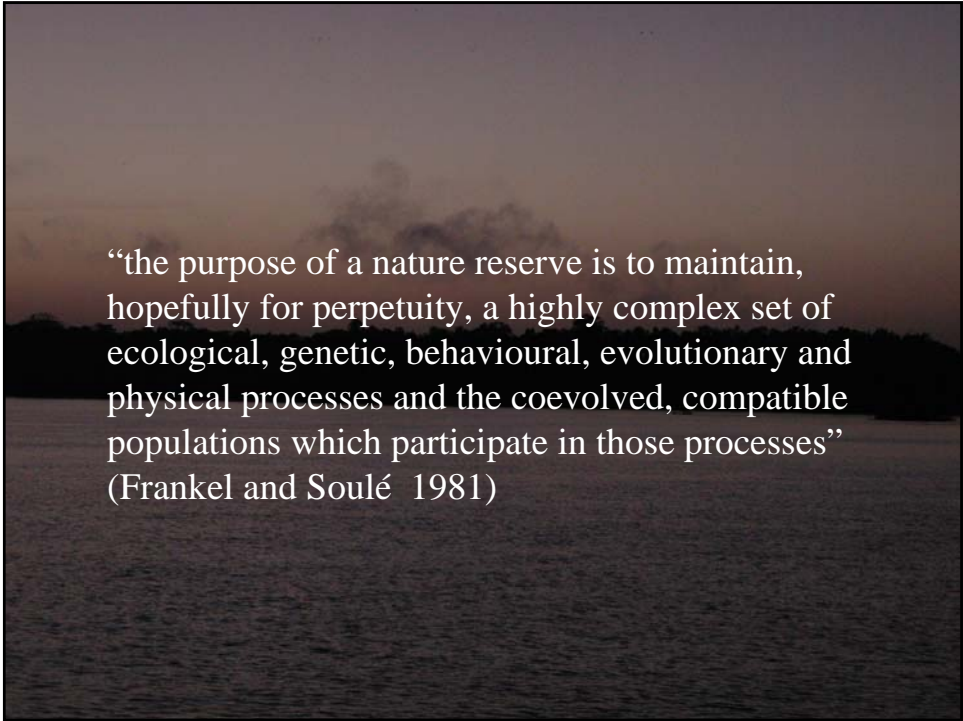




## Targets for biodiversity process



“the purpose of a nature reserve is to maintain, hopefully for perpetuity, a highly complex set of ecological, genetic, behavioural, evolutionary and physical processes and the coevolved, compatible populations which participate in those processes”  
(Frankel and Soulé 1981)



## Which processes to plan for?

- Processes we know about
- Processes that are understood well enough for their spatial requirements to be estimated
- Processes for which conservation planning can make a difference ...
- Fine-scale processes can be accommodated regardless
- Very extensive processes are beyond the influence of conservation planning (e.g. ocean currents, plate tectonics)
- Between these scales, the persistence of processes will be determined, at least in part, by conservation planning



## Examples of biodiversity processes that need to be maintained ...

- Population dynamics within patches
- Population dynamics between patches
- Interspecific interactions (pollination, competition, herbivory, predation)
- Patch dynamics of disturbances (e.g. fire, storms)
- Patch dynamics of resources (e.g. rainfall, flowering, flooding)
- Short- and long-distance regular movements
- Adjustment of distributions and persistence in refugia with climate change
- Diversification of lineages





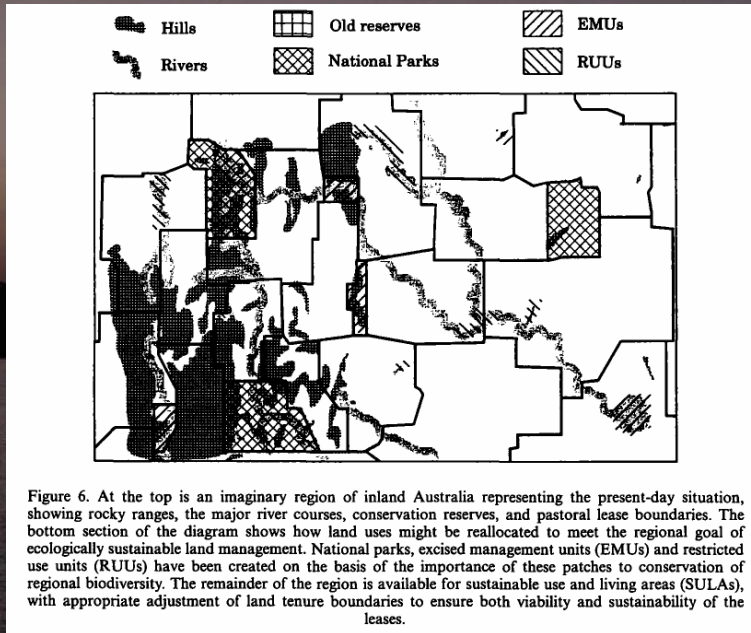
## 1. Variable conservation targets

- Estimates of viable population sizes (and corresponding areas), adjusted for life history characteristics and responses to disturbance (e.g. fire)
- “Insurance multipliers” for targets that account for proportions of conservation systems expected to be affected by disturbance at any time

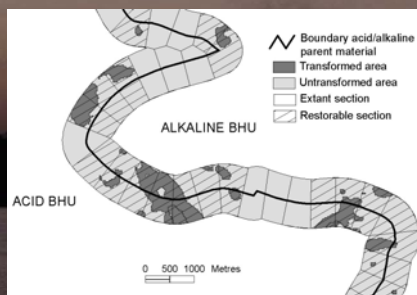


## 2. Moveable conservation areas

- Applied and removed as features of interest shift between parts of a planning region, or applied temporarily and repeatedly to particular areas
- Proposed to maintain spatio-temporal dynamics (e.g. shifts in waterbird breeding colonies, species associated with natural disturbances)
- Temporary restrictions on extraction (e.g. fishing closures, exclusion of grazing stock)



### 3. Spatial catalysts



- Drought refugia (e.g. run-on areas and gorges)
- Climatic gradients
- Climatic refugia
- Migration routes or staging areas

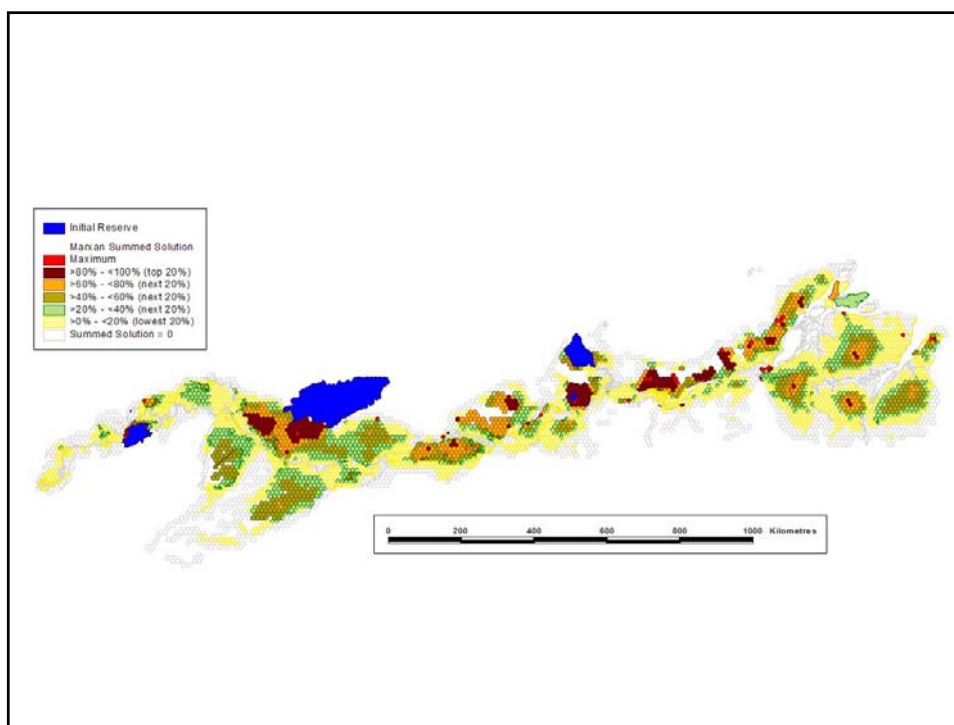
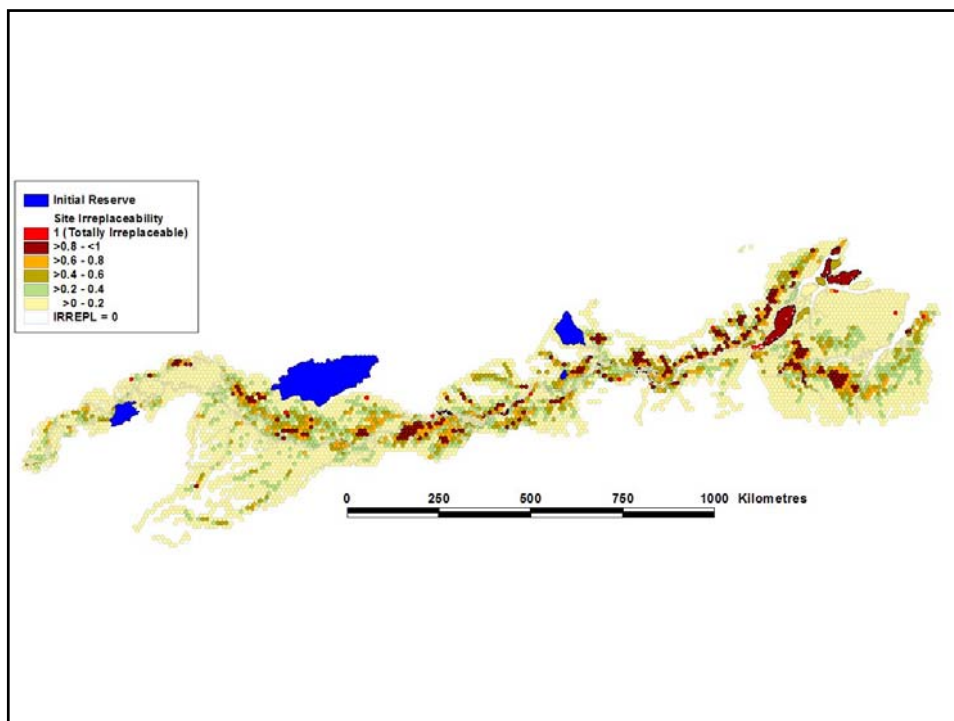
- Many are features to represent and manage for conservation
- Others are demarcations of historical influences on species composition and help to subdivide regions

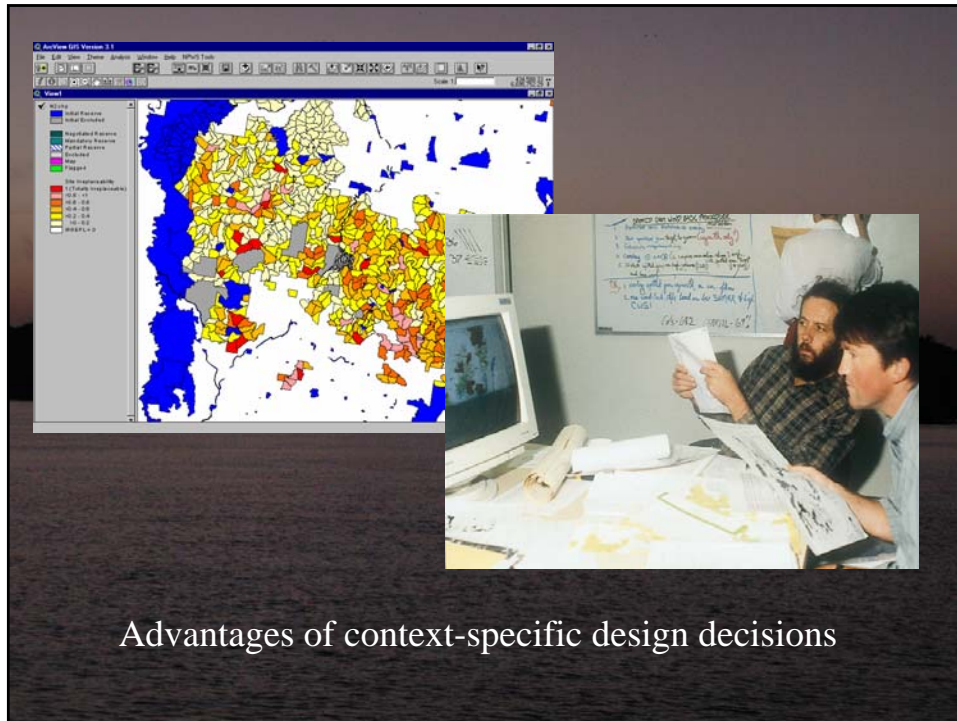
## 4. Generic design criteria

- Design criteria: size, shape, connectivity (many concepts and measures), directional alignment, minimum spacing, maximum spacing, replication
- Generic criteria have no explicit link to design requirements of particular processes in particular parts of a region
- Design criteria are most commonly applied generically (vs specifically, below) because of lack of information on the spatial requirements for particular processes (including species population dynamics) to persist

## Planning with generic design criteria

- Can be used to review existing systems of conservation areas, e.g. size frequency analysis of established reserves
- Can be used as preferences for planning new conservation areas, e.g. where there is a choice, enlarge or link conservation areas
- Both review and planning are made difficult by the lack of quantitative targets (how big?, how to combine competing criteria?)
- Generic criteria do not provide a basis for strong arguments in negotiation settings





## 5. Quantitative design criteria

- The same criteria (size, shape, connectivity etc)
- Stage 1 (essential): Interpret requirements of processes as quantitative targets for design criteria (e.g. minimum size of reserves, minimum distance between reserves)
- Possible to use integrated measures such as “effective area” of habitat that include quality, extent, connectivity)
- Typically, quantitative design targets developed for very few processes because of lack of information
- Stage 2 (highly desirable): Map the options for achieving design targets across the region

Table 7  
Minimum numbers of individuals of large and medium-sized mammals recognised in fragments of native vegetation

Species/category	Min. no. <sup>a</sup>	Rationale
Elephant	50	Minimum size of functional social unit. Assumes active metapopulation management between conservation areas.
Black rhinoceros	10	Minimum number maintained by conservation agencies. Assumes active metapopulation management between conservation areas.
Other herbivores <sup>b</sup>	25	Minimum number maintained by conservation agencies. Assumes active metapopulation management between conservation areas.
Large carnivores <sup>b</sup>	10	Minimum number sufficient for social interactions. Unable to persist outside conservation areas or to move between them. Assumes active metapopulation management between conservation areas.
Mobile smaller carnivores/insectivores <sup>b</sup>	4	Minimum size of breeding group. Assumes that animals will move between conservation areas across transformed or untransformed land.
Social omnivores <sup>b</sup>	10	Minimum size of functional social unit. Assumes that animals will move between conservation areas across transformed or untransformed land.
Non-social omnivores/insectivores <sup>b</sup>	4	Minimum size of breeding group. Assumes that animals will move between conservation areas across transformed or untransformed land.

<sup>a</sup> Minimum number recognised in a fragment of native vegetation, estimated only from extant, core habitat. Fragments unable to support these minimum numbers had populations of the respective species set to zero for the planning exercise (see Kerley et al., 2003).

<sup>b</sup> Table 6 lists species in each category.

