Population Viability Analysis (PVA)

What it is?

Application of data and models to estimate probabilities that a populations(s) will persist for specified times into the future.

Three parts:

Persistence

Time

Probabilities

Population Viability Analysis (PVA)

Particularly useful for questions regarding conservation/management of small populations that seek to:
-prevent further declines
-facilitate increases to more secure numbers

Sources of Stochasticity:

Environmental -

Demographic -

Genetic effects -

Catastrophe-

Population Viability Analysis (PVA) for San Joaquin Kit Fox

Dennis & Otten (2000)

PVA using time series data

Table 3. Estimated probability (and approximate 95% CI) that the San Joaquin kit fox population will decrease to n_e individuals within t yr, starting in 1995 from a population of 133 individuals.

n_e	t	Estimated probability	95% CI
50	5	0.03	<0.01–0.11
50	10	0.15	0.01–0.44
50	15	0.15	0.01–0.40
50	20	0.19	0.01–0.52
30	5	<0.01	0.00–0.01
30	10	0.02	0.00–0.10
30	15	0.02	0.00–0.08
30	20	0.03	0.00–0.12

Viable Population Monitoring Protocol (VPM)   Staples et al (2005)

Yearly risk predictions used as monitoring indicator

Increases in risk indicate deteriorating status, action warranted

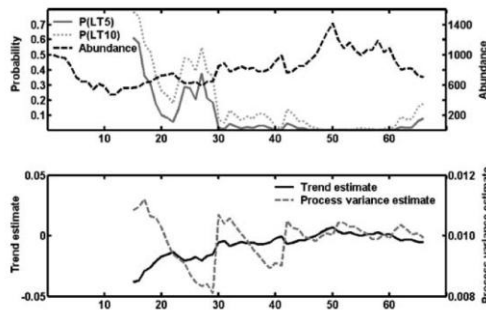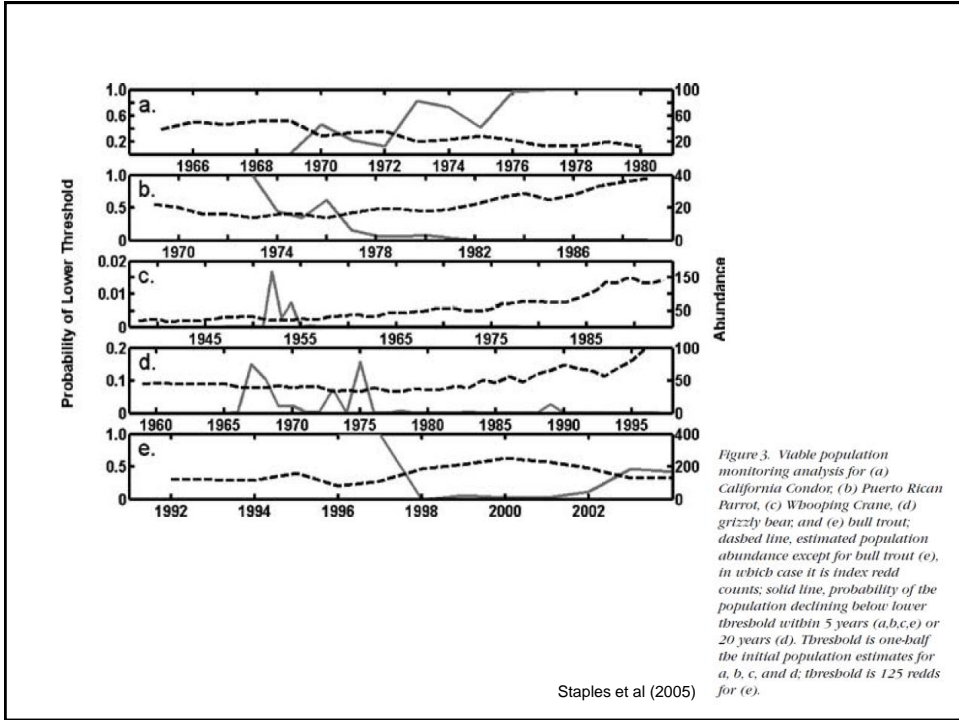Decreases in risk indicate management may be working to reduce risk

Figure 1. (top) Simulated random-walk population growth with predicted probabilities for declining below a threshold value within 5 years (PLT5) and 10 years (PLT10) calculated with an exponential growth model. (bottom) Trend and process variance estimates used to calculate PLT5 and PLT10.

Figure 3. Viable population monitoring analysis for (a) California Condor, (b) Puerto Rican Parrot, (c) Whooping Crane, (d) grizzly bear, and (e) bull trout; dashed line, estimated population abundance except for bull trout (e), in which case it is index redd counts; solid line, probability of the population declining below lower threshold within 5 years (a,b,c,e) or 20 years (d). Threshold is one-half the initial population estimates for a, b, c, and d; threshold is 125 redds for (e).

Staples et al (2005)

Demographically explicit PVA

Vital rates (fecundity and survival) used to predict future trends

(Oleyar & Marzluff, in prep)

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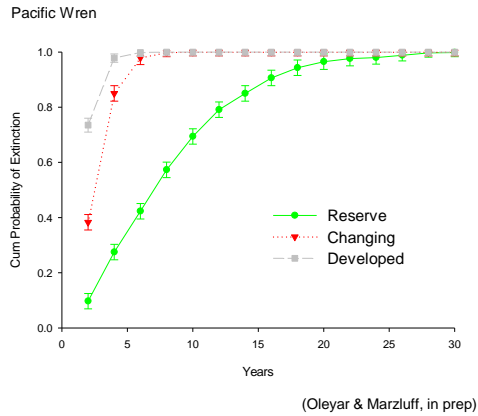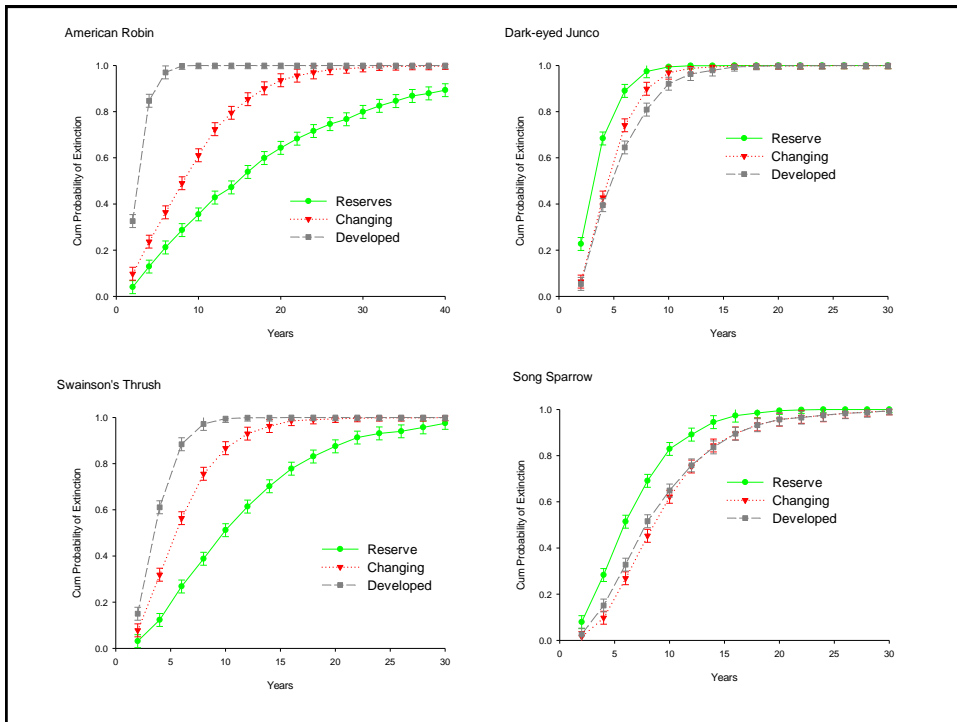
Using PVA to assess multiple conservation scenarios

Leadbeater's Possum

- Endangered species due to habitat loss caused by logging and fire (occurs in 60 X 50 km area in Austrailia)
- Nests in old growth trees

Possingham et al (2002) examined several management strategies in a PVA framework to aid in the decision making process
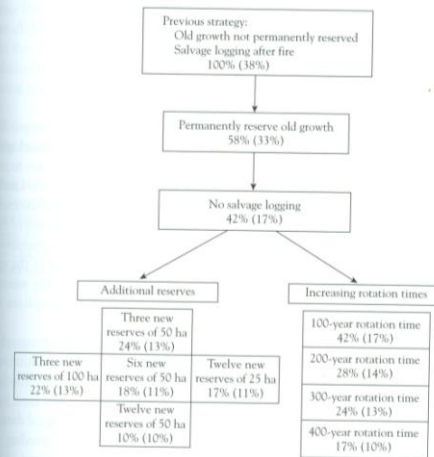
Using PVA to assess multiple conservation scenarios

Values are extinction probabilities
for 150 yrs (in parentheses) and
for 500-650 yrs into the future.

So…what's the recommended
strategy?

What else would be useful and likely
considered by decision makers?

Box 12.4 Continued

Possible management strategies to reduce extinction probabilities for Leadbeater's possums. For each management option, the percentage chance of extinction is given for the long-term of 500–600 years, and over the next 150 years (in parentheses). From Possingham et al. (2002). Reproduced with permission of the University of Chicago Press.