

# Not in My Stream: The Asian Carp Invaders



species  
game  
invasion  
predator  
coloring  
invasive  
prey  
activity  
board  
matching  
carp  
web  
food  
elementary  
stream  
diversity

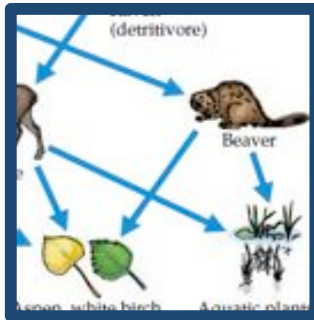


# Learning goals



## Watersheds

- Where does our water end up?



## Food webs

- How are all living things connected within a single habitat?

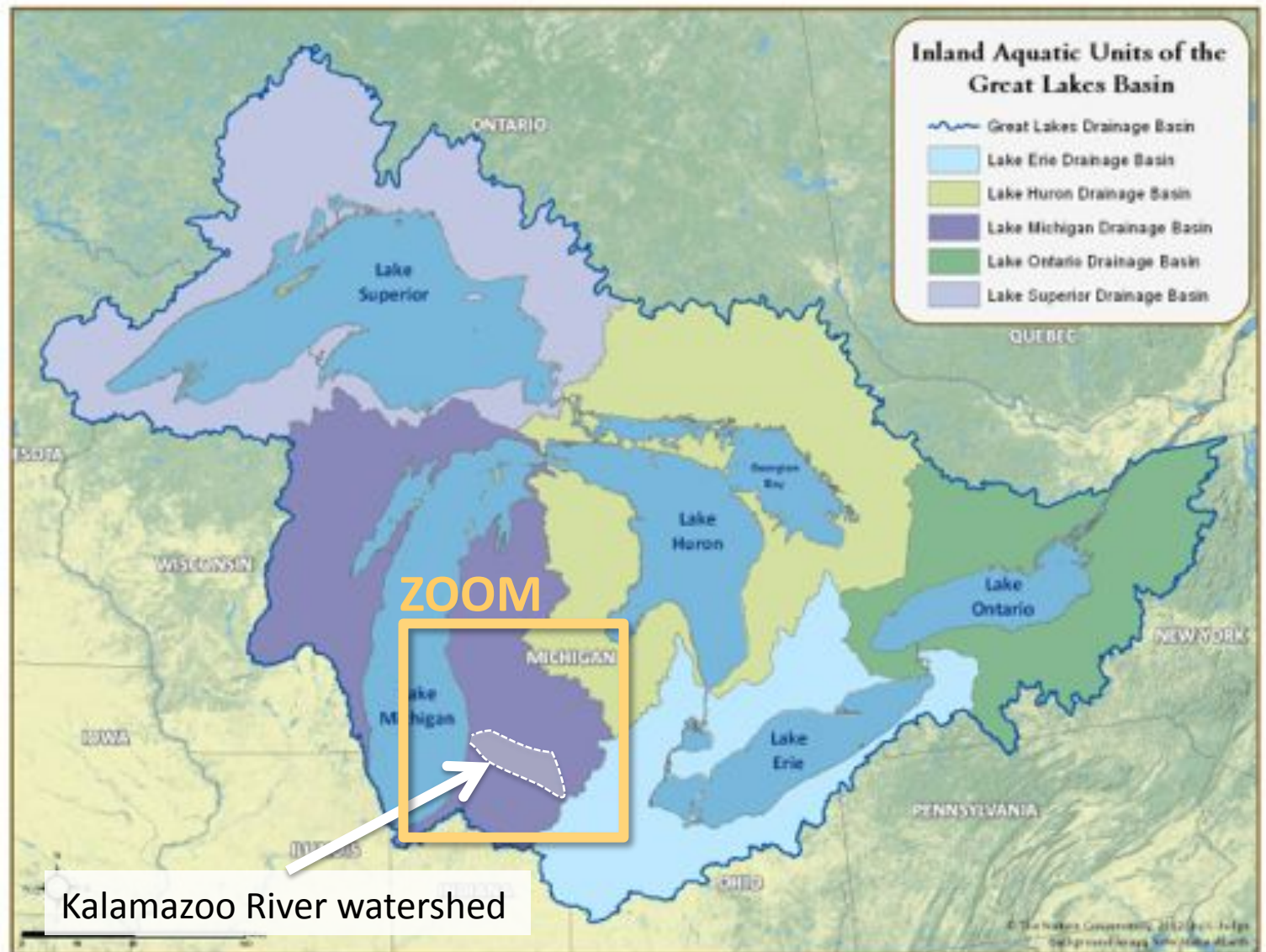


## Invasive species

- How have humans changed watersheds and food webs so that invasive species can multiply?

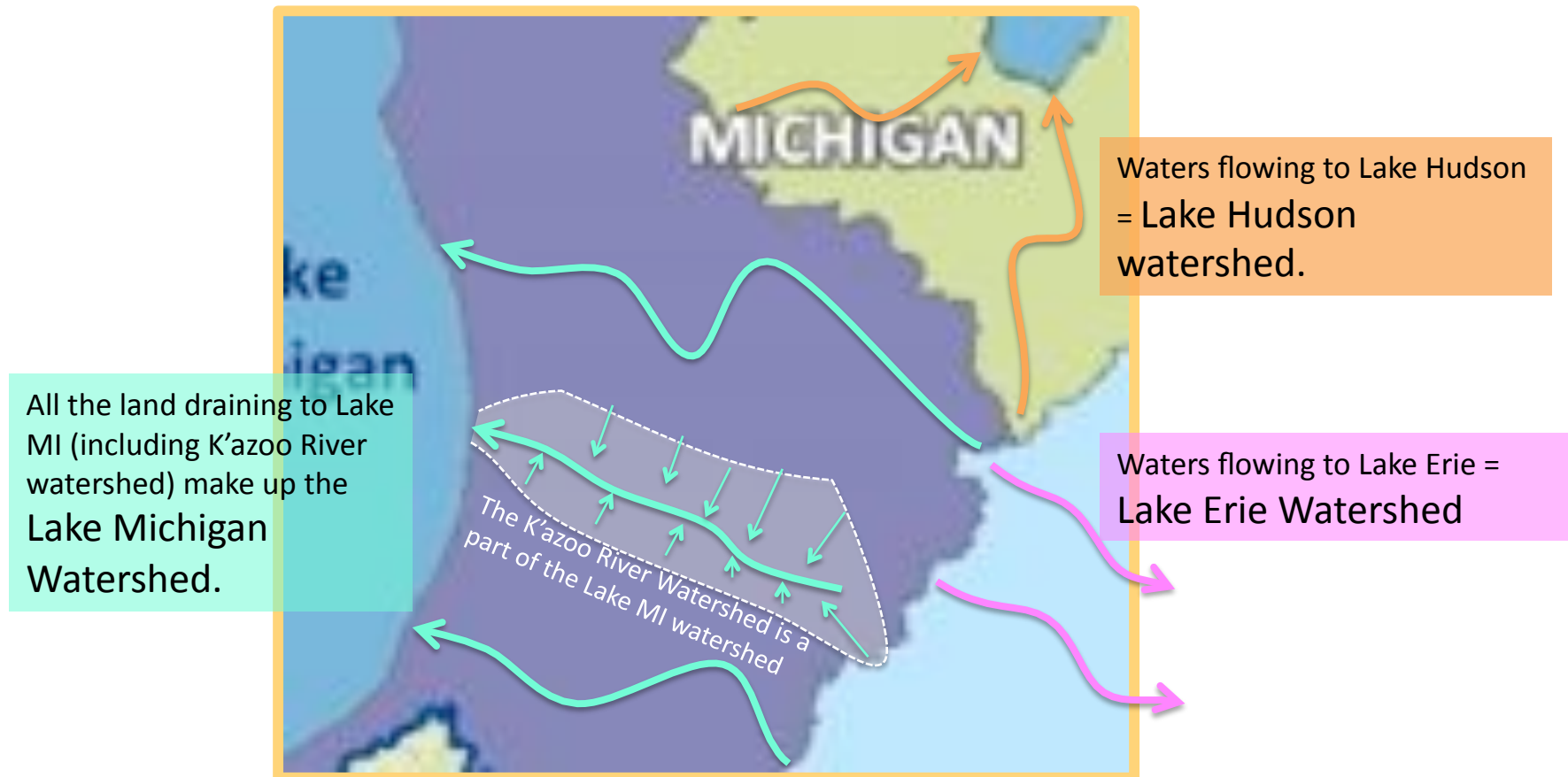


What is a watershed?





# What is a watershed?





## Our watershed neighbors



Can a fish from the Mississippi River reach the Great Lakes?

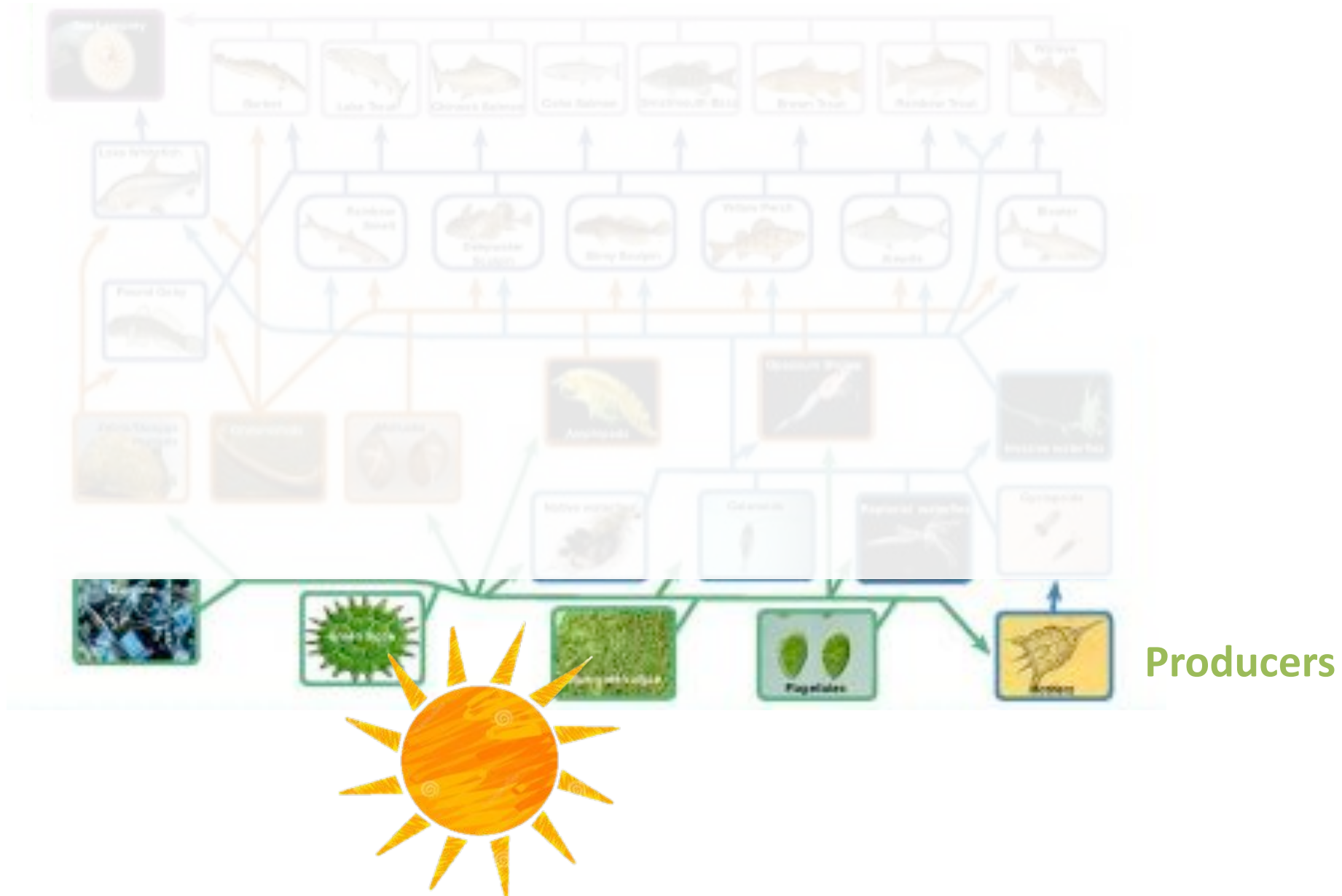


**What kinds of things are living (or could be living) in this picture?**



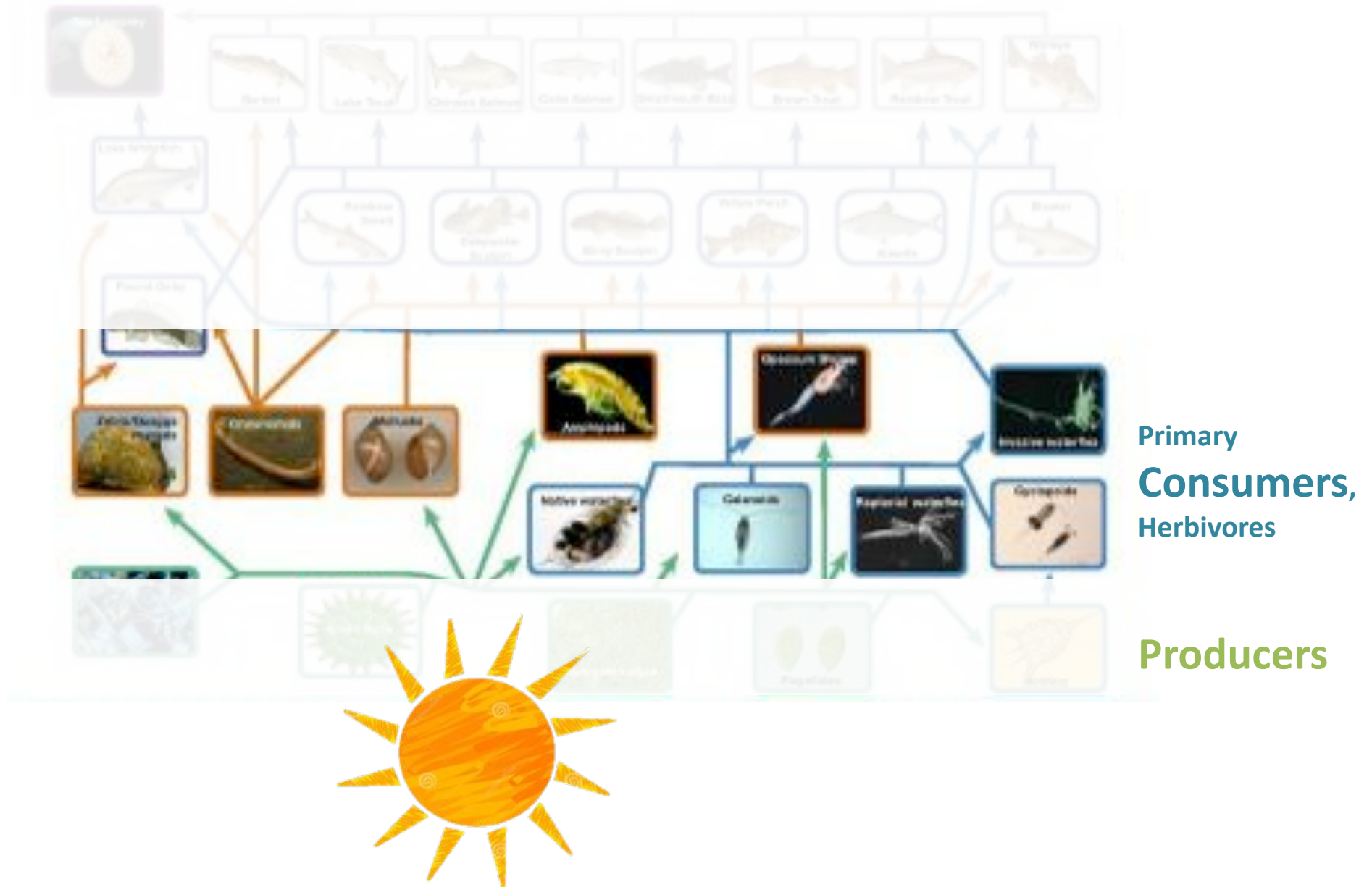


# Lake Michigan Food Web



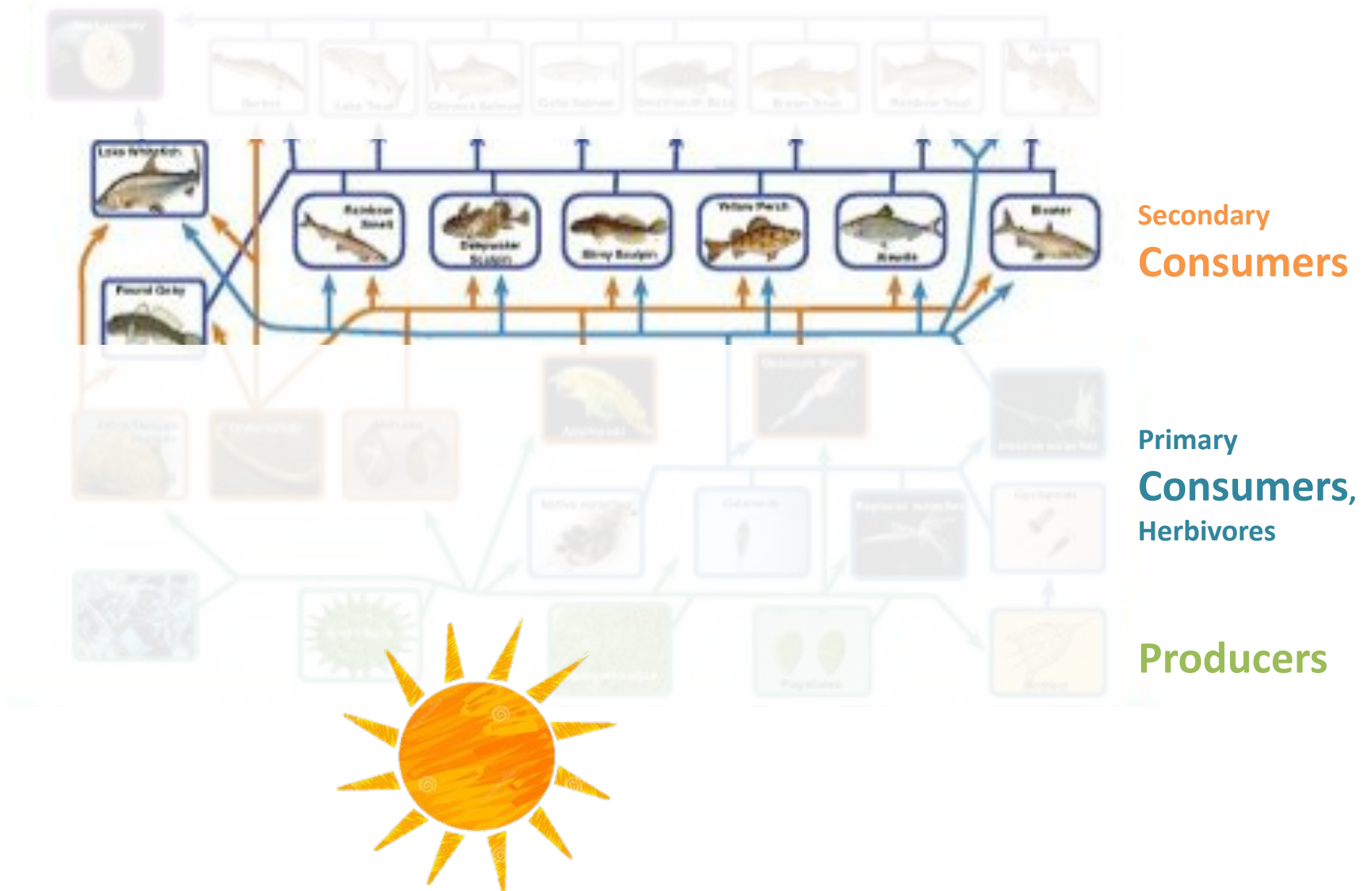


# Lake Michigan Food Web





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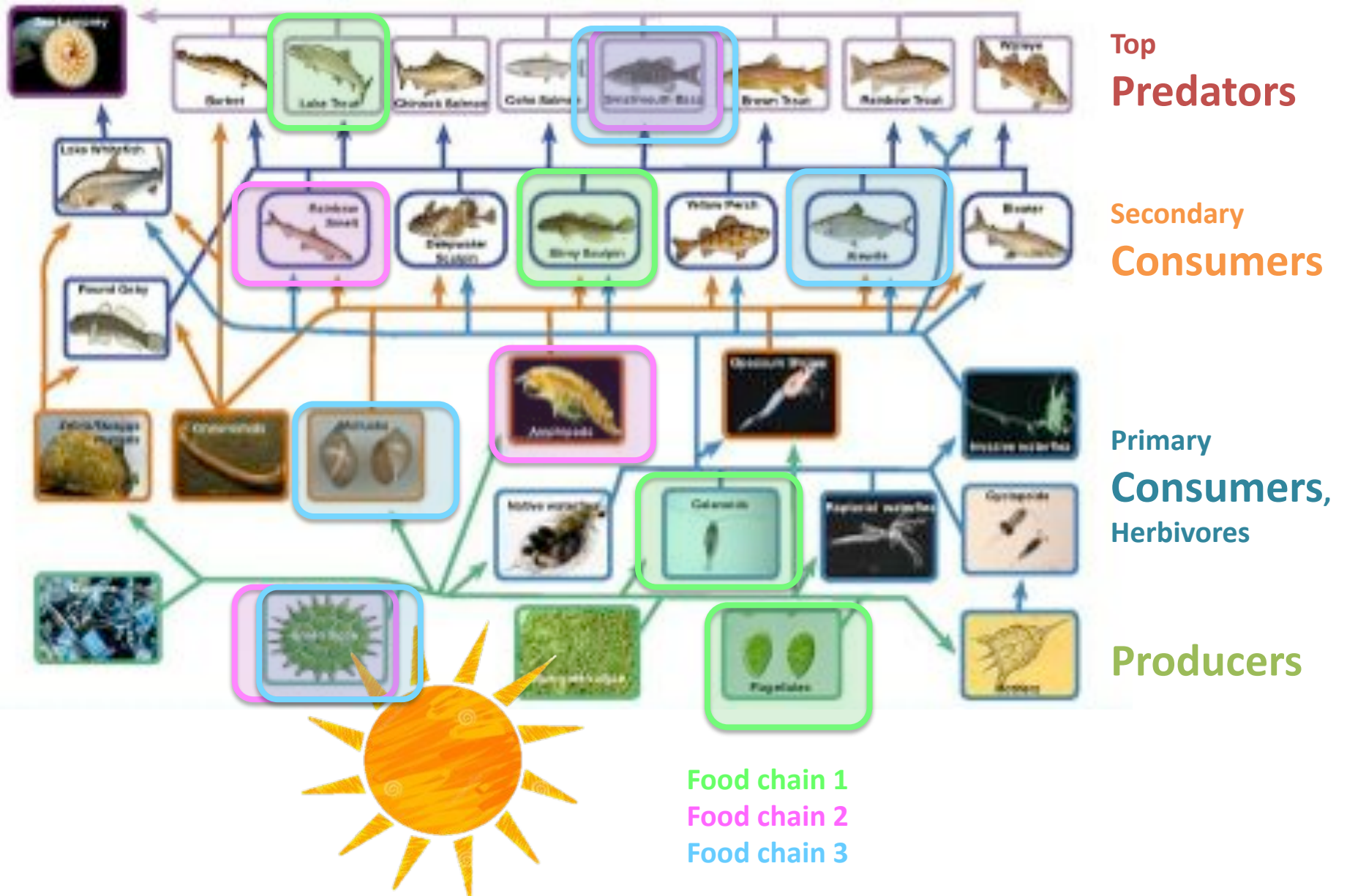


# Lake Michigan Food Web



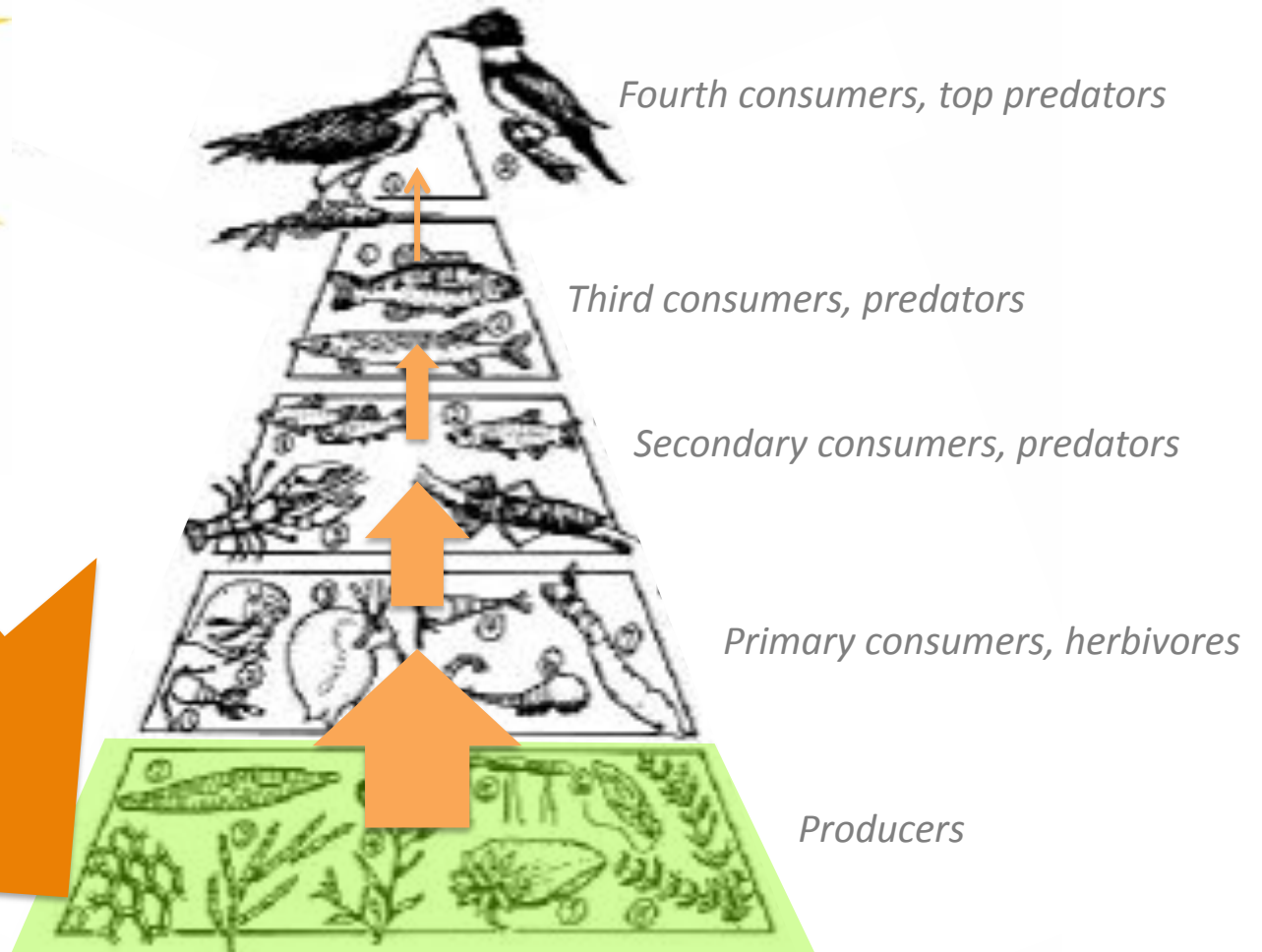


# Lake Michigan Food Web



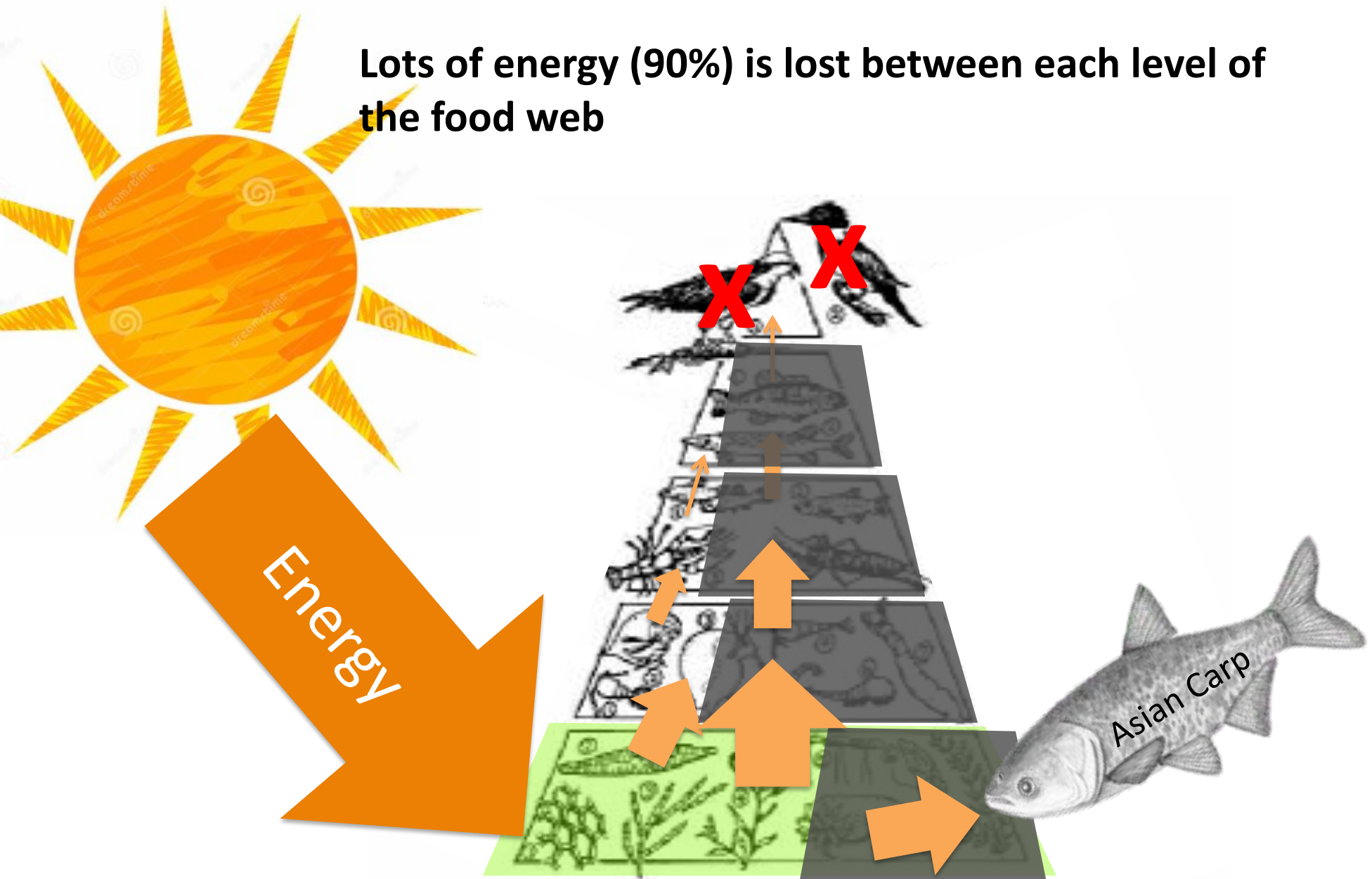


**Lots of energy (90%) is lost between each level of the food web**



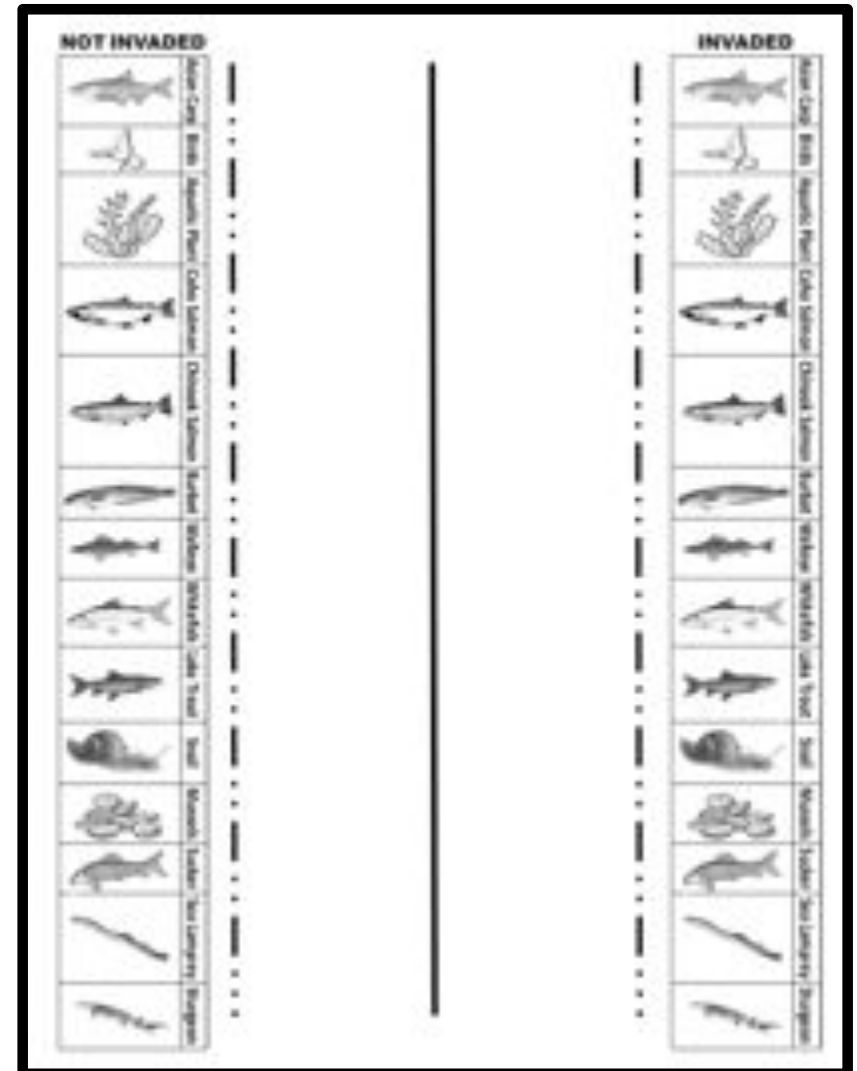
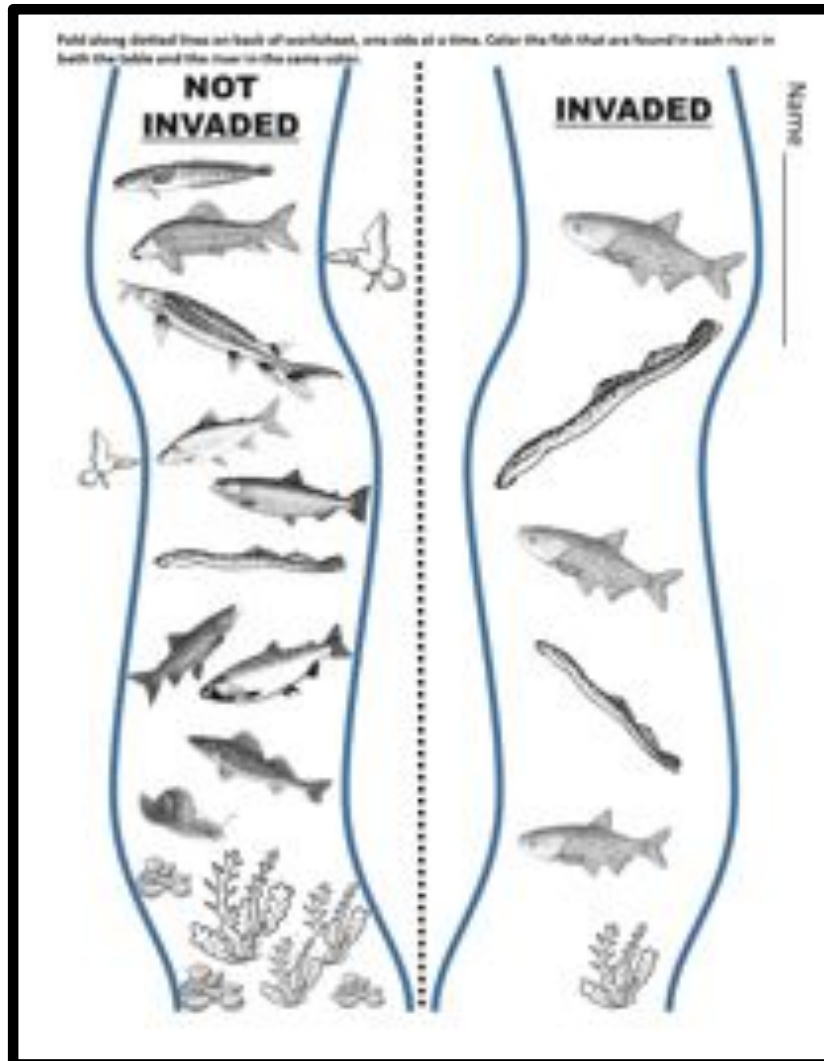


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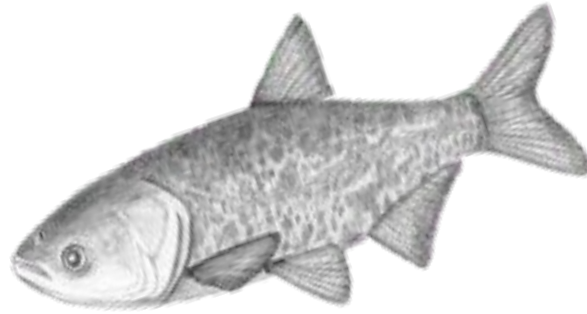


# Matching & Coloring Activity





# Matching & Coloring Activity



- How do you think the Asian carp could lead to the loss of so many species?
- Do the carp affect some species *indirectly*?
- How do you think the physical environment of the invaded stream might change over time?



# What are invasive species?

- An invasive species is a species that is not native (or from) an area and has negative effects on the food web that it invades. Often invasive species **outcompete** native species for resources (food and space).





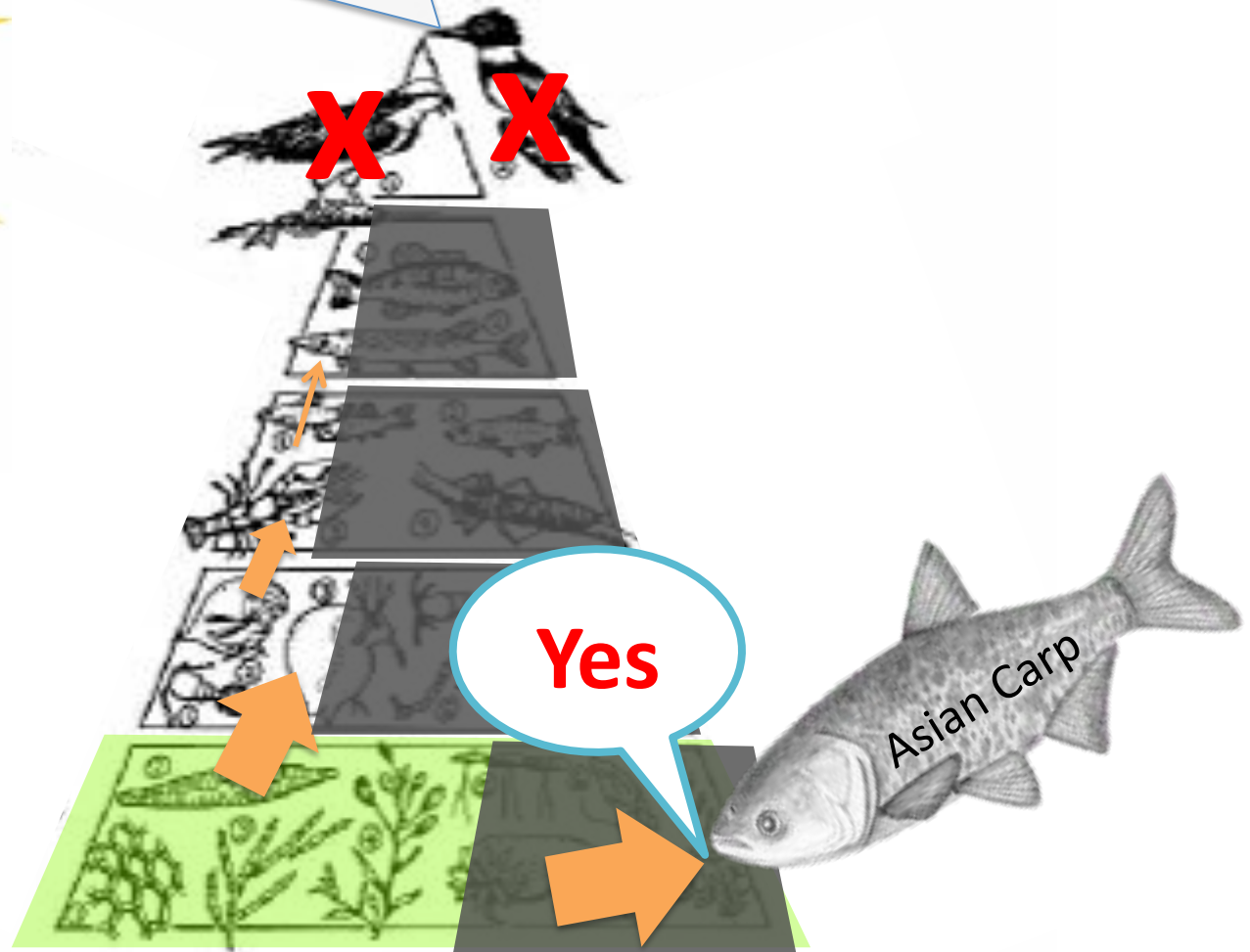
## Example invasive species

- North American Beaver
  - **Native** to North America, where it has natural predators
  - **Invasive** when introduced to South America, where it has no predator



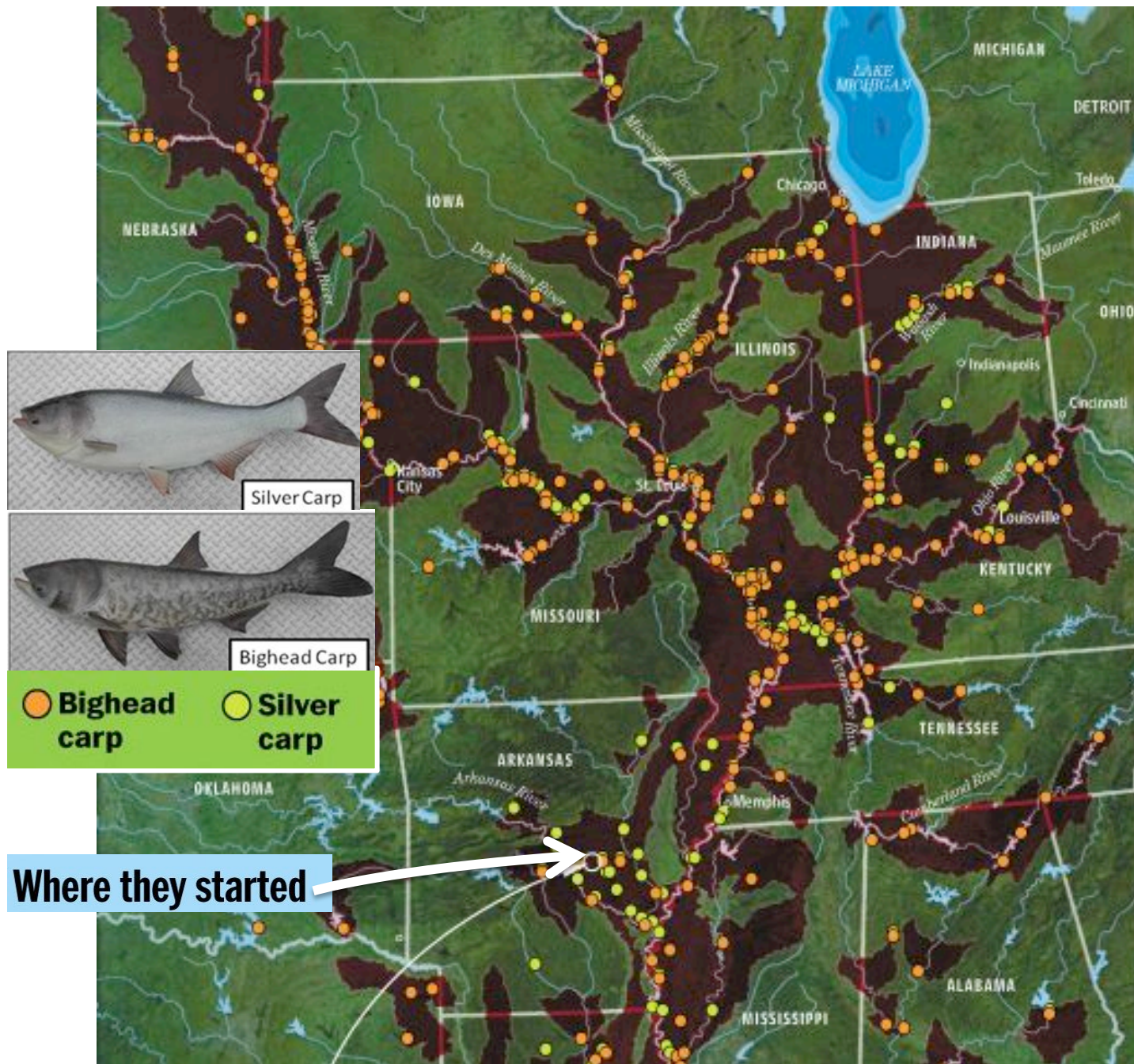


Could something like that happen  
to the Lake Michigan food web?!





How would they get here?





## Our watershed neighbors





# Anatomy of a battlefield

Historically, the Chicago River flowed into Lake Michigan. Chicagoans reversed the flow of the river more than a century ago to flush their sewage into the Mississippi River basin. The project created an artificial connection between the Mississippi and the Great Lakes, and that has opened the door to the possibility of Asian carp entering the lake and creating biological chaos.

■ = NAVIGATION LOCKS

● = Positive DNA samples for silver carp

Fish from Mississippi River

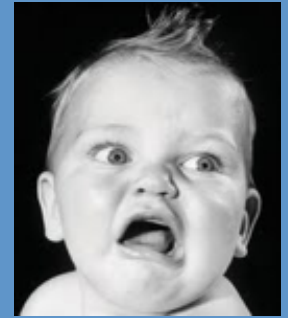
In December 2009, government agencies poisoned the canal between the Lockport dam and electric fish barrier, a distance of 5.7 miles.

Electric fish barrier area

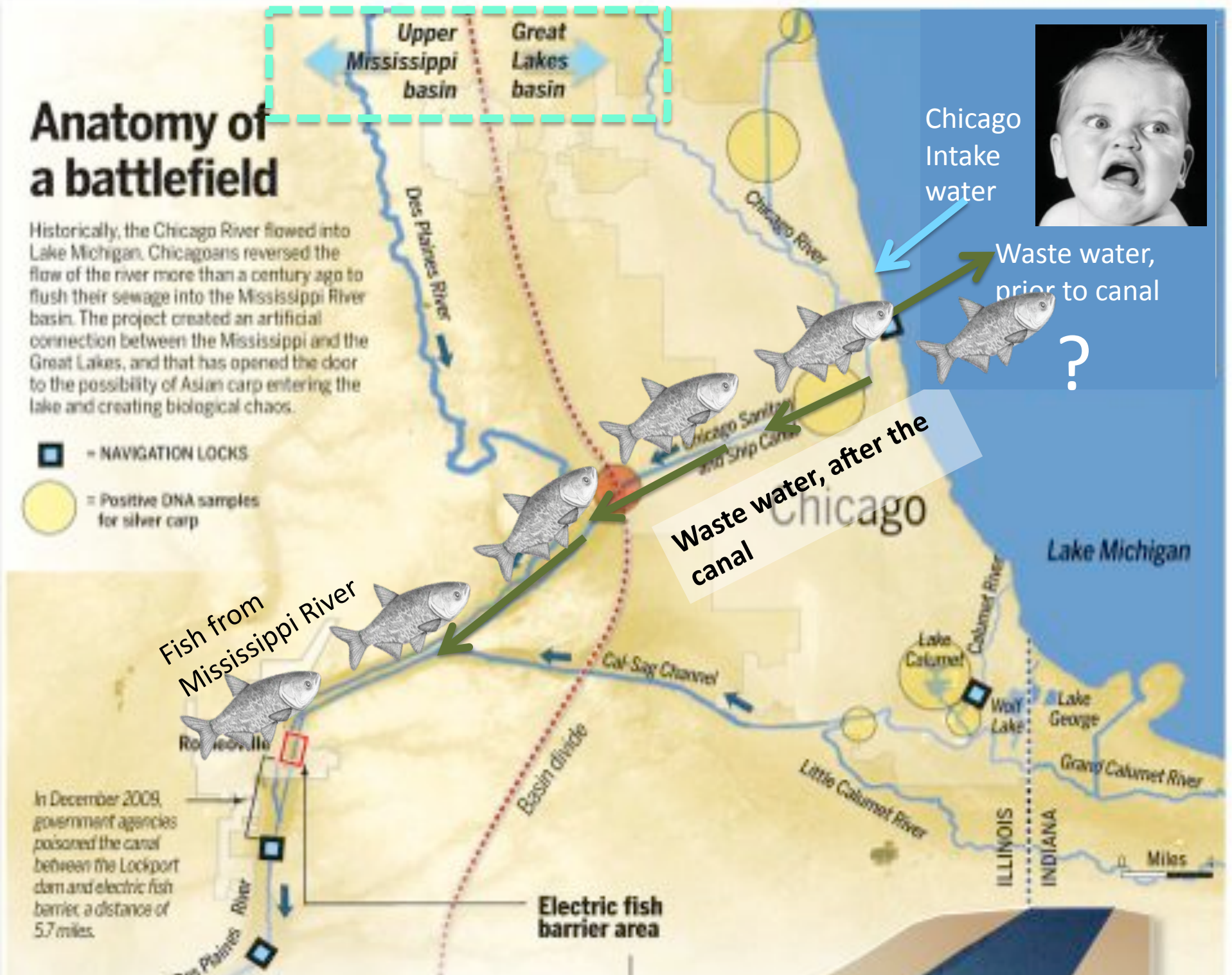
Chicago Intake water

Waste water, prior to canal

Waste water, after the canal



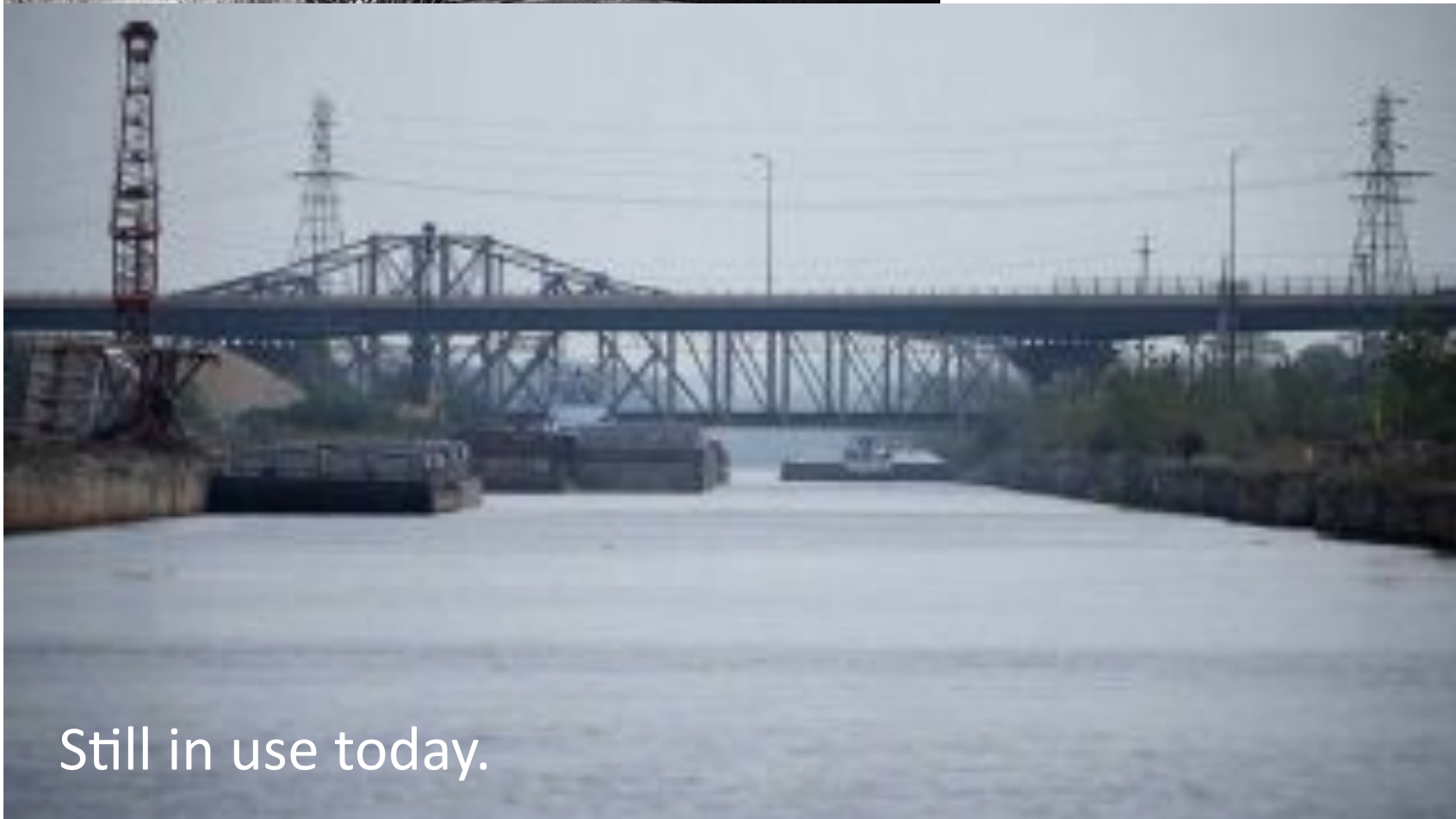
?







The construction of a  
**man-made**  
river



Still in use today.



Why would Asian Carp be a problem if they got to Lake Michigan?



High likelihood of survival & rapid population growth



Changes to food web could hurt many native species



Could lead to irreversible changes to the food web (loss of native species, changes in the way the ecosystem works)




# The Invasive Asian Carp video



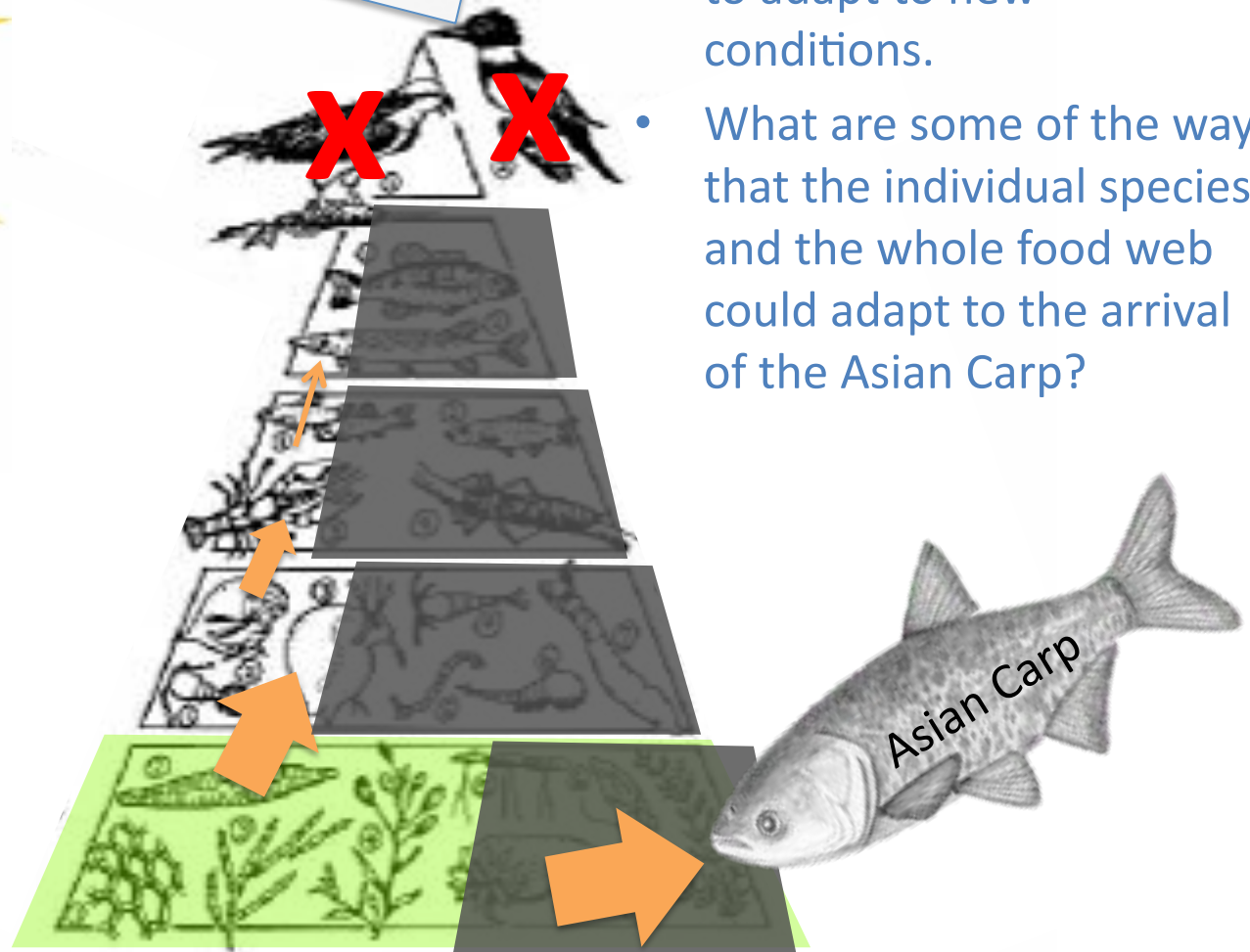
<http://youtu.be/rPeg1tbBt0A?t=8s>





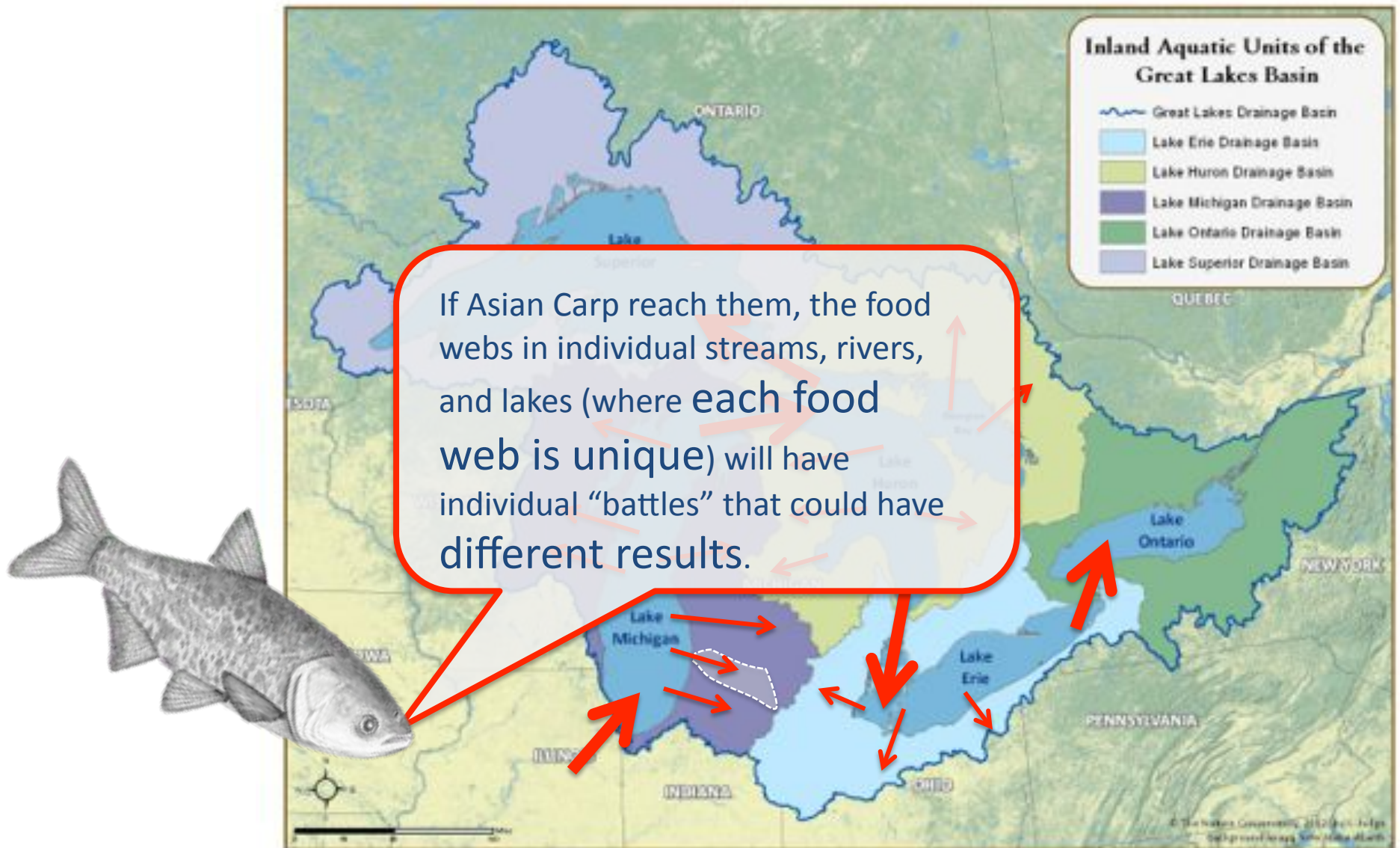
Do we all go extinct or could some species adapt to the new food web?

- Species have the potential to adapt to new conditions.
- What are some of the ways that the individual species and the whole food web could adapt to the arrival of the Asian Carp?



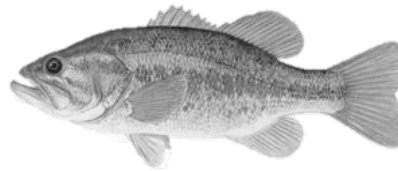
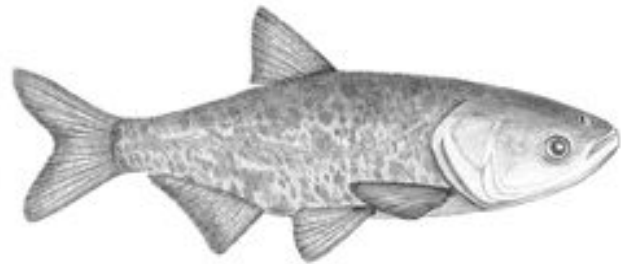


Does invasion happen just once?





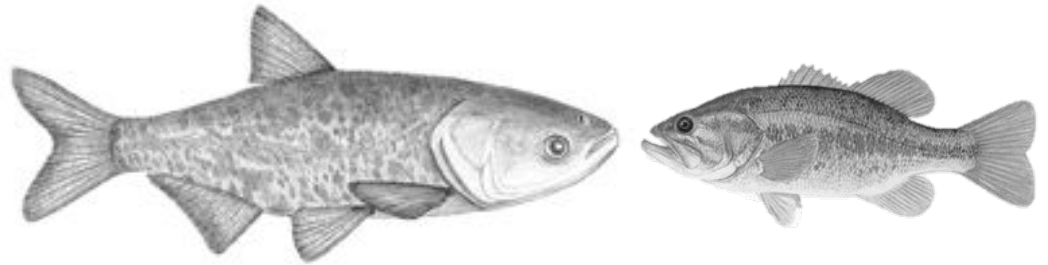
# Survival Game Rules



1. Play in pairs.
2. Roll die: Player that gets the bigger number gets to choose which fish they want to be. Other player goes first.
3. Your turn: Roll die, *do not simply move the number of spaces you rolled!* Instead **look at table** & follow its directions for the number you rolled.
4. First player to “Survival” wins. Play 5 rounds, keep track of winner in the table on the game board.



# Survival results



- How many times did the Carp win?
- How many times did the Bass win?
- What differences between individual rivers and lakes do you imagine would make them more or less likely to have carp successfully invade?
- What kinds of human actions affected each fish?
- What kinds of natural events affected each fish?
- How were these effects different on the carp vs. bass?

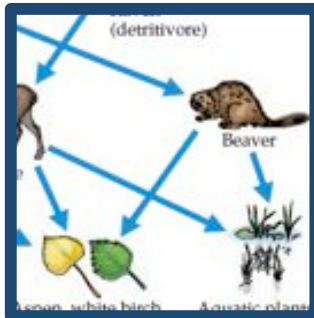


# What did we learn today?



## Watersheds

- Where does our water end up?



## Food webs

- How are all living things connected within a single habitat?



## Invasive species

- How have humans changed watersheds and food webs so that invasive species can get in and multiply?



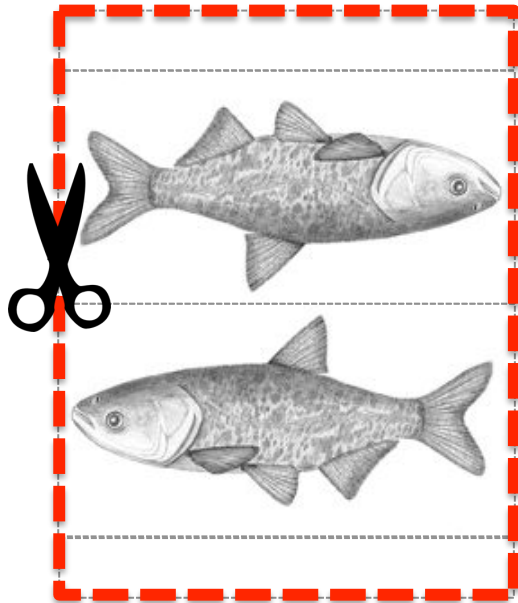
# The end

- This presentation was created by graduate students in the NSF Kellogg Biological Station GK-12 program. For more information visit:  
<http://kbsgk12project.kbs.msu.edu>.
- The following slides are extra slides you may find useful.

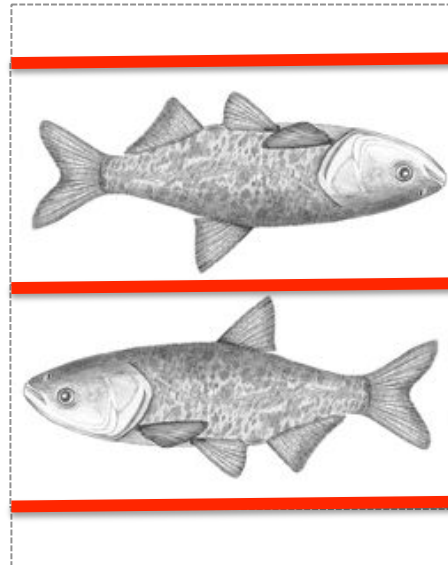


# Board Game assembly instructions

1. Cut these out as one piece.



2. Fold

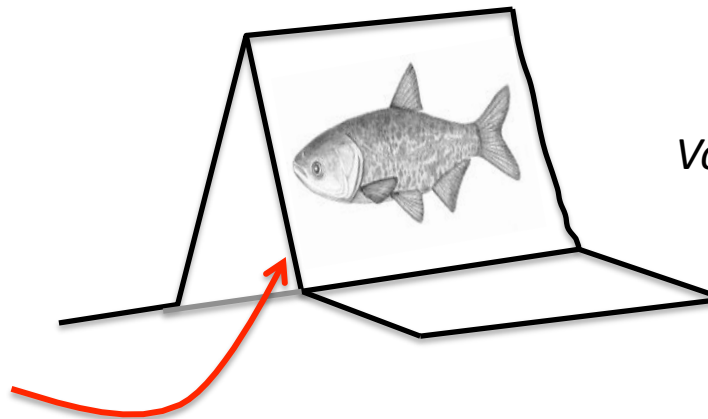


← Fold out so the little part flaps out like feet.

← Fold closed so a fish shows on each side.

← Fold out.

3. Put a piece of tape inside to help it keep its shape.

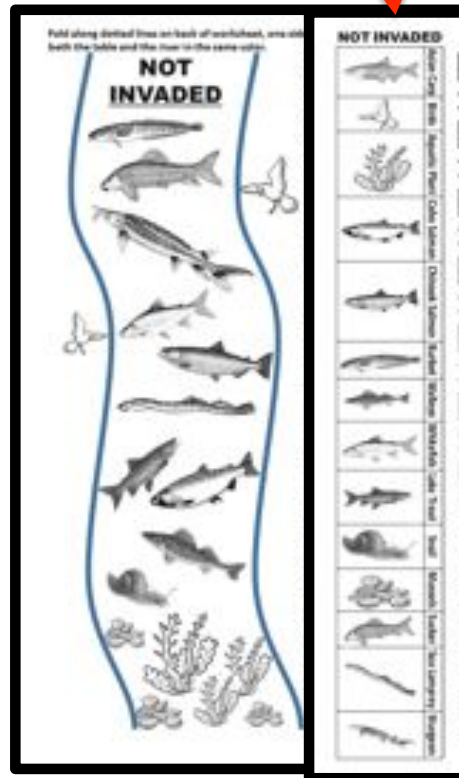
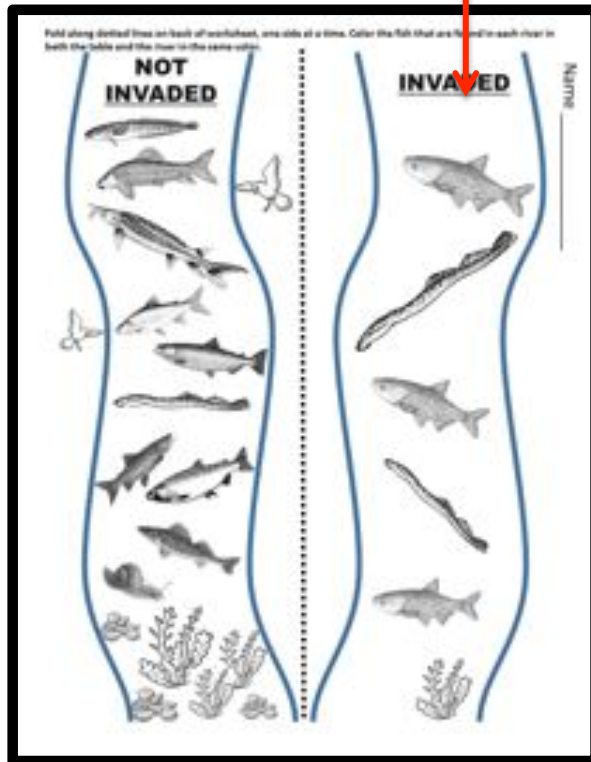


*Voila!*



# Matching worksheet folding instructions

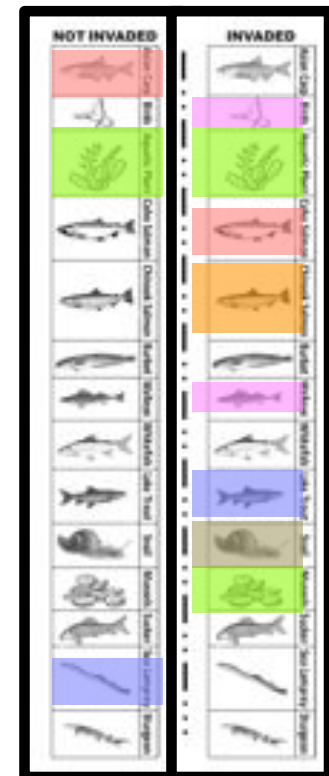
1. Fold here so it looks like



2. Color in the species in the table that you see in the stream.

3. Do the opposite when you're ready to color in the invaded side.

4. Fold both sides in so you can compare how many species you have colored in for the two streams →



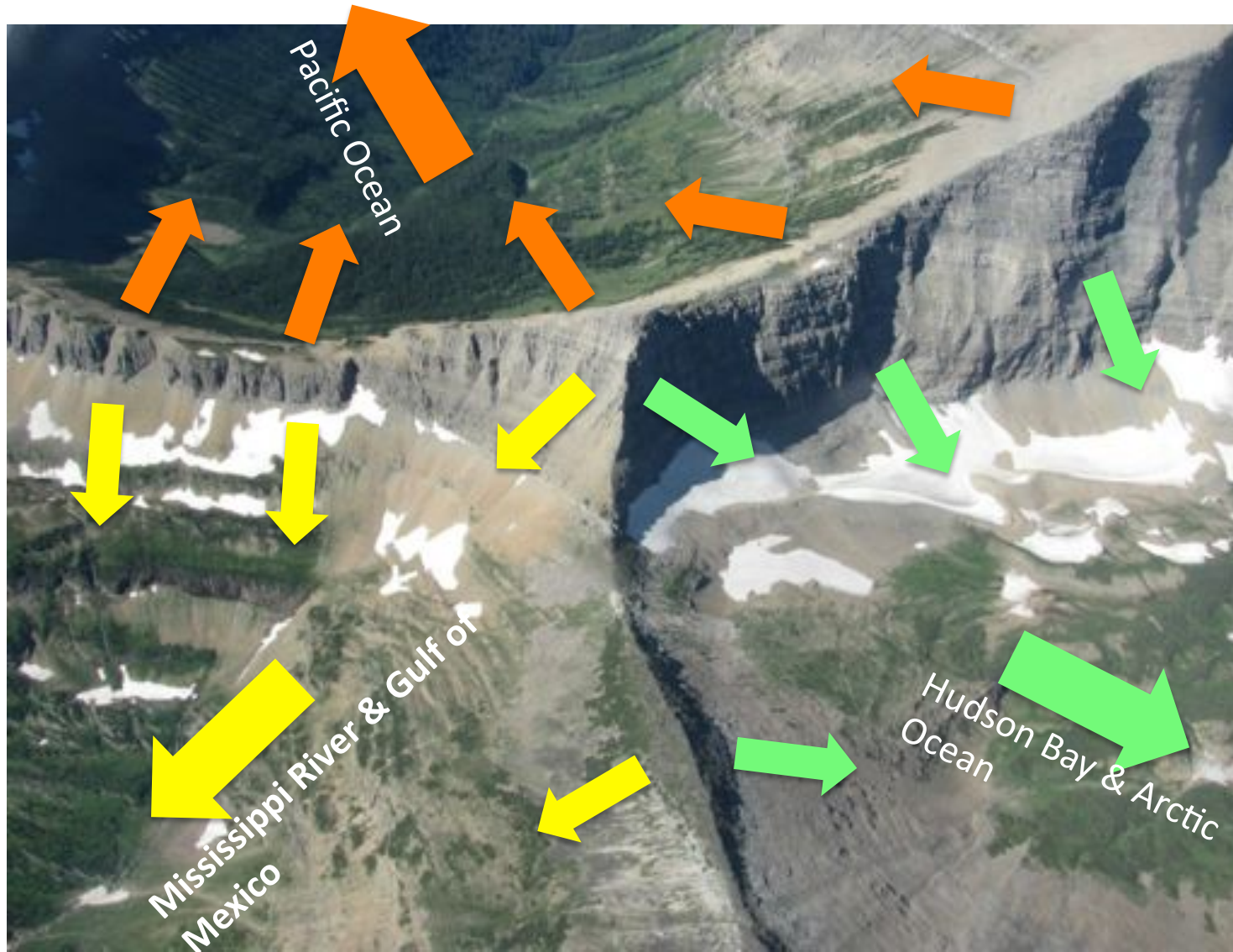


Our watershed neighbor, the Mississippi River watershed





Triple Divide Pass, Glacier National Park, Montana





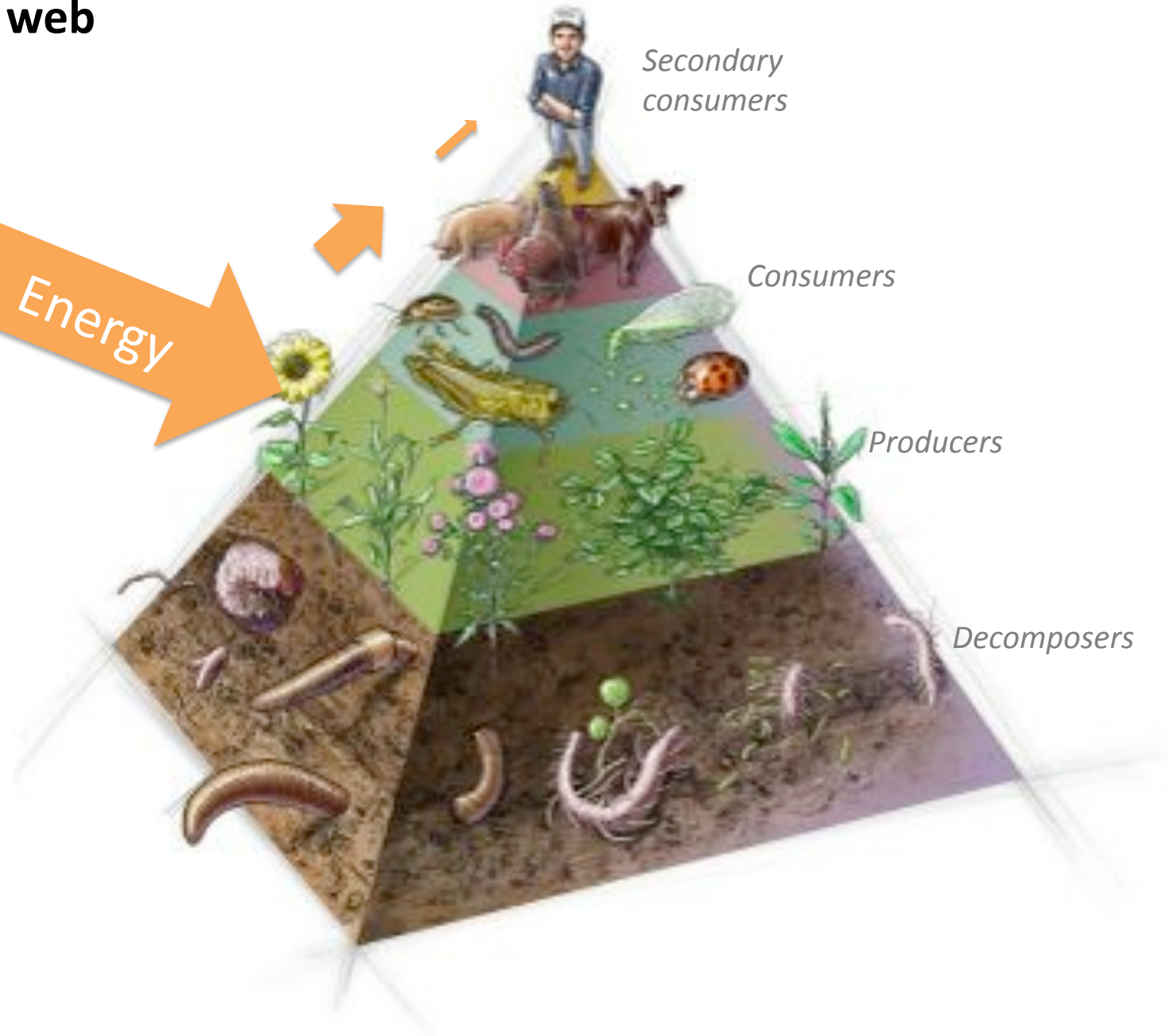




**Lots of energy is lost between each level of the food web**



Energy



*Secondary consumers*

*Consumers*

*Producers*

*Decomposers*



