

OCR A Science – Comparing mown and unmown grassland – Hackney Marshes

Specification links

B3.4 Why do some species become extinct, and does it matter? What is the importance of biodiversity?

Specification Objectives:

1. Understand that living organisms are dependent on the environment and other species for their survival;
2. Understand that there is competition for resources between different species of animals or plants in the same habitat;
3. Relate changes affecting one species in a food web to the impact on other species that are part of the same food web;
4. Understand that a rapid change in the environment may cause a species to become extinct, for example, if:
 - the environmental conditions change;
 - a new species that is a competitor, predator or disease organism of that species is introduced;
 - another organism in its food web becomes extinct.

Assessment Objective 3 (AO3): Practical, enquiry and data-handling skills:

- carry out practical tasks safely and skilfully;
- evaluate the methods they use when collecting first-hand and secondary data;
- analyse and interpret qualitative and quantitative data from different sources;
- consider the validity and reliability of data in presenting and justifying conclusions. (25.2%)

Candidates either singly or collaboratively take part in a practical procedure in order to collect primary data. Candidates are assessed on their ability to analyse and evaluate the data collected and the limitations of the techniques used.

Equipment list

Quadrat (50cmx50cm)	Funnel	50cm ruler	Collection pots for soil
Recording table	Measuring cylinder	Long tapes	
Clipboard	Large bottle of water	Knitting needles (marked with a scale)	
Plant key (optional)	Digital camera (optional)	Small spade	

Websites and resources

SKEES Project – <http://www.kcl.ac.uk/depsta/education/skees.html>
 Contact Rod Watson at King's College, London

Sessions 1 and 2: Pre-fieldwork activities in the classroom**Aim:** To review ecological vocabulary and to consider sampling methods.

Activities	Resources needed
1. Introduce ecological language using worksheet.	Sheet 1: The Hackney Marshes ecosystem
2. Look at Sense of Place PowerPoint; and introduce the problem of the decline in biodiversity due to the actions of humans on Hackney Marshes, using newspaper article.	Sense of Place PowerPoint Sheet 2: Newspaper article
3. Introduce the study by considering the effect humans have on a smaller scale on mowing the marsh (relating this later to the bigger picture of the removal of the habitats completely). Use the picture in the PowerPoint.	PowerPoint pictures Sheet 3: Impact of trampling
4. Ask; how might we sample two areas so that the plants could be studied so that they could be compared? The sampling worksheet could help here to introduce the pupils to what is necessary to consider when sampling using a quadrat.	Sheet 4: Sampling
5. The pupils should be clear that they will look at species frequency and percentage cover - considering if human impact (mowing) changes the plants found.	
6. Risk assessment – Pupils could review PowerPoint to identify the risks and consider the controls that are necessary to lessen them. Presentations could be given and these skills analysed.	Sense of Place PowerPoint Sheet 5: Can you spot the risks

Session 3: Fieldwork**Aim:** To observe differing habitats and identify and record data on plants.

Activities	Resources needed
1. Review safety with pupils.	Risk assessment
2. At site ask pupils identify the plant species listed on the recording table. They could also estimate the percentage cover of this species to practice this skill.	Sheet 6: Field notes Sheet 7: Results sheets
3. Class to record abiotic factors.	Random number list (mobile no.)
4. Class to sample both sites randomly, identifying and recording the information in the table.	See equipment list
Ask a pupil to take digital photos to help remind the group in the next lesson what they did!	Digital camera

Notes for teachers on fieldwork techniques

Percentage cover

Using 2 long tapes (approx. 10m x 10m) mark out the area to be sampled. Using a random number system place the quadrat at 10 different sites. The random numbers could be formed from phone numbers e.g. 020 8969 7767 could mean place quadrat 0 m along the x axis and 2 m along the y axis.

The different number of species in the quadrat should be recorded and the height of the vegetation. The percentage cover of the species listed in the table should then be approximated. The plants listed on the table are generally well adapted to living in regularly mowed regions; apart for fine leaved grasses. The amount of bareground may be significantly higher also in a continuously mowed area.

Filtration rate

Dig a hole 3 cm deep. Place a funnel into the soil. Pour ½ litre of water into the funnel. Time how long it takes for the water to leave the funnel and enter the soil.

Soil pH

In the lab, place 1 cm³ of barium sulphate into a test tube. Place the same quantity of the soil sample from the site. Either add 10cm³ of water to the test tube and shake, or 10cm³ of universal indicator and shake. Where water has been added a pH probe attached to a sensor can be inserted and the data recorded. For universal indicator application compare sample colour to an indicator chart and record. Plants are greatly affected by the pH of soil and are adapted to live in differing soil pH types. pH can vary greatly within one site, and can be affected by differing plant species living at the site.

Soil compactness

Using a graded knitting needle place into the soil using the same force at each site. Record the depth of the needle in the soil. Most plants find it difficult to grow in very compact soils; soils such as this are generally found where lots of mowing takes place. Plants such as plantain, yarrow and dandelion have adapted roots, but due to their hardiness few primary consumers are able to feed on them.

Notes for teachers on common grassland plants

Yarrow (*Achillea millefolium*)

Perennial, creeping underground stems. Aromatic when crushed. Maintains a green sward even in very dry weather, and patches of it in a lawn may spread at the edges when other competing species are weakened by drought. Also common in meadows and roadside verges. Can reproduce vegetatively.

Stemless thistle (*Cirsium acaulon*)

This plant is characteristic of grassland communities in chalk and limestone areas. Rosette of spiny leaves with flowering head growing close to the ground; thus survives against cutting.

Clover (*Trifolium spp.*)

Creeping stems rooting at the nodes. Seeds can stay dormant for several years and can germinate at differing times of the year. *Rhizobium* (nitrogen-fixing bacteria) found in root nodes fix nitrogen. Can reproduce vegetatively.

Perennial rye grass (*Lolium perenne*)

An important hard-wearing grass commonly sown for playing fields and pastures. White shoots can be found growing in the base, thus tuft of grass can grow vegetatively.

Annual meadow Grass (*Poa annua*)

The flowering heads are abundant and mature very rapidly, providing an important item of diet for all the seed-eating birds of lawns and pastures.

Broad leaved grasses (*Agrostis spp.*)

Specialised for dry conditions, it will thrive in such places better than in damp places where it meets competition from species better adapted to damp soil. Can reproduce vegetatively.

Goosegrass (*Galium aparine*)

The fruit is covered with stiff hooked bristles and these assist in dispersal.

Dandelion (*Taraxacum officinale*)

Long tap roots used in unfavourable periods in the winter. Rosette form.

Plantains (*Plantago spp.*)

Long tap roots that can reach the deeper moister layers of the soil. Rosette form.

Sheep's Sorrel (*Rumex acetosella*)

Vegetative reproduction

Buttercups (*Ranunculus spp.*)

Can reproduce vegetatively.

Knotweed (*Polygonum aviculare*)

Tough, prostrate stems. Very hardy plant.

Sessions 4 and 5: Post-fieldwork review in the classroom

Aim: To analyse the data and relate to the effect on other organisms. To evaluate the method used and to justify if data collected could be used as evidence that development on the marshes will have longer term effects on local biodiversity.

Activities	Resources needed
1. To find averages for the species found in each site and to draw comparable bar graphs using this data. To describe the finding in the graphs including qualitative data collected. 2. To answer questions on feeding relationships related to the information collected. 3. To evaluate the usefulness of the data considering whether it could be used as evidence at a council meeting.	Graph paper Sheet 8: Analysis Sheet 9: Evaluation
Consider the national and international effects on the decline of biodiversity whilst analysing scientific texts.	Newspaper article

Hackney Marshes (Hackney) - Site background Information

Location

Hackney Marshes can be most easily accessed from the Marshgate Bridge end of Homerton Road. Grid reference TQ367854

History of site

Sited at the side of the River Lea, Hackney Marshes was historically vulnerable to flooding. The construction of the River Lea Navigation canal in 1794 helped to reduce this flooding risk. Before 1894, land at Hackney Marshes was Lammas fields. Local people had the right to graze livestock on the land after grass had been cut for hay.

After Hackney Marshes came into public ownership in 1894, the land was increasingly developed for recreation. Many trees were planted around the edges of the marshes, including a row of 40 plane trees along Lea Navigation and groups of native black poplars on Homerton Road (six to the north and six to the south). This collection of black poplars is unique in London. Football pitches and changing rooms were also constructed. At one time there were 120 football pitches laid out, although over a third of these have now been lost. Hackney Marshes was an early training ground for many famous footballers including Bobby Moore and David Beckham.

Another use for the marshes in the late nineteenth century was rubbish dumping. Pottery and china dating from this period are sometimes found when holes are dug to plant trees. Bomb rubble was dumped on the Main Marsh, but not Wick Field, after World War Two. This is one of the reasons why trees grow more quickly on Wick Field; they do not have to push their roots through rubble unlike the trees on the Main Marsh.

Wick Field, on the south side of Homerton Road, was planted as a Community Woodland between 1996 and 2000. A variety of species, including hazel, silver birch, ash and willow, were chosen for their value in attracting wildlife. Wide paths and the area at the centre of Wick Field were kept clear of trees to provide open space for birds, butterflies, squirrels and foxes. Keeping areas open encourages species of plants to grow which can better compete in the light, such as white dead-nettle and hedge mustard, as well as woodland plants.

Hackney Marshes has been affected by building throughout the twentieth century. For example, a row of ash trees at the edge of Wick Field was chopped down when the M11 Link Road (the A12) was built in the late 1990s.

The future of Hackney Marshes is uncertain. Plans for the development of buildings for the London Olympics in 2012 threaten several parts of the site.

Arena Field, to the south of Wick Field, is planned to be used as part of the Olympics Precinct. East Marsh, east of the River Lea, may be used as a car and coach park. A travellers' site at nearby at Waterden Road may be relocated to a site on Main Marsh between Homerton Road and the Tree Nursery.

Wildlife

There are several distinct habitat areas for wildlife in Hackney Marshes. Open grassland and meadow is particularly important in the Main Marsh, where it is actively managed by mowing. The football pitches and paths are mown weekly in the summer. Longer grass areas which in some cases are only cut once a year is cut around the edges. Plants which can tolerate trampling and mowing, such as daisies and hawkweed, are found in the short grass. These support insects and small mammals such as rabbits. Birds such as geese, woodpigeons, gulls and kestrels use the football pitches for feeding. The longer grassland allows plants to grow taller and to form flowers and seeds. The seed heads of teasel and thistle attract birds such as goldfinches. Ants colonise the long grassland.

The most extensive area of woodland is in Wick Field. This was planted in the late 1990s as open woodland with a variety of species chosen. Along the paths and in the open areas grow taller plants, such as burdock (with sticky seeds) and rosebay willowherb. Butterflies move along the paths and magpies and green woodpeckers feed on the ground where the grass is shorter. The height of the understorey vegetation underneath the canopy depends on the tree species. Ash trees have limited undergrowth because the leaves do not allow much light to reach the woodland floor, while silver birch trees with smaller leaves allow more light through, and a greater amount of undergrowth.

Site web address

www.hackneyenvironment.org.uk

No education officer on site.

RISK ASSESSMENT PRO FORMA 2006

Activity/Situation Investigation into the effects of shading. Hackney Marshes; Marshgate Bridge							Date of Assessment: Tuesday 30 th May 2006											
HAZARDS IDENTIFIED Grouped by Outcomes		PERSONS AT RISK FROM EXPOSURE TO HAZARD					RISK RATING WITHOUT CONTROLS IN PLACE	WITH CONTROLS IN PLACE										RISK RATING WITH CONTROLS IN PLACE
								A					B					
								WORST CASE OUTCOME					LIKELIHOOD /PROBABILITY					
NO.		Employee	Students	Visiting staff	Public	ALL	Worst Case Outcome X Likelihood / Probability	1 Inconvenience	2 Minor Injury	3 Injury / Illness	4 Major Injury	5 Fatality / Multiple	1 Unlikely	2 Rarely	3 Infrequently	4 Sometimes	5 Often	(A x B)
1	Slips, trips and falls – walking to site Narrow footpath	x	x	x			4x3=12				4			2				8
2	Slips, trips and falls – doing activity Roots and tall grasses	x	x	x			2x3=12		2					2				4
3	Hazardous Substances – Soil Borne diseases	x	x	x			5x2=10					5	1					5
4	Hazardous Substances – Fungi	X	X	X			4X2=10				4		1					4
5	Hazardous Substances – Glass, litter, faeces, syringes					X	5x4=20					5		2				10
6	Harmful plants		x				5x3=15					5	1					5
7	Manual Handling - Carrying equipment	x	x	x			4x2=8				4			2				8
8	Weather – Extreme cold					x	5x2=10					5	1					5
9	Weather – Extreme sun/ hot					x	5X2=10					5	1					5

10	Weather – High wind Tree branches/ dead wood					x	5x2=10					5	1					5
11	Cyclists within park	x	x	x			5x3=15					5	1					5
12	Strangers		x				5x2=10					5	1					5
13	Getting Lost		x	x			5x3=15				4		1					4
14	Gardeners machinery – tools on path or adjacent to path	x	x	x			4 x 2 = 8			3			1					3

This pro forma does not replace school policy risk assessments. This can be used for guidance only. Site must be visited and assessed by teacher leading activity.



No	Risk Rating	THESE CONTROL MEASURES ARE TO BE IN PLACE. LEADING TEACHER TO ENSURE ACCOMPANYING STAFF AND ADULTS ARE CLEARLY BRIEFED, BEFORE THE START OF THE ACTIVITY REGARDING THEIR SUPERVISORY ROLE + ACTION TO TAKE IF ANY PROBLEMS OCCUR	Is additional action req'd Yes / No
1	8	Safety talk given previous to leaving; walk in no more than pairs and single lane if obstacle on footpath. Staying in pairs along path. No running. Suitable footwear worn.	No
2	4	Safety talk given previous to leaving school. Pupils to look where they are walking, especially in long grasses. No running and to walk with care. Suitable footwear worn.	No
3	5	Safety talk given and symptoms told to pupils. All are to wash hands at end of session. Pupils told not to touch faces or put fingers near mouths.	No
4	4	Safety talk given. All pupils told not to eat any fungi seen, or berries etc.	No
5	10	Site to be used to be surveyed by group leader prior to lesson. Items should be removed using gloves or activity re-sited. In safety talk pupils must be told that they must not touch any item found and to be careful when on site. Pupils told not to put fingers in mouth or to eat. All to wash hands after. Pupils to report any item found to adult. Adult should remove item using gloves or ask pupils to move.	No
6	5	Safety talk given on not eating berries etc. and being aware of nettles. Show nettles to pupils when on site.	No
7	8	Pupils shown how to use and carry quadrats, long tapes etc.. Pupils supervised at all times.	No
8	5	Pupils to be told to bring appropriate clothing; waterproof and extra layers. Teacher to monitor weather conditions. Play warming games if necessary	No
9	5	Pupils to be told to bring sun cream, sun hats and bottled water. Teacher needs to monitor weather conditions. Shade should be sort to work in where appropriate.	No
10	5	Pupils to be made aware of risk. Teacher to monitor weather conditions and change locations as appropriate.	No
11	5	Tell pupils to be aware of others using park in safety talk.	No

12	5	Pupils to be advised that the park is a public space. Told not to talk to strangers and to stay with partner/ group. Report any incidents to members of staff.	No
13	4	Safety talk: group told to stay together. Pupils told to stay still if lost. Pupils and assistants to be told approx. length of activity. Mobile to be carried by lead teacher.	No
14	3	Insist that students do not touch any tools/machinery that they see.	No

Assessment carried out by: Melissa Glackin (FSC) May 2006

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Teachers/ group leaders before taking a group should:

1. Re-read school own 'off-site' policy
2. Carry a mobile that has reception at the site
3. Carry telephone numbers for the school office where pupil details are stored
4. Carry a basic first aid kit
5. Check the adult: pupil ratio is correct
6. Carry an up-to-date register

First Aid kits should contain –

- 1 first aid guidance leaflet
- 10 waterproof plasters
- 2 triangular calico bandages
- 1 large sterile dressing pad (18x18cm)
- 1 medium sterile dressing pad (12x12cm)
- 2 pairs of vinyl gloves (medium)
- 2 antiseptic wipes (alcohol free)
- 2 safety pins

KEY TO ASSESSMENT FORM 2006

PEOPLE AT RISK

KEY	DESCRIPTION
EMPLOYEE	EMPLOYEES INCLUDING VOLUNTEERS
STUDENTS	<u>ALL</u> students working with FSC
VISITING STAFF	All teachers / lecturers / adult helpers with groups
PUBLIC	When the general public have access to the area being Risk Assessed
ALL	All persons who are exposed to the hazard

SEVERITY OF OUTCOME

KEY	DESCRIPTION	GUIDANCE
1	Slight inconvenience	Verbal reassurance given, able to continue with activity
2	Minor injury	Requires First Aid, may be able to continue with activity
3	Injury / Illness	Medical attention required, unable to continue with the activity
4	Major Injury	As defined by RIDDOR, hospitalisation required, use of emergency services
5	Fatality, Multiple Injury	As defined by RIDDOR, injury may lead to a disability

LIKELIHOOD / PROBABILITY OF INJURY TAKING PLACE

KEY	DESCRIPTION	GUIDANCE ON DEFINITIONS
1	Highly unlikely to occur	
2	May occur	Rarely
3	Does occur	Not frequently
4	Occurs	From time to time
5	Likely to occur	Often

NOTE

When the final risk rating score is 8 or 9 everyone must be made aware of the hazards and the activity should be modified to lower the risk. If the score is 10 or higher the activity must cease .

The information given on the definitions can only be used as guidance and should not be referred to as the definitive version.