

Invasive Species in Freshwater Ecosystems: Introduction



BSCI 467: Freshwater Biology
Dr. Alina Avanesyan

Learning Outcomes

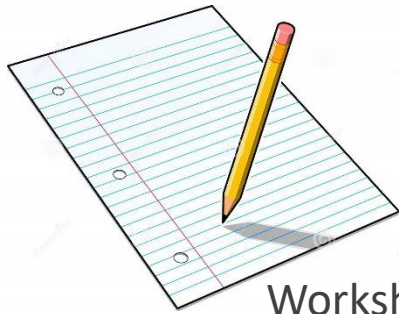
By the end of today's introduction lecture you will know:

- what invasive species are
- how invasive species can be introduced

By the end of today's introduction lecture you will be able to:

- differentiate between invasive and non-invasive species
- name at least two freshwater invasive species

Class Activities



Worksheet



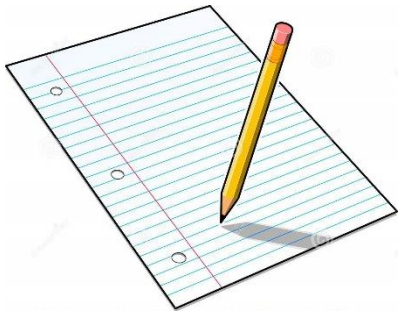
Small group discussion



All-class-discussion



In-class ungraded quizzes



Invasive Species?

Worksheet Part 1. Please list the first words (associations) that come to your mind (30 sec)

BSCI 467: Freshwater Biology - Worksheet

BSCI 467: Invasive Species in Freshwater Ecosystems: Introduction

Part I. Invasive species: definition, introduction, establishment.

In the provided space below, please list the first words (associations) that come to your mind when you hear “invasive species” (30 sec)

- Please pick 3 associations in your list which you think your classmates might have, too (30 sec)
- Please compare your guess in pairs and highlight the matches (30 sec)
- Please compare your matches with formal definition of invasive species (1 min) (use 'Yes/No cards')



30 sec later..



Invasive Species?

→ Please pick 3 associations in your list which you think your classmates might have on their lists, too

(30 sec)

→ Please compare your guess in pairs and highlight the matches

(30 sec)

1 min later..

Invasive Species

“a **non-native species** whose **introduction** does or is likely to **cause** economic or environmental **harm** or harm to human, animal, or plant health”

(National Invasive Species Management Plan, 2006)



Please compare your matches with formal definition of invasive species (1 min) (use 'Yes/No cards')



Aquatic Invasive Species

“**non-native plants and animals** that have been **introduced** (accidentally or intentionally) into **lakes and rivers**, and whose introduction **threatens** the diversity or abundance of native species, the stability of the ecosystem and/or the use of the infested water body.

[They] are **a major threat to freshwater ecosystems** and a significant management concern because of their ecological and socio-economic costs.”

Freshwater Invasive Species



Curly-leaf pondweed



Asian carp



Asian Swamp Eel



Eurasian watermilfoil



Ruffe



Channeled Apple Snail



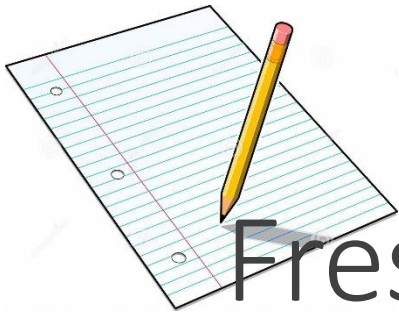
Zebra mussel



Asian Clam



Spiny waterflea



Freshwater Invasive Species

Worksheet Part 2.



Zebra mussel

“Brought here from Europe in ships’ ballast water; zebra mussels were first discovered in the Great Lakes region in 1988. Zebra mussels have inflicted tremendous damage to native ecosystems and to facilities using water, like power plants and municipal water suppliers.

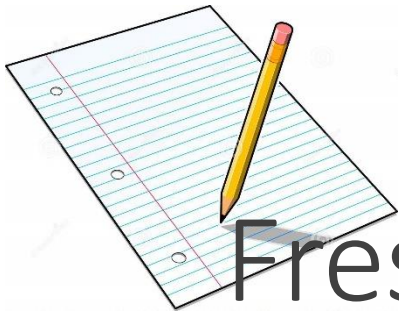
Millions of dollars have been spent by water users, to control and eradicate zebra mussels. And, as zebra mussel populations in an area increase, native mussels decrease; a strong indication that zebra mussels are the cause.” *U.S. Fish & Wildlife Service, 2017*



Why is it an invasive species? Please check ALL that applies (30 sec):

- Introduced to the US from other countries
- Causes damage to freshwater ecosystem
- Has economic impact

30 sec later..



Freshwater Invasive Species

Worksheet Part 2.



Zebra mussel

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Why is it an invasive species? Please check ALL that applies (30 sec):

- ✓ Introduced to the US from other countries
- ✓ Causes damage to freshwater ecosystem
- ✓ Has economic impact

Native vs. Non-native ?



Before European Settlement



After European Settlement

Country	Name of Settlement	Present-Day Location	Year First Settled
Spain	St. Augustine	Florida	1565
England	Jamestown	Virginia	1607
France	Quebec	Canada	1608
Holland	New Amsterdam	New York	1624
Sweden	New Sweden	New Jersey	1638



How can non-native species be introduced in freshwater ecosystems?

Intentional Introduction

- Aquaculture (transferring contents of home aquarium into a lake)
- Water gardening (planting exotic plants)

Unintentional Introduction

- ships, boats, barges
- aquatic recreation (fishing, hunting, boating, diving, etc.)
- seaplanes, connected waterways

Native Community

How can non-native species be introduced in freshwater ecosystems?

Intentional Introduction

- Aquaculture (transferring contents of home aquarium into a lake)
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Unintentional Introduction

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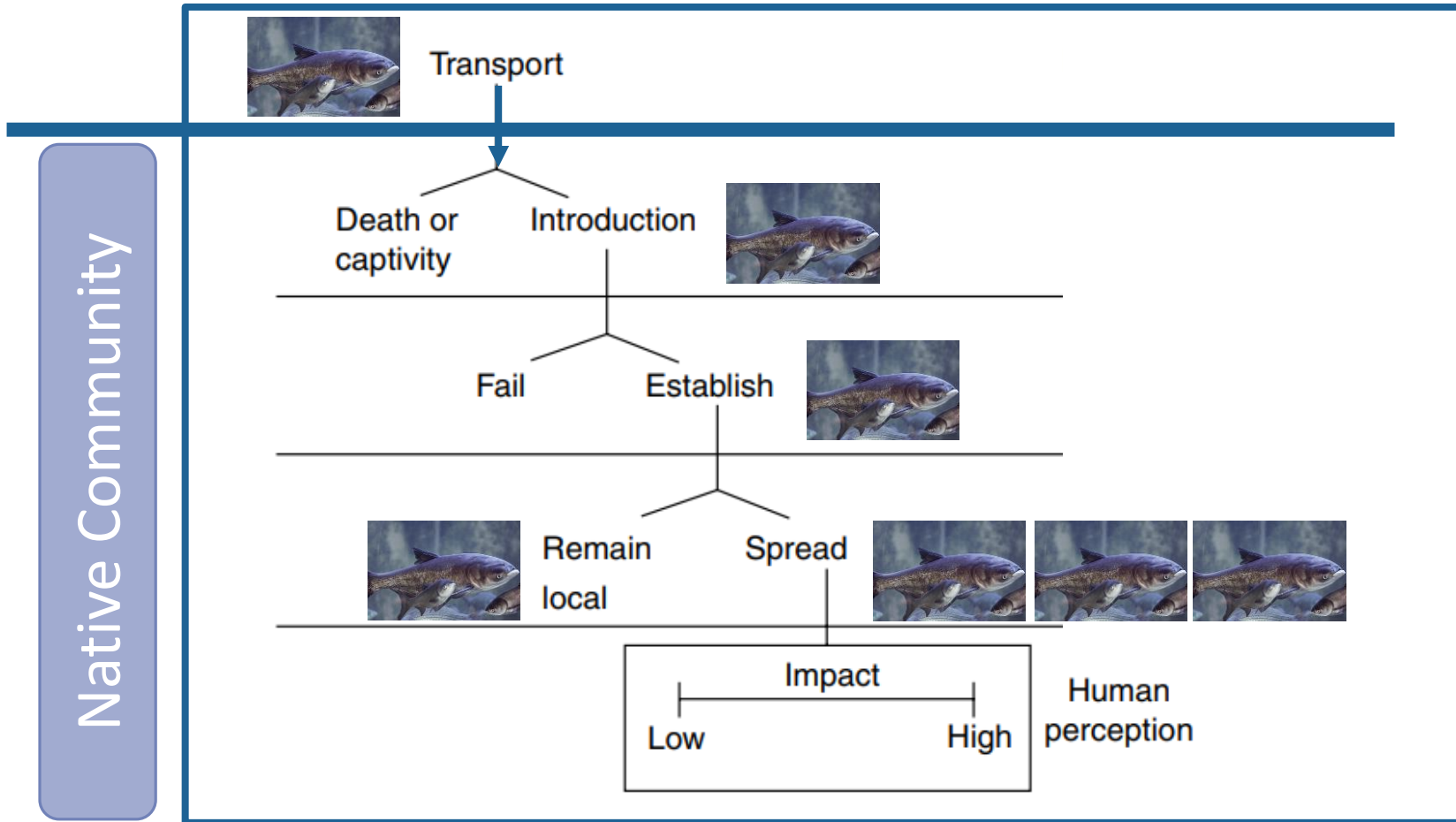
Native Community



Worksheet Part 3.



What do you see?



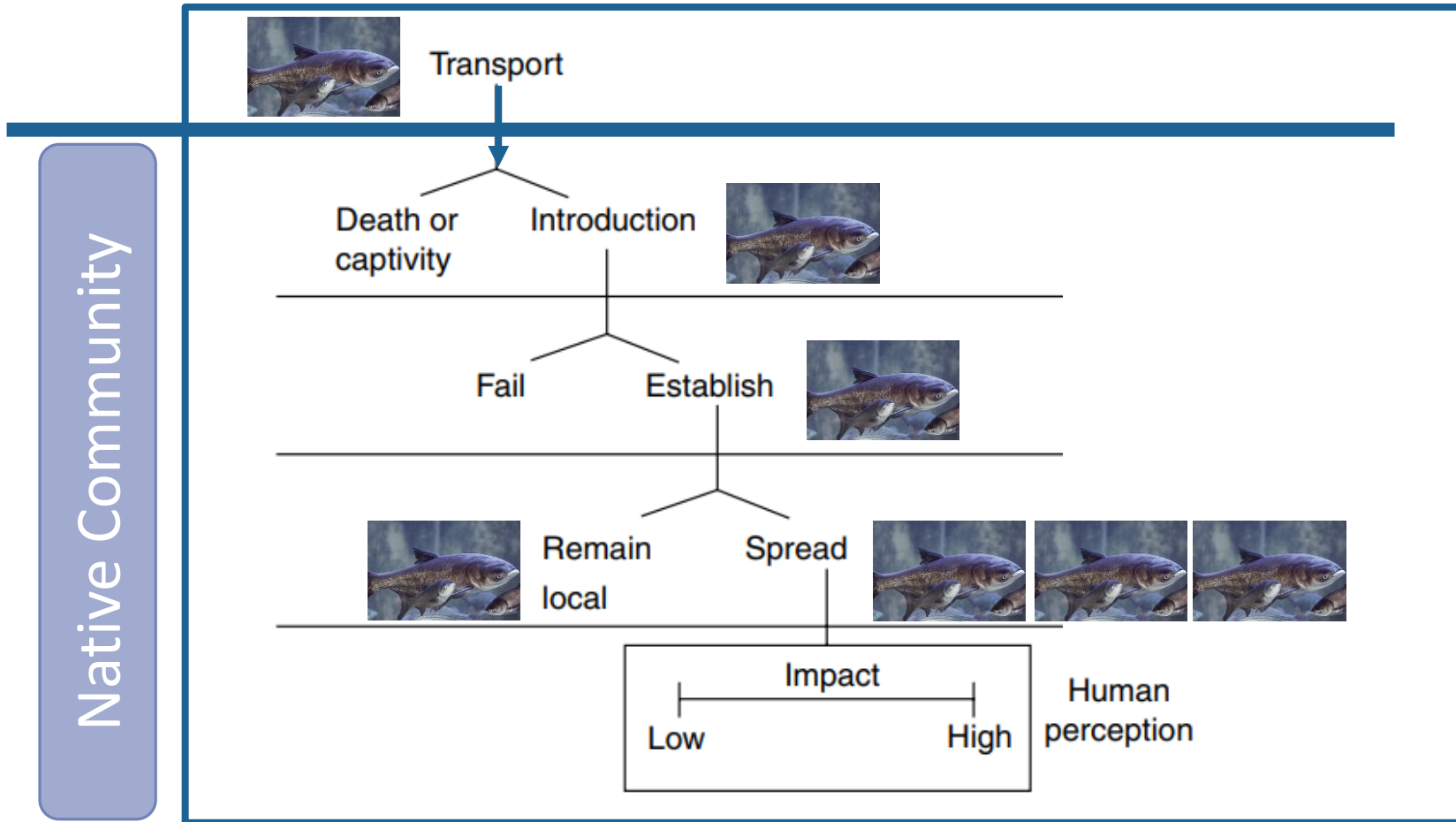
Expected answers:

- Pictures of fish
- Words 'transport', 'introduction', etc.
- Connecting lines



Worksheet Part 3.

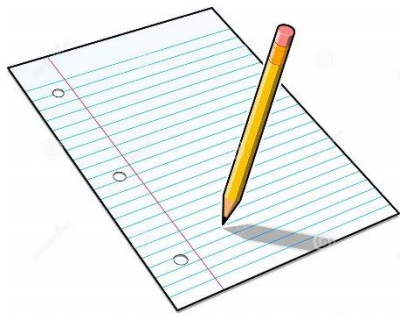
What does it mean?



Native Community

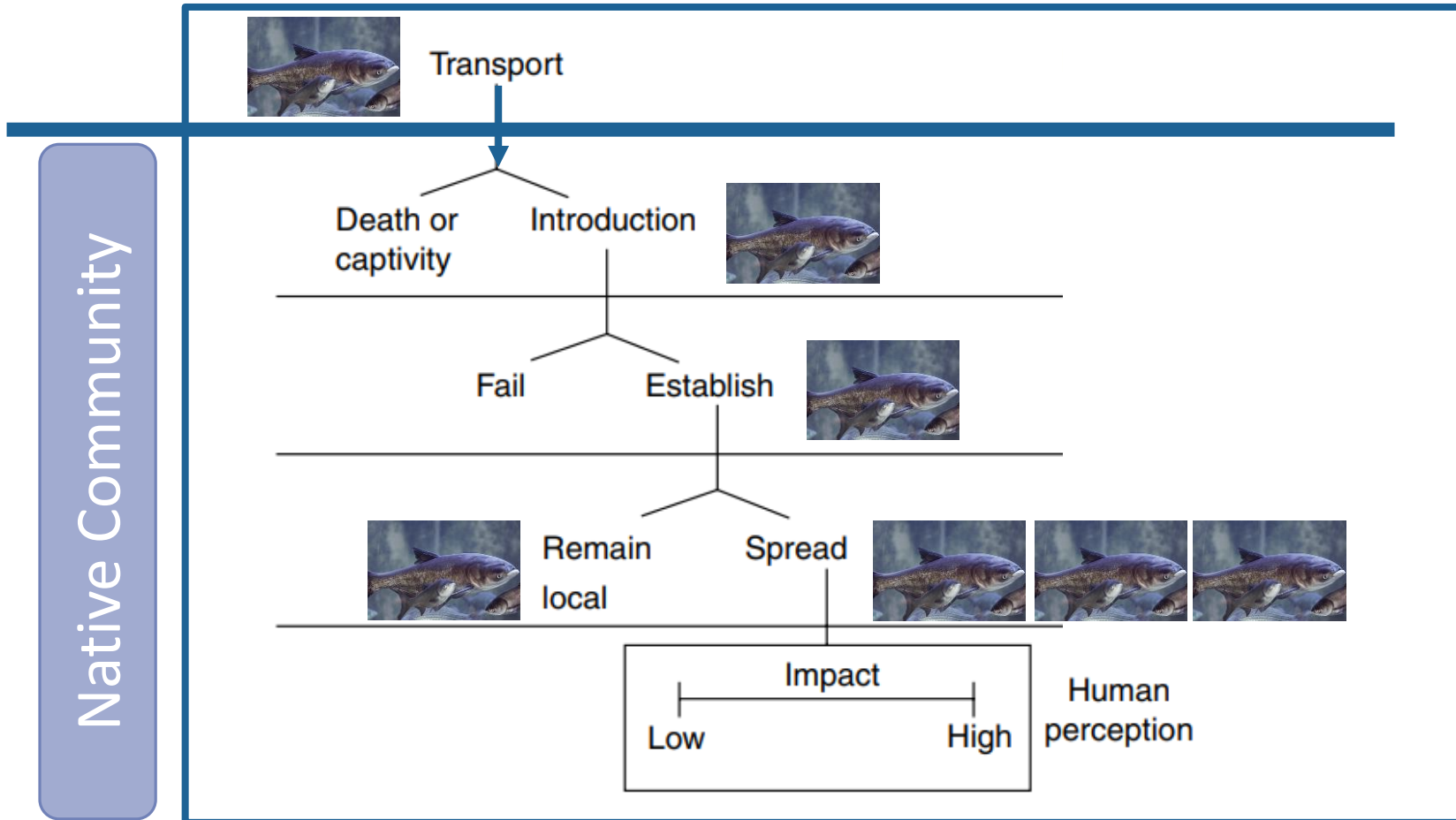
Expected answers:

- Are all transported species successfully introduced? (Yes/**No**)
- Do introduced species need to be established in order to spread and be invasive? (**Yes**/No)
- Other thoughts?...



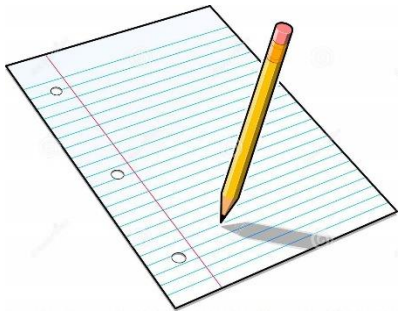
Worksheet Part 3.

Title for this scheme?

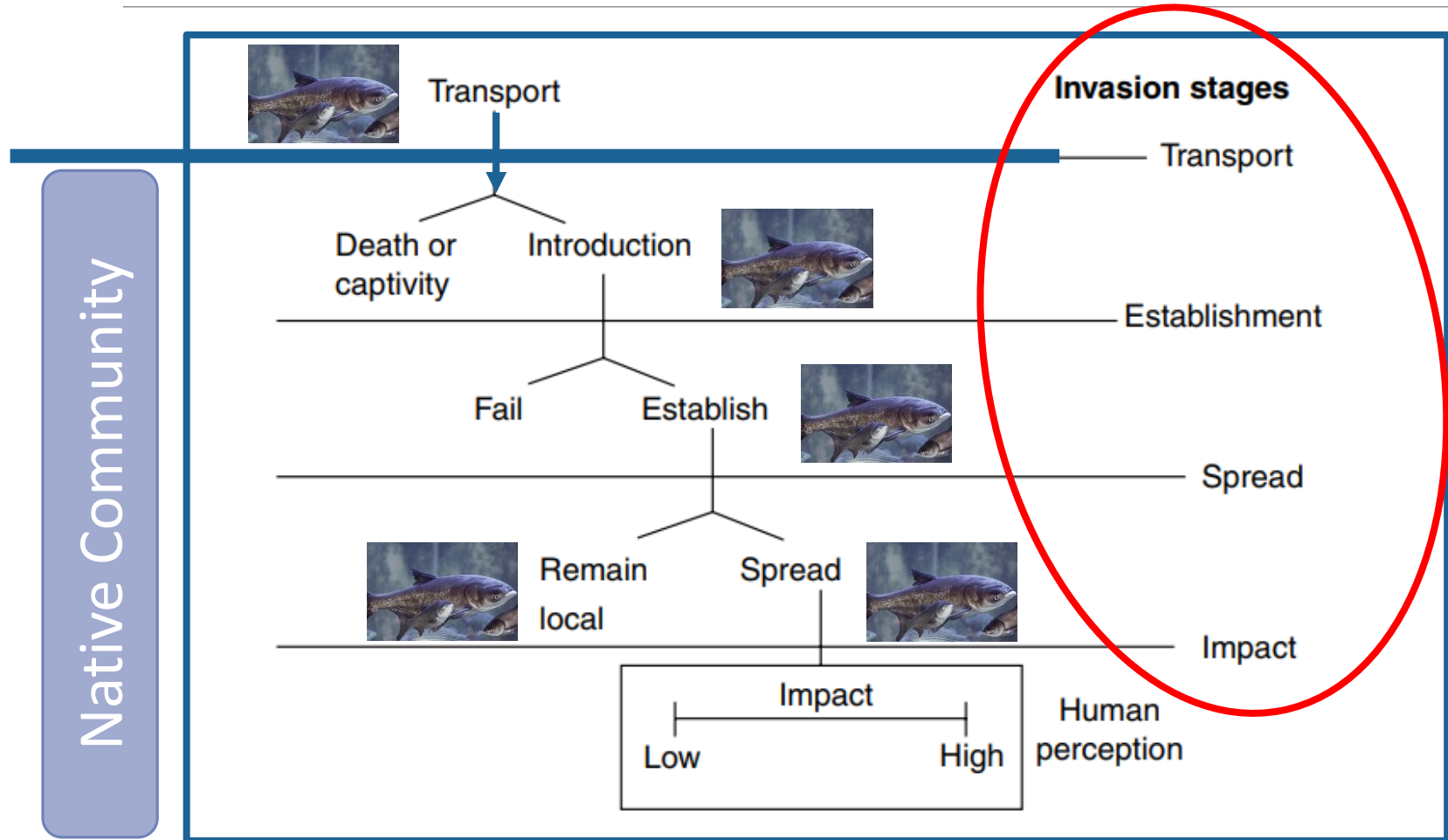


Expected answers:

- Invasion process
- Species introduction
- Non-native species in the native community



Invasion stages





Almost done...

Learning Outcomes Review

1. Invasive species are:

- introduced species (yes/no)
- unintentionally introduced species only (yes/no)

2. Invasive species can:

- fail to establish (yes/no)
- cause only economic problems (yes/no)

3. Please name these two freshwater invasive species

4. One thing which you didn't know about...



Thank you!



Expected answers:

1. Invasive species are:

- introduced species (yes/no)
- unintentionally introduced species only (yes/no)

2. Invasive species can:

- fail to establish (yes/no)
- cause only economic problems (yes/no)

3. Zebra mussel



Asian carp



4. One thing which you didn't know about...



Thank you!
