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| --- | --- | --- |
| ABIOTIC/ BIOTIC FEATURE |  IMPORTANT POINTS | EFFECT / ADAPTATIONS |
| WATER FLOW | * Called velocity
* Flattened and protected from high flows within thin boundary layer where friction results in a zone of relatively low flow immediately adjacent to rock surface.
* High flow- more oxygen
 | * Need to be able ‘to hang on’ or they will be swept away.
* Streamlined or flattened body (less friction) or special hooks or suction attachments.
* Have an extremely flattened side profile that allows them to inhabit stone surfaces in fast water flow.
* Don’ move v much in water or move slowly.
* Build houses.
* Often have specialized front legs and mouthparts.
* Some have tusks for burrowing.
 |
| CONDUCTIVITYuS/cm | * Healthy stream 30- 500us/cm
* Die above 1500us/cm
 | * Aquatic plants and animals need natural salts contained in water for GROWTH.
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| pH | * pH of freshwater usually lies in range 6.5-8.2
* Animals and plants adapted to certain ranges of PH.
* Below 6.5 aquatic insects levels drop.
 | * Extremely high or low pH values will lead to the death of aquatic life.
 |
| TURBITYNTU | * Is the result of suspended solids and is a relative measure of the clarity of water.
* Greater the turbidity, the murkier the water.
* Increased turbidity reduces the transmission of light.
 | * Blocks gill filaments.
* Suffocates macro invertebrates.
* Fine particulate materials can clog or damage sensitive gill structures.
* Decreases their resistance to disease, prevents proper egg and larval development, can interfere with particulate feeding activities / less light means decrease in macrophyte growth which affects animals feeding on it.
 |
| SUBSTRATE | * Good fish and invertebrate habitat requires a rough bottom with rocks, holes and submerged logs.
 | * Some burrowers have tusks to burrow.
* Mayfly legs have flattened and developed femurs
* Mayfly hooks on appendages.
* Caddisfly hooks on end to attach to rocks.
* Mayfly live on the surfaces of rock on the riverbed, spending most of the time on the lower surfaces out of the main current and only moving to outer surfaces in low light. Helps protect from predators.
 |
| PREDATORS | * Fish, Stonefly and Dobsonfly Nymph
* Occasionally fish will forage for them
 | * Live under rocks or gaps between stones.
* Colour – camouflage. Usually camouflaged against their background.
* Hard case or exoskeleton - difficult for predator to eat.
* Short bursts of movement – **Watch mayflies swim (Describe)**
* **In some species the gills may also be used as swimming paddles.**
* Gills on abdomen can send water off at right angles to the body – this is used to mislead predators. Since the gills send water away from their bodies at several points, the nymphs are not as easy to track <http://www.ucmp.berkeley.edu/arthropoda/uniramia/ephemeroptera.html>
 |
| TEMP | * Many of the physical, biological and chemical characteristics of a river are directly affected by temperature.
* Warmer water cannot hold as much oxygen.
* Riparian vegetation keeps water cooler.
* Warmer temp – more plant growth.
* Temps over 21 C unacceptable
 | * Warmer temps stress many macro invertebrates.
* Most aquatic organisms have a fairly narrow range in which they are able to effectively function, so lowering the temp may also affect the maintenance of reproductive systems.
 |
| DODissolved Oxygen | * A level below 3mg/L is stressful to most vertebrates and other forms of aquatic life.
* Measure of amount of oxygen dissolved in water.
* Windy day can agitate water and increase dissolved oxygen.
* Rocky outcrops in stream can increase turbulence which increases DO.
* Colder water holds more DO.
* Shallow water warms up quicker and has less DO due to increased temp.
 | * Needed for respiration
* A biological gill is an organ that allows dissolved dissolved oxygen from the water to pass ( by diffusion) into an organisms body.
* Disc shaped gills on side of abdomen ( mayfly )
* These gills beat to control the flow of water through the body, which also controls the amountof oxygen and salt that flows through the body.
* In insects, gills are usually outgrowths of the tracheal system. They are covered by a thin layer of cuticle that is permeable to both oxygen and CO2
* In mayflies and damselfly nymphs the gills are leaf-like in shape and located on the sides or rear of the abdomen
* Stoneflies and caddisflies have filamentous gills on the thorax or abdomen.
* In many species of mayfly the gills are moveable and may be vibrated in order to increase the amount of water moving over them
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| FOOD | * Algae on rocks
* Periphyton
* Macrophyton
* Detritous
 | * Shredders
* Scrappers
* Mouthparts
 |
| NUTRIENTS | * Nitrates should be below 1mg/L
* Phosphates should be below 0.1 mg/L
* Can leech into waterways from fertilisers or consequences of dairy farming
 | * Increases plant growth – algal blooms – increased bacteria which decomposers dead plants and algae.
* Bacteria use up the dissolved oxygen
* Other animals die.
* EUTROPHICATION
 |
| MOVEMENT | * To obtain food
* To move to more favourable conditions
* To escape from predators
 | * Describe movement of Mayfly and Caddisfly.
* Observe carefully in sample trays.
 |

OTHER IMPT NOTES:

1. Species name: ‘ A life-history response by the mayfly Deleatidium ( Ephemeroptera: Leptophlebiidae ) from a permanent – flowing and intermittent flowing reach of the Selwyn River, New Zealand, to failing water conditions was examined using field populations and laboratory experiments in Jan 2006.
2. How to Use a Kick net:
* Place the net downstream from your sample area ( so that the specimens get washed into the net by the flow of water, disturb the substrate, turning over rocks and sediment and take what you have collected to the white sample bucket with stream water in.
* Sweep net used in areas where there is a lot of vegetation on side of stream.
1. Transect :
* A transect is a line placed across a community of organisms.
* Transects are usually carried out to provide information on the distribution of species in the community.
* This is of particular value when environmental factors change over the sampled distance.
* Stretch a string between 2 markers. – across the stream.
* Calculate the distance between quadrat points. You should start measuring from one bank of the stream to the other bank. You should divide the transect evenly across the stream so that you take 4 quadrat samples.
* The sampling points along the transect can be used for the siting of the quadrats.
1. Quadrat.
* Explain how you worked out quadrat size.
* Calculate Quadrat size. Is it 50cm2
1. Profile Diagram
* Include GPS reading re: location.
* Include Time, Date, weather condition.
1. Site Map.
* See examples.
1. Get names of equipment from Waterwatch. List:

REPORT LAYOUT:

1. Title Page.
2. INTRODUCTION
3. AIM
4. METHOD
5. RESULTS –Table

 -Kite Diagrams

1. CONCLUSION – Statement only.
2. DISCUSSION.
* using measurements/ readings of Abiotic factors from table of results.
1. EVALUATION
* Reliability
* Validity

COMPARE CONTRAST VOCABULARY.

|  |  |
| --- | --- |
| COMPARE - to liken, draw a parallel between. | CONTRAST – to show unlikeness or difference |
| As well as | However |
| Also | Different than |
| Too | But |
| Like | On the other hand |
| Similarly | While  |
| Similar to | Although |
| Both | Less than |
| Have in common | Yet |
| The same as | Despite |
| Likewise | Unlike |
| Alike | Compared to |
| In the same way | Instead |
| Again  | Whereas |
| Also | Never the less  |
|  | In contrast to |
|  | Conversely |
|  | Yet |

EXTRA POINTS.

1. OXYGEN.
* Oxygen levels in the water drop as a result of a rise in organic decomposition. After some time the oxygen levels increase as the larger plants in the stream photosynthesis.
1. NITROGEN.
* Aquatic organisms can utilize both dissolved and some particulate forms of nitrogen.
* The delicate balance of an ecosystem can be upset when nitrogen concentrations become too high. Resulting problems can include algal blooms, excessive growth of aquatic plants and loss of species diversity.
* Decomposition of plant material and other organic matter is the source of much of the nitrogen.
1. CONDUCTIVITY.
* Conductivity is simply a measure of the amount of salt dissolved in the water.
* Needed by plants and animals for growth.
* Conductivity normally lowest during high flows and increases as flow decreases.
* If conductivity increases above the normal range the natural community will become stressed.
* Conductivity of a healthy stream is 30-500µs/cm. Saltwater 30,000 – 50,000µs/cm.
1. TEMPERATURE.
* Warmer water cannot hold as much oxygen as cooler water.
* Temperature influences the rate of photosynthesis by algae and large water plants.
* Warm water tends to be more susceptible to blooms and therefore eutrophication.
* Warmer temps stress organisms.
* Most aquatic organisms have a narrow temperature range in which they are able to effectively function.
1. TURBIDITY.
* Is the result of suspended solids and is a relative measure of the clarity of water: the greater the turbidity, the murkier the water.
* Increase in turbidity reduces the transmission of light.
* High turbidity increases water temp.