Aerial and Ground Surveys as a Tool in Game Selection for Domestication: The Kainji Experience

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Introduction

There are several tools used in game selection for domestication social acceptance, adaptability and game inventory to mention but a few. In this paper we must devote most of our discussion on game inventory, game social stress condition both of which are most related to survey of animal population. If there be no game inventory, how do we know the available lot of game to be selected from. And if we do not delve into the social organization of the game spp. how do we know the various stress conditions that game animals encounter, and which condition exposes or predispose them most to death. A survey must be carried out in trying to find out any of the above mentioned conditions relative to the conditions we can improvise.

In selection of game spp. to be domesticated an inventory of the available game animals has to be taken and this inventory is only possible through census. Aerial census of animals population, is geared towards confirmation of the results of ground surveys. Sometimes both complement each other. Certain places or habitats are difficult to penetrate such as mangrove swamps and thick deciduous tropical rain forests. In such places aerial surveys will be the best tool to use in ascertaining the types and estimating the numbers of wild animals present.

When the inventory is taken, each sp. is studied for knowledge of its social organization and physiological adaptability. Some animals are shy and would flee at the sight of human beings, examples include the oribi, duiker and these will be difficult to class either as fit or unfit for domestication by using only the ground census method. An aerial survey would in this case be necessary for the purposes of selection of these animals for domestication. Such surveys would go a long way in aiding the livestock officer on which of the three levels of domestication would be employed relative to the spp. – Ranching, farming or intensive rearing.

In assessing animal population particular attention must be paid to seasonality. Some animals do not expose themselves readily in the wet season. There is no need to migrate to water holes and river valleys and there would be enough vegetation covers for them little or no wandering occurs. Others are strictly nocturnal such as the hippopotamus, bats. Some animals change habit as the season changes, examples include local movement of individuals and population. In dry season, switching of food preferences, reduction in population etc.

Problems of Aerial Surveys

Surveys carried out from aircraft in the air have a series of problems ranging from choice of airplane to meteorological. During the past twenty years, light aircraft have played an increasingly important role in wildlife research and managements. Research workers and game department are becoming more dependent

on aircraft to increase their flexibility in research and other aspects of wildlife work. The various characteristics of the wide variety of available aircraft today have not been fully appreciated. There are reports that there are over 45 different types of aircraft available in use for such works and that they range from two-seater trainers to medium size twin-engine airplanes and helicopters.

In choosing an aircraft, right for the right job, the following are considered: Cost, useful load, speed, Runway requirements, seating capacity and noise level.

Lamprey (1969) recounts that attempts to census large mammals population from the air are frequently made in East Africa with results of doubtful value. He argues that the feasibility and reliability of total counting are points of considerable uncertainty and depend on many variable factors which include:

(i) spp. to be counted
(ii) Type of flight pattern used
(iii) Height above ground of the aircraft
(iv) Vegetation and nature of the terrain
(v) Weather
(vi) Time of day
(vii) Pilot and observer experience
(viii) Fatigue factor and length of time flown.

The degree of fatigue produced by the aircraft type is of obvious consideration. There are many causes of fatigue, some still little known and a good summary of the problem could be found in the Agricultural Pilots manual, published by the department of civil aviation in Australia. They consider that fatigue is contributed to by all of the following agents: heat, cold, noise, vibration, pressure, accelerative forces, the maintenance of posture over long periods, boredom, frustration, the need for prolonged vigilance and concentration, apprehension, anxiety, fear, sense of responsibility, psychological reaction to physical discomfort, and frequent critical peaks of activity during flight.

High wing airplanes are generally preferred to low wing chiefly for the purposes of visibility. In most high wing airplanes used for counting, door and panels are removable.

The countability of animals are influenced by the following:

(1) Animals outside the observers' visibility profile
(2) Animals in the visibility profile but invisible
    a. Physical Obstruction
    b. Animals that hide
    c. Panel Observation
(3) Physical characters of the environment
    a. Illumination. Here position of sun in relation to lighting and observer position (see illustration)
    b. Average visual acuity in man.

The limits of visual acuity as applied to counting animals are difficult to establish due to the wide variation in condition encountered, but generally speaking, counting is not attempted above 1000ft and most work is done in the range of 200-800ft. Being too close to the animals impairs countability in that too much details is distraction.

(4) Counting rate: There are many occasions when animals potentially visible to the observer go unrecorded and the factors responsible for this are related to the rate at which the observer must discriminate and record the animals. And fairly definite limits on the countability of plainly visible animals can be seen.

If the observer intends to count all the animals in the visibility profile in one pass of the aircraft an indication of the "critical density" above which they become uncountable could be shown as in the table below:

Countability of Animals at Various Air Speeds Expressed as Density per 100 Yards of Visibility Profile

Air speed m.p.h	40	60	80	100
Sec. to cover 100 yds	5.1	3.4	2.6	2.0
No. of animals countable				
Per 100 yds	15.3	10.2	7.8	6.0
Density per mile	270	177	137	105

Source: Graham & Bell (1969).

In the table a counting rate of 3 per second has been used. This seems the approximate maximum rate an observer could expect to maintain for extended periods (Watson 1967). Where groups of closely compacted animals exceed 100 they must for most practical purposes be considered uncountable by the human observer since the flying time required is usually incompatible with the economics of the operation.

Another problem of the countability is the effect of distribution. Groups of animals are more readily seen than solitary ones and where both configurations occur together bias towards searching for groups is likely others include patterns of distribution in a group viz: lines or circularly shaped groups; uni directional or randomly orientated and regular or even spacing.

The noise level of the aircraft in use is another parameter for choice of aircraft. Most of the animals ran away from the noise of the airplane when first seen, so some animals were missed on counting. Roan antelope and hartebeest are not disturbed by the approach of Land rover as known from ground observation and the same may be with the noise of aircraft. However, if the power-off glide performance of the airplane is good enough then noise level can to some extent be taken care of.

Also the weather conditions will greatly affect aerial surveys. When clouds are low as with overcast of cumulus clouds, flying is not advisable (authors personal experience). The visibility is poor and navigation is rather instrument and not visual. This means that even when grids are flown no observations are reliable. Animals that hide will not be seen. Even very visible animals in open field will not be seen. There would be a wrong assessment of the animal behaviour or response to external disturbances.

Problems of Groud Surveys

There are many methods of carrying out a population study on the ground and all of them have their peculiar problems. Wild animals do not like interaction or disturbance from other animals and especially man, this brings to bear on them social stress. For an animal species to be effectively domesticated or even considered for domestication, the social stress has to be non existent or brought down to tolerable levels. This is where the capture and recapture method of population census becomes tricky. The very first two assumptions of the method viz:

(1) Marking does not affect the mortality or behaviourof the animals, the marks are not lost and marked individuals are readily recognized.

(2) The marked animals mix randomly in the unmarked population following their release impose limitations to the use of this method as a tool for selection of animals to be domesticated. It is however useful in the sense that it gives an indication of the animals' social stress amenability.

When the sample area is large, direct count of the whole population becomes difficult except for animals that have large bulk and the habitat relatively open. Strip censuses are used when it is impractical to carry out whole population count. Here sighting of animals is the possible short-coming. It seems needful to mention here that the only ground survey method fit enough as a tool for selection of animals for domestication would be that method which guarantees freightless exposure of the animals as counted giving details of the population structure – age, sex, size and behaviour. Such a method is far fetched, the closest being the King census and the fixed transect belt methods. In these something has to be done in case of shy animals, which

flee on the sight of any other animals and/or sound. Such animals include, Grey Duiker, Oribi, Water Buck etc. (Kainji Experience).

Seasonality also affects ground surveys. In the Kainji Lake National Park, the best time for ground survey is the dry months of the year, especially when some burning had taken place. Visibility at this time is best. The park is dry and water holes are drying up so there is a compulsory movement of most animals towards the valley of the Oli River. At this period it will be possible to study the interaction of the animals as they meet at a common drinking place. At the rainy or wet season, survey is best done to study the behaviour of the rather solitary species. So by and large surveys are necessary to get an inventory of the available animals in the wild, further surveys would be necessary to document the behaviour and organization of the animal species so that surveys could be a tool for selecting animals for domestication.

Effects of Surveys in Selection of Game for Domestication

The distribution and abundance of animals in an area is dependent on the vegetation patterns and that is dependent on the geology and climate of the area. The major parts of the Kainji Lake National Park (KLNP) in the east (Halstead 1971) and the West (Klinkenberg, 1965) are underlain by undifferentiated metasediments. The annual rainfall is about 1200mm (Ayeni, 1980).

The main vegetation associations in the area are *Isoberlinia Tomentosa* woodland, *Afzelia Africana* woodland, *Acacia* 'complex' and *Burkea Africana – Terminalia avicenoides* woodland. These vegetation types are recognizable from aerial photographs (Geerling, 1976). Milligan (1976) has shown that there are significant differences between the species ordination in the vegetation types. This can only mean that the animal species available and their distribution would vary accordingly. The available mammalian species could be put into two groups, the Oli Valley group and the Savanna group. Milligen (1979) reported that the Oli Valley group composed kob, red duiker, waterbuck, warthog, bushbuck, baboons and monkeys; while the Savanna group included hartebeest, roam antelope, grey duiker, oribi and elephant. Buffalo was apparently intermediate between these two groups.

With surveys like these a check list becomes readily available to the livestock officer who now becomes armed with a tool for game selection for domestication.

Such a check list had been documented by Ayeni, Afolayan, and Ajayi (1982) in the master plan for the management of Kainji Lake National Park. Six types of wild mammals occur in the area and include members of the orders:

Carnivore	16 Species
Rodentia	13 Species
Artiodactyla	12 Species
Chiroptera	6 Species
Primates	5 Species
Insectivore	2 Species

The following are represented by only one species; Pholifoda, Proboscidea, Sirernia, Tubulidenta and Hydracoides. According to child (1974) 24 species of amphebia and over 350 spp. of birds occur in the Park.

The relative abundance of this game would aid in selection criteria of game for domestication. So surveys are important as they say silently, what they are and in what proportions and conditions.

Summary

In spite of the difficulties in carrying out successful surveys and in spite of the fact that most figures of animal abundance documented are only estimates of animal populations it is almost difficult to select game for

domestication without a knowledge of what is available. Various methods have been employed in surveys be they aerial or ground. Counting has been made more reliable by adjusting the methodology and of course subjecting the results to statistical analysis. Most biases are removed and so the information given by most surveys are reliable. In the Kainji Lake National Park sampling methods have been subjected to continuous comparison and changes. The results of surveys on the ground are cross checked by result in the air and a reliable documentation is assured.

Recommendation

It is recommended that aerial and ground surveys would remain unbeatable as a tool in game selection for domestication. However, the methods and techniques employed must suffer constant review as science is dynamic. Other studies could be carried out on the survey results just as a back up.

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