Appendix 5

ECOLOGICAL FIELD SURVEYS

A5 ECOLOGICAL FIELD SURVEYS

A5.1 Methodology

A5.1.1 Sublittoral Benthos Survey

Grab-sampling of the anchorage site to be dredged was conducted in order to assess the importance of the existing sublittoral benthic community. Sampling points are shown in **Figure A5.1a**. Three 0.1m^2 grabs were taken at each of 8 sites (2 sites in each of the two navigation channels, 2 at the proposed breakwater and 2 in the anchorage) on 1 April 1999.

Samples were sieved using a 0.5 mm sieve. Collected organisms were preserved for identification to the lowest practicable taxonomic level using a binocular dissecting microscope.

A5.1.2 Horseshoe Crab Survey

Horseshoe crab presence and abundance was assessed during natural shore surveys as specified in Section A5.1.4 below. Horseshoe crabs encountered during shore surveys were identified to species and counted.

Local fishermen were interviewed (see Chapter 7 and **Appendix 6**) to determine whether they had captured horseshoe crabs in the Tai O area. Fishermen were interviewed between 15 February and 15 March 1999.

A5.1.3 Dolphin Survey

Land-based visual surveys were conducted to estimate dolphin use of Tai O Bay and nearby offshore waters. Four surveys were conducted, two in the morning and two in the afternoon; each survey was 4 hours in length. Morning surveys took place on 29 March and 14 April 1999; afternoon surveys took place on 14 and 16 April 1999. Survey time was approximately evenly divided between flood tides and ebb tides. The observation point chosen was Shek Tsai Po Pier, shown in **Figure A5.1a**; hillside locations were tried, but did not offer an unobstructed view of the survey area. Two observers were stationed at the end of the pier and scanned the whole of Tai O Bay and waters to the west and north-west within approximately 1.5 km for dolphins. Each observer covered half this area (a range of approximately 120°) with naked eye supported by binoculars. Observers alternated positions every half hour. Sea state (measured on the Beaufort scale), weather and visibility were recorded.

The locations of dolphin sightings were recorded on map sheets. Number of dolphins, age class, distance from observers, and heading were recorded on data sheets, together with remarks on behaviour where appropriate.

In view of the limited time frame available for field surveys, interviews with local residents were used to provide further information on dolphin use of Tai O Bay. Interviews with local fishers (see Chapter 7 and **Appendix 6**) were also used to seek information about local occurrence of dolphins.

A5.1.4 Natural Shore and Littoral Fauna Survey

Systematic surveys of the coastal fauna of Tai O Bay were carried out on natural shores to provide an index of species representation, abundance and density. Surveys were conducted on 29 March 1999. Three sample transects were established perpendicular to the tide line. Sampling locations are shown in **Figure A5.1b**. Each transect covered the tidal range. Square quadrats measuring 0.5 x 0.5 m (0.25 m^2) were sampled for intertidal epifauna at 1.0 m intervals. All epifauna were identified to species and counted. Data were reported as species richness, species diversity, evenness, and abundance.

All suitable shores (i.e. muddy or sandy shores) within Tai O Bay were surveyed for horseshoe crabs. Surveys attempted to locate both adult and juvenile crabs. Surveys were conducted by walking along the shoreline on 17, 18, and 29 March 1999. Survey effort covered all muddy and sandy shores in Tai O Bay, and focused on areas identified by local fishermen as sites where horseshoe crabs have been observed. Any horseshoe crabs encountered were identified to species and counted and their location recorded.

A5.1.5 Salt Pan Fauna Survey

Surveys of the salt pan intertidal and subtidal zones were carried out to describe the fauna that inhabits the restricted intertidal mudflat of the salt pan bunds, and the much larger permanently inundated area in the salt pans.

Due to the narrowness of the intertidal zone within the salt pan, line transects were not set up for intertidal fauna sampling. Instead, three quadrats were set up at 5 randomly selected sites. Square quadrats measuring 0.5 x 0.5 m (0.25 m^2) were sampled for intertidal epifauna at 1.0 m intervals. Infauna were sampled using a square quadrat measuring 0.1m x 0.1m (0.01m^2) placed inside the large quadrats. The top 10 cm layer of sediments was sieved using a 0.5 sieve. All epifauna and infauna were preserved in 5% formalin, identified to the lowest practicable taxonomic level and counted. Data were reported as species richness, species diversity, evenness, and abundance. Sampling locations are shown in **Figure A5.1a**.

Subtidal fauna were grab-sampled using a 0.1 m^2 grab and sieved using a 0.5 mm sieve. Three grabs were collected from each of 5 randomly selected sites in the permanently inundated zone, corresponding to the intertidal sampling sites. Sampling locations are shown in **Figure A5.1a**. Collected organisms were preserved for identification using a binocular dissecting microscope. Collected organisms were identified to the lowest practicable taxonomic level and counted. Data were reported as species richness, species diversity, evenness, and abundance. Pre-disturbance data from all ponds were grouped to provide an overall baseline for comparison with post-plantation data, which are proposed to be collected to document the progress of invertebrate recolonisation of the restored mangrove.

A fine-mesh cast net was used to sample fish inhabiting the salt pans. Net surveys were conducted in all ponds, and a minimum of 3 casts was made in each pond. Surveys were carried out on 15 April 1999. Captured fish were identified to species, measured for standard length to the nearest 1 mm, and the total catch of each net was weighed to the nearest 0.1 gram. Data for all ponds were aggregated, and results reported as species richness, species diversity, evenness, and abundance. Total weight of fish per cast was reported. Mean length was reported by species.

A5.1.6 Salt Pan Mangrove and Other Vegetation Survey

Surveys were performed on 2 and 19 February 1999. Salt pan bunds were walked, and mangroves within the salt pans were mapped, identified to species and counted. Individual mangroves were not mapped because they were too scattered, but major mangrove stands with mature adults worthy of conservation were highlighted (**Figure A5.3**). In addition to counts, heights of mangrove along a 850m pond bund section were measured and described. Number of adults (height 1m, flowering, or fruiting) was estimated. Exact counts of number of seedlings colonising around or under the canopy of the mother trees were not possible, but numbers were estimated. Mangrove-associate plant species established within the salt pans were recorded and described.

The pre-disturbance data will provide a useful baseline for comparison with mangrove species representation and abundance in the post-plantation mangrove area.

A5.1.7 Survey of Other Mangroves at Tai O

Tai O Creek and estuary support extensive stands of mangroves of at least 5 species. The intertidal area of Tai O was partitioned into 10 sites to ease description (**Figure A5.2**). Site A is the major salt pan area, while Sites B to J are other areas supporting mangroves at Tai O.

Surveys were performed on 17, 18 March and 14 April 1999 to map mangroves in lowland habitats, including fish ponds, old salt pans, marshes and estuaries. Point-centred quarter surveys (Cintron and Novelli 1984, Cottam and Curtis 1956) were performed at Site F to quantitatively describe the mangrove stand in terms of density and dominance. The patchiness of fragmented mangroves stands at other sites precluded quantitative surveys. Each site was photographed and described qualitatively. The conservation importance of the mangroves was evaluated in relation to the report prepared for AFD by Tam and Wong (1997). Collected data will provide a useful comparison with post-plantation mangrove sampling data.

A5.1.8 Stream and Marsh Fauna Survey

Fauna in Tai O Creek and the brackish marsh immediately to the east of the salt pans were sampled. The creek was sampled using fine-mesh cast nets on 1 April 1999. The marsh was sampled using a tidal net on 18, 31 March and 16 April 1999; dense vegetation precluded the use of a cast net here. Sampling locations are shown in **Figure A5.1a**. At least three replicates were collected at each sampling site. Captured invertebrates and fish were identified to species or the lowest practicable taxonomic level and counted. Data were reported as species richness, species diversity, evenness, and abundance. Pre-disturbance data provide a baseline for comparison with post-construction monitoring data.

A5.1.9 Foraging and Roosting Bird Survey

Tai O Egretry

The Tai O egretry was surveyed on 14 and 29 April 1999. The egretry was searched for nests with incubating adult birds or juveniles of breeding species. Results were compared to historical breeding records for the egretry.

Bird Use of Salt Pans

The transect count method was used to survey bird species feeding on the Tai O salt pan mudflat during low tide. A 1.6 km transect (shown in **Figure A5.1a**) was sampled along the edge of the salt pans. Sampling was carried out between 1000-1130 hrs on 12 and 26 February and 5 March 1999 (winter), 17, 25 and 29 March and 14 April 1999 (spring). The salt pans were numbered and birds seen and heard within each salt pan were identified to species using the taxonomy of Viney *et al*. (1994). Microhabitats (e.g. bunds and shores) used by the birds were also recorded. Areas within 5 m from the bunds and seawall of the salt pans were classified as shore. Index of bird abundance was estimated for all species and wetland dependent species in birds per unit area (birds ha^{-1}). Data were reported as species diversity and evenness, species richness, and abundance. The resulting data provide a baseline for comparison with post-plantation bird monitoring data. The comparison will enable tracking of the progress of bird colonisation and use of the mangrove plantation.

Relative use of the salt pans by Little Egrets as foraging and roosting habitats outside breeding season was studied. Little Egrets observed moving or making head turns when perching were assumed foraging and birds observed standing still were assumed roosting.

The Shannon index of species diversity *H'* and evenness J' were calculated for the transect using the formulae :

$$H' = -1 \times \sum_{i=1}^{S} (N_i / N) \ln (N_i / N) \qquad \text{(Shannon and Weaver, 1963)}$$

and

$$J' = H' / \ln s \qquad \text{(Pielou, 1966)}$$

where *s* is the total number of species in the sample, N is the total number of individuals, and N_i is the number of individuals of the i^{th} species. Dominance was calculated using the Berger-Parker index *d* (Berger and Parker 1970) which expresses the proportional importance of the single most abundant species.

$$d = N_{max} / N$$

where N_{max} = the number of individuals in the single most abundant species, and *N* is the sample total count.

Flight Line Study

The flight lines of Little Egrets breeding at the Tai O egretry were studied on 29 April and 3 May 1999. Little Egrets flying from the Tai O egretry were followed using 10x42 binoculars. The first landing site was taken to indicate a feeding habitat. Landing sites were plotted on a 1:5000 scale topographic map and flight distances were measured on the map. Habitat and tide level for each flight were recorded. Tide was identified as “high” when most of the bunds in the salt pans were under water.

The relative importance of the feeding habitats was expressed as birds per unit area (birds ha^{-1}). Only relatively well-defined habitats (marshes, ponds and salt pans) were compared.

A5.2 Results and Discussion

A5.2.1 Sublittoral Benthos Survey

A total of 271 individual organisms of 39 species were recorded from the 24 samples collected (3 replicates (a, b and c) at each of 8 sites). Raw data are provided in **Annex A5a**. Taxa recorded and total number of species are summarised in **Table A5.1**.

Table A5.1: Taxa Recorded in Benthic Surveys of Tai O Bay.

Phylum/Class/Order	Family	Species	Count
Annelida			
Polychaeta	Nereidae	*Neanthes glandicincta*	2
		Nereis sp.	1
		Tylonereis bogoyawleski	2
Polychaeta	Pilargiidae	*Ancistrosyllis* sp.	2
		Pilargis sp.	1
		Sigambra hanaokai	2
Polychaeta	Hesionidae	sp. A	1
Polychaeta	Glyceridae	*Glycera* sp.	3
Polychaeta	Goniadidae	*Glycinde* sp.	18
Polychaeta	Nephtyidae	*Aglaophamus lyrochaeta*	1
		Nephthys sp.	14
Polychaeta	Lacydoniidae	*Paralacydonia paradoxa*	2
Polychaeta	Phyllodocidae	*Anaitides* sp.	1
Polychaeta	Sigalionidae	*Sthenolepis japonica*	7
Polychaeta	Amphinomidae	*Linopherus* sp.	4
Polychaeta	Onuphidae	*Onuphis* sp.	1
Polychaeta	Lumbrineridae	*Lumbrineris* sp.	6
Polychaeta	Orbiniidae	*Haploscoloplos* sp.	16
Polychaeta	Cirratulidae	*Cirritulus* sp.	2
Polychaeta	Cossuridae	*Cossurella dimorpha*	1
Polychaeta	Sternaspidae	*Sternaspis scutata*	5
Polychaeta	Capitellidae	*Mediomastus californiensis*	13
Polychaeta	Maldanidae	*Euclymene* sp.	1
Polychaeta	Oweniidae	*Galathowenia* sp.	1
Polychaeta	Pectinaridae	*Pectinaria* sp.	1
Polychaeta	Terebellidae	*Pista* sp.	1
Polychaeta	Sabellidae	*Branchiomma* sp.	1
Mollusca			
Bivalvia	Cardiidae	*Fulvia* sp.	1
Bivalvia	Donacidae	*Donax* sp.	53
Bivalvia	Mactridae	*Mactra* sp.	39
Bivalvia	Tellinidae	sp. A	1
Bivalvia	Veneridae	*Tapes* sp.	3
		Timoclea sp.	23

Phylum/Class/Order	Family	Species	Count
Opisthobranchia		sp. A	15
Crustacea			
Amphipoda	Dexaminidae	sp. A	7
Decapoda	Pinnotheridae	*Neoxenophthalmus obscurus*	1
Nemertinea		sp. A	6
Phoronida		*Phoronis* sp.	8
Unidentified			4
Total no. of individuals			**271**

No rare species were found in the samples. Bivalves and polychaetes were the two main component fauna in the grab samples collected from the sea bottom of Tai O Bay. Organisms of these two taxa constituted over 90 % of all organisms recorded.

Mean statistics for number of species, species diversity and evenness at each site are given in **Table A5.2**, pooling the 3 samples for each site. Diversity is calculated using the Shannon-Wiener index.

Table A5.2: Mean Values of Number of Species (S), Species Diversity (H') and Species Evenness (J) for 8 Benthic Survey Sites in Tai O Bay.

Site	1	2	3	4	5	6	7	8
S	7.33 ±4.16	4.67 ±1.53	7.00 ±2.00	5.33 ±2.51	1.67 ±1.53	8.33 ±3.21	6.00 ±1.73	7.00 ±1.73
H'	1.78 ±0.56	1.44 ±0.33	1.48 ±0.39	1.44 ±0.52	0.51 ±0.19	1.77 ±0.38	1.64 ±0.27	1.78 ±0.35
J	0.94 ±0.04	0.96 v0.04	0.77 ±0.09	0.9 ±0.10	0.56 ±0.03	0.85 ±0.03	0.93 ±0.01	0.92 ±0.06

The number of species in each sample was low, with none exceeding 10. The diversity index H' for all eight sites ranged from 0.51 to 1.78. The benthic fauna of Tai O Bay cannot be considered diverse by either of these measures. Density of organisms was also low, with only 271 organisms found in 24 samples.

A5.2.2 Horseshoe Crab Survey

No live horseshoe crabs were found during intertidal, salt pan, stream, marsh, benthic or fisheries surveys at Tai O. Carcasses of 4 adult (prosoma width > 25 cm) individuals of *Carcinoscorpius rotundicauda* were seen entangled in abandoned fish nets along the salt pan perimeter. This may be evidence of the occurrence of horseshoe crabs in the vicinity.
A total of 20 local fishermen were interviewed (see Chapter 7 and **Appendix 6** for detailed

results of interviews). All reported that horseshoe crabs could be found and occasionally caught inside Tai O Bay, and even in the intertidal portion of Tai O Creek. They are, however, more common in areas of more sandy shores such as Yi O, Fan Lau and Shek Pik rather than in the muddy bottom of Tai O. This indicated that although suitable, Tai O is not the most preferred habitat for horseshoe crabs.

A5.2.3 Dolphin Survey

A total of 7 sightings of dolphins (individuals or groups) were made during 16 hours of survey. Locations of sightings are shown in **Figure A5.4**. No sightings were made within the proposed breakwater and anchorage site. Two sightings occurred near the mouth of the bay: one was a group of two subadults and one adult (sighting 1 on **Figure A5.4**), while the other was a single adult (sighting 2). The group of three was observed to swim to the south side of the bay and spend over 10 minutes in that area, occasionally spyhopping and possibly resting. Feeding was not observed within the bay.

Five sightings were made outside the bay. All were at least 700 m to the west or north-west of Tai O Bay. Most were subadults or adults, but sighting 7 included one juvenile. In most cases direction of travel and behaviour could not be determined, but in one case dolphins appeared to be travelling in a south-westerly direction. Group size ranged from 1 to 3.

Local fishers interviewed reported that dolphins seldom enter Tai O Bay (see Chapter 7 and **Appendix 6**). However, recreational anglers who frequent the pier at Shek Tsai Po reported that dolphins are regularly seen in outer Tai O Bay. One resident reported that dolphins enter the bay primarily during sea-bass season (autumn), and that they have been known to penetrate the bay as far as the proposed breakwater site.

A5.2.4 Natural Shore and Littoral Fauna Survey

The majority of the natural shores inside Tai O Bay have been destroyed due to various developments. The only section remaining undisturbed is located in the south-west part of the bay, close to the open waters. It is a semi-exposed shore covered by large boulders and rocks. All three transects were laid along this shore. Results are summarised in **Table A5.3**; raw survey data are provided in **Annex A5b**.

Table A5.3: Fauna Recorded in Transect Surveys of Natural Shores at Tai O.

Taxon	Count
Nodilittorina millegrana	902
Nodilittorina pyramidalis	506
Littorina scabra	571
Monodonta albio	22
Nerita albicilla	5
Saccostrea cucullata	7
Patelloida saccharina	2

Species recorded were all common species of boulder shores and rocky shores throughout the

SAR. Littorinid snails were the dominant fauna recorded. *Nodilittorina millegrana* was the most abundant species, followed by *Littorina scabra*. Statistics for number of species, species diversity and evenness of the transects are given in **Table A5.4**. Diversity is calculated using the Shannon-Wiener index.

Table A5.4: Number of Species (S), Species Diversity (H') and Species Evenness (J) for the Three Natural Shore Transects at Tai O.

Distance from high tide mark	1m	2m	3m	4m	5m	6m	7m
S	1	3	3	4	5	6	5
H'	0	1.07	1.01	0.85	0.99	1.36	1.19
J	0	0.98	0.92	0.62	0.62	0.76	0.74

A5.2.5 Salt Pan Fauna Survey

The salt pan area is divided into 7 parts by former fish pond bunds. Like other tidal ponds, the water level inside salt pan rises and falls under the influence of tides. Due to the impeding function of the seawall, both flooding and ebbing of the sea water inside the salt pan is delayed compared to Tai O Bay. There is thus usually a water level difference between the salt pans and the bay, and the salt pans have a smaller tidal range.

Most areas within the salt pans are underwater even at low tide. Only the areas at bund and seawall edges are exposed at low tide and can be considered as intertidal areas. Intertidal fauna is confined to this narrow band, approximately 1-2 m wide. This intertidal zone consisted of a muddy substrate colonised by gastropods and crabs.

Intertidal Epifauna Surveys

Results of the intertidal epifauna survey are given in **Annex A5c**. The dominant fauna recorded was the gastropod *Cerithidea rhizophorarum*, which composed over 95% of the epifauna counted. Barnacles *Balanus albicostatus* and false oyster *Plicatula plicata* were also present, but only 12 individuals were found in the 15 quadrats.

These results do not completely represent the epifauna, since crabs and other mobile epifauna would retreat into their burrows when the surveys were being conducted. Crabs were observed in significant numbers on the exposed intertidal zone. During low tide, numerous fiddler crabs could be seen feeding and socialising on the exposed intertidal zone. To address this issue, the number of burrows inside quadrats was counted during the survey. These burrows may be used by crabs, mudskippers and some infauna, and can be used as an indicator of the abundance of these animals. A total of 126 burrows was counted inside 15 quadrats. The highest number was 19 inside one quadrat (76 burrow/m^2).

Although the abundance of crabs could not be shown from the quadrat sampling data, a visual estimate was made to supplement the epifauna surveys. The density of crabs was estimated to be over 25 individuals/m^2. Mudskippers *Periophthalmus cantonensis* were seen on the fish pond bunds and in the intertidal zone.

Intertidal Infauna Surveys

Raw results of the intertidal infauna survey are given in **Annex A5d**. **Table A5.5** summarises taxa recorded and total numbers of each recorded from all sites.

Table A5.5: Taxa Recorded in Intertidal Infauna Survey of Salt Pans.

Taxon	Total Count
Dosinia sp.	5
Euclymene sp.	46
Gafrarium sp.	1
Galathowenia sp.	3
Haploscoloplos sp.	1
Insect	1
Laternula sp.	1
Mediomastus californiensis	1274
Melinna sp.	114
Neanthes glandicincta	114
Nereis sp.	1
Prionospio sp.	3
Tellinidae	1
Uca sp.	1
Unidentified	1
Total number of individuals	1567

The polychaete *Mediomastus californiensis* (family Capitellidae) was the most common and abundant infauna in the samples. It was present in all samples and over 100 individuals were recorded in 7 out of 15 samples. The highest number of *M. californiensis* in a single sample was 220. It constituted over 80% of the infauna counted (1274 out of 1567). *Melinna* sp. (family Ampharetidae) and *Neanthes glandicincta* (family Nereidae) were the second most abundant infauna, with 114 individuals of each recorded.

Statistics for mean number of species, species diversity and evenness at each site are given in **Table A5.6**. Diversity is calculated using the Shannon-Wiener index.

Table A5.6: Mean Number of Species (S), Species Diversity (H'), and Species Evenness (J) for Intertidal Infauna in Salt Pans.

Site	1	2	3	4	5
S	3.67±0.58	4.33±2.31	4.33±0.58	6.67±1.53	4±1
H'	0.83±0.03	0.52±0.12	0.42±0.10	0.61±0.26	1.09±0..14
J	0.65±0.07	0.39±0.06	0.29±0.09	0.31±0.10	0.81±0.07

Salt Pan Benthos Surveys

Raw results of the intertidal infauna survey are given in **Annex A5e**. **Table A5.7** summarises taxa recorded and total numbers of each recorded from all sites.

Table A5.7: Taxa recorded in Benthic Survey of Salt Pans.

Taxon	Total Count
Anaitides sp.	1
Branchiomma sp.	3
Cerithidea sp.	2
Circe sp.	1
Dendronereis pinnaticirris	1
Dexaminidae sp.	4
Euclymene sp.	105
Gafrarium sp.	10
Galathowenia sp.	9
Glycinde sp.	4
Lumbrineris sp.	13
Macrophthalmus sp.	1
Mactra sp.	2
Mediomastus californiensis	203
Minuspio cirrifera	3
Neanthes glandicincta	10
Nemertea sp.	3
Opisthobranchia	1
Phoronis sp.	1
Pilargis sp.	1
Polynoidea sp.	1
Prionospio sp.	9
Sternaspis scutata	1
Tapes sp.	1
Total number of individuals	**390**

Mediomastus californiensis and *Euclymene* sp. were the dominant organisms in the benthic samples, constituting 52% and 27% respectively of all organisms recorded. No rare species was found in the samples. **Table A5.8** summarises statistics for mean number of species, species diversity and evenness at each site. Diversity is calculated using the Shannon-Wiener index.

Table A5.8: Mean Values of Number of Species (S), Species Diversity (H') and Species Evenness (J) for Salt Pan Benthos.

Site	1	2	3	4	5
S	3±1	6±0	5.33±1.53	7.33±2.52	4.33±1.53
H'	0.93±0.21	1.00±0.35	0.98±0.53	1.50±0.47	1.24±0.31
J	0.90±0.12	0.56±0.20	0.57±0.24	0.75±0.13	0.87±0.08

Salt Pan Cast Net Surveys

Raw results of the cast net survey of the salt pans are given in **Annex A5f**. The dominant species was *Leiognathus daura,* which constituted 67% of all organisms caught. **Table A5.9** summarises species recorded and numbers caught. The diversity index H' was 1.04 and species evenness J was 0.58.

Table A5.9: Fauna Caught by Cast Net Sampling in Salt Pans.

Family	Species	Number	Mean Size (mm)
Leiognathidae	*Leiognathus daura*	33	7.20±2.23
Mugilidae	*Mugil affinis*	9	41.23±30.49
Gerridae	*Gerres lucidus*	1	8.6
Portunidae	*Charybdis helleri*	3	15.97±4.3
Portunidae	*Charybdis affinis*	2	16.9±6.5
Penaeidae	*Penaeus penicillatus*	1	21.5
Total catch (no.)		**49**	

Table A5.10 summarises yield in weight from each of the sites and replicates. Average yield per sampling was less than 100 grams. Total yield from the salt pans was 720.6 g.

Table A5.10: Yield (grams) from Cast Net Sampling Inside the Salt Pans.

Site		1	2	3	4	5	6	7
Replicate	A	58.4	72.1	13.9	14.7	13.8	39.1	30.7
	B	169.9	11.4	0	4.6	0	5.8	29.9
	C	161.8	7.3	6.2	48.1	8.5	4.7	19.7
Sub-total yield		390.1	90.8	20.1	67.4	22.3	49.6	80.3
Total yield	720.6							

A5.2.6 Salt Pan Mangroves and Other Vegetation

Vegetation in the salt pans was mainly found on and alongside the bunds. Mangroves colonised the corners and the outer edge of pond bunds where more muddy substrates were available and the elevation was above 1.2 mPD (**Plate A5.1**). Mangrove associates and other species

established at higher elevations (1.5-2.5 mPD) where the substrate was more rocky and dry. Most areas within the salt pans were below 1.0 mPD. Little vegetation was developed in the flooded pond centres.

A total of 3,366 individuals of 6 true mangrove species were recorded in the salt pans. Species representation is reported in **Table A5.11** (Site A) and numbers of each species in **Table A5.12**. The salt pan mangroves were dominated by *Kandelia candel* and *Avicennia marina* in terms of number of adults, seedlings and canopy. *Bruguiera gymnorhiza, Aegiceras corniculatum, Excoecaria agallocha*, and *Acanthus ilicifolius* were also present, but fewer than 20 individuals of each species were found, indicating a very low dominance. *Kandelia candel* had the highest number of mature individuals (around 100), followed by *Avicennia marina* (about 12). *Aegiceras corniculatum* and *Acanthus ilicifolius* were flowering during surveys, while *Bruguiera gymnorhiza* and *Excoecaria agallocha* were not. The latter 2 species were recorded nowhere at Tai O outside the salt pans.

Table A5.11: Mangrove and Mangrove Associate Species Recorded at Tai O.

				Relative abundance at Tai O[3]									
Species	**Category[1]**	**Habitat**	**Occurrence in HK[2]**	**Site A (salt pans)**	**Site B**	**Site C**	**Site D**	**Site E**	**Site F**	**Site G**	**Site H**	**Site I**	**Site J**
Acanthus ilicifolius	true mangrove	shrub	uncommon sp.	+ +	+ +	+ + +	+	+ +	+	+	+	+	+
Aegiceras corniculatum	true mangrove	tree	representative sp.	+		+		+	+ +	+		+ + +	
Avicennia marina	true mangrove	tree	representative sp.	+ + +	+ +	+		+ +	+ + +	+		+	
Bruguiera gymnorhiza	true mangrove	tree	representative sp.	+									
Excoecaria agallocha	true mangrove	tree	representative sp.	+									
Heritiera littoralis	true mangrove	tree	uncommon sp.										
Kandelia candel	true mangrove	tree	representative sp.	+ + +	+ + +	+ +	+	+ + +	+ +	+	+ + +	+	+ + +
Lumnitzera racemosa	true mangrove	tree	frequent sp.										
Acrostichum aureum	mangrove associate	fern	frequent sp.		+	+ + +	+		+		+	+ +	
Clerodendrum inerme	mangrove associate	shrub	representative sp.	+ + +	+ +	+		+ +	+ +	+ + +		+	+
Cerbera manghas	mangrove associate	tree	frequent sp.										
Hibiscus tiliaceus	mangrove associate	tree	representative sp.	+	+ +	+	+	+ +	+ +	+ +	+ + +	+	+ + +
Thespesia populnea	mangrove associate	tree	uncommon sp.										
Total no. of true mangroves			8	6	3	4	2	4	4	4	2	4	2
Total no. of mangrove associates			5	2	3	3	2	2	3	2	2	3	2

Notes:

1: Categorisation follows Tam and Wong (1997)

2: Occurrence in Hong Kong (follows Tam and Wong 1997). Representative species = species with occurrence < 50%, frequent sp. = species with occurrence between 25 and 50%, uncommon species = species with occurrence 25% of total stands remaining in Hong Kong.

3: Relative abundance. + + + = common, + + = occasional, + = rare

See **Figure A5.2** for locations of Sites A-J

Table A5.12: Total Counts of Mangroves at Salt Pans.

	Kandelia candel	*Avicennia marina*	*Bruguiera gymnorhiza*	*Aegiceras corniculatum*	*Acanthus ilicifolius*	*Excoecaria agallocha*	**Total**
Subtotal	2177	1148	13	10	17	1	3366
Estimated no. Adults	100	12	1	3	5	1	122

Only two mangrove associate species, *Clerodendrum inerme* and *Hibiscus tiliaceus*, were recorded in the salt pans. *C. inerme* formed a dense cover on many bund tops, while *Hibiscus tiliaceus* occasionally established on higher ground. Both are common mangrove associates in Hong Kong.

A total of 299 mangrove plants were measured along the 850 m sampling section; results are shown in **Table A5.13**. Of the total, 275 (92%) were *Kandelia candel*. Average height of the mangroves (excluding *Bruguiera gymnorhiza*, only one individual of which was recorded and measured) ranged from 49.0 cm to 59.1 cm. This indicates that most of the mangroves recorded were young in age, (which is a reasonable assumption since fish pond operation here was abandoned only within the last 20 years), or dwarf in growth form, which is common in Hong Kong.

Table A5.13: Mean Height of Mangroves in Salt Pans.

	Kandelia candel	*Avicennia marina*	*Bruguiera gymnorhiza*	*Acanthus ilicifolia*
Mean Height (cm)	58.8	59.1	180.0	45.0
Standard deviation	27.5	15.1	-	32.2
Minimum (cm)	15.0	25.0	-	15.0
Maximum (cm)	170.0	80.0	-	110.0
Count	275	14	1	9

Other plant species recorded within the salt pans are listed in **Table A5.14**. These species colonised the salt pan bunds with the mangrove associates. The prostrate climber *Sesuvium portulacastrum*, the herb *Suaeda australis* and the reed *Phragmites australis* were commonly found. Typical coastal or backshore species including *Pluchea indica, Canavalia maritima, Derris trifoliata, Ipomoea brasiliensis* and *Scolopia chinensis* were also recorded. The remaining species were mostly ruderals, grasses or weeds.

Table A5.14: Other Plant Species Recorded at Tai O Salt Pans.

Species	Exotic	Habit	Relative abundance
Achyranthes aspera		shrub	+
Apluda mutica		grass	+ +
Bidens pilosa		herb	+
Bothriochloa intermedia		grass	+
Canavalia maritima		climber	+
Cassia occidentalis		shrub	+
Chloris batata		grass	+
Conyza canadensis	Yes	shrub	+
Cynodon dactylon		grass	+ +
Derris trifoliata		climber	+
Ficus virens var. *sublanceolata*		tree	+
Ipomoea brasiliensis		climber	+
Lactuca indica		herb	+
Lantana camara	Yes	shrub	+ +
Leucaena leucocephala	Yes	tree	+ +
Macaranga tanarius		tree	+
Melanthera bicolor		climber	+
Mimosa pudica		herb	+
Neyraudia reynaudiana		grass	+
Panicum repens		grass	+
Passiflora foetida		climber	+
Phragmites australis		grass	+ + +
Pluchea indica		herb	+ + +
Sapium sebiferum		tree	+
Scaevola sericea		shrub	+
Scolopia chinensis		tree	+
Sesbania cochinchinensis		shrub	+
Sesuvium portulacastrum		climber	+ + +
Solanum nigrum		herb	+
Suaeda australis		shrub	+ + +
Zoysia sp.		grass	+ +

Notes :
relative abundance - + + + = common, + + = occasional, + = rare

A5.2.7 Survey of Other Mangroves at Tai O

Mangroves and mangrove associates recorded at Tai O sites outside Site A, the salt pan, are listed in **Table A5.11** (Sites B-J). Photos of these sites are shown in **Plates A5.1** to **A5.4**. Species composition and abundance at each site are described below.

Site B

Site B is an abandoned salt pan, part of which has been filled to build a football pitch. Salt pan bunds were not prominent, and the remaining area was inundated even at low tide. Site B was hydrologically separated from Site A (the salt pans) but was still subject to some tidal influence

through Tai O Creek. Mangroves mainly colonised near the bunds which were of higher elevation (**Plate A5.1**). *Kandelia candel* of about 2 m in height formed a belt along the south bunds, some having a trunk diameter of about 10 cm and fruiting. Some mature *Avicennia marina* stands were found on the north bund; individuals reached a height of 1.5 m with numerous propagules surrounding the mother trees. *Acanthus ilicifolius* were also flowering during surveys, and grew with the mangrove associates, mainly *Clerodendrum inerme* and *Hibiscus tiliaceus*.

Site C

Site C is an abandoned field dominated by *Phragmites australis*. It was hydrologically separated from Site A (the salt pans) but was still subject to some tidal influence through Tai O Creek. It is separated from Site B by a footpath, but culverts under the footpath maintain the hydrological connection. As at Site B, mangroves mainly established along the footpath while a few also grew on the fringe of the reed bed which was higher in elevation (**Plate A5.1**). In addition to *Kandelia candel, Acanthus ilicifolius* and *Avicennia marina*, some flowering *Aegiceras corniculatum* were recorded near the north-east corner of the site. Dense clumps of the mangrove fern *Acrostichum aureum* were found between the mangroves and the reedbed.

Site D

Site D is composed of small fish ponds around the foothill near San Tsuen (**Plate A5.2**). The ponds appeared to be abandoned, although pond bunds remain intact and standing water is present. Only a few individuals of mangrove seedlings, mainly *Kandelia candel*, colonised the ponds.

Site E

Site E is composed of abandoned ponds close to Tai O Creek. Seedlings and mature trees of *Kandelia candel* and *Avicennia marina* (height between 50 cm and 150 cm) colonised the centre of the ponds (**Plate A5.2**). Pond bunds were more or less intact and were dominated by *Clerodendrum inerme* and *Hibiscus tiliaceus*.

Site F

Site F is an abandoned field where the densest and most homogeneous patch of mangroves at Tai O was recorded (**Plate A5.2**). Results of point centred quarter survey show that the mangrove stand had a density of 13,212 per ha, i.e. more than one individual per square metre, and an average basal diameter of 4.5 cm. *Avicennia marina* dominated the stand, followed by *Kandelia candel* and *Aegiceras corniculatum*. Similar to Site E, the fringe of the site was dominated by mangrove associates including *Clerodendrum inerme* and *Hibiscus tiliaceus*. The reed *Phragmites australis* was also abundant at the margin.

Site G

Site G is the stretch of Tai O Creek subject to intertidal influence (**Plate A5.3**). The estuary was urbanised and occupied by stilt houses on both banks. It was also polluted by domestic sewage. Only a few *Kandelia candel* seedlings were observed under the stilt houses. Away from the estuary the river bank was disturbed by ongoing reclamation. A few individuals of mangroves

including *Kandelia candel, Avicennia marina* and *Acanthus ilicifolius* occasionally formed small clumps on muddy banks.

Further upstream the river bank was dominated by mangrove associates including *Hibiscus tiliaceus* and *Clerodendrum inerme*. The raised rocky stream bed precluded tidal dispersal of mangroves upstream.

Site H

Site H is a group of fish ponds which are apparently abandoned, although the ponds still have standing water and the pond bunds remain intact (**Plate A5.3**). *Kandelia candel* and *Hibiscus tiliaceus* established along both sides of the ditches and pond bunds.

Site I

Site I is an abandoned salt pan, similar in size to Site A. The salt pan bunds can still be seen in aerial photos, although many have started degenerating. Mangroves dominated by *Kandelia candel* and *Aegiceras corniculatum* established along the old bunds (**Plate A5.3**). *Phragmites australis* co-dominated with the mangroves.

Site J

Site J is an abandoned pond which was described as a "tidal lagoon" by Tam and Wong (1997). Mangroves mainly occupied the west bund, dominated by *Kandelia candel* and *Hibiscus tiliaceus* (**Plate A5.3**). The mangrove stand was tall (with a maximum height up to 3m) and dense, but was disturbed by dumping of litter.

Discussion

Of 8 true mangroves and 5 mangrove associates recorded in Hong Kong, 6 and 2 respectively were recorded at Tai O. *Kandelia candel, Avicennia marina, Hibiscus tiliaceus*, and *Clerodendrum inerme* are common. *Aegiceras corniculatum, Acanthus ilicifolius*, and *Acrostichum aureum* are also present, while *Bruguiera gymnorhiza* and *Excoecaria agallocha* are poorly represented and were only recorded in the salt pan (Site A). Mangroves and mangrove associates mainly established along pond bunds or margins of water bodies. The densest patch was recorded at Site F.

The dominance of pioneer mangrove species (*K. candel, A. marina*) and backshore mangrove associate species (*H. tiliaceus, C. inerme*) and the absence of a "middle" zone of back mangrove species (*B. gymnorhiza, E. agallocha*) is probably due to the absence of a real intertidal zone with continuous elevation gradient. This is rather typical at Tai O where the estuary area has been urbanised or converted to salt pans. The bunds of salt pans and fish ponds and the stream bank have steep gradients and offer limited areas for mangrove establishment. Another reason for poor development of back mangrove species may be lack of seed source. Few adult trees of *B. gymnorhiza* and *E. agallocha* were found in the whole study area. Some major seed sources in the vicinity (Chek Lap Kok, part of Tung Chung) have been destroyed due to construction of the airport and the new town.

The old salt pans (Site A) provide an opportunity to compensate for loss of mangroves and also

to increase the diversity of mangrove species in the Tai O area.

A5.2.8 Stream and Marsh Fauna Survey

Tai O Creek estuary is influenced by both freshwater from the stream and sea water from Tai O Bay. The water level in the estuary changes significantly with the tide level. Both marine and brackish water species are found in the estuary. While brackish species inhabit the estuarine areas, marine species follow the tide and can be found in the area upstream of the village proper.

Fauna in the creek estuary was sampled using fine-mesh cast nets. Results of the stream survey are given in **Annex A5g** and summarised in **Table A5.15**. Ten cast net samplings were conducted. Four samplings did not collect any organisms; a total of 14 individuals were caught in the other 6 samplings. The total yield was 473.3 grams. The majority of organisms caught were the marine fish *Leiognathus daura*. Other species recorded included the fish *Tilapia mossambica*, *Mugil affinis* and *Elops saurus*. The diversity index H' was 0.90 and species evenness J was 0.64.

Table A5.15: Fauna Collected by Cast Net Sampling in Tai O Creek.

Family	Species	Catch (no.)	Yield (g)
Leiognathidae	*Leiognathus daura*	10	58.2
Cichlidae	*Tilapia mossambica*	2	280
Mugilidae	*Mugil affinis*	1	58.6
Elopidae	*Elops saurus*	1	76.5

The size of *Leiognathus daura* caught in Tai O Creek were markedly smaller (standard length < 70 mm) than those caught in Tai O Bay and Yi O. This may be evidence that the estuary provides a suitable habitat for juvenile fish.

The brackish marsh immediately to the east of the salt pans is also tidally influenced, via Tai O Creek. Aquatic fauna of the marsh was sampled using a tidal net. Results are reported in **Annex A5h** and summarised in **Table A5.16**. A total of 66 individuals were caught, and the total yield was close to 2 kg. (1912.7 grams). Except one mud crab and one *Elops saurus*, all individuals caught were *Tilapia mossambica*. The diversity index H' was 0.17 and species evenness J was 0.14 - both very low due to the high dominance of Tilapia. The majority of the Tilapia were juveniles and subadults, with standard length smaller than 100 mm. Both observations and catches from tidal net sampling showed numerous juvenile and subadult fish inhabited the marsh.

Table A5.16: Fauna Collected by Tidal Net at the Marsh in Tai O.

Family	Species	Total catch (no.)	Total yield (g)
Cichlidae	*Tilapia mossambica*	64	1580.3
Elopidae	*Elops saurus*	1	77.2
Portunidae	*Scylla serrata*	1	255.2

A5.2.9 Foraging and Roosting Bird Survey

Tai O Egretry

Eight pairs of Little Egret and thirteen pairs of Night Heron were recorded nesting in the Tai O egretry on 14 April 1999 (**Table A5.17**). Since dense leaves made accurate counting of nests impossible, these results represent the minimum number of nests in the egretries. All nests were built in stands of bamboo behind an orchard (**Figure A5.1a**, **Plate A5.4**). Adults were incubating on 14 April 1999. Chicks were observed on 30 April 1999. One Chinese Pond Heron nest was found on 30 April 1999 (**Table A5.17**). Great Egrets and Grey Herons were flushed from the egretry on 14 April 1999, but nests of these species were not found. These two species are not common breeders in local egretries (Dahmer and Kwok 1997, Young and Cha 1995).

Based on results through the end of April, the abundance of nests of Little Egrets and Chinese Pond Herons declined from 20 to 8 pairs (60% decrease) and from 10 to 1 (90% decrease) respectively between 1995 and 1999, while the abundance of nests of Night Herons increased from 3 to 13 pairs (333.3% increase) (**Table A5.17**). A 33.3% decline has occurred in total breeding pairs in the Tai O Egretry from 1995 to 1999; the number of breeding species has not changed, but dominance has shifted from Little Egret to Night Heron.

Little Egret is the commonest ardeid breeding in the SAR; it has been reported breeding in 23 of the 28 reported local egretries (Dahmer and Kwok 1997, Young and Cha 1995). However, the range of breeding colonies of Little Egrets has been shrinking in the last few decades (*ibid*.). The mean SAR breeding population of Little Egret between 1989 and 1995 was 204 pairs; the Tai O breeding population in 1999 thus represents some 4% of the average local breeding population (Young and Cha 1995).

Night Heron has been reported breeding in 13 of the 28 reported local egretries (Dahmer and Kwok 1997, Young and Cha 1995). This species nests in mangroves, among other habitats (Young and Cha 1995). The mean SAR breeding population of Night Heron between 1989 and 1995 was 255 pairs; the Tai O breeding population in 1999 thus represents some 5% of the average local breeding population (*ibid*.).

Chinese Pond Heron has been reported in 24 out of the 28 reported local egretries (Dahmer and Kwok 1997, Young and Cha 1995). The mean SAR breeding population of Chinese Pond Heron between 1989 and 1995 was 150 pairs; the breeding population at Tai O thus represents less than 1% of the average local breeding population (*ibid*.).

Table A5.17: Number of Breeding Pairs of Ardeids in Tai O Egretry in 1995 and 1999.

	1995	14/4/1999	29/4/1999
Chinese Pond Heron	10	-	1
Night Heron	3	13	4
Little Egret	20	8	7

The reasons for the change in breeding population of the breeding ardeid species from 1995 to 1999 are unknown. Estimates of breeding ardeid population were made only in 1995 and 1999, and insufficient data are available to draw solid conclusions about temporal trends of breeding at the Tai O egretry.

Bird Use of Salt Pans

A total of 312 birds of 26 species were recorded in the salt pans during the winter and spring surveys (**Annex A5i**). Most are common and widespread terrestrial species, though 8 are wetland-dependent (Viney *et al*. 1994). One rare species, the Plumbeous Redstart, was recorded. This is a wetland dependent species usually found near running water, for which the salt pans would not be considered a primary habitat (*ibid*.).

The average bird density in the salt pans was 3.93 per ha. This is low compared to bird density in other intertidal habitats in Hong Kong (e.g. Shuen Wan, Tolo Harbour 10.77 per ha; Pak Nai and Ha Pak Nai, Deep Bay 22.28 per ha). Shannon's diversity index ranged from 1.6 to 2.55, not high by local standards. Pielou's evenness index ranged from 0.73 to 0.95. The bird community in the salt pans was moderately dominated by Little Egrets.

Species richness and bird abundance in each of the 7 salt pan sections is summarised in **Table A5.18**. Bird abundance in the individual salt pans ranged from 1.03 (salt pan no. 4) to 5.34 birds per ha (salt pan no. 6). Large flocks of roosting Little Egrets accounted for the highest bird abundance in salt pan no. 6. The reason for the lowest bird abundance in salt pan no. 1 is unknown, but may be related to proximity to sources of human disturbance. Although salt pan no. 7 was also located near houses, the presence of trees and other vegetation on the bund may have compensated for the effect of human disturbance.

The number of species recorded was highest in salt pan no. 7. The highest species richness in salt pan no. 7 was due to the presence of trees and dense vegetation on the bund, which can provide shelter and food to small insectivorous birds. Plants also provide breeding habitats for Yellow-bellied Prinia, which were observed chasing conspecific intruders out of territories in the salt pans. Black-eared Kites, Barn Swallow and Tree Sparrow were observed carrying nesting materials near the salt pans during the spring surveys. Barn Swallows collected mud from the salt pans as nesting material. These species probably breed near the salt pans.

Table A5.18: Species Richness and Bird Abundance in Each Salt Pan.

Salt pan	Area (ha)	No. of species	No. of birds	Birds per ha
1	2.78	5	20	1.03
2	1.31	8	30	3.27
3	1.25	5	20	2.29
4	1.01	5	16	2.12
5	1.04	8	16	2.2
6	1.73	6	64	5.28
7	2.22	13	83	5.34

Birds in the salt pans were recorded in four microhabitats: bunds, seawall, shore and the nullah to the south of salt pan no. 7. Most of the birds and species recorded were foraging and/or roosting on the bunds, seawall and shore of the salt pans (**Table A5.19**). The interior of the salt pans was not used due to the water depth.

Table A5.19: Relative Proportion of Use of the Salt Pan Microhabitats.

	No of birds	% of total birds	No .of species
Bunds and seawall	137	48.6	18
Shore	125	44.3	11
Nullah	20	7.1	12

Wetland dependent species accounted for about one-third of total species and total birds of the bird community in the salt pans (**Table A5.20**). The average abundance of wetland birds in the salt pans was 1.5 per ha. This is only one-fifth of that in the marshes in Shuen Wan, Tolo Harbour (7.6 per ha), which is similar in area (11.6 ha) to the salt pans (11.34 ha). However, 33 wetland dependent species were recorded in Shuen Wan.

Table A5.20: Relative Importance of Wetland-Dependent and Terrestrial Species in the Salt Pans.

	No. of species	% of total species	No. of birds	% of total birds
Wetland dependent species	8	30.8	117	37.5
Terrestrial species	18	69.2	195	62.5

Little Egret *Egretta garzetta* was the dominant species of the bird community in the salt pans (30.8% of total birds). This species is known to forage in open wetland habitats (Cheng 1993). During the winter and spring surveys, the salt pans were found to provide both foraging and roosting habitats for Little Egrets, with the latter proportionally higher (**Table A5.21**). Little Egrets only foraged on bunds, seawall and shore in the salt pans due to the depth of water in the interior of the salt pans. Little Ringed Plover and Common Sandpiper, which are much smaller

than Little Egret and therefore more affected by water depth, also foraged only on the shore.

Table A5.21: Proportion of Foraging and Roosting Little Egrets in the Salt Pans in Winter and Spring

	Winter		Spring		Average (%)
	No. of birds	% of total	No. of birds	% of total	
Roosting	54	73.0	2	9.1	58.3
Foraging	20	27.0	20	90.9	41.7

Little Egrets were also recorded foraging in other habitats in Tai O (e.g. abandoned cultivated lands and seashore). Since it has been reported that breeding colonies in Hong Kong have been abandoned due to loss of nearby feeding habitats, it is important to study the relative importance of the salt pans compared to other habitats in Tai O as feeding habitats of Little Egrets during breeding season. This was investigated through the flight line study described below.

Kingfishers and Black-eared Kites are the only birds that potentially can exploit the interior of the salt pans. However, these species only accounted for a small proportion (6.7%) of the total birds. The number of kingfishers in the salt pans was low; this is due to the highly territorial nature of the species. The abundance of foraging Black-eared Kites on the salt pans and nearby seashore was estimated during surveys. The number of Black-eared Kites ranged from 1 to 4 birds, not high compared to counts in other localities in Hong Kong (Carey 1996). In addition, Black-eared Kites were observed taking food from the sea frequently but never from the interior of the salt pans.

Flight Line Study

Flight lines of 119 Little Egrets were followed to determine at what sites and in what habitat types they were feeding. Available foraging habitats were broken down into 7 types for reporting purposes: mangrove, marsh, channel, pond, open sea, rocky shore and salt pan. Marsh included the marshes near San Tsuen and Leung Uk (14.6 ha), and the wet abandoned cultivated lands (9.4 ha) on the east of the Tai O egretry.

Table A5.22 summarises the habitat use of Little Egrets recorded through the flight line study. **Table A5.23** relates numbers of bird to available area of habitat to determine relative importance of the different habitats. Fish ponds were found to be the most important foraging habitat, a finding that is generally consistent with previous studies. Wong (1991) found fish ponds to be the most important feeding habitats for Little Egrets; Cornish (1998) found intertidal mudflat to be the most important and fish ponds the second most important foraging habitat for this species.

The salt pans were markedly the least important foraging habitat for Little Egrets breeding at the Tai O Egretry. This appears to be due to the depth of the water in the salt pans, which precluded foraging over most of their area.

Table A5.22: Habitat Use of Little Egrets.

Habitat	No. of birds	% of total
Mangrove	4	3.4
Marsh	22	18.4
Channel	17	14.3
Pond	29	24.4
Sea to N of egretry	29	24.4
Sea to W of egretry	13	10.9
Rocky shore	4	3.4
Salt pans	1	0.8
Total	119	100.0

Table A5.23: Relative Importance of Foraging Habitat.

Habitat	No. of birds	Area (ha)	Birds per ha
Mangrove	4	3.7	1.08
Marsh	22	24	0.917
Channel	17	10	1.70
Pond	29	2.8	10.4
Salt pans	1	11.34	0.088
Total	73	-	-

Summary

Bird abundance and species richness in the salt pans was low compared to other local intertidal habitats. Wetland dependent species accounted for only one-third of the total species and total birds recorded in the salt pans. Low species richness and bird abundance of wetland-dependent species was concluded to be due to the depth of water in the interior of the salt pans, which precluded foraging by many species.

Little Egret is identified as the key sensitive receiver in terms of avifauna. This species breeds in the Tai O Egretry, the only egretry in Lantau. Winter and spring surveys showed that this species roosted and foraged in the salt pans, although the flight line study showed that the salt pans are the least important foraging habitat during breeding season. Fish ponds and abandoned agricultural lands to the east of the Tai O egretry are the most important feeding sites during breeding season.

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Annex A5a: Raw Data from Benthic Sampling at 8 Sites in Tai O Bay.

Taxon	Count		Taxon	Count
Site 1-a			***Site 3-a***	
Mactra sp.	3		*Mactra sp.*	1
Nemertea sp.	2		*Donax sp.*	10
Mediomastus californiensis	2		*Opisthobranchia*	1
Sternaspis scutata	3		*Aglaophamus lyrochaeta*	1
Linopherus sp.	1		*Sigambra hanaokai*	1
Unidentified	1		*Ancistrosyllis sp.*	1
Opisthobranchia	3		*Cirritulus sp.*	2
Tylonereis bogoyawleski	1		***Site 3-b***	
Pilargis sp.	1		*Mactra sp.*	3
Lumbrineris sp.	1		*Donax sp.*	13
Pista sp.	1		*Opisthobranchia*	3
Cossurella dimorpha	1		*Sigambra hanaokai*	1
Site 1-b			*Nephthys sp.*	1
Mactra sp.	3		**Site 3-c**	
Sthenolepis japonica	1		*Neoxenophthalmus obscurus*	1
Branchiomma sp.	1		*Mactra sp.*	9
Mediomastus californiensis	1		*Donax sp.*	4
Site 1-c			*Opisthobranchia*	3
Mactra sp.	2		Unidentified	1
Dexaminidae sp.	1		*Dexaminidae sp.*	3
Sternaspis scutata	2		*Mediomastus californiensis*	4
Opisthobranchia	1		*Haploscoloplos sp.*	1
Lumbrineris sp.	1		*Phoronis sp.*	1
Haploscoloplos sp.	1			
			Site 4-a	
Site 2-a			*Mactra sp.*	1
Mactra sp.	1		*Donax sp.*	7
Dexaminidae sp.	1		*Tylonereis bogoyawleski*	1
Linopherus sp.	1		*Glycinde sp.*	5
Site 2-b			*Nephthys sp.*	1
Nemertea sp.	1		***Site 4-b***	
Glycinde sp.	1		*Tellinidae*	1
Mediomastus californiensis	1		*Mactra sp.*	1
Sthenolepis japonica	2		*Donax sp.*	2
Phoronis sp.	1		*Nephthys sp.*	2
Linopherus sp.	1		*Nemertea sp.*	1
Site 2-c			*Galathowenia sp.*	1
Mactra sp.	3		*Neanthes glandicincta*	1
Opisthobranchia	1		*Nereis sp.*	1
Unidentified	1		***Site 4-c***	
Hesionidae sp.	1		*Neanthes glandicincta*	1
Nephthys sp.	1		*Mediomastus californiensis*	2
			Opisthobranchia	1

Taxon	Count		Taxon	Count
Site 5-a			***Site 7-a***	
Donax sp.	1		*Timoclea sp.*	3
Timoclea sp.	8		*Nephthys sp.*	1
Glycinde sp.	1		*Dexaminidae sp.*	1
Site 5-b			*Sthenolepis japonica*	1
Timoclea sp.	7		*Mediomastus californiensis*	1
Mediomastus californiensis	1		***Site 7-b***	
Site 5-c			*Timoclea sp.*	3
Nothing			*Haploscoloplos sp.*	2
			Nephthys sp.	1
Site 6-a			*Glycinde sp.*	1
Tapes sp.	1		*Sthenolepis japonica*	1
Donax sp.	6		***Site 7-c***	
Nephthys sp.	2		*Tapes sp.*	1
Haploscoloplos sp.	1		*Mactra sp.*	1
Lumbrineris sp.	1		*Donax sp.*	1
Glycinde sp.	1		*Timoclea sp.*	2
Site 6-b			*Haploscoloplos sp.*	3
Haploscoloplos sp.	6		*Nephthys sp.*	3
Pectinaria sp.	1		*Glycinde sp.*	1
Glycinde sp.	3		*Paralacydonia paradoxa*	1
Onuphis sp.	1			
Phoronis sp.	1		***Site 8-a***	
Lumbrineris sp.	1		*Glycera sp.*	1
Nephthys sp.	1		*Phoronis sp.*	4
Site 6-c			*Linopherus sp.*	1
Mactra sp.	6		*Ancistrosyllis sp.*	1
Donax sp.	6		*Haploscoloplos sp.*	1
Haploscoloplos sp.	1		***Site 8-b***	
Sthenolepis japonica	1		*Mactra sp.*	1
Glycera sp.	1		*Donax sp.*	2
Glycinde sp.	2		*Glycera sp.*	1
Phoronis sp.	1		Unidentified	1
Opisthobranchia	2		*Glycinde sp.*	1
Anaitides sp.	1		*Nemertea sp.*	1
Nephthys sp.	1		*Sthenolepis japonica*	1
Lumbrineris sp.	2		*Euclymene sp.*	1
Dexaminidae sp.	1		***Site 8-c***	
			Tapes sp.	1
			Mactra sp.	4
			Donax sp.	1
			Fulvia sp.	1
			Paralacydonia paradoxa	1
			Glycinde sp.	2
			Mediomastus californiensis	1
			Nemertea sp.	1

Annex A5b: Raw Data from Natural Shore Survey, Tai O.

Transect A				Transect B				Transect C		
Distance	**Taxon**	**No.**		**Distance**	**Taxon**	**No.**		**Distance**	**Taxon**	**No.**
1	No fauna			1	*Littorina scabra*	13		1	*Littorina scabra*	10
2	*Nodilittorina millegrana*	36		2	*Littorina scabra*	11		2	*Nodilittorina millegrana*	15
	Nodilittorina pyramidalis	23		3	*Littorina scabra*	62			*Nodilittorina pyramidalis*	10
	Littorina scabra	11			*Nodilittorina pyramidalis*	33			*Littorina scabra*	10
3	*Nodilittorina millegrana*	30			*Nodilittorina millegrana*	42		3	*Littorina scabra*	55
	Littorina scabra	70		4	*Littorina scabra*	63			*Nodilittorina pyramidalis*	30
4	*Monodonta labio*	2			*Nodilittorina millegrana*	70			*Nodilittorina millegrana*	35
	Littorina scabra	21			*Nodilittorina pyramidalis*	5		4	*Littorina scabra*	44
	Nodilittorina millegrana	3			*Monodonta labio*	1			*Nodilittorina millegrana*	55
5	*Nodilittorina millegrana*	406		5	*Littorina scabra*	70			*Monodonta labio*	2
	Nodilittorina pyramidalis	256			*Monodonta labio*	3		5	*Littorina scabra*	34
	Littorina scabra	7			*Nerita albicilla*	3			*Nodilittorina pyramidalis*	66
6	*Littorina scabra*	16			*Nodilittorina millegrana*	50			*Nodilittorina millegrana*	80
	Nodilittorina millegrana	10		6	*Nodilittorina pyramidalis*	48			*Monodonta labio*	3
	Saccostrea cucullata	4			*Nodilittorina millegrana*	24		6	*Littorina scabra*	19
	Monodonta labio	5			*Littorina scabra*	15			*Nodilittorina millegrana*	21
	Nerita albicilla	2							*Nodilittorina pyramidalis*	25
7	*Littorina scabra*	40							*Nerita albicilla*	3
	Nodilittorina millegrana	25							*Monodonta labio*	6
	Nodilittorina pyramidalis	10								
	Patelloida saccharina	2								
	Saccostrea cucullata	3								

Annex A5c: Raw Data from Epifauna Survey of Salt Pans.

Site	Taxon	Replicate A	Replicate B	Replicate C
1	*Cerithidea rhizophorarum*	14	22	41
1	*Clibanarius longitarsus*	1		
1	*Balanus albicostatus*	2	1	
1	Burrow	4		1
1	*Plicatula plicata*		3	
2	*Cerithidea rhizophorarum*	13	22	18
2	Burrow	10	17	12
3	*Cerithidea rhizophorarum*	11	1	12
3	Burrow	16	19	18
4	*Cerithidea rhizophorarum*	22	33	50
4	Burrow	10	12	7
4	*Plicatula plicata*			6
5	No fauna	\	\	\
	No burrow	\	\	\

Annex A5d: Raw Data from Intertidal Infauna Survey of Salt Pans.

Taxon	Count	Taxon	Count
Site 1-a		***Site 3-c***	
Laternula sp.	1	*Neanthes glandicincta*	4
Mediomastus californiensis	13	*Euclymene sp.*	8
Neanthes glandicincta	1	*Mediomastus californiensis*	189
Melinna sp.	26	*Prionospio sp.*	1
Site 1-b		*Galathowenia sp.*	1
Neanthes glandicincta	2		
Euclymene sp.	1	***Site 4-a***	
Mediomastus californiensis	19	*Dosinia sp.*	1
Melinna sp.	7	*Gafrarium sp.*	1
Site 1-c		*Neanthes glandicincta*	25
Haploscoloplos sp.	1	*Euclymene sp.*	3
Mediomastus californiensis	18	*Prionospio sp.*	1
Melinna sp.	13	*Nereis sp.*	1
		Melinna sp.	4
Site 2-a		*Mediomastus californiensis*	101
Mediomastus californiensis	143	***Site 4-b***	
Euclymene sp.	5	Insect	1
Neanthes glandicincta	20	*Dosinia sp.*	2
Site 2-b		*Neanthes glandicincta*	13
Dosinia sp.	1	*Euclymene sp.*	6
Uca sp.	1	*Melinna sp.*	5
Euclymene sp.	4	*Mediomastus californiensis*	168
Mediomastus californiensis	83	*Prionospio sp.*	1
Neanthes glandicincta	4	***Site 4-c***	
Melinna sp.	2	*Neanthes glandicincta*	4
Galathowenia sp.	2	*Euclymene sp.*	2
Site 2-c		*Melinna sp.*	2
Dosinia sp.	1	*Mediomastus californiensis*	120
Euclymene sp.	3	Unidentified	1
Mediomastus californiensis	31		
		Site 5-a	
Site 3-a		Tellinidae	1
Neanthes glandicincta	10	*Neanthes glandicincta*	10
Euclymene sp.	6	*Melinna sp.*	14
Mediomastus californiensis	104	*Euclymene sp.*	1
Melinna sp.	1	*Mediomastus californiensis*	17
Site 3-b		***Site 5-b***	
Neanthes glandicincta	4	*Melinna sp.*	6
Euclymene sp.	2	*Mediomastus californiensis*	2
Mediomastus californiensis	220	*Neanthes glandicincta*	8
Melinna sp.	19	***Site 5-c***	
		Neanthes glandicincta	9
		Melinna sp.	15
		Euclymene sp.	5
		Mediomastus californiensis	46

Annex A5e: Raw Data from Benthic Survey of Salt Pans.

Taxon	Count	Taxon	Count
Site 1-a		***Site 3-c***	
Cerithidea sp.	2	*Tapes sp.*	1
Euclymene sp.	2	*Polynoidea sp.*	1
Mediomastus californiensis	4	*Mediomastus californiensis*	22
Site 1-b		*Euclymene sp.*	8
Neanthes glandicincta	1	*Galathowenia sp.*	8
Mediomastus californiensis	1	*Lumbrineris sp.*	7
Site 1-c		*Sternaspis scutata*	1
Euclymene sp.	11		
Mediomastus californiensis	10	***Site 4-a***	
Neanthes glandicincta	1	*Mactra sp.*	1
Prionospio sp.	2	*Dexaminidae sp.*	1
		Neanthes glandicincta	2
Site 2-a		*Euclymene sp.*	6
Macrophthalmus sp.	1	*Lumbrineris sp.*	1
Euclymene sp.	12	*Nemertea sp.*	1
Mediomastus californiensis	47	*Branchiomma sp.*	1
Neanthes glandicincta	1	***Site 4-b***	
Prionospio sp.	2	*Glycinde sp.*	2
Galathowenis sp.	1	*Euclymene sp.*	20
Site 2-b		*Nemertea sp.*	1
Circe sp.	1	*Mediomastus californiensis*	5
Prionospio sp.	1	*Minuspio cirrifera*	1
Euclymene sp.	16	***Site 4-c***	
Nemertea sp.	1	*Gafrarium sp.*	5
Mediomastus californiensis	60	*Mactra sp.*	1
Lumbrineris sp.	1	*Dexaminidae sp.*	2
Site 2-c		*Opisthobranchia*	1
Euclymene sp.	5	*Euclymene sp.*	11
Mediomastus californiensis	10	*Minuspio cirrifera*	2
Neanthes glandicincta	1	*Mediomastus californiensis*	3
Prionospio sp.	3	*Branchiomma sp.*	1
Glycinde sp.	1	*Glycinde sp.*	1
Phoronis sp.	1	*Lumbrineris sp.*	1
Site 3-a		***Site 5-a***	
Dexaminidae sp.	1	*Gafrarium sp.*	2
Gafrarium sp.	1	*Euclymene sp.*	1
Mediomastus californiensis	11	*Dendronereis pinnaticirris*	1
Euclymene sp.	2	***Site 5-b***	
Prionospio sp.	1	*Gafrarium sp.*	2
Site 3-b		*Euclymene sp.*	6
Mediomastus californiensis	29	*Neanthes glandicincta*	1
Euclymene sp.	1	*Lumbrineris sp.*	1
Pilargis sp.	1	***Site 5-c***	
Lumbrineris sp.	1	*Euclymene sp.*	4
		Neanthes glandicincta	3

Taxon	Count	Taxon	Count
		Lumbrineris sp.	1
		Branchiomma sp.	1
		Mediomastus californiensis	1
		Anaitides sp.	1

Annex A5f: Raw Data from Cast Net Survey of Salt Pans.

Site	Replicate	Family	Scientific name	Weight (g)	Size (mm)
1	1a	Leiognathidae	*Leiognathus daura*	6.2	61
1	1a	Leiognathidae	*Leiognathus daura*	3.4	49
1	1a	Portunidae	*Charybdis helleri*	15.2	43
1	1a	Portunidae	*Charybdis helleri*	12.1	45
1	1a	Portunidae	*Charybdis affinis*	21.5	48
1	1b	Mugilidae	*Mugil affinis*	50.2	134
1	1b	Mugilidae	*Mugil affinis*	40.6	127
1	1b	Mugilidae	*Mugil affinis*	46.2	132
1	1b	Portunidae	*Charybdis helleri*	20.6	45
1	1b	Portunidae	*Charybdis affinis*	12.3	40
1	1C	Mugilidae	*Mugil affinis*	114.3	180
1	1C	Mugilidae	*Mugil affinis*	30.1	110
1	1C	Leiognathidae	*Leiognathus daura*	6.8	57
1	1C	Leiognathidae	*Leiognathus daura*	10.6	68
2	2a	Mugilidae	*Mugil affinis*	40.6	128
2	2a	Leiognathidae	*Leiognathus daura*	7.8	67
2	2a	Leiognathidae	*Leiognathus daura*	9.3	70
2	2a	Leiognathidae	*Leiognathus daura*	7.9	60
2	2a	Leiognathidae	*Leiognathus daura*	6.5	62
2	2b	Leiognathidae	*Leiognathus daura*	11.4	71
2	2c	Leiognathidae	*Leiognathus daura*	7.3	63
3	3a	Leiognathidae	*Leiognathus daura*	6.5	58
3	3a	Leiognathidae	*Leiognathus daura*	7.4	63
3	3b	\	\	\	\
3	3c	Leiognathidae	*Leiognathus daura*	6.2	55
	4a	Leiognathidae	*Leiognathus daura*	5.3	54
4		Leiognathidae	*Leiognathus daura*	9.4	65
4	4b	Leiognathidae	*Leiognathus daura*	4.6	56
4	4c	Leiognathidae	*Leiognathus daura*	6.2	60
4	4c	Leiognathidae	*Leiognathus daura*	6.3	64
4	4c	Leiognathidae	*Leiognathus daura*	7.4	60
4	4c	Leiognathidae	*Leiognathus daura*	6.9	60
4	4c	Leiognathidae	*Leiognathus daura*	5.3	60
4	4c	Leiognathidae	*Leiognathus daura*	7.4	63
4	4c	Gerridae	*Gerres lucida*	8.6	67

Site	Replicate	Family	Scientific name	Weight (g)	Size (mm)
5	5a	Leiognathidae	*Leiognathus daura*	8.5	63
5	5a	Leiognathidae	*Leiognathus daura*	5.3	55
5	5b	\	\	\	\
5	5c	Leiognathidae	*Leiognathus daura*	8.5	59
6	6a	Mugilidae	*Mugil affinis*	19.3	93
6	6a	Mugilidae	*Mugil affinis*	14.5	83
6	6a	Leiognathidae	*Leiognathus daura*	5.3	53
6	6b	Leiognathidae	*Leiognathus daura*	5.8	55
6	6c	Leiognathidae	*Leiognathus daura*	4.7	50
7	7a	Leiognathidae	*Leiognathus daura*	9.2	58
7	7a	Penaeidae	*Penaeus penicillatus*	21.5	39
7	7b	Mugilidae	*Mugil affinis*	15.3	86
7	7b	Leiognathidae	*Leiognathus daura*	14.6	74
7	7c	Leiognathidae	*Leiognathus daura*	8.4	58
7	7c	Leiognathidae	*Leiognathus daura*	4.6	47
7	7c	Leiognathidae	*Leiognathus daura*	6.7	53

Annex A5g: Raw Data from Cast Net Survey of Tai O Creek.

Replicate	Family	Species	Weight (g)	Size (mm)
1	Cichlidae	*Tilapia mossambica*	190.5	164
1	Leiognathidae	*Leiognathus daura*	4.5	58
2	Cichlidae	*Tilapia mossambica*	89.5	141
2	Elopidae	*Elops saurus*	76.5	158
3	Mugilidae	*Mugil affinis*	58.6	134
3	Leiognathidae	*Leiognathus daura*	3.8	54
4	Leiognathidae	*Leiognathus daura*	9.4	68
5	Leiognathidae	*Leiognathus daura*	6.5	59
5	Leiognathidae	*Leiognathus daura*	4.5	47
5	Leiognathidae	*Leiognathus daura*	8.4	65
6	Leiognathidae	*Leiognathus daura*	4.6	49
6	Leiognathidae	*Leiognathus daura*	5.4	57
6	Leiognathidae	*Leiognathus daura*	5.9	59
6	Leiognathidae	*Leiognathus daura*	5.2	55
7	\	\	\	\
8	\	\	\	\
9	\	\	\	\
10	\	\	\	\

Annex A5h: Raw Data from Tidal Net Survey of Marsh.

Replicate	Family	Species	Size (mm)	Weight (g)
a	Cichlidae	*Tilapia mossambica*	98	34.5
a	Cichlidae	*Tilapia mossambica*	82	20.9
a	Cichlidae	*Tilapia mossambica*	90	25.4
a	Cichlidae	*Tilapia mossambica*	84	22.3
a	Cichlidae	*Tilapia mossambica*	85	23.1
a	Cichlidae	*Tilapia mossambica*	87	23.9
b	Cichlidae	*Tilapia mossambica*	90	26.4
b	Cichlidae	*Tilapia mossambica*	78	17.2
b	Cichlidae	*Tilapia mossambica*	94	30.5
b	Cichlidae	*Tilapia mossambica*	84	21.9
b	Cichlidae	*Tilapia mossambica*	85	22.5
b	Cichlidae	*Tilapia mossambica*	87	25.3
b	Cichlidae	*Tilapia mossambica*	86	24.1
b	Cichlidae	*Tilapia mossambica*	92	28.9
b	Cichlidae	*Tilapia mossambica*	90	24.7
b	Cichlidae	*Tilapia mossambica*	90	26.5
b	Cichlidae	*Tilapia mossambica*	84	20.3
b	Cichlidae	*Tilapia mossambica*	86	25.1
b	Cichlidae	*Tilapia mossambica*	90	23.3
b	Cichlidae	*Tilapia mossambica*	92	29.6
b	Cichlidae	*Tilapia mossambica*	82	20.4
b	Cichlidae	*Tilapia mossambica*	89	25.6
b	Cichlidae	*Tilapia mossambica*	102	35.4
b	Cichlidae	*Tilapia mossambica*	85	23.4
b	Cichlidae	*Tilapia mossambica*	86	22.1
b	Cichlidae	*Tilapia mossambica*	87	23.8
b	Cichlidae	*Tilapia mossambica*	92	29.4
b	Cichlidae	*Tilapia mossambica*	90	27.7
b	Cichlidae	*Tilapia mossambica*	86	22.5
b	Cichlidae	*Tilapia mossambica*	85	21.0
b	Cichlidae	*Tilapia mossambica*	78	17.3
b	Cichlidae	*Tilapia mossambica*	94	30.4
b	Cichlidae	*Tilapia mossambica*	80	18.0
b	Elopidae	*Elops saurus*	227	77.2
c	Cichlidae	*Tilapia mossambica*	145	70.1
c	Cichlidae	*Tilapia mossambica*	106	40.3
c	Cichlidae	*Tilapia mossambica*	93	25.3
c	Cichlidae	*Tilapia mossambica*	92	20.4
c	Cichlidae	*Tilapia mossambica*	85	22.0
c	Cichlidae	*Tilapia mossambica*	90	23.6
c	Cichlidae	*Tilapia mossambica*	76	18.4
c	Cichlidae	*Tilapia mossambica*	79	19.4
c	Cichlidae	*Tilapia mossambica*	84	20.6
c	Cichlidae	*Tilapia mossambica*	96	23.7
c	Cichlidae	*Tilapia mossambica*	90	30.5

Replicate	Family	Species	Size (mm)	Weight (g)
c	Cichlidae	*Tilapia mossambica*	83	21.4
c	Cichlidae	*Tilapia mossambica*	86	22.3
c	Cichlidae	*Tilapia mossambica*	85	23.0
c	Cichlidae	*Tilapia mossambica*	80	19.2
c	Cichlidae	*Tilapia mossambica*	78	17.3
c	Cichlidae	*Tilapia mossambica*	83	20.5
c	Cichlidae	*Tilapia mossambica*	85	22.8
c	Cichlidae	*Tilapia mossambica*	88	21.4
c	Cichlidae	*Tilapia mossambica*	93	26.3
c	Cichlidae	*Tilapia mossambica*	82	21.4
c	Cichlidae	*Tilapia mossambica*	102	45.0
c	Cichlidae	*Tilapia mossambica*	83	28.4
c	Cichlidae	*Tilapia mossambica*	80	15.2
c	Cichlidae	*Tilapia mossambica*	83	19.6
c	Cichlidae	*Tilapia mossambica*	84	25.3
c	Cichlidae	*Tilapia mossambica*	81	20.6
c	Cichlidae	*Tilapia mossambica*	86	25.8
c	Cichlidae	*Tilapia mossambica*	77	17.4
c	Cichlidae	*Tilapia mossambica*	81	20.3
c	Cichlidae	*Tilapia mossambica*	74	19.4
c	Portunidae	*Scylla serrata*	115	255.2

Annex A5i: Bird Species Recorded in the Salt Pans, Winter 1998/99 and Spring 1999.

Common name	Latin name	Salt pan no.	Micro-habitat	Date							Status	Abundance	Wetland dependent
				12/2	26/2	5/3	17/3	25/3	29/3	14/4			
Little Egret	*Egretta garzetta*	1	b		2					2	R	●	✓
			s	1		2	6	1					
		2	b	2					1				
			s	1			2	1					
		3	s	3	1				1				
		4	b	1									
			s	1									
		5	s		1								
		6	b	1	2	1		1					
			s		13	34	2	1	1	1			
		7	s	7		1	1	1					
Grey Heron	*Ardea cinerea*	5	b				4				R	⊙	✓
Black-eared Kite	*Milvus lineatus*		*	2	1	3	2	2	1	4	R	●	
White-breasted Waterhen	*Amaurornis phoenicurus*		n			1					R	⊙	✓
Little Ringed Plover	*Charadrius dubius*	5	s		1								✓
Common Sandpiper	*Actitis hypoleucos*	1	b		1						R	●	✓
			s		1								
		2	s							1			
		3	s	1			1						
		4	s		1		1						
		7	s			1		1					
Spotted Dove	*Streptopelia chinensis*	6	b					1			R	●	
		7	b	6	1	7	6			2			
			s		1	1	1						
			n					2		1			
White-breasted Kingfisher	*Halcyon smyrnensis*	5	b	1							PM WV	●	✓
		6	b				1						
		7	s			1							
Common Kingfisher	*Alcedo atthis*	1	b				1				R	●	✓
		7	s	1			1						

Common name	Latin name	Salt pan no.	Micro-habitat	Date							Status	Abundance	Wetland dependent
				12/2	26/2	5/3	17/3	25/3	29/3	14/4			
Barn Swallow	*Hirundo rustica*	* 2	 s			2	 2	5 5	1	7	SV PM	●	
Olive-backed Pipit	*Anthus hodgsoni*		n			2					WV	●	
White Wagtail	*Motacilla alba*		n				1				WV	●	
Crested Bulbul	*Pycnonotus jocosus*	7	b s n			4 2				 4	R	⊙	
Chinese Bulbul	*Pycnonotus sinensis*	3 4 5 7	b b b n	3 1	 1 2	 2	 1	4 1	2 8	 3 2 1	R	●	
Magpie Robin	*Copsychus saularis*	7	b n				2	 1	 1		R	●	
Plumbeous Redstart	*Rhyacornis fuliginosus*		n			1					WV	○	✓
Yellow-bellied Prinia	*Prinia flaviventris*	3 4 5 6 7	b b s b b b	1 1	 1 	 1 2	 1 	1 1 	 1 1 	 1 	R	●	
Common Tailorbird	*Orthotomus sutorius*	6	b					1					
Dusky Warbler	*Phylloscopus fuscatus*	2 3 4 7	b b b s b n		 1 1 	 1 1	1 1	 1 2	 2 1	 1 3	PM	⊙	
Japanese White-eye	*Zosterops japonica*		n							4			
Rufous-backed Shrike	*Lanius schach*	4	b	2							R	●	
Magpie	*Pica pica*	2	b						1		R	●	
		7	b	1									
Jungle Crow	*Corvus macrorhynchus*	1	b				2				R	●	

Common name	Latin name	Salt pan no.	Micro-habitat	Date							Status	Abundance	Wetland dependent
				12/2	26/2	5/3	17/3	25/3	29/3	14/4			
Crested Myna	*Acridotheres cristatellus*	1	b		1						R	●	
		2	b	3					3				
		5	b				3						
		6	b		2		1						
Tree Sparrow	*Passer montanus*	1	b	2							R	●	
		2	b						3	2			
		7	b	1		2	7						
			n					1		5			
Masked Bunting	*Emberiza spodocephalus*	7	b				3				WV	●	
			n					2					
Number of species				12	9	14	17	12	10	11			
Number of birds				43	35	72	54	36	28	44			
H'				2.01	1.60	1.79	2.55	2.20	1.99	2.27			
J'				0.81	0.73	0.68	0.90	0.88	0.86	0.95			
d (%)				0.40	0.54	0.53	0.20	0.28	0.36	0.16			

Notes:

Status: R = resident, SV = summer visitor, PM = passage migrant, WV = winter visitor, OV = occasional visitor.

Abundance: ● = widespread and common, ⊙ = local but not uncommon, ○ = very local and rare, usually occurs annually in very small numbers or is restricted to a particular locality (abundance indices follow Viney *et al.* 1994).

Habitat: b = bunds of salt pans, n = nullah between salt pan 7 and village, s = shore (areas within 5m from the bunds).

Figure A5.1a Sampling Locations for Benthos, Intertidal Fauna in Stream, Marsh and Saltpans, Birds and Dolphins

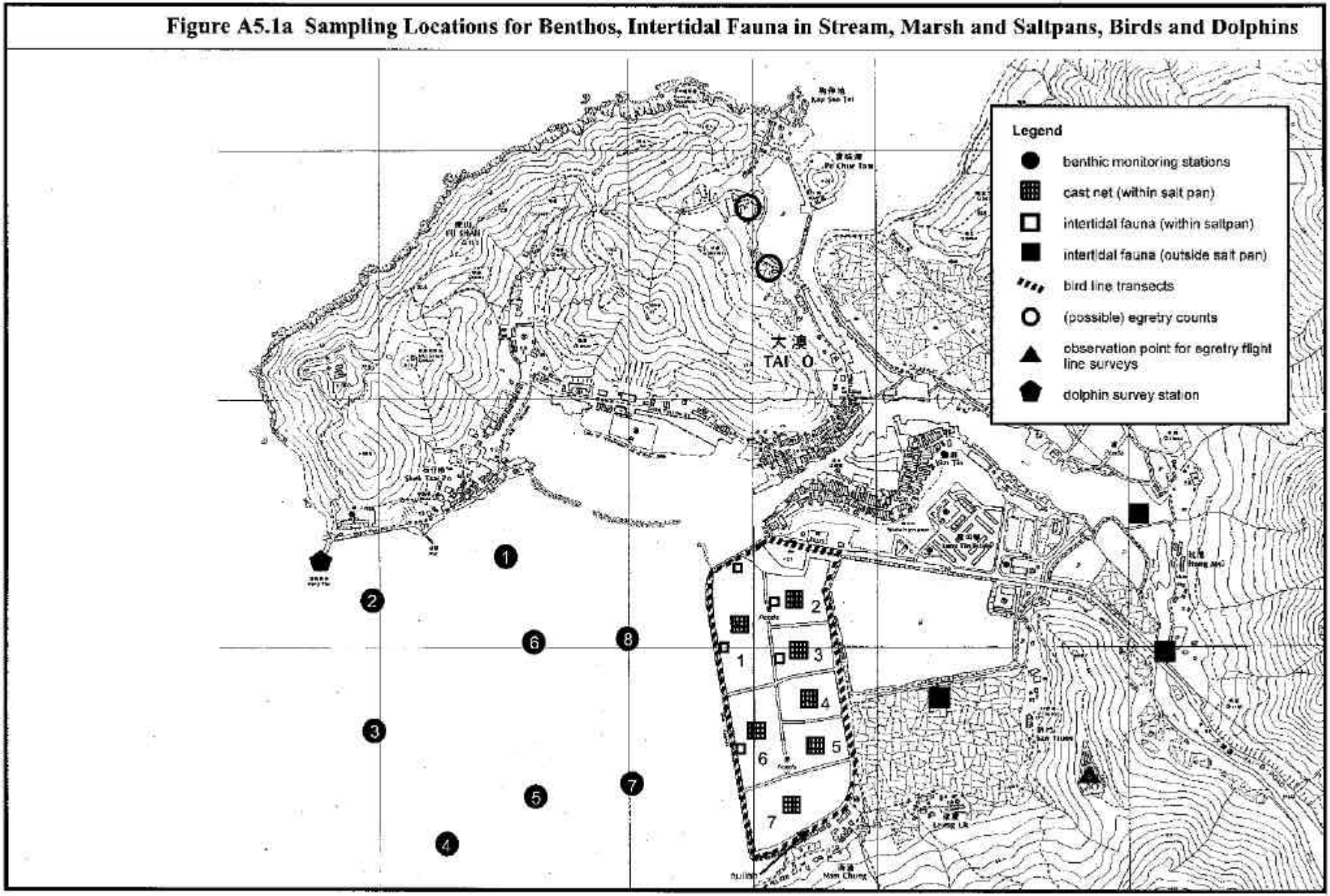


Figure A5.1b Sampling Locations for Fisheries and Intertidal Fauna on Natural Shores

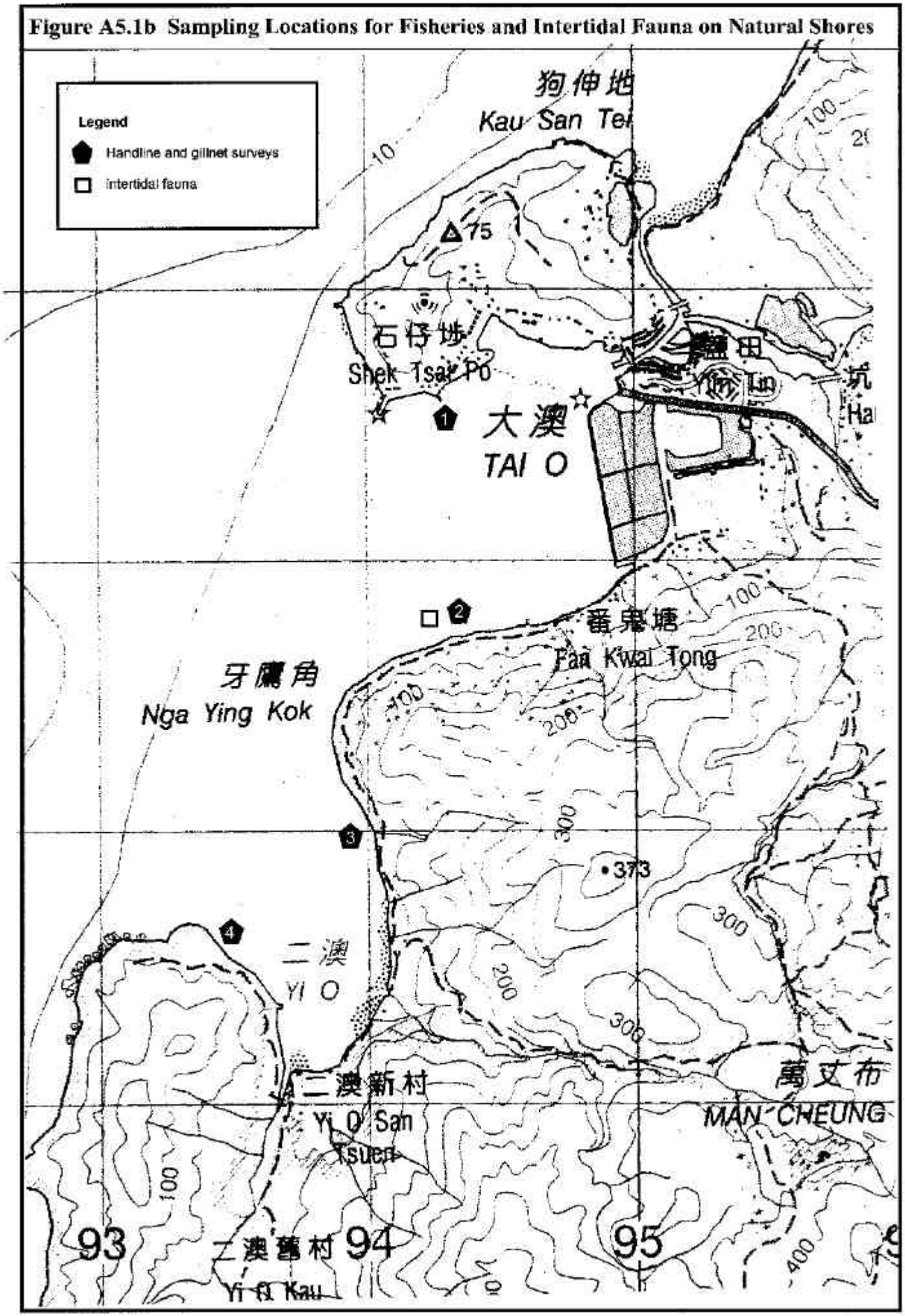
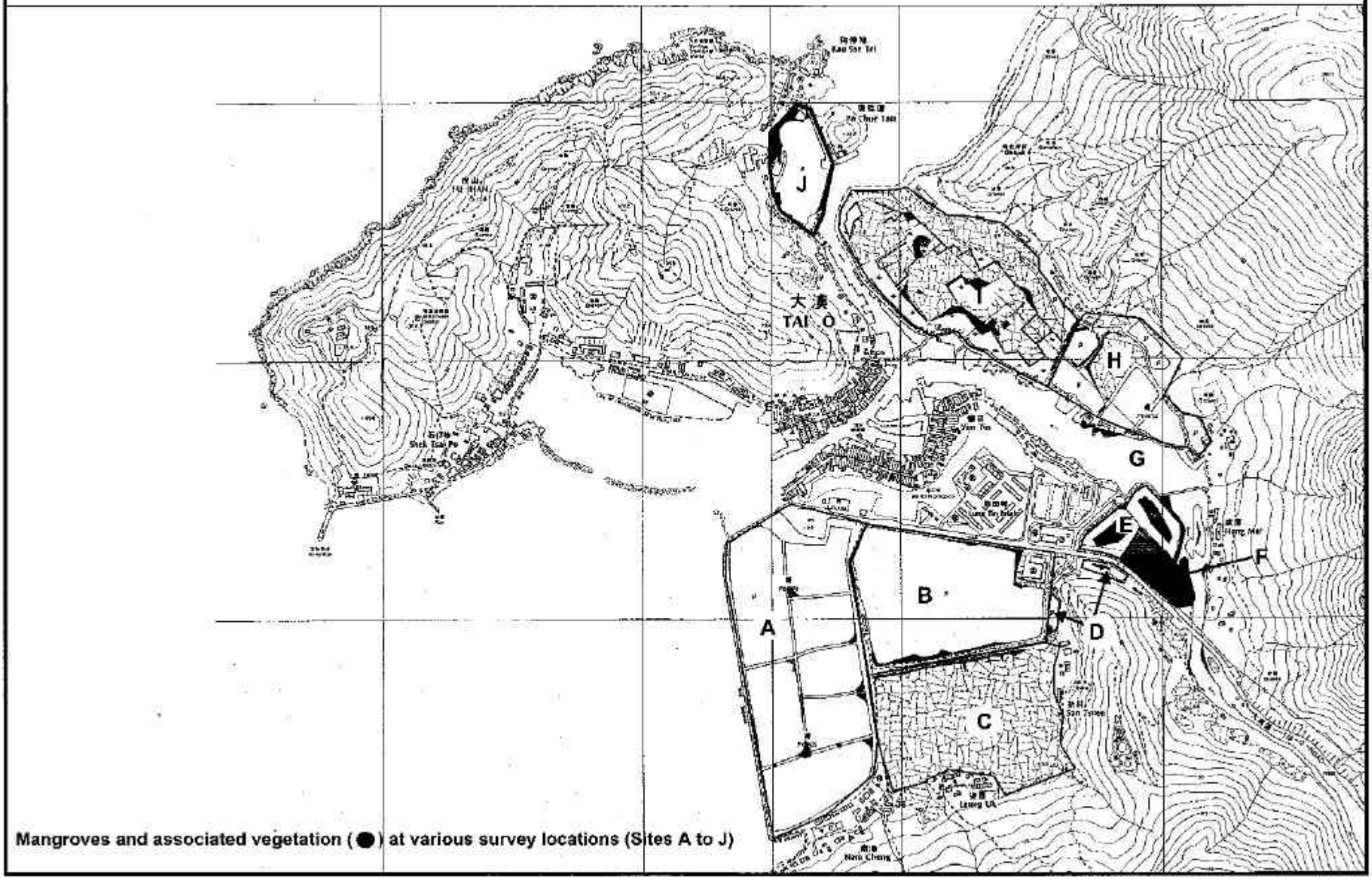


Figure A5.2 Mangroves and Associated Vegetation



Mangroves and associated vegetation (●) at various survey locations (Sites A to J)

Figure A5.3 LocationsofMajorMangrove Stands

Locationsofmajormangrovestands( ) worthyofconservation attheTaiOsaltpans.

Figure A5.4 Locations of dolphin sightings with direction of travel where determined

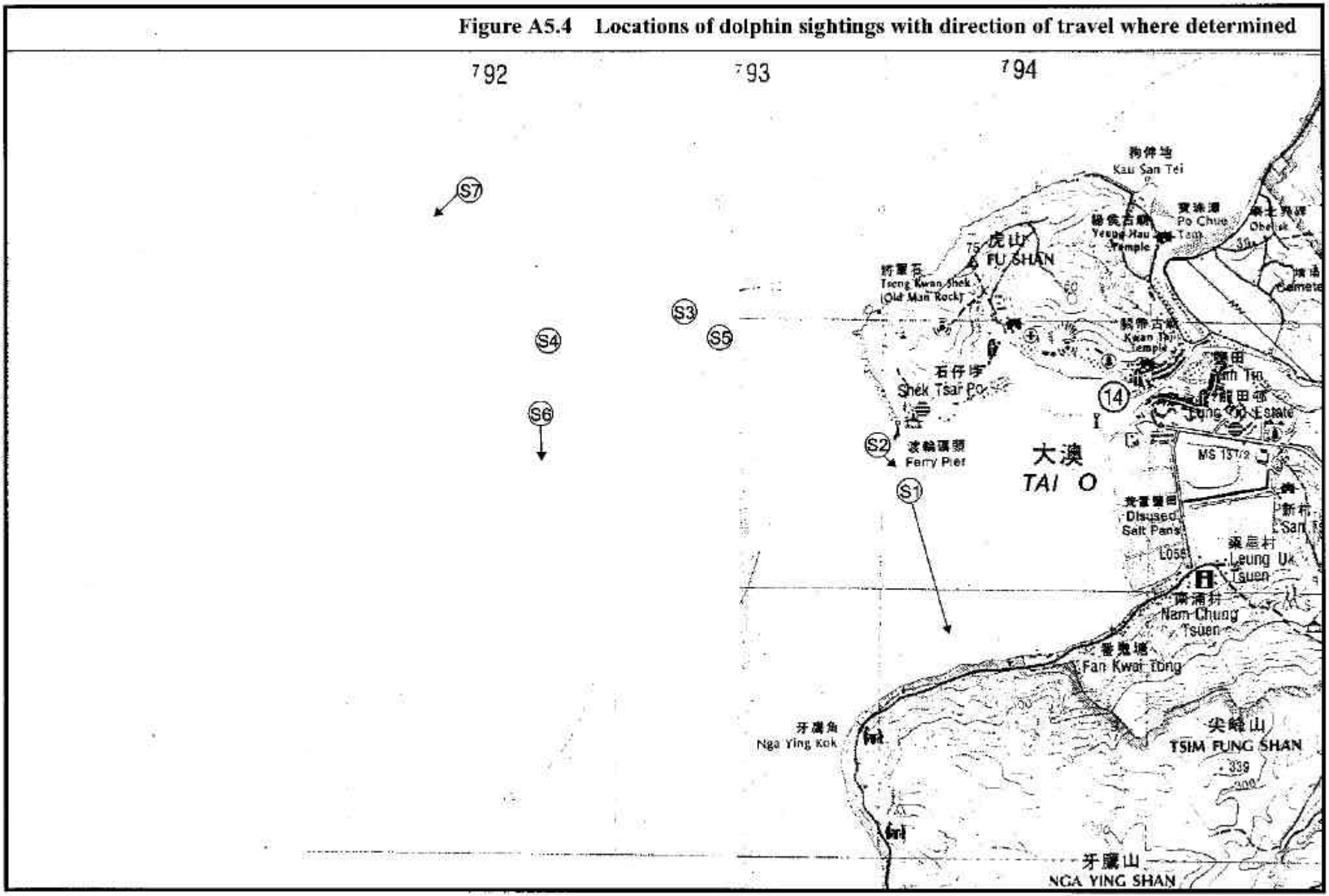
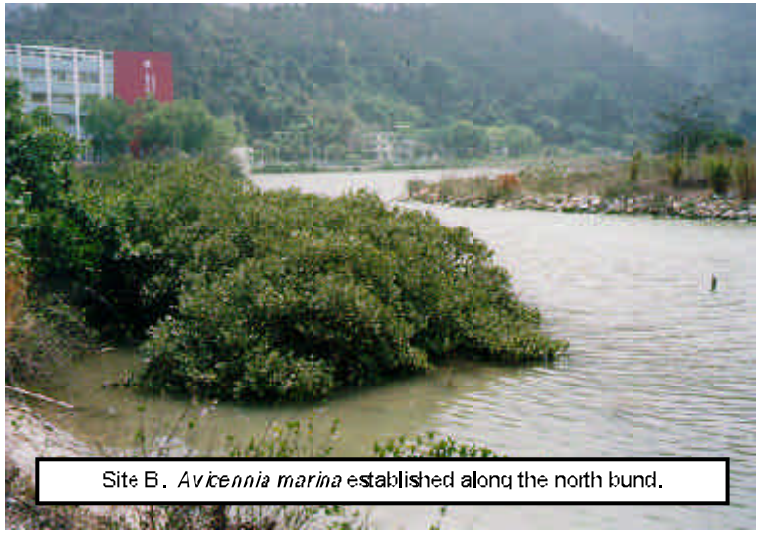


Plate A5.1 Mangroves at Sites A, B. and C of the Tai O Study Area

Site A. Mangroves tend to colonise the corner of the salt pans



Site B. *Avicennia marina* established along the north bund.

Site C. Mangroves established at the north end of the reedbed.

Plate A5.2 Mangroves at Sites D, E, and F of the Tai O study area

Site D. A few *Kandelia* seedlings established in an abandoned pond.

Site E. A mixed stand of *Kandelia candel* and *Avicennia marina* in an abandoned pond.

Site F. A well developed stand of *Avicennia marina* and *Kandelia candel* in an abandoned field.

Plate A5.3 Mangroves at Sites G, H, I and J of the Tai O Study Area

Site G. Mangrove associates along Tai O Creek banks.

Site H. Mangroves colonising the pond bunds

Site I. Mangroves and mangrove associates established along old bunds.

Site J. Mangroves at the western edge of the tidal lagoon