

BIOACCUMULATION AND BIOMAGNIFICATION

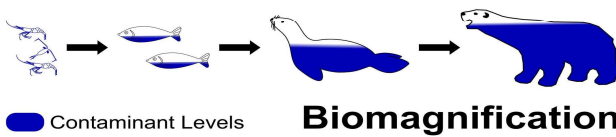
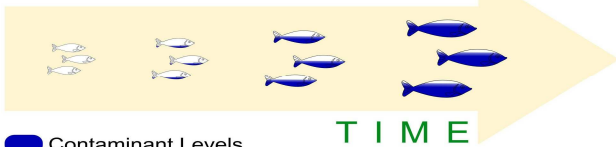
"WHY ARE ALL THE FISH DYING IN FLORIDA?"



KEY TERMS

- **BIOACCUMULATION:**
 - BIO= LIFE
 - ACCUMULATION= TO GAIN
- LIVING THINGS GAIN SOMETHING OVER THEIR LIVES.
- TEXTBOOK: THE SELECTIVE ABSORPTION AND STORAGE OF TOXINS OR OTHER MOLECULES IN AN ORGANISM OVERTIME. (TOXINS CONCENTRATING IN YOU FROM YOUR FOOD/ WATER/ AIR)
- **BIOMAGNIFICATION:**
 - BIO= LIFE
 - MAGNIFICATION=MAKE BIGGER
- LIVING THINGS MAKE SOMETHING BIGGER OR CONCENTRATE THINGS.
- TEXTBOOK: THE TOXIC BURDEN OF ORGANISMS AT A LOWER TROPHIC LEVEL ARE INHERITED BY A PREDATOR IN A HIGHER TROPHIC LEVEL. (TOXINS BEING PASSED UP THE FOOD CHAIN IN INCREASING DOSES THROUGH PREDATION)

Bioaccumulation



KEY TERMS

- POP:
- PERSISTENT ORGANIC POLLUTANTS
- I.E. LEAD, MERCURY, DDT

The Dirty Dozen

Pesticides <ul style="list-style-type: none"> • Aldrin • Chlordane • DDT • Dieldrin • Endrin • HCB • Heptachlor • Mirex • Toxaphene 	Industrial Chemicals <ul style="list-style-type: none"> • Hexachlorobenzene (HCB) • Polychlorinated biphenyls (PCBs)
Unintentionally Produced by-Products <ul style="list-style-type: none"> • Dioxins • Furans • HCB • PCBs 	

NEXT LET'S TALK ABOUT THOSE POPS:

- WHERE DO THEY COME FROM?
- HOW DO WE GET RID OF THEM, OR CAN WE?

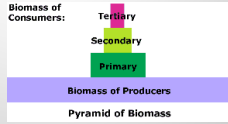
WHAT'S A FOOD CHAIN?

ALGAE ---> SHRIMP ---> HERRING ---> SALMON ---> GRIZZLY BEAR

- WHY ARE THE ARROWS POINTING THE WAY THEY ARE?
 - SHOWS MATTER AND ENERGY FLOWING FROM ONE ORGANISM TO THE NEXT AS ONE EATS ANOTHER.
- WHERE DID ALL THAT ENERGY COME FROM ORIGINALLY?
 - SOLAR ENERGY CAPTURED BY PRODUCERS.

HERE'S ANOTHER WAY TO SHOW ORGANISMS IN A FOOD CHAIN:

- PYRAMID OF NUMBERS/ BIOMASS:



- WHY ARE THERE MORE PRODUCERS THAN ANY OTHER TROPHIC LEVEL? ONLY 10% OF THE ENERGY AVAILABLE FROM ONE TROPHIC LEVEL TRANSFERS UP THE FOOD CHAIN, LESS ENERGY MEANS FEWER INDIVIDUALS.

OK, LET'S PLAY A GAME:

- LET'S PRETEND THERE'S A FOOD CHAIN IN THIS ROOM. SOME OF YOU WILL BE HERRING, SOME OF YOU WILL BE SALMON, AND SOME OF YOU WILL BE GRIZZLY BEAR.
- THE HERRING EAT THE SHRIMP, SALMON EAT HERRING, AND GRIZZLY CAN EAT EITHER THE HERRING OR THE SALMON (MORE LIKELY TO EAT THE SALMON)

RULES FOR THE GAME:

- HERRING GET A 30 SEC HEAD START, YOU GO EAT AS MUCH SHRIMP AS YOU CAN PICKING UP ONE AT A TIME.
- ONCE THE SALMON ARE RELEASED THEY TRY TO CATCH THE HERRING TO EAT THEM (NO RUNNING), TO EAT A HERRING YOU MUST TOUCH THE PERSON'S ELBOW TO STOP THEM AND THEN WIN A GAME OF ROCK, PAPER, SCISSORS. IF THE HERRING WINS IT SWIMS AWAY. IF THE SALMON WINS, THE HERRING DIE AND GIVE ALL OF THEIR SHRIMP CARDS TO THE PREDATOR THAT ATE YOU AND GO SIT DOWN.
- GRIZZLY FOLLOW THE SAME RULES AS YOU TRACK DOWN AND TRY TO EAT SALMON.
- *** THE GAME ENDS WHEN I TURN OFF THE LIGHTS***

RESULTS:

- EVERYONE RETURN TO THEIR SEAT AND COUNT UP YOUR SHRIMP CARDS, SEPARATE THE WHITE SHRIMP FROM THE COLORED ONES AS YOU COUNT THEM.
- WHY DO YOU THINK I PUT OUT TWO DIFFERENT COLORED SHRIMP CARDS?
 - THE COLORED CARDS REPRESENT SHRIMP THAT HAVE BEEN EXPOSED TO AND ARE CARRYING A POP. (MERCURY)
- SINCE HERRING ARE SMALL, IF YOU SURVIVED THE GAME BUT HAVE ANY COLORED SHRIMP IN YOUR PILE...YOU'RE NOW DEAD DUE TO MERCURY POISONING
- SALMON ARE BIGGER AND ABLE TO TOLERATE MORE TOXIN, IF MORE THAN HALF OF YOUR SHRIMP ARE COLORED...YOU'RE DEAD.
- IF HALF OF THE SHRIMP THE GRIZZLY HAS ARE COLORED, THEY ARE NO LONGER ABLE TO REPRODUCE BUT THEY ARE STILL ALIVE.

LET'S TALK ABOUT THIS IN TERMS OF
BIOACCUMULATION AND BIOMAGNIFICATION.

- WHAT PART OF THIS ACTIVITY REPRESENTS BIOACCUMULATION?
- WHEN THE HERRING DIE FROM THE TOXIC SHRIMP, WHAT DOES THIS REPRESENT?
- WHAT DOES THE LOSS OF THE HERRING MEAN FOR THE FOOD CHAIN/ ECOSYSTEM?
- WHAT PART OF THE GAME REPRESENTS BIOMAGNIFICATION?
- WHAT IMPACT DOES THIS HAVE ON THE FOOD CHAIN AS SALMON DIE OFF OR GRIZZLY FAIL TO REPRODUCE? WHAT IMPACT DOES IT HAVE ON THE ENVIRONMENT?

CLOSURE:

- WRITING ASSIGNMENT:
- ARGUE FOR OR AGAINST THE FOLLOWING STATEMENT, MAKE A MODEL FOOD CHAIN OF YOUR OWN AND SUPPORT ANY CLAIMS WITH DATA WHERE APPLICABLE.
- **REMOVING POPS FROM THE ENVIRONMENT IS EXPENSIVE, TIME CONSUMING, AND NEARLY IMPOSSIBLE UNLESS EVERYONE WORLD WIDE CHANGES THE WAY THEY TREAT OUR WATERWAYS SO WHY BOTHER TRYING; NATURE WILL SIMPLY DEAL WITH THE DAMAGE AND EVOLVE.**
