

# Invasive Species in Freshwater Ecosystems: Introduction



BSCI 467: Freshwater Biology  
Dr. Alina Avanesyan

09/20/2019

# Learning Outcomes

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

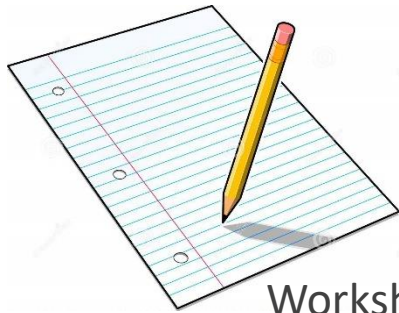
- ☐ what invasive species are
- ☐ how invasive species can be introduced

***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

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Worksheet



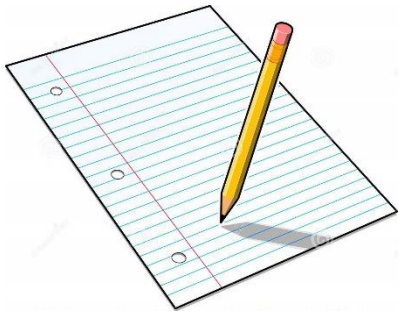
Small group discussion



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)

A large, empty rectangular box with a thin black border, intended for the student to write down their first words or associations when they hear the term 'invasive species'. It is located below the instruction text.

- 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')



# Invasive Species?

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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)

# Invasive Species

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“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

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“**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



Purple loosestrife



Eurasian watermilfoil



Earthworms



Asian carp



Ruffe



Zebra mussel



Asian Swamp Eel



Channeled Apple Snail

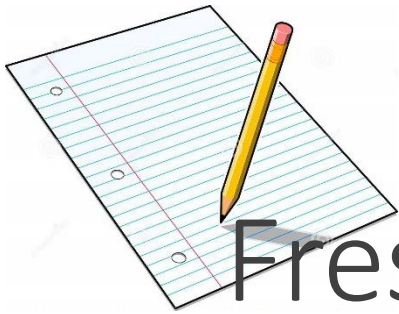


Asian Clam



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



## Native vs. Non-native

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a species which has been introduced 5 years ago?

20 years ago?

100 years ago?

500 years ago?

# Native vs. Non-native



Before European Settlement

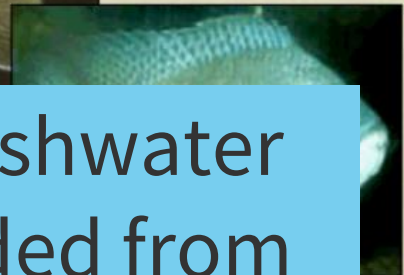
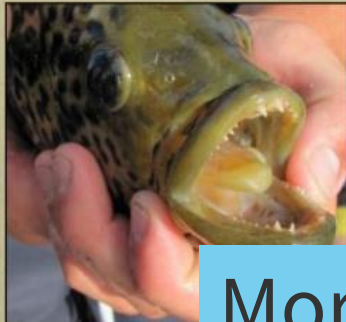


After European Settlement

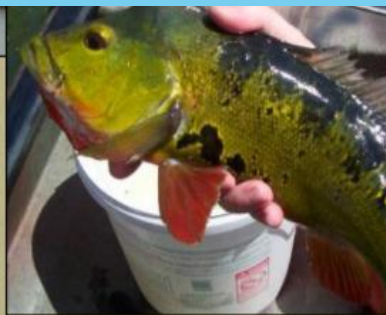
Country	Name of Settlement	Present-Day Location	Year First Settled
Spain	St. Augustine	Florida	1565
England	Jamestown	Virginia	1607
France	Quebec	Canada	1608
Holland	New Amsterdam	New York	1624
Sweden	New Sweden	New Jersey	1638



# Exotic Fishes



More than 145 non-native freshwater fish species have been recorded from Florida since the 1880s.



# Modes of Introduction

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## 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

# Modes of Introduction

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## Intentional Introduction

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

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- aquatic recreation (fishing, hunting, boating, diving, etc.)
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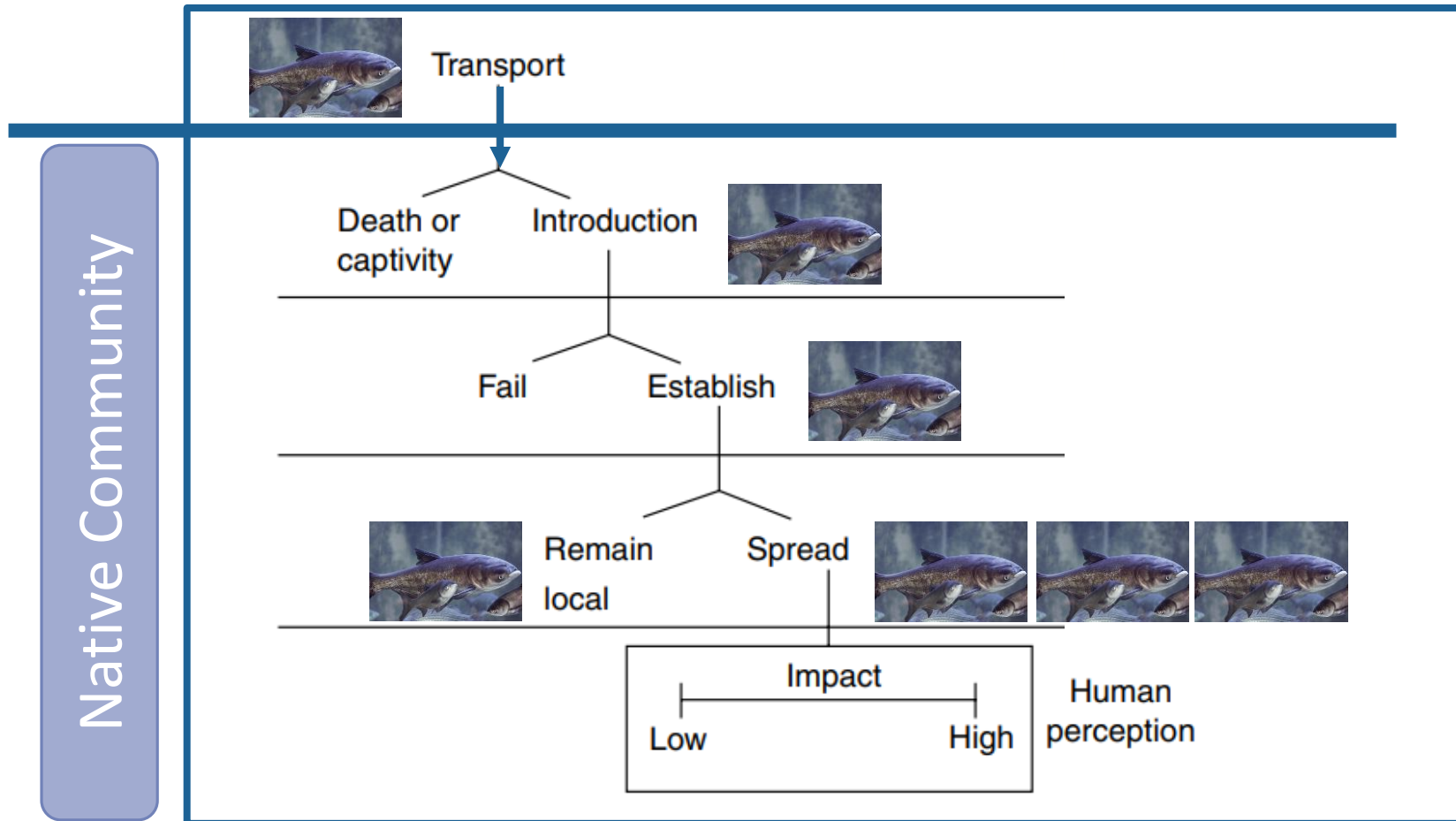
Native community

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graph LR; A[Intentional Introduction] --> D[Native community]; B[Unintentional Introduction] --> D;
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# Discussion

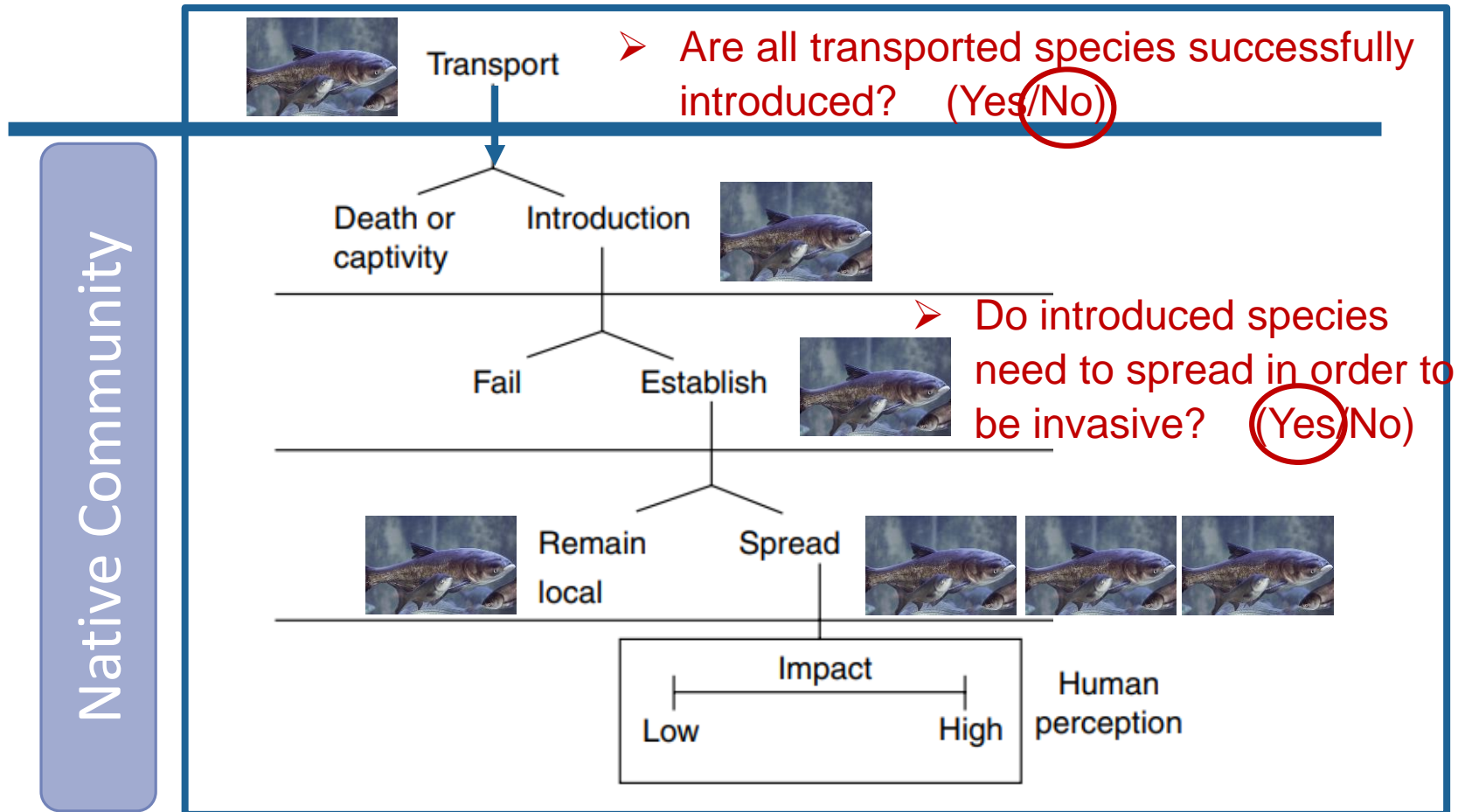
What do you see?

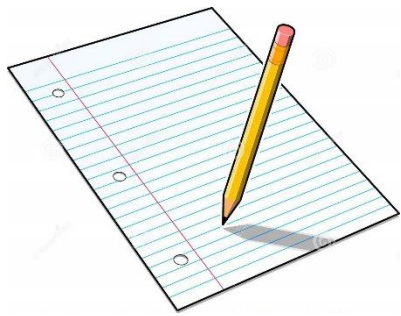






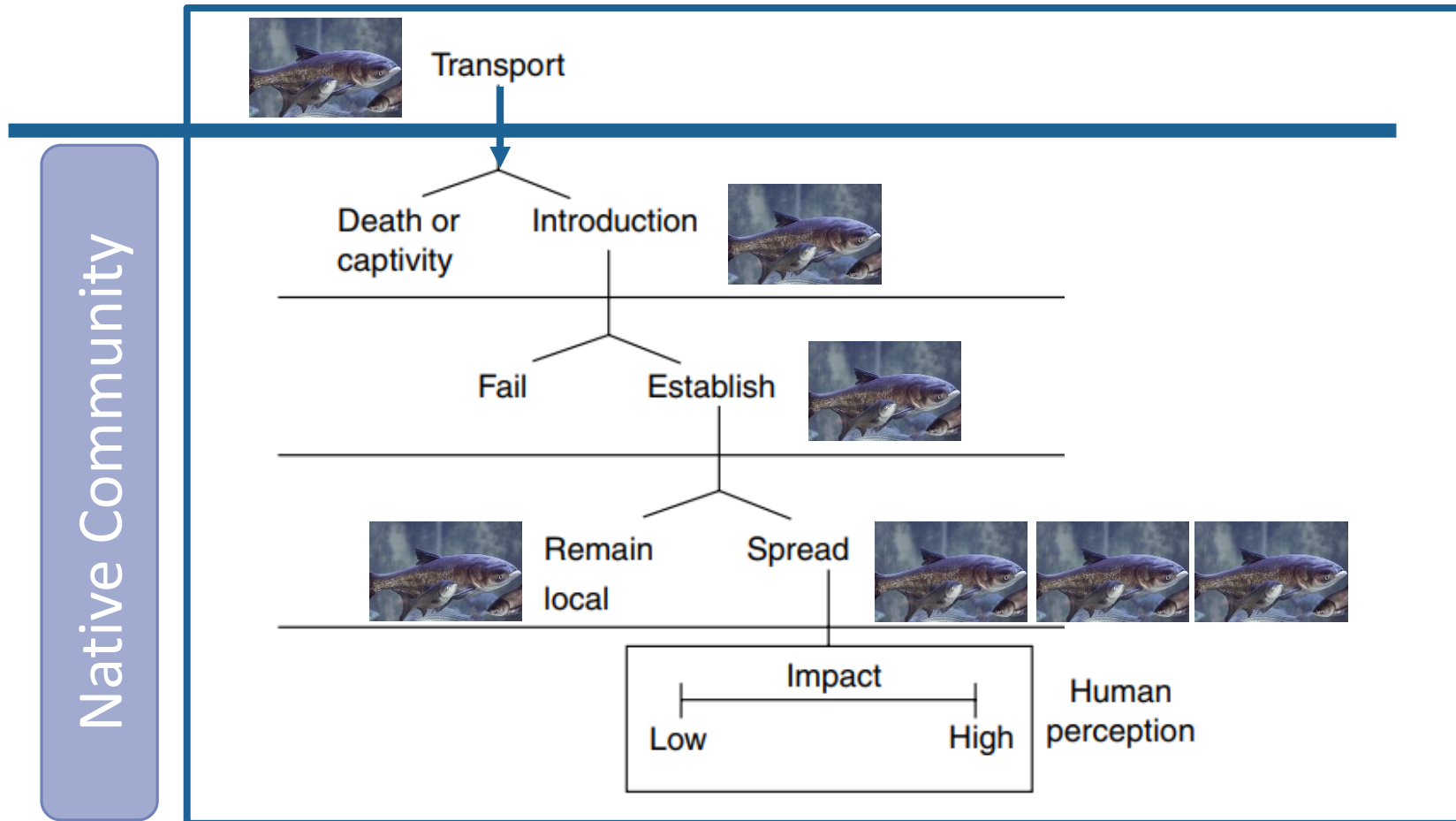
# What does it mean?

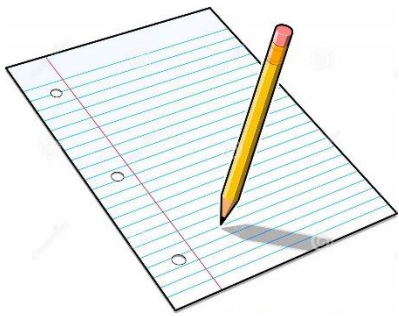




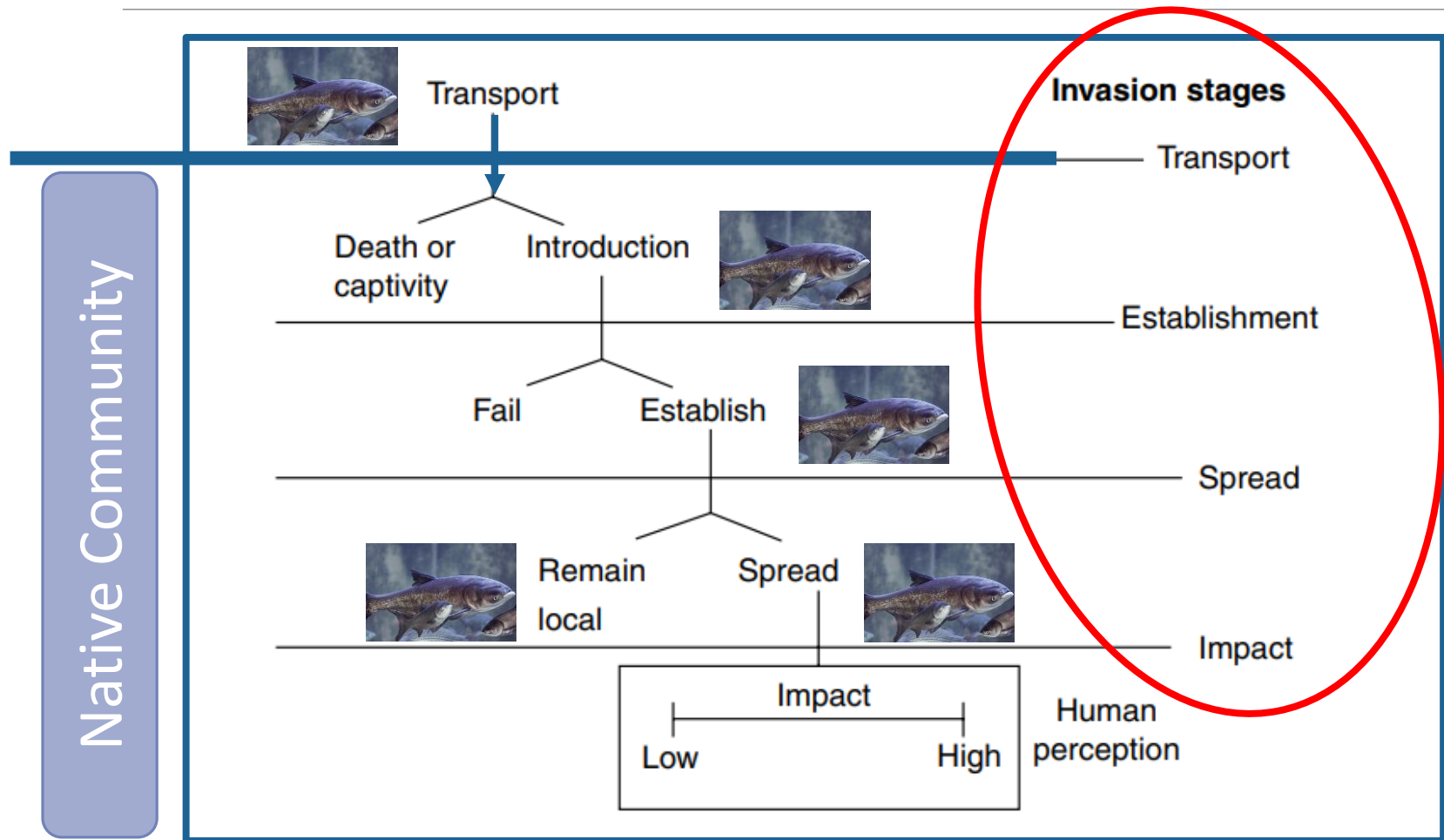
## Worksheet Part 3.

# ➤ Title for this scheme?





# Invasion stages





*Almost done...*

## Learning Outcomes Review

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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 at least two freshwater invasive species

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



*Thank you!*

