

- **How Rates of groundwater/stream velocity and flood recurrence Interval are calculated including what all of the variables mean:**

$$V = \frac{K}{n} \left(\frac{h_2 - h_1}{l} \right)$$

Hydraulic Conductivity (measurement of permeability)

Porosity

Hydraulic gradient

Groundwater: Higher slope= higher hydraulic gradient= higher groundwater velocity
 Shallow slope= low hydraulic gradient= low groundwater velocity

- Hydraulic gradient: the change in hydraulic head over a distance (the slope of the water table)

Stream Velocity: Max Velocity Determines where the erosion and deposition occurs. Faster velocity occurs at cut banks where erosion is occurring. Slower velocity occurs at point bars where deposition is occurring

Numbers of years of discharge records used

$$RI = \frac{n + 1}{m}$$

Recurrence Interval

Flood rank

Flood Recurrence: The more discharge the flood gives the higher the rank it has

- **Parts of different landforms/ features: parts of a stream, different kinds of streams, glacial landforms, petroleum traps, geologic structures:**

Cut Bank: where the stream erodes the most

Point Bar: Where most deposition occurs in the stream

Anticline and Syncline

Glacial Landforms:

- Hanging Valleys: valleys where smaller glaciers joined a larger glacier
- Truncated spurs: smooth triangular ridges on the edge of the main glacier
- Aretes: sharp ridges separating valleys
- Cirques: steep-sided half-bowl recesses carved into mountain side of glaciers
- Horns: sharp peak where several cirques have been carved into the mountain

Continental Landforms:

Ice sheets produce rounded landforms

- Rounded Knobs:
- Grooves: orientation of grooves indicate direction of ice sheet movement

- **Ages of things we have discussed (last ice age, how are divisions in the geologic time scale determined)**

The last of the large North American ice sheets melted 10,000 years ago

Pleistocene Epoch: Peak of the most recent ice age was 18,000 years ago

- **How often does Old Faithful Erupt**

Every 65 Minutes (Yellowstone National Park, Montana)

- **The benefits and limitations of science (doesn't give absolute answers to moral/ ethical problems; determined by best practices of the scientific method; can change based on new evidence)**

Benefits: Constantly being refined and corrected and understanding how natural world works

Limitations: Doesn't have moral judgments, Doesn't make aesthetic judgements, Doesn't tell you how to use scientific knowledge, Doesn't draw conclusions about supernatural explanations

- **Be able to identify geologic structures (anticline / syncline / dome / basin) and determine where the youngest / oldest layer is located based on the type of fold**

Anticline: Shaped like (A) youngest layers are on the outside, oldest layers are in the middle

Syncline: Shaped like (U) youngest layers are in the middle, oldest layers are on the outside

Dome: (3D Anticline) Youngest rocks are on the outside, oldest rocks are in the center

Basin: (3D Syncline) Youngest rocks are in the center, oldest rocks are on the outside

• **Negative Impacts of Increasing ocean acidity and overfishing**

Ocean Acidity:

- Dissolution of calcifying organisms (disrupts the food web)
- Reproductive and physiological effects on organisms
- Increased Red tides (algae)
- Decline of commercial fisheries
- Damage to indigenous people

Overfishing:

- Too many fish removed so species is not able to sustain their population
- Heavy depletion in breeding stock
- ByCatch: any fish that you caught that you didn't want (killed)
- Ghost Nets are lost or left nets by fisherman (kill and trap thousands of fish and sea life)

• **Types of marine debris and plastic degradation**

Marine Debris

- Ghost Nets: lost or left behind fish nets by fisherman (kill and trap thousands of fish and sea life) trapped animals are eaten by bottom dwelling organisms. Net becomes buoyant and starts traveling again. They entangle and strangle starve, lacerate, or suffocate marine animals. (turtles)
- Nurdles: Preproduction plastic pellets used to make plastic products or used in soaps and cosmetics. They can be broken down plastic less than five mm in diameter. (starve to death)
- Plastic: 8.8 million tons of plastic released into the ocean each year. Great Pacific Garbage Patch (100 million tons of plastic in the oceans)

Plastic Degradation

- Photodegradation: weakening of material due to sunlight and disintegration into smaller and smaller pieces. Relatively quick. Degrades plastic into smaller plastic polymers. Not a chemical breakdown
- Biodegradation: complete chemical breakdown of plastic. $\text{polymer} + \text{oxygen} = \text{carbon dioxide} + \text{water}$. Happens **very** slowly. Degrades plastic into elements not smaller pieces of plastic.

• **Plans for the future of Yucca Mountain and communicating dangers of the area**

(highly radioactive area) buried nuclear waste (Rods) in Yucca Mountain in Nevada.

What they ended up doing and communicating...

- Posted several large posts with a description of danger around earthen berms containing warnings, maps, periodic tables, and astronomical charts. They buried time capsules at various depths with wood samples for dating.

Other ideas that they didn't do...

- Build spike fields to discourage movement into the area
- Plant engineered blue cacti at the site to indicate its importance
- Place human remains around the site

• Characteristics of urbanized vs. natural streams

Urbanized Streams: (greatly affected by the infrastructure and pavement created because there is no where for the water to go)

- Shorter lag time (when the water level rises it rises super fast)
- Higher peak Flow (when rainfall occurs it the flow increases much quicker than a natural stream)
- Lower base Flow (drains out more than the natural stream) lower than it was originally before rain
- Quicker return to pre rainfall conditions
- Greater risk of flash floods
- Decreased recharge of aquifers (**aquifers** : body of sediment or rock saturated with water that allows groundwater to move easily)

Natural Streams:

- Riparian Zones: diverse vegetation that grows along streams separating land and water works as a stream buffer (helps prevent erosion) and a biofilter (helps prevent contaminated run off)
 - High diversity/ density of species
 - Unique vegetation and soil
 - Doesn't reach as high a peak flow or as low a base flow as urbanized streams (because there are faced with less run off compared to urbanized streams which are surrounded by pavement and other surfaces that water cant seep into)
 - Returns to pre-rainfall conditions more gradually than urbanized streams