



My area for discussion on Sand dunes, is south of the town of Dornoch in Sutherland, O.S Pathfinder 79-80 by 89-88. I have walked along an imaginary line from the waters edge, for about half a mile inland, I there for plan to explain what I observed on this walk, discussing the various forms of succession that I encountered on the way. The tide is high but not a spring tide, there has not been much rain, so the ground underfoot is fairly dry. My back is to the Dornoch firth I am facing North, this is an area of mud flats, there are in fact 18 hooper swans about 50 yards off shore.

Succession, dictionary definition, following in order,, a series of vegetation types following one another in the same region. A process by which organisms establish them selves, creating an environment in which other species can move in and develop successfully, there for making the ecosystem not suitable for the original organism, which in turn moves out, to establish some where else. Succession comes in three stages, primary, were a completely hostile environment is colonised,. Secondary succession where ground has been disturbed and the topsoil removed for example, and species move in. Where a community is stable and has been for a number of years, where there is little change in the habitat, this is called a climax community. We were shown an example in the film of Presque island on lake Erie . Where new born land is growing out of the lake, sand shift is taken from the windward side of the island, and deposited on a curved point, creating waves of sand, which eventually build-up in ridges causing trapped lagoons to form, the new land, is very inhospitable to any form of life, frequent sand blow, hot, cold, dry and unstable. Cotton wood which relies on the lake to despoir its seeds, germinates on the flotsam on the waters edge, it has long roots which gradually get establish, therefore creating an environment for more life forms to move in, and establish them selves, and stabilise the sand. Dunes.



L
The Dornoch
Firth.

LAY OUT

VER

Succession The Dornoch Links.



J
SMALL
BRACKISH
POOLS



This area of coast line is very unstable there are small pools of brackish water, little promontories going out into the firth these are being constantly broken off, there is a lot of coming and going of water, because this area is so low, about 8 inches above sea level, acting like a sponge in wet weather as there is a large area of grass land behind the dunes that drain out at this point, high tides and gales brake further inland , which means that for a lot of the winter this whole ecosystem is extremely water logged. But there is a lot of plant life ~~that~~ ^{ing} keep a ~~lot of~~ the coast line stable

K
WINTER
WAVES
EROSION
OF
COAST
LINE
HELD BY VEGETATION.



, Thrift, plantain, and sea purslane, which case dense mats, and only the very fierce gales can dislodge. What is interesting is large areas of shell sand, quite large shell pieces, very little grows on these shell beds, but gradually the sea purslane is establishing itself around the edges, this is a prime example of succession, a hostile environment where nothing appears to grow, there is no stability, no soil, and no moisture as these areas appear to be above ^{THE} water level of the

1
SEA
PURSLANE
\$
THRIFT



natural fresh water seepage. It is very dry. Frequented by oystercatchers who nest in this area. These shell beds have remained the same for many years.



H.
SHELL
SAND
HEAPS
OYSTER
CATCHER
NEST.



We are now continuing to walk away from the sea, the vegetation changes, the land gets higher, here we have mirram grass. This would have established itself on the high tide mark, having long roots, that reach down through the sand for moisture, its long roots also protect it from winter gales, and it manages to hang on. Mirram grass attracts other species, the leaves rot down and produce litter, creating humus, other plants establish them selves, and most important sea weed, and detritus washed in from the sea get caught up in the mirram grass, rotting down, and in turn creating more soil, for more plants to get established. This is also a safe environment for small invertebrates, which in turn produce food for birds, and amphibians. This is now a fairly stable environments, safe from gales, just above the high tide mark, well established.



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SAND
DUNE
COLONIZED
BY
MIRRAM
GRASS.

DEBRIS
ROTTING
DOWN
TO FORM
SOIL



We will now continue over the dunes, they are not high at this point, away from the fresh water seepage, so quite a dry environment, the mirram grass is thinning out there is a more complex mix of vegetation, small shrubs gorse juniper, ferns moss, buttercup, and finer leafed grasses. This area is not unlike the shrubby area explained in the film on Presque Isle This is an example of succession, where the new species have taken over, and the original species has died out due to competition, which is why there is no mirram grass in this area.. Continuing on the walk away from the sea we are now coming into a lower area the dunes are behind us, this is now only just above sea level, and therefore very wet, considering that there has been very little rain, this wetness is due to seepage from the fields, there is some vegetation grasses, buttercups, and sea purslane, but no sign of animal life. This area extends for about 100 yards, before there is a secondary dune, no mirram grass, but moss, willow herb

F

WET
AREA
BETWEEN
DUNES



E
2nd
DUNE
VERY
MIXED
VEGETATION
SMALL
SHRUBS.



We now have an example of mans interference with the natural landscape, because a new golf course is being established, this area was originally grazing, the fence has been moved, and no grazing animals have access to it, there has been a huge regeneration of plant life, thick tussocks which give shelter to nesting birds, this area can be flooded, but is generally dry in the summer, the original plants are beginning to come back, but will they be choked by the grass, this area extends for about 200 yards, to the edge of the new golf course,



LAND RECOVERING FROM GRAZING
NOW ON MARGIN OF NEW GOLF COURSE.

man has altered the habitat, by removing the indigenous turf and re-seeding with fine green, which is necessary for golfers. The golf course is an important part of the local economy, possibly a similar case as in Presque isle, where a balance has to be found between the natural rich flora, and humanities need for relaxation and activities. Hopefully the golf course will be sympathetic to the needs of wild life, and allow the

marginal lands to be free from sprays and too much disturbance., this is another case of allogenic succession..



NEW GOLF COURSE

We must continue on our walk across the golf course to a artificial small pond, this is completely devoid of life, and the bare sand around it is beginning to be colonised by course annual weeds, such as willow herb and thistle, sorrel, yarrow and buttercup, another example of secondary succession..

B.
2ndry
Succession



, we now come to the fence, and the start of the grazing land, the animals have eaten a lot of the more interesting vegetation, and this is mostly grass and white clover,

A.



OVER GRAZING

This area is often total submerged by water, particularly in the wetter winter months, there is flooding from the Black Burn, and seepage as I have mentioned before from the large area of grazing land to the North., this is an example of changes to the environment made by climate, and called allogenic succession, were the original vegetation has been distorted by change of conditions..This area extends to about 100 yards, the ground now rises again, there appears to be a second line of dunes, these have been well established with a large variety of vegetation, gorse vetch and fine grasses.



WATER COURSE DRAINING FROM
LINKS LAND.

although this ground has been links land for many years, it gets a rather derogatory mention in the STATISTICAL Accounts of 1808" This has been a common, some years ago a scheme of division was formed, under the authority of the Court of Session. It was accordingly divided among the proprietors of the adjacent lands, and march stones set up, but still lies untrained and a nuisance as before, some feeble attempts have been made towards culture at the western extremity of it."



LINKS LOOKING NORTH.

We have described a small strip of land on the edge of the Dornoch firth, the firth being an important area for winter migratory birds, and feeding grounds for waders and geese, the sand dunes are rich in flora and fauna, ~~broth-golf~~ coarsen hare, voles, foxes, and even otters. It is easily accessible to the town of Dornoch, which has a thriving tourist trade. Several farmers come to gather to graze up to 500 sheep and about 20 cattle on what was once the common grazing. The golf course has extended its course to the west, and

in time could extend in another direction. The area is under threat from global warming as every winter the water table gets higher, and more land is under water, the coast line is under treat from wave power, which is constantly nibbling away at the high tide mark. The dunes however do seem to remain static, and as long as there is not too much pressure but on them by man, they should remain unaltered.

THERE
MUST BE
SPACE
FOR
VISITORS

