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A REMOTE SENSING EVALUATION OF HABITAT RESOURCES IN A NEW TOWN SITE

Abstract

One major problem in developing a virgin rural site is to determine the optimum type and distribution of the many buildings and land uses that constitute a new town.

In particular there is an urgent need to reduce to a minimum the environmental impact on the original plant and animal life of the site. Aerial photography, at a scale of 1:10,000, was flown in 1968 before any building had started, and this photography has been used as the sole source of information to map the habitat resources of the new town site.

A discrete map was compiled showing the extent and distribution of habitat types. The map was digitised at 100 points per $1km^2$ and isopleths were drawn to show habitat value density. This information is being used to assess existing and guide future development.

In recent years, near zero rates of population and economic growth in developed countries have been significant factors in the re-orientation of social attitudes. A greater emphasis on the qualitative values and aspects of life, as opposed to the mainly economic or quantitative ones, has seen the emergence in the planning sphere of disciplines such as environmental planning, landscape architecture and ecology. These disciplines are largely concerned with subjective attitudes to land. The value of an area of countryside for its wildlife, or landscape quality, is difficult to quantify when compared with other potential and possible land uses, such as agriculture or urban development.

The progress of new town development in the UK over the past two decades illustrates these changing attitudes. That many new towns, both within and outside the UK, have been criticised for the poverty of their physical and cultural environments is not the concern of this paper. There is, however, always a case for retrospective examination of decisions, particularly in the light of new sources of data which have been made available, and which will be available in the future.

This paper describes a study of the wildlife habitat resources of the site of Milton Keynes New Town prior to its development.

The New Town Site

The development of Milton Keynes New Town began in 1969 and it is planned that a population of 250,000 will be achieved by the year 1985. The designated area covers 9,000 hectares of North Buckinghamshire and includes mainly medium quality agricultural land, with only a little existing urban land in the small towns of Bletchley and Stony Stratford.

The study was carried out in three distinct stages, the first two stages of which were based on the method used by G.S. Burrows in his Ecological Appraisal of West Sussex.

1. Data Collection and Discrete Mapping

   Compilation of a classification of 'Wildlife Habitats'

   Production of discrete maps of wildlife habitats for the Milton Keynes designated area, using aerial photographs taken in 1968.

2. Evaluation

   Allocation of habitat 'values'

   The allocation of these predetermined habitat values using an evenly spaced dot grid system over the maps, plus values at regular intervals along certain linear features of ecological significance.

3. Production of isopleth plots

Isopleth plots were produced by a process of interpolation based on the values allocated by the dot grid system, to provide a visual appreciation of the distribution and gradients of ecological values over the area.

The results of the survey can be used to assess to what extent those parts of the new town which have been built are in suitable locations.

It can also be of value in helping to determine where future development might take place in order to reduce the negative aspects of environmental impact of the urban development on the wildlife habitat.

1. Data Collection and Discrete Mapping.

The 'wildlife habitat', based on vegetation, was the basic mapping unit. The term 'wildlife', is used to include both plant and animal resources, but since animals depend to a large extent on vegetation for their food and cover, vegetation is generally regarded as the main indicator of ecological value.

The first stage of the study involved the classification of habitat types (Figure 1), which was adapted from standard habitat classifications such as the one used in the West Sussex study (ibid) though some changes were made to make it more appropriate to the Milton Keynes area. For example, Clay pits, Gravel pits and Clay spoil heaps were included as distinct categories. Also, a separate category (category 11) was used to include those land uses which are often found in and around urban areas, and which contain a significant enough vegetational component to make them fairly important as wildlife habitats. They are often fragmented in distribution, and in a semi-neglected vegetational state.

This was followed by the production of discrete maps of wildlife habitats (Figure 2) for the whole of the Milton Keynes designated area. Overlapping pairs of aerial photographs were viewed under a Wild ST4 stereoscope. The aerial photographs used were 9" x 9" black and white prints at a scale of 1:3,000, and mapping was done directly onto a map base at a 1:10,000 scale. The difference in scale between maps and aerial photographs meant that a large number of aerial photographs had to be handled to cover the area. This was more time-consuming than if 1:10,000 scale photographs had been available, but on the other hand, the larger amount of detail available was occasionally useful where there were difficulties in identification.

Most of the categories used in the classification of wildlife habitats were easily interpreted from the aerial photographs.

However, marshland was not identified with a high degree of confidence, and some small areas of marshland may have gone undetected. Similarly, the distinction between permanent pasture and temporary pasture (ley), is not easy to make, even on the ground, and the distinction between these, made on the basis of tone, texture and associated features, is necessarily subjective.

For wildlife habitat purposes, some fairly extensive areas of domestic gardens, usually in older residential areas of towns, are significant enough as wildlife habitats to be separated from developed land for purposes of this classification. These were thus amalgamated with category 11, Orchards, Allotments, etc.

Rough Grassland and Wasteland, categories 8 and 9 respectively, were distinguished on the basis of their urban or rural status. Thus, a patch of neglected grassland within an urban area was classified as Wasteland but if it occurred in a rural area it was classified as Rough Grassland.

It was appreciated that certain linear features had particular values as wildlife habitats. Among these linear features were canals, streams, rivers and thick hedges, each of which are shown as discrete units on the map.

Two other linear features were considered to be significant habitats - road verges and railway verges - and these were identified and mapped separately from roads and railways.

2. Evaluation.

Close co-operation was maintained with the Ecological Staff of Milton Keynes Development Corporation who allocated to each habitat type a value which was thought to reflect its relative importance as a wildlife habitat.

These numerical values (Figure 1) were then used in conjunction with the discrete habitat map (Figure 2). A transparent overlay containing a regular grid of dots 10mm apart (equivalent to 100m on the 1:10,000 scale map) was laid on the discrete map and the habitat values which occurred under each dot were marked on the overlay (Figure 3).

Although the cell size of the grid was quite small (1 ha: giving 100 points each $1km^2$) it was appreciated that narrow linear features such as canals, streams and rivers would not show up on the isopleth map. In an effort to overcome this problem it was decided to identify and record the linear habitat value at a regular interval of 10mm (on the map) along its entire path or course. These values were superimposed on the original regular grid (Figure 3). This was only carried out for the most important linear features in the study area.

3. Production of Isopleth Plots.

Computer compilation of an isopleth map from a regular grid of spot values is a fairly standard task. However, this is much complicated when random linear points are superimposed over the regular grid.

Figure 4 shows the resultant isopleth map in which both the regular grid and irregular linear points have been included. Because the linear features have such relatively high habitat values they have exerted a major influence on the distribution pattern; particularly the steep gradients which are evident on the isopleth map.

This map shows where the high habitat values are, where the low habitat values are, and clearly identifies the steepness of the habitat value gradient.

Conclusion.

The three stages outlined in this paper together form the first phase of this applied study. From the information gathered, tabulated, stored and mapped it is now possible to assess the extent to which the development which has taken place so far at Milton Keynes fits into the natural habitat situation of the original site.

Furthermore it will allow future development to be planned and located so that its impact on the wildlife habitat of the area can be optimised.

Whilst it is most desirable to have nature reserves and national parks, these are usually situated well away from towns. It is in the urban environment that most of us spend most of our time and live most of our lives.

In the attempts to improve the quality of life of the urban dweller we must take into account the problems of managing our natural environments of which our wild life habitats form an important part.

Reference

Burrows G.S. (1973), Ecological Appraisal of West Sussex Sussex County Council

FIGURE 1 MILTON KEYNES: HABITAT RESOURCES SURVEY

HABITAT VALUES	CATEGORY NUMBER	MAP CODE	CATEGORY
10	1	Wd	Deciduous woodland
4	2	Wc	Coniferous woodland
10	3	Wdc	Mixed woodland
10	4	Sc	Scrub
10	5	M	Marsh
6	6	P	Pasture
2	7	A	Arable/lev
10	8	G	Rough Grassland not in agricultural use
8	9	Wa	Wasteland
6	10	Pk	Parkland (including large parks and private estates)
6	11	O	Orchards, Market Gardens, Allotments, Cemeteries. Very small parks/play areas, large areas of domestic garden
2	12	MG	Managed grassland
0	13	D	Developed land (including built land, or land with hard surface, and land disturbed for building)
10	14	Rv	Road verges
10	15	R	Railway verges
10	16	Csh	Clay spoil heaps
6	17	Cp	Clay pits
10	18	Gp	Gravel pits
10	19	C	Canals
10	20	Pl	Ponds/lakes
10	21	___	River
10	22	___	Important streams
10	23	___	Thick hedgerows, or those with an abundance of large trees

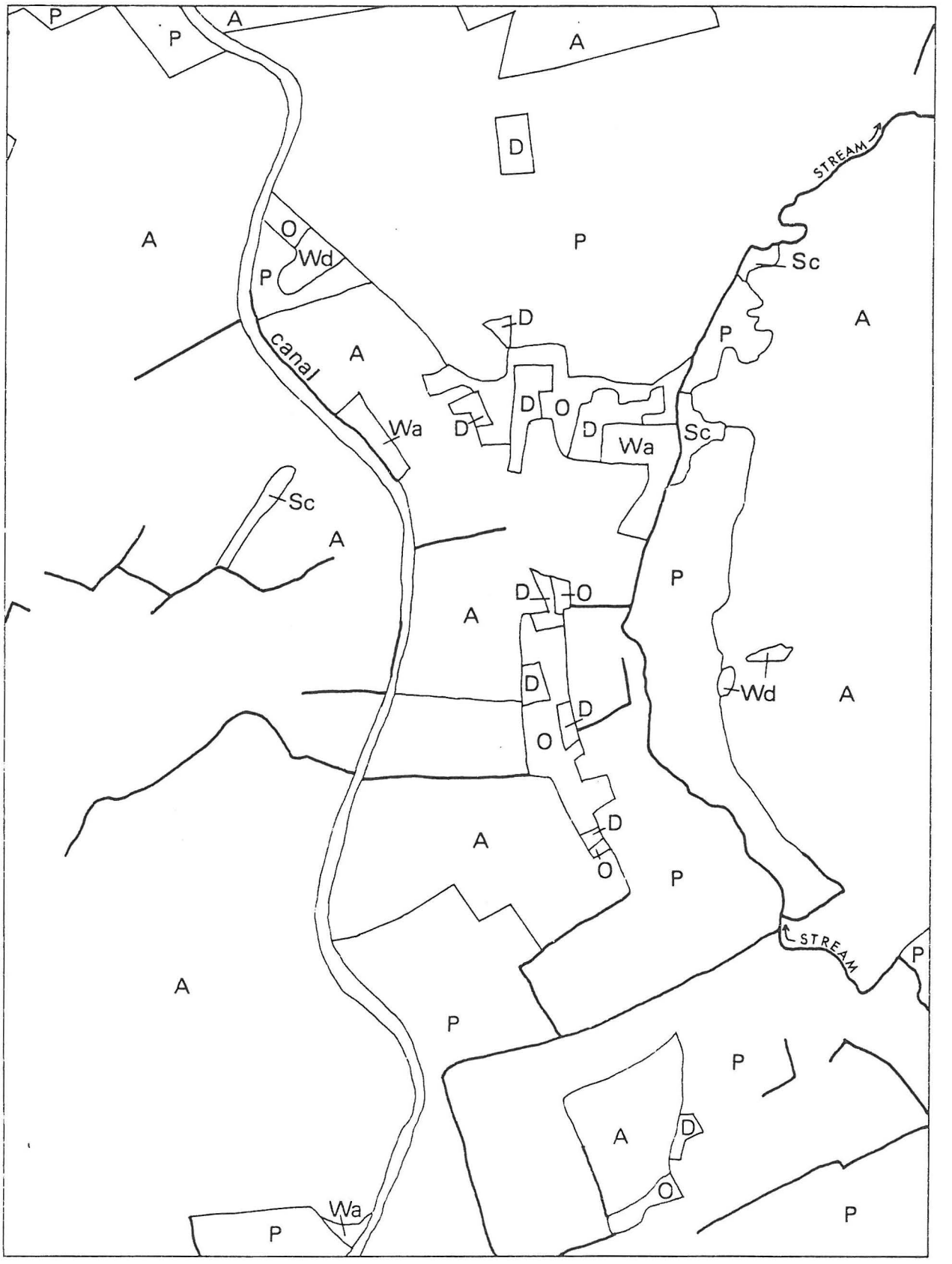

FIGURE 2. HABITAT TYPES.

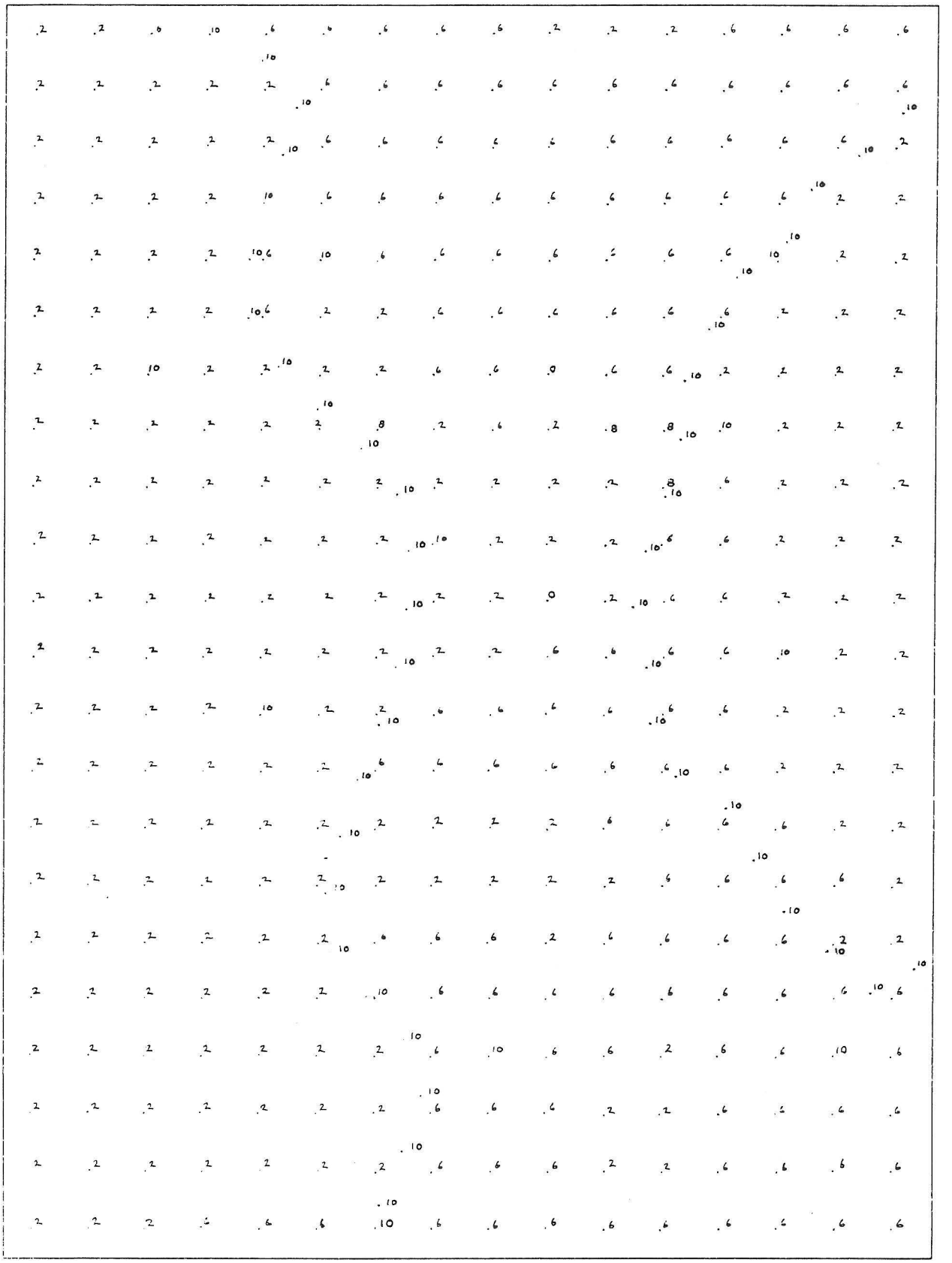

FIGURE 3. HABITAT VALUES ON GRID.

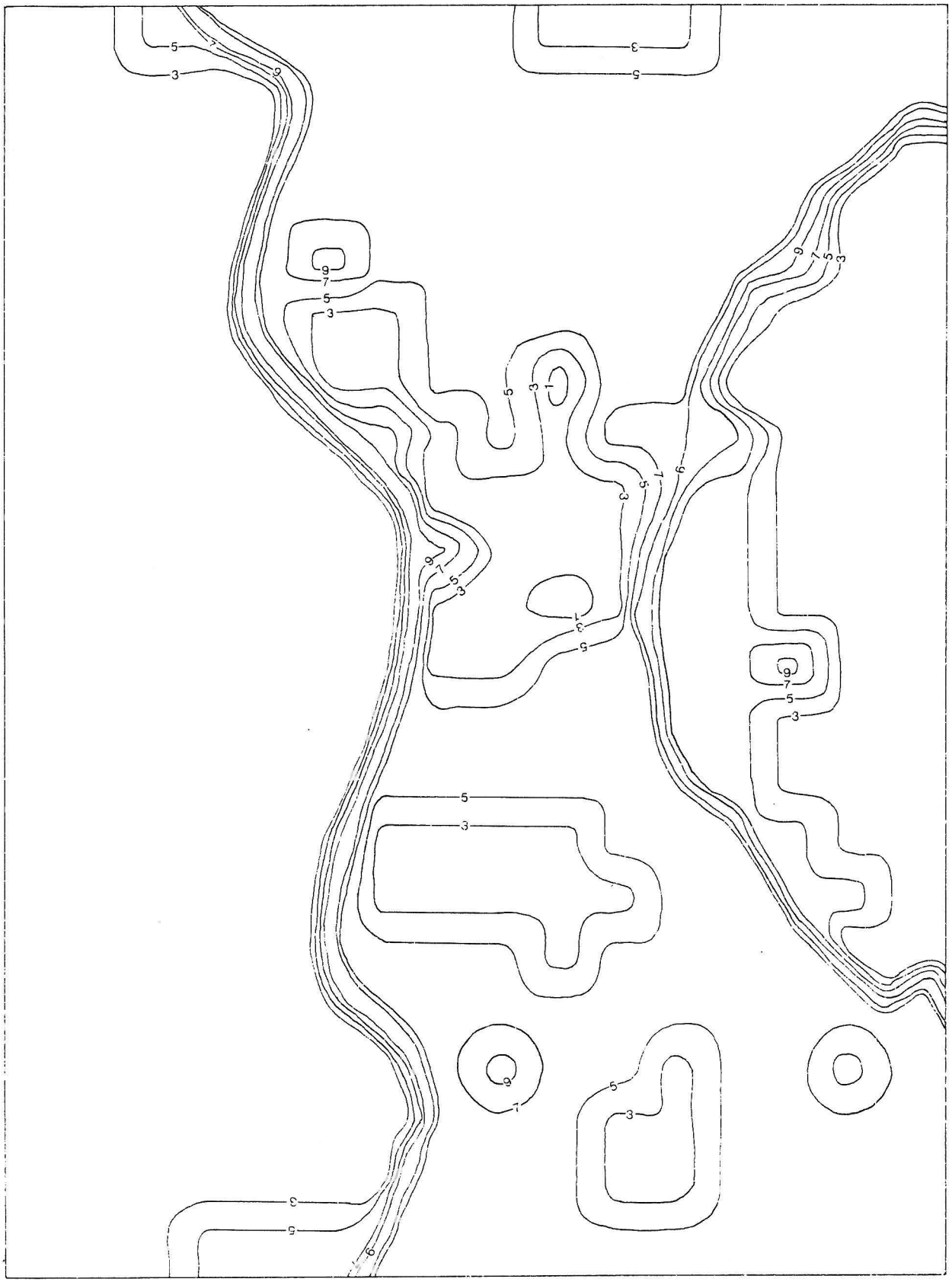

FIGURE 4. ISOPLETH OF HABITAT VALUES.