Biodiversity Strategy and Action Plan
Marine Biodiversity Working Group
Marine Habitat Assessment Focus Group –Final Report (September 2014)

1. **Relevant Aichi Biodiversity Target(s)/ CBD requirements(s)**

   - **Relevant Aichi Biodiversity Target(s)**
   - Strategic Goal B
     – Loss of Habitat: By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.

     – Sustainable Fisheries: By 2020, all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impact on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.

   - Strategic Goal C
     – Protected Areas: By 2020, at least 17% of terrestrial and inland water areas and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representatives and well connected systems of protected areas and other effective areas-based conservation measures, and integrated into the wider landscape and seascape.

     – Preventing Extinction: By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

   - **Relevant Convention on Biological Diversity Articles**
     Article 7. Identification and Monitoring
     (a) Identify components of biological diversity important for its conservation and sustainable use having regard to the indicative list of categories set down in Annex I:

Annex I. Identification and Monitoring

*(1). **Ecosystems and habitats:***
- ***containing high diversity,***
- ***large numbers of endemic or threatened species, or***
- ***wilderness;***
- ***required by migratory species;***
- ***of social, economic, cultural or scientific importance; or,***
- ***which are representative, unique or associated with key evolutionary or other biological processes;***

(2). Species and communities which are:
- *threatened;*
- *wild relatives of domesticated or cultivated species;*
- *of medicinal, agricultural or other economic value; or social, scientific or cultural importance; or*
- *importance for research into the conservation and sustainable use of biological diversity, such as indicator species; and*

(3). Described genomes and genes of social, scientific or economic importance.

(b) Monitor, through sampling and other techniques, the components of biological diversity identified pursuant to subparagraph (a) above, paying particular attention to those requiring urgent conservation measures and those which offer the greatest potential for sustainable use;

(c) Identify processes and categories of activities which have or are likely to have significant adverse impacts on the conservation and sustainable use of biological diversity,

Article 8. In-situ Conservation
(a) Establish a **system of protected areas or areas** where special measures need to be taken to conserve biological diversity:

(b) Develop, where necessary, guidelines for the selection, establishment and management of **protected areas or areas** where special measures need to be taken to conserve biological diversity:

(c) Regulate or manage biological resources important for the conservation of biological diversity whether within or outside **protected areas**, with a view to ensuring their conservation and sustainable use;

(d) Promote the protection of **ecosystems, natural habitats** and the maintenance of viable populations of species in natural surroundings:

(e) Promote environmentally sound and sustainable development in **areas adjacent to protected areas** with a view to furthering protection of these areas:

(f) **Rehabilitate and restore degraded ecosystems** and promote the recovery of threatened species, inter alia, through the development and implementation of plans or other management strategies:

2. **Leaders**
   Samantha Lee and Prof. Gray A. Williams

3. **Key experts/ stakeholders who should be involved in the discussion:**
   a. **Within the Steering Committee/ working groups**
      - Prof. Nora Tam
      - Prof. Paul Shin
      - Dr Ang Put
      - Dr Samuel Hung
      - Dr Cheung Siu Gin
      - Dr Qiu Jianwen
      - Dr Andy Cornish
      - Kevin Laurie
   b. **Outside the Steering Committee/ working groups**
      - Yu Yat Tung
      - Dr Terence Ng
      - Dr Wai Tak Cheung
      - Dickson Wong
      - Tony Nip
      - Stan Shea
      - Calton Law
      - Shadow Sin
      - Terence Fong
      - Dr Cheang Chi Chiu

4. **Brief Summary on the meetings/ events organized**
   One meeting was conducted with the members in November 2013. The subsequent discussions were made through emails.

   In December 2013, the leaders of the Focus Group connected with Ms Jihyun Lee, the secretariat of CBD (Environmental Affairs Officer for marine and coastal biodiversity) and sought her advice on an appropriate set of criteria to adopt in Hong Kong.

5. **Aim / Objective**

   To examine the best available scientific data and devise a mechanism with criteria for identifying marine "hotspot" areas (for various habitats and species). Information gaps will be reviewed, with conservation and management of potentially important marine habitats recommended.

6. **Scope**

   The criteria mechanism for assessing different marine habitats and taxa will be developed as the key output of this focus group. Recommendations on additional research and the construction of a definitive marine "hotspot" map will be suggested in the final report for the government to consider and follow up in 2015-2020.

7. **Methodology**

   a. ***Selecting the most appropriate Criteria System for identifying the Marine Hotspot***

      "*Marine biodiversity hotspots are areas of high species and habitat richness that include representative, rare and threatened features. Identifying and protecting marine biodiversity hotspots should contribute to the ecosystem-based approach to the management of our seas, through identifying which are the most valuable areas for biodiversity and where protection will yield benefits for the maintenance of ecosystem structure and functioning, including the biotic processes that drive them.*"[1]

      A set of sound criteria and appropriate ranking system is considered crucial to assess various marine habitats and species so as to identify the marine hotspots in Hong Kong coastal areas. This Focus Group investigated and proposed the most appropriate set of criteria which is applicable for assessing the marine habitats in Hong Kong. Decisions were made to establish whether existing criteria could be adopted, amended, or even a whole new set of criteria developed.

   b. ***Marine Hotspot Map***

      The Marine Hotspot Map shall clearly illustrate the core locations of the sensitive marine species/ habitats which shall require better protection, with the aim that such a map can be used as a planning tool to help map out the current and future sustainable management of marine ecosystems. The production of a map showing biodiversity hotspots is considered as a vital planning tool that will help identify conservation

---

[1] Hiscock K. & Breckels, M. 2007. Marine Biodiversity Hotspots in the UK: A report identifying and protecting areas for marine biodiversity. WWF-UK

areas, or ecologically important areas, which should be avoided in future coastal development.

The map can be compiled from existing data (GIS is needed) with the input of various stakeholders/experts with interests or knowledge of the areas, combined with subsequent ground-truthing surveys. Constraints such as the location of the proposed/ on-going/ past infrastructure, existing/ proposed marine protected areas, shipping navigation channels etc shall also be identified on the map. This Focus Group would, however, only provide preliminary recommendations on the potential hotspot areas based on existing knowledge and experts' input. Further research is required to complete the map and suggestions are proposed in this report for the construction of a comprehensive marine hotspot map which will need to be led by the government.

c. *Conservation and management of potentially important marine habitats*
As the city develops, the plight of our sea has been exacerbated by reclamation, pollution, dredging and dumping. Not only is the marine biodiversity in the local waters (such as Chinese white dolphins) at stake, but some previously common food fishes are close to local extinction. More and bigger protected areas in Hong Kong are needed to be able to secure the future of our marine life, and conserve our vulnerable marine environment for future generations. This Focus Group undertook a preliminary review of the potential marine protected areas proposed by the government in the last few decades to see if any of these falls within a designated hotspot area, with conservation and management of potentially important marine habitats recommended.

8. **Hong Kong's existing status**
   a. *Marine Biodiversity*
   Hong Kong has a long coastline with more than 200 islands. Its special geographic location and hydrographic conditions contribute to the diverse and productive coastal and marine habitats found in Hong Kong. The Hong Kong marine environment supports rich and diverse marine species, with > 1,000 species of fish, 85 species of hard corals, two species of horseshoe crabs and marine mammals, etc. A recent study showed that a total of >5,700 species have been recorded, which makes Hong Kong's biodiversity comparatively rich as compared to many other regions of the world. Even though Hong Kong's marine area is only ~0.03% of the marine area of China, the number of marine species recorded in Hong Kong is ~25% of the total recorded for China seas. The sea is an important and precious resource, and should be carefully managed to conserve biodiversity, and at the same time to support

fisheries, recreation, and a high quality of life. A healthy sea provides a wealth of benefits to the Hong Kong people.

In September 2012, WWF produced the Marine Biodiversity Map, which revealed the extent of Hong Kong's rich biodiversity by providing a close-up look at 12 habitats/ species in local waters (hard corals, octocorals, black corals, mangroves, seagrasses, Chinese white dolphin, finless porpoise, horseshoe crab, green turtles, amphioxus, white bellied sea eagle and intertidal mudflat, *Figure 1*). The map was designed to promote both knowledge and awareness of conservation of Hong Kong's diverse marine environment through photos and interesting facts.

b. *Marine Protected Areas*
A Marine Protected Area (MPA) is an area designated to protect marine ecosystems, processes, habitats, and species, which can contribute to the restoration and replenishment of resources for social, economic, and cultural enrichment. In Hong Kong, there are a few types of MPAs, ranging from non-anchoring areas in coral communities, to Marine Parks, a Marine Reserve, Ramsar site and the future Fisheries Protection Area. These have quite different levels of protection, and the range of activities allowed or prohibited within their boundaries varies considerably too.

To date, less than 2% of Hong Kong's marine waters are designated as protected areas (of which <0.1% is no take zone), with the rest receiving little or no protection. Many ecologically sensitive areas suffer from a lack of adequate policy legislation and management, while coastal development, habitat destruction and degradation are continuous threats. These threats have had a major and cumulative impact on the various populations of marine species and habitats for years and no new MPA has been established since 2001 (excluding the no-anchoring area for coral communities). AFCD's next priority in the coming two years is to designate the proposed marine park at the Brothers Islands to satisfy the stipulation in the Environmental Permit for the Hong Kong-Zhuhai-Macau Bridge – Hong Kong Boundary Crossing Facilities Project. The Highways Department is now carrying out the preparatory works for the designation of the marine park in the Brothers Islands (BIMP), including a detailed study on the proposed boundary, devising a management plan for the proposed BIMP and consultation with stakeholders.

In order for marine life to survive and be given the chance to flourish, it is important to establish MPAs with a range of protection measures for all important marine habitats. According to the Aichi Target, "*10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved* through effectively

and equitably managed, ecologically representatives and well connected systems of protected areas and other effective areas-based conservation measures, and integrated into the wider landscape and seascape*". Hong Kong clearly needs more MPAs designated to act as sanctuaries for protection, population recovery and conservation of marine species.

9. **Gaps identified**
   a. ***Lack of Centralized and Public-Accessible Ecological Database***
   There has been a great deal of research and surveys on Hong Kong's biodiversity through academics and government in the past decades, however, as there is a lack of a centralized, public-accessible database, it requires a great deal of time to conduct any desktop review to compile appropriate data. In addition, it is also difficult to access older scientific papers (i.e. before 1990) which are often not available in electronic format.

   In 2012 - 2013, The Swire Institute of Marine Science, The Hong Kong University undertook a project named "A review of marine biodiversity and ecological surveys in Hong Kong" (funded by the Environment and Conservation Fund), to review and evaluate past ecological data and survey methodologies of the main, documented, marine biodiversity studies in Hong Kong waters. An inventory of local marine resources including marine species and their habitats was established and a literature review of over 670 references on Hong Kong's marine biodiversity, including details of the 5,711 marine species recorded in Hong Kong waters and their localities, was complied into a database.

   However, this database does not include all the ecological data - as the Hong Kong Government has conducted a range of marine biodiversity surveys in Hong Kong waters through both commissioned or internal monitoring projects, but most of these data have never been disclosed or be made accessible to the public, and so cannot be included into a comprehensive database which could effectively be used for conservation and management purposes. In addition, there is no natural history museum in Hong Kong that can provide reference samples and hence species recorded from the literature cannot be highly assured and that may hamper the monitoring of biodiversity loss.

   It should also be noted that there is lack of good distributional data for many species, such as the majority of fish species and invertebrate, as such, research to fill in the information gaps are needed.

b. Key Criteria Used to Evaluate Marine Hotspot

Several existing criteria for site selection of marine protected areas have been briefly reviewed by the Focus Group. They include:

· SSSI
· EIAO Technical Memorandum
· Criteria for selecting MPAs (in 'Guidelines for Marine Protected Areas' edited by Graeme Kelleher in 1999[2])

While these criteria are helpful and could be used as points of reference for MPA site selection, it was felt that there was potential for a more in-depth, robust and comprehensive mechanism to better reflect the ecological value of a marine site and the environmental threat posed by human activity in surrounding areas. BSAP provides an excellent opportunity for the HKSAR Government to adopt and improve the existing MPA site-selection mechanism.

To this purpose, Focus Group members agreed it would be advisable to search for a quality-assured set of scientifically assessed criteria developed to meet international standards for marine habitat/species assessment. Slight modifications or supplementary criteria may then be adopted to better fit the environmental circumstances of Hong Kong.

The CBD provide a wealth of resources and run workshops designed to help signatories implement appropriate and standardized methods, and it seems logical that Hong Kong should make use of these resources and follow this example. Based on her recommendations, the criteria of ***Ecologically or Biologically Significant Marine Areas (EBSAs)*** was proposed as the key metric for the identification of marine "hotspots".

The EBSAs criteria have been drawn from a process agreed upon by the Convention on Biological Diversity (CBD) for describing marine areas that are of particular importance from a biological or ecological perspective and that therefore warrant some degree of protection. The ecological or biological significance of these areas is assessed by evaluating marine areas using a list of seven scientific criteria that have been adopted at the CBD COP 9 in 2008. The scientific EBSA criteria are listed in ***Annex I***. A summarized version is as below:

1. Uniqueness or Rarity
2. Special importance for life history / stages of species

---

[2] Kelleher, G. 1999. Guidelines for Marine Protected Areas. Accessed on 29th July 2014 at https://portals.iucn.org/library/efiles/documents/PAG-003.pdf

3. Importance for threatened, endangered or declining species and/or habitats
4. Vulnerability, Fragility, Sensitivity, or Slow Recovery
5. Biological Productivity
6. Biological Diversity
7. Naturalness

EBSA criteria have been applied to various regions around the world, covering 75% of the worlds oceans so far, including both coastal waters and open ocean/deep sea habitats. Through these experiences, EBSA criteria have been proved to be an effective set of criteria to help countries identify the ecological or biological value of marine waters.

Members of the Focus Group were invited to test how appropriate / transferable the EBSAs were to Hong Kong (the methodology and trial outcomes are in *Annex II*).

A trial was conducted to test how EBSA criteria may be transferred/ applied to Hong Kong. A simple numerical 5-point scoring system was adopted in this trial for its advantages of simplicity and clarity. Members of the Focus Group were invited to rate scores for randomly selected sites in Hong Kong with a 5-point scale for 7 criteria. The full methodology and outcomes of this trial are included in *Annex II*.

Key feedbacks of the trial run are as follows:

• Some of the criteria may require further deliberation for adoption in Hong Kong since they may not be applicable to Hong Kong's habitat/ species. This aspect requires further clarification and expert advice.

• In the case of adoption of a numerical scoring system, more detailed and standardized scoring guidance should be provided.

• Output from the Red List Focus Group on the threatened and endangered species assessment may be used to lend further efficiency to the evaluation process.

• The success of making such assessments is very dependent on the quality of available data.

It was determined that the EBSA criteria were a plausible and useful tool for marine assessment in the process of identifying ecological 'hotspots' in Hong Kong. Apart from its comprehensiveness and scientific credibility,

it also has the advantage of meeting international standards and has been used to evaluate major ocean areas in large parts of the world.

However, further testing is needed to devise a suitable supplementary ranking/scoring system for accurate and representative evaluation.

It is recommended that a more in-depth study may be conducted as follow-up to this report.

c. **Marine Hotspot Areas**

In order to identify marine hotspot areas, targeted locations shall be assessed and evaluated based on the following three criteria:

1. *EBSA* – The identification of EBSAs should use the best available scientific and technical information and integrate the traditional, scientific, technical, and technological knowledge of academics and local communities, and requested the relevant authority (i.e. AFCD) to facilitate availability and inter-operability of the best available marine and coastal biodiversity data sets and information across regional and local scales.

2. *Hong Kong Red List* (FG chaired by Prof Yvonne Sadovy) – The list will contain the information of species of conservation concern/ importance (e.g. threatened, vulnerable, endangered) in Hong Kong waters. This shall take into consideration when such species is recorded in the assessed locations.

3. *Threat/ Development Impact Assessment* - It was noted that the EBSA criteria in themselves only evaluate the ecological value of a site in and of itself. Evaluation of human impact from beyond the immediate boundary of a site was not included. In the context of Hong Kong, intense coastal urbanization and rapid major infrastructural development, particularly in Lantau waters, are justification for setting assessment standards to consider the cumulative impact of human activity from nearby areas. Therefore, it is recommended that Threat/ Development Impact Assessment would also be adopted into site-selection criteria. Whenever there is seabed dredging / construction / reclamation or other coastal development in neighbouring marine areas, the selected site under evaluation should receive higher priority for consideration as a protected area. This is in compliance with the principle of ecological compensation.

To facilitate the hotspot identification process, members of this FG were invited to identify the sites with species, or habitats, of their interest which are important for conservation. **These sites should be prioritized**

for marine hotspot assessment, as well as being considered for implementing stronger and better conservation management measures in the future. The suggested sites are indicated in *Figure 2* and listed in *Annex III*.

d. *From Hotspot to Site Protection - Conservation and management of potentially important marine habitats*

Identifying marine hotspots is only the very preliminary first step. Within the CBD, we can only confirm the ecological or biological value of certain marine areas. The process needs to be taken further to assess the values through to appropriate protection, including to designate these areas as marine protected areas (MPAs) with management plans or by any other appropriate measures taken by competent bodies. An appropriate set of protective measures will be dependent on the existing and potential human activities and threats specific to any of the areas identified as Marine Hotspots.

(i) Benefits of Designating Appropriate MPAs
- Conserve living habitats and species that rely on them
- Prevent extinctions
- Facilitate recovery of the fishery where protected areas protect breeding adults, and spawning and nursery grounds
- Conserve sources of eggs and larvae seeding local waters
- Build ecosystem resilience to climate change

(ii) MPA Locations
Over the past decades, AFCD has designated/ proposed a number of MPAs for conservation purpose, which are:
- Existing Marine Parks and Reserve[3]
- Ramsar Site[4]
- Proposed or Planned Marine Park[5][6]
- Fisheries Protection Area (indicative, as exact location and boundary has not been confirmed yet)
- Country and Marine Park Board's Marine Park Proposal[7]
- AFCD Suitability Study[8][9][10][11][12][13][14][15]

---

[3]http://www.afcd.gov.hk/english/country/cou_vis/cou_vis_mar/cou_vis_mar_des/cou_vis_mar_des.html
[4]http://www.afcd.gov.hk/english/conservation/con_wet/con_wet_look/con_wet_look_man/files/RSMPII ESEng.pdf
[5] http://www.mardep.gov.hk/en/aboutus/pdf/pacp03_01.pdf
[6] http://www.hzmbenpo.com/ep_docs/HKBCF/new_marine_park.pdf
[7] Country & Marine Park Committee, 2009. Proposed Boundaries of New Marine Parks. CMPB/MPC/2/2009, Revised
[8] AFCD 1999. Study on the Suitability of South Lamma to be Established as Marine Park or Marine Reserve

- No-anchoring Area for Coral Communities[161718]

All these existing/ planned/ proposed MPAs are illustrated in *Figure 3* with their approximate size listed in **Annex IV**.

<u>All the government designated/proposed/ planned areas added up together contribute to 7.1% of the total waters of Hong Kong.</u>

There are some sites which are worthy of greater protection which are not covered in any of these government initiatives or proposals, such as Ha Pak Nai, Shui Hau and Luk Keng (horseshoe crabs); Luk Keng, Sha Tau Kok, Inner Tolo Channel, Ting Kok and Three Fathoms Cove (mangroves) and west Lantau (Chinese white dolphins etc, see *Figure 4*).

According to the Aichi Target, "*Protected Areas: By 2020, at least 17% of terrestrial and inland water areas and <u>10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed,</u> ecologically representatives and well-connected systems of protected areas and other effective areas-based conservation measures, and integrated into the wider landscape and seascape.*"

As such, there is a need to explore more locations for MPA assessment and establishment. A series of maps from various sources, indicating locations of conservation value which some of them have been proposed for MPA establishment in previous government plans and scientific

[9] Tsang et al. 1999. Study on the Suitability of South West Lantau to be Established as Marine Park or Marine Reserve. Study was conducted by HKIEd with final report summited to AFCD.

[10] Ni et al. 1999. Study on the Suitability of Shelter Island Area to be Established as Marine Park or Marine Reserve. Study was conducted by HKUST with final report summited to AFCD.

[11] Ang et al. 2000. Study on the Suitability of Ping Chau to be Established as Marine Park or Marine Reserve. Study was conducted by CUHK with final report summited to AFCD.

[12] Ang et al.. Study on the Suitability of Kat O Chau (Crooked Island) and Ngo Mei Chau (Crescent Island) to be Established as Marine Park. Study was conducted by CUHK with final report summited to AFCD.

[13] Tsang et al. Suitability of Tai Long Wan as Marine Park/ Marine Reserve. Study was conducted by HKIEd with final report summited to AFCD.

[14] Tsang et al. Suitability of Bluff Island & Ninepin as Marine Park/ Marine Reserve. Study was conducted by HKIEd with final report summited to AFCD.

[15] Tsang et al. Suitability of Long Ke Wan to Pak Lap as Marine Park/ Marine Reserve. Study was conducted by HKIEd with final report summited to AFCD.

[16] http://www.afcd.gov.hk/tc_chi/conservation/con_mar/con_mar_cor/con_mar_cor_mult/files/common/L_Port_Island_B.jpg

[17] http://www.afcd.gov.hk/tc_chi/conservation/con_mar/con_mar_cor/con_mar_cor_mult/files/common/L_Ung_Kong_Wan_B.jpg

[18] http://www.afcd.gov.hk/tc_chi/conservation/con_mar/con_mar_cor/con_mar_cor_mult/files/common/L_Sharp_Island_B.jpg

publications, have been attached (*Figures 5-10*) to indicate the variety of areas which have received attention.

- Morton 2000[19] (*Figure 5*)
- Spawning and nurseries ground for fisheries[20] *(Figures 6 and 7)*
- South West New Territories Development Strategy Review by Planning Department in 2001 (*Figure 8*)
- Territorial Development Strategy Review, Board Conservation Strategy by Planning Department in 1998 (*Figure 9*)
- Study of Southeast New Territories Development Strategy Review – Landscape and Conservation Framework by Planning Department (*Figure 10*)
- Recognized ecologically and geologically important areas in Tolo Harbour[212223] (*Figure 11*)

(iii) Potential type of Protection/ Protection Status

Under the global context, there are many different types of MPA with the management arrangements ranging from multiple-use to strict protection within "no-take zones" or "Highly Protected Marine Reserves". They include examples of all the different categories of protected areas defined by IUCN[24] (Table 1) and reflect the varied objectives of MPAs.

---

[19] Morton, B. 2000. Coastal zone management for marine conservation in Hong Kong: the need for regional co-operation in Southern China. In The Marine Flora and Fauna of Hong Kong and Southern China (ed. B. Morton), 3-33. Proceedings of the Tenth International Marine Biological Workshop: the Marine Flora and Fauna of Hong Kong and Southern China, Hong Kong 1998. Hong Kong: Hong Kong University Press.

[20] ERM 1998. Fisheries Resources and Fishing Operations in Hong Kong Waters. Report submitted to AFCD.

[21] Morton, B. and Morton, J. 1983. The Sea Shore Ecology of Hong Kong. Hong Kong University Press, Hong Kong.

[22] Morton, B. 1998. The history of and future plans for the conservation of the marine environment of Hong Kong, China. In: Proceedings of the APEC Workshop on the Impacts of Destructive Fishing Practices on the Marine Environment, Hong Kong 1997. Agriculture and Fisheries Department, Hong Kong Government, Hong Kong.

[23] Morton, B. 2003. Marine areas in Hong Kong: progress towards coastal zone management (1977-2002). In: Morton, B. (ed.) Perspectives on Marine Environment Change in Hong Kong and Southern China, 1977-2001. Hong Kong University Press, Hong Kong.

[24] IUCN (1994) Guidelines for Protected Area Management Categories. IUCN, Gland, Switzerland

Table 1. IUCN Protected area categories

Category	Management Objectives
I	Protected area managed mainly for science or wilderness protection (I(a) Strict Nature Reserves and I(b) Wilderness Areas).
II	Protected area managed mainly for ecosystem protection and recreation (National Park).
III	Protected area managed mainly for conservation of specific natural features (Natural Monument).
IV	Protected area managed mainly for conservation through management intervention
V	Protected area managed mainly for landscape/seascape conservation and recreation (Protected Landscape/Seascape)
VI	Protected area managed mainly for the sustainable use of natural ecosystems (Managed Resource Protected Area).

Although usually considered to be areas designated for conservation of biodiversity, there are also other types of MPAs. They include fisheries reserves or areas where there may be seasonal closures or gear restrictions as part of a management regime for commercial fisheries and recreational purposes. Within the Hong Kong context, it is concerned with MPAs where the conservation of marine environment is the principle reason for establishment; in particular to help prevent important habitats from being degraded or destroyed from coastal development and anthropogenic activities.

In Hong Kong, the current MPAs can be divided into the following five types:
- No-anchoring area for coral communities
- Marine Park
- Marine Reserve
- Fisheries Protection Area
- Ramsar Site

There are also some areas where fishing is not permitted for security (i.e. around the airport) or safety reasons (major vessel fairways, and in some marinas).

The first marine parks and reserve were designated 18 years ago, however, to date, there is no review be done of the impact and effectiveness of different types of MPAs in HK, including SSSIs.

No-take Zones

Marine Protected Areas with fisheries regulation measures are an essential measure which can help restore a depleted fishery. Such MPAs have been demonstrated to allow inshore fishery species to recover in number, individual size, and reproductive output. They allow for the protection of biodiversity, and act as an insurance against fisheries collapse, by protecting the fish populations in them. In the longer term, fisheries catches should increase outside these areas through fish and larval dispersal but only if fishing is reduced to appropriate levels or is not allowed at all (i.e. no-take zones).

Multi-Use Zoning (MUZ) MPA

The concept of multiple-use areas or Multi-Use Zoning (MUZ) is commonly adopted worldwide in nations such as Australia, USA, and UK[25]. Spaces within the boundaries of an identified MPA are zoned according to their different nature, with each zone type having different objectives and restrictions. Some zones may allow a greater degree for resource extraction, while some may require stricter preservation, depending on the characteristics of the area.

Where stakeholder conflict is a primary concern for the targeted area, the MUZ approach may lead to a more satisfactory outcome for all interested parties. Within a framework for integrated management, adopting MUZ schemes for a marine park - instead of drawing one single purpose for the entire area - could feasibly lead to a better balance between the needs for ecological conservation and the needs for economic development.

A typical MUZ for a multi-use MPA shall consist of[26]:

- **No-take marine reserve zone (core areas)**: strict preservation with entry by permit only and no manipulative research.
- **Buffer zone of no-take marine reserve**: can be used for manipulative

[25] Day, J., Dudley, N., Hockings, M., Holmes, G., Laffoley, D. D. A., Stolton, S., & Wells, S. M. (2012). Guidelines for applying the IUCN protected area management categories to marine protected areas. IUCN.
[26] Agardy, T., Bridgewater, P., Crosby, M. P., Day, J., Dayton, P. K., Kenchington, R.,. & Peau, L. (2003). Dangerous targets? Unresolved issues and ideological clashes around marine protected areas. Aquatic Conservation: Marine and Freshwater Ecosystems, 13(4), 353-367.

research and education, or traditional uses.
- **Secondary zone:** may be used as 1) experimental reserves for manipulative research; 2) recreational, non-consumptive user areas; 3) education zones; and 4) traditional use zones.
- **Secondary or fringing buffer:** may be used for limited consumptive uses and all other non-consumptive uses, such as recreation and education.

The main advantage of a MUZ approach lies in its flexibility and capacity to accommodate various users. As an instrument to user compatibility, multi-use schemes may be developed on a site-specific basis to help progress towards social consensus, arriving more quickly at a sustainable solution for marine management.

It must however be noted that, for the MUZ approach to effectively balance conservation with human development, certain conditions are required, such as:
- An integrated management framework that plans for compatibility between users from the beginning;
- A minimum spatial requirement for no-take zones.

Typically, 20% of no-take MPAs is recommended as the spatial target for minimum core area preservation. 20% as the lower bar has been adopted for coral reef ecosystems under USA jurisdiction, and in other countries such as Australia, Bahamas, Canada, Galapagos Islands, and the Philippines[6].

According to AFCD, fishermen reflect that compensation as well as the impact on their future livelihood are the concerns they have if a Marine Park/ Marine Reserve is going to be designated. These issues are some of the prime reasons for the government to justify why no more new MPA has been designated since 2001. In order to resolve conflicts and dispute, it is time for the government to consider introducing multi-purpose MPAs into Hong Kong, so critical areas can be conserved while sustainable uses are still allowed in the protected area. The proposed Fisheries Protection Areas could potentially be multiple-use zoning.

The designation of marine protected areas requires follow-up through a number of actions to allow these areas to remain functional and provide services to the community. Zoning of the area to determine uses by various interest groups (diving, sailing, swimming, research, education, etc) needs to be established to avoid conflicts. Maximum numbers of people/boats allowed per day should be determined to allow the ecosystem to recover and avoid further degradation from excessive

human impact. This needs to take into account the provision of mooring facilities, toilets, access trails, rest areas etc. where appropriate. Because the proposed no-take zones neighbour developed areas, it is necessary to reduce the impact of the latter on the protected areas by eliminating sewage discharge, runoff, etc. Extraction of any animals, plants or minerals from these areas needs to be prohibited unless it occurs in designated recreational fishing zones or for specific research purposes (see findings of Focus Group on Sustainable Use of Marine Resources).

(iv) MPA Designation Criteria

As recommended by the Marine Parks and Marine Reserves Working Group, the following 5 major criteria may need to take under consideration when identifying sites for the designation of Marine Parks/Reserve:

(a) Diversity of natural themes – biotic and abiotic;
(b) Uniqueness of the marine resources, and their representativity of the regional character;
(c) Degree of naturalness – its present condition and the potential threat;
(d) Educational value – availability of information for educational use or presence of records of past studies; and
(e) Convenience of law enforcement – whether it is feasible to protect the site once designated.

(v) MPA Network

To balance the needs of people and the marine environment, and to maximize protection benefits, the best solution is often a grouping of smaller MPAs protecting different habitats at various locations within the larger ecosystem. These MPAs can have differing protection status and management structures. A group of protected areas like this is called an "ecologically representative network of MPAs", or a "representative network of MPAs" for short.

If well-designed, the location of MPAs in such a network would allow them to support each other by taking advantage of ocean currents, migration routes, and other natural ecological connections. This would help provide much-needed resilience against a range of threats. For example, if one MPA is damaged by a storm, oil spill, coral bleaching event, or other disaster, it could be re-colonized by fish and other species from an 'up-current' MPA in the network. By protecting multiple sites within the ecosystem, the overall damage caused by a disaster in one MPA is therefore reduced. The key elements for establishing a MPA network shall also be considered when identifying locations for designation of MPAs.

A network of MPAs that covers 10% of Hong Kong´s waters containing no-take zones (e.g. the core habitats of important conservation value, such as spawning and nursery ground for fisheries) should be established to help the sustainable recovery of the marine ecosystem. This is the minimum area that should be set aside, free of all kinds of exploitation and used for specific, non-destructive types of fishing, educational and recreational activities.

10. Recommended Strategies and Actions

Recommended Strategy	Recommended Activity/ Action	Long Term/ Short Term	Priority	Expected Outcome	Timeline
Objective 1: To enrich the ecological knowledge of local marine habitats through constructing a comprehensive marine biodiversity database of Hong Kong by 2015.					
1. Consolidate, centralize and make readily accessible all ecological information for a better understanding of the baseline distribution and abundance of species within Hong Kong waters.	1. Government departments shall release and share with academics (e.g. contribute to HKU's marine biodiversity database) all the raw data collected from past internal ecological studies/ monitoring surveys/ consultancy studies. 2. Construct a centralized and public-assessable platform for the sharing of HKU's marine biodiversity database. Funding supported may need to be considered for the long-term maintenance of the database. 3. Conduct surveys to update the marine biodiversity species-specific database based upon the distribution within Hong Kong waters and relevant site(s). 4. Set up a natural history museum on biodiversity as a depository for local species.	Medium/ Long Term	Medium to High	1. The comprehensive ecological database can be used for mapping important habitats/areas (e.g. species-rich areas; spawning grounds of important species; distribution of ecological habitats such as mangroves and coral beds), as well as individual species' distribution maps in Hong Kong waters. 2. Facilitate availability and inter-operability of the best available marine and coastal biodiversity data sets and information across regional and local scales. 3. Facilitate the identification of information gaps for addition survey/ research when necessary. 4. A full set of comprehensive data will be crucial for the marine hotspot assessment and identification. 5. The natural history museum on biodiversity will promote academic research and raise public awareness through public education.	To be completed by 2016. (The suggestion related to museum shall be

Objective 2: To produce a Hong Kong Marine Hotspot Map illustrating the marine habitats of conservation importance by early 2018.					
1. Fill in the information gaps related to the ecological knowledge of potential marine hotspot areas	Once the potential hotspots which require further protection are proposed (by local experts) and identified, government should commission studies (internal or external) to conduct surveys and fill in the information gaps which are necessary to complete the criteria assessment.	Short Term	Medium	– The identification of EBSAs should use the best available scientific and technical information

Adequate ecological information should be provided for the full assessment of EBSA criteria - The hotspot can be assessed and identified with its priority ranked based on data. | Once the data gap(s) is identified, the government should initiate appropriate study/ research (external or internal), which shall be completed in no more than 1.5 years.

The key information gaps shall be addressed before 2018. |
| 2. A set of EBSA criteria with robust ranking system which is applicable in Hong Kong should be produced for the marine hotspots identification. | 1. Workshop (Phase I) composed by local academics and scientists, and other government and non-government experts shall be conducted for the comprehensive discussion of the criteria and scoring system. For maximal effectiveness, and assure compliance with international standards CBD experts should be invited to share their knowledge.

2. Trials with different species and locations shall then be tested out to devise a suitable supplementary ranking/ scoring system for accurate and representative evaluation. | Short Term | High | A tangible and robust EBSA criteria and site ranking mechanism tailored for Hong Kong's marine habitat will be produced for marine hotspot identification. This criteria will meet internationally recognized (CBD) standards. | To be completed in 2017. |

3. Identify and prioritize Marine Hotspot Areas through assessing and evaluating the suggested locations by experts (Figure 2 and Annex III)	1. Workshop (Phase II) composed by local academics and scientists shall be conducted for Marine Hotspot Areas identification. The Hong Kong Red List shall be referred for species of conservation concern (i.e. threatened, vulnerable, endangered). 2. A Marine Hotspot Map with habitats that are ecologically important to marine animals (e.g. spawning and nursery grounds, areas of primary productivity such as seagrasses, mangroves, and coral communities) should be produced. 3. Prioritize the importance of identified Marine Hotspot Areas based on three criteria: EBSA, Hong Kong Red List and Threat Impact assessment.	Short Term	Very High	This Marine Hotspot Map will clearly illustrate the core habitats of the sensitive marine species which require better protection, which can also be used as a crucial planning tool to help map out the current and future management of marine ecosystems. This map would be considered as a vital planning tool that helps identifying "no go" areas (conservation area), or ecologically important areas, which should be avoided in the site selection for coastal development. The map can be compiled from existing data (GIS is needed) with the input of various stakeholders/experts with interests or knowledge of the areas, as well as the subsequent ground-truthing surveys.	Should be complete no later than 2018.
Objective 3: A total of 10% of Hong Kong waters should be designated as Marine Protected Areas with no-take area zoned by 2020, to form a representative areas network.					
1. An independent consultative body (The Marine Protected Area Steering Group) shall be established to provide technical comments and advise the government on the potential sites for designation of Marine Protected Areas.	The Marine Protected Area Steering Group shall be formed by academics and NGOs. (based on conservation merit) Their key role will be to study and suggest potential sites for MPA establishment, as well as the corresponding management measures.	Short Term	High	This group will provide independent advice to the government on the list of MPAs which shall be designated. Their suggestions will act as the supplementary information for further discussion at the Country and Marine Park Boards (AFCD) meetings. This group will be formed by members from different backgrounds, which is important to ensure voices from different sectors will be heard and considered, so as to minimize dispute and achieve a holistic viewpoint.	Should be formed in 2017.

2. Identify the possible locations and generate a list for designation of Marine Protected Areas based on the Marine Hotpot Map	The Marine Protected Area Steering Group shall host rounds of meeting to - Assess and evaluate the suggested sites for MPA by AFCD (Figure 3) - Assess and evaluate the potential sites which are of conservation importance or suggested by the Planning Department (Figures 5-10) The MPA list which make up 10% of the total waters including no-take zone of Hong Kong should be produced, with different phases and a solid timeline for establishment provided. Different levels of protection and management measures for various locations should also be suggested. Study on no-take zone, including its size and management approach (e.g. adaptive management) shall be conducted.	Medium Term	Very High	A map/ list with the suggested future MPA areas (10%) with no-take zone will be produced, and will act as a tool for Government's planning on MPAs and subsequent network establishment.	The list should be produced no later than end of 2018. The designation of 10% MPA should be completed by 2020.
3. Review of the current MPA types such as SSSI, non-anchoring area and MP for their functions and effectiveness in protecting the local biodiversity	Comparative study on various MPA shall be conducted in order to elucidate the intended outcome of each MPA type, their effectiveness and the potential for further advancement/ improvement.	Short to Medium Term	High	The function and effectiveness of various MPAs would be assessed. Further enhancement or improvement measures could be applied to perfect the local MPA systems	Should be completed no later than end of 2017.
4. Explore Multi-Use Zoning for the MPA network.	A feasibility study shall be conducted to see whether the Multi-Use Zoning approach is applicable to achieve the CBD Strategic Goals & Aichi Targets and to help manage MPAs in Hong Kong.	Medium to Long Term	Medium	The multi-use approach including no-take zone may be developed on a site-specific basis to help progress towards social consensus, arriving more quickly at a sustainable solution for marine management. This means the government may need to consider other than Marine Parks and Marine Reserve, a new type of multi-purpose MPA be introduced.	Should be completed no later than end of 2017.

| 5. Active engagement of the local villagers, fishermen or other stakeholders such as NGOs in the procedure of designating MP | Different stakeholders shall be invited to participate in the process of designating MPs.

Creating more incentives or looking for common interest for various stakeholders shall increase the chance for different parties to reach consensus.

Those incentives include:
- Long term profit gained from engaging into commercial activity associating with sustainable ecotourism, other than one-off compensation
- Receiving assistance of the related capacity building activities, e.g. training Mutual benefit acquired through collaboration between stakeholders | Short to Long Term | High | Consensus obtained from more stakeholders in the community would help accomplish legislation procedure in the legislative council. The process of designation of the MP could be speeded up. | Should be complete no later than 2018 |

Objective 4: Increase the public awareness on marine conservation and benefits of MPA.					
1. To gain a strong buy-in from the public, and educate the key stakeholders (e.g. fishermen groups, legislators, business operators) of the benefits of the MPAs.	Educate the public through education programme, talks, social media channels, site visits etc.	Long Term	Low to Medium	A strong contingency for MPA establishment is expected to be built among these directly affected sectors. Actively engaging the general population as well as business in various activities could be effective – involvement in activities is expected to generate higher awareness.	Various activities shall be conducted throughout the years

11. Evaluation and Monitoring

The BSAP report with suggestions on the sustainable management of the marine habitat should be a living document, which can be reviewed and revised regularly based on changes of activities, issues and conditions, so as to maintain and improve its effectiveness and relevance. A working group should be formed for this function with relevant bodies such as officials from various government departments, academics, environmental groups, fishermen communities and relevant industry stakeholders so as to carry out regular consultation for the review of the recommendations and action taken, as well as evaluate the threats from development on a regular basis.

Figure 1. WWF-Hong Kong's Marine Biodiversity Map[27].

[27] http://awsassets.wwfhk.panda.org/downloads/marinebiodiversitymap.pdf
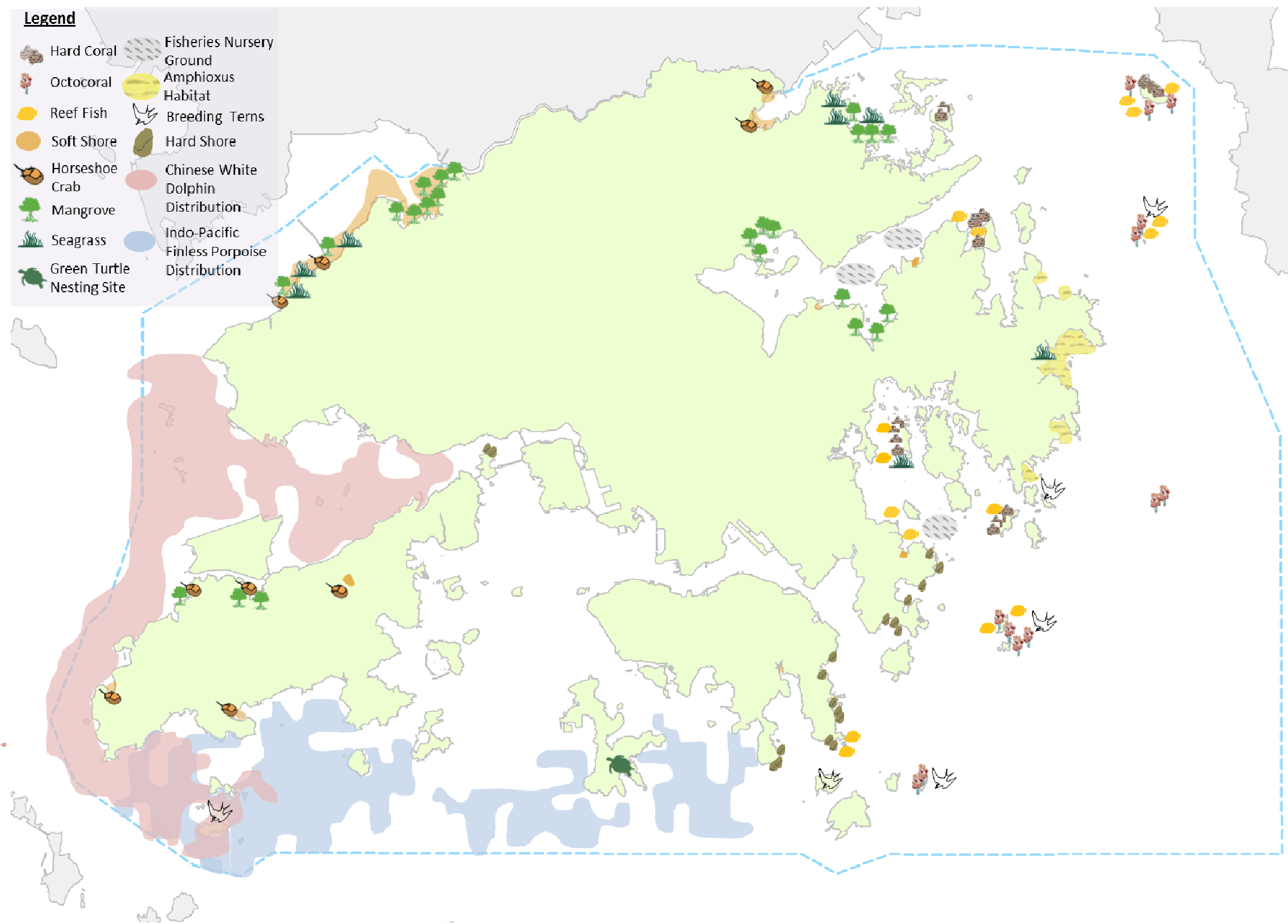
Figure 2. Principal, top sites with species which are important for conservation as suggested by Focus Group members.
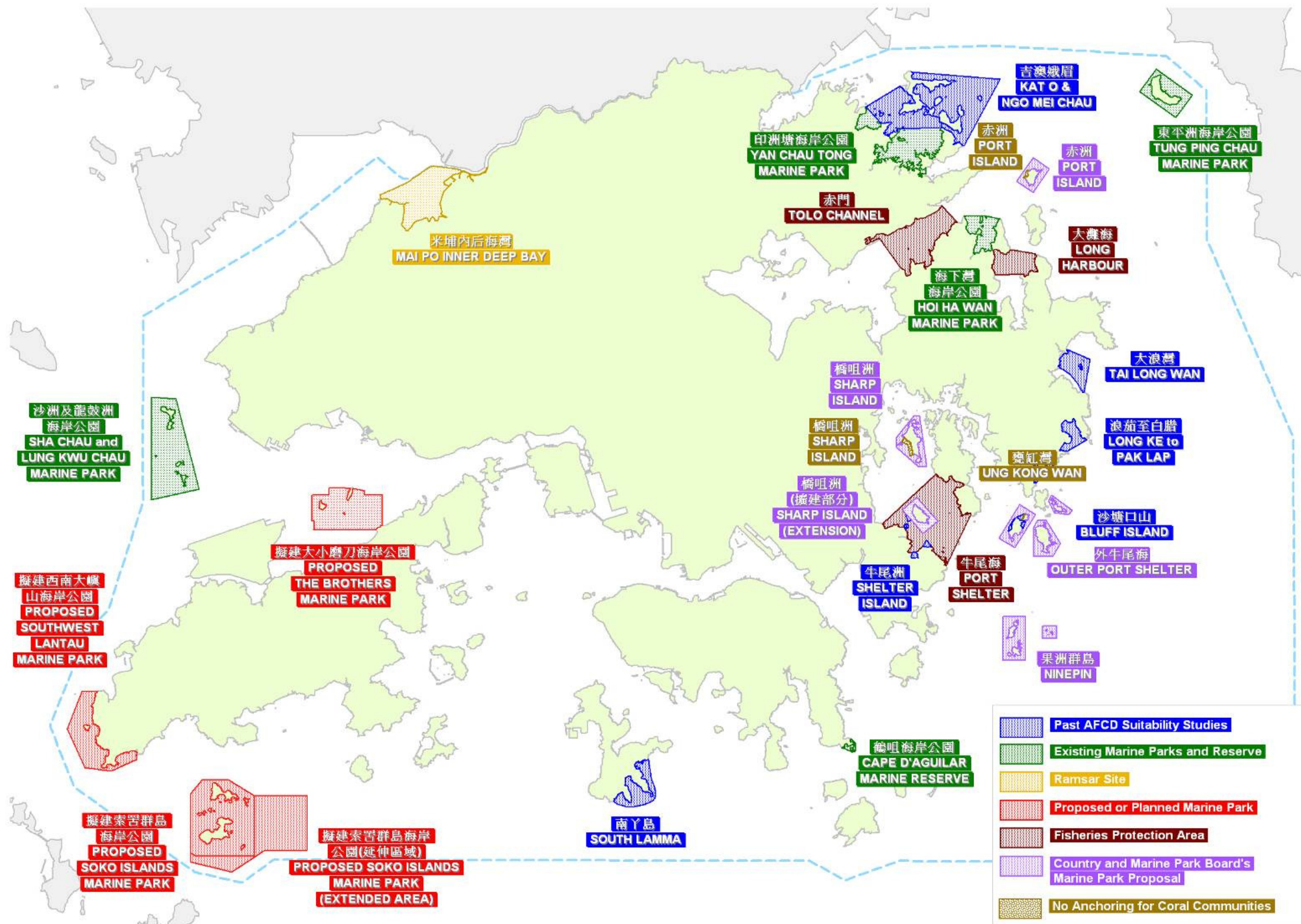
Figure 3. Hong Kong Marine Protected Areas (MPAs) Map (constructed based on AFCD's provided information). Please note that the area of proposed Soko Islands Marine Park (Extended Area) and three Fisheries Protection Areas are indicative.
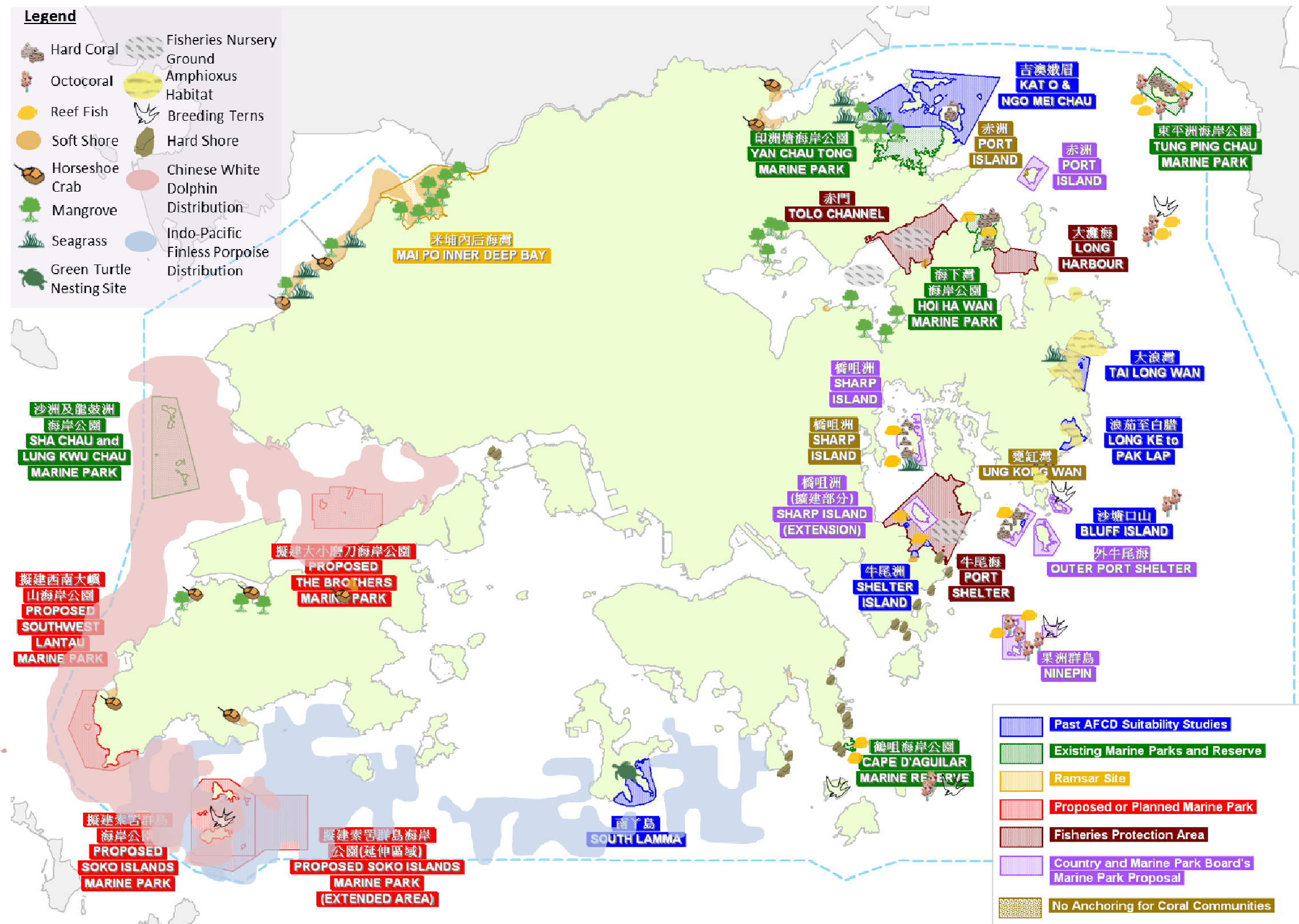
Figure 4. Sites with species of conservation importance which should be considered for better protection (combination of Figure 2 and 3). . Please note that the area of proposed Soko Islands Marine Park (Extended Area) and three Fisheries Protection Areas are indicative.
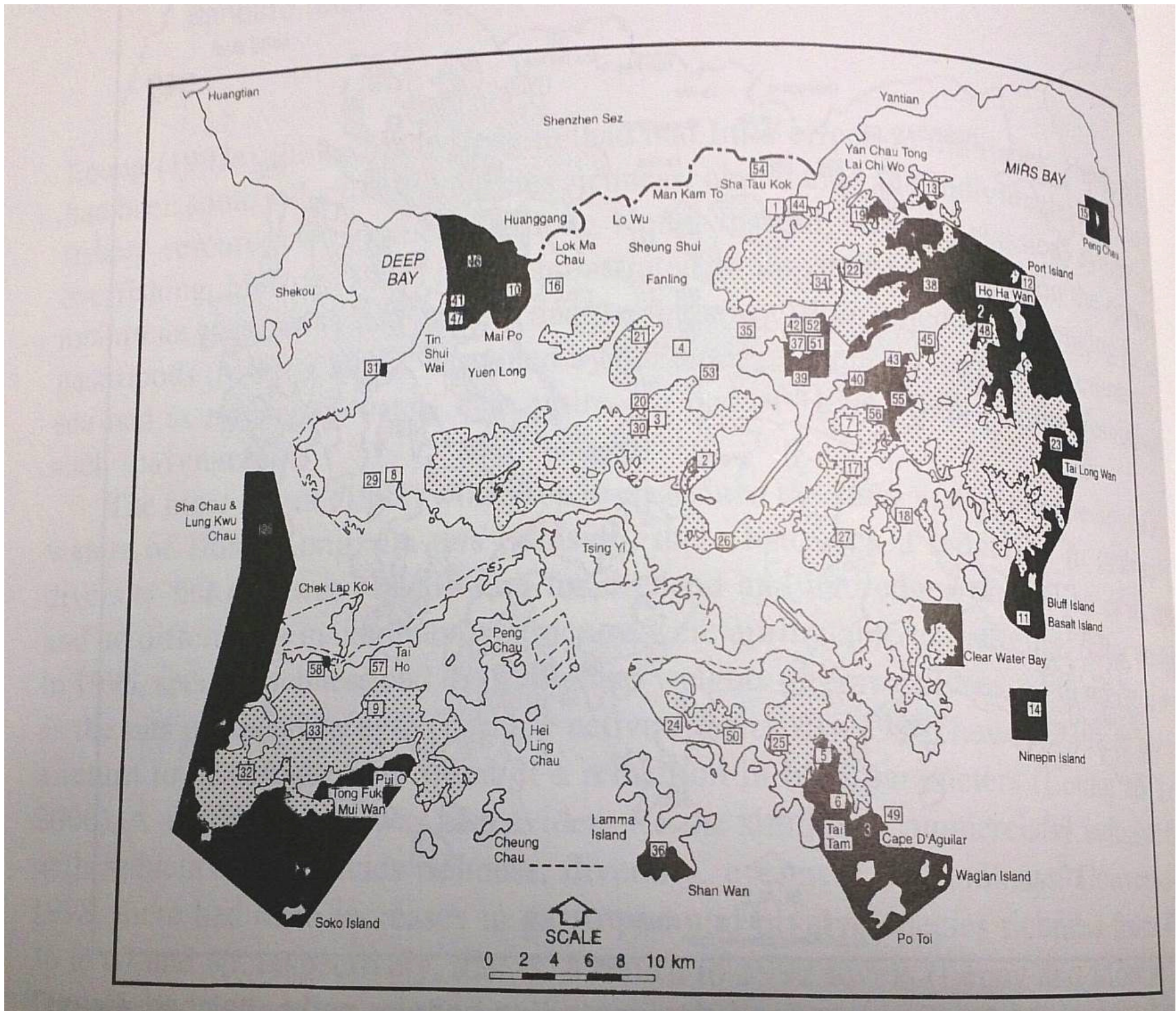
Figure 5. Locations proposed for designation as either marine parks or reserve in Hong Kong by Morton (2000).
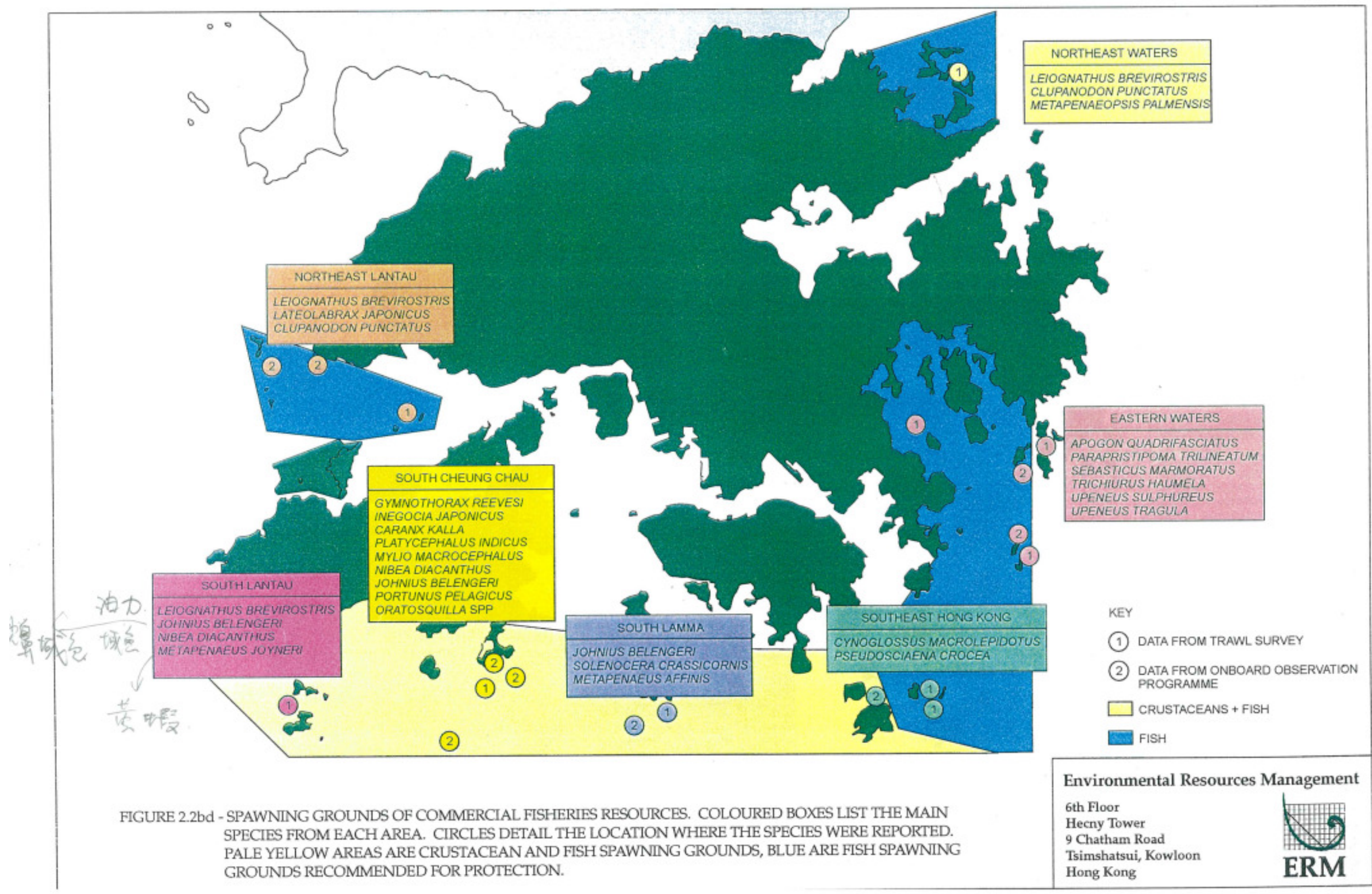
FIGURE 2.2bd - SPAWNING GROUNDS OF COMMERCIAL FISHERIES RESOURCES. COLOURED BOXES LIST THE MAIN SPECIES FROM EACH AREA. CIRCLES DETAIL THE LOCATION WHERE THE SPECIES WERE REPORTED. PALE YELLOW AREAS ARE CRUSTACEAN AND FISH SPAWNING GROUNDS, BLUE ARE FISH SPAWNING GROUNDS RECOMMENDED FOR PROTECTION.

Figure 6. Spawning grounds of commercial fisheries resources. Report produced by ERM in 1998.

NORTHEAST WATERS

CHRYSOPHRYS MAJOR
RHABDOSARGUS SARBA
SPARUS SPP
METAPENAEOPSIS PALMENSIS
LUTJANUS FRY

PORT SHELTER

CHRYSOPHRYS MAJOR
RHABDOSARGUS SARBA
SPARUS SPP
METAPENAEOPSIS PALMENSIS
PARAPRISTIPOMA TRILINEATUM
EPINEPHELUS FRY
SERIOLA PURPURESCENS

SOUTH LANTAU

ORATOSQUILLA ANOMALA
DICTYOSQUILLA FOVEOLATA
SCIAENID FRY
SQUILLA FRY

LAMMA ISLAND

METAPENAEOPSIS BARBATA
METAPENAEOPSIS PALMENSIS
ORATOSQUILLA SPP
OXYURICHTHYS TENTACULARIS
SCIAENID FRY
SERRANID FRY

KEY

1 TRAWL SURVEY (REGULAR)

2 TRAWL SURVEY (NURSERY)

3 INTERVIEW PROGRAMME

4 ONBOARD INTERVIEW

5 FRY CAPTURE (HELICOPTER SURVEY)

FIGURE 2.2be - NURSERY AREAS OF COMMERCIAL FISHERIES RESOURCES. BLUE AREAS ARE THOSE RECOMMENDED
FOR PROTECTION. THE COLOURED BOXES DETAIL THE SPECIES PRESENT AT EACH SITE. THE CIRCLES
DETAIL THE LOCATION WHERE THE JUVENILES WERE REPORTED.

Environmental Resources Management

6th Floor
Hecny Tower
9 Chatham Road
Tsimshatsui, Kowloon

ERM

Figure 7. Nursery grounds of commercial fisheries resources. Report produced by ERM in 1998.
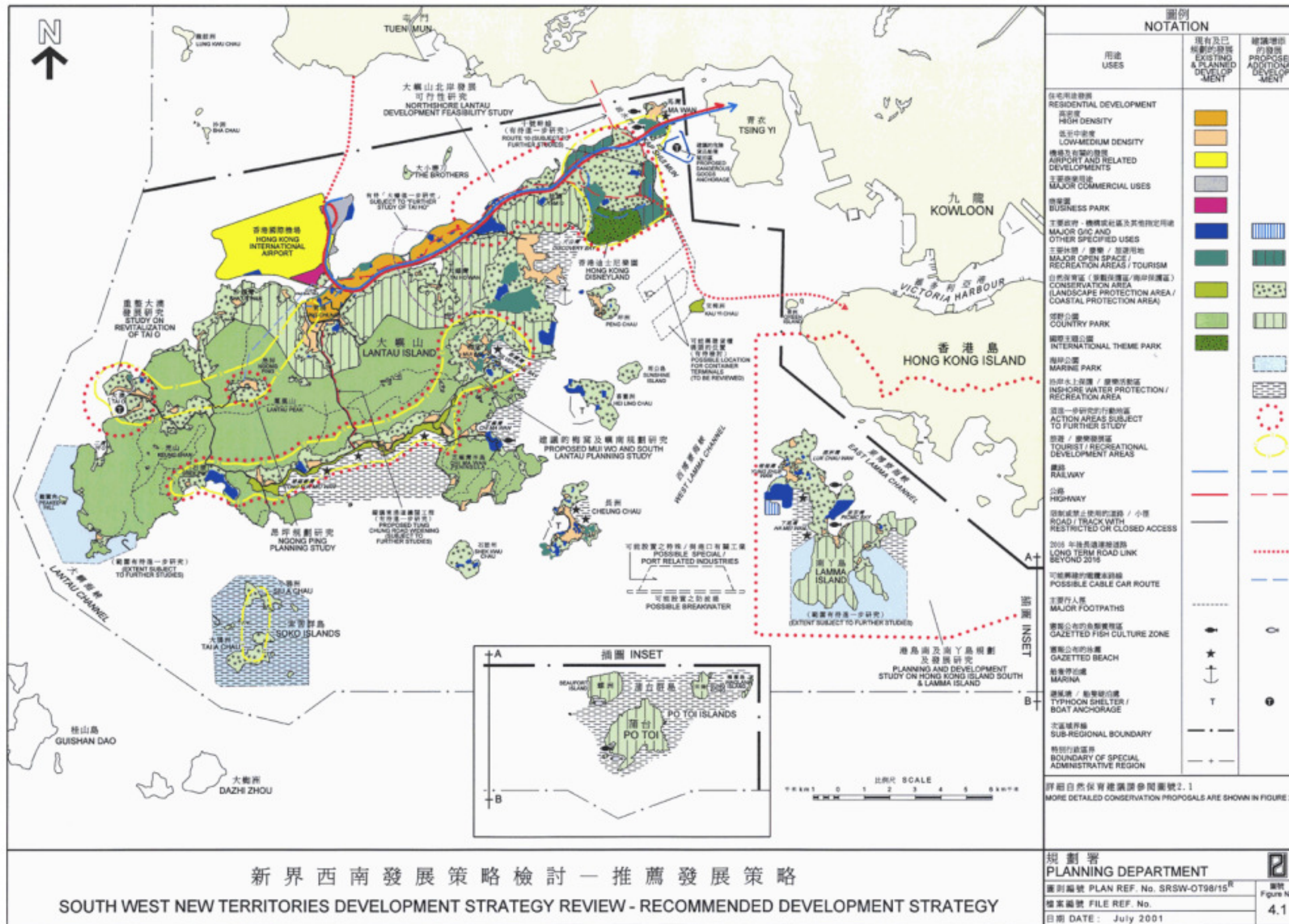
Figure 8. South West New Territories Development Strategy Review by Planning Department in 2001.
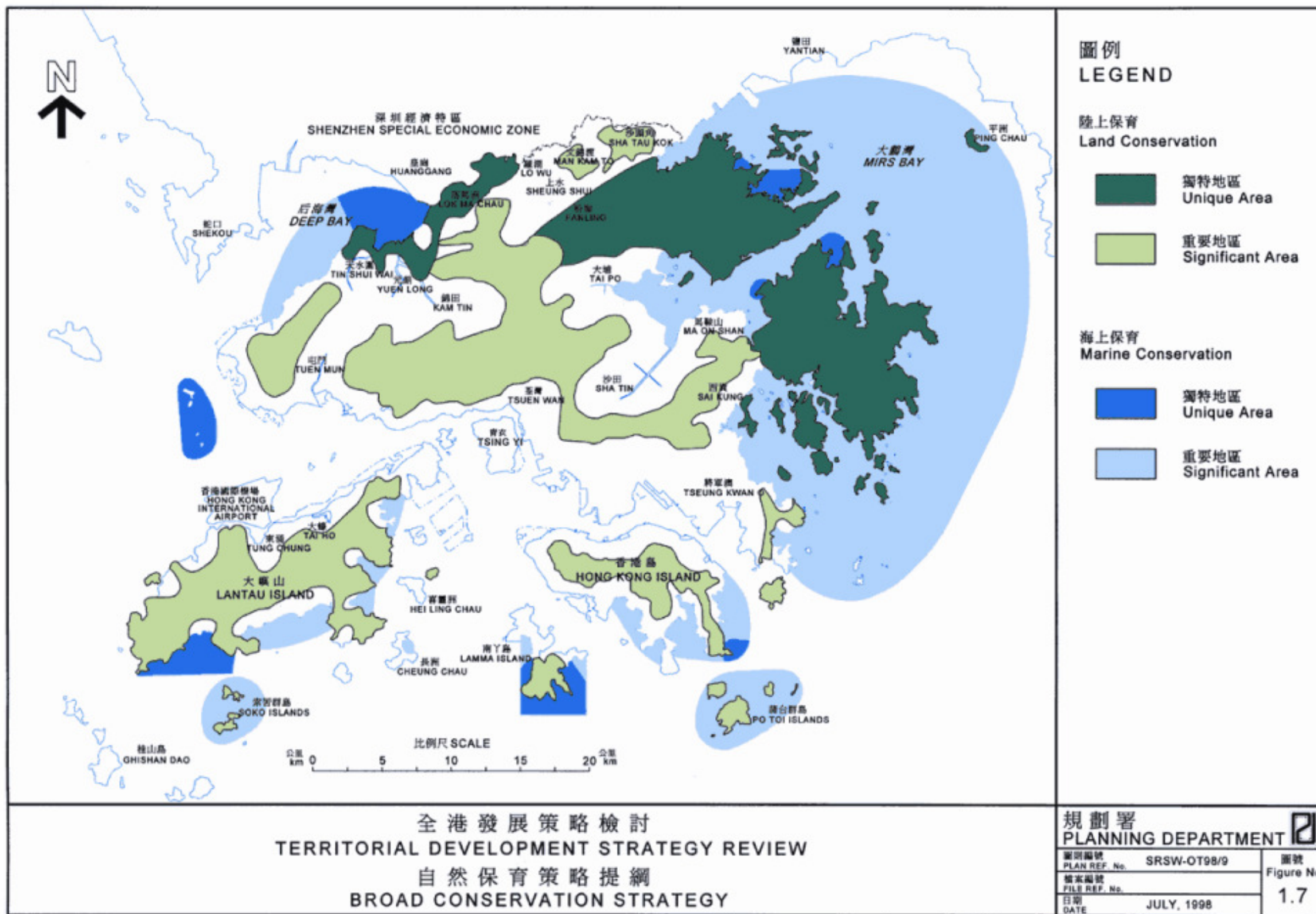
Figure 9. Territorial Development Strategy Review, Broad Conservation Strategy by Planning Department in 1998.
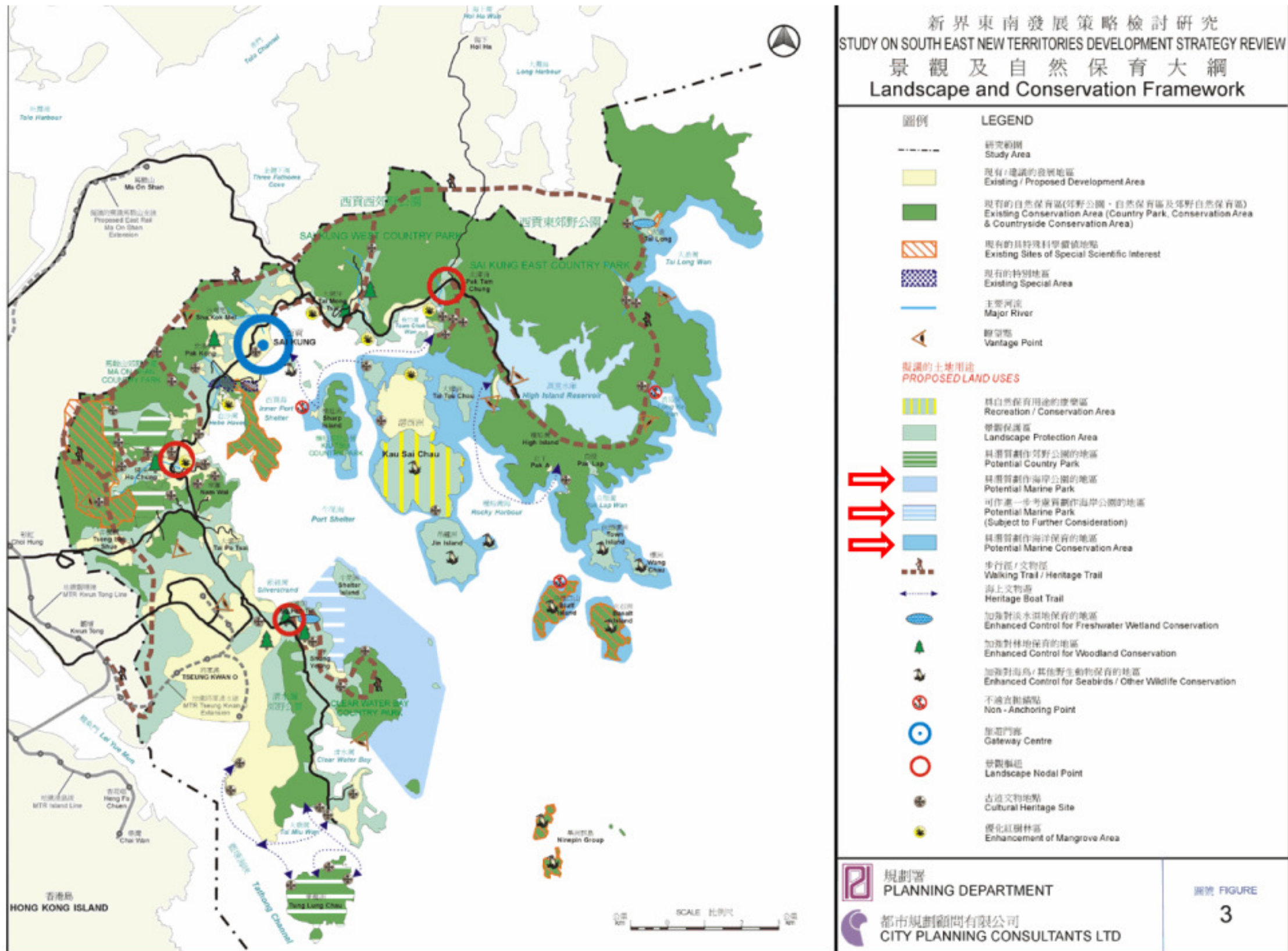
Figure 10. Southeast New Territories Development Strategy Review – Landscape and Conservation Framework by Planning Department.

Locations of Several Recognized Ecologically and Geologically Important Areas in Tolo Harbour

Figure 11. Recognized ecologically and geologically important areas in Tolo Harbour. (Prepared by Kadoorie Farm and Botanic Garden)

Annex I. EBSAs Criteria

Annex I

SCIENTIFIC CRITERIA FOR IDENTIFYING ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS IN NEED OF PROTECTION IN OPEN-OCEAN WATERS AND DEEP-SEA HABITATS 5/

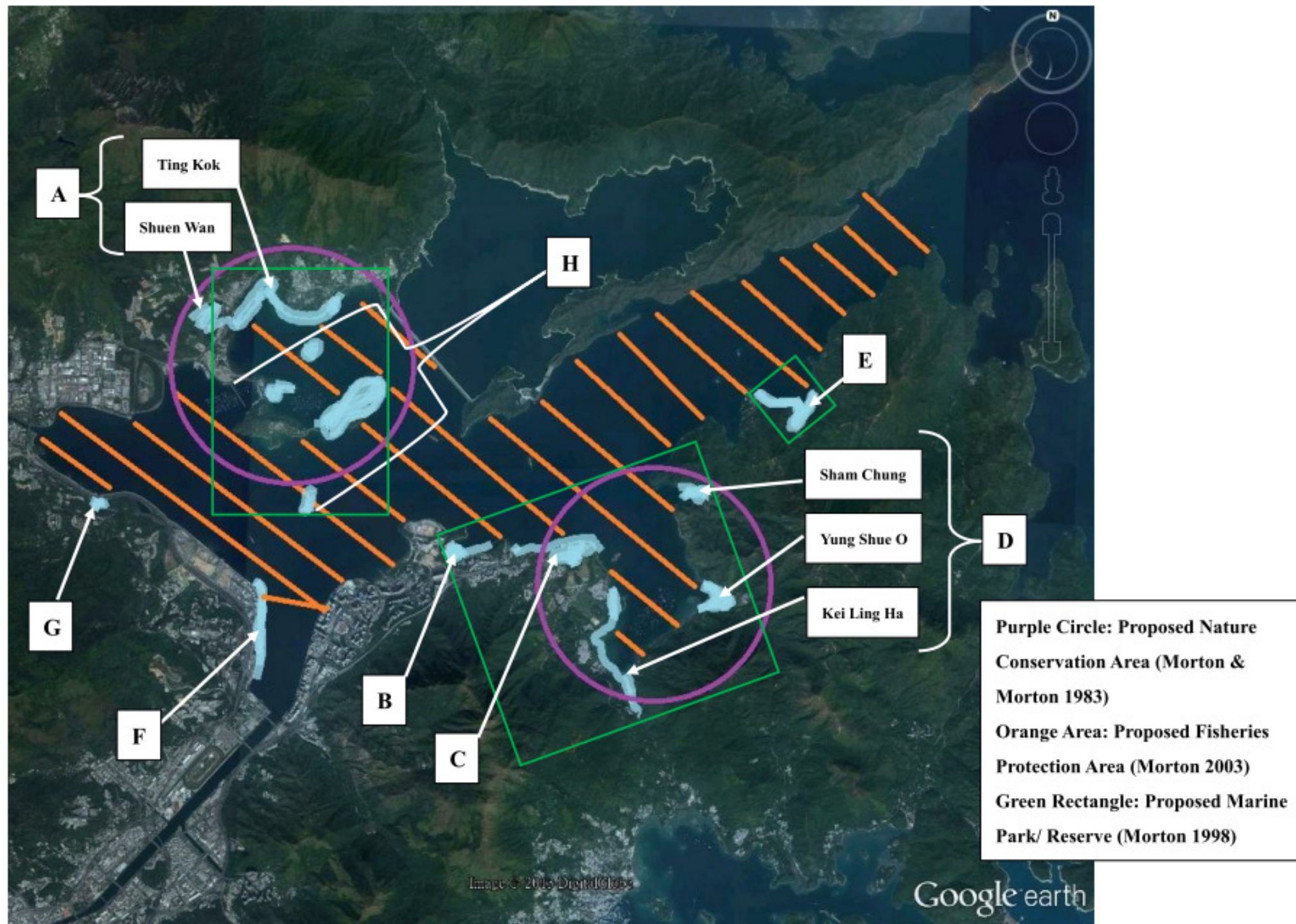| Criteria	Definition	Rationale	Examples	Consideration in application
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features	• Irreplaceable • Loss would mean the probable permanent disappearance of diversity or a feature, or reduction of the diversity at any level.	*Open ocean waters* Sargasso Sea, Taylor column, persistent polynyas. *Deep-sea habitats* endemic communities around submerged atolls; hydrothermal vents; sea mounts; pseudo-abyssal depression	• Risk of biased-view of the perceived uniqueness depending on the information availability • Scale dependency of features such that unique features at one scale may be typical at another, thus a global and regional perspective must be taken
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.	Various biotic and abiotic conditions coupled with species-specific physiological constraints and preferences tend to make some parts of marine regions more suitable to particular life-stages and functions than other parts.	Area containing: (i) breeding grounds, spawning areas, nursery areas, juvenile habitat or other areas important for life history stages of species; or (ii) habitats of migratory species (feeding, wintering or resting areas, breeding, moulting, migratory routes).	• Connectivity between life-history stages and linkages between areas: trophic interactions, physical transport, physical oceanography, life history of species • Sources for information include: e.g. remote sensing, satellite tracking, historical catch and by-catch data, vessel monitoring system (VMS) data. • Spatial and temporal distribution and/or aggregation of the species.

5/   Referred to in paragraph 1 of annex II to decision VIII/24.

Criteria	Definition	Rationale	Examples	Consideration in application
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.	To ensure the restoration and recovery of such species and habitats.	Areas critical for threatened, endangered or declining species and/or habitats, containing (i) breeding grounds, spawning areas, nursery areas, juvenile habitat or other areas important for life history stages of species; or (ii) habitats of migratory species (feeding, wintering or resting areas, breeding, moulting, migratory routes).	• Includes species with very large geographic ranges. • In many cases recovery will require reestablishment of the species in areas of its historic range. • Sources for information include: e.g. remote sensing, satellite tracking, historical catch and by-catch data, vessel monitoring system (VMS) data.
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.	The criteria indicate the degree of risk that will be incurred if human activities or natural events in the area or component cannot be managed effectively, or are pursued at an unsustainable rate.	*Vulnerability of species* • Inferred from the history of how species or populations in other similar areas responded to perturbations. • Species of low fecundity, slow growth, long time to sexual maturity, longevity (e.g. sharks, etc). • Species with structures providing biogenic habitats, such	• Interactions between vulnerability to human impacts and natural events • Existing definition emphasizes site specific ideas and requires consideration for highly mobile species • Criteria can be used both in its own right and in conjunction with other criteria.

Criteria	Definition	Rationale	Examples	Consideration in application
			as deepwater corals, sponges and bryozoans; deep-water species. *Vulnerability of habitats* • Ice-covered areas susceptible to ship-based pollution. • Ocean acidification can make deep-sea habitats more vulnerable to others, and increase susceptibility to human-induced changes.	
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.	Important role in fuelling ecosystems and increasing the growth rates of organisms and their capacity for reproduction	• Frontal areas • Upwellings • Hydrothermal vents • Seamounts polynyas	• Can be measured as the rate of growth of marine organisms and their populations, either through the fixation of inorganic carbon by photosynthesis, chemosynthesis, or through the ingestion of prey, dissolved organic matter or particulate organic matter • Can be inferred from remote-sensed products, e.g., ocean colour or process-based models • Time-series fisheries data can be used, but caution is required

/...

Criteria	Definition	Rationale	Examples	Consideration in application
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.	Important for evolution and maintaining the resilience of marine species and ecosystems	- Sea-mounts - Fronts and convergence zones - Cold coral communities - Deep-water sponge communities	- Diversity needs to be seen in relation to the surrounding environment - Diversity indices are indifferent to species substitutions - Diversity indices are indifferent to which species may be contributing to the value of the index, and hence would not pick up areas important to species of special concern, such as endangered species - Can be inferred from habitat heterogeneity or diversity as a surrogate for species diversity in areas where biodiversity has not been sampled intensively.
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.	- To protect areas with near natural structure, processes and functions - To maintain these areas as reference sites - To safeguard and enhance ecosystem resilience	Most ecosystems and habitats have examples with varying levels of naturalness, and the intent is that the more natural examples should be selected.	- Priority should be given to areas having a low level of disturbance relative to their surroundings - In areas where no natural areas remain, areas that have successfully recovered, including reestablishment of species, should be considered. - Criteria can be used both in their own right and in conjunction with other criteria.

Annex II. Members' trial on the EBSAs criteria and the ranking system.

How to do the trial:
1. **Read through the 7 EBSA criteria as attached.**
2. **Pick 1-3 sites to run the trial (go through each criterion, score it from 1 (least) to 5 (most), and put down the reason of how you score those criteria).**

	EBSA Criterion						
	1 **Uniqueness or rarity**	**2** **Special importance for life-history stages of species**	**3** **Importance for threatened, endangered or declining species and/ or habitats**	**4** **Vulnerability, fragility, sensitivity, or slow recovery**	**5** **Biological productivity**	**6** **Biological diversity**	**7** **Naturalness**
Site							
A Sham Wan, Lamma							
Remark for the scoring	5 The only remaining regularly used nesting beach for green turtles. Also includes one of the most developed coral communities outside of eastern waters	4 For green turtles migrating to HK this is THE critical habitat. Not known to be as important for other species that inhabit the area	5 Critically important for green turtles which are on the verge of extinction in HK	4 Only the hard coral community and use by green turtles are likely to be of great relevance. The hard coral community would likely take at least 10 years to recover if seriously degraded (if the stressor did not reoccur). Green turtles used to nest regularly at a number of beaches in HK, including on Lamma, but this is one of the few where village and other developments have not occurred behind the beach, causing light pollution and other disturbance. It seems likely therefore that green turtles are particularly sensitive to disturbance	2. Productivity likely greater in estuarine waters to the west	4. Hard coral diversity is quite high (need to check Denise's thesis), and reef fish diversity has been observed to be relatively high. Green turtle has already been noted, and a migratory whale shark was observed here in 2012	3-4. Relatively speaking, this is quite undisturbed, with no development on the foreshore or seabed (other than AFCD warden post). Like almost all marine sites though, it is commercially fished, blighted by marine trash, and visited by recreational vessels

	EBSA Criterion						
	1 **Uniqueness or rarity**	**2** **Special importance for life-history stages of species**	**3** **Importance for threatened, endangered or declining species and/ or habitats**	**4** **Vulnerability, fragility, sensitivity, or slow recovery**	**5** **Biological productivity**	**6** **Biological diversity**	**7** **Naturalness**
Site							
South Bay, HK Island							
Remark for the scoring	1. Not known to incorporate any rare or unique features	1. Not as far as is known	1. Not as far as is known	3. The hard coral colonies may be the most sensitive organisms, and could take a decade to recover from a serious mortality event	2. Productivity likely greater in estuarine waters to the west	2 Some encrusting hard corals, seaweeds and reef fish, but diversity seems less than many other bays	2. Most of the coastline is natural, but the beach is heavily disturbed, there are buildings at the back of the beach, and shark nets

	1	2	3	4	5	6	7
				(providing the stressor was removed)		in eastern waters	represent artificial structures. Fishing and marine litter are other disturbances

Octocoral habitats

	EBSA Criterion						
Site: Ninepins	**1** **Uniqueness or rarity**	**2** **Special importance for life-history stages of species**	**3** **Importance for threatened, endangered or declining species and/ or habitats**	**4** **Vulnerability, fragility, sensitivity, or slow recovery**	**5** **Biological productivity**	**6** **Biological diversity**	**7** **Naturalness**
A - scoring	4	3	2	3	2	4	4
Remark for the scoring	The octocoral community is very unique here as this is one of the very areas in Hong Kong supporting very extensive (down to 30m deep, some area with >60% coral coverage) and extremely abundant octocoral communities, in particular *Dendronephthya* spp.. In addition, big patches formed by this genus were the major characteristics that could be seen in both shallow and deep water regions. Species *Studeriotes* sp., which is globally rare, could be found in this site.	As a very extensive and diversified octocoral assemblage, it shall be a spawning and nursery ground for this coral species as well as some invertebrates.	No threatened, endangered or declining species has been recorded, however, a number of coral species with very large geographic ranges could be found.	Corals are of low fecundity and slow growth. They are also the important species with structures providing biogenic habitats. The increased sediment load from the dumping activities may cause harmful effect to the community.	The biological productivity of octocoral is relatively low, when comparing to hard corals.	More than 30 species of octocoral could be recorded in this site (The top site with highest octocoral diversity recorded was Tung Ping Chau, 41 species)	This site has a low level of disturbance due to its rocky formation (no trawling activities) and relatively expose. The sediment load may sometimes be affected by the dumping activities in the surrounding waters.

	EBSA Criterion						
Site	**1** **Uniqueness or rarity**	**2** **Special importance for life-history stages of species**	**3** **Importance for threatened, endangered or declining species and/ or habitats**	**4** **Vulnerability, fragility, sensitivity, or slow recovery**	**5** **Biological productivity**	**6** **Biological diversity**	**7** **Naturalness**
Ha Pak Nai **(site of high ecological value)**	5	5	4	4	3	2	2
Remark for the scoring	Juveniles of two species of horseshoe crabs, *Tachypleus tridentatus* and *Carcinoscorpius rotundicauda*, as well as the seagrass *Halophila beccarii* are found. This is one of the three sites in	The site is a spawning and nursery ground of horseshoe crabs which spend about 8 to 10 years as juveniles on the shore before migrating to the sea when mature.	Both horseshoe crab species are not listed under IUCN red list as there is insufficient information on their population status. There is some indication that the population of the Chinese	Horseshoe crabs spend 8 to 10 years on the shore as juveniles. Slow growth and long time to sexual maturity put these species at risk especially at this site with a high level of human disturbance. The high level	*Halophila beccarii* is a fast growing species with high productivity. The productivity of horseshoe crab is low, owing to its low density at the site.	No information is available on the biological diversity of this site but the diversity at Pak Nai, a site next to Ha Pak Nai with similar habitat characteristic, was not high according to our	This site is sitting next to the oyster farm. Lots of concrete bricks for oyster culture were washed ashore. It also receives a lot of rubbish (e.g., plastic debris) from the sea and polluted water from the

	1	2	3	4	5	6	7
	Hong Kong where two species of horseshoe crabs coexist.		horseshoe crab *T. tridentatus* in Asia, including Hong Kong, is declining. The seagrass *H. beccarii* is listed as a vulnerable species in the IUCN red list. The global population trends indicate this species is declining	of organic pollution may enhance the growth of benthic algae which may grow on the leaf surface of the seagrass and reduces its photosynthetic rate.		shore survey conducted in 2005.	stream.
Lung Kwu Tan (site of low ecological value)	1	1	1	1	1	1	3
Remark for the scoring	This is a sandy shore without any rare or unique species.	This is not a spawning or nursery ground of any species of particular concern.	No threatened or endangered species were found.	This is an ordinary sandy shore. Similar habitats can be found in other places in Hong Kong.	Low species diversity and abundance. Productivity is low.	Species diversity is low.	A typical sandy shore but areas nearby are developed as a recreational area.
Lai Chi Chong (randomly chosen site)	4	3	2	2	4	4	4
Remark for the scoring	No rare or unique species were found. The site is designated as a SSSI owing to its geological features including igneous and sedimentary rocks. The site has various types of habitat include mangroves, sandy shores and freshwater streams.	The mangroves may be spawning and/or nursery ground of some marine fishes.	No threatened or endangered species were found.	Most of the species have short life span and fast growth.	High productivity due to the mangroves and the high density of filter feeding bivalves.	Very high diversity of molluscs (41 species) and crustaceans (16 species) in our survey in 2005.	The site is relatively remote and mainly accessed by ferries. The level of human disturbance is medium.

	EBSA Criterion						
	1	**2**	**3**	**4**	**5**	**6**	**7**
	Uniqueness or rarity	**Special importance for life-history stages of species**	**Importance for threatened, endangered or declining species and/ or habitats**	**Vulnerability, fragility, sensitivity, or slow recovery**	**Biological productivity**	**Biological diversity**	**Naturalness**
Site							
A Rambler Channel	1	1	2	1	1	1	1
Remark for the scoring	Majority of shorelines are homogeneous and consist of artificial seawalls only. The seabed is predominantly sandy and silty soft-bottom substrates. Such highly-modified environment is commonly found in the territory.	Based on Port Survey data, the site is not an important nursery or breeding site for commercial fish. Sparse and small colonies of gorgonians are unlikely to provide strong support to survival of other species.	No threatened or endangered species were found in the site. Species found in intertidal zones were fouling organisms, which can be found in most disturbed shoreline in Hong Kong. One of the gorgonian corals found in the site, *Guaiagorgia* sp., is a localized species in Hong Kong. Most other benthic invertebrates and fish are pollution tolerant and can	Most species found are common fouling species and pollution tolerant. Artificial seashores are dominant in the area, which is easy to be recreated.	No hard corals, mangroves or sea grass bed are found. Sparse small colonies of gorgonian in the site have limited biological productivity. Majority of fish species (e.g. *Siganus canaliculatus*) found are in low trophic level and fast growing.	Species found are similar to surrounding areas and relatively low in diversity. Habitats are homogenous, which strongly suggested it supports a low biodiversity community.	Shorelines are highly modified by artificial seawalls. The area is also disturbed by heavy marine traffic and pollution loads.

			be found in most places in the territory.				
References				http://www.epd.gov.hk/eia/register/report/eiareport/eia_1832010/Index.html			
B Shelter Island	3	4	4	4	4	4	3
Remark for the scoring	There are several similar small islands surrounded by coral communities in eastern Hong Kong.	Coral community is always regarded as an important spawning and nursery grounds for various marine organisms including both fish and invertebrates. High species diversity and abundance of hard corals in the site also highly suggested the site is also important for hard coral settlement and growth.	High density of Chevron butterflyfish (*Chaetodon trifascialis*), a near threatened species on IUCN Red List and of local conservation concern, was found in the site within Hong Kong territory. The species is high dependent on *Acropora* sp., which is dominant in the site.	Corals are of low fecundity and slow growth. They are also the important species with structures providing biogenic habitats. Hard corals are also sensitive to water quality especially turbidity. Frequent visits by divers may also increase the chances of coral damage.	Hard coral communities are generally accepted to have high productivity.	High species diversity and richness of hard coral species was found. Fish species (>90 spp. of >30 families) was found to be high as well.	There are currently no development on the island and surrounding areas. Fishing activities are occasionally found. The site is popular for recreational SCUBA diving and snorkeling.
Reference				- McCorry, D. (2002) Hong Kong's scleractinian coral communities: status, threats and proposals for management. PhD. Thesis Department of Ecology & Biodiversity, The University of Hong Kong, Hong Kong - Shea, K. H. (2009) Species composition and temporal and spatial patterns in butterflyfishes (chaetodontidae) associated with coral communities insub-tropical Hong Kong. MPhil. Thesis. Department of Ecology & Biodiversity, The University of Hong Kong, Hong Kong - To, W. L. (2009). The biology, fishery of groupers (family: serranidae) in Hong Kong andadjacent waters, and implications for manangement. PhD. Thesis Department of Ecology & Biodiversity, The University of Hong Kong, Hong Kong			
C Starfish Bay	4	4	2.5?	3	3	4	4
Remark for the scoring	Starfish Bay is a sheltered, sandy mudflat shore, which is relatively rare in Hong Kong, especially in Tolo Harbour and Tolo Channel.	Previous studies have found the species is a nursery ground for some commercially important species.	Species of conservation concern is not frequently found in the bay. Seahorse (*Hippocampus kuda*) was sighted previously, but further evidence is needed to confirm if the area is important for the species. A blackcoral species, *Antipathes* sp. is also found in the bay. Such kind of soft shore is also relatively rare within Hong Kong territory.	Species found there are mainly common species on the same type of shores. However, housing development in the surrounding areas and current recreational use are notable. Some previously common species in the area are now rare, such as *Archaster typicus*.	Productivity of sandy mudflat is poorly known in Hong Kong. Macroalgae can be found in the area during winter. A very small community of mangrove on the side of the bay. However, from a juvenile fish survey, it is likely to be an important nursery area for some commercially important fish. Thus, it is believed the area is of moderate productivity.	The biodiversity of the site is considered to be moderate-high relatively to same type of shore in the territory.	The whole bay area is largely natural. Human disturbance, such as recreational use, occasionally on the beach but the level is believed to be mild.
References				- http://www.epd.gov.hk/eia/register/report/eiareport/eia_0832002/English/7305TOC.html - Morton, B. & John Morton. (1983). The Sea Shore Ecology of Hong Kong. Hong Kong: Hong Kong University Press. - Nip, T.H.M. and Wong, C.K. (2010). Juvenile fish assemblages in mangrove and non-mangrove soft-shore habitats in Eastern Hong Kong. Zoological Studies. 49:760-778.			

	EBSA Criterion						
Site: Shek Ngau Chau (tern breeding site)	**1** **Uniqueness or rarity**	**2** **Special importance for life-history stages of species**	**3** **Importance for threatened, endangered or declining species and/**	**4** **Vulnerability, fragility, sensitivity, or slow recovery**	**5** **Biological productivity**	**6** **Biological diversity**	**7** **Naturalness**

			or habitats				
A - scoring	5	5	5	4	??	5?	3
Remark for the scoring	The second largest and the most remoteness island in Mirs Bay	The largest tern breeding site in Hong Kong	Three species of tern breed on this island annually and all these species are (probably – need to confirm later when species assessment is done) of locally conservation concern	Breeding terns are highly vulnerable to disturbances from predators (including human). One accident could cause total failure of breeding success in that year (given that the terns breed only once every year).	Productivity might be low because the concerned species are in high trophic level.	Only three species of tern breed in HK waters and this island also has the breeding site of all these three species.	A beacon has been built on the top of the island and the island also has medium to high level of human disturbance from fishing activities (from anglers) during the tern breeding season.

Site: Soko Islands (tern breeding site)	EBSA Criterion						
	1 Uniqueness or rarity	2 Special importance for life-history stages of species	3 Importance for threatened, endangered or declining species and/ or habitats	4 Vulnerability, fragility, sensitivity, or slow recovery	5 Biological productivity	6 Biological diversity	7 Naturalness
B - scoring	3	5	2	4	??	2?	2
Remark for the scoring	There are several similar island in size and remoteness in the nearby area.	A regular breeding site for the Black-naped Tern.	Only one species (Black-naped Tern) was found breeding in the area and they were presented in small numbers. This site is less important to this species from the local context.	Breeding terns are highly vulnerable to disturbance from predators (including human).	Productivity might be low because the concerned species are in high trophic level.	Only one breeding tern is found breeding in the area. However, other marine/coastal bird species, especially White-bellied Sea Eagle and Eastern Reef Egret, could also breed in the vicinity.	There is an abandoned refugees camp on Tai A Chau. The island might have low level of human disturbance due to no regular schedule of public ferry and its remoteness but anglers could still be spotted in the area during holiday (and so need to check!)

Site: Sham Chung (White-bellied Sea Eagle breeding site)	EBSA Criterion						
	1 Uniqueness or rarity	2 Special importance for life-history stages of species	3 Importance for threatened, endangered or declining species and/ or habitats	4 Vulnerability, fragility, sensitivity, or slow recovery	5 Biological productivity	6 Biological diversity	7 Naturalness
C - scoring	1	5	4	2	??	1?	5
Remark for the scoring	Coastal habitat not rare; but the species, i.e. WBSE, that use the habitat is of regional importance	Breeding site for WBSE. The site would be used site most of the year, if the breeding is successful in the year, and repeatedly used for many years.	The WBSE population in HK is of regional important	Low as the landside is Country Park which is relatively protected; but the coastal frequent with various recreational activities, such as fishing.	Possibly not applicable. The concerned species is an apex predator.	Not applicable. It's a species-specific habitat with only one concerned species	Natural and undisturbed habitat. Level of human disturbance is low at present. Fishing activity is also in low level.

San Shek Wan on North Lantau (Exposed Boulder and Cobble Shore (e.g., the boulder is not large (about hand size)))

EBSA Criterion							
	1	2	3	4	5	6	7

	Uniqueness or rarity	Special importance for life-history stages of species	Importance for threatened, endangered or declining species and/ or habitats	Vulnerability, fragility, sensitivity, or slow recovery	Biological productivity	Biological diversity	Naturalness
Scoring	4	2 or 3 (2.5?)	2 or 3 (2.5?)	2 or 3 (2.5?)	2	3	4
Remark for the scoring	Quite unique; this type of boulder shore is not common in Hong Kong.	Due to the exposed nature it maybe not as important as other sheltered bay as nurseries. But definitely it will provide breeding and nursery grounds for intertidal species that can only be found in this kind of habitat.	No threatened, endangered or declining species has been recorded, although at least one interesting intertidal goby has been recorded. But this kind of habitat is facing threats from development in Hong Kong (e.g., the extensive boulder shore along the coast of Tuen Mun has been completely lost due to the widening of the Castle Peak Road; the HK-Zhuhai-Macau Bridge is under construction just outside San Shek Wan).	San Shek Wan is not facing any immediate threats but HK-Zhuhai-Macau Bridge is under construction just outside this bay, and the potential village expansion may also affect the shore.	It does not seem to be of high productivity.	69 intertidal species were recorded[28]. As the survey effort was limited, it is believed that the actual biodiversity should be higher. Although most species recorded were common, it is believed that some uncommon species could be found with more survey effort; some species depend on this kind of habitat.	Largely natural.

Three Fathoms Cove (including Kei Ling Ha mangal SSSI, Yung Shue O and Sham Chung), Tolo Harbour (Protected mudflats with boulders, mangroves and freshwater input from streams)

EBSA Criterion							
	1 Uniqueness or rarity	2 Special importance for life-history stages of species	3 Importance for threatened, endangered or declining species and/ or habitats	4 Vulnerability, fragility, sensitivity, or slow recovery	5 Biological productivity	6 Biological diversity	7 Naturalness
Scoring	4	4 or 5 (4.5?)	4	4	4	4 or 5 (4.5?)	4
Remark for the scoring	Extensive mangrove with boulders is not common.	Very important fish[29] and crustacean nurseries; breeding and nursery sites for many intertidal species – a complete coastal ecosystem (sea, mudflat, mangrove, stream, coastal woodland)	Mangrove Skimmer (a dragonfly depending on mangrove environment considered to be Vulnerable by IUCN[30]) inhabits the estuaries and mangrove there. This area also provides habitats for a diverse Sesarmine Crab community; endemic Sesarmine Crabs could be recorded[31]. Species new to Hong Kong (Athana shrimps) have also been recorded recently.	Although it seems to be intact, coastal development and pollution are threatening the entire system; once destroyed, not readily re-creatable.	Mangroves, mudflats and estuaries are generally believed to be of high productivity.	Very high (e.g., species diversity would not be lower than that of Lung Mei; maybe even higher)[32]	Although threatening by pollution and development, the shoreline is still largely natural.

[28] http://www.epd.gov.hk/eia/register/report/eiareport/eia_1732009/pdf/Section%2010%20(Ecology)/Appendix%2010B.pdf
[29] Nip, T.H.M. and Wong, C.K. 2010. Juvenile fish assemblages in mangrove and non-mangrove soft-shore habitats in Eastern Hong Kong. *Zoological Studies* 49, 760-778.
[30] http://www.iucnredlist.org/details/60302/0
[31] Kwok, W.P.W. and Tang, W.-S. 2005. An introduction to Common Sesarmine Crabs of Hong Kong. *Hong Kong Biodiversity* 9, 1-6.
[32] http://www.epd.gov.hk/eia/register/report/eiareport/eia_1402007/further_info/pdf/further_info.pdf

Che Ha shoreline, Tolo Harbour (Extensive sheltered mudflat with boulders and freshwater input from streams (only scattered mangrove trees))

EBSA Criterion							
	1 **Uniqueness or rarity**	**2** **Special importance for life-history stages of species**	**3** **Importance for threatened, endangered or declining species and/ or habitats**	**4** **Vulnerability, fragility, sensitivity, or slow recovery**	**5** **Biological productivity**	**6** **Biological diversity**	**7** **Naturalness**
Scoring	4	4 or 5 (4.5?)	4	4	4	4 or 5 (4.5?)	4
Remark for the scoring	Extensive mudflat with boulders like this is not common in Hong Kong.	Could be important fish and crustacean nurseries. Four-spot Midget could be found in nearby brackish marshes[33] but these marshes are under serious threats now. Breeding and nursery sites for many intertidal species – a complete coastal ecosystem (sea, mudflat, mangrove, stream, coastal woodland)	Mangrove Skimmer (Globally Vulnerable[3]) and Four-spot Midget (Globally Near-threatened[34]) - inhabits the mangrove there. This area also provides habitats for a diverse Sesarmine Crab community; endemic Sesarmine Crab could be recorded[35].	Although it seems to be intact, coastal development and pollution are threatening the entire system; once destroyed, not readily re-creatable.	Mudflats and estuaries are generally believed to be of high productivity.	Very high (e.g., species diversity would not be lower than that of Three Fathoms Cove)	Although threatening by pollution and development, the shoreline is still largely natural (but backshore vegetation is disturbed).

Starfish Bay, Tolo Harbour (Sheltered sandy mudflat)

EBSA Criterion							
	1 **Uniqueness or rarity**	**2** **Special importance for life-history stages of species**	**3** **Importance for threatened, endangered or declining species and/ or habitats**	**4** **Vulnerability, fragility, sensitivity, or slow recovery**	**5** **Biological productivity**	**6** **Biological diversity**	**7** **Naturalness**
Scoring	4	4	3	4	4	3	3 or 4 (3.5 ?)
Remark for the scoring	Quite unique (geologically) in Hong Kong	Important fish[2] and crustacean nurseries. Breeding and nursery sites for many intertidal species.	No very special species being recorded based on recent surveys but the habitat itself is quite unique.	Although it seems to be intact, coastal development and especially pollution are threatening the entire system; once destroyed, not readily re-creatable.	Mudflat is generally believed to be of high productivity.	In general moderate to high	Although threatening by pollution and development, the shoreline is still largely natural (but backshore vegetation and surroundings are largely disturbed).

Brief summary of the assessment for site 1: **Pak Ma Tsui**

Site	Assessment & Description
Pak Ma Tsui	
1 **Uniqueness or rarity**	3 48.1% of hard coral cover has been recorded in Hong Kong Reef Check 2013, commissioned by the AFCD. In addition, habitats of rocky reef and macroalgae habitats, i.e. *Ulva* spp. and the presence of Sargassum

---

[33] http://threatenedtaxa.org/ZooPrintJournal/2011/December/o289126xii112242-2252.pdf
[34] http://www.iucnredlist.org/details/13891/0
[35] Lee, S.Y. 1995. New Crab Site. *Porcupine! – Newsletter of the Department of Ecology and Biodiversity, Hong Kong University* 13, 5.

		during wintertime (personal observation) were observed.
2 **Special importance for life-history stages of species**	**3** Reef fishes associate directly or indirectly with coral reefs for all or part of their lives. They derive shelter or food from the corals and from associated organisms. Coral communities are relatively important habitat for the local reef fishes including seahorse which has been observed regularly during a single year underwater visual survey at Pak Ma Tsui (OPCF, Unpublished data).	
3 **Importance for threatened, endangered or declining species and/ or habitats**	**3** Presence of the locally rare species (Sadovy & Cornish, 2000; To et. al., 2013): *Choerodon schoenleinii* (IUCN – Near Threatened); *Diodon holocanthus* (IUCN – non-assessed) ; and *Hippocampus kuda* **(IUCN – Vulnerable)**	
4 **Vulnerability, fragility, sensitivity, or slow recovery**	3 Coral communities are vulnerable to physical damage, as from anchors which could overturn them. Discarded and abandoned fishing nets entangled in corals. There is other particular concern over the actual and potential impacts of dredging, typhoons, coastal development and climate change might also pose adverse impacts to local coral communities.	
5 **Biological productivity**	3 The coral reef communities of the world are tremendously varied associations of plants and animals growing in the tropical waters (Odum & Odum, 1955). Coral associated habitats have been classically viewed as complex biological systems of high productivity (Stoddart, 1969), yet, there is a general lack of research showing that the productivity spectrum across various habitats in Hong Kong or the biological productivity of local coral communities. Further, a study within stations in Port Shelter showed that the phytoplankton population is similar to that in Tolo Harbour, Junk Bay and other coastal areas in Hong Kong (Yung et al., 2001)	
6 **Biological diversity**	**Unknown** No thorough study has been done within the area in terms of the biological diversity	
7 **Naturalness**	**2** Following activities have been observed within the area: Cage trapping; Fish releasing; and Hand-line fishing	

Brief summary of the assessment for site 2: Shelter Island

Site	Assessment & Description	
Shelter Island		
1 **Uniqueness or rarity**	**3** Shelter Island was classified as with relatively high coral coverage, > 60% in an underwater transect survey between 1996 and 1998 (McCorry, 2002) and 58.8% of hard coral cover has been recorded in Hong Kong Reef Check 2013, commissioned by the AFCD. In addition, habitats of rocky reef and certain sites of the area can be as deep as almost 20m depth.	
2 **Special importance for life-history stages of species**	**3** Coral reef fishes associate directly or indirectly with corals for all or part of their lives. They derive shelter from the corals and food from associated habitats or organisms. Thereby, coral communities are relatively important habitat for the local reef fishes as well as other invertebrate species. In Shelter Island, reported to contain *Montipora* to *Acropora* fringing communities which restricted to the eastern waters of Hong Kong.	
3 **Importance for threatened, endangered or declining species and/ or habitats**	**3** Presence of the locally rare species (Chan et al., 2005; Sadovy & Cornish, 2000; To et. al., 2013): *Acanthurus dussumieri* (IUCN – Least Concern); *Acanthurus olivaceus* (IUCN – Least Concern); *Acropora* spp. (IUCN – various status); *Anyperodon leucogrammicus* (IUCN – Least Concern); *Arothron stellatus* (IUCN – non-assessed);	

	Cantherhines pardalis (IUCN – non-assessed);
	Cephalopholis argus (IUCN – Least Concern);
	Chaetodon bennetti (IUCN – Data Deficient);
	Chaetodon kleinii (IUCN – Least Concern);
	Chaetodon punctatofasciatus (IUCN – Least Concern);
	Chaetodon trifascialis (IUCN – Near Threatened);
	Choerodon anchorago (IUCN – Least Concern);
	Choerodon azurio (IUCN – Data Deficient);
	Chrysiptera unimaculata (IUCN – non-assessed);
	***Cromileptes altivelis* (IUCN – Vulnerable);**
	Ctenochaetus binotatus (IUCN – Least Concern);
	Diodon holocanthus (IUCN – non-assessed);
	Epinephelus merra (IUCN – Least Concern);
	Halichoeres nebulosus (IUCN – Least Concern);
	Parupeneus barberinoides (IUCN – non-assessed);
	Parupeneus heptacanthus (IUCN – non-assessed);
	Pentapodus setosus (IUCN – non-assessed);
	Pervagor janthinosoma (IUCN – non-assessed);
	Petroscirtes mitratus (IUCN – non-assessed);
	Pomacentrus chrysurus (IUCN – non-assessed);
	Pomacentrus coelestis (IUCN – non-assessed);
	Stethojulis trilineata (IUCN – Least Concern);
	Thalassoma hardwicke (IUCN – Least Concern); and
	Zebrasoma velifer (IUCN – non-assessed)
4 **Vulnerability, fragility, sensitivity, or slow recovery**	**3** Coral communities are vulnerable to physical damage, as from anchors which could overturn them. Discarded and abandoned fishing nets entangled in corals. Currently, at Shelter Island, there is lack of anchoring zone/buoys for the relatively high frequent use for diving during summertime. There is other particular concern over the actual and potential impacts of dredging, typhoons, coastal development and climate change might also pose adverse impacts to local coral communities.
5 **Biological productivity**	**3** The coral reef communities of the world are tremendously varied associations of plants and animals growing in the tropical waters (Odum & Odum, 1955). Coral associated habitats have been classically viewed as complex biological systems of high productivity (Stoddart, 1969), yet, there is a general lack of research showing that the productivity spectrum across various habitats in Hong Kong or the biological productivity of local coral communities. Further, a study within stations in Port Shelter showed that the phytoplankton population is similar to that in Tolo Harbour, Junk Bay and other coastal areas in Hong Kong (Yung et al., 2001)
6 **Biological diversity**	**4** More than 15 hard coral species have been recorded at Shelter Island. The diversity index (*H'c*) of coral communities in Shelter Island was estimated to be higher than the mean *H'c* of 1.7 in an underwater survey among 20 studied sites throughout the period 1996 – 1998.
7 **Naturalness**	**1** Following activities have been observed within the area: Cage trapping; Fish releasing; Hand-line fishing; Spearfishing; Yacht anchoring; Surfing; and Recreational diving

Brief summary of the assessment for site 3: **Tsim Chau**

Site	Assessment & Description

Tsim Chau	
1 **Uniqueness or rarity**	**2** Habitat composed with mainly rocky reefs with patchy hard coral distributing within the area. Depth of at least 15m.
2 **Special importance for life-history stages of species**	**2** Reef fishes associate directly or indirectly with reefs for all or part of their lives. They derive shelter from the rocky reef and food from associated organisms.
3 **Importance for threatened, endangered or declining species and/ or habitats**	**2** Presence of the locally rare species (Sadovy & Cornish, 2000; To et al., 2013): First and single record of *Aulostomus chinensis* (IUCN – non-assessed); *Cheilodactylus zonatus* (IUCN – non-assessed); *Halichoeres nebulosus* (IUCN – Least Concern); *Lutjanus lemniscatus* (IUCN – non-assessed); *Pseudolabrus eoethinus* (IUCN – Least Concern); and *Siganus guttatus* (IUCN – non-assessed)
4 **Vulnerability, fragility, sensitivity, or slow recovery**	**2** Corals are vulnerable to physical damage, as from anchors which could overturn them. Discarded and abandoned fishing nets entangled in corals. There is other particular concern over the actual and potential impacts of typhoons and climate change might also pose adverse impacts to local coral communities. However, the coral coverage within the site is rather patchy and low comparing to other assessed sites in the trial.
5 **Biological productivity**	**Unknown** No thorough study has been done within the area in terms of the biological productivity and no relevant study on the biological productivity of rocky reefs
6 **Biological diversity**	**Unknown** No thorough study has been done within the area in terms of the biological diversity
7 **Naturalness**	**3** Following activities have been observed within the area: Cage trapping; Hand-line fishing; and Recreational diving

Reference

Chan, A., Choi, C., McCorry, D., Chan, K., Lee, M. & Put Jr., A. (2005) *Field guide to hard corals of Hong Kong* Agriculture, Fisheries and Conservation Department with Friends of the Country Parks and Cosmos Books Ltd., Hong Kong

McCorry, D. (2002) Hong Kong's scleractinian coral communities : Status, threats and proposal for management Hong Kong *Ph.D. Thesis, The University of Hong Kong*

Odum, H. & Odum, E. (1955) Trophic structure and productivity of a windward coral reef community on Eniwetok Atoll *Ecological Monographs*: 25(3)

Sadovy, Y. & Cornish, A. (2000) *Reef Fishes of Hong Kong* Hong Kong University Press, Hong Kong

Stoddart, D. (1969) Ecology and morphology of recent coral reefs *Biological Reviews*: 44(4) pp. 433 – 498

To, A., Ching, K. & Shea, S. (2013) *Hong Kong reef fish photo guide* Eco-Education and Resources Centre Allion Printing Limited, Hong Kong

Yung, Y., Wong, C., Yau, K. & Qian, P. (2001) Long-term changes in water quality and phytoplankton characteristics in Port Shelter, Hong Kong, from 1988 – 1998 *Marine Pollution Bulletin* Vol.: 42 (No. 10) pp. 981 – 992

Annex III. The sites with species of their interest which are important for conservation

Habitat Type	Location	Remark
Mudflat with horseshoe crabs	1. Pak Nai /Ha Pak Nai	With Chinese horseshoe crabs (*Tachypleus tridentatus)* and mangrove horseshoe crabs (*Carcinoscorpius rotundicauda)*
	2. Tung Chung	With Chinese horseshoe crabs (*Tachypleus tridentatus)* and mangrove horseshoe crabs (*Carcinoscorpius rotundicauda)*
	3. Shui Hau	One of the sites with the highest density of Chinese horseshoe crabs (*Tachypleus tridentatus)*
	4. Yi O	With Chinese horseshoe crabs (*Tachypleus tridentatus)* and mangrove horseshoe crabs (*Carcinoscorpius rotundicauda)*
	5. Luk Keng (Starling Inlet)	One of the sites with the highest density of mangrove horseshoe crabs
	6. Tai Ho Wan	With mangrove horseshoe crabs (*Carcinoscorpius rotundicauda) recorded*
	7. San Tau	With Chinese horseshoe crabs (*Tachypleus tridentatus)* and mangrove horseshoe crabs (*Carcinoscorpius rotundicauda)* – but maybe threatened by future development
	8. Sha Tau Kok	Discovered many juvenile horseshoe crabs, requires further survey
Amphioxus (lancelets) ***Branchiostoma* spp. & *Epigonichthys* spp.**	1. Tai Long Wan	Density of amphioxus could be greater than 100ind/m^2 (may require further survey for updated data)
	2. Pak Lap Wan	Density of amphioxus could be greater than 100ind/m^2 (may require further survey for updated data)
	3. Nam She Wan	Density of amphioxus could be greater than 100ind/m^2 (may require further survey for updated data)
	4. Long Ke Wan	

Lingula anatina (brachiopod – living fossil)	1. Tai Tan	One of the three sites where *Lingula* was found in a survey conducted between 2000 and 2002. The other two sites were Wong Yi Chau and Yung Shu O. This survey had sampled 40 sandy shores and mudflats in Hong Kong
	2. Wong Yi Chau	Individuals were found in recent research
Seagrass	1. Lai Chi Wo (Double Heaven)	with largest *Zostera japonica* bed, *Halophia ovalis* in shallow subtidal and both species in the abandoned fishpond
	2. So Lo Pun (Double Heaven)	with dense *Zostera japonica* and mangrove within the abandoned fishponds, forming an interesting ecosystem
	3. Ham Tin Wan	with *Zostera japonica* and *Ruppia martima* along the stream (with strong tidal influence) connecting to the sea, very unique ecosystem
	4. Sharp Island South	with a dense subtidal *Halophia ovalis* bed and close to high coral coverage site
	5. Deep Bay (along the coast from Mai Po to Ha Pak Nai)	*Halophila beccarii* and juvenile horseshoe crabs commonly found along the coast
Soft shore (mudflat and sandy shore)	1. Lai Chi Chong	
	2. Sheung Sze Wan	
	3. Tai Ho Bay	
	4. Shui Hau	
	5. Starfish Bay	
	6. Tai Tam Bay	
Mangroves	1. Lai Chi Wo	

	2. Ting Kok	
	3. San Tau in Lantau Isalnd	
	4. Kei Ling Ha Hoi (include Tung Shue O and Sai Keng)	
	5. Nai Chung	
	6. Deep Bay Ramsar	
	7. Sai Keng	
	8. Tung Chung Bay	
Chinese white dolphins	1. waters around Lung Kwu Chau	
	2. waters around the Brothers Islands	
	3. waters around Tai O Peninsula	
	4. waters around Peaked Hill extending toward Fan Lau	
	5. waters around the Soko Islands	
	1.	
Indo-Pacific Finless Porpoise	2. waters around the Soko Islands (especially to the south of Tai A Chau)	
	3. waters between the Sokos Islands and Shek Kwn Chau	
	4. southern waters of Shek Kwu Chau	
	5. southern waters of	

	Cheung Chau	
	6. southern waters of Lamma Island	
Fisheries nursery ground	1. Tolo Harbour and Channel	Lots of juvenile fish were captured, especially for Sparidae
	2. Port Shelter	
Reef fish	1. Sharp Island	
	2. Tung Ping Chau	
	3. Ninepins	
	4. Cape d'Aguilar	
	5. Shek Ngau Chau	
	6. Hoi Ha Wan	
	7. Shelter Island	
	8. Pak Ma Tsui	
	9. Bluff Island	
Hard Shore (Rocky shore)	1. Cape d'Aguilar	
	2. Shek Mei Tau (Clearwater Bay area)	
	3. Stanley Peninsula	
	4. Tai Mui Wan	
	5. Shek O	
	6. Big Wave Bay	
	7. Man Wan Tung Wan Cheung Tsui	
	8. Lung Ha Wan	

Breeding Terns	1. Kong Tau Pei	
	2. East Ninepins	
	3. Waglan Island	
	4. Shek Ngau Chau	Largest breeding tern colony in Hong Kong
	5. Beaufort Island	Small numbers if terns breed in this small rock regularly in recent years
	6. Soko Islands	Small number of Black-naped Terns breed in this area annually
Octocorals	1. Ninepins	More than 30 species of octocorals recorded
	2. Shek Ngau Chau	29 species of octocorals recorded
	3. Victor Rock	Site is very pristine, large number of octocorals recorded, more study is needed
	4. Waglan	Site is very pristine, large number of octocorals recorded, more study is needed
	5. Tung Ping Chau	More than 40 species recorded
Hard Corals	1. A Ma Wan, TPC	
	2. Coral Beach, HHW	
	3. Wu Pai	
	4. Kiu Tsui, Sharp Island	
	5. Ung Kwong Wan	

Annex VI. Government's existing/ planned/ proposed MPAs with size in hectares.

Existing Marine Parks and Reserve		
CAPE D'AGUILAR MARINE RESERVE	鶴咀海岸保護區	20
HOI HA WAN MARINE PARK	海下灣海岸公園	260
SHA CHAU AND LUNG KWU CHAU MARINE PARK	沙洲及龍鼓洲海岸公園	1200
TUNG PING CHAU MARINE PARK	東平洲海岸公園	270
YAN CHAU TONG MARINE PARK	印洲塘海岸公園	680
Ramsar Site		
MAI PO INNER DEEP BAY	米埔內后海灣	778.15
Proposed or Planned Marine Park		
PROPOSED SOKO ISLANDS MARINE PARK	擬建索罟群島海岸公園	1270
PROPOSED SOKO ISLANDS MARINE PARK (EXTENDED AREA) (Indicative)	擬建索罟群島海岸公園(延伸區域)	700
PROPOSED SOUTHWEST LANTAU MARINE PARK	擬建西南大嶼山海岸公園	660
PROPOSED THE BROTHERS MARINE PARK	擬建大小磨刀海岸公園	850
Fisheries Protection Area (Indicative)		
LONG HARBOUR	大灘海	301.39
PORT SHELTER	牛尾海	1078.24
TOLO CHANNEL	赤門	784.02
Country and Marine Park Board's Marine Park Proposals		
NINEPIN MARINE PARK	果洲群島海岸公園	324.5
OUTER PORT SHELTER MARINE PARK	外牛尾海海岸公園	381.1
PORT ISLAND MARINE PARK	赤洲海岸公園	137.7
SHARP ISLAND (EXTENSION) MARINE PARK	橋咀洲(擴建部分)海岸公園	138.3
SHARP ISLAND MARINE PARK	橋咀洲海岸公園	198.5
AFCD Suitability Studies		
BLUFF ISLAND	沙塘口山	21.88
KAT O	吉澳娥眉	963.9
LONG KE TO PAK LAP	浪茄至白臘	197.57
SHELTER ISLAND	牛尾洲	56.78
SOUTH LAMMA	南丫島	268.87
TAI LONG WAN	大浪西灣	223.27
No-anchoring Area for Coral Community		
PORT ISLAND	赤洲	
SHARP ISLAND	橋咀	
UNG KONG WAN	甕缸灣	
	Total Area	**11794 ha**
	7.1% of total Hong Kong waters	