A C T A T H E R I O L O G I C A

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Comparison of Estimates of Numbers Obtained by the Methods of Release of Marked Individuals and Complete Removal of Rodents [1]

[With 7 Tables & 2 Figs.]

The number of marked rodents present on a given day was estimated, taking into consideration not only their capture on that day, but also making use of information on their captures in preceding and following days (Calendar of catches method). These estimated numbers were compared with those estimated by means of the regression method when carrying out complete removal of the rodents in the same area. The mean difference in estimated numbers for resident individuals was 20.2%, and for all individuals caught in the study area 25.6%. It was demonstrated that there were differences in trappability among individuals from the same population and that entry of other individuals from the surrounding area takes place into the capture area.

I. INTRODUCTION, STUDY AREAS

The aim of the study was to compare estimates of the numbers of rodents obtained by two different methods. With the first method numbers were estimated on the basis of release of marked individuals, with the second, on the basis of complete removal of rodents.

Investigations were made in the following areas:

1. in a forest and a meadow near the Field Station of the Institute of Ecology at Dziekanów Leśny. The wooded areas were composed of the following associations: *Pino-Quercetum, Vaccinio myrtylli-Pinetum subass. molinietosum, Tilio-Carpinetum, Carici elongatae-Alnetum.*

The meadow formed a complex of the following associations: *Glycerietum maximae, Caricetum elatae, Carici-Agrostetum, Stellario-Deschampsietum.*

2. in the Mazurian Lake District near the Field Station of the Institute of Ecology at Mikołajki, in wooded areas consisting of *Vaccinio myrtylli-Pinetum* associations and several variants of the *Pineto-Quercetum* association.

3. on the "Crab-apple" island situated in Lake Bełdany (Mazurian Lake District), where the following forest associations were distinguished: *Solici-Franguletum, Circaeo-Alnetum, Tilio-Carpinetum* [2]).

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[1]) This study was carried out under the rodent project of the International Biological Programme in Poland.

[2]) Phytosociological elaboration of the areas described was made by H. and T. Traczyk of the Institute of Ecology, Polish Academy of Sciences.

II. CAPTURE METHODS

The rodents were captured in four ways.

1. Standard catches (Sp). Captures were divided into two stages: (a) catching, marking and releasing the rodents on the place of capture (CMR), (b) removal (killing the rodents caught). 512 live-traps were set within an area of 5.76 ha, two traps on each point in 16 rows and 16 lines running vertically to them. The distance between rows and lines was 15 m. The traps were set alternately every other day in either the even or the odd rows. The set traps were inspected morning and evening. The traps which were not set on a given day were left open so that the rodents could take the oats used as bait from them. Rodents were caught in this way for 21 days, each animal caught being individually marked by amputating the toes, then released on the place of capture. As from the 22nd day of captures all the rodents caught were killed. Removal of the rodents was continued until the marked individuals were completely removed (average removal period lasted 7 days).

2. Shortened standard catches (Kp). These captures differed from the standard one only in that the period during which marked rodents were released (CMR) lasted from 12 to 14 days.

3. Weekly catches (Tp). CMR catches were made by trapping rodents once a week. The last three catches before removal were used for estimating numbers by the CMR method. Removal of the rodents lasted 6 days. The capture areas in these experiments varied from 3.4 ha to 4.0 ha. The number of traps, arranged singly in a grid with 14 m $\times$ 14 m spacing, varied in consecutive experiments from 140 to 224. A detailed description of this method is to be found in the study by Andrzejewski & Wrocławek (1962).

4. Captures on an island (Wp). Traps were arranged in a grid with 15 m $\times$ 15 m spacing on an island 4 ha in area. 1, 2 or 3 traps were placed alternately on the points so that there was the same number of traps on the same point every third day. The traps were left set for the whole capture period (Sept. 4th — 28th 1964), and were inspected twice daily.

The vole population on the island originated from the introduction of 394 individuals in spring and summer, and from the introduction of 150 voles released during the capture period (Sept. 10th). CMR catches lasted 6 days and removal 12 days.

III. METHODS OF ESTIMATING NUMBERS

1. Estimates obtained from the calendar of captures. The results obtained during the period of CMR captures were compared by means

of the calendar of captures (Andrzejewski & Wierzbowska, 1961; Petrusewicz & Andrzejewski, 1962; Kaczmarzyk *et al.*, 1963). In this comparison the periods of stay of the individuals in the capture area defined by the dates of their first and final captures were entered according to the order of their first captures during the capture period. Two categories of rodents can be distinguished, depending on the time the individuals spent in the capture area: (a) migrating — staying one day, (b) resident — staying for longer than one day.

During the initial period of CMR captures we have to do with marking of individuals in the population examined. After a certain time (on an average 6 days) almost all the individuals in the study area marked. It may be taken that after this period unmarked individuals captured there are animals entering the area from its surroundings.

Omitting the initial capture period during which intensive marking of individuals takes place, it is possible by means of the calendar of captures to estimate the number of individuals present on a given day, not only on the basis of the number of individuals caught that day, but also taking into account the number of animals which we conclude to be present on the grounds of their capture on earlier and later days. The number of individuals present, defined in this way, forms the estimate of population numbers. The estimate may be split into two components: (a) estimate of the numbers of migrating rodents (caught on one day only) and (b) estimate of the numbers of resident rodents (caught at least twice on two different days). The following parameters of variations in numbers, which will be used in this study, were calculated from the calendar of captures: (a) Mean daily number of resident rodents as from the time the population was marked (s), (b) Mean daily number of new rodents caught after the period of marking the population (m), (c) Mean number of migrating rodents per day (e).

2. Estimates obtained from removal of rodents. The method for estimating numbers proposed by Hayne (1949) and Davis (1956) consists in comparing the number of individuals caught on a given day with the total number of individuals caught up to a given day. The number of animals caught on a given day is set out on the axis of ordinates, and the cumulated number of animals caught up to a given day on the axis abscissae. By calculating for the above data the equation of linear regression according to the methods given in statistical handbooks it is possible to calculate the point of intersection of linear regression with the axis of abscissae, which forms the estimate of population numbers in the study area. This method does not permit of estimating numbers when the number of individuals caught in consecutive captures does not decrease. When there is an increase in the

number of rodents caught during the final capture days the regression equation was calculated only for the initial days which are characterized by a tendency for the number of individuals caught to decrease. Choice of the number of days for which regression is calculated is, under such circumstances, to a certain degree both subjective and arbitrary. This method was used to calculate the following population characteristics analyzed in this study: (a) estimation of the number of resident rodents — *Ns* (regression was calculated only for marked individuals caught during the CMR period), (b) estimation of the number of all rodents — *N* (regression was calculated for the marked and unmarked rodents caught).

IV. PRINCIPLES FOR COMPARISON OF ESTIMATED NUMBERS OBTAINED BY THE TWO CAPTURE METHODS

1. Comparison of number of resident individuals. If there were no losses (mortality, emigration) of marked rodents, then the mean number of resident individuals per day (s) in CMR captures would equal the number of resident individuals obtained from regression (Ns). An additional condition for fulfilling this equality is the same trappability of rodents in CMR captures and removal.

2. Comparison of numbers of all individuals. The total number of rodents per day (resident plus migrating) in CMR captures cannot equal the numbers of all rodents (marked and unmarked) obtained from regression. The number of migrating individuals are part of the new unmarked individuals (caught in successive days of CMR captures). The second part of the new individuals is formed by those which have already become resident (i.e. were caught at least twice on two different days). The numbers of migrating individuals, and of settling-in and resident individuals (these two latter categories being treated jointly) were converted to numbers per day.

When calculating numbers of all individuals by means of regression, the number of new individuals (unmarked) was cumulated for those days of removal for which we calculate regression. Estimated numbers of all rodents on the basis of regression will therefore be higher than those based on the calendar of captures. By adding to the mean number of resident individuals (s) in CMR captures the average number of new individuals (m) per day, multiplied by the number of days for which regression (T) was calculated, we should obtain numbers in accordance with the estimate of numbers obtained from regression of all rodents (N).

The mean number of new individuals per day calculated from CMR captures. It is important in these calculations to add the value mT to the average number of resident individuals (s), and not to the average total number of individuals per day ($s + e$) registered by the calendar of captures, since migrating individuals do not remain in the area until removed and therefore should not be taken into consideration in calculations. Estimated numbers of all individuals from regression were therefore compared with the numbers obtained from the calendar of captures according to the following formula:

$$N = s + mT$$

3. Means of assessing differences between numbers estimated by the two methods. The value of the difference was assessed by means of the index:

$$A = [|A_1 - A_2| \times 100] : A_1$$

where A_1 — the estimates of numbers obtained from the calendar of captures, and A_2 — estimates of numbers obtained from regression.

The absolute (positive) values of index A were taken for calculating average difference and variations in differences in all the experiments made. Variations in index A were estimated by calculating the variability coefficient

$$cv = \sigma : \bar{x}$$

where $\bar{x} = \Sigma A : n$, and $\sigma = \sqrt{\Sigma(A - \bar{x})^2 : n}$, while n is the number of experiments made. The significance of differences between mean values was checked by means of the t Student test.

V. RESULTS

A total of 10 catches were made, which included four by the standard method, two by the shortened standard method, three by the weekly catches method and one by the method applied on the island.

Only the following species of small rodents, caught in the greatest numbers, were used for analysis: *Clethrionomys glareolus* (Schreber, 1780), *Apodemus flavicollis* (Melchior, 1834) and *A. agrarius* (Pallas, 1771).

1. Comparison of estimates of numbers of resident individuals. Omitting the period of marking individuals in the population, calculation was made from the calendar of captures of the mean number of resident individuals per day (Table 1). The numbers of resident individuals were next estimated by means of regression (Table 1). Numbers calculated in this way were compared with each other by means of index A. The mean value of index A calculated from all catches for the various species is 20.2%. The variability index is $cv = 0.74$. The difference between these two estimates is not statistically significant ($P > 0.5$).

The mean values of index A for catches by methods SP and Kp is

21.4%, and for catches by method *Tp* 24.3%. The difference between these two values is not statistically significant. For *C. glareolus* the mean value of index *A* is 19.1%, and for *A. agrarius* 18.2%.

The results obtained from the analysis point to the similarity of the results obtained by different capture methods and to the similarity of estimates obtained for *C. glareolus* and *A. agrarius*. The mean value of index *A* was not calculated for *A. flavicollis* on account of the small number of experiments.

Table 1.

Number of resident rodents estimated from calendar of captures and regression.

Location	Time	Kind of capture	Species	Regression calculated for no. of days (T)	Number estimated from: calendar of captures (S)	regression (Ns)	$A = \frac{(S-Ns) \times 100}{S}$
D. forest	spring 64	Sp	*C. gl.*	2	22.1	15	32.1
D. forest	autumn 64	Sp	*C. gl.*	4	56.6	62	— 9.5
M. island	autumn 64	Sp	*C. gl.*	5	76.0	70	7.8
D. forest	summer 65	Kp	*C. gl.*	4	22.0	16	27.2
D. forest	autumn 65	Kp	*C. gl.*	4	33.5	30	10.4
D. forest	autumn 57	Tp	*C. gl.*	3	34.0	29	14.7
D. forest	spring 57	Tp	*C. gl.*	3	7.0	4	42.8
D. forest	summer 57	Tp	*C. gl.*	3	19.0	14	26.3
M. island	autumn 64	Wp	*C. gl.*	5	346.0	350	— 1.1
D. forest	autumn 64	Sp	*A. ag.*	7	26.7	31	—16.1
D. meadow	autumn 64	Sp	*A. ag.*	4	63.5	72	—13.3
D. forest	autumn 64	Kp	*A. ag.*	5	11.6	10	13.8
D. forest	autumn 57	Tp	*A. ag.*	3	38.0	31	18.4
D. forest	summer 57	Tp	*A. ag.*	3	41.0	33	19.5
M. forest	autumn 64	Sp	*A. fl.*	5	40.0	68	—70.0
D. forest	summer 65	Kp	*A. fl.*	5	23.5	18	23.4
D. forest	autumn 65	Kp	*A. fl.*	3	14.3	14	2.1

D. — Dziekanów Leśny M. — Mikołajki

2. The percentage of resident individuals in CMR registered in removal. The differences between the number of resident rodents per day in CMR catches and the number of resident rodents estimated from regression may be connected with the disappearance of some of the marked individuals.

Calculation was made of what percentage of settled individuals in CMR catches was caught during removal (Table 2). On an average 53.8% of the resident individuals from CMR catches were caught during removal. The difference between numbers estimated by these two methods was, however, 20.2%. A negative correlation was found between the value of index *A* and the percentage of resident individuals from CMR catches captured during removal (Fig. 1). The correlation coefficient $r = -0.74$. This means that the greater the percentage of resident

Table 2.

Disappearance of resident individuals during CMR catches and removal.

Location	Time	Kind of capture	Species	Number of resident individuals in CMR	% of resident individuals in removal
D. forest	spring 64	Sp	*C. gl.*	46	34.8
D. forest	autumn 64	Sp	*C. gl.*	94	63.8
M. forest	autumn 64	Sp	*C. gl.*	99	66.6
D. forest	summer 65	Kp	*C. gl.*	38	44.7
D. forest	autumn 65	Kp	*C. gl.*	47	68.0
D. forest	autumn 57	Tp	*C. gl.*	65	44.6
D. forest	summer 57	Tp	*C. gl.*	41	29.2
M. island	autumn 64	Wp	*C. gl.*	150	76.0
D. forest	autumn 64	Sp	*A. ag.*	38	89.4
D. meadow	autumn 64	Sp	*A. ag.*	102	72.5
D. forest	autumn 65	Kp	*A. ag.*	23	43.4
D. forest	autumn 57	Tp	*A. ag.*	95	33.4
D. forest	summer 57	Tp	*A. ag.*	69	42.0
M. forest	autumn 64	Sp	*A. fl.*	60	50.0
D. forest	summer 65	Kp	*A. fl.*	34	55.8
D. forest	autumn 65	Kp	*A. fl.*	28	46.4
Average					53.8

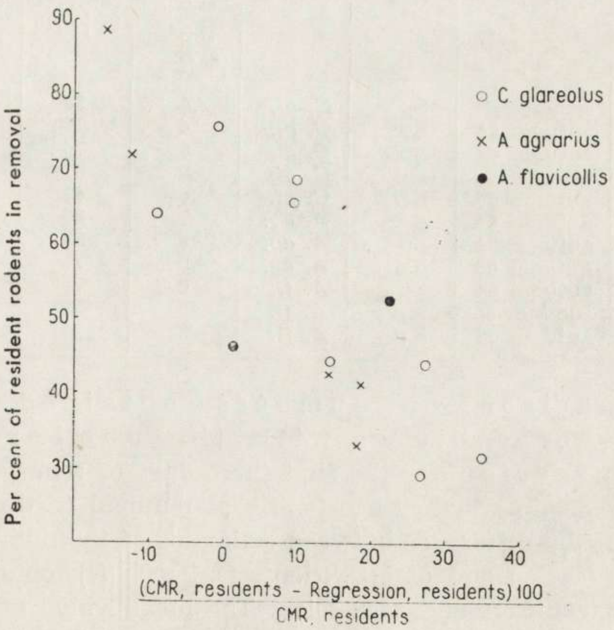

Fig. 1. Correlation of percentage of captured resident rodents with difference in estimated numbers of residents obtained from the calendar of captures and regression.

individuals from CMR captured during removal, the closer to each other the estimates obtained from the calendar of captures and regression. The small percentage of marked rodents caught during removal makes it obvious that estimations of numbers from calendar of captures are greater than those from regression.

3. Estimation of numbers of all rodents (marked and unmarked), obtained from regression should equal the average numbers of resident rodents in CMR captures plus the number of new individuals per day multiplied by number of days for which regression was calculated. The difference between these two estimates of numbers was assessed by means of index *A* (Table 3). The mean value of the difference for all experiments is 25.6%; $cv = 0.89$. The difference between these two estimates is not statistically significant.

Table 3.

Numbers of all rodents estimated from calendar of captures and regression.

Location	Time	Kind of capture	Species	Regression calculated for no. of days (T)	Number estimated from: calendar of captures (S+mT)	Number estimated from: regression (N)	$A = \frac{(S+mT-N)\times 100}{S+mT}$
D. forest	spring 64	Sp	*C. gl.*	4	30	21	30.0
D. forest	autumn 64	Sp	*C. gl.*	4	75	81	— 8.0
M. forest	autumn 64	Sp	*C. gl.*	6	76	84	—10.5
D. forest	summer 65	Kp	*C. gl.*	8	32	28	12.5
D. forest	autumn 65	Kp	*C. gl.*	6	42	42	0.0
D. forest	autumn 64	Sp	*A. ag.*	7	36	66	—83.3
D. meadow	autumn 64	Sp	*A. ag.*	5	93	114	—22.5
D. forest	autumn 65	Kp	*A. ag.*	5	17	18	— 5.8
M. forest	autumn 64	Sp	*A. fl.*	6	71	104	—46.4
D. forest	summer 65	Kp	*A. fl.*	5	32	19	40.4
D. forest	autumn 65	Kp	*A. fl.*	3	18	14	22.2

4. Comparison of numbers obtained from the calendar of captures with the numbers obtained from regression for the first three days of removal. A check was made to ascertain whether shortening of removal to three days affects the value of the difference between estimates of the numbers of resident individuals (S, N_s) and of all rodents ($s + mT$, N) obtained from the calendar of captures and regression. The mean value of index *A* when comparing resident individuals is 22.5%; $cv = 0.64$ (Table 4). The mean value of index *A* when comparing all individuals is 45.3%; $cv = 0.83$ (Table 5). The analysis made shows that shortening of removal time only

Table 4.
Number of resident rodents estimated from calendar of captures and regression calculated for 3 days of removal.

Location	Time	Kind of capture	Species	Number estimated from: calendar of captures (S)	regression (Ns)	$A = \frac{(S-Ns) \times 100}{S}$
D. forest	spring 64	Sp	*C. gl.*	22.1	20	9.5
D. forest	autumn 64	Sp	*C. gl.*	56.6	74	—30.7
M. forest	autumn 64	Sp	*C. gl.*	76.0	73	3.9
D. forest	summer 65	Kp	*C. gl.*	22.0	14	36.3
D. forest	autumn 65	Kp	*C. gl.*	33.5	34	— 1.4
D. forest	autumn 57	Tp	*C. gl.*	34.0	29	14.7
D. forest	summer 57	Tp	*C. gl.*	19.0	14	26.3
M. island	autumn 64	Wp	*C. gl.*	346.0	330	4.6
D. forest	autumn 64	Sp	*A. ag.*	26.7	40	—49.8
D. meadow	autumn 64	Sp	*A. ag.*	63.5	90	—41.7
D. forest	autumn 65	Kp	*A. ag.*	11.6	8	31.0
D. forest	autumn 57	Tp	*A. ag.*	38.0	31	18.4
D. forest	summer 57	Tp	*A. ag.*	41.0	33	19.5
M. forest	autumn 64	Sp	*A. fl.*	40.0[1])	—	—
D. forest	summer 65	Kp	*A. fl.*	23.5	12	48.9
D. forest	autumn 65	Kp	*A. fl.*	14.3	14	2.1

[1]) Regression could not be calculated on account of the increase in the number of rodents caught on the 2nd and 3rd day.

Table 5.
Numbers of all rodents estimated from the calendar of captures and regression, counted for 3 days of removal.

Location	Time	Kind of capture	Species	Numbers estimated from: calendar of captures (S+mT)	regression (N)	$A = \frac{(S+mT-N) \times 100}{S+mT}$
D. forest	spring 64	Sp	*C. gl.*	30	21	30.0
D. forest	autumn 64	Sp	*C. gl.*	75	84	— 12.0
M. forest	autumn 64	Sp	*C. gl.*	76	68	10.5
D. forest	summer 65	Kp	*C. gl.*	32	22	31.2
D. forest	autumn 65	Kp	*C. gl.*	42	68	— 61.9
D. forest	autumn 64	Sp	*A. ag.*	36	92	—155.0
D. meadow	autumn 64	Sp	*A. ag.*	93	140	— 50.5
D. forest	autumn 65	Kp	*A. ag.*	17	20	— 17.6
M. forest	autumn 64	Sp	*A. fl.*	40	—	—
D. forest	summer 65	Kp	*A. fl.*	32	12	62.5
D. forest	autumn 65	Kp	*A. fl.*	18	14	22.5

slightly increases the range of estimated numbers of resident individuals, but that there is an almost twofold increase in the range of estimates of all individuals. This result may point to the different probability of catching marked and unmarked individuals during removal. This phenomenon may be connected with the increase in immigration of individuals during removal or with differences in the trappability of marked individuals (trap-prone or trap-shy).

5. Topography of captures of rodents during the last part of the removal period (from 4th day until end). In order to check the correctness of the assumption that the rodents caught during the final period of captures are animals entering the study area from its surroundings, the capture area was divided into an outer belt covering three rows or lines of traps and an inner square containing 10 inner rows and lines of traps. The outer belt contained 156 points, and the inner square 100 points with traps. Calculation was next made of how many rodents were caught on an average on one point with traps in the outer belt and inner square, for experiments in which suitably numerous material was obtained (Table 6). In the majority of cases a larger number

Table 6.

Topography of captures of rodents during the final period of removal (from 4th day to end of removal).

Location	Time	Kind of capture	Species	Number of individuals per point:			
				outer belt (156 points)		inner square (100 points)	
D. forest	autumn 64	Sp	*C. gl.*	(19)[1]	0.12	(3)	0.03
D. forest	summer 65	Kp	*C. gl.*	(12)	0.07	(2)	0.02
D. forest	autumn 65	Kp	*C. gl.*	(13)	0.08	(2)	0.02
D. forest	autumn 64	Sp	*A. ag.*	(13)	0.08	(3)	0.03
D. meadow	autumn 64	Sp	*A. ag.*	(6)	0.04	(4)	0.04
D. forest	summer 65	Kp	*A. ag.*	(4)	0.02	(1)	0.01
D. forest	autumn 65	Kp	*A. ag.*	(4)	0.02	(1)	0.01
D. forest	autumn 64	Sp	*A. fl.*	(2)	0.01	(0)	0.00
D. forest	summer 65	Kp	*A. fl.*	(14)	0.09	(2)	0.02
D. forest	autumn 65	Kp	*A. fl.*	(5)	0 03	(5)	0.05

[1]) Number of rodents caught is given in brackets.

of captures were made in the outer belt, which proves that rodents enter the capture area.

6. Average period between repeat captures. In order to check the correctness of the assumption that marked rodents exhibited the same trappability in CMR catches and removal, comparison was made of the average interval between repeat captures in CMR catches with the average interval between the final capture in CMR and capture in removal (Table 7).

In all the cases analysed the average period between the final capture in CMR and removal was greater than in CMR catches, which may be interpreted as a different degree of trappability in the group of marked individuals. This conclusion is confirmed by analysis of removal of marked individuals on the island (Fig. 2). The removal rate of these individuals measured by coefficient a of the regression equation $y = -ax + b$ for the first five days was $a = -0.54$, while for the last five days it was $a = -0.24$. The almost twofold decrease in the removal

Table 7.
Average period between repeat captures, in days.

Location	Time	Kind of capture	Species	Average period between repeat captures		Number of periods	
				CMR	CMR-removal	CMR	CMR-removal
D. forest	spring 64	Sp	*C. gl.*	2.1	3.3	206	16
D. forest	autumn 64	Sp	*C. gl.*	3.2	8.5	186	61
M. forest	autumn 64	Sp	*C. gl.*	3.4	7.9	525	66
D. forest	summer 65	Kp	*C. gl.*	1.8	4.8	127	17
D. forest	autumn 65	Kp	*C. gl.*	1.9	6.6	126	31
D. forest	autumn 64	Sp	*A. ag.*	3.3	10.4	58	36
D. meadow	autumn 64	Sp	*A. ag.*	2.5	4.9	334	73
D. forest	autumn 65	Kp	*A. ag.*	1.9	5.6	50	10
M. forest	autumn 64	Sp	*A. fl.*	7.4	15.8	475	30
D. forest	summer 65	Kp	*A. fl.*	2.0	5.8	109	19
D. forest	autumn 65	Kp	*A. fl.*	1.5	7.0	62	13

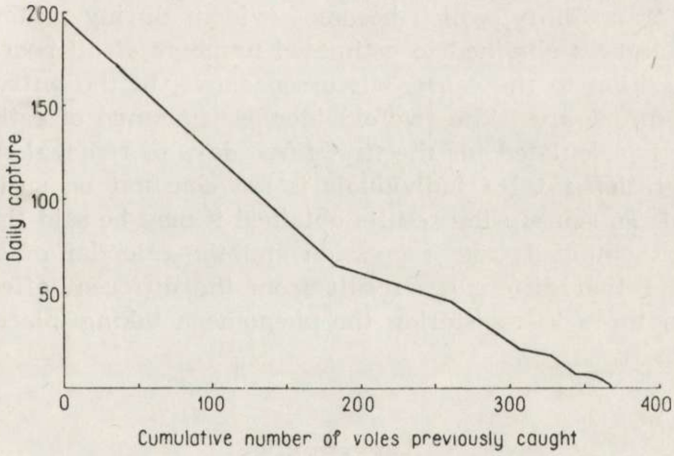

Fig. 2. Removal of marked individuals on the island.

rate of marked individuals indicates that during the final days of removal more trap-shy individuals were caught, exhibiting a lower trappability than those caught during the initial period of removal.

VI. DISCUSSION

Comparison of estimates of numbers obtained by two different methods (calendar of captures and regression) showed that the difference between these two estimates is on an average 20.2% for resident individuals and

25.6% for all individuals. Comparison of estimated numbers of resident individuals showed that the greater the percentage of CMR marked individuals caught during removal, the closer to each other the estimates obtained from the calendar of captures and regression.

If we assume that the marked individuals which were not caught during removal had died or emigrated, than the differences observed in estimated numbers would be due only to the disappearance of individuals from the capture area. This interpretation would not, however, be correct. The estimated numbers of resident rodents obtained from regression exceed, in five cases out of seventeen, the estimates obtained from the calendar of captures (Table 1). Such a situation may arise when we are concerned with different degree of trappability of marked individuals. This conclusion is confirmed by the analysis made of removal of individuals on the island and by the comparison made of the mean period between repeat captures in CMR with the mean interval between the last capture in CMR and capture in removal (Table 7). It may therefore be assumed that the differences between estimates obtained from regression and the calendar of captures are due not only to the disappearance of marked individuals, but also to their different degree of trappability, which becomes evident during removal.

The differences obtained in estimated numbers of all rodents are also due, in addition to the causes discussed above, to the entry of rodents into the capture area. The twofold increase in range of estimates when regression is calculated for the first three days of removal suggests that the immigration rate of individuals is not constant on successive days of removal. To sum up the results obtained it may be said that estimates of numbers obtained from regression and the calendar of captures are similar, and that differences result from the different effectiveness of the two methods in registering the phenomena taking place in rodent populations.

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PORÓWNANIE OCEN LICZEBNOŚCI UZYSKANYCH METODĄ WYPUSZCZANIA ZNAKOWANYCH OSOBNIKÓW I ZUPEŁNEGO WYŁOWU

Streszczenie

Badania przeprowadzano w lesie i na łące w Dziekanowie Leśnym, w lesie na Pojezierzu Mazurskim oraz na wyspie położonej na jeziorze Bełdany (Pojezierze Mazurskie).

Połowy drobnych gryzoni dzieliły się na dwa etapy: a) łowienie, znakowanie i wypuszczanie gryzoni w miejscu złowienia, b) wyłów polegający na usuwaniu wszystkich złowionych gryzoni. Ogółem przeprowadzono 10 połowów. Do analizy wzięto tylko najliczniej poławiane gatunki drobnych gryzoni: *Clethrionomys glareolus, Apodemus flavicollis* i *A. agrarius.*

Liczbę obecnych znakowanych gryzoni w danym dniu oceniano uwzględniając nie tylko ich złowienia w tym dniu, lecz wykorzystując również informację o ich złowieniach w poprzednich i następnych dniach (metoda kalendarza złowień). Tę ocenę liczebności porównano z oceną, uzyskaną metodą regresji przy zupełnym wyłowie gryzoni na tym samym terenie. Średnia rozbieżność ocen liczebności uzyskanych dwoma metodami dla osobników osiadłych wynosi 20,2% (Tabela 1), a dla wszystkich osobników złowionych na badanym terenie 25,6% (Tabela 3).

Wykazano, że skrócenie czasu wyłowu do trzech dni, nieznacznie zmienia rozbieżność ocen liczebności osobników osiadłych (Tabela 4), a prawie dwukrotnie zwiększa rozbieżność ocen wszystkich osobników (Tabela 5).

Wykazano, że wśród osobników z tej samej populacji istnieje zróżnicowanie łowności (Tabela 7), oraz, że na teren z którego są wyławiane gryzonie nachodzą osobniki z okolicy (Tabela 6).