Texas Envirothon AQUATICS

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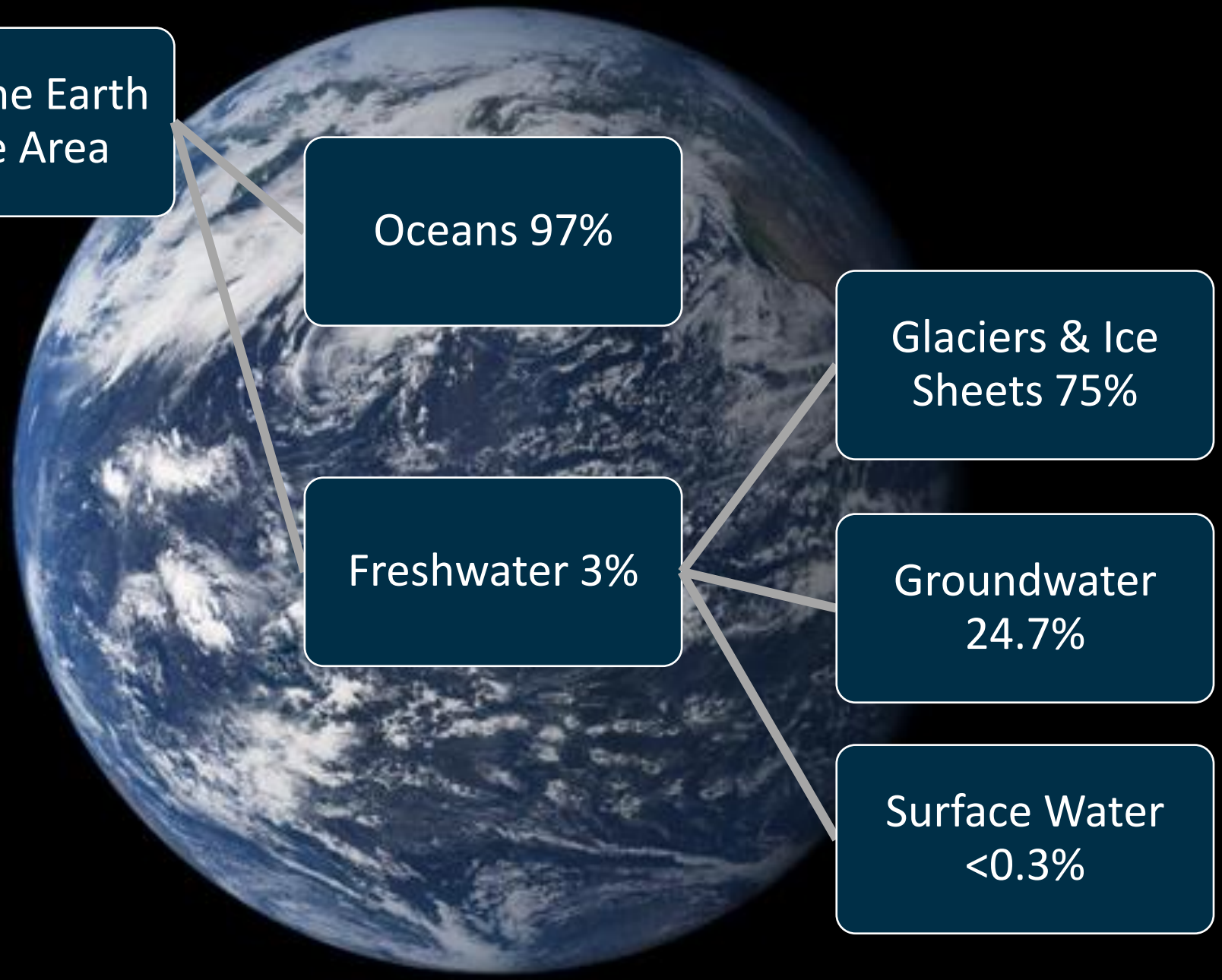
10:35-11:35

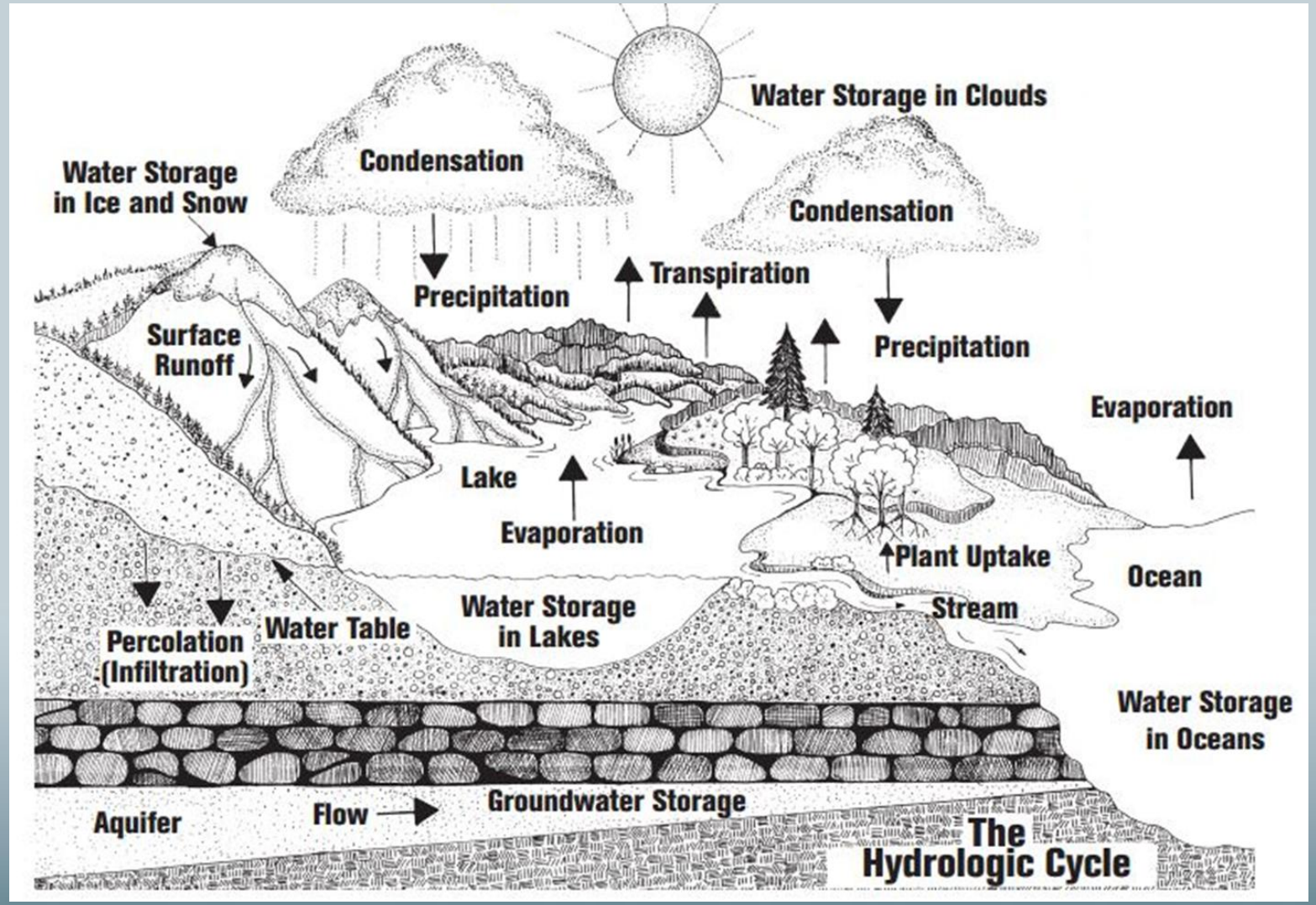
Core Content Areas

- Abiotic Factors
  - Water Cycle
  - Watersheds
  - Water Quality
- Biotic Factors
  - Aquatic Ecology
  - Identify Species
  - Index of Biotic Integrity
- Aquatic Environments
  - Wetland, Lotic, Lentic, Groundwater, Estuary, Ocean
  - Ecosystem Services
  - Riparian and Buffer Zones
- Water Protection & Conservation
  - Aquatic Nuisance Species
  - Laws and Agencies
  - Pollution
  - Water Use/Quantity

"Non-point Source Pollution: It Begins at Home!"


75% of the Earth Surface Area
Oceans 97%
Freshwater 3%
Glaciers & Ice Sheets 75%
Groundwater 24.7%
Surface Water <0.3%

Hydrologic Cycle



- Provides Freshwater
- Regulates Climate & Weather
- Transports Nutrients
- Supports Ecosystems
- Connects Earth Systems

Water Quality - History

- Water Pollution Control Act (1948): "…for eliminating and reducing the pollution of interstate waters and tributaries and improving the sanitary condition of surface and underground waters."

- Water Quality Act (1965):
  - Required states to establish water quality standards

Water Quality - History

Cuyahoga River Fire of 1952, $1.3 million in damages

- Cuyahoga River Fire
  - Cleveland, OH
  - Not the first time the River had burned
  - 1969 Fire – Publicity that demanded stronger action
  - Time Magazine:
    - "River that oozes rather than flows"
    - "Where a person does not drown but decays"

Water Quality - History

- Clean Water Act - 1972
  - Stipulated broad national objectives to restore and maintain the chemical, physical and biological integrity of the Nation's waters
  - Provided EPA authority to implement pollution control programs

Water Quality - Agencies

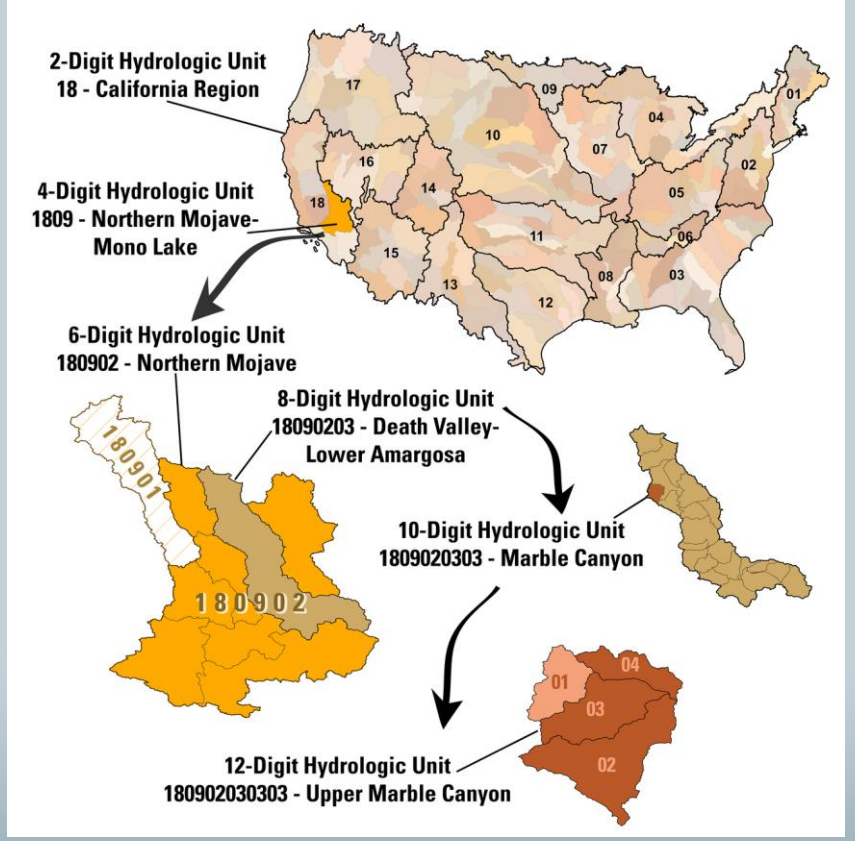
- Federal Agencies:
  - Environmental Protection Agency (EPA)
    - Office of Water – Regulatory and Guidance for Water
    - Approves states Water Quality Standards & Impaired Waters: Section 303D of CWA
  - National Oceanic and Atmospheric Administration (NOAA)
  - United States Department of Agriculture (USDA) - (NRCS)
  - United Fish and Wildlife Service (USFWS)
- Texas Agencies:
  - Texas Commission on Environmental Quality (TCEQ)
  - Texas State Soil and Water Conservation Board (TSSWCB)
  - Texas Water Development Board (TWDB)
  - Texas General Land Office (GLO)
  - Texas Parks and Wildlife Department (TPWD)

Watersheds - Terms

- Headwaters
- Tributary
- Main Stem
- Flood Plain
- Mouth
- Receiving Waterbody
- Ephemeral
- Perennial
- Strahler Stream Order

Model My Watershed

- Watershed Boundaries
  - National Hydrography Dataset (NHD)
  - Hydrologic Unit Code (HUC)
- Features Affecting a Watershed
  - Hydrology
  - Land Use/Land Cover
    - Urban Stream Syndrome
  - Soil Infiltration
  - Elevation/Slope
  - Erosion (meander, oxbows)
  - Climate Change – FEMA and TWDB Flood Maps



Pollution

- Point Source Pollution: Pollution that enters surface water at a single, identifiable and discrete point





- Non-point Source Pollution: Pollution that enters surface water without a single, identifiable and discrete point of entry




Water Quality Standards

- TCEQ: Texas Surface Water Quality Standards
  - Supports Public Health and Enjoyment
  - Protects Aquatic Life

Texas Surface Water Quality Standards

- Recreational Use
  - Pathogen Indicator Bacteria: *E. coli* or Enterococci
- Aquatic Life Use
  - Dissolved Oxygen
- General Use
  - Nutrients: Nitrate, Total Phosphorus, Ammonia
  - Temperature
- Fish Consumption Use
  - PCBs and Dioxins

Recreational Use

- What is it?
  - Potential health risk when people contact waterways. Pathogen indicator bacteria *Escherichia coli* (*E. coli*) and *Enterococcus spp*. indicates likely fecal contamination therefore potential presence of disease-causing pathogens in water.
- Why do we care?
  - High bacterial concentrations increase the risk of contracting gastrointestinal illnesses or skin infections for swimmers or others who come into direct contact with the water.
- How can you help?
  - WWTF Releases- If you observe an unauthorized release, report it to the Texas Spill-Reporting Hotline at 800-832-8224 or submit an electronic Complaint.
  - Maintain OSSFs- Learn more about OSSFs through H-GAC's homeowner wastewater assistance program.
  - Scoop the Poop - Always pick up your pet's waste and dispose of it in a trash can.

Aquatic Life Use

- What is it?
  - Most widely assessed using dissolved oxygen (DO). Aquatic organisms like fish and crawfish absorb DO in the water through their gills.
- Why do we care?
  - Oxygen is essential for aquatic life. Sudden or prolonged decreases in DO could cause stress or even death to aquatic organisms.
- How can you help?
  - Reduce Runoff - Suspended sediments can block sunlight aquatic plants need to produce oxygen. You can reduce soil runoff by planting native plants and adding green infrastructure features to your yard that reduce stormwater runoff.
  - Eutrophication – take steps to reduce nutrient pollution.

General Use (Nutrients)

- What is it?
  - There are currently up to four parameters that are assessed: Total Phosphorus, Nitrate, Ammonia, and Chlorophyll-a. Chlorophyll-a only at a select number sites, typically focused on lakes and bays.
- Why do we care?
  - Excess nutrients can lead to harmful algal blooms and low dissolved oxygen which can result in potential harm to human health and aquatic life.
- How can you help?
  - Fertilizer Management –Do not over-fertilize your lawn and do not apply fertilizers before it rains.
  - Choose Phosphate-free Products -You can opt for detergents, soaps, and household cleaners that are phosphate-free.
  - Yard Waste Management - You can avoid blowing or dumping grass clipping and leaves into storm drains. Instead, you can bag them or use them as mulch.

General Use (Temperature)

- What is it?
  - Temperature impacts which aquatic organisms can survive and thrive in it. Temperatures fluctuate naturally based on season and time of day; however human activities and climate cycles can result in higher water temperatures.
- Why do we care?
  - Many native aquatic organisms can become stressed or even die if exposed to unusually high temperatures, while invasive species from warmer climates may be able to thrive in those conditions
- How can you help?
  - Natural Riparian Zones - Trees and other vegetation that grow along the banks of natural waterways provide shade, helping to keep the water temperature lower and more consistent. Volunteer to support local efforts to restore riparian ecosystems by planting trees, removing invasive plant species, and encouraging such projects where they are considered.

Fish Consumption Use

- What is it?
  - PCBs and dioxins are organic pollutants that persist for a long time, accumulate in sediments and organisms, and become increasingly concentrated as they move up the food chain, posing risks to wildlife and human health.
- Why do we care?
  - A DSHS **limited consumption advisory** means that fish or shellfish from a specific water body may contain unsafe The advisory usually specifies different recommendations for children and women of childbearing age, and other adults.
  - A DSHS **no consumption advisory** means that fish or aquatic life from a specific Texas water body should not be eaten due to unsafe levels of contaminants.
- How can you help?
  - Be Informed - It is important for recreational and commercial anglers to be aware of and follow the consumption advisories issued by the DSHS. To learn more about fish consumption advisories visit the DSHS website.

Other Water Quality Parameters

- Suspended Solids/Sediments
- pH
- Debris- Macro and Micro
- Heavy Metals
- Pharmaceuticals/Hormones/Endocrine Disruption Chemicals
- Volatile Organic Compounds (VOCs) & other Toxic Chemicals
- PFAs
- Salts
- Radioactive Materials
- Harmful Algal Blooms/Cyanotoxins
- Index of Biotic Integrity (IBI) – Fish and Macroinvertebrate Community Biodiversity.

Water Quality Data- Resources

- EPA: How's my Waterway tool
- TCEQ: Surface Water Quality Web Reporting Tool
- TCEQ: Surface Water Quality Segment Viewer
- H-GAC: Water Resources Information Map