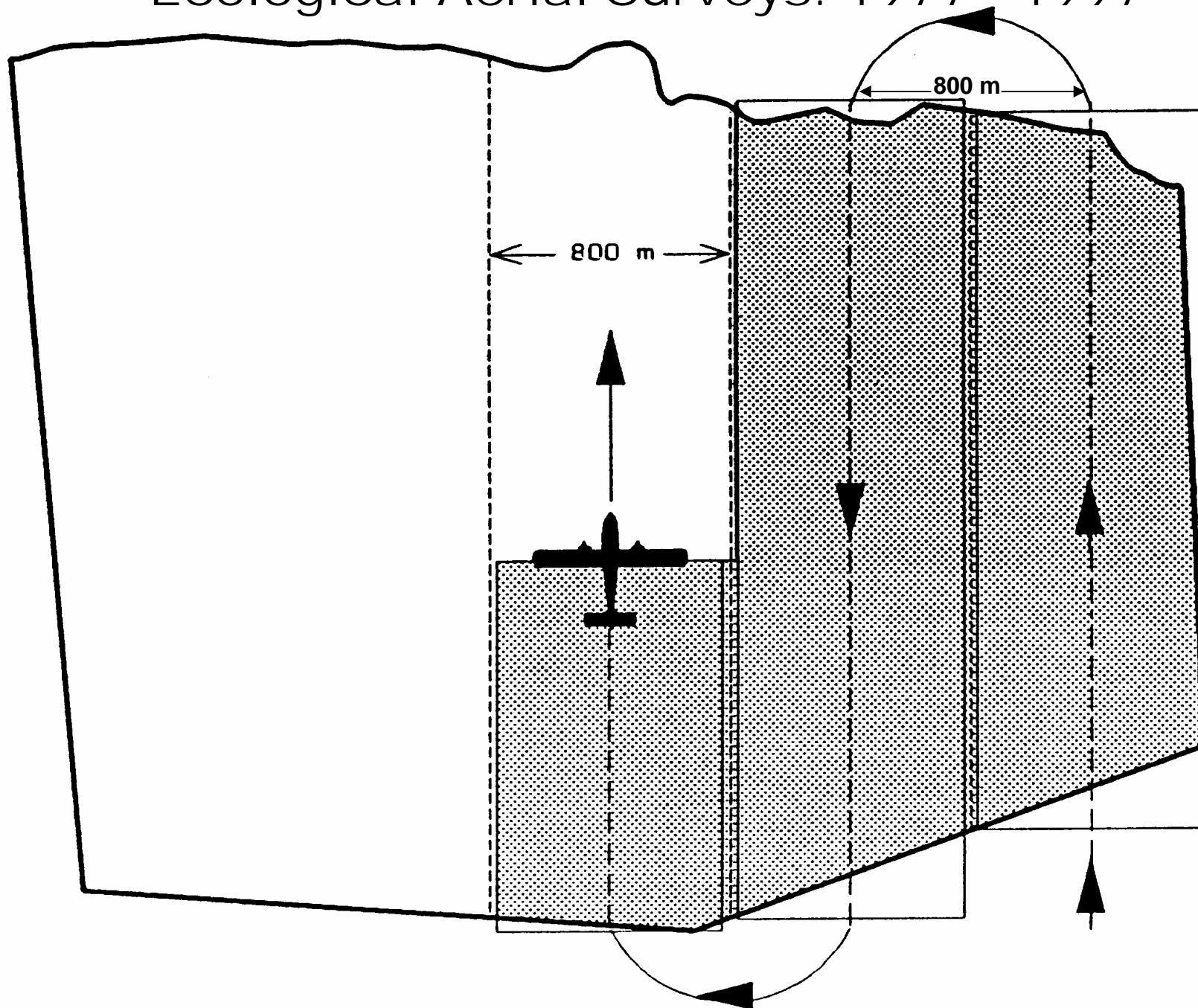


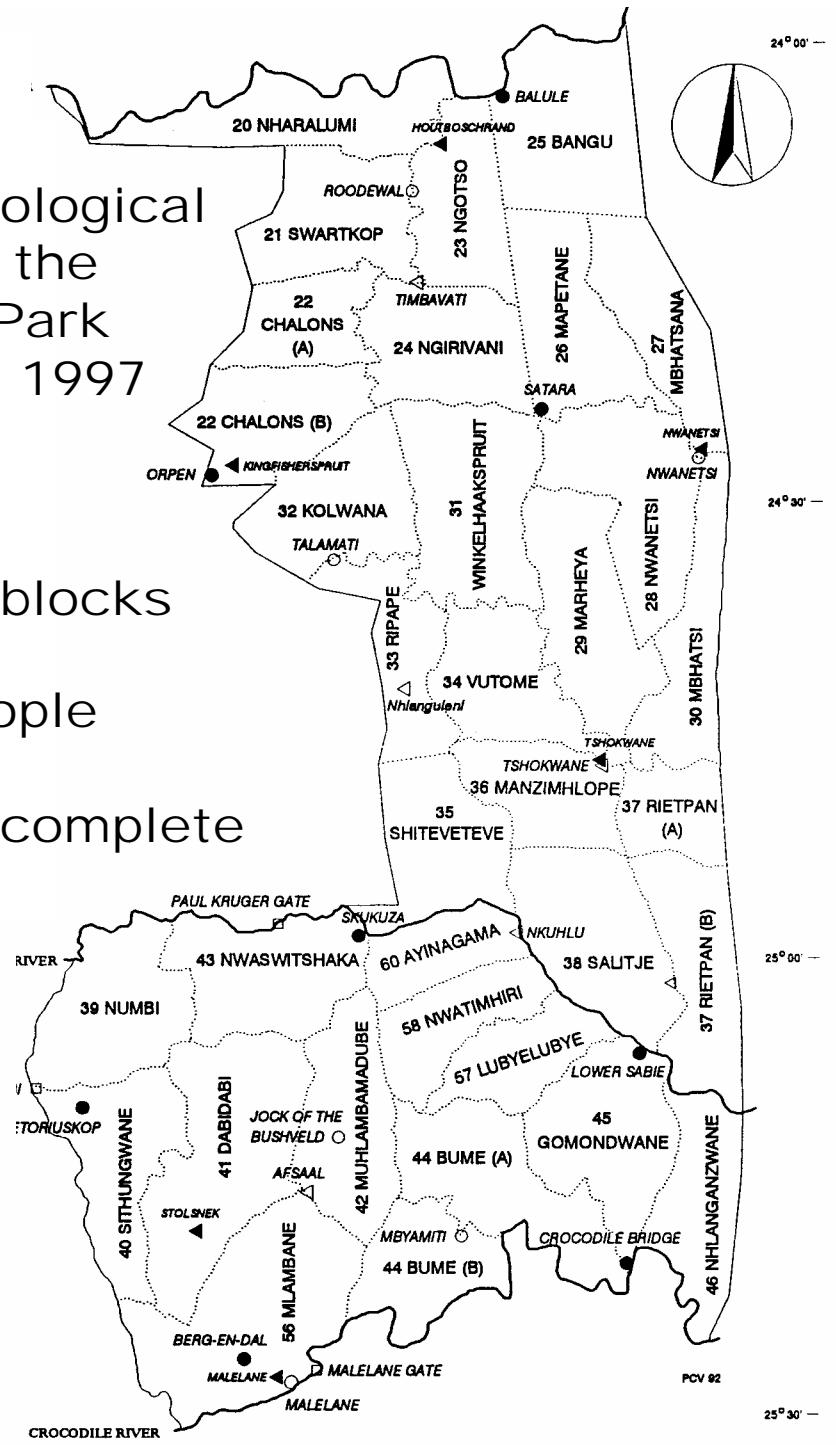
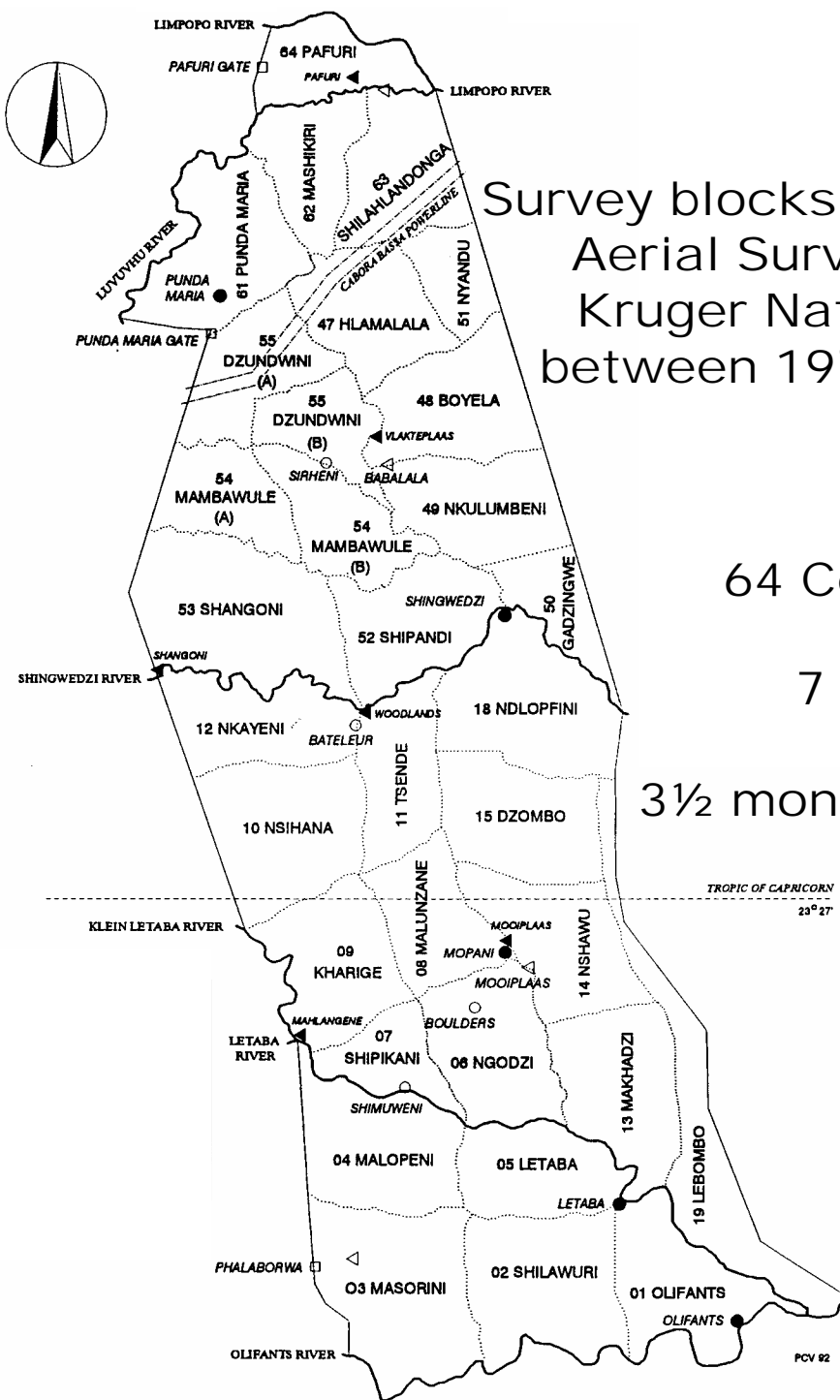
ECOLOGICAL AERIAL SURVEYS (1977 - 1997) AND
AERIAL LINE TRANSECTS (1998 - 2005)
IN THE KRUGER NATIONAL PARK



IAN WHYTE (data collection)
JUDITH KRUGER (data analysis)

Ecological Aerial Surveys: 1977 - 1997





Survey blocks for Ecological
Aerial Surveys in the
Kruger National Park
between 1977 and 1997

64 Census blocks

7 - 8 people

3½ months to complete

24° 00' —
24° 30' —
25° 00' —
25° 30' —

PCV 92

PCV 92

ECOLOGICAL AERIAL SURVEYS
BECAME TOO COSTLY IN TERMS OF
HUMAN RESOURCES AND FINANCE

ECOLOGICAL AERIAL SURVEYS
BECAME TOO COSTLY IN TERMS OF
HUMAN RESOURCES AND FINANCE

- BETWEEN 1994 – 1997, SURVEYS
WERE NOT COMPLETED (WEATHER)

ECOLOGICAL AERIAL SURVEYS BECAME TOO COSTLY IN TERMS OF HUMAN RESOURCES AND FINANCE

- BETWEEN 1994 – 1997, SURVEYS
WERE NOT COMPLETED (WEATHER)
- A NEW METHOD WAS REQUIRED:

ECOLOGICAL AERIAL SURVEYS BECAME TOO COSTLY IN TERMS OF HUMAN RESOURCES AND FINANCE

- BETWEEN 1994 – 1997, SURVEYS WERE NOT COMPLETED (WEATHER)
- A NEW METHOD WAS REQUIRED:
- AERIAL LINE TRANSECTS USING DISTANCE SAMPLING





D

C

B

A

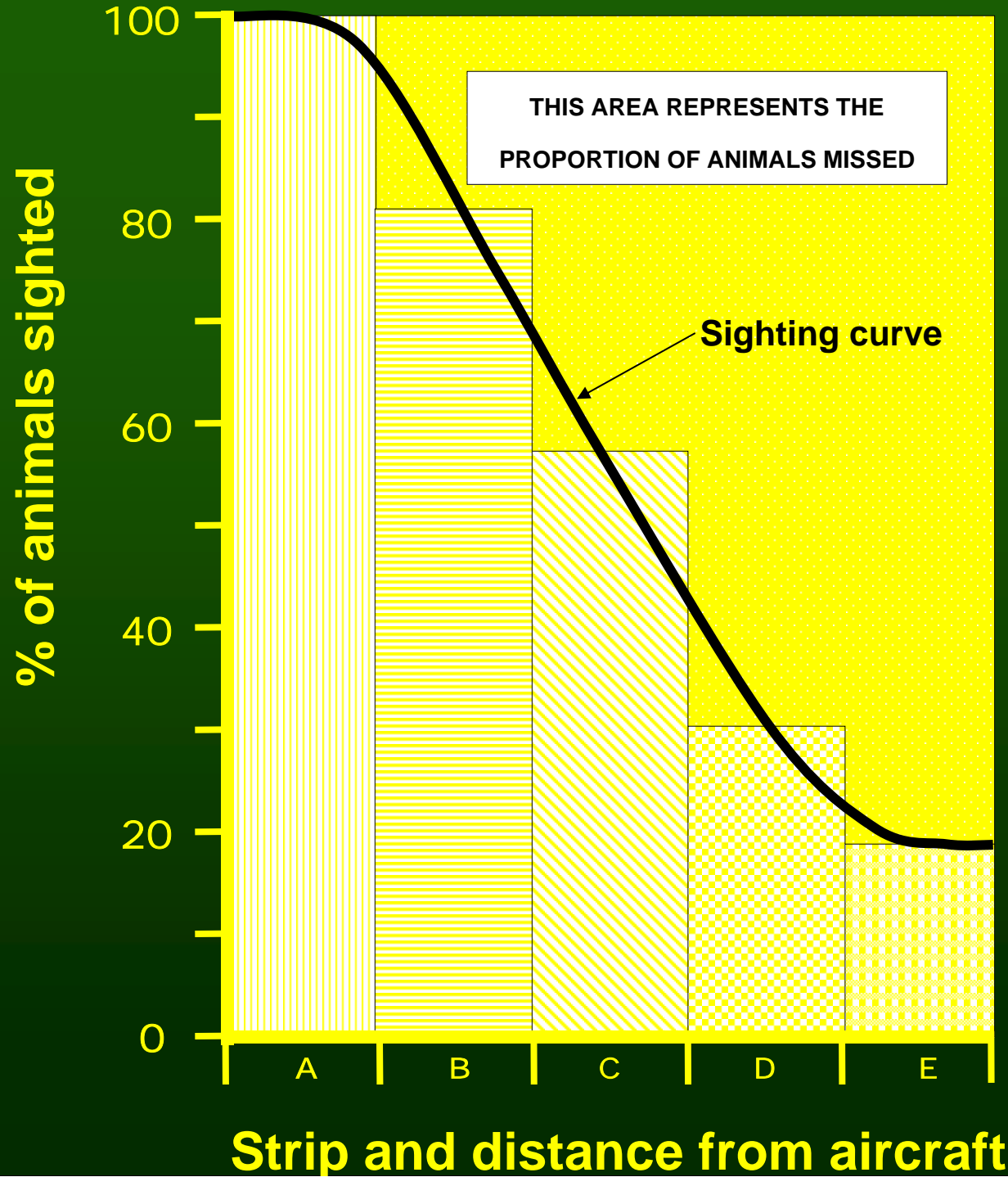


A

B

C

D



Partenavia P-68 (1998, 2000, 2001, 2002, 2003, 2004)

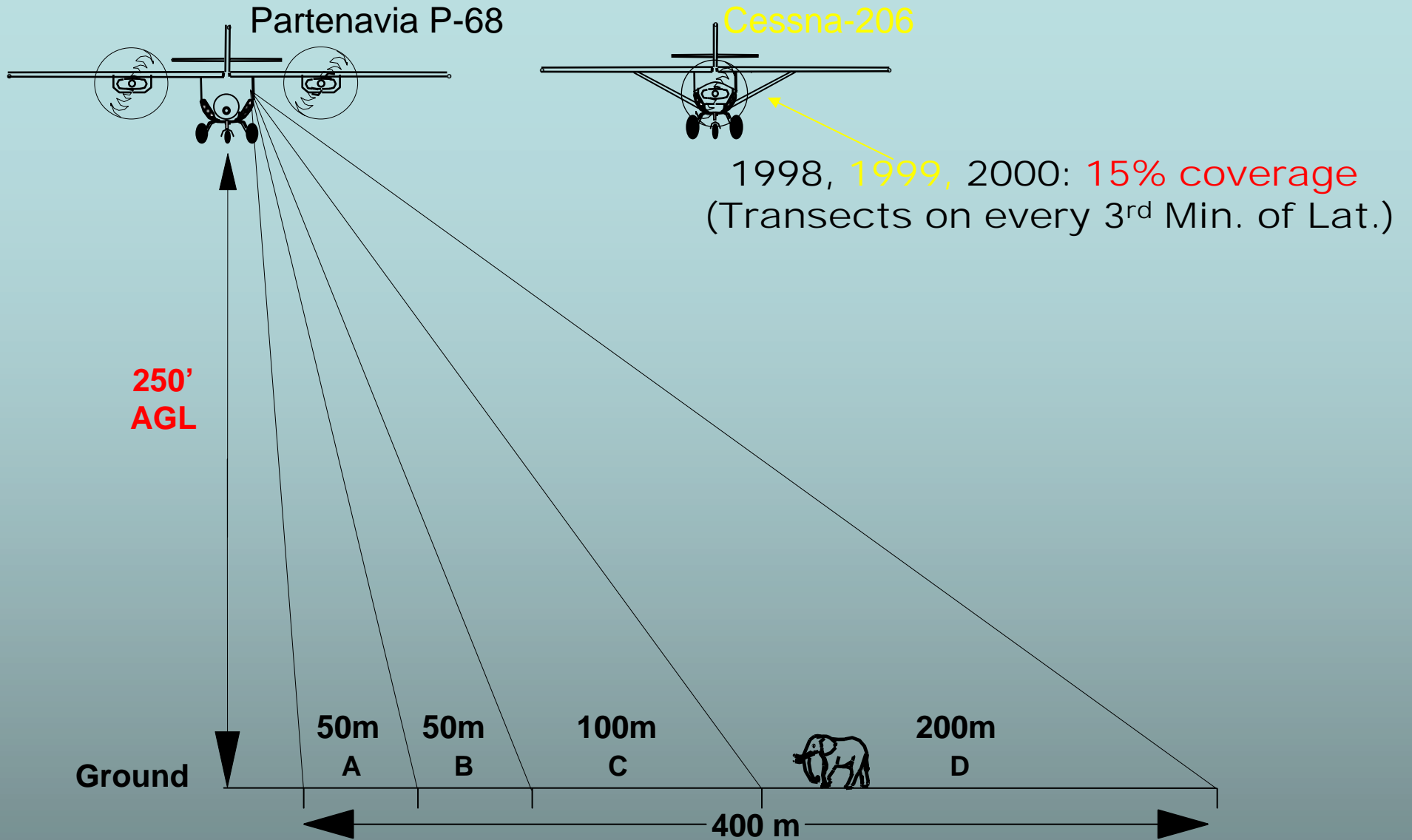


AIRCRAFT USED FOR ALTs:

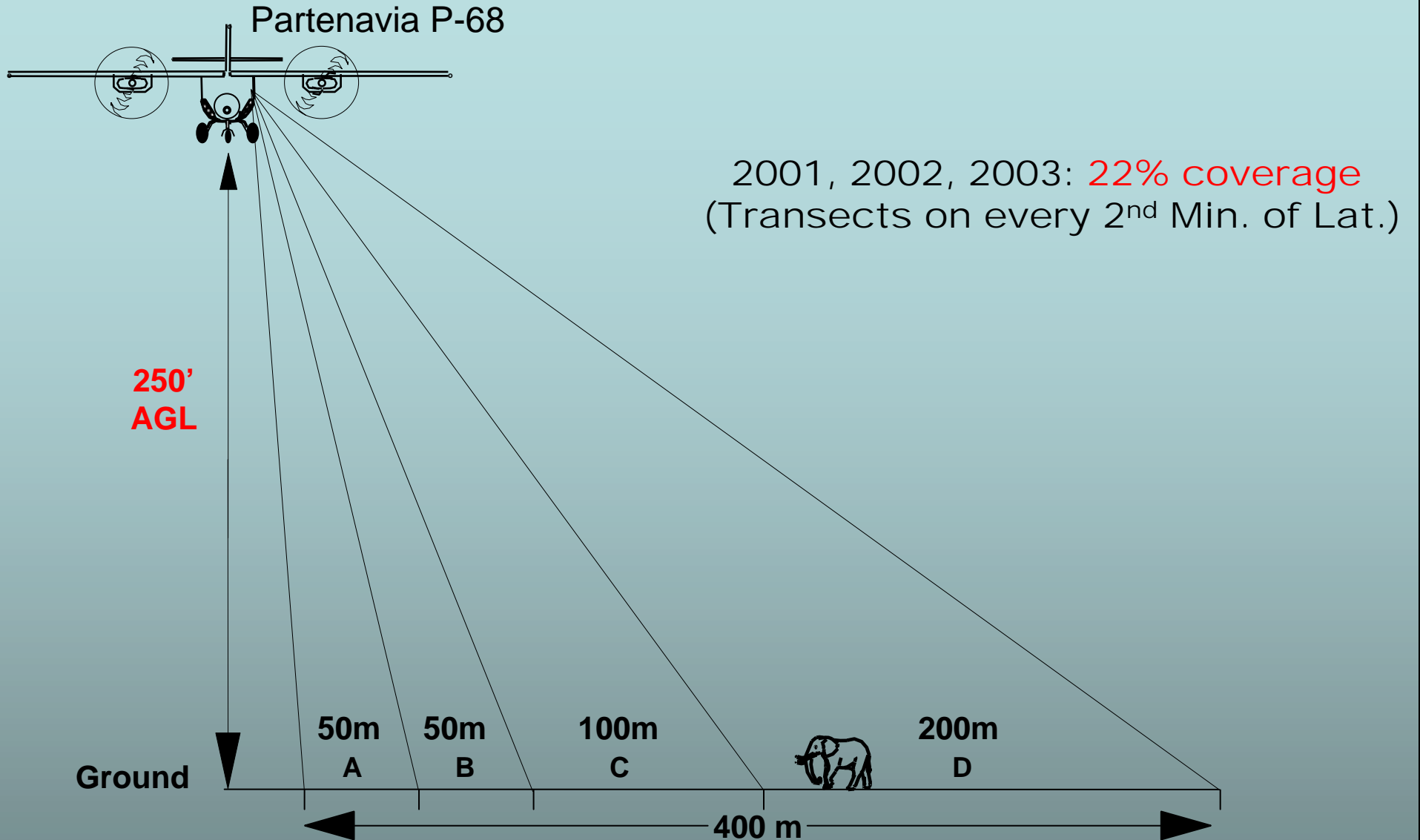
Cessna 206 (1999, 2005)



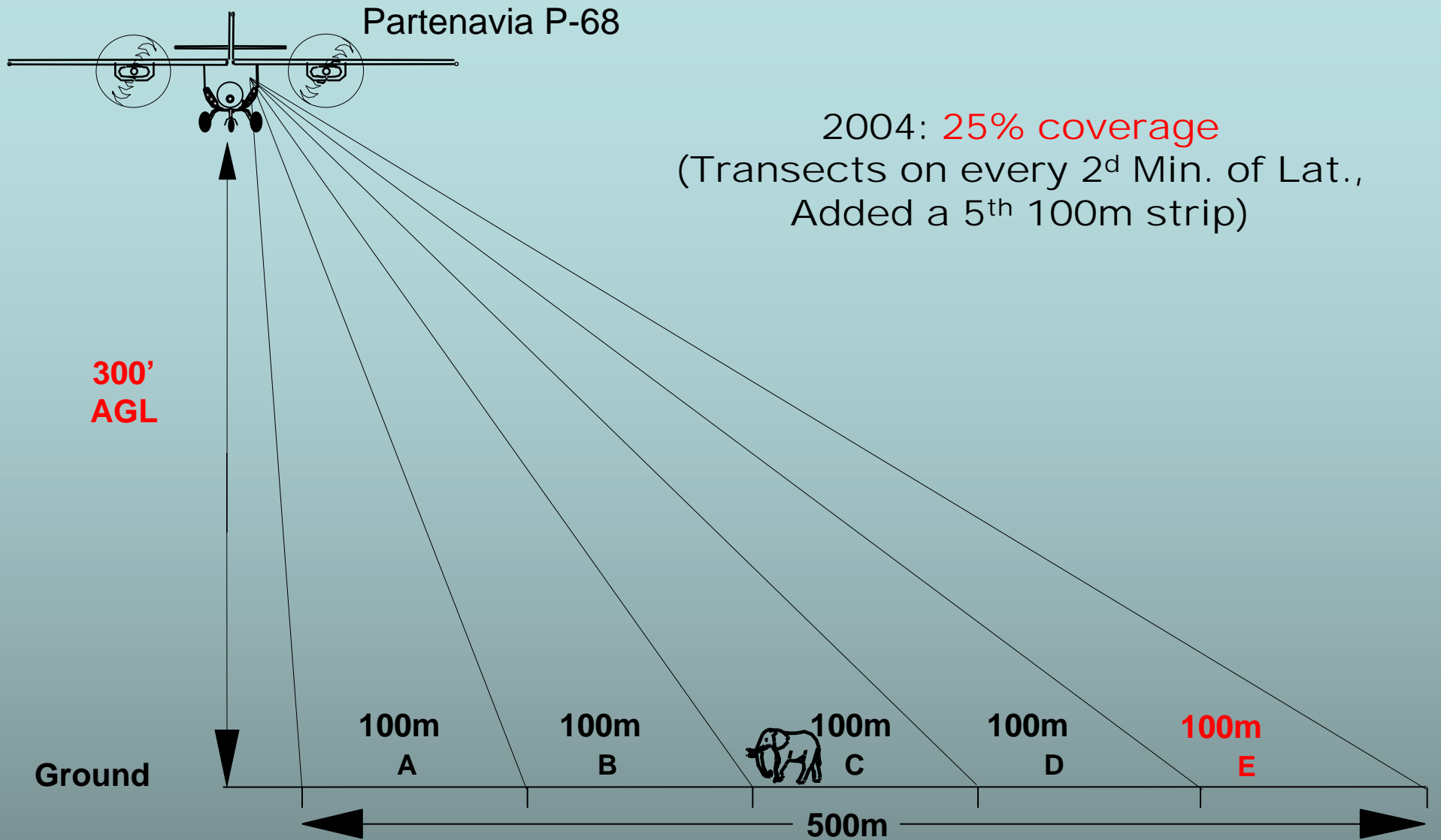
AERIAL LINE TRANSECT SURVEYS BETWEEN 1998 AND 2005



AERIAL LINE TRANSECT SURVEYS BETWEEN 1998 AND 2005

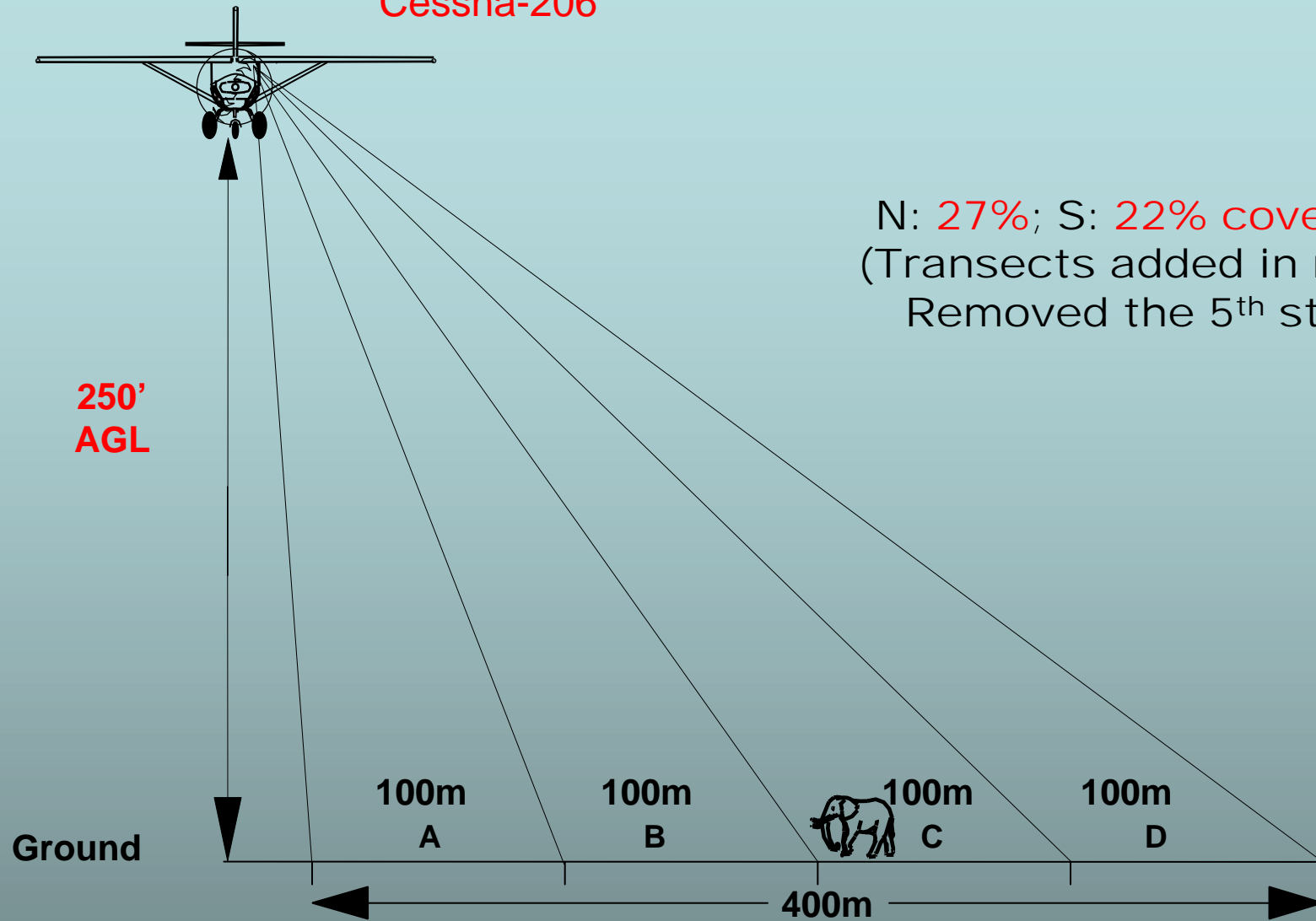


AERIAL LINE TRANSECT SURVEYS IN 2004



AERIAL LINE TRANSECT SURVEYS IN 2005

Cessna-206



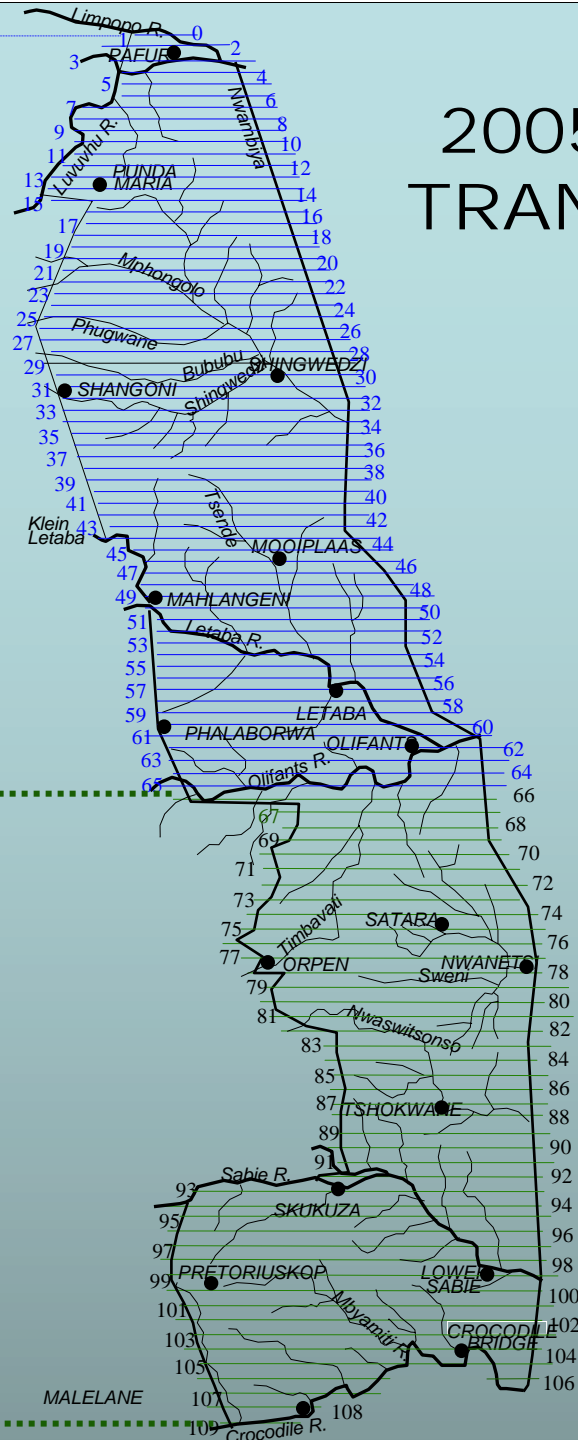
N: 27%; S: 22% coverage
(Transects added in north,
Removed the 5th strip)

Ground

2005 ALTs TRANSECTS

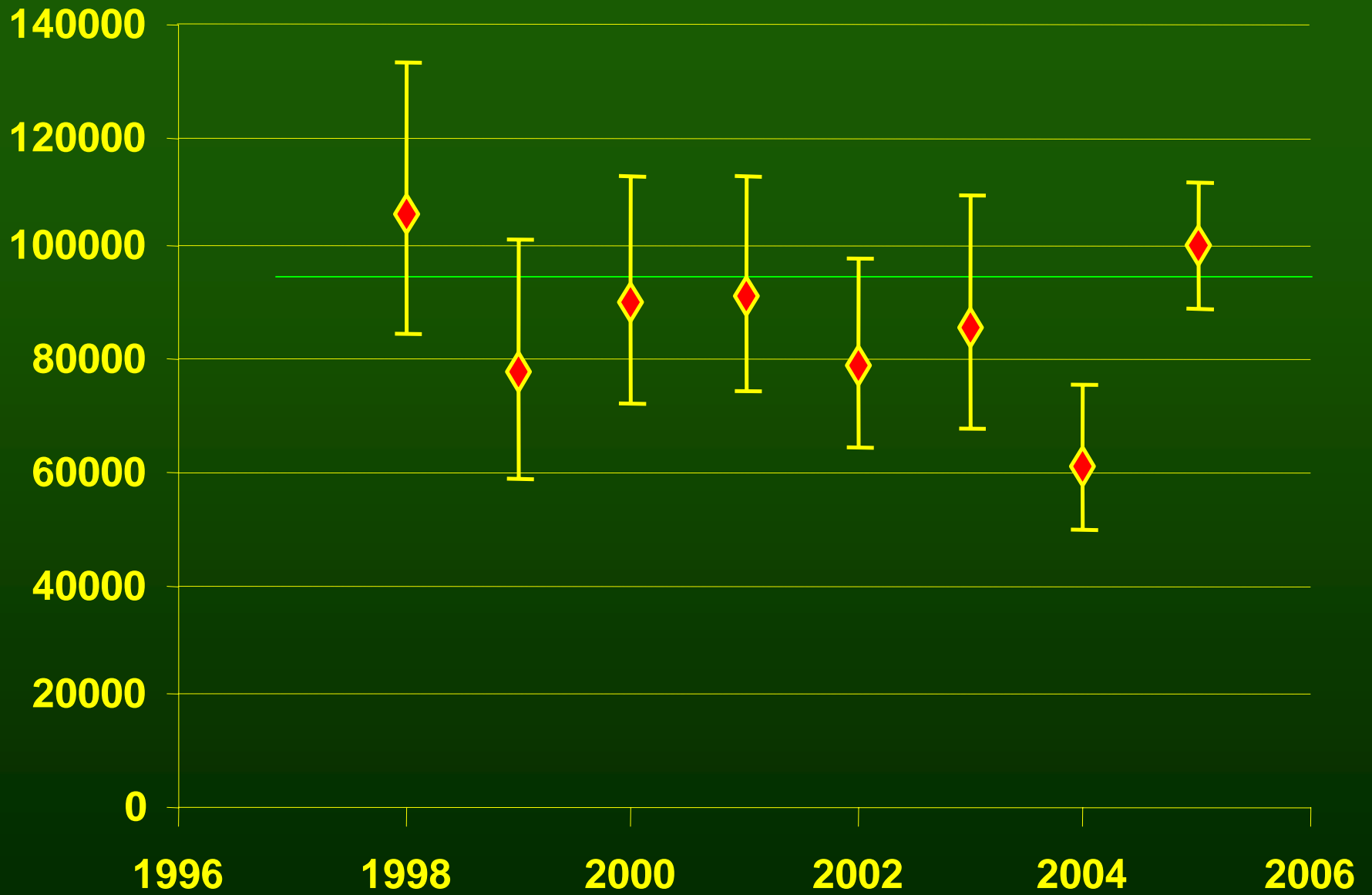
65 Transects
± 3.0 km apart
(27% coverage)

44 Transects
± 3.75 km apart
(22% coverage)

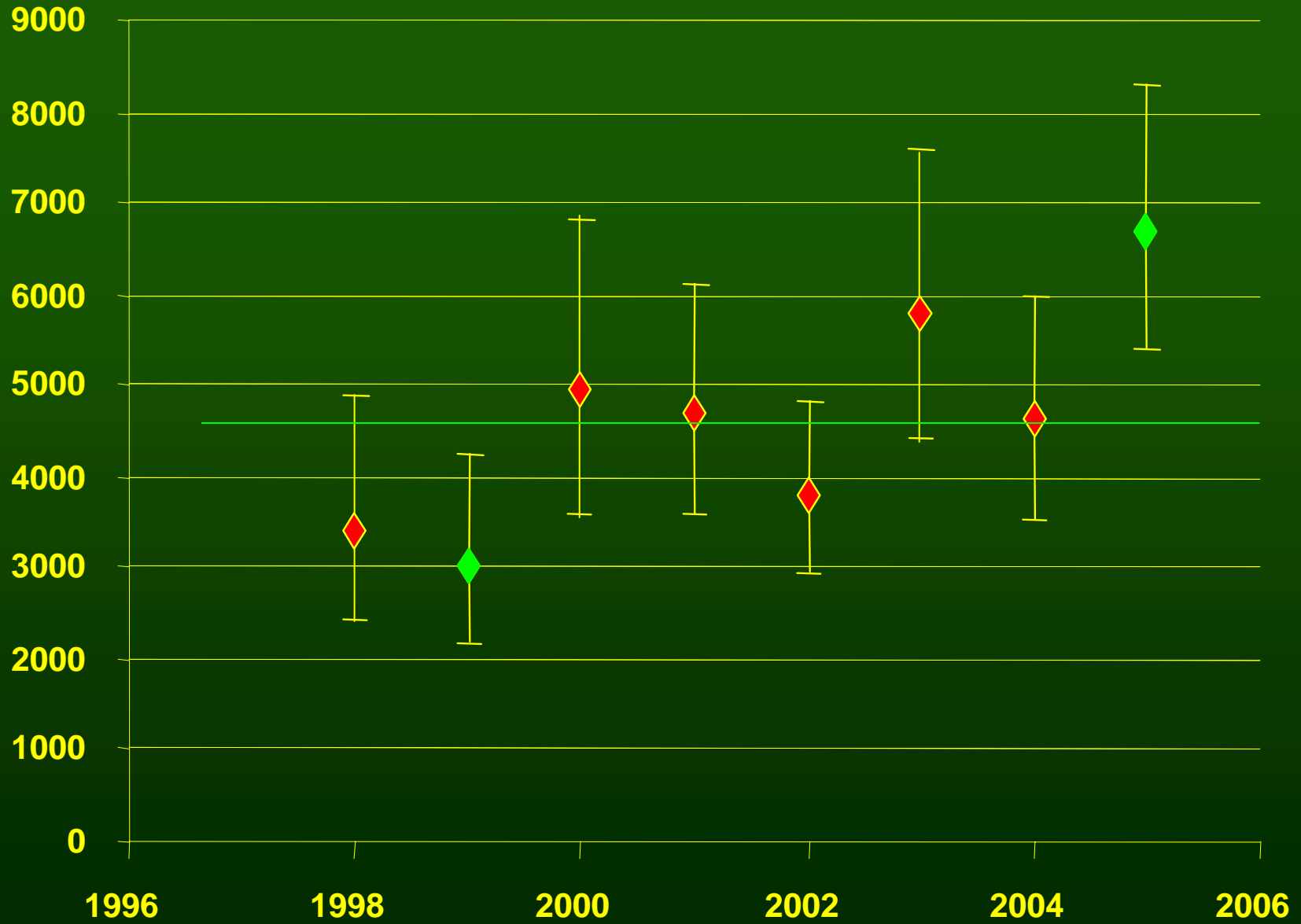


All of the changes made to the ALT method have been due to the need to reduce Coefficients of Variance

Impala



Kudu



Coefficients of Variance
are mainly influenced by:

- No of observations
- Variability of group sizes

% Coefficients of variance for ALT estimates for KNP herbivores: 1998 & 2005

Year	Impala	Giraffe	Zebra	Wildebeest	Kudu	W. Rhino	Waterbuck	Warthog
1998	11.4	14.0	11.3	22.1	18.0	20.1	33.8	57.8
1999	13.6	14.3	12.7	18.2	17.0	16.0	33.7	41.1
2000	11.2	14.2	15.5	25.3	16.2	17.7	28.0	23.2
2001	10.7	11.2	14.3	25.8	13.5	14.1	29.1	39.97
2002	10.6	13.2	13.2	22.0	12.5	12.0	35.0	-
2003	12.2	12.4	12.9	24.0	13.8	11.9	25.0	-
2004	10.5	12.6	11.9	21.2	13.4	13.4	29.1	25.2
2005	6.4	8.8	8.8	20.0	11.0	8.8	22.2	23.1

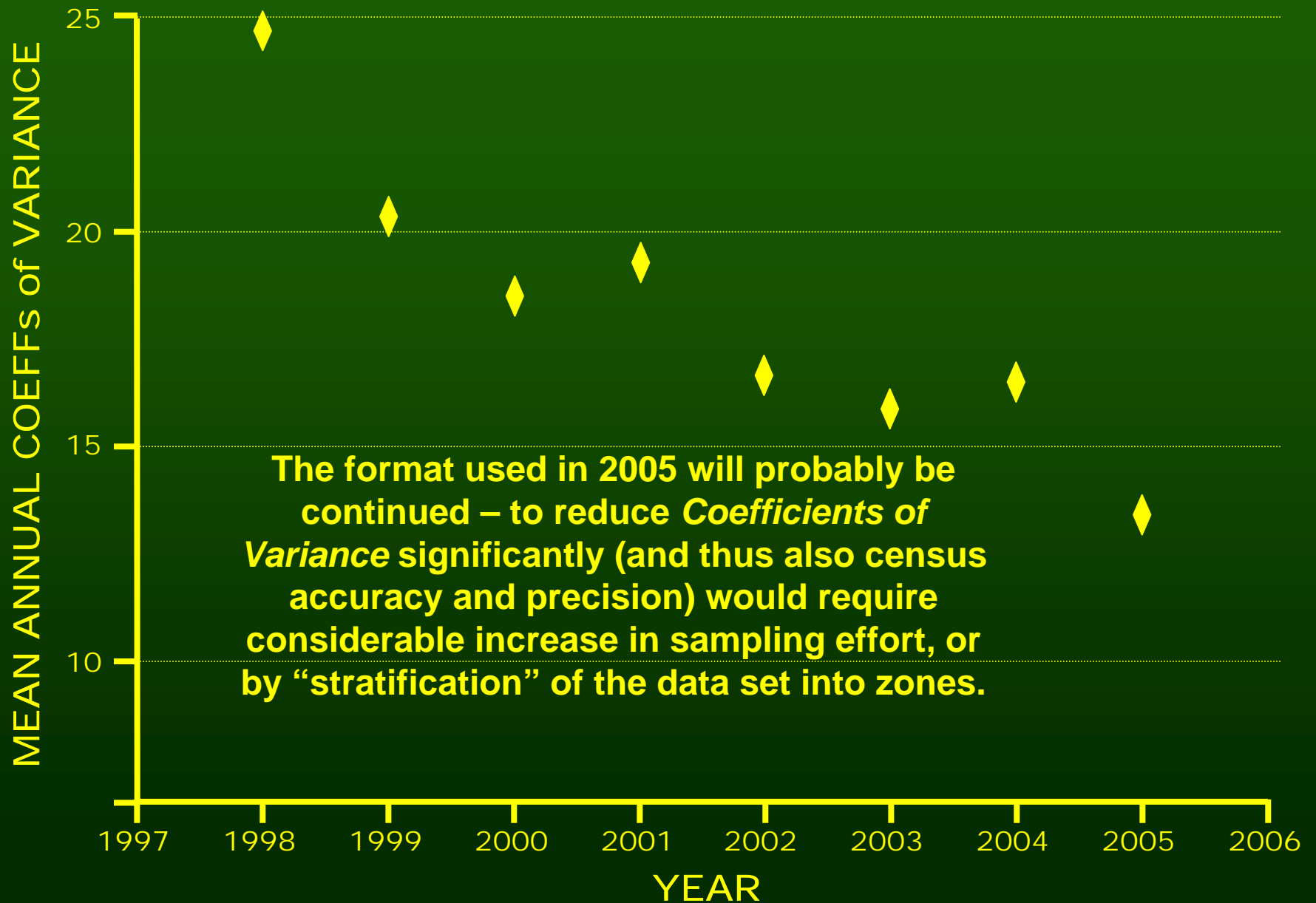
% Coefficients of variance for ALT estimates for KNP herbivores: 1998 & 2005

Year	Impala	Giraffe	Zebra	Wildebeest	Kudu	W. Rhino	Waterbuck	Warthog
1998	11.4	14.0	11.3	22.1	18.0	20.1	33.8	57.8
1999	13.6	14.3	12.7	18.2	17.0	16.0	33.7	41.1
2000	11.2	14.2	15.5	25.3	16.2	17.7	28.0	23.2
2001	10.7	11.2	14.3	25.8	13.5	14.1	29.1	39.97
2002	10.6	13.2	13.2	22.0	12.5	12.0	35.0	-
2003	12.2	12.4	12.9	24.0	13.8	11.9	25.0	-
2004	10.5	12.6	11.9	21.2	13.4	13.4	29.1	25.2
2005	6.4	8.8	8.8	20.0	11.0	8.8	22.2	23.1

ALT census estimates for large herbivores between 1998 and 2005

Year	Impala	Giraffe	Zebra	Wildebeest	Kudu	W. Rhino	Waterbuck	Warthog
1998	106103	7263	22425	10179	3437	2846	1369	1432
1999	77575	4178	14296	6373	3021	3067	739	1625
2000	89921	4981	19620	5102	4961	2655	2866	1727
2001	91742	6754	29016	22195	4705	5241	2288	2260
2002	79492	5655	21598	9331	3764	4428	4663	3804
2003	85869	5114	17797	9612	5798	4509	2951	697
2004	61433	4140	12177	9574	4614	4533	2517	1126
2005	100947	6692	21102	12018	6705	6942	3213	2283

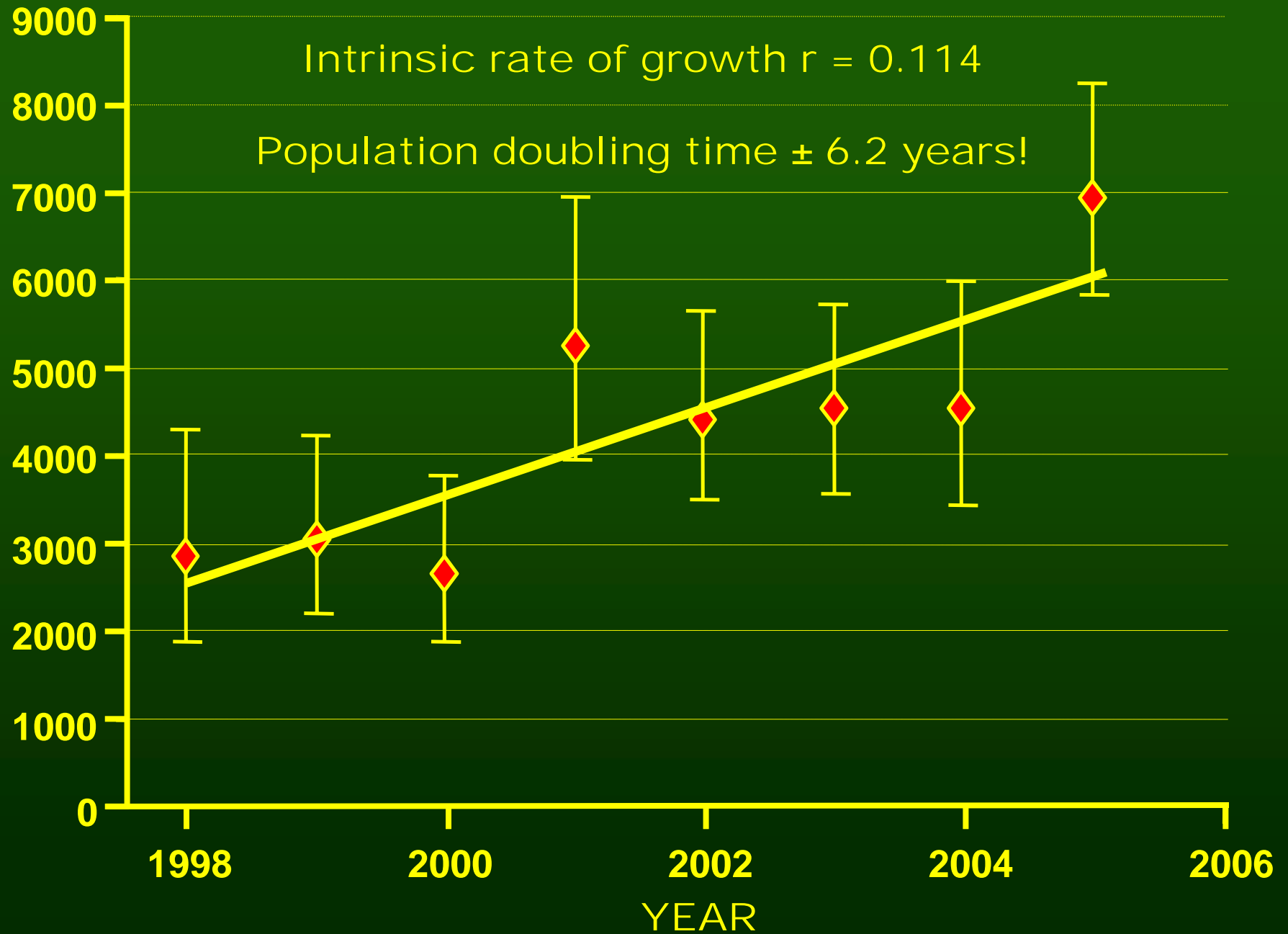
DECREASE IN THE MEAN ANNUAL COEFFICIENTS OF VARIANCE



WHITE RHINO POPULATION ESTIMATES: 1998-2005

Intrinsic rate of growth $r = 0.114$

Population doubling time ± 6.2 years!



PROS AND CONS: EAS vs ALTs

Ecological Aerial Surveys:

Pros

- **Good consistent estimates of all large herbivore populations**
- **Good distributional data for all species**

PROS AND CONS: EAS vs ALTs

Ecological Aerial Surveys:

Pros

- **Good consistent estimates of all large herbivore populations**
- **Good distributional data for all species**

Cons

- **Huge financial and human resources investment**
- **Risk of not completing the surveys**
- **Can not give estimates of actual numbers, no S.E. or estimates of variance**

PROS AND CONS: EAS vs ALTs

Ecological Aerial Surveys:

Pros

- Good consistent estimates of all large herbivore populations
- Good distributional data for all species

Cons

- Huge financial and human resources investment
- Risk of not completing the surveys
- Can not give estimates of actual numbers, no S.E. or estimates of variance

AERIAL LINE TRANSECTS:

Pros

- Consistent estimates of selected large herbivore populations
- Financial and human resources investment considerably reduced
- No risk of incomplete surveys (11 days in good weather)
- Gives estimates of actual population numbers

PROS AND CONS: EAS vs ALTs

Ecological Aerial Surveys:

Pros

- Good consistent estimates of all large herbivore populations
- Good distributional data for all species

Cons

- Huge financial and human resources investment
- Risk of not completing the surveys
- Can not give estimates of actual numbers, no S.E. or estimates of variance

AERIAL LINE TRANSECTS:

Pros

- Consistent estimates of selected large herbivore populations
- Financial and human resources investment considerably reduced
- No risk of incomplete surveys (11 days in good weather)
- Gives estimates of actual population numbers

Cons

- Not good data on species distribution
- Not a good technique for rare antelopes

ACKNOWLEDGEMENTS

- Dr Brian Reilly: Data analysis & advice
- Ezekiel Khosa: Data capture (FSO)
- Thando Msomi: Consistent enthusiastic observer
- Obert Mathebula & Simon Khosa (aircraft servicing)
- Many others (too many to mention):
Rangers, students and other keen staff members

ACKNOWLEDGEMENTS (CONTINUED)

Particular thanks to all those who have suffered in the "vomit comet !!"



But it is not as bad as this!!!



THANK YOU !!