The Conservation Programme for the Chinese White Dolphin in Hong Kong

Agriculture, Fisheries and Conservation Department
2000

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I. INTRODUCTION

The Indo-Pacific Hump-backed dolphin (*Sousa chinensis*), or locally known as Chinese White Dolphin, is found throughout the western Pacific and Indian oceans, from southern China and northern Australia in the east to South Africa in the west. One dolphin population appears to be centred around the Pearl River Estuary, and Hong Kong waters represent the eastern portion of the range, which extends far into Mainland waters. The species is protected in Hong Kong by the Wild Animals Protection Ordinance (Cap. 170). The import, export, and possession of this species are also regulated by the Animals and Plants (Protection of Endangered Species) Ordinance (Cap. 187). Although the first scholarly description of a Chinese White Dolphin was made from observations of live animals in the Pearl River in 1757, there was no local dedicated scientific study on this species until early 1990s.

Concerned with the possible impact of various development projects in North Lantau on the Chinese White Dolphin, Agriculture, Fisheries and Conservation Department (AFCD), previously Agriculture and Fisheries Department (AFD), commissioned the Swire Institute of Marine Science in 1993 to undertake a biological baseline study on the dolphin within Hong Kong waters. In 1996, AFCD commissioned the Multi-disciplinary Research Programme on Indo-Pacific Hump-backed Dolphin Population (MRP) study to collect more systematic and in-depth information to ascertain the biology and status of the Chinese White Dolphin in Hong Kong. Dr Thomas A. Jefferson of Ocean Park Conservation Foundation was employed to undertake the study. The principal aim of the study was to examine the distribution and abundance of the population, and to determine trends in numbers. Information on stock discreteness, behavioural ecology, movement patterns, life history, and threats to the population were also addressed.

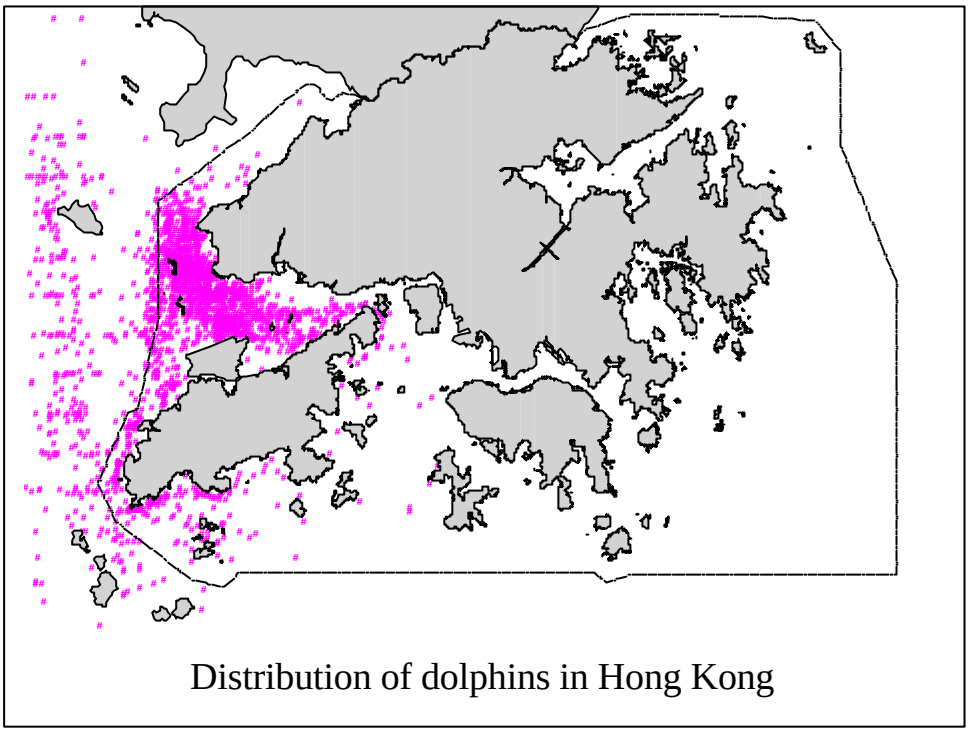
In 1998, the MRP study was completed. Government has also pledged, in the context of the 1998 Policy Address, to develop a conservation programme for the Chinese White Dolphins by 2000. This Conservation Programme is thus prepared, based on the findings of previous studies. Following this introductory section, the Programme is organized as follows: -

- Section II – Species Overview – provides a brief summary of the existing knowledge on Chinese White Dolphin acquired through the MRP study. The content of this section is extracted from the MRP study report, entitled "Population Biology of the Indo-Pacific Hump-backed Dolphin (*Sousa chinensis* Osbeck, 1765) in Hong Kong Waters: Final Report", submitted to AFCD in April 1998. Readers who need more scientific information on the dolphins should refer to this MRP study report and the references therein.

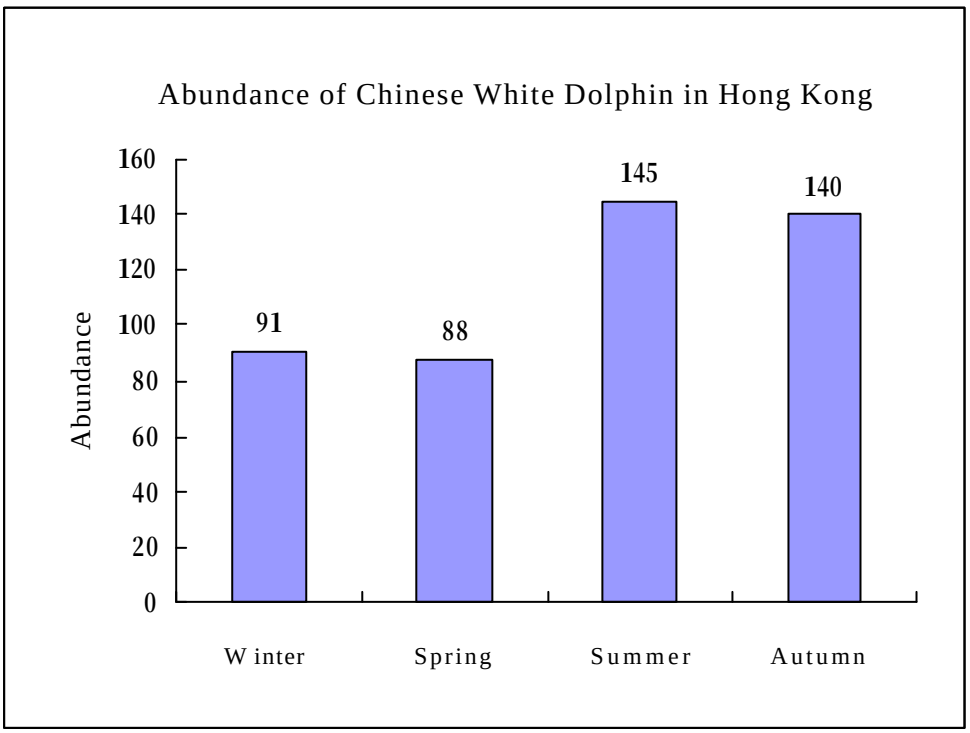
- Section III – Human Impact – describes the human-related factors that may threaten the continued survival of the species in Hong Kong, as their biological characteristics and requirements in the region are now better understood as a result of the recent study findings.

- Section IV – Conservation Plan – provides an account of conservation actions that government has initiated and will take to achieve the

objective of maintaining the long-term viability of the dolphins that use Hong Kong waters.



Distribution of dolphins in Hong Kong



II. SPECIES OVERVIEW

1. Distribution

The Indo-Pacific hump-backed dolphin (*Sousa chinensis* Osbeck, 1765), locally known as Chinese White Dolphin, is distributed throughout shallow, coastal waters of the Indian and western Pacific oceans, from South Africa in the west to northern Australia and southern China in the east. There are probably about 7 to 8 populations of Chinese White Dolphins along the southern China coast, mainly centred around the mouths of large rivers. One of the best-known populations in southern China is centred around the mouth of the Pearl River.

Indo-Pacific hump-backed dolphins are distributed widely in the eastern Pearl River Estuary, from the western waters of Hong Kong to at least the Zhuhai and Macau areas. There is much intermixing throughout this area, strongly suggesting that a single population is involved.

Within the Hong Kong Special Administrative Region, dolphins only occur regularly to the north and west of Lantau Island. However, the Deep Bay, East and South Lantau, and Lamma areas are used seasonally and to a lesser extent.

In winter and spring months, dolphins in Hong Kong use mostly waters of North Lantau. However, in summer and autumn when freshwater input increases, there is an influx of animals into other western waters of Hong Kong.

There are seasonal changes in the distribution patterns of dolphins in the North Lantau area. In winter and spring, dolphins are mostly seen west of the Brothers' Islands, but in summer and autumn, they are more continuously distributed throughout the entire North Lantau area.

2. Abundance

Abundance of dolphins in Hong Kong (based on line transect analysis) ranges from a low of about 88 animals in spring to a high of about 145 dolphins in summer. There appear to be over 900 animals in mainland Chinese waters of the Pearl River Estuary in winter, and currently the best available estimate of the total population size is 1,028 dolphins.

Mark/recapture analysis of photo-identification data suggests that the size of the total population in the Pearl River Estuary (including both Hong Kong and mainland Chinese waters) is over 556 dolphins.

3. Home Range and Group Size

Most individual dolphins appear to have home ranges that do not include the entire population's range. Many dolphins move between Hong Kong and Pearl River Estuary waters to the west of the boundary. Home range sizes of 29 km^2 to 395 km^2 were documented.

Groups of up to 23 dolphins were seen in Hong Kong, with an overall average group size of 3.8 dolphins. Groups in the Pearl River Estuary are significantly larger, ranging up to 44 animals. There appears to be no significant seasonal variation in

average group size. Calves make up only a small proportion of groups observed in winter months.

Composition of groups is highly fluid, with groups often changing membership over periods of hours or even minutes. Association indices for most pairs of individuals were quite low, indicating that pairs of individuals only spend about 0.23% of their time together, on average.

4. Behaviour

General behaviour patterns are similar to those of other species of coastal dolphins, although wave-riding behaviour is uncommon.

Dolphins associate with a number of types of fishing vessels, although pair trawlers are by far the most common and important ones. Dolphins often gather in large groups behind active pair trawlers and feed on prey stirred-up by the nets. Individual dolphins show different tendencies to feed behind pair trawlers.

5. Growth and Development

There is a great deal of developmental variation in the colour pattern. Newborns are dark grey and they lighten in the juvenile stage. Young subadults apparently continue to lighten and the dark colour gives way to dark spots on a light background. Adult females are pinkish-white in colour, with little or no spots. There may be some sexual dimorphism, with males retaining more spotting in the adult stage.

Length at birth is estimated to be about 100 cm, and the fetal growth rate appears to be about 8.8 cm/month.

Post-natal growth is rapid during the first year and then begins to level off. A secondary growth spurt appears to occur at about 10 years of age, after which asymptotic length is reached.

Length/weight relationships show an exponential pattern, reaching a maximum of about 250 kg for animals of 260 cm total length.

6. Feeding and Reproduction

Feeding appears to be mainly on several species of demersal and pelagic fish species, which are generally associated with estuaries. Neither cephalopods nor shrimps appear to be important prey items.

Although young are born throughout the year, there appear to be two calving peaks, one in late spring and another in late summer. Sexual maturity in females appears to occur at about 9-10 years of age.

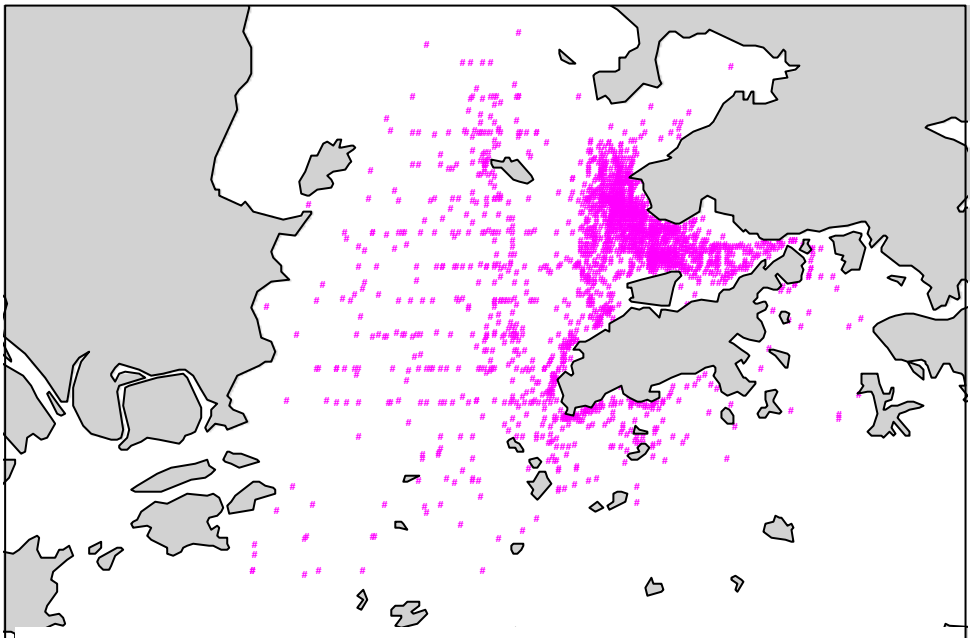
7. Threats

There are many development activities occurring in the area that may be having an effect on the dolphins' behaviour. The construction of the Aviation Fuel Receiving Facility in the range of the dolphins around the island of Sha Chau appears to have caused some short-term disturbance and temporary movement out of the adjacent area.

Several causes of death were suggested for stranded dolphins, including incidental entanglement in fishing gear and vessel collisions. However, because of the advanced level of decomposition of most strandings, the cause of death could not be determined for most animals.

Toxicological analysis shows that some dolphins have very high levels of environmental contaminants in their bodies (especially mercury and DDT). What effects these are having on the animals' longevity and reproduction are unknown, but a high incidence of neonate strandings may be related to organochlorine poisoning.

Levels of mortality in relation to population size cannot be accurately assessed at this time, because of various uncertainties. However, based on what we do know, there appears to be some cause for concern over the future status of the population. Nevertheless, extirpation does not appear likely in the immediate future, and the population shows every indication of still being viable.



Distribution of dolphins in the Pearl River Estuary

III. HUMAN IMPACTS

1. Habitat Loss and Disturbance

Reclamation involves converting an area of coastal waters into a piece of land. If that area of coastal waters were used by the Chinese White Dolphins as part of their home range, then the reclamation would result in a permanent loss of their habitat. Habitat loss as a result of coastal development has occurred in Chinese White Dolphin's range. At least part of the sea area now occupied by the Chek Lap Kok airport platform in North Lantau used to be a habitat for the dolphins before it was reclaimed, although the significance of removal of this habitat to the dolphins cannot be confirmed.

Construction activities occurring within the dolphins' core habitat have been, and remain a major concern. In the construction of the Aviation Fuel Receiving Facility (AFRF) at Sha Chau, an innovative measure called "bubble curtain" was developed and deployed to reduce the noise damage and disturbance to the dolphins caused by underwater percussive piling. This mitigation measure was found to be effective, and other mitigation measures, such as monitoring the area for presence of dolphins before piling, emission of warning sounds before operation began and acoustic de-coupling, were also implemented for this AFRF project. There was however still evidence to suggest that the dolphins might have experienced disturbance and stress during piling and have temporarily moved out of the adjacent area during the construction of the AFRF.

The issue of habitat loss and disturbance is indeed part of a wider problem of competition for limited resources, namely, the coastal waters within Hong Kong, among various users. Competing uses include navigation, reclamation for development, dredging for marine sand, dumping space for contaminated or uncontaminated sediment, fishery, and conservation. Clearly, it is unlikely that the intensity of this competition will diminish and habitat loss remains a threat to dolphins in Hong Kong waters.

2. Pollution

The volume of sewage discharged into Hong Kong's waters is considerable. Although there is very little information available on the effects of sewage on wild dolphin populations, the sewage could be a potential source of pathogenic bacteria, fungi and viruses. Chinese White Dolphins, being marine mammals, are vulnerable to a number of pathogens which can be transmitted via human sewage wastes. Infection of local cetaceans, Chinese White Dolphin included, from sewage contaminated waters could be a potential issue of great concern.

Immunosuppression and other health impacts caused by accumulation of environmental contaminants, such as heavy metals and organic compounds, can be another potential long-term threat to the local dolphin population though the causal relationship is difficult to prove conclusively. For example, the level of mercury was found to be high enough to warrant concern, considering the known damaging effects that this heavy metal can exhibit in dolphins. The apparent residency of the population in the Pearl River Estuary also means that the animals are unlikely to move out of the area to a less polluted area.

3. Depletion of Food Resources

Since feeding habit studies found that there was an overlap in prey of dolphins and targets of fishing vessels, competition exists between fishermen and dolphins for the same fisheries resources. There is some recent evidence suggesting that the fisheries resources in Hong Kong have declined. This would affect not only the fishermen, but also the dolphins. Both of them will surely suffer if there is a continual decline in fisheries resources of the area. There is however insufficient information to allow an accurate evaluation of the significance of this potential threat.

4. Vessel Traffic

Hong Kong is one of the busiest ports in the world, and a large number of vessels pass through Hong Kong waters everyday. North Lantau, the most important dolphin habitat in Hong Kong, is also a busy vessel traffic area. In fact, the Urmston Road, a shipping channel in North Lantau, is also an area where numerous sightings of Chinese White Dolphins have been located. In the photo-identification catalogue, there are some individuals which show unmistakable evidence of propeller cuts on the body, apparently resulting from previous encounters with vessel collisions. Albeit the actual cause of death could not be established for most dead stranded dolphins, vessel collision, together with incidental catch by fishermen (see below) were found to be two of the most significant human-related mortality factors.

Besides the risk of direct collision, vessel traffic also generates noise that can interfere with echolocation and communication of dolphins. In Hong Kong, where the Chinese White Dolphins live in turbid estuarine waters, the noise problem is likely more significant since the poor turbidity makes visual detection difficult.

Vessel traffic associated with dolphin-watching tours also has a potential impact on the dolphins. Although the impact of dolphin-watching seems minimal compared to the disturbance caused by other vessels, it could nevertheless result in greater stress and higher chances of boat collisions, as dolphin groups are being sought out and pursued on purpose.

5. Fishery By-catch

Unlike in other parts of Asia (e.g. Japan and Indonesia), there appears to be no direct fishery for dolphins in southern China, including Hong Kong. Some stranded specimen showed strong evidence of capture in fishing nets. They were however very likely the result of incidental catches. Deliberate capture of dolphins does not appear to be a significant threat in Hong Kong. Dolphins in Hong Kong and Pearl River Estuary however associate with pair trawlers. Some individuals may use this as their primary feeding method. The incidental by-catch problem, therefore, should not be neglected and should be monitored and examined further.

IV. CONSERVATION PLAN

1. Introduction

The overall long-term goal of this Conservation Plan is to enable the Chinese White Dolphins to continue to use waters of Hong Kong SAR as a portion of their population range and to enhance the continued survival of this dolphin population inhabiting the Pearl River Estuary.

To achieve this goal, a four-pronged approach involving management, public education, research, and cross-boundary co-operation is necessary. Management will aim at improving the habitat for the dolphins and at minimizing the effects from human activities that may threaten the short-term and long-term survival of the dolphins in Hong Kong. Public education will improve the community's understanding of the issue and solicit their support for the conservation programme. Research will increase our knowledge of the species and provide the scientific basis and input for improving, refining, and updating the conservation plan. Cross-boundary co-operation will help to improve co-ordination with Mainland authorities in developing and implementing joint conservation programmes. This is crucial since the dolphin population to be conserved uses waters of both Hong Kong and Guangdong, as well as those of Macau.

2. Objectives

2.1 Management

- Improve the general marine environmental conditions
- Minimize or avoid impacts of coastal development on dolphins
- Designate more marine protected area for Chinese White Dolphins
- Ensure the existing marine protected area for Chinese White Dolphins is properly managed
- Implement measures to re-build fish stocks

2.2 Public Education

- Promote community involvement and awareness

2.3 Research

- Monitor trends in abundance of Chinese White Dolphins
- Maximize efforts to acquire scientific information from stranded animals
- Conduct further population and ecological studies

2.4 Cross-boundary Co-operation

- Co-ordinate efforts with neighbouring Administrations

3. Management

3.1 Improve the General Marine Environmental Conditions

Explanation

Degradation of the local marine environment, on which the dolphins ultimately depend, is a threat to the long-term survival of the animals. Major efforts should be made to clean-up local waters and improve water quality. Due to the likelihood that high levels of pathogenic bacteria would cause health problems to the dolphins, the standard of treatment of sewage effluent discharging into the dolphins' range should

be upgraded to chemically enhanced primary (or secondary) treatment plus disinfection. Illegal use and discharge of toxic substances, such as DDT, should be investigated and eliminated.

Action

Implement the Strategic Sewage Disposal Scheme (SSDS). The SSDS is intended to provide a sewage collection, treatment and disposal system in stages to improve water quality in Victoria Harbour. Stage I of this Strategic Sewage Disposal Scheme is being implemented which, upon completion by late 2001, would certainly improve the general marine water quality in Victoria Harbour.

Disinfection of Sewage Discharging into North Lantau. Government is planning to disinfect all effluent discharging into North Lantau waters, which is the most important dolphin habitat in Hong Kong. This precautionary measure, adopted principally to safeguard the well being of the dolphins, would reduce the risk of sewage-borne pathogens to dolphins. In particular, disinfection facilities will be provided at Siu Ho Wan Sewage Treatment Plant by 2004.

Disinfection of all major sewage discharges in Hong Kong. To further improve the marine water quality, it is government's target to complete by 2000 the formulation of a ten-year programme to upgrade major sewage treatment facilities to achieve the 99.9% bacteria load reduction.

Take Response Actions in Chemical or Oil Spill. To ensure, in the event of chemical or oil spill accidents that dolphins would not be further stressed, AFCD would liaise with other government departments or agencies closely such that any such incidents would be promptly reported to us. Depending on the locations of the incident, we would recommend appropriate actions (e.g. not to use oil dispersant chemicals) and to take recovery actions to save those injured dolphins.

Study of Toxic Substances Pollution. In October 1999, the Environmental Protection Department (EPD) has commissioned a study on toxic substances pollution in Hong Kong to identify the sources and fates of toxic pollutants in the aquatic environment and their potential impacts on local flora and fauna. The study is expected to be completed by early 2002. The study will provide a sound scientific basis for the formulation of an effective toxic substances pollution control strategy for Hong Kong.

3.2 Minimize or Avoid Impacts of Coastal Development on Dolphins

Explanation

The environmental impact assessment process is an important means of avoiding or minimizing the potential impacts of development on the Chinese White Dolphins. Whenever a major development project is proposed in or adjacent to important dolphin areas, the proponent would be required to conduct an ecological assessment with special reference to dolphins. Appropriate mitigation measures would be specified to ensure that the residual impact to dolphins would be kept within acceptable levels.

The Environmental Impact Assessment Ordinance (EIAO) (Cap. 499) which came into effect in 1998 is an ordinance to provide for assessing the impact on the environment of certain projects and proposals. These projects or proposals, called

designated projects, are clearly listed in the two schedules of the ordinance. All designated projects require an approved Environmental Impact Assessment report prepared in accordance with the statutory procedure. The construction, operation and decommissioning of designated projects (Schedule 2) require an Environmental Permit. The public consultation in the statutory EIA procedure, in which the public and the Advisory Council on the Environment (ACE) are allowed to comment on the project profile and EIA report approval, renders the whole process much more transparent.

Action

Ensure the potential impact on dolphins is properly addressed in all development projects. For all development that may affect the Chinese White Dolphin, the EIA team established within AFCD would examine the project to ensure that the impact assessment on dolphins is properly done, and necessary mitigation measures are proposed. The team will also monitor the implementation and effectiveness of mitigation measures designed for negating ecological impacts. Under the EIAO, mitigation measures set out in the approved EIA report will become part of the conditions of the Environmental Permit; violation of Environmental Permit conditions is an offence.

3.3 Designate More Marine Protected Areas for Chinese White Dolphins

Explanation.

Protecting the core areas within the range of the dolphins is one of the most important means of conserving this marine mammal species. Statutory designation of the protected core area, followed by its active and effective management, would go a long way to help maintain the long-term viability of the species.

Action

Consider the Designation of Southwest Lantau as a Marine Park. A feasibility study was commissioned by AFCD in late 1997 to study four potential marine park/reserve sites in Hong Kong, namely South Lamma, Outer Port Shelter, Ping Chau and Southwest Lantau. The study indicates that the Southwest Lantau area is used by both Chinese White Dolphins and the Finless Porpoises, and should merit consideration of designation as a marine park or reserve. Meanwhile, the relatively undeveloped area along the west coast of Lantau Island (and perhaps part of the South Lantau area around Fan Lau and the Sokos Islands) have been found in our recent study to deserve consideration for marine park status. AFCD is considering the way forward with a view to designating Southwest Lantau as a Marine Park for the benefit of the dolphins. During the interim, we would consider to designate Southwest Lantau as a Site of Special Scientific Interest (SSSI).

3.4 Ensure Protected Areas for Chinese White Dolphins are Properly Managed

Explanation

The Marine Parks Ordinance (Cap 476) and the Marine Parks and Marine Reserves Regulation make provisions for the management and control of marine parks and marine reserves and to prohibit or control certain activities in a marine park or a reserve. Proper management of the Sha Chau and Lung Kwu Chau Marine Park, designated for the protection of Chinese White Dolphins and the general marine environment, is essential to ensure that this Marine Park would benefit the long-term survival of the dolphins.

Action

Patrol and Enforcement. Regular patrols are made by AFCD staff and warning or enforcement actions are taken against persons violating the Marine Parks and Marine Reserve Regulations. Vessels travelling in the Marine Park must observe a speed limit of 10 knots. This would reduce the chance of a vessel running over dolphins. Other activities that may injure dolphins indirectly, such as stern trawl, pair trawl or shrimp trawl fishing devices, are prohibited within the Marine Park.

Monitoring of Conditions. Physical and biological monitoring programme were established and are being implemented to keep track of the conditions and trends of both the physical parameters and biological characteristics within the Sha Chau and Lung Kwu Chau Marine Park.

Establish a Hang Trawl Prohibition Zone within the Marine Park. In view of the fact that hang trawl fishing is permitted within the Sha Chau and Lung Kwu Chau Marine Park, and that this fishing method may pose potential hazards to Chinese White Dolphins, AFCD has set up a hang trawl prohibition zone in the northern part of the Marine Park where most Chinese White Dolphins sightings were made.

Deployment of Artificial Reefs in North Lantau. To enhance fisheries resources, which would benefit the Chinese White Dolphins by providing more fishes for them to feed on, AFCD has deployed artificial reefs in the Sha Chau and Lung Kwu Chau Marine Park and in Chek Lap Kok Marine Exclusion Zone. Experience in other countries indicates that artificial reef deployment, coupled with appropriate management measures, has a beneficial effect on the fisheries resources. Deployment of artificial reefs in the Marine Parks was completed in March 2000. The effectiveness of artificial reefs in ecological enhancement for the benefit of the Chinese White Dolphin is being monitored and assessed.

3.5 Implement Measures to Re-build Fish Stocks

Explanation

Prey species of dolphins are also targeted by Hong Kong fishermen. While both of them will suffer from a depletion of fisheries resources, they both will benefit if there is rehabilitation of the fisheries resources. Implementations of measures to re-build the local fish stock will therefore enhance the long-term availability of prey species to the dolphins.

Action

Amendment of Fisheries Protection Ordinance (Cap 171). The purpose of this ordinance is to promote the conservation of fish and other forms of aquatic life within the waters of Hong Kong and to regulate fishing practices and to prevent activities detrimental to the fishing industry. To further protect the fisheries resources and to deter destructive fishing practices, the ordinance has been amended in 1998 to increase the maximum fine from $10,000 to $200,000 and the amendment to widen the scope of control over other forms of destructive fishing practices has taken effect from 31.12.1999 onward.

Implement the Artificial Reef Programme. A sum of HK$100 million has been secured in AFCD to enhance existing marine habitats and fisheries resources through

the deployment of artificial reefs (ARs). The purpose of the AR programme in Hong Kong is to protect and restore important areas of the marine ecosystem and promote sustainable use of natural resources. The first phase of the AR programme, which involves the deployment of ARs in marine parks was completed. The second phase of the programme, which involves the deployment of ARs at other sites in Hong Kong waters, is being implemented. The recently completed consultancy study (The Artificial Reef Deployment Study) has identified suitable sites for AR deployment, formulated an overall deployment and management strategy, and recommended site-specific management and deployment plans for this phase 2 programme.

Formulate and Implement a Fisheries Resources Conservation and Management Strategy. In 1996, AFCD commissioned the "Fisheries Resources and Fishing Operations in Hong Kong Waters" consultancy study. The study was completed in 1998. It indicated that fisheries resources are overexploited and this is the main factor that has led to the decline in fish stocks. To rectify the over-exploitation situation and to promote the sustainable development of the fishing industry, government considers that further measures should be adopted to manage the fisheries resources and fishing operations in Hong Kong waters. Although there are different views regarding the pace and extent of implementation during the public consultation exercise, it is generally agreed that the high priority options recommended by the consultants should be implemented first. These high priority measures include the following six elements: introduction of fishing license system, limiting entrants, protection of nursery and spawning areas, habitat enhancement, habitat restoration and restocking. The on-going AR programme comes under the habitat enhancement management option and will be given high priority. A management strategy for fisheries resources and fishing operations in Hong Kong is being formulated with regard to the consultants' recommendations and public opinions. AFCD has also set up an advisory Working Group on Fisheries Management to advise on matters relating to the implementation of a fisheries management strategy in Hong Kong waters.

4. Public Education

4.1 Promote Community Involvement and Awareness

Explanation

Conservation of the Chinese White Dolphin is unlikely to be successful without the support and participation of the community. Effort is therefore needed, from both government and non-government organizations (NGOs) to arouse public interest and awareness of dolphin protection. On the other hand, increased public interest in dolphins may generate more commercial or non-commercial dolphin watching activities, which if improperly conducted and managed, may cause harassment to the dolphins. Hence, in promoting public interest, the importance of community education should not be lost sight of.

Action

Minimize Harassment by Dolphin Watching Activities. A dolphin watching "Code of Conduct" was first published by World Wide Fund for Nature Hong Kong. This was further refined by AFCD as a "Code of Conduct for Dolphin Watching Activities". Main points of the code of conduct have also been incorporated into one leaflet and distributed for people to observe.

Strengthen Education and Publicity to the Community and Fishermen. Well aware of the importance of publicity in achieving conservation objectives, AFCD has produced leaflets, posters and bookmarks on Chinese White Dolphins. Exhibition panels have been displayed in some of our visitor/education centres. Five life-size Chinese White Dolphin models have been produced and been used in exhibition programmes. Co-operation with the Education Department has been made to produce education television programmes on Chinese White Dolphin conservation.

AFCD will continue to produce in the future more publicity materials (e.g. Video CD or CD-ROM) and education materials (e.g. teaching kit or education pack) on Chinese White Dolphins, as necessary. More information will also be made available in the AFCD homepage, such that any person interested may access the information easily through the Internet.

To arouse the awareness of the public and fishermen on fisheries protection, 20 signposts have been erected at popular landing piers, reminding them not to practice destructive fishing. Messages on fisheries and dolphin conservation are also disseminated to fishermen and the general public through leaflets and various seminars or training courses.

Liaison with stakeholders of the Sha Chau and Lung Kwu Chau Marine Park, including the fishermen, are conducted regularly. As a result, fishermen using Sha Chau and Lung Kwu Chau Marine Park are generally well informed of the requirements of the ordinance and regulations, and the need for protecting the Chinese White Dolphins that heavily use the waters within the Marine Park.

Enhance Partnership with non-government organizations (NGOs). Disseminating dolphin conservation messages to the public is not the sole responsibility of government. NGOs have been doing this task for some time already and have contributed much. To optimise use of available resources and to improve effectiveness of conservation efforts, more and better means of co-operation between the government and NGOs will continue to be explored. One recent example is AFCD's consent to have one of their Chinese White Dolphin models on-loan to Green Power for display at the China Light and Power Chinese White Dolphin Resource Centre at Lung Kwu Tan.

5. Research

5.1 Monitor Trends in Abundance of Chinese White Dolphins

Explanation

Accurate and up-to-date information on the abundance and trends in abundance is vital to sound conservation and adaptive management of the animal. To assess the effectiveness of various actions of the conservation programme, the change in distribution and abundance of Chinese White Dolphins within Hong Kong waters is an essential piece of information. Continual monitoring of abundance would therefore provide a useful indicator of the success, or otherwise, of the conservation measures that have been taken for the dolphins.

Action

Continue to Monitor Dolphin Distribution and Abundance in Hong Kong. Through the previous studies, in particular the "Multi-disciplinary Research Programme on

Indo-Pacific Hump-back Dolphin Population" (MRP) study, appropriate methods and procedures for estimating abundance of dolphins have been established. The MRP study has also provided useful baseline information with which future monitoring results can be compared to detect any trend in abundance. Using the same methodology, AFCD will monitor the abundance of Chinese White Dolphins in Hong Kong waters over the long-term.

5.2 Maximize Efforts to Acquire Scientific Information from Stranded Animals

Explanation

Stranding is a source of information on aspects of dolphin biology that cannot easily be obtained in any other way. Collection of stranded dolphin carcasses and detailed necropsies provide information on the causes of death, and samples for life history studies, including their feeding habits, growth and reproduction, ecotoxicology and stock structure. Assessments of the causes and frequency of mortality also help understand and monitor abundance trends.

Action

Continue and Enhance the Stranding Investigation Programme. A stranding programme, established by AFCD, has been running for several years. The programme aims at prompt and efficient recovery and investigation of stranded animals, proper necropsy for dead animals and adequate analysis. To facilitate reporting of dolphin strandings, a hotline has been established, and publicised through posters and leaflets. Dedicated staff in AFCD will continue to oversee and co-ordinate the stranding programme, to ensure that incidents of stranding will be reported to AFCD for action, and that efficient and appropriate actions be taken to collect scientific information from the stranded animals. Leaflets or posters will be produced regularly to publicize the stranding programme.

5.3 Conduct Further Studies

Explanation

Based on the findings of recent studies on Chinese White Dolphins, the following further studies are recommended.

(a) Systematic line transect studies, using the same technique as in previous studies, should be continued in Pearl River Estuary, in addition to Hong Kong waters, over the long term. This would allow for tracking of population trends with a high degree of statistical power.

(b) Programmes involving vessel surveys of distribution and abundance, using the same systematic line transect technique and recovery of stranded animals, such as those established in Hong Kong, the Pearl River Estuary, and Xiamen, should be extended to other areas along the coast of southern China. Only by doing so, we can put the situation of the local population into the larger context.

(c) To obtain reliable data on the organochlorine level of the population as a whole would involve the development of a small-scale, trial programme aimed at collection of small biopsy samples of skin and blubber from live specimens in at least Hong Kong or the Pearl River Estuary. However, in view of the

potential harm biopsy may have on the dolphins, further collection of biopsies should only proceed if adequate wound healing can be documented.

(d) Because knowledge of stock structure is such an important management issue, population discreteness along the southern China coast should be examined further using molecular, morphometric, and other techniques. Collection of skin samples from biopsies would also facilitate this.

(e) There is still little information on the critical issue of life history parameters. Therefore, the reproductive biology and life history of the population occurring in Hong Kong waters should be further examined. In particular, parameters such as age and length at sexual maturity, length of stages in the female reproductive cycle, and reproductive rates should be studied.

(f) Due to the fact that there has been almost no research conducted on the acoustic behaviour and noise disturbance factors for Indo-Pacific Hump-backed dolphins, a study to characterize the predominant sounds made by the animals should be conducted. This should also include an evaluation of potential acoustic disturbance from human-caused sound sources in the dolphins' environment.

(g) Study of the interaction between dolphins and fisheries, in particular the pair trawl fishery, to assess the significance of accidental by-catch and to study the possible relation between the distribution of dolphins and fisheries resources should be conducted.

Action

Undertake and Encourage Studies on Chinese White Dolphins. Further studies identified above would either be undertaken by government, or by tertiary institutes and NGOs. Collaborative studies among interested parties on dolphins would also be encouraged.

The Swire Institute of Marine Science is currently studying the acoustic behaviour and noise disturbance factors for Chinese White Dolphins. AFCD has rendered support for surveys within the Sha Chau and Lung Kwu Chau Marine Park. The Ocean Park Conservation Foundation is studying the interaction between dolphins and fisheries and population biology. AFCD will liaise with these organizations to keep in view of the findings and recommendations of the studies.

6. Cross-Boundary Co-operation

6.1 Co-ordinate Efforts with Neighbouring Administrations

Explanation

Since the dolphins that use Hong Kong waters form part of the dolphin population inhabiting the Pearl River Estuary, which encompasses waters of both the Hong Kong Special Administrative Region and Mainland, as well as Macau, it is important that regular liaison be maintained among the administrations to facilitate a co-ordinated approach to better conserve the dolphin population. The dolphin population that lives in Pearl River Estuary seems to have little or no genetic exchange with other populations in China (e.g. dolphins in Xiamen). Maintaining and protecting the Pearl

River dolphin population should therefore be accorded high priority by both Hong Kong and Guangdong.

Action

Strengthen Co-operation with Guangdong Authorities. A Study Group for the Conservation of Chinese White Dolphin was established in 1997 under the Technical Sub-Group of the Hong Kong – Guangdong Environmental Protection Liaison Group (EPLG). Meetings are held regularly to exchange information and enhance co-operation, with a view to developing a joint conservation programme in future. In early 1999, a poster was produced by the Study Group to increase public awareness on dolphin conservation. Telephone hotlines are also printed on the poster to encourage the public in both Hong Kong and Guangdong to report sightings of dolphins to the relevant authorities. A Fisheries Resources Environmental Protection Group has also been established since late 1998 to exchange information on fisheries resources and red tide, and to consider co-operative efforts in resource conservation. The Study Group for the Conservation of Chinese White Dolphin is an important venue to allow co-operation between Hong Kong and Guangdong in conserving the Chinese White Dolphin population of Pearl River Estuary. The work of the Study Group will continue and be strengthened through the "Hong Kong-Guangdong Marine Resources and Conservation Special Panel" set up under the "Hong Kong-Guangdong Joint Working Group on Sustainable Development and Environmental Protection".

Exchange Information and Experience with Xiamen Authorities. There is a population of Chinese White Dolphin living in Xiamen waters, which is probably separate from that in the Pearl River Estuary. This group is probably one of the closest populations to the one inhabiting Pearl River Estuary. In August 1997, a provincial Xiamen Chinese White Dolphin Nature Reserve, covering an area of 5,500 hectares, was established. Contacts will be made between Hong Kong and Xiamen governments to share experience in the management of protected areas for dolphins and to exchange knowledge and information on this important species.

7. Advisory Body

The conservation programme should be a dynamic and iterative programme. It should be implemented in a manner which is responsive to the changing nature of the biological system. The findings and progress of its implementation should be regularly reviewed so that the various conservation actions can be adjusted in accordance with the most up-to-date situation.

The Marine Mammal Conservation Working Group under the Country and Marine Parks Board is the suitable advisory body to give advice and monitor progress of the implementation of the conservation programme. The Working Group, established in 1995, serves to advise the Director of Agriculture and Fisheries of potential threats to the well-being of marine mammals in Hong Kong waters and to make recommendations for potential action. Members of the Working Group include scientists, government representatives, Green Group members, and fishermen leaders, representing views of different stakeholders of the community.

It is therefore recommended that progress of the implementation of the Conservation Programme be presented regularly to the Marine Mammal Conservation Working

Group of the Country and Marine Parks Board to seek advice and guidance from Working Group members for continuous and effective review and refinement of the Conservation Programme for the Chinese White Dolphin in Hong Kong.

Agriculture, Fisheries and Conservation Department
November 2000