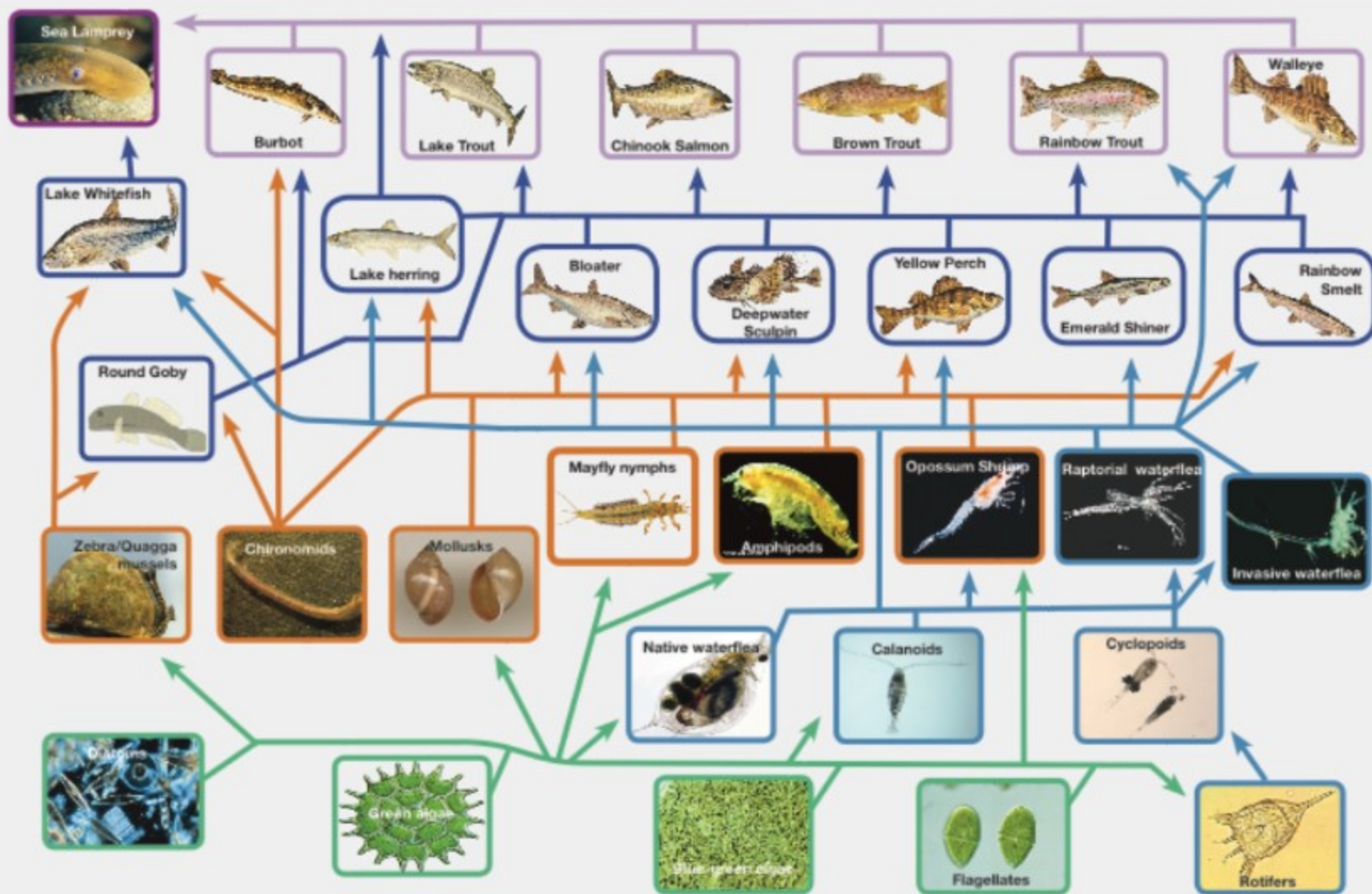


Great Lakes Food Webs





Lake Huron Food Web

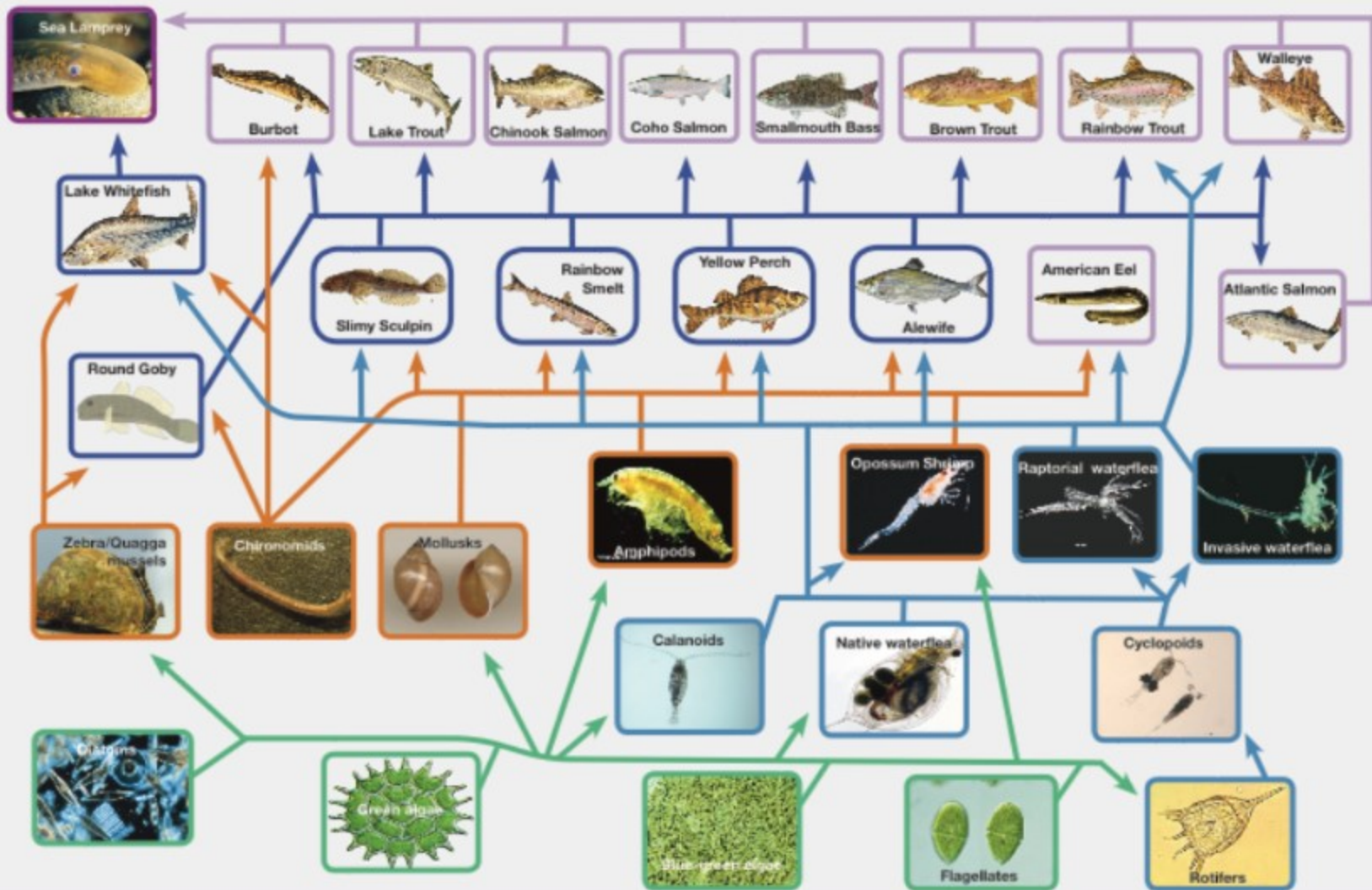


Foodweb based on "Impact of exotic invertebrate invaders on food web structure and function in the Great Lakes: A network analysis approach" by Mason, Krause, and Ulanowicz, 2002 - Modifications for Lake Huron, 2009.

NOAA, Great Lakes Environmental Research Laboratory, 4840 S. State Road, Ann Arbor, MI 734-741-2235 - www.glerl.noaa.gov



Lake Ontario Food Web

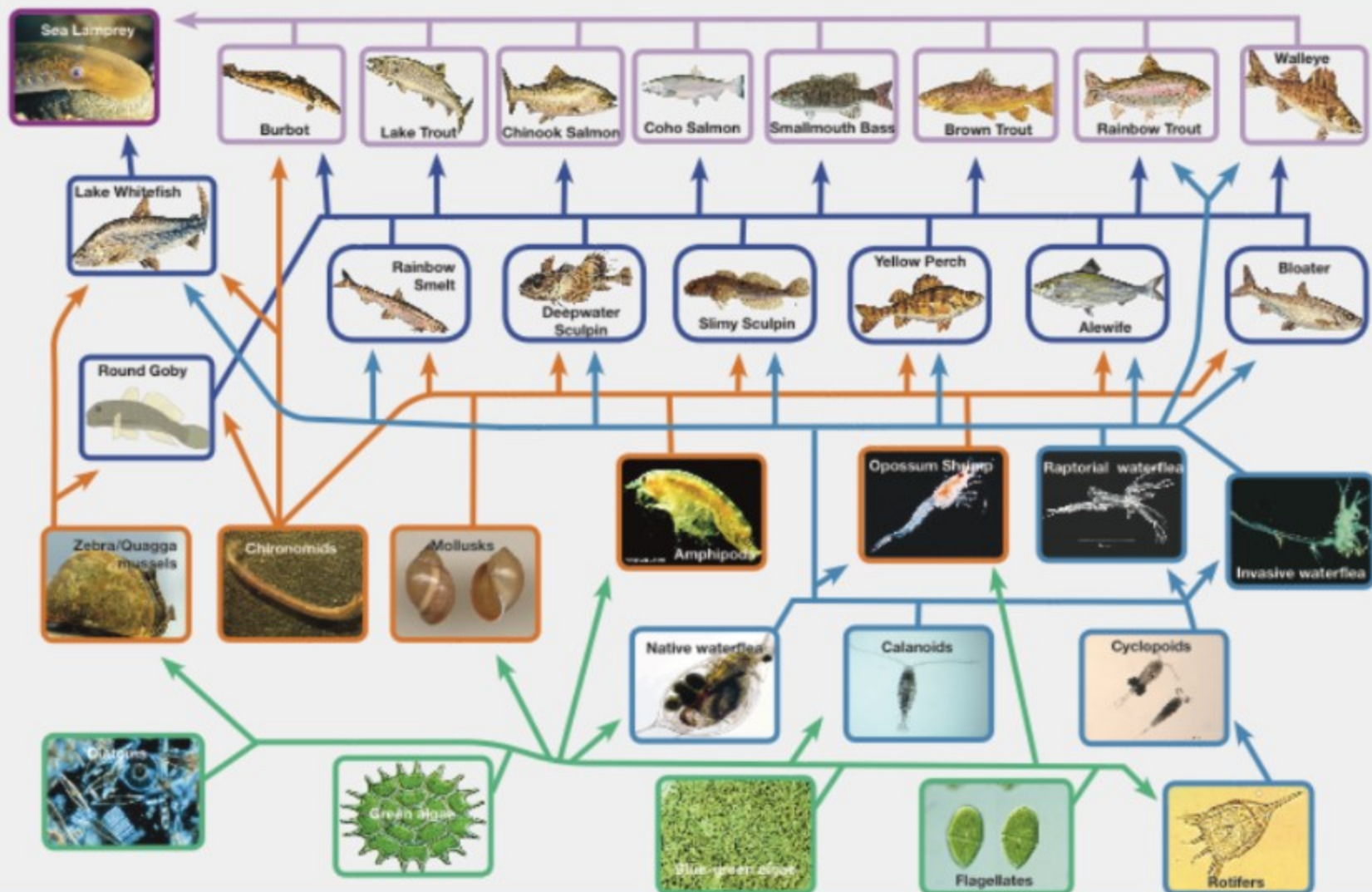


Foodweb based on "Impact of exotic invertebrate invaders on food web structure and function in the Great Lakes: A network analysis approach" by Mason, Krause, and Ulanowicz, 2002 - Modifications for Lake Ontario, 2009.

NOAA, Great Lakes Environmental Research Laboratory, 4840 S. State Road, Ann Arbor, MI 734-741-2235 - www.glerl.noaa.gov



Lake Michigan Food Web

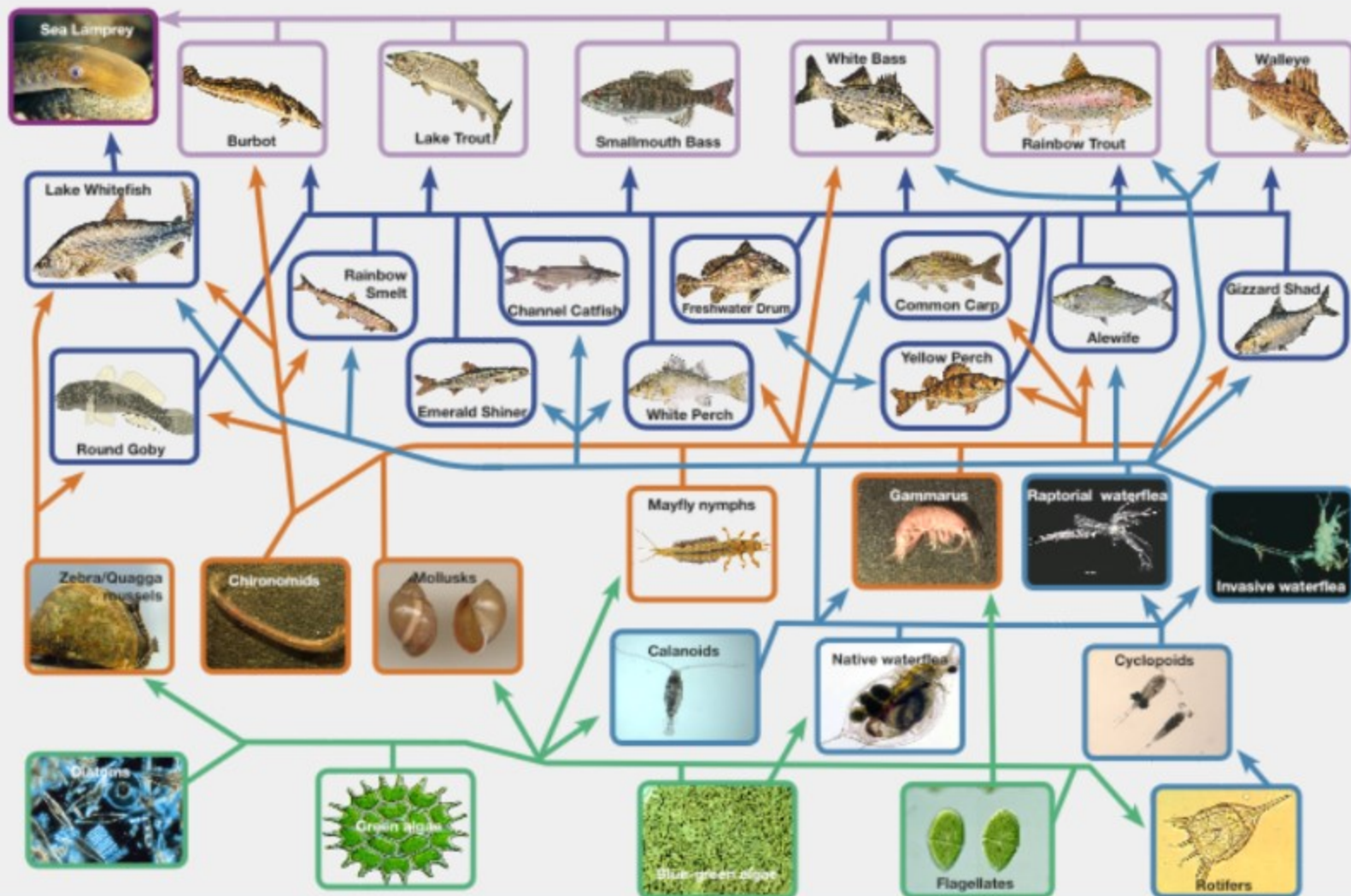


Foodweb based on "Impact of exotic invertebrate invaders on food web structure and function in the Great Lakes: A network analysis approach" by Mason, Krause, and Ulanowicz, 2002 - Modifications for Lake Michigan, 2009.

NOAA, Great Lakes Environmental Research Laboratory, 4840 S. State Road, Ann Arbor, MI 734-741-2235 - www.glerl.noaa.gov



Lake Erie Food Web

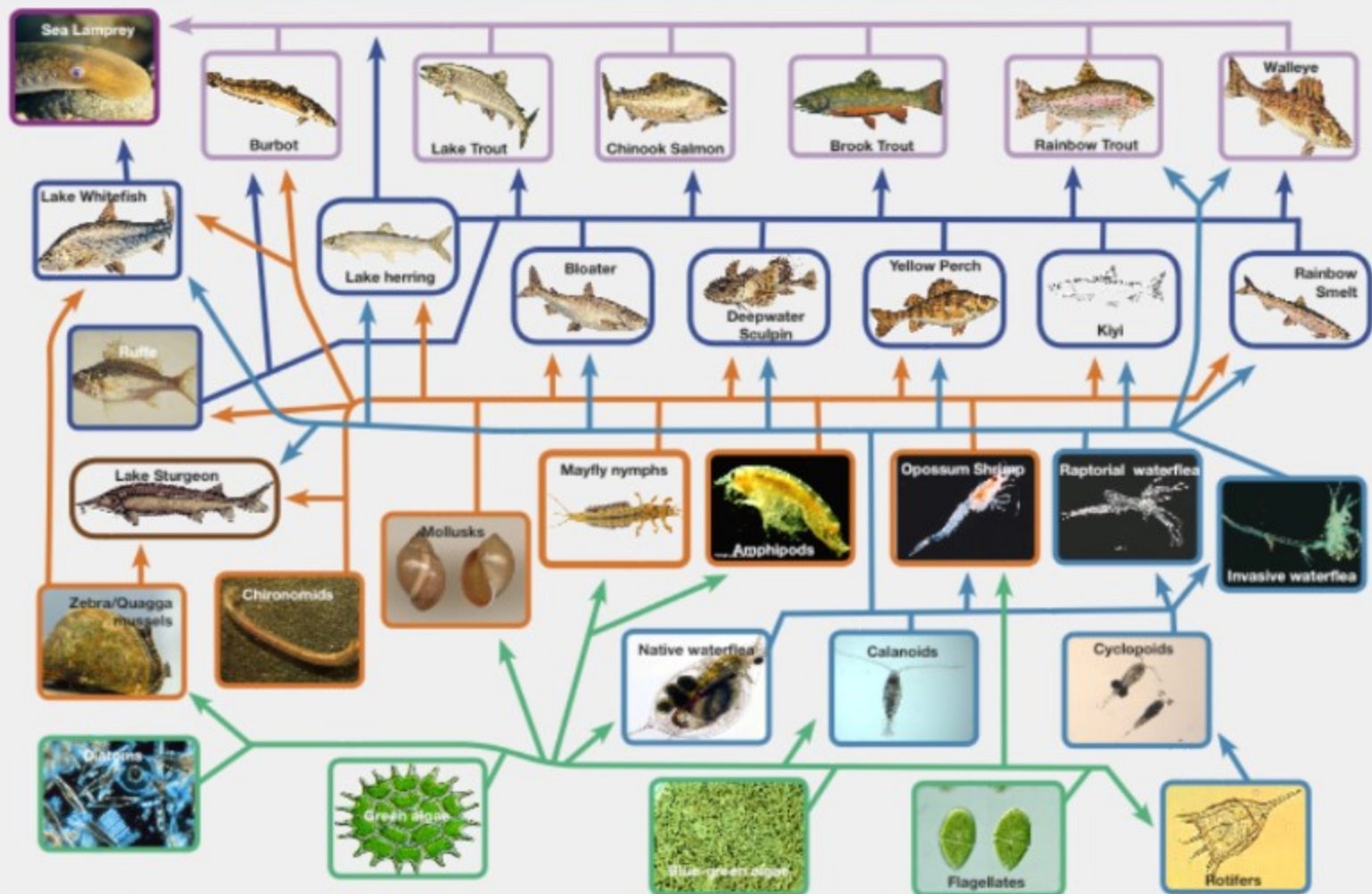


Foodweb based on "Impact of exotic invertebrate invaders on food web structure and function in the Great Lakes: A network analysis approach" by Mason, Krause, and Ulanowicz, 2002 - Modifications for Lake Erie, 2009.

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Lake Superior Food Web



Foodweb based on "Impact of exotic invertebrate invaders on food web structure and function in the Great Lakes: A network analysis approach" by Mason, Krause, and Ulanowicz, 2002 - Modifications for Lake Superior, 2009.

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Look at the Lake Superior Food Web

Answer this question:

How many trophic levels are in the Lake Superior food web?

- Definition of Trophic level:
 - A trophic level is the group of organisms within an ecosystem which occupy the same level in a food chain.
- The first trophic level would be photosynthetic organisms, or primary producers, such as phytoplankton, aquatic plants, etc. They are autotrophic, meaning they make their own energy.
- The second trophic level consists of herbivores, or those organisms gaining energy by eating primary producers. Herbivores also may be called primary consumers.

Lake Superior Food Web:

Test your knowledge answers

Question: How many trophic levels are in the Lake Superior food web?

Answer: Between Five and Six (depending on how you count).

- Phytoplankton;
- Herbivorous zooplankton (includes native waterflea) and Benthos (includes molluscs, zebra/quagga mussel, chironomids);
- Benthivores (eat benthos), Carnivorous zooplankton (Ghost Shrimp, Cyclopoid copepods, Invasive waterflea), Planktivorous fish (eat herbivorous zooplankton);
- Planktivorous fish (that eat Carnivorous zooplankton)
- Piscivorous fish (eat planktivorous and benthivorous fish)
- Sea Lamprey (eat piscivorous fish)

Look at the Lake Michigan and Lake Erie Food Webs

Answer this question:

Bighead and Silver carp are planktivorous Asian carp species that feed on microscopic plants and animals at the base of the food web. What species group would they most affect in Lake Erie or in Lake Michigan if they invade and become established?

Great Lakes Food Webs:

Test your knowledge answers

QUESTION: Bighead and Silver carp are planktivorous Asian carp species that feed on microscopic plants and animals at the base of the food web. What species group would they most affect in Lake Erie or in Lake Michigan if they invade and become established?

ANSWER: Green algae, blue-green algae, bacteria, native water fleas, detritus, and organisms that feed on those groups.

Look at the Great Lakes Food Webs

Answer these questions:

1. Which organisms are primary producers (also called autotrophs, as they can make their own Food)?
2. Which organisms are primary and secondary producers?
 - Definition of trophic level:
 - A trophic level is the group of organisms within an ecosystem which occupy the same level in a food chain.
 - The first trophic level would be photosynthetic organisms, or primary producers, such as phytoplankton, aquatic plants. They are autotrophic, meaning they make their own energy.
 - The second trophic level consists of herbivores, or those organisms gaining energy by eating primary producers. Herbivores also may be called primary consumers.

Great Lakes Food Webs:

Test your knowledge answers

1. Which organisms are primary producers (also called autotrophs, as they can make their own Food)?
 - **ANSWER:** Includes green algae, diatoms, blue-green algae, some flagellates
2. Which organisms are primary and secondary consumers?
 - **ANSWER:**
 - Primary consumers: includes herbivorous zooplankton (native waterflea), or benthos (chironomids, molluscs, zebra/quagga mussels)
 - Secondary consumers eat primary consumers: includes cyclopoid copepods, Opossum shrimp, invasive waterflea

Look at the Great Lakes Food Webs

Answer these questions:

1. Can you assign a trophic level to humans and Cladophora?
2. What are some of the organisms missing from the Great Lakes food web diagrams?

- Definition of trophic level:
 - A trophic level is the group of organisms within an ecosystem which occupy the same level in a food chain.
- The first trophic level would be photosynthetic organisms, or primary producers, such as phytoplankton, aquatic plants. They are autotrophic, meaning they make their own energy.
- The second trophic level consists of herbivores, or those organisms gaining energy by eating primary producers. Herbivores also may be called primary consumers.

Great Lakes Food Webs:

Test your knowledge answers

1. Can you assign a trophic level to humans and Cladophora?

ANSWER:

- Humans: trophic level 6 if they eat Chinook salmon or lake trout
- Cladophora: trophic level 1 as they produce their own energy through photosynthesis

2. What are some organisms missing from these food web diagrams?

ANSWERS:

- Humans; Fish eating birds (cormorants, mergansers); Aquatic macrophytes (Cladophora); Terrestrial insects; Viruses; Autotrophic (self-feeding) bacteria; Detritus (material from dead organisms, fecal material)

Look at the Lake Michigan Food Web

Answer these questions:

1. What is the definition of a food web versus and food chain?
2. Can you identify a food chain leading to Chinook salmon in Lake Michigan?

Great Lakes Food Webs:

Test your knowledge answers

1. What is the definition of a food web versus a food chain?

ANSWER:

- A food chain is a linear network of links in a food web starting from primary producers (or autotrophs) like diatoms or green algae which use radiation from the Sun to make their food, and ending at apex predator species (like Chinook salmon, Lake trout) detritivores (Gizzard shad), microbes, or decomposer species (bacteria, viruses)
- A food web is a natural interconnection of food chains

2. Can you identify a food chain leading to Chinook salmon in Lake Michigan?

ANSWER:

- Lake Michigan food chain example: Diatoms—native water flea—Opossum shrimp—Alewife—Chinook salmon