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Fish migration - type and significance

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INTRODUCTION- :

- Few species travel long distance moving from place to place in search or food or for breeding . This movement of a large number of fishes for the purpose of feeding or spawning is known as Migration.
- According to baker (1998) it is ' the act of moving from one spatial unit to another'.
- According to nikolsky (1963) – ' migration is an adaptation toward increasing the abundance of a species .'
- Migration behaviour is of course one of the phenomena in the life histories of the fish directed toward reproductive success.

MIGRATORY SPECIES-

- Several species are migrated of mature adults for spawning and feeding. These are example of migratory fishes-

1. The cod (*Gadus morhua)*
2. Herring *(Clupea harengus)*
3. Salmon (*salmo sp.)*
4. Eel *(Anguilla anguilla, A. Rostrata and A. japanica*
5. *Hilsa (Hilsa ilisa)*
6. Three- spined stickle back *(Gasterosteus aculeatus)*
7. The lampreys (Petromyzon marinus)
8. The tunnas (Thunnus thynnus)

TYPES OF MIGRATION-

Migration may be the following types:

a. ALIMENTORY MIGRATION – This is in search of food and water.

B. GAMETIC MIGRATION - For reproduction .

C. CLIMATIC MIGRATION - to secure more suitable climatic conditions.

d. OSMOREGULATORY MIGRATION.

METHOD OF MIGRATION-

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A Fish can make migratory movements by several methods:

1. **BY DRIFTING :** Fishes are carried passively be water currents. This is called DRIFT, and may result in 'directional movements'. If the over all water movement is in one direction.

2. **RANDOM LOCOMOTORY MOVEMENT-**

- Locomotary movements that are random in direction lead to a uniform distribution or to an aggregation.
- If the fishes are released from a point in a uniform enviorment and spread out in all directions the process is called – DISPERSAL and leads to uniform distribution of the species.

3. ORIENTATION SWIMMING MOVEMENT-

- **Fishes swim in a particular direction:**

a. **Either towards or away from the source of stimulation**

a. **At some angle to an imaginary line running between them and the source of stimulation.**

PERIODICITY OF MIGRATION-

- most of migration occurs at regular intervals and may be daily, monthly , seasonally , yearly biannually or longer.
- Thus , pacific salmon may remain at sea for several years before returning to the spawning grounds.
- Larvae of *Petromyzon marinus* may spend several year in the mud before metamorphosis and migrating to sea.
- Eel spend several years (up to 20) feeding in fresh water , before undertaking spawning migration to sea.
- The periodicity thus varies between different species , and even within a species and appears to be due to many biotic and abiotic initiating factor.

MARKING AND TAGGING -:

- Information about the pattern of fish migration , its direction and speed of movement , can be studied by marking and tagging of fish followed by rapured.
- The mark or tag must be easily identible and must stay with the till end of the study .
- Many types of tags have been developed for attachment to the fish for recognise.

PATTERNS OF MIGRATION-:

- ✓ The form or pattern of migration differs between species ,as well as within a species , myers (1949) has used the following terms to describe fish migration :

1. DIADROMOUS FISHES

A. Anadromous (salmon and hilsa)

B. Catadromous (anguilla)

C. Amphidromous

2. POTAMODROMOUS FISHES

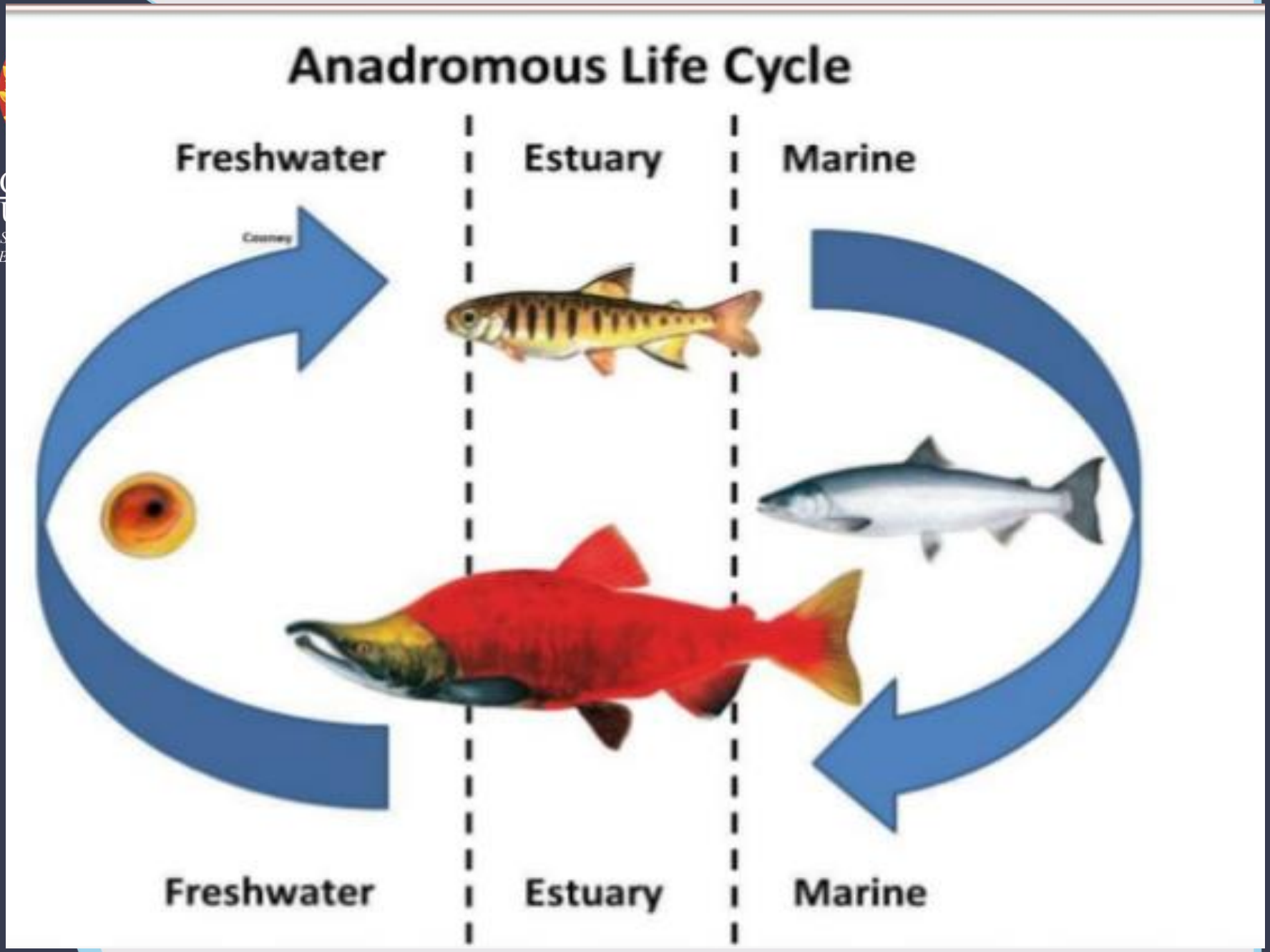
3. OCEANODROMOUS FISHES

1- DIADROMOUS FISHES-:

- these are truly migratory fishes which migrate between the sea and fresh water and are three types:

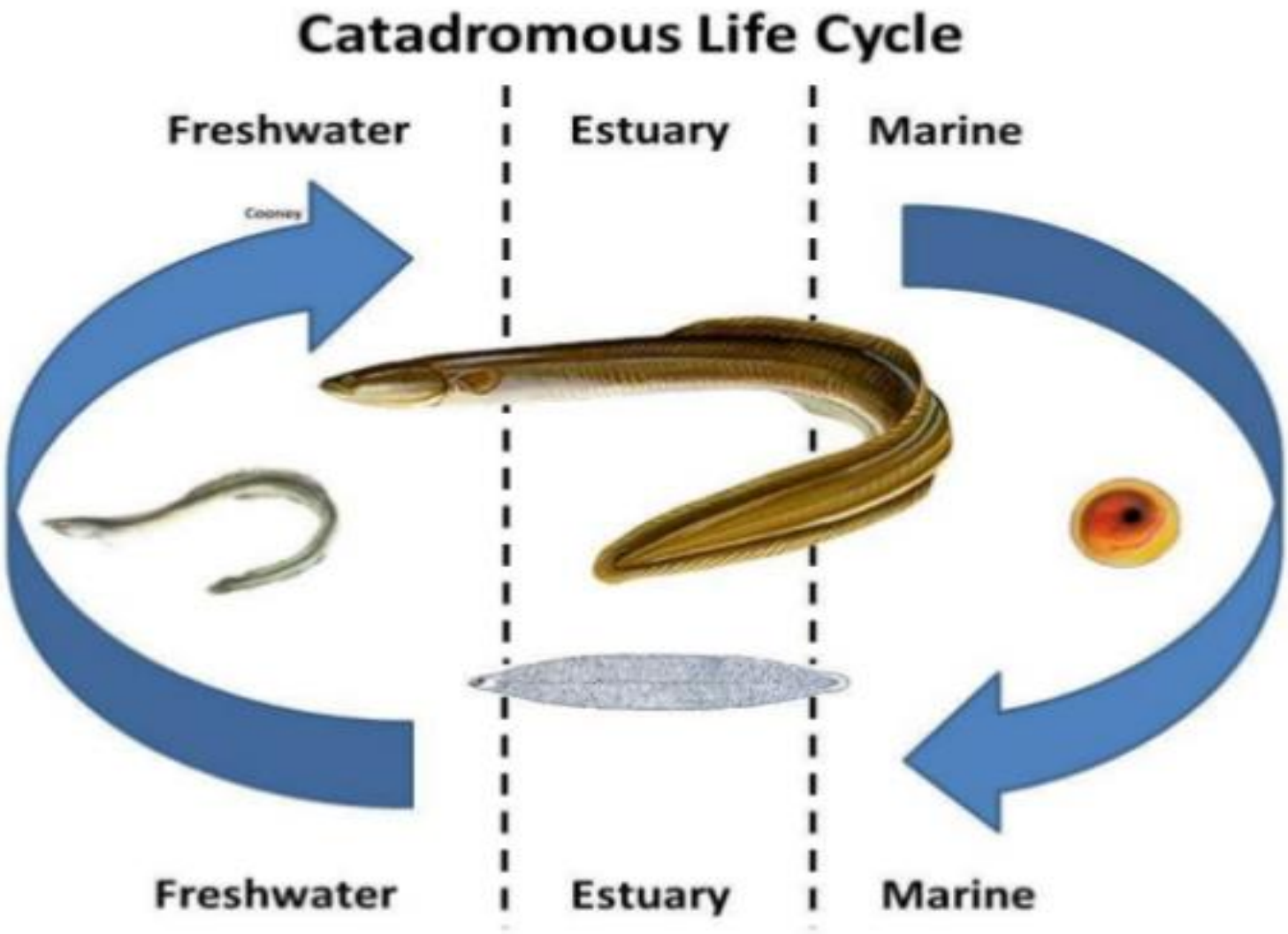
A. ANADROMOUS FISHES -:

- diadromous fishes which spend a major part of there lifes in the sea but migrate to fresh water during breeding period for spawning.
- Thus , many marine fishes like *the Salmon shad Lampray and Hilsa* ,travel long distances in te sea and run up the river to spawn in fresh water .
- *Salmon and Hilsa* have been found to travel several thousand km in the sea, then several hundred km inland to reach the spawning ground , after egg laying , the spend fishes return to feeding places in the sea.


Anadromous Life Cycle
Freshwater
Estuary
Marine
Freshwater
Estuary
Marine

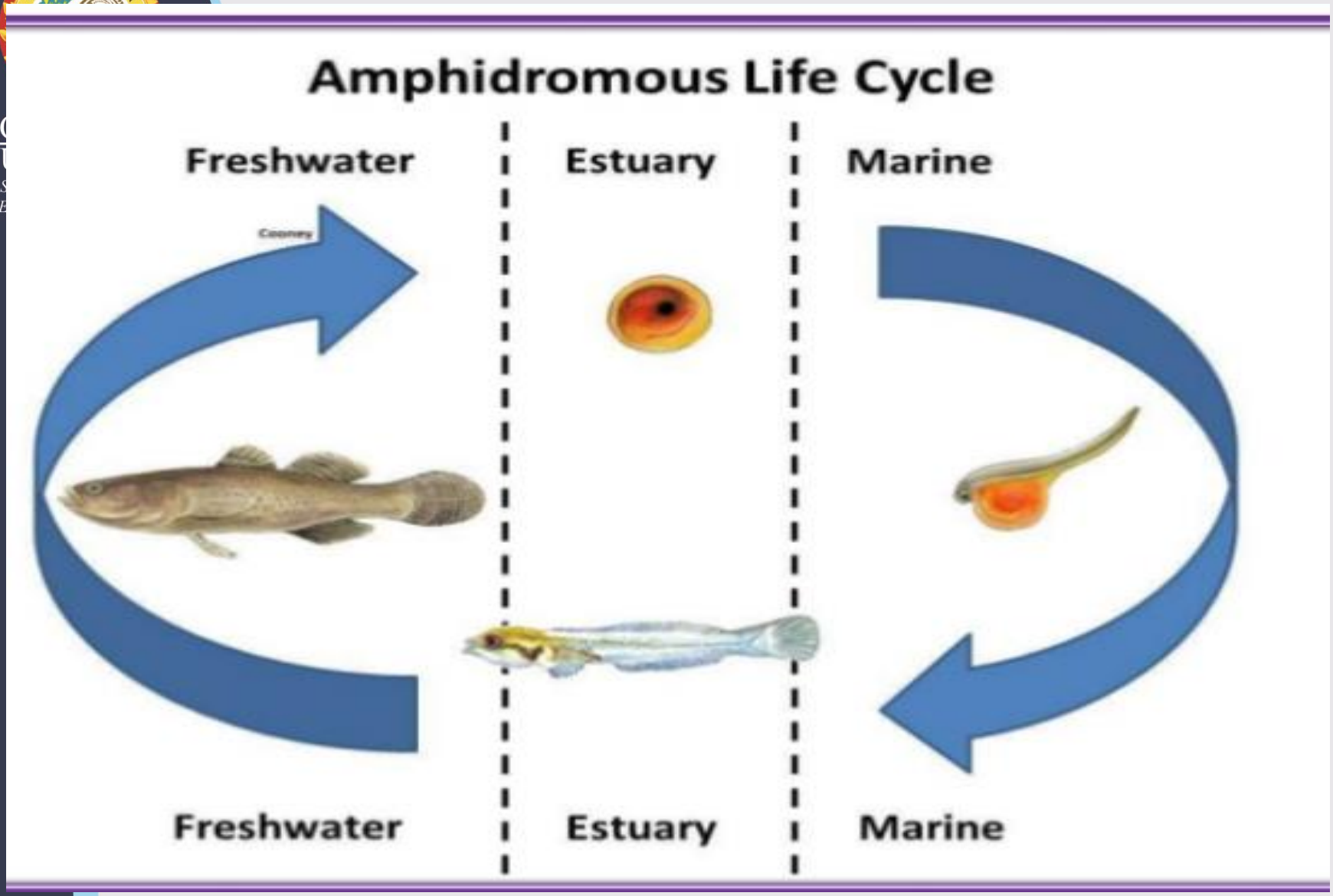
2. CATADROMOUS:

- This group including diadromous fishes which spend a major of their lives in fresh water but migrate to the sea for breeding purpose.
- Thus the fresh, water eel *Anguilla* travels several thousand km starting from the rivers and reaching the spawning grounds in the sea.
- After egg laying , the river die and the young larvae drift and swim back towards the fresh water , taking three years in reaching the rivers.
- Here ,they become adult , and on reaching maturity start their seaward migration again.


Catadromous Life Cycle
Freshwater
Estuary
Marine
Freshwater
Estuary
Marine

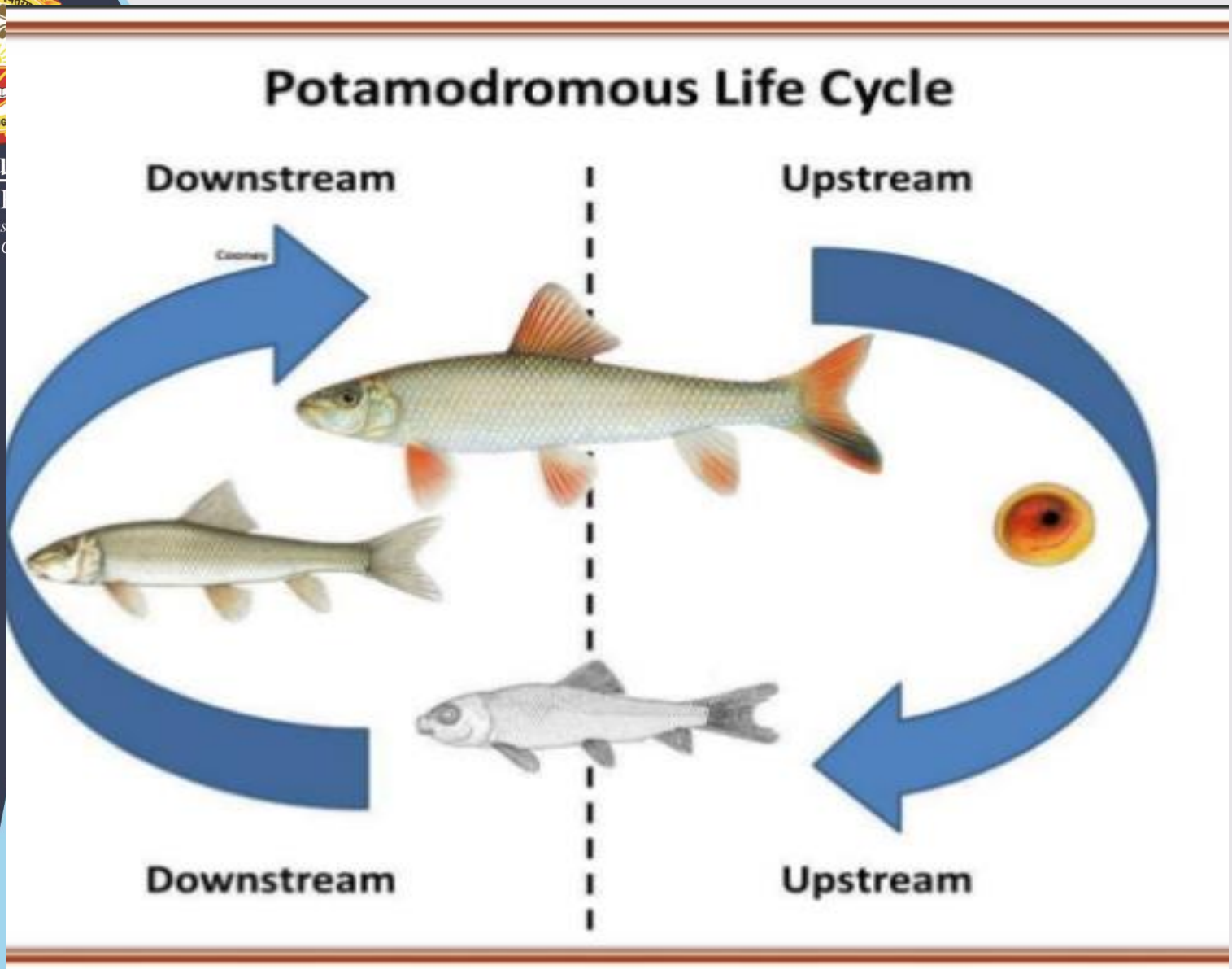
C. AMPHIDROMOUS:

- These are diadromous fishes in which migration from fresh water to the sea or *vice versa* is not for the purpose of breeding.
- But occurs regularly at some other definite stage of the life cycle.
- Myer suggests that the migration of some gobies might fall into this category.


Amphidromous Life Cycle
Freshwater
Estuary
Marine
Freshwater
Estuary
Marine

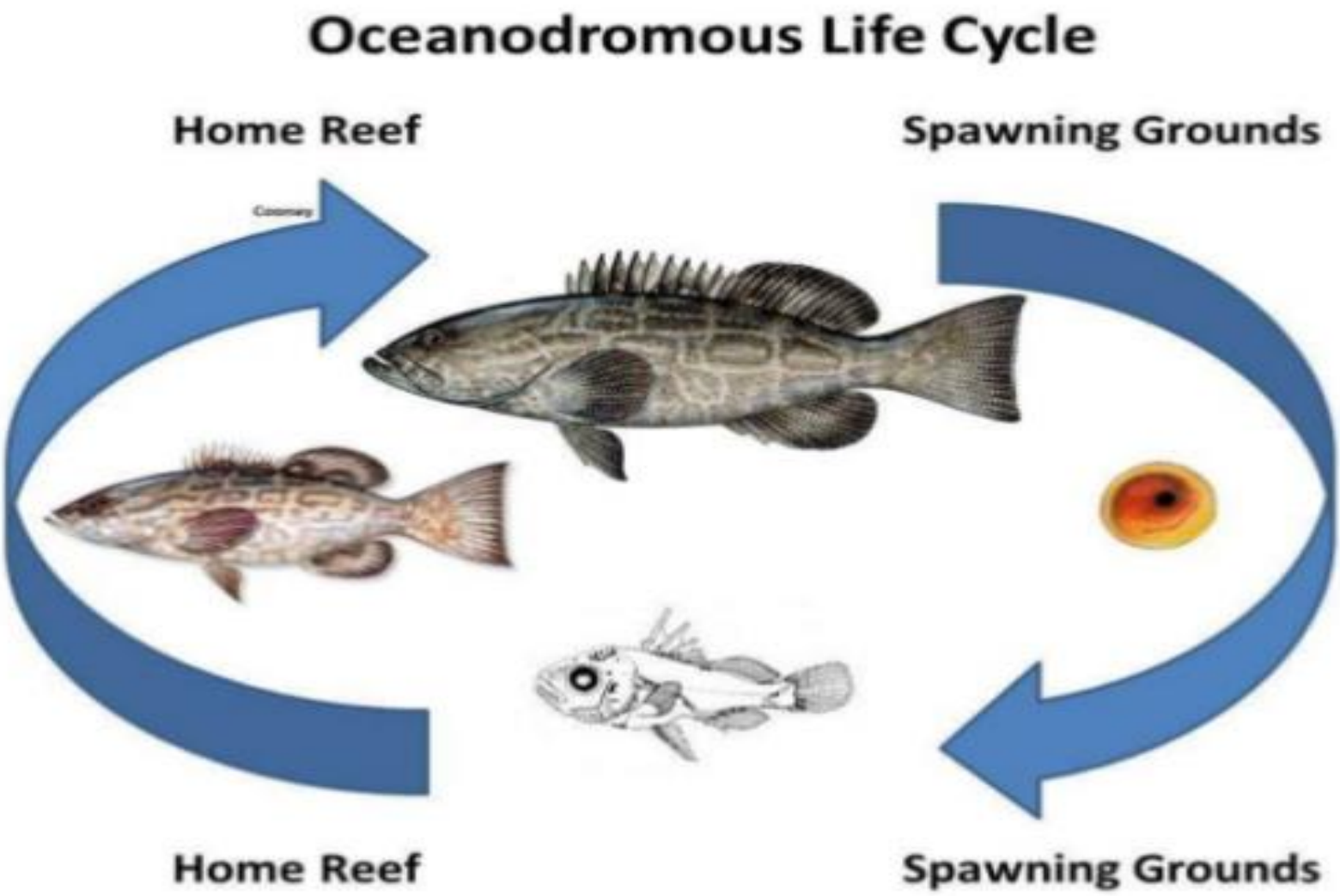
2. POTAMODROMOUS FISHES-:

- Truly migratory fishes whose migration remain confined to fresh water , *e.g. the carps and the trout* travels long distance in large rivers in search of spawning grounds.
- After egg laying at suitable places they return to the feeding area.


Potamodromous Life Cycle
Downstream
Upstream
Downstream
Upstream

3. OCEANODROMOUS FISHES-:

- Truly migratory fishes which live and migrate in the sea.
- Many marine fishes like the cod , the *herrings (Clupea) , mackerels (Scomber) and the tunnas (Thunnas)* travel long distance in the sea to deposit their eggs , and later return to the feeding grounds.


Oceanodromous Life Cycle
Home Reef
Spawning Grounds
Home Reef
Spawning Grounds

FACTOR INFLUENCING AND CONTROLLING MIGRATION-:

- Migration are influenced by several factors which may be physical, chemical and biological.
- Physical factors-

1. Bottom materials
2. Depth of water
3. temperature
4. light intensity
5. Photoperiod
6. Current turbidity

- Chemical factor-

1. salinity
2. pH
3. Smell and taste of water.

- Biological factor—

1. Migration are the sexual maturity
2. Blood pressure
3. Food
4. Memory
5. Physiological clock
6. The endocrine glands
7. Presence or absence of the predators and competitors may also be considered as the biological factors governing migration of fishes.

MECHANISM OF ORIENTATION -:

- The mechanism of orientation during fish migration has been reviewed by Hasler (1971) and Able (1980).
- Orientation means arranging of an animal in a given direction.
- Homing- a fish may recognised its home site by a direct sensory stimulus vision or olfaction . This is called ' homing ' or ' piloting'.
- 'navigation' refers to the mechism by which an animal can find direction towards a desired area.

- Homing ability of a fish required a knowledge of some kind of ‘ map’ , whose information might be stored in the central nervous system
- fish can use the sun for orientation during migration the fishes are observe the changing angle of the sun , relative to the horizontal and vertical planes.
- During night , fish might use the position of moon for orientation
- some species might make use of the magnatic and electrical field for orientation , and have the ability to produce and receive electric signals and exhibit the power of electrolocation.

CAUSE OF MIGRATION-:

- Several authors have given various reasons as to why fish migrate ,according to Northcote (1978) this is:

1) To optimize feeding
2) To avoid unfavourable condition,
3) To enhance reproductive success , and
4) Possibly to promote colonization.

- the strategy of fish is to exploit rich food source , to enhance food intake which is necessary for increased growth rate , fecundity and survival.

ADVANTAGES OF MIGRATION-:

- Migration is an adaptation towards abundance.
- it would be an advantage to have separate spawning , nursery and feeding grounds.
- A species whose adults return to spawn in an area where the environmental condition were similar to those under which they themselves survived when young.
- Thus a better egg and larvae survival would lead to a greater number of spawners on a particular ground.