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Maximizing Edge and Coverts for Quail and Small Game

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Oakland Club

The data for Oakland presented the opportunity to make correlation tests for 4 of the same items as were measured on Groton (Table 2) and, in addition, to find relationship between these 4 items and hunting success. Oakland had a lower population, lower hunting success, and a higher kill (Table 1) so the same correlations as tested on Groton can be expected to vary on Oakland in their amount of significance.

On Oakland Club all significant correlations were positive (Table 4). Summer whistling cocks were closely related to coveys found, similarly to Groton, but on Oakland whistling cocks were significantly related to kill. This was not so on Groton. Numbers of birds shot (kill), amount of time spent afield, and coveys found were significantly interrelated.

Young per adult female was significantly related to percent subadults on Oakland, which was not the case on Groton.

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SUPPLEMENTAL PAPERS

MAXIMIZING EDGE AND COVERTS FOR QUAIL AND SMALL GAME

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<u>Abstract</u>:

A computer-generated table is presented, enabling the land manger to maximize on a given acreage the length of edge and the number of coverts (or corners where 3 or more cover types come together).

Between-field connections are provided for sportsmen and farm machinery. The equations are presented along with diagrams of field layout and graphs of the relative changes in edge and coverts resulting from certain decisions related to management efficiency.

The effectiveness of quail and other wildlife habitat management should be measured against a concept of potential production rather than percent change from past populations. The concept of highest potential production of quail on an area is useful not only for evaluating management effectiveness, but also for preventing over-investments made to achieve increases in natural populations past the potential.

One aspect of intensive quail habitat management is believed to be the production of linear distance of edge (cover) and coverts or corners where more than 2 types of cover come together. Food supplies are essential, but these are only of secondary interest in this paper.

With proper management, fall quail densities can exceed 1 bird per acre by several times. Under ideal habitat conditions, the only logical limit to a quail population is that of spatial tolerance associated with social behavior. When such limits are approached, coveys tend to become spaced at uniform distances apart (1). Implementation of the concept presented herein may help to achieve the highest possible densities of quail populations.

The question posed of the manager is: How does he produce simultaneously the greatest amount of edge per unit area and the greatest number of coverts, yet retain some practical field reality such as cultivation and the possibility for hunting or observing wildlife?

The solution is quite empirical. Long strips of cover close together produce much edge per acre. Very small patches of cover, say 1 m^2, produce abundant coverts, but few managers would evaluate the results as functional edge for wildlife. Among the regular nesting geometric structures that can be fitted throughout a management area (Fig. 1), equilateral triangles provide the most edge per area enclosed with the maximum corners.

Fig. 1 shows a management area, all of which is potentially developable for quail. The task of the manager is to fit as many triangles into the area as possible, or that "make sense", given the local conditions. The lines shown can be any type of hedgerow or cover strip. The interiors of the triangles should be regularly (or randomly) cultivated food plots for quail or other small game. They could be in corn, bird-food mix, clover, fallow, or any similar rotation. Openings (12 ft) are provided for hunters, dogs, and farm equipment.

Computer-generated Table 1 will enable the land manager to maximize the amount of edge and coverts he can create on a given acreage. The table is based on the function of establishing equilateral triangles of the same size within 1 large equilateral triangle. The basis for the tables is:

Table 1. The linear feet of edge (E), the number of coverts (C), and the area of the triangle not encomposed or residual (R), are presented as a function of the length of the leg of the interior triangles and the acres within the management area.

Area in acres	Length of leg of interior triangles in feet																							
	24			36			48			60			72			84			96			108		
	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R
0.5	2268	90	0.0	1836	42	0.0	1248	20	0.1	972	12	0.2	1188	12	0.0	708	6	0.2	816	6	0.1	924	6	0.0
1.0	4524	182	0.0	3120	72	0.2	2592	42	0.2	2400	30	0.1	1968	20	0.2	1404	12	0.4	1620	12	0.2	924	6	0.5
1.5	6720	272	0.0	4740	110	0.2	4416	72	0.0	3348	42	0.2	2940	30	0.2	2328	20	0.4	2688	20	0.0	1836	12	0.5
2.0	8424	342	0.1	6696	156	0.1	5508	90	0.1	4452	56	0.2	4104	42	0.1	3480	30	0.2	2688	20	0.5	3048	20	0.1
2.5	10320	420	0.2	7800	182	0.3	6720	110	0.2	5712	72	0.2	4104	42	0.6	3480	30	0.7	4020	30	0.2	3048	20	0.6
3.0	12408	506	0.2	10260	240	0.1	8052	132	0.2	7128	90	0.1	5460	56	0.5	4860	42	0.5	4020	30	0.7	4560	30	0.1
3.5	14688	600	0.2	11616	272	0.2	9504	156	0.2	7128	90	0.6	7008	72	0.2	6468	56	0.1	5616	42	0.2	4560	30	0.6
4.0	17160	702	0.1	13056	306	0.3	11076	182	0.1	8700	110	0.4	7008	72	0.7	6468	56	0.6	5616	42	0.7	4560	30	1.1
4.5	19824	812	0.0	14580	342	0.3	12768	210	0.0	10428	132	0.2	8748	90	0.3	8304	72	0.0	7476	56	0.0	6372	42	0.3
5.0	21228	870	0.2	16188	380	0.3	12768	210	0.5	10428	132	0.7	8748	90	0.8	8304	72	0.5	7476	56	0.5	6372	42	0.8
5.5	22680	930	0.3	17880	420	0.3	14580	240	0.3	12312	156	0.3	10680	110	0.3	8304	72	1.0	7476	56	1.0	6372	42	1.3
6.0	25728	1056	0.1	19656	462	0.3	16512	272	0.1	12312	156	0.8	10680	110	0.8	10368	90	0.3	9600	72	0.1	8484	56	0.3
6.5	27324	1122	0.3	21516	506	0.3	16512	272	0.6	14352	182	0.5	12804	132	0.3	10368	90	0.8	9600	72	0.6	8484	56	0.8
7.0	28968	1190	0.4	23460	552	0.2	18564	306	0.4	14352	182	1.0	12804	132	0.8	10368	90	1.3	9600	72	1.1	8484	56	1.3
7.5	32400	1332	0.1	25488	600	0.1	20736	342	0.1	16548	210	0.5	15120	156	0.1	12660	110	0.5	11988	90	0.1	10896	72	0.1
8.0	34188	1406	0.2	25488	600	0.6	20736	342	0.6	16548	210	1.0	15120	156	0.6	12660	110	1.0	11988	90	0.6	10896	72	0.6

Table 1 (Continued)

Area in acres	Length of leg of interior triangles in feet																							
	120			132			144			156			168			180			192			204		
	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R	E	C	R
0.5	348	6	0.4	384	6	0.3	420	6	0.3	456	6	0.3	492	6	0.2	528	6	0.2	564	6	0.1	600	6	0.1
1.0	1032	6	0.4	1140	6	0.3	1248	6	0.2	1356	6	0.0	492	6	0.7	528	6	0.7	564	6	0.6	600	6	0.6
1.5	2052	12	0.2	1140	6	0.8	1248	6	0.7	1356	6	0.5	1464	6	0.4	1572	6	0.2	1680	6	0.0	600	6	1.1
2.0	2052	12	0.7	2268	12	0.4	2484	12	0.1	1356	6	1.0	1464	6	0.9	1572	6	0.7	1680	6	0.5	1788	6	0.3
2.5	3408	20	0.2	2268	12	0.9	2484	12	0.6	2700	12	0.3	1464	6	1.4	1572	6	1.2	1680	6	1.0	1788	6	0.8
3.0	3408	20	0.7	3768	20	0.2	2484	12	1.1	2700	12	0.8	2916	12	0.5	3132	12	0.1	1680	6	1.5	1788	6	1.3
3.5	3408	20	1.2	3768	20	0.7	4128	20	0.2	2700	12	1.3	2916	12	1.0	3132	12	0.6	3348	12	0.2	1788	6	1.8
4.0	5100	30	0.4	3768	20	1.2	4128	20	0.7	4488	20	0.1	2916	12	1.5	3132	12	1.1	3348	12	0.7	3564	12	0.3
4.5	5100	30	0.9	5640	30	0.2	4128	20	1.2	4488	20	0.6	4848	20	0.0	3132	12	1.6	3348	12	1.2	3564	12	0.8
5.0	5100	30	1.4	5640	30	0.7	4128	20	1.7	4488	20	1.1	4848	20	0.5	3132	12	2.1	3348	12	1.7	3564	12	1.3
5.5	7128	42	0.3	5640	30	1.2	6180	30	0.3	4488	20	1.6	4848	20	1.0	5208	20	0.3	3348	12	2.2	3564	12	1.8
6.0	7128	42	0.8	5640	30	1.7	6180	30	0.8	4488	20	2.1	4848	20	1.5	5208	20	0.8	5568	20	0.1	3564	12	2.3
6.5	7128	42	1.3	7884	42	0.3	6180	30	1.3	6720	30	0.5	4848	20	2.0	5208	20	1.3	5568	20	0.6	3564	12	2.8
7.0	7128	42	1.8	7884	42	0.8	6180	30	1.8	6720	30	1.0	4848	20	2.5	5208	20	1.8	5568	20	1.1	5928	20	0.4
7.5	9492	56	0.5	7884	42	1.3	8640	42	0.1	6720	30	1.5	7260	30	0.5	5208	20	2.3	5568	20	1.6	5928	20	0.9
8.0	9492	56	1.0	7884	42	1.8	8640	42	0.6	6720	30	2.0	7260	30	1.0	5208	20	2.8	5568	20	2.1	5928	20	1.4

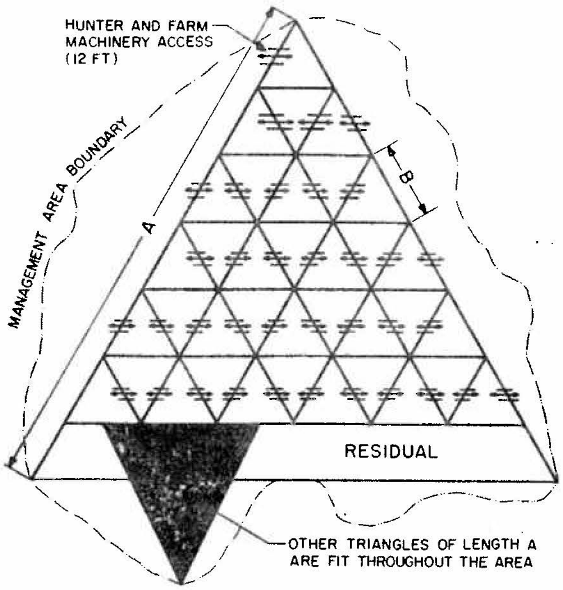

Fig. 1. A management area for maximum management of quail. Equilateral triangles fit throughout the area can maximize edge and coverts (see Table 1.)

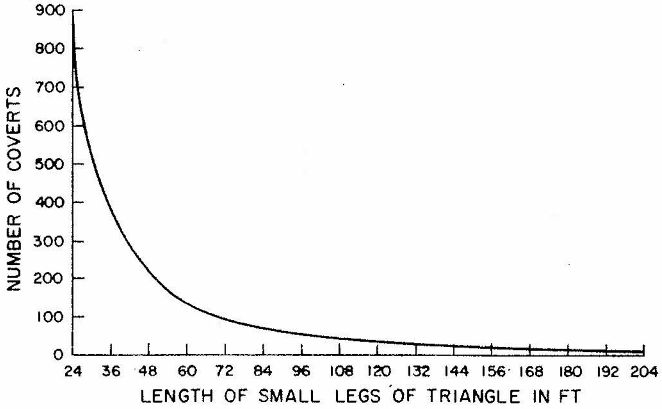

Fig. 2. Relationship of number of coverts to length of the legs of small equilateral triangles on an area of 5 acres.

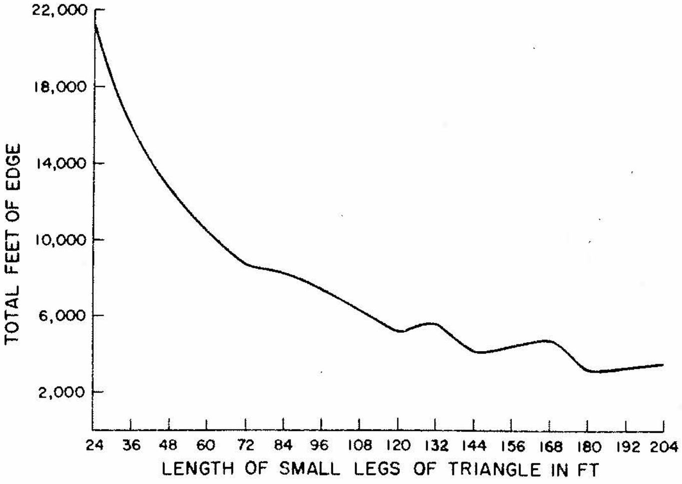

Fig. 3. Relationship of edge to length of the legs of small triangles on an area of 5 acres.

$$E = [(\Sigma_{k=0}^{[A/B]}[A/B] - k) \times 3B] - [[A/B]^2 * G]$$

Where E is the total length of all edges

A is the length of the legs of the large equilateral triangle

B is the length of the leg of the interior smaller triangles

k is the count of the number of triangles without common edges

and G is the width of the opening or gate between each area, assumed throughout to be 12 ft. .

[] symbolizes the absolute value.

The number of coverts, C, is calculated from

$$C = \sum_{i=2}^{[A/B]} N_{(i-1)} + i + 1$$

where $N_{(1)} = 3$.

The land manager should determine on a map or photograph the size, in acres, of the largest equilateral triangle that he can fit into his management area. Within this large triangle, smaller equilateral triangles will be made. The manager, after deciding on the length of the legs of these smaller triangles, will be able to determine the amount of edge and number of coverts he can create. He can also see how much of the area is not being used either as edge or as coverts (considered residual due to the length of the legs of the small triangle). Subsequent triangles can then be fitted into the area until all spaces are developed.

Fig. 2 shows how the number of coverts decreases as the interior triangles approach the size of the larger triangle for a 5-acre tract.

On the same area, though, the length of edge decreases as the interior triangles increase (Fig. 3). The decrease is not as rapid. A balancing of the 2 factors is possible and by plotting any desired ratio of coverts to linear ft and observing the breaking point, it is possible to identify an optimum length of the leg of the interior triangle.

With the tables, the trade offs between maximum habitat and maximum harvests or maximum quality hunts can be more rationally discussed and decided.

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