Analysis of Hunter Movement for Game Management Using GIS Data

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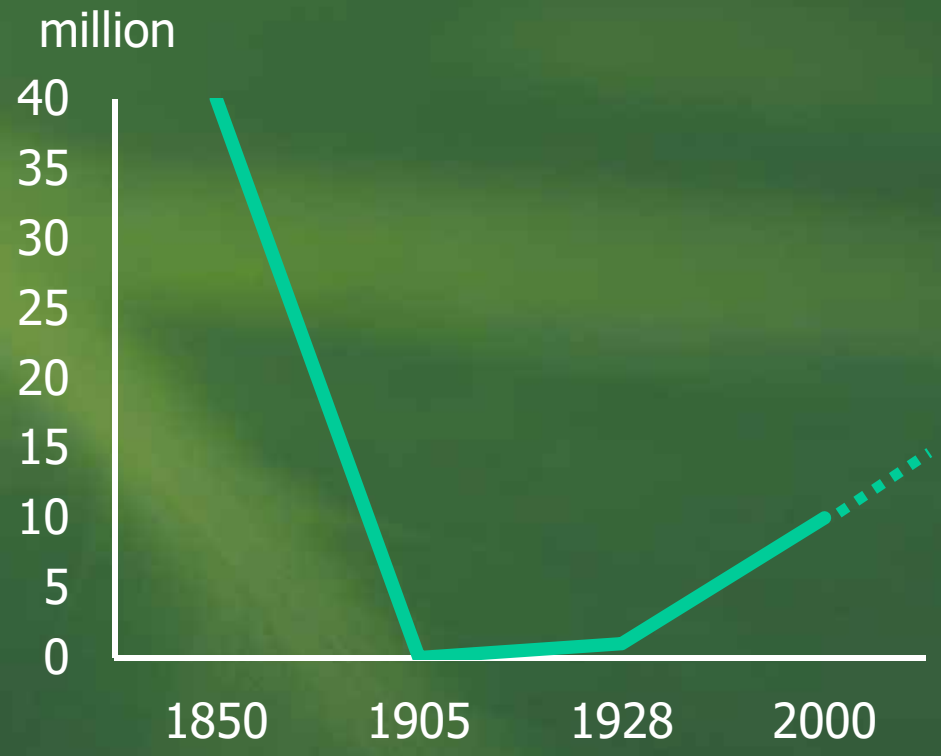
Historical populations

White-tailed Deer

(Length:2-2.5m, Weight:50-130kg)



Deer Population in USA

Negative Impacts of White-tailed Deer

Agriculture, Forestry Damage
($102-116 million/year in Penn State)

Deer-vehicle Collisions
(100 thousand crashes/year
in Penn State)

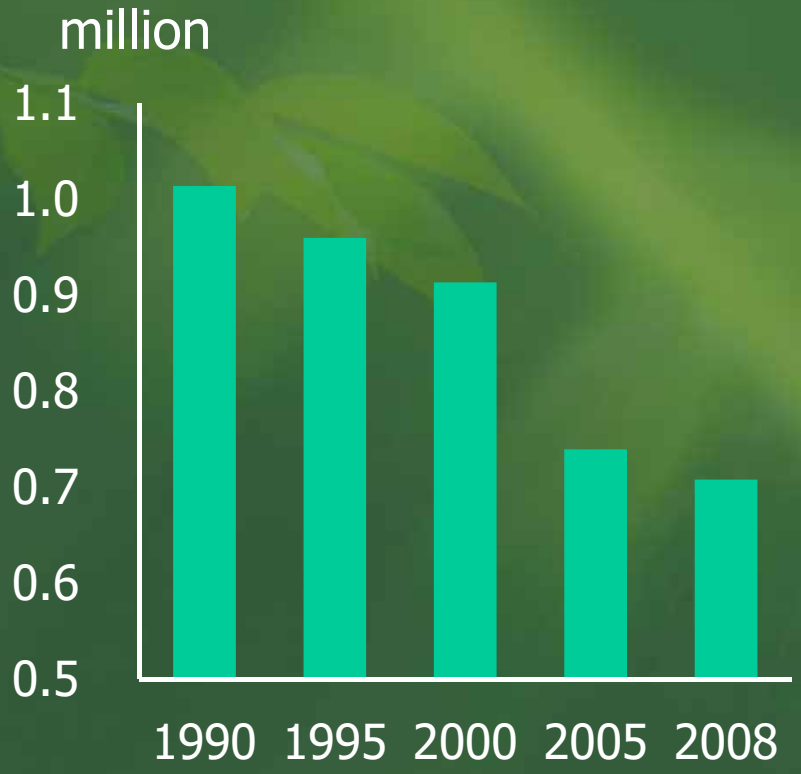
Lyme Disease
(21% in Penn State)

Positive Effects of Recreational Hunting

Primary Management Tool to Control Deer Populations
(300-500 thousand/year in Penn State)

Economic Influence
($500 million/year in Penn State)

Decrease and Aging of Hunters



Number of Deer Hunters in Penn State

Proportion of Hunters Penn State, 2006

Age	Population	Hunter
16 to 17	**3**	2
18 to 24	**11**	6
25 to 34	14	14
35 to 44	20	30
45 to 54	19	**23**
55 to 64	15	15
> 65	18	10

National Survey, U.S. Fish & Wildlife Service

Hunter Movement Survey

in Sproul State Forest

Public land(45,749ha), Unrestricted hunter access

Hunter Movement Survey

using GPS unit and Questionnaires

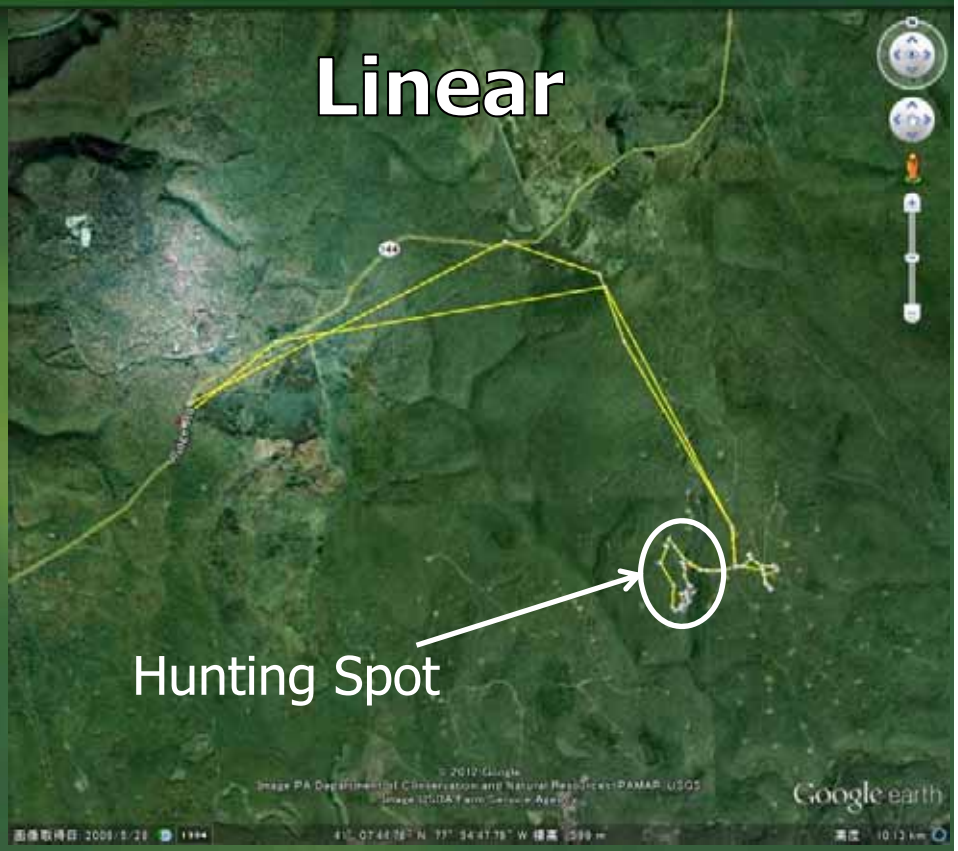
Hunter Characteristics (Questionnaire)

- 162 cases
- 98% male
- 96% Penn State residents
- 60% >40 years old
- 51% 1-2 days hunting effort (Max. 12 days)
- 14% success harvest (12% antlered)

Hunter Movements (GPS)

- 8’24” time spent hunting (per day)
- 17.1km total distance traveled
- 36.7m/min. average speed of travel
- 716m max. distance from public road
- 123m vertical interval

Movement Pattern



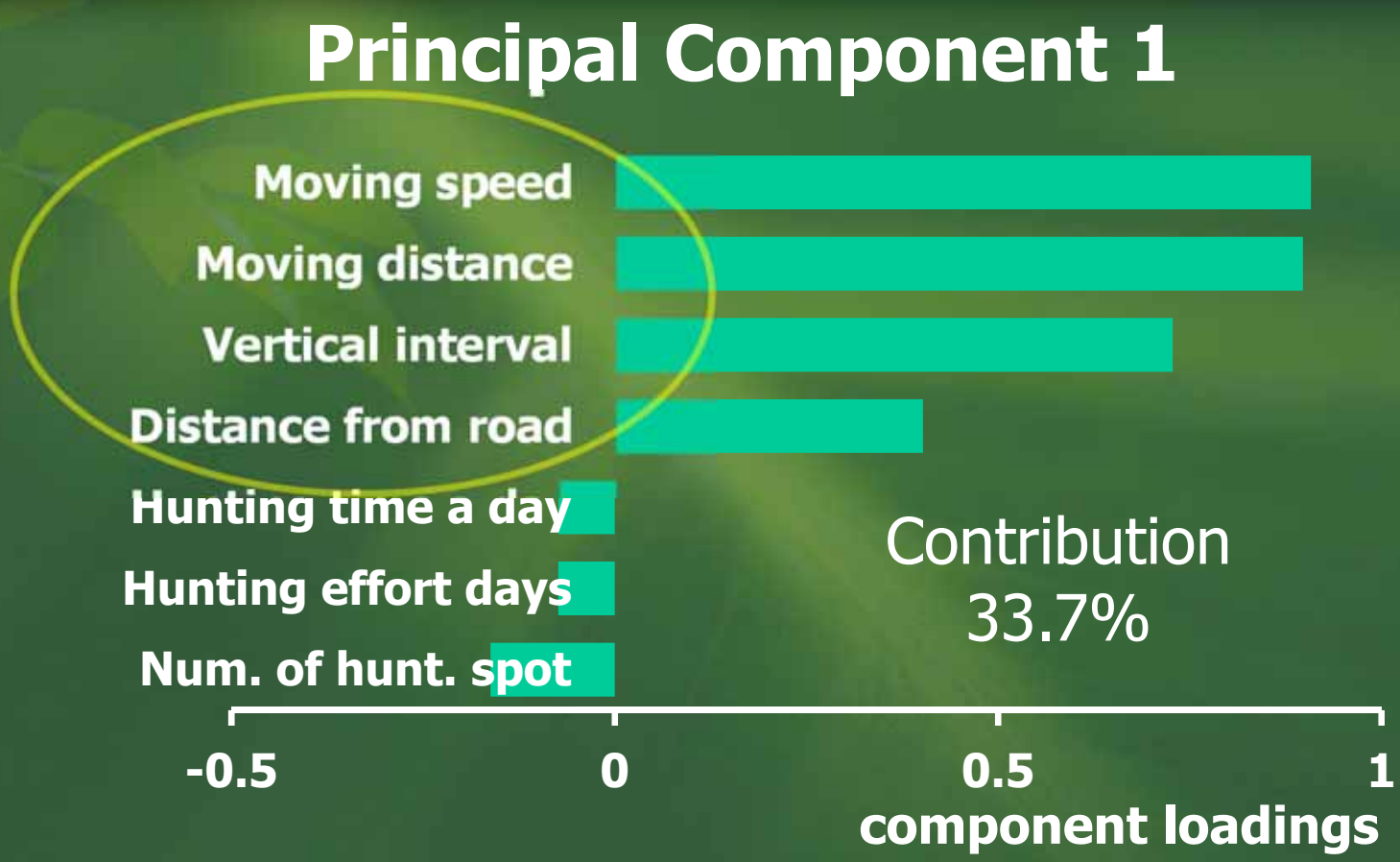
Note: Visually estimation by authors

- 50% circle, 50% linear
- 45% hunted at one place (27% two places)

Single Regression Analyses

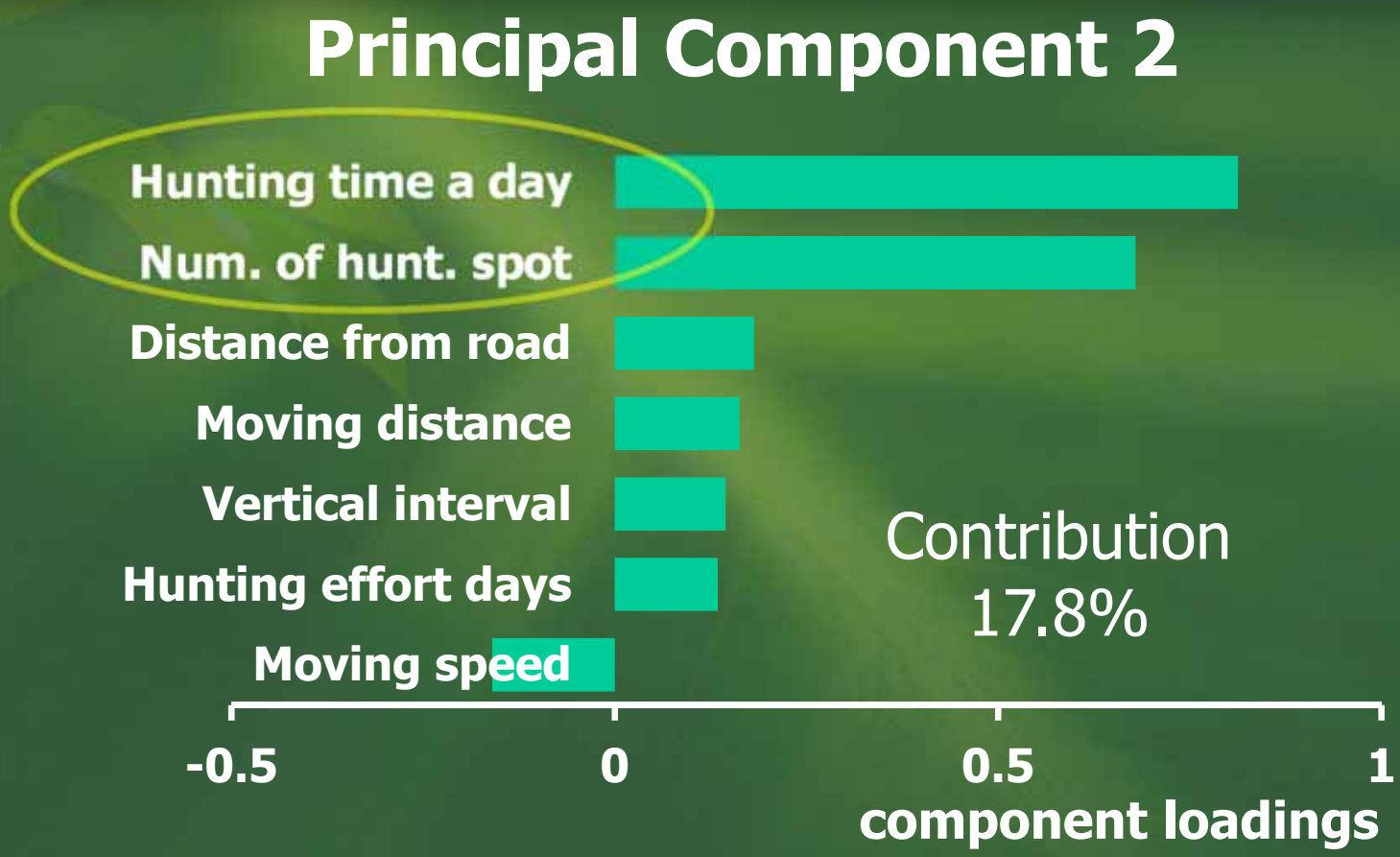
- Hunter's age has negative effects on:
  - moving distance ($p<.01$, $R^2=.07$)
  - moving speed ($p<.01$, $R^2=.08$)
  - distance from road ($p<.01$, $R^2=.04$)
  - vertical interval ($p<.01$, $R^2=.04$)

Principal Component Analysis



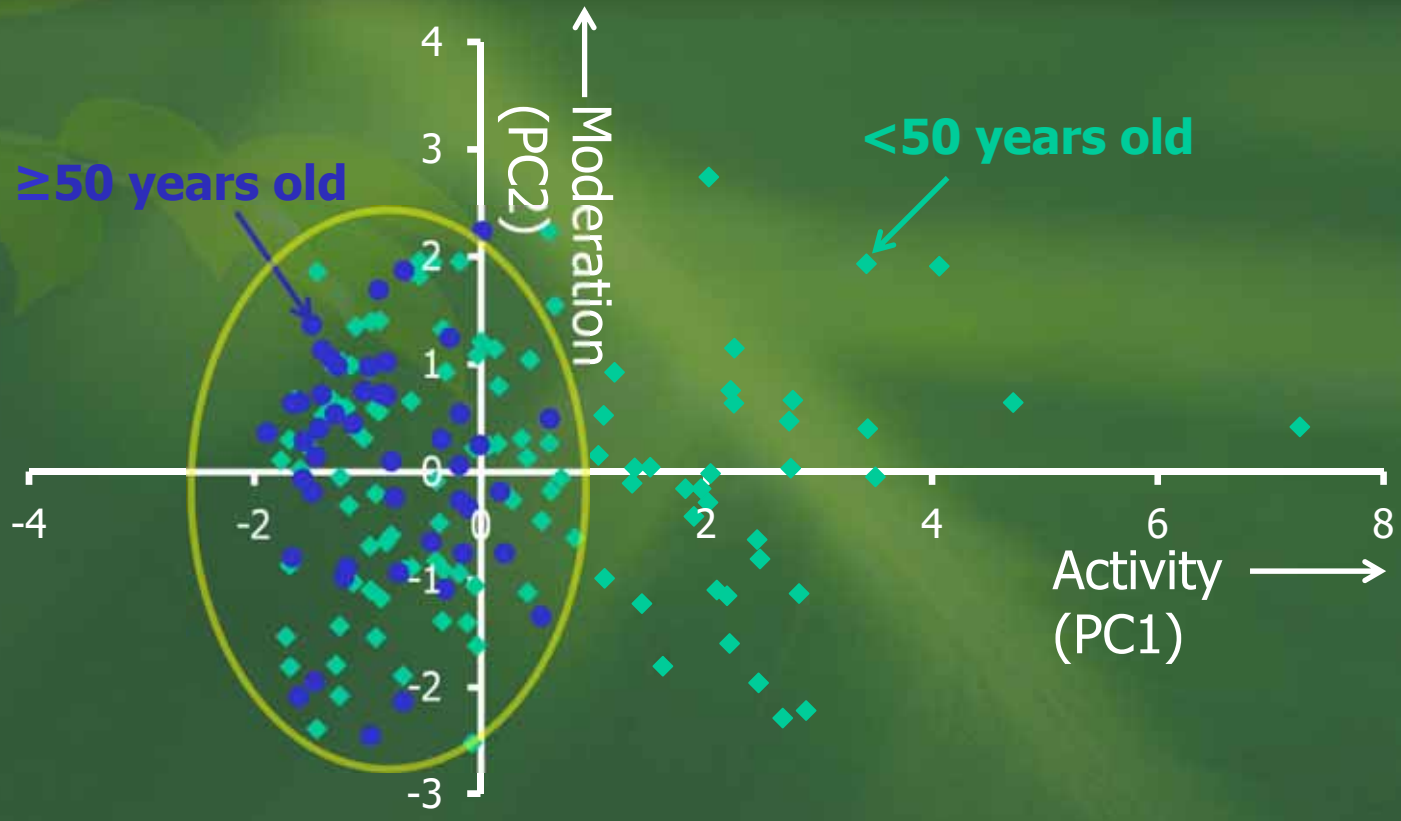
- PC1 means "Activity"

Principal Component Analysis



- PC2 means "Moderation"

Hunting Activity and Age



- Senior hunters in low activity group

Multivariate Logistic Regression

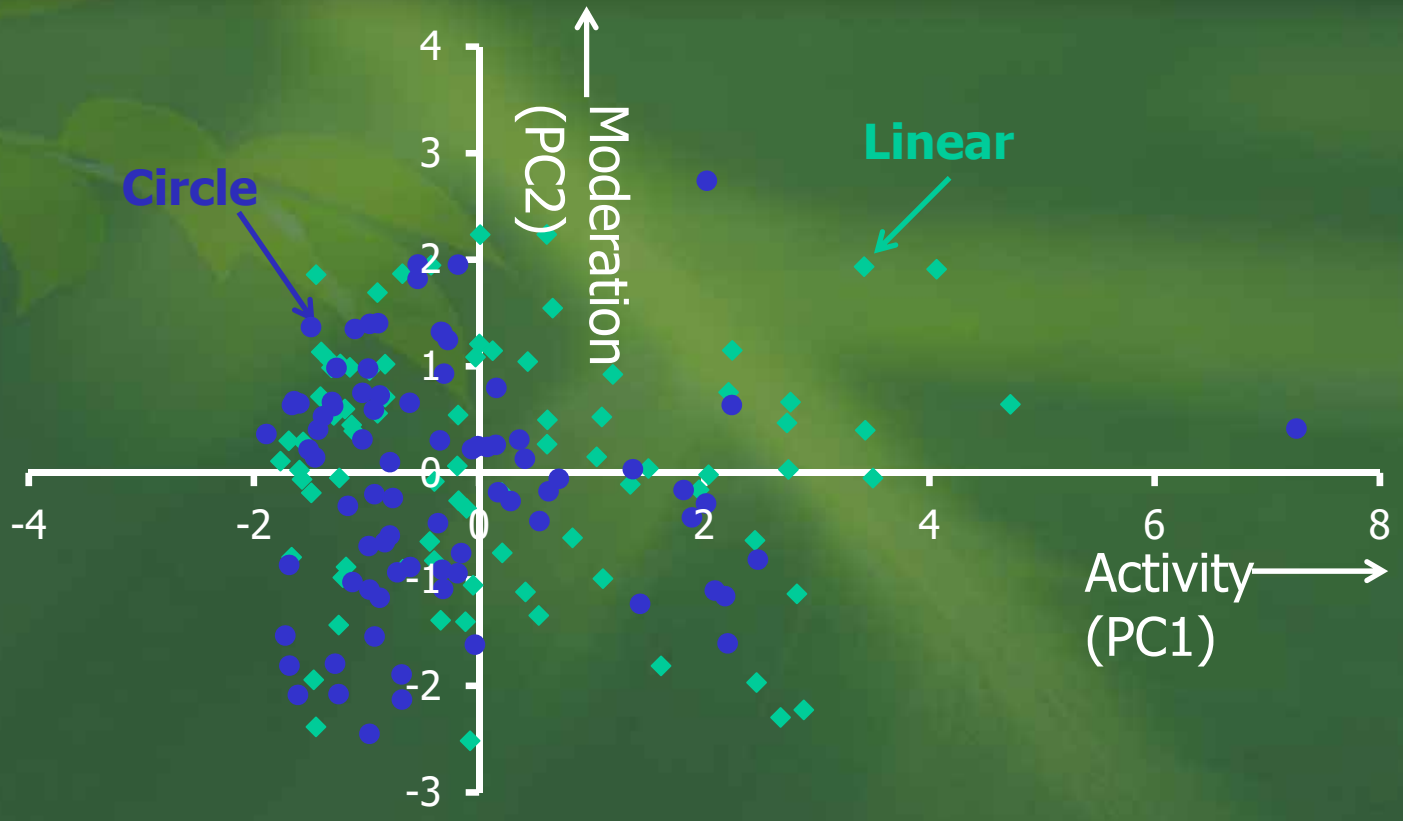
- Regression of Age (senior dummy) on PC1, PC2

Variable	Coefficient	Test	Odds Ratio
PC1 (Activity)	- .8932	**	.409
PC2 (Lazily)	.0977		1.103
Constant	-1.249	**	.287
n=	162		
R^2=	.145		

** p< .01

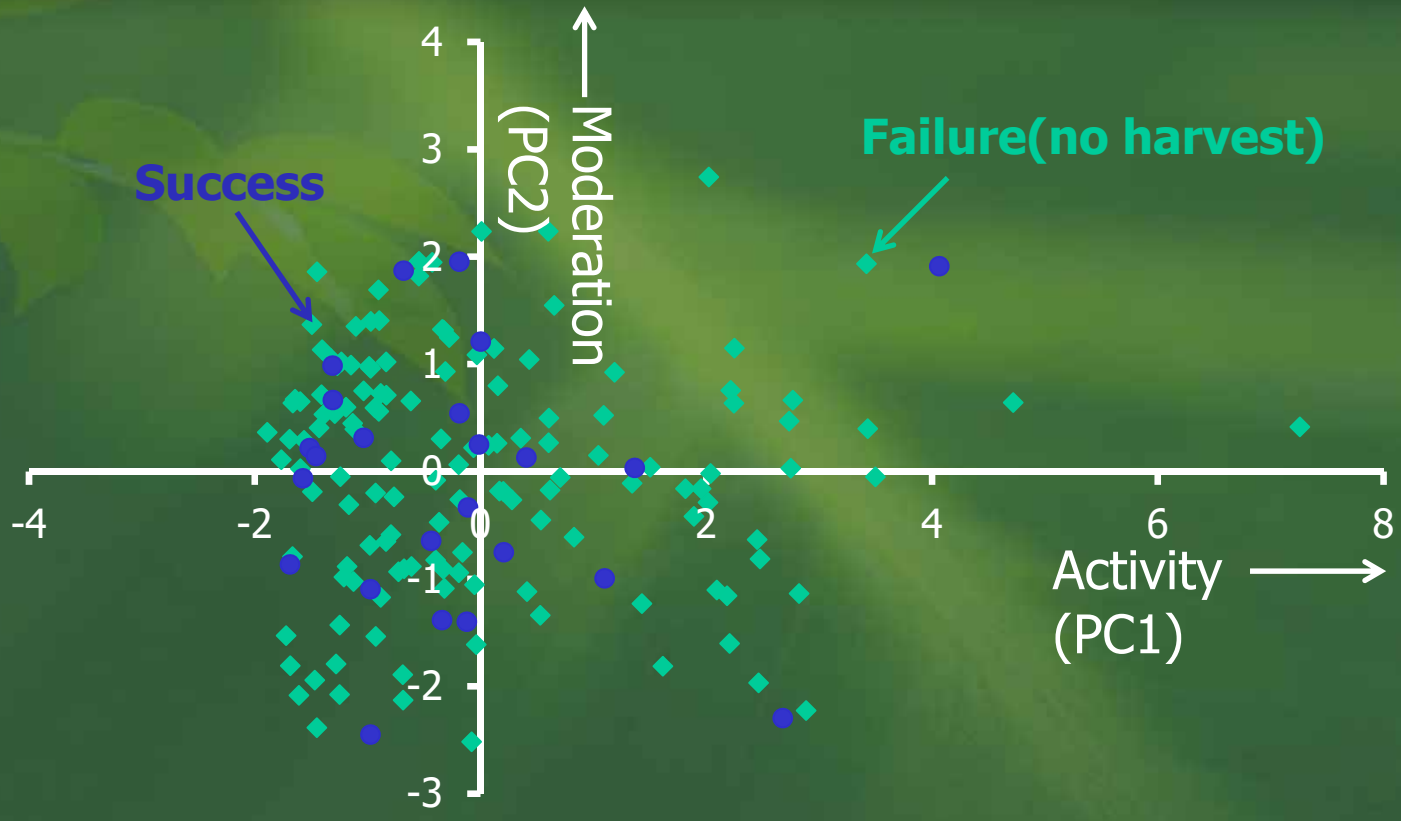
Significant relationship between Low Activity and Age

Hunting Activity and Movement Pattern



- No relationship between Activity and Movement Pattern

Hunting Activity and Harvest



- No relationship between Activity and Harvest

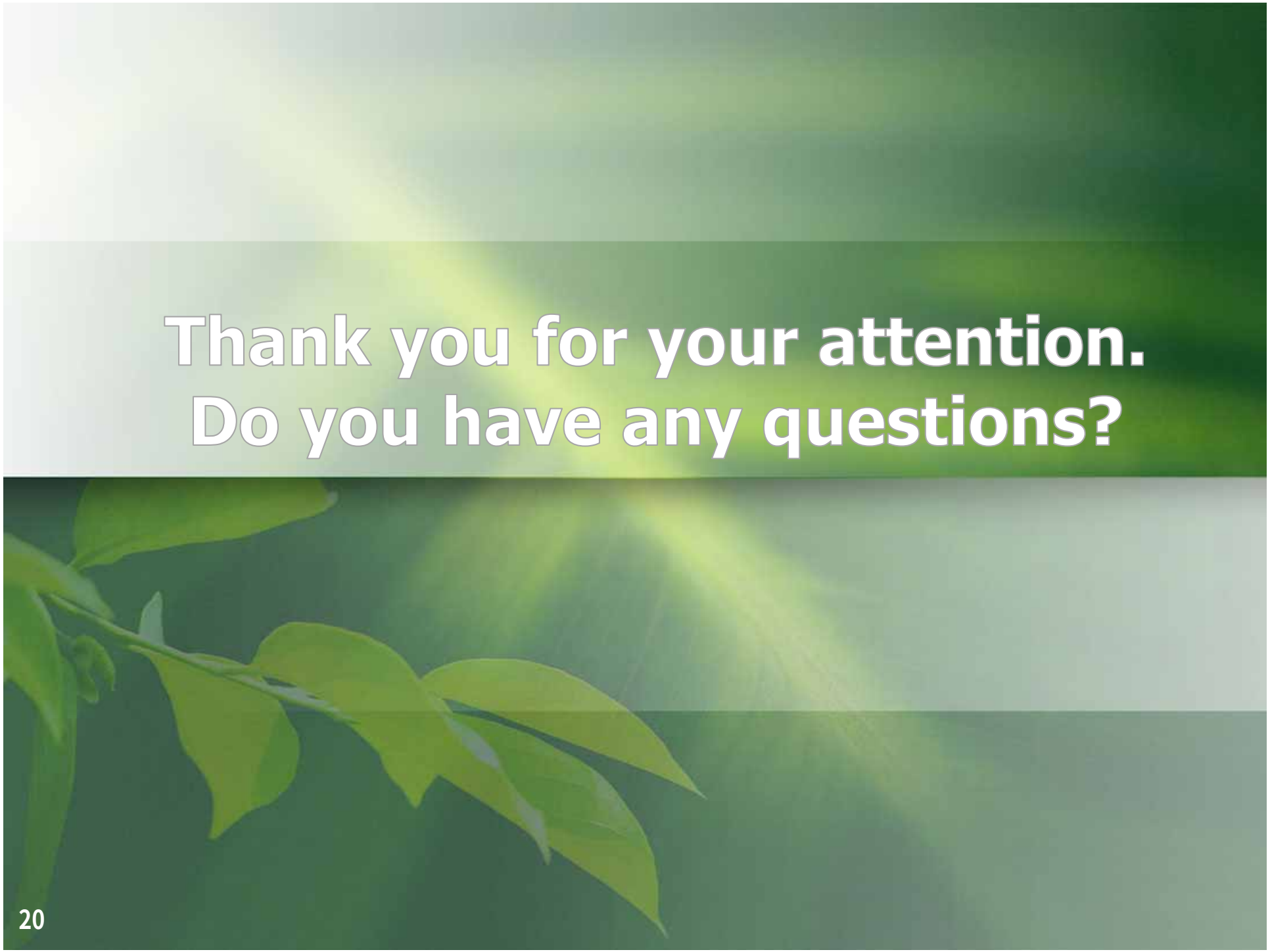
Summary

- Deer populations are on the increase
- (Young) hunter numbers are decreasing
  →It will become difficult to control populations
- Antlerless is getting unpopular with hunters
- Senior hunters are in low activity (they hunt only in the place which is easy to access)
  →Balance of deer population is collapsing

Strategy for Wildlife Management

- For managing right (and well-balanced) deer population...
  - → Changing hunting regulations for antlered
  - → Discount of license fee to young hunters
  - → Education to inexperienced hunters:

    e. g. Many deer inhabit the backwoods


Thank you for your attention.
Do you have any questions?