LESCHENAULT INLET—ASPECTS OF CONSERVATION

S.W.A.N.S. Vol. 2 No. 1 contained a summarised version of a report on Leschenault Inlet by Dr. N. Morrissy, Research Officer, Department of Fisheries and Fauna. The report described the area and its present utilisation, outlined the hydrological conditions and ecology of the estuary, and discussed guidelines for future development. However, certain aspects can usefully be re-emphasised because of their importance to the particular biological problems involved. The following additional comments and observations have been made by Dr. E. Hodgkin, Reader in Zoology and Mr. G. Smith, Senior Lecturer in Botany, University of Western Australia.

"The inlet is an interdune coastal lagoon, 1½ miles wide and originally 10 miles long. It is separated from the sea by geologically recent dunes only half a mile wide. The greater part of it is very shallow and extensive sand flats are exposed on low tides; even the central channel is only about 6 feet deep.

Engineering activities have made important changes during the last twenty years. Before 1951 the outlet to the sea was at Bunbury, at the extreme southern end of the inlet. At that time tidal exchange in the inlet would certainly have been no greater than now and was probably less. The southern outlet was plugged in 1951 and the new cut made through the dunes almost opposite the mouth of the Collie River.

The Wellington Dam on the Collie River was completed in 1960 and this considerably reduced both volume and duration of river flow.

The construction of the effluent pipe from the La Porte works (1964), across the southern part of the inlet, must have affected circulation within the inlet to some extent because half a mile at the eastern end of the pipe is on solid fill. There have been occasional spillages from the pipe and Dr. Morrissy also reports that there have been seepages from the pipeline along the western shore.

Construction of the new port in 1970 separated a small southern part from the inlet proper. This part now communicates with the sea through the new harbour and tidal exchange has been increased, **but potential contamination from harbour wastes and spillage has increased.**

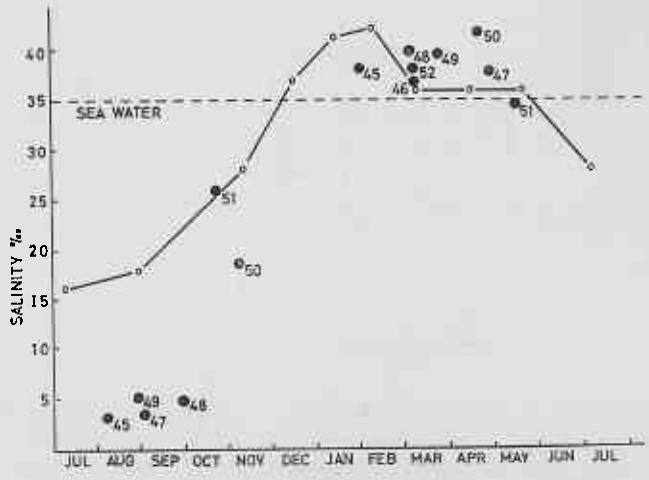
Daily (astonomic) tides in the inlet are only about half those of the open sea, probably seldom exceeding a foot; nevertheless tidal exchange is great because of the very shallow water. Barometric tides have periods of days and are therefore much less damped; they also have a range of about a foot. Freshwater discharge to the inlet is confined to the winter-spring period, from June to about November. The Collie River is the main source of fresh water and this and the Preston River both enter the inlet almost opposite the cut at the extreme southern end of the inlet. River water only enters the main part of the inlet by tidal mixing. However, freshwater drainage from coastal swamps also flows into the head of the inlet. From December to May there is little or no freshwater discharge and the inlet water becomes progressively more salt until it is more salt than the sea.

Thus the hydrological picture is obviously complex and only broad generalisations can be made about it, based on a limited number of observations by C.S.I.R.O. (1945 to 1952) and by T. D. Meagher and E. P. Hodgkin, since 1967. Near the cut, daily salinity changes are great in winter, at times ranging from fresh to sea water salinity (35°/₀₀), but in the summer salinity stays fairly constant around sea water salinity.

From Australind northwards there is little daily variation but great seasonal change, though this was much less in 1968-69 (16 to 45°/₀₀S) than in 1945-52 (3 to 45°/₀₀S), i.e. after opening of the cut and construction of Wellington Dam. It would be valuable to have further data on seasonal salinity changes in the inlet. Temperature fluctuations, both daily and seasonal, are least near the cut and greatest at the northern end (about 11° to 28°C) because of the shallow water there and minimal exchange with the sea.

Another significant variable from the biological point of view is the duration of the low salinity period. In a wet winter salinity is likely to be below 10°/₀₀ for five months (June to October), while in a dry winter salinity does not drop much below 20°/₀₀S at any time north of the pipe line.

The extreme southern part of the inlet which has recently been isolated by the harbour works will probably show much less hydrological variation than the inlet proper because of its small volume and large tidal exchange.



Salinity (parts per thousand) of Leschenault Inlet water near Australind. Solid circles C.S.I.R.O. samples 1945-51. Open circles 1968-69 (T. D. Meagher)

Aquatic flora and fauna:

Below low water there is a rich growth of the flowering "sea grass" *Halophila* and a few species of marine algae (*Chaetomorpha, Cladophora, Rhizoclonium,* etc.). These, and the sand and mud provide shelter for an abundant and diverse invertebrate fauna on which crabs, fish and birds all feed. This fauna is more diverse and probably also richer than in either Peel-Harvey inlets or the Swan. The plankton is also abundant. Both plants and animals flourish in spite of the wide variation in salinity, in marked contrast to the sparse bottom fauna and absence of plants in the rivers which are completely fresh in winter.

Salt marshes:

There are extensive salt marshes both in the southern portion and along the margins of the inlet proper. They have a varied and interesting assemblage of halophytic (salt-tolerant) plants—succulent chenopods, sedges, and the she-oak (*Casuarina obesa*). Their roots bind the mud and prevent erosion of the banks by wave action and the wash of boats.

The marshes have been blamed for breeding larvae of the salt-tolerant mosquito *Aedes vigilax.* Where stagnant pools have been dug or enclosed by dumping and filling, as has been done in some places round the inlet, breeding does occur. This is a harmless situation in the inlet proper, but action may need to be taken in the cut-off part of the inlet close to Bunbury if, in fact, such situations have been created. Breeding is not likely to occur in parts of the swamps which are regularly innundated by the tides.

Mangrove *(Avicennia marina):*

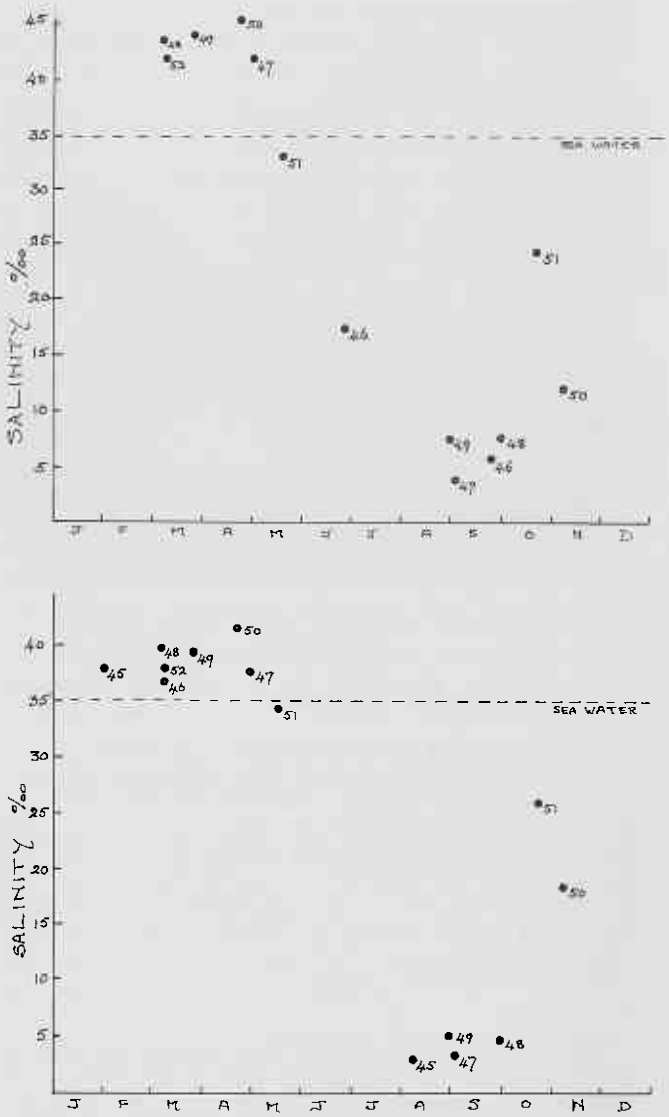
This forms a narrow fringe around salt marshes in the southern part. The trees are healthy and there are seedlings and young plants. Like the salt marsh plants, the mangrove binds the mud. There may well be a special fauna associated with the mangrove, but no study has yet been made of it.

There is another, even smaller, stand of mangrove just north of Waterloo Head. It also is healthy and appears to be maintaining itself, as evidenced by the presence of seedlings and juvenile plants. However, the small size of the stand and encroachment of dune sand make its future hazardous. The track round the foot of the dune is probably the most immediate danger. It would take a bulldozer a few hours only to wipe out the mangrove, on the pretext of upgrading the track.

The western dunes:

These form a peninsula, nearly eight miles long, that is inaccessible by land except by a track through private land at the north end of the inlet.

An extensive and distinctively maritime flora borders the peninsula, with incursions into the woodland of the stable dunes along the several large blow-outs which dissect the peninsula. The principal vegetation is woodland of tuart



Leschenault Inlet surface salinities 1947-52 from C.S.I.R.O. Division of Fisheries Station Lists

(*Eucalyptus gomphocephala*) and Peppermint (*Agonis flexuosa*). This woodland is in a healthy and vigorous condition, no doubt partly because of its isolation from urbanisation. As yet it has suffered little fire damage and is remarkably free from aggressive weeds. In contrast to this situation, is the damage to vegetation in the vicinity of the outlet of the La Porte effluent pipe reported by Dr. Morrissy.

Conservation:

The richness of the plant and animal life of the inlet is attributable to the extensive areas of shallow mud and sand and a salinity régime which is never so extreme as to eliminate the diverse brackish-water fauna. Any extensive dredging and filling or other interference with the bottom must of necessity reduce the productivity of the inlet.

The mangrove is of great botanical interest because this is the only mangrove between the

Gascoyne River (and the Abrolhos Islands) in the north and the Gulf region of South Australia to the south. Its presence emphasises the fact that there are here, environmental conditions which are favourable to some species of tropical plants, and of animals such as the blue-manna crab also. As noted above, both stands are healthy but both are very vulnerable and it would be foolish to assume that the southern stand could safely be destroyed because of the existence of the northern stand. Both should be preserved and, if our suggestion for a dune reserve is accepted, it would be valuable to try to establish another stand along the western shore. Perhaps this might be a useful project for school groups or the Tree Society.

The salt marshes are of considerable botanical interest because of the diversity of salt-adapted species found there. As noted above they also serve to bind the soil as efficiently and more economically than man-made structures. Probably no special interest attaches to the salt marshes of the southern part; there are similar and much more extensive salt marshes around the inlet proper. However, it is unlikely that the mangrove would long survive if they were filled.

Probably even more important, however, is the western dune peninsula. The endemic Peppermint and Tuart and the associated woodland communities of plants and animals have a limited distribution along the west coast only. They are particularly vulnerable at the present time because of the rush to "develop" the coast and the relatively small extent of national parks in this region. Fortunately, as yet the peninsula has suffered little fire damage and is remarkably free of aggressive weeds.

The relative isolation of this stretch of coastal dune, despite its proximity to a large centre of population, the richness and diversity of its vegetation, and its almost virgin condition make it a most suitable area for preservation as a national park or fauna and flora reserve. It is moreover an area of great natural beauty where stark moving dunes alternate with thick forest. Because of its relative isolation it could readily be preserved. It is vulnerable to damage; beach buggies or other vehicles have already invaded the dunes, and sections have been burnt out. More effective protection is required urgently before it is "discovered" by destructive agencies. The peninsula is grazing land and **at the present level of stocking** this is not incompatible with preservation as a park or reserve.

Most of the eastern shore will inevitably be developed, but some of it, where there are salt marshes and fringing woodlands, should be preserved, particularly at the northern end. Some sectors of the shore between the road and high water mark should be fenced against access by vehicles and persons and clearly labelled as natural history refuges.

Finally, there is the need to retain natural habitats close to centres of population so that students of formal biology and other environmental studies have ready access to field study areas. This aspect applies to Bunbury where the high school has an increasing number of students of the natural sciences; they could well use Leschenault Inlet and its surroundings for field studies of environmental problems which have become part of modern biological education."

BUSTARDS - 1914

In the previous issue of S.W.A.N.S. as part of the series "Our Diminishing Heritage", we highlighted the need to preserve the Australian Bustard (Wild Turkey). Reports from Honorary Wardens support the fact that the range and numbers of this bird continue to decrease, and that there is a real danger of extinction of the species in its natural habitat.

As a result of the article we were delighted to receive an interesting letter from Mr. J. E. Watson of Busselton describing a personal experience which occurred in 1914. Mr. Watson's letter is reproduced below; it does show that the precarious situation of the Bustard was not always so.

"Referring to wild turkeys in the issue of S.W.A.N.S. of Autumn, 1971, Vol. 2, No. 2, and knowing what I do know of this fine bird, I grieve to think that possibly zoos or some wilderness area, if we ever have one set aside, may be the only places where they will survive. You would be interested to know that in early 1914 on river flats about 10 miles from Billunin Pool on the Murchison River, I saw what could possibly have been the greatest concentration of turkeys anyone has ever seen. Whilst diamond drilling with a crew of 10 at a place called Holden's Find in this area, and being supplied each fortnight with stores freighted by camel team, it was part of my job (aged 19 and being the recognised hunter) to augment the tinned meat supply with kangaroo, wild turkey and duck.

"Whilst stalking two turkeys one day I noticed five others fully occupied in moving slowly along picking up something as they moved; and while I watched I became aware of many others doing likewise. I appeared to be on the flank of these birds and level with the foremost, so moving away from them I hastened to get well ahead of them, where I partly concealed myself, knowing the birds were moving towards me. It was then that I noticed that the ground was a mass of black caterpillars, all moving in one direction. In quite a short time I was surrounded by **hundreds** of turkeys all feeding on the caterpillars; as far as I could see the birds were on the move. It was an unbelievable sight even in those far off days when 10 to 20 in a group were often seen."

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