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SEASONAL FOOD PREFERENCES OF ADULT AND OF YOUNG GROUSE IN NEW YORK STATE

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A study of the foods utilized by ruffed grouse in New York State as been an important part of the investigation of the ecology of his species which has been carried on by the Bureau of Game of the Conservation Department since 1930. The crop and gizzard contents have been preserved from all suitable specimens available. Sources have included, in addition to regular survey work, collections made for pathological examination and material donated by hunters. Representative series of both adults and chicks have been thus secured from all regions of the state and all seasons of the year.

Analyses of the specimens preserved were made in collaboration with the section of Food Habits Research of the Bureau of Biological Survey. So far a total of 485 adults and 332 chicks have been examined. This paper represents but a brief summary of the data which is contained in these records.

Three regions of the state have been recognized. The Adirondack region comprises those northern counties in which the mountains of the same name are situated; the Catskill region includes those southeastern counties within which lies the Catskill Mountain area; and the third region includes the rest of the state and has been so designated. Differences among these regions as to climate, topography, soil type, and utilization by man are reflected in the plant and animal associations present which may furnish food for grouse.

Table 1 shows the number of analyses in each age class from each region during each season. Due to the fact that a minimum of collecting was done in the spring and summer a few of these groups are low.

TABLE 1.—DISTRIBUTION OF RUFFED GROUSE STOMACH MATERIAL EXAMINED

	Adult Specimens				
	Spring	Summer	Fall	Winter	Total
Adirondack Region	48	16	41	28	133
Catskill Region	13	17	34	25	89
West of State	58	52	76	77	263
Total	119	85	151	130	485
	Chick Specimens				
	June	July	August		Total
Adirondack Region	18	20	31		69
Catskill Region	34	47	3		84
West of State	63	74	42		179
Total	115	141	76		332

In general a very wide variety of food items appear to be acceptable to grouse as food. Among the adults 53 families of plants and 73 families of insects (including spiders) were represented while in the chicks these figures were 46 and 133, respectively.

In tabulating this material for comparative purposes percentage bulk has been used as a basis with respect to the vegetable matter, while for the animal matter instance figures have been used.

Table 2 lists the ten most important genera of plants eaten by each age class in each region for the year as a whole. In each case these ten groups comprise over half the total bulk of the food present except in the Catskill region where the figure is 43.1%. It will be noted that the groups appearing in this tabulation vary considerably in the different regions. There is, however, a definitely greater degree of similarity throughout the three regions in the foods chosen by the chicks than in those chosen by the adults. Whereas in the former age class seven genera ranked among the first ten in all three regions, this was true of only three genera in the latter age class. Similarly the figures for the adults during the summer season alone show only 4 genera occurring in all regions.

While it is beyond the scope of this paper to discuss in any detail the reasons for the variations between regions recorded among the adults it may be noted that availability of the food both as to its distribution and seasonal accessibility seems the most important determining factor. For example, *Kalmia* occurs to a very limited extent in New York outside the Catskill region.

With respect to the chicks, however, it is significant that the genus *Rubus* is by far the most important in all regions, with *Carex* second and *Fragaria* third in two and fourth in the other.

While the foregoing may be considered to represent in general the staple foods in each region, there is a considerable degree of variation in their importance according to season. To illustrate this Table 3 lists the first two genera for each season in each region for both adults and chicks. Among the adults it is interesting that in the spring *Betula* and *Populus* rank highest in each region while at other seasons a much greater variation between the regions exists. In the summer the position of *Rubus* is significant as is the presence in the fall of such fruit bearing species as *Crataegus, Prunus, Vitis* and *Fagus*. Among the chicks throughout the summer *Rubus, Carex* and *Fragaria* are of greatest importance.

Further analysis of the material also shows that certain items which do not appear at all in the tabulations on a full year basis may become quite important during a shorter period. A tabulation of the highest ten genera for each season in the Adirondack region may be used as an example (Table 4). Thus in the spring *Oxalis, Rhus* and

TABLE 2.—THE TEN GENERA OF VEGETABLE FOODS UTILIZED TO THE GREATEST DEGREE IN EACH REGION BY ADULT AND CHICK RUFFED GROUSE

Adult Specimens						Chick Specimens					
Adirondack Region		Catskill Region		Rest of State		Adirondack Region		Catskill Region		Rest of State	
Populus	13.70	*Prunus*	5.77	*Crataegus*	8.20	*Rubus*	38.13	*Rubus*	31.54	*Rubus*	28.98
Betula	11.30	*Rhus*	5.34	*Populus*	7.66	*Carex*	16.60	*Carex*	9.79	*Carex*	9.05
Prunus	9.60	*Rubus*	5.09	*Ostrya*	7.00	*Fragaria*	3.15	*Amelanchier*	5.19	*Fragaria*	5.60
Crataegus	5.50	*Betula*	4.60	*Rubus*	6.86	*Cornus*	2.36	*Fragaria*	3.58	*Prunus*	5.57
Rubus	5.15	*Fragarai*	4.37	*Fagus*	5.72	*Acer*	2.34	*Ranunculus*	2.98	*Ranunculus*	2.57
Thelypteris	5.00	*Gaultheria*	3.94	*Prunus*	4.59	*Prunus*	2.23	*Viola*	1.28	*Viola*	2.11
Ostrya	4.38	*Cornus*	3.65	*Betula*	4.49	*Sambucus*	2.08	*Prunus*	.71	*Impatiens*	1.87
Carex	2.85	*Vitis*	3.57	*Quercus*	2.97	*Ranunculus*	1.76	*Polygala*	.51	*Amelanchier*	1.14
Corylus	2.64	*Quercus*	3.44	*Rhus*	2.79	*Viola*	1.40	*Impatiens*	.23	*Acer*	1.11
Fragaria	1.75	*Kalmia*	3.35	*Carpinus*	2.54	*Impatiens*	.95	*Rumex*	.20	*Polygonum*	.90

NOTE: In compiling the percentages listed only species occurring in 5 per cent or more of the stomachs from the respective regions have been used.

Acer occur although they do not appear in the data for the year as a whole. Similarly in the summer *Ranunculus, Malus, Cornus, Vaccinium,* and *Polygala* are important; in the fall *Viburnum, Cornus, Viola, Amelanchier* and *Vitis;* and in the winter *Malus, Acer, Symplocarpus* and *Rhus.* In this case the number of these additional seasonally important groups is the same for summer and fall. In the other two regions the number is greater for the summer.

TABLE 3.—SEASONAL VARIATIONS IN THE VEGETABLE FOODS UTILIZED TO THE GREATEST DEGREE IN EACH REGION

Adult Specimens				Chick Specimens		
Spring	**Summer**	**Fall**	**Winter**	**June**	**July**	**August**
	Adirondack Region				**Adirondack Region**	
Populus	*Rubus*	*Crataegus*	*Betula*	*Carex*	*Carex*	*Rubus*
Betula	*Carex*	*Prunus*	*Populus*	*Rubus*	*Rubus*	*Carex*
	Catskill Region				**Catskill Region**	
Betula	*Rubus*	*Prunus*	*Rhus*	*Rubus*	*Rubus*	*Rubus*
Populus	*Prunus*	*Vitis*	*Kalmia*	*Fragaria*	*Carex*	*Carex*
	Rest of State				**Rest of State**	
Populus	*Rubus*	*Crataegus*	*Ostrya*	*Carex*	*Rubus*	*Rubus*
Betula	*Populus*	*Fagus*	*Prunus*	*Fragaria*	*Carex*	*Prunus*

TABLE 4.—SEASONAL IMPORTANCE OF CERTAIN GENERA OF VEGETABLE FOODS WHICH RANK MUCH LOWER ON A FULL YEAR BASIS

Adult Specimens—Adirondack Region				
Spring	**Summer**	**Fall**	**Winter**	**Whole Year**
Populus	*Rubus*	*Crataegus*	*Betula*	*Populus*
Betula	*Carex*	*Prunus*	*Populus*	*Betula*
Prunus	*Populus*	*Betula*	*Prunus*	*Prunus*
Thelypteris	*Prunus*	*Rubus*	*Ostrya*	*Crataegus*
Ostrya	*Ranunculus*	*Viburnum*	*Thelypteris*	*Rubus*
Corylus	*Malus*	*Cornus*	*Corylus*	*Thelypteris*
Fragaria	*Fragaria*	*Thelypteris*	*Malus*	*Ostrya*
Oxalis	*Cornus*	*Viola*	*Acer*	*Carex*
Rhus	*Vaccinium*	*Amelanchier*	*Symplocarpus*	*Corylus*
Acer	*Polygala*	*Vitis*	*Rhus*	*Fragaria*

Another consideration which should not be overlooked is the fact that certain species which other workers have found to stand high as grouse foods rank comparatively low in this data, presumably due to sparse distribution or to poor fruiting seasons during the years studied. For example, during all but two of the years covered very few beechnuts were produced in New York. Similarly, apple trees are not numerous where much of the collecting has been done.

In addition to the items which comprise the major portion of the herbaceous food of the grouse are several species which are taken with a high degree of frequency although they represent but very little of the bulk content. For the adults these are *Maianthemum canadense* and *Mitchella repens* and for the chicks *Mitchella repens* and *Vaccinium* sp.

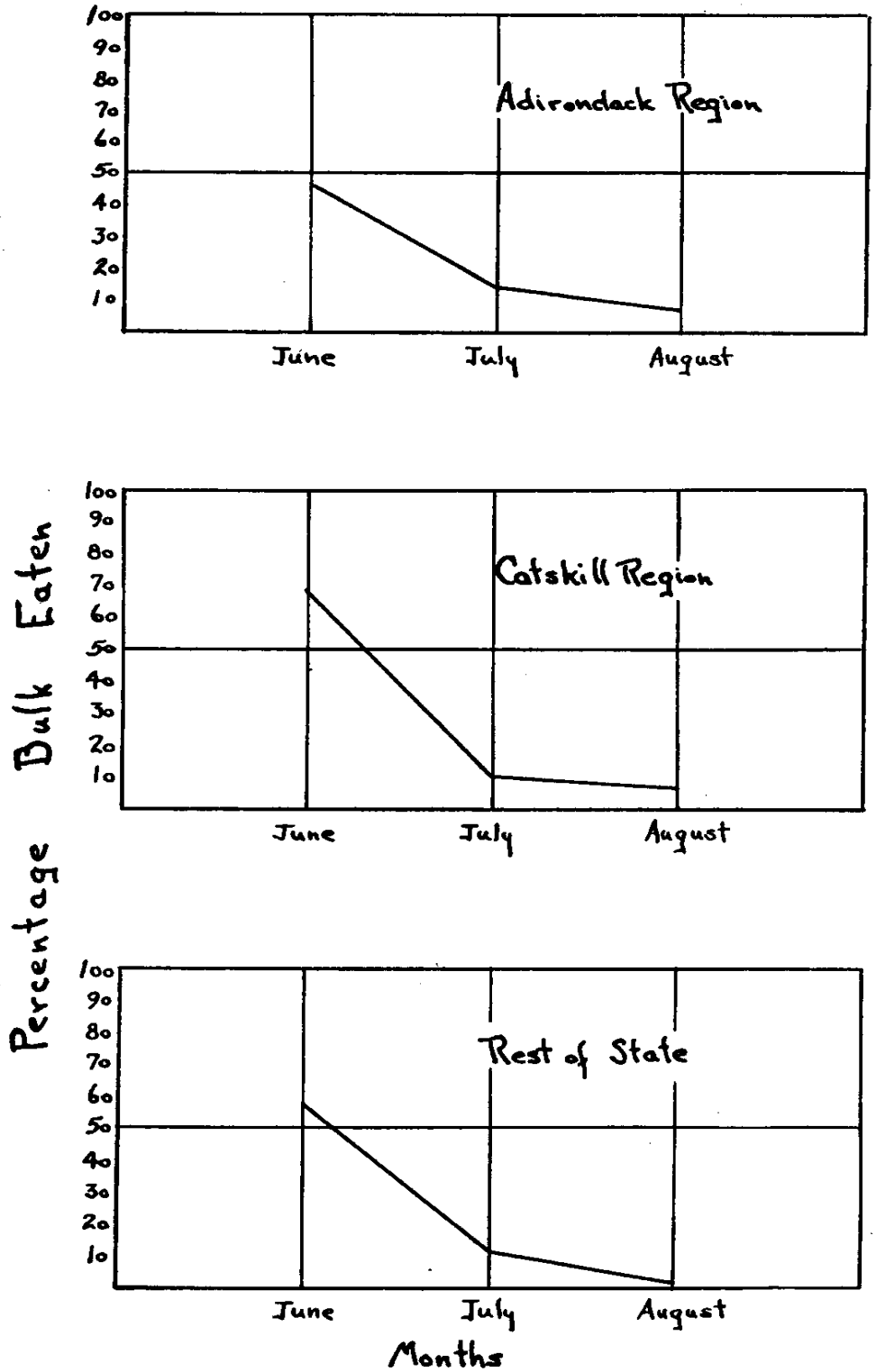

FIGURE 1.—RELATIVE UTILIZATION OF ANIMAL FOODS BY RUFFED GROUSE CHICKS THROUGHOUT BROOD PERIOD.

With respect to the parts of the plant which are eaten by adult ruffed grouse, twigs and buds are of greatest importance during winter and spring and are used to a moderate degree in the fall. During the summer and fall seeds and fruits are by far the most frequently taken parts and are also found to a moderate degree in the other two seasons. Leaves are taken most often during the spring but also form an appreciable part of the food taken during the other seasons, being taken least in the fall. Among the chicks seeds and fruits are mainly eaten.

Although in general vegetable material forms the principal diet of the ruffed grouse a variety of animal material is taken. Among the adults this type of food seems of minor importance, amounting to less than 0.6 per cent of the yearly food consumption. Seasonally it is taken in the greatest amount during the summer but at this time barely exceeds 3 per cent in the Adirondack region and falls below 1 per cent in the Catskills. Among the chicks, however, animal material comprises a considerable proportion of the food, particularly during their early development. During the month of June food of this sort formed from 46.8 per cent of the total diet of chicks in the Adirondack region to 68.3 per cent in the Catskills. For August, on the other hand, it had dropped to from 6.9 per cent in the Adirondacks to 1.3 per cent in the rest of the State. The accompanying graph (Figure 1) ilustrates the trend in the utilization of this type of material by the chicks in each region throughout the summer.

With respect to the various items of animal food taken the great majority are insects (including spiders). In addition sundry millipedes, crustaceans, mollusks and other forms are taken. As noted earlier in the paper relative importance of the various items of this type of food has been based on instance rather than percentage bulk since the major portion of most insects is soft and leaves little or no trace. As pointed out above the data for the adults apply primarily to the summer season.

Time will not permit going into the composition of this animal food in detail. However, among the adults the groups taken most frequently were, in order, the *Hymenoptera, Coleoptera, Arachnida, Lepidoptera, Orthoptera* and *Opiliones.* Among the chicks the important groups were *Hymenoptera, Coleoptera, Lepidoptera, Opiliones, Hemiptera* and *Diptera.* In both age classes the *Hymenoptera* and *Coleoptera* ranked first and second, respectively.