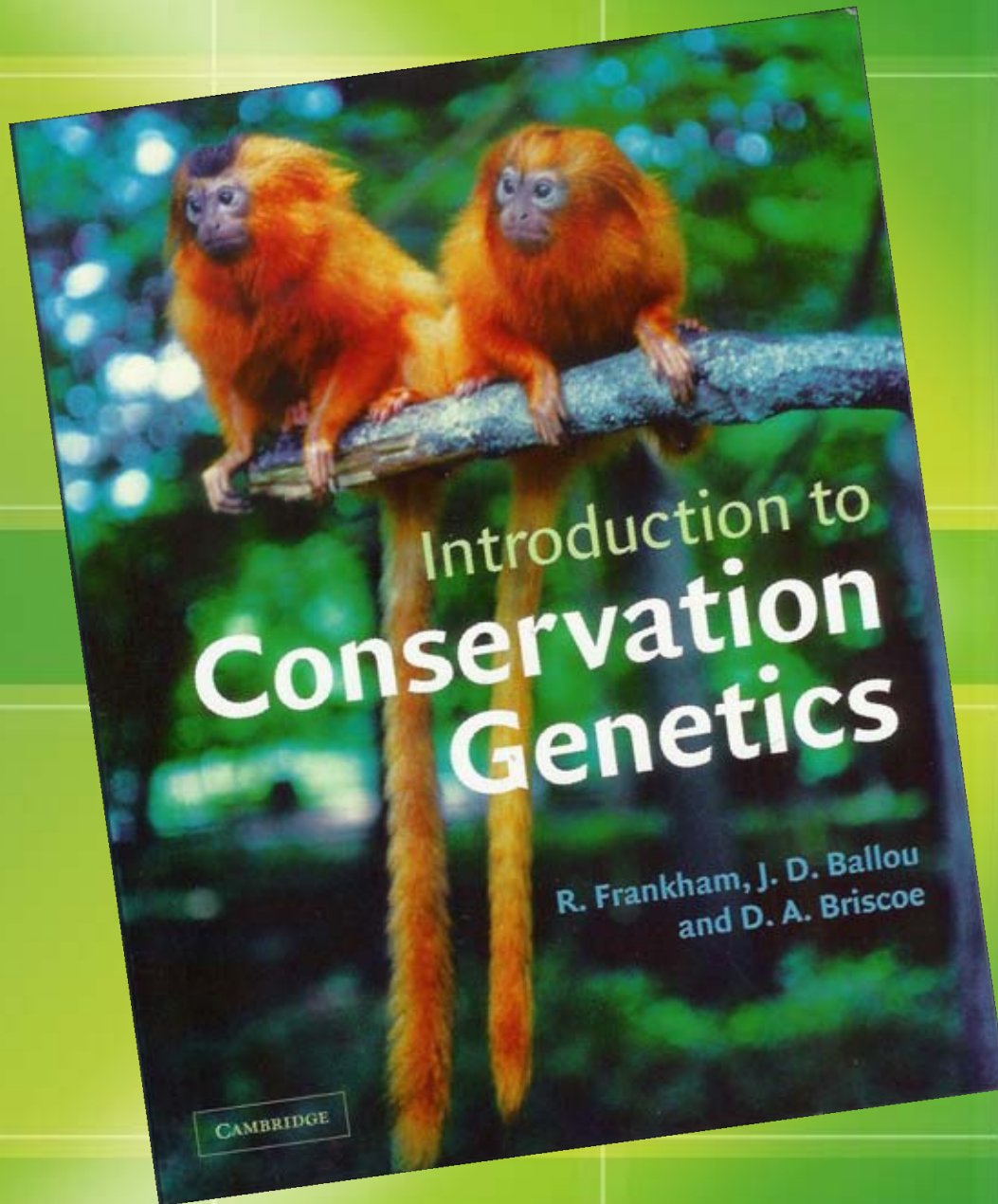


Are we Targeting Hawaii's Endangered Plants For Extinction?



**Bruce P. Koebele
Ka`ala Farm, Inc.**



“I’m not a population geneticist. But **I did stay at a Holiday Inn Express** last night.”

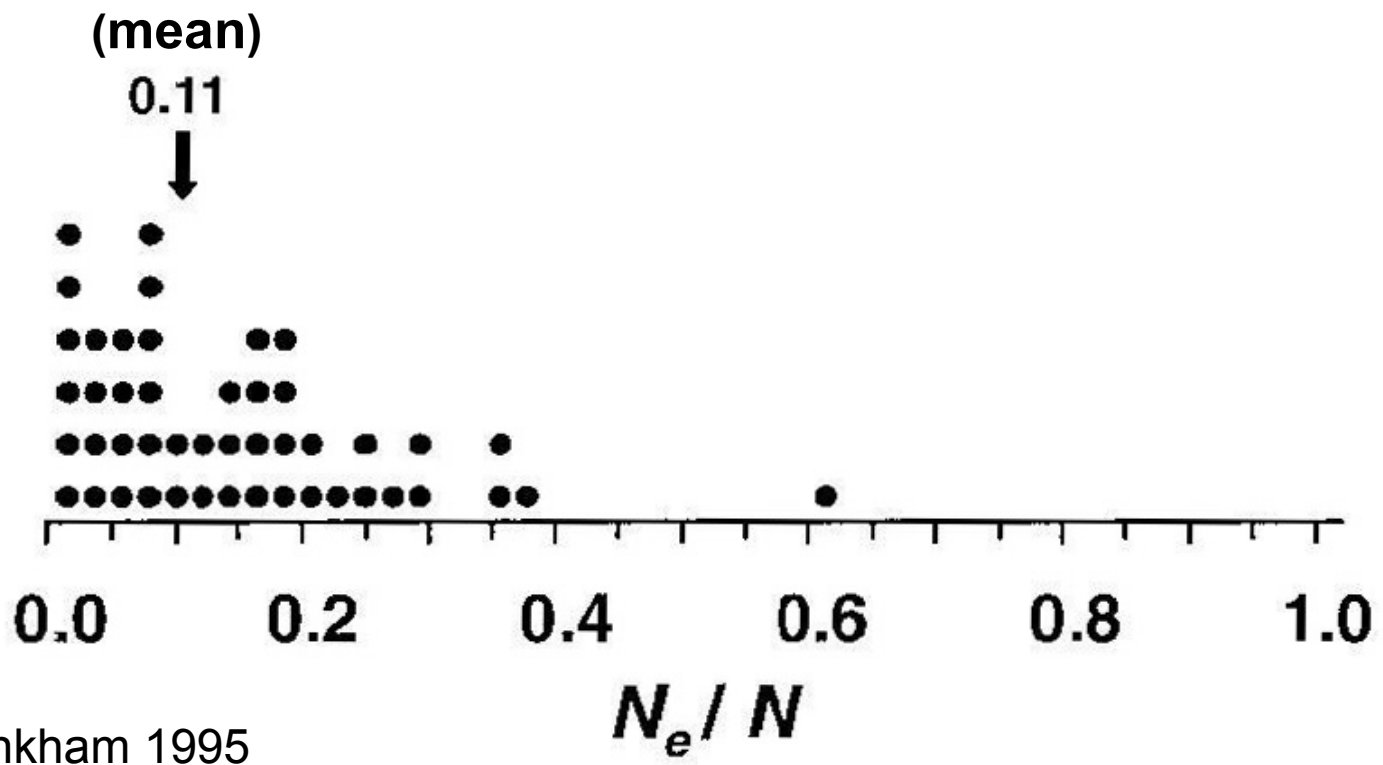
“.... A minimum total of 3 populations of each taxon with a minimum of **25 mature individuals** per population for long-lived perennials And a minimum of **50 mature individuals** per population for short-lived perennials” (*Recovery Plan for the Oahu Plants*, US Fish & Wildlife Service, 1998)

“The Hawaii and Pacific Plants Recovery Coordinating Committee (HPPRCC) (1994) recommended stability goals as three populations of plants with a minimum of either **25 mature and reproducing individuals** of long-lived perennials (>10 year life span), **50 mature and reproducing individuals** of short-lived perennials (<10 year life span) or **100 mature and reproducing individuals** of annual taxa per season (<1 year life span).” (*Mākua Implementation Plan*, US Army Garrison Hawaii, 2003)

“Measurable Long-Term Success Criteria

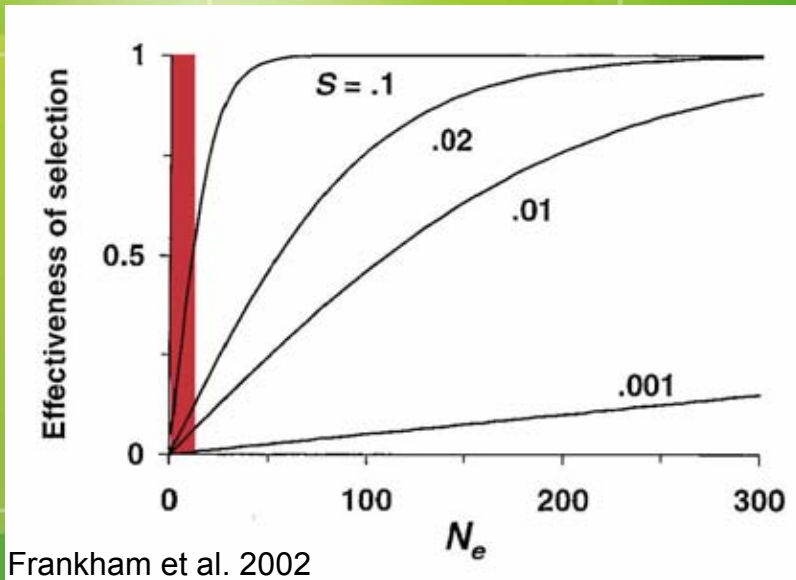
(1) At least **80 reproducing adult plants** will be present in each population, averaged over a five-year period after irrigation is ceased.” (*Habitat Conservation Plan for *Abutilon menziesii* at Kapolei*; State of Hawai'i Department of Transportation, 2004)

Effective population size (N_e): The number of individuals that would result in the same inbreeding or genetic drift if they behaved in the manner of an idealized population.

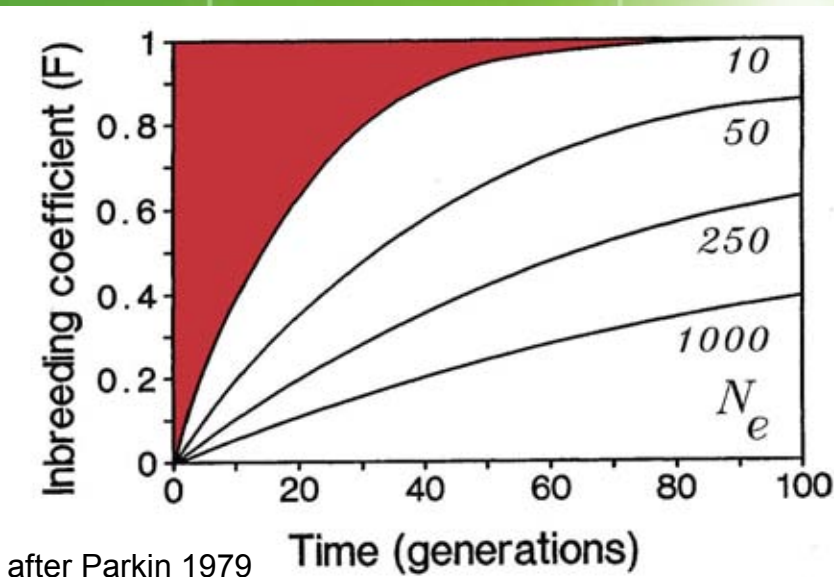


Frankham 1995

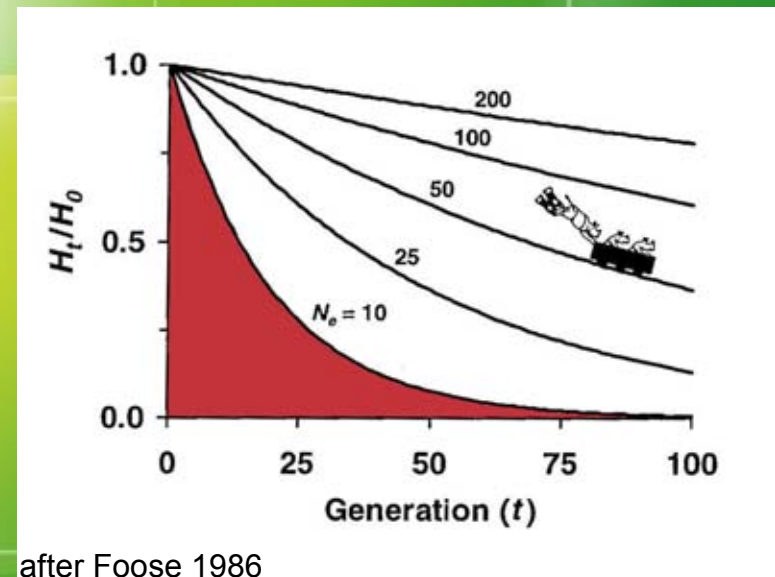
How does a small N_e affect the population?



Frankham et al. 2002

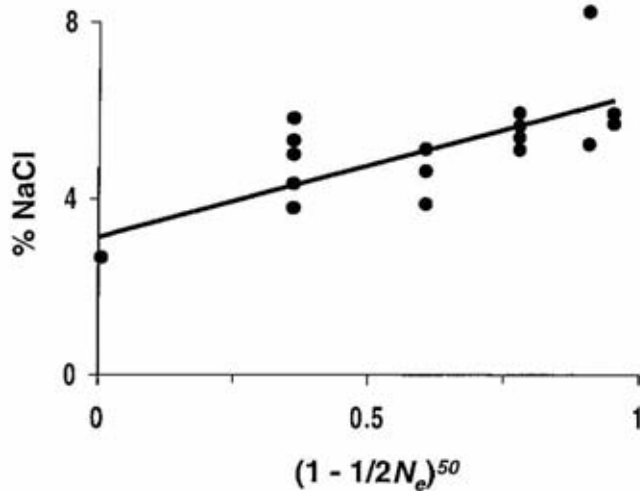


after Parkin 1979

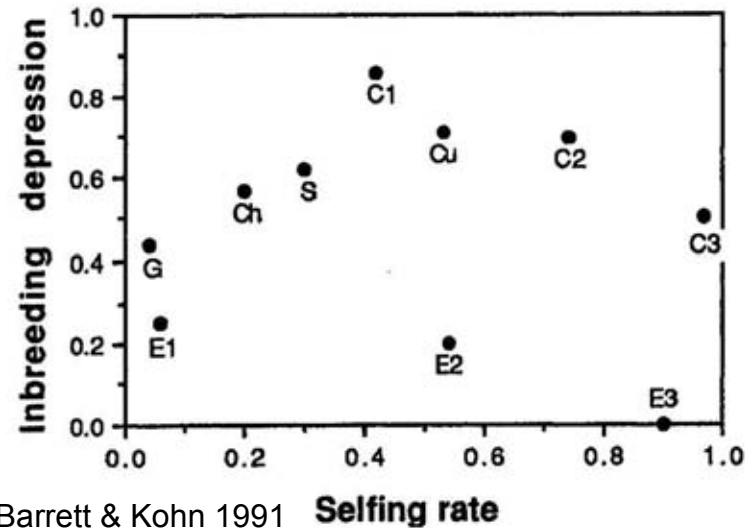


after Foose 1986

But are these effects detrimental?
Yes, they are!



Frankham et al.
2002



Barrett & Kohn 1991

So, what should we do?

- **Increase stabilization targets by at least ten-fold.**



This is exactly what **WE** did for *Achyranthes splendens* var. *rotundata* at the USFWS Kalaeloa Unit.



So, what should we do?

- Increase target values.
- **Restrict the use of the term “population” to demonstrated genetic entities.**

“At the time of listing, 1,500 to 3,000 individuals of *Nototrichium humile* were known in 11 populations on Oahu and one on Maui.”
(*Nototrichium humile* [Kulu`i] 5-Year Review Summary and Evaluation, US Fish & Wildlife Service, 2008)

“At the time of listing, *Pritchardia kaalae* was known from five populations in the northern Waianae Mountains of Oahu, with a total of 130 wild individuals.” (Pritchardia kaalae [Lo`ulu] 5-Year Review Summary and Evaluation, US Fish & Wildlife Service, 2008)

So, what should we do?

- Increase target values.
- Restrict use of “population.”
- **Determine the genetic diversity of endangered Hawaiian plant species.**



“Both RAPD and ITS sequence analysis indicate that populations of *C. skottsbergii* var. *skottsbergii* on Oahu and Molokai are genetically distinct, and the extent of this genetic differentiation supports the recognition of these populations as distinct varieties.” (*Population Variation and Phylogeny in the Endangered Chamaesyce skottsbergii [Euphorbiaceae] Based on RAPD and ITS Analyses*, Morden & Gregoritza, 2005)

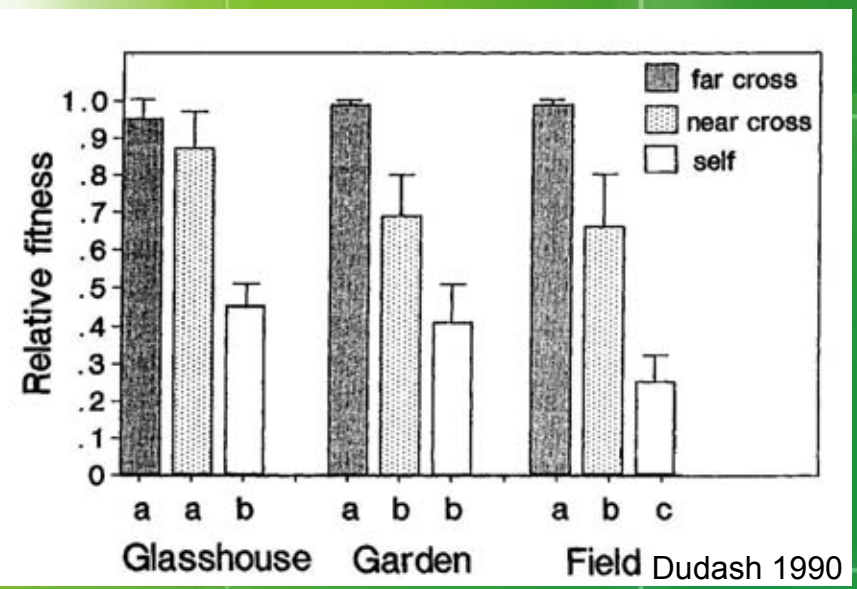
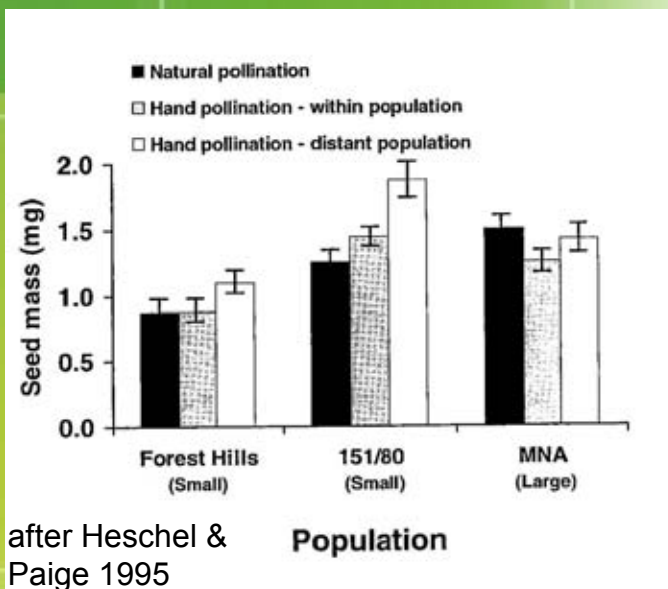
In contrast:

“We (Morden, Sherwood & Birch) did some work on *Gossypium* and found that ‘populations’ on different islands (not just parts of the same island) are **genetically indistinguishable**. Thus, the entire species among the islands is likely a metapopulation rather than distinct different populations.” (Morden, personal communication, 2008)



So, what should we do?

- Increase target values.
- Restrict use of “population.”
- Determine genetic diversity.
- Use artificial migration to reestablish gene flow between isolated plant clusters.





Acknowledgements:

I would like to thank **Cliff Morden** (Professor of Botany, University of Hawai`i at Mānoa) for his help with this presentation.