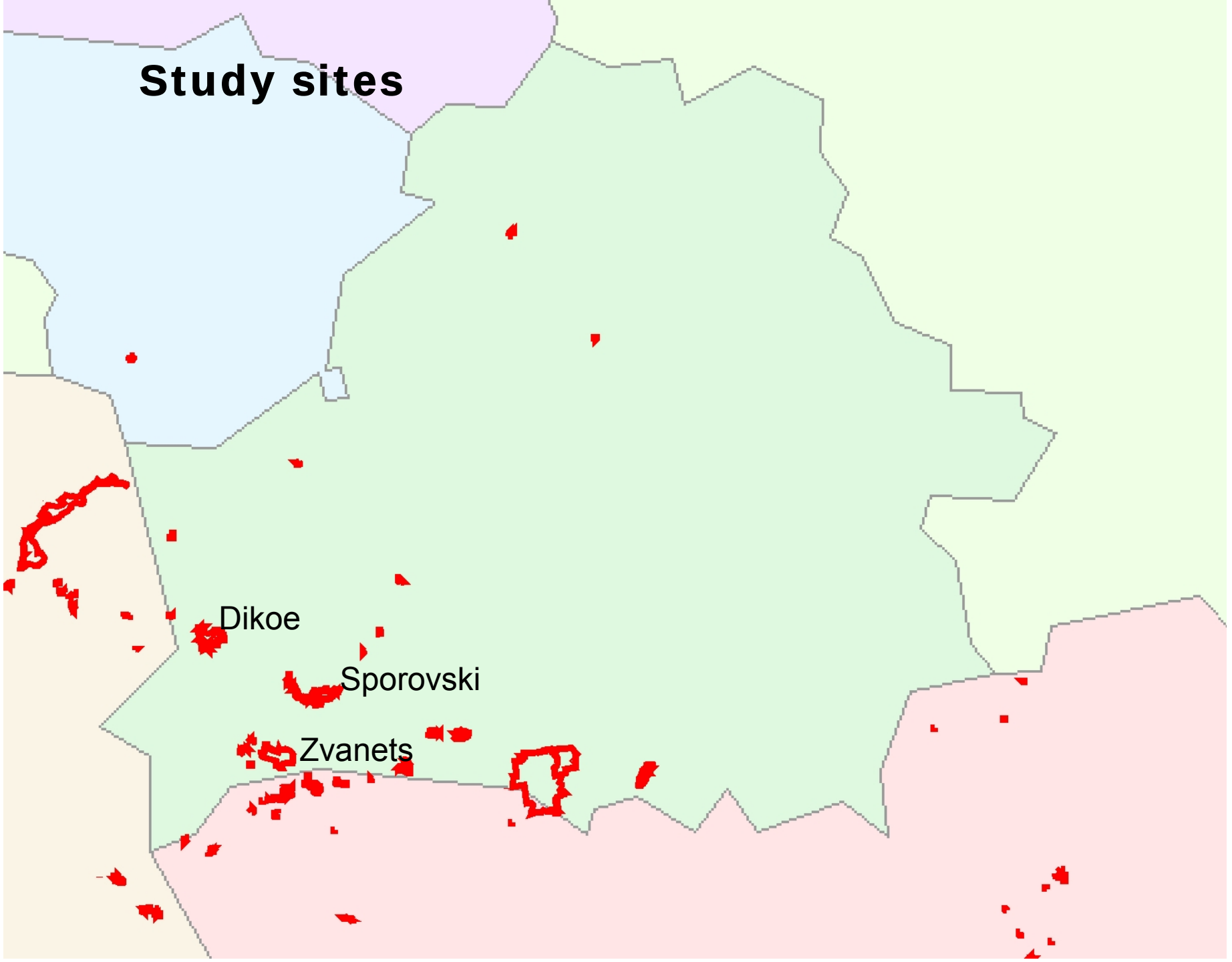
Key habitat factors, diet, predation and population dynamics of AW in Belarus

Alexander Kozulin & Lyuba Vergeychik


Study sites
Dikoe
Sporovski
Zvanets

Main characteristics of study sites

Plant Association	Fens				
	Sporovo			Zvanets	Dikoe
	Peschnka	Kostyuki	Kokoritsa	Povit	Vibrody
Mineralisation of water, mg/l	289	145	163	347	106
Caricetum elatae	89,1	13,5	38	58	9,6
Caricetum appropinquatae	0	81,1	13	37	4,5
Caricetum rostratae	4,5	0	2,9	0	0
Caricetum diandrae	0	0	0	0	3,9
Caricetum lasiocarpae	0	5,2	39	0	45
Caricetum limosae	0	6,5	0	0	16,4
Phragmitetum communis	4,5	0	0	0,2	5,9

Research of current state of the Aquatic Warbler (1995-2006)

Complex research of mire ecosystems (water, soil, vegetation, insects, birds)

Monitoring of bird density and key environmental factors from 1996 till 2006 (6 monitoring plots)

Monitoring of breeding success and reasons of nest mortality (fate of 164 nests has been monitored)

Diet analysis of Aquatic Warbler and other species vs analysis of food availability (1300 ligature samples)

Research of migration (520 birds ringed, 5 recoveries)

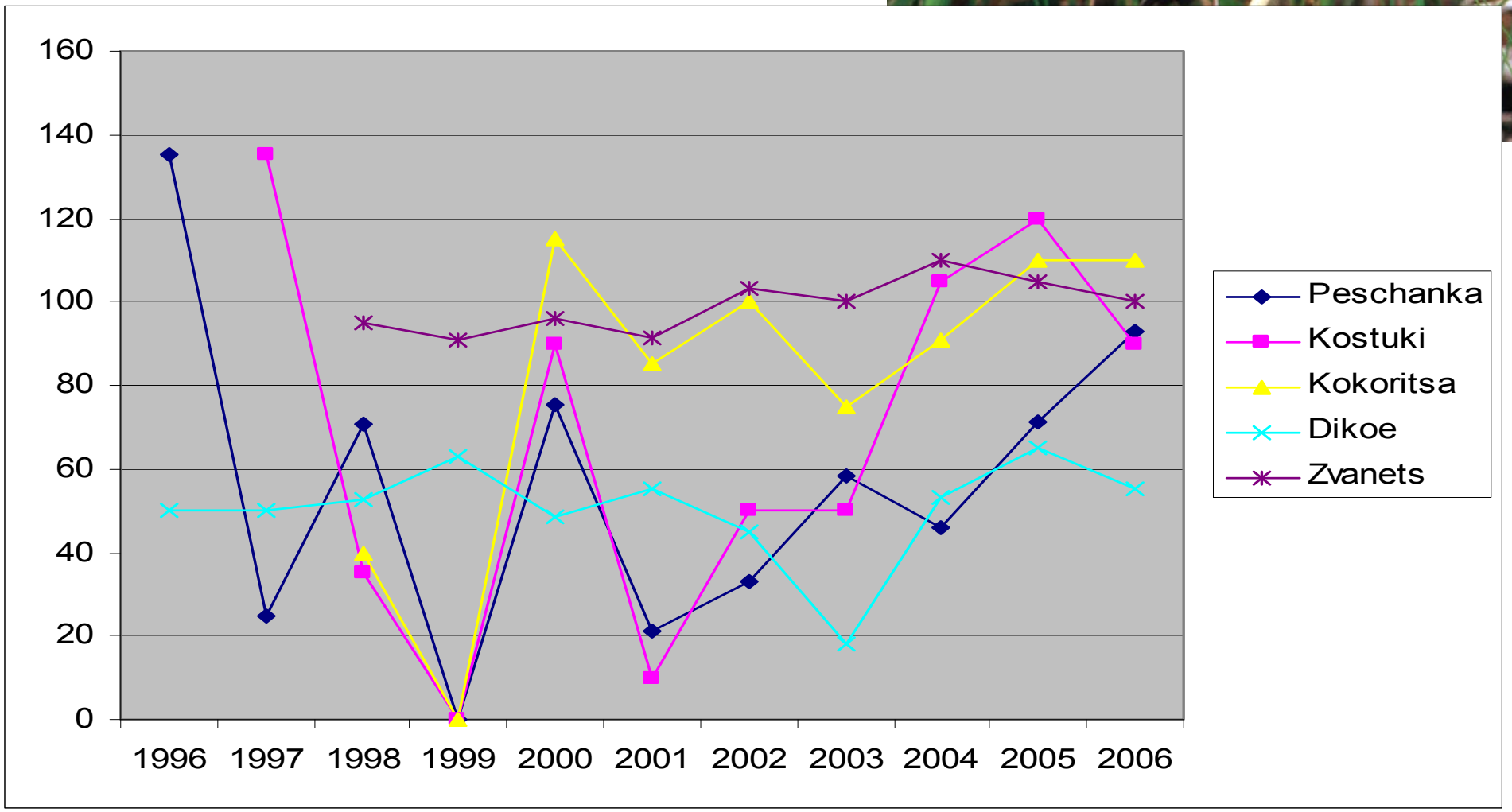
Характеристика местообитаний

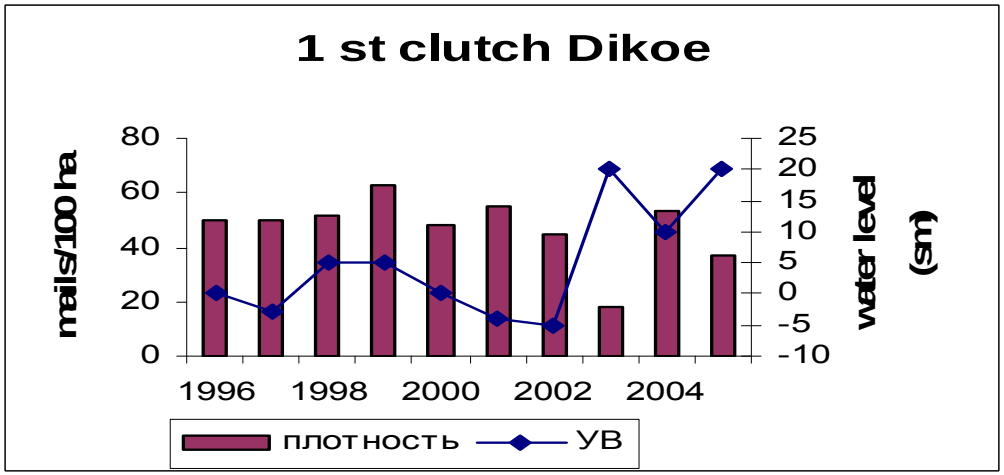
Geo-botanical descriptions conducted

Chemical characteristics of water analysed

Aquatic Warbler is a habitat specialist and inhabits only open fen mires (hypno-sedge) with mineralisation of water from 100 to 400 mg/l

Monitoring of Aquatic Warbler density on 5 monitoring plots

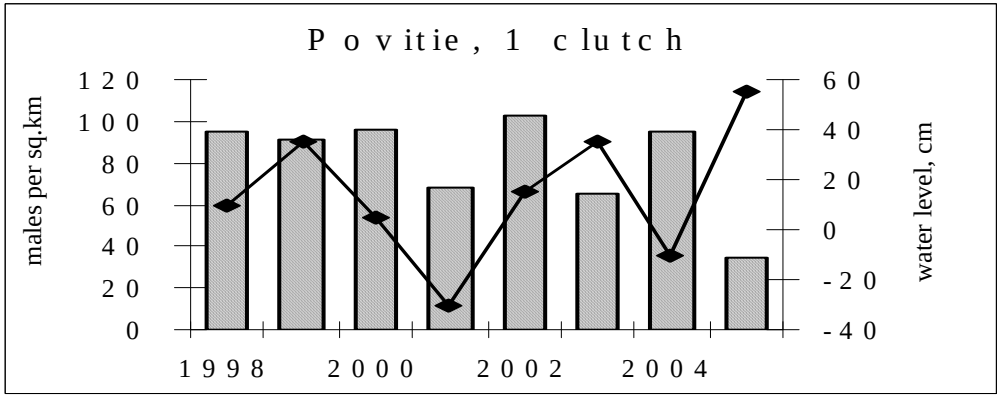


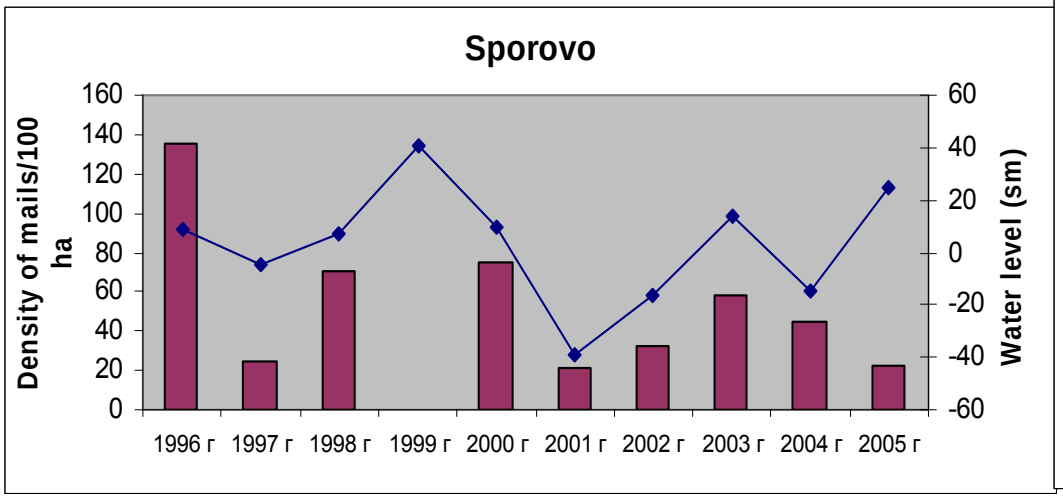


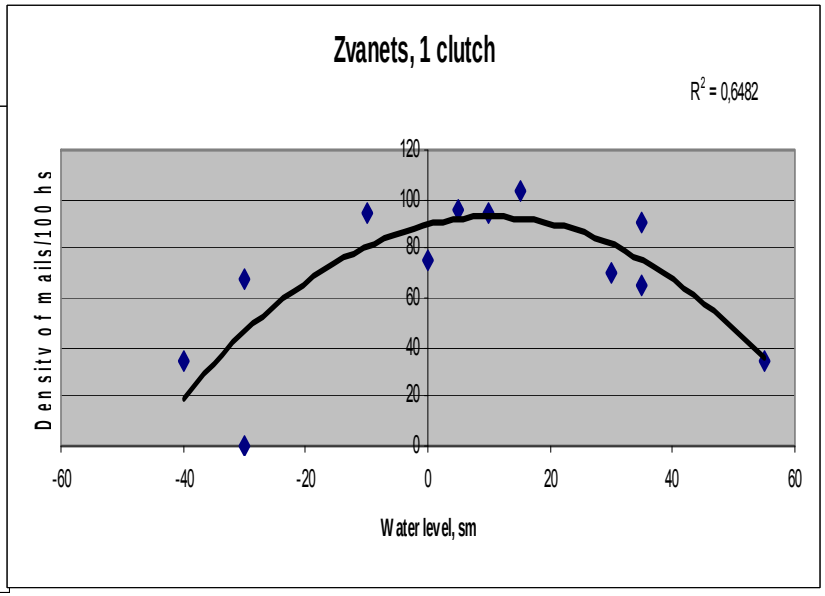
Key factors determining density of vocalizing males :

– water level at the mire;

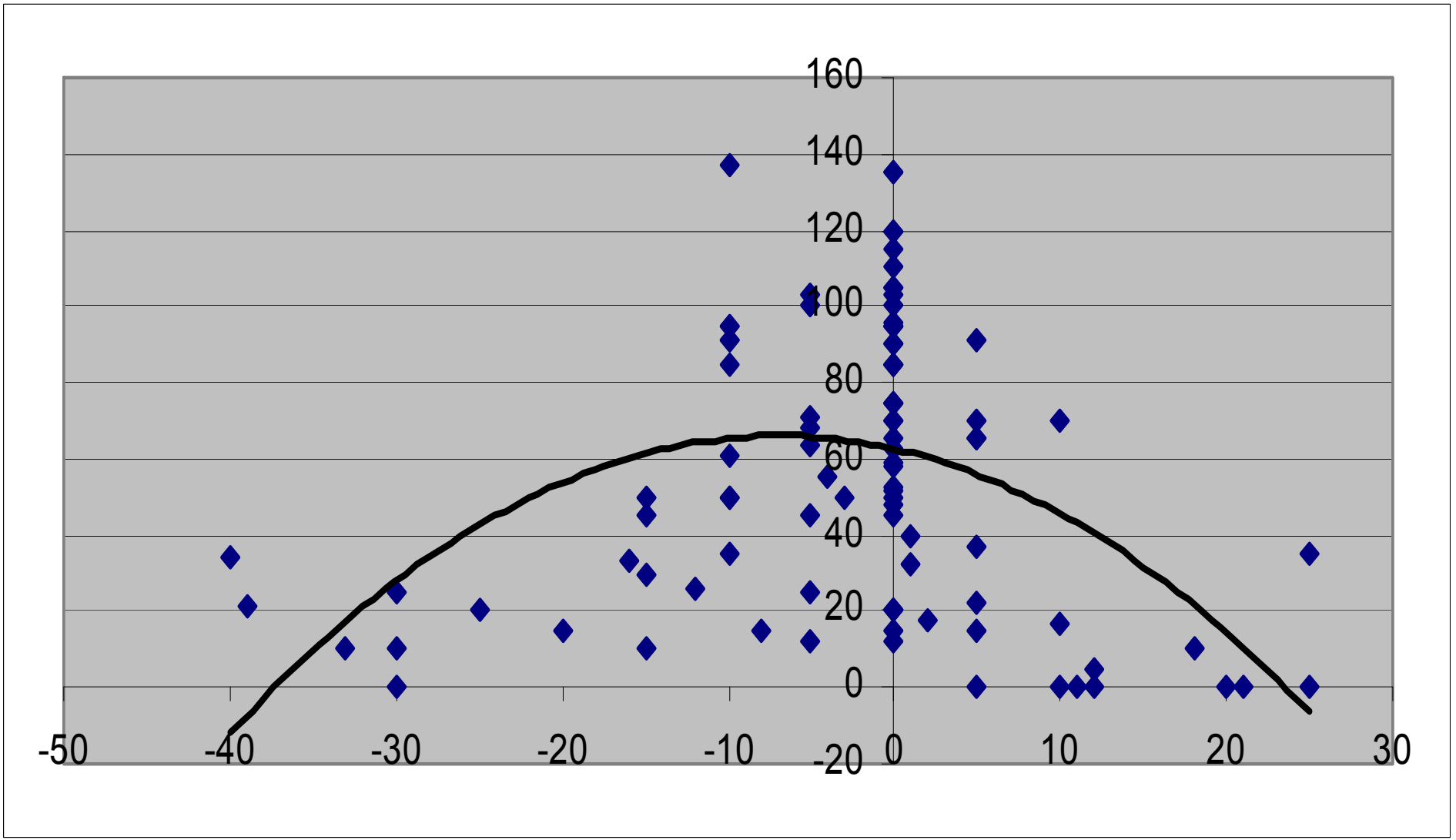
- vegetation structure

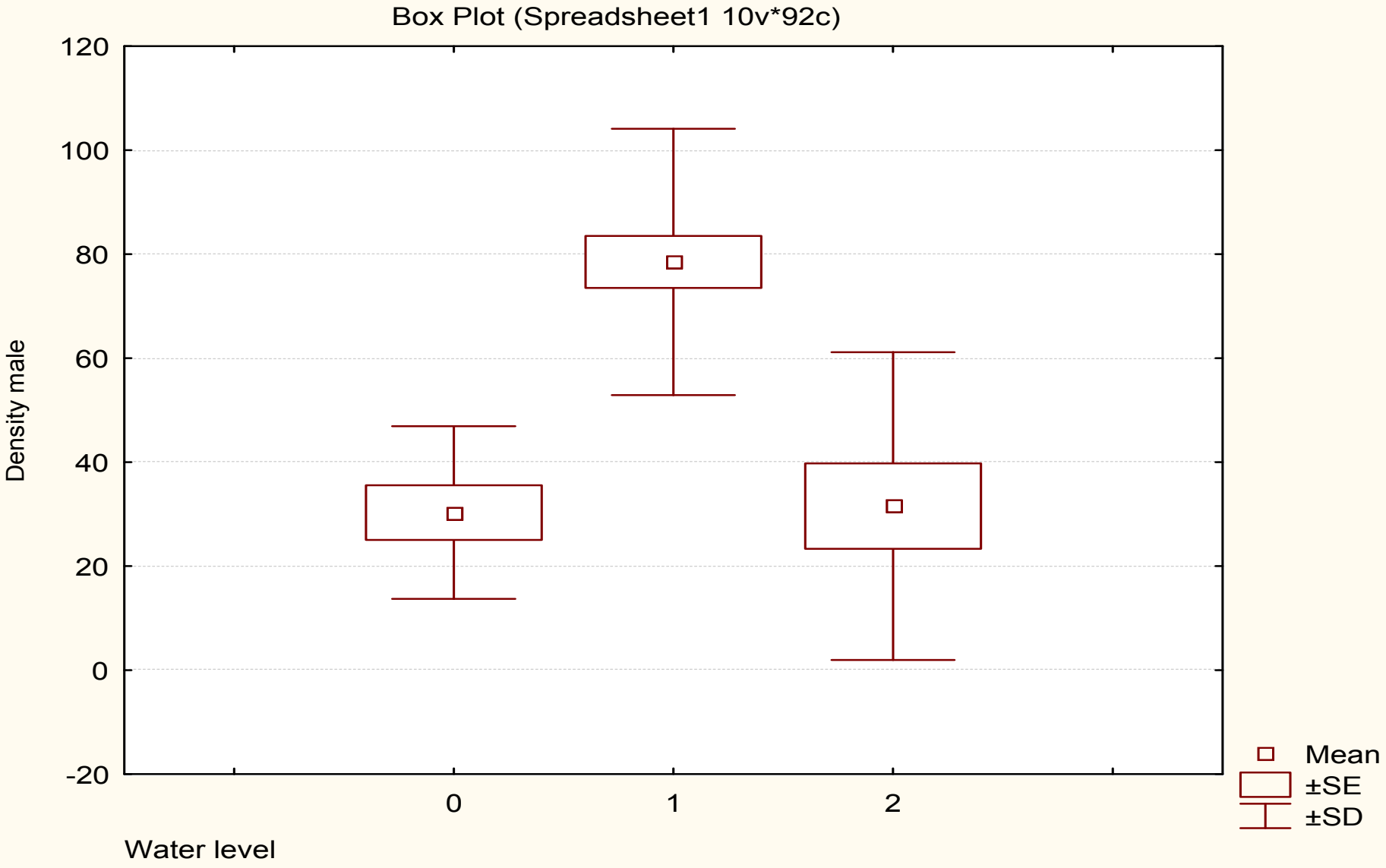




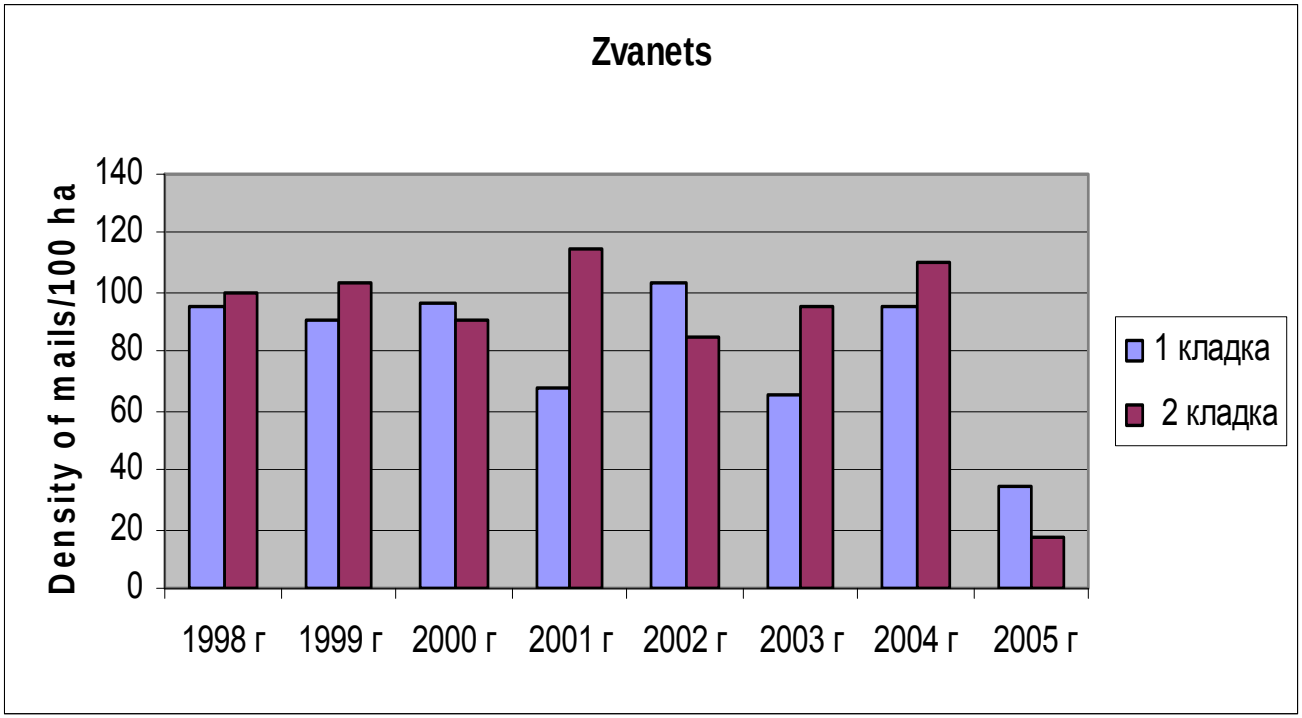


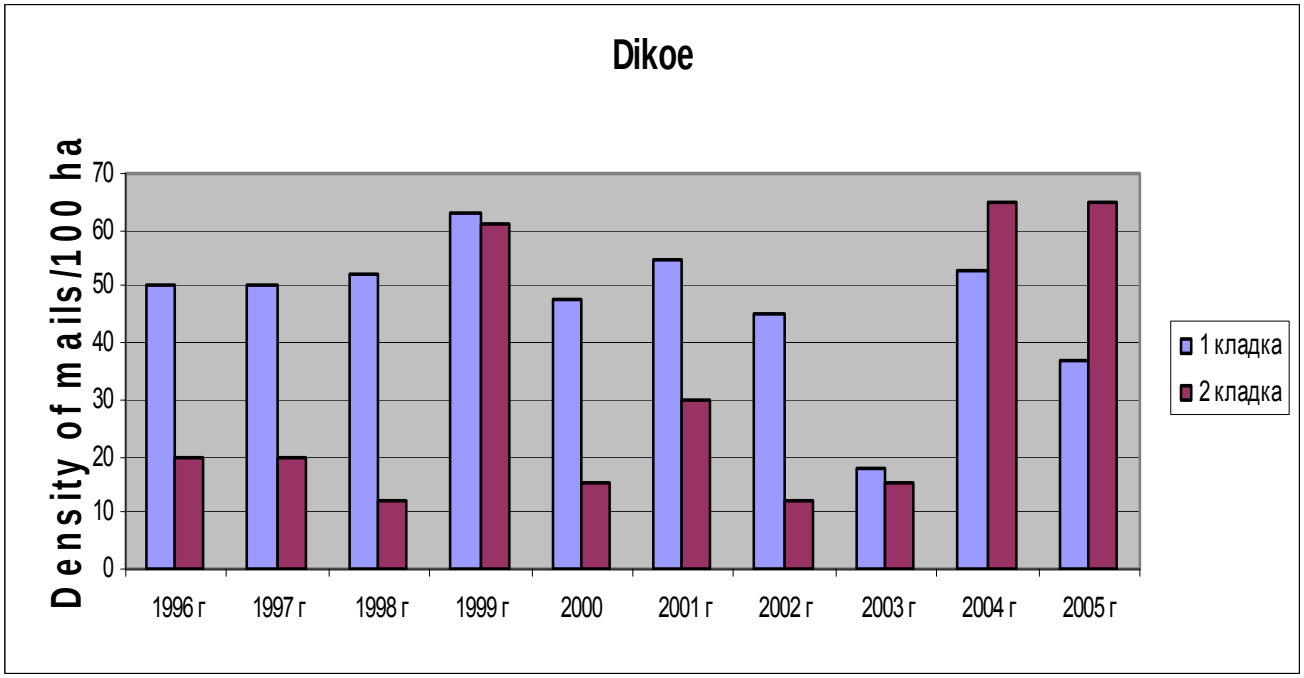
Correlation of density of males with water level





Dependence of density of males during first clutch on the level of water at the mire
Water level: 0 – 10 см below ground level; 1 – from -9 to +19 см (not reaching the level of tussocks; 2 – 20-55 см above ground level (above tussoks)



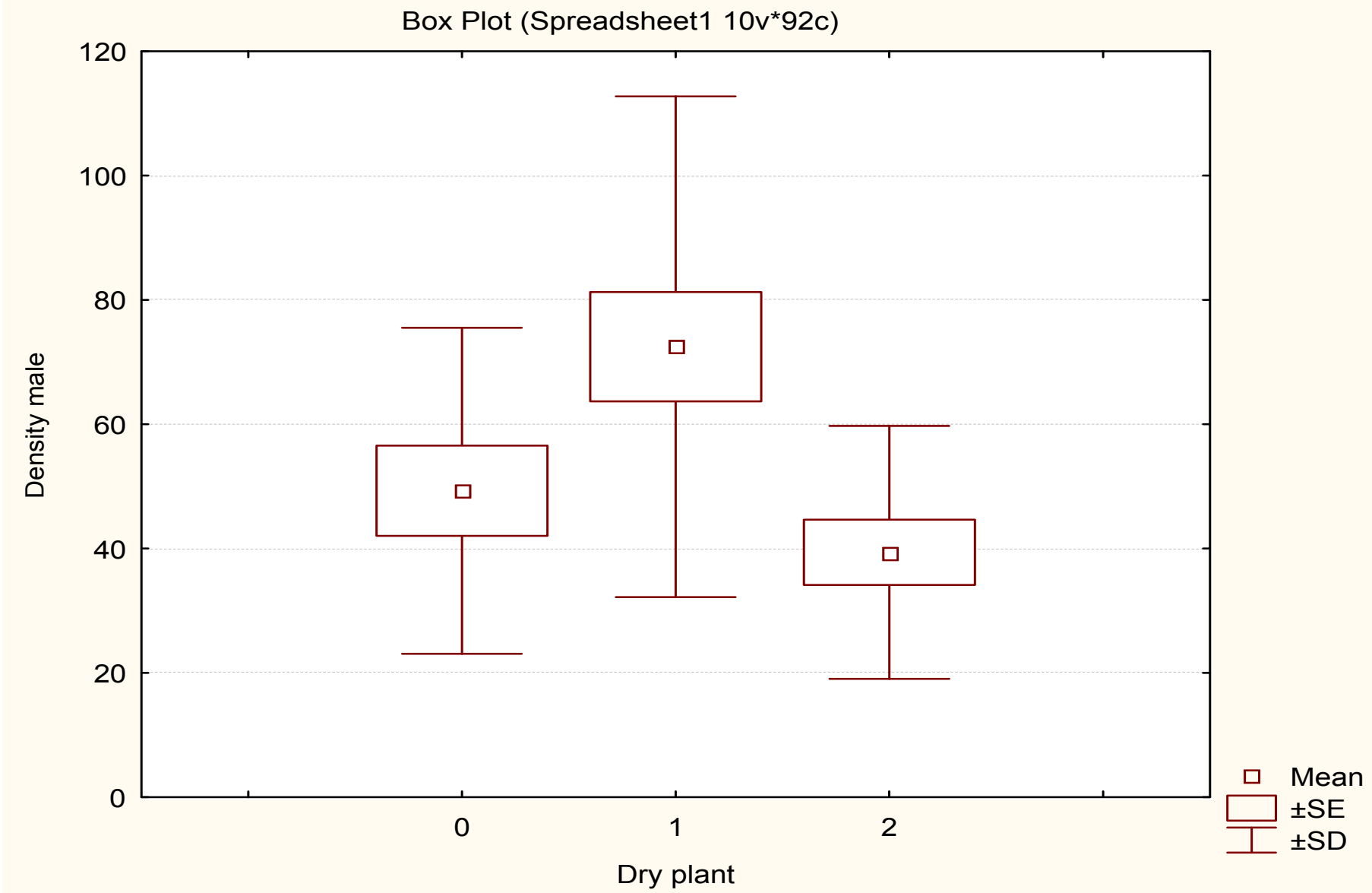


Unfavorable years:

- density in July is higher than in May

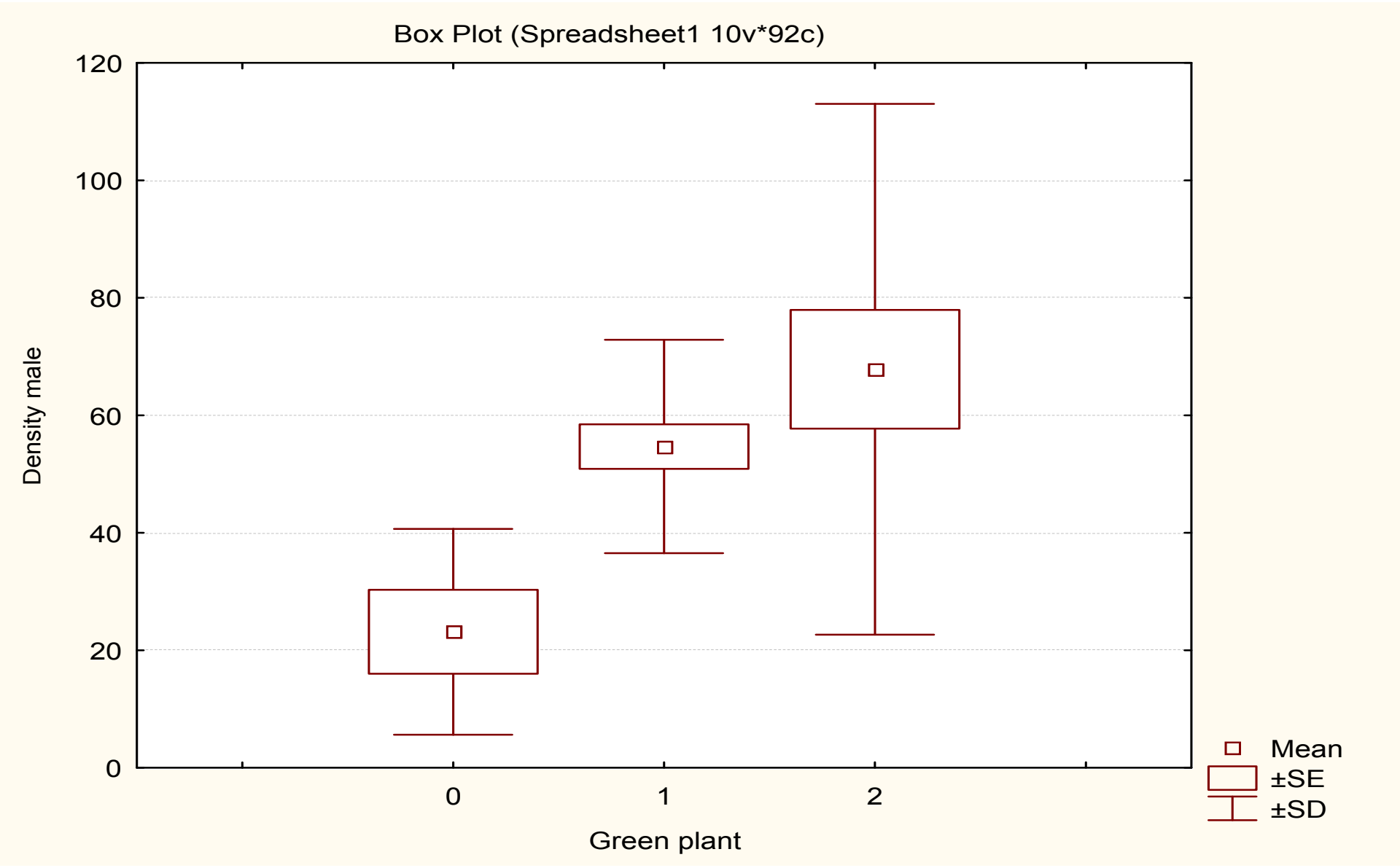
Normal years:

- density of males in May is higher than in July



Dependency of density of males at first clutch on the state of dry vegetation. 0 – no dry vegetation; 1 – last year's vegetation preserved; 2 – thick layer of dead vegetation from last year and previous years


Servech, 27 May 2006



Dependency of density of males at the first clutch on the state of green vegetation. 0 – green vegetation is not developed; 1 – green vegetation is at 50% development; 2 – green vegetation is at 100% development.

Environmental factors that determin the population of the species

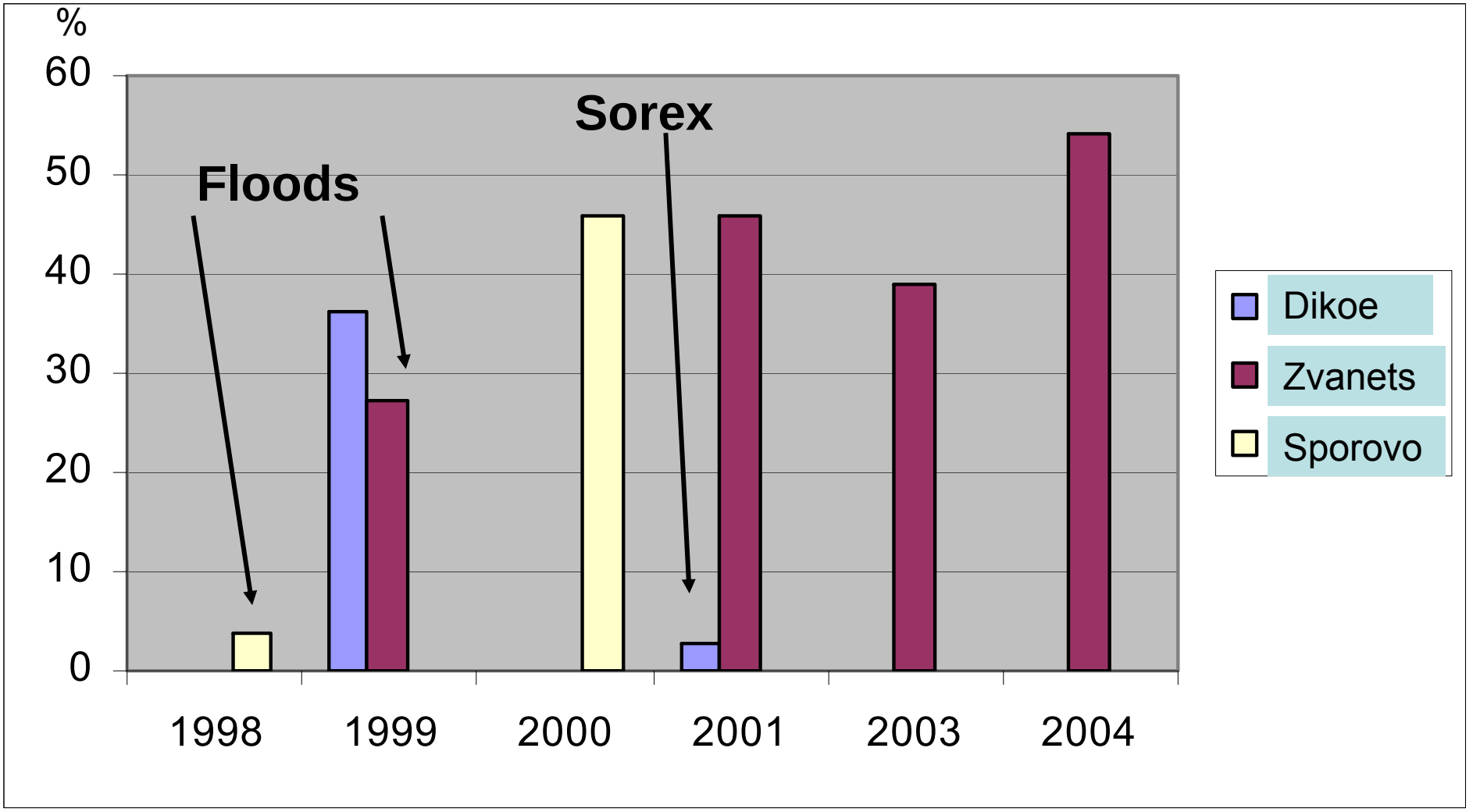
Water level dynamics during the breeding season

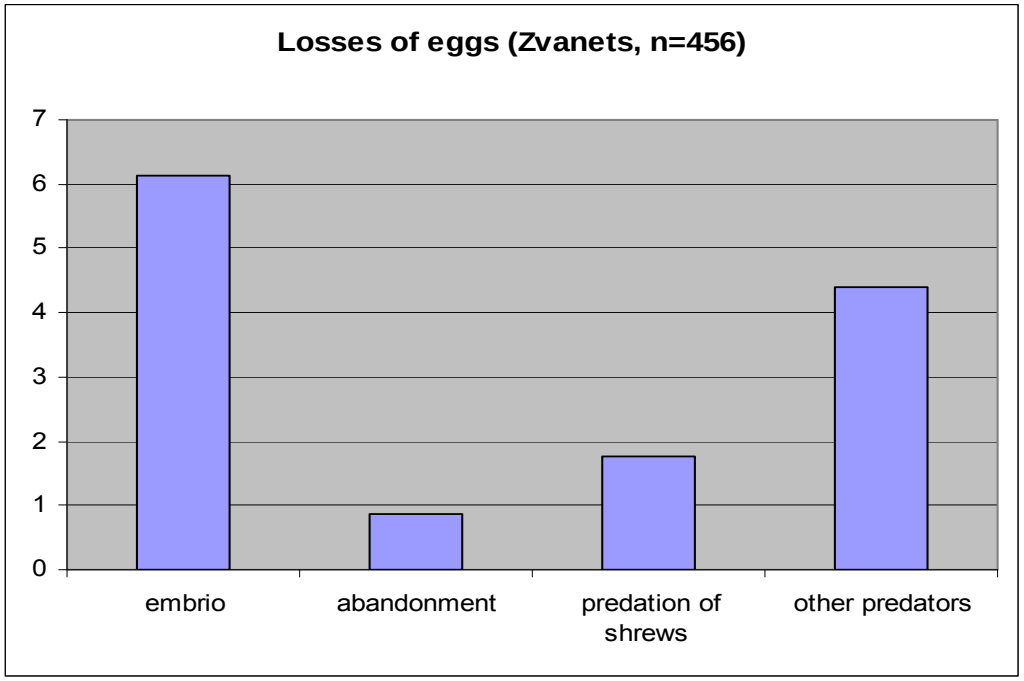
The state of old vegetation

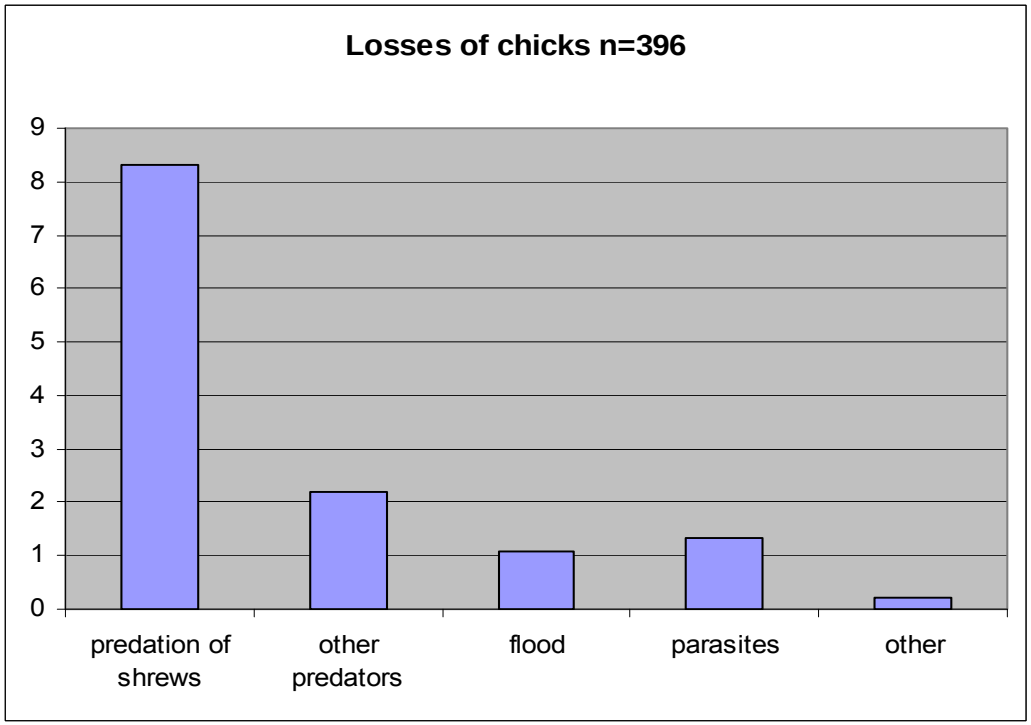
Development of green vegetation

Shrew density

Dynamics of breeding success of AW, %




Losses of eggs (Zvanets, n=456)
7
6
5
4
3
2
1
0
embrio
abandonment
predation of shrews
other predators


Losses of chicks n=396
9
8
7
6
5
4
3
2
1
0
predation of shrews
other predators
flood
parasites
other

Breeding statistics of Aquatic Warbler in main habitats
(Values are given as: mean ± se)
min-max

	Dikoe (2 years)	Zvanets (4 years)	Sporovo (2 years)	Biebrza, Poland (4 years)*
Number of nests monitored	28	99	34	157
Mean clutch size	4.68 ± 0.82	4.61±0.77	4.88±0.91	4.81±0.73
Embryo mortality, %	7.5	6.6	2.13	8.6
Share of nests destroyed by predators (among all nests), %	25 11.8-45.4	13.13 8.57-33.33	2.94 0-10	11.1 10-12
Daily egg mortality rate, %	6.27±1.36 3.93-12.22	4.93±0.50 2.14-5.09	13.61±2.48 3.6-17.8	
Daily nestling mortality rate, %	5.87±0.88 3.45-12.37	2.39±0.31 1.85-5.13	2.58±0.46 2.06-5.10	
Daily egg predation rate caused by shrews, %	2.5±0.87	0.52±0.18	0	
Daily nestling predation rate caused by shrews, %	5.04±0.82	1.52±0.24	0.34±0.17	
Breeding success, %	18.47±4.26 2.89-36.30	42.28±3.40 27.68-54.07	10.36±3.94 3.77-46.54	
Nest success, %	37.75±12.26 8.90-64.16	64.47±7.31 37.99-78.83	46.86±12.56 6.41-78.75	62.7 60-67
Breeding success, %, traditional method	52.67 33.96-65.38	73.68 57.75-78.63	66.26 38.18-80.18	62
Mean number of fledged chicks per nest, traditional method	2.46 1.64-3.00	3.39 2.73-3.55	3.24 2.10-3.71	3.2 1.86-4.56

Main adaptation of the species to unfavorable factors

(fires, floods, droughts)

Change of nest location

Broad variability of breeding period dates

Local gatherings of breeding females

Shift of breeding sites to more suitable fragments of mire (up to 20 km)

Change of nest location

Ways of location of nests:

-standard, under cover of dead vegetation;

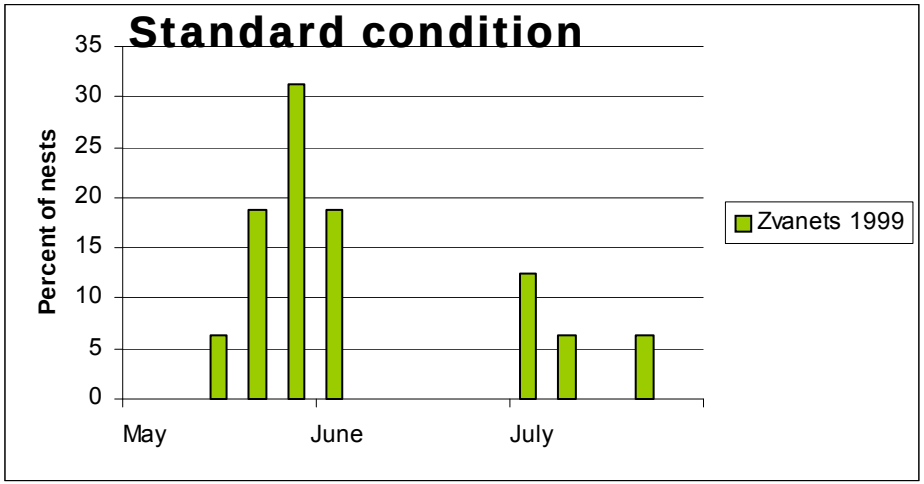
-in burrows and niches in tussocks;

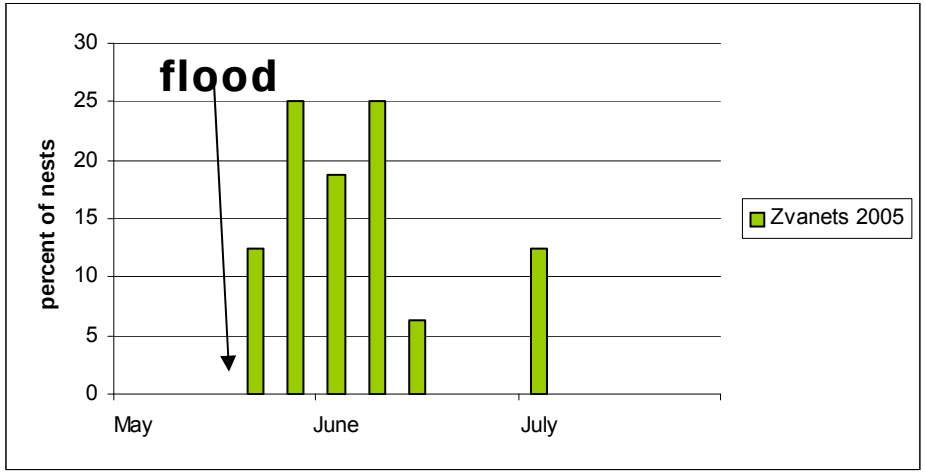
-**masking only by green vegetation;**

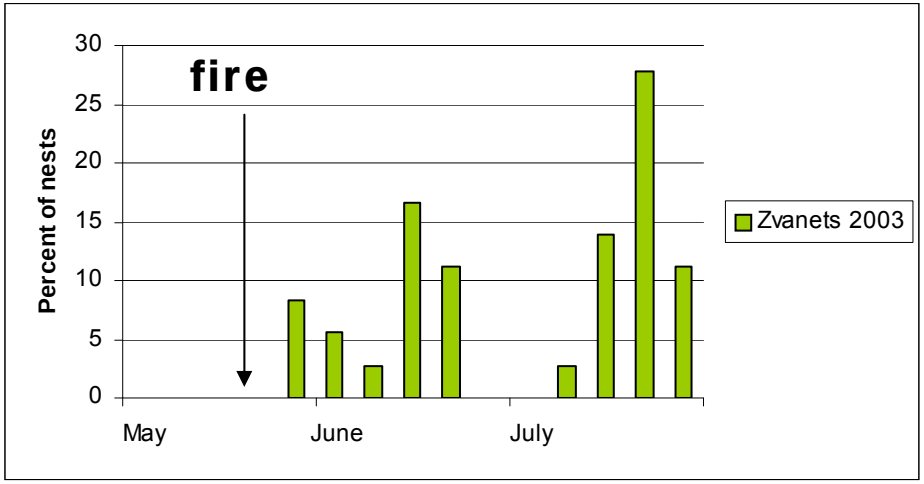
Other possible locations of nests:

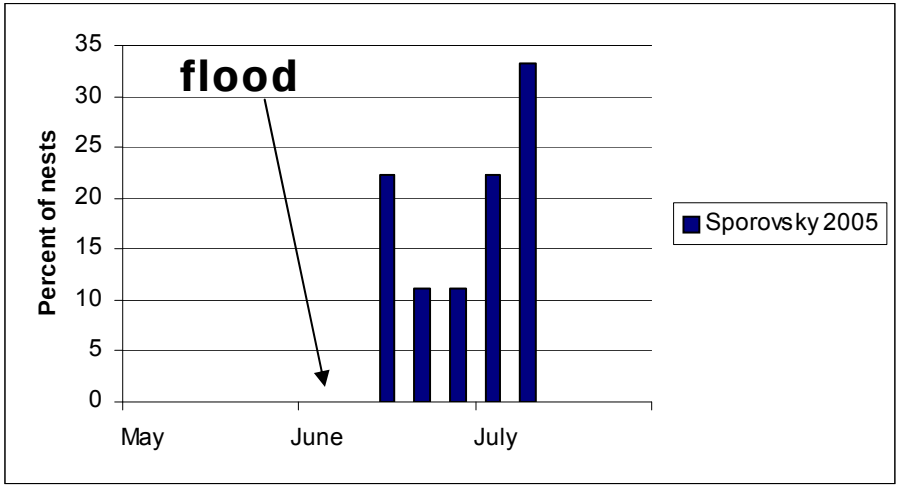
-above water on dead vegetation

Shift of breeding period

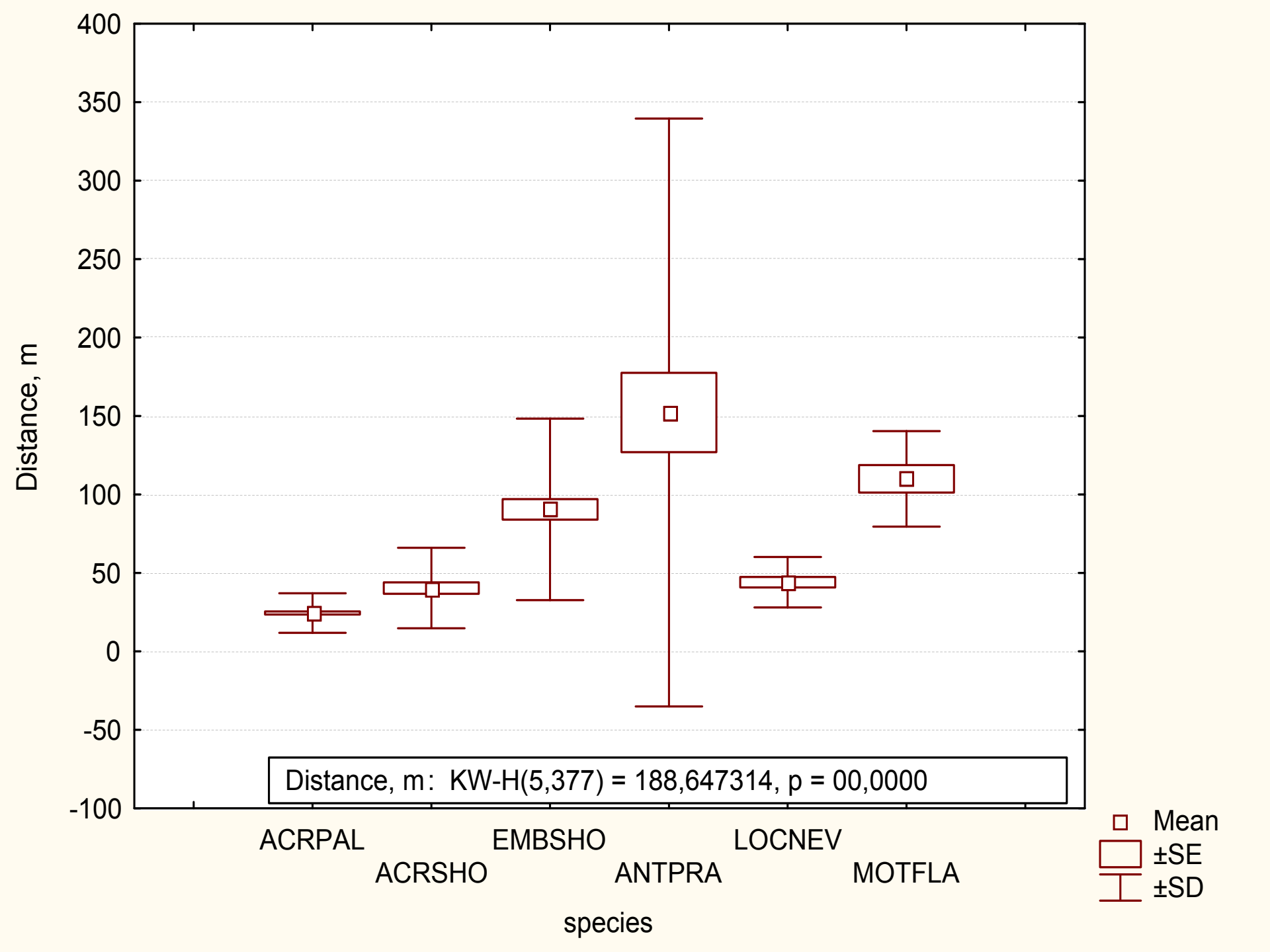


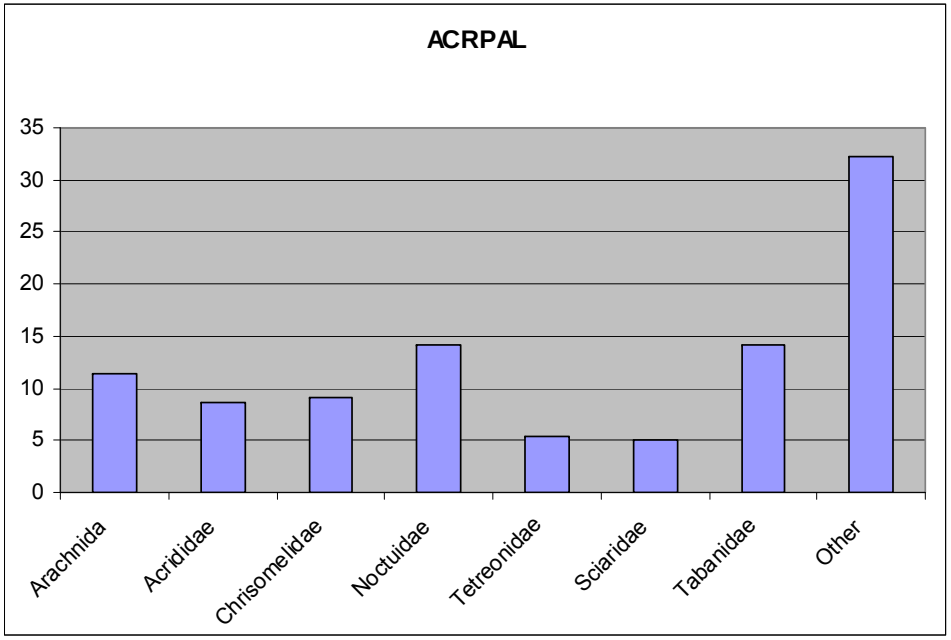


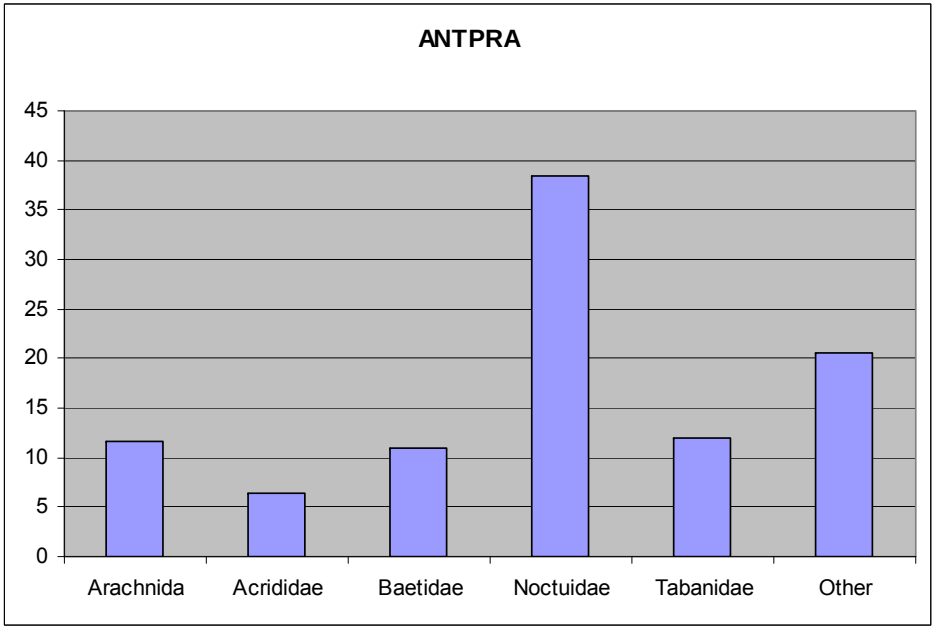


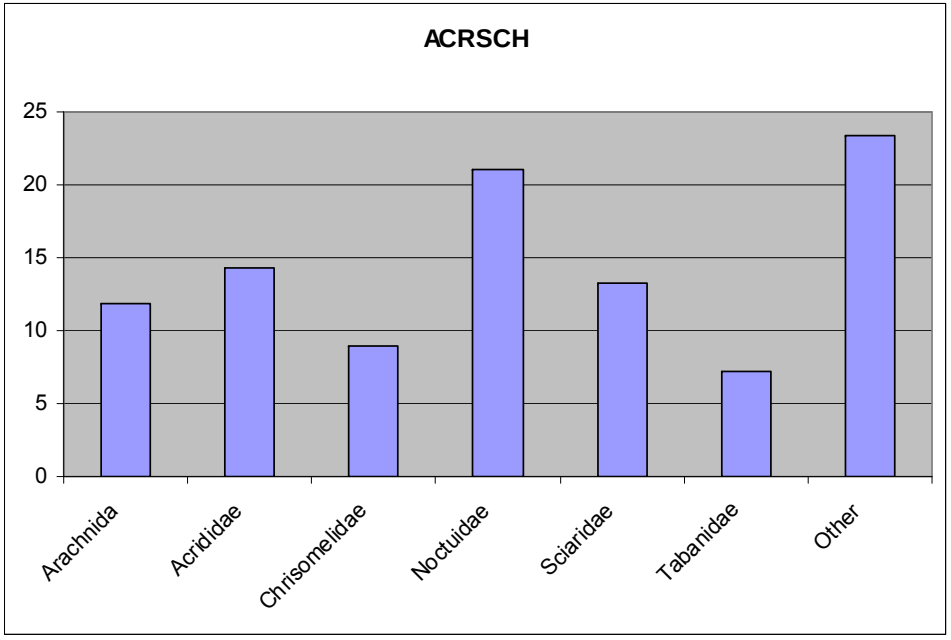


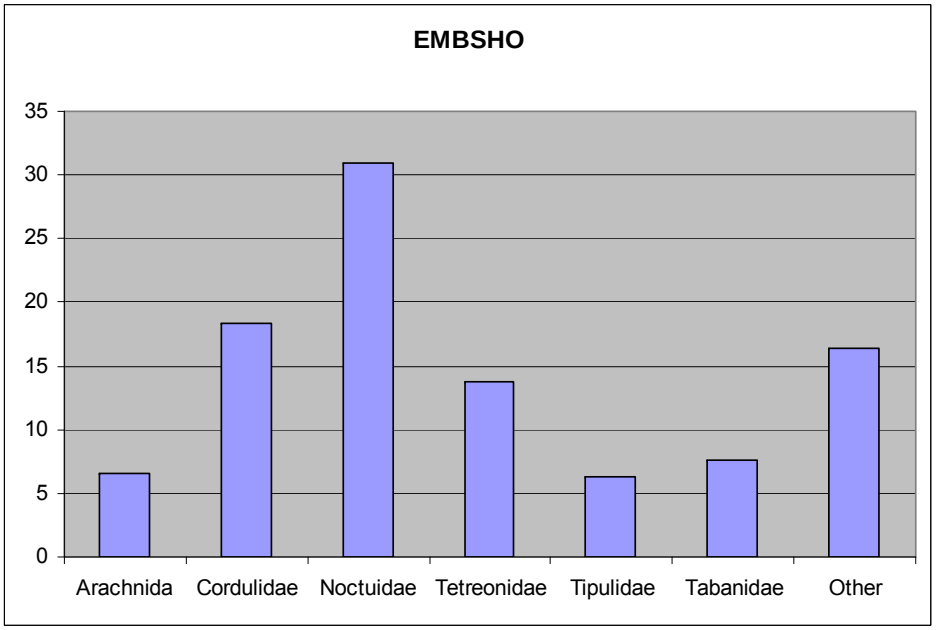
Diet of AW


400
350
300
250
200
150
100
50
0
-50
-100
Distance, m
Distance, m: KW-H(5,377) = 188,647314, p = 00,0000
ACRPAL
ACRSHO
EMBSHO
ANTPRA
LOCNEV
MOTFLA
species
Mean
±SE
±SD





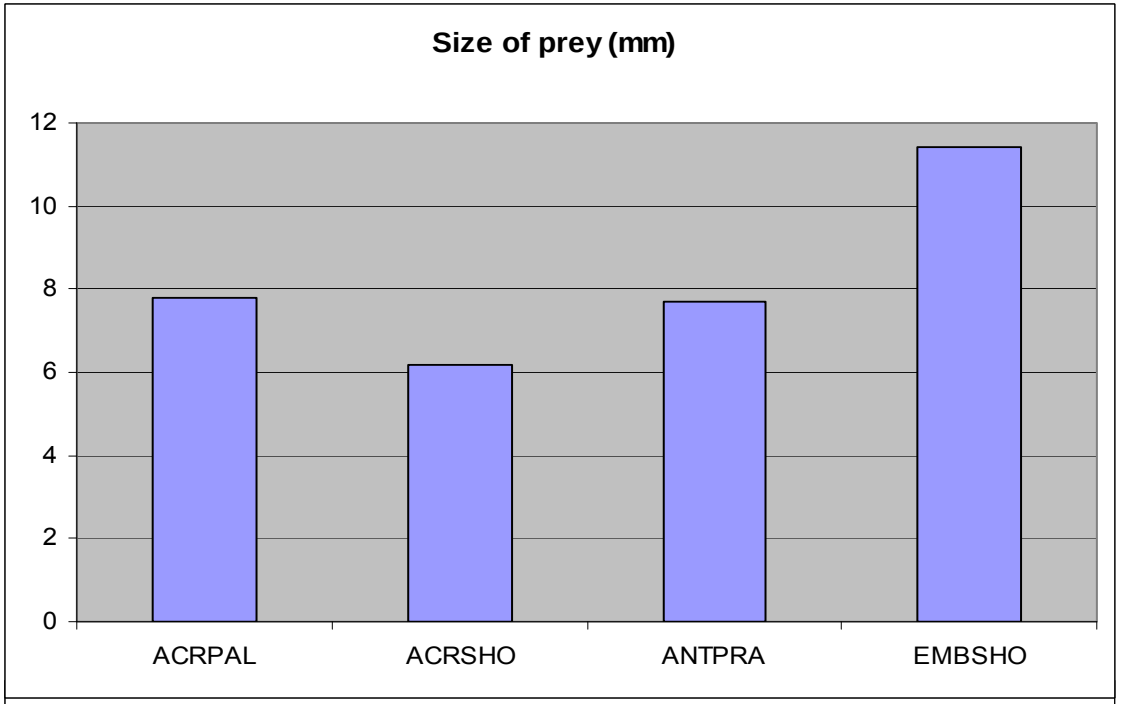


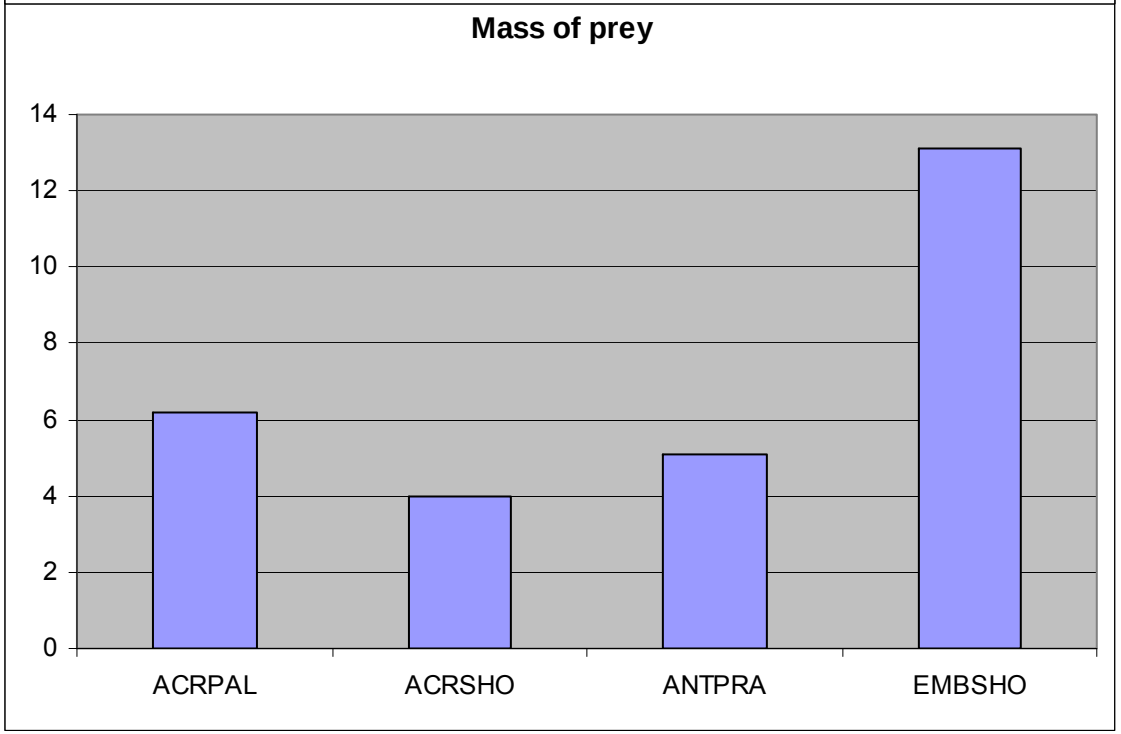


Ratio of different insect families in the diet of different species (% of weight)

Comparative characteristics of diet

	AW	ACRSCH	ANTPRA	EMBSHO	LOCNEV
Number of nest	32	17	5	12	2
Ligatur number	859	535	131	220	69
Number of prey	3422	3003	712	679	208
Mass of prey	21271.4	12055	3620	8902	2195
Size min max	7.87±0.1 2 75	6.25±.0.1 1 34	7.79±0.1 2 37	11.45±0.3 1 61	9.92±0.5 1 32
Mass min max	6.22±0.1 1 158	4.01±0.1 1 86	5.10±0.3 1 96	13.11±0.8 1 168	10.55± 1.3 1 162
Mass preys min max	24.76±0.6 1 158	22.53±0.6 1 86	27.71±1.6 3 96	40.46±2.1 2 168	31.81± 3.1 1 162
Number of prey min max	3.98±0.1 1 34	5.61±0.2 1 39	5.44±0.6 1 38	3.09±0.2 1 28	3.01 ± 0.3 1 11


Size of prey (mm)
12
10
8
6
4
2
0
ACRPAL
ACRSHO
ANTPRA
EMBSHO


Mass of prey
14
12
10
8
6
4
2
0
ACRPAL
ACRSHO
ANTPRA
EMBSHO

Main provisions of management plans

- **Re-establishment and maintanance of optimal hydrological regime**
- **Preventing site overgrowth by bushes and reeds by controlled burning, bush removing and mowing.**