THE ROLE OF MARGINAL VEGETATION IN SOME WATERFOWL HABITATS

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INTRODUCTION

Because of the demand for greater production, the farmers' attention is constantly being directed toward those areas of their land which are non-productive. Inevitably wetlands — swampy gullies, lagoons or lakes — come under close scrutiny. Soils underlying wetlands are usually very fertile and some of New Zealand's best dairy lands have been derived from them. Balham (1952) recorded the extent of this development in the Manawatu district at that time. In a submission to the Peatlands Committee in 1965, the Wildlife Service outlined the scope of wetland drainage in the Waikato and Hauraki Basins — one of the major waterfowl areas of New Zealand. According to this survey, 118,000 acres of Crown- and privately-owned swamp remained in this area; but 74,000 acres (63%) were set aside for immediate drainage or were being drained. Another 12,000 acres would be drained at a later stage when projects became effective. And although much of this massive swamp was considered good water-bird habitat, by the time present schemes are completed barely 8,000 acres will remain; and there is no certainty about the future survival of this area.

Waterfowl are not losing their habitat solely by drainage, however. Natural ecological succession is playing an important role. The encroachment of semi-aquatic plants, of which raupo (*Typha muelleri*) is by far the most aggressive, onto established water areas has converted many previously ideal waterfowl habitats into useless bogs. Raupo appears to be limited in its spread only by water depth, movement and salinity. Since World War II, concurrent with a major increase in the use of agricultural fertilizer, raupo has made a dramatic and widespread appearance on wetlands throughout New Zealand — to the extent that it has become an economic problem in some places through blocking waterways.

Raupo, more than any other water-colonising plant, has profoundly affected the occupation of wetlands by waterfowl. By colonising shallow margins, it has:—

(i) eliminated this important feeding area for many species, and

(ii) denied birds access to margins where they can loaf, preen or brood their young.

IMPORTANCE OF WATER MARGINS TO CERTAIN WATERFOWL

There are 11 species of Anatiformes now established in New Zealand, some endemic, some introduced. They are adapted to different stages in the succession from open water to swamp. We will discuss briefly the importance of marginal vegetation and water areas in the ecology of some of these species:—

(1) To Canada geese (*Branta canadensis*), the margins of water areas are very important for feeding and brooding the young. Open water is the usual retreat in times of danger. Observation of feeding habits indicates that much of the goslings' food is either small water-side and aquatic plants or the invertebrates which occur amongst them. Probably, as with ducks (Weller 1964), both animal and vegetable material is taken initially, with a higher proportion of vegetable matter being eaten as the goslings grow older. The older goslings range further away from water on feeding forays.

For nesting, this species prefers an exposed situation; and although it freqently nests beside water, it may nest several hundred yards from it and, in hill country, sometimes as high as 1,000 feet above it.

The adult goose makes use of water areas for roosting, limited feeding and for safety during the flightless period of the moult. However, being essentially a grazing bird, most of its food is obtained on land; so, access to the margin is

important during the moult as well as when rearing young, though it is relatively unimportant at other times.

(2) Black swans (*Cygnus atratus*) are mainly grazers of aquatic vegetation and spend a large proportion of their time on water. Even cygnets feed on aquatic plants which are often hauled up for them by their parents. Obviously there is a limit to the depth at which swans can feed, and likewise there is a limit to the depth at which the various plants can grow. Thus, relatively shallow water is favoured by swans.

With this species the use of dry land increases during two phases of reproduction — nesting and rearing the brood. A colonial nester, unique amongst swans, the black swan prefers nesting in relatively exposed situations, close to the water margin. Freedom of movement to and from the water is essential. The importance of the open margin is well illustrated by Puke Puke Lagoon, the Wildlife Service's waterfowl research lake in the coastal dunes of the Manawatu. Here most of the shore is completely blocked by raupo (Fig. 1). Swans nest along the only open margin. The paucity of clear edge is a factor which, we believe, limits the number of swans which nest there. Like other young waterfowl, cygnets need considerable brooding and, in the early stages at least, cannot spend long periods on water. So they, too, need access to dry ground.

FIGURE 1. *Invasion of open water by raupo* (Typha muelleri). *Puke Puke Lagoon, January 1968.*

(3) The New Zealand shelduck or paradise duck (*Tadorna variegata*) is very goose-like in habits and its requirements for water areas are similar to those of the Canada goose. Water areas and their associated growth become limiting factors at breeding time. This species nests close to water and in recent years has made considerable local use of artificial farm ponds. Its requirements are for a clear access to the water but with a small amount of cover. Essentially, all it requires in this respect is a few tussocks (*Poa* spp.) growing at the margin or in the water, so that the ducklings may hide. The normal reaction to danger in this species is to dive, but eventually the young seek overhead cover and a few tussocks at the shore supply this admirably. Both young and adults graze pasture extensively; the water areas are for safety — they normally provide little or no food.

(4) Dabbling ducks (*Anas* spp.) use water areas for loafing, escape, brood-rearing and feeding, and this is why they need a shallow water margin that also allows them to get onto dry land. Care of the body surface is an important daily activity and cannot be satisfactorily performed on water; consequently, dabblers spend much of the middle of the day resting and preening on land. Brooding by the parent and extensive rest periods on land are also necessary for young ducklings. Thus, for both breeding and feeding, raupo and other tall water-colonisers restrict use of otherwise good habitat.

But we must not think that the ideal habitat for dabblers is a water area with shallow margins and a completely open periphery. Rather, a balance is important. Escape cover for broods and adults is essential. These ducks differ from paradise ducks in the type and quantity of cover required: vegetation which overhangs the margin is what is sought. Weeping willows (*Salix babylonica*) have probably played a bigger role than any other plant in providing suitable cover. They have the advantage of considerable water tolerance, provide excellent overhead cover, yet still provide areas suitable for ducks to rest clear of the water. On water, ducks and broods are safe from land predators, but the overhead cover provided by plants such as willows gives them protection from aerial predators as well. Raupo is used as brood cover and cover for moulting adults provided it is not too dense, but this seems to be its only use.

CONCLUSIONS

The conservation of wetlands is obviously essential to waterfowl management. The greatest danger to those wetlands which escape drainage

and pollution is from vigorous plant colonisers such as raupo. At Puke Puke Lagoon the Wildlife Service has started a programme designed to study various ways of controlling or eradicating raupo. Cutting, spraying and burning are all time-honoured methods but, in addition, we will be evaluating the effect of fluctuating water levels — not only on raupo but also on other aquatic plants. Experiments in the U.S.A. have shown that many desirable plants may be encouraged and undesirable ones restricted by careful manipulation of water levels (Martin 1953; Green, MacNamara and Uhler 1964).

At Puke Puke raupo has reduced the area of open water; furthermore, a high silt flow down the various farmland drains leading into the lake has made it very shallow. This combination has caused considerable drying up during summer and autumn. The exposure of dry silt is ideal for germination of raupo seeds and allows a more rapid rate of colonisation than by rhizome propagation alone. Furthermore, raupo has a detrimental effect on desirable plants, such as nigger-heads (*Carex* spp.), which provide birds with both food and nesting habitat. We will be watching closely the effect of water levels on these plants.

In summary, traditional waterfowl habitat requires more than just open water. Marginal vegetation and the degree to which it has invaded a body of water are very important factors limiting waterfowl occupation and production.

We are indebted to T. A. Caithness for assistance in preparing this paper.

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