



# Integrating monitoring in conservation management projects

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# Different types of investigation

- *Natural history recording*, which contributes to historical archives;
- *Research*, which is carried out to increase our knowledge about a species or habitat, perhaps through ecological modeling, population viability analysis and demographic studies;
- *Experimental management*, which tests the effects of different management practices;
- *Environmental impact assessment*, which assesses the likely effects of a development or incident;
- *Survey*, which is typically a ‘one-off’ descriptive exercise, perhaps to describe the habitats on a site or to map the distribution of a species;
- *Surveillance*, which is a repeatable survey, often used to detect trends in habitats, populations and environmental change; and
- *Monitoring* (as defined by Hellawell), which is ‘intermittent (regular or irregular) surveillance carried out in order to ascertain the extent of compliance with a predetermined standard or the degree of variation from an expected norm’.



## Different types of question

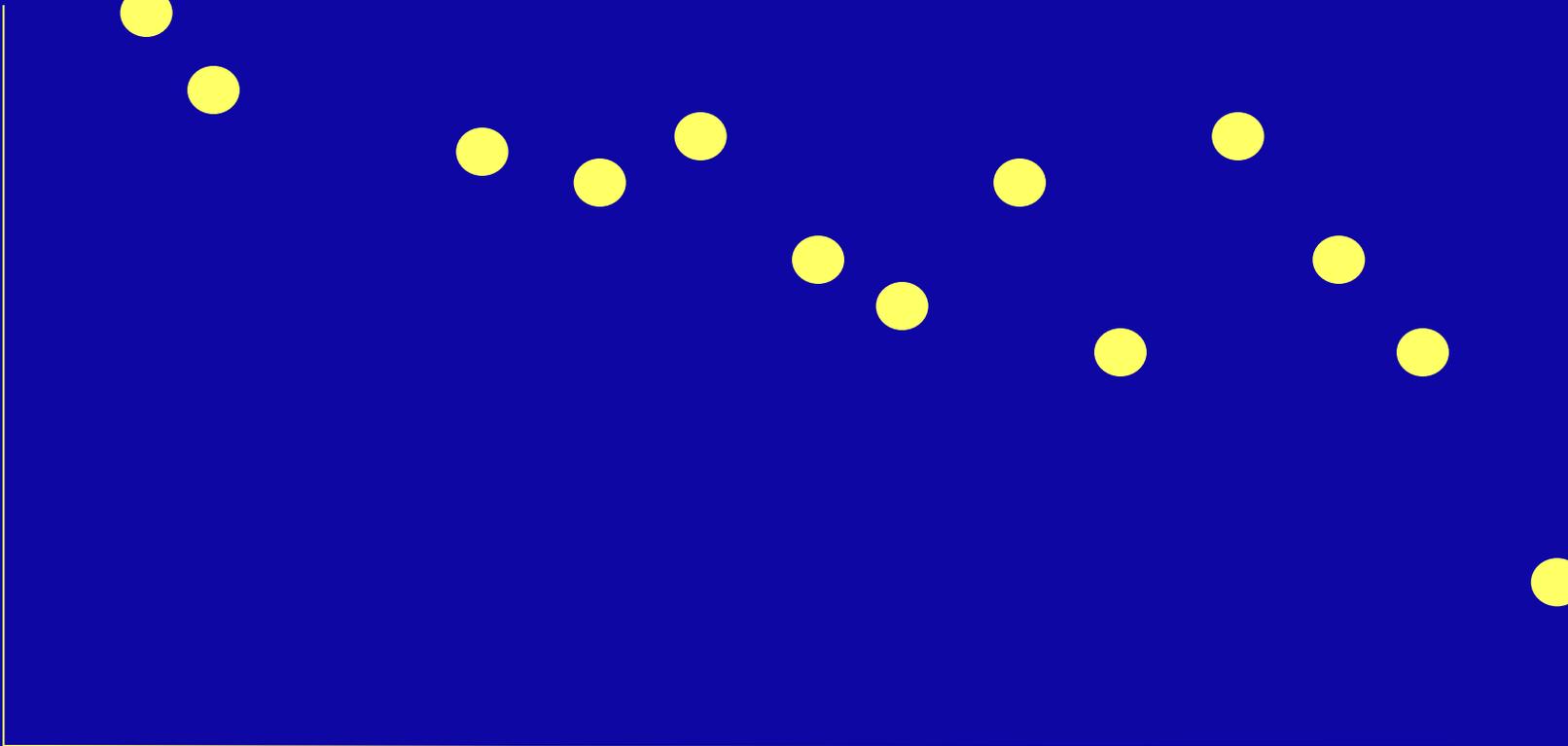
- How is the *Liparis loeselii* population changing? Surveillance
- Do we have enough plants of *Liparis loeselii*? Monitoring
- What is the size of the *Liparis loeselii* population? Survey

Only one of these is a monitoring question.....



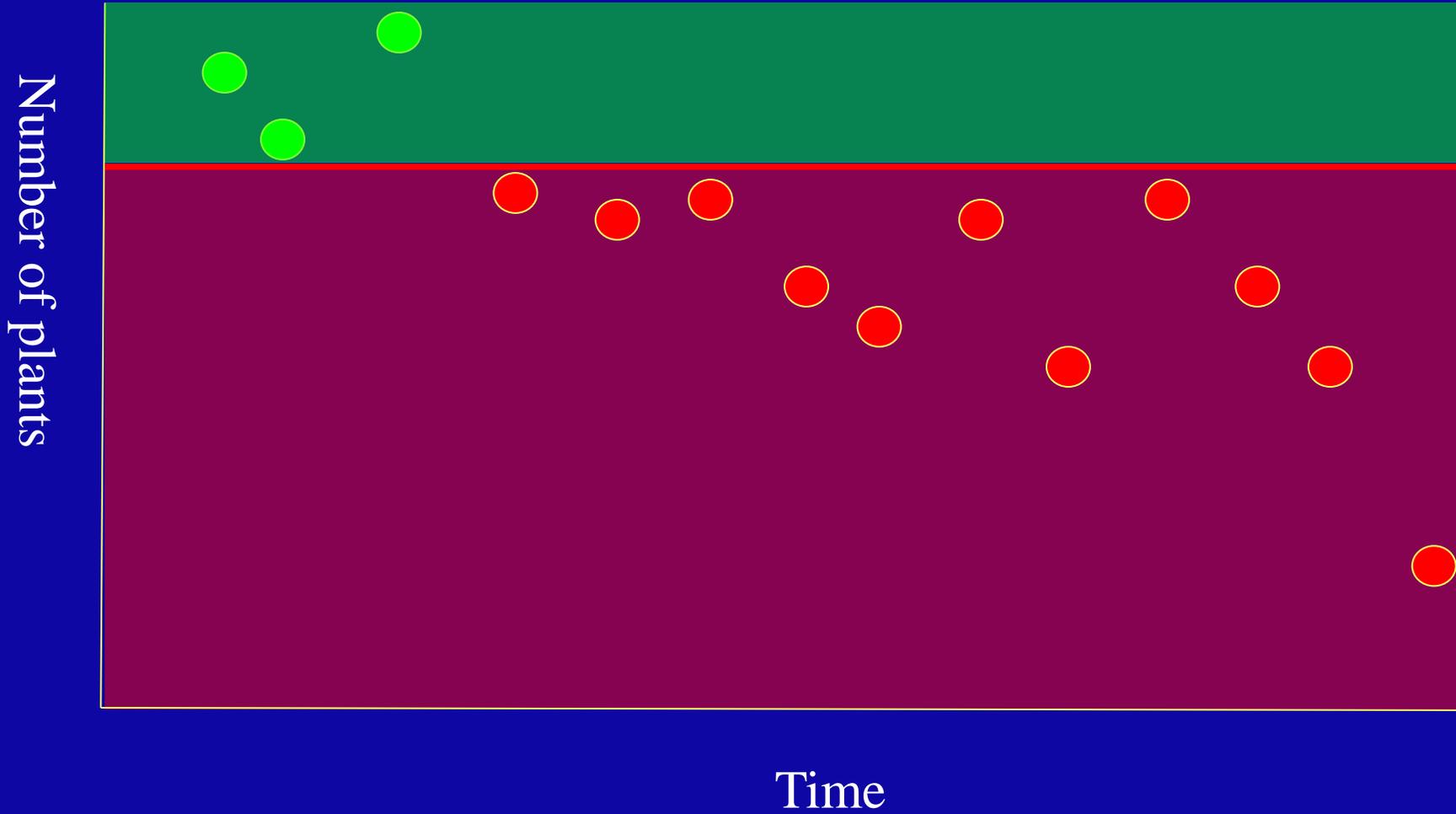
# Surveillance

Number of plants

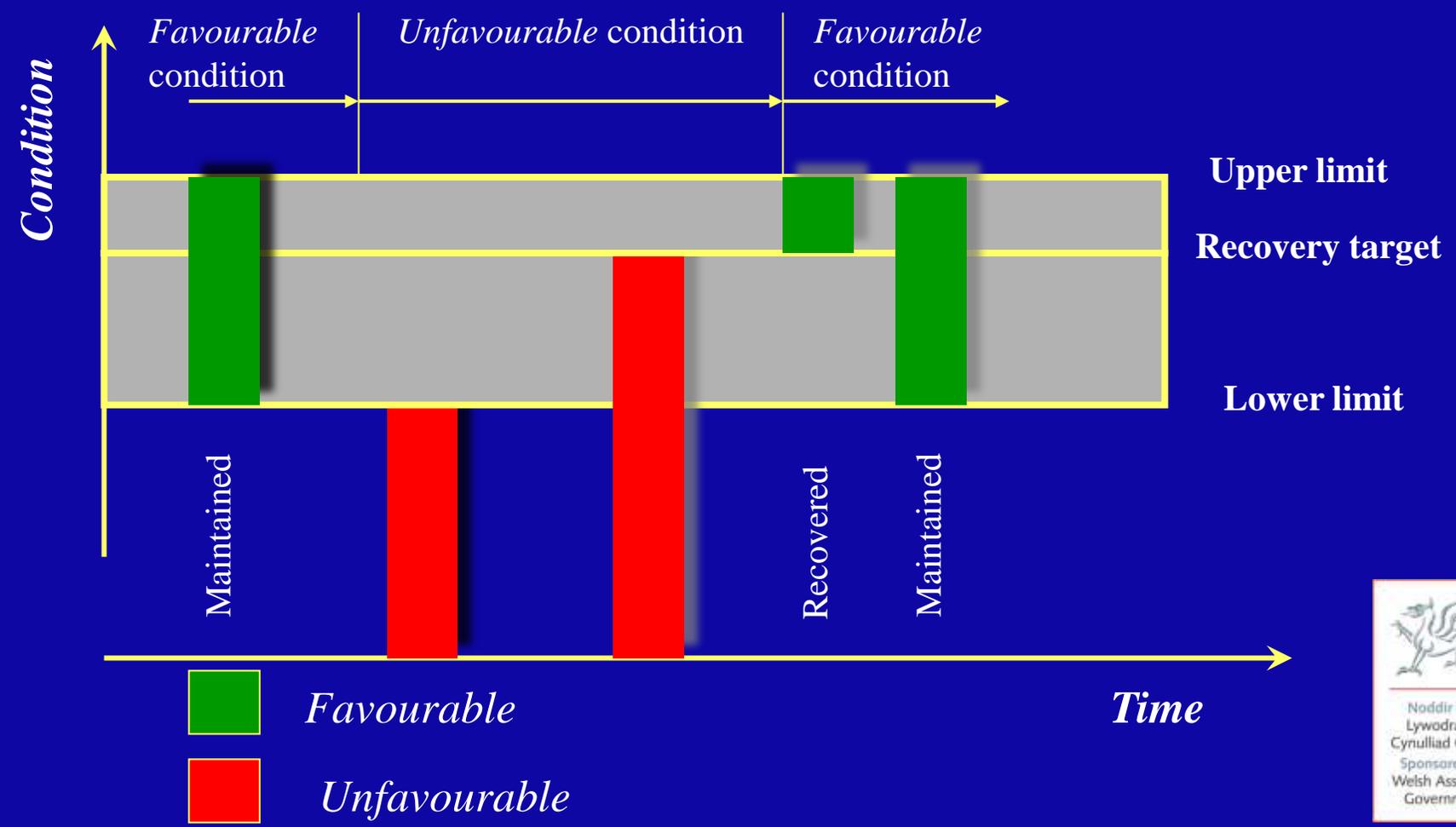


Time

# Monitoring

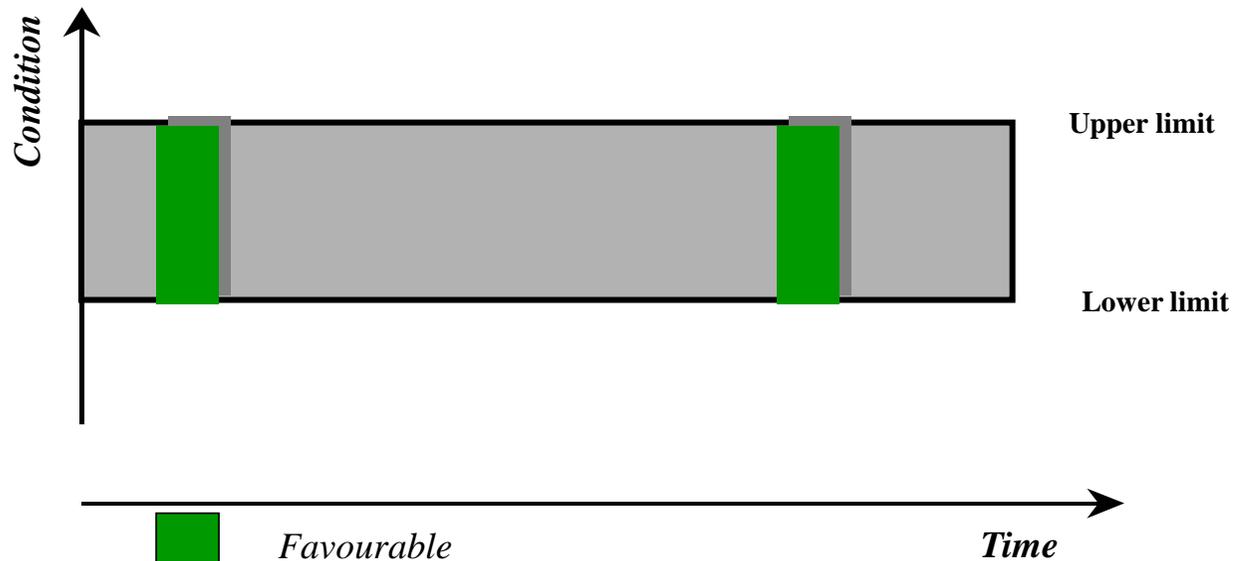


# A model for conservation

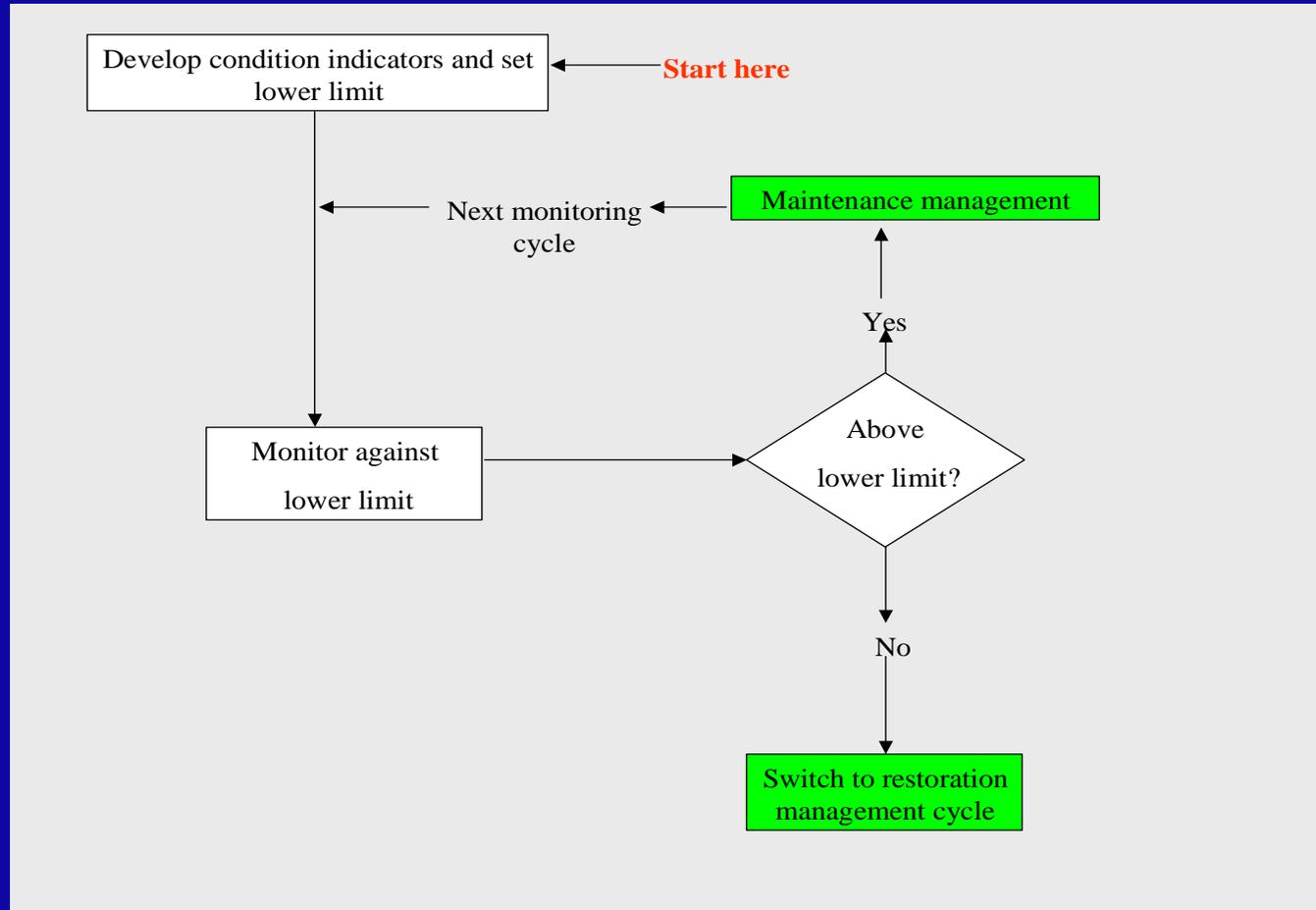


# Phase I of the cycle

When the condition of the feature is favourable

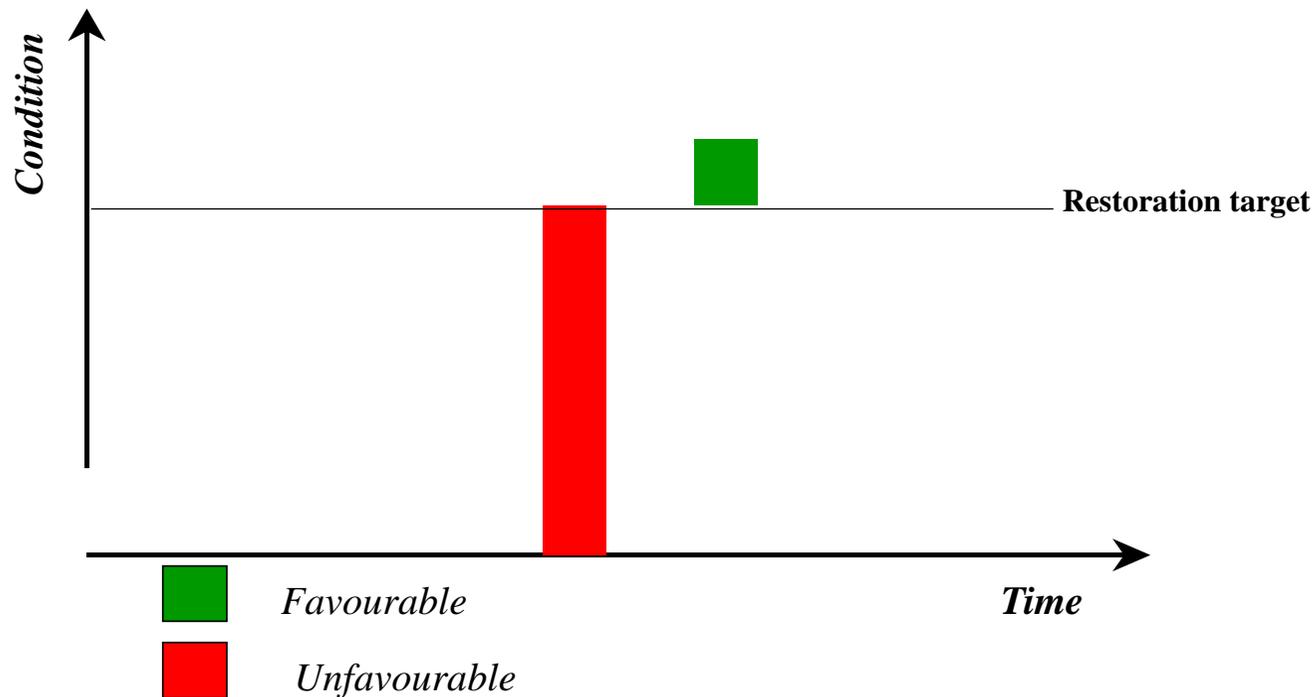


# The management cycle for habitats or species in favourable condition

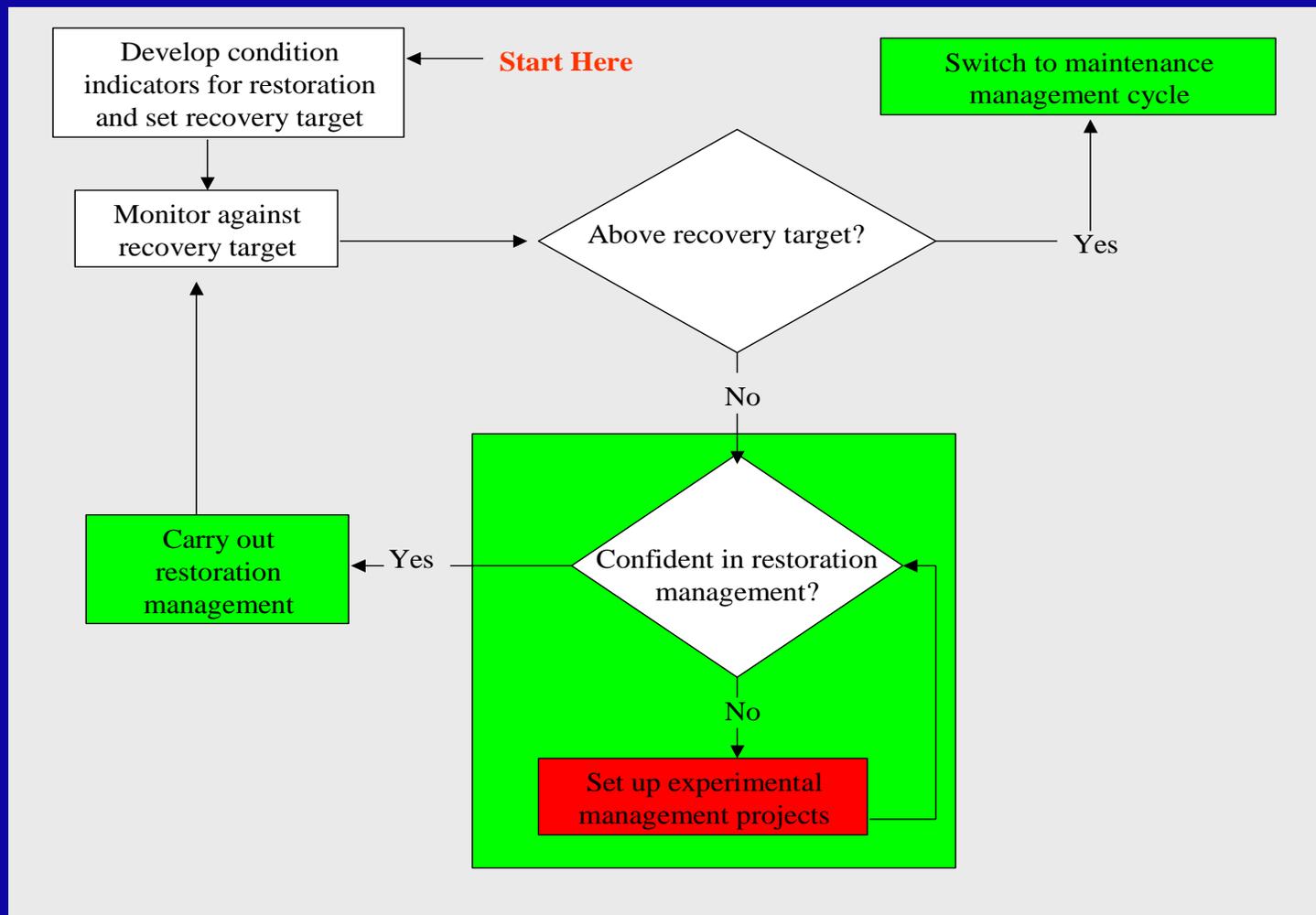


## Phase II of the cycle

When the condition of the feature is unfavourable



# The management cycle for habitats or species in an unfavourable state



**However, before we can apply this model, we must make some difficult decisions, such as:**



- What do we want?
- Where do we want it?

And, critically

- How will we know when we have got it?

Most habitats in western Europe have, either directly or indirectly, been influenced by cultural activities, so these are relevant questions



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# A short case study



# The location of Kenfig SAC



# Kenfig SAC

- Kenfig SAC comprises two National Nature Reserves: the dune systems at Kenfig NNR and Merthyr Mawr NNR. The SAC is noted for three Annex I habitats: humid dune slacks; dunes with *Salix arenaria*; and fixed coastal dunes with herbaceous vegetation;
- The cSAC is also noted for two Annex II species: *Liparis loeselii* (at Kenfig NNR only) and *Petalophyllum ralfsii* (at both sites)
- Kenfig NNR, the larger of the two sites at 602 ha, holds more than 10% of the humid dune slack resource in the UK and more than 50% of the UK *Liparis loeselii* population
- Both Annex II species occupy the species-rich, successional-young stages of dune slack formation



# Embryo dune slack vegetation at Kenfig NNR





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# Humid dune slacks at Kenfig NNR



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# *Liparis loeselii*



# *Petalophyllum ralfsii*



# Major factors contributing to the loss of conservation interest at Kenfig NNR



- Habitat succession in the absence of natural habitat creation is resulting in a decline in the extent and distribution of successional-young habitats – perhaps driven by atmospheric nitrogen deposition
- Offshore dredging and intertidal sand extractions have reduced the potential for sand accretion
- Fewer summer storms limit the scope for scouring by dry windblown sand
- Rabbit numbers continue to decline through myxomatosis
- Until recently, an open access policy prevented the use of fencing for livestock
- Appropriate levels of stock grazing are difficult to achieve
- Increased visitor pressure and dog walking restricts stock grazing to the north of the site

Habitat succession in the absence of new habitat creation is the principal threat to the conservation interest at Kenfig SAC



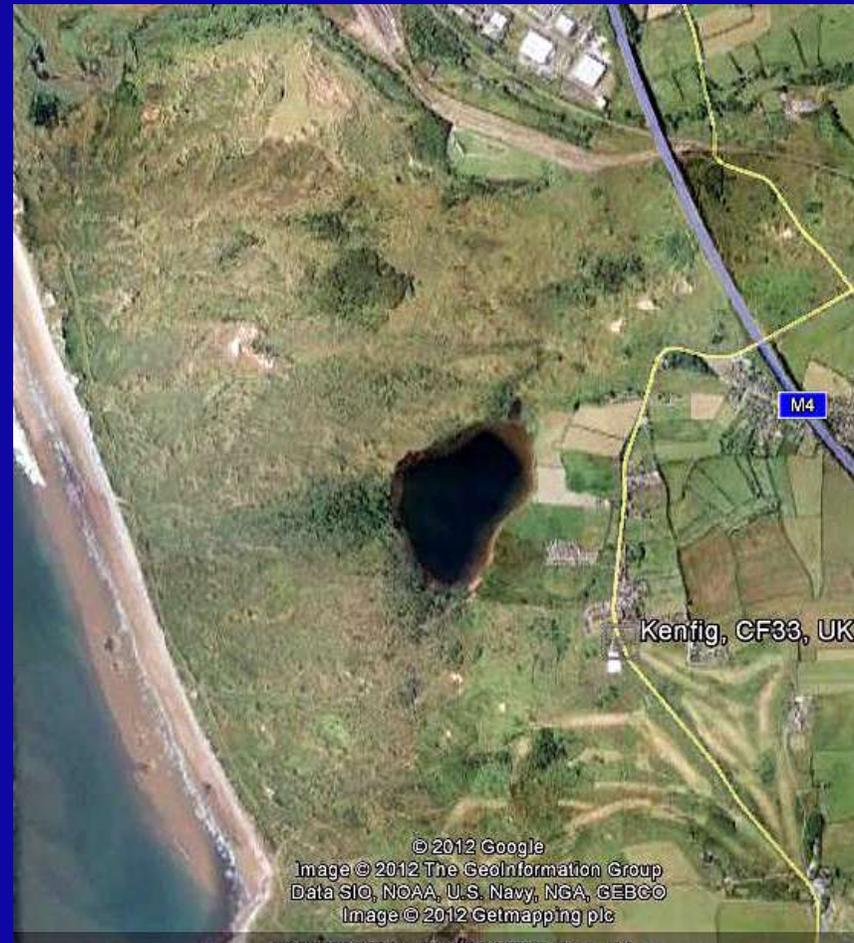
# Kenfig SAC c.1945

Kenfig dunes shortly after  
the end of World War II –  
c.1945



# Kenfig c.2006 – before *Liparis* habitat restoration work started

- By 2006, bare sand habitats at Kenfig represented < 3% of the dune system, and young humid dune slack habitat was limited to few m<sup>2</sup>
- At this time, with the exception of a few plants, *Liparis* was restricted to areas of closed slack vegetation kept short by annual mowing



# The condition indicators for monitoring in 2000



Performance indicators For when the condition of the habitat is favourable	The <i>humid dune slack</i> habitat at Kenfig will be in favourable condition when	
Quality	Lower limit	<p>In Section 1 (Map )</p> <p>&gt;30% of the dune slack sampling points in Area Y <u>and</u> &gt;45% of the dune slack sampling points in Area Z are either embryo or successional-young slack vegetation <u>and</u></p> <p>In Section 1 outside of Areas Y and Z</p> <p>at least 8 dune slacks of &gt;0.5ha, and</p> <p>at least 4 dune slacks of &gt;0.25ha</p> <p>have vegetation where &gt;70% of sampling points are either successional-young or orchid-rich slack vegetation</p>
<b>Site specific habitat definitions</b>		
Dune slack vegetation	Moist vegetation on level ground between sloping dunes, typically with <i>Salix repens</i> present.	
Successional-young dune slack vegetation	<p>Bare soil and thalloid liverworts present, <u>and</u> at least 4 of the following present: <i>Carex viridula ssp. viridula</i>, <i>Juncus articulatus</i>, <i>Anagallis tenella</i>, <i>Samolus valerandi</i>, <i>Eleocharis quinqueflora</i>, <i>Ranunculus flammula</i>, <i>Liparis loeselii</i>, within any 50cm radius</p> <p>None of the following present: <i>Phragmites australis</i>, <i>Molinia caerulea</i>, <i>Calamagrostis epigejos</i> within any 1m radius</p>	
Embryo slack vegetation	25-50% open ground with <i>Salix repens</i> forming clonal patches, <u>and</u> at least two of <i>Carex arenaria</i> , <i>Sagina nodosa</i> or <i>Juncus articulatus</i> present within any 1m radius	
Orchid-rich dune slack vegetation	<p>At least 2 of the following present: <i>Epipactis palustris</i>, <i>Dactylorhiza incarnata</i>, <i>Gymnadenia conopsea</i>, <i>Pyrola rotundifolia</i>, in any 50cm radius <u>and</u></p> <p>None of the following present: <i>Phragmites australis</i>, <i>Molinia caerulea</i>, <i>Calamagrostis epigejos</i> within any 1m radius</p>	



# Rationale behind the condition indicators



- The primary conservation interest at Kenfig centres on the embryo and successional-young dune slack vegetation, as this supports the populations of *Petalophyllum ralfsii* and *Liparis loeselii*.
- The condition indicator table identifies two areas for sampling: y and z.
- These were selected because, in the year 2000, they were the areas most likely to meet the criteria for favourable condition.
- Therefore, if these areas failed to meet the targets we could assume that everywhere else on the site would also fail.
- This assumption holds true because these areas include the youngest examples of dune slack vegetation at Kenfig

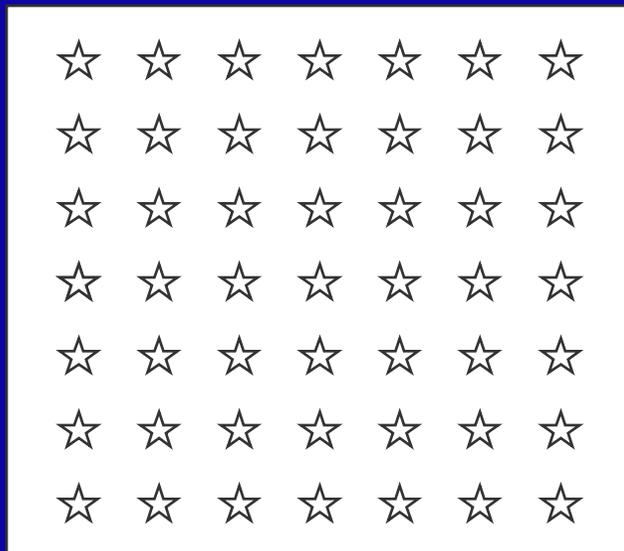
## Note:

- The surveyor needs the skill to recognise only 21 species : and
- The dune slack monitoring will take one surveyor two days to complete



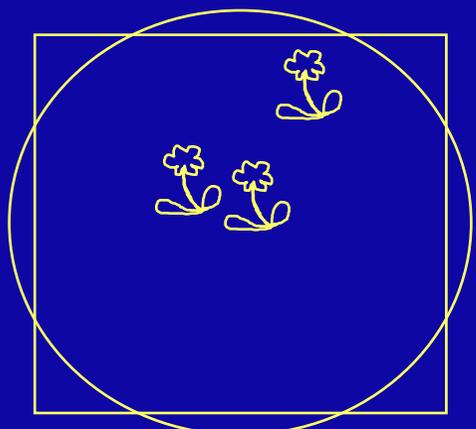
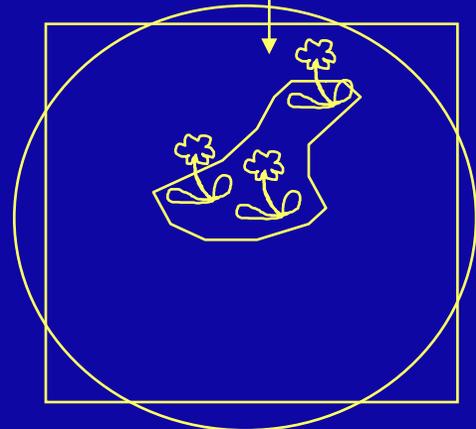
# The sampling method

Non-random  
orientation;  
Random start  
point



At every point located by GPS

Presence of A with  
>10% cover



Presence of wanted /  
unwanted species

and / or

Presence of cover  
psuedospecies

## Monitoring results in the reporting period to 2006

Dune slack results	Area Y	Area Z	Kenfig total
No of sampling points	89	53	142
Embryo dune slack	3	0	3
Successionally-young slack	2	4	6
% passes	6%	8%	
Lower limit	30%	45%	
Condition status	Unfavourable	Unfavourable	



# Typical dune slack vegetation at Kenfig in 2006



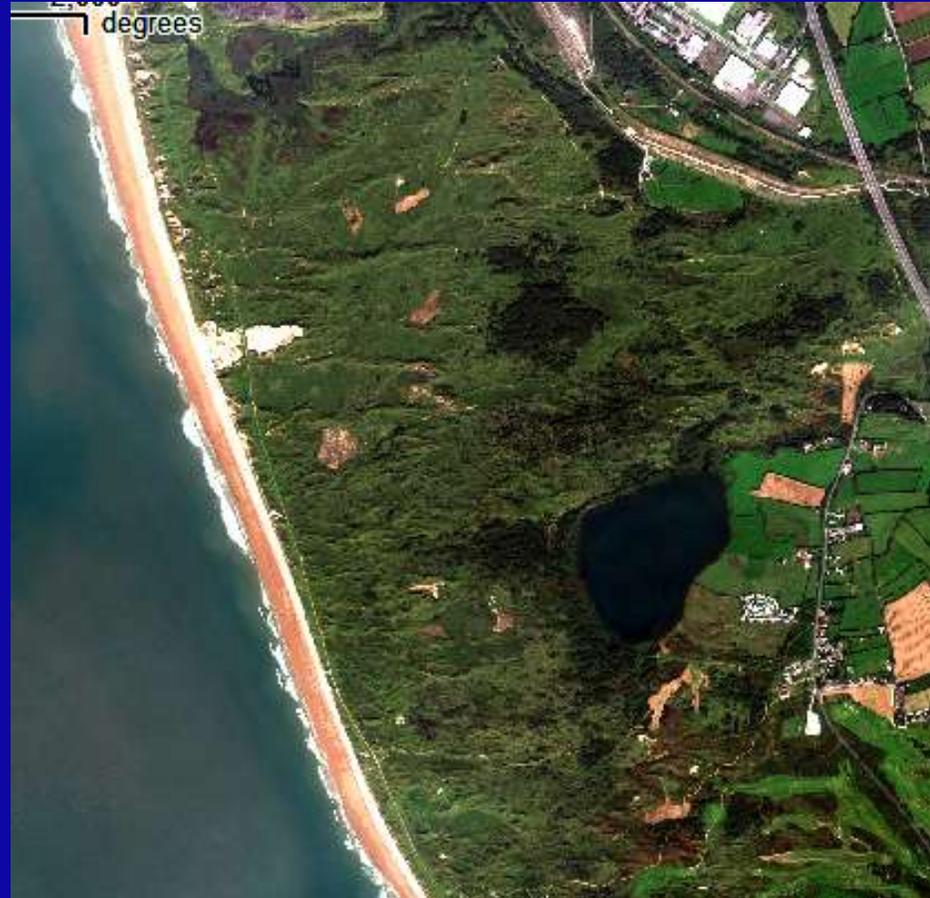
## As a consequence of the monitoring results

- A programme of close mowing has been carried out in several dune slacks to create short-term habitat for *Liparis loeselii*
- After many years of negotiation, a fence has been erected to enable controlled grazing in the north of the site, and
- In 2008 a five-year programme of excavation work was initiated to create new humid dune slack vegetation for *Petalophyllum* and *Liparis*



## Kenfig in September 2012

- We are now in the fifth year of the *Liparis* habitat restoration work at Kenfig, and in the next few months a meeting is scheduled to revise the condition indicators and to decide whether further restoration work is needed and, if so, how much and where....



# Successes.....



In 2012, both *Liparis loeselii* and *Petalophyllum ralfsii* colonised restoration areas that had been created since 2010



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