Integrating monitoring in conservation management projects

Clive Hurford
Countryside Council for Wales
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

Number of plants vs. Time
A model for conservation

- Favourable condition
- Unfavourable condition

- Upper limit
- Recovery target
- Lower limit

Maintained
Recovered
Maintained

Favourable
Unfavourable

Time
Phase I of the cycle

When the condition of the feature is favourable
The management cycle for habitats or species in favourable condition

- Develop condition indicators and set lower limit
- Monitor against lower limit
- Above lower limit?
  - Yes: Maintenance management cycle
  - No: Switch to restoration management cycle
- Next monitoring cycle

Start here
Phase II of the cycle

When the condition of the feature is unfavourable
The management cycle for habitats or species in an unfavourable state

Start Here

Develop condition indicators for restoration and set recovery target

Monitor against recovery target

Above recovery target?

Yes

Switch to maintenance management cycle

No

Confident in restoration management?

Yes

Carry out restoration management

No

Set up experimental management projects
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
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
Humid dune slacks at Kenfig NNR
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-youth 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 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 m².
- 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

<table>
<thead>
<tr>
<th>Performance indicators</th>
<th>The humid dune slack habitat at Kenfig will be in favourable condition when</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
<td>Lower limit In Section 1 (Map) &gt;30% of the dune slack sampling points in Area Y and &gt;45% of the dune slack sampling points in Area Z are either embryo or successionaly-young slack vegetation and In Section 1 outside of Areas Y and Z at least 8 dune slacks of &gt;0.5ha, and at least 4 dune slacks of &gt;0.25ha have vegetation where &gt;70% of sampling points are either successionaly-young or orchid-rich slack vegetation</td>
</tr>
</tbody>
</table>

### Site specific habitat definitions

- **Dune slack vegetation**: Moist vegetation on level ground between sloping dunes, typically with *Salix repens* present.
- **Successionally-young dune slack vegetation**: Bare soil and thalloid liverworts present, and at least 4 of the following present: *Carex viridula ssp. viridula*, *Juncus articulatus*, *Anagallis tenella*, *Samolus valerandi*, *Eleocharis quinqueflora*, *Ranunculus flammula*, *Liparis loeselii*, within any 50cm radius
  - None of the following present: *Phragmites australis*, *Molinia caerulea*, *Calamagrostis epigejos* within any 1m radius
- **Embryo slack vegetation**: 25-50% open ground with *Salix repens* forming clonal patches, and at least two of *Carex arenaria*, *Sagina nodosa* or *Juncus articulatus* present within any 1m radius
- **Orchid-rich dune slack vegetation**: At least 2 of the following present: *Epipactis palustris*, *Dactylorhiza incarnata*, *Gymnadenia conopsea*, *Pyrola rotundifolia*, in any 50cm radius and
  - None of the following present: *Phragmites australis*, *Molinia caerulea*, *Calamagrostis epigejos* within any 1m radius
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 wanted / unwanted species

and / or

Presence of cover pseudospecies

Presence of A with >10% cover
Monitoring results in the reporting period to 2006

<table>
<thead>
<tr>
<th>Dune slack results</th>
<th>Area Y</th>
<th>Area Z</th>
<th>Kenfig total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of sampling points</td>
<td>89</td>
<td>53</td>
<td>142</td>
</tr>
<tr>
<td>Embryo dune slack</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Successionally-young slack</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>% passes</td>
<td>6%</td>
<td>8%</td>
<td></td>
</tr>
<tr>
<td>Lower limit</td>
<td>30%</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Condition status</td>
<td>Unfavourable</td>
<td>Unfavourable</td>
<td></td>
</tr>
</tbody>
</table>
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*
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.