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The settlement of upland game population in new recently reclaimed polder-land

We have in our country a unique opportunity of studying the settlement and the development of game populations on newly obtained land. This land consists of polders that have been made in the former « Zuiderzee ». The polders under discussion are: the « Noordoostpolder » (48.000 hectare) and « Oostelijk Flevoland » (54.000 hectare) which became dry in 1942 and 1957 respectively.

A polder is an area of land in which the height of the water is artificially controlled and which usually is 3 to 5 feet below Sea-level. The land is reclaimed by surrounding a part of the sea, or a lake, by a dike, and then pumping the water out of the enclosed areas.

Subsequently canals and ditches are dug in the drying bottom of the sea, roads are made and the land is prepared for agriculture. Later farms are built and villages with shopping-centres, etc.

Plant life.

The establishment of the vegetation in the new polders can be divided in three phases :

1) The development of plants from seed that was already introduced by the seawater before the polder became dry and which therefore was present from the beginning. This plant community was very poor in regard to the number of species and consisted mainly of: Reed (*Phragmites communis* Trin.) and Sea Club-rush (*Scirpus maritimus* L.).

2) After the polder became dry so called « pioneer-plants » colonized spots that did not yet have a dense vegetation of reed. These pioneers were:

Coltsfoot (*Tussilago farfara* L.)

Creeping Thistle (*Cirsium arvense* (L.) Scop.)

Polygonum nodosum Pers. (*Persicaria* species)
Hastate Orache (*Atriplex hastata* L.)
Celery-leaved Crowfoot (*Ranunculus sceleratus* L.)
Marsh Fleavort (*Senécio congestus* (R. Br.) DC.
var. *palustris* (L.) Hyl. = *S. tubicaulis* Mansf.)
and Sea Aster (*Aster tripolium* L.)

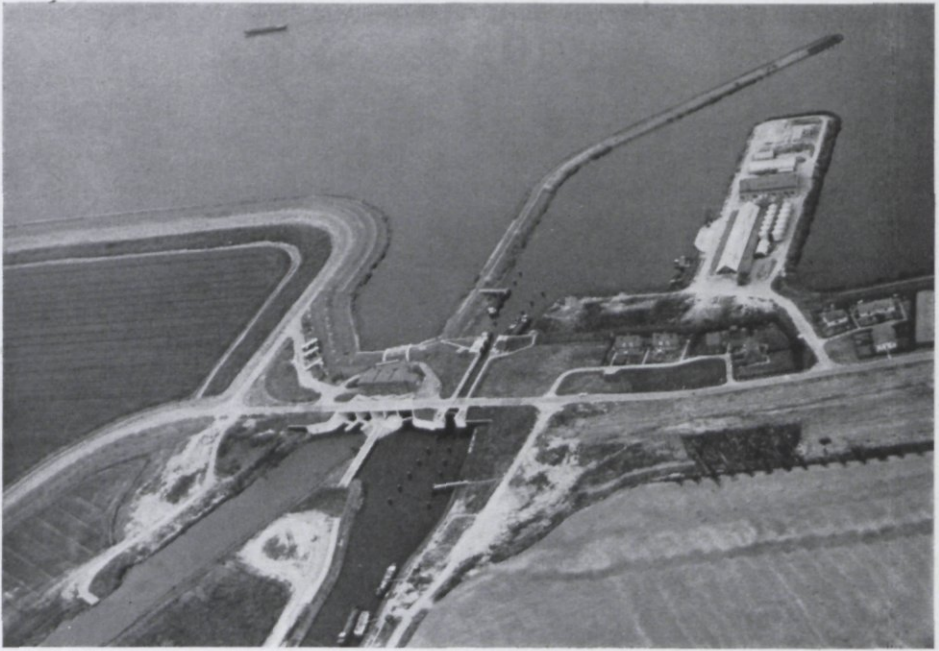


Fig. 1 - Oostelijk Flevoland. Pompstation « Colijn ».

3) Finally when cultivating the land, man introduced seeds of both weeds and other plants.

First red and white clover, lucerne (Alfalfa), coalseed, wheat, barley, oats and flax are grown. Also forests are planted in some areas.

About twelve years after the Noordoostpolder became dry 550 species of plants were represented, which is about one third of all species of the Dutch flora.

The game in the Noordoostpolder.

Hares (*Lepus europaeus* Pallas).

On the dike along the old land hares occurred before the polder became dry. In the spring of 1943 (half a year after the polder became dry) the first hares were observed in the south-eastern corner of the polder. The game density increased both by immigration from the old land and by multiplication of the hares that were already present. In 1946 (four years after the polder fell dry) the first six lots, adjoining the old land, could be let for shooting. This means that with the census that was made during the winter-months (i.e. before the breeding season) on an average more than five hares were encountered per unit of twenty four hectares. Every following year, more westwards, lots could be let and in 1951 the hare-density also in the last lots of the polder was high enough to let them for shooting.

During the winter-months of every year the gamekeepers make counts in all lots (10 units in every lot) in order to get an impression of the hare density. The counting technique consists in the counting of rising hares by driving over a unit of flat land while keeping a distance of about ten meters between the drivers. By this method even with drivers walking to and fro not all hares present are counted, but a satisfactory impression of the density is certainly obtained. For if the figures obtained with the countings are compared with the size of the bag in the various years it appears that the two run about parallel. If the number of hares counted is below the desired minimum (at present 4 hares per lot = 1 hare per 6 hectares), then shooting in the lot under consideration is forbidden in that year, in order to maintain the game-density in the polder. The numbers of hares shot show that the hare-density increased to a maximum in 1952. From calculations it appears that in the latter years more than one hare was present per hectare. This was such an overpopulation that mass mortality in the next winter was inevitable. In 1953 the density was nearly one hare on 3 hectares. And it decreased more in 1954, increased slightly in 1955, again went down a little in 1956 and in 1957 reached a minimum of one hare on 5 hectares. In following years the density improved and at present the population density is about 1 hare per 3 hectares.

The oscillations in the density of the population after the mass mortality in 1952-53 are distinctly correlated with the weather-conditions during August and September. This means that hares at the age of 3-5 months are most liable to infections.

A study of the hares shot in the 24 lots during the past ten years (1951-1960) shows that the lots along the margins of the Noord-oostpolder produced more hares than the more central ones. As the marginal lots have another soil (sand, peat, light clay) than the central lots (heavy clay) it is obvious to relate this difference to the observed fluctuations in the population density between those lots. It may be understood that in wet periods the areas with heavy clay offer no healthy biotope for hares, and encourage infection by coccidia and *Pasteurella pseudotuberculosis* bacteria. In order to prevent the spread of diseases of this kind we advise the hunters to shoot during the season (15 October - 31 December) as many hares as possible, and especially the small ones. Research showed that especially the late young ones become victims of the mentioned diseases, and therefore are dangerous biotope infectors during their life.

Besides diseases hares have other enemies in mowing-machines, traffic, and agricultural poisons. Also this has to be taken into account when managing effectively the hare population.

Rabbits (*Oryctolagus cuniculus* L.).

In 1944 (two years after the polder became dry) the first rabbits were observed in the forested areas. Shooting these animals was immediately permitted, but not until 1951 were the first 45 shot. Characteristic is in this case the adaptation of the bionomics of the rabbit to the clayish soil, in which it can not burrow deep holes. The young are born in very short tunnels.

Also in the polder we know the ups and downs in the population density as a result of the coming and going of myxomatosis.

Pheasants (*Phasianus colchicus* L.).

Soon after the planting of the first forest areas the first pheasants made their appearance although no stocking was done. In post-war-years, however, some areas were stocked. The first shooting permit was given for 1948-49. In order to save the females for breeding, in the first shooting periods only shooting of cocks was permitted.

The pheasant population clearly reacted to the weather in the second quarter of the year. Though 1957 was a poor year for hares because of its wet August and September, the same year was favourable for pheasants because April, May and June were exceptionally dry.

Through stocking and additional feeding a satisfactory pheasant population is being established.

Partridge (*Perdix perdix* L.).

One year after the polder became dry small numbers of partridges were observed for the first time. Since 1954 partridges are shot, exclusively by driving. First the population density was low but since the shooting has become somewhat more intensive the partridge-population has reached a higher level.

Roe deer (*Capreolus capreolus* L.).

In May 1943 the first roe deer, a buck, was observed in the southern part of the Noordoostpolder. In 1958 there were approximately 40 specimens, which estimate was decidedly too low, as counts in 1960 gave a population of fully 200. The damage to the young forests increased here and there to such extent that in 1960 shooting became advisable: 39 does and 26 bucks were shot. It was in this polder that in 1960 the best buck of the year for our country was shot.

The buck was 8 years old, the antler lengths were 22 ½ and 23 ½ cm. This buck was one of the « field roes » which occur in the agricultural area of the Northwest part of the polder.

Probably the food, as a result of the fertile soil, is so rich in minerals that bucks with a good natural ability have an opportunity of developing exceptionally good antlers. The density of the roedeer population was in 1960 about 10 per 100 hectares of wood, field roes included. Therefore the density in the wooded areas was a bit lower. In general the quality of the stock is very good, but there are poor animals which have to be selected out.

The reproductional urge in this new land apparently is very great. A roe deer of less than one year old (therefore really a calf) which was killed by a collision appeared to be with two young that were practically fully developed.

The game in Oostelijk Flevoland.

Hares (*Lepus europaeus* Pallas).

This polder became dry in 1957 and also here the first upland game present were hares. Already before the polder became dry, hares occurred on the surrounding dikes and shortly after 1957 hares were



Fig. 2 - The best roe buck of the Noordoostpolder.

observed in the marginal lots. Because in this area young forest had been planted, which very soon showed damage caused by hares, already in 1960 the first 5 lots were let for shooting hares (three years after the land became dry). The census in the winter of 1959-'60 gave an average of 5 hares per unit (= 30 ha) in all 5 lots.

In lot nr. 2 already then pseudo-tuberculosis was found and therefore the number shot in this lot was considerably lower than that in the other four lots. The fact that suckling and gravid hares were found even in December '60 demonstrates that also here a strong reproduction urge was present. However, in this year the number of lots for shooting could not be extended, as the population density in the relevant areas did not yet permit shooting. This shows that there is a difference between the growth of the hare population in the Noordoostpolder and that in Oostelijk Flevoland. This difference may be explained by a difference in the position of the polderland in relation to the old land. The Noordoostpolder adjoins the mainland on one side, while Oostelijk Flevoland is separated from the old land by a wide zone of water. Hares therefore have to cross by swimming or they have to come over the ice in winter, which results in a slower immigration.

Rabbits (*Oryctolagus cuniculus* L.).

Only here and there rabbits have been observed in the forested areas along the dike.

Pheasants (*Phasianus colchicus* L.).

In 1958 in the forested areas along the dike the first pheasants were observed and following later extensive stocking shooting was already possible in 1960.

Partridges (*Perdix perdix* L.).

Partridges were shot from 1960 after they had been observed for the first time in 1958.

Roe deer (*Capreolus capreolus* L.).

In 1959, prints of roe deer were found at about 6 km from Harderwijk (« southern corner »). In 1960 at least 16 specimen were present and in the present year the population is estimated to be about 30.

Prints have been found even near the opposite end of the polder. By day the roe deer shelters in the reed, while in the evening they graze on the areas with Reflexed Poa (*Puccinella distans* (L.) Parl. and *Spergularia salina* J. & C. Presl. Prints of roe deer were found up to 12 km deep into the reed.

Like hares the roe deer must have entered this polder by swimming or via the ice.

RESUME

Apparition du gibier dans les regions asséchées ces dernieres années.

L'établissement du gibier dans les nouveaux polders, le « Noordoostpolder » qui fût asséché en 1942 et celui de « Oostelijk Flevoland » asséché en 1957, dans ce qui fut autrefois le Zuiderzee donne les resultats suivants.

Immédiatement après l'assèchement on voit apparaître les premiers lievres dans le polder. Ensuite on signale la présence des faisans, des perdrix et des lapins ainsi que les premiers chevreuils.

La croissance des lievres s'est accrue beaucoup plus rapidement dans le Noordoostpolder, qui est rattaché au continent que dans le polder Oostelijk Flevoland qui est séparé du continent par un bassin (qui était autrefois une partie du Zuiderzee).

Très visiblement on peut constater dans le Noordoostpolder un surcroit de la population et on peut compter plus qu'un lievre par hectare. L'hiver 1952-1953 fut marqué par une periode de grande mortalité. Cette periode de décroissance augmenta encore en 1957. Par la suite on constate momentanément une amelioration, ce qui fait qu'avant la periode de chasse on peut compter approximativement 1 lievre sur 3 hectares.

La plupart des lievres que l'on rencontre vivent dans des terrains formés de terre légère, tandis que le sol plus lourd formé de terre glaise, et particulièrement dans une année pluvieuse paraît malsain pour le lievre.

On constate une corrélation dans la croissance de la population due aux dispositions atmosphériques dans les mois d'Août et de Septembre. Une corrélation semblable est constatée pour la population des faisans. Dans ce cas là les dispositions atmosphériques jouent un grand rôle dans le deuxième trimestre de l'année.

Par suite de l'augmentation intensive de la population des chevreuils dans le Noordoostpolder, l'on a dû se déterminer en 1960 à abattre un certain nombre d'exemplaires de cette population. Le plus beau spécimen de chevreuil trouvé en 1960 aux Pays-Bas fût abattu dans ce polder. Les chevreuils avec un bon disposition naturelle, ont la chance de se développer parfaitement bien avec une alimentation riche en minéraux d'un sol fertile.

RIASSUNTO

Comparsa della selvaggina nelle zone prosciugate in questi ultimi anni.

L'insediamento della selvaggina nei nuovi polder, il « Noordoostpolder » che fu prosciugato nel 1942 e l'« Oostelijk Flevoland », prosciugato nel 1957, in quello che fu un tempo lo Zuiderzee, ha dato i seguenti risultati.

Immediatamente dopo il prosciugamento sono comparse nei polder le prime lepri. In seguito è stata segnalata la presenza dei fagiani, delle starne e dei conigli selvatici, come pure dei primi caprioli.

L'aumento delle lepri è stato molto più rapido nel Noordoostpolder, che è unito al continente, che non in quello di Oostelijk Flevoland, separato invece dal continente da un bacino (che era un tempo una parte dello Zuiderzee).

Nel Noordoostpolder si può visibilmente constatare un accrescimento della popolazione animale e si può calcolare più di una lepre per ettaro. L'inverno 1952-53 fu caratterizzato da un periodo di grande mortalità. Questo periodo di decremento numerico si protrasse ed aumentò ancora nel 1957. Attualmente si constata un miglioramento e pertanto prima del periodo della caccia si può calcolare approssimativamente su 1 lepre per ogni 3 Ha.

La maggioranza delle lepri che si rinvergono vivono nei terreni leggeri, tanto che il suolo più pesante e particolarmente in una annata piovosa, sembra poco salubre per la lepre.

Si constata una correlazione fra l'accrescimento della popolazione e le condizioni atmosferiche nei mesi di agosto e settembre. Una analoga correlazione è stata accertata nei confronti della popolazione di fagiani. In questo caso le condizioni atmosferiche giocano un ruolo importante nel secondo trimestre dell'anno.

A seguito dell'aumento della popolazione di caprioli nel Noordoostpolder, ci si è dovuti decidere nel 1960 ad abbattere un certo numero di esemplari di questa specie. Il più bel capriolo ucciso in Olanda nel 1960 viveva in questo polder. Gli esemplari con una buona disposizione naturale, hanno la probabilità di svilupparsi perfettamente bene con una alimentazione ricca di minerali propria di un suolo fertile.