UPSETTING THE PYRAMID

CARD PUZZLE
MODERATE TO DIFFICULT
1 - 4 PLAYERS

OBJECT
Turn an aquatic food pyramid upside down by removing three native species and adding three invasive species.

WILDCARDS
See sample list below: 1 fish-eating bird, 2 small fish, 3 aquatic carnivores, 4 aquatic herbivores, 3 aquatic invasives (Note: Substitute other cards or build a terrestrial food pyramid.)

DEAL
Working alone or in small groups, read the information on the native Wildcards and build a pyramid:

• 1st row — animal that eats fish (Common Loon)
• 2nd row — fish that eats small invertebrates (Bluegill, Yellow Perch)
• 3rd row — invertebrates that eat other invertebrates (Alderfly Larva, Dragonfly Larva, Damselfly Larva)
• 4th row — plant-eating invertebrates (Mayfly Larva, Caddisfly Larva, Stonefly Larva, Riffle Beetle)

PLAY
Now, without moving any other cards, turn the pyramid upside down by removing three native species cards and adding three invasive species cards (e.g., Zebra Mussel, Rainbow Smelt, and Rusty Crayfish). See solution on the next page.
**THINK ABOUT IT!**

Check out the aquatic food pyramid now! While invasives don’t completely turn food pyramids upside down, they do compete with native species for limited food, cover, and space. They often upset the whole ecosystem that they invade. Look at the backs of the *Wisconsin Wildcards: Alien Invaders* to discover some of the adaptations that allow invasive species to outcompete native species and upset aquatic ecosystems:

- Invasives are free from the predators, parasites, and diseases that control populations of native species.
- Invasives have great dispersal ability or migratory tendencies.
- Invasives have a high reproductive potential.
- Invasives mature early.
- Invasives are often able to reproduce both sexually and asexually.
**RIFLE BEETLE**

Order Coleoptera (meaning “sheath-wings”)  
Family Elateridae

These beetles live their entire lives primarily in fast-moving water on gravel, wood, and vegetation. There are 24 species in Wisconsin. Both adults and larvae eat plants and scrape algae from rocks.

Check for these characteristics:
- Adults and larvae dark, with thick, leathery skin
- Larvae cylindrical
- Adults and larvae with long claws to hold onto the bottom in fast water
- Adults with thread-like antennae

**WILD!** After flying to disperse, adults return to the water and go to the surface only once in a lifetime to obtain oxygen. They hold oxygen in a flattened bubble on many tiny hairs on their body, refilling it with oxygen from the water as it is depleted.

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Photo: Natural Resources Conservation Service  
Art: UNLCE  
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**STONEFLY LARVA**

Order Plecoptera (meaning “broad-winged wings” – adults position back wings in folds under front wings)

These pollution intolerant insects eat plants, dead material, and other insects. The eggs and larvae of Wisconsin’s 58 stonefly species live in cool, flowing water in gravel, rock, wood, or leaf packs. The larvae crawl or swim by moving their abdomen side to side. Avoid confusing them with mayfly larvae.

Check for these characteristics:
- Long antennae
- Two claws on each leg
- No gills located along middle of abdomen
- Two tails

**WILD!** Stonefly larvae have few gills, so they highly oxygenated water to survive. To increase oxygen supply to their gills, they do “push-ups” to move oxygen rich water across them, making it easier to absorb the oxygen.

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Photo: Dr. Steve Shanks, Professor of Limnology, UW-EE  
Art: UNLCE  
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**RAINBOW SMELT**

**WHAT IS IT?**

These slender fish are typically 6 to 8 inches long, with obvious teeth and a small fin on top of their body near the tail. They escaped into the Great Lakes from an inland lake in Michigan.

**WHAT'S THE PROBLEM?**

These fish cause problems in our inland lakes, where they were probably used as bait and released. Adult smelt eat young walleye, and the young of both fish comprise for the same food.

**WHAT CAN I DO?**

- Learn how to identify rainbow smelt
- If you catch a rainbow smelt in an inland lake, kill it, and dispose of it in the trash
- Don’t use live smelt as bait

**WILD!**

Fried smelt are tasty, but they smell like cucumbers when freshly caught!

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**RUSTY CRAYFISH**

Orconectes rusticus

**WHAT IS IT?**

Rusty crayfish have larger claws than most other native crayfish species with dark, rusty spots on each side of their carapace (middle part of their outer body)

**WHAT'S THE PROBLEM?**

Rusty crayfish feed very aggressively on aquatic plants, reducing the abundance of vegetation in many northern Wisconsin lakes. They also are very prolific and reduce native crayfish populations.

**WHAT CAN I DO?**

- Learn how to identify rusty crayfish
- Don’t transport them from lake to lake by using them as fishing bait

**WILD!**

Female rusty crayfish can lay by 80-575 eggs!

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**ZEBRA MUSSEL**

**WHAT IS IT?**

These yellowish-brown clams – up to 2 inches long – have light and dark stripes on their “D” shaped shells. Native to the Baltic and Caspian Sea region of Europe, they came here in water carried in the bottom of seagoing ships.

**WHAT'S THE PROBLEM?**

They attach to all hard surfaces, including boats and docks, and dog water intakes. They are filter feeders, taking plankton out of the water that young fish rely on for food. They produce tens of thousands of young mussels each summer, and can cover lake and river bottoms.

**WHAT CAN I DO?**

- Learn how to identify zebra mussels
- If you find zebra mussels, dispose of them in the trash
- Drain all water (livewell, bilge) before going to another waterbody

**WILD!**

They are one of the ONLY freshwater mussels that can attach themselves to solid objects!

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