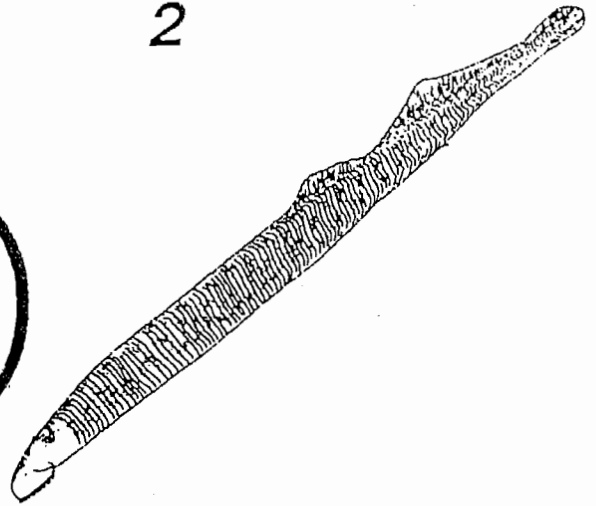
Filter feeds on plankton



1

2

Exotic Species #2
Sea Lamprey (*Petromyzon marinus*)



3

4

Came from Atlantic Ocean

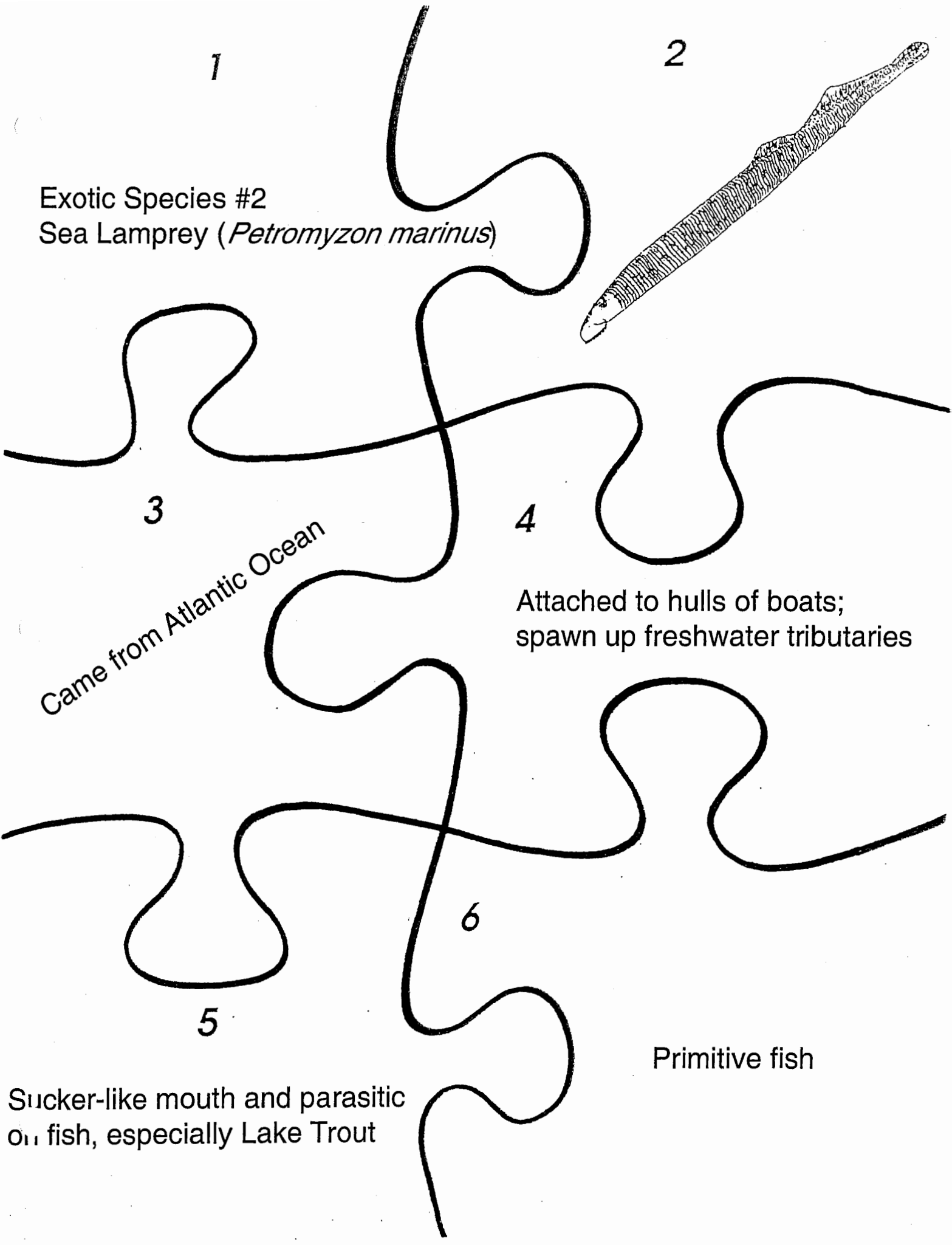
Attached to hulls of boats;
spawn up freshwater tributaries

5

6

Sucker-like mouth and parasitic
on fish, especially Lake Trout

Primitive fish

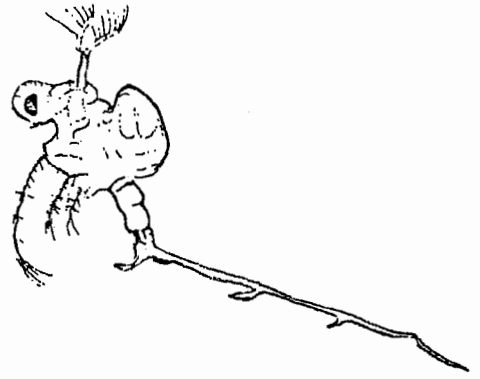


1

2

Exotic Species #3

Spiny Water Flea (*Bythotrephes cederstroemi*)



3

4

Native of northern Europe

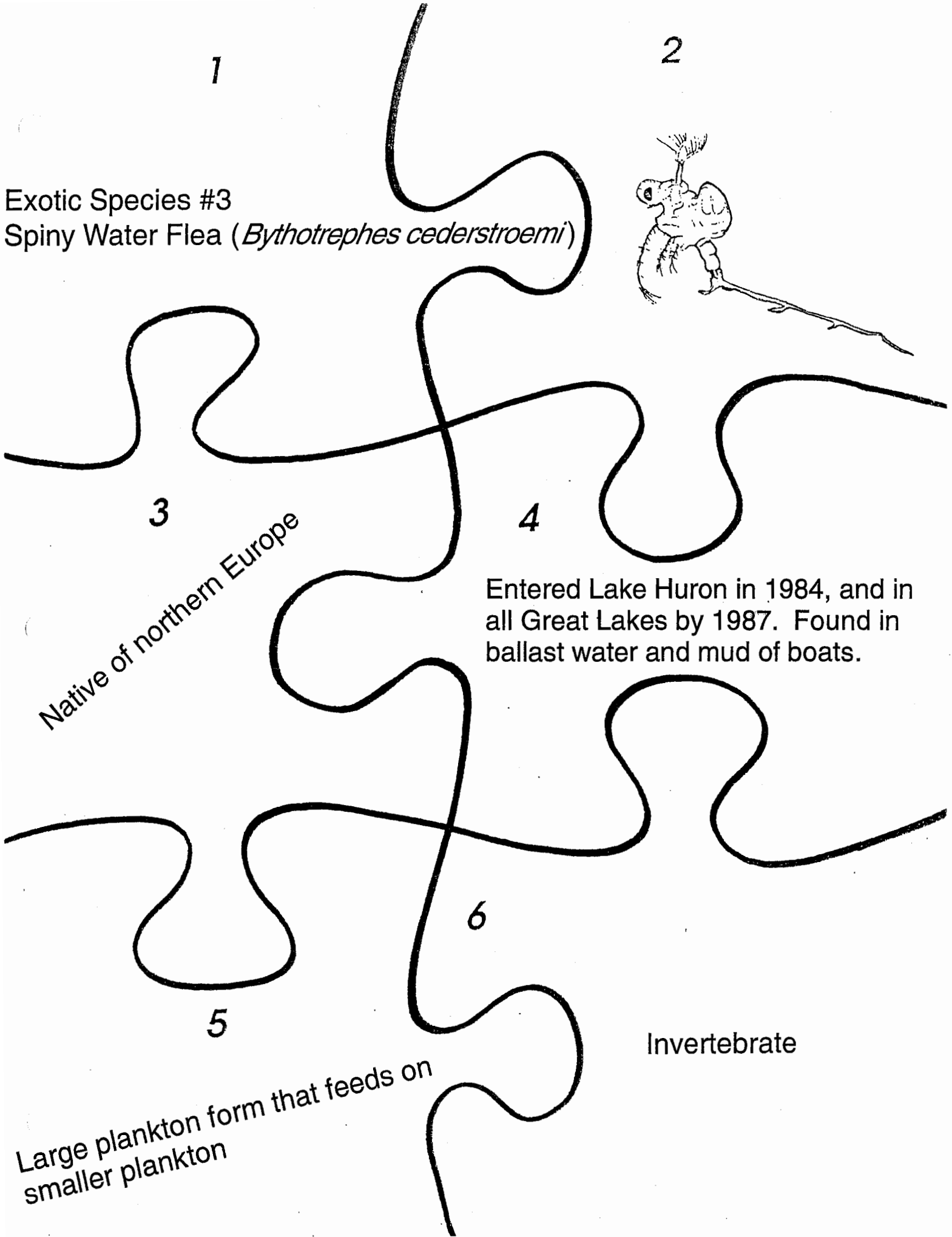
Entered Lake Huron in 1984, and in all Great Lakes by 1987. Found in ballast water and mud of boats.

5

6

Invertebrate

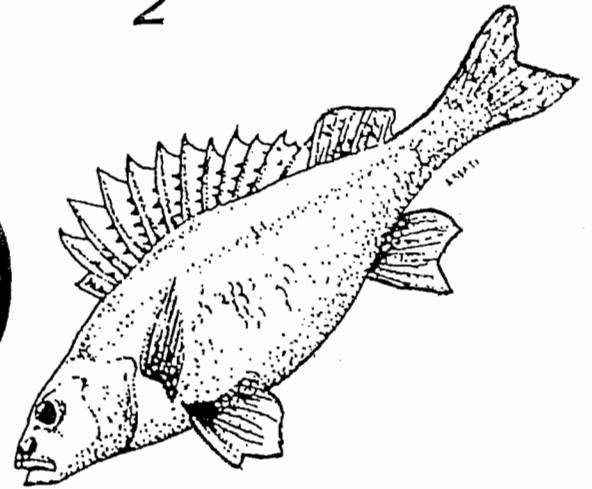
Large plankton form that feeds on smaller plankton



1

2

Exotic Species #4
River Ruffe (*Gymnocephalus cernuus*)



3

4

Freshwater and brackish water
of Northern Europe

1986 discovered in Lake Superior;
"hitchhiked" in ballast waters

6

5

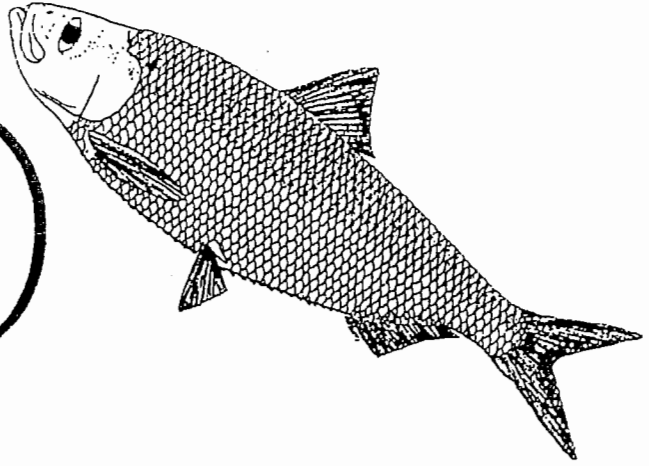
Perchlike fish

Dark spots on dorsal fin, 15 cm as
adult; bottom feeder

1

2

Exotic Species #5
Alewife (*Alosa pseudoharengus*)



3

4

Atlantic Ocean

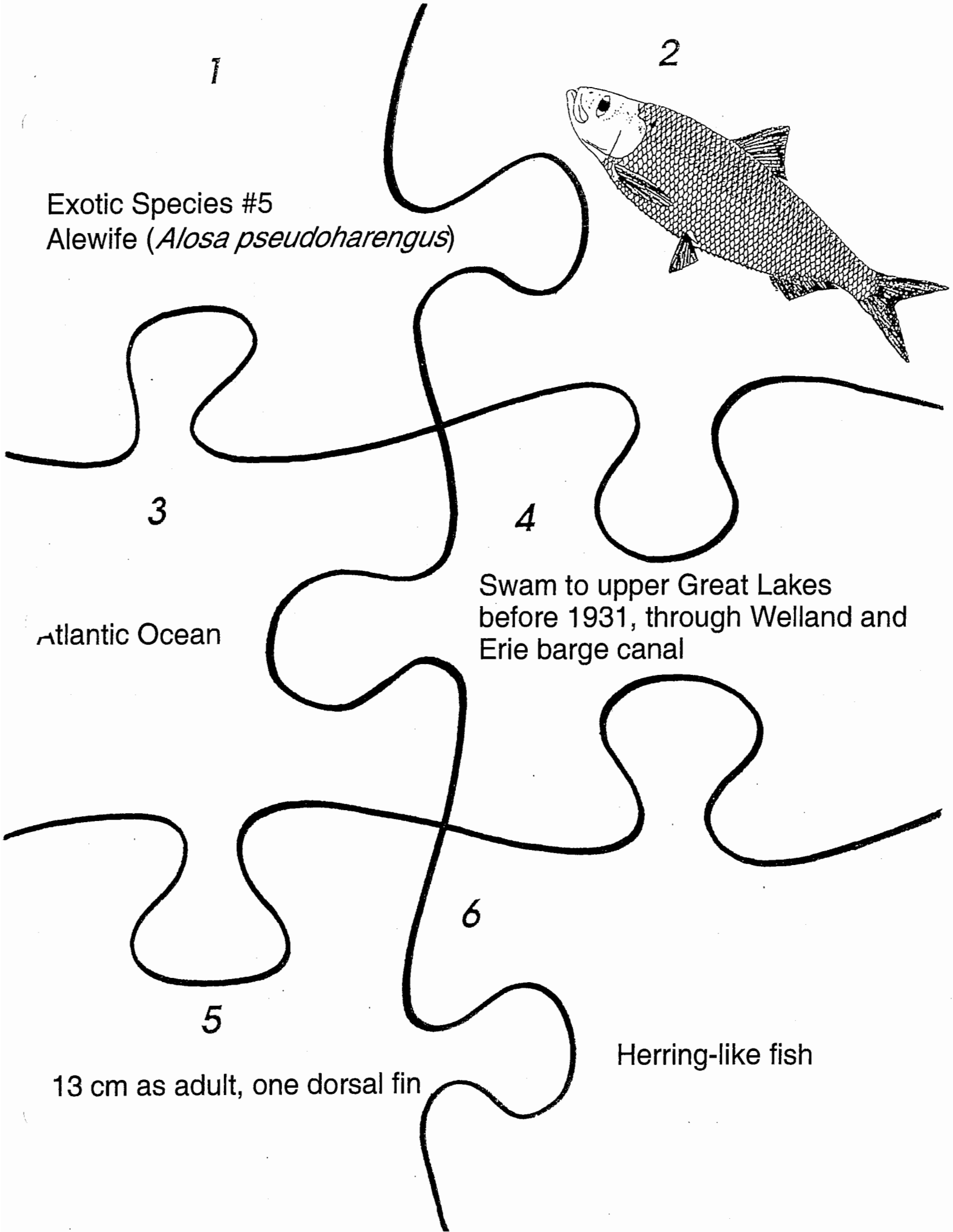
Swam to upper Great Lakes
before 1931, through Welland and
Erie barge canal

6

5

Herring-like fish

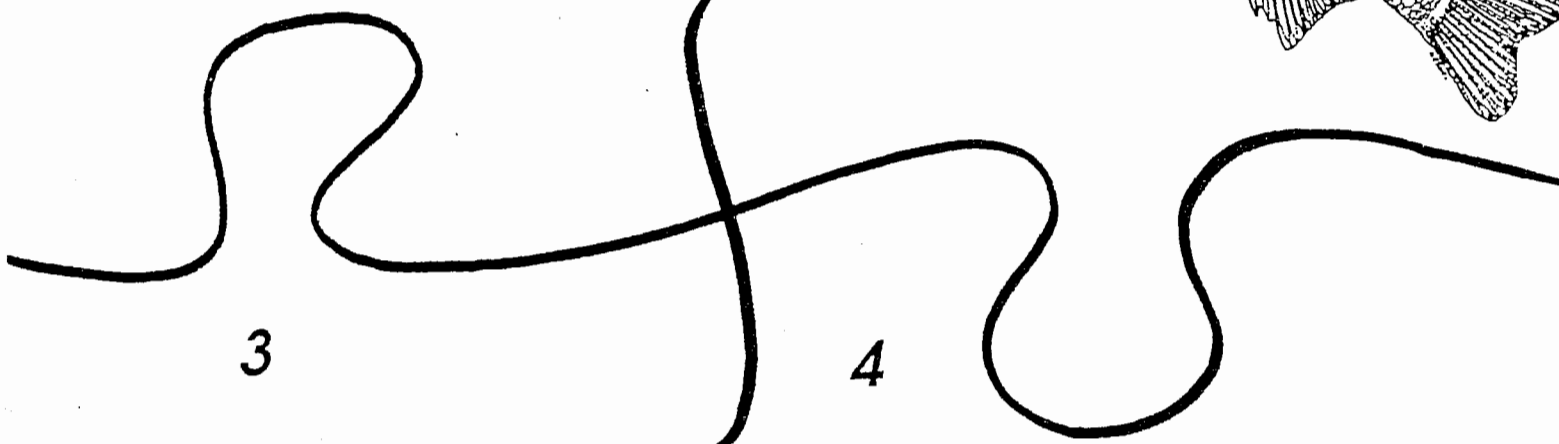
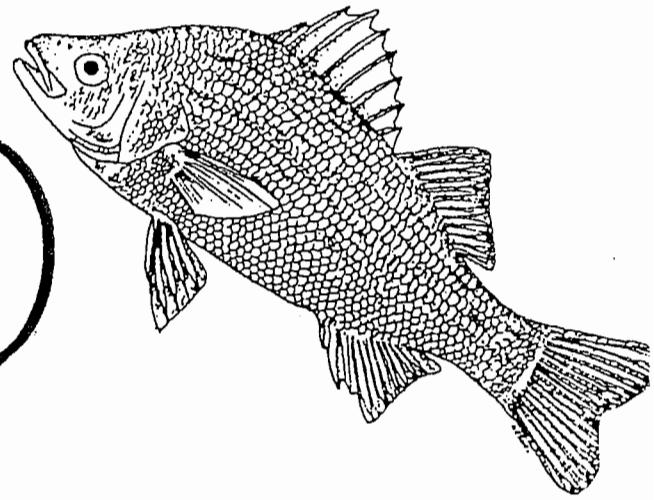
13 cm as adult, one dorsal fin



1

2

Exotic Species #6
White Perch (*Morone americana*)

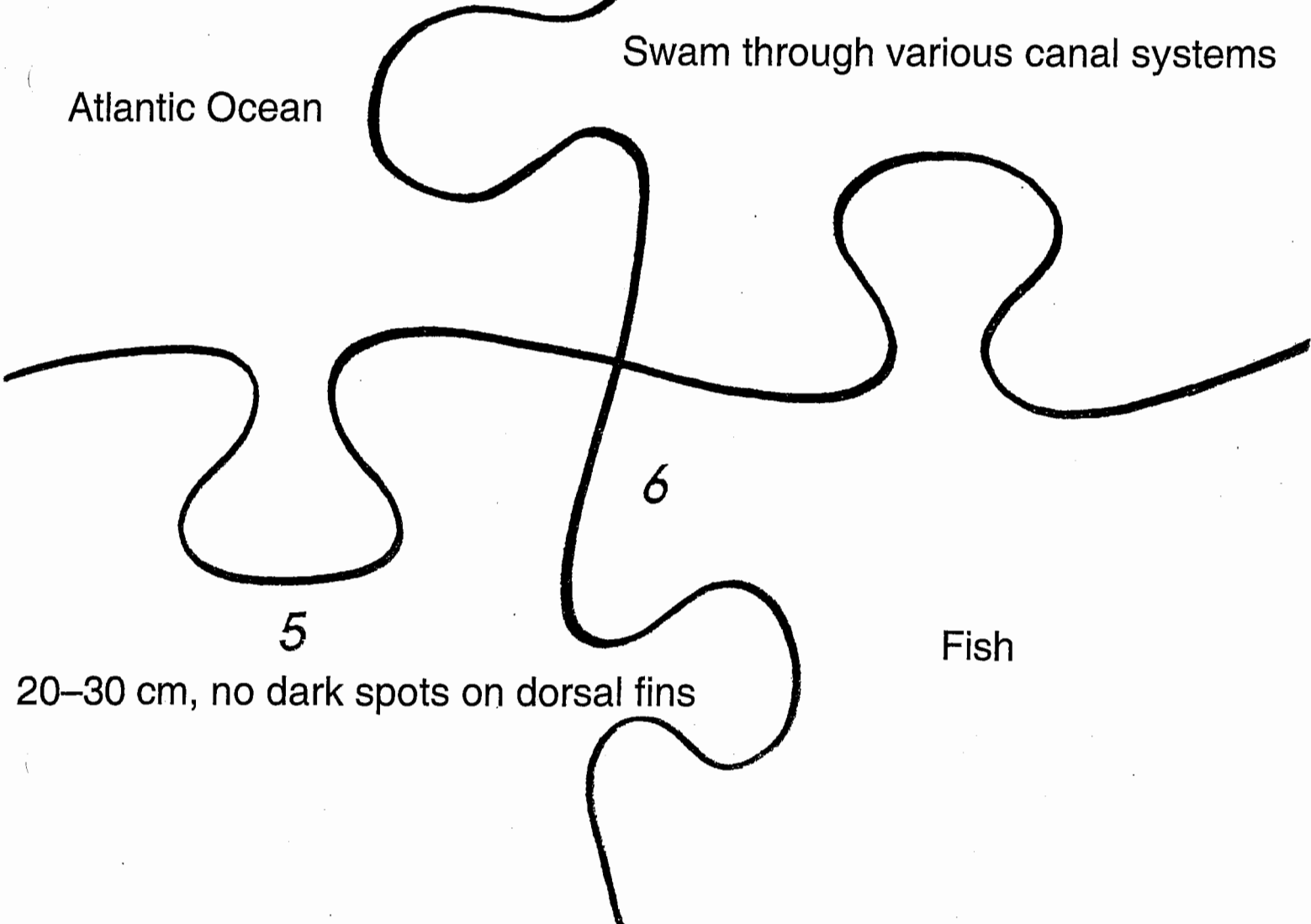


3

4

Swam through various canal systems

Atlantic Ocean



5

6

Fish

20-30 cm, no dark spots on dorsal fins

1

2

Exotic Species #7
Purple Loosestrife (*Lythrum salicaria*)



3

4

northern Europe

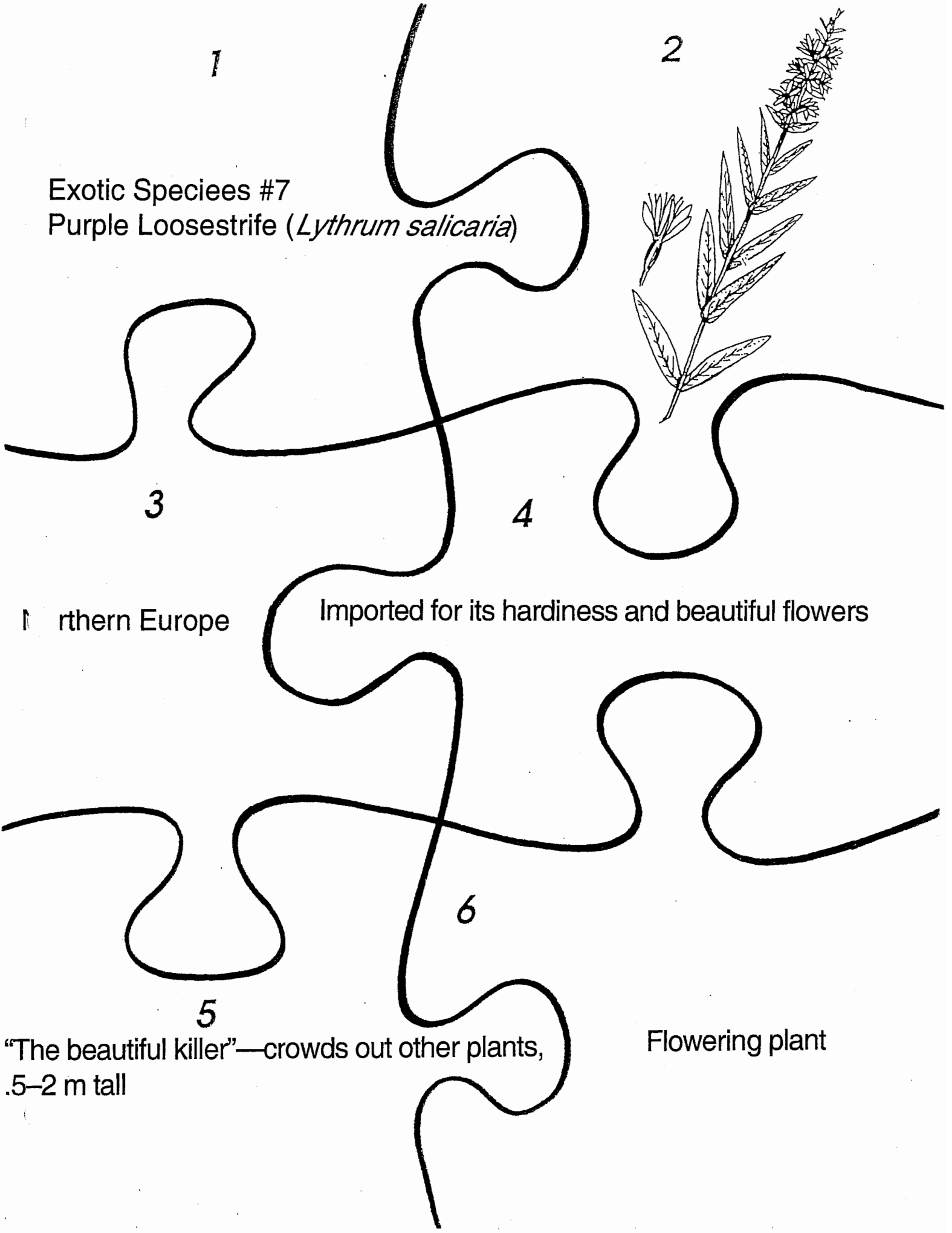
Imported for its hardiness and beautiful flowers

6

5

"The beautiful killer"—crowds out other plants,
.5–2 m tall

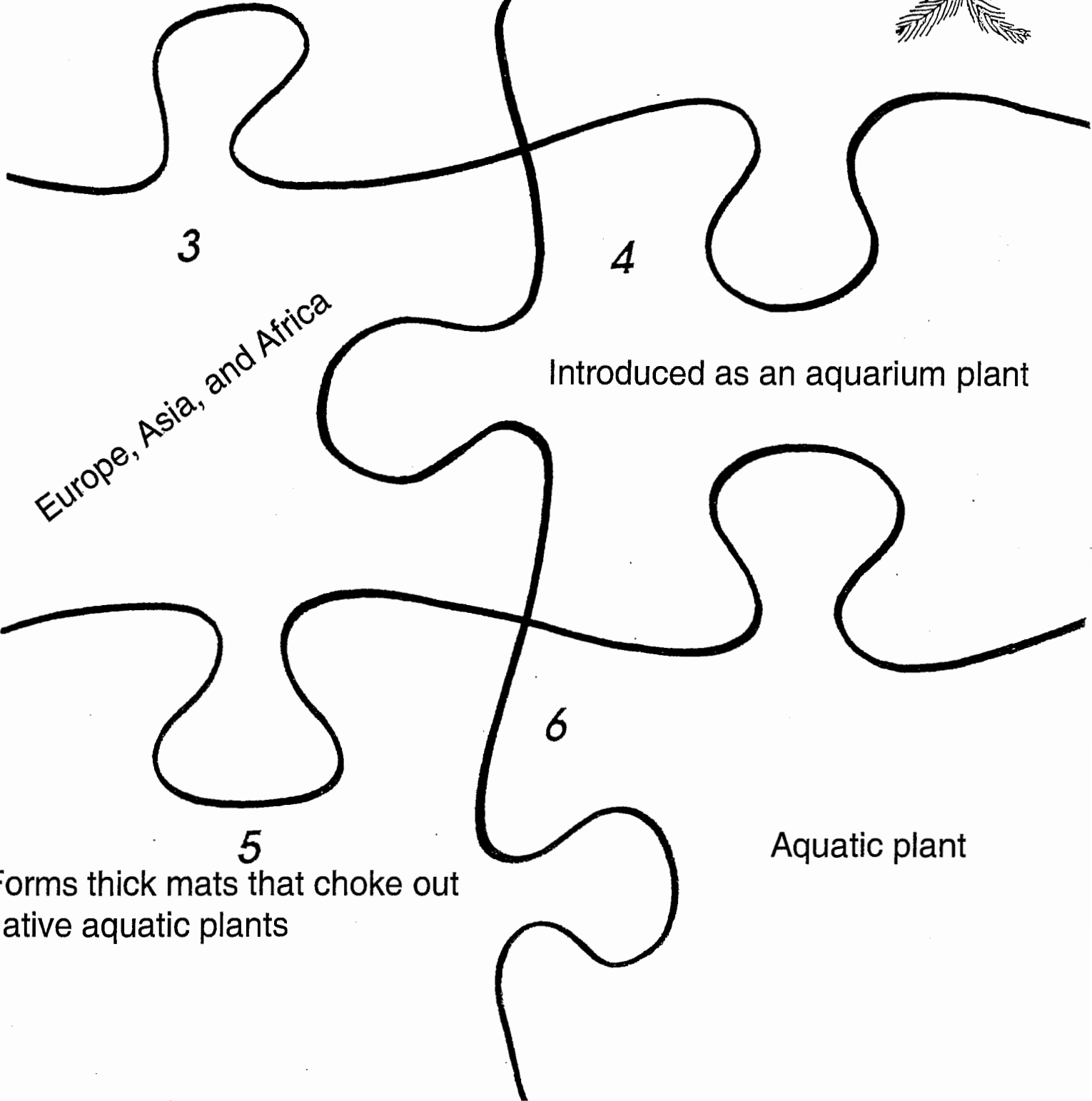
Flowering plant



1

2

Exotic Species #8
Eurasian Watermilfoil (*Myriophyllum spicatum*)



3

4

Europe, Asia, and Africa

Introduced as an aquarium plant

6

5
Forms thick mats that choke out
native aquatic plants

Aquatic plant