High Creek Fen Field Work Day

Science Fieldwork/Data Collection

Team Member Names:

1._____

2._____

3._____

4._____

Test Kit # _____

Objectives:

1. I can **record data accurately**.
2. I **understand that guidelines must be followed** while collecting samples and running tests.
3. I **understand that one team member will record the data, and the team will collaborate on answering the questions.** The data will be entered into the World Water Monitoring Day data website by a CUSP staff member.
4. Benthic macroinvertebrate data will be entered into a separate data sheet for the use of monitoring the impacts and changes in the High Creek Fen.

High Creek Fen

A fen is a type of wet meadow or marshland fed primarily by groundwater that is constantly flowing to the surface. The High Creek Fen is an astonishing vestige (remnant, trace) of the last Ice Age. The preserve is the most ecologically diverse (assortment), floristically (plant life) rich fen known to exist in the Southern Rocky Mountains. Indeed, it contains more rare plant species than any other wetland known in Colorado. There are only two or three other fens like this in the United States. In fact there are only a few in the whole world. *From the Nature Conservancy*

High Creek Fen is a calcareous (rich in calcium carbonate) spring-fed wetland supporting a large number of rare plants that are calcareophilous (calcium-loving) and/or arctic disjuncts. Arctic disjuncts are isolated populations of species whose normal range is now much further north. The calcareous conditions at High Creek are due to the fact that the wetland's springs seep through limestone-rich glacial outwash from the high elevations of the Mosquito Range to the west. The wetland community at High Creek Fen is a relict of the much colder and wetter conditions that prevailed in South Park during the last ice age. Greenland primrose, silver willow, pale blue-eyed grass, slender cotton grass, Porter feathergrass, few-seeded bog sedge, low blueberry willow, and alpine groundsel are all found at High Creek Fen. *From the Environmental Protection agency.*

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Data Collection Sheet

Date _____ Time_____

Latitude_____ Longitude_____

Site Name_____

Site Description_____

Site Near to What Landmark_____

Site Country_____

Site State_____

Watershed Name_____

Waterbody Name_____

Waterbody Type Description_____

Site Recent Precipitation_____

Surrounding Land Use_____

Site Terrain Elevation _____

Test	Start Time	End Time	Result	Notes
air temperature				
Turbidity=clarity				
water temperature				
pH=acidity				
DO=dissolved oxygen				
% saturation				

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Macro invertebrate sampling:

Sampling will consist of 20 net 'jabs'.
In order to reduce our impact on the fen, only one or two people will actually 'jab' with the nets. A second person will stand outside the sample area holding a bucket and spray bottle. After every few jabs, the sampler should hand the net to the second person, who can then rinse the contents of the net into the bucket. We do not want to kill the invertebrates by leaving them out of the water. Count how many 'jabs' and record it on the data sheet.
The rest of the team will set up the sorting area.
There are many different stream habitats. We will focus on two types at the fen.

Vegetated bank margins. This habitat consists of overhanging bank vegetation and submerged root mats attached to banks. The bank margins may also contain submerged, decomposing leaf packs trapped in root wads or lining the steam banks. This is generally a highly productive habitat in a muddy bottom stream, and it is often the most abundant type of habitat.
Silt/sand/gravel substrate. This habitat includes sandy, silty, or muddy stream bottoms; rocks along the steam bottom; and/ or wetted gravel bars. This habitat may also contain algae-covered rocks. This is the least productive of the stream habitats and it is always present in one form or another.

Sampling protocol: Sampling is always started at the farthest reach downstream.
Sample *vegetated bank margins* by jabbing vigorously with an upward motion, brushing the net against vegetation and roots along the bank. The entire jab motion should occur underwater.
Sample *silt/sand/gravel substrate,* by placing the net with net edge against the steam bottom and push it forward about a foot (in an upstream motion) to dislodge the first few inches of silt, sand, gravel or rocks. To avoid gathering a net full of mud, periodically sweep the mesh bottom of the net back and forth in the water, making sure water does not run over the top of the net. This allows fine silt to rinse out of the net.

Sorting:

Pour the contents of the bucket (water, organisms and organic material) into a large shallow white pan and fill the ice cube tray with clean stream water. Using tweezers, or a spoon, pick through the leaf litter and organic material looking for anything that swims, crawls, or seems to be hiding in a shell (like a snail). Look carefully; many of these creatures are quite small and fast-swimming. Sort similar organisms into the plastic ice cube tray.

Identify Macroinvertebrates

Identify the collected macroinvertebrates. Using the hand lens or magnifying glass and the aquatic organism identification key carefully observe the collected macroinvertebrates. Refine your initial sort so that like individuals are placed in the same sections(s) of the ice cube tray. If you cannot identify the specimen, draw a picture and take accurate notes [the fen has several rare species of aquatic beetles].
On your field data sheet note the number of individuals of each type of organism you have identified.
Once you are done identifying, return all organisms back to the water.

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Data Documentation

Number of jabs taken per sampling _____

Vegetative band margin _____

Silt/sand/gravel substrate _____

Identify the macroinvertebrates in your sample and assign them letter codes based on their abundance.
R (rare) = if 1-9 organisms are found in the sample
C (common) = if 10-99 organisms are found
D (dominant) = if 100 of more of the organisms are found.

Group 1 sensitive	**Group 2 somewhat sensitive**	**Group 3 tolerant**
○ water penny larvae	○ beetle larvae	○ aquatic worms
○ pyralid caterpillar	○ clams	○ blackfly larvae
○ mayfly nymphs	○ crane fly larvae	○ leeches
○ gilled snails	○ crayfish	○ midge larvae
○ riffle beetle adult	○ damselfly nymphs	○ snails
○ stonefly nymphs	○ scuds	○
○ caddisfly larvae	○ sowbugs	○
○ Susan's purse-making caddisfly	○ dragonfly larvae	○
○	○ alderfly larvae	○
○	○	○
○	○	○

To calculate the index value, add the number of letters found in the three groups above and multiply by the indicated weighted value.

Group 1
___ (# of R's) x 5.0= ____
___ (# of C's) x 5.6=___
___ (# of D's) x 5.3=____

Sum (add all three lines) _____

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Group 2

__ (#of R's) x 3.2 =____
__ (#of C's) x 3.4 =____
__ (#of D's) x 3.0 =____

Sum add all three lines_____

Group 3

__ (# of R's) x 1.2 =_____
__ (# of C's) x 1.1=_____
__ (# of D's) x 1.0=_____

Sum add all three lines_____

To calculate the water quality score for you sample site, add together the sums. The sum of these values equals the water quality score

Water Quality Score_____

Compare the score to the following number ranges to determine the quality of your stream site. Circle your score.

Good >40

Fair 20-40

Poor <20

Notes:

Weather now:

- Storm (heavy rain)
- Rain (steady rain)
- Showers (intermittent rain)
- Overcast
- Sunny

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Conclusions from High Creek Fen Water Testing

Part 1

Would you drink the water from the fen?

What will you remember most about today's fieldwork?

What are the important things you learned today?

How has this experience changed the way you think about protecting water?

What new terms did you learn today?

Part 2

Please read the article below and answer the questions that follow.

Montane Wetlands

Beaver ponds, small glacial ponds, wet meadows and fens (bog-like areas) can be found in the mountain valleys of the Rockies. Many mountain lakes have wetlands along their shorelines. Streams in mountain valleys generally have narrow flood plains, and wetlands occur as thin bands adjacent to their banks. Small pools formed by snowmelt in the alpine tundra have willow wetlands that attract elk in the summer months and can be seen in Rocky Mountain National Park.

Fens are mountain wetlands that support a unique ecology of rare plants not found in other types of wetlands. One species of bulrush only grows in Alaska, Yellowstone, western Canada and in the High Creek Fen of South Park, Colorado. Fens produce peat that accumulates at the rate of 8 to 11 inches per thousand years, making peatlands a repository of 10,000 years of post-glacial history. Peat is not good for garden soils due to low nutrient content. When added to garden soil, it hinders aeration and drainage. Peat produced by fens is not a renewable resource.

Mountain fens act as natural filters cleaning ground and surface water. The High Creek Fen filters out high concentrations of heavy metals. Fens also act as sponges by absorbing heavy

precipitation and slowly releasing it downstream, which minimizes erosion and recharges groundwater systems. Fens can be seen in South Park, and in Rocky Mountain National Park (RMNP). The town of Estes Park, Colorado, was hit by floodwaters from the Lawn Lake dam failure in 1982. The Horseshoe Park wetlands in RMNP, being similar to fens, absorbed and slowed down the flood crest, preventing death and lessening the damage in Estes Park.

Questions

1. Little bulrush, according to this article, is only found in four places in the world. Why do you think this is significant?

2. In a garden, why is peat from a fen not suitable for soil improvement?

3. Do you think very many people in South Park know about the High Creek Fen? Yes / No.

4. How does development, the building of houses, affect this fen?

5. What types of wildlife do you think live by a fen and why?

7. How can you help your community understand the importance of preserving the fen?