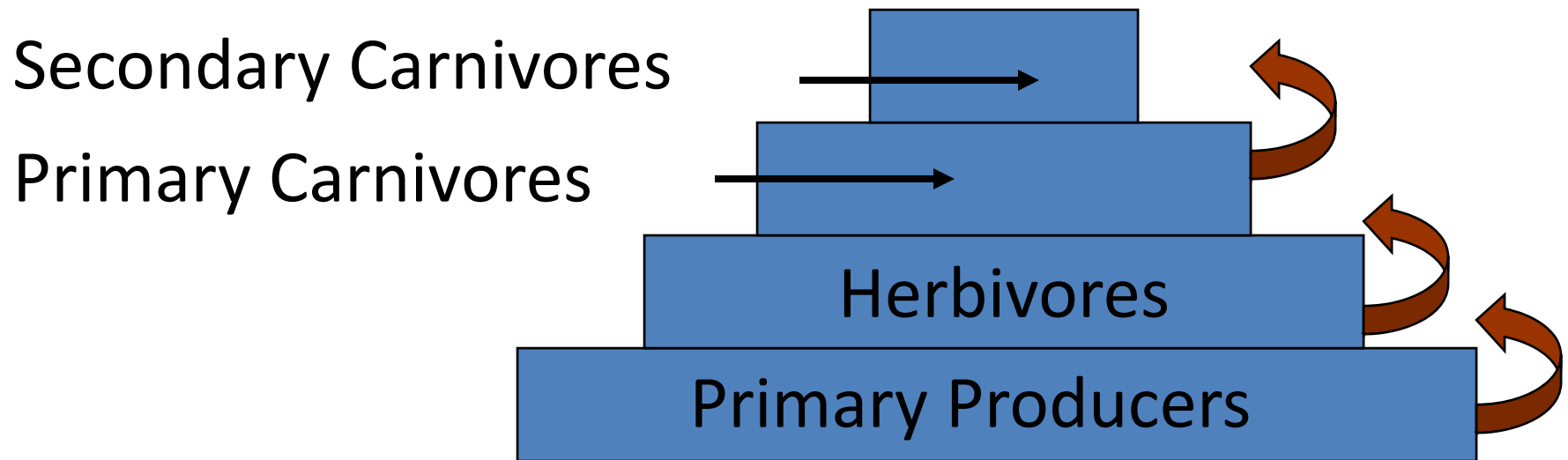


Trophic Transfer

- Movement of energy between trophic levels



Each box corresponds to productivity

Trophic Transfer

- Consume prey – where does it go?
 - Egestion
 - Excretion
 - Metabolism (heat loss)
 - Growth
 - Reproduction
- Up to 90% loss
- Available to next trophic level (10%)

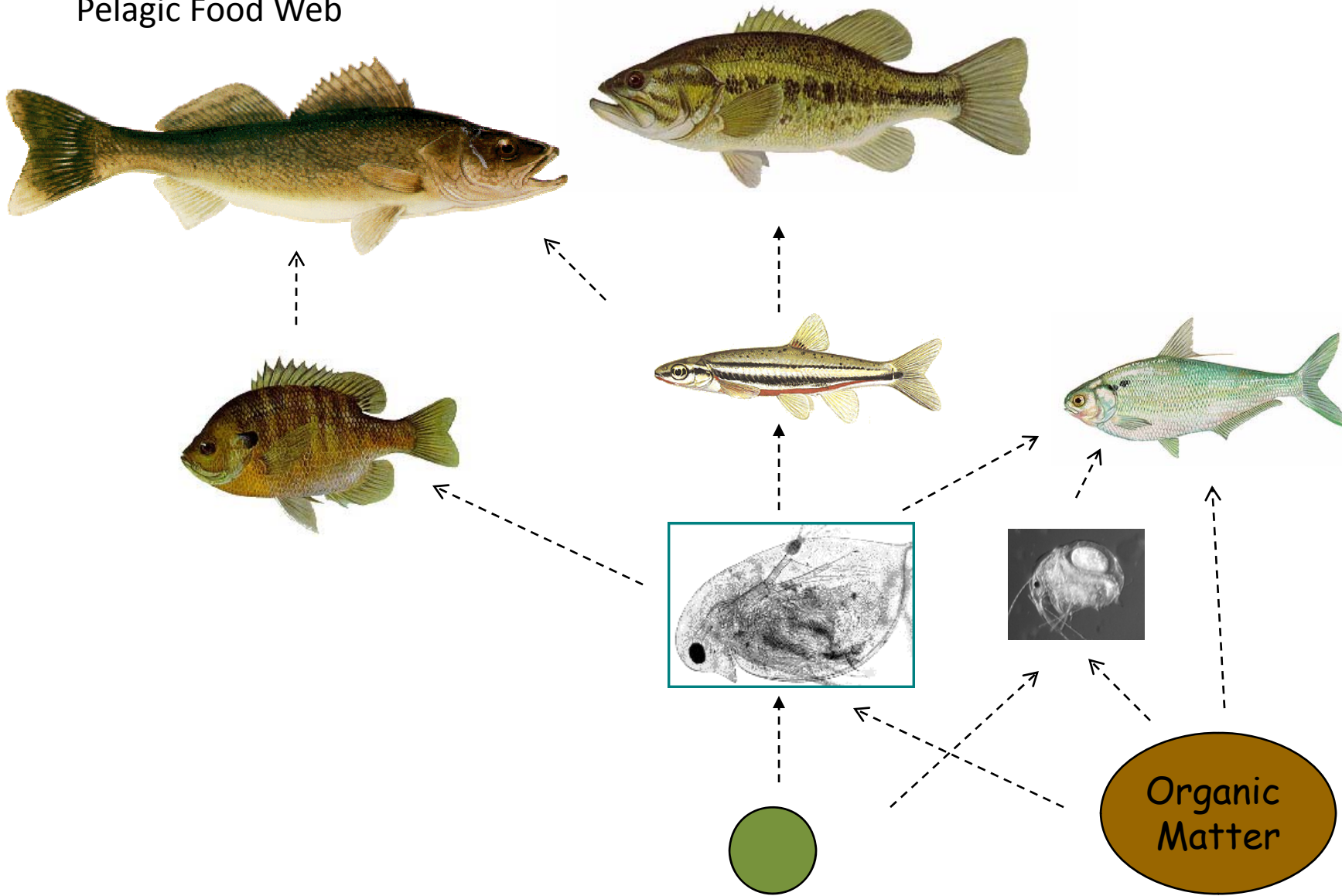
Nutrition

- Evidence increasing that not all prey created equal
 - Essential fatty acids
 - Micronutrients
 - C:N ratio (high N is typically preferred)
- Low quality prey = inefficient energy transfer

Why do we care?

- Inefficient transfer limits
 - number of trophic levels
 - total standing biomass
 - productivity of ecosystem

Pelagic Food Web

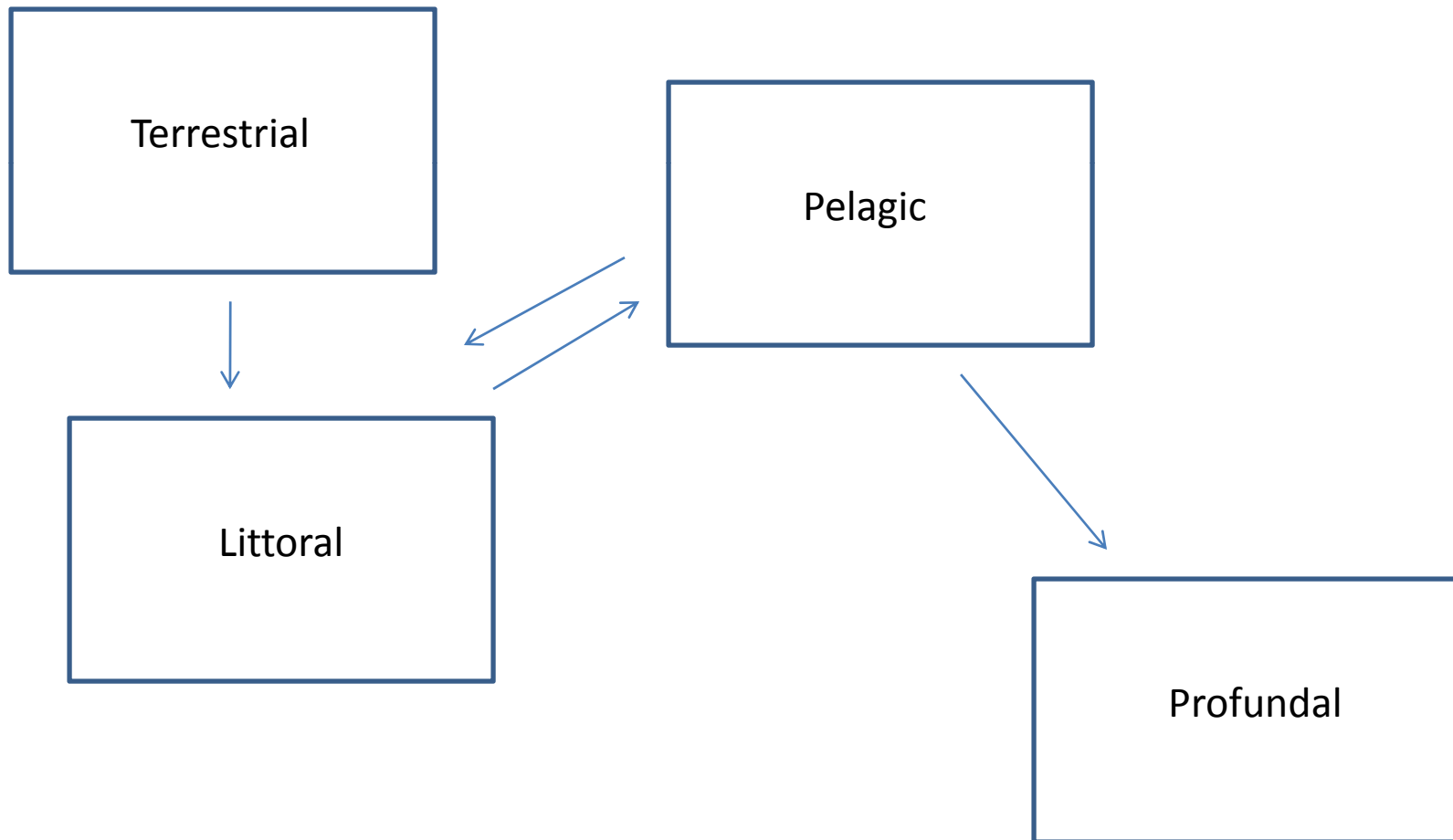


Trophic Transfer

- Not just the trophic inefficiency of individuals
- Also – complexity of the food web
 - More complex, less likely that the energy will move “up” a trophic level
 - Within an ecosystem
 - Among ecosystems...

Trophic Transfer

- Subsidies...



Benthic-Pelagic Links

- Benthos

- Recall, littoral versus profundal

- Littoral

- High light
- Heterogeneous
- Oxygen not limited

Diverse biota

- Profundal

- No light
- Homogenous, fine sediment
- Oxygen typically limited

Less diverse (but can be productive ... driven by particulate OM)

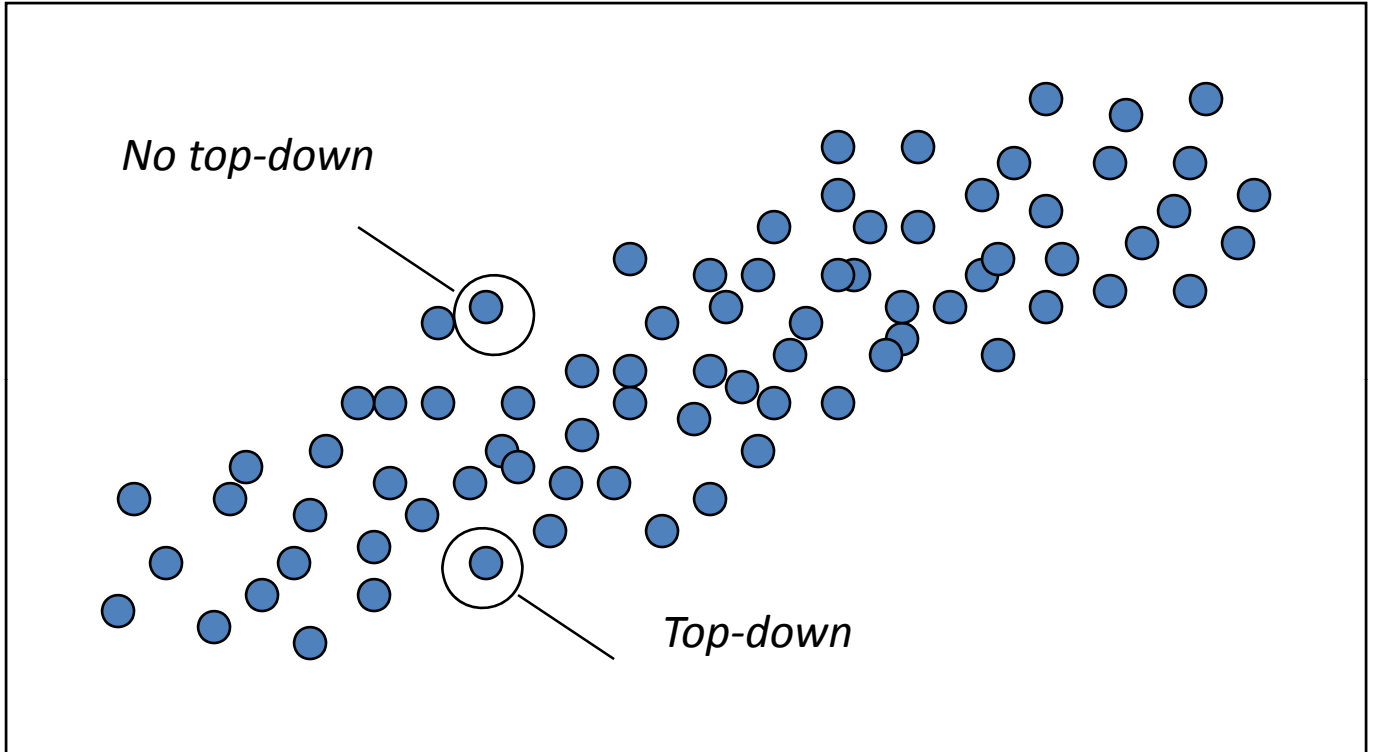
Benthic-Pelagic Links

- Migrations
 - Zooplankton – DVM (profundal to pelagic)
 - Amphipods (littoral/profundal to pelagic)
 - Day – benthic feeding
 - Night – pelagic feeding
 - Fish (littoral to pelagic)
- Material transport
 - Physical - currents
 - Biological - movement

Generalities?

- To date, “bottom up” forces have been focus
- But how do consumers affect their prey from “top down”?
 - Reduce density
 - And may affect size
 - And may affect PRIMARY PRODUCTIVITY!

Algae



Nutrients (Phosphorus)

Trophic Cascades

- Consumer effects extend beyond their prey

Piscivore



Planktivore

Clear,
productive
lake



Daphnia



Phytoplankton

Planktivore



Daphnia

Green,
productive
lake



Phytoplankton

Trophic Cascades

- Even number of trophic levels (i.e., 4)
- High standing biomass of top predators (no harvest....probably stock beyond carrying capacity)
- Simple food webs
- Large *Daphnia*
- Edible algae with fast turnover
- Omnivory rare

Trophic Cascades

- Can happen in streams as well
 - Smallmouth bass
 - Creek chubs
 - Stonerollers
 - Benthic algae (aufwuchs)