

Aquatic Section Florida Envirothon Study Packet 2011 Competition

Prepared and Provided by:
The Florida State Envirothon

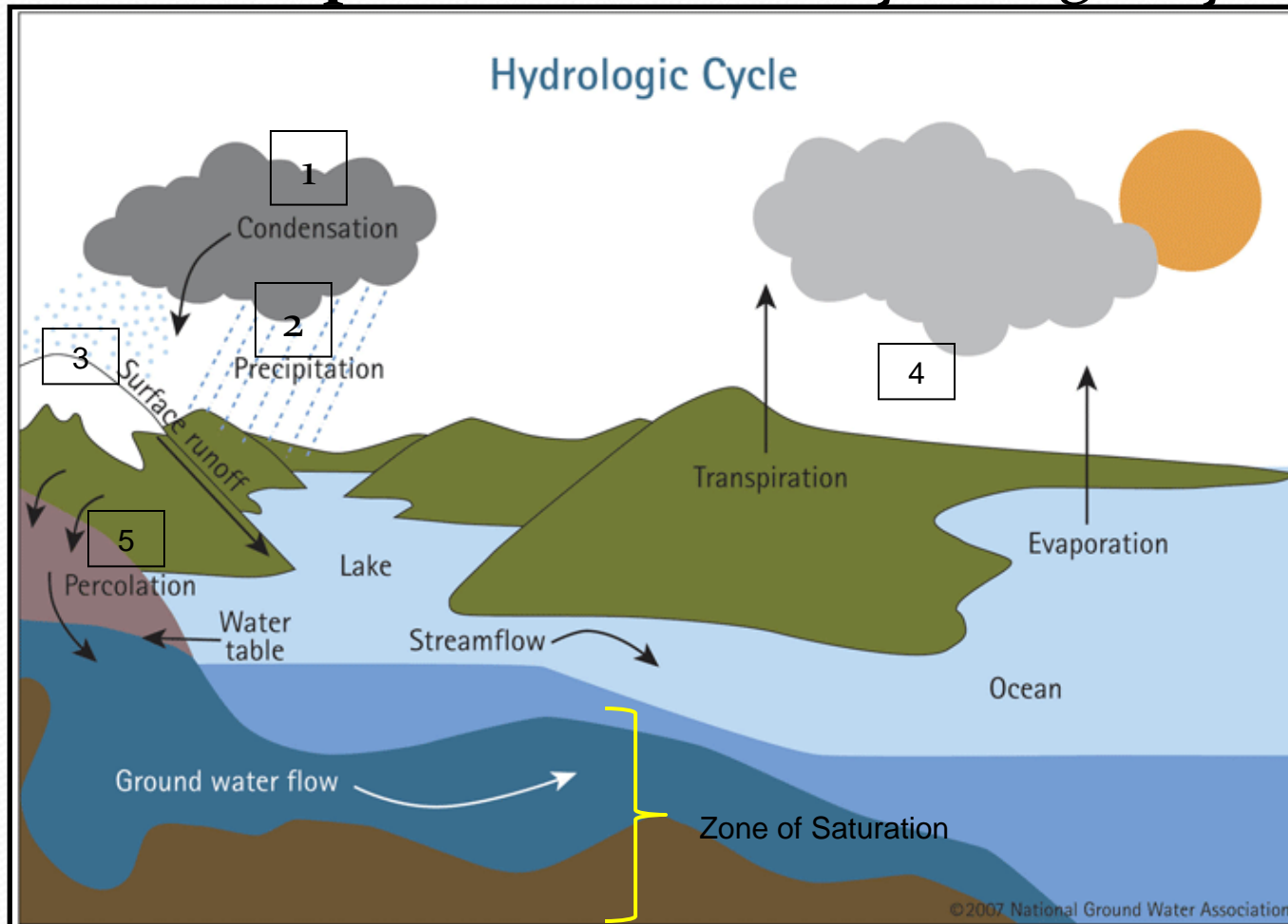
Presented by:
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Organization of Aquatics Study Packet

- Table of Contents has been updated – a copy will be provided in Study Packet
- Every Section has been assigned a number (Section 1, 2, 3, etc.) in the table of contents
- Some figures have been added – copies will be available in Study Packet
- Sample exercises are available after the Glossary
- Testing kit for water sampling : La Motte 3-5886 with instructions will be provided to competing schools for practice purpose.

Section 1 – Water Cycle Facts

- There are **five processes** in the Hydrologic Cycle:





Groundwater contamination sources are widespread and can be caused by **intentional** and **unintentional** input:

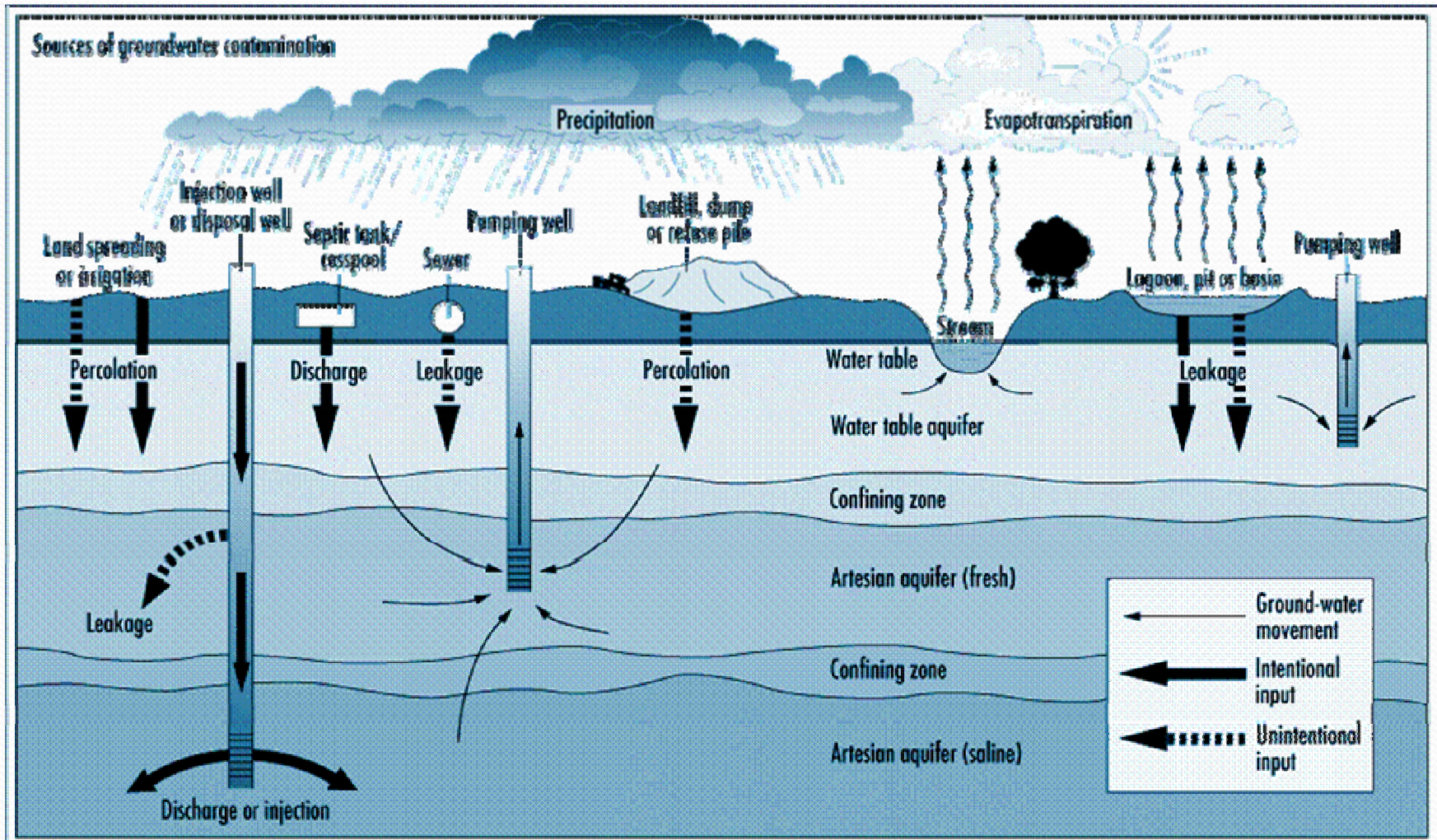
Intentional

- Injection well or disposal,
- Radioactive land disposal, salt intrusion
- Septic tanks/Cesspool discharge

Unintentional

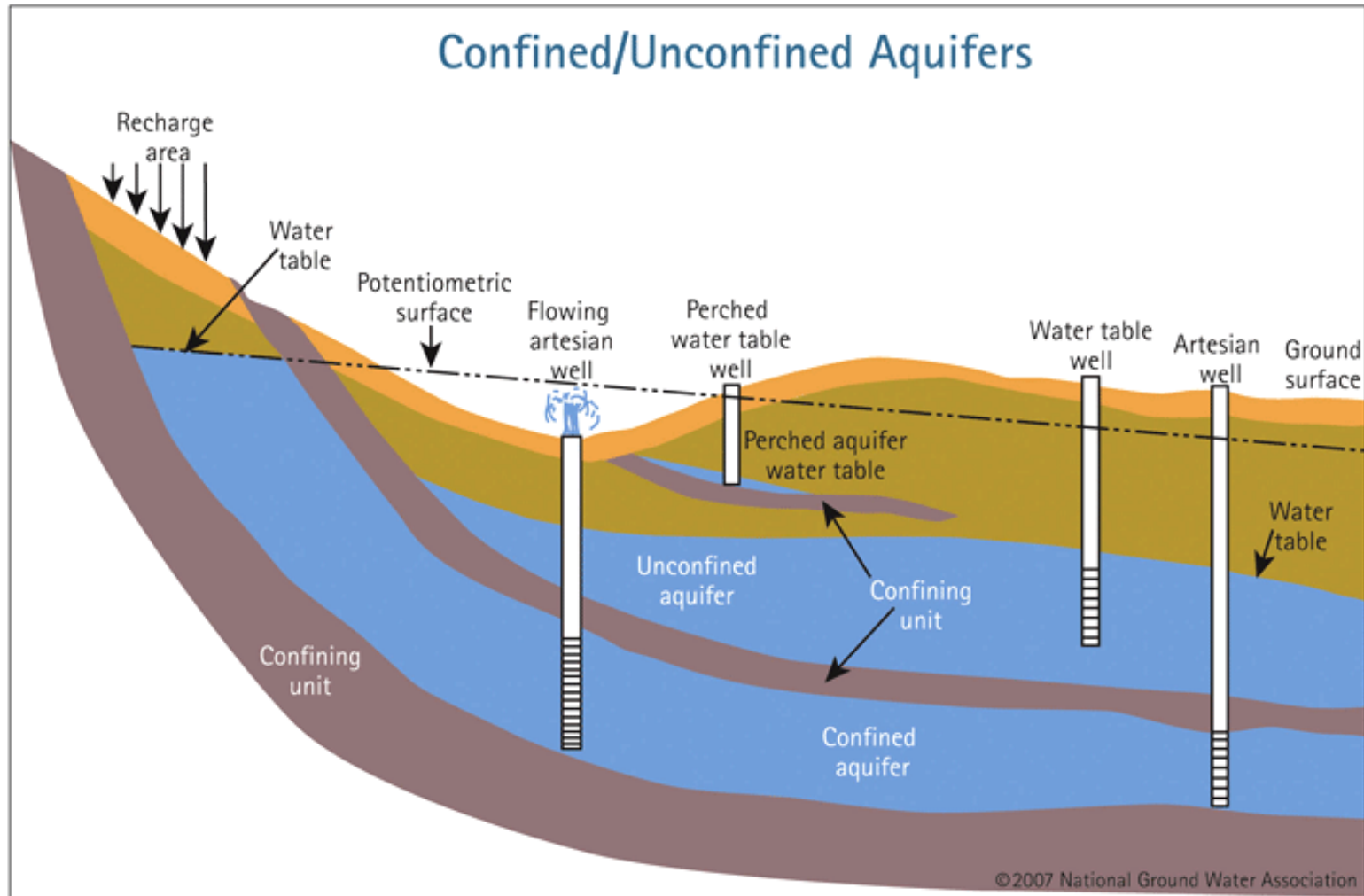
- Accidental landfills
- Landfill dump or refuse piles
- Sewer leakage
- Leakage from lagoon pit or basin
- Irrigation

Sources of Groundwater Contamination



Section 2 – Aquifer Facts

- Classification of **confined** and **unconfined** Aquifers



http://www.ngwa.org/Fundamentals/use/PublishingImages/aquifer_types.gif



- There are **five** major Florida aquifers (**page 7**):

1. Floridan

2. Biscayne

3. Sand and Gravel Aquifer

4. Surficial Aquifer

5. Highly mineralized Aquifer

Section 3 – River System Facts

- **Tributaries are:**

1. Streams
2. Creeks
3. Rivers

- **Other water bodies in Florida are:**

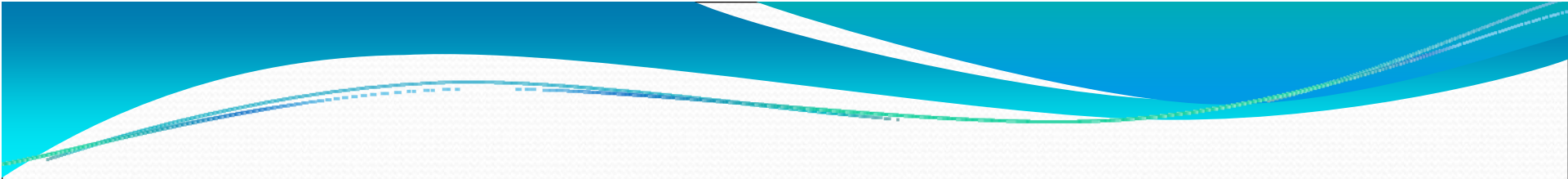
1. Ponds and lakes
2. Estuaries
3. Springs

- **River features**

1. River forms
2. Velocity and discharge
3. Riverbed materials
4. Bank slope

Section 4 – Watershed Facts

- A watershed is the land area from which both surface water and groundwater, sediment and dissolved materials drain to a common watercourse or body of water.
- Stream Orders:
 1. **1st order stream**- smallest channels and no tributaries
 2. **2nd-order stream** – formed by two 1st-order streams
 3. **3rd-order stream** – formed by two 2nd-order streams and so on.

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- Streams can be also classified by the **period of time** during which flow occurs:
 1. **Perennial**: year-round flow (90% or more), i.e. higher order streams
 2. **Intermittent**: flow during wet season (50% time or less)
 3. **Ephemeral**: during and shortly after extreme precipitation (or snowmelt), i.e. 1st and 2nd-order streams and headwater

Section 5 – Wetland Facts

- Refer to **Wetland Classification Chart (Page 31)** for categorization, general location and wetland types
- **Functions of Wetlands (page 34):**
 1. Water holding, absorbing capacity
 2. Sediment trapping, erosion control
 3. Filtering, water quality improvement
 4. Nesting, nursery, spawning and habitat for fish and wildlife
 5. Recreation
 6. Cultural value, attractiveness
 7. Atmospheric equilibrium




- **Human Impacts on Wetlands include (Page 35):**

1. Agricultural activities
2. Pond and lake construction
3. Mining
4. Natural threats (erosion, sea level rise, hurricanes, drought)
5. Wetland degradation (pollution from pesticides, heavy metals, sediments, domestic sewage, fertilizers)

Section 6 – Stormwater Facts

- Stormwater runoff is the water flowing over the land that follows immediately after a rainstorm
- **Factors affecting stormwater runoff** in a watershed include (page 37) :
 1. Soil permeability
 2. Vegetation
 3. Slope
 4. Orientation of the land
 5. Pollution caused by human development

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- Pollution sources can be categorized as **point** and **nonpoint**(page 38):
 1. **Point source pollution** flows from a specific and known discharge point. This kind of pollution is easier to collect and regulate through permitting.
 2. **Nonpoint source pollution** does not come from a specific location. It comes from runoff of storm water and snowmelts. This kind of pollution is more difficult to quantify and control than point source pollution.



- **Retention/Detention Ponds (Page 42)**

1. Retention ponds hold water until it either soaks or infiltrates into the ground or evaporates. Retention ponds may be dry during certain parts of the year.
2. Detention ponds are used in areas that are too wet . They maintain a planned permanent level of water throughout the year and act as treatment facilities.

Section 7 – Water Quality Facts

- **The most common water quality test parameters** are shown below.
1. Dissolved oxygen (DO), in ppm
 2. Biochemical Oxygen Demand (BOD), in ppm
 3. Fecal Coliform, in fecal coliforms per 100 ml
 4. pH, scale 0-14
 5. Temperature, °C
 6. Nutrients (Nitrate and Phosphate), in ppm
 7. Total Solids, mg/L
 8. Turbidity, in NTU, also in JTU

Section 8 – Benthic Invertebrate Facts

- Live in the bottom substrata of the wetlands.
- Recycle the organic matter in the water.
- Major food source for small fish.
- **Indicator** species in particular aquatic environments can be used to compile a **biotic index for water quality**.
- Relatively immobile or sedentary, thus precise location of pollution sources can be identified.
- Long life cycles, so changes over time can be studied.
- Easy to sample.

**TOLERANT of
Poor Water Quality**

**SOMEWHAT
TOLERANT
of Poor Water Quality**

**INTOLERANT to
Poor Water Quality**

Caddisflies



streamwatch.org

Stoneflies



pestid.msu.edu

Midges



clemson.edu

Mayflies



islandwood.org

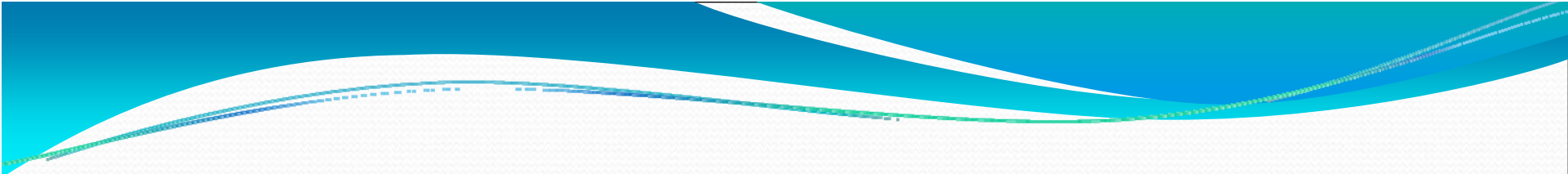
Segmented Worms



biodiversitysnapshots.net.au

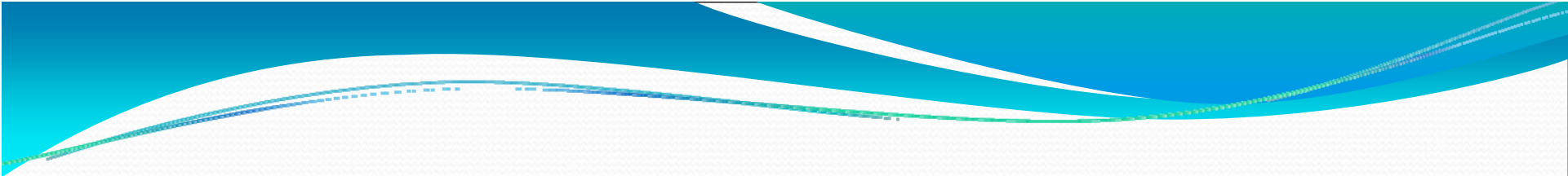
Section 9 – Marine/Coastal Facts

- The **coast** is the place where the sea meets the land. There are two kinds of coastal areas:
 1. Rocky Coasts
 2. Sandy Coasts – high energy and low energy
- **Seawater** is composed of sodium chloride, magnesium chloride, sodium sulfate, calcium chloride and potassium chloride.
- **Salinity** is the amount of salt in seawater; measured in part per thousand (‰)
- **Estuaries** are places where rivers meets the ocean.
- **Salt marshes** are areas protected by barrier islands

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- There are **three kinds of mangroves** in Florida (page 70, and **Guide to Mangroves of Florida**):
 1. **Red**: have a complex network of “prop roots” that come from the trunk and branches
 2. **Black**: have a system of complex shallow “cable roots” that radiate out from the tree; have short branches
 3. **White**: smaller size and have broad flattened oval leaves
 - Mangroves protect shorelines and provide valuable habitat for a range of fish and invertebrates

Section 10 – Water Conservation Facts

- Florida water management districts determine how much water and for which purpose the water is needed to preserve Florida's ecosystems. The districts use water conservation and alternative sources as management tools.
- **Water conservation** enables efficient use of water resources and protects the water from pollution. Major reasons for saving water:
 1. Economic benefits
 2. Energy savings
 3. Pollution reduction
 4. Resource protection

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- **Reuse** of water reduces wastewater disposal costs, water costs, saves energy, reduces discharge of pollutants to receiving waters, and improves water quality for landscape and agricultural use
 - **Alternative sources** of water in Florida:
 1. Desalination of brackish water, ocean or gulf water
 2. Under consideration: freshwater offshore springs water