White Paper

The Herpetological Conservation Planning Process

Steve Langham
April 2012

Natural acuity

Natural Acuity is a limited company specialising in the support of strategic decisions in the defence and ecology sectors. They excel at using evidence-based approaches, conduct high quality analysis and develop effective visualisations to provide understanding of complex assessments.

Natural Acuity Limited
Panorama
Folly Hill
Farnham
Surrey GU9 0BD

Email: steve.langham@naturalacuity.com
Website: www.naturalacuity.com

Further copies of this publication are available from Natural Acuity Limited

This document is also available on the NAL website (www.naturalacuity.com)

Published by Natural Acuity Limited.
Printed in the UK in April 2012.

White Paper

The Herpetological Conservation Planning Process

Executive Summary

The herpetological community: including government, NGOs and volunteers, is a federation of organisations that lacks a common, clear methodology for planning conservation activities.

It is the aim of this paper to describe a process that could be adopted to unify effort across this community, with all parties striving towards agreed goals, and each contributor understanding his part of the overall plan.

The process laid out here is not theoretical; it is based upon sound logical steps for developing a series of capabilities across a complex environment. The approach is used by major industry, and within the UK Ministry of Defence, where it is known as Through Life Capability Management (TLCM).

There are eight stages proposed to generate a 'master' herpetological conservation plan:

1. Develop and agree a herpetological conservation taxonomy – a structured and hierarchical list of all factors that influence the conservation of native reptiles and amphibians.
2. Develop agreed definitions for each taxonomy element, and assign metrics.
3. Generate goals, or favourable reference values for each taxonomy element, that is based upon evidence, or that are agreed and recorded as working assumptions.
4. Assess the current status for each taxonomic element, using the definitions and metrics agreed above, and assess the benefits that existent plans may deliver.
5. Conduct a *Conservation Audit*, where goals are compared with the current and planned assessments for each taxonomic element.
6. Undertake shortfall analysis, in order to understand why there are gaps, if any, between the assessments and the goals.
7. Commission research in order to understand how shortfalls may be mitigated and solutions found.
8. Develop a resourced conservation management plan, based upon the solutions generated that elevate taxonomic elements that are displaying a shortfall to a favourable level.

Although a proven approach, the process can be complex with a heavy demand upon data, information management and information exchange. However; the benefits are manifest through improved efficiencies derived from the identification of gaps in the conservation programme and the reduction in duplicated work.

Contents

List of figures

Introduction

Key legal drivers for conservation in the United Kingdom are drawn from the UK's commitments to the *Bern Convention* and the *Convention on Biological Diversity*. There are of course strong personal, moral and ethical drivers for the conservation of biodiversity.

The UK governmental responsibility for the conservation of biodiversity is hierarchical. The lead state department is the Department for the Environment and Rural Affairs (DEFRA). Their conservation advisors are the Joint National Conservation Committee (JNCC), and across the UK, there are four Countryside Agencies who lead the conservation effort on behalf of their respective parliaments.

Lead partners are frequently drawn from national conservation NGOs. In herpetological terms, this lead is provided by the Amphibian and Reptile Conservation Trust (ARC) as the only effective national conservation charity in the UK for this taxon group.

Supporting herpetological conservation at local level is a wide array of Reptile and Amphibian Groups (ARGs), under the umbrella organisation of ARG-UK.

Additionally, land managers, wildlife trusts, natural history groups, volunteers and interested individuals all have their part to play.

Responsibility for herpetological conservation in the United Kingdom clearly lies across many organisations and motivated individuals.

With so many stakeholders committed to supporting the conservation of reptiles and amphibians, it is essential that a common framework is provided such that these disparate groups can mutually support each others work, gaps in the conservation effort can be identified and duplication of effort minimised to provide a more efficient gearing of scarce resources towards tangible conservation results.

The purpose of this paper is to outline one approach for the generation of common conservation goals and workstreams across the entire UK herpetological enterprise. Metaphorically, if every organisation contributes a jigsaw piece towards the puzzle of herpetological conservation, then this planning framework strives to produce the picture on the puzzle box, such that each contributor understands where their piece fits, and how it is framed by pieces from other contributors.

Context

The scope of this paper is limited to an operating model for *Conservation Planning*. Planning is one element of the wider herpetological operating model, which is outlined in the block diagram below.

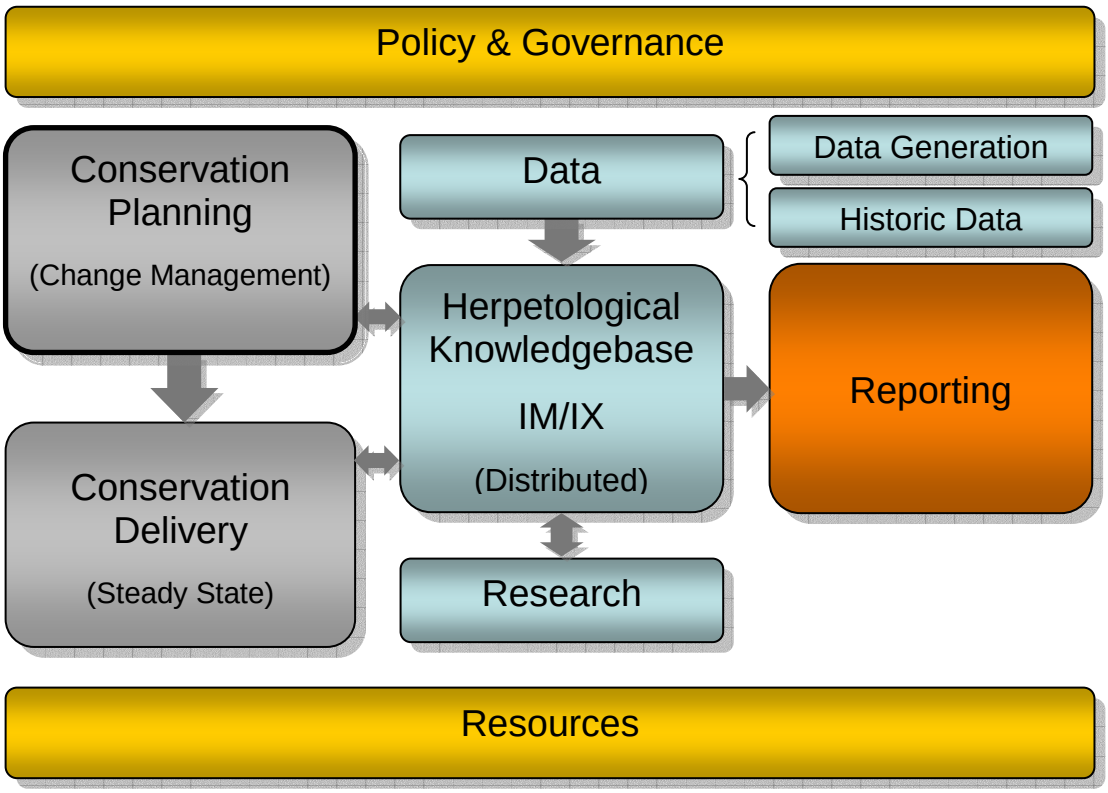


figure 1 - level 0 operating model for herpetological conservation

Principles Underpinning the Approach

Conservation Planning Principles:

1. Wherever possible, analysis and deductions must be based upon objective evidence.

2. Where objective evidence is not available, then it is acceptable to use and record working assumptions, provided that these assumptions are agreed by the majority of informed stakeholders, and that a research line is identified to replace the assumption with objective evidence at a later date.

3. Wherever possible, analysis must be objective, impartial and repeatable.

4. Conservation activities must be goal–driven. If an activity is identified that lacks a goal, then a new target must be engineered into the process. This reinforces effective actions and identifies ineffective activities.

5. The conservation planning process must have an owner, who governs its development and use, and advises the conservation community of interpretations as necessary.

6. The process should ideally have a governmental sponsor.

7. The process must be clear to all involved, and each participant should understand their role in the grand plan.

8. The approach should be geographically scalable, from national, regional and local to even site levels.

9. The process must be resource aware, but not resource constrained with the exception of the final plan, which assigns available resources to actions across time. Activities that are essential are required regardless of resource availability!

10. The primary objective for the process should be the generation and development of an efficient and effective management plan for reptile and amphibian conservation, however; we should be aware of additional reporting requirements, and build the means to address these into the supporting information systems.

Table 1 - Conservation Management Planning Principles

The Conservation Planning Process

The process proposed for generating conservation plans comprises eight stages, and is an iterative, rather than a linear process. It is acknowledged that throughout the cycle, lessons will be learned, and adjustments required for fine-tuning.

The process itself is shown in diagrammatic form in figure 3. Each of the eight stages is summarised below.

1. Conservation Taxonomy

In systems architecture; a taxonomy can be defined as the practice and science of classification. Taxonomies, or taxonomic schemes, are composed of taxonomic units known as taxa (singular taxon), and are frequently arranged in a hierarchical structure, typically related by subtype-supertype relationships, also called parent-child relationships.

A conservation taxonomy is a hierarchical structure of factors which have a bearing on the conservation status or conservation condition for the species in question. Each taxonomy element has neither metrics nor goal associated with it. This lack of initial detail is deliberate, as focussing on the taxonomy structure alone means that consensus is more easily achieved. Frequently, taxonomy debates are about the definition, metrics or goals rather than the classification scheme *per se*; so by agreeing the taxonomy independently of these complicating factors allows for progress and a more structured development.

By structuring the various conservation factors into a taxonomic architecture, it is usually possible to spot gaps and overlaps in the classification scheme. Similarly, some terms are subsets of other taxa, and this may be catered for in the hierarchical nature of the structure.

One option for the top-level taxonomic scheme for any conservation taxonomy would be the interpretation of the EU Habitats Directive reporting requirements shown in figure 2 below:

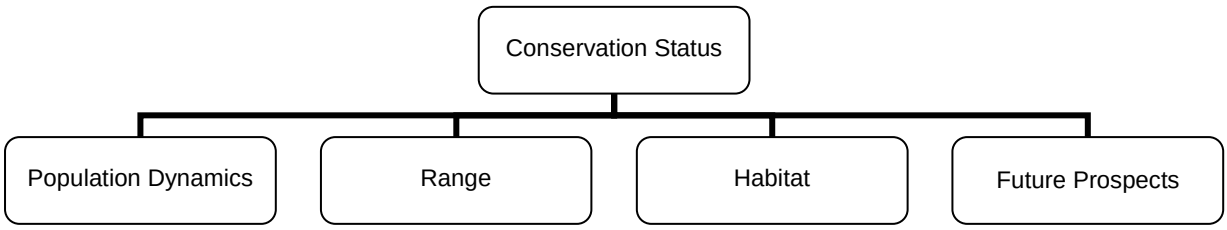
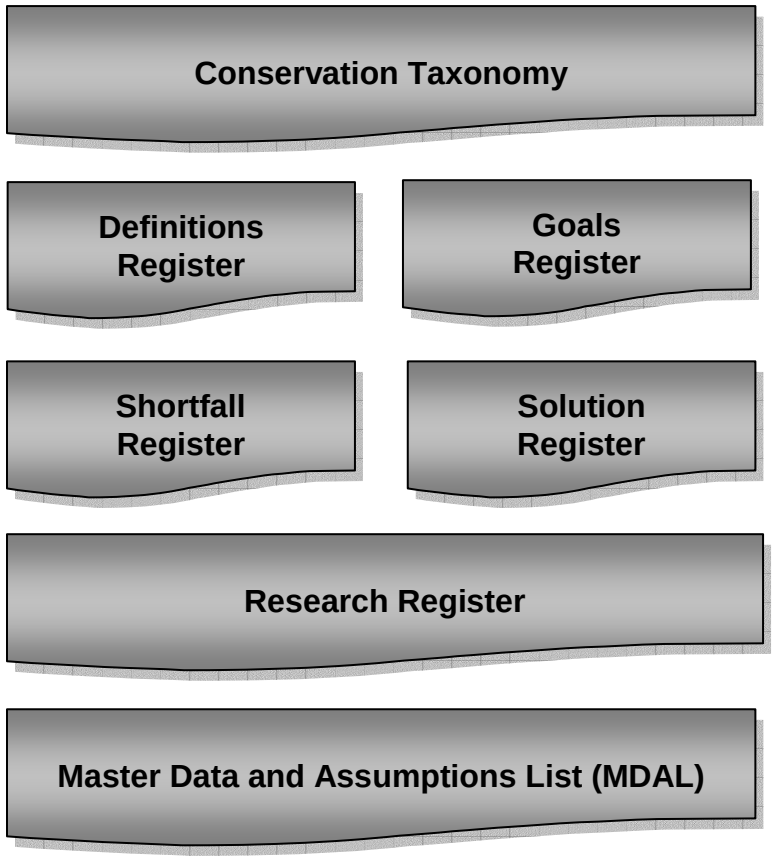


figure 2 - top level taxonomy for conservation status

The Conservation Planning 'Water wheel'



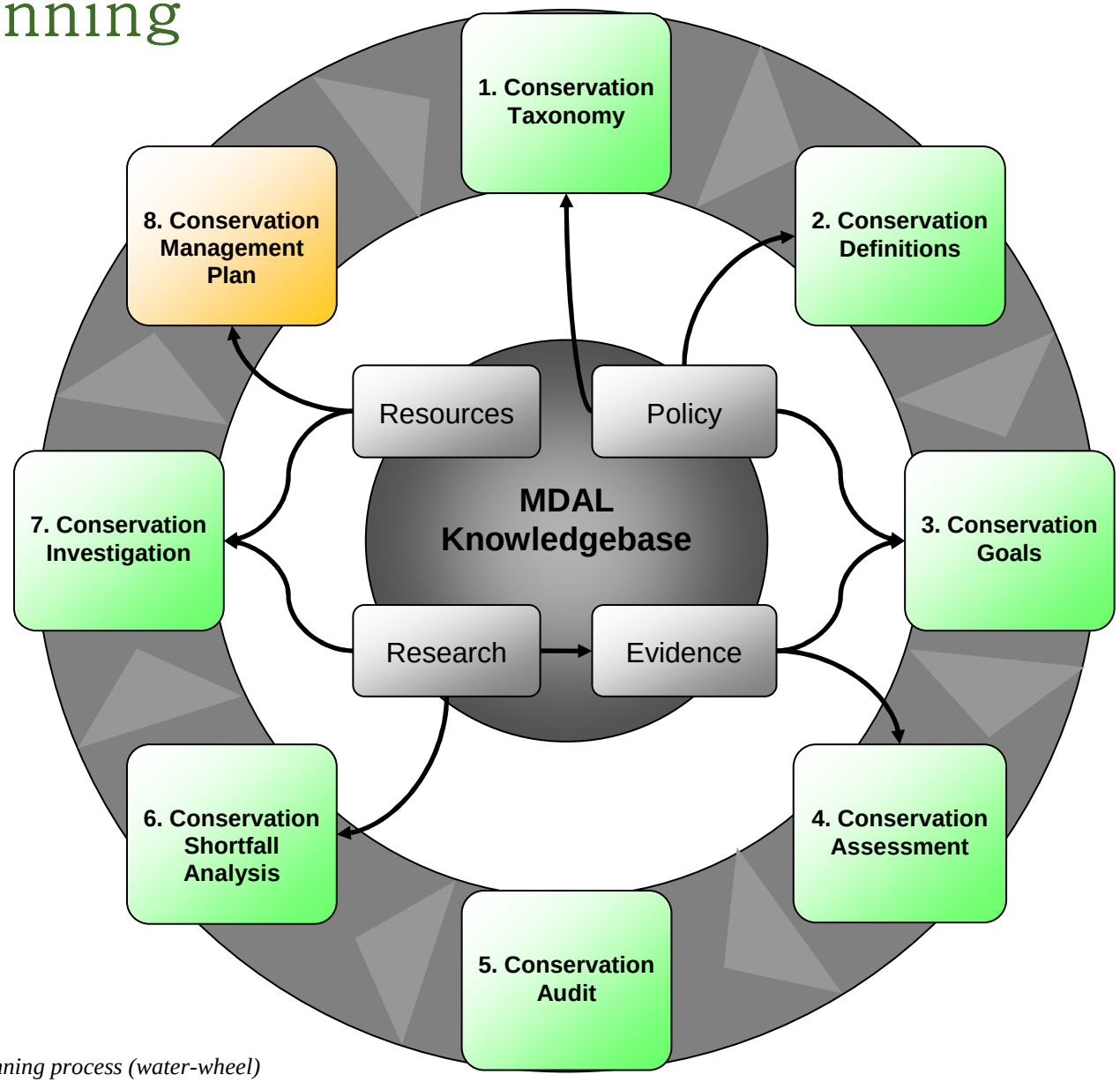


figure 3 - the Conservation Planning process (water-wheel)

2. Conservation Definitions

Once an initial taxonomy has been agreed by key stakeholders, the detail of defining each term is required. Each taxonomy element should have a working definition and assigned the metrics by which the taxonomy element will be measured. Whilst taxonomy element titles should be consistent, the definitions and metrics may vary by species and geographic scale.

An example might be a taxonomy element of *area occupied* by the species; for national coverage, monads may be the preferred metric, but for site assessments, hectares may be the metric of choice. For a site that is adequately surveyed, the definition of *occupied* may be *known* presence, whereas at the national scale the definition may be *predicted* presence.

3. Conservation Goals

We now have a taxonomy of conservation factors, which have been defined and assigned appropriate metrics. The next stage is to set *Conservation Goals* for each taxonomy element, for each species and for each geographic scale. The setting of goals must be based upon evidence or agreed and recorded assumptions, and must always have a logical audit trail.

We are able to set two goals, a Threshold (just enough for the time being) and an Objective (the ideal goal). The idea of having a target range is important when we come to the allocation of resources to taxonomy elements, as this range represents the space within which we can trade priorities and achieve resource levelling.

Again using the example of the taxonomy element *area occupied*, let us assume the target species is the sand lizard (*Lacerta agilis*) and the geographic scale of the assessment is at national level. We need a logical process to define a goal for the number of monads occupied by sand lizards for us to reach a favourable conservation status.

One approach may be to gather historic sightings, and to correlate these sightings against habitat type and geology. We may also wish to assess climatic factors. Using predictive mapping, we could assess an estimate for historical sand lizard range. Within this range, we could categorise monads as being *currently unsuitable* with no chance of improvement, currently unsuitable but may be *manageable to become suitable*, and *currently suitable*.

We may wish to see sand lizards occupy all currently suitable monads within historic range, and perhaps 50% of recoverable monads (we would require a rationale for this figure of 50%). Following these calculations we may decide that an appropriate objective goal (or favourable reference value) for sand lizard occupancy across the UK would be 2000 monads, whilst a threshold goal may be as low as 1500 monads.

Each taxonomy element for each species at each geographic scale being considered must have an associated goal. Clearly this can become rapidly complex with large amounts of data being managed. An effective knowledgebase, perhaps using a relational database structure would be required. Remember that the audit trail, or rationale of how the goal was set also needs to be recorded in the *Conservation Goals Register*.

For some species, policy may well be a driving force. For example, if the assessment is for an alien or invasive species, then policy may dictate that some taxonomy element goals (such as population or range) should be set to zero.

So far, every step has been solution agnostic, in that only *what is needed* has been considered and not the *how it is delivered*.

4. Conservation Assessment

Having set goals for each taxonomy element, we now need to measure the current status (assessment) of the metric, this forms our *Baseline*. We then need to measure the predicted effects of the current plan in the near future. This is often assessed for epochs, (perhaps each of 6 year duration to tie in with the EU reporting cycle), as this eliminates the need for annual assessments, and helps match precision to accuracy.

For our sand lizard example, we need to assess the number of occupied monads at the time of the assessment and for the effect that current plans are believed to deliver. As survey resources are scarce, and the UK's area is large, it is unlikely that we will ever be able to empirically derive a ground truth for any but the rarest and most geographically constrained species.

Assessment is likely to be derived from computer modelling, which draws from empirical data to generate estimates for the current baseline and the effects delivered by extant plans at future dates. This approach does not breach our principles, as computer models are objective and repeatable. We may have to make some working assumptions when creating the model's algorithms, but provided these are exposed, agreed and recorded, we are still on track for a robust system. Wherever possible, lines of research should be identified that would improve the level of evidence used for these assumptions, such that a register of research requirements can be generated, and prioritised for later resource allocation.

Both the *Conservation Assessment* and *Conservation Goals* stages rely heavily upon data and assumptions. A well structured information management and exchange process will need to be in place to support the conservation management planning process. This 'knowledgebase' or 'IM/IX' system is the subject of a further NAL white paper (Langham 2012).

5. Conservation Audit

In principle the conservation audit is simple. It is the comparison of the goals against the assessment for each taxonomy element. In practice, this may mean the comparison of hundreds of taxonomy elements, so there is a need to visualise the results in a meaningful manner. Either matrices or 'bullseyes' are the usual way of visualising such an audit process.

It is common practice to assign 'traffic light' colours to the degree by which the assessment of each taxonomy element satisfies its goal. Traditionally *red* means that the assessment fails strongly to achieve the goal (perhaps 0 to 50% of the goal). *Amber* still means a failure to achieve the goal, but is less of a severe failure than *red* (say 50% to

the goal Threshold). *Green* usually means that the goal is achieved, such as between *Threshold* and *Objective*. *Blue* is often reserved for when the assessment exceeds the goal. This process of colour–matching performance against goals is sometimes referred to as 'RAGging', which is derived from a verbalisation of the Red, Amber & Green acronym (RAG).

6. Conservation Shortfall Analysis

Where an assessment fails to achieve the target set for that taxonomy element, it is deemed to have a *Conservation Shortfall*. Having succeeded with our conservation audit, we now know those taxonomy elements where we fall short of our targets. However; we may not understand *why* we have fallen short. The purpose of this stage of the process is to determine why the shortfall exists.

In many cases, the cause may be obvious, but this should still be recorded. Shortfalls may exist in the present (*Baseline*), but may be reduced or even removed in later epochs, where we assess the extant plan as being effective.

In some cases the cause of the shortfall may not be apparent, and research may be required to understand the root causes. Against each shortfall in our shortfall register, the cause of the shortfall should be recorded, or a research line identified in the research requirements register to generate the necessary understanding.

7. Conservation Investigation

Knowing we have a shortfall, and even knowing why the shortfall exists does not necessarily mean that we know *how* to fix the problem. *Conservation Investigations* are lines of research that look for solutions to shortfalls.

Capability Investigations may involve a COEIA (cost effectiveness investment appraisal), which compares multiple solution options, leading to the recommendation of the most cost–effective fix.

If a *Conservation Investigation* leads to a *Conservation Solution*, this should be recorded in the *Solutions Register*. If not, then a research line should be identified and recorded in the *Research Register*.

8. Conservation Management Plan

Having reached stage 8 of the process, we should now have a clear understanding of what is required for the conservation of the species, and how far down the path of achieving its conservation we have reached. Where there are conservation shortfalls, we either have (cost effective) solutions identified, or we have identified research activities that may provide the solutions.

What is now required is to asses the available resources, identify conservation activity priorities (which may require relative weighting of taxonomy elements), and to generate a resourced conservation management plan across time, that is affordable.

This process is best achieved via a committee, which has the required information at hand to make strategic decisions. Possibilities for such a committee could be the Amphibians and Reptiles of the British Isles Taxon Expert Group (ARBITEG) or a separate committee chaired by CEO ARC.

One of the key information requirement for such a committee would be visualisations of plans supporting taxonomic elements, called *Conservation Staircases* (see figure 4). These show how the effectiveness of a shortfall–reduction plan is assessed across time. The totality of taxonomy element plans is the *Conservation Management Plan* for the species.

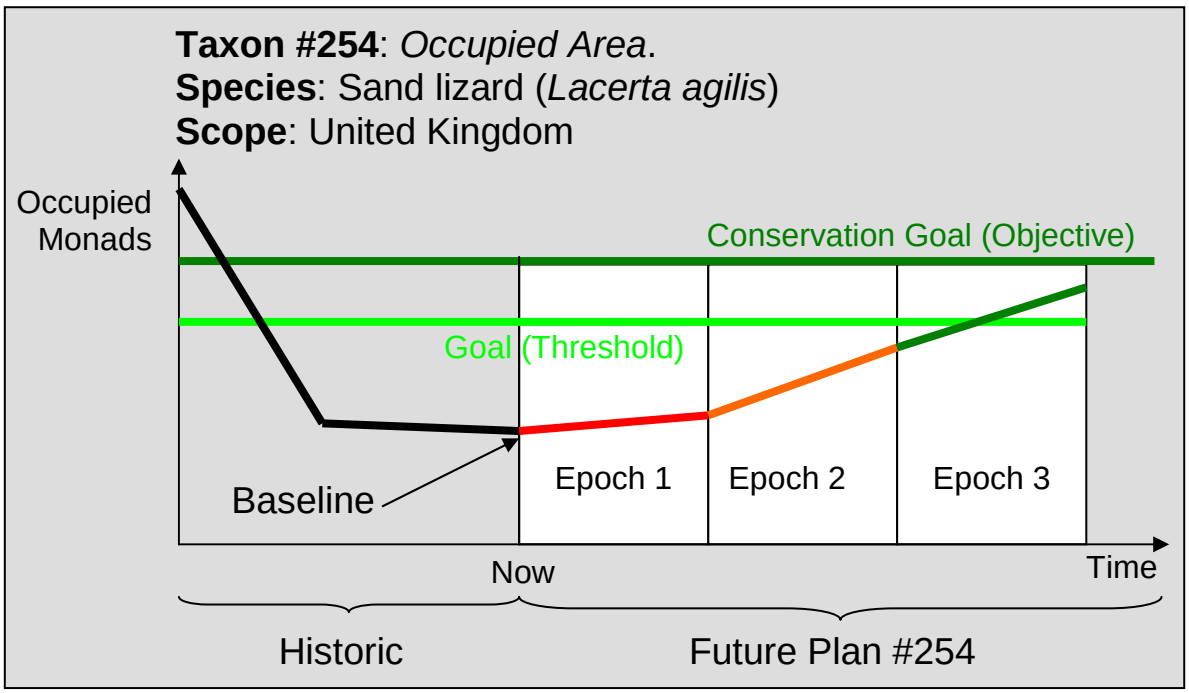


figure 4 – example Conservation Staircase diagram

Activities identified in this *Conservation Management Plan* could be categorised as Species Action Plan activities or Habitat Action Plan activities. This would provide a firm base for influencing HAPs, or to leverage funding from donors by using this persuasive evidence–based approach.

This paper is concerned with the process for generating an evidence-*Conservation Delivery*, including the recording of activities and tracking against targets is beyond the scope of this paper, and is adequately described in professional programme management methodologies such as MSP [1].

Closing the Loop

It is inevitable that new reporting requirements or insights from conducting the process will require adjustments to the taxonomic structure. With a well–designed IM/IX system, the *Conservation Management Plan* can be rebalanced with minimal effort.

[1] MSP – Managing Successful Programmes. http://www.msp–officialsite.com

Further information concerning this process can be obtained from the author using the following email address: steve.langham@naturalacuity.com

Glossary of terms

ARC	Amphibian and Reptile Conservation Trust.
COEIA	COst Effectiveness Investment Appraisal.
Conservation Audit	A comparison of assessments to goals.
Conservation Delivery	The execution of conservation plans.
Conservation Goal	The quantity of a metric deemed as sufficient.
Conservation Investigation	Research into how to fix a defined shortfall.
Conservation Management Plan	A coherent schedule of resourced conservation actions.
Conservation Shortfall	Where an assessment falls short of a goal.
Conservation Staircase	A graph of plan effectiveness across time.
Conservation Taxonomy	A structured list of factors affecting conservation.
Definitions Register	A list of meanings and metrics applied to the taxonomy.
Favourable Reference Value	Goal or Target.
Goals Register	A structured list of Conservation Goals.
HAP	Habitat Action Plan.
IM/IX	Information management and exchange.
Knowledgebase	A repository of data, assumptions and information.
MDAL	Master Data and Assumptions List.
MSP	Managing Successful Programmes.
NAL	Natural Acuity Limited.
NGO	Non-Governmental Organisation.
Objective	A goal, that is the ideal target for conservation.
RAG	Red, Amber & Green - assessment visualisation technique.
Research Register	A list of research lines and their exploitation route.
Resources	Funding or manpower.
SAP	Species Action Plan
Shortfall Register	A structured list of conservation shortfalls.
Solution Register	A structured list of agreed solutions to shortfalls.
Threshold	A goal that is acceptable, yet less than ideal.

A Natural Acuity Limited Publication