DOWNLOAD PDF HEADWATERS : FOUR DIFFERENT STREAMS BEGIN

Chapter 1 : River source - Wikipedia

The source or headwaters of a river or stream is the furthest place in that river or stream from its estuary or confluence with another river, as measured along the course of the river.

The beginning of a river[change change source] The start of a river is called the source or head water. Young rivers often have lots of small waterfalls and rapids. As the rivers travel downhill they begin to erode the ground taking small bits of soft rock and soil. The source of a river may be a spring , often on a hill , mountain , glacier , or another high place. A spring is water that flows out from under the ground. The source of a river may be a lake where lots of water from small streams gathers when it rains or snows. A river may begin in mountains where there is snow. The melting snow runs together to form a small stream that runs down the mountain. As more little streams run in, the main stream gets bigger, until it forms a river. Some rivers flow from hills where there is no snow, but lots of rain. Some rivers only flow after there has been rain near the head water. The headwaters of the Arkansas River have rapids. Waterfalls are most often found in a young river. This river in Northern Australia only runs after heavy rain. The middle part of a river[change change source] The middle part of a river is called a mature river. A mature river makes a riverbed that is U-shaped. It might be very deep and run fast. It sweeps over small rocks and boulders, and makes big turns around hills and mountains. It is much wider than a young river, but not as wide as an old river. To cross over a mature river, people use bridges. Many cities and towns are built on the banks of mature rivers. Many farms that keep animals such as dairy cows , horses and sheep are along mature rivers because the animals can drink from the river every day. Clearwater River in Alberta is a "mature river". The Severn River flowing through farmland. The Rhine River valley has many towns. The city of Florence was built beside the Arno River. The last part of a river[change change source] A river usually ends by flowing into an ocean , a lake or a bigger river. As a river flows towards its mouth, the countryside around the river often changes from hilly to flat. As it flows over the flat land the river becomes wider and slower. An old river often floods across the land after there is lots of rain at the headwaters. An old river slowly builds up its banks on either side; the high banks are called levees. An old river often meanders twists and turns , and sometimes, after a flood, it leaves lakes behind which are called ox-bows or billabongs. Old rivers are the most useful type of river for growing crops. Corn , rice , fruit , cotton , hay , tobacco and sugar are some of the crops that are grown near old rivers. The shape of the mouth depends on the conditions of the sea where it flows. If there is a strong tide where the river meets the sea, the river forms an estuary. An estuary is a wide, funnel -like mouth of the river. The fresh water of the river mixes slowly with the salt water, becoming brackish water â€” somewhat salty water. Many kinds of fish , clams , molluscs and other sealife live at estuaries. Where a river flows out to the sea, it sometimes flows very slowly through sandy or muddy land, making lots of little islands as it flows. The main stream of the river gets broken into many parts that spread out into a triangle shape like the Greek letter delta. When this happens, it is called the delta of the river. Deltas are often places that are not good for towns or farms but are very good for birds and other wildlife and fishing. Deltas are often made into wildlife reserves. Not all rivers have deltas. The Nowitna is an old river with meanders and ox-bow lakes. The delta of the Ganges River in India The grassy islands of the Okavango delta are the home of elephants, lions and flamingos. Cities are often near the mouth of a river. Underground rivers[change change source] Some rivers flow underground through caves. Underground rivers form in places where there are lots of cracks in the rocks above, so that in rainy weather, the water runs downs and collects in small underground streams. Sometimes the underground water trickles or gushes out of the ground to form a small spring of water. In other places, where there are caves, the small underground streams run together to form a river. The river can sometimes run through deep wide underground caverns. While many underground rivers flow gently, some underground rivers flow fast and have rapids , particularly after heavy rain. Many underground rivers flow out through a cave mouth to become an ordinary river. It can usually be drunk safely by people unless it is too dirty because of mud or human pollution. People and animals need fresh water to drink, so they often live by the side of a river. Rivers give water for drinking, bathing and washing clothes. Rivers give water for cattle and other animals to drink and for

people to grow plants. Rivers give products that are useful to people such as fish for food, clay for bricks and reeds to make the roofs of houses. Rivers can be used for transporting people, crops and other goods by boat. Rivers can be used to give power to turn machinery such as water mills. Rivers give water for factories that make cloth, steel and many other products. Rivers sometimes have dams to hold the water for people to drink, or to make electricity. Rivers can be used for leisure and sports such as swimming, boating, fishing and just walking by the river. Rivers often have beautiful scenery. Many painters, story-tellers and poets have painted or written about rivers. Rivers are sometimes turned into canals. Water for living[change change source] Two elephants have been taken to a river to drink and take a bath. A wool weaving factory on the Klyazma River. Cargo containers waiting for transport from North River Port, Moscow. Dams are built across rivers to store water and make electric power. Water for fun[change change source] Canoeing is a popular river sport.

Chapter 2 : Headwaters Stream Initiative Spring Preview | Friends of the Rappahannock

Headwater streams are the beginnings of rivers, the uppermost streams in the river network furthest from the river's endpoint or confluence with another stream. Headwater streams trap floodwaters, recharge groundwater supplies, remove pollution, provide fish and wildlife habitat, and sustain the health of downstream rivers, lakes and bays.

Flour millers in the Minneapolis area, as well as boat captains on the Upper Mississippi River, often had difficulties working on the river in the late summer months because the river ran dry. So much so that one of the first tasks assigned to Brevet Maj. According to Corps reports, engineers quickly realized the importance of the Headwaters region to improving river navigation in the Twin Cities. Following the surveys, the Corps created several plans to reduce the navigation issues found along the river. After exploring the Headwaters region and additional river basins in Minnesota and Wisconsin, Warren called for as many as 41 reservoirs in The reservoirs were to be scattered across the St. Croix, Chippewa, Wisconsin and Mississippi rivers. With surveys completed, Congress formally asked the Corps to study the impacts that the reservoir system would have on navigation. The study began in Brad Johnson, regulatory division archaeologist, said the Objibwe Bands were often on the losing side of the dam construction process. When our lands were given to us by the Great Father we could do something, but if these dams are made we will all be destroyed. Jeff Steere, northern Headwaters section supervisor, said, despite their opposition to the dams, many Native Americans helped build them. The Dam construction continued in , when the Corps began building more wood-framed dams in the region. The Big Sandy Lake Dam was modified in to contain the only navigation lock at any of the Headwaters reservoirs. Despite completing all the wood-framed dams in the Headwaters region, the Corps began rebuilding them less than 20 years later with the more modern construction material â€” concrete. Paul and the reservoirs were looked at as the cure for navigation during the summer. During this time, the Corps was also making improves downstream of St. Paul as part of the four-and-one-half foot channel requirement. The reservoir cure was short-lived. Henry Bosse, district draughtsman and photographer in the s, testified before Congress in that the reservoirs only helped raise water levels in St. Paul during a prolonged drought by more than a foot. While the water release was beneficial to navigation in St.

Chapter 3 : Streams | Rivers & Streams | US EPA

Headwater streams are small streams and wetlands at the highest end of a watershed. Some are so small that they don't show up on maps. If a river network is the circulatory system of the landscape, headwater streams are the small capillaries that fan into the larger veins and arteries.

Types of Streams Like the photos on this page? Visit our Flickr Gallery to see more streams. Headwater streams trap floodwaters, recharge groundwater supplies, remove pollution, provide fish and wildlife habitat, and sustain the health of downstream rivers, lakes and bays. Headwater streams are the smallest parts of river and stream networks, but make up the majority of river miles in the United States. Headwaters can be streams that flow briefly when snow melts or after rain, but shrink in dry times to become individual pools filled with water. Desert headwater streams can arise from a spring and run above ground only a few hundred yards before disappearing into the sand. Other spring-fed headwaters contain clear water with steady temperature and flow. Yet other headwaters originate in marshy meadows filled with sluggish tea-colored water. Headwater streams and streams that only flow for part of the year make up the majority of river miles in the United States. About 53 percent of the total stream miles in the continental U. Almost 60 percent of stream miles in the continental U. S only flow seasonally or after storms. Flow in a headwater may be year-round, seasonal, or rain-dependent. Year-round streams perennial typically have water flowing in them year-round. Most of the water comes from smaller upstream waters or groundwater while runoff from rainfall or other precipitation is supplemental. Click on the map above to see the percentage of people in your county that gets some of their drinking water directly or indirectly from streams that are seasonal, rain-dependent or headwaters. Seasonal streams intermittent flow during certain times of the year when smaller upstream waters are flowing and when groundwater provides enough water for stream flow. Runoff from rainfall or other precipitation supplements the flow of seasonal stream. During dry periods, seasonal streams may not have flowing surface water. Larger seasonal streams are more common in dry areas. Rain-dependent streams ephemeral flow only after precipitation. Runoff from rainfall is the primary source of water for these streams. Like seasonal streams, they can be found anywhere but are most prevalent in arid areas. Despite their seasonal or temporary appearance on the landscape, seasonal and rain-dependent streams are critical to the health of river systems, are hydrologically and biologically connected to the downstream waters, and provide many of the same functions and values as rivers and larger streams. The arid Southwest and Midwest portions of the country have the highest number of seasonal and rain-dependent streams. For example, more than 95 percent of the streams in Arizona are seasonal. Channels are natural or artificial open areas that connect two bodies of water and may have water flowing in them continuously or periodically. Arroyos are small, deep, flat-floored channels of a seasonal or rain-dependent stream, usually with nearly vertical banks cut into soil and sediment, rather than rock. Arroyos are most often found in the arid and semiarid regions of the United States. Sloughs are small, marshy stretches in a swale or shallow undrained depression, or slow-moving creeks or channels in a wetland. Top of page Importance of Streams Streams, headwaters and streams that flow only part of the year provide many upstream and downstream benefits. They protect against floods, filter pollutants, recycle potentially-harmful nutrients, and provide food and habitat for many types of fish. These streams also play a critical role in maintaining the quality and supply of our drinking water, ensure a continual flow of water to surface waters, and help recharge underground aquifers. Streams play a critical role in the quality and supply of our drinking water by ensuring a continuous flow of clean water to surface waters and helping recharge underground aquifers. In the continental United States, , miles of streams provide water for public drinking water systems. Of that total, 58 percent more than , miles are headwater streams. Approximately million peopleâ€” over one-third of the total U. Small streams, headwaters and streams that flow only part of the year protect against floods, filter pollutants, and provide food and habitat for many types of fish. Flood and erosion protection: Headwaters, seasonal streams and rain-dependent streams absorb significant amounts of rainwater, runoff and snowmelt before flooding. These streams have significant storage ability and play a critical role in protecting downstream communities by moderating flooding during heavy flow and by maintaining flow

during dry weather. Water enters the groundwater through the stream bed. Even during dry periods, groundwater replenishes flow in the stream to feed downstream waterways. In arid regions, water from rain-dependent and seasonal streams supports springs, wetlands and plants far from the recharge areas. A major source of water in rivers in the Southwest is from groundwater released into streams that only flow part of the year. Streams can reduce the pollution that flows to downstream rivers, lakes, bays, and coastal waters. They are able to retain sediments and excess nutrients, such as nitrogen and phosphorus, and prevent these pollutants from traveling further downstream where they could cause algal blooms or dead zones. Streams that only flow for part of the year are unique and diverse habitats that can support thousands of species, including plants, fish, amphibians, birds and mammals. These streams are important as spawning and nursery habitats, seasonal feeding areas, refuge from predators and competitors, shelter from extreme weather and travel corridors. Many stream species, including fish, snails, crayfish, insects and salamanders, are now in danger of extinction as a result of human actions. A few dozen species are already listed under the U. Endangered Species Act; hundreds of others are rare enough to be considered for listing. Streams that flow for only part of the year provide crucial habitat, food and water for plants and wildlife. In the arid West, vegetation and wildlife near these streams â€” which often have water flowing just below the surface even when the surface looks dry â€” is significantly higher than in the surrounding uplands. Protecting streams is important for the economy, particularly for their key role in fishing, hunting, agriculture, and recreation. Healthy streams and headwaters support many industries that are dependent on clean water. Industries use fresh water to process, wash, cool, dilute, and manufacture products. Manufacturing used more than 6. Farmers depend on clean water to irrigate farm crops across the country. Irrigation accounts for 37 percent of all surface freshwater withdrawals in the U. You will need Adobe Reader to view some of the files on this page.

Chapter 4 : Rivers & Streams | Rivers & Streams | US EPA

There are 72 streams in the State of Colorado that are named Willow Creek, 71 streams named Spring Creek, 53 streams named Cottonwood Creek, 49 streams named Bear Creek, 49 streams named Beaver Creek, 48 streams named Dry Creek, 33 steams named Rock Creek, 33 streams named Sand Creek, and 32 steams named Mill Creek.

Streams A stream is a body of water that carries rock particles and dissolved ions and flows down slope along a clearly defined path, called a channel. Thus, streams may vary in width from a few centimeters to several tens of kilometers. Streams are important for several reasons: Streams carry most of the water that goes from the land to the sea, and thus are an important part of the water cycle. Streams carry billions of tons of sediment to lower elevations, and thus are one of the main transporting mediums in the production of sedimentary rocks. Streams carry dissolved ions, the products of chemical weathering, into the oceans and thus make the sea salty. Streams are a major part of the erosional process, working in conjunction with weathering and mass wasting. Much of the surface landscape is controlled by stream erosion, evident to anyone looking out of an airplane window. Most population centers are located next to streams. When stream channels fill with water the excess flows onto the the land as a flood. Floods are a common natural disaster. The objectives for this discussion are as follows: How do drainage systems develop and what do they tell us about the geology of an area? How do stream systems operate? How do streams erode the landscape? What kinds of depositional features result from streams? How do drainage systems evolve? What causes flooding and how can we reduce the damage from floods? Drainage Systems Development of Streams - Steamflow begins when water is added to the surface from rainfall, melting snow,and groundwater. Drainage systems develop in such a way as to efficiently move water off the land. Streamflow begins as moving sheetwash which is a thin surface layer of water. The water moves down the steepest slope and starts to erode the surface by creating small rill channels. As the rills coalesce, deepen, and downcut into channels larger channels form. Rapid erosion lengthens the channel upslope in a process called headward erosion. Over time, nearby channels merge with smaller tributaries joining a larger trunk stream. The linked channels become what is known as a drainage network. With continued erosion of the channels, drainage networks change over time. Drainage Patterns - Drainages tend to develop along zones where rock type and structure are most easily eroded. Thus various types of drainage patterns develop in a region and these drainage patterns reflect the structure of the rock. Dendritic drainage patterns are most common. They develop on a land surface where the underlying rock is of uniform resistance to erosion. Radial drainage patterns develop surrounding areas of high topography where elevation drops from a central high area to surrounding low areas. Rectangular drainage patterns develop where linear zones of weakness, such as joints or faults cause the streams to cut down along the weak areas in the rock. Trellis drainage patterns develop where registrant rocks break up the landscape see figure Drainage Basins - Each stream in a drainage system drains a certain area, called a drainage basin also called a catchment or a watershed. In a single drainage basin, all water falling in the basin drains into the same stream. A drainage divide separates each drainage basin from other drainage basins. Continental Divides - Continents can be divided into large drainage basins that empty into different ocean basins. North America can be divided into several basins west of the Rocky Mountains that empty into the Pacific Ocean. Lines separating these major drainage basins are termed Continental Divides. Such divides usually run along high mountain crests that formed recently enough that they have not been eroded. Thus major continental divides and the drainage patterns in the major basins reflect the recent geologic history of the continents. Permanent Streams - Streams that flow all year are called permanent streams. Their surface is at or below the water table. They occur in humid or temperate climates where there is sufficient rainfall and low evaporation rates. Water levels rise and fall with the seasons, depending on the discharge. Ephemeral Streams - Streams that only occasionally have water flowing are called ephemeral streams or dry washes. They are above the water table and occur in dry climates with low amounts of rainfall and high evaporation rates. They flow mostly during rare flash floods. Geometry and Dynamics of Stream Channels Discharge The stream channel is the conduit for water being carried by the stream. The stream can continually adjust its channel shape and path as the amount of water

passing through the channel changes. The volume of water passing any point on a stream is called the discharge. As the amount of water in a stream increases, the stream must adjust its velocity and cross sectional area in order to form a balance. Discharge increases as more water is added through rainfall, tributary streams, or from groundwater seeping into the stream. As discharge increases, generally width, depth, and velocity of the stream also increase. Friction slows water along channel edges. Friction is greater in wider, shallower streams and less in narrower, deeper streams. In straight channels, highest velocity is in the center. In curved channels,The maximum velocity traces the outside curve where the channel is preferentially scoured and deepened. On the inside of the curve were the velocity is lower, deposition of sediment occurs. The deepest part of the channel is called the thalweg, which meanders with the curve the of the stream. Flow around curves follows a spiral path. Stream flow can be either laminar, in which all water molecules travel along similar parallel paths, or turbulent, in which individual particles take irregular paths. Stream flow is characteristically turbulent. This is chaotic and erratic, with abundant mixing, swirling eddies, and sometimes high velocity. Turbulence is caused by flow obstructions and shear in the water. Turbulent eddies scour the channel bed, and can keep sediment in suspension longer than laminar flow and thus aids in erosion of the stream bottom. Cross Sectional Shape Cross-sectional shape varies with position in the stream, and discharge. The deepest part of channel occurs where the stream velocity is the highest. Both width and depth increase downstream because discharge increases downstream. As discharge increases the cross sectional shape will change, with the stream becoming deeper and wider. Erosion by Streams Streams erode because they have the ability to pick up rock fragments and transport them to a new location. The size of the fragments that can be transported depends on the velocity of the stream and whether the flow is laminar or turbulent. Turbulent flow can keep fragments in suspension longer than laminar flow. Streams can also erode by undercutting their banks resulting in mass-wasting processes like slumps or slides. When the undercut material falls into the stream, the fragments can be transported away by the stream. Streams can cut deeper into their channels if the region is uplifted or if there is a local change in base level. As they cut deeper into their channels the stream removes the material that once made up the channel bottom and sides. Although slow, as rocks move along the stream bottom and collide with one another, abrasion of the rocks occurs, making smaller fragments that can then be transported by the stream. Finally, because some rocks and minerals are easily dissolved in water, dissolution also occurs, resulting in dissolved ions being transported by the stream. Stream load is divided into three categories. Suspended Load - particles that are carried along with the water in the main part of the streams. The size of these particles depends on their density and the velocity of the stream. Higher velocity currents in the stream can carry larger and denser particles. Bed Load - coarser and denser particles that remain on the bed of the stream most of the time but move by a process of saltation jumping as a result of collisions between particles, and turbulent eddies. Note that sediment can move between bed load and suspended load as the velocity of the stream changes. Dissolved Load - ions that have been introduced into the water by chemical weathering of rocks. This load is invisible because the ions are dissolved in the water. These ions are eventually carried to the oceans and give the oceans their salty character. The maximum size of particles that can be carried as suspended load by the stream is called stream competence. The maximum load carried by the stream is called stream capacity. Both competence and capacity increase with increasing discharge. At high discharge boulder and cobble size material can move with the stream and are therefore transported. At low discharge the larger fragments become stranded and only the smaller, sand, silt, and clay sized fragments move. When flow velocity decreases the competence is reduced and sediment drops out. Sediment grain sizes are sorted by the water. Sands are removed from gravels; muds from both. Gravels settle in channels. Sands drop out in near channel environments.

Chapter 5 : Streams and Drainage Systems

Small streams (such as headwater streams) and their associated wetlands are equally important. These streams, including streams and wetlands that do not have water year round, play a key role in providing critical habitat, food and shelter for waterfowl, fish, and other aquatic species.

Stream Order The concept of stream order assigns numerical designations that indicate where in a watershed drainage system a certain stream segment lies. The smallest flows from upland areas, as well as springs and seep sources that maintain defined stream beds throughout the year are first-order streams. Where two first-order streams combine, a second-order stream is designated; and two second-order streams join creating a third-order stream. The hypothetical stream system at left has been labeled to indicate the stream order of the various segments. At Reynoldsdale, Bobs Creek joins Dunning Creek, itself a 4th order stream at this point, to create a 5th order stream from there downstream. Typically, 3rd and 4th order streams comprise the majority of our quality trout streams. The Raystown Branch is a sixth-order stream which joins with others to form the 7th order Juniata River. The Susquehanna River, the longest river along the East Coast, is an 8th order stream. There is but one 10th order river in the United States, the Mississippi. The River Continuum Concept Streams are continuous gradients where downstream processes are linked to upstream events, producing a predictable change in the assemblage of organisms along the stream sysytem. The River Continuum Concept, developed by Dr. Robin Vannote and others at Stroud Water Research Center in the s, is a model for describing and understanding characteristics of a watercourse as it flows from the headwaters to the mouth. Streams are open dynamics systems, interacting with the land, through changing influences of soil chemistry, vegetative cover, and topography. Changes in stream slope effect stream depth and width, water velocity, and streambed composition. Soil chemistry has significant effects on the chemical composition of small headwater streams due to the greater proportion of the flow being in contact with the stream banks and bottom in these smaller waters. The amount and type of vegetation along the stream, as well as throughout the riparian zone , influences water temperature, soil stability, and community of aquatic plants and animals. The River Continuum Concept is a useful tool in environmental assessments of stream corridors but has limitations when applying to certain stream types, especially those away from the eastern woodland streams where it was developed. For example , many western streams begin as headwaters in rather barren, mountainous terrain devoid of the leafy and woody energy input typical of our eastern waters. Such headwaters are naturally low in mineral and nutrient content and will have low diversity and density of aquatic organisms. Limestone spring creeks are another special case. Those stream sections that arise from valley floors, as the smallest, unbranched tributaries of the system, would typically be labeled as 1st order streams. In some places these "1st order" creeks arise from a spring as rather large flows, more typical of maybe a 3rd order stream. The characteristics we expect to find in low-order headwater streams, described below, are not features usually found in low-order spring streams in limestone valleys. Freestone streams are more common than limestone streams but in some areas of Pennsylvania, limestone is prevalent, particularly in valleys. Headwaters are streams of first, second, and third order and in natural condition are usually narrow with thick vegetation along the banks. Heavy shading reduces the photosynthetic potential for aquatic plants and most organic material enters the stream as fallen leaves, twigs, or branches. Aquatic macroinvertebrates that process this organic material by breaking it into smaller bits for consumption are known as shredders and include many mayfly and stonefly species. Collector type organisms that utilize coarse particulate organic material may also be well-represented. These streams are often home to the coldwater fish species such as sculpins, black-nose dace, longnose dace, and brook trout. Click here for a chart of stream organism feeding group descriptions. First and second order streams are typically higher gradient streams. First order streams from headlands usually flow rather straight, directly down the slope with little meandering , as a series small pools and cascades. As slope decreases, and the stream widens with additional tributary flows, third order streams will have more of a riffle-pool character with some meandering. The middle reaches are comprised of 4th through 6th order streams. The streams are wider in these sections so even with natural undisturbed riparian

vegetation, more sunlight gets to the water and the larger rocks and logs can support films of algae and bacteria, known as periphyton. Production through photosynthesis exceeds consumption by respiration. A smaller portion of the organic material is composed of leaves and such and more fine organic particles are part of the drift. Collector and grazer organisms make up a significant part of the aquatic invertebrate community, with an increase in number and diversity of caddisflies and additional populations of fly larvae and certain mayfly species. Middle reach streams can host coldwater fish species such as trout if well-shaded or fed by significant spring sources but are likely to also be home to coolwater species such as smallmouth bass, fallfish, and suckers, or even warmwater species such as largemouth bass and sunfish. Middle reach streams are much more likely than headwater streams to be impacted by both point and non-point sources of pollution. Residential, urban, and agricultural landscapes are likely to be features of these watershed areas with run-off impacting aquatic community health and, possibly, patterns of flood and high water damage. These middle reach streams are more likely to be recreational areas for a broader variety of uses, including fishing, small watercraft boating, and swimming. Lower reaches are of 7th order and greater. These large rivers drain areas of thousands to more than a million square miles Mississippi River. Fine particulate organic material FPOM , in the drift from upstream segments, remains a feature and an important energy input. Plankton organisms are prevalent and contribute to increased turbidity that limits photosynthesis by rooted plants in deeper water sections. The large rivers of the lower reaches are important transportation resources and often support commercial fisheries as well as sport fishing and recreational boating.

Chapter 6 : List of rivers of Colorado - Wikipedia

Stream channels have four different channel patterns, the shapes they show when viewed from above or on a calendrierdelascience.com curviness of a channel is measured by its sinuosity, which is the ratio between the length of the thalweg and the distance downstream along the stream valley.

If a river network is the circulatory system of the landscape, headwater streams are the small capillaries that fan into the larger veins and arteries. Headwater streams can start as small forested wetlands, beaver impoundments, or cascading mountain streams, varying according to the topography and geology of the surrounding landscape. Topography and geology influence the speed of water flow, the river bottom material, the plants growing around the streams, whether the stream sometimes or always contains water, and which wildlife species live in or use the stream. Types of Headwater Streams Montain Streams Mountain streams tend to have large rocks, steep grades, and flash floods. Stream salamanders, brook trout, and certain aquatic invertebrates are well adapted to these dynamic habitats. Valley Streams These streams flow through broad, flat valleys. They tend to be slow-moving and surrounded by wetland plants and shrubs. Beaver activity creates a patchwork of wetlands around the streams, including shrub swamps, wet meadows, and ponds. Wildlife are drawn to these areas including ducks, geese, turtles, amphibians, and fish. Spring-fed Brooks These small streams flow through glacially deposited sand and gravel and originate from natural springs. Their year-round supply of cool water provides a stable environment for brook trout, particularly during hot weather. Warm Rocky Streams The riffles and pools of these rocky brooks are reminiscent of mountain or brook-fed streams, but they are too warm to support cold-water fish. They often flow between beaver ponds in hilly terrain, serving as corridors and hunting grounds for mink, northern water snake, and other wildlife. Why are Headwater Streams Important? Many headwater streams are scoured by ice in winter, flood in the spring and fall, and are dry in the summer. Wide variations in water flow and temperature make life difficult in headwater streams. A unique group of plants, amphibians, and insects are adapted to survive in these difficult conditions. These small streams also have a large impact on the health and integrity â€" both for water quality and wildlife â€" of major rivers downstream. Rich Habitats Headwater streams are places where forest and stream habitats converge, leading to high densities of insects around the streams. Stoneflies see drawing at right , mayflies, and dragonflies, whose larvae live underwater, are found alongside upland insects such as moths, beetles, and grasshoppers. This concentration of food attracts predators from the surrounding forest including northern long-eared bat, red-shouldered hawk, raccoon and ribbon snake. Small streams also help remove excess nutrients, such as nitrogen, from a watershed, helping ensure cleaner water downstream. Wood in the small, upriver streams traps leaves and other nitrogen sources, preventing them from accumulating in the lower reaches of the river. Eastern brook trout see at left may live year-round in tiny streams, feeding on both upland and aquatic insects. They may also travel over 20 miles from larger rivers to headwater streams during the fall spawning season or, if the streams have enough water, to find a cool refuge during the summer months. Refuge streams Many species take advantage of the relative safety of headwater streams for reproduction. Green frogs and spring and two-lined salamanders lay their eggs in intermittent, fish-less streams. Common white suckers and rainbow smelt, two fish species, migrate every year into small streams to spawn. Headwater streams also can act as travel corridors for wildlife such as mink, otter, beaver, forest birds, and forest-dwelling bats. The isolation and harsh conditions of headwater streams can also provide native fish with a refuge from introduced species. Natives such as banded sunfish, redfin pickerel, and redbelly dace can thrive in headwater streams, but are over-run by introduced fish in the more stable and often degraded habitats of larger rivers and lakes. Their small size makes them vulnerable to human impacts, particularly those caused by human development. Use of groundwater by residential or commercial wells can cause streams to dry up. Roads, driveways, and poorly designed or placed culverts fragment streams like the "perched" culvert in the photo at right , causing sedimentation, and isolate wildlife populations. Runoff from paved surfaces can introduce pollutants, increase flooding, and cause spikes in stream temperature. Climate Vulnerabilities of Headwater Streams Any increase in the intensity and frequency of flooding events will cause habitat damage

and direct mortality to aquatic species, in particular freshwater mussels. This impact would be disproportionately larger in developed watersheds where human infrastructure exacerbates flood damage and limits recolonization. Higher temperatures will cause the distribution of species dependent on cold water to shift north and to higher elevations. Groundwater resources will be stressed by an increase in evapotranspiration due to climate change. This increase, in combination with water withdrawal for human consumption, may lower summer base flows in some watersheds, causing many perennial streams to become intermittent. Be on the lookout for these species and follow stewardship guidelines to help maintain or enhance headwater stream habitats.

Chapter 7 : Glossary of River Terms - calendrierdelascience.com

Describe some of the landforms associated with the headwaters of mountain streams, including rapids and waterfalls Headwaters of mountain streams: mountain streams begin in bedrock-dominated areas with relatively high relief and high elevation.

At TU we are incredibly greatful for your support, help and concern for our environment. No additional volunteers are need based on our current August 11, schedule, but keep checking this space. Please let a Board Member know if you have ideas for future TU projects. I hope you are able to join us this year because each one of you brings a different but thought-provoking perspective to the program. Thank you for your time. The overall goal is to create a metapopulation of greenback cutthroat trout across approximately 37 miles of stream habitat and acres of lake habitat in northcentral Colorado. To achieve this goal, 54 miles of connected streams will need to be treated to recover the 37 miles of greenback habitat. Implementation is starting this year in Grand County and restoration work will be phased over 15 years, including designing, enhancing or constructing two permanent and three temporary non-native fish barriers; removing non-native fish such and brook and brown trout that compete for food and habitat; and stocking native lineage fish, protecting the habitat until isolated native populations have established. Work is beginning with surveys and the construction of a fish barrier in Grand Ditch, and the application of piscicide in Parika Lake and Baker Gulch to remove non-native species. Colorado Trout Unlimited is serving as the trustee. Come a little early and be sure to order snacks and beverages. The presentation by U. We are experiencing one of the hottest, driest years in decades and with that we are experiencing stream temperatures that are too hot for the survival of trout. Trout are a cold water fish because cold water holds more dissolved oxygen which trout require. At stream temperature above 65 degrees F, enough dissolved oxygen can escape into the atmosphere to stress trout. At temperatures of 74 degrees F. On the Fraser River the afternoon stream temperatures are reaching 74 degrees F and on tributaries to the Fraser River, afternoon stream temperatures are reaching Above 65 degrees F trout are stressed. The Headwaters Chapter of Trout Unlimited is asking all catch and release fishers to fish with a thermometer and stop fishing when stream temperatures reach 65 degrees F. Until you can obtain a thermometer you should use the 1: Based on recent stream temperature trends, our streams are reaching temperatures that stress trout on a daily basis by 1: Give the fish a break. Fish streams in the morning and move to lakes in the afternoon. Treat the trout well and they will be around to enjoy and to create a healthy fishing economy for years to come.

Chapter 8 : Colorado River Headwaters TU > Events

List the hydrosphere's major reservoirs and describe the different paths that water may take through the hydrologic cycle Oceans, glaciers, rivers, lakes, air, soil, and living tissue; Water evaporates from the ocean, plants, and soil; moves through the atmosphere, and eventually falls as precipitation.

The tenses, too, are present, as if the main features of the country remained unchanged: This has made many suppose that the site of Paradise was in the Persian Gulf, in a region now submerged; and the Babylonian legends actually place it there, at Eridu, at the junction of the Tigris and Euphrates. The two other rivers they suppose to have been the Indus and the Nile, represented by the two coasts of the Persian Gulf. Rawlinson suggests the Babylonian province of Gan-duniyas, where four rivers may be found; but in neither case could the ark have floated against the current of the flood up to the highlands of Armenia. We must add that many authors of note have regarded the whole as symbolical, among whom is the famous Syriac writer, Bar-Hebraeus, who regards it as a description of the human body. Pulpit Commentary Verse And a river literally, a flowing water, applicable to large oceanic floods - Job To conclude from this that the river had its source within the limits of the garden is to infer more than the premises will warrant. Nothing more is implied in the language than that a great watercourse proceeded through the district of Eden, and served to irrigate the soil. Probably it intersected the garden, thus occasioning its remarkable fecundity and beauty. And from thence i. Roshim, from rosh, that which is highest; either principal waters, arms or branches Taylor Lewis, Alford , or beginnings of rivers, indicating the sources of the streams Gesenius, Keil, Macdonald, Murphy. If the second of these interpretations be adopted, Eden must be looked for in a spot where some great flowing water is subdivided into four separate streams; if the former be regarded as the proper exegesis, then any great river which is first formed by the junction of two streams, and afterwards disperses its waters in two different directions, will meet the requirements of the case. Matthew Henry Commentary 2: The better we take up with plain things, and the less we seek things to gratify pride and luxury, the nearer we approach to innocency. Nature is content with a little, and that which is most natural; grace with less; but lust craves every thing, and is content with nothing. No delights can be satisfying to the soul, but those which God himself has provided and appointed for it. Eden signifies delight and pleasure. Wherever it was, it had all desirable conveniences, without any inconvenience, though no other house or garden on earth ever was so. It was adorned with every tree pleasant to the sight, and enriched with every tree that yielded fruit grateful to the taste and good for food. When Providence puts us in a place of plenty and pleasure, we ought to serve God with gladness of heart in the good things he gives us. Eden had two trees peculiar to itself. There was the tree of life in the midst of the garden. Of this man might eat and live. Christ is now to us the Tree of life, Re 2: There was the tree of the knowledge of good and evil, so called because there was a positive revelation of the will of God about this tree, so that by it man might know moral good and evil. It is good not to eat of this tree. It is evil to eat of this tree. In these two trees God set before Adam good and evil, the blessing and the curse.

Chapter 9 : Watersheds 2 - Stream Order

Despite the Objibwe Bands opposition, Congress approved $75, in for the Corps to begin constructing Winnibigoshish Lake Dam via the Rivers and Harbors Act.