

## Diagnosing threat What *is* the problem?

**AIM:** For participants to understand the value of using thinking tools (causal flow) to shed light on a species decline problem and help in identifying main areas of research required and hypothesis generation

### Objectives:

- I. To introduce the concept of the declining population paradigm and its relevance to the management of species recovery
  - II. To highlight the lack of research into this field and the subsequent risk of “reinventing the wheel”- a lack of “evidence-based” conservation
  - III. To introduce the concept of causal flow diagrams as a way of representing understanding of threats and potential impacts on a species
  - IV. To provide a systematic way of determining principle threats, based on the work of Sutherland (2000)- *how relevant is this to amphibian cons?*
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### Introduction (15 mins)-

ON BOARD                      ↓ Threat                      =                      ↑ population

“As species conservation managers this is what we are trying to achieve- a reduction in the main threat to a species resulting in its recovery. However, this is perhaps an oversimplification- How often do we know what the principle threat is to a species, when there may be many affecting it? Do we really know the links causing population decline or are we assuming a direct/indirect relationship?

“This is particularly relevant to amphibians where multiple threats may be working synergistically to exacerbate the problem. If we are to become more effective at managing amphibian recovery then we must deepen our theoretical understanding of the cause/effect relationships governing species decline at the local level, recognising the potential influence of regional and global factors. How do we identify likely points in the system where we need to act either to gain more understanding or to turn the species around?

Graeme Caughley (1994) wrote a hallmark paper considering this aspect of conservation biology- and compared it to our understanding of small populations.

ON BOARD-                      Graph of a declining population with circle at end point where population small-

***Small population paradigm-*** we know a lot about how small populations operate and can predict the genetic/ demographic impacts of smallness on the chances of survival for a species/population. This is what you will be finding out about later on in the course.

**Declining population paradigm-** This is where conservation managers are operating, doing a lot of work, but perhaps not making the most of the learning that could take place. We know the practice (sometimes it works and sometimes it doesn't!) but not the theory as managers are too busy doing things to systematically approach a problem and most importantly get the lessons learnt out for others to learn from.

**HOLD UP AGILE FROG ACTION PLAN-** We have all seen species action plans- they include some analysis of threats- how often, though do they identify the main threat and therefore priorities for action? (Read from action plan as example- just a list!) It may be hard to set priorities for amphibian threats as we know so little about their interactions- it is therefore even more important for us to develop thinking tools to propose what could be happening and set the research agenda.

**Today we will be focusing in on threat diagnosis and tools we can employ to help build up a plausible picture or what is going on and identify where we will act first.**

One tool we can use to build up this picture is known as a causal flow diagram. It encourages us to identify direct links in a problem chain and can be used to suggest missing links in our understanding and set hypotheses.

For example...

ON BOARD-                      ↑ Cash → ↑ Conservation impact

Is this true? If we have less money can we have less impact on a species?? So this is not a direct link- other factors involved that need to be identified before we can see what the cause and effects are...

**Powerpoint (20 mins)-** What's the threat to the species?

**Small group activity (90-115 mins)-** Brainstorming/analysis of potential impacts of threats (30-45 mins) followed by Causal flow diagramming (60 mins)

ON FLIPCHART-

To do:

- 1) Brainstorm the list of factors involved in species decline- the main problem! (for each potential threat suggest range of potential impacts)
- 2) Link up the different factors into cause and effect
- 3) Decide if the links are direct or inverse
- 4) Chose one area of threat and build up causal flow diagram showing all the links.
- 5) Identify real and suggested links (dotted/solid lines)
- 6) Propose areas for further research and create hypotheses

**Feedback (45 mins)-** Each group present their diagrams with links and explanations- at which point in the diagram could they intervene? (demonstrate

value of diagrams in identifying multiple options). What hypotheses could we formulate?

**Summary (15 mins)-** Comments on causal flow diagrams- strengths and weaknesses? A lot relies on the initial surfacing of information, be it fact or informed assumption. They do highlight that we are operating in an uncertain field- we know so little- but that does not stop us from making informed guesses and helping us to make more objective choices about priority areas for research or direct action. **WHAT WE MUST NEVER FORGET IS THAT INACTION IS AN ACTION-** take the case of the pou'oli- in 2004 when Simon was here we looked at diagnosing threats for the species...soon after it went extinct...

Lessons learnt in threat diagnosis- a summary of the whole process:

OHP/POWERPOINT- show process from Sutherland identifying where in the process the causal flow diagram would fit. NOTE- FOR AMPHIBIANS IT MAY BE A RISKY STRATEGY TO COMPARE BETWEEN SITES AS WE KNOW THAT IMPACTS MAY BE SITE AND SPECIES-SPECIFIC!

(From Sutherland (2000))

1. Review evidence for decline. *What evidence is there for decline at a large/small scale and reduction in distribution/range? Is any localised drop mirrored by an increase elsewhere? Is the decline within historic fluctuations for the species?*
2. Understand species life history. *What habitat/microhabitat does it occupy? What does it eat and at what times of the year? What are the species other competitors, predators, prey, pathogens? What are the main causes of death/breeding failure? Are there "model" species that could fill in the gaps? Where does it breed?*
3. Evidence for ecological change. *Have anthropogenic factors changed? Have introduced predators/competitors appeared recently? Has exploitation increased?*
4. List possible reasons for decline. *Keep an open mind!*
5. TEST HYPOTHESES FOR DECLINE. *Studies in multiple sites often reveal more than if focus on one site of decline, in order to separate out key threats from multitude (e.g. as shown in gecko decline table in threats powerpoint).*
  - A) Carry out population study- measure breeding success/survival at different stages. Don't rush to action at this stage! (e.g. A study of Giant Sequoia considered fire as main damage to the species- in fact it was crucial to regeneration!)
  - B) Compare breeding success/survival between sites
  - C) Compare environment in area where species declined and where it has not- what are the critical factors?
  - D) EXPERIMENT within a site to change an environmental conditions (e.g. controlling invasives). I.e. act but in a systematic way that allows for key variables to be assessed.
  - E) Relate change in a variable with change in population at a site.
6. Link reasons for decline discovered through testing to ecological changes identified before and identify ways of removing the effect.  
**MONITOR THE POPULATION!**
7. As knowledge accumulates go back to stage 1- particularly if species not recovered.
8. Celebrate!!)

### **Summary (5 mins)**

So though we have successes to talk about, few of them have been approached in such a way that lessons can be learnt and applied to other species in other situations. The theory of managing population recovery and understanding declining populations is limited- we need more systematic work by conservation managers to develop our understanding and move away from

oft-used but oft-ineffective methods of managing a problem, i.e. not based on evidence-based conservation.

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### **Equipment**

PPT- diagnosing threats

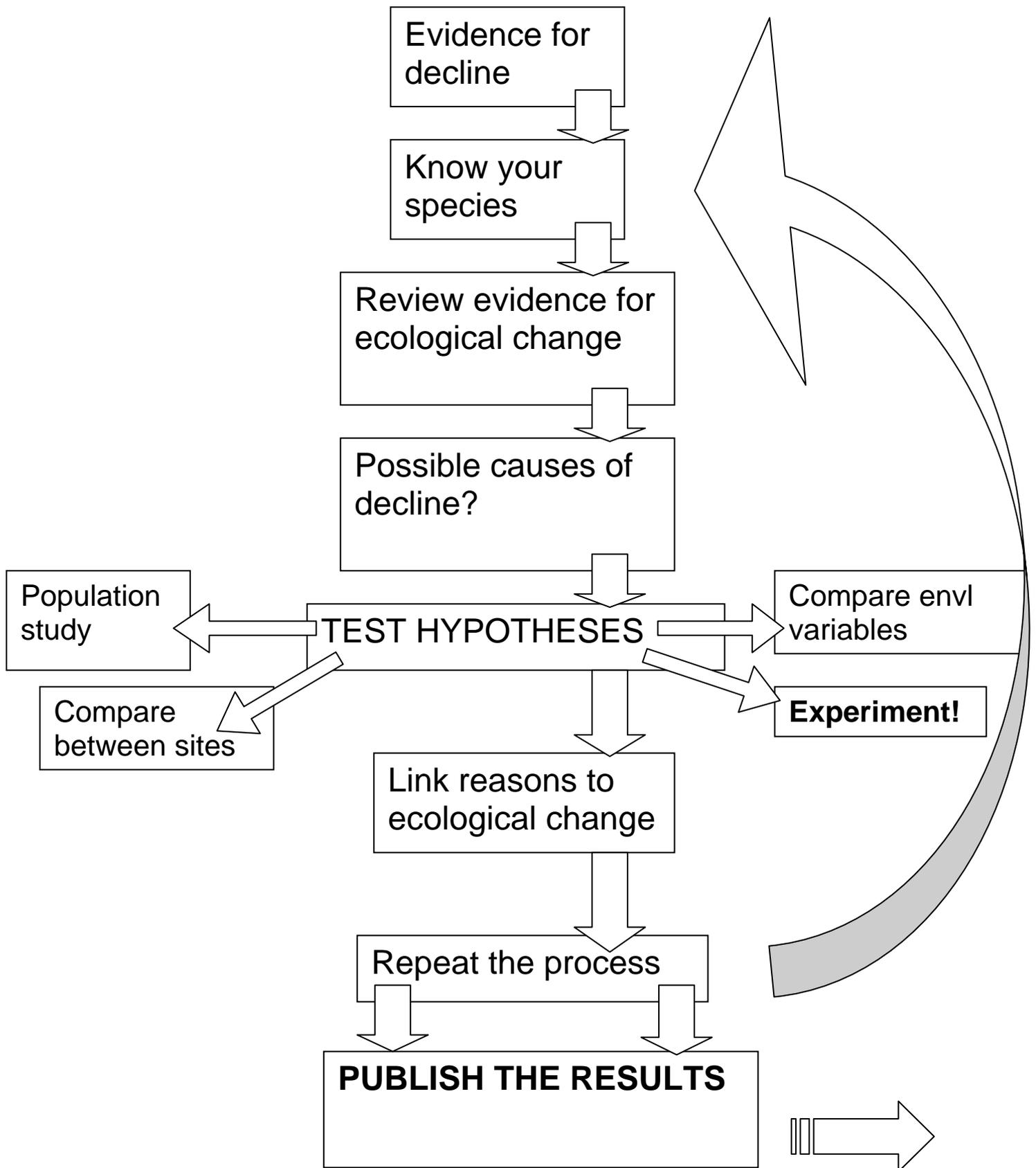
-What's the threat to the species?

OHP- flow chart of process (Sutherland, 2000)

Papers by Green on Causes of population decline in birds, Directions in conservation Biology (Caughley, 1994), Evidence for food limitation in Hen harriers paper (Amar et al, 2003), Sutherland- Conservation Handbook.

Blaustein & Kiesecker (2002)- Ecology letters- in ref folder

# Diagnosing the threat



Modified from Sutherland (2000)