2019 Orchid
Poland Workshop

Spala, Lodz
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Population Dynamics

Tools for Conservation

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Objectives

- Predict with certain confidence level the possible growth or reduction in population size.

No Problem

- collect lots of information
  - > 10^5 or more individuals for many, many years and from many populations

Species we are concerned about:

* Few individuals
* Few populations

PVA = Population Viability Analysis

- **Evaluation the risk of extinction**
  - Evaluate the risk of populations
  - Compare the risks between 2 or more populations
  - Analysis and synthesize the data
- **What is the likely impact of management?**
  - Identify the life history stages which could *impact areas* of management for modifying population growth.
  - Determine how large the conservation area and population size should be for species conservation

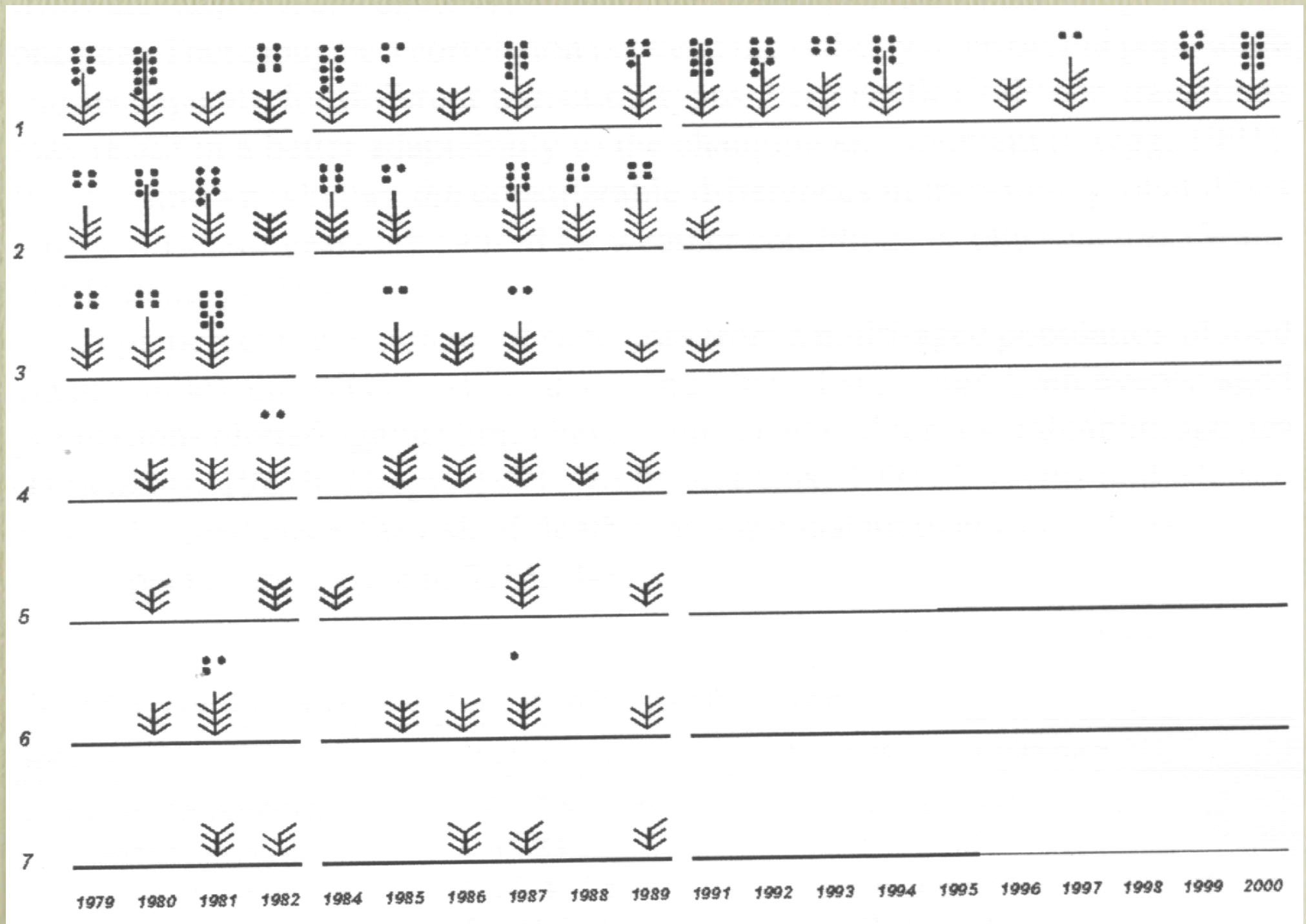
Cephalanthera rubra

1979-2000

Hutchings 1987

www.orchid-rhoen.de/ Arten/Cephalanthera_rubra.h

Cephalanthera rubra
Foto: Bjørnar Olsen


1
2
3
4
5
6
7
1979
1980
1981
1982
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000

Dactylorhiza praetermissa

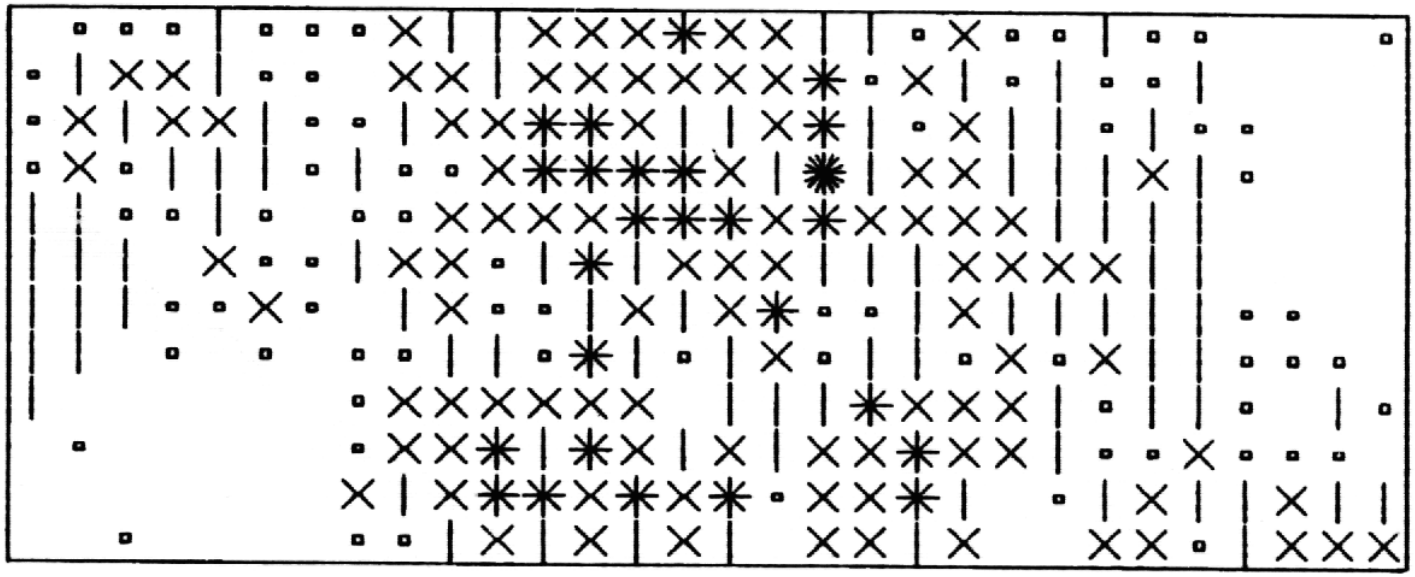
Number of plants with flowers

Vanhecke 1991

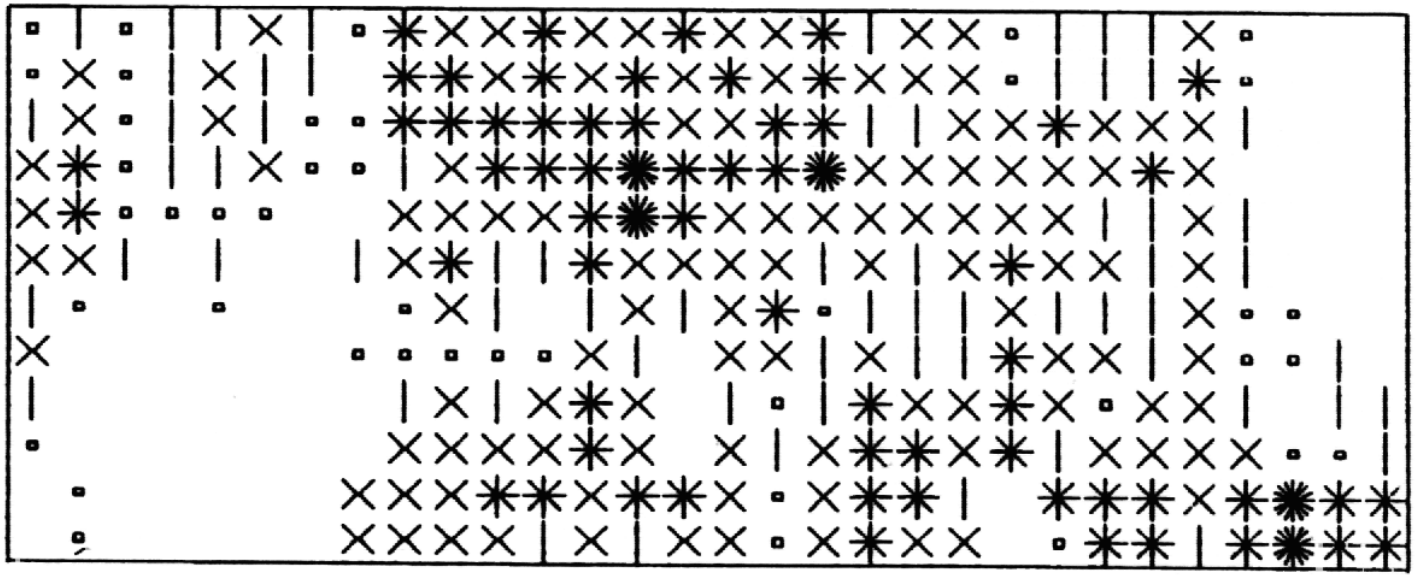
Drawing 1974-1985 of the dynamic of the population

www.franknature.nl

nl/vijerplaten/html/zone_B.htm



1984



1985

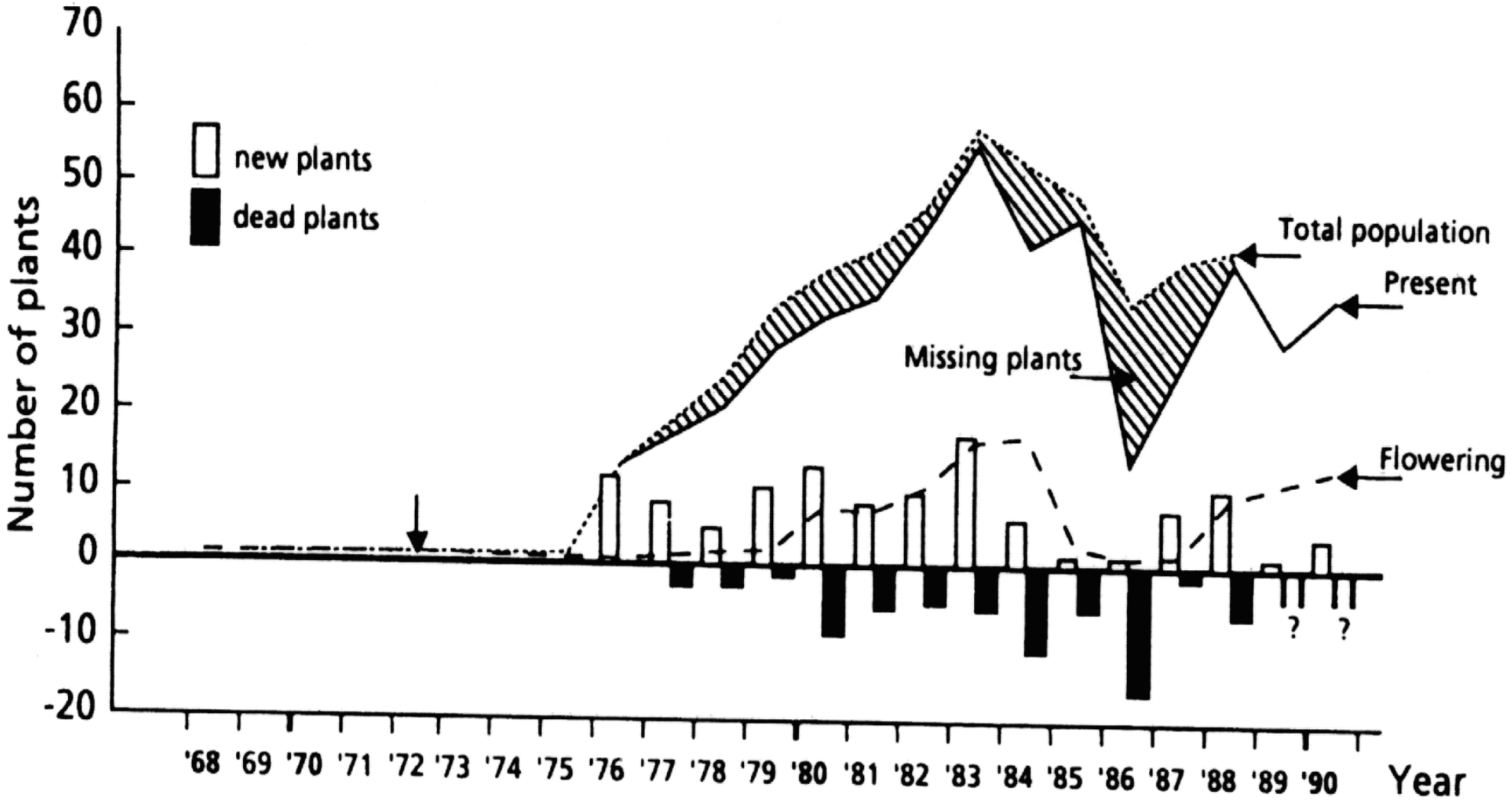
0	1–3	4–9	10–27	28–81	82–243	> 243
	•	|	×	✳	✹	○

Orchis simia

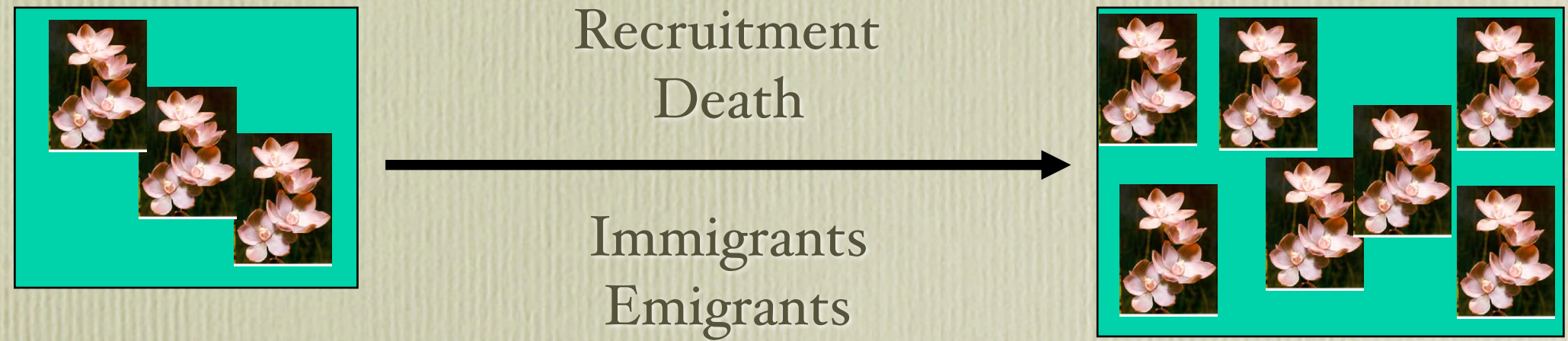
Population dynamics

Sampling period 1969-1990

Willems and Bik 1991


70
60
50
40
30
20
10
0
-10
-20
Number of plants
new plants
dead plants
Total population
Present
Missing plants
Flowering
? ?
'68 '69 '70 '71 '72 '73 '74 '75 '76 '77 '78 '79 '80 '81 '82 '83 '84 '85 '86 '87 '88 '89 '90
Year

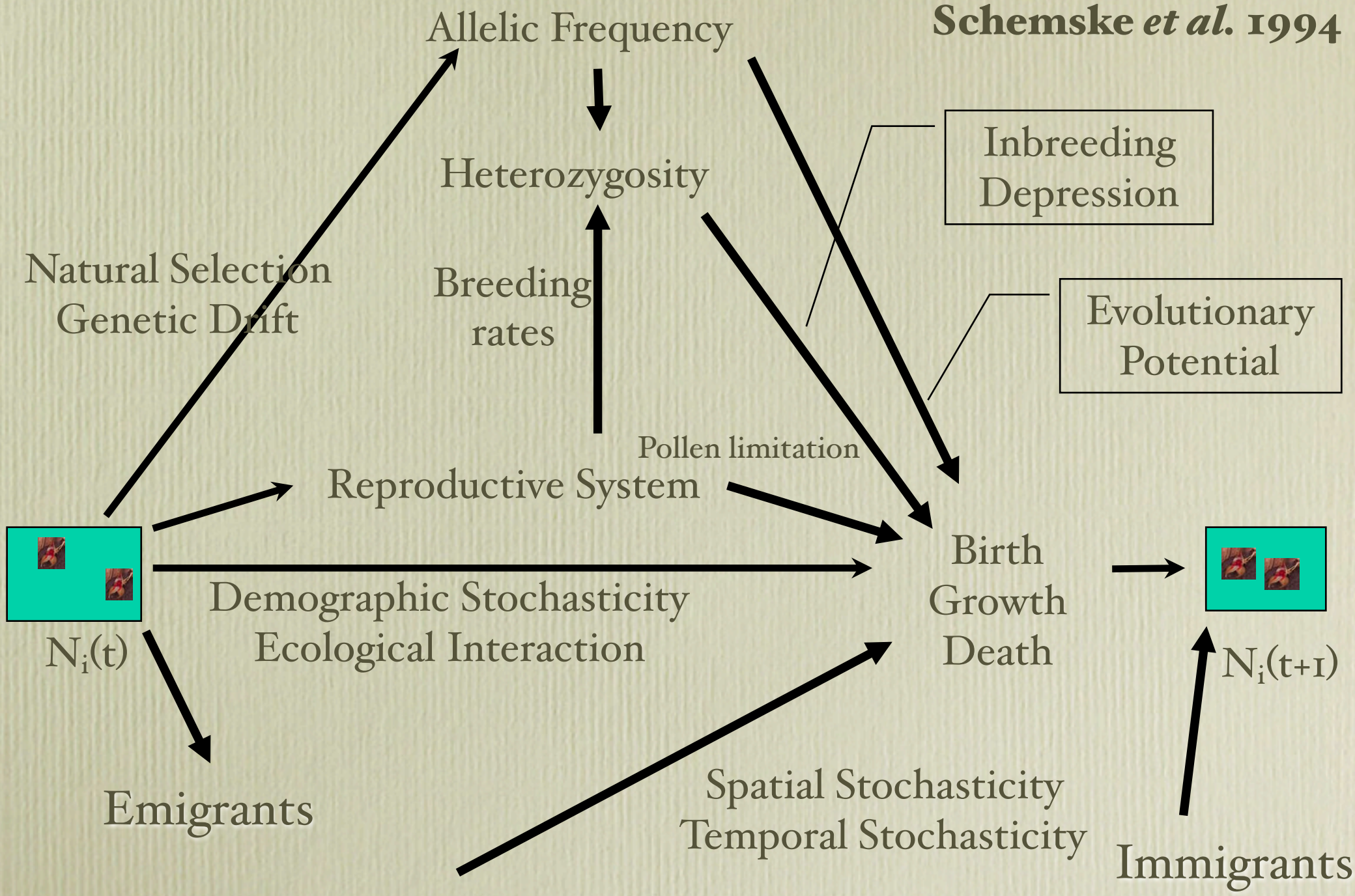
Predicting population growth

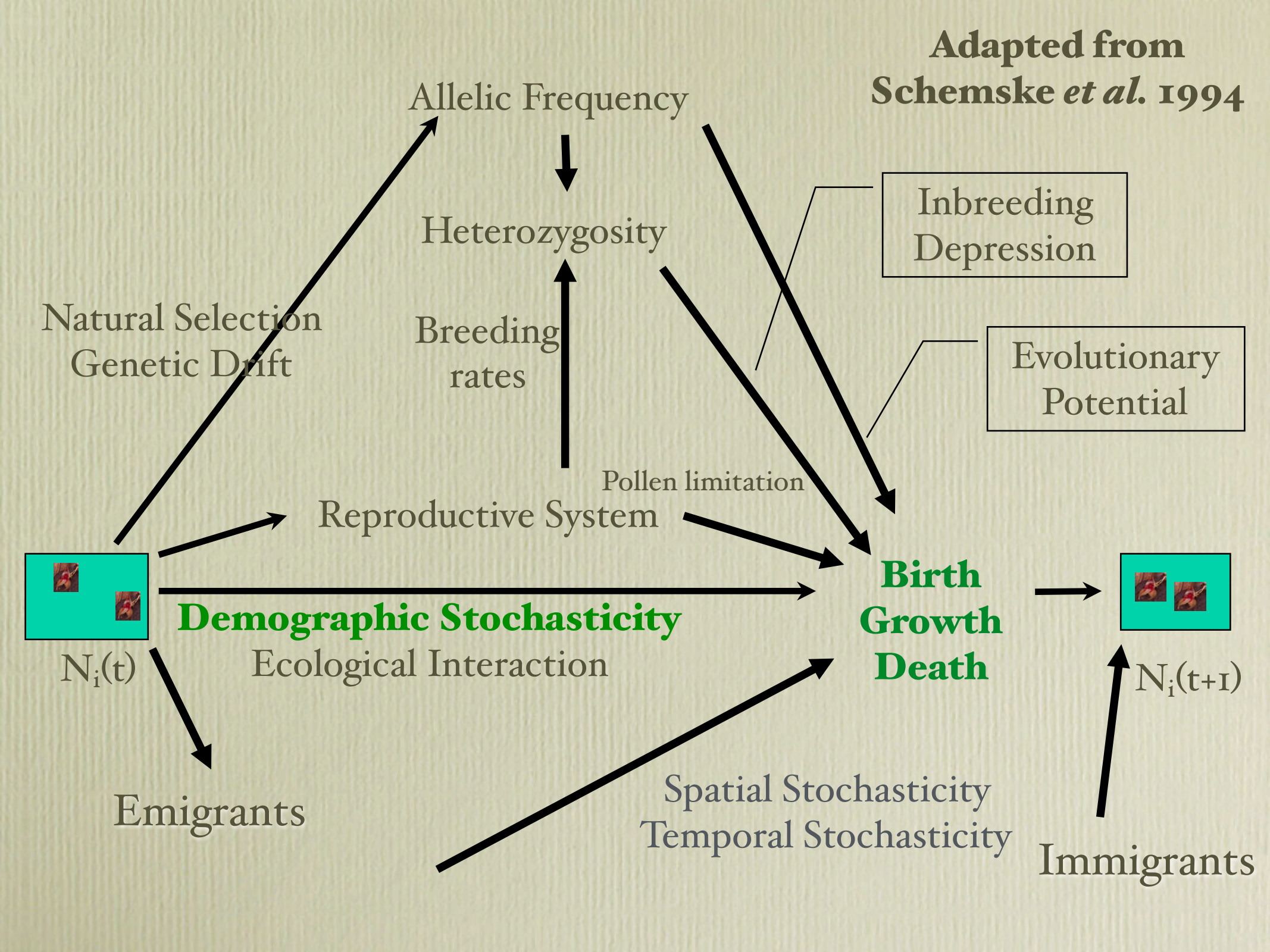


$N_i(t)$

$N_i(t+1)$

Adapted from Schemske *et al.* 1994




Adapted from
Schemske et al. 1994
Allelic Frequency
Heterozygosity
Inbreeding
Depression
Natural Selection
Genetic Drift
Breeding
rates
Evolutionary
Potential
Pollen limitation
Reproductive System
Birth
Growth
Death
Demographic Stochasticity
Ecological Interaction
Ni(t)
Ni(t+1)
Emigrants
Spatial Stochasticity
Temporal Stochasticity
Immigrants