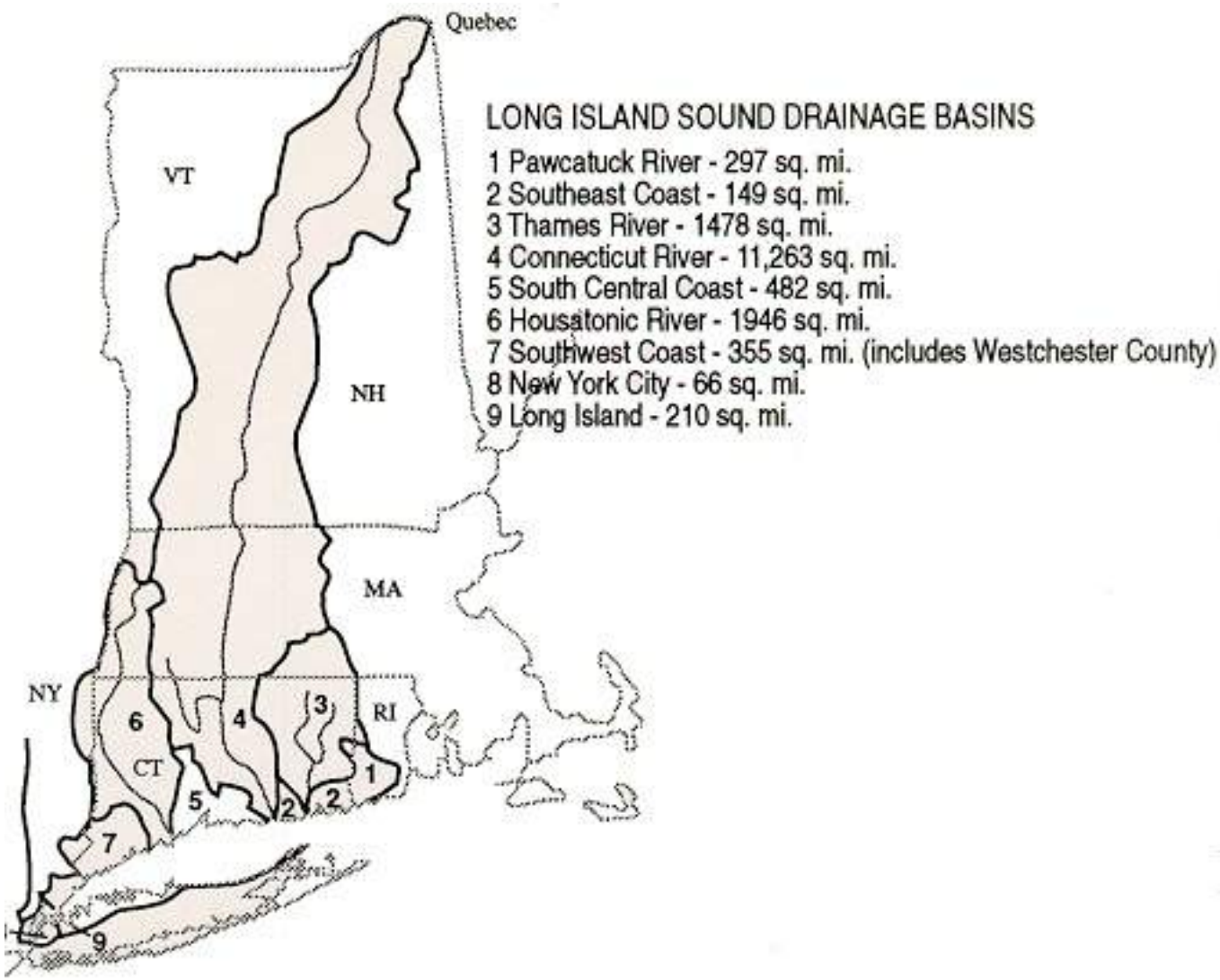
Saltwater fishes of Connecticut*

Jon Velotta
June 25, 2014

* Definitely not all of them!

The Long Island Sound is an estuary



Freshwater eels - *Anguillidae*

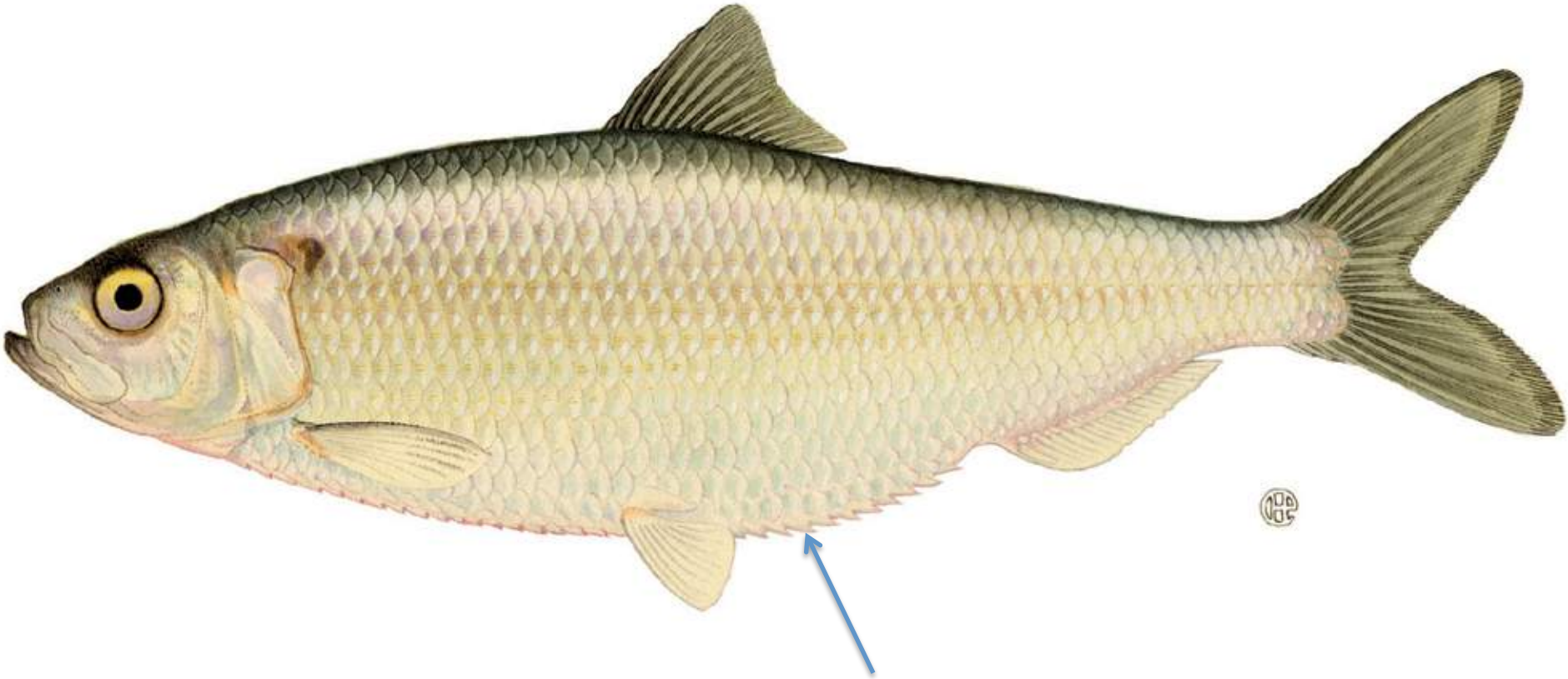
- "Eel-like" body facilitates forward and backward movement
  - Tight places and soft bottoms
- Small gill openings
- Long continuous dorsal, anal and caudal fins
- Loss of pelvic girdle
- Modified upper jaw composed of three fused bones
- Catadromous
  - Born at sea, migrate to freshwater to feed and grow

Connecticut Eels

- American eel (*Anguilla rostrata*)

Herring are in the family **Clupeidae**

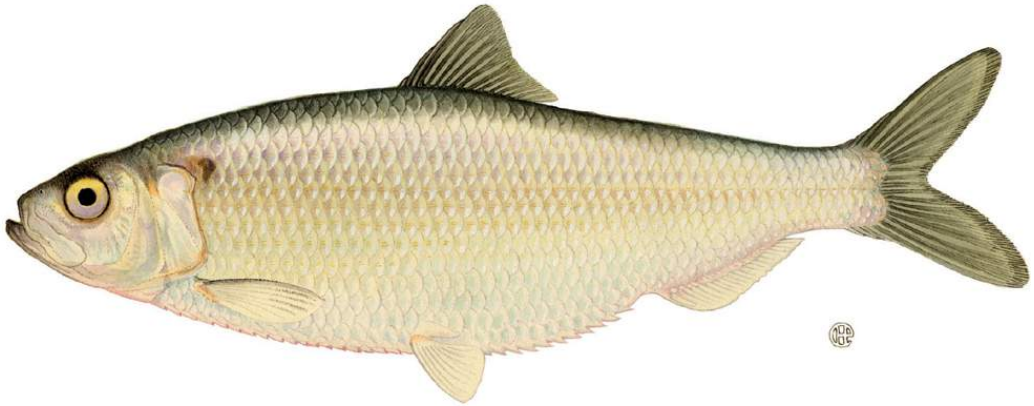
- Order **Clupeiformes**
- Generally marine, open water (pelagic) schooling species
  - Anadromous and Landlocked Clupeidae exist
- Clupeiformes have special "ear to gas bladder" connection that increases sensitivity to low frequency – e.g., tail beats



Scutes – sharp and bony

River herring are anadromous

- Blueback herring (*Alosa aestivalis*)
  - Run up rivers and breed in flowing water
- Alewife (*Alosa pseudoharengus*)
  - Run up small streams and breed in lakes
- Both species of concern in CT



Anchovy are also **Clupeiformes**

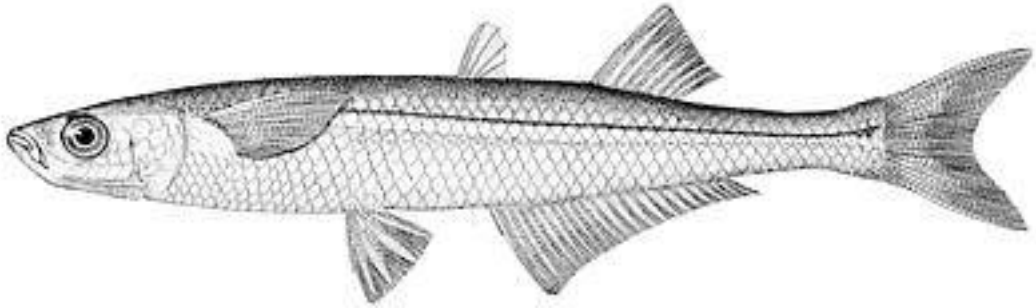
- Not Clupeidae…Clupeiformes (-formes indicates Order)
- They are in the family **Engraulidae**
- Large, elongate mouths for eating zooplankton!
  - Elongated maxilla

Anchovy are also **Clupeiformes**

- Bay anchovy (*Anchoa mitchelli*)
- Striped anchovy (*Anchoa hepsetus*)

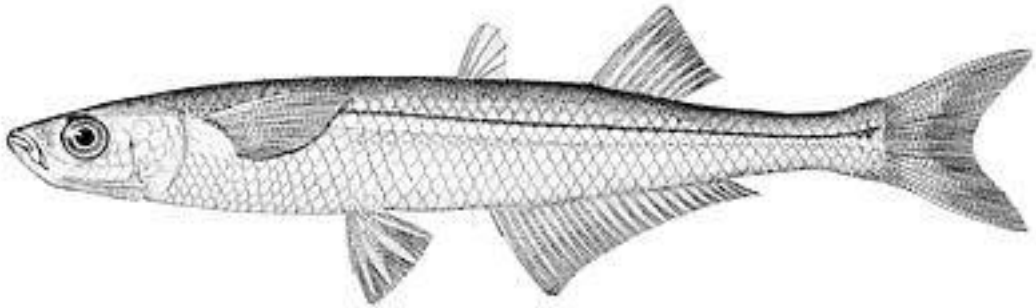
Silversides are the *Atherinopsidae*

- Translucent, and silvery
- Strong lateral stripe
- Mouth upturned
- TWO well-separated dorsal fins
- Schooling fish



Silversides are the *Atherinopsidae*

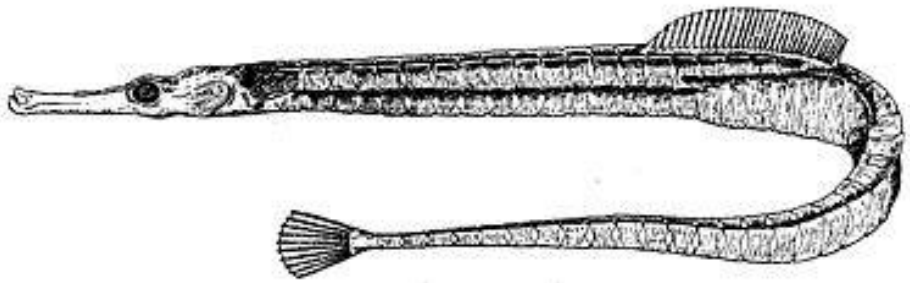
- Atlantic silverside (*Menidia menidia*) – p 100



- Inland silverside (*Menida beryllina*) – p 101

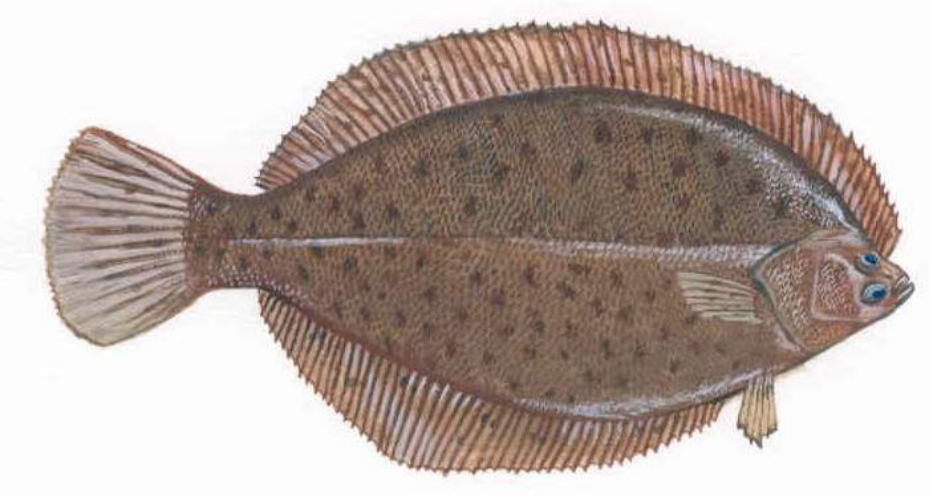
Sygnathidae are the pipefish and seahorses

Northern pipefish – *Sygnathus fuscus*



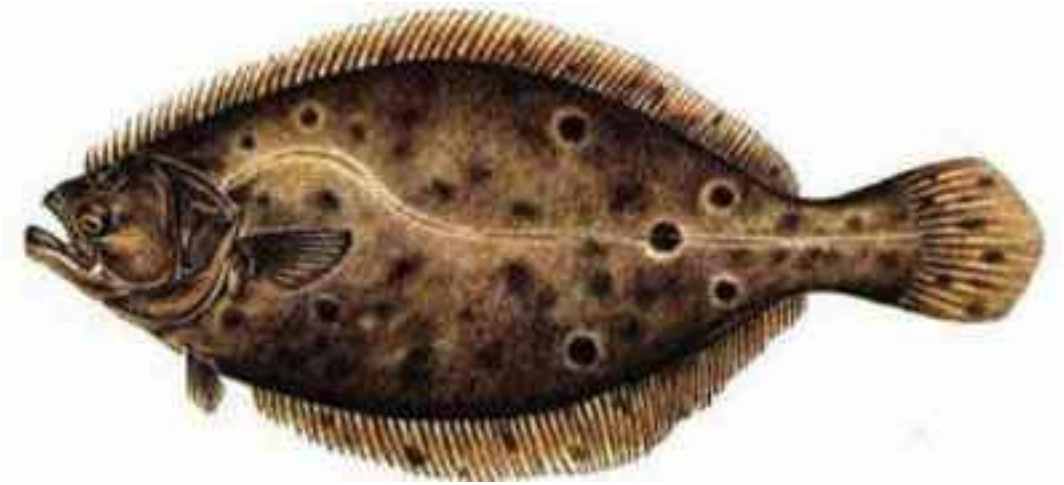
Flatfishes are in the **Pleuronectiformes**

- Sit and wait predators – camouflaged, benthic
- Fully marine
- Begin life with eyes on same side!
- Family **Pleuronectidae** – right-eyed flounder
  - Winter flounder (*Pseudopleuronectes americanus*)



Flatfishes are in the **Pleuronectiformes**

- Family **Paralichthyidae** – large toothed flounders
  - Summer flounder or fluke (*Paralichthys dentatus*)



Pufferfish are in the family *Tetraodontidae*

Northern Puffer – *Sphoeroides maculatus*

Pufferfishes are in the family Tetraodontidae

- Highly **derived**
- High degree of fusion of bones in the head and body
- Thick, leathery skin covered in scales modified into spines
- Can inflate body by filling stomach with **water**
- Concentrate tetraodotoxin **– can cause death**

Fish Assemblages

Fish assemblages

- A group of populations of a larger taxon (i.e., the fishes) in a defined area

- An **assemblage structure** is the number of species, families, etc., and their ecological interactions

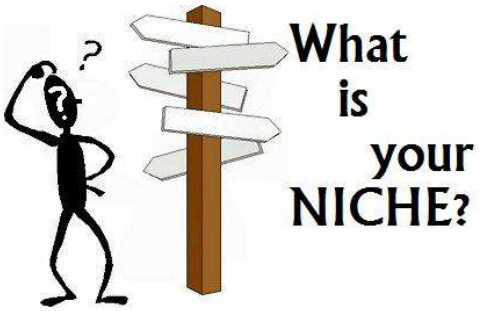
Competition and predator-prey interactions can determine size structure of assemblages

- Largemouth bass/bluegill interact in lakes and pond
  - When bass are abundant, growth is slowed
    - predation on small bluegill is very high
      - bluegill that survive have little competition and low predation

Competition and predator-prey interactions can determine size structure of assemblages

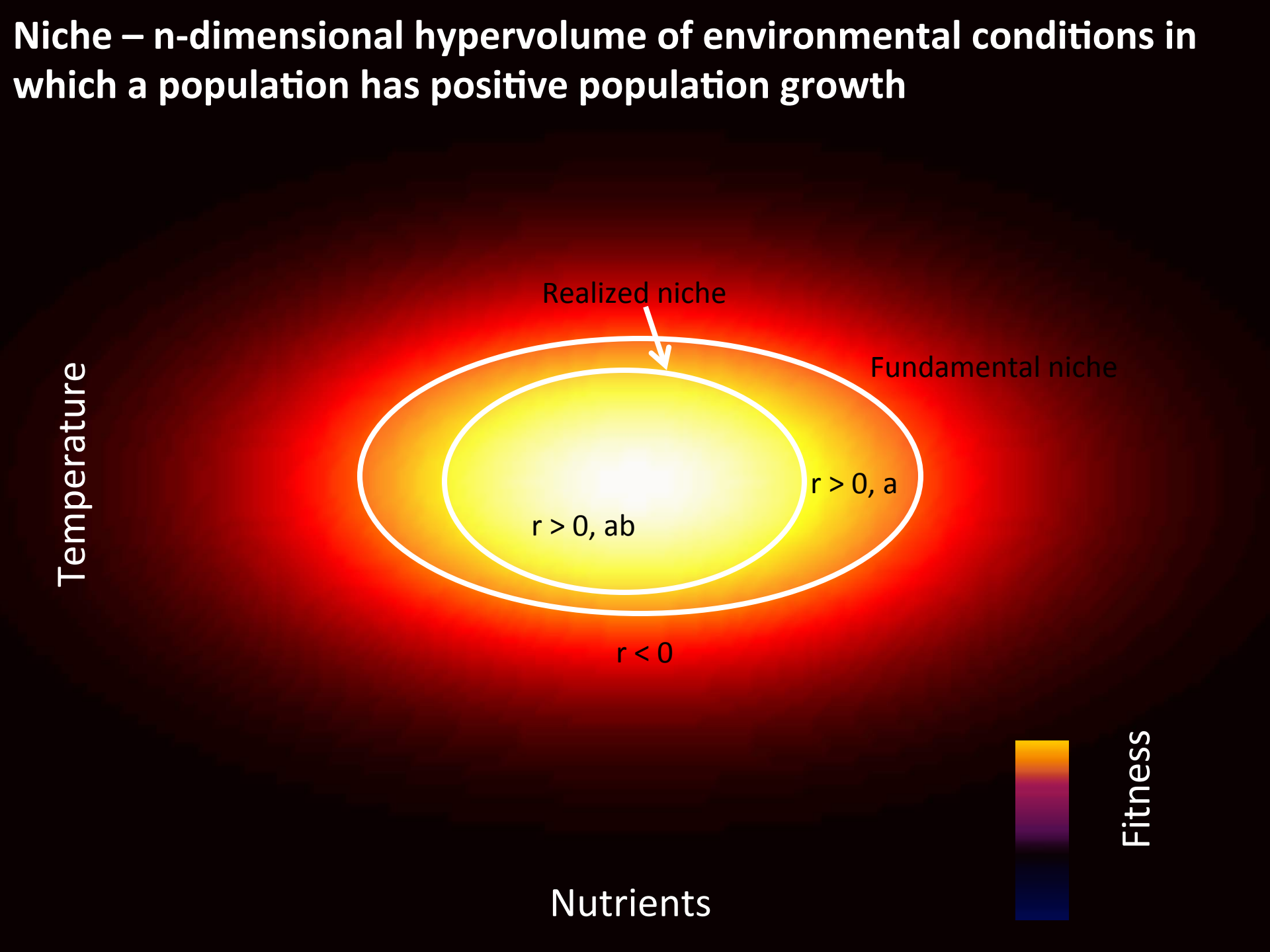
- With fewer, larger bass, predation on small bluegill decreases and the bluegill may stunt

The niche

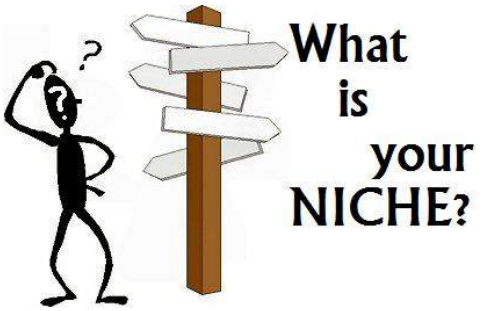


- Assemblages are composed of species with different **niches**
- The ***niche*** is:

Niche – n-dimensional hypervolume of environmental conditions in which a population has positive population growth



The niche



- Assemblages are composed of species with different **functional roles**
- The ***niche*** is
  - Environmental requirements (temperature, salinity, pH, etc.)
    What an animal eats
  - What eats it
  - Symbiotic associations

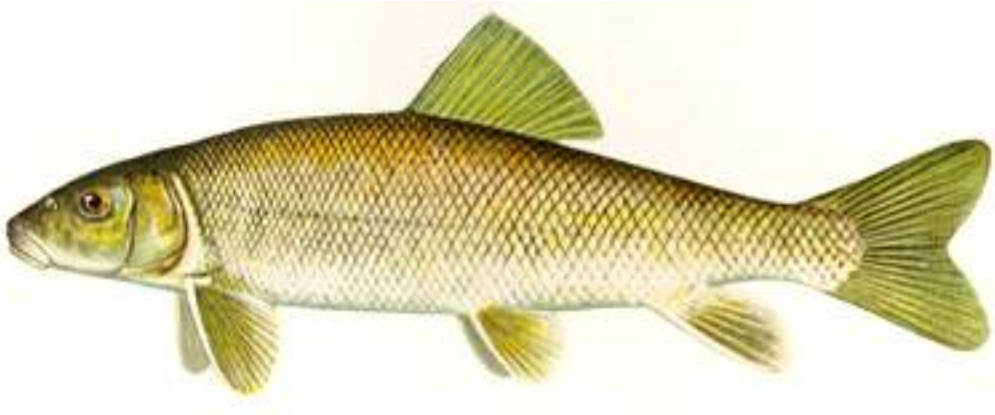
The guild

- A group of species in an area that exploit a similar resources in a similar way – e.g., a feeding guild

- Anchovies, herrings, silversides and others form a nocturnal feeding zooplanktivore guild.

The guild

- A benthic guild

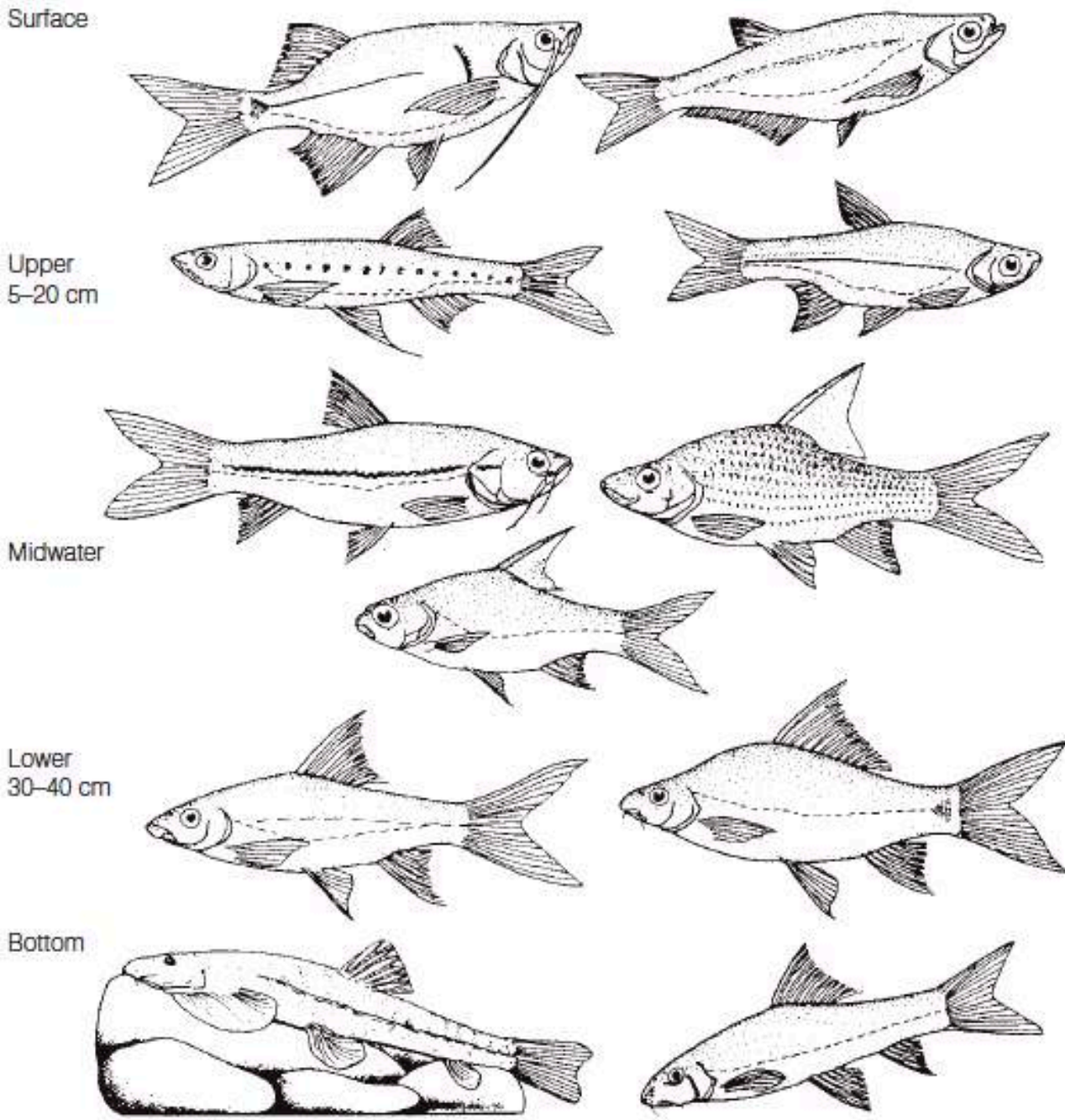


Habitat use by fish

- Habitat use and choice is an important component of niche
  - Species prefer habitats where they can successfully feed, avoid predators and reproduce

- Stream/River species separate along **vertical dimensions** based on preferred current strength, bottom type, vegetation, etc.

Vertically structured fish assemblages occur in streams



Helfman et al, 2009

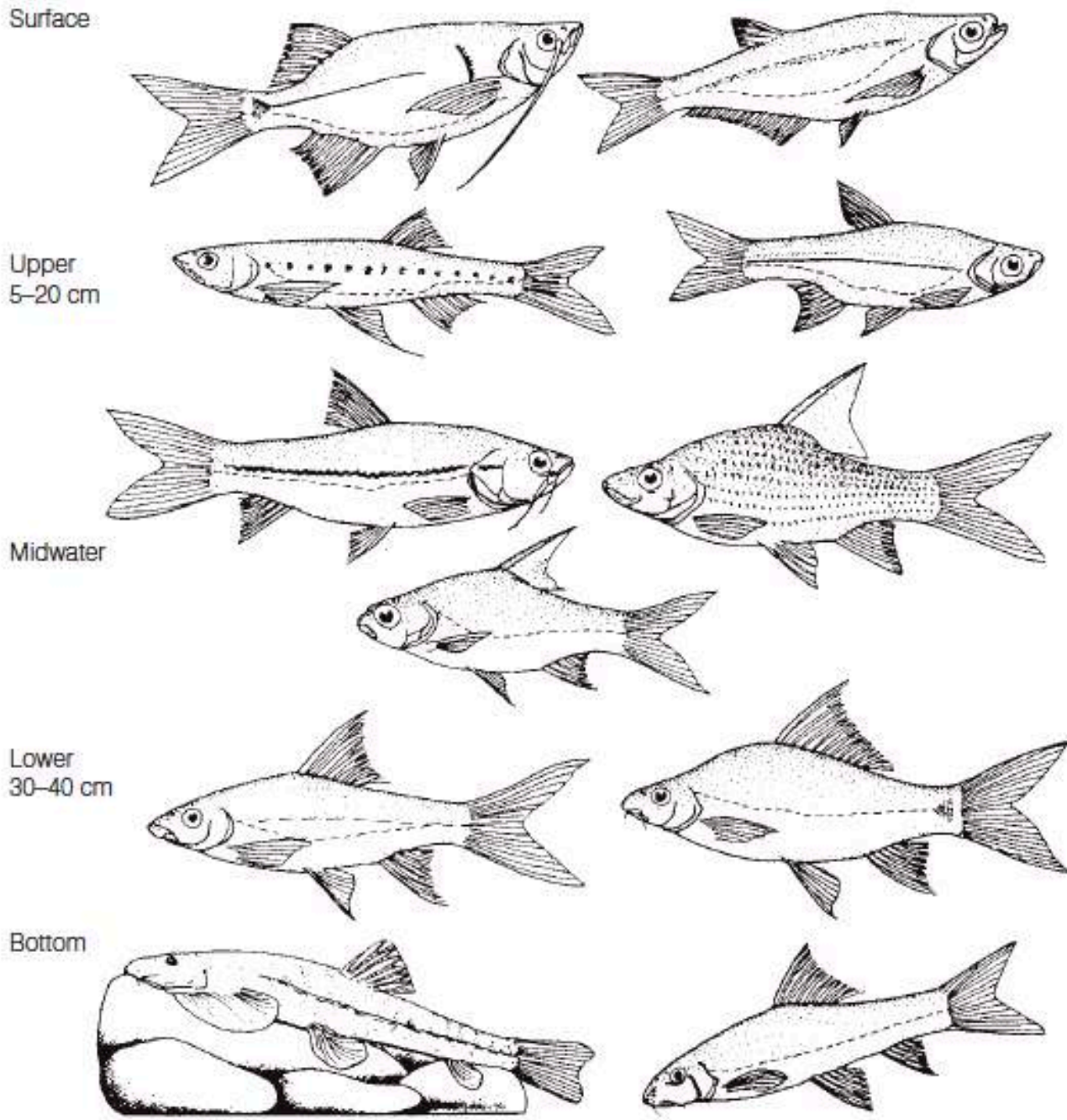
Vertically structured fish assemblages occur in streams

Cyprinids, killifish

Trout, cyprinids

Suckers

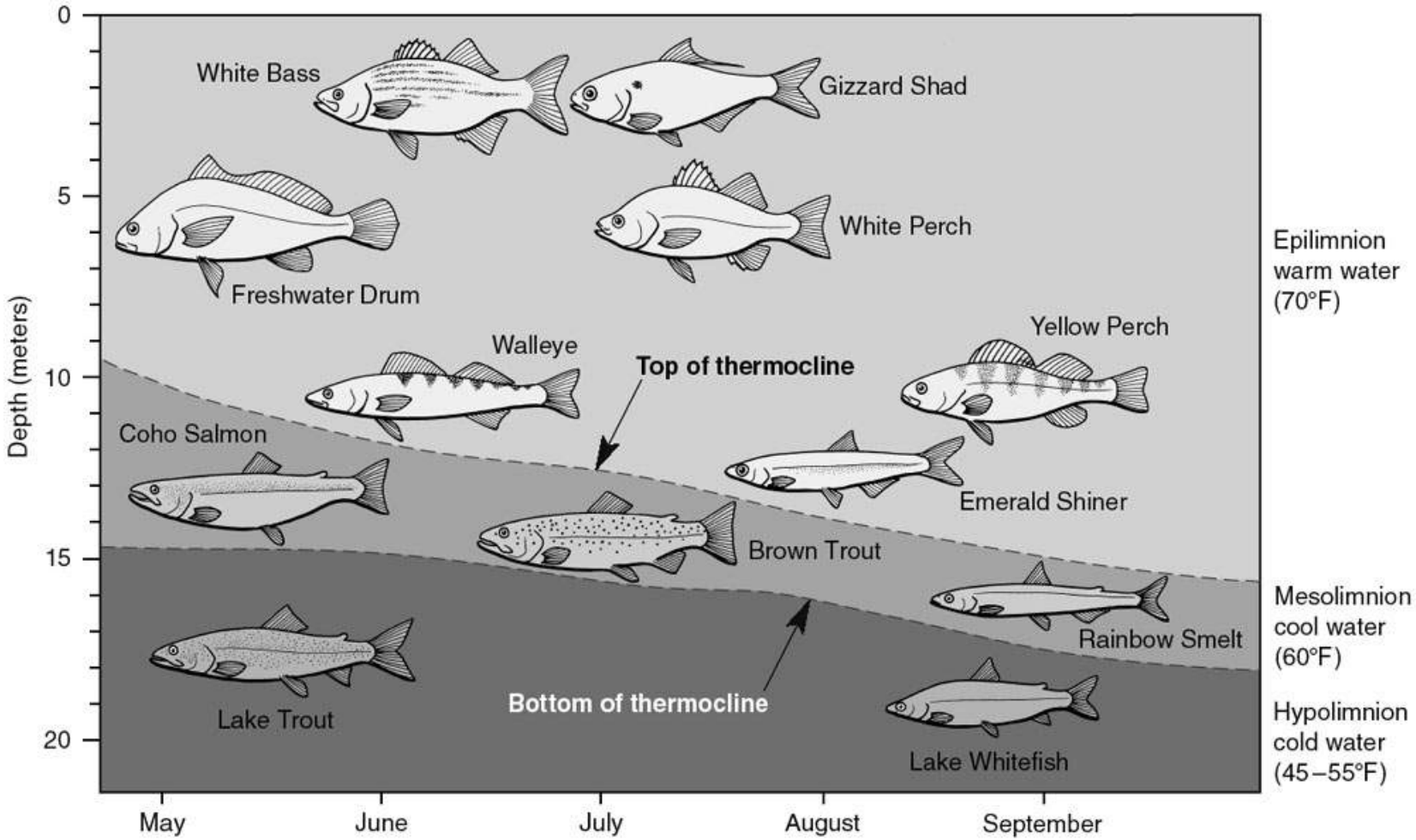
Catfishes, darters



Helfman et al, 2009

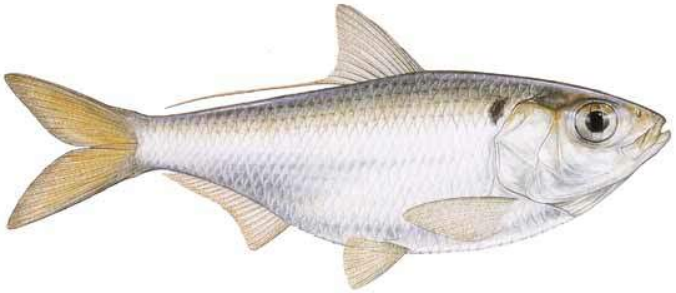
Lakes have vertically structured fish assemblages

Based on **physiologically** optimal temperature ranges

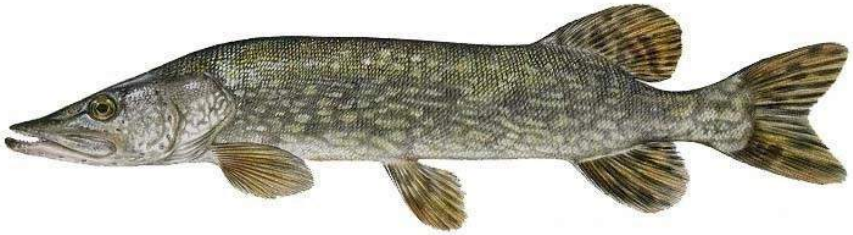


Barton, 2005

Ectotherms have body temperatures close to ambient



Warmwater species – e.g., threadfin shad

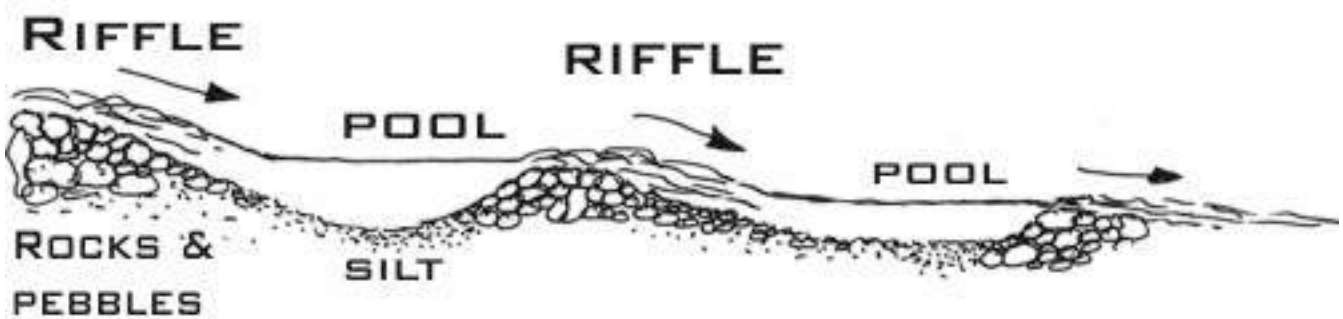


Coolwater species – e.g., northern pike

Coldwater species – e.g., Arctic grayling

Stream species can assemble by flow preference

- Swift water – darters and trout
- Moderate flow – catfishes, cyprinids, sunfishes

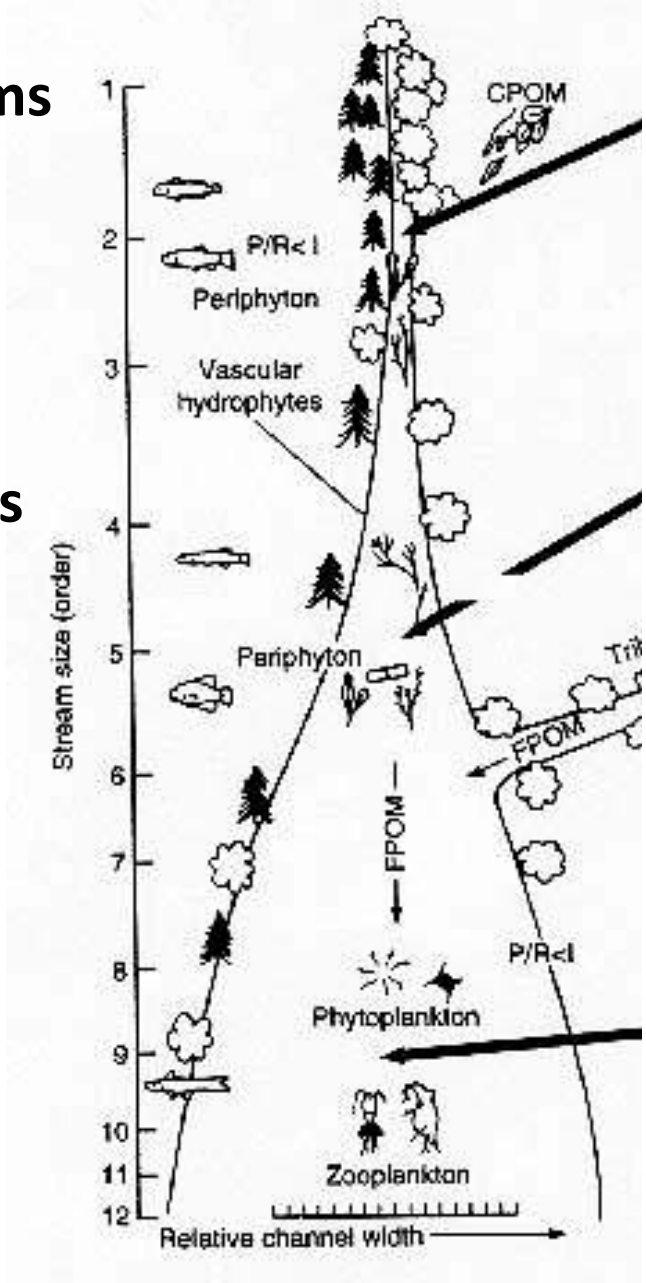


Fish can assemble in relation to stream order

Headwater streams
Order 1 - 3

Mid-sized streams
Order 4 - 6

Large rivers
Order > 6



Higher habitat diversity, structural diversity, depth, and productivity = **more fish diversity**

Fish can assemble in relation to stream order

TABLE 2. Distribution of fishes by stream sections

Species	I	II	VI	VII	IX	X
Salvelinus fontinalis	*	*	*	*	*	*
Rhinichthys atratulus	*	*	*	*	*	*
Rhinichthys cataractae	*	*	*	*	*	*
Semotilus atromaculatus	*	*	*	*	*	*
Cottus bairdi	*	*	*	*	*	*
Catostomus commersoni	*		*	*	*	*
Salmo trutta			*	*	*	*
Campostoma anomalum			*	*	*	*
Clinostomus elongatus			*	*	*	
Exoglossum maxillingua			*	*	*	*
Notropis cornutus			*	*	*	*
Semotilus margarita			*	*	*	*
Ictalurus nebulosus			*	*		
Noturus insignis			*	*	*	*
Etheostoma olmstedi			*	*	*	*
Cottus cognatus			*	*		
Fundulus diaphanus				*		*
Notropis hudsonius					*	*
Notropis procne					*	*
Semotilus corporalis					*	*
Percina peltata					*	*
Notropis analostanus						*
Notropis rubellus						*
Pimephales notatus						*
Pimephales promelas						*
Lepomis auritus						*

Sheldon 1968

TABLE 3. Distribution of species in section X by depth categories. This table is somewhat simplified by the omission of collections containing one or two individuals

Species	Depth in cm			
	0–15	15–30	30–60	>60
Rhinichthys atratulus	*	*	*	*
Rhinichthys cataractae	*	*		
Cottus bairdi	*	*	*	*
Salmo trutta		*	*	*
Exoglossum maxillingua		*	*	*
Notropis cornutus		*	*	*
Semotilus atromaculatus		*	*	*
Semotilus margarita		*	*	*
Catostomus commersoni		*	*	*
Hypentelium nigricans		*	*	*
Noturus insignis		*	*	*
Fundulus diaphanus		*	*	
Etheostoma olmstedi		*	*	*
Campostoma anomalum			*	*
Notropis hudsonius			*	*
Notropis procne			*	*
Notropis rubellus			*	*
Pimephales notatus			*	*
Semotilus corporalis			*	*
Percina peltata			*	*
Notropis analostanus				*
Pimephales promelas				*
Lepomis auritus				*

Sheldon 1968

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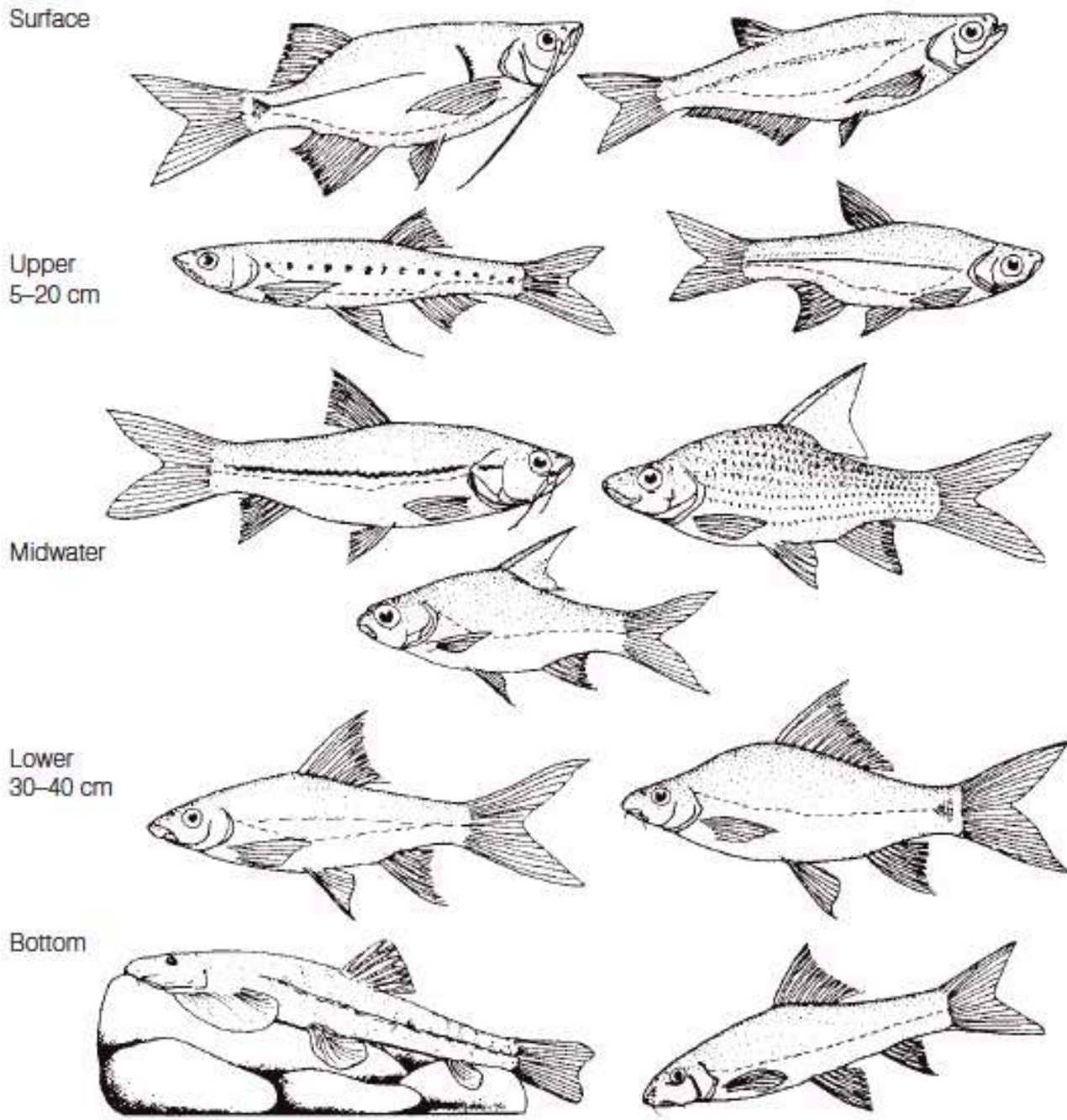

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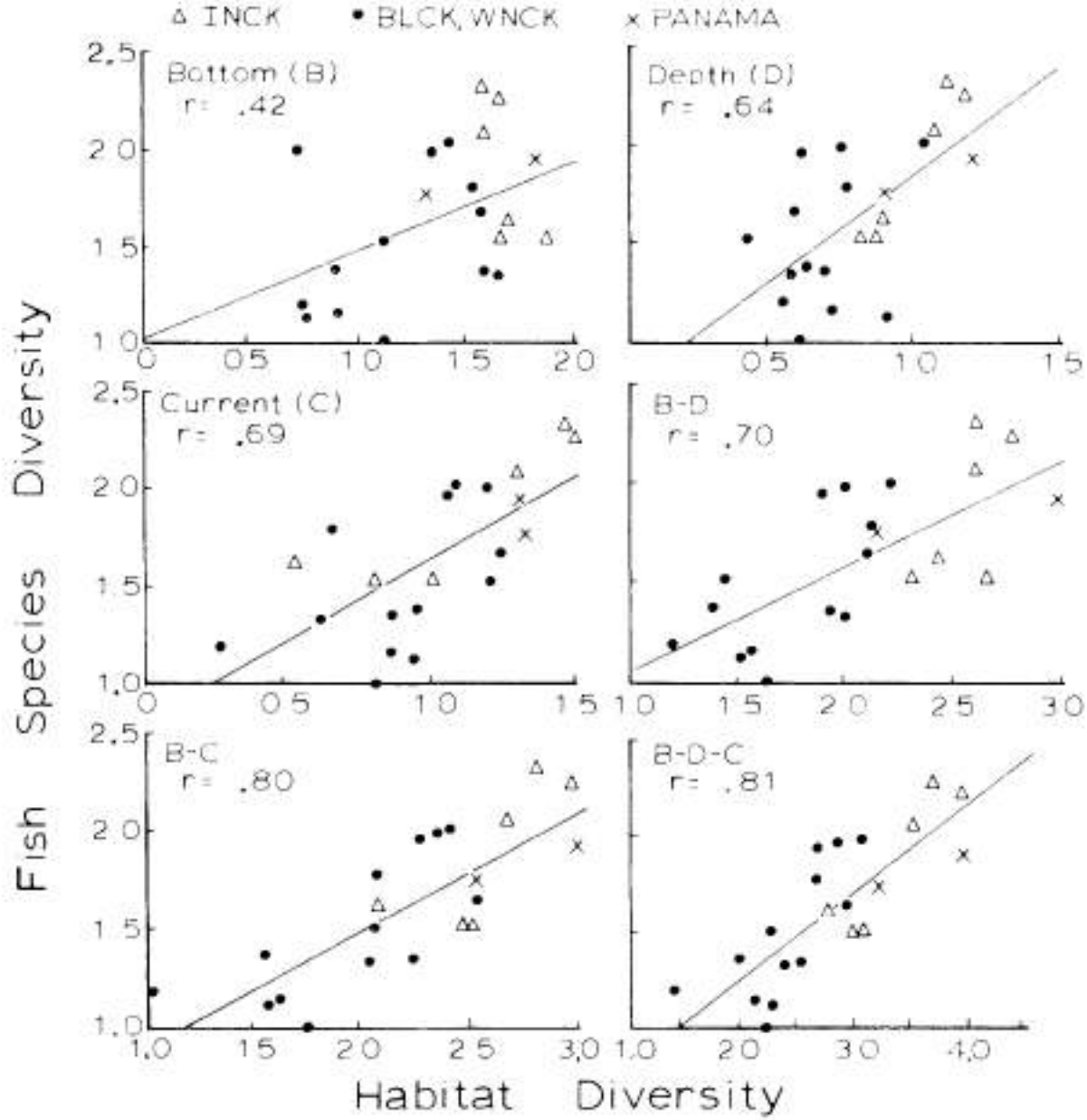

FIG. 2. Regressions (r) of fish species diversity against habitat structure diversity for streams in Indiana and Panama.

Gorman and Karr 1978