Environmental Studies
FACT SHEET
www.curriculum-press.co.uk
Number 129

Managing Nature Reserves

This Factsheet:

- **reviews the principles behind effective management of nature reserves in the UK and internationally**
- **discusses the management of Ainsdale sands NNR on Merseyside**
- **illustrates the common exam questions on this topic**

In the UK, we have three types of Nature Reserve (Table 1)

Tabel 1. Types of Nature Reserve

Type	No.	Description
Local Nature Reserve (LNR)	**>1280**	normally > 2ha, managed for nature conservation and/or special opportunities for study, research or enjoyment of nature. Range from ancient woodlands and flower-rich meadows to former inner city railways. Usually designated by Local Authorities under the National Parks and Access to the Countryside Act 1949
National Nature Reserve (NNR)		Owned or controlled by Natural England or Wildlife Trusts. Protect the most important areas of wildlife habitat and geological formations in Britain and as places for scientific research. Usually SSSIs - best examples of a particular habitat e.g. coastal salt-marshes, dunes and cliffs, downlands, meadows, woodlands, chalk downs, lowland heaths and bogs and estuaries *e.g. Studland Heath, Dorset*
Marine Nature Reserve (MNR)	**3**	Designation within 3 nautical miles of the coast with similar status and protection to NNRs. Conserve marine flora and fauna and geological or physiographical features of special interest and provide opportunities for study e.g. Lundy Island

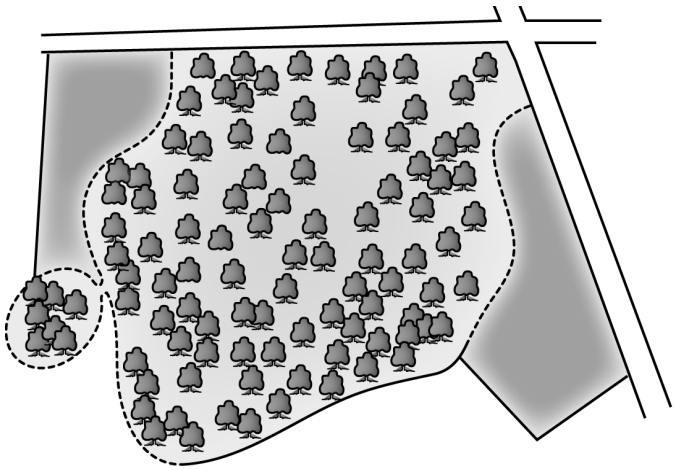
Management principles

Nature reserves often need active intervention / management to maintain their conservation or educational value. The key principles:

- human intervention such as poaching, damage and littering must be stopped
- visitor access may be restricted to buffer zones to avoid disturbance to sensitive zones
- active management may be needed to establish lost species, to protect threatened species or prevent the establishment of non-indigenous (alien) species and to restore degraded areas
- interpretation or other educational facilities may be needed to improve the local community's understanding of the importance of the nature reserve
- reserve wardens may be needed to protect the area
- culling of animals/ contraception may be required if animal populations exceed resources / carrying capacity
- restriction of visitor numbers may be needed if their number exceeds the carrying capacity (maximum number of visitors that can be accommodated sustainably / without long-term damage)

Typical Exam Question

The diagram shows an ancient oak wood that stands on boulder clay. The wood has not been managed for 40 years.



You have been appointed to manage the wood as a Nature Reserve with a substantial budget.

(a) Suggest two economic benefits of creating this Nature Reserve (2)

(b) Suggest practical management techniques that could be undertaken in order to:

(i) increase species diversity within the wood (2)

(ii) protect rare species whilst encouraging public enjoyment of the wood (2)

(iii) increase the carrying capacity of the Nature Reserve (3)

Markscheme

(a) money from visitors / ecotourism;
creation of jobs;
benefit to local economy via grants;

(b) (i) Coppice;
To let more light to woodland floor;
Rotational coppice to vary age – distribution of trees;
Re-introduce locally native species;
Remove non-native species;

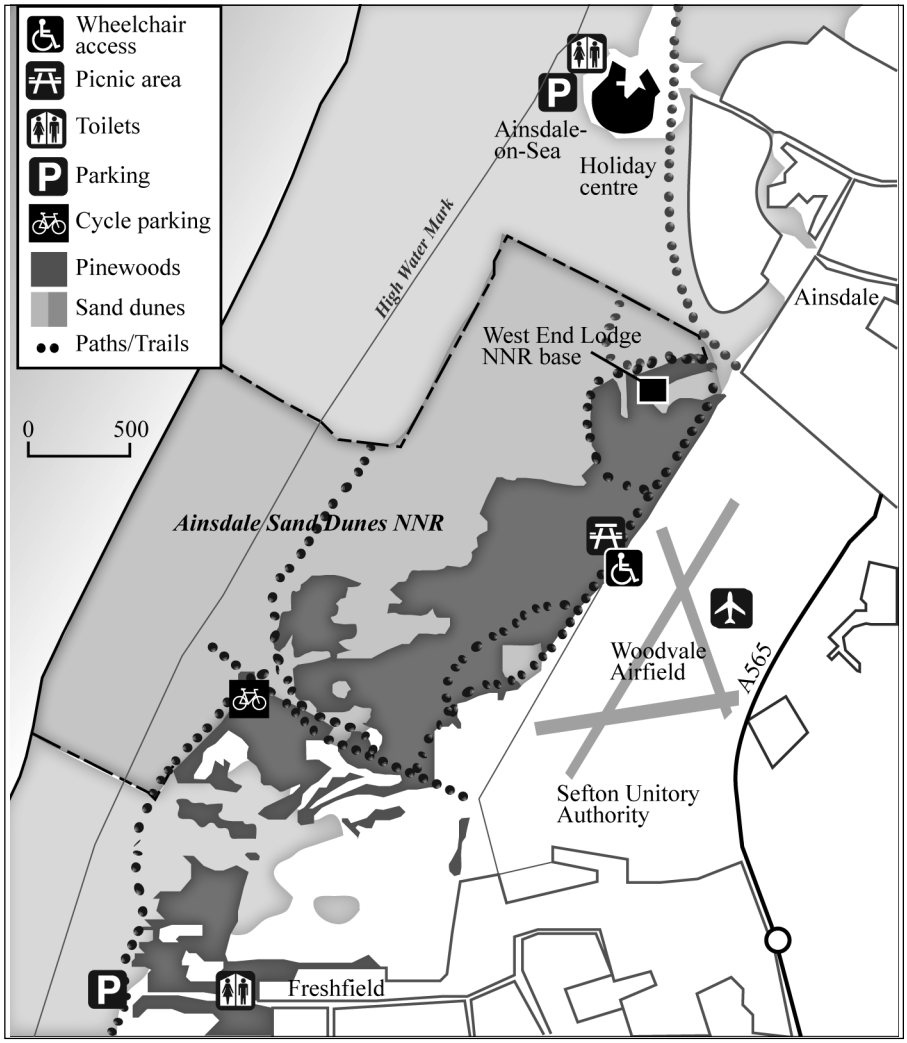
(ii) Establish no-access areas to protect rare species;
Time-zoning to prevent access at key times;
Interpretation facilities;
Wardens;

(iii) Provision of nest boxes;
Provision of supplementary food;
Introduce plants to attract plant pollinators or seed dispersors;
Control competitors or predators;
Ref to habitat enhancement e.g. pond adjoining wet area/ biological corridors/ beetle banks;

Case Study: Ainsdale sand dunes NNR

The NNR was established in 1965 to protect the finest example of lime-rich sand dunes on the North West coast. The dunes cover 492ha on the Sefton coast SSSI on Merseyside (Fig.2) and have been designated a European Special Area for Conservation.

Fig 2. Ainsdale sand dunes



The dunes contain 460 plant species including 33 that are locally or regionally rare e.g. petalwort and dune helleborine. The dunes are also home to over 400 species of invertebrate, almost 800 species of fungi, as well as sand lizards, natterjack toads and great-crested newts. Further inland, pine woodland provide habitat for red squirrels.

The dunes provide a range of habitats (Table 2).

Management techniques on the dunes

In order to ensure the optimal management of the dunes, wardens and volunteers collect information about visitor numbers, animal and plant populations and the condition of the various areas of the dunes.

Activities include:

- pedestrian counts in and out of the tourist season to monitor areas where trampling may be a problem
- measurement of soil compaction/infiltration rates/vegetation height which may be linked to trampling
- monitoring of footpaths for erosion and litter
- limiting visitor access to the dunes by fencing off sensitive areas, closing some paths/areas, providing wooden 'boardwalks' along the most used paths through the dunes to encourage visitors to use these routes and avoid others

Active management of the dunes is also important:

- The sand dunes are grazed by a flock of around 200 Herdwick sheep over winter, along with 5 Shetland cattle. These provide some scrub control to maintain habitat for the rare plants.
- Volunteers plant Marram grass to restore the sand dune habitat.
- The rear pinewoods are managed to provide a better age structure for the cone-bearing trees as a food source for red squirrels. Woodland operations include thinning, coppicing, creation of firebreaks and replanting.
- Visitor facilities include waymarked paths, interpretation boards, cycle parks and routes and a picnic area.

Table 2. Range of habitats provided by the dunes

Dune type	Habitat/significance
High frontal dune ridges (yellow dunes)	Sand lizards in marram grass
Grey dunes	Grasslands are abundant with spiders, grasshoppers and specialist beetles e.g. asparagus beetle
Dune slacks	Often flooded in winter; the pools provide spring breeding grounds for natterjack toads, great crested newts and a variety of dragonflies. When the pools dry, orchids, yellow bartsia and bog pimpernel appear
Corsican pine woodlands, interspersed with areas of wet woodland, alder and scrub	The pines provide habitat for red squirrel and green flowered helleborine

Typical Exam Question

(a) Name the UK government body responsible for designating National Nature Reserves (1)

(b)The Royal Society for the Protection of Birds (RSPB) is the largest voluntary conservation organisation in Europe.

(i) Explain the main difference in funding between a voluntary organisation such as the RSPB and a statutory (governmental) conservation body (2)

(ii) Suggest why designating an area as a Nature Reserve may not protect it from development (1)

Answers

(a) Natural England;

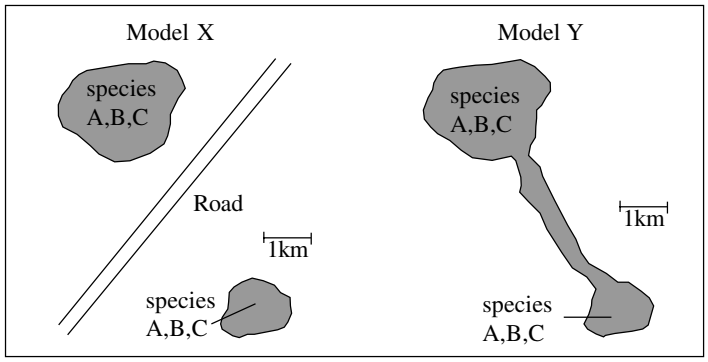
(b) (i) Voluntary organisation relies on membership fees / subscriptions / sale of merchandising / legacies / donations;
statutory organisations are funded by taxes;

(ii) Development may be in national interest e.g. for minerals /military use / reserve status may be overridden by government;

Designing Nature Reserves

Fig. 3 shows two different models for the design of a nature reserve for conserving three animal species, A,B and C. Model X has two isolated reserves. Model Y has a corridor connecting the reserves.

Fig 3. Models for design of nature reserve

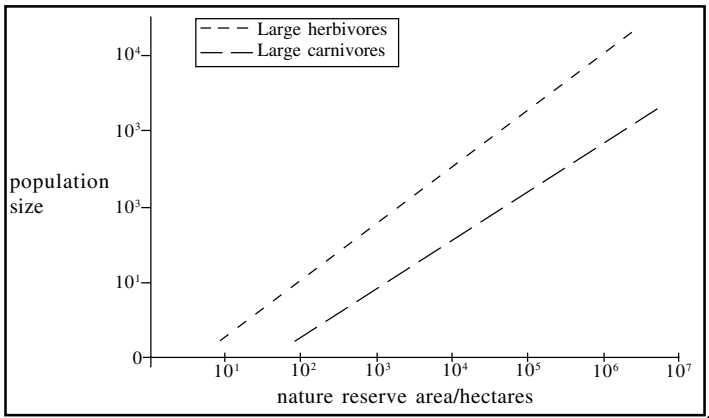


Which model would be better for the conservation of the genetic diversity of the species?

You probably identified Model Y, which, by virtue of the corridor allows organisms to migrate between the reserves. This results in more opportunities for mating with a wider population and should lead to greater genetic diversity.

The size of nature reserves is also important. Fig 4 shows that, in general, the bigger the reserve, the greater the populations of both herbivores and carnivores that can be maintained.

Fig 4. Size of reserve vs population



Monitoring and, if need be, artificially altering the populations of large herbivores and carnivores e.g. in a wildlife reserve is crucial. The population density of large herbivores must be maintained above that of the carnivores because each carnivore requires more than one large herbivore to feed on and energy is lost at every stage in the food chain/trophic level.

Practice Questions

Aston Rowant NNR comprises flower-rich chalk grassland together with beech woodland and juniper scrub. The chalk grassland is an important habitat for butterflies and the height of the grass is controlled by managed sheep grazing.

Table 3 shows the effects of sheep grazing on the population of the meadow brown butterfly (*Maniola jurtina*) in three different areas of the NNR.

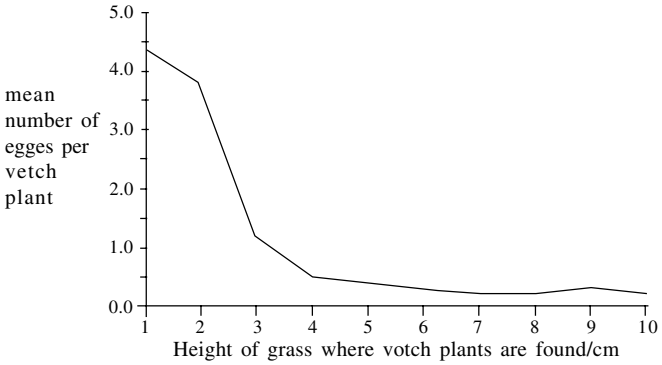
Table 3. Effects of sheep grazing on population of meadow brown butterfly

Management option	Population of meadow brown butterflies	
	1980	1990
Area A: grazed by sheep in summer	435	415
Area B: grazed by sheep in winter	522	595
Area C: no grazing	287	239

Statistical analysis showed that the population changes between 1980 and 1990 are significantly different in areas B and C.

(a) Which management option should be chosen in future? Explain your answer (2)

(b) The butterfly lays its eggs on vetch plants in summer. The graph shows the number of eggs found on vetch plants in different heights of grass.



Use the graph to explain the results shown in Table 3.

Markscheme

(a) grazing in winter;

(b) more eggs laid on each vetch plant when the grass is shortest;
gives significant increase in butterfly population;
sheep grazing keeps grass short;
decrease in butterflies when sheep graze in summer because they also eat the vetch with the eggs on;

Acknowledgments: This Factsheet was researched and written by Kevin Byrne. *Curriculum Press, Bank House, 105 King Street, Wellington, Shropshire, TF1 1NU* **ISSN 1351-5136**