

STUDIES OF WATERFOWL (ANATIDAE) IN NORTH QUEENSLAND. 7. LONG-TERM CHANGES IN HABITAT

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SUMMARY

Changes in the major type of habitat providing drought-refuge for waterfowl in north Queensland during 1958-1970 are described.

Although vegetation distribution and abundance varied considerably each year with rainfall and with invasions of weed species, the principal long-term change of habitat type was due to deposition of silt. Thus deep-water types such as lagoons eventually became shallow-water types such as swamps, with appropriate changes in utilization by waterfowl species.

I. INTRODUCTION

In north Queensland the area of habitat for waterfowl diminishes greatly from May to November each year. During this dry season birds congregate at the remaining localities, particularly lagoons, many of which are water conservation impoundments. Large populations, often of the same individuals, return to these localities after each wet season and accordingly many of the areas have been reserved as fauna sanctuaries.

In the course of studies of waterfowl in north Queensland during 1958-1970, the opportunity was taken to investigate the degree of permanence of this type of habitat.

II. METHODS

The main studies were undertaken at Mt. St. John, a freshwater conservation impoundment at the headwaters of a coastal saltpan 5 miles west of Townsville. Area, a maximum of 200 acres, varied with time of year. The surrounding widespread grassland habitat was grazed perennially by moderate numbers of beef cattle. As many as 6,500 waterfowl of the following nine species, and 900 other water-birds of 20 additional species, have been recorded on the lagoon at one time (July 3, 1959):

- Magpie goose (*Anseranas semipalmata* (Latham))
- Water whistling-duck (*Dendrocygna arcuata australis* Reichenbach)
- Grass whistling-duck (*Dendrocygna eytoni* (Eyton))
- Black swan (*Cygnus atratus* (Latham))
- Black duck (*Anas superciliosa rogersi* Mathews)
- White-eyed duck (*Aythya australis* (Eyton))
- Maned wood duck (*Chenonetta jubata* (Latham))
- Green pygmy goose (*Nettapus pulchellus* Gould)
- Australian pygmy goose (*Nettapus coromandelianus albigennis* Gould).

Large numbers of grass whistling-ducks used this fauna sanctuary every year.

Distributions and relative abundances of predominant vegetation, maximum water depths, and numbers of all waterfowl species present were determined at 3-yearly intervals (1961, 1964, 1967 and 1970) in July when most plants were mature and when birds occurred in largest numbers.

Distribution of vegetation was mapped using aerial photographs and point quadrat observations along traverses set at 10° intervals around the Mt. St. John focal point of the crescent-shaped lagoon. Abundance was estimated according to frequency of occurrence of these species at 50 ft intervals along the traverses. Water depth was measured from marker posts placed in the lagoon and the depth of silt was estimated by measuring downwards from fixed marks near the water's edge.

Data were compared with similar measurements taken at Ooononba lagoon, the largest of three natural lagoons located 5 miles south of Townsville in grasslands heavily grazed by cattle throughout the dry season.

III. RESULTS

Figures 1–3 illustrate the distributions of major wetland vegetation zones at Mt. St. John, Townsville, in July 1964, July 1967 and July 1970 respectively. Table 1 gives relative abundances of the plant species at these times. In 1961 and 1969 little rain fell in the district and the area was dry. In 1968 flooding took place during the wet season and the water-retaining wall was breached; by July no water remained and the vegetation comprised only some salvinia (*Salvinia auriculata* Aubl.) in the lowest places.

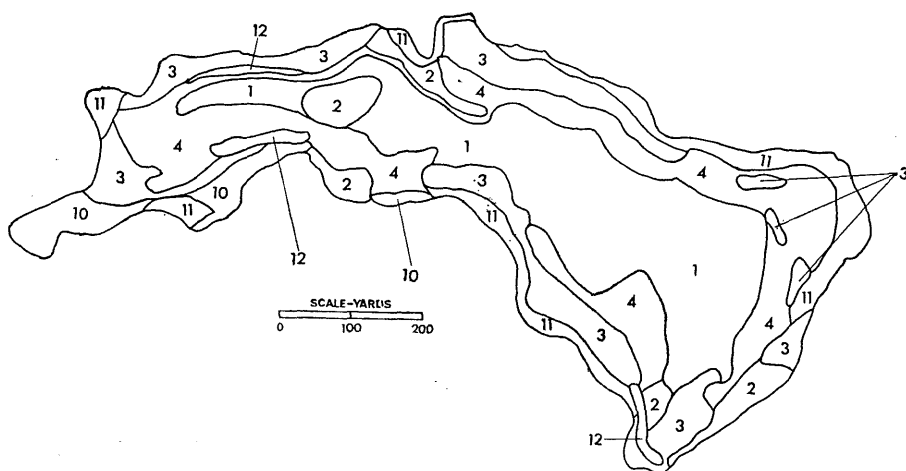


Fig. 1.—Distribution of major wetland vegetation zones at Mt. St. John lagoon, Townsville, July 1964.

Key to Figs. 1-3.

- 1 = open water: submerged aquatic plants (e.g. hornwort (*Ceratophyllum demersum* L.) and bushy pondweed (*Najas graminea* Del.), occasionally); some waterfern (*Azolla filiculoides* L.) and thin duckweed (*Lemna oligorrhiza* Kurz)
- 2 = waterlilies (*Nymphaea* species); occasional stands of sacred lotus (*Nelumbo nucifera* Gaertn.)
- 3 = bulkuru sedge (*Eleocharis dulcis* (Burm. f.) Trin.)
- 4 = water snowflake (*Nymphoides indicum* (L.) O.K.)
- 5 = water hyacinth (*Eichhornia crassipes* (Mart.) Solms)
- 6 = smartweeds (*Polygonum* species)
- 7 = salvinia (*Salvinia auriculata* Aubl.)
- 8 = nardoo (*Marsilea* sp.)
- 9 = water primrose (*Ludwigia peploides* (Kunth) Raven)
- 10 = other sedges (*Eleocharis* species and *Cyperus* species)
- 11 = summer grasses (*Brachiaria* species)
- 12 = upland grasses and bare dry ground.

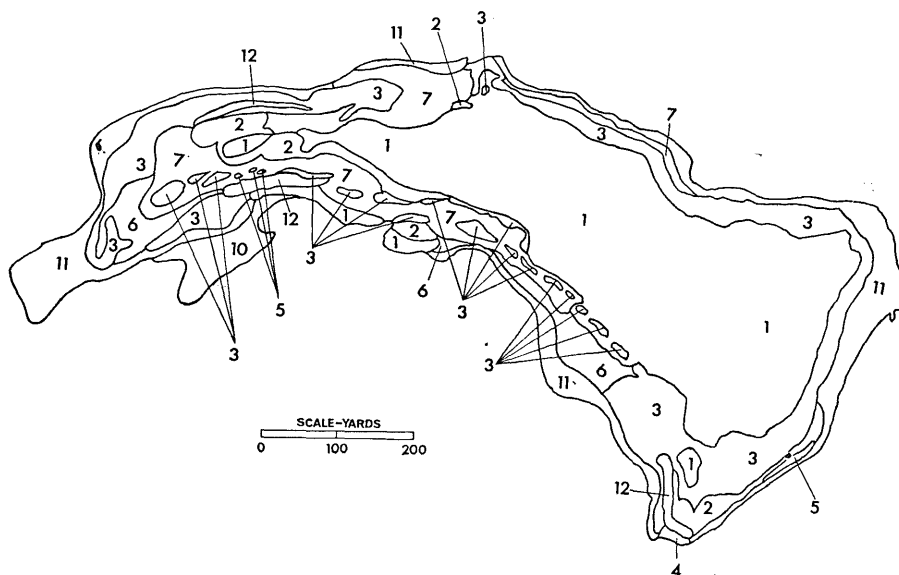


Fig. 2.—Distribution of major wetland vegetation zones at Mt. St. John lagoon, Townsville, July 1967. Key as for Figure 1.

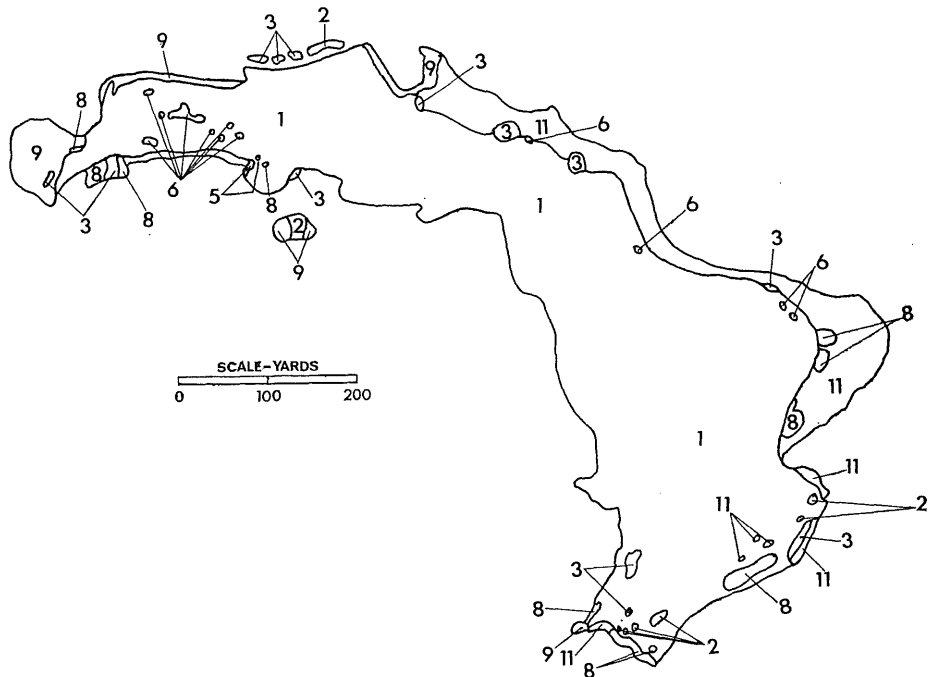


Fig. 3.—Distribution of major wetland vegetation zones at Mt. St. John lagoon, Townsville, July 1970. Key as for Figure 1.

TABLE 1
RELATIVE ABUNDANCES OF VEGETATION TYPES AT MT. ST. JOHN LAGOON, TOWNSVILLE
1961-1970*

| Predominant Vegetation Type | Vegetation Type Present | | | | | |
|-----------------------------|-------------------------|----------------------------|-----------------------|----------------------------|-----------------------|----------------------------|
| | 1964 | | 1967 | | 1970 | |
| | No. of Quadrat Points | Percentage of Total Points | No. of Quadrat Points | Percentage of Total Points | No. of Quadrat Points | Percentage of Total Points |
| Submerged aquatics .. | 66 | 32 | 80 | 37 | n.r.† | |
| Waterlilies | 13 | 7 | 13 | 6 | n.r. | |
| Bulkuru sedge | 31 | 15 | 51 | 24 | 1 | 5 |
| Water snowflake | 60 | 29 | n.r. | | n.r. | |
| Smartweeds | | | 8 | 4 | n.r. | |
| Salvinia | | | 27 | 13 | n.r. | |
| Nardoo | n.r. | | n.r. | | 1 | 5 |
| Water primrose | n.r. | | n.r. | | 6 | 27 |
| Other sedges | 11 | 5 | 8 | 4 | n.r. | |
| Summer grasses | 24 | 12 | 26 | 12 | 14 | 63 |

* 1961, a dry year; nil quadrat points.

† Present but not recorded at a quadrat point.

Maximum water depth decreased by approximately 2 ft during 1958–1964, with no appreciable change thereafter. From 1964 the area provided no permanent wetland habitat. Water then appeared seasonally with rainfall as for typical swamp-type habitat.

Numbers of waterfowl changed from large populations as in 1959 to some 630 birds of five species (grass whistling-duck, black duck, grey teal (*Anas gibberifrons gracilis* Buller), white-eyed duck and maned wood duck) present on July 17, 1970.

Similar changes occurred at Oonoonba lagoon. Thus from 1966 to 1969 the area was dominated by salvinia. The maximum water depth decreased steadily by approximately 2 ft from 1961 to 1970. During 1959 as many as 953 birds and seven species were recorded; from 1966 the most birds seen there at one time was 20 black ducks on July 30, 1970.

IV. DISCUSSION

Wetlands used annually by large concentrations of waterfowl in the Townsville district changed significantly in the distributions and abundances of plant species present each year 1958–1970. In early years of the study the vegetation consisted entirely of broad zones of native species throughout one wetland area (Figure 1); this area provided maximum waterfowl food supply because all native wetland vegetation species in north Queensland are utilized as foods approximately according to their frequency of occurrence (Lavery 1971). In occasional later years the habitat was dominated by weed species of no food value to waterfowl; the fluctuation in abundances of these plant species (Table 1) and eventual disappearance without the implementation of control measures were also noted for salvinia and for water hyacinth (*Eichhornia crassipes* (Mart.) Solms) at a number of other localities and different habitat types.

Water depth decreased due to deposition of silt (siltation) principally from erosion of soils on adjacent grasslands. This erosion was hastened by grazing stock particularly late in the dry season when winds were more severe. Supplementary feeding of stock was practised and native pastures were overgrazed, especially near abattoirs. At Mt. St. John where surface water became seasonal in occurrence, the rate of siltation diminished probably as a consequence of wind and stock erosion of the relatively flat dry floor. The rate of silt deposition accordingly was slower at Oonoonba lagoon because of the deep narrow shape of the lagoon. Nevertheless, habitat eventually changed from deep-water to shallow-water types. Deep-water plant species such as waterlilies (*Nymphaea* species) diminished rapidly (Table 1).

Waterfowl numbers declined concurrently, notably of the more resident coastal tropical species such as the pygmy geese that fed primarily on deep-water vegetation (see Lavery 1971). Observations to date indicate the habitat formed also to be of little value compared with shallow-water habitat types otherwise derived. Thus populations at Mt. St. John declined both in species and numbers present well below those of the adjacent West Mt. St. John swamp in 1970.

Within a district, water conservation impoundments presently continue to be built. Some existing areas are deepened mechanically from time to time, and others are fenced, preventing access by stock.

V. ACKNOWLEDGEMENT

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REFERENCE

- LAVERY, H. J. (1971).—Studies of waterfowl (Anatidae) in north Queensland. 6. Feeding methods and foods. *Qd J. agric. Anim. Sci.* 28:255-73.

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