MONITORING OF MARINE MAMMALS IN HONG KONG WATERS – DATA COLLECTION (2010-11)

FINAL REPORT
(1 April 2010 to 31 March 2011)

Submitted by

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Submitted to the Agriculture, Fisheries and Conservation Department

of the Hong Kong SAR Government

Tender Re.: AFCD/SQ/139/09

15 May 2011

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EXECUTIVE SUMMARY

Since 1995, a longitudinal research programme has been conducted on Chinese white dolphins (a.k.a. Indo-Pacific humpback dolphins) and Indo-Pacific finless porpoises in Hong Kong and the Pearl River Delta region. The present one-year marine mammal monitoring project in Hong Kong, funded by the Agriculture, Fisheries and Conservation Department, represents the continuation and extension of this programme. The main goal of the project is to collect systematic data for assessment of distribution and abundance of local cetaceans, and take photographic records of individual dolphins to update the photo-identification catalogue.

From April 2010 to March 2011, 147 line-transect vessel surveys with 5,148 km of survey effort were conducted among nine survey areas. From these surveys, 270 groups of 934 Chinese white dolphins and 65 groups of 158 finless porpoises were sighted. D olphins frequently occurred along the west coast of Lantau, and were regularly sighted throughout the entire North Lantau region. Porpoises were mostly sighted in the southern waters, especially to the south of Tai A Chau and near Shek Kwu Chau. However, they appeared to have avoided the inshore waters of South Lantau, likely due to the increasing amount of high-speed ferry traffic.

Examination of annual porpoise encounter rate revealed that there appeared to be no consistent trend among the four survey areas where they occurred regularly, which may be related to their frequent movement across different areas in any given year. However, porpoise encounter rate during the peak months of their occurrence in southern waters showed a steady increase in recent years, which is an encouraging sign. On the contrary, the combined dolphin encounter rate around Lantau showed a downward trend in recent years, and such decline was also evident in examination of annual dolphin encounter rates across Northwest, Northeast and West Lantau survey areas. Using line-transect analysis, annual dolphin abundance was also estimated for each of these three areas. The combined estimates from the three areas ranged from 75-158 individuals annually during 2002-2010, with the ones in 2003 and 2010 being the highest and the lowest respectively. All three areas showed noticeable declining trends during the past decade, and autocorrelation test found such trends to be significant. The decline in dolphin abundance raises grave concern on the continuous usage of Chinese white dolphins in Hong Kong, which may be related to reduction of fishery resources, coastal developments and underwater noise disturbance. A suite of conservation measures are recommended to rectify this serious problem.

In 2010, the most heavily utilized habitats by dolphins and porpoises were located in West Lantau and offshore waters of South Lantau respectively. During 2006-10, the west coast of Lantau (especially around Tai O, Peaked Hill and Fan Lau) and around Lung Kwu Chau represented the most important dolphin habitats in recent years. On the other hand, in 2004-10, important porpoise habitats were located just south of Tai A Chau, the offshore water between Soko Islands and Shek Kwu Chau and around Shek Kwu Chau during winter/spring months, and around Po Toi Islands during summer/autumn months. During the 12-month study period, most dolphin and porpoise groups tended to be small. The overall percentage of young calves among all dolphins sighted has steadily increased in recent years, but occurrence of mother-calf pairs in West Lantau appeared to be at a lower level during the present study period, which may become a concern. Dolphin groups associated with feeding activities were mostly found near Tai O Peninsula and Kai Kung Shan, while the ones associated with socializing activities occurred more often around the Brothers Islands, Lung Kwu Chau, near Tai O and Peaked Hill.

From the social structure analysis using photo-identification data from 2000-09, two clusters were detected in the dolphin network; on average dolphins preferred to associate with others from their own social cluster rather than the other cluster. The two social clusters occurred with highest densities around Lung Kwu Chau and West Lantau respectively, and their ranges overlapped in northern section of West Lantau where social interaction between the two clusters primarily occurred. Behavioural differences were also found between the two social clusters, with the northern cluster best described by a model of acquaintances that break up in under a year, and the western cluster best described by a model where associations dissipate very gradually over a long period of time. The northern individuals were more gregarious that they preferred larger group sizes and had higher number of associates on average, while the western individuals had stronger associations than the northern individuals but more cliquish social cohorts. These differences may correspond to different life history strategies related to feeding or reproduction.

Over 30,000 photographs of Chinese white dolphins were taken during the 12-month period. A total of 149 individuals, sighted 366 times altogether, were identified, with 22 of them being newly identified individuals. Most newly-identified individuals from the previous monitoring period were repeatedly sighted this year, showing their increased reliance of Hong Kong waters. Similar to the past few monitoring periods, frequent movements of many individuals between

West and Northwest Lantau were documented. In light of the two social clusters being identified in North and West Lantau respectively, these frequent movements between these two areas may have important implications for social interactions between the two clusters. Since the future construction of Hong Kong Link Road will pass through an area where the two social clusters came into regular contact (i.e. Shum Wat to Peaked Hill), such movement patterns of individual dolphins should be carefully monitored before and during construction works. Frequent cross-boundary movements of many known individuals identified in Hong Kong were also evident during the 12-month period, and most of these individuals have core areas that centered on West Lantau area. The above highlights the importance of West Lantau to the overall dolphin population in the Pearl River Estuary, as this area serves as an important habitat to many dolphins that have frequent cross-boundary movements, as well as an area for dolphins from both North and West Lantau social clusters to meet.

Dolphin-related acoustic studies were initiated for the first time under the present study. A total of 8 hours and 5 minutes of acoustic recordings from 119 sound samples were made at various acoustic monitoring stations around Lantau, and at additional locations for dolphin sound recordings. A pilot study on anthropogenic noises revealed that important disturbing influences could have occurred in areas with low to medium vessel activities, and the proximity of dolphins to boats rather than the number of boats present may be the deciding factor in masking and/or physiologically affecting the Chinese white dolphins. In area with very busy shipping traffic, sound pressure level (SPL) also increases at and above 1,000 Hz, which can be especially important for Chinese white dolphins as their communication and echolocation channels are also above 1,000 Hz. Another pilot study on dolphin vocalizations using 596 samples found broadband click trains, burst pulses and narrowband whistles. Based on differences in inter-click interval (ICI), there appears to be two types of click trains, and these variations are similar to those in Hawaiian spinner dolphins. Of the variety of whistles, several of them had the general contour similar to the humpback dolphins in the Indus Delta region. When compared to a similar study in Australia, the quacks and grunts are missing in vocalization repertoire of Hong Kong dolphins, which may be a result of environmental differences between the study sites, or due to the masking effect in the noisy underwater environment of Hong Kong.

Finally, 22 educational seminars were held at local schools during the study period, to increase public awareness on the conservation of local cetaceans. Through the integrate approach of research works an education program, the Hong Kong public can gain first-hand information from local dolphin researchers.

行政摘要(中文翻譯)

自 1995 年，一項有關本地及珠江口之中華白海豚及印度太平洋江豚的長期研究已展開，現在這個為期一年、獲香港政府漁農自然護理署資助的研究正是這項監察項目的延伸。此項研究主要目的是要系統化地搜集數據，以分析香港海洋哺乳類動物的分佈和數量；及為個別中華白海豚拍下照片，以更新海豚相片名錄。

在 2010 年 4 月至 2011 年 3 月期間，研究員共進行了 147 次樣條線船上調查，在全港九個調查區共航行了 5,148 公里，並且觀察到共 270 群中華白海豚(總數達 934 隻)及 65 群江豚(總數達 158 隻)。中華白海豚經常出沒於大嶼山西岸一帶水域，而在大嶼山北面的廣泛水域到處亦可找到牠們的蹤影。江豚則主要在香港南面水域出沒，尤其在大鴉洲南面及石鼓洲一帶水域經常出沒；但為避開日益頻繁的高速船航道，牠們似乎在近期明顯地減少利用大嶼山南面的近岸水域。

在牠們主要出沒的四個區域，江豚的年度遇見比率並沒有明顯的趨勢變化，這可能與牠們在不同年份經常來往穿梭不同的區域所致。但在江豚出沒的高峰季節，牠們在香港南面水域的整體年度遇見比率在近年卻有明顯的上升趨勢。相反，中華白海豚在大嶼山附近水域的整體年度遇見比率在近年呈現下降的趨勢，而且分別在海豚出現的三個主要區域(大嶼山西北、東北及西)均可發現此下降趨勢。此外，研究員利用樣條線分析方法以估計中華白海豚在此三個區域的年度數量，發現在 2002-10 年期間，海豚的整體數量由 2003 年最多的 158 條下降至 2010 年最少的 75 條；再利用 autocorrelation test 加以分析年度趨勢，發現海豚的數量在三個主要分域均呈現明顯下降趨勢。此情況確實值得深切關注，因為中華白海豚在香港的長期使用已可能受到不同的因素(如漁業資源下降、沿岸發展、水底噪音滋擾)所影響。此報告亦建議一系列的保育措施以確保中華白海豚長遠持續使用香港的水域。

量化生境使用分析顯示，大嶼山西面水域及南面離岸水域分別是中華白海豚及江豚在 2010 年度使用量最高的生境。在 2006-10 年期間，大嶼山西面水域(尤其是大澳、雞翼角及分流一帶)及龍鼓洲附近水域均為近年中華白海豚的重要生境。另外，在 2004-10 年度的冬春兩季期間，香港最重要的江豚生境分別位於大鴉洲南面水域、索罟群島及石鼓洲之間的離岸水域、及石鼓洲附近水域，而蒲台群島附近水域則是江豚在夏秋兩季期間的重要生境。在過去的 12 個月期間，中華白海豚的及江豚的組群成員數目均較為小。幼豚佔整體海豚數目的比率在近年有上升的趨勢，但母豚及幼豚在大嶼山西面水域出現的情況卻在本年度有減少的跡象，情況令人憂慮。正在覓食的海豚群體大多聚集於大澳半島及雞公山一帶水域，而正在社交活動的群體則較常於大小磨刀洲、龍鼓洲、大澳及雞翼角附近水域發現。

利用 2000-09 年間的相片辨認數據，社群結構分析顯示大嶼山一帶水域共有兩個社交群體的存在。一般來說，海豚只會較喜歡與自己身處的社交群體成員交往，而較少與另一社交群體成員聯繫。此倆社交群體分別在大嶼山北的龍鼓洲及大嶼山西面水域一帶聚集，而牠們的分佈範圍只有在大嶼山西區域以北的水域重疊，此水域相信亦是牠們唯一有機會相互聯繫及進行社交活動的地方。此倆社交群體在行爲上亦有明顯的區分：北面社交群體的相互聯繫較爲短暫(一般少於一年)，而南面社交群體的相互聯繫則較爲長久。而且，北面社交群體的成員較喜愛大群聚在一起，每一條海豚亦與較多的成員彼此聯繫；而南面社交群體的成員則較爲喜愛分黨派，而牠們成員之間的相互聯繫亦較爲穩固。此倆社交群體在行爲上的分野可能與牠們擁有不同的覓食或繁殖交配策略有關。

在 2010-11 年度，研究員共拍攝到超過三萬多張中華白海豚相片，並辨認出 149 隻個別海豚，共 366 次的目擊紀錄，其中 22 隻海豚爲相片名錄的新成員。大部分於上年度成爲相片名錄新成員的海豚，均於本年度恆常地出現，顯示牠們正逐漸增加使用香港的水域。跟過去數個監察年度相若，本年度亦發現有眾多海豚均在大嶼山西及西北調查區來回穿梭。由於此研究項目的新發現剛確認香港存在著兩個社交群體，因此，個別海豚於大嶼山西面及西北面水域的來往移動更爲值得重視及關注。在深屈至雞翼角水域一帶，則該倆社交群體活動範圍重疊的地方，即將會興建港珠澳大橋的香港接線，因此海豚在此水域的來往移動、及兩個社交群體的交往情況更需要在工程前及進行期間仔細監察。此外，眾多個別海豚亦經常往返中港兩地水域，而這些海豚活動範圍亦大多位於大嶼山西面水域。以上各研究成果均反覆證明，大嶼山西面水域是生活在香港、甚至珠江口的中華白海豚的重要生境。

與中華白海豚有關的水底聲音監察項目亦於本年度正式展開。在大嶼山一帶水域的水底聲音監察站及一些錄取海豚發聲的個別地點，研究員錄取了 119 個、合共 8 小時 5 分的水底聲音片段。一項針對水底噪音的先導研究發現，在低至中度船隻航行頻繁情況的水域，船隻發出的噪音仍對中華白海豚有重要的干擾性影響；似乎除了船隻數量此因子外，船隻與海豚的距離更能斷定對海豚的滋擾及傷害程度。在船隻航行非常頻繁的水域，水底聲音的分貝在 1,000 赫茲或以上有著明顯的增加，而此亦正是中華白海豚用作溝通及進行回聲定位行爲較爲重要的頻率範圍。而另一項針對中華白海豚發聲行爲的先導研究，共利用了 596 個海豚發聲樣本進行分析，發現牠們擁有三種不同的發聲模式：broadband click train、burst pulse 及 narrowband whistle。從不同 inter-click interval 之間的分野，研究發現了兩種不同的 click train，這些 click train 跟夏威夷的飛旋海豚十分相似。而在香港中華白海豚眾多的 whistle 之中，數種 whistle 亦跟印度河三角洲的駝背豚較爲相似。與澳洲一項針對駝背豚發聲的研究結果比較，香港海豚的發聲技能似乎沒有

兩種 quack 及 grunt 的發聲模式，這可能與兩個研究地區的水底環境有關，或由於香港較爲嘈雜的水底環境已完全遮蓋白海豚的發聲而未有發現。

在本年度，研究員協助漁農自然護理署，共爲本地中小學主持了 22 場講座，內容主要圍繞香港中華白海豚及江豚的最新情況、與牠們有關的保育措施。透過糅合長期研究監察及公眾教育活動，香港市民可從研究員獲得更多有關鯨豚的最新資訊。

1. INTRODUCTION

Since 1995, the Hong Kong Cetacean Research Project (HKCRP) has been conducting a longitudinal study on Chinese white dolphins (also known as the Indo-Pacific humpback dolphin, *Sousa chinensis*) and finless porpoises (*Neophocaena phocaenoides*) in Hong Kong and the Pearl River Delta region, primarily funded by the Agriculture, Fisheries and Conservation Department (AFCD) as well as various government departments, environmental consultants and NGOs. The multi-disciplinary research programme aims at providing critical scientific information to the Hong Kong SAR Government to formulate sound management and conservation strategies for the local dolphins and porpoises. In addition, HKCRP has been extensively involved in numerous environmental consultancy studies to assess potential impacts of marine construction projects on cetaceans in Hong Kong and the Pearl River Estuary, and to provide suggestions on mitigation measures to lessen the development pressures on dolphins and porpoises. Results from these integrated studies have been used to establish several systematic databases, which can be used to estimate population size, to monitor trends in abundance, distribution and habitat use over time, and to keep track of levels and changes in mortality rates of the local cetaceans (e.g. Hung 2008; Hung and Jefferson 2004; Jefferson 2000a, b; Jefferson and Hung 2008; Jefferson et al. 2002, 2006, 2009).

The present monitoring project represents a continuation and extension of this research programme, with funding support from the Agriculture, Fisheries and Conservation Department of HKSAR Government. This is a one-year project covering the period of 1 April 2010 to 31 March 2011. And this final report is submitted to AFCD to summarize the status of the monitoring project covering the entire 12-month study period.

2. OBJECTIVES OF PRESENT STUDY

The main goal of this one-year monitoring study was to collect systematic data for assessment of the distribution and abundance of Chinese white dolphins and finless porpoises in Hong Kong, and to take photographic records of individual dolphins to update the current Chinese white dolphin photo-identification catalogue. To achieve this main goal, several specific objectives are set for this study. The first one is to assess the spatial and temporal patterns of distribution, abundance and habitat use of Chinese white dolphins and finless porpoises in Hong Kong in great detail. This objective has been achieved through the collection of research data on dolphins and porpoises by conducting regular systematic line-transect shipboard surveys and helicopter surveys.

The second objective was to identify individual Chinese white dolphins by their natural markings using photo-identification technique. This objective was achieved by taking high-quality photographs of dolphins for photo-identification analysis, and the resulting data was used to study individual ranging patterns, core area use and social organization of Chinese white dolphins in detail. Photographs of newly identified and re-sighted individuals were compiled and added to the current photo-ID catalogue, with associated descriptions for each newly identified individual.

The third objective of this study was to take photographic records of finless porpoises during vessel and helicopter surveys. Finally, the fourth objective was to educate the members of the public on local dolphins and porpoises, using the study results from the long-term monitoring research programme. This objective was achieved by providing public seminars arranged by AFCD.

3. RESEARCH TASKS

During the study period, several tasks were completed to satisfy the objectives set for the present marine mammal monitoring study. These tasks were:

- to collect data for assessment on spatial and temporal patterns of distribution, abundance and habitat use of Chinese white dolphins and finless porpoises through systematic line-transect vessel surveys and helicopter surveys;
- to conduct dolphin-related acoustic duties in conjunction with line-transect vessel surveys;
- to conduct onboard observations of dolphin activities and behaviour;
- to conduct quantitative analysis on spatial patterns of habitat use of local dolphins and porpoises;
- to take photographic records of dolphins for photo-identification analysis and update the photo-identification catalogue;
- to take photographic records of finless porpoises during vessel and helicopter surveys;
- to assist AFCD in arousing public awareness on local dolphins and porpoises through school seminars.

4. METHODOLOGY

4.1 Vessel Surveys

The survey team used standard line-transect methods (Buckland et al. 2001) to conduct regular vessel surveys, and followed the same technique of data collection that has been adopted in the last 15 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP, especially for AFCD and the Airport Authority (Hung 2010; Jefferson 2000a, b; Jefferson et al. 2002). The territorial water of Hong Kong Special Administrative Region is divided into twelve survey areas, and line-transect surveys were conducted among nine survey areas (i.e. Northwest (NWL), Northeast (NEL), West (WL), Southwest (SWL) & Southeast Lantau (SEL), Deep Bay (DB), Lamma (LM), Po Toi (PT)and Ninepins (NP)) (Figure 1).

Starting in 2010, with the consent of AFCD, revised sets of transect lines in several survey areas were adopted. For example, the configuration of transect lines in Deep Bay and West Lantau survey areas were modified from several parallel transect lines to the coastline, to a series of shorter transect lines running perpendicular to the coastline following the suggestions of Dawson et al. 2008. This improved survey design was to avoid any potential bias and to minimize the variance in encounter rates in the line-transect analysis, with consideration of the possibility of a density gradient from high density nearshore to low density offshore (Dawson et al. 2008). Moreover , to improve the coverage throughout the entire survey area for quantitative grid analysis, additional transect lines were placed in the survey areas of LM, PT, NP and NWL, to allow the survey team to choose alternate sets of transect lines on each survey day for improved coverage.

For each vessel survey, a 15-m inboard vessel (*Standard* 31516) with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 35 *Brunton* marine binoculars. Both observers searched the sea ahead of the vessel, between 270^o and 90^o (in relation to the bow, which is defined as 0^o). One to three additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species. Beforehand they had participated in rigorous at-sea training program provided by the PI.

During on-effort survey periods, the survey team recorded effort data including time, position (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (*Garmin eTrex Legend H*). When dolphins or porpoises were sighted, the survey team would end the survey effort, and immediately recorded the initial sighting distance and angle of the dolphin/porpoise group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin/porpoise group to the transect line was later calculated from the initial sighting distance and angle. The line-transect data collected during the present study were compatible with the long-term databases maintained by HKCRP in a way that it can be analyzed by established computer programmes (e.g. all recent versions of DISTANCE programme including version 6.0, ArcView© GIS programme) for examination of population status including trends in abundance, distribution and habitat use of Chinese white dolphins and finless porpoises.

4.2 Helicopter Surveys

Several helicopter surveys arranged by the Government Flying Service (GFS) through AFCD were conducted during the study period to survey mainly the remote survey areas that were relatively inaccessible by boat (e.g. Po Toi, Ninepins, Sai Kung, Mirs Bay) (Figure 2). The survey coverage of each helicopter survey largely depended on weather conditions such as visibility, sea state, cloud cover and wind direction, and the planned flight route could be changed with some flexibility according to the final decision by the GFS pilot. The helicopter survey usually lasted 1.5 hours, flying at an altitude of about 150 m and a speed of 150-200 km/hr. Three to four observers were on board to search for dolphins and porpoises on both sides of the helicopter. Data on sighting position, environmental conditions, group size and behaviour of the dolphins or porpoises were recorded when they were sighted. The off-effort helicopter surveys were mainly used to collect data for distribution of Chinese white dolphins and finless porpoises, but individual dolphins with very distinct identifying features were occasionally identified from pictures taken from the helicopter.

4.3 Photo-identification Work

When a group of Chinese white dolphins were sighted during the line-transect survey, the survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical. Two professional digital cameras (*Canon* EOS 7-D, 40-D models), each equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.

All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater details, and were carefully compared to over 700 identified dolphins in the PRE Chinese white dolphin photo-identification catalogue. Chinese white dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson 2000a). All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database. Any new individuals were given a new identification number, and their data were also added to the catalogue, along with text descriptions including age class, gender, any nickname or unique markings. The updated photo-ID catalogue incorporates all new photographs of individual dolphins taken during the present study.

4.4 Dolphin-related Acoustic Work

For acoustic data collection, a set of hydrophones were deployed 3-7 metres below the sea surface by 1-metre long spar buoys from the briefly stopped (mostly 3-5 minutes) research vessel engaged in the regular line-transect surveys, with vessel noise off and the vessel drifting. The hydrophone set includes broad frequency and high frequency (i.e. ultra-sonic) hydrophones (CR1 and CR3) made and spot-calibrated by personnel of the Cetacean Research Technology, Seattle, USA. The spar buoys acted to prevent excessive hydrophone movement from wave and boat motion. The recordings were streamed into a digital memory field recorder (Fortex FR-2) with a pre-amplified signal conditioner (PC200-ICP) to prevent overloading and minimize cable noise. The recordings were then stored in a 4 GB Compact Flash Card, to be downloaded onto a computer for further analysis.

During regular line-transect surveys, the HKCRP research vessel would stop at various monitoring stations set up along the transect lines in North, West and South Lantau waters (Figure 3) to collect baseline sound habitat and existing/potential anthropogenic noises within the dolphin habitat (e.g. shipping traffic at Urmston Road and South Lantau Vessel Fairway; future construction sites of the Hong Kong Link Road, Boundary Crossing Facility and Black Point Gas Supply pipeline; dredging activities at contaminated mud pits). Additional locations were also included opportunistically to collect vocalizations of dolphins when they came close to the stern of the HKCRP research vessel.

4.5 Data Analyses

4.5.1. Distribution pattern analysis

The line-transect survey data was integrated with Geographic Information System (GIS) in order to visualize and interpret different spatial and temporal patterns of dolphin and porpoise distribution using sighting positions. Location data of dolphin/porpoise groups were plotted on map layers of Hong Kong using a desktop GIS (ArcView© 3.1) to examine their distribution patterns in details. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, fishing boat associations, young calves and activities. Data from the long-term sighting databases were used to compare past distribution patterns in recent years to the one in the present study period.

4.5.2. Encounter rate analysis

Since the line-transect survey effort was uneven among different survey areas and across different years, the encounter rates of Chinese white dolphins and finless porpoises (number of on-effort sightings per 100 km of survey effort) were calculated in each survey area in relation to the amount of survey effort conducted. The encounter rate could be used as an indicator to determine areas of importance to dolphins and porpoises within the study area.

4.5.3. Line-transect analysis

Density and abundance of Chinese White Dolphins was estimated by line-transect analysis using systematic line-transect data collected under the present study. For the analysis, survey effort in each single survey day was used as the sample. Estimates were calculated from dolphin sightings and effort data collected during conditions of Beaufort 0-3 (see Jefferson 2000a), using line-transect methods (Buckland et al. 2001). The estimates were made using the computer program DISTANCE Version 6.0, Release 2 (Thomas et al. 2009). The following formulae were used to estimate density, abundance, and their associated coefficient of variation:

$$\hat{D} = \frac{n\ \hat{f}(0)\ \hat{E}(s)}{2\ L\ \hat{g}(0)}$$

$$\hat{N} = \frac{n\ \hat{f}(0)\ \hat{E}(s)\ A}{2\ L\ \hat{g}(0)}$$

$$C\hat{V} = \sqrt{\frac{\hat{var}(n)}{n^2} + \frac{\hat{var}[\hat{f}(0)]}{[\hat{f}(0)]^2} + \frac{\hat{var}[\hat{E}(s)]}{[\hat{E}(s)]^2} + \frac{\hat{var}[\hat{g}(0)]}{[\hat{g}(0)]^2}}$$

where D = density (of individuals),
n = number of on-effort sightings,
f(0) = trackline probability density at zero distance,
E(s) = unbiased estimate of average group size,
L = length of transect lines surveyed on effort,
g(0) = trackline detection probability,
N = abundance,
A = size of the survey area,
CV = coefficient of variation, and
var = variance.

A strategy of selective pooling and stratification was used in order to minimize bias and maximize precision in making the estimates of density and abundance (see Buckland et al. 2001). Distant sightings were truncated to remove outliers and accommodate modeling, and size-bias corrected estimate of group size was calculated by regressing $\log_e$ of group size against distance. Three models (uniform, half-normal and hazard rate) were fitted to the data of perpendicular distances. The model with the lowest values of Akaike's Information Criterion (AIC) was chosen as the best model and used to estimate f(0) and the resulting dolphin density and abundance (Buckland et al. 2001).

Besides estimating dolphin abundance in 2010 under the present monitoring period, annual abundance estimates were also generated for every year since 2001 in NWL and NEL survey areas and since 2002 in WL survey area, to investigate any significant temporal trend using autocorrelation test. The autocorrelation test, conducted by Dr. Gilbert Lui from the Department of Statistics and Actuarial Science of the University of Hong Kong, is commonly used to measure the association between the observation in the current period and that in the previous period, to detect whether a significant trend is present or not.

4.5.4. Quantitative grid analysis on habitat use

To conduct quantitative grid analysis of habitat use, positions of on-effort sightings of Chinese white dolphins and finless porpoises were retrieved from the long-term sighting databases and then plotted onto 1-km^2 grids among the nine survey areas on GIS. Sighting densities (number of on-effort sightings per km^2) and dolphin/porpoise densities (total number of dolphins/porpoises from on-effort sightings per km^2) were then calculated for each 1 km by 1 km grid with the aid of GIS. Sighting density grids and dolphin/porpoise density grids were then further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid was calculated by examining the survey coverage on each line-transect survey to determine how many times the grid was surveyed during the study period. For example, when the survey boat traversed through a specific grid 50 times, 50 units of survey effort were counted for that grid. With the amount of survey effort calculated for each grid, the sighting density and dolphin/porpoise density of each grid were then normalized (i.e. divided by the unit of survey effort).

The newly-derived unit for sighting density was termed SPSE, representing the number of on-effort **s**ightings **p**er 100 units of **s**urvey **e**ffort. In addition, the derived unit for actual dolphin/porpoise density was termed DPSE, representing the number of **d**olphins **p**er 100 units of **s**urvey **e**ffort. Am ong the 1-km^2 grids that were partially covered by land, the percentage of sea area was calculated using GIS tools, and their SPSE and DPSE values were adjusted accordingly. The following formulae were used to estimate SPSE and DPSE in each 1-km^2 grid within the study area:

$$SPSE = ((S / E) \times 100) / SA\%$$

$$DPSE = ((D / E) \times 100) / SA\%$$

where S = total number of on-effort sightings

D = total number of dolphins/porpoises from on-effort sightings

E = total number of units of survey effort

SA% = percentage of sea area

Both SPSE and DPSE values were useful in examining dolphin/porpoise usage within a one square kilometre area. For the present study, both SPSE and DPSE values were calculated in each 1-km^2 grid among all survey areas for the entire one-year monitoring period (2010-11), and in recent years of monitoring (2006-10 for Chinese white dolphins and 2004-10 for finless porpoises). The grid analysis also offers opportunities to examine sighting and dolphin/porpoise densities in different spatial and temporal scales using pooling and stratification strategies.

4.5.5. Behavioural analysis

When dolphins were sighted during vessel surveys, their behaviour was observed. Different behaviours were categorized (i.e. feeding, milling/resting, traveling, socializing) and recorded on sighting datasheets. This data was then inputed into a separate database with sighting information, which can be used to determine the distribution of behavioural data with desktop GIS. Distribution of sightings of dolphins engaged in different activities and behaviours would then be plotted on GIS and carefully examined to identify important areas for different activities. The behavioural data was also used in the quantitative analysis on habitat use (see Section 4.5.4) to identify important dolphin habitats for various activities.

4.5.6. Ranging pattern analysis

For the ongoing ranging pattern study, location data of individual dolphins with 10 or more re-sightings were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, created by the Alaska Biological Science Centre, USGS (Hooge and Eichenlaub 1997), was loaded as an extension with ArcView© 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD level. The core areas of individuals with 15+ re-sightings at two different levels (50% and 25% UD) were also examined to investigate their range use in greater detail.

4.5.7. Residency pattern analysis

To examine the monthly and annual occurrence patterns of individual dolphins, their residency patterns in Hong Kong were carefully evaluated. "Residents" were defined as individuals that were regularly sighted in Hong Kong for at least eight years during 1995-2010, or five years in a row within the same period. Other individuals that were intermittently sighted during the past years were defined as

"Visitors". In addition, monthly matrix of occurrence was also examined to differentiate individuals that occurred year-round (i.e. individuals that occur in every month of the year) or seasonally (i.e. individuals that occur only in certain months of the year). Using both yearly and monthly matrices of occurrence, "year-round residents" can be defined as the individual dolphins that were regularly sighted in Hong Kong throughout the year, while "seasonal visitors" can be defined as the ones that were sighted sporadically in Hong Kong and only during certain months of the year during the study period.

4.5.8. Social structure analysis

All analyses of social structure were performed in SOCPROG v2.4, using sighting and photo-identification data from the Pearl River Estuary Chinese white dolphin photo-identification catalogue collected during 2000-09, by Ms. Sarah Dungan from Trent University. Analyses were limited to individuals with at least 11 sightings in that time period (88 dolphins). This restriction was necessary since there must be an adequate amount of data on each dolphin to be statistically confident in the accuracy of social patterns (Whitehead 2008). Relationships between each pair of dolphins (dyads) were quantified with the half-weight association index, which is typical for studies on cetacean societies (e.g. Lusseau et al. 2006). Statistical routines were then run on the matrix of association indices for all 88 dolphins.

Social clustering was assessed with Newman's (2006) eigenvector method, and resulting clusters were put into a geographic context by pooling individual home-ranges (established by fixed kernel estimator; see Section 4.5.6) according to the respective cluster. This allowed for an approximation of the territory occupied by each social cluster, and identification of overlap areas. Behavioural patterns in each social cluster were interpreted from the significance of network parameters relative to what would be expected from a randomized network (Whitehead et al. 2005). These parameters included association strength, network reach (indirect connectedness), centrality, and clustering coefficient (cliquishness).

Temporal stability of associations in each social cluster was also assessed with standardized lagged association rates (SLARs, Whitehead 1995). T emporal patterns in SLARs were determined by fitting models described in Whitehead (2007) and assessing fit using the recommended quasi-Akaike information criterion (QAIC).

4.5.9. Acoustic data analysis

Data analysis of the acoustic recordings was performed by the research team of

Professor Würsig at Texas A&M University, using the state-of-the-art SpectraPRO332 Professional Sound Analysis Sound Analysis Software, Adobe Audition 2.0 Software and Raven Pro 1.3 Software. Each recording file was played back and analyzed in both wave and spectrogram forms with audio (Fast Fourier Transform, FFT, window size 512) to confirm, if possible, a relative change in Sound Pressure Level (SPL) and audio at the cue times. For each cue time, either a 5 or 10 seconds clip was selected depending on the general speed of the vessel present (slow: 10 seconds; fast: 5 seconds) in order to gain an accurate view of its noise contribution. For each clip, the average spectrogram, showing SPL versus frequency, was computed and converted to a text file for graphing use later. Recordings were dived into three categories of activity (very little, moderate, and very busy). The cue times and median of each recording was taken and graphed, and the results were recorded in Microsoft Excel 2008 for Macintosh and graphed using Minitab 16 statistical software.

For dolphin vocalizations, the recording file was also played back and analyzed in both wave and spectrogram forms with audio to differentiate vocalizations from non-delphinid sounds. Vocalizations were separated into three categories of broadband clicks, burst pulses, and narrowband frequency modulated sounds based on their spectrogram and waveform characteristics. Click trains were defined as logical click sequences (e.g. even spacing between clicks or a gradual increase/decrease in amplitude and/or spacing). Burst pulses were broadband vocalizations with numerous and tightly spaced harmonics. Whistles were down sampled to 44 kHz to better clarify their shape and separated into categories based on spectrogram form. Vocalization locations were marked within each file for later analysis.

Using Raven Pro 1.3, duration, inter-click interval (ICI, in seconds), minimum, maximum, start, end, center, and inter-quartile range (IQR) frequencies (Hz) were measured. The smallest and largest inter-click intervals, and the start and end inter-click interval, for click trains that fluctuated, were measured. Vocalizations were analyzed in both spectrogram and waveform to best qualify the parameters. Only vocalizations that had clear start and end times were measured for duration. Vocalizations that contained noise and/or vocalization overlap were not analyzed for center and IQR frequencies. Results were saved as text files and recorded and graphed using Microsoft Excel 2008, and graphed using Minitab 16 statistical software.

5. RESULTS AND DISCUSSIONS

5.1. Summary of Survey Effort, Dolphin and Porpoise Sightings

5.1.1. Number of surveys

From April 2010 to March 2011, a total of 147 line-transect vessel surveys were conducted among nine survey areas in Hong Kong waters. These included 35 surveys in WL, 32 surveys in NWL, 23 surveys in NEL, 17 surveys in SWL, 16 surveys in SEL, eight surveys in DB, six surveys in LM, six surveys in PT and four surveys in NP. The details of the survey effort data are shown in Appendix I.

Moreover, five helicopter surveys were conducted during the study period, mainly covering the survey areas in the eastern and southern waters of Hong Kong with the support of the Government Flying Service arranged by AFCD. The off-effort data on Chinese white dolphins and finless porpoises collected from these surveys were also included in the analysis of distribution and group size.

5.1.2. Survey effort

During the 12-month study period, a total of 592 hours were spent to collect 5,147.9 km of survey effort among the nine survey areas in Hong Kong. A majority of survey effort (75.6% of total) was conducted around Lantau and in Deep Bay, in which 32.9% of total effort were spent in NEL/NWL, 18.3 % in WL, 20.6% in SEL/SWL and 3.7% in DB (Figure 4a). In addition, survey effort was also allocated to areas in southern waters of Hong Kong (45.1% of total effort spent in SWL, SEL, LM and PT) where occurrence of finless porpoises were more frequent. Despite the frequent encounters of poorer weather conditions throughout the study period, HKCRP research team managed to conduct most survey effort (90.9%) under favourable sea conditions (Beaufort 3 or below with good visibility). This percentage was even slightly higher than the previous monitoring periods (e.g. Hung 2007, 2009). It should be emphasized that the high percentage of survey effort conducted under favourable sea conditions is critical to the success of the marine mammal data collection programme in Hong Kong, as only such data can be used in various analyses such as the examination of encounter rate, habitat and estimation of density and abundance.

In general, survey effort was evenly spread throughout the study period, with at least 350 km of survey effort conducted every month of the year except in October and February when weather conditions were generally poorer (Figure 4b). However, more surveys were conducted in subsequent months to make up for the fewer surveys conducted in October and February.

Since 1996, the long-term marine mammal monitoring programme coordinated by HKCRP has collected a total of 121,630.5 km of line-transect survey effort in Hong Kong and Guangdong waters of the Pearl River Estuary under different government-sponsored monitoring projects, consultancy studies and private studies, with the majority of survey effort (52.8%) commissioned and funded by AFCD. The survey effort in 2010 alone comprised 8.3% of the total survey effort collected since 1996.

5.1.3. Chinese white dolphin sightings

From April 2010 to March 2011, 270 groups of Chinese white dolphins, numbering 934 individuals, were sighted from both vessel and helicopter surveys (Appendix II). Among them, 218 groups were sighted during on-effort line-transect vessel surveys, while others were off-effort sightings. A majority of the dolphin sightings were made in WL (137 sightings) and NWL (82 sightings), comprising 81.1% of the total. Dolphin groups were less frequently sighted in other areas, including 25 groups sighted in NEL, 18 groups in SWL and seven groups in DB. Only one group of eight dolphins was sighted in SEL following behind pair-trawlers, but no dolphin sighting was made in LM, PT or NP survey areas.

5.1.4. Finless porpoise sightings

During the 12-month study period, 65 groups of finless porpoises totaling 158 individuals were sighted during vessel and helicopter surveys (see Appendix III). Among these sightings, 54 of them were recorded during on-effort search, which could be used in line-transect analysis to estimate density and abundance as well as analyses on encounter rates and habitat use patterns. The porpoise sightings were unevenly distributed among SEL (21 groups), SWL (13 groups), LM (8 groups) and PT (15 groups). Only five groups of nine porpoises were sighted in Ninepins survey area, probably related to the fewer survey effort being allocated there. A total of eight groups of 17 porpoises were sighted during helicopter surveys, and some of these were made in the offshore waters of Mirs Bay, Sai Kung and Ninepins.

5.2. Distribution

5.2.1 Distribution of Chinese white dolphins

During the 12-month study period, Chinese white dolphins are unevenly distributed throughout the WL, NWL and NEL survey areas, and to a smaller extent in SWL and DB survey areas (Figure 5). For the most part this is similar to part distribution records in recent years (Figure 6). However, it is noted that more dolphins were sighted near Yam O in NEL and Pillar Point in NWL, and fewer dolphins were sighted along the coast of WL survey area. The only two areas that were consistently used by the dolphins in the past, the entire stretch of coastline of WL and around Lung Kwu Chau in NWL, were still utilized by the dolphins in a high extent during the 2010-11 monitoring period (Figure 6), providing strong evidence that these two areas represented the most import dolphin habitats in Hong Kong.

With a closer look, dolphins were frequently sighted along the west coast of Lantau, and the sightings were mainly concentrated between the waters off Sham Wat, Tai O and Peaked Hill, and around Fan Lau (Figure 7). More dolphins appeared to be sighted nearshore than offshore. Although the area between Peaked Hill and Fan Lau were known to be utilized by dolphins intensively in the past, only a handful of sightings were made there during the 2010-11 monitoring period (Figure 7). It is suspected that the dolphin usage around Fan Lau and nearby waters may be affected by the increased amount of high-speed ferry traffic in recent years, creating more acoustic disturbance to the dolphins and posing more risks for them to forage in this favourable habitat. This issue should be examined more closely in the near future, especially on the potential behavioural disturbance on dolphins caused by high-speed ferry traffic.

On the other hand, dolphins were regularly sighted throughout the entire North Lantau region, with slightly higher concentrations of dolphin sightings near Lung Kwu Chau, Pillar Point, Yam O, and around the Brother Islands (Figure 8). The frequent sightings made near Yam O were quite surprising, as this area was known as a marginal habitat for the dolphins. But all dolphin groups sighted there were small groups with fewer than four individuals (see Section 5.6.1 for more details), and therefore they may just occur there opportunistically for feeding or resting activities. When compared to past distribution records, fewer dolphin sightings were made within the marine park area, especially to the northeast and east of Lung Kwu Chau during the present monitoring period (Figure 8). The diminished use of this important dolphin habitat should be closely monitored in the near future, as many known individual dolphins in Hong Kong used to utilize Lung Kwu Chau as their core area in the past, and this area was identified as one of the few critical dolphin habitats in Hong Kong (Hung 2008, 2010).

During the 2010-11 monitoring period, seasonal difference in dolphin distribution was evident in North and South Lantau waters, similar to the past monitoring periods. In North Lantau, dolphins occurred in greater number in summer, with higher concentration around Lung Kwu Chau and near Pillar Point (Figure 9). Then the usage of North Lantau diminished gradually in autumn and winter months, and dolphins occurred more frequently around the Brothers Islands while fewer of them occurred around Lung Kwu Chau during the winter months (Figure 9). In spring months, dolphins infrequently occurred in North or South Lantau waters, and sightings were concentrated along the west coast of Lantau Island.

5.2.2. Distribution of finless porpoises

During the 2010-11 monitoring period, finless porpoises were mostly sighted in the southern waters of Hong Kong where more survey effort was allocated, but they occurred sparingly in the eastern waters where relatively less survey effort was conducted (Figure 10). In South Lantau waters, high concentrations of porpoise sightings can be found to the south of Tai A Chau, and between Shek Kwu Chau and the Soko Islands (Figure 10). However, similar to the previous monitoring period, porpoises were mostly found in the offshore waters of South Lantau, mainly to the south of the South Lantau vessel fairway (Figure 10). It is suspected that the increasing amount of high-speed ferry traffic within the vessel fairway may have prevented the porpoises moving further inshore to Pui O Wan, an area once known to be an important porpoise habitat. The consistent avoidance behaviour of inshore waters due to disturbance of vessel traffic is quite alarming, as the inshore water may once have been used for resting and nursing activities (mother-calf pairs were frequently observed there in the past), and is no longer utilized by the porpoises. The diminished usage of this favourable habitat may eventually affect the survival of the local porpoise population. As the vessel traffic may have also affected the dolphin usage in South Lantau waters especially near Fan Lau, further study should be commenced to investigate this potential disturbance to the dolphins and porpoises, in order to formulate suitable conservation strategies to rectify this problem.

Moreover, high concentrations of porpoise sightings can be found to the south of Tai A Chau, and between Shek Kwu Chau and Soko Islands, which was also the case in the recent monitoring periods (Figure 10). Several surveys were conducted in Lamma and Po Toi survey areas during the monitoring period, and porpoises occurred there to a lesser extent when compared to their occurrence in South Lantau waters. The porpoise sightings were mainly distributed in the southern and eastern offshore waters of Lamma and offshore waters to the east of Po Toi Islands (Figure 10). Only a few porpoises were found around the Po Toi Islands. A few sightings were also made in Ninepins survey area, but mainly in the offshore waters (Figure 10).

Porpoise distribution in 2010-11 was also compared with the past five monitoring periods, and some temporal changes in their distribution were noticeable (Figure 11). More porpoises were sighted on the eastern side of Lamma while fewer were sighted around Po Toi Islands in 2010-11 when compared to the past monitoring periods. Moreover, only one porpoise sighting was made to the north of the South Lantau Vessel Fairway in 2010-11, which was very different from previous years. The only area that recorded consistently high porpoise occurrence in the past six monitoring periods has been the area around Soko Islands, and the waters between Soko Islands and Shek Kwu Chau, while porpoise occurrence in other survey areas were far less predictable.

5.3. Encounter Rate

5.3.1. Encounter rates of Chinese white dolphins

To calculate encounter rates of Chinese white dolphins, only data collected in Beaufort 0-3 conditions was included in the analysis, since the dolphin encounter rate was considerably lower in Beaufort 4-5 conditions (encounter rate of 2.42) than in Beaufort 0-3 conditions (encounter rate of 6.72). During the present monitoring period, the combined dolphin encounter rate of NWL, NEL, WL and SWL was 6.8, which was similar to the 2009-10 monitoring period, but was almost the lowest among recent years of monitoring (i.e. 2002-09) (Figure 12). In recent years, there appears to be a downward trend in dolphin encounter rates, with the exception of 2007-08 monitoring period (Figure 12).

Among the four main survey areas around Lantau, the dolphin encounter rate was the highest in WL (13.4 sightings per 100 km), which was only slightly higher than in NWL (7.5), and was much higher than in NEL (2.6), SWL (2.4) and DB (3.3) (Figure 13a). Dolphin encounter rates in WL were also the highest among all four seasons, and the differentiation was the greatest in spring months (Figure 13b). The prominent usage of WL by the dolphins has been documented consistently in the past eight monitoring periods (i.e. 2002-11), providing strong evidence that this stretch of coastal waters presents the most important habitat for Chinese white dolphins in Hong Kong. However, the differentiation between encounter rates of WL and NWL was particularly low during the present monitoring period, due to the noticeable decline in dolphin usage in WL. Such temporal trends should be continuously monitored.

Temporal trends in annual dolphin encounter rates were also examined in NWL, NEL and WL for the period of 2002-10. Overall, with the exception of 2003, there appeared to be a slight decline in annual encounter rates from the three areas combined during the nine-year period (Figure 14). In NEL, there was a considerable drop in annual encounter rates from 2002-03 to 2004-10 (Figure 14). Temporal trends in dolphin usage of NEL should be carefully monitored, as this area serves as an important core area for many long-term year-round residents (Hung 2008), and a reclamation project for the Hong Kong Boundary Crossing Facilities will be conducted there in the near future. In NWL and WL, the annual encounter rates continued to drop in recent years. In fact, the 2010 encounter rates in both areas were the lowest since 2002 (Figure 14). Since these two areas recorded the highest densities and abundance estimates within Hong Kong waters (Jefferson 2007), the continuous drop in dolphin usage there in recent years deserves serious attention in light of several important infrastructure projects to be constructed within dolphin habitats around Lantau in the next decade. Any significant trend in dolphin encounter rates can provide preliminary indications on whether these projects and other existing threats will affect their continuous usage of Hong Kong waters.

5.3.2. Encounter rates of finless porpoises

Encounter rates of finless porpoises were calculated using only data collected in Beaufort 0-2 conditions, since the porpoise encounter rate dropped considerably from 3.09 sightings per 100 km of survey effort in Beaufort 0-2 conditions to 1.36 in Beaufort 3-5 conditions. Even in relatively calm condition (i.e. Beaufort 3 condition), finless porpoises were more difficult to find at sea than Chinese white dolphin. Therefore, only the data collected in Beaufort 2 or below conditions should be used in calculating porpoise encounter rates and grid analysis to examine habitat use.

In 2010-11, the combined encounter rate of SWL, SEL, LM and PT was 3.28 porpoises per 100 km of survey effort, which was lower than the one recorded during the previous monitoring period (3.5). Among the four survey areas, porpoise encounter rate was the highest in SEL (5.4), and were lower in SWL (2.7), LM (3.0) and PT (3.36). Moreover, temporal trend in annual encounter rates of finless porpoises from the four survey areas combined were examined from 2002 to 2010. Annual encounter rates were relatively higher in 2002, 2007 and 2009, but were lower in 2005 and 2006 (Figure 15). It appeared that porpoise usage fluctuated across recent years with no apparent trend.

Temporal trends in annual encounter rates of finless porpoises from 2002-10 were examined among the four survey areas where they occurred regularly. There appeared to be no consistent trend of porpoises in all four areas. In SWL, porpoise encounter rates were similar in recent years, but was exceptionally high in 2007 and very low in 2003 (Figure 16). In SEL, there appeared to be an increasing trend in porpoise usage in recent years, but the exceptionally high and low encounter rates occurred in consecutive years in 2006-08 (Figure 16) respectively. In LM, porpoise encounter rates also fluctuated in recent years, with a considerable drop in 2010 (Figure 16). In Po Toi, porpoise occurrence was also largely inconsistent with no clear temporal trend (Figure 16). The inconsistency in porpoise usage may be related to their frequent movements across different areas in any given year during the 9-year study period. Unfortunately, individual movement of finless porpoises has been impossible to study so far due to the lack of any natural markings on the porpoises for photo-identification; therefore it is still impossible to determine whether the same groups of porpoises show up each year in each area.

In order to understand the temporal pattern of porpoise usage in a broader scale, porpoise data collected during winter and spring months (i.e. the peak months of porpoise occurrence; Jefferson et al. 2002) from SWL, SEL and LM were pooled to examine the temporal trend of porpoise encounter rate in southern waters. This trend offered a more apparent result, with a noticeable decline of porpoise usage from the highest in 2002 to the lowest in 2005, followed by a steady increase to a higher level in recent years (Figure 17). Since most porpoises sighted in Hong Kong used these three areas primarily, and winter and spring months represented the peak months where abundance of finless porpoises were the highest in Hong Kong (Jefferson et al. 2002), this trend appeared to show that porpoise usage in Hong Kong has increased in recent years, which is an encouraging sign. In the near future, line-transect analysis should be conducted to examine annual porpoise abundance estimates and their temporal trends in these areas, in order to provide more quantitative information on temporal changes of porpoise usage in Hong Kong.

5.4. Density and Abundance

To estimate annual dolphin abundance in NWL, NEL and WL utilizing the line-transect survey data from 2001-2010, only effort and sighting data under conditions of Beaufort 0-3 were used. This resulted in 1,031 survey days with 25,467 km of on-effort systematic survey effort and 2,544 groups of Chinese white dolphins during the study period.

Throughout the study period (2001-2010), West Lantau had the highest densities among the three areas in every year, with a range of 136-327 individuals/100 km^2 in wet seasons, 101-213 individuals/100 km^2 in dry seasons, and 120-278 individuals/100 km^2 for the entire years. Northwest Lantau recorded moderate densities of Chinese white dolphins among the three areas, with a range of 34-72 individuals/100 km^2 in wet seasons, 37-111 individuals/100 km^2 in dry seasons, and 40-97 individuals/100 km^2 for the entire years. On the contrary, Northeast Lantau had the lowest densities among the three areas in every year, with a range of 17-52 individuals/100 km^2 in wet seasons, 8-41 individuals/100 km^2 in dry seasons, and 10-37 individuals/100 km^2 for the entire years. The results highlighted the importance of West Lantau as the primary dolphin habitat in Hong Kong in the past decade, either in dry, wet seasons or for the entire years.

During 2001-2010, the annual abundance estimates of Chinese white dolphins ranged from 33-77 individuals in West Lantau, 35-72 individuals in Northwest Lantau, and 5-20 individuals in Northeast Lantau. Collectively, the combined estimates from the three areas that represent the primary dolphin habitat in Hong Kong ranged from 75-158 individuals, with the ones in 2003 and 2010 being the highest and the lowest respectively. Notably, the coefficient of variations (%CV) were fairly low (<20%) for all annual estimates in WL and NWL, and remained below 30% in all annual estimates in NEL. The low CVs indicated that the annual estimates generated should be reliable, and the results have accurately reflected the actual number of dolphins in each area during every year of the study period.

Temporal trends of annual dolphin abundance in each of the three survey areas were further examined. All three areas showed noticeable declining trends during the past decade (Figure 18). In West Lantau, individual abundance steadily dropped from the highest in 2002 (77 individuals) to the lowest in 2010 (33 individuals). Similarly, individual abundance also dropped in Northwest Lantau from the highest in 2001-03 (72-84 individuals) to the lowest in 2010 (35 individuals). Dolphin abundance also dropped noticeably in Northeast Lantau from the highest in 2001-03 (18-20 individuals) to the lowest in 2009-10 (5-7 individuals). In fact, the autocorrelation test also found such declining trends among all three areas to be significant ($p<0.05$). However, for trends in seasonal estimates, the autocorrelation test only showed that the temporal trend in West Lantau was significant during the wet seasons, while the ones in Northwest and Northeast Lantau were significant during the dry seasons.

The significant downward trend in abundance of Chinese white dolphins, which also concurs with the significant downward trend in dolphin encounter rates shown in Section 5.3.1, provided strong indications that dolphin usage in Hong Kong waters has diminished during the past decade, reaching the lowest point in the past year or two. Such decline in dolphin abundance raises grave concern on the continuous usage of Chinese white dolphins in Hong Kong, as the declining trends may indicate either the overall population of Chinese white dolphins in the Pearl River Estuary has been on a decline, or more dolphins prefer to move across the border into Chinese territorial waters from Hong Kong in recent years. We speculated that such decline may be due to various factors, including the reduction of fishery resource in relation to overfishing or reduction of freshwater outflow into western waters of Hong Kong; coastal development such as reclamation, dredging and filing; acoustic disturbance from increased vessel traffic (as noted in Section 5.2.1 and 5.2.2) and dolphin-watching activities off Tai O; and increased reliance of Chinese waters across the border with less human activities.

To deal with this serious issue, we strongly suggest that the temporal trends in dolphin abundance should be closely monitored in the future, and each of the abovementioned potential threats should be examined further, especially in light of the impending construction of the Hong Kong-Zhuhai-Macau Bridge and other proposed infrastructure projects and development activities. Any future planning of coastal development in North and West Lantau should be largely avoided, to safeguard the dolphin population from further decline. Since West Lantau has been identified as the most important dolphin habitat in Hong Kong, this stretch of coastal waters should receive more stringent conservation measures as far as possible. For example, the high-density areas of dolphins in WL waters should be established as a marine park as soon as possible, and the dolphin-watching activities off Tai O should be strictly regulated, in order to attract more dolphins to use this important habitat. High-speed ferry traffic should also be diverted away from Fan Lau to allow dolphins to forage safely from this important dolphin habitat, and prevent impediment of dolphin movements between Fan Lau and the Soko Islands. Without taking further action, it will be increasingly challenging to ensure the continuous use of Hong Kong waters by the Chinese white dolphins as a portion of their population range, as stated in their conservation plan formulated by AFCD.

5.5. *Habitat Use*

For the present study period, both SPSE values (number of on-effort sightings per 100 units of survey effort) and DPSE values (number of dolphins/porpoises from on-effort sightings per 100 units of survey effort) were calculated among all grids in the six survey areas where dolphins regularly occur (i.e. DB, NWL, NEL, WL, SWL and SEL) and the four survey areas where porpoises regularly occur (i.e. SWL, SEL, LM and PT). Both SPSE and DPSE values were used to quantitatively assess habitat use patterns of local dolphins and porpoises during the study period and in recent years. The derived quantitative information on habitat use could show the area of importance to dolphins and porpoises more accurately than merely observing their distribution patterns without acknowledging the uneven survey effort coverage between and within survey areas.

Since the encounter rates of dolphins and porpoises dropped noticeably in Beaufort 4+ and Beaufort 3+ conditions respectively, only the survey data collected in favourable survey conditions were used in the present habitat use analysis. To satisfy these conditions, only the survey data from the days that had at least 50% of total survey effort collected in Beaufort 0-3 conditions for dolphins and Beaufort 0-2 conditions for porpoises were included in the grid analysis. This stratification strategy may exclude most survey data that was collected in rougher sea conditions when dolphins and porpoises were more difficult to sight, in order to ensure the superior quality of data used in the habitat use analysis.

5.5.1. Habitat use patterns of Chinese white dolphins

In 2010, the most heavily utilized habitats by Chinese white dolphins included the waters around Lung Kwu Chau (Grids G10 & H11) and off Black Point (Grids H6-8) in NWL; around the Brothers Islands (Grids P16 & R14) and Yam O (Grid U15) in NEL; around Tai O Peninsula (Grids D22, D24, E22-25), near Peaked Hill (Grids A28-29, B27-28, C25-26) and near Fan Lau (Grids B30, D30) in WL and SWL (Figures 19-20). Notably, most grids in WL (and extending to the western end of SWL) recorded high to very high dolphin densities, again highlighting this area as a very important dolphin habitat in Hong Kong in 2010.

To examine dolphin habitat use in recent years, all survey effort and on-effort dolphin sightings from 2006-10 were pooled to calculate the overall SPSE and DPSE values. The longer study period with much larger sample size may help to depict more accurately where the important habitats for Chinese white dolphins were located in Hong Kong in recent years. During the five-year period, almost all grids in NWL, NEL, WL, SWL and DB were utilized by dolphins at various degrees (Figures 21-22). The only few areas that were largely avoided by the dolphins included the inner Deep Bay, Castle Peak Bay, both sides of the airport platform (mainly due to the lack of survey effort within the restricted zones there), Tai O Bay, near Shek Pik, and to the south of Soko Islands. Only three grids in SEL recorded on-effort dolphin sightings during the five-year period despite extensive survey effort was conducted there, and therefore this survey area should be considered as marginal habitat for the dolphins.

Among all 350 grids around Lantau, the west coast of Lantau and the waters around Lung Kwu Chau represented the most important dolphin habitats during 2006-10, with very high SPSE and DPSE values. In particular, many grids in WL recorded very high dolphin densities, including the ones around Tai O Peninsula (Grids C23-25, D22-24, E22-23 & F22), near Kai Kung Shan and Peaked Hill (Grids A27-29, B25-28, C26-27), and at Fan Lau (Grids B30, C30-31, D30). In addition, the grids around Lung Kwu Chau and Black Point also recorded very high dolphin usage during 2006-10, including Grids G7-11, H7-11, I7-8, I10 and I12 (Figures 21-22). Moderate dolphin densities were also recorded near Kau Ling Chung (Grid F29), between Soko Islands (Grid K33), between Peaked Hill and Fan Lau (Grids B29, C29), near Pak Chau (Grids G12-13), between Tai Mo To and Siu Mo To (Grid Q15), and near Yam O (Grids U15 & V15) (Figures 21-22). All these grids with moderate to high dolphin usage should deserve special attention during the planning of development projects around Lantau waters.

5.5.2. Habitat use patterns of finless porpoises

In 2010, spatial patterns of porpoise habitat use revealed a number of grids being utilized more often by finless porpoises. These included the waters just south of Tai A Chau (Grids I35, J35-36, K35-36), near Shek Kwu Chau (Grids Q30, Q32, R31-32, S31), and between Shek Kwu Chau and Soko Islands (Grids O32-33, P32) (Figures 23-24). Although porpoise densities among some grids in LM, PT and NP survey areas were very high as well, the results in these grids were biased with the relatively low amount of survey effort during the study period (e.g. most grids in PT and NP had only 3 or fewer units of survey effort).

In order to show a more representative picture of porpoise habitat use in recent years, all survey effort and on-effort porpoise sightings from 2004-10 were pooled to calculate SPSE and DPSE values of porpoise densities among the five survey areas with a larger sample size and longer study period. Since finless porpoises in Hong Kong exhibit distinct seasonal variations in distributions with rare occurrence in each survey area during certain months of the year (Hung 2005, 2008; Jefferson et al. 2002), the data was stratified into winter/spring (December through May) and summer/autumn (June through November) to deduce habitat use patterns for the dry and wet seasons respectively. This stratification strategy can depict a better picture of porpoise usage during the peak months of their occurrence in that particular area.

During winter and spring months (i.e. dry season) in 2004-10, important porpoise habitats with high SPSE and DPSE values were mostly located in South Lantau waters, including the waters just south of Tai A Chau, the offshore water between Soko Islands and Shek Kwu Chau, the west and southwest sides of Shek Kwu Chau, and the southeast side of Cheung Chau (Figures 25-26). Grids with low to moderate porpoise densities could also be found along the inshore waters of South Lantau and all around Soko Islands. Around Lamma Island, porpoises appeared to be more evenly distributed in the southern section of the survey area, and occurred in slightly higher densities on the east and southwestern sides of the island. The PT survey area was not surveyed consistently during the dry season due to strong wind condition, and the survey effort per grid was relatively low, resulting in a few grids with very high DPSE values based on a single porpoise sighting (Figures 25-26).

On the contrary, porpoises occurred at a low extent in South Lantau waters during summer and autumn months (i.e. wet season) despite extensive survey effort being conducted there year-round throughout the six-year period. Only a small number of grids recorded porpoise usage, with most of these grids located at the offshore waters between Cheung Chau, Shek Kwu Chau and Tai A Chau (Figures 25-26). Only a few surveys were conducted in Lamma during the wet season, and no porpoise was sighted there during those months. On the other hand, porpoise occurred in most grids in PT survey area and some grids in NP survey area during the wet season, with frequent occurrence around the Po Toi Islands. Even though a number of grids in NP survey area and the northern end of PT survey area recorded very high porpoise densities, it should be cautioned that all these grids recorded one porpoise sighting with only a few units of survey effort during the six-year period, resulted in biased results of very high SPSE and DPSE values (Figures 25-26). Considerably more effort will be needed among those grids in the future, in order to depict a better picture of porpoise habitat use pattern in the eastern waters of Hong Kong.

5.6. Group size

5.6.1. Group sizes of Chinese white dolphins

During the study period, dolphin group sizes ranged from singles to 30 animals, with an overall mean of 3.5 ± 3.41. Among the four survey areas where dolphins regularly occurred, their mean group sizes were similar across NEL, NWL and WL (3.4-3.6), while the one in SWL was slightly lower (2.9). The mean dolphin group size in the present monitoring period was lower than all past monitoring periods, which was similar to the 2007-08 and 2008-09 monitoring periods when the mean group sizes were also exceptionally low (Figure 27).

Most dolphin groups sighted in 2010-11 tended to be small, with 53.3% of the groups composed of 1-2 animals, and 76.3% of the groups with fewer than five animals (Figure 28). The smaller dolphin groups were scattered throughout North, West and South Lantau waters, especially in peripheral areas of the dolphins' range near Yam O, Deep Bay and the Soko Islands (Figure 29). On the other hand, among the 270 dolphin groups recorded in 2010-11, only ten groups had more than ten animals, and two groups had more than 15 animals. These large aggregations were mostly sighted around the Brothers Islands, around Lung Kwu Chau, near Black Point, and along the west coast of Lantau Island (Figure 29). Notably, two large groups occurred in an area where the future reclamation site of the Hong Kong Boundary Crossing Facilities (i.e. east of airport platform), and several large groups were also found very close to the future alignment of the Hong Kong Link Road (Figure 29). Since large dolphin aggregations in these areas may imply rich fishery resources and good feeding opportunities for dolphins, the impending construction works may affect their usage of these favourable habitats, which should be closely monitored throughout the construction period.

5.6.2. Group sizes of finless porpoises

During the study period, group sizes of finless porpoises ranged from singles to eleven animals, with an overall mean of 2.4 ± 1.89. Although the mean group size in 2010-11 was higher than the one in the previous monitoring period (2.1 in 2009-10), it was still well below the overall mean in 1996-2009 (3.0). Similar to past monitoring periods, most porpoise groups tended to be very small during the study period, with 66.2% of porpoise groups composed of 1-2 animals, and only five out of 65 porpoise groups had more than five animals per group (Figure 30). The five larger groups (with 6-11 animals per group) were distributed to the south of Tai A Chau, south of Shek Kwu Chau, between Lamma and Cheung Chau, near Tung O Wan of Lamma, and near Cape D'Aguilar of Hong Kong Island (Figure 31). Among the five survey areas where porpoises were found during the study period, their mean group sizes were very similar in SWL and PT (2.6), but were slightly higher in LM (3.1) and lower in SEL (2.2) and NP (1.8). The mean group sizes were also slightly higher in spring and summer months (2.6) than in autumn and winter months (2.3 and 1.9).

5.7. Group Composition and Calves

In the past monitoring periods, special attention has been given to the status of calves of Chinese white dolphins, since there were concerns that the future survival of the local dolphin population might be hampered by high mortality rates of young calves (Jefferson et al. 2006; Parsons and Jefferson 2000). During the 2010-11 monitoring period, a total of 3 unspotted calves (UCs) and 64 unspotted juveniles (UJs) were sighted in Hong Kong, and these young calves comprised 7.2% of all animals sighted. The UCs were only sighted near Peaked Hill and between the Soko Islands, while the UJs were sighted throughout NEL, NWL and W survey areas, with apparent concentrations near Fan Lau, Tai O, Lung Kwu Chau and the Brothers Islands (Figure 32).

The percentage of young calves among all dolphins sighted during the 2010-11 monitoring period followed the same trend as in the past monitoring periods, with the lowest percentage of UCs recorded in 2010-11 since 2002. On the contrary, the percentage of UJs steadily increased from the lowest in 2006-07 (4.0%) to the highest in 2010-11 (6.9%; Figure 33a). It is possible that the number of calves being born in Hong Kong waters has diminished in recent years, but this area still attracted a number of mother-calf pairs for nursing activities, which is an encouraging sign. In light of more disturbances from human activities (e.g. infrastructure projects, increased amounts of vessel traffic) in the near future, especially in WL, the proportion of calves that appear in dolphin groups in Hong Kong waters should be continuously monitored. It should be noted, however, that the encounter rate of young calves in West Lantau was at a lower level during the present study period (Figure 33b), and this area was identified as an important area for frequent occurrences of mother-calf pairs in the past. Such trend should also be monitored, as mother-calf pairs are more sensitive to underwater noise, and the acoustic disturbance of dolphin-watching activities off Tai O and increased amounts of boat traffic off Fan Lau may have deterred their usage of West Lantau waters.

5.8. Activities and Associations with Fishing Boats

When dolphins were sighted during vessel surveys, their behaviour and engaged activities were observed and recorded. Their activities were categorized into four different types, which include feeding, socializing, traveling and milling/resting. During the 12-month period, a total of 42 and 13 dolphin sightings were associated with feeding and socializing activities respectively, comprising of 15.6% and 4.8% of the total dolphin sightings. Only one dolphin group each was engaged in traveling activity and milling/resting behaviour during the study period. Most of the dolphin sightings associated with feeding activities were concentrated along the west coast of Lantau, with apparent concentrations near Tai O Peninsula and Kai Kung Shan (Figure 34). On the other hand, sightings associated with socializing activities were more scattered, with several sighting each around the Brothers Islands, Lung Kwu Chau, near Tai O and Peaked Hill (Figure 34).

Temporal trends in percentages of activities among all dolphin groups showed that frequencies of feeding activities have steadily increased from the lowest in 2007-08 monitoring period to a higher level in this and the previous monitoring periods, but the percentage in 2010-11 was still well below previous highs in earlier years (e.g. 2002-03, 2004-05 monitoring periods) (Figure 35). On the contrary, the frequency of socializing activities were in 2010-11 was lower than most of the previous monitoring periods (Figure 35). Such temporal trends should be continuously monitored, as the frequencies of various activities spent by dolphins could provide important implications to their usage of Hong Kong waters for these important activities that are vital to their fitness and survival.

During the 2010-11 monitoring period, the proportion of fishing boat-associated sightings remained very low, with only 17 dolphin groups associated with operating fishing boats, or 6.3% of all dolphin groups. Notably, the annual percentage of fishing boat associations among all dolphin groups in 2010 was the second lowest since 1996 (the lowest was in 2008), and the dolphins appeared to rely much less on feeding opportunities behind trawlers in recent years. This may be related to the decline in overall catch total by fishing boats, or the reduced fishing effort within dolphin habitats.

Among the 17 dolphin groups associated with fishing boats, five groups were associated with pair trawlers, while the others were associated with shrimp trawlers (seven groups) and hang trawler (four groups). These fishing boat associations occurred in every season except in summer months, and these associations with mostly found within the Sha Chau and Lung Kwu Chau marine park, the offshore waters of Tai O Peninsula, or along the coastline of Southwest Lantau (Figure 36).

5.9. *Photo-identification Work*

From April 2010 to March 2011, over 30,000 digital photographs of Chinese white dolphins were taken during vessel surveys for the photo-identification work. All dolphin photographs taken in the field were used to compare and update the photo-identification catalogue. Any new photographs identified as existing or new individuals during the study period as well as updated information on gender and age class were also incorporated into the photo-ID catalogue.

5.9.1. Photo-ID work summary

Currently, a total of 704 individuals have been identified in Hong Kong and the rest of the Pearl River Estuary, including the addition of 29 new individuals identified during the present study period. These included 307 dolphins first identified in Guangdong waters of the Pearl River Estuary, and 397 dolphins first identified within Hong Kong SAR territorial waters. In the PRE Chinese white dolphin photo-identification catalogue, 10 individuals were seen 50 times or more; 31 individuals were seen 30 times of more; 97 individuals were seen 15 times or more; and 147 individuals were seen 10 times or more. The individual recorded the highest number of re-sightings was NL24 with a total of 138 re-sightings since 1996. On the other hand, 56% of all identified individuals were only seen once or twice since the photo-ID catalogue was established in 1995, and the majority of these (36.5% of all individuals) were only sighted in Guangdong waters. Combined with all other photo-ID data collected in consultancy projects, ecological studies and dolphin-watching trips, the temporal trend in the total number of identified individuals, total number of re-sightings made as well as the number of individuals within several categories of number of re-sightings all indicated that the photo-ID work in Hong Kong and the Pearl River Estuary has progressed very well in recent years (Figures 37a-c).

During the 2010-11 monitoring period, a total of 149 individuals, sighted 366 times altogether, were identified during AFCD monitoring surveys (Appendices IV-V). Among them, 22 individuals were newly-identified for the first time, while the others were existing individuals in the photo-ID catalogue. Notably, most newly-identified individuals from the past monitoring period were repeatedly sighted in the present study period (e.g. NL272, WL142, WL144), showing their increased reliance of Hong

Kong waters in recent years. The majority of re-sightings were made in WL and NWL, comprising 52% and 30% of the total respectively. In addition, 47 and 15 re-sightings were made in NEL and SWL respectively, and only three re-sightings were made in DB. Notably, about 50% of all dolphins sighted in NEL (47 out of 91 animals) were identified as known individuals, with the majority of them being year-round residents, providing indications that this area is mostly visited by individuals that occur in Hong Kong regularly.

Most of the identified individuals were sighted only once or twice during the 12-month study period, with some notable exceptions though. For example, WL88 and WL109 were sighted ten and eight times respectively; seven individuals (e.g. NL11, NL24, NL98 and WL25) were sighted six times; while three other individuals (NL33, NL261, WL73) were sighted five times in total in the past 12 months. Their frequent occurrences in Hong Kong suggested that this area was an important part of their home range in the past year, and therefore their range use can be closely monitored to detect any temporal changes in their range use within and outside Hong Kong waters.

5.9.2. Individual movement

In the past few monitoring periods, a number of individuals have expanded their ranges from NWL to WL (or vice versa) with frequent movements between the two areas. After combining all other photo-ID data from other studies collected during the same period as the present AFCD monitoring project, it was found that many individual dolphins also moved between North and West Lantau waters during the 12-month period. For example, 17 individuals were sighted in both NWL and WL survey areas, while four individuals (NL136, NL165, NL210 and WL11) moved across from NEL to WL survey areas. One individual (WL47) even extended its range from SWL to NWL. Moreover, three NL individuals were seen in WL during the 12-month period, while two individuals that were frequently seen in WL were sighted in NWL (CH153) and NEL (WL33). The extensive movements of individual dolphins across North and West Lantau may be very important, as social structuring among dolphins that regularly occur in Hong Kong with two social clusters identified in North and West Lantau respectively is evident (see Section 5.9.5 for more details). The area where the two social clusters came into regular contact was between Shum Wat and Peaked Hill, where the future Hong Kong Link Road as part of the construction of the Hong Kong-Zhuhai-Macao Bridge will pass through. This important area is also affected by frequent dolphin-watching activities operated form Tai O fishing village. Therefore, movements of individual dolphins from the two social clusters should be carefully monitored through photo-identification work and ranging pattern analysis, to examine whether the current and future threats would potentially impede such movement and limit the interactions between the two social clusters.

Moreover, dolphin monitoring surveys in Lingding Bay during the same study period (i.e. August 2010 to January 2011) also found frequent cross-boundary movements of many known individuals identified in Hong Kong waters. In total, 39 individuals that frequented Hong Kong waters in the past were also found across the border, and 30 of them were sighted both in Hong Kong and Chinese waters during the 12-month period. Interestingly, a majority of these individuals have ranges that centered on West Lantau, and are members of the West Lantau social cluster. This finding further confirmed the earlier suggestion that individual dolphins with core areas centered on West Lantau waters move frequently across the border into Chinese waters (Hung 2008). It also highlights the importance of West Lantau to the overall dolphin population in the Pearl River Estuary, as this area serves as an important habitat to many dolphins that have frequent cross-boundary movements, as well as an area for dolphins from both North and West Lantau social clusters to meet. Even though the area of West Lantau is relatively small, it recorded the highest dolphin density among all survey areas in the Pearl River Estuary, and certainly more dolphins occur in this area regularly than the current abundance estimate has suggested (33 dolphins from line-transect analysis in 2010 versus 134 individuals identified in West Lantau during the same period). Considering the significant downward trend detected in annual dolphin abundance in West Lantau as shown in Section 5.4, this area should receive more stringent conservation measures. Such measures not only protect the dolphins that frequent Hong Kong waters, but also the ones that range into Lingding Bay regularly.

5.9.3. Individual range use

The matrix of occurrence of 80 frequently sighted individual dolphins with 10+ re-sightings that were also sighted in 2010 is shown in Table 1. Using the fixed kernel method, the 95% kernel ranges of 107 individuals that occurred during 2009 and/or 2010 are deduced and these ranges are shown in Appendix VI. Moreover, individual range use of 67 dolphins that were sighted 15+ times and occurred in recent years were further examined for their range use (Table 2). Most of them were sighted in NWL (58 dolphins), NEL (33), WL (56) and SWL (22), but only a few individuals have used DB (7 dolphins), EL (3) or SEL (3) survey areas as part of their ranges (Table 2). Among the 67 dolphins, 38 of them occupied ranges that spanned from Hong Kong across the border to Guangdong waters, showing frequent cross-border movements of many individuals once again.

All individual ranges were not confined to just one survey area, and some of them in fact ranged extensively across several areas. For example, 28 individuals occupied ranges that spanned across NWL, NEL and WL survey areas, and 12 individuals had ranges that covered NEL and NWL survey areas as well as Chinese waters (Table 2). Using the kernel estimator, individual ranges at 50% and 25% UD levels were examined for their core area use. For the 67 individuals with 15+ re-sightings, their 25% UD core areas were mainly concentrated at four areas: around the marine park (33 dolphins), around the Brothers Islands (16), along the stretch of coastal waters from Tai O to Fan Lau (24), and around the northeast corner of airport (2) (Table 2). Examples of identified individuals that utilized each of the three core areas are illustrated in Figures 38-40.

5.9.4. Residency pattern

Annual and monthly occurrences of 67 individual dolphins with 15+ re-sightings were examined to understand their residency patterns in Hong Kong. All except five were considered residents in Hong Kong (i.e. sighted in, at least eight years, or five years in a row) (Table 2). However, it should be cautioned that the high proportion of residents could be biased, as the visitors were sighted less frequently in Hong Kong waters, and their number of re-sightings usually takes much longer to accumulate in order to reach the minimum requirement of 15 re-sightings for this analysis. By examining their monthly occurrence, it was found that only 15 individuals used Hong Kong year-round, while the other 52 individuals showed distinct seasonal occurrence (i.e. always absent from Hong Kong during certain months of the year) (Table 2).

Overall, 15 and 47 individuals dolphins were identified as year-round and seasonal residents respectively, while only five were identified as seasonal visitors (Table 2). Notably, individuals that utilized the Brothers Islands as their 25% UD core areas were dominated by year-round residents (53% when compared to 15% of all seasonal residents), while the ones that utilized the marine park as their core areas were typically seasonal residents (57% when compared to 27% of all year-round residents). It appears that the two main core areas serve two different groups of animals, and the year-round residents utilize the entire North Lantau waters more often than the seasonal residents. These seasonal residents may leave Hong Kong for certain months of the year, but their cross-boundary movements are unclear, as they were not sighted across the border as often as the West Lantau individuals. On the contrary, the individuals that utilized West Lantau waters as their core areas were mostly seasonal residents (17), while only a few of them were year-round residents (5) or seasonal visitors (2). The high number of residents utilizing West Lantau could be biased as mentioned above. Moreover, it is likely that many individuals utilizing West Lantau as part of their range may have core areas outside of Hong Kong. With the disproportionate survey effort between Hong Kong and Chinese waters, the ranging patterns of West Lantau individuals will be difficult to examine as it will always be biased unless considerably more effort is conducted across the border regularly.

5.9.5. Social structure

5.9.5.1.Social structure and geographic clustering

From the social structure analysis, two clusters were detected in the dolphin network (Figure 41); on average dolphins preferred to associate with others from their own social cluster rather than the other cluster. The larger cluster, with 54 dolphins, has territory primarily north of Lantau Island, with highest densities around Lung Kwu Chau (Figure 42). The second cluster, with 34 dolphins, has territory centralized on the western side of Lantau, but extends into both the north and the south, curving around the coast (Figure 43). The core areas of the two social clusters do not overlap and correspond to the high-density areas (West Lantau and Lung Kwu Chau) previously identified in Hung (2008). However, the overall ranges of the two clusters (95% UD range) do overlap in northwest Lantau (Figure 44), so this is the region where social interaction between the clusters primarily occurs. Bo th West Lantau and Lung Kwu Chau are areas with greater calf densities, and have had more observations of feeding activity than other survey areas (Hung 2008). The correspondence of the two social clusters to these habitat ‘hotspots’ reaffirms their importance to the dolphins, but the overlap of territories highlights West Lantau in particular.

5.9.5.2.Behavioural differences between social clusters

In both clusters, lagged association rates were maintained above null association rates, indicating non-random temporal patterns throughout the study period. A model of casual acquaintances that break up in under a year best describes the northern cluster, but later re-association with former acquaintances results in a net long-term stabilization above the null rate (Figure 45a). The western cluster, by contrast, is best described by a model where associations dissipate very gradually over a long period of time, about six years (Figure 45b).

Network parameters indicated that there were a greater proportion of northern individuals without associates from the western ones than vice versa; northern individuals do not reach as far into the whole network as would be expected, meaning there are many with relatively limited social cohorts. This was likely because many northern individuals have ranges that do not approach the west. There was some statistical evidence to suggest this geographical segregation arises from active social avoidance, but the basis for it (e.g. resource/habitat competition, kinship/relatedness) is as of yet unknown.

A greater portion of the western cluster's territory occurs in the overlap area than the northern cluster's does (Figure 44), so more individuals from the west will have encounters with northern individuals simply due to a common habitat preference. This was reflected in a greater than expected average network that reached among western individuals.

Other parameters also suggest behavioural differences between the clusters. Northern individuals were more gregarious; they preferred larger group sizes and had higher numbers of associates on average (26.4 ± 1.4) than western individuals (19.8 ± 1.2). This also resulted in a greater than expected network centrality among northern individuals. However, in spite of this gregariousness, associations among northern individuals were not as strong as would be expected (mean non-zero association index 0.083 ± 0.002). By contrast, western individuals had stronger associations (mean non-zero association index 0.098 ± 0.003) and more cliquish social cohorts, where an individual's associates also tended to be associates of each other (indicated by greater than expected network clustering coefficient).

These behavioural differences, in cohort structure and in temporal stability, may correspond to different life history strategies related to feeding or reproduction. For example, western individuals may have developed a foraging strategy that requires more tightly knit, persisting social teams.

5.9.5.3.Summary and further studies

In summary, there was strong evidence in support of two social clusters among the dolphins regularly observed around Lantau Island, one with territory primarily to the north of Lantau Island, and the other with territory primarily to the west of Lantau Island. Each has an area of preferred habitat (Lung Kwu Chau and West Lantau), and their territories overlap in northwest Lantau.

The reasons for cluster segregation are unknown since it is within the animals' capabilities to move within the whole region. One possibility is that the two clusters may have once been more completely segregated, perhaps partitioning habitat/ resources around Lantau on the basis of kin groups. Habitat degradation in the north may then have encouraged expansion/shifting of home-ranges further into the west (by breeding females especially). In addition, it is clear that the area near Shum Wat and Tai O Peninsula is likely a preferred area for dolphins from both clusters, making ease of movement between the north and west critical. This means not only is it important to minimize the degradation of preferred dolphin habitat, particularly in the hotspot areas of West Lantau and Lung Kwu Chau, but also the disruption of movement along the northwest coast of Lantau. Lar ge-scale construction projects planned for this region (such as the Hong Kong-Zhuhai-Macau Bridge, which requires intense marine construction directly in this area) are thus of particular concern.

Further studies will be focused on the effect of calves and fishing activities on social patterns and how these factors distinguish the two social clusters. Other analyses, such as movement analysis, will be further explored as well. Finally, the social structure of the Pearl River Estuary population will be compared to the one in the Eastern Taiwan Strait, a critically endangered population that numbers fewer than 100 individuals and inhabits a small stretch of shallow coastal waters along central-western Taiwan (Wang et al. 2007, 2008). This comparative approach may provide insights into how these populations sustain themselves with different foraging strategies in relation to their population status.

5.10. Dolphin-related Acoustic Studies

5.10.1. Summary of acoustic data collection

During the 12-month study period, a total of 8 hours and 5 minutes of acoustic recordings from 119 sound samples were made at various acoustic monitoring stations in NEL, NWL, WL, SWL, SEL and DB survey areas, and at additional locations for dolphin sound recordings (Appendix VII). The acoustic data was analyzed by the research team at Texas A&M University led by Professor Bernd Würsig, and the preliminary study results on studies of anthropogenic noises and dolphin vocalizations are provided here as baseline information for further studies in the near future.

5.10.2. Pilot study on anthropogenic noises

From the sound recordings made during the study period, thirty-seven of them were used for analysis due to data inconsistencies in the others. Of those analyzed, nine were classified as being at locations (hereafter termed "stations") having little boat/industrial activity (LOW), ten as having moderate anthropogenic activity (MID), and seven as having busy activity (HI) (see descriptions of these stations and their respective categories in Appendix VIII). Medians of the recordings show a large amount of variation in each activity category (Figures 46-49). Likewise, much variation existed in the individual activity for each recording, regardless of its activity category (Figures 50-51).

5.10.2.1. Activity medians

Medians of LOW activity displayed high variance in Sound Pressure Levels (SPLs in decibels, or dB re. 1 μPa, here-after abbreviated to dB) at frequencies < 1000 Hz (Figure 46). From 1000-10,000 Hz, the SPL station variance is noticeably more uniform in its distribution, clustering around a SPL of 110 dB. The stations' median SPLs split after 10,000 Hz into three SPL groupings before condensing at 100 SPLs near a frequency of 100,000 Hz. Overall, levels displayed two major peaks, one around 120-125 dB, near frequencies of 100 Hz for the (a) and (b) recordings of NW Lantau. The other major peak (around 120 dB) occurred at about 800 Hz for most recordings, after which most of the recordings continuously decreased in SPLs.

Medians of MID activity had less overall variance in comparison to LOW, but also spanned a larger range across the SPL spectrum for extended frequencies (Figure 47). The highest SPLs were within recording NWL#5 (b), extending along SPLs near 120 dB from frequencies around 100-4,000 Hz before descending in SPLs from frequencies > 4,000 Hz, parallel to most other moderate recordings. In contrast, NEL#1 (c) extends at an SPL near 84 dB from around 500-4,000 Hz before ascending to gradually merge with the majority of moderate medians. Similar to LOW, there are two main peaks, one around 117 dB, frequency range 700-1,000 Hz, and the second near 110 dB with a frequency range from 1,200-9,000 Hz. The median for recording NWL#5 (b) was noticeably higher, mostly due to the proximity and nature of the vessels where it was taken. Comparatively the recording, which had an extended low SPL, only recorded a high-speed ferry) with engine idling.

Medians for HI activity were more uniform in distribution than the other two activity medians (Figure 48). There was only one peak in the medians; however, this peak was extended over a frequency range of 900-9,000 Hz around SPLs of 114 dB. Recordings NWL#4 (b) and NWL#3 were noticeably higher in SPLs than other recordings in smaller frequencies (0-1,000 Hz) but converged with the other recordings after that frequency range. Recording NEL#4 also distinguished itself at a SPL range around 114 dB from frequencies 10,000 – 15,000 Hz, before merging with the general trend of the other recordings. Finally, recording WL#3 had a lower SPL than the majority of recordings, descending to near 92 dB at frequencies around 2000-10,000 Hz before merging in SPLs with the other recordings at a frequency of 80,000 Hz.

5.10.2.2. Summary of findings

For LOW activities, the first major SPL peak (~120-122 dB) occurs for two areas in NWL, a and b, which are both around 100 m from the Airport Fuel Receiving Facility (AFRF). The other NWL area, c, is around 500 m from the AFRF; however, its SPL (~93 dB) is much lower at that same frequency level.

Figure 49 indicates that SPL of the HI activity area increases over the other two activity levels, but only at and above 1,000 Hz. However, it should be cautioned that Figure 49 presents the medians of medians, and is therefore quite removed from individual sources of anthropogenic noise. Neverthe less, the increase above 1,000 Hz is likely to be especially important for Chinese white dolphins, whose communication and echolocation channels are also above 1,000 Hz. On average, HI levels were about 6-7 dB higher than Low/Mid levels, or about 2 to 4 times apparent "loudness" for HI over Low/MID (with a doubling of "loudness" at about 3 dB each).

Important disturbing influences could have occurred at LOW and MID levels. The variation in recordings ranges from one boat to five, and at various proximities. While there may be a fewer or greater number of boats in areas with little activity versus areas with very busy activity, proximity to these boats may be the deciding factor in masking and/or physiologically affecting the Chinese white dolphins. Literature on bottlenose dolphins indicates that "masking" thresholds increase as a function of frequency, meaning that vocalizations must be louder at higher frequencies to compensate for background noise levels. Since the majority of click trains occur at higher frequencies, masking effects may greatly hinder navigational and foraging abilities. Additionally, boat traffic may cause behavioural changes. A previous study in Hong Kong showed preliminary results on avoidance of boat traffic by Chinese white dolphins (Ng and Leung 2003). These behavioural disturbances may have energetic and stress consequences which have not yet been documented.

5.10.2.3. Recommendations for further studies

Further research into the nature of the Chinese white dolphin vocal repertoire is needed in addition to audiograms and a masking threshold. This will help assess possible effects of masking and physiological damage to Chinese white dolphins. Comparisons to other similar populations may help in understanding the long-term effects of Hong Kong's noisy environment on the local dolphin population.

A longer time series for data collection would allow a more accurate assessment of the general noise activities of the area and possible seasonal fluctuations in this as well. Unfortunately, the current data set can only conclude in relation to the limited time frame in which the dolphin habitat was monitored.

To assess impacts of individual boats, taking recordings at set distances will allow greater accuracy in determining the most prevalent sound sources, though it is possible from the data shown that the main issue is the combination of many noise sources. L astly, if needed for management policies, statistical conclusions at a population level could be made from random sampling.

5.10.3. Pilot study on vocalizations of Chinese white dolphins

For the first year of the long-term acoustic monitoring programme, opportunistic recordings of Chinese white dolphin sounds were collected in WL and NWL, with an attempt to characterize their vocalizations, and compare the results with a previous study on humpback dolphins conducted by Van Parijs and Corkeron (2001) in Moreton Bay, the only area where acoustic behaviours of humpback dolphins have been extensively studied. A total of 12 recordings of Chinese white dolphin vocalizations were taken over six different days in Hong Kong waters during the study period; however these did not exclude the presence of boats or other anthropogenic noises. From these 12 files, a total of 596 dolphin vocalizations were analyzed. There were broadband click trains (n = 382), burst pulses (n = 19), and narrowband whistles (n = 195), which are described below in detail:

Broadband clicks ~ Broadband clicks appeared as individual clicks or click trains (Figure 52), and were 64% of all vocalizations. Click trains varied in inter-click interval (ICI), ranging from constant intervals throughout the vocalization to fluctuations in interval length (Figure 52). Beginning and ending ICIs increased proportionally in click trains with constant ICIs (Figure 53). Click trains had the longest duration (Figure 54), widest interquartile range (IQR) (Figure 55), and highest maximum and center frequencies (Figures 55-56) of the three vocalization types. Based on spectral views showing clicks extending into the highest frequency, the full frequency range of the click trains could not be documented. This was a result of recording limitations (sampling rate of 192 kHz).

Burst Pulses ~ Burst pulses were classified as "barks" based on their spectrogram form as compared to Van Parijs and Corkeron's (2001) study. Nineteen barks were found, 3% of total vocalizations. Bark durations were shorter than click trains but longer than whistles (Figure 54). The minimum and maximum frequencies were greater than whistles but shorter than click trains, ranging from a low of 4061 Hz minimum frequency to a high of 24,934 Hz maximum frequency (Figure 56). Barks had numerous harmonics that were closely spaced together. No "quacks" were found based on Van Parijs and Corkeron's (2001) frequency range or its proportion to barks.

Narrowband Whistles ~ Whistles comprised 33% of the total vocalizations and varied greatly in spectrogram form, with numerous variations (Figure 57). These variations were based on differences in duration, frequency range, spectral contour, and number of harmonics. Present in some whistles, harmonics differed from those found in barks, having wider spacing and a lesser occurrence per vocalization. IQR bandwidth was much lower in comparison to both click trains and barks; however, center frequency was similar to that in barks (Figure 55).

Based on differences in ICI, there appear to be two types of click trains, distinguished by ICI patterns of either constant intervals or fluctuating ones. These variations are similar to those found by Lammers et al. (2004) in Hawaiian spinner dolphins. Within the fluctuating click trains, ICIs varied, some starting with closely spaced ICIs and ending with widely spaced ICIs, some vice versa, and still others with more variations, including sections of constant ICIs. It is possible that these differences are a result of optimal functionality, with constant ICIs used for orientation/navigation purposes since distance to objects is unknown, whereas fluctuating ICIs may be a function of distance to prey. In foraging bats, clicks begin as FM (frequency modulated: wider spaced ICIs) when initially searching for prey and end in CF (constant frequency: closely spaced ICIs) modulation in the prey capture stage (Herzing et al. 2009). Similarly, Chinese white dolphins may alternate their click trains depending on their hunting strategy or stage in a prey capture. There is some evidence for this in several odontocetes, including bottlenose dolphins (*Tursiops* sp.), known to alter their ICI to compensate for hindering conditions, e.g. weather, ambient noise, distance to target, and target characteristics (Richardson et al. 1995).

Click trains differed greatly from whistles and barks in mean duration, IQR and center frequencies, and frequency range. These differences may be due to their function. When echolocating, dolphins tend to produce lengthy click trains to gain details of an object or location in contrast to socializing, in which numerous whistle and burst pulse vocalizations generally are emitted in short durations (Janik 2009). Present click trains had the largest frequency ranges, which allowed high center frequencies and large IQR ranges, suggesting that the majority of energy in click trains is focused in higher frequencies. Since higher frequencies result in a short propagation (MMandLFS 2000), the click trains of Chinese white dolphins may require longer durations to properly assess an object or background.

Whistles and barks differed in frequency range, and as a result their IQR bandwidth; however, they shared similar center frequencies. Barks were considered broadband sounds and spanned a broader frequency range, whereas whistles were more narrowband in range and were consequently down sampled. The IQR difference is a function of their frequency ranges. Larger frequency ranges, e.g. barks, have wider IQRs. The similarity found in center frequency may be related to their use in communication (Frankel 2009). Sounds at lower frequencies travel farther underwater (MMandLFS 2000), which would allow the Chinese white dolphins to communicate at greater distances.

Of the variety of whistles in our study, none were directly comparable to those in the Van Parijs and Corkeron (2001) study. Instead, the general contour of several whistles (Figure 52) were similar to those found in the Zbinden et al. (1977) study of humpback dolphins, in addition to a few signature whistle variations from bottlenose dolphins (Janik et al. 1994). Wang et al. (1995) showed that bottlenose dolphin whistles differ significantly in inflection points among five geographical locations, possibly because of differing levels of ambient noise. May-Collado and Wartzok (2008) highlighted significant whistle variation within multiple parameters found among bottlenose dolphin populations in the Atlantic Ocean. Their study hypothesized that this intraspecific variation was due to local adaptation as a result of changes in acoustic habitat structure, which may be the cause of geographical differences. Likewise, it is possible that similar variation exists in different geographical locations for Chinese white dolphins. Recent DNA evidence also indicates that the Hong Kong and Australian populations of humpback dolphins are quite different genetically, and may even eventually be named as different species, which may further explain broad-scale differences in vocalizations (Frère et al. 2008).

Complementing Van Parijs and Corkeron's (2001) results in Australia, this study further documented the frequency ranges of Chinese white dolphin click trains and burst pulses; however, it appears that some click trains may extend beyond the frequency range of the equipment, so higher sampling rates should be used to examine their full range. In addition, our small sample of burst pulses (n = 19) requires a greater sample size before descriptions of frequency range can be solidified. Van Parijs and Corkeron (2001) also found quack and grunt vocalizations in Moreton Bay, neither of which were present in Hong Kong. Both of these vocalizations occur at lower frequencies, and are used in a social context. Similar to the variation found in whistle contours, it is possible that this difference is a result of environmental differences between study sites, or simply due to different populations. The absence of recording said quacks and grunts may also be an artifact due to a "masking" effect, where vocalizations were unable to be separated from the background noise. The western water of Hong Kong is noisy, with much of the sound concentrated in lower frequencies (Würsig and Greene 2002). However, whether these sounds do not exist in Hong Kong dolphins, or whether we did not pick them up in our few recordings, either by chance or by masking, awaits further work.

Noise pollution is an important issue in marine environments due to the reliance of odontocete cetaceans on acoustic signaling for communication, foraging, and navigation (Laiolo 2010). This is of particular concern with the Chinese white dolphin population in Hong Kong, where there are many sources of anthropogenic disturbances, such as dredging, heavy vessel traffic, chemical pollution, and noise pollution (Würsig and Greene 2002; Jefferson et al. 2009). According to the Cetacean Specialist Group of the International Union for Conservation of Nature (Reeves et al. 2008), Indo-Pacific humpback dolphins (i.e. Chinese white dolphins) are considered Near Threatened, with several populations in decline. This study serves to characterize some of the vocalizations recorded from Chinese white dolphins in Hong Kong; however, more research is needed to more fully describe the sound repertoire of the Hong Kong population, and in assessing the impacts of anthropogenic activities.

5.11. School Seminars and Public Talks

During the study period, HKCRP researchers continued to provide assistance to AFCD to increase public awareness on the conservation of local cetaceans. In total, HKCRP researchers delivered 22 education seminars at local primary and secondary schools regarding the conservation of Chinese white dolphins and finless porpoises in Hong Kong. A PowerPoint presentation was produced for these school talks, with up-to-date information on both dolphins and porpoises gained from the long-term monitoring programme. The talks also included content such as the threats faced by local cetaceans, and conservation measures that AFCD has implemented to protect them in Hong Kong. Moreover, the author helped the Marine Park Division of AFCD to speak at their Lecture Series on past occurrences of cetacean species in Hong Kong, including the recent incident of a stray humpback whale.

Through the integrated approach of the long-term monitoring programme and publicity/education programme, the Hong Kong public can gain first-hand information from our HKCRP researchers. Their support will be vital to the long-term success in conservation of local cetaceans.

6. ACKNOWLEDGEMENT

The author would like to thank a group of people who were integrally involved and helped in the long-term monitoring project in 2010-11. First and foremost, the PI wants to thank his research associates and assistants, Mr. Vincent Ho, Ms. Yeung Ka Ying, Mr. Perry Chan, Ms. Theresa Webb and Ms. Keira Yau for their dedicated work and diligent support throughout the project. He also wants to thank his research interns, Lai Chi Leong (Baptist University College of International Education), Maria Qingzhi Kallamaa (Bournemouth University) and Robin Cheung (University of Queensland) for their involvement in the vessel survey and land-based survey programme.

The author also expresses his gratitude to Professor Bernd Würsig and Mr. Paul Sims from the Texas A&M University as well as Mr. Joe Olson from the Cetacean Research Technology for their integral involvement in the dolphin-related acoustic studies; Ms. Sarah Dungan for her assistance on the social structure analysis and Dr. John Y. Wang and Professor Bradley White of Trent University (Canada) for their supervision on Sarah's work; Ms. Maria Qingzhi Kallamaa for her assistance on the line-transect analysis; and Dr. Gilbert Lui from the University of Hong Kong for his expertise and assistance on examination of temporal trends in dolphin abundance estimates and encounter rates. He is also grateful for the information of identified dolphins provided by South China Sea Fisheries Research Institute, Hong Kong Dolphin Conservation Society and Hong Kong Dolphinwatch Limited.

HKCRP Research Team would like to especially thank our boat captain Mr. and

Mrs. Ng for their great boating skills and patience. Our main contacts at AFCD, Dick Choi, Joseph Sham, Ivan Chan and C. P. Lam, have been very helpful throughout, and we also want to thank Mrs. Chan and Mr. Ng Chi-Wah for their assistance and support on arrangement of school seminars and helicopter surveys. To the many others, whom we cannot thank individually, we would also like to give our heartfelt thanks.

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Table 1. Matrix of occurrence of the 80 frequently sighted individual dolphins that were also sighted in 2010

ID	# of Stg.	2005												2006											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
CH12	18														C			W	SW		C				
CH25	15																								
CH34	34							NE	NE						NW	NW				NE	NE	NE	NW		NW
CH38	20														C								W		
CH98	33											NW		NW	NW							NW		NW	NW
CH105	10							C			C											W			C
CH108	15																		W						
CH113	14														W										
CH144	11																C			W					
EL01	57	NE					NE	NE		NW		NE			NW			NW					NW	NE	
EL03	11				W							C	SW												
NL06	14																								
NL11	64						NW	NW		NW	NW	NW		DB	NW						NW		NW		NW
NL12	20																			NW					
NL18	72								NE	NE	NW				NE	NW	NE	NW		NE	NE		NW	NW	
NL24	135	NW			NW			NW	NE	NW	NW				NW		W					NW	W	NW	NW
NL33	39																							NW	
NL37	42				NW			SW	W			NE			NW										
NL46	33												W		W					C	NW	C	NW		NW
NL48	33										NW				NW									NW	NW
NL49	17																						NW		
NL60	28									NW									C					C	
NL75	16																					NW		NW	NE
NL93	22										NE										NE			NW	
NL98	72				W				NW	NW	NW	NE		W	NW	NW							W	NW	
NL103	32				NW							NW		NW	NW									NW	NW
NL104	46							NE	NW			NW			NW				W		W				NW
NL118	32												NW	NW				NW	W	NE				NW	NW
NL120	51										NE	NW							NE				NW	NW	NW
NL123	69	W						NW	NW	NW	NW	W			NW	NW	NW						W	NE	NW
NL128	30								W		W				SW				W			W			W
NL136	20										NW	NW			NW										NW
NL139	62							NE		NW	W	NE			NW	NW				NE		NW	NW		NE
NL145	19					W		NE													W				
NL153	15										NW				NW			NW				NW			NW
NL156	10																								NW
NL165	28					NW																	NW		
NL179	21					NW																NW			
NL188	26								W		NW				NW	NW								NW	
NL191	29											NW		W				W			NW			C	
NL202	23					NW	W							NW	NW								NW		NW
NL205	12														NW										
NL206	20														NW										
NL212	13													NW											
NL213	11													NW											NW
NL215	13														NE							NW			NE
NL219	12																					NW		NW	NW
NL220	14																					NW	NW		NW
NL224	13																			W			NW	NW	
NL233	19																								NW
NL242	15														NW										NW
NL244	21																								
NL246	12																								
NL258	10																								
NL259	11																								
NL260	21																								
NL261	13																								
NL265	13																								

ID	# of Stg.	2007												2008											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
CH12	18	W		W				W				W						W							
CH25	15					W									W		W			W					
CH34	34	C			NW	NW	NW			NE	NE	NE	NW							NE		NE		NW	
CH38	20	SW		W					SW														W		
CH98	33				NW					NW	NW	NW			NW	NW							DB		NW
CH105	10																								
CH108	15	W	W		W									W			W			W					W
CH113	14							NW							W					W					
CH144	11																								
EL01	57	NW						NW				NE												NE	NE
EL03	11					W						SW						NW				SW		SW	
NL06	14			NW															NW	NE	NE			NW	NW
NL11	64			NW							NW	NW	NW		NW	NW									NW
NL12	20									NW					NW										
NL18	72	NE		NW		NE									NE				NW		NW	W			NE
NL24	135	NW	NW			NE	NW					W				NW	NW			NE			NW	NW	NW
NL33	39	NE				NW			NE		NE		NW	W	NE					NE				NE	NW
NL37	42						NW	NE							NW										
NL46	33	NW		NW			NW						NW						NW				W		NW
NL48	33	NW		NW					NE		NE		NW								NE	NE			NW
NL49	17												NW												
NL60	28								NW													NW			
NL75	16														NE						NE				
NL93	22							NE				NW							NW				W		
NL98	72				NW	NW									NW								NW	NW	
NL103	32	NW									NW		NW			NW					W	W			NW
NL104	46			NW			NW					W			NW		NW		NW	NE	W	W			
NL118	32			NW						W	NW		NW					NW	W						NW
NL120	51	NW	NW		NW	NW	NW	NE	NE	NE	NW								NW	NE	NE	NE			NW
NL123	69	W			NW	NE			NE			NW		W						NE		W			NW
NL128	30	W			W					W	SW			SW									W		
NL136	20	NW									NW	NW			NE									NW	
NL139	62	W		NW			NW		NE			NW	NE		NE							NE			NE
NL145	19																		NW						
NL153	15			NW					NW	NW															
NL156	10																								
NL165	28	NW		NW					NE						NE	NW	NW		NW	NE					NW
NL179	21	NW							NE	NE		NE	NE	NE		NE	NW		NW	NE					NW
NL188	26	W		NW				NE			W	NW			NE		W						W	NW	NW
NL191	29	NW		NW								NW	NW							NE			NW		NW
NL202	23	NW								W	NW	NW	NW							NE	W	NW	NW		
NL205	12										NW	NW	NW		NW										NW
NL206	20		W				W					W													W
NL212	13										NW						W			W	W				
NL213	11			NW							NW	NW													NW
NL215	13											NE	NW				NW		NW			NE		W	NE
NL219	12						NW						NW									NW	NW		NW
NL220	14	NW		NW						NE		NW			NW							NE	W		
NL224	13	NW				NW			NE			NW			NW					NE					
NL233	19	NW		NW								NW	NW							NE					NW
NL242	15										NE	NW											NW		
NL244	21	NW		NW		NE	W						NW	NE		NW				NE		W	NW		NW
NL246	12			NW					NE				NW				NW			NE		NE			NE
NL258	10										NW				NW					NW	SW				
NL259	11																		NW		NW	W			
NL260	21																		NW	NE		NE	W		NW
NL261	13																			NE		NE	NW	NE	NW
NL265	13																								

ID	# of Stg.	2009												2010											
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
CH12	18	W			W			W						W		W								W	
CH25	15		NW						W										W			W			
CH34	34									NE	NW		DB					NW				C			
CH38	20				W				SW		W					W	W							W	W
CH98	33	NW	NW	NW						NW			DB					NW					NW		
CH105	10												NW			W									
CH108	15		W		W		W	SW												SW					
CH113	14		W					W								NW		W				C			
CH144	11		W	W	W					W					SW	W									
EL01	57			NW		W	W						NE			NE									
EL03	11		W										SW				W				C				
NL06	14		NW	NW									NW					NW							
NL11	64	NW											DB			NW					NW		NW	DB	
NL12	20								NW										NW						
NL18	72	NW					NE	NE				NW	NE		NW									NW	NW
NL24	135	NE	NW				NW	NE			NE		NE	NW		W			NW		NW			NW	NE
NL33	39	NE	NW	W				NW								W		NE							NE
NL37	42	NW					NE									NW									
NL46	33			NW								NW													NW
NL48	33	NW	NW				NW			NW											NW		NW	NW	
NL49	17	NW																			W				
NL60	28		DB								NW		DB								NW		NW	NW	
NL75	16						NW				NW		NE			NE									NE
NL93	22		NW			NW	NW						NW			NW								NE	
NL98	72	NE	NW				NW	NE			NE		NE	NW		W		NE			NW			NW	NE
NL103	32		NW																NW						
NL104	46						NE					NW							NE						NW
NL118	32		NW									NW				NW									
NL120	51	NE		NE				NE			NE		NE			NE									NE
NL123	69	NE					NE				NW		NE			NE					NW				NE
NL128	30	NW						W							SW	NW					C				
NL136	20	NW	NW	NW				NW					NW								W				
NL139	62						NW			NE			NE		NW										
NL145	19										NW										NW				
NL153	15								NW												C				
NL156	10		NW					W															W	W	
NL165	28		W	NE				NW								NW		W			NW				
NL179	21			NE												NE					NW				
NL188	26											NW					W								NW
NL191	29		NE								NW		NE			NE		NW							
NL202	23										NW						NW	NW							
NL205	12															NW								NW	
NL206	20				W	W	W	SW	W			W	SW				W					W	W		W
NL212	13		NW						W							W			W			W		C	
NL213	11	NW														NW							NW		
NL215	13												NE			NE									
NL219	12												NW										NW		
NL220	14									NW											NW	W			
NL224	13													W			W								
NL233	19	NW		NW		NW		W				NW		NW		NW									
NL242	15		NW				NW					NW		NW		W								NW	
NL244	21							NW		NW		NW	NW			NW					W				
NL246	12										NW					NE				NW		NE			
NL258	10							W	W				NW			W		NW							
NL259	11	NW			W			NE		NW		NW					W								NW
NL260	21	NE	NW	NE			NW				NE				W	NE			NW					NW	
NL261	13			NE							NW		DB							NW	NW				NE
NL265	13	NW								W			W	W		W	W	W				W			

Table 1. (cont'd)

		2005												2006												2007												2008												2009												2010											
ID	# of Stg.	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
WL04	13																						NW		NW	NW													NW				NW															W							W							NW	
WL05	18								NW														NW										NE	W		NW	NW							NE						NW								NW					NW	NW	W				C	W	W		
WL09	20				W												W		W							W		W																						NW			W		W	W		NW					W		W				C	W	W	C	
WL11	37							SW							NW	NW				NE	NW		W			NW					NW	NE							NE		NW			NE						NW	NW			NW	NW	W				NW			W								C		NW
WL15	38							SW																W					W						W				SW	W					SW			W	W		W	W	W		W				W	W			W									W	
WL17	13								W													W				W												SW																							SE	W											
WL21	26				W			W											SW	W	W		C	C		W					W							W			W		SW	W									W			W						W	NW	W						C			W
WL25	71				W	W			W			W	W	W	C		W	W	SW		W		NW	W		W		W	W			W		W	W	W		W		W			W			W	W			W	W		W				SW	W		W	W	W	W	W		W			W			W	W
WL28	10													W												W										W											W									W								W								C	
WL29	13				W																	W				W		W																							W							W		W					W						W		W
WL37	15																C	W													W								W																W									W								C	
WL42	37	W													W	W			C							W		W								W				W	W	W	W	W	W		W		NW		W					SW	SW				W		W	W	W	W			W	W	W		C
WL44	12				W																				NW									W										SW			W				NE					W				W	NE								C			NW	
WL50	21											W		W	C			W							NW									W	W			W			W		W								W		W	W		W	SW			W				W	W					C			W
WL55	25																	W		W						SW		W	W				SW		W	SW			SW			W			SW						W		W	W	W	W			W	W	SW			W				W					W
WL61	17																			W		W				W									W	W		W	W				W				W	W	W			W	W													W							
WL62	25																			W		W						W	W							SW		W		W					SW		W				W	W	W						W	W			SW	W	W			W					
WL69	26																						W	W			W	W													W						W	W		W	W	W				W	W		W	W			SW						C	SW	W	W	C
WL72	21																									W									W	W				W				SW	SW				W	W	W					W				W				NW	W	W							NW
WL73	14																									W														W						SW			W				W								W			W	W	W					W		W
WL74	13																									SW	W				W					W																				SW					W				W				W	W			
WL84	12																										W											SW		W							W						W						W					W	W	W							W
WL86	16																											W								W			SW				W		SW				W			W	W		W									W					W		W	W	SW
WL87	16																											W												W							W						W							W			SW	W	W							W	C
WL88	24																											W	W							SW											W		W	W				W			W		W	W	W			W	W	SW		W		SW	W	SW	SW
WL91	11																												W																							W	W			SW			W	W				W	W				C				
WL108	21																																			W		SW				W			W		W		W		W		W	W					W	SW	SW			W	W	W							
WL109	24				W																		C							W						W				W	W				SW				W	W				W						W		W		W	W	W		W	C				W
WL111	12																														W									NE				NE			NW		NW		NW					NW		NW		NW				NW									
WL114	15																																							W	W					SW	W						W				SW		W					NW	W	W				W			W
WL116	18																																							W							W		W		NW		W	W			SW			W				NW	W					W			C
WL120	11																																									W	W		NW		W						W	W				W						W		W							
WL123	19																																										W		W								W		W		SW		W			W		NW		W	W	SW			C				W
WL132	10																																																	W		W	W			W							SW	W	W				C		W		
WL137	10																																																			W	W		W				W	W	SW			W	W								C
SL05	25																					W																		W			W				W					W	W			SW			W	SW	SW		SW	W	W					W		W	
SL27	19									W						W	W		SW	W													SW		W	SW											W				W										SW		W									W	
SL35	45							SW					SW	W	SW	SW			SW	W			C			W		W			SW		SW	W	W			W					SW	SW		W	W	W	W	SW	W	W	W							W			W	W	W								
SL40	18																									SW												W								SW	W			W		W	W			SW			W		SW		SW								C	W	SW

Table 2. Range use (50%/25% UD core areas and sighting coverage) and residency pattern of 67 individuals with 15+ sightings from the PRE humpback dolphin photo-ID catalogue during 1995-2010.

(abbreviations: MP= Sha Chau & Lung Kwu Chau Marine Park; CLK= northeast corner of airport; BR= Brothers Islands; WL= West Lantau; DB= Deep Bay; EL= East Lantau; NEL= Notheast Lantau; NWL= Northwest Lantau; SWL= Southwest Lantau; SEL= Southeast Lantau; CH=Chinese waters)
(* denotes individuals that have their gender determined by biopsy sampling)

		Age			50% UD Core Area				25% UD Core Area				Occurrence in Survey Areas							
ID#	# STG	Class	Gender	Residency	MP	CLK	BR	WL	MP	CLK	BR	WL	DB	EL	NEL	NWL	WL	SWL	SEL	CH
CH06	33	SA	?	Seasonal Resident				√				√					√	√		√
CH12	18	SA	?	Seasonal Resident				√				√					√	√		√
CH25	15	SS	F	Seasonal Visitor				√				√				√	√			√
CH34	34	UA	F	Year-round Resident	√		√				√		√		√	√				√
CH38	20	SA	?	Seasonal Resident				√				√					√	√		√
CH98	29	UA	?	Seasonal Resident	√				√				√			√	√			
CH108	15	SS	F	Seasonal Resident				√				√					√	√		√
EL01	57	UA	M*	Year-round Resident	√		√				√			√	√	√	√			
EL07	62	SJ	M*	Year-round Resident			√				√			√	√	√	√			
NL11	64	SA	F	Seasonal Resident	√				√				√			√				√
NL12	20	SA	F	Seasonal Resident	√				√							√		√		√
NL18	72	SA	F	Year-round Resident	√		√				√				√	√	√			√
NL19	31	SA	F	Seasonal Resident		√	√				√				√	√				√
NL20	38	UA	F	Seasonal Resident	√				√						√	√	√	√		√
NL24	135	SA	?	Year-round Resident	√		√		√						√	√	√			√
NL33	39	SS	F*	Seasonal Resident	√		√		√		√				√	√	√			
NL37	42	SJ	?	Seasonal Resident	√	√	√		√	√	√			√	√	√	√			
NL46	33	SA	F*	Seasonal Resident	√				√							√	√			√
NL48	33	SA	?	Seasonal Resident	√				√						√	√				
NL49	17	SA	F*	Seasonal Resident	√				√						√	√	√			
NL60	28	UA	?	Seasonal Resident	√				√				√			√				√
NL75	16	SA	?	Seasonal Visitor		√	√				√				√	√				
NL93	22	SS	F	Seasonal Resident	√		√		√						√	√	√			
NL98	72	SS	F*	Year-round Resident	√	√	√		√		√				√	√	√			√
NL103	32	SA	?	Seasonal Resident	√				√							√	√			
NL104	46	SA	F	Seasonal Resident	√	√	√		√						√	√	√			√
NL105	16	SA	?	Seasonal Resident	√				√							√	√			√
NL112	16	SJ	M*	Seasonal Resident	√				√				√		√	√	√			
NL118	32	SS	F*	Seasonal Resident	√		√		√						√	√	√			
NL120	51	SS	F*	Year-round Resident			√				√				√	√	√			
NL123	70	SS	F	Year-round Resident	√	√	√			√	√				√	√	√			√
NL128	30	SA	M*	Seasonal Resident				√				√				√	√	√	√	√
NL136	20	UA	F*	Seasonal Resident	√				√						√	√	√			
NL139	62	UA	F	Seasonal Resident			√				√				√	√	√			√
NL145	19	SS	F	Seasonal Resident	√				√						√	√	√			
NL149	20	SS	?	Seasonal Resident				√				√				√	√			√
NL153	16	SS	F	Seasonal Visitor	√				√							√				√
NL165	28	SS	?	Year-round Resident	√		√		√		√				√	√	√			
NL169	19	SJ	?	Seasonal Resident	√				√				√			√				
NL176	33	SS	F*	Seasonal Resident	√		√		√		√				√	√	√			
NL179	21	SJ	?	Seasonal Resident		√	√				√				√	√				
NL181	19	SS	M*	Seasonal Visitor	√				√				√			√				√
NL188	26	SJ	?	Seasonal Resident	√				√						√	√	√			
NL191	29	SJ	?	Seasonal Resident	√		√		√		√				√	√	√			√
NL202	23	SA	F	Seasonal Resident	√				√						√	√	√			
NL206	20	SJ	F	Seasonal Resident				√				√				√	√	√		
NL233	19	SS	F	Seasonal Resident	√				√						√	√	√			
NL242	15	SA	F	Seasonal Resident	√				√						√	√	√			
SL05	25	UA	F	Seasonal Visitor				√				√					√	√		
SL07	24	UA	?	Seasonal Resident				√				√					√	√	√	√
SL27	19	SJ	?	Seasonal Resident				√				√				√	√	√		
SL35	45	SS	?	Year-round Resident				√				√				√	√	√	√	√
WL05	19	SS	?	Seasonal Resident	√				√						√	√	√			√
WL09	20	SJ	?	Seasonal Resident				√				√				√	√	√		√
WL11	37	SS	F*	Year-round Resident	√				√						√	√	√			√
WL15	38	SS	M*	Seasonal Resident				√				√			√	√	√	√		
WL21	26	SS	F	Seasonal Resident				√				√				√	√	√		√
WL25	71	SA	F	Year-round Resident				√				√				√	√	√		√
WL37	12	SS	?	Seasonal Resident				√				√					√			√
WL40	17	SA	F*	Seasonal Resident	√			√	√							√	√			√
WL42	37	SS	?	Year-round Resident				√				√				√	√	√		√
WL50	21	SJ	F	Year-round Resident				√				√				√	√	√		√
WL55	25	SJ	?	Year-round Resident				√				√				√	√	√		
WL61	17	SJ	?	Seasonal Resident				√				√					√			
WL62	25	UA	F	Seasonal Resident				√				√				√	√	√		√
WL69	26	SA	?	Seasonal Resident				√				√					√	√		√
WL109	24	SJ	?	Seasonal Resident				√				√				√	√	√		√

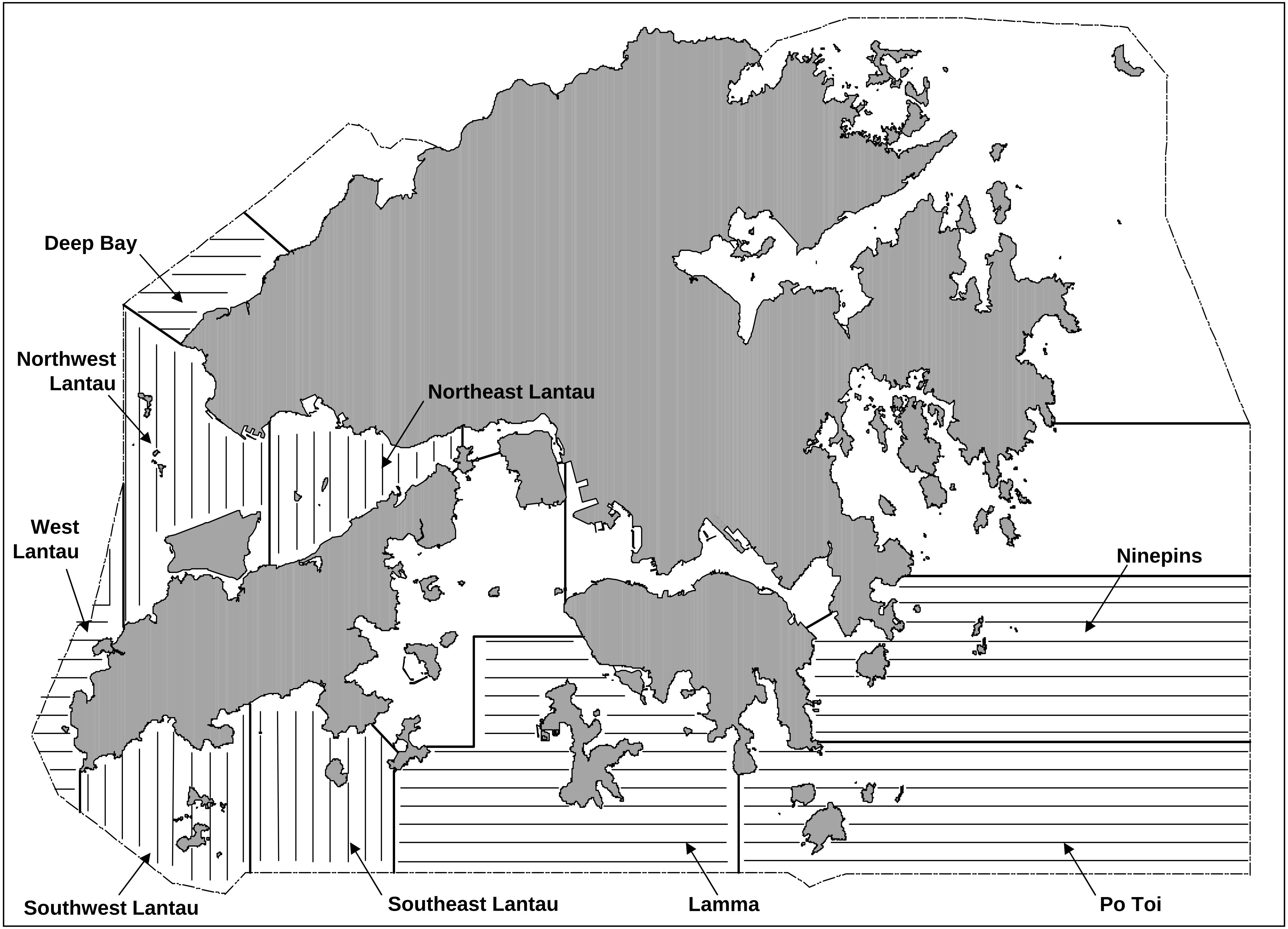


Figure 1. Nine Line-Transect Survey Areas within the Study Area

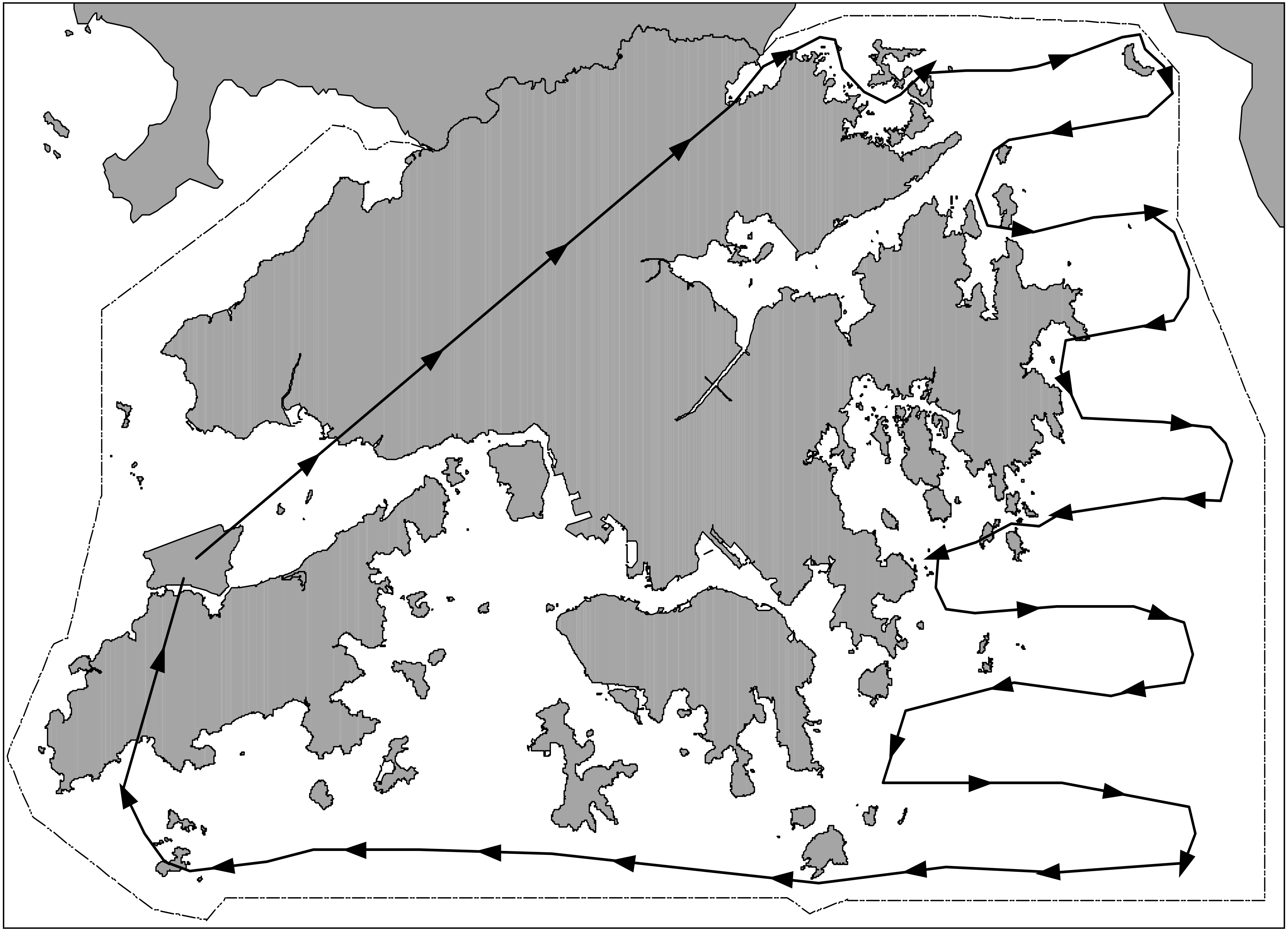


Figure 2. Survey Route for Helicopter Surveys in Eastern and Southern Waters of Hong Kong

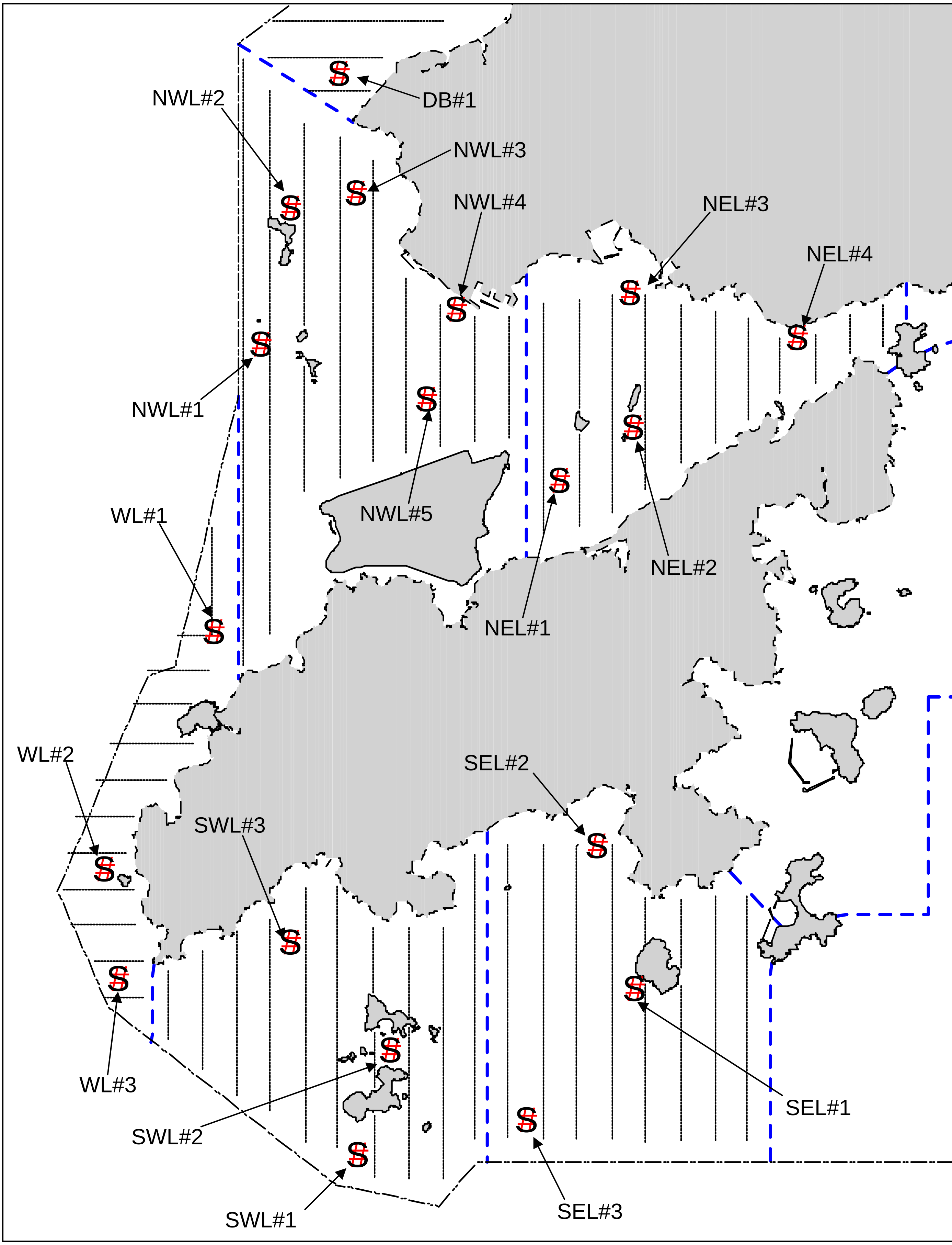


Figure 3. Locations of various acoustic monitoring stations around Lantau waters

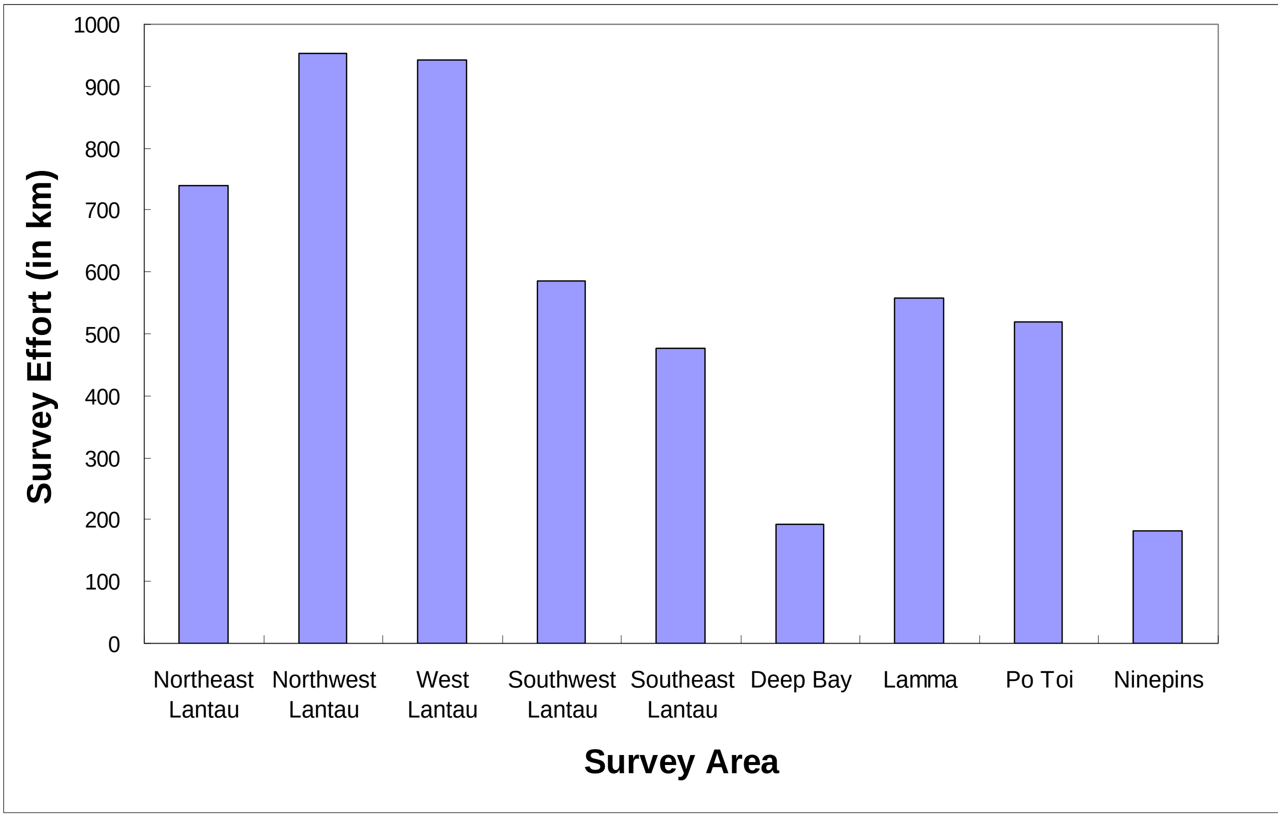


Figure 4a. Distribution of survey effort among nine survey areas from April 2010 – March 2011

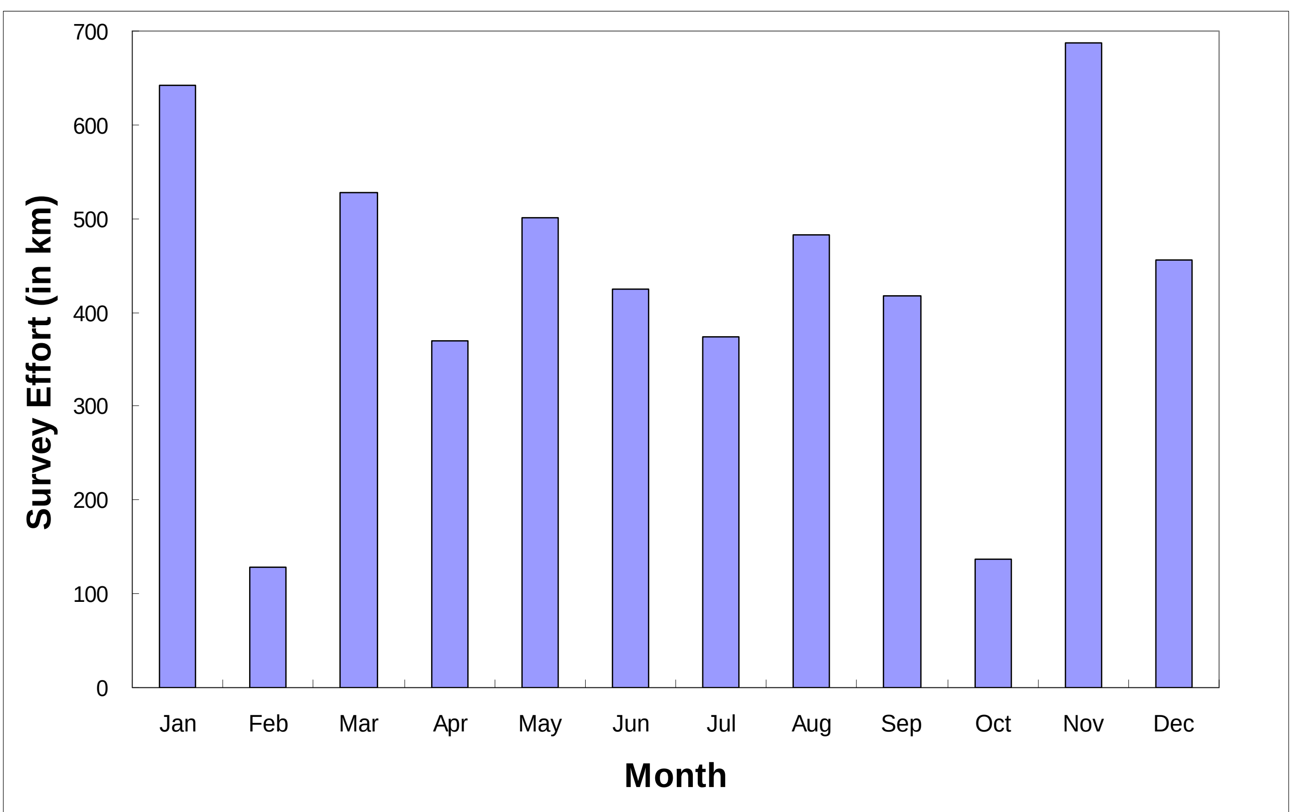


Figure 4b. Distribution of survey effort among different months from April 2010 – March 2011

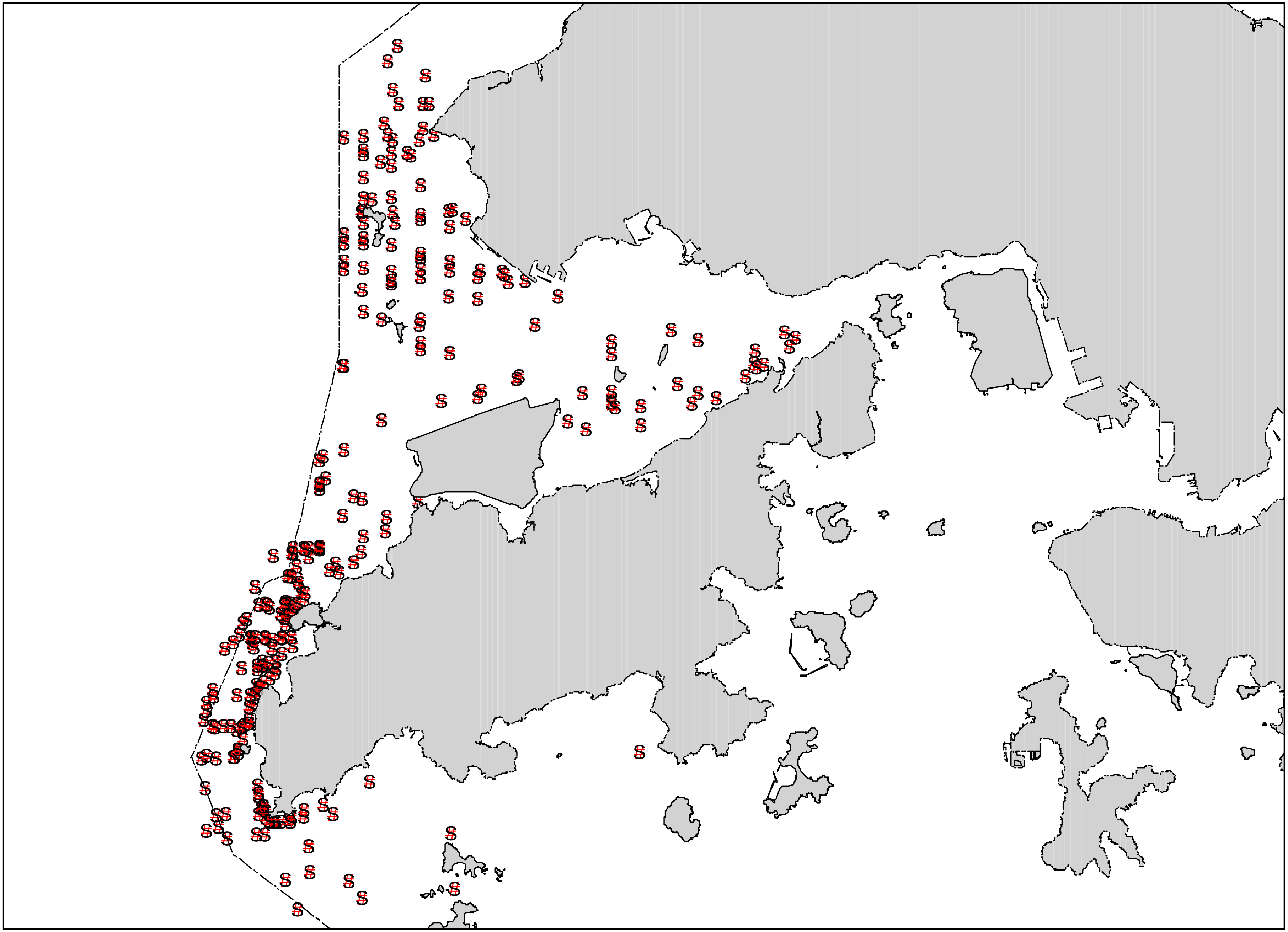


Figure 5. Distribution of Chinese white dolphin sightings in Hong Kong waters (April 2010 – March 2011)

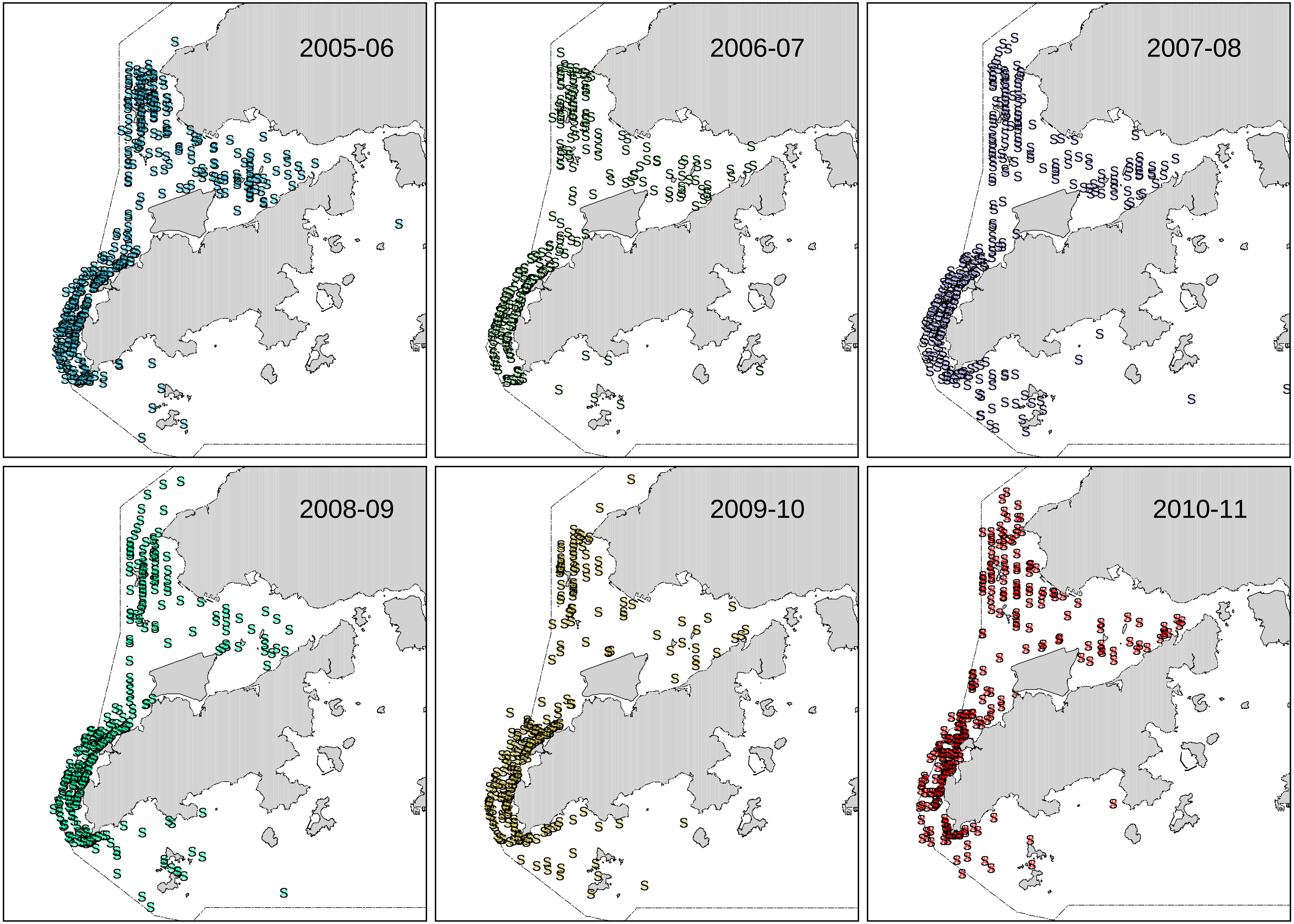


Figure 6. Comparison of dolphin distribution patterns from the past six years of monitoring period (2005-11)

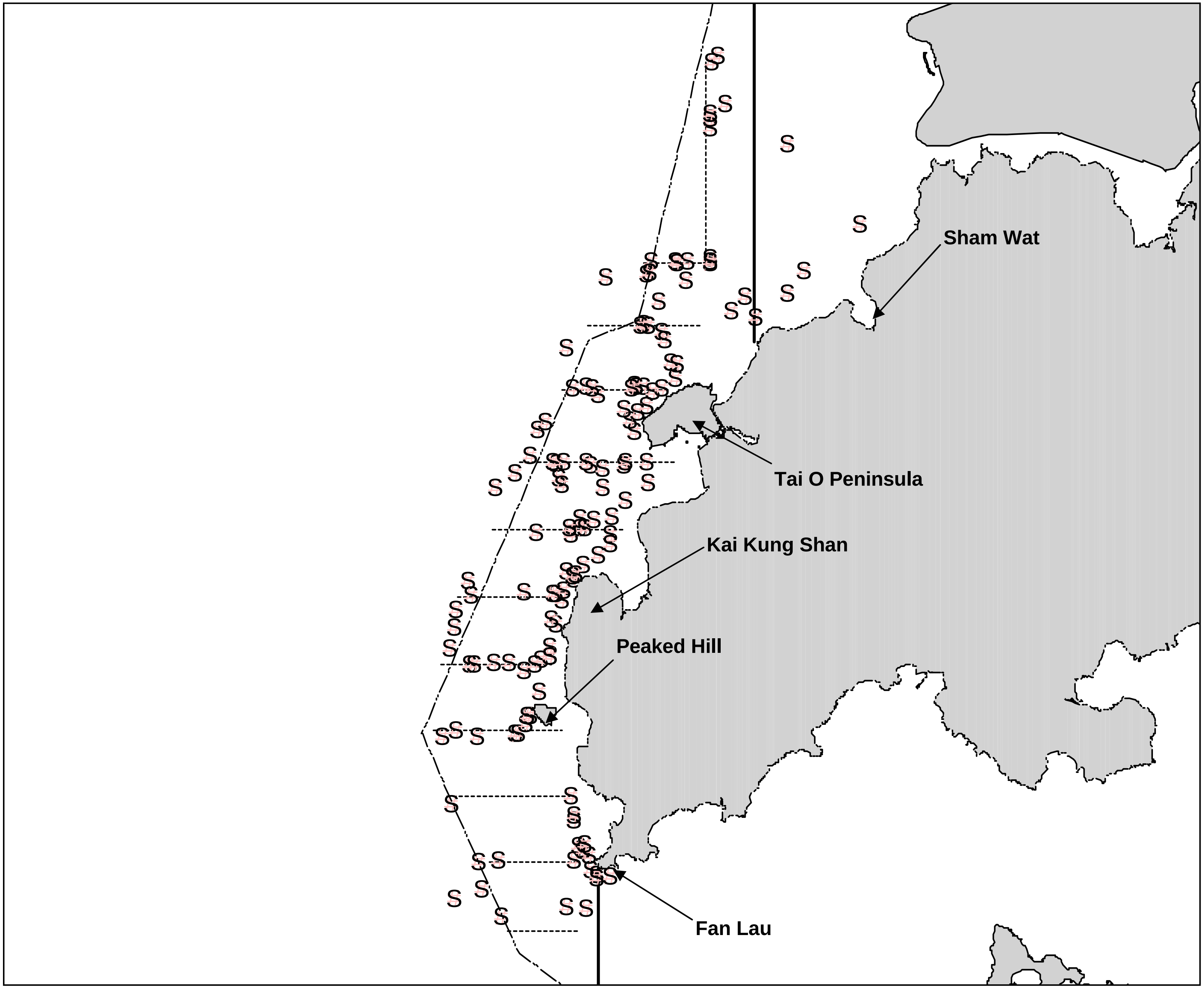


Figure 7. Distribution of Chinese white dolphin sightings in West Lantau waters (April 2010 – March 2011)

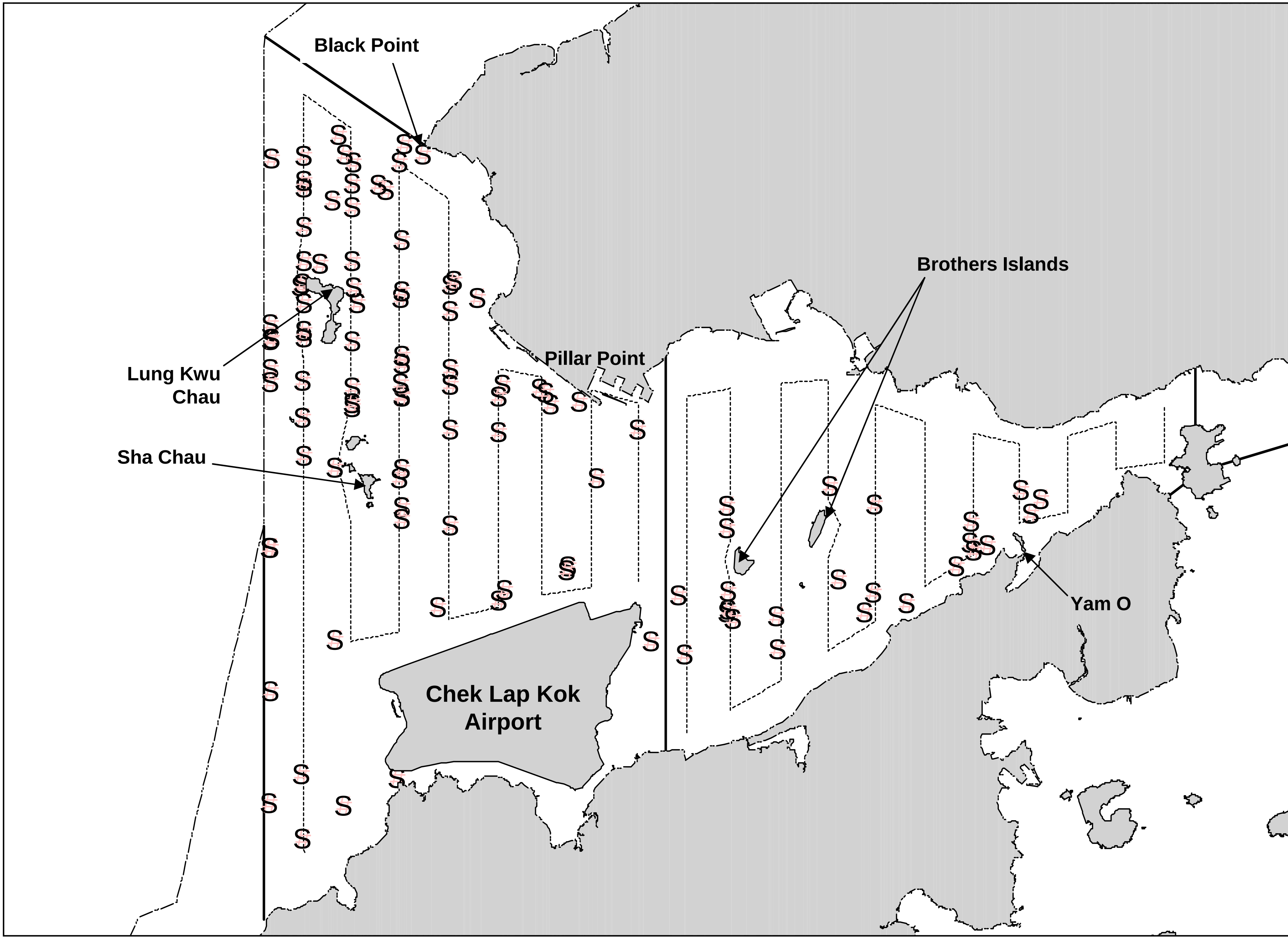


Figure 8. Distribution of Chinese white dolphin sightings in North Lantau waters (April 2010 – March 2011)

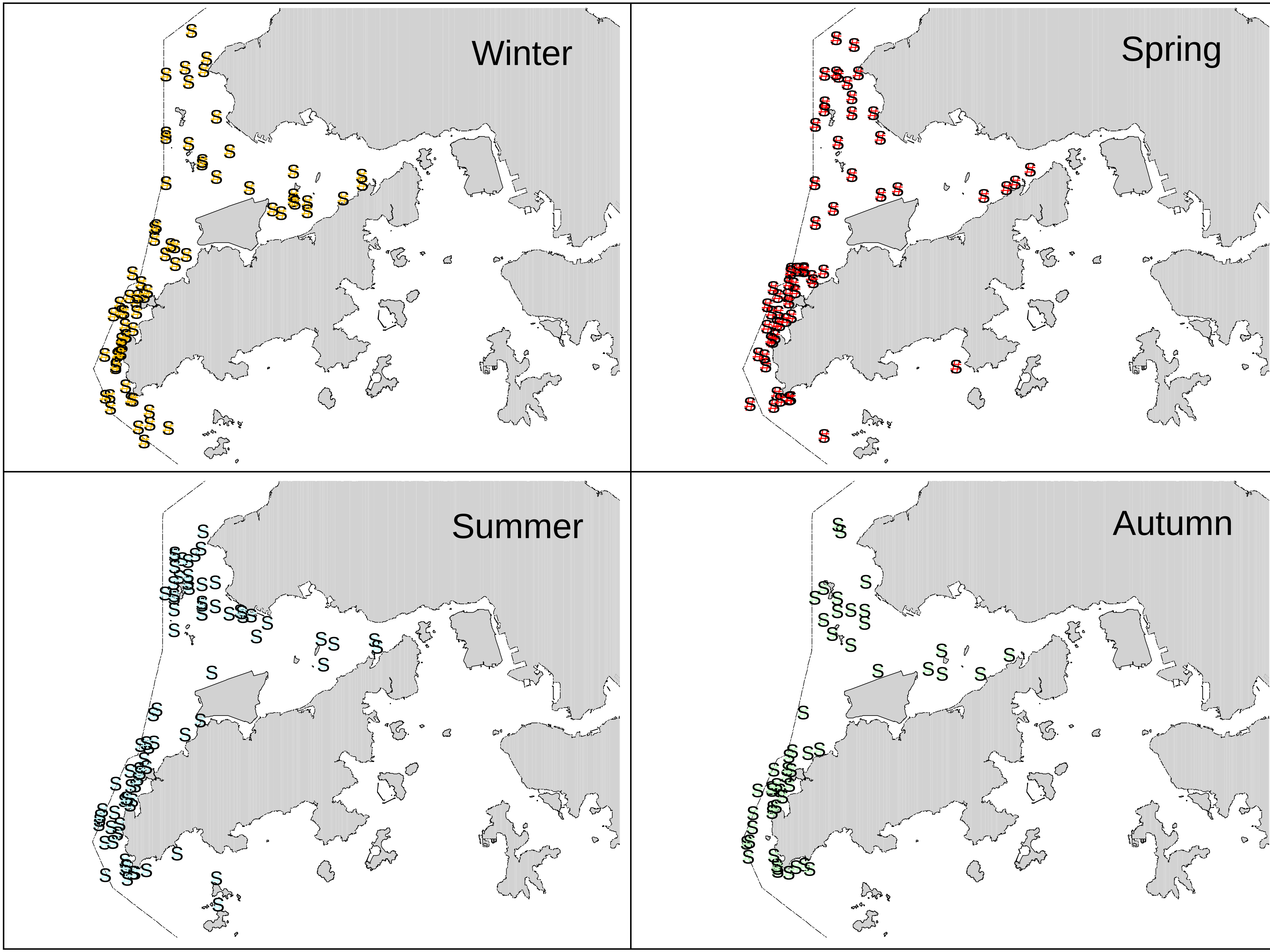


Figure 9. Seasonal distribution of Chinese white dolphins in Hong Kong waters (April 2009 – March 2011)

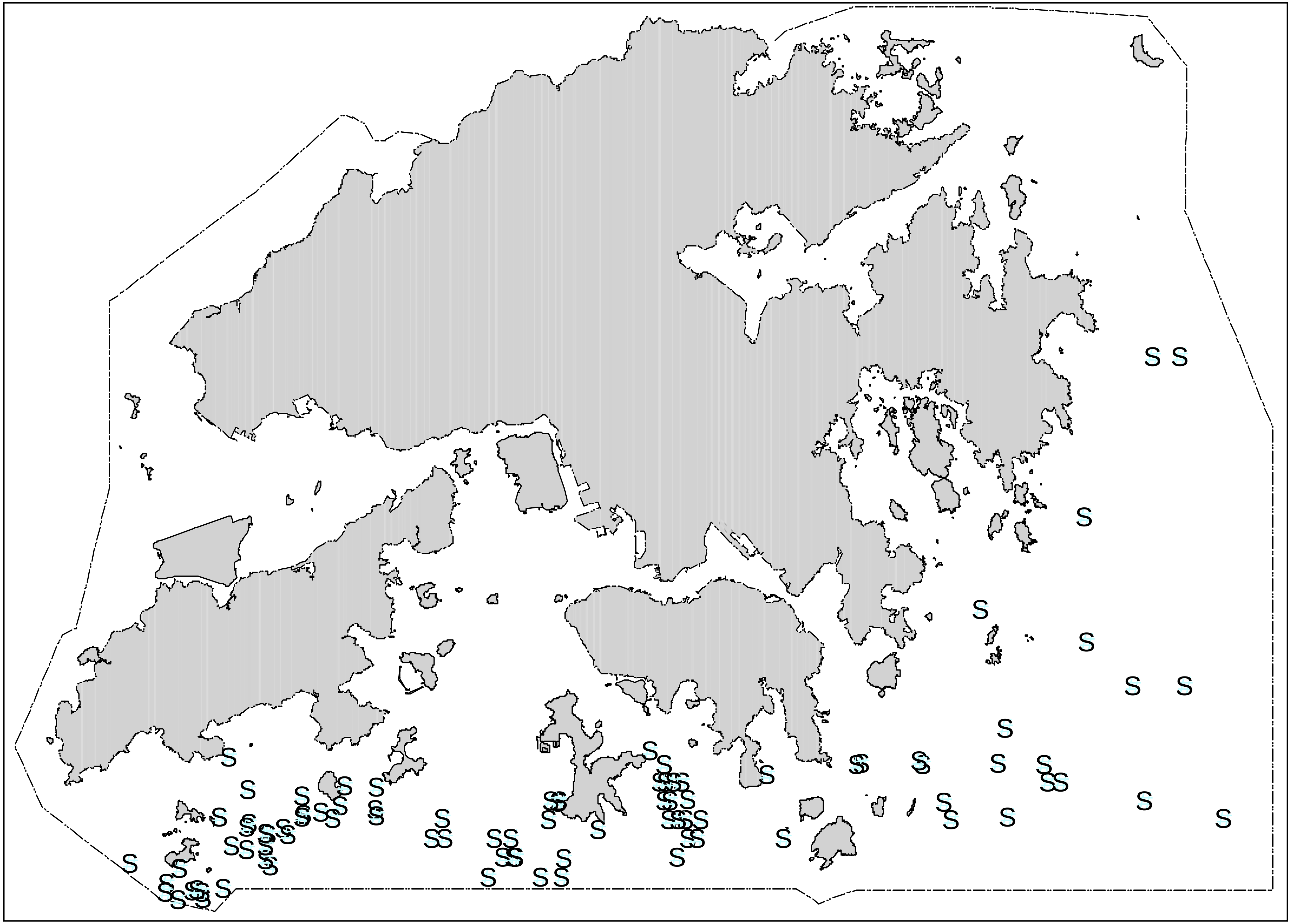


Figure 10. Distribution of finless porpoise sightings (April 2010 – March 2011)

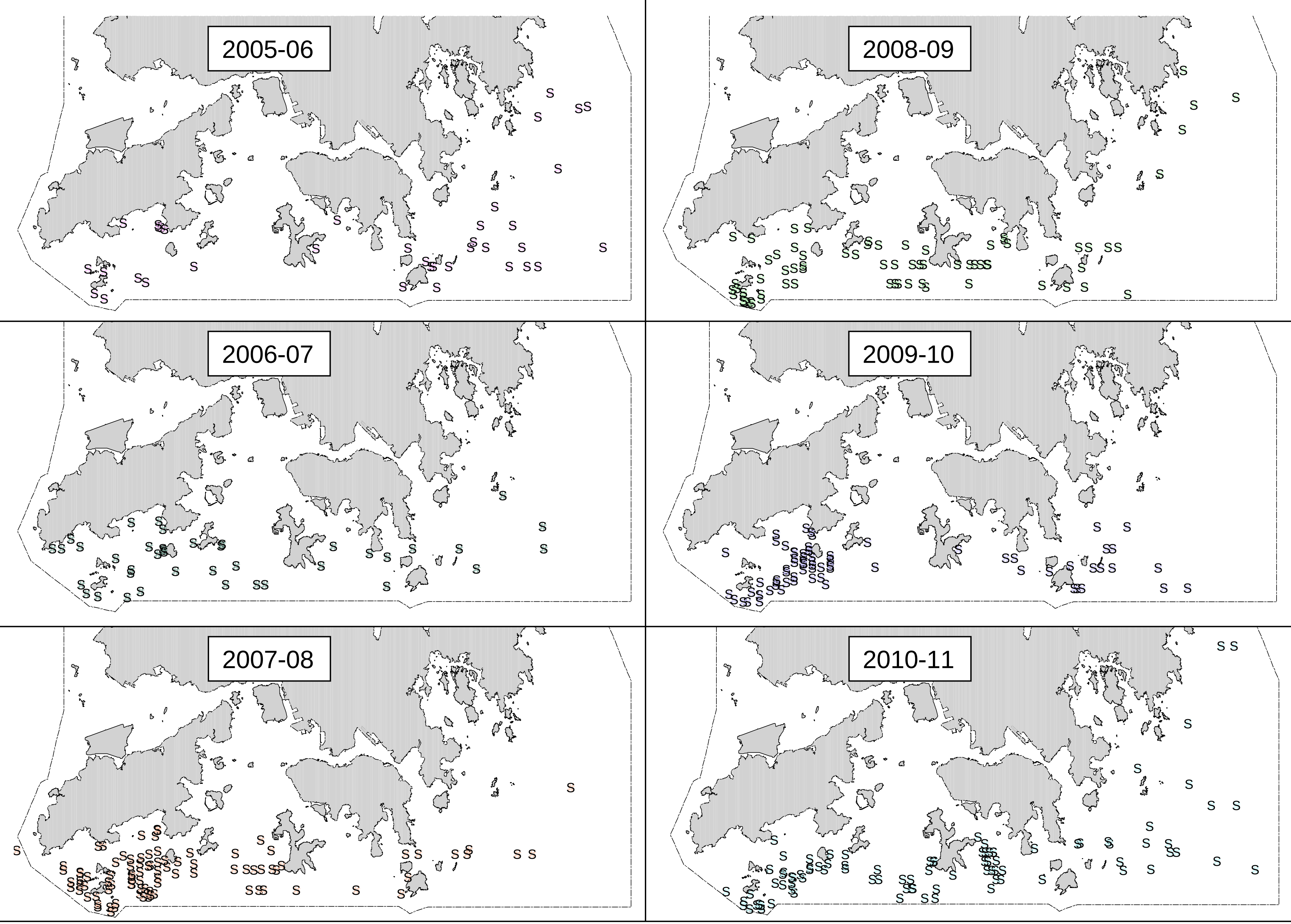


Figure 11. Comparison of porpoise distribution patterns from the past six years of monitoring period (2005-11)

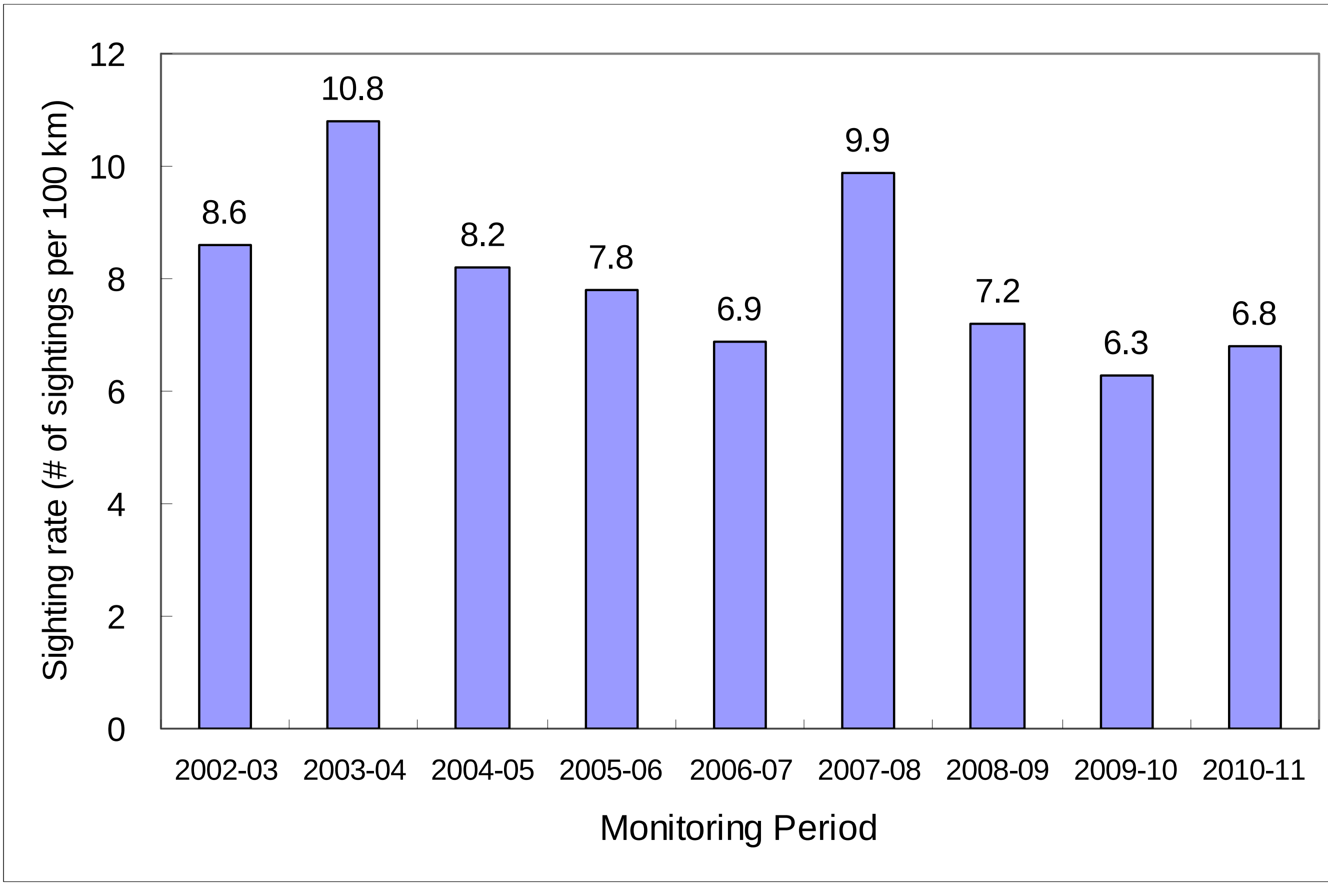


Figure 12. Temporal trend of dolphin encounter rates (combined from West, Northwest, Northeast and Southwest Lantau survey areas) in the past seven monitoring periods from 2002-11

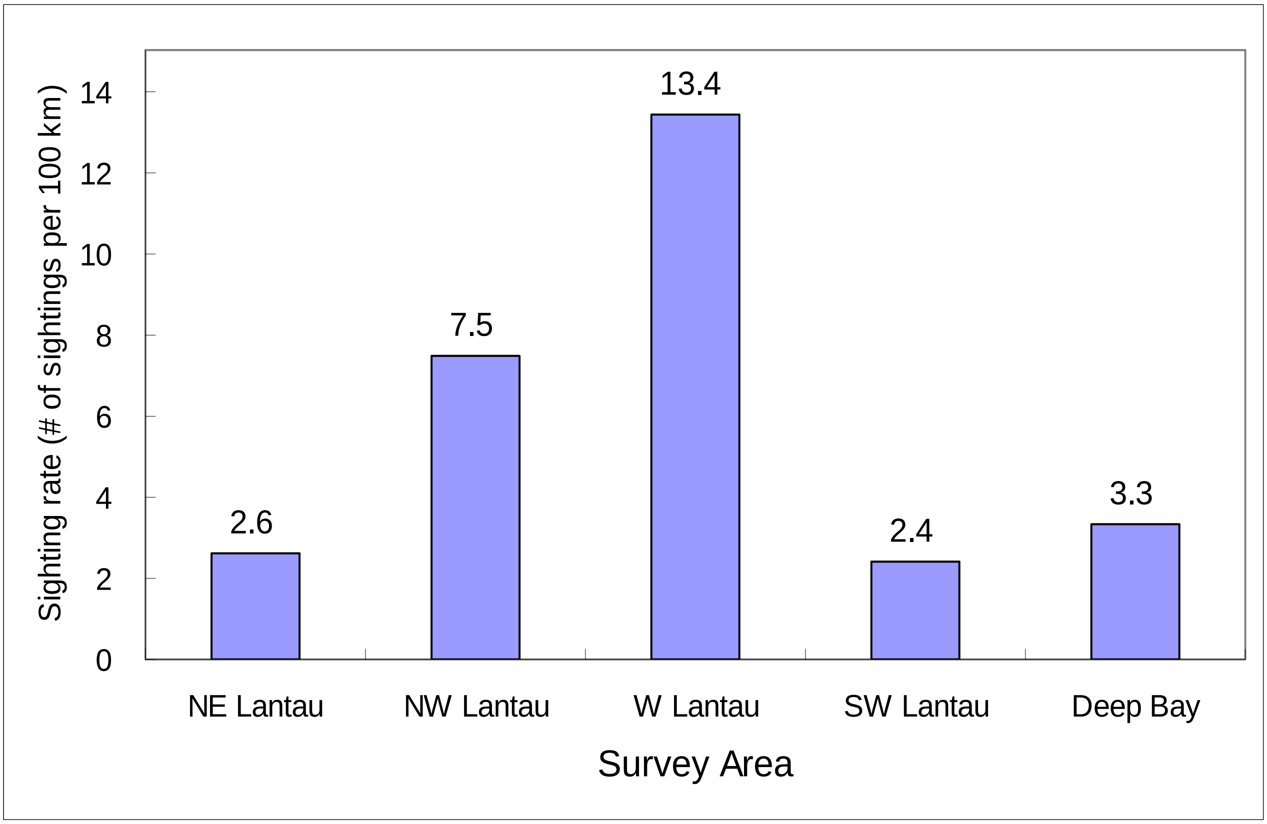


Figure 13a. Encounter rates of Chinese white dolphins among different survey areas (April 2010 – March 2011)

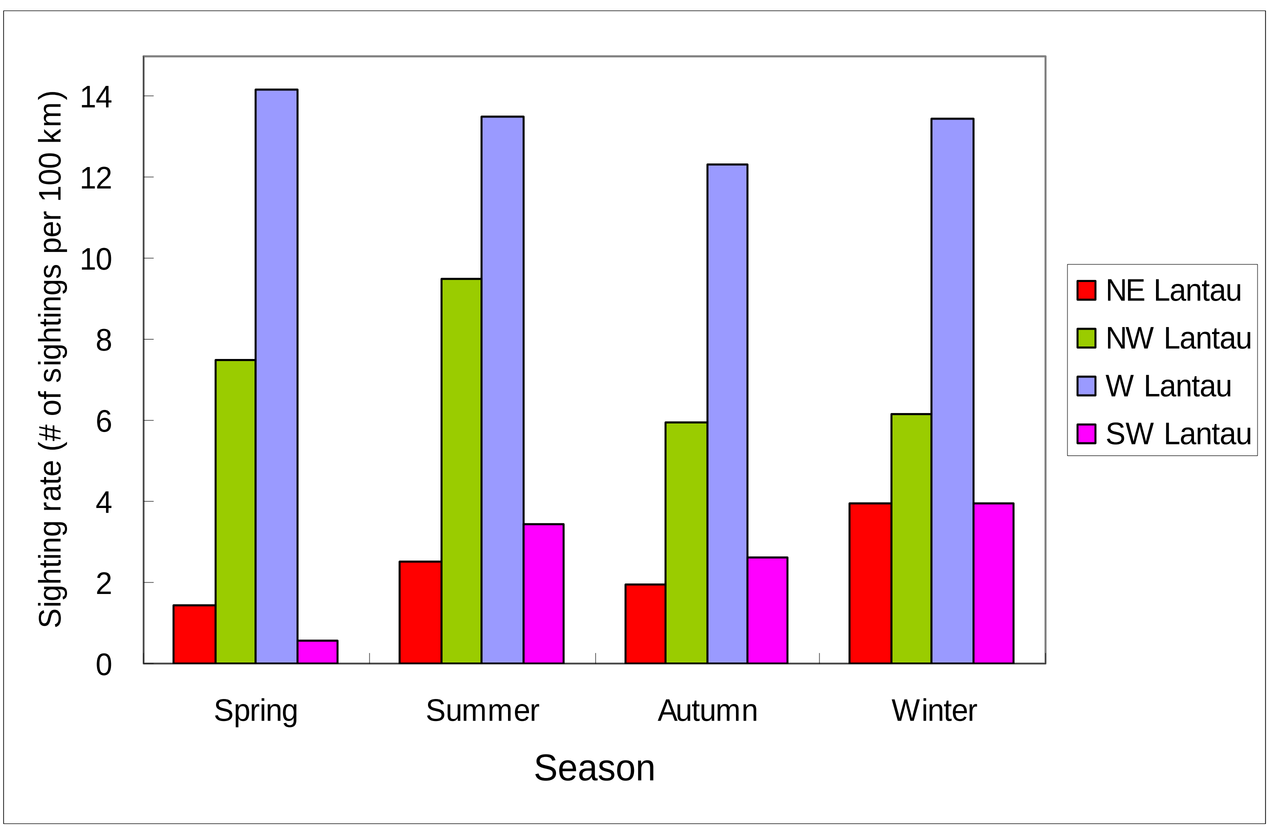


Figure 13b. Seasonal encounter rates of Chinese white dolphins among different survey areas (April 2010 – March 2011)

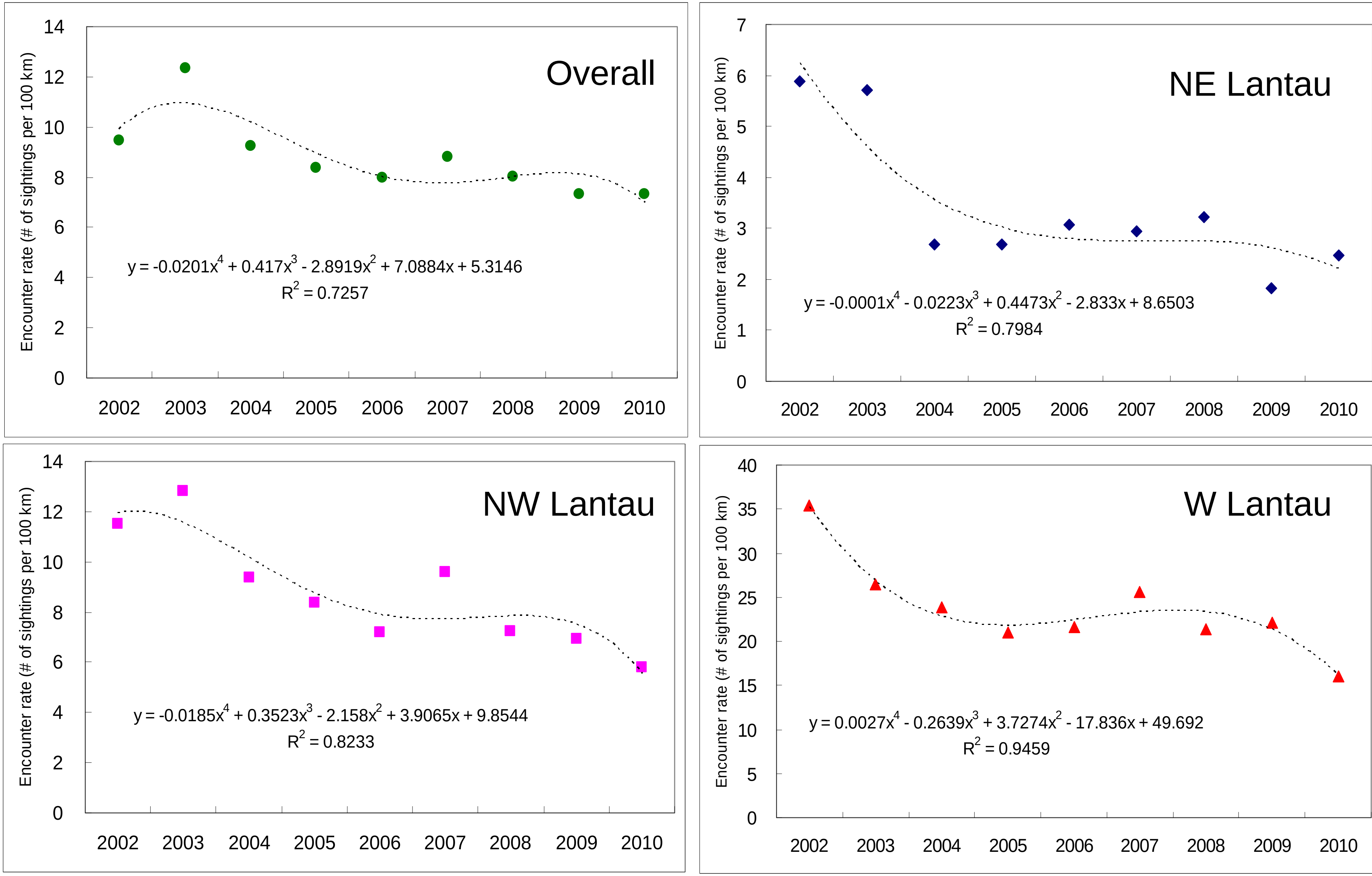


Figure 14. Temporal trends in annual encounter rates of Chinese white dolphins among different survey areas

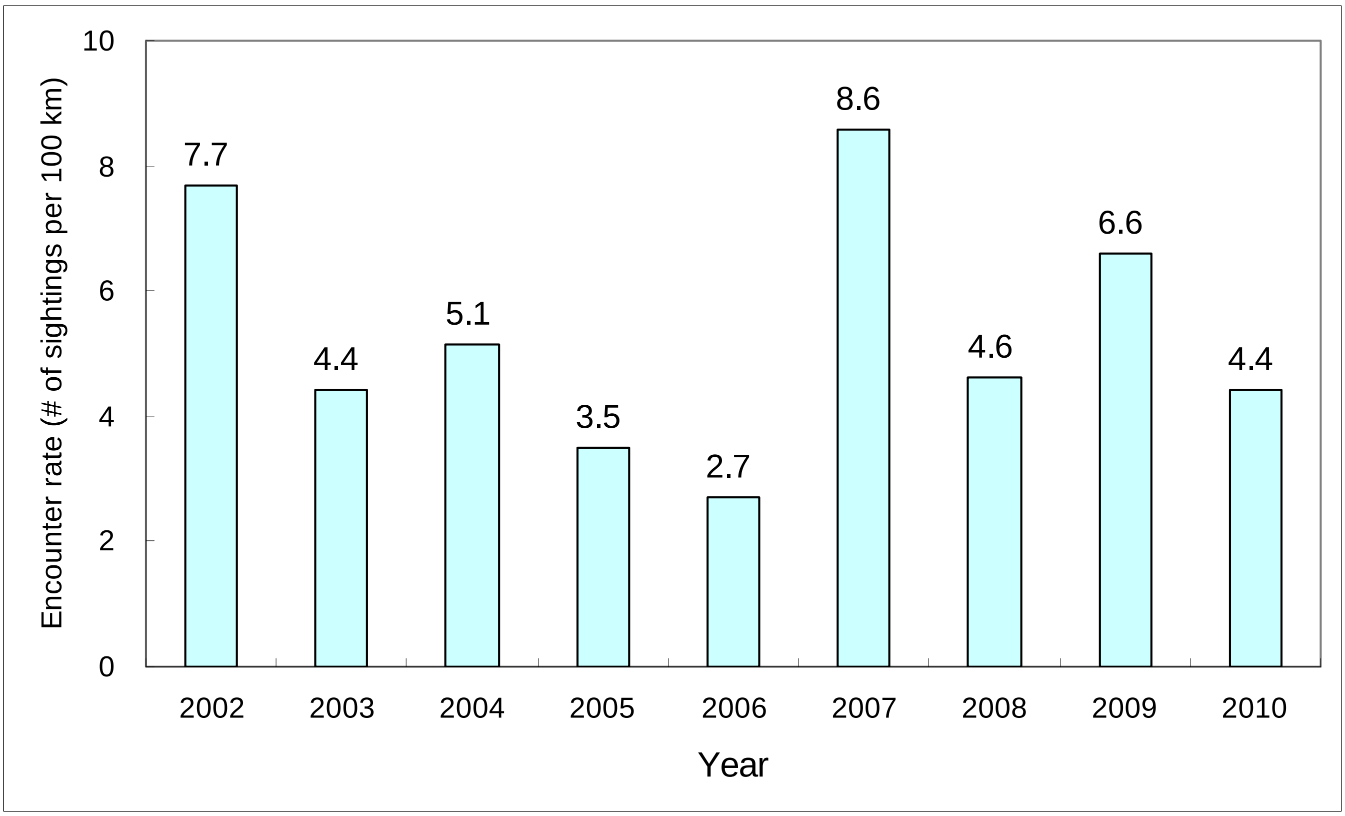


Figure 15. Temporal trend of annual encounter rates of finless porpoises (combined from Southwest and Southeast Lantau, Lamma and Po Toi survey areas) from 2002-10

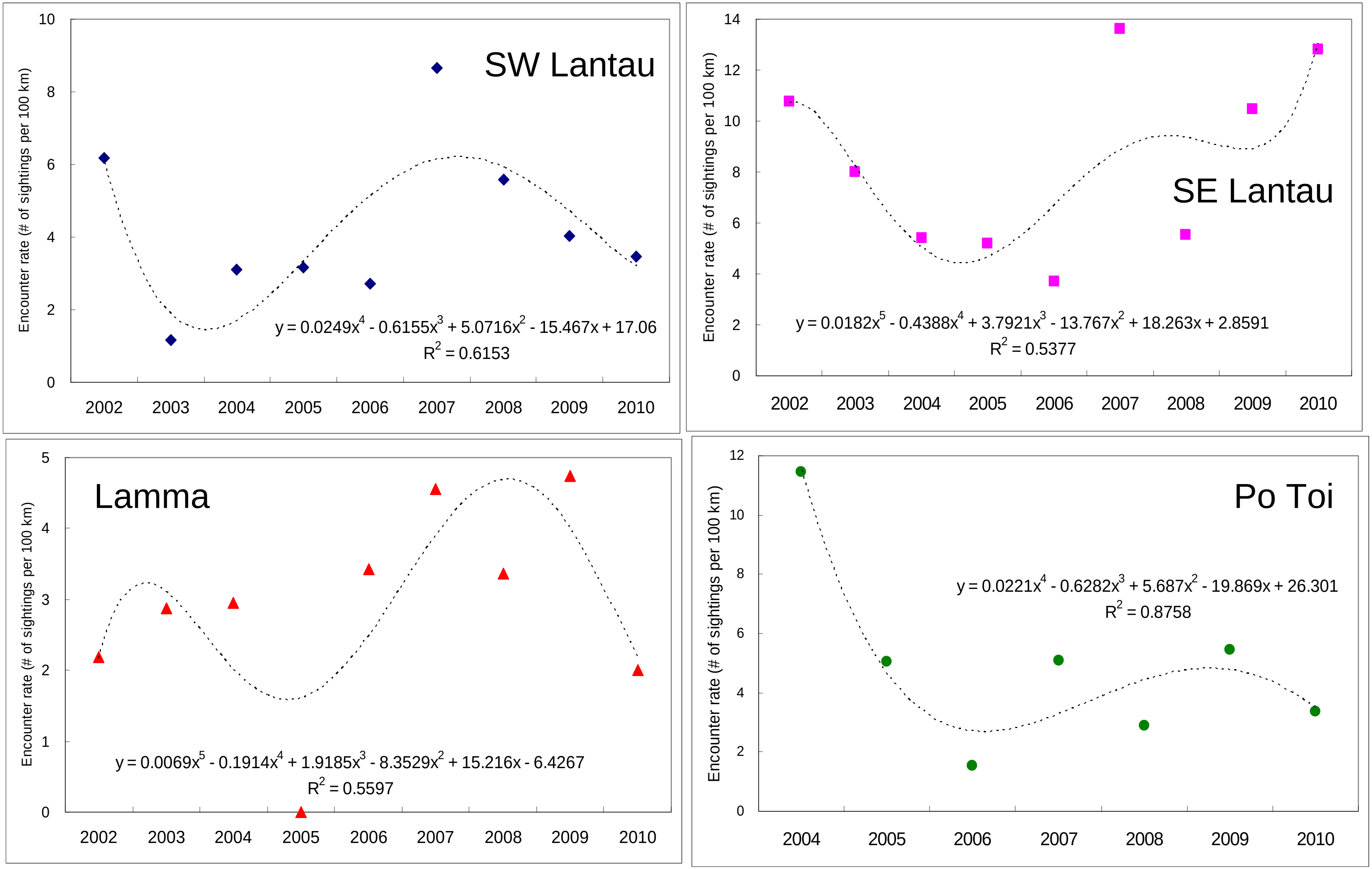


Figure 16. Temporal trends in annual encounter rates of finless porpoises among different survey areas

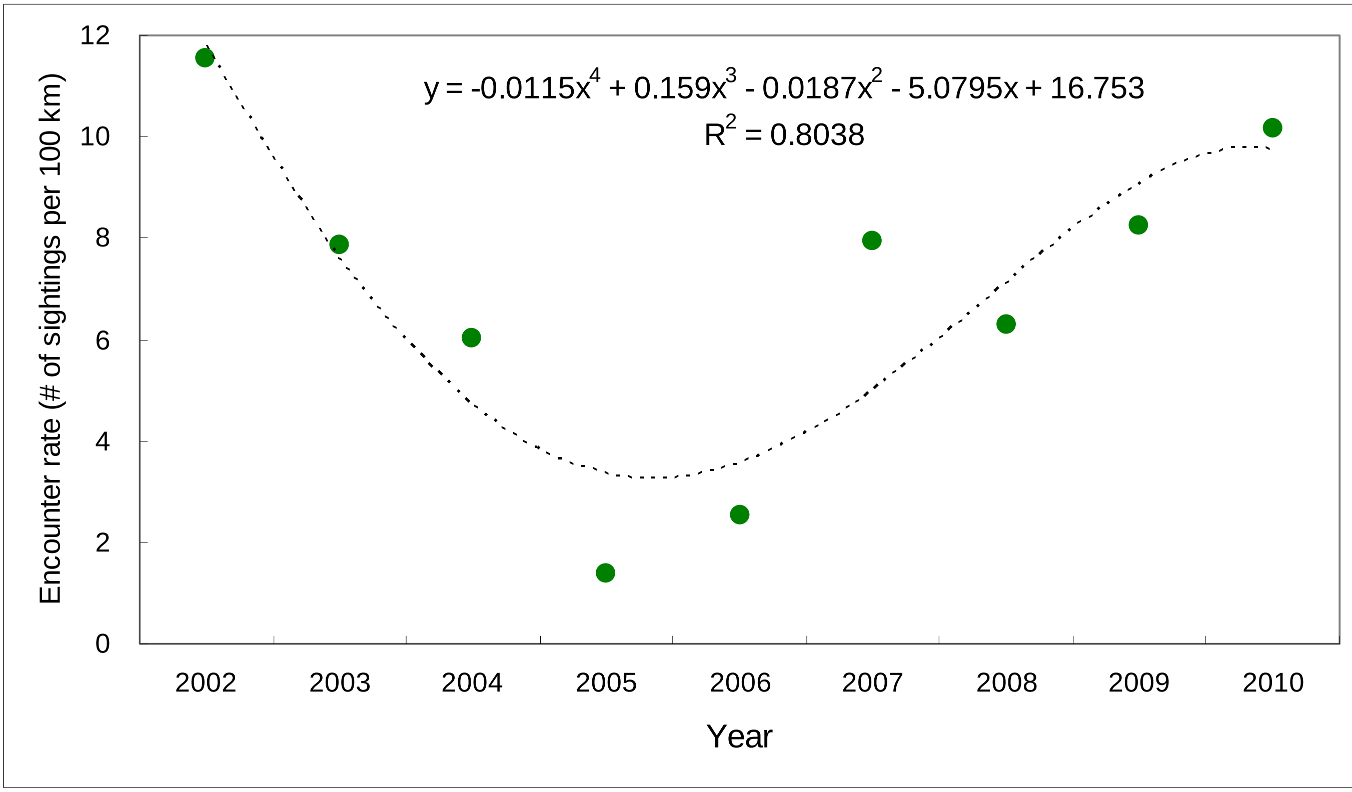


Figure 17. Temporal trend of porpoise encounter rates in South Lantau and Lamma waters combined from winter/spring months of 2002-10

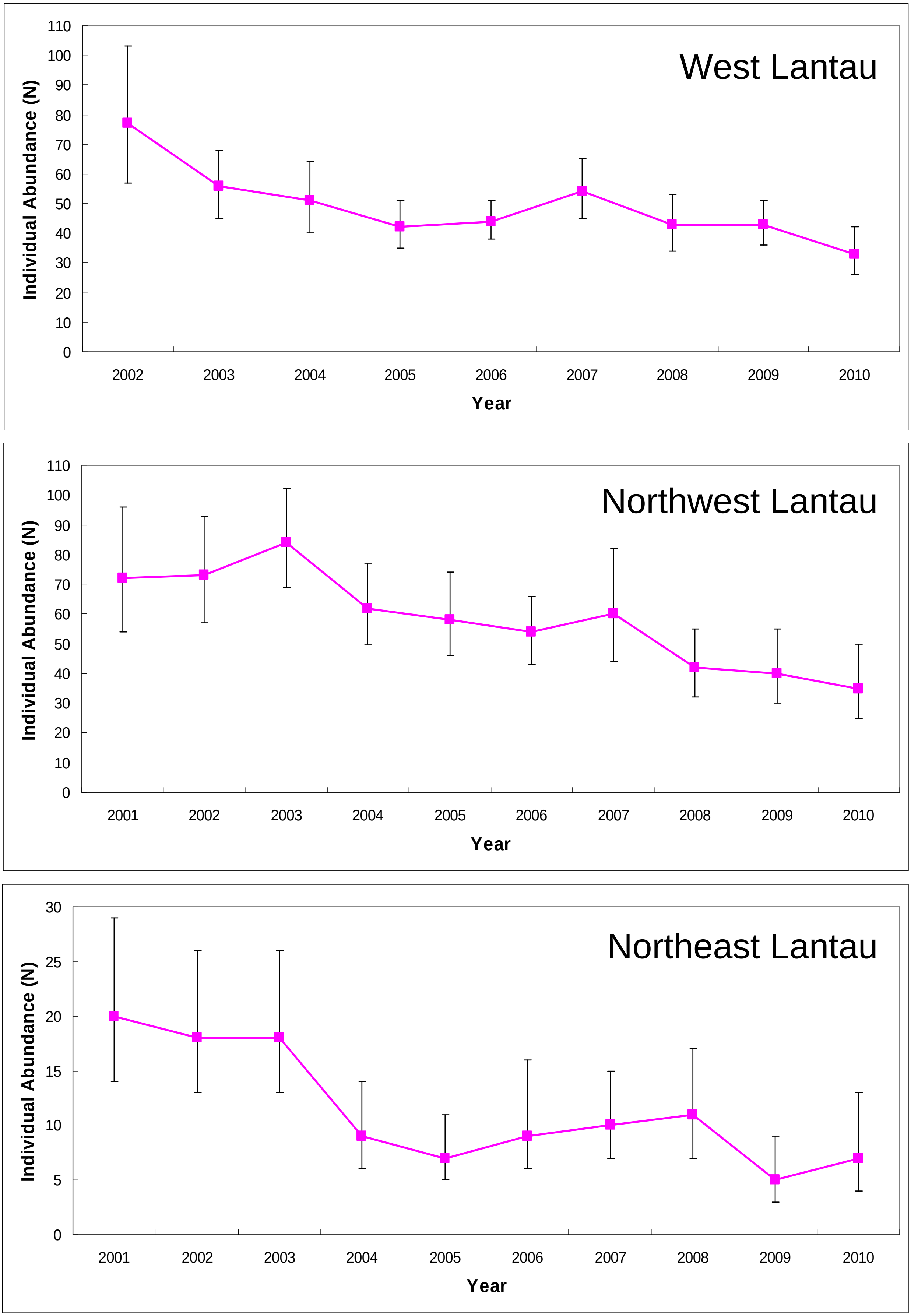


Figure 18. Temporal trends in abundance estimates of Chinese white dolphins in West, Northwest & Northeast Lantau from 2001-10 (error bars: 95% confidence interval of abundance estimates)

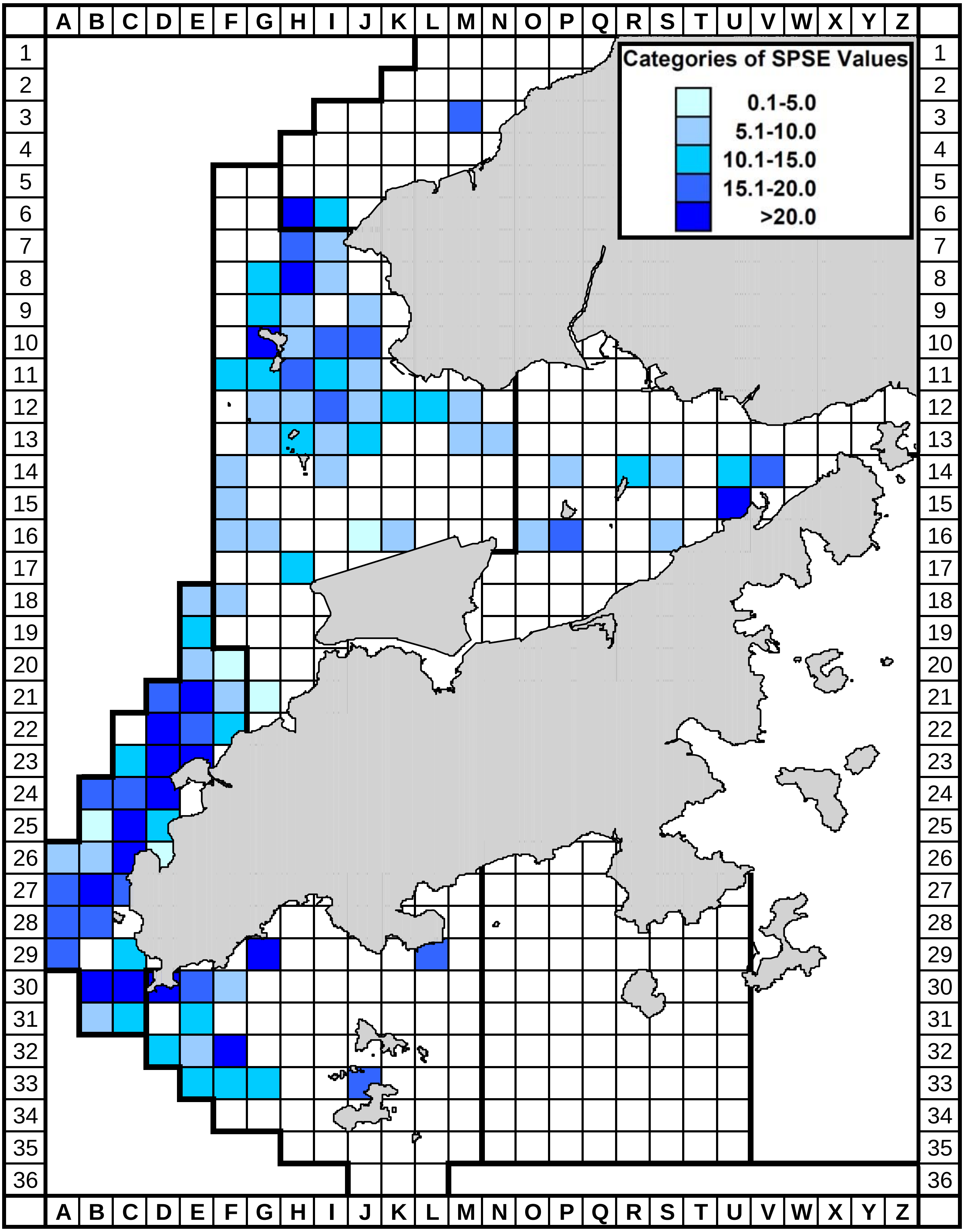


Figure 19. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island, using data collected during 2010 (SPSE = no. of on-effort dolphin sightings per 100 units of survey effort)

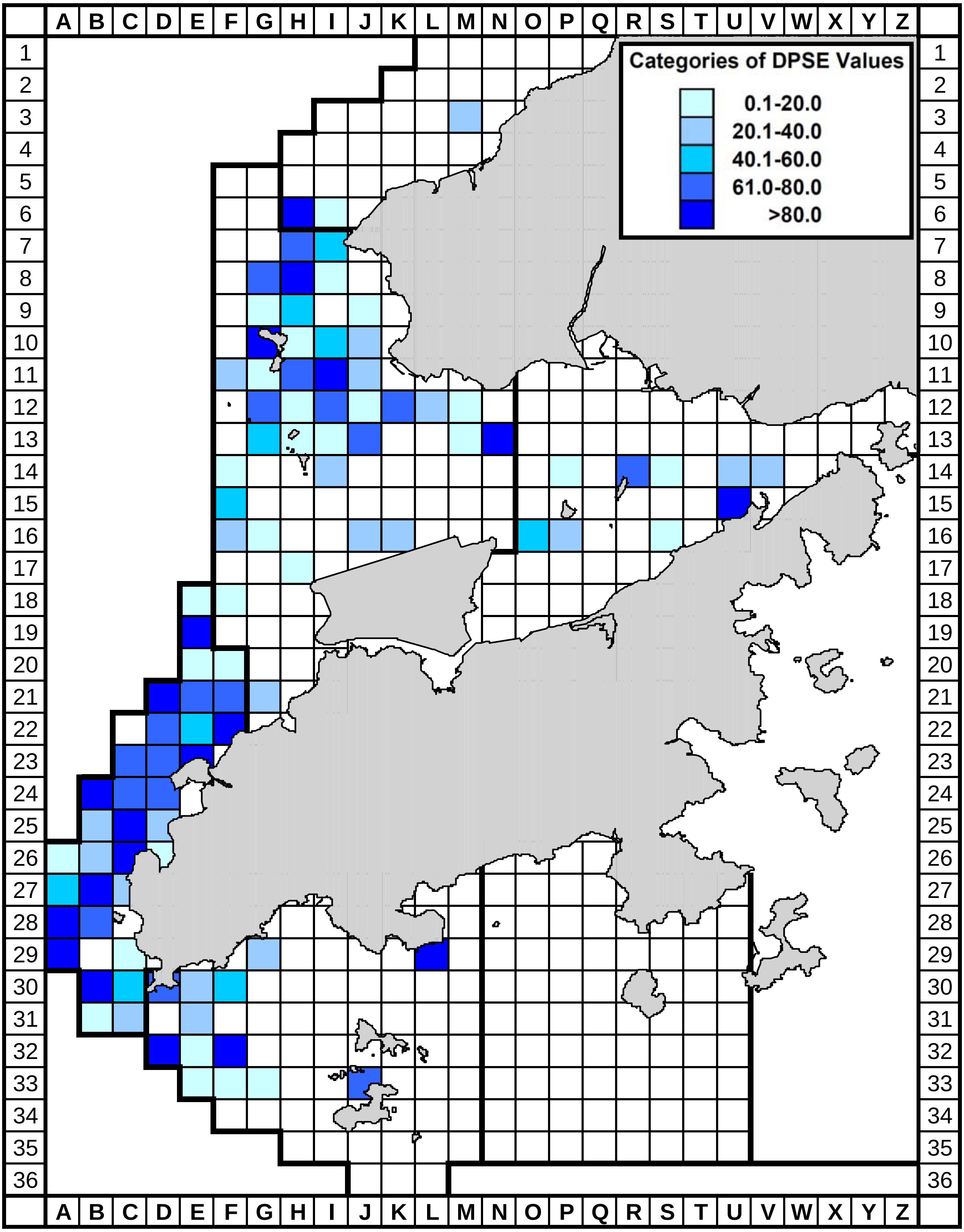


Figure 20. Density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island, using data collected during 2010 (DPSE = no. of dolphins per 100 units of survey effort)

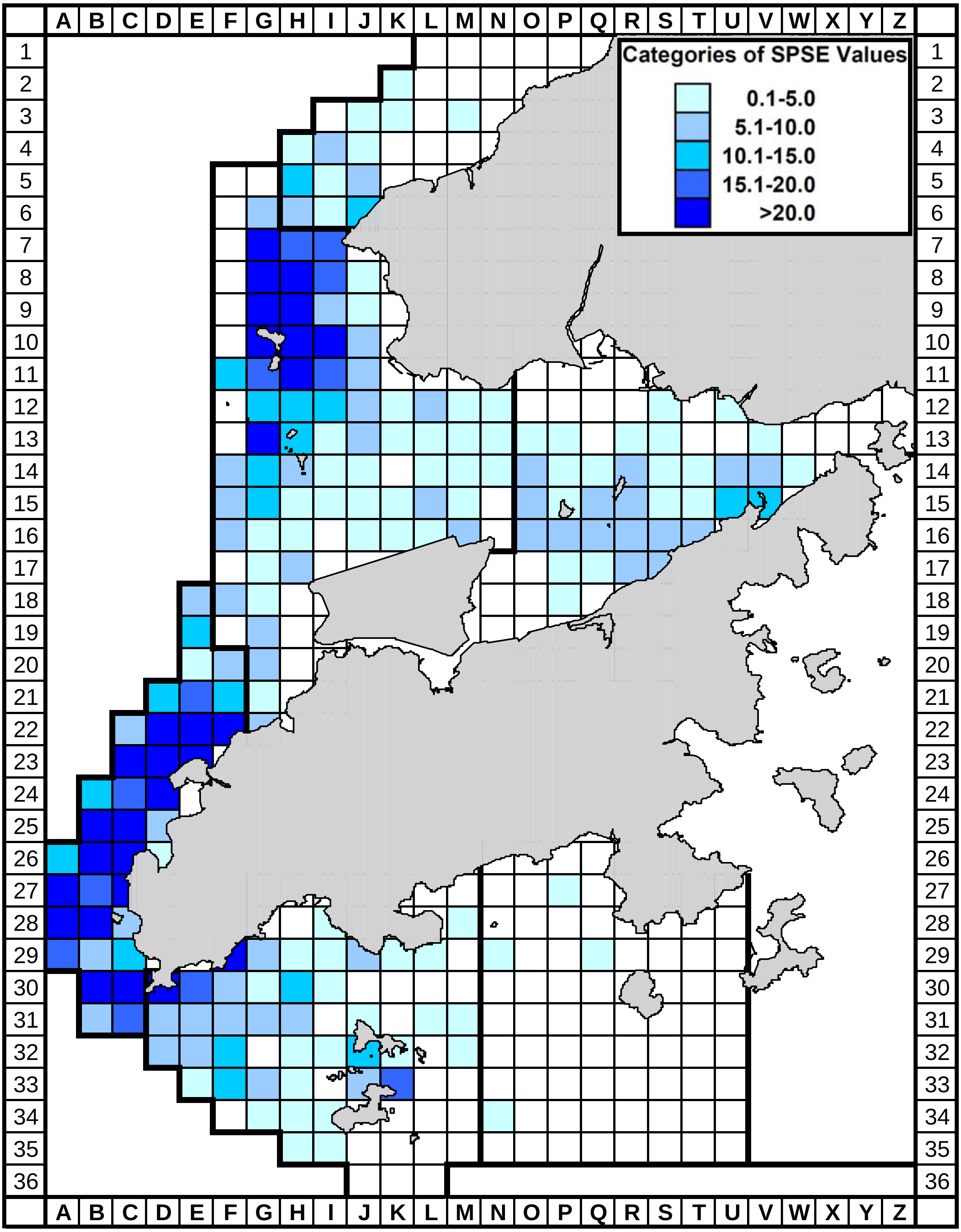


Figure 21. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island, using data collected during 2006-10 (SPSE = no. of on-effort dolphin sightings per 100 units of survey effort)

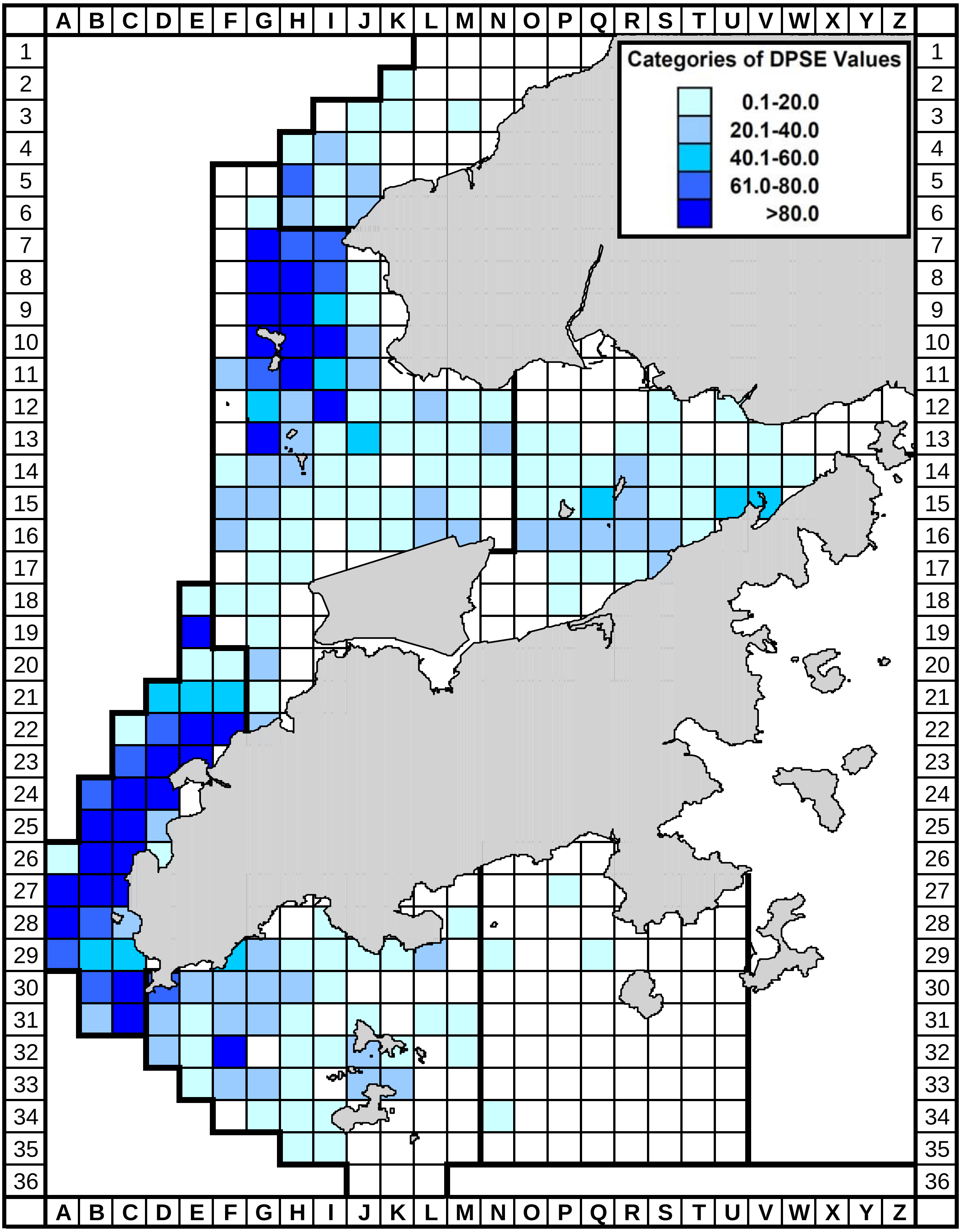


Figure 22. Density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island, using data collected during 2006-10 (DPSE = no. of dolphins per 100 units of survey effort)

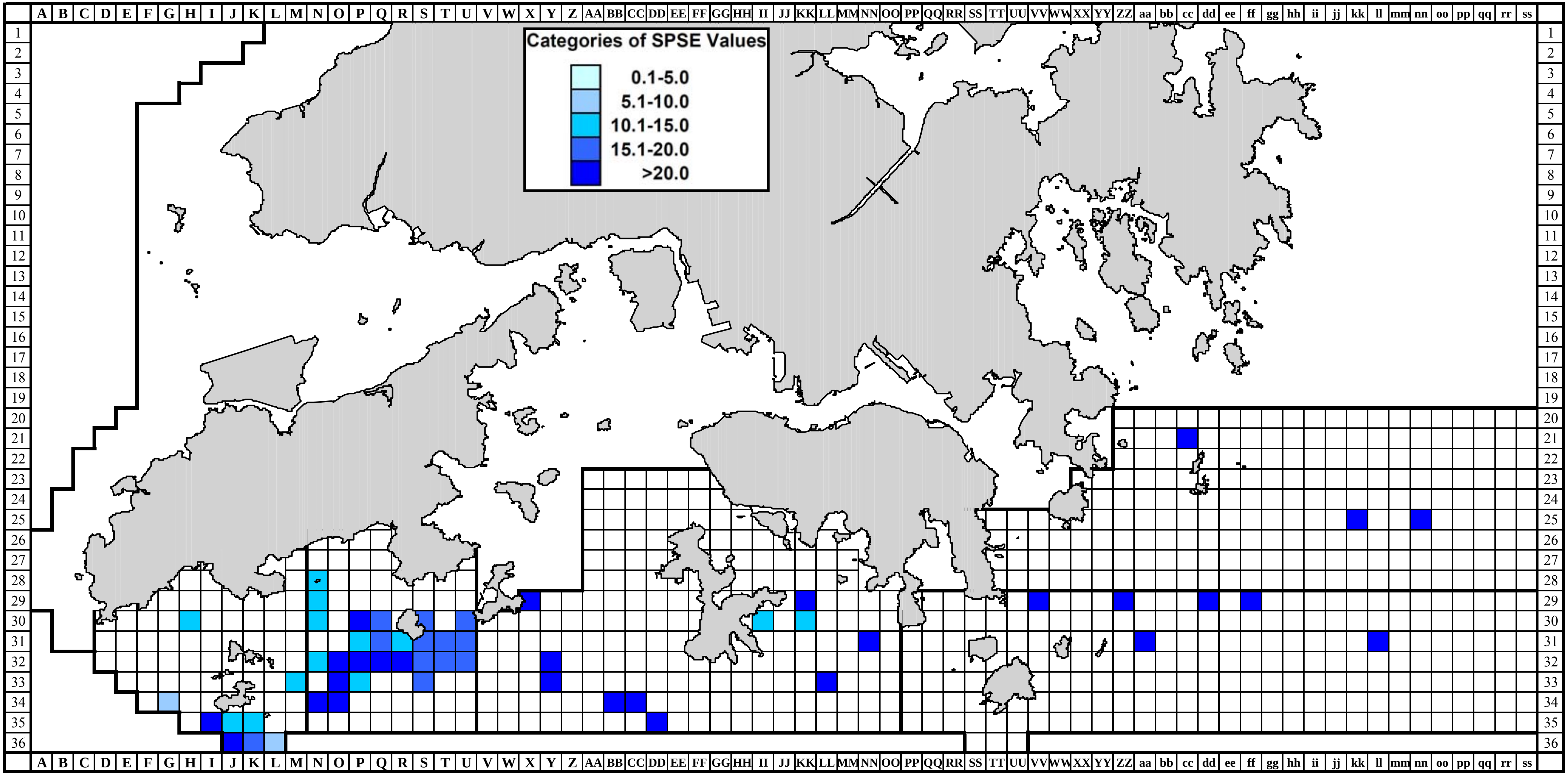


Figure 23. Sighting density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong, using data collected during 2010 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort)

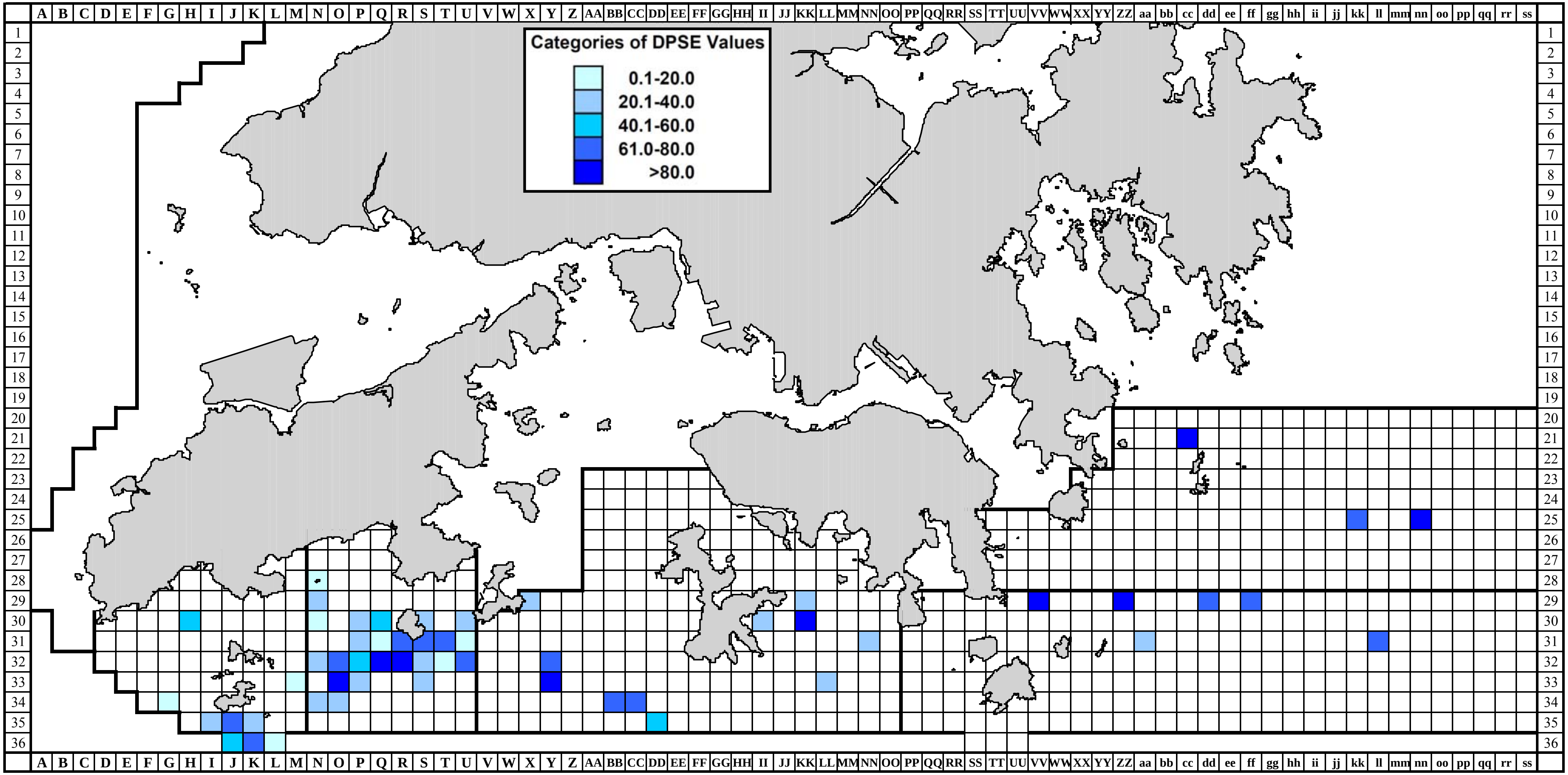


Figure 24. Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong, using data collected during 2010 (DPSE = no. of porpoises per 100 units of survey effort)

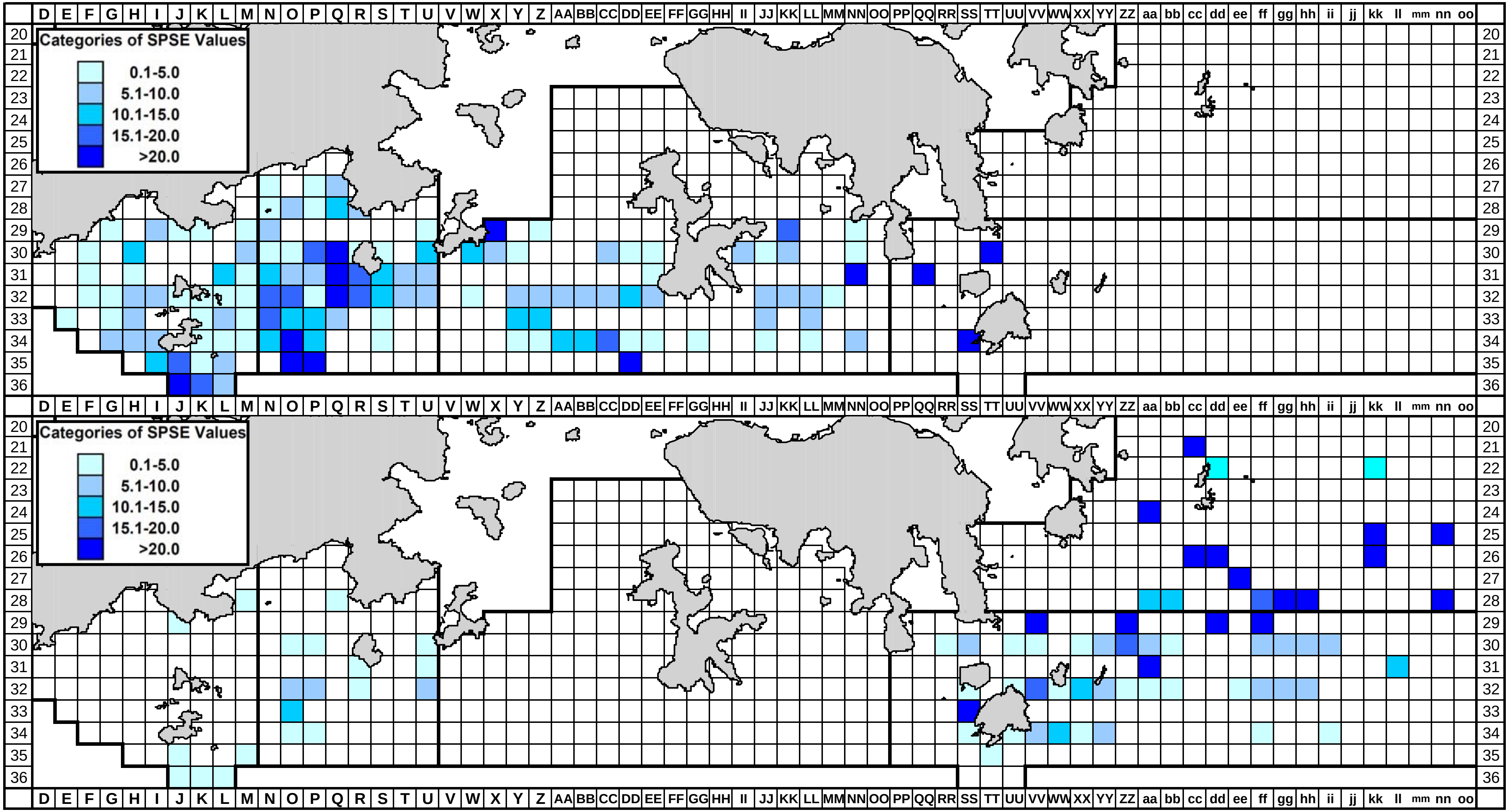


Figure 25. Sighting density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong during dry season (top) and wet season (bottom), using data using data collected during 2004-10 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort)

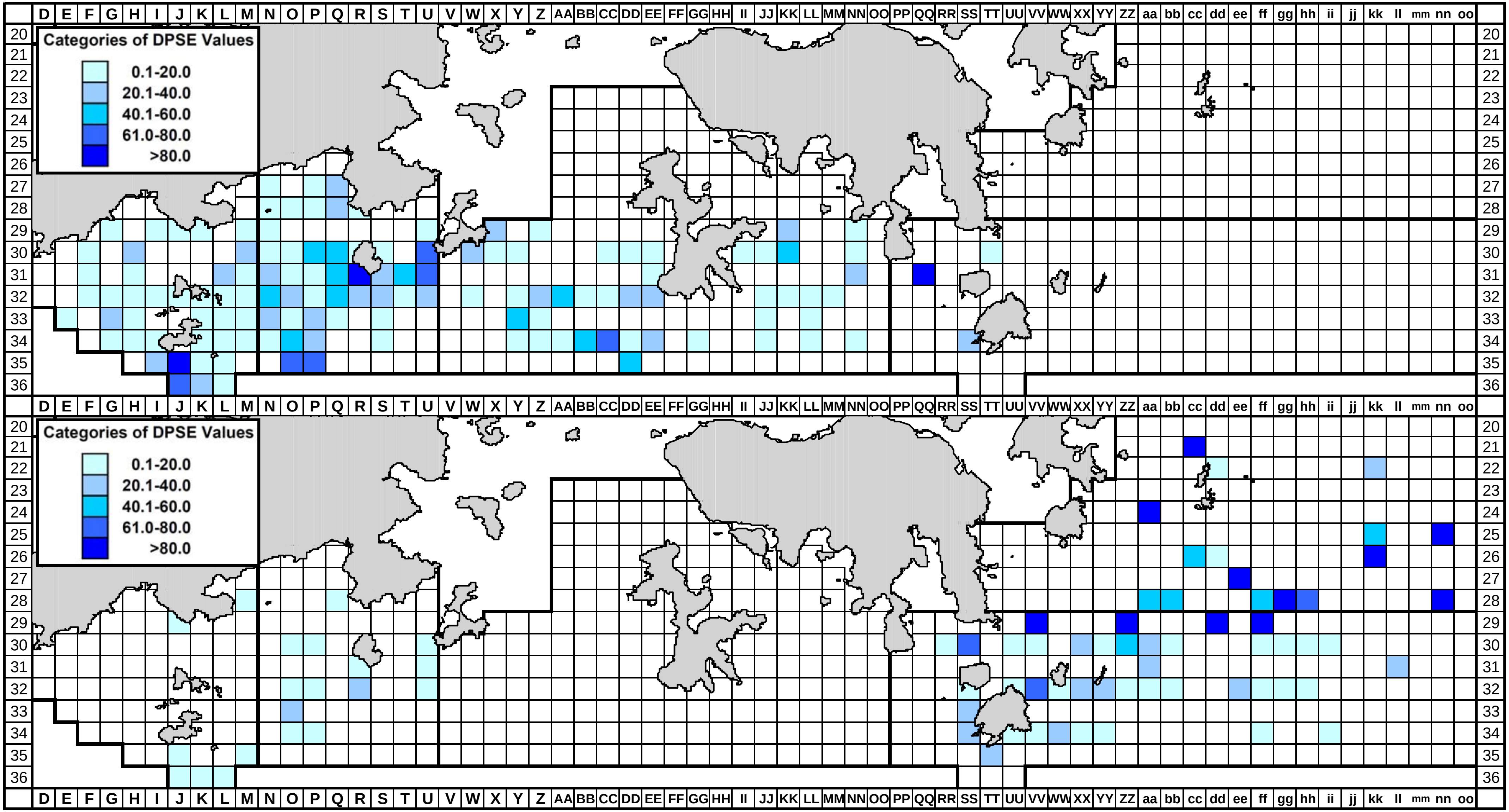


Figure 26. Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong during dry season (top) and wet season (bottom), using data collected during 2004-10 (DPSE = no. of porpoises per 100 units of survey effort)

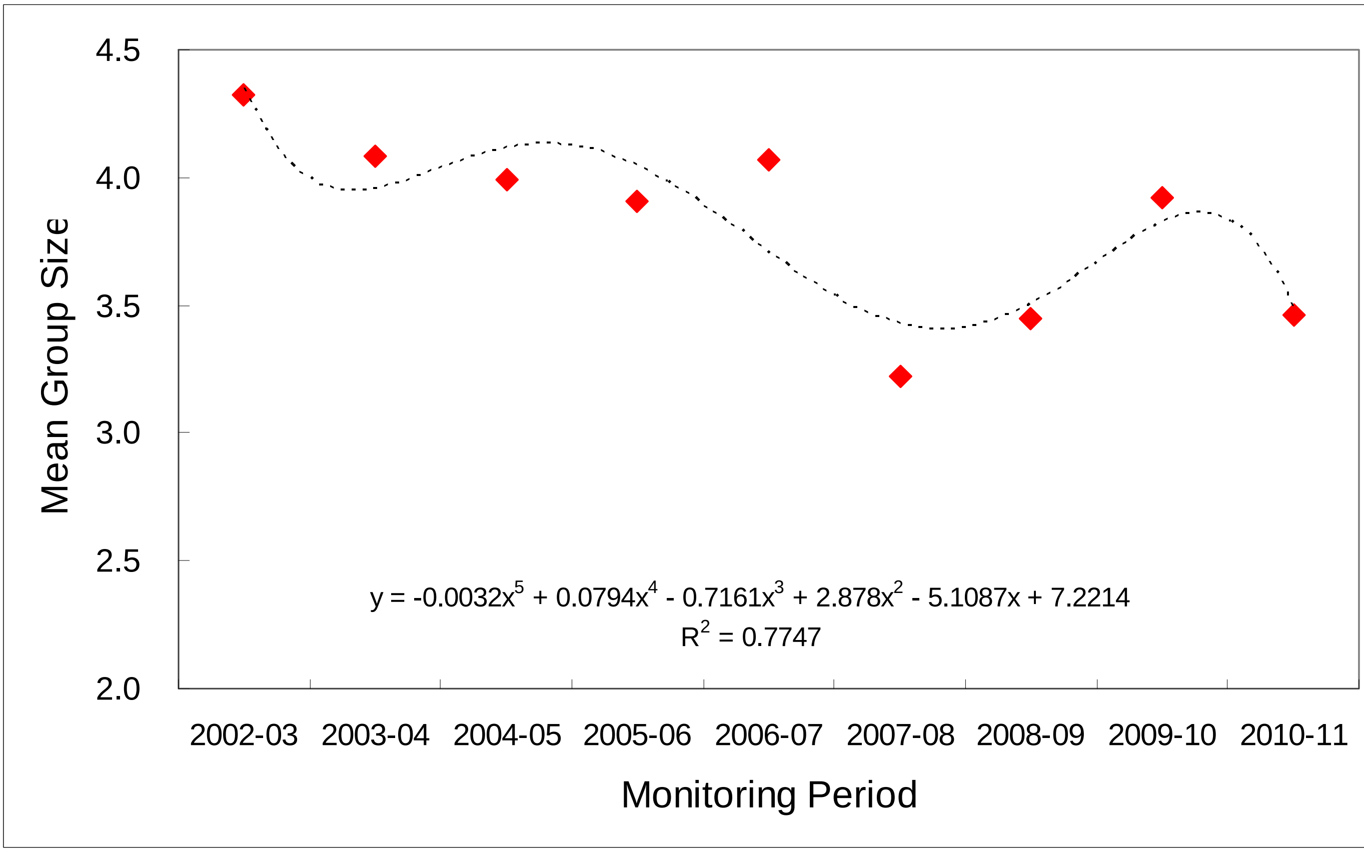


Figure 27. Temporal trend of mean dolphin group size in 2002-11

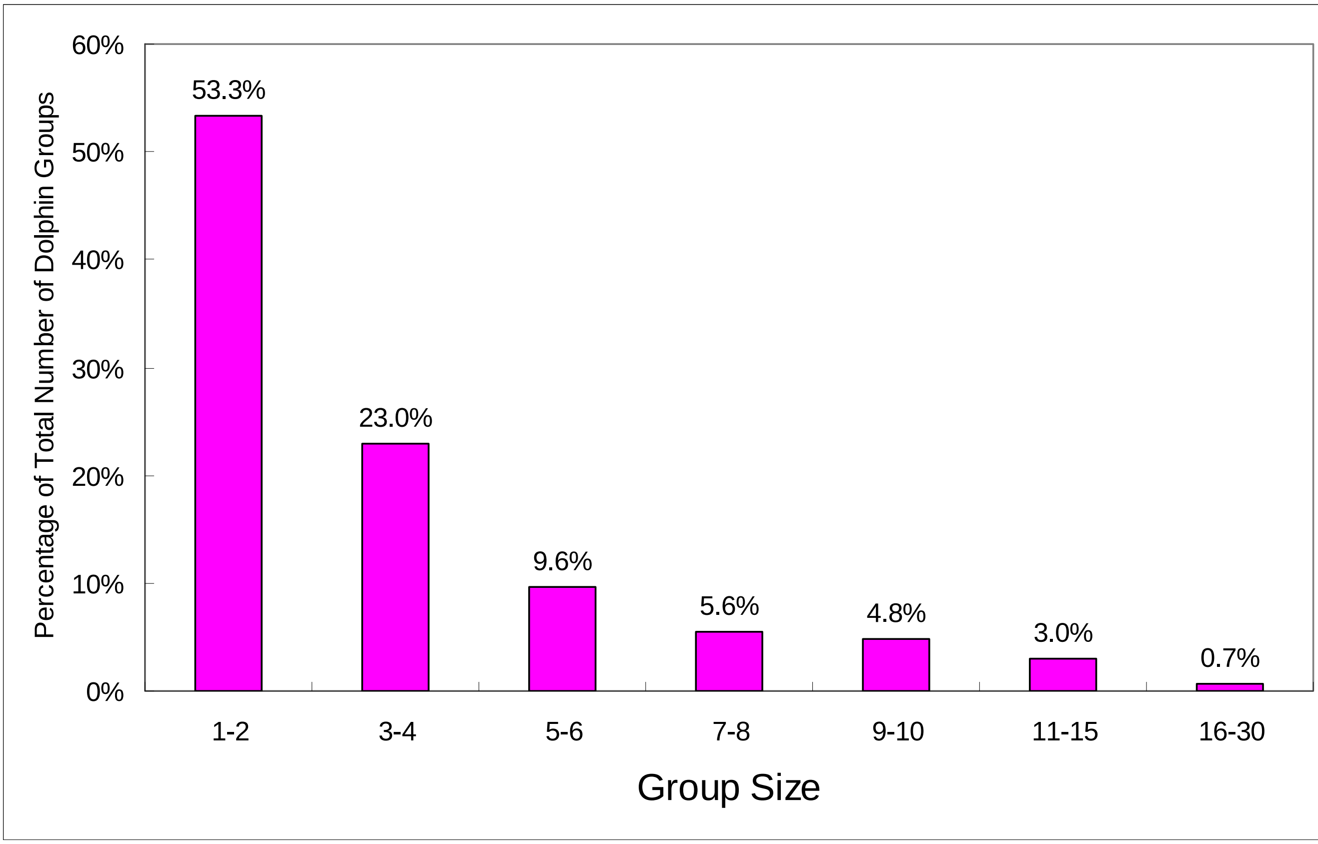


Figure 28. Percentages of different group sizes of Chinese white dolphins in Hong Kong during April 2010 to March 2011

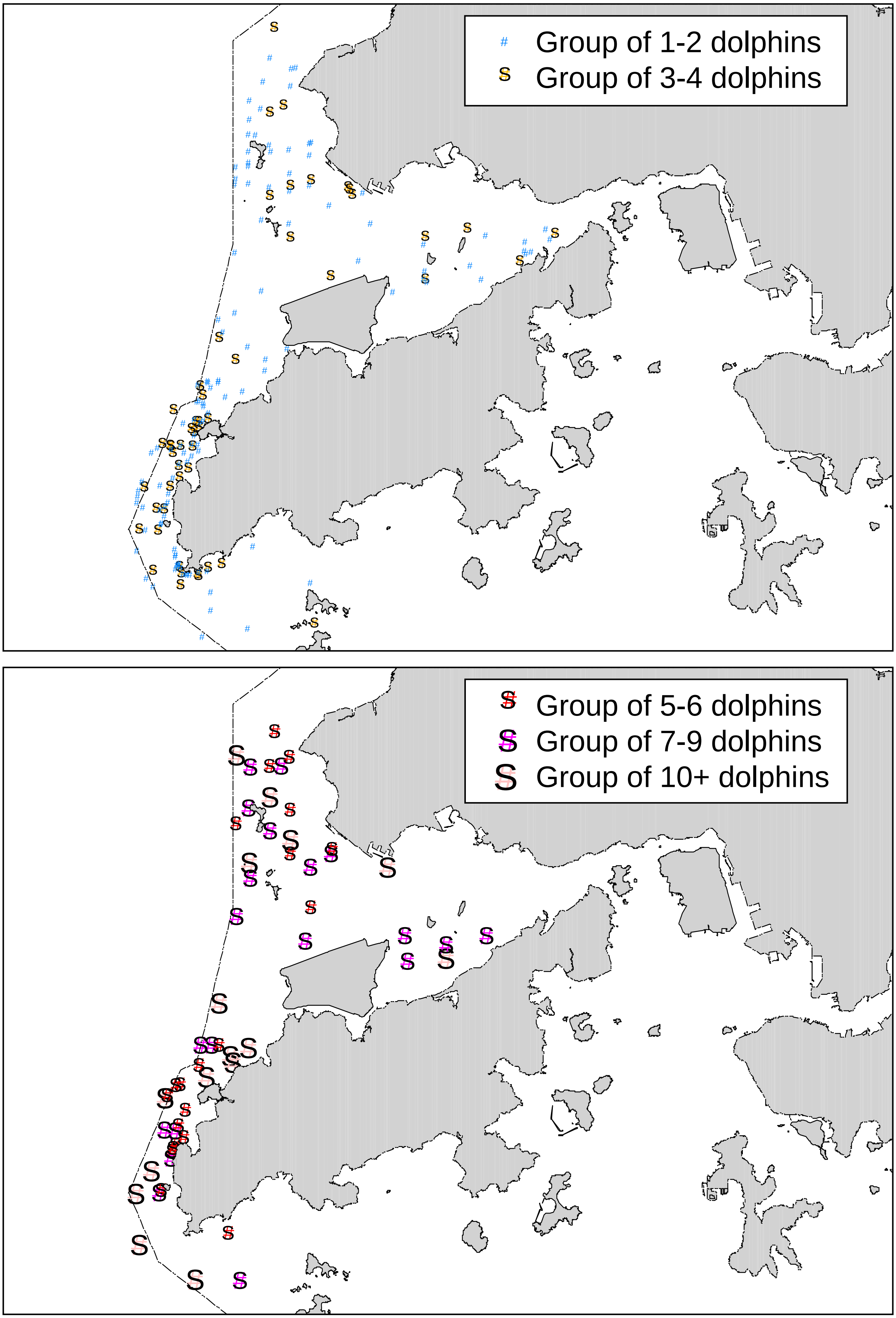


Figure 29. Distribution of Chinese white dolphins with different group sizes (April 2010 – March 2011)

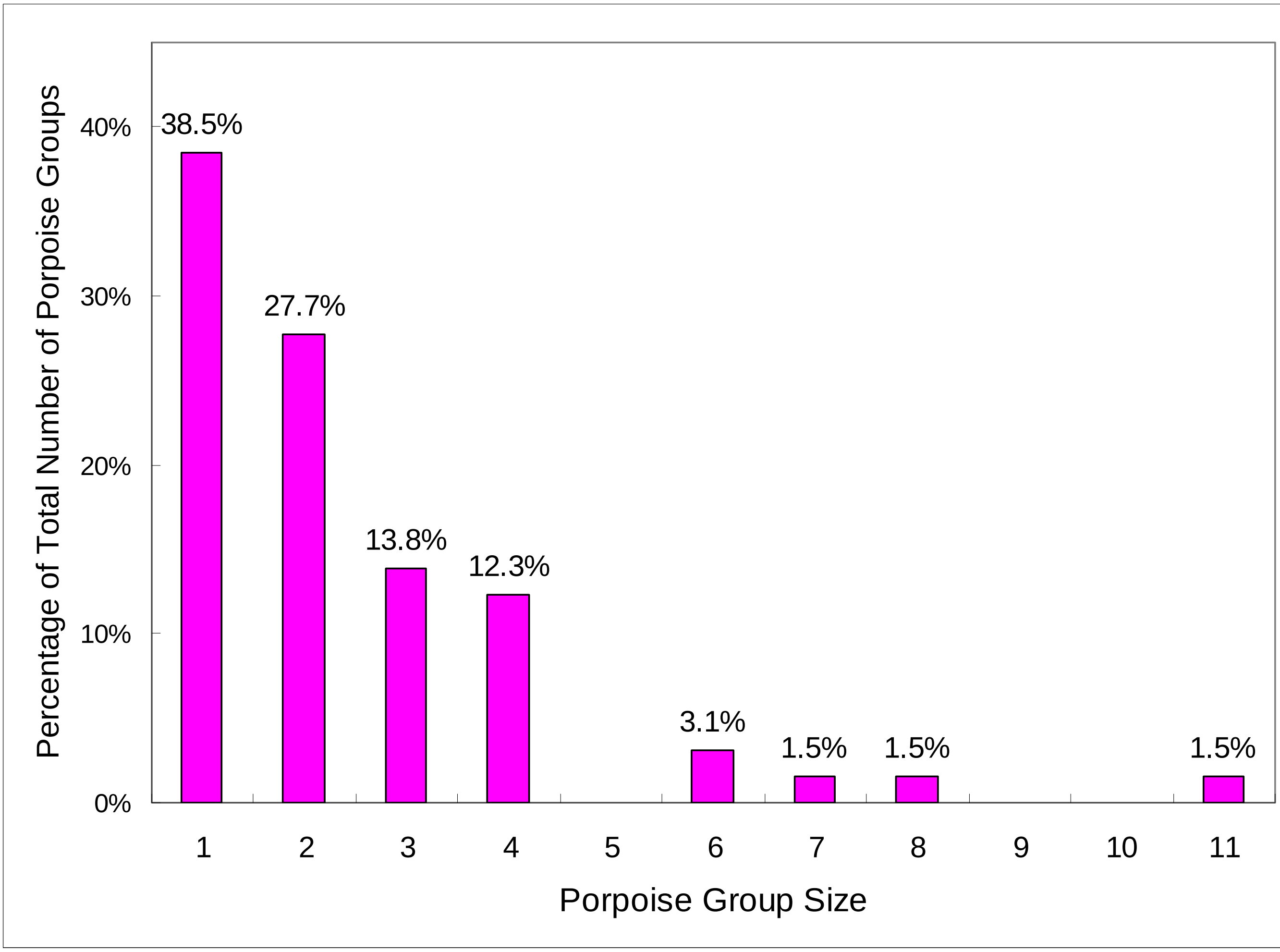


Figure 30. Percentages of different group sizes of finless porpoises in Hong Kong during April 2010 to March 2011

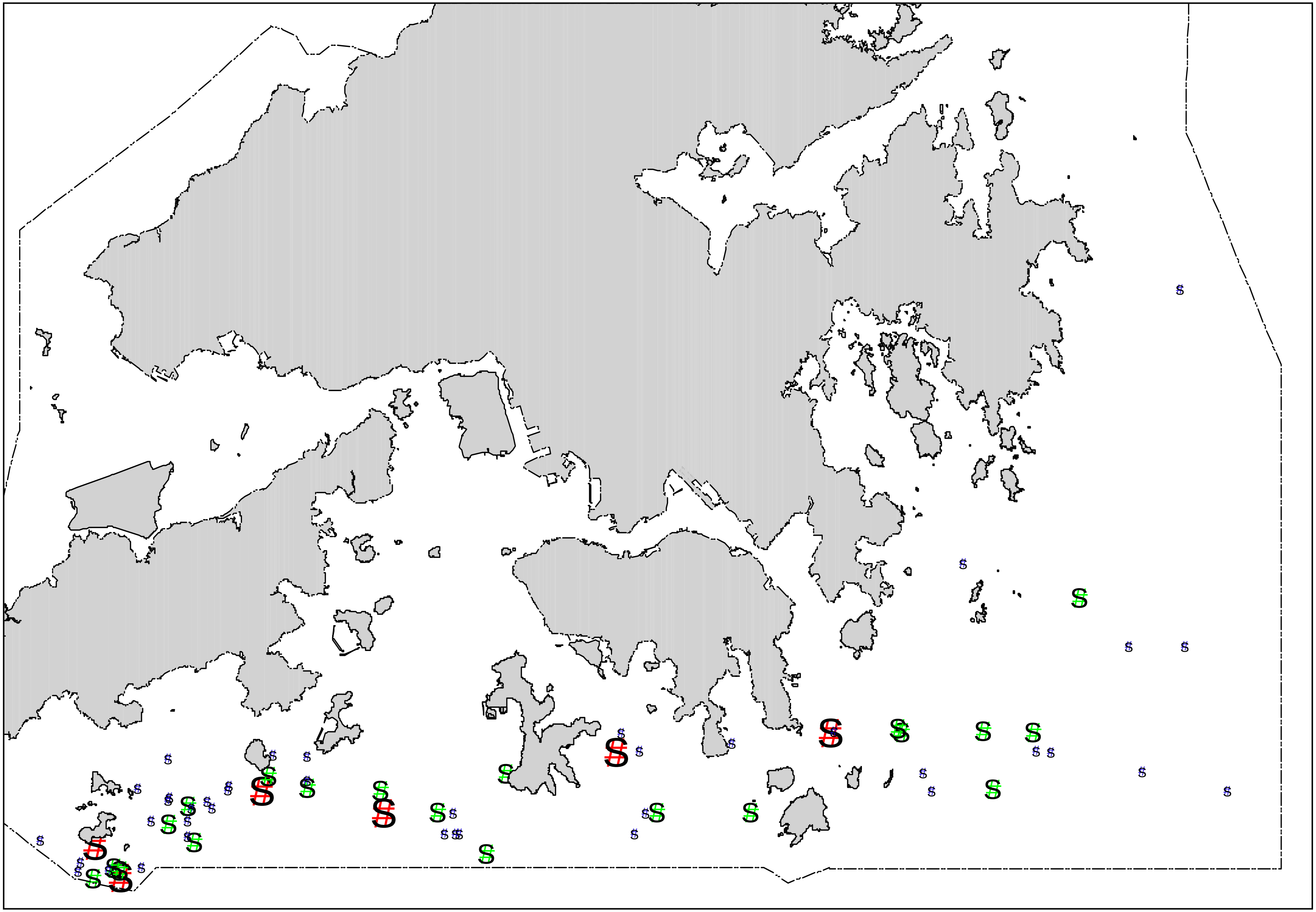


Figure 31. Distribution of finless porpoises with different group sizes during April 2010 – March 2011 (blue dots: group sizes of 1-2; green dots: group sizes of 3-4; red dots: group sizes of 5 or more)

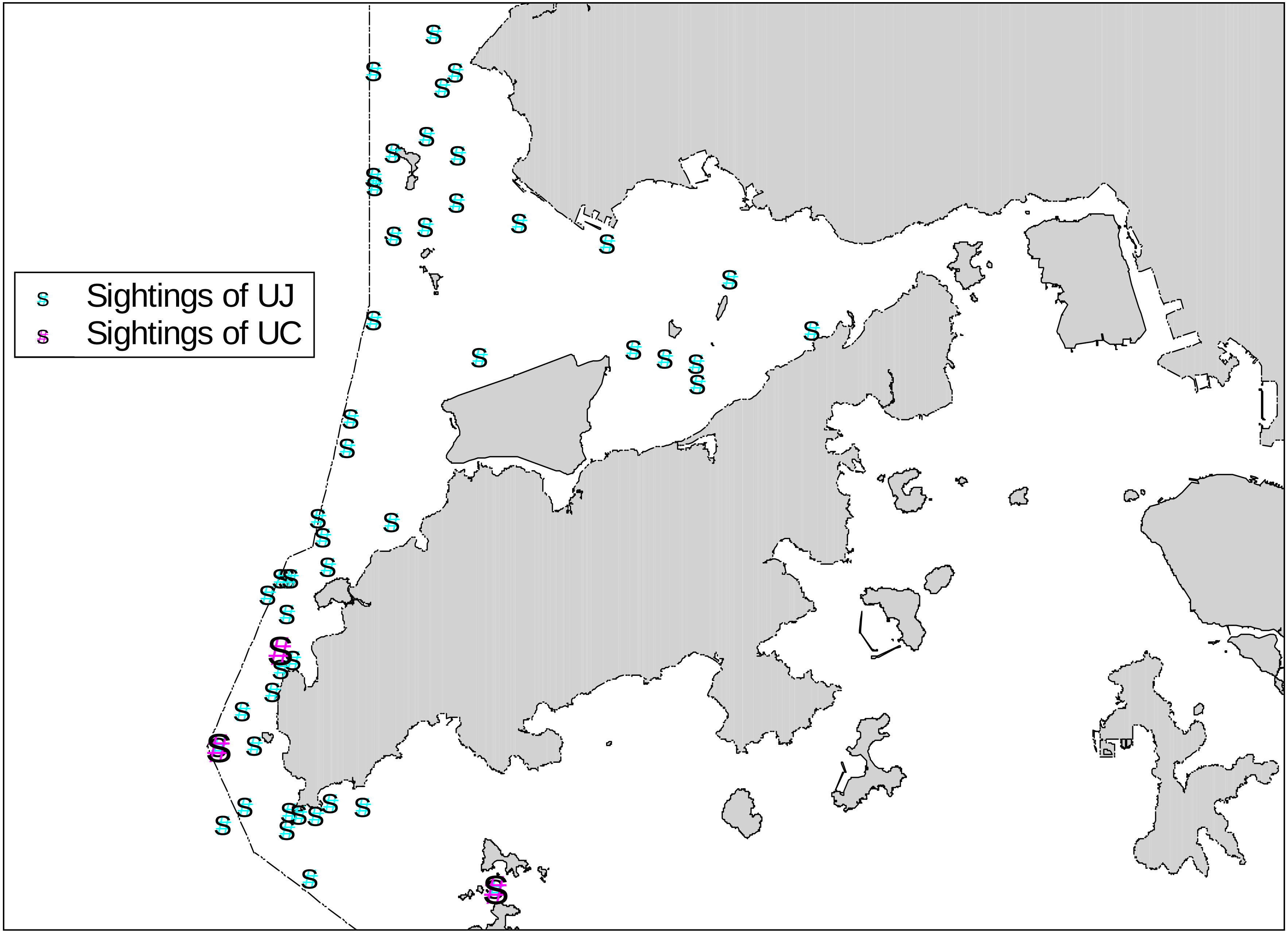


Figure 32. Distribution of Unspotted Calves (UC) & Unspotted Juveniles (UJ) (April 2010 – March 2011)

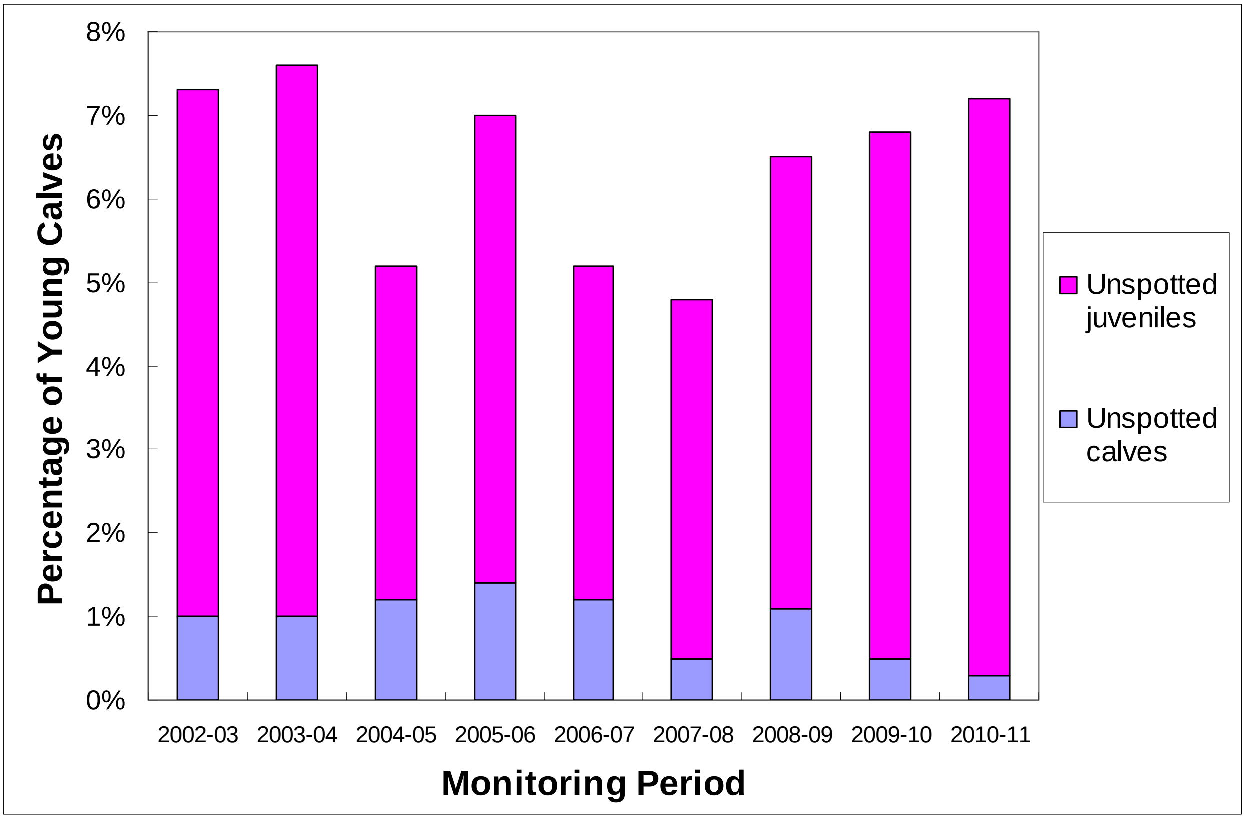


Figure 33a. Percentages of young calves (including unspotted calves and unspotted juveniles) among dolphin groups in Hong Kong during 2002-11

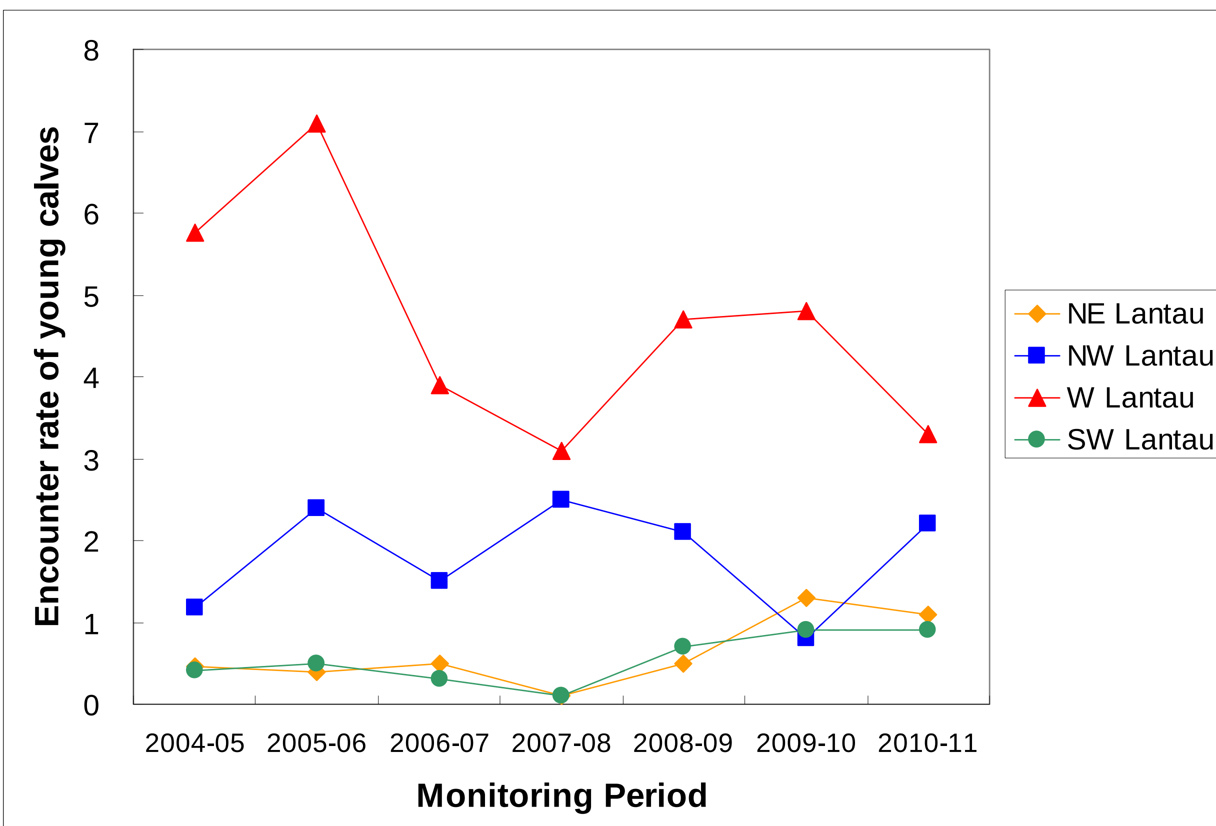


Figure 33b. Temporal trends of encounter rates of young calves (including unspotted calves and unspotted juveniles) in 2004-11

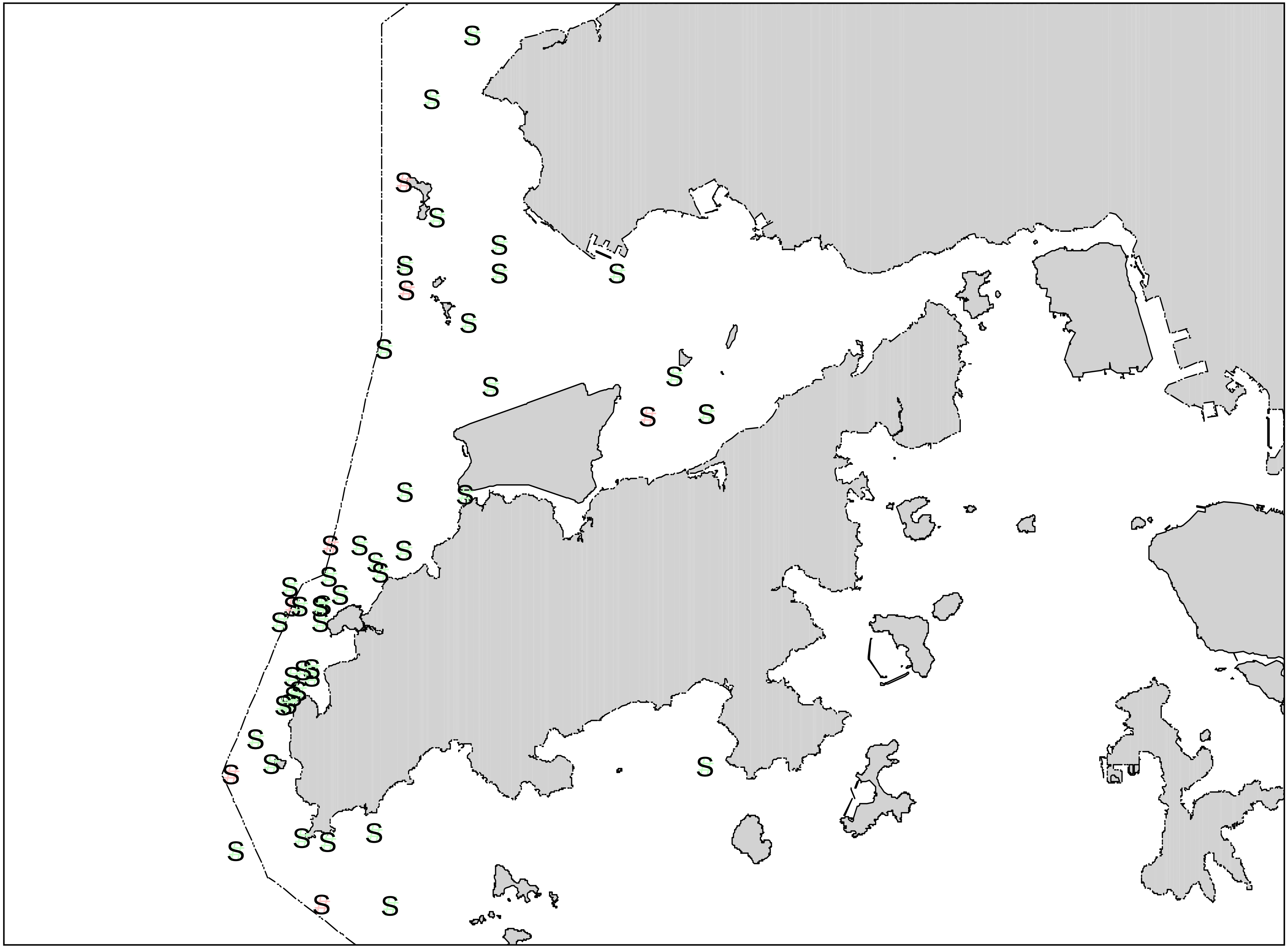


Figure 34. Distribution of Chinese white dolphins engaged in feeding (green dots) and socializing (pink dots) activities (April 2010 – March 2011)

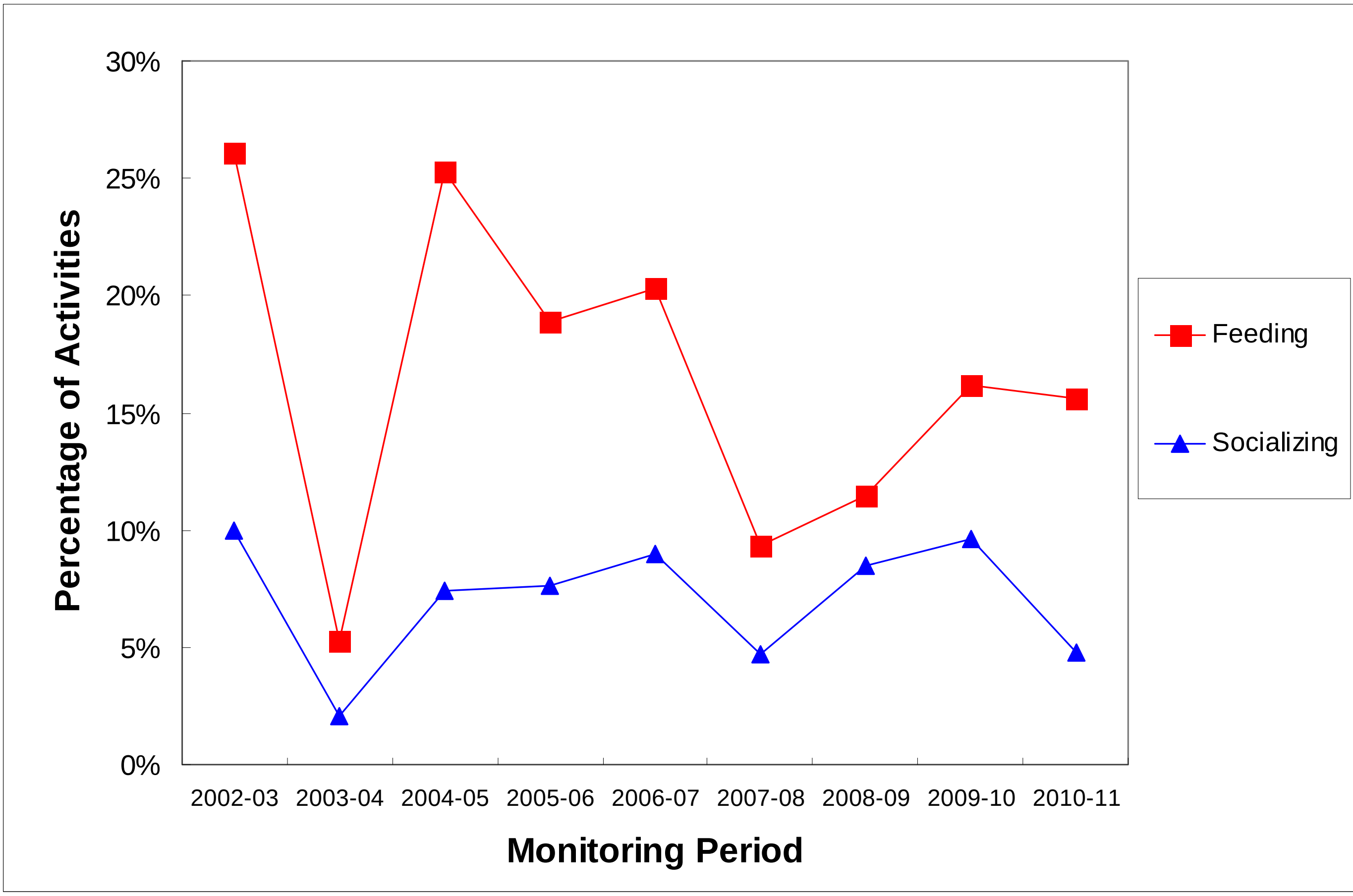


Figure 35. Percentages of feeding and socializing activities among all dolphin groups sighted in Hong Kong during 2002-11

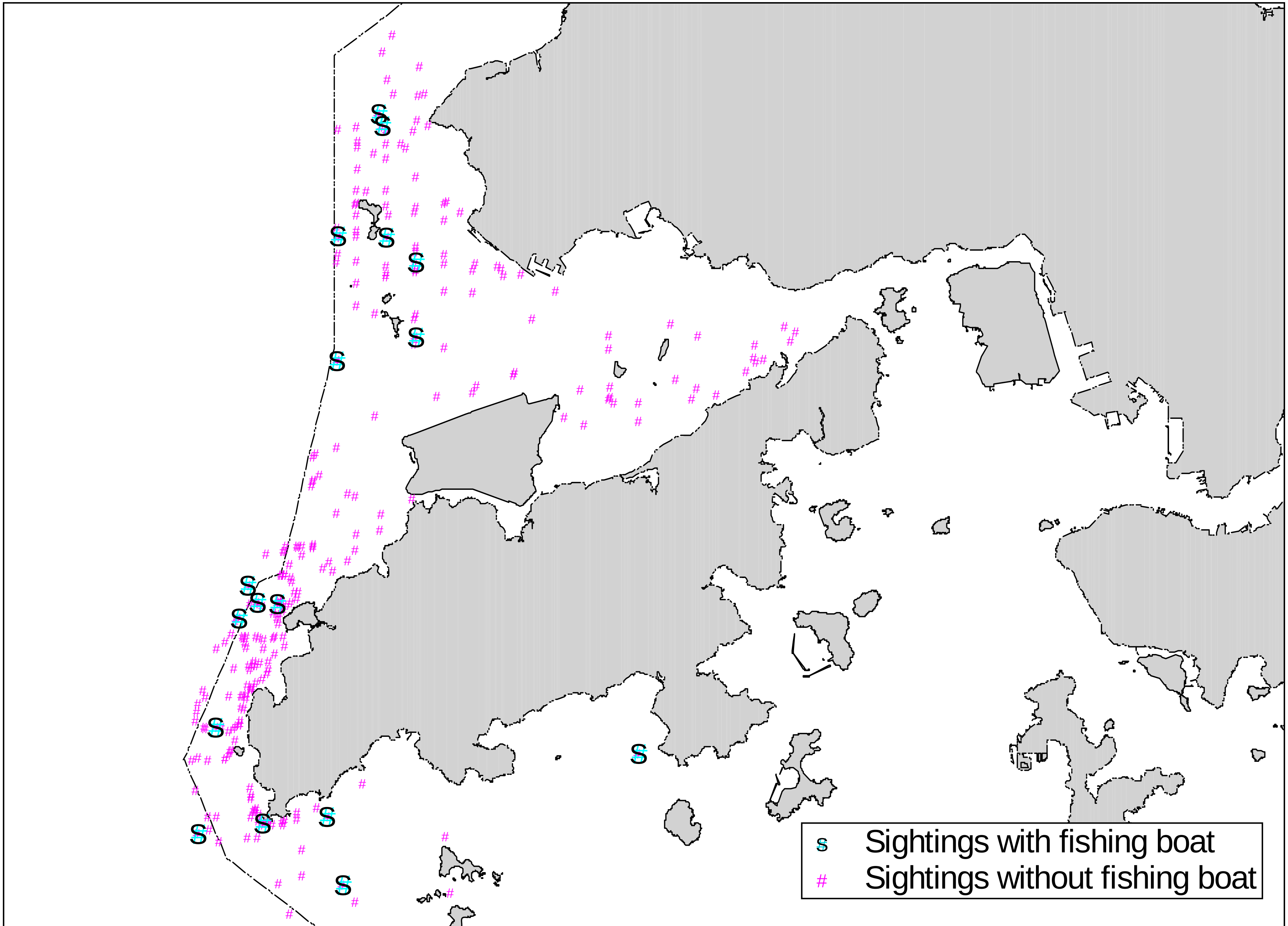


Figure 36. Distribution of dolphin sightings associated with and without fishing boats (April 2010 – March 2011)

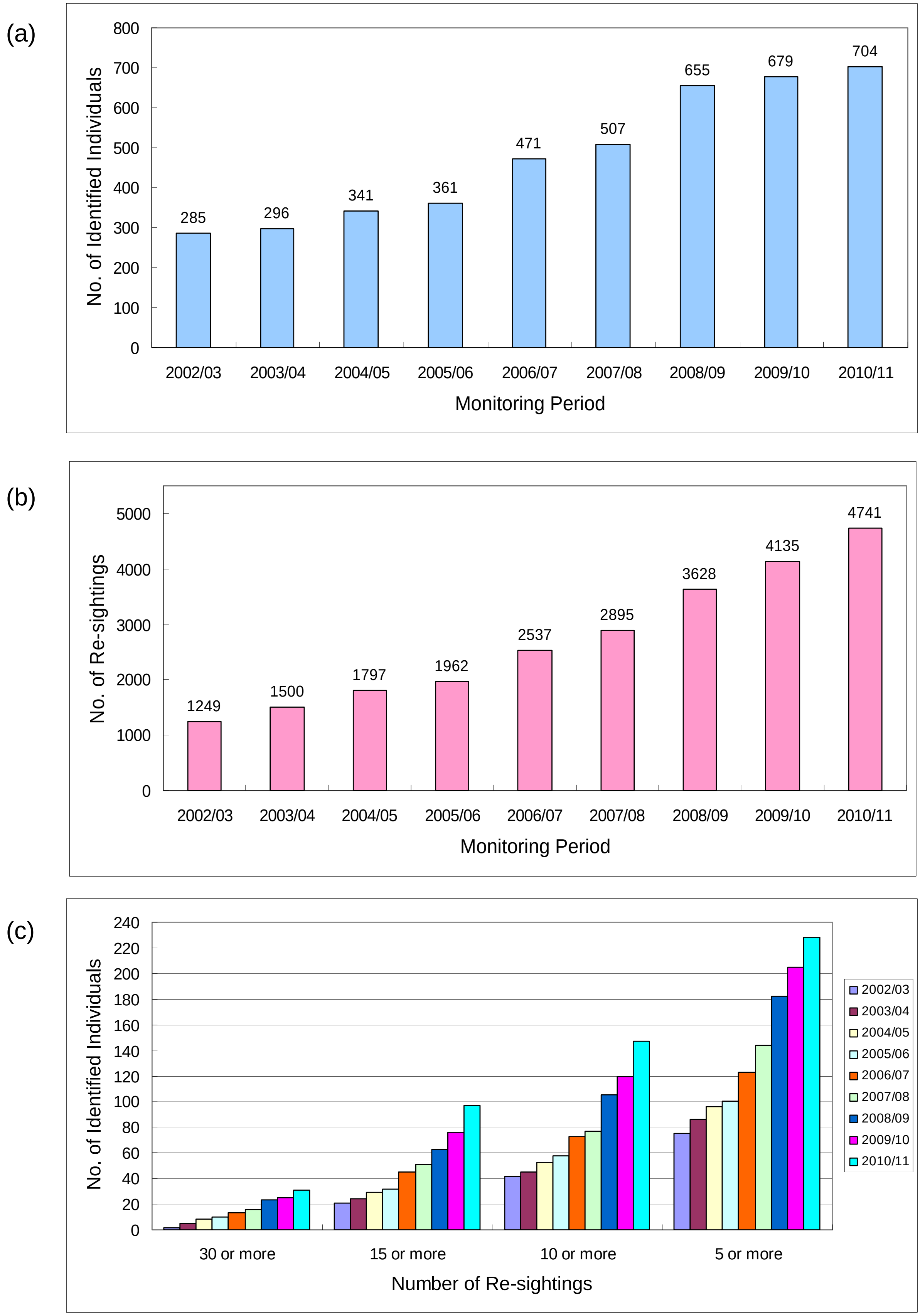


Figure 37. Temporal trends of (a) total number of identified individuals; (b) total number of re-sightings made; and (c) number of identified individuals within several categories of number of re-sightings in the past nine monitoring periods since 2002

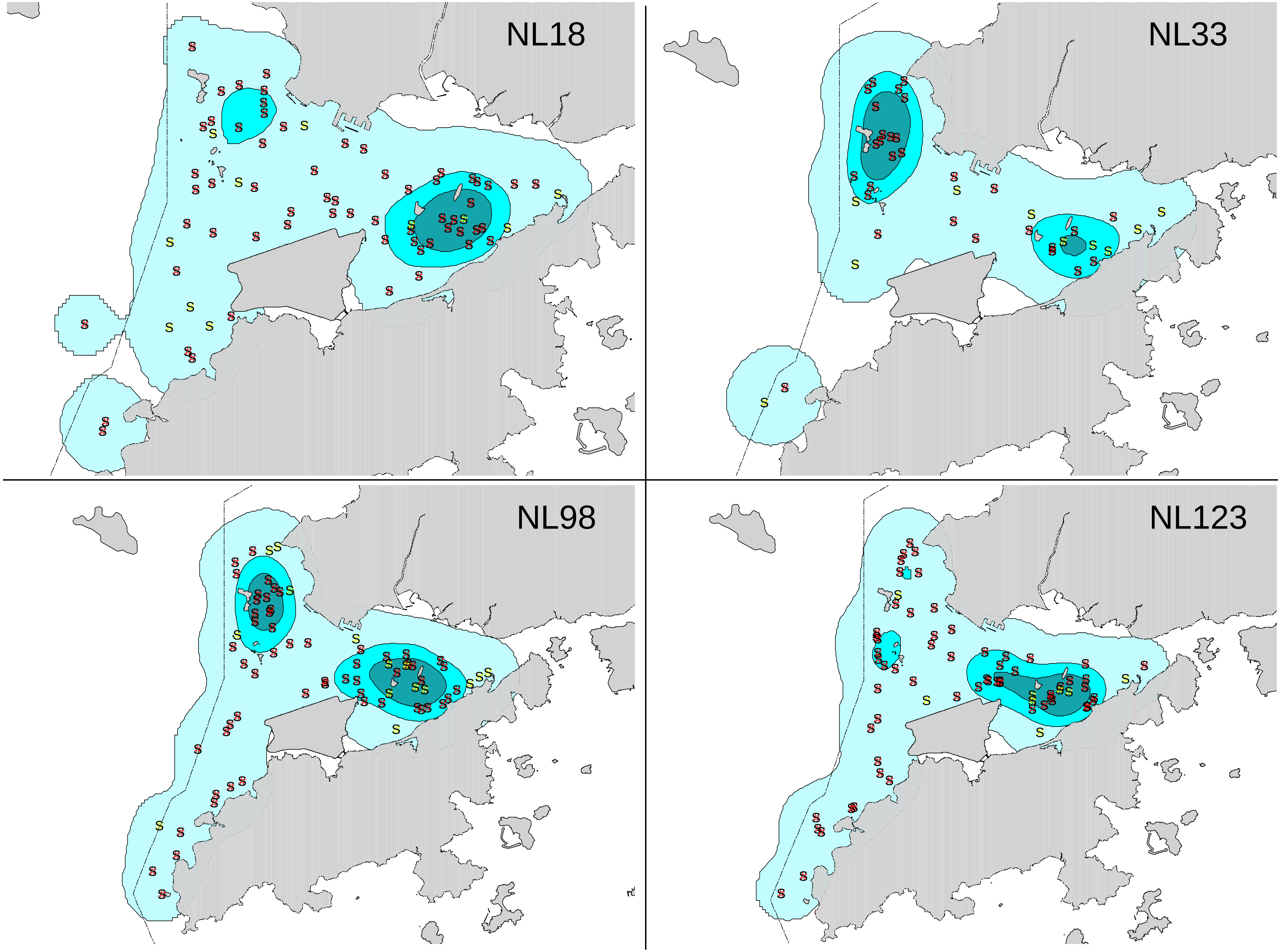


Figure 38. Ranging patterns of four individuals with their core areas centered around the Brothers Islands

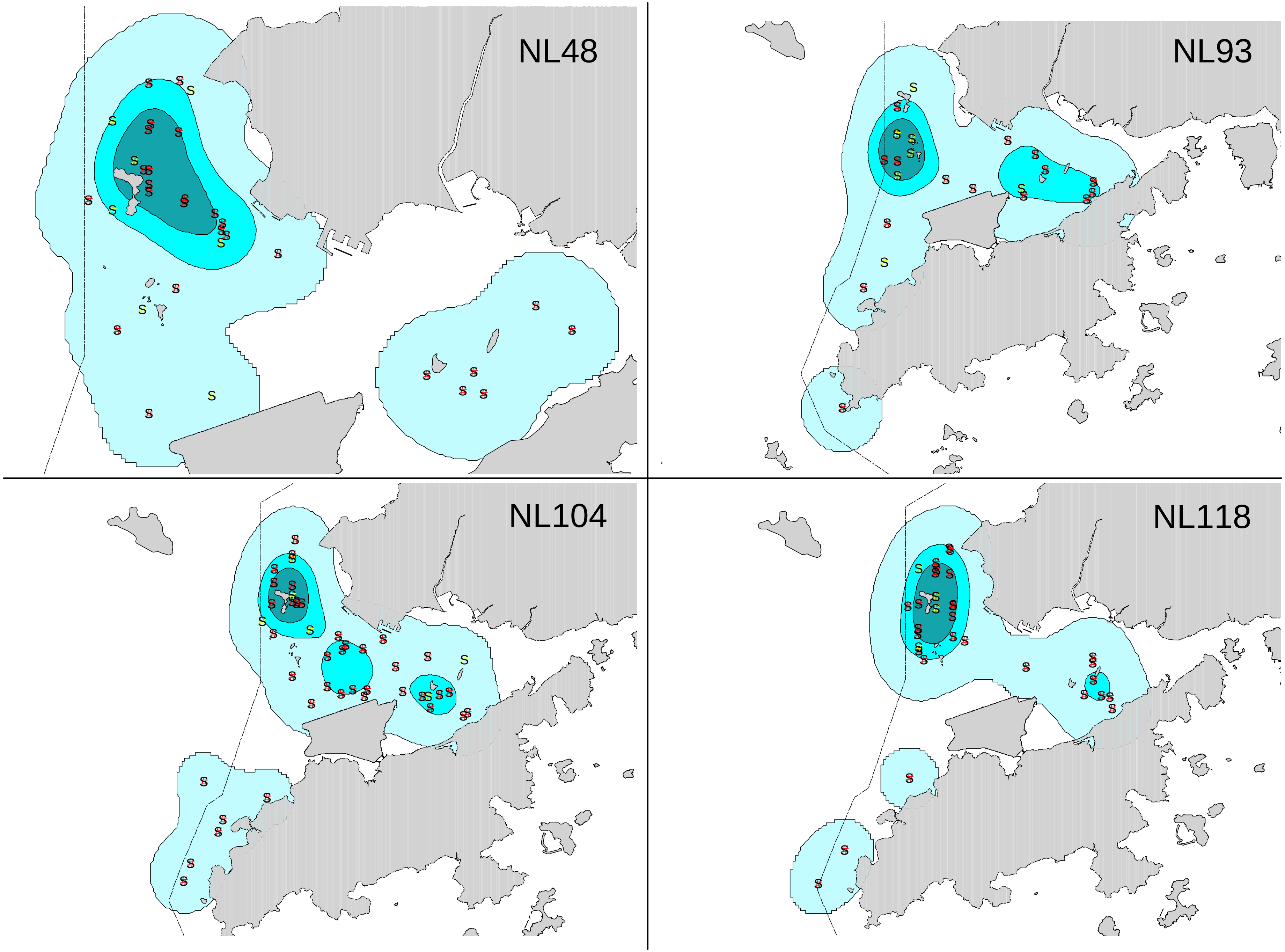


Figure 39. Ranging patterns of four individuals with their core areas centered around SC & LKC Marine Park

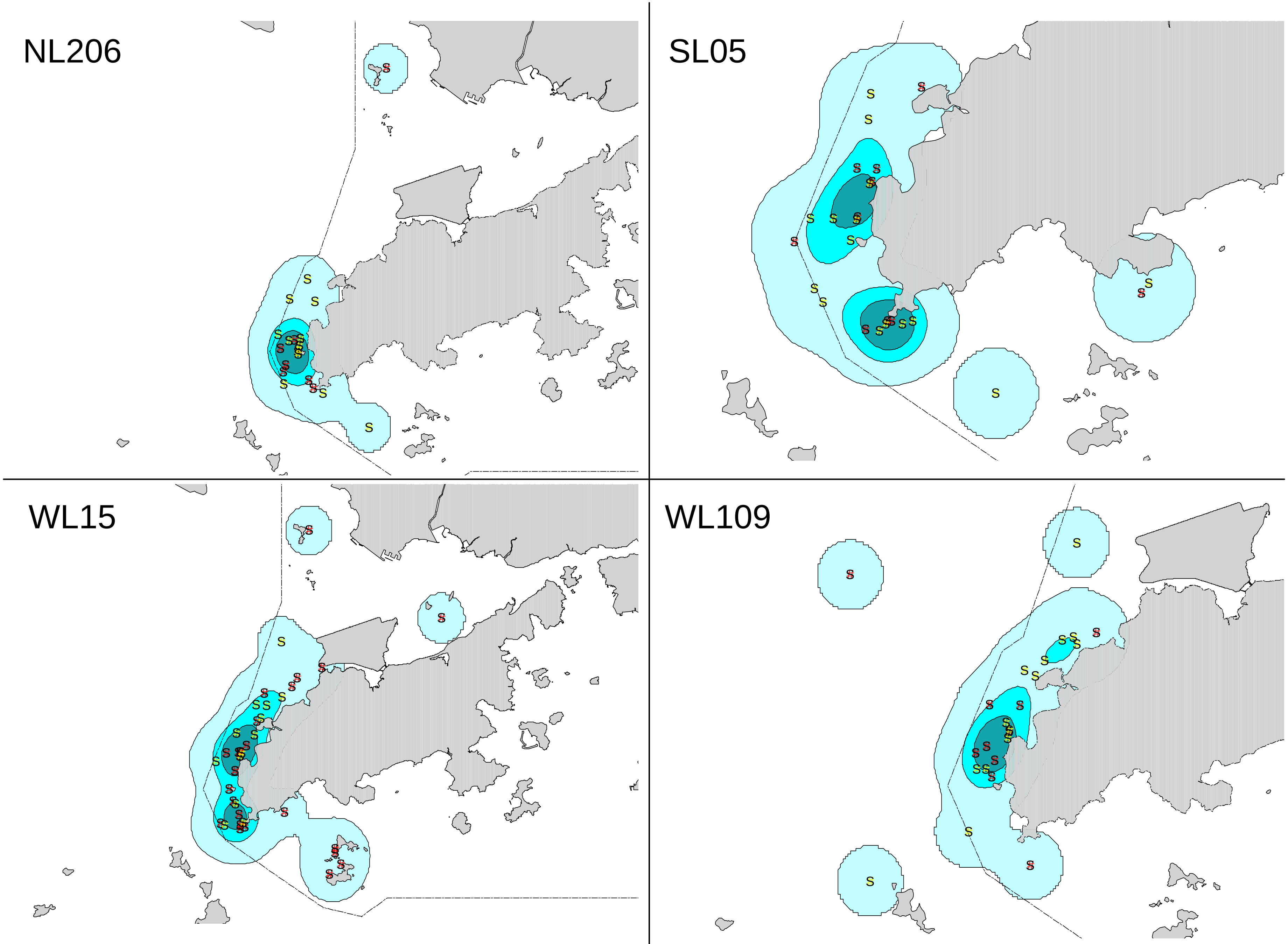


Figure 40. Ranging patterns of four individuals with their core areas centered along west coast of Lantau

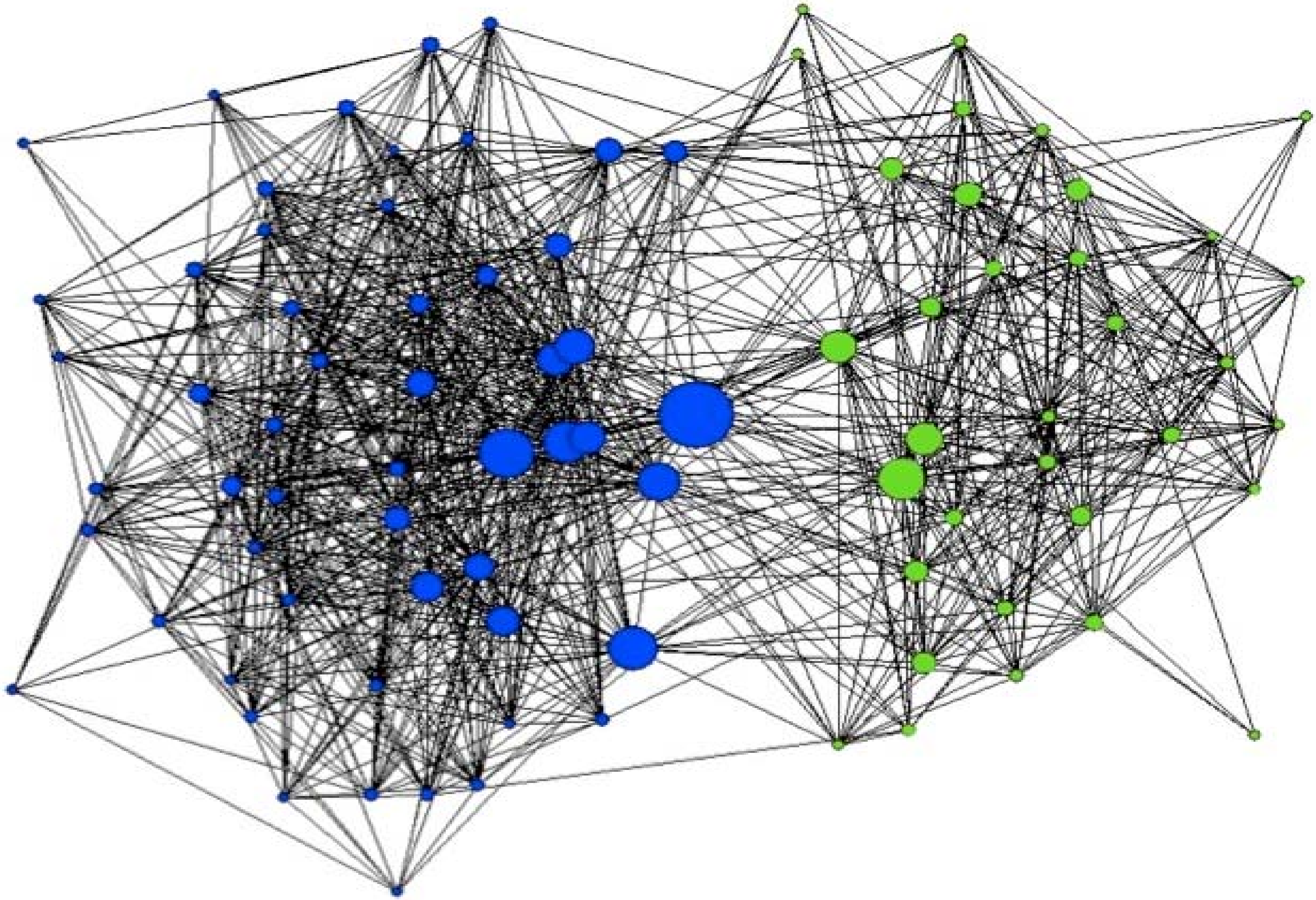


Figure 41. A sociogram of the 88 dolphins included in analyses of social structure. Nodes are individual dolphins (size proportional to network reach) and edge lengths are proportional to association indices. Colours indicate social clusters assessed with Newman's (2006) eigenvector method (blue: northern cluster, green: western cluster).

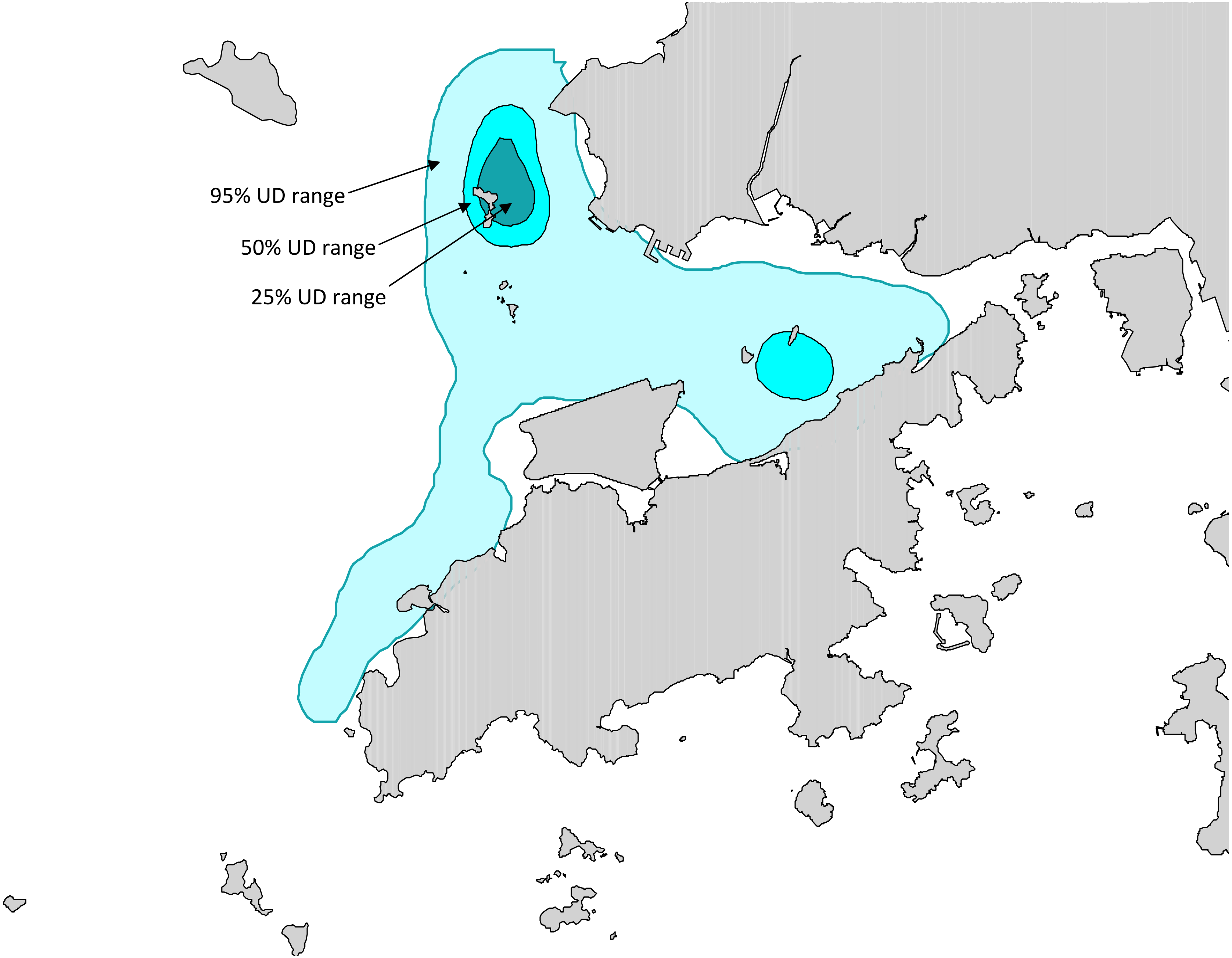


Figure 42. 95%, 50%, and 25% utilization densities for dolphins categorized in the northern social cluster.

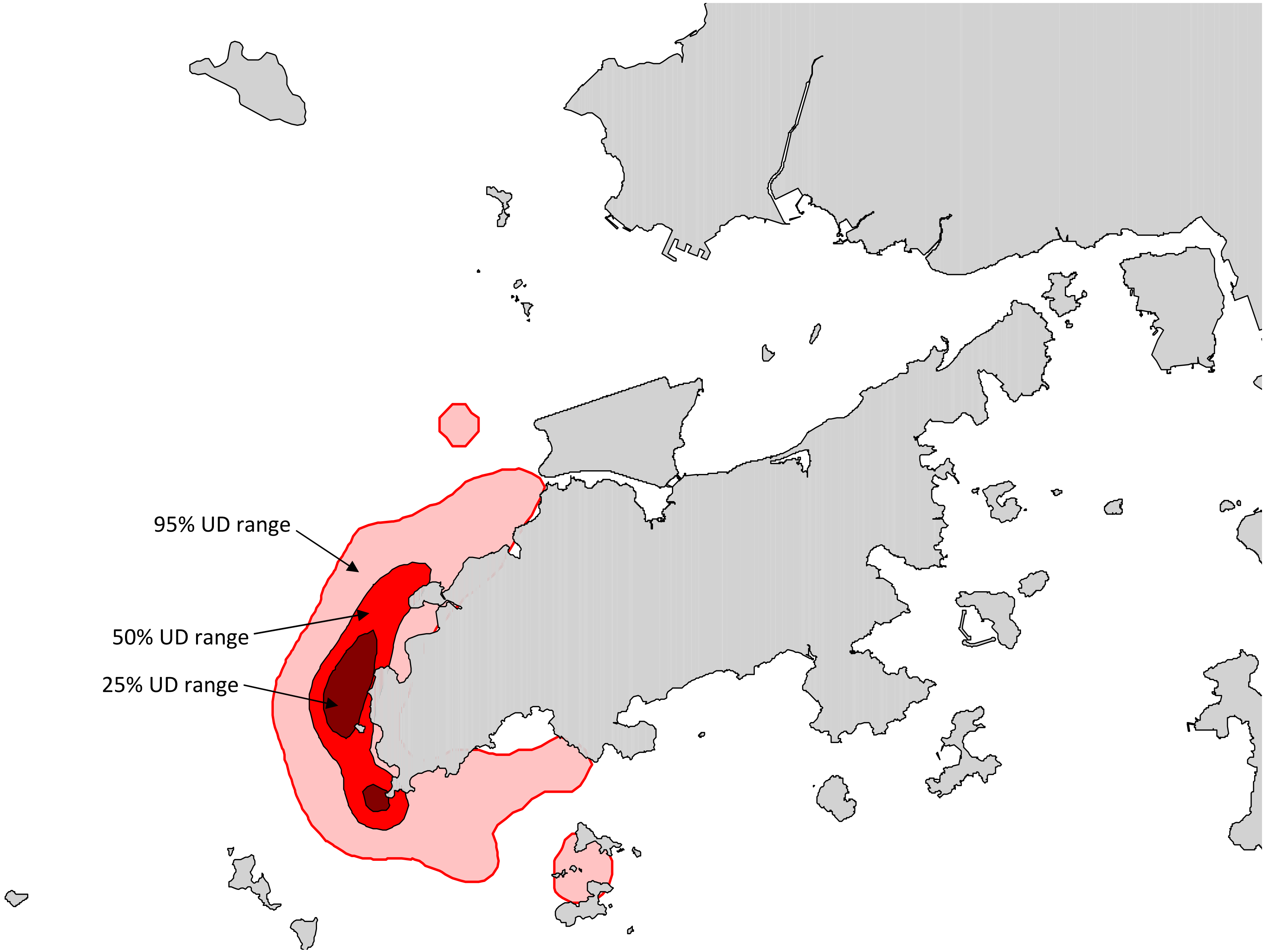


Figure 43. 95%, 50%, and 25% utilization densities for dolphins categorized in the western social cluster.

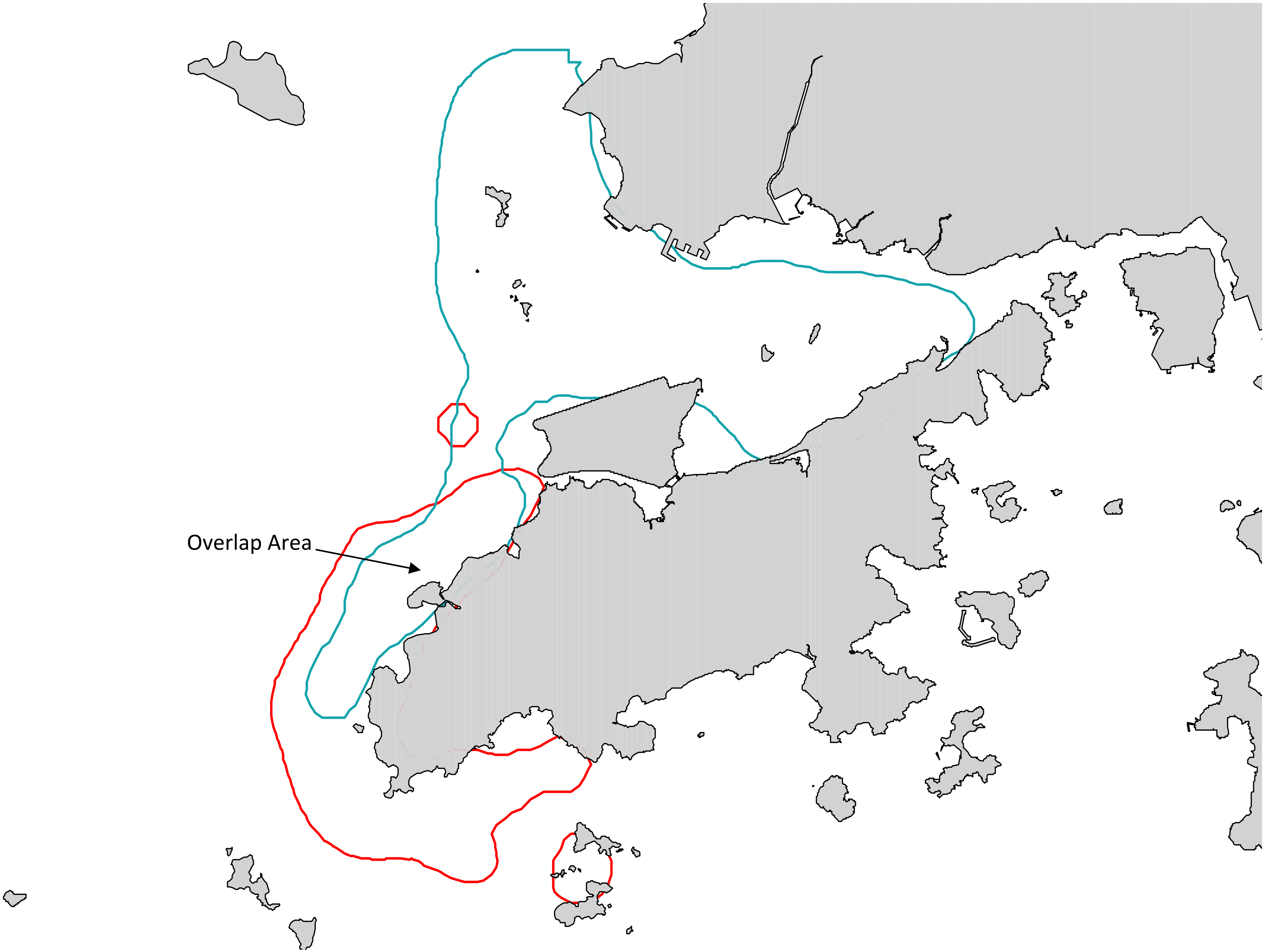


Figure 44. Overlap of the 95% utilization densities for each social cluster.

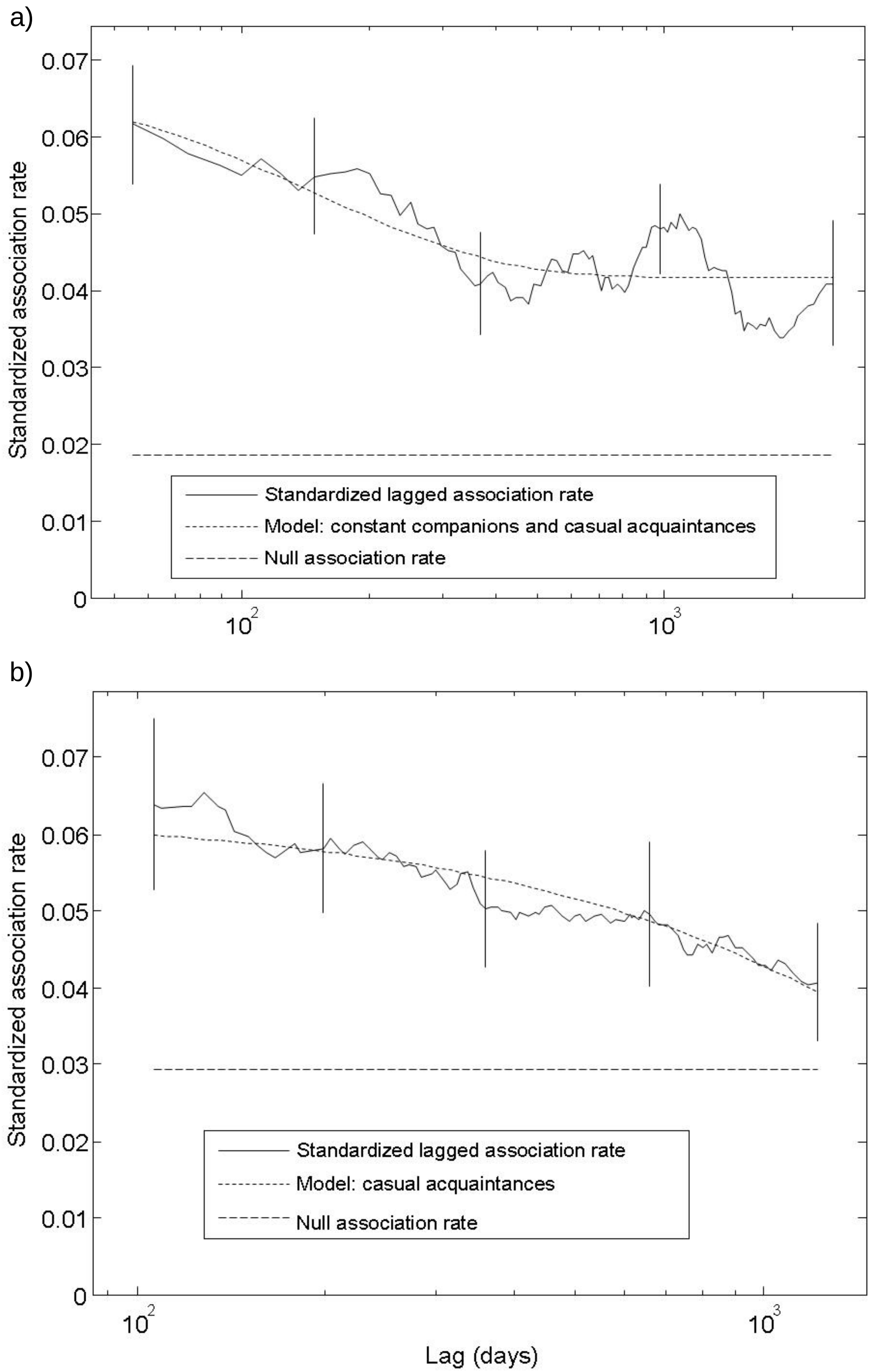


Figure 45. Standardized lagged association rates for each cluster: a) northern individuals, b) western individuals. Four models described in Whitehead (2007) were fit to each cluster, and goodness of fit was assessed with the quasi-Akaike information criterion (QAIC). The best models are included in the graphs.

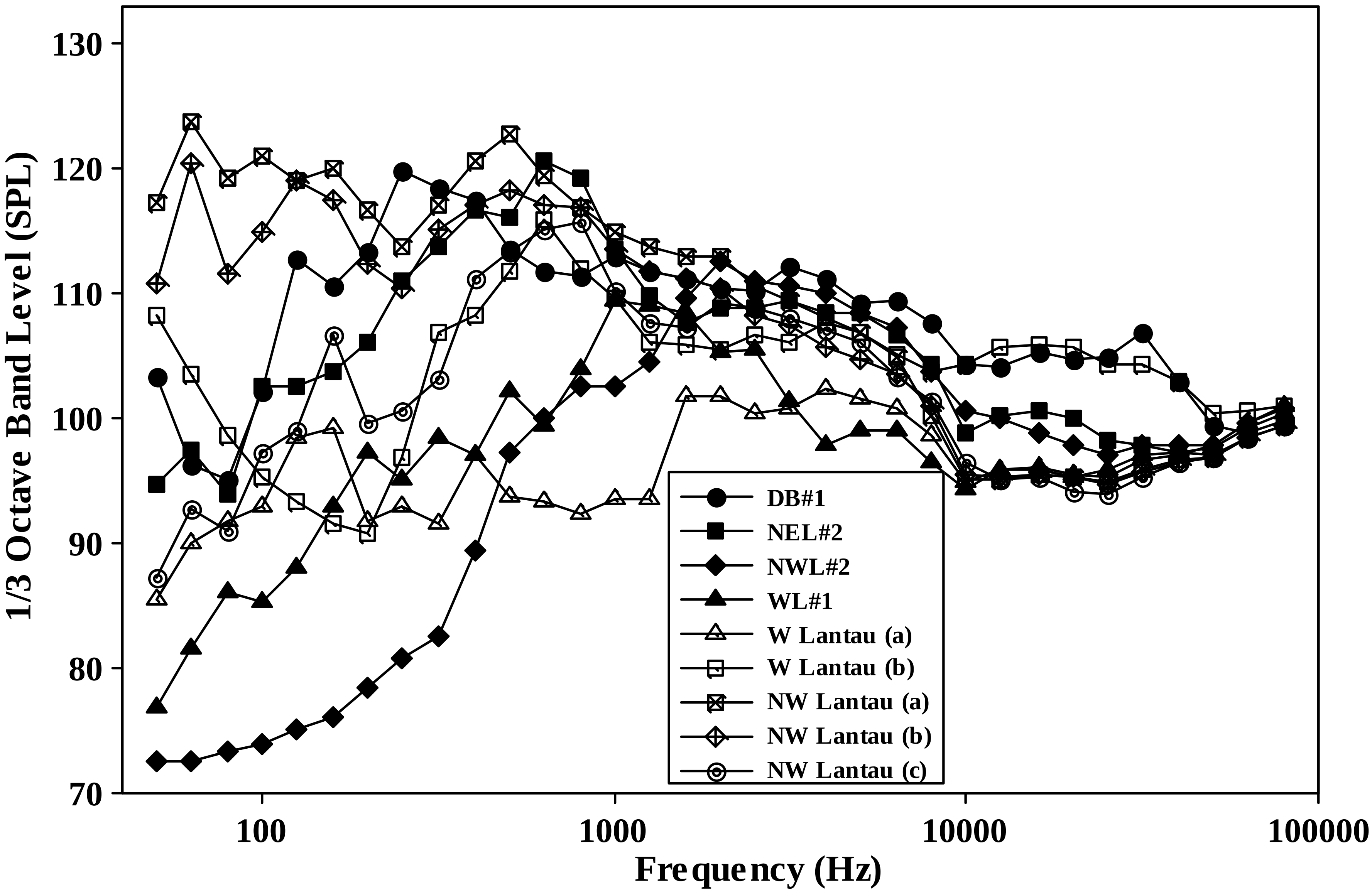


Figure 46. Low (LOW) activity station medians

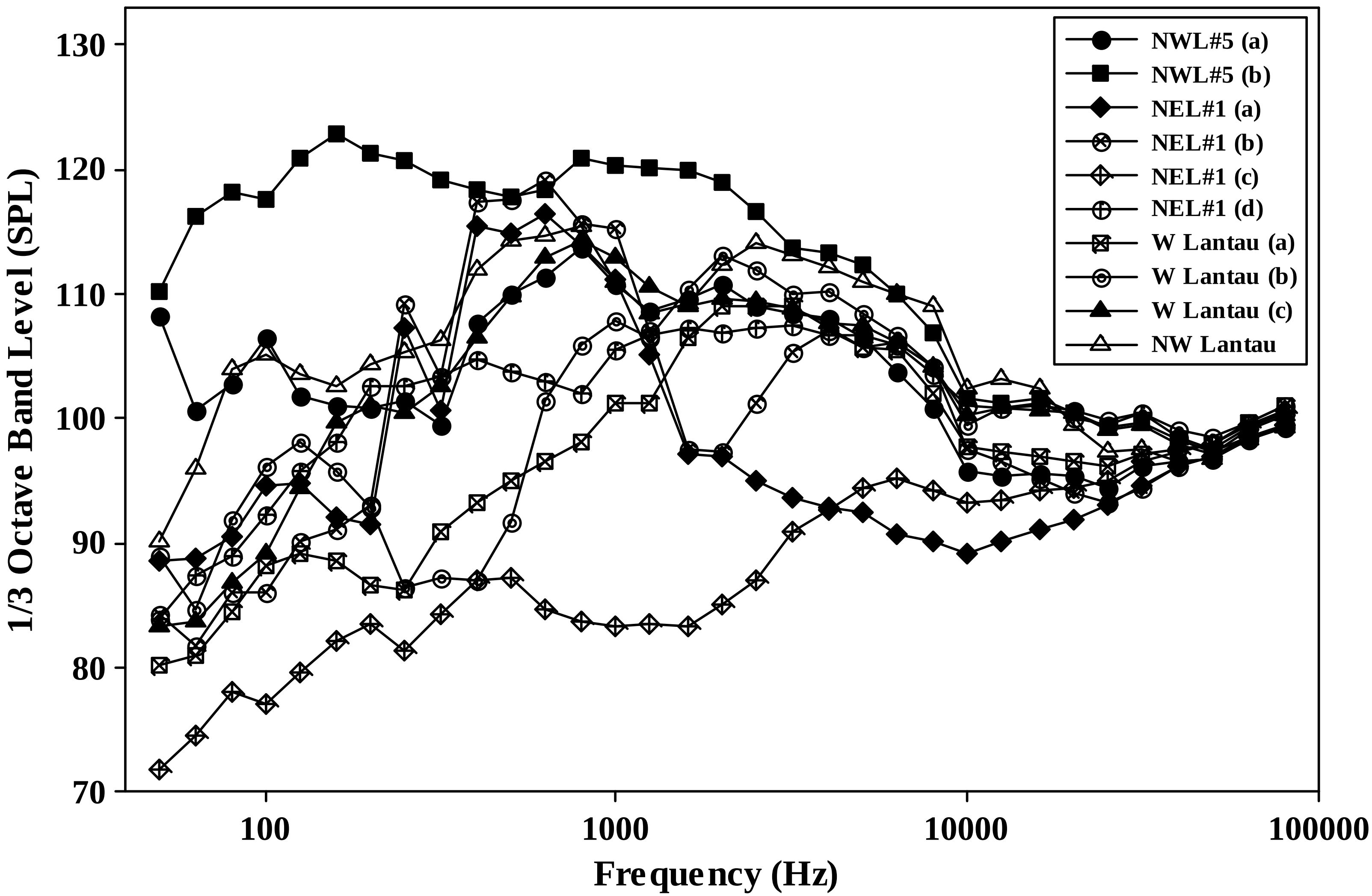


Figure 47. Moderate (MID) activity station medians

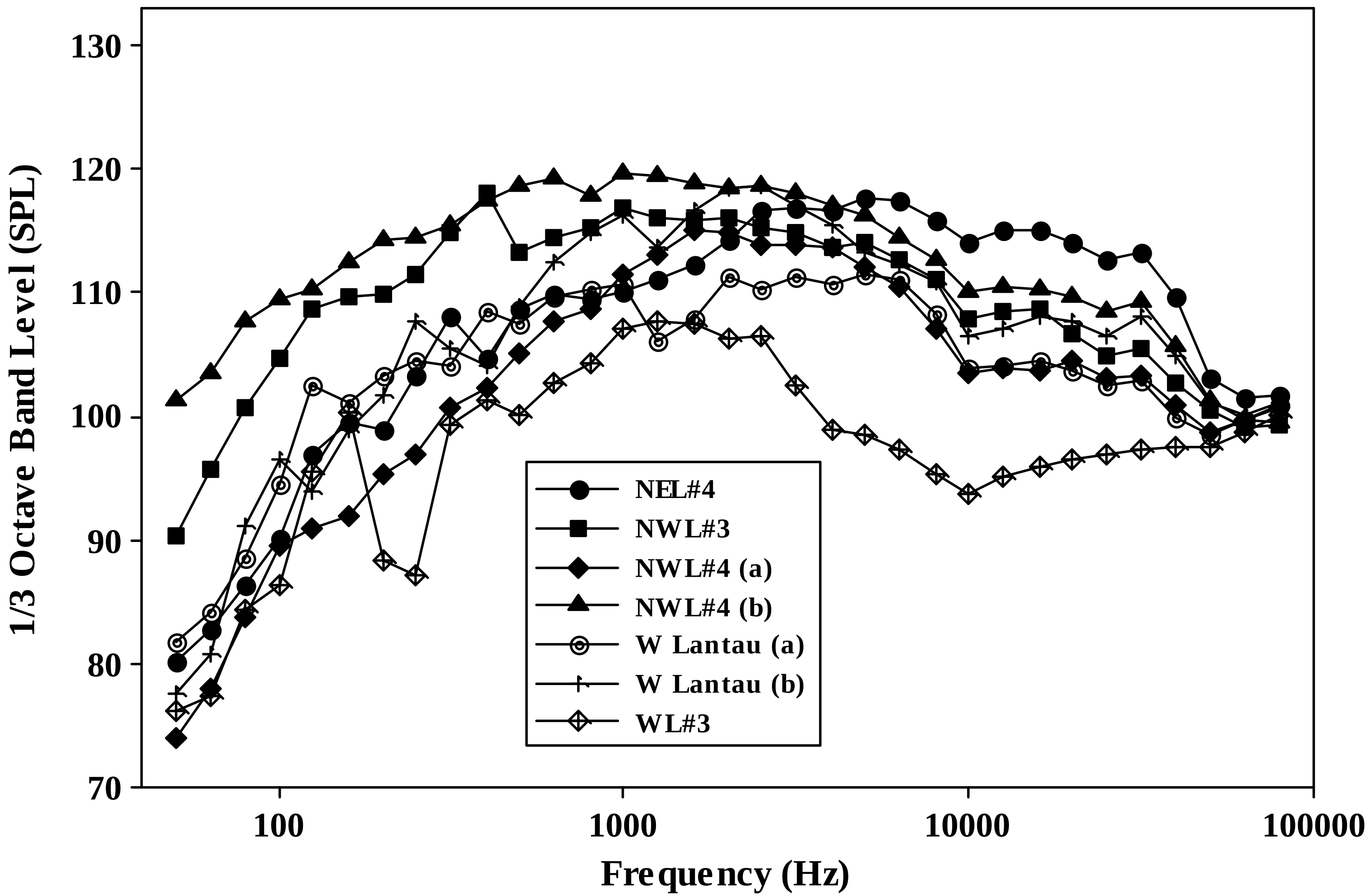


Figure 48. High (HI) activity station medians

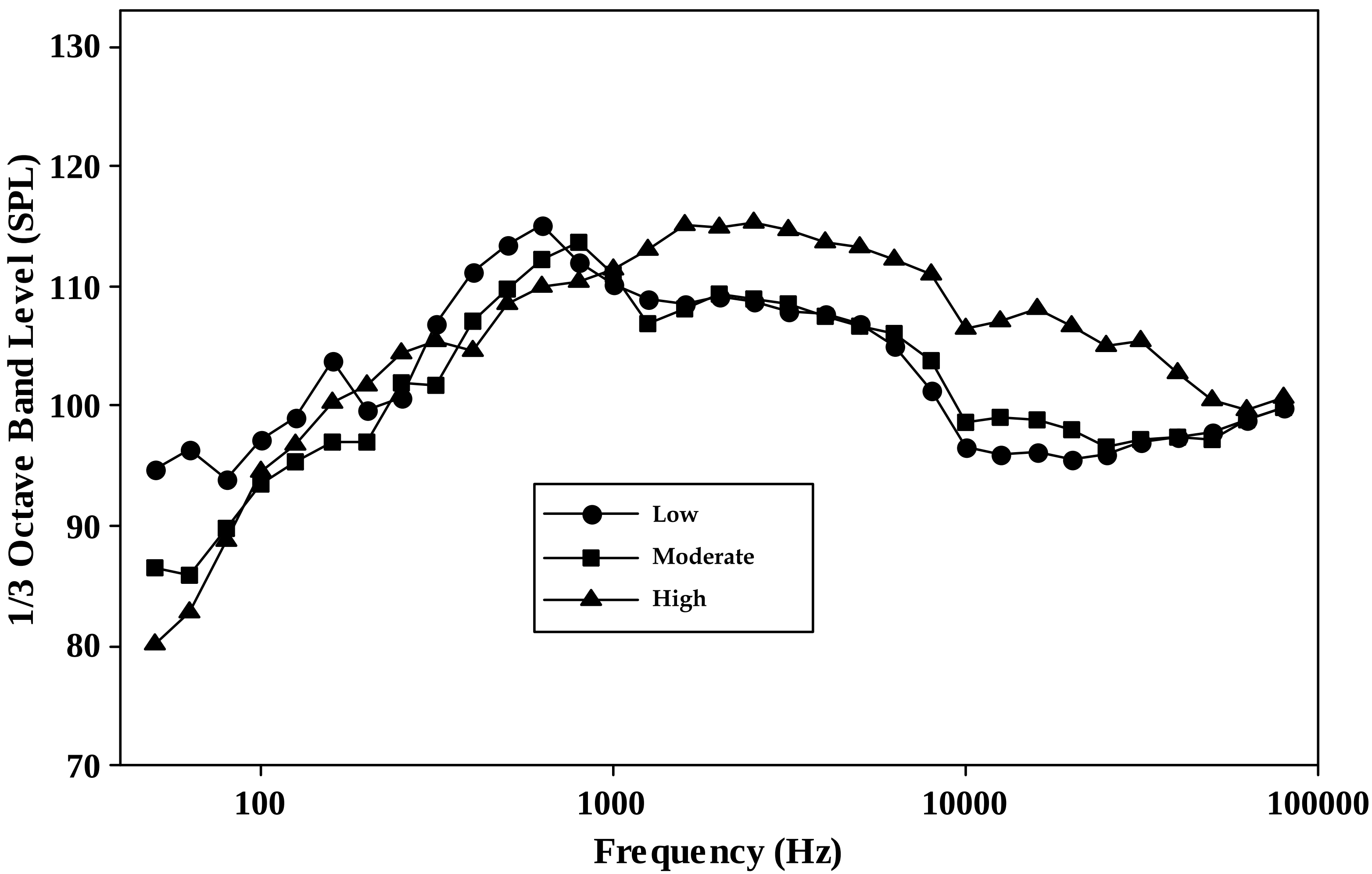


Figure 49. Medians of low, moderate and high activity station medians

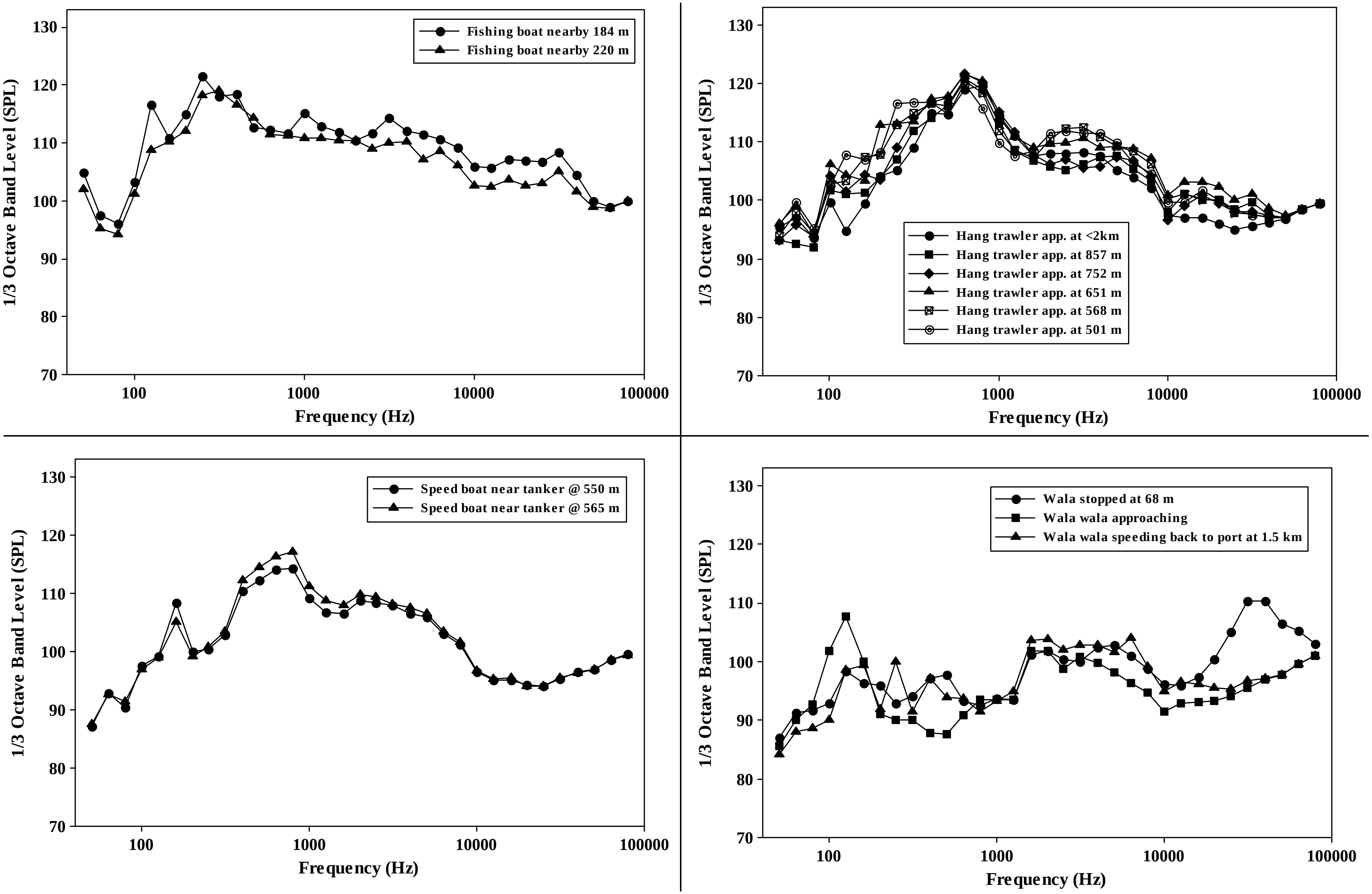


Figure 50. Several examples to illustrate medians of various activities within dolphin habitats

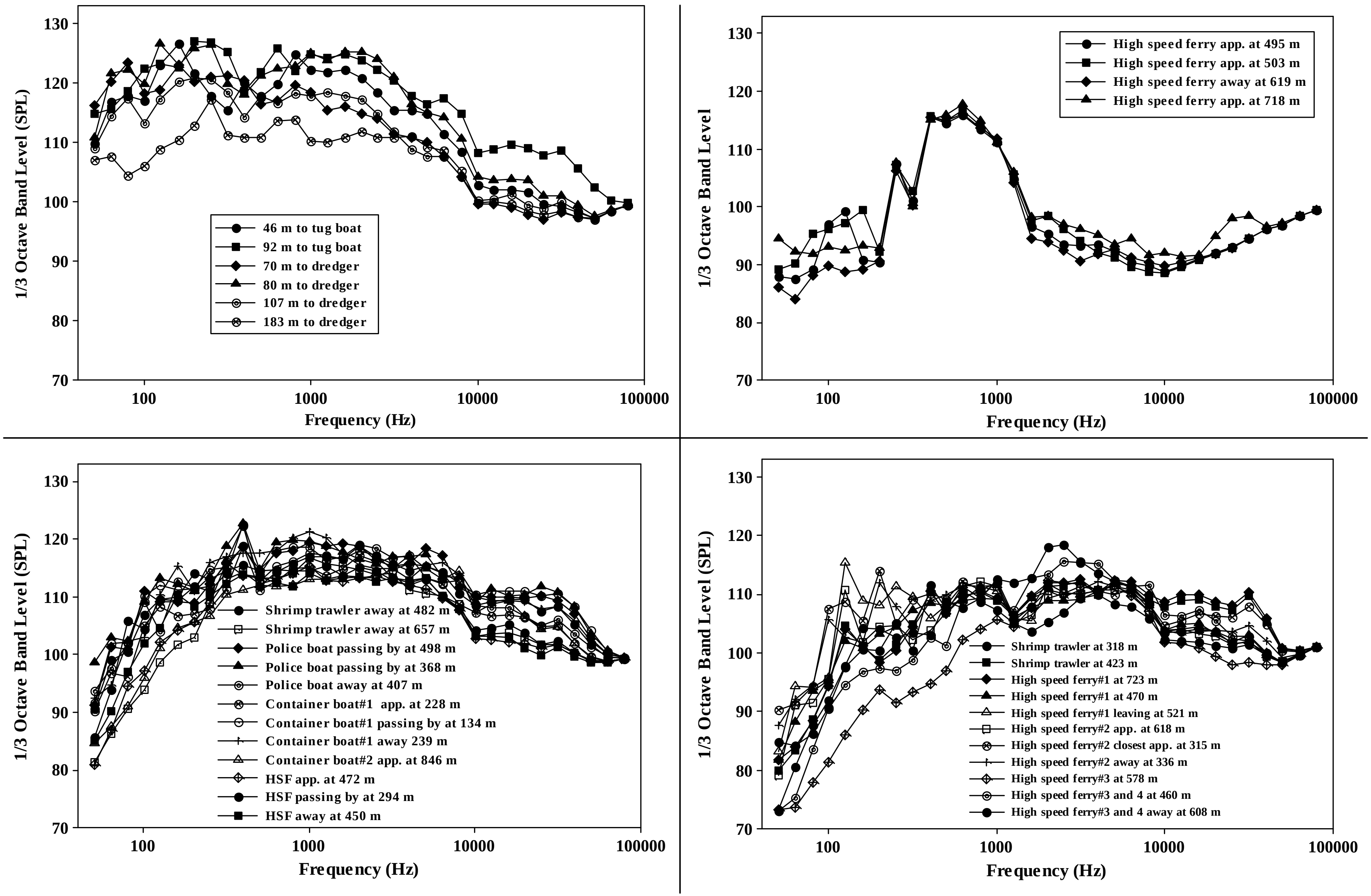


Figure 51. Several examples to illustrate medians of various activities within dolphin habitats

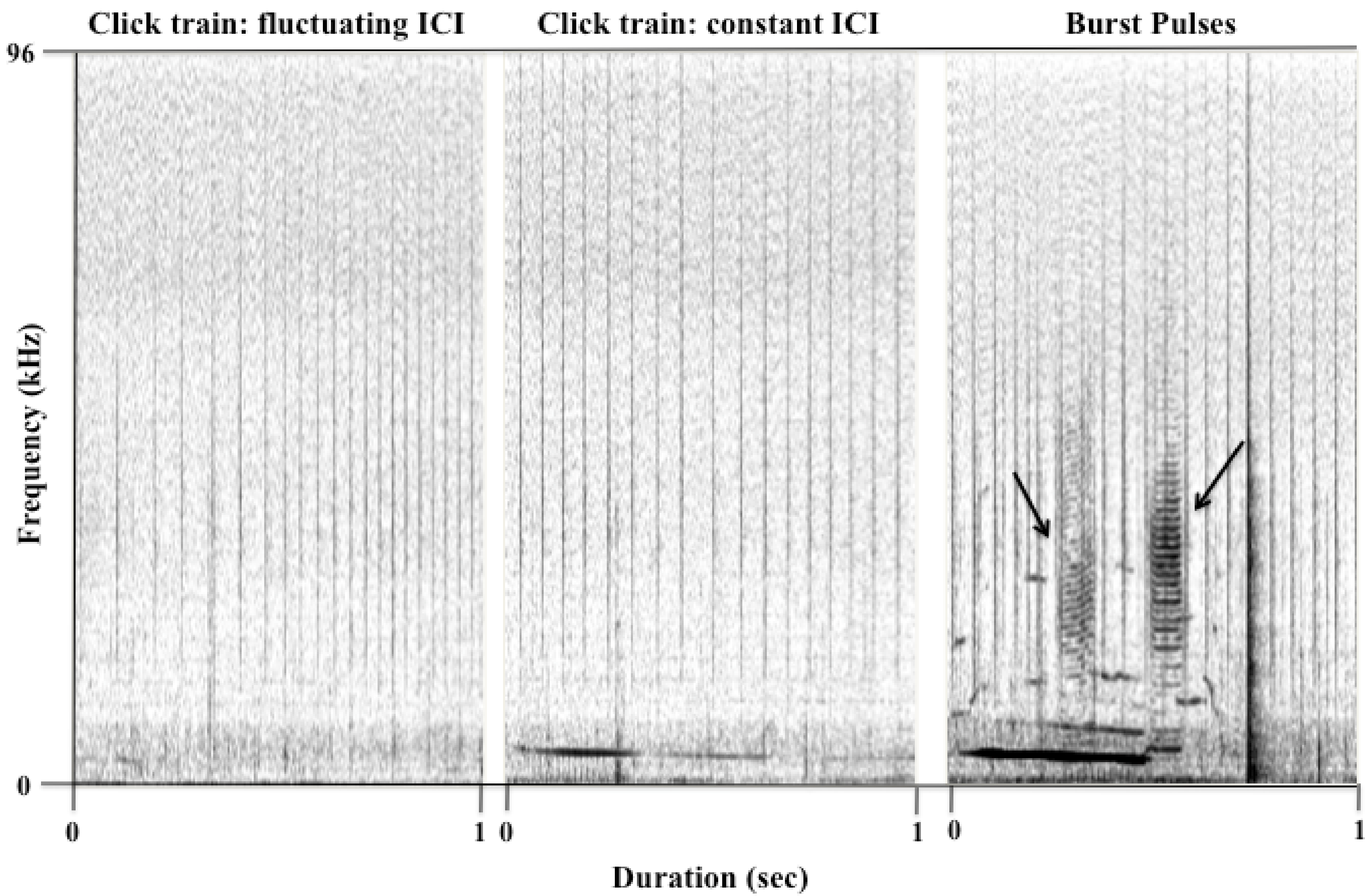


Figure 52. Spectrogram forms of click trains with fluctuating and constant ICIs & two burst pulses on the far right

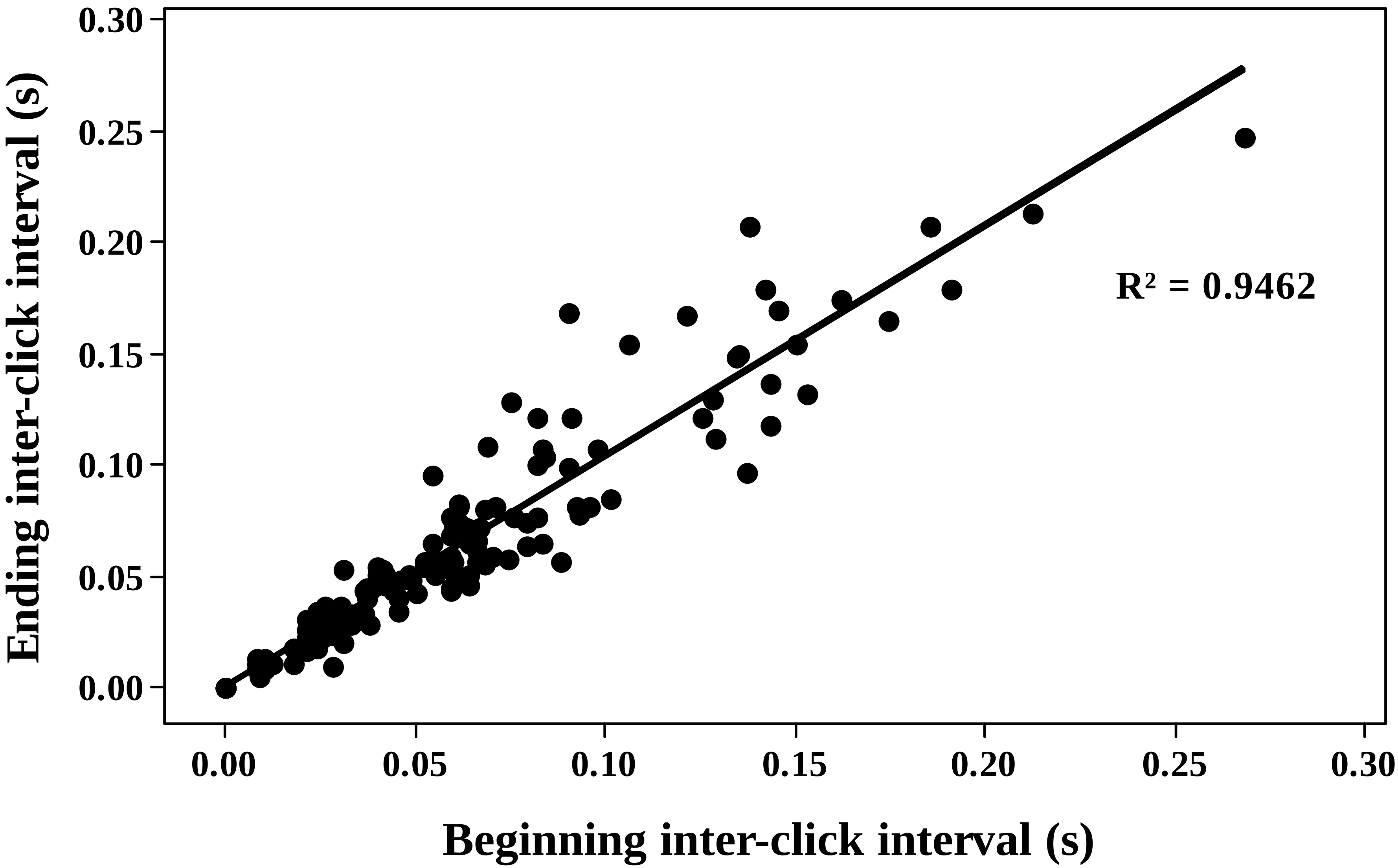


Figure 53. Scatterplot showing beginning ICI vs. ending ICI for click trains with constant ICIs

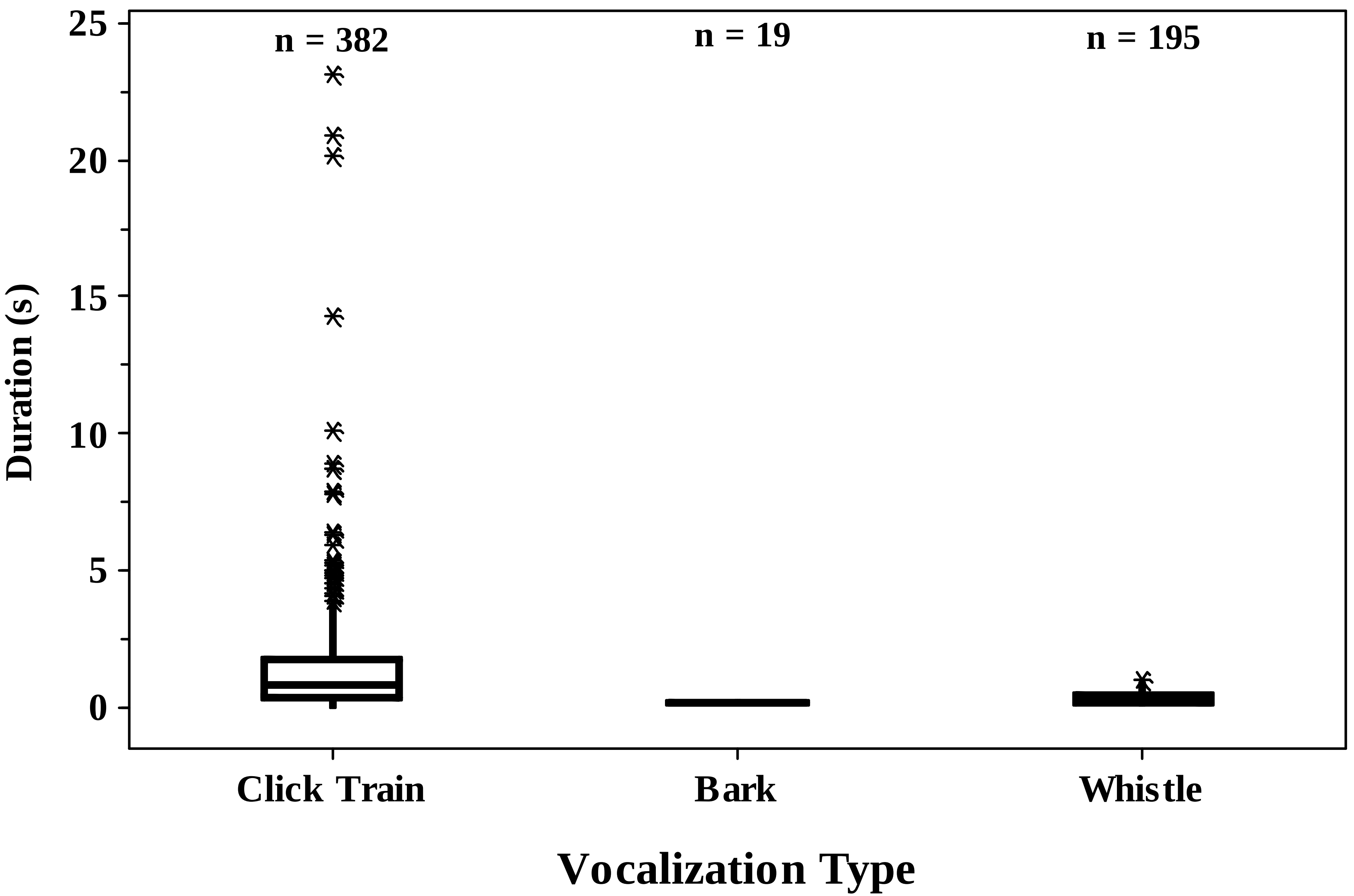


Figure 54. Distribution of duration (s) for each vocalization type

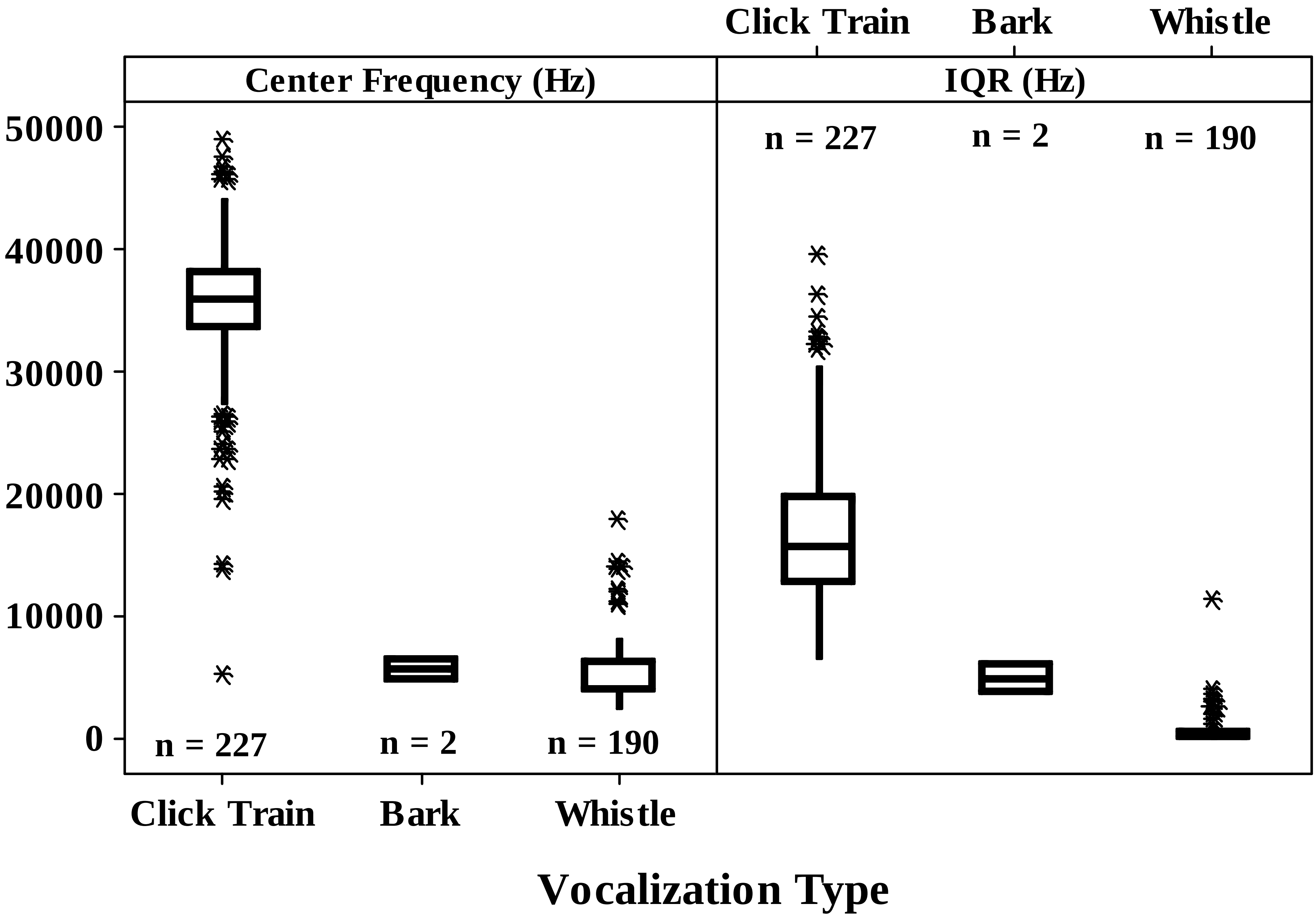


Figure 55. Vocalization distributions for center frequency and interquartile (IQR) range (Hz)

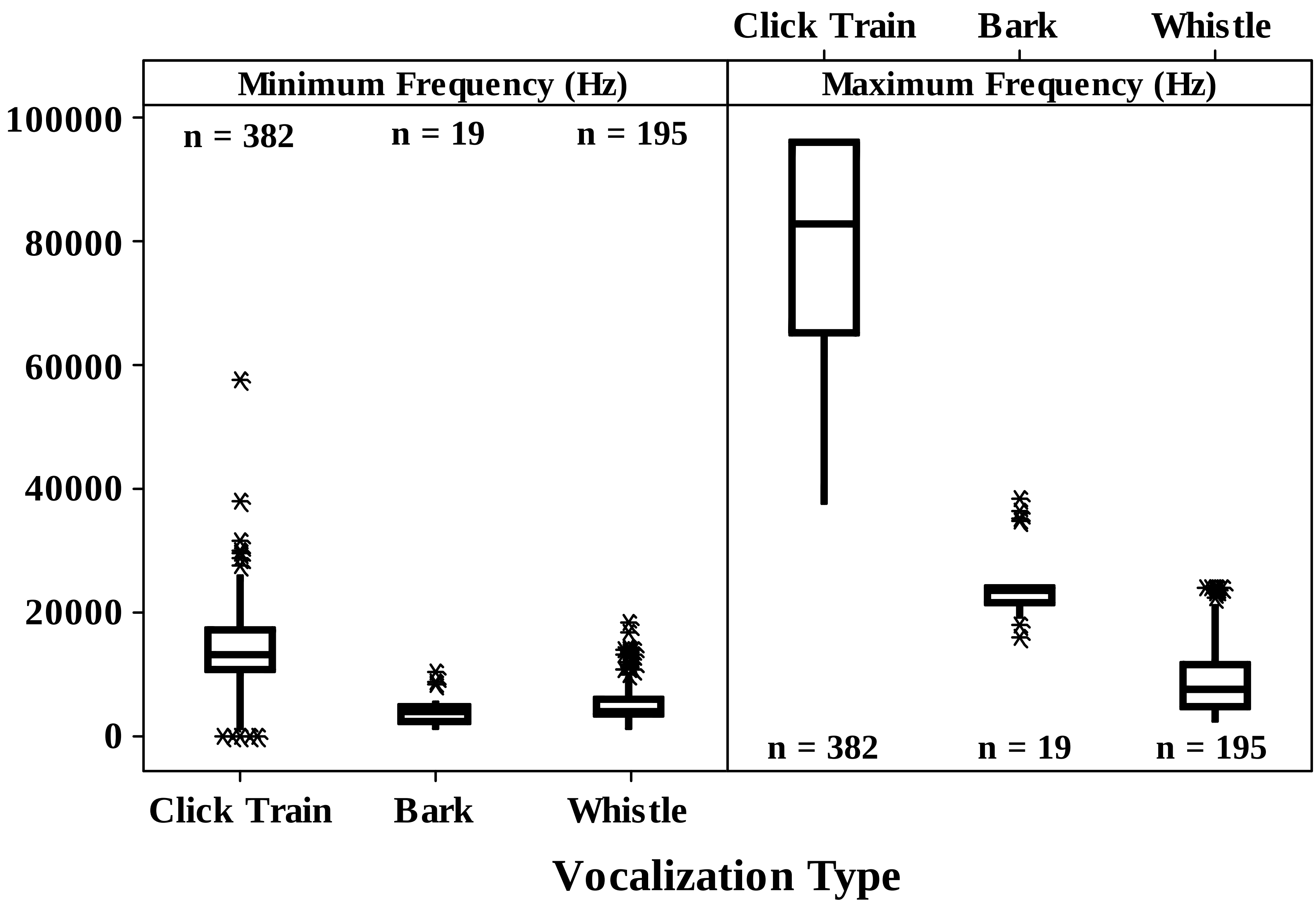


Figure 56. Distributions of vocalizations for minimum and maximum frequencies (Hz)

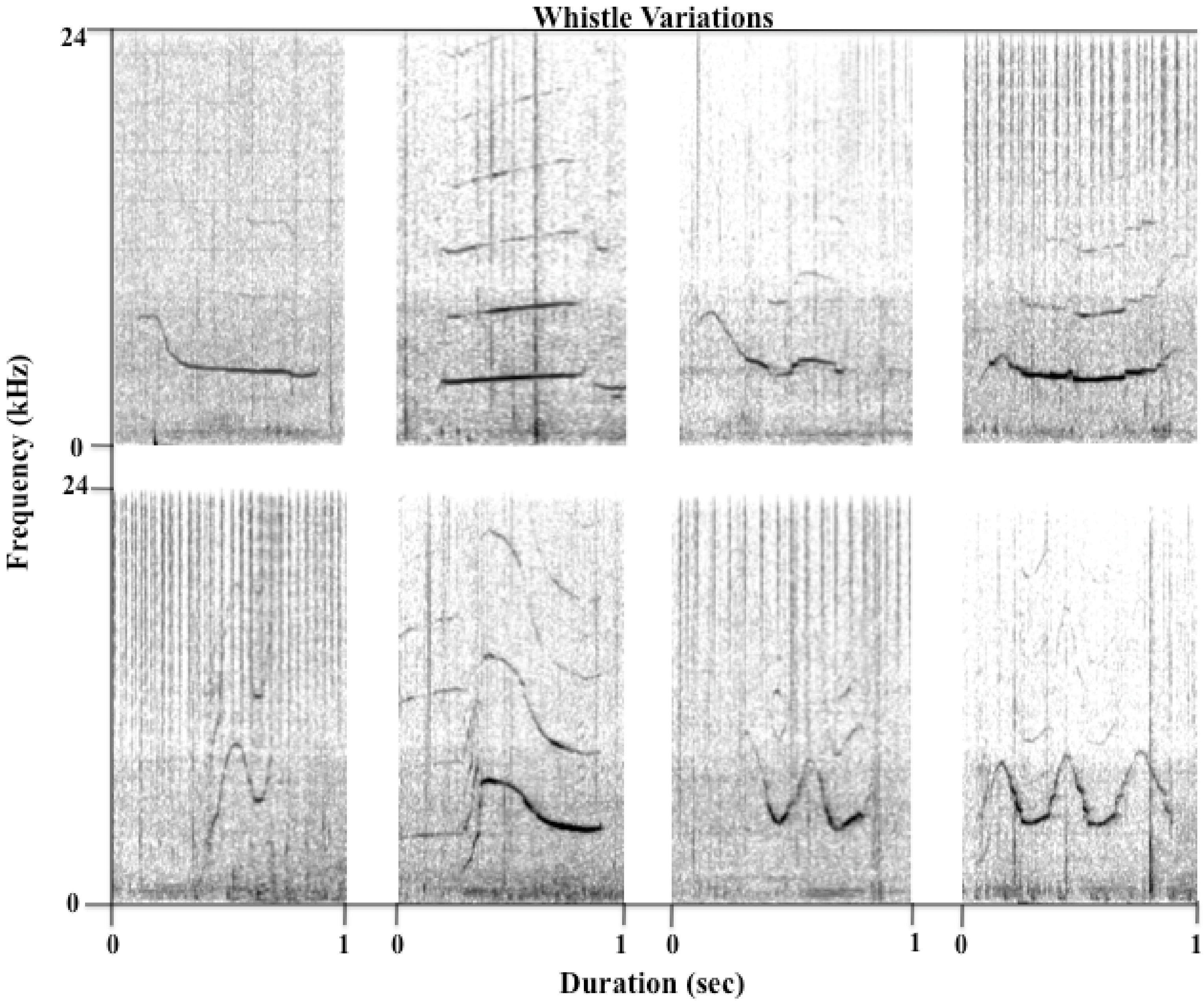


Figure 57. A subset of the variations found in whistle vocalizations

Appendix I. Survey Effort Database (April 2010 - March 2011)
(Note: P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
1-Apr-10	SW LANTAU	1	1.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Apr-10	SW LANTAU	2	28.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Apr-10	SW LANTAU	3	1.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Apr-10	SW LANTAU	2	11.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Apr-10	SW LANTAU	3	2.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Apr-10	SE LANTAU	1	3.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Apr-10	SE LANTAU	2	21.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Apr-10	SE LANTAU	1	2.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Apr-10	SE LANTAU	2	4.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
12-Apr-10	LAMMA	1	27.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
12-Apr-10	LAMMA	2	37.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
12-Apr-10	LAMMA	3	3.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
12-Apr-10	LAMMA	1	9.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
12-Apr-10	LAMMA	2	14.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
12-Apr-10	LAMMA	3	2.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Apr-10	W LANTAU	1	2.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
19-Apr-10	W LANTAU	2	5.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
19-Apr-10	W LANTAU	3	5.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
19-Apr-10	W LANTAU	4	2.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
19-Apr-10	W LANTAU	1	1.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Apr-10	W LANTAU	2	6.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Apr-10	W LANTAU	3	6.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Apr-10	W LANTAU	4	3.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Apr-10	W LANTAU	5	2.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
20-Apr-10	W LANTAU	3	3.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
20-Apr-10	W LANTAU	4	4.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
20-Apr-10	W LANTAU	3	12.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
20-Apr-10	W LANTAU	4	8.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
20-Apr-10	SW LANTAU	2	22.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
20-Apr-10	SW LANTAU	3	2.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
20-Apr-10	SW LANTAU	1	3.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
20-Apr-10	SW LANTAU	2	10.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
20-Apr-10	SW LANTAU	3	0.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
22-Apr-10	NW LANTAU	3	5.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
22-Apr-10	NW LANTAU	4	5.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Apr-10	NW LANTAU	1	8.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Apr-10	NW LANTAU	2	8.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Apr-10	DEEP BAY	1	4.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Apr-10	DEEP BAY	2	1.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Apr-10	DEEP BAY	3	1.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Apr-10	DEEP BAY	4	2.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Apr-10	DEEP BAY	1	3.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Apr-10	DEEP BAY	2	1.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Apr-10	DEEP BAY	3	1.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Apr-10	DEEP BAY	4	0.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Apr-10	DEEP BAY	5	1.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Apr-10	W LANTAU	1	0.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Apr-10	W LANTAU	2	8.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Apr-10	W LANTAU	1	2.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Apr-10	W LANTAU	2	4.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Apr-10	NW LANTAU	1	3.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Apr-10	NW LANTAU	2	10.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Apr-10	NW LANTAU	3	7.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Apr-10	NW LANTAU	1	0.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Apr-10	NW LANTAU	2	9.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
4-May-10	NE LANTAU	1	5.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
4-May-10	NE LANTAU	2	11.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
4-May-10	NE LANTAU	3	6.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
4-May-10	NE LANTAU	2	6.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
4-May-10	NE LANTAU	3	4.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
4-May-10	NW LANTAU	2	1.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
4-May-10	NW LANTAU	3	20.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
4-May-10	NW LANTAU	4	8.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
4-May-10	NW LANTAU	3	4.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
4-May-10	DEEP BAY	3	5.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
4-May-10	DEEP BAY	4	3.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
4-May-10	DEEP BAY	3	3.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
4-May-10	DEEP BAY	4	2.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-10	W LANTAU	2	0.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-10	W LANTAU	3	6.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-10	W LANTAU	1	0.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-10	W LANTAU	2	3.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-10	W LANTAU	3	14.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-10	SW LANTAU	0	0.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-10	SW LANTAU	1	7.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-10	SW LANTAU	2	7.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-10	SW LANTAU	1	7.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-10	SW LANTAU	2	2.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-10	SE LANTAU	0	0.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-10	SE LANTAU	1	1.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-10	SE LANTAU	2	3.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-May-10	W LANTAU	2	1.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-May-10	W LANTAU	3	8.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-May-10	W LANTAU	4	2.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-May-10	W LANTAU	5	3.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-May-10	W LANTAU	2	1.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-May-10	W LANTAU	3	3.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-May-10	W LANTAU	4	8.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-May-10	W LANTAU	5	2.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-May-10	NE LANTAU	2	0.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-May-10	NE LANTAU	3	12.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-May-10	NE LANTAU	4	0.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-May-10	NE LANTAU	3	3.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-May-10	W LANTAU	2	4.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-May-10	W LANTAU	3	3.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-May-10	SW LANTAU	1	10.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-May-10	SW LANTAU	2	11.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-May-10	SW LANTAU	1	2.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-May-10	SW LANTAU	2	5.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-May-10	SE LANTAU	1	13.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-May-10	SE LANTAU	2	10.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-May-10	SE LANTAU	1	2.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-May-10	SE LANTAU	2	6.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
24-May-10	LAMMA	2	5.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
24-May-10	LAMMA	3	30.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
24-May-10	LAMMA	4	20.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
24-May-10	LAMMA	5	11.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
24-May-10	LAMMA	1	2.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
24-May-10	LAMMA	2	3.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
24-May-10	LAMMA	3	11.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
24-May-10	LAMMA	4	5.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
24-May-10	LAMMA	5	3.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	LAMMA	3	1.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
25-May-10	LAMMA	4	6.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	LAMMA	5	0.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	SE LANTAU	3	5.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	SE LANTAU	4	5.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	SE LANTAU	5	2.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	SE LANTAU	3	4.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	SE LANTAU	5	3.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	SW LANTAU	3	1.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	SW LANTAU	4	1.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	SW LANTAU	5	0.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	SW LANTAU	5	0.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	W LANTAU	2	0.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	W LANTAU	3	6.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	W LANTAU	4	3.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	W LANTAU	2	0.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	W LANTAU	3	3.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	W LANTAU	4	3.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	W LANTAU	5	0.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	NW LANTAU	1	0.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	NW LANTAU	2	8.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	NW LANTAU	4	4.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
25-May-10	NW LANTAU	1	0.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
25-May-10	NW LANTAU	3	1.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
26-May-10	NW LANTAU	1	2.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	NW LANTAU	2	6.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	NW LANTAU	3	6.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	DEEP BAY	1	6.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	DEEP BAY	2	5.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	DEEP BAY	3	5.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	DEEP BAY	1	2.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
26-May-10	DEEP BAY	2	9.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
26-May-10	DEEP BAY	3	1.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
26-May-10	NE LANTAU	2	0.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	NE LANTAU	3	21.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	NE LANTAU	4	5.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-10	NE LANTAU	2	3.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
26-May-10	NE LANTAU	3	4.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
4-Jun-10	SE LANTAU	0	0.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Jun-10	SE LANTAU	1	24.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Jun-10	SE LANTAU	0	3.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Jun-10	SE LANTAU	1	5.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Jun-10	SE LANTAU	2	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Jun-10	SW LANTAU	1	17.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Jun-10	SW LANTAU	2	15.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Jun-10	SW LANTAU	1	8.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Jun-10	SW LANTAU	2	4.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Jun-10	W LANTAU	1	11.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
21-Jun-10	PO TOI	2	2.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
21-Jun-10	PO TOI	3	52.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
21-Jun-10	PO TOI	4	3.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
21-Jun-10	PO TOI	2	2.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
21-Jun-10	PO TOI	3	11.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
21-Jun-10	NINEPINS	2	5.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
21-Jun-10	NINEPINS	3	3.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
22-Jun-10	NE LANTAU	1	2.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
22-Jun-10	NE LANTAU	2	8.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
22-Jun-10	NE LANTAU	3	6.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
22-Jun-10	NE LANTAU	1	3.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
22-Jun-10	NE LANTAU	2	3.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
22-Jun-10	NE LANTAU	3	2.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
22-Jun-10	NW LANTAU	1	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
22-Jun-10	NW LANTAU	2	12.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
22-Jun-10	NW LANTAU	3	19.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
22-Jun-10	NW LANTAU	2	4.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
22-Jun-10	NW LANTAU	3	5.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
22-Jun-10	NW LANTAU	4	0.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Jun-10	W LANTAU	2	4.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Jun-10	W LANTAU	3	17.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Jun-10	W LANTAU	1	2.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Jun-10	W LANTAU	2	2.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Jun-10	W LANTAU	3	12.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Jun-10	NE LANTAU	1	9.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Jun-10	NE LANTAU	2	5.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Jun-10	NE LANTAU	1	2.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Jun-10	NE LANTAU	2	2.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-10	NE LANTAU	1	2.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-10	NE LANTAU	2	5.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-10	NE LANTAU	3	13.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-10	NE LANTAU	1	0.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-10	NE LANTAU	2	7.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-10	NE LANTAU	3	2.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-10	NW LANTAU	1	2.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-10	NW LANTAU	2	8.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-10	NW LANTAU	3	6.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-10	NW LANTAU	4	2.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-10	NW LANTAU	2	5.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-10	NW LANTAU	3	2.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-10	NW LANTAU	4	0.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jun-10	NW LANTAU	0	2.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jun-10	NW LANTAU	1	13.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jun-10	NW LANTAU	2	2.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jun-10	NW LANTAU	3	2.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jun-10	NW LANTAU	0	1.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jun-10	NW LANTAU	1	0.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jun-10	NW LANTAU	2	2.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jun-10	NW LANTAU	3	1.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jun-10	W LANTAU	2	2.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jun-10	W LANTAU	3	11.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jun-10	W LANTAU	2	3.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jun-10	W LANTAU	3	14.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jun-10	W LANTAU	4	4.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-10	SE LANTAU	1	2.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-10	SE LANTAU	2	21.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-10	SE LANTAU	3	1.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-10	SE LANTAU	1	2.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-10	SE LANTAU	2	6.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-10	SW LANTAU	1	7.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-10	SW LANTAU	2	5.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-10	SW LANTAU	3	7.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-10	SW LANTAU	1	2.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-10	SW LANTAU	2	6.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-10	SW LANTAU	3	6.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-10	W LANTAU	3	9.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-10	W LANTAU	4	1.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Jul-10	W LANTAU	1	2.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jul-10	W LANTAU	2	6.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jul-10	W LANTAU	3	10.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
13-Jul-10	W LANTAU	1	0.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Jul-10	W LANTAU	2	6.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Jul-10	W LANTAU	3	10.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Jul-10	NW LANTAU	1	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jul-10	NW LANTAU	2	2.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jul-10	NW LANTAU	3	5.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jul-10	NW LANTAU	4	4.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jul-10	NW LANTAU	2	0.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Jul-10	NW LANTAU	3	4.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Jul-10	NW LANTAU	4	0.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
14-Jul-10	PO TOI	1	1.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Jul-10	PO TOI	2	6.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Jul-10	PO TOI	3	41.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Jul-10	PO TOI	4	13.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Jul-10	PO TOI	1	1.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
14-Jul-10	PO TOI	2	4.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
14-Jul-10	PO TOI	3	8.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
14-Jul-10	PO TOI	4	4.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jul-10	SE LANTAU	2	2.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jul-10	SE LANTAU	3	14.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jul-10	SE LANTAU	2	1.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jul-10	SE LANTAU	3	5.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jul-10	SE LANTAU	4	3.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jul-10	SW LANTAU	2	8.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jul-10	SW LANTAU	3	18.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jul-10	SW LANTAU	2	0.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jul-10	SW LANTAU	3	10.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jul-10	W LANTAU	3	10.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jul-10	W LANTAU	4	0.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jul-10	NW LANTAU	2	8.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jul-10	NW LANTAU	3	28.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jul-10	NW LANTAU	2	2.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jul-10	NW LANTAU	3	10.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jul-10	NW LANTAU	4	1.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Jul-10	NE LANTAU	1	1.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jul-10	NE LANTAU	2	14.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jul-10	NE LANTAU	3	1.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Jul-10	NE LANTAU	2	11.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
2-Aug-10	NINEPINS	1	9.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
2-Aug-10	NINEPINS	2	43.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
2-Aug-10	NINEPINS	3	14.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
2-Aug-10	NINEPINS	1	4.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
2-Aug-10	NINEPINS	2	1.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
2-Aug-10	NINEPINS	3	2.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Aug-10	PO TOI	1	9.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-10	PO TOI	2	54.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-10	PO TOI	3	11.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-10	PO TOI	4	1.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-10	PO TOI	1	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Aug-10	PO TOI	2	8.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Aug-10	PO TOI	3	8.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Aug-10	W LANTAU	1	1.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Aug-10	W LANTAU	2	6.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Aug-10	W LANTAU	3	3.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Aug-10	W LANTAU	2	10.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Aug-10	W LANTAU	3	2.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Aug-10	NW LANTAU	2	8.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Aug-10	NW LANTAU	3	2.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Aug-10	NW LANTAU	4	0.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Aug-10	NW LANTAU	2	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Aug-10	NW LANTAU	3	2.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
13-Aug-10	DEEP BAY	2	7.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Aug-10	DEEP BAY	3	9.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Aug-10	DEEP BAY	4	0.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Aug-10	DEEP BAY	2	2.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Aug-10	DEEP BAY	3	8.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Aug-10	NW LANTAU	2	9.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Aug-10	NW LANTAU	3	20.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Aug-10	NW LANTAU	4	1.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Aug-10	NW LANTAU	3	8.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
16-Aug-10	NE LANTAU	0	4.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
16-Aug-10	NE LANTAU	1	29.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
16-Aug-10	NE LANTAU	2	6.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
16-Aug-10	NE LANTAU	0	1.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
16-Aug-10	NE LANTAU	1	7.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
16-Aug-10	NE LANTAU	2	2.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
16-Aug-10	NW LANTAU	2	3.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
16-Aug-10	NW LANTAU	3	3.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
16-Aug-10	NW LANTAU	2	2.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-10	W LANTAU	0	1.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-10	W LANTAU	1	12.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-10	W LANTAU	2	7.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-10	W LANTAU	1	12.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-10	W LANTAU	2	6.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-10	NW LANTAU	1	2.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-10	NW LANTAU	2	12.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-10	NW LANTAU	3	16.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-10	NW LANTAU	2	2.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-10	NW LANTAU	3	4.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Aug-10	W LANTAU	2	9.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-10	W LANTAU	3	11.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-10	W LANTAU	2	4.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Aug-10	W LANTAU	3	14.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Aug-10	W LANTAU	4	0.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Aug-10	NW LANTAU	2	21.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-10	NW LANTAU	3	1.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-10	NW LANTAU	2	2.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Aug-10	NW LANTAU	3	0.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-10	W LANTAU	3	9.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-10	W LANTAU	4	0.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-10	SW LANTAU	2	5.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-10	SW LANTAU	3	15.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-10	SW LANTAU	2	2.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-10	SW LANTAU	3	13.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-10	SE LANTAU	2	4.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-10	SE LANTAU	3	10.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-10	SE LANTAU	4	0.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-10	SE LANTAU	2	5.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
7-Sep-10	PO TOI	2	21.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Sep-10	PO TOI	3	43.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Sep-10	PO TOI	4	7.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Sep-10	PO TOI	5	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Sep-10	PO TOI	2	7.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
7-Sep-10	PO TOI	4	1.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
7-Sep-10	NINEPINS	3	6.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Sep-10	NINEPINS	4	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Sep-10	NINEPINS	0	1.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Sep-10	NINEPINS	1	22.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Sep-10	NINEPINS	2	50.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Sep-10	NINEPINS	3	8.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Sep-10	NINEPINS	1	2.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Sep-10	NINEPINS	2	5.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
14-Sep-10	NE LANTAU	1	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-10	NE LANTAU	2	20.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-10	NE LANTAU	3	10.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-10	NE LANTAU	2	10.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
14-Sep-10	NW LANTAU	2	11.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-10	NW LANTAU	3	9.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-10	NW LANTAU	2	4.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
14-Sep-10	NW LANTAU	3	2.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
17-Sep-10	PO TOI	1	23.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
17-Sep-10	PO TOI	2	7.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
17-Sep-10	PO TOI	3	45.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
17-Sep-10	PO TOI	1	3.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
17-Sep-10	PO TOI	2	10.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
17-Sep-10	PO TOI	3	5.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
12-Oct-10	NE LANTAU	1	0.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
12-Oct-10	NE LANTAU	2	16.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
12-Oct-10	NE LANTAU	3	0.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
12-Oct-10	NE LANTAU	1	2.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
12-Oct-10	NE LANTAU	2	6.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
12-Oct-10	NW LANTAU	1	10.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
12-Oct-10	NW LANTAU	2	20.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
12-Oct-10	NW LANTAU	3	3.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
12-Oct-10	NW LANTAU	1	1.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
12-Oct-10	NW LANTAU	2	9.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
12-Oct-10	NW LANTAU	3	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
13-Oct-10	W LANTAU	1	13.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
13-Oct-10	W LANTAU	2	8.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
13-Oct-10	W LANTAU	1	11.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
13-Oct-10	W LANTAU	2	5.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
13-Oct-10	NW LANTAU	1	3.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
13-Oct-10	NW LANTAU	2	16.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
13-Oct-10	NW LANTAU	2	2.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
13-Oct-10	NW LANTAU	3	2.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
2-Nov-10	NW LANTAU	1	1.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
2-Nov-10	NW LANTAU	2	8.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
2-Nov-10	NW LANTAU	3	15.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
2-Nov-10	NW LANTAU	4	8.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
2-Nov-10	NW LANTAU	1	1.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
2-Nov-10	NW LANTAU	2	4.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
2-Nov-10	NW LANTAU	3	3.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
2-Nov-10	NW LANTAU	4	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
2-Nov-10	NE LANTAU	2	18.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
2-Nov-10	NE LANTAU	3	3.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
2-Nov-10	NE LANTAU	2	4.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
3-Nov-10	W LANTAU	3	8.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
3-Nov-10	W LANTAU	4	2.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
3-Nov-10	SW LANTAU	2	12.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
3-Nov-10	SW LANTAU	3	21.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
3-Nov-10	SW LANTAU	2	4.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
3-Nov-10	SW LANTAU	3	7.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
3-Nov-10	SE LANTAU	2	20.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
3-Nov-10	SE LANTAU	3	4.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
3-Nov-10	SE LANTAU	2	9.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
4-Nov-10	W LANTAU	1	0.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
4-Nov-10	W LANTAU	2	6.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
4-Nov-10	W LANTAU	3	14.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
4-Nov-10	W LANTAU	2	9.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
4-Nov-10	W LANTAU	3	10.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
4-Nov-10	NW LANTAU	1	3.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
4-Nov-10	NW LANTAU	2	8.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
4-Nov-10	DEEP BAY	2	5.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
4-Nov-10	DEEP BAY	3	8.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
4-Nov-10	DEEP BAY	4	0.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
4-Nov-10	DEEP BAY	2	5.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
4-Nov-10	DEEP BAY	3	5.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Nov-10	SE LANTAU	2	10.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Nov-10	SE LANTAU	3	14.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Nov-10	SE LANTAU	1	1.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Nov-10	SE LANTAU	2	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Nov-10	SE LANTAU	3	5.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Nov-10	SW LANTAU	0	0.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Nov-10	SW LANTAU	1	5.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Nov-10	SW LANTAU	2	15.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
8-Nov-10	SW LANTAU	1	2.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Nov-10	SW LANTAU	2	8.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Nov-10	W LANTAU	1	1.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Nov-10	W LANTAU	2	8.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
8-Nov-10	W LANTAU	3	1.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
9-Nov-10	W LANTAU	3	1.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
9-Nov-10	W LANTAU	4	0.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
9-Nov-10	W LANTAU	5	3.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
9-Nov-10	W LANTAU	6	0.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
9-Nov-10	W LANTAU	2	0.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
9-Nov-10	W LANTAU	3	12.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
9-Nov-10	W LANTAU	4	2.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
9-Nov-10	W LANTAU	5	3.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
9-Nov-10	NE LANTAU	0	4.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
9-Nov-10	NE LANTAU	1	13.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
9-Nov-10	NE LANTAU	2	23.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
9-Nov-10	NE LANTAU	1	3.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
9-Nov-10	NE LANTAU	2	7.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-10	NE LANTAU	1	8.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-10	NE LANTAU	2	7.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-10	NE LANTAU	3	2.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-10	NE LANTAU	1	6.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-10	NE LANTAU	2	3.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-10	NE LANTAU	3	0.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-10	NW LANTAU	2	3.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-10	NW LANTAU	3	5.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-10	NW LANTAU	2	1.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-10	NW LANTAU	3	2.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-10	DEEP BAY	2	5.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-10	DEEP BAY	3	7.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-10	DEEP BAY	2	6.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-10	DEEP BAY	3	4.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Nov-10	W LANTAU	3	19.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Nov-10	W LANTAU	4	2.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Nov-10	W LANTAU	3	17.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Nov-10	W LANTAU	4	3.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Nov-10	NE LANTAU	1	1.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Nov-10	NE LANTAU	2	12.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Nov-10	NE LANTAU	3	3.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Nov-10	NE LANTAU	1	2.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Nov-10	NE LANTAU	2	4.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Nov-10	NE LANTAU	3	2.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-10	PO TOI	0	1.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Nov-10	PO TOI	1	5.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Nov-10	PO TOI	2	26.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Nov-10	PO TOI	3	38.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Nov-10	PO TOI	4	2.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Nov-10	PO TOI	1	1.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-10	PO TOI	2	7.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
22-Nov-10	PO TOI	3	7.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-10	PO TOI	4	1.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-10	NW LANTAU	1	3.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-10	NW LANTAU	2	7.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-10	NW LANTAU	3	11.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-10	NW LANTAU	4	8.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-10	NW LANTAU	1	1.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-10	NW LANTAU	2	1.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-10	NW LANTAU	3	3.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-10	NW LANTAU	4	0.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-10	W LANTAU	3	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-10	W LANTAU	4	7.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-10	W LANTAU	5	2.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-10	W LANTAU	4	14.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-10	W LANTAU	5	3.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-10	W LANTAU	6	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Dec-10	W LANTAU	2	3.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Dec-10	W LANTAU	3	6.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Dec-10	SW LANTAU	1	11.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Dec-10	SW LANTAU	2	7.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Dec-10	SW LANTAU	3	5.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Dec-10	SW LANTAU	1	5.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Dec-10	SW LANTAU	2	6.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Dec-10	SW LANTAU	3	1.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Dec-10	SE LANTAU	1	7.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Dec-10	SE LANTAU	2	13.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Dec-10	SE LANTAU	1	7.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Dec-10	SE LANTAU	2	1.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-10	NE LANTAU	1	0.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-10	NE LANTAU	2	12.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-10	NE LANTAU	3	19.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-10	NE LANTAU	4	1.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-10	NE LANTAU	2	4.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-10	NE LANTAU	3	5.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-10	NW LANTAU	2	13.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-10	NW LANTAU	3	15.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-10	NW LANTAU	2	3.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-10	NW LANTAU	3	5.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Dec-10	W LANTAU	1	0.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Dec-10	W LANTAU	2	6.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Dec-10	W LANTAU	3	11.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Dec-10	W LANTAU	4	1.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Dec-10	W LANTAU	1	2.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Dec-10	W LANTAU	2	5.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Dec-10	W LANTAU	3	12.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Dec-10	W LANTAU	4	0.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Dec-10	NW LANTAU	1	1.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Dec-10	NW LANTAU	2	0.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Dec-10	NW LANTAU	3	18.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Dec-10	NW LANTAU	4	4.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Dec-10	NW LANTAU	3	9.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Dec-10	NW LANTAU	4	1.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Dec-10	W LANTAU	2	3.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Dec-10	W LANTAU	3	10.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Dec-10	W LANTAU	4	1.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Dec-10	W LANTAU	2	4.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Dec-10	W LANTAU	3	12.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Dec-10	W LANTAU	4	2.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Dec-10	NE LANTAU	1	14.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Dec-10	NE LANTAU	1	5.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Dec-10	NE LANTAU	2	3.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
20-Dec-10	LAMMA	1	11.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Dec-10	LAMMA	2	43.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Dec-10	LAMMA	3	15.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Dec-10	LAMMA	1	5.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Dec-10	LAMMA	2	8.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Dec-10	LAMMA	3	1.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Dec-10	NW LANTAU	1	1.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Dec-10	NW LANTAU	2	17.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Dec-10	NW LANTAU	3	10.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Dec-10	NW LANTAU	2	9.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Dec-10	NW LANTAU	3	1.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Dec-10	NE LANTAU	1	0.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Dec-10	NE LANTAU	2	24.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Dec-10	NE LANTAU	2	10.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Jan-11	SE LANTAU	2	12.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Jan-11	SE LANTAU	3	23.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Jan-11	SE LANTAU	4	14.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Jan-11	SE LANTAU	2	8.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Jan-11	SE LANTAU	3	3.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Jan-11	SE LANTAU	4	2.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Jan-11	SW LANTAU	2	0.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Jan-11	SW LANTAU	3	10.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Jan-11	SW LANTAU	4	1.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Jan-11	SW LANTAU	3	3.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Jan-11	SW LANTAU	4	0.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Jan-11	LAMMA	1	2.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Jan-11	LAMMA	2	32.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Jan-11	LAMMA	3	12.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Jan-11	LAMMA	4	17.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Jan-11	LAMMA	5	3.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Jan-11	LAMMA	1	0.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Jan-11	LAMMA	2	15.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Jan-11	LAMMA	3	6.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Jan-11	LAMMA	4	4.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Jan-11	W LANTAU	3	19.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jan-11	W LANTAU	4	2.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jan-11	W LANTAU	3	20.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Jan-11	NE LANTAU	2	18.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jan-11	NE LANTAU	3	10.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Jan-11	NE LANTAU	2	9.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Jan-11	W LANTAU	2	0.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
17-Jan-11	W LANTAU	3	11.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
17-Jan-11	W LANTAU	4	9.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
17-Jan-11	W LANTAU	2	2.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Jan-11	W LANTAU	3	9.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Jan-11	W LANTAU	4	7.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Jan-11	NW LANTAU	2	9.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
17-Jan-11	NW LANTAU	3	18.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
17-Jan-11	NW LANTAU	2	6.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Jan-11	NW LANTAU	3	1.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-11	W LANTAU	2	10.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-11	SW LANTAU	1	0.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-11	SW LANTAU	2	28.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-11	SW LANTAU	3	2.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-11	SW LANTAU	4	5.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-11	SW LANTAU	5	1.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-11	SW LANTAU	2	9.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-11	SW LANTAU	3	1.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-11	SW LANTAU	4	0.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-11	SW LANTAU	5	2.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-11	SE LANTAU	2	2.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
18-Jan-11	SE LANTAU	3	3.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-11	SE LANTAU	2	1.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-11	SE LANTAU	3	4.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jan-11	NE LANTAU	1	1.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jan-11	NE LANTAU	2	11.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jan-11	NE LANTAU	3	7.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jan-11	NE LANTAU	1	1.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jan-11	NE LANTAU	2	7.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jan-11	NE LANTAU	3	2.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jan-11	NW LANTAU	2	3.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jan-11	NW LANTAU	3	7.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jan-11	NW LANTAU	2	4.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jan-11	NW LANTAU	3	3.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jan-11	DEEP BAY	2	16.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jan-11	DEEP BAY	3	1.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jan-11	DEEP BAY	2	8.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jan-11	DEEP BAY	3	2.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jan-11	W LANTAU	4	2.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jan-11	W LANTAU	5	8.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jan-11	SW LANTAU	2	5.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jan-11	SW LANTAU	3	17.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jan-11	SW LANTAU	4	2.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jan-11	SW LANTAU	2	7.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jan-11	SW LANTAU	3	2.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jan-11	SW LANTAU	4	2.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jan-11	SE LANTAU	2	2.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jan-11	SE LANTAU	3	13.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jan-11	SE LANTAU	2	1.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jan-11	SE LANTAU	3	7.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-11	NW LANTAU	3	31.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Jan-11	NW LANTAU	4	6.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Jan-11	NW LANTAU	2	0.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-11	NW LANTAU	3	11.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-11	NE LANTAU	2	8.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Jan-11	NE LANTAU	3	17.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Jan-11	NE LANTAU	2	3.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-11	NE LANTAU	3	3.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Feb-11	NE LANTAU	2	9.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Feb-11	NE LANTAU	3	5.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Feb-11	NE LANTAU	4	2.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Feb-11	NE LANTAU	2	5.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Feb-11	NE LANTAU	3	3.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Feb-11	W LANTAU	1	2.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Feb-11	W LANTAU	2	5.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Feb-11	W LANTAU	3	8.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Feb-11	W LANTAU	4	5.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Feb-11	W LANTAU	1	0.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Feb-11	W LANTAU	2	6.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Feb-11	W LANTAU	3	6.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Feb-11	W LANTAU	4	5.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Feb-11	W LANTAU	5	0.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Feb-11	W LANTAU	1	8.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Feb-11	W LANTAU	2	10.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Feb-11	W LANTAU	3	0.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Feb-11	W LANTAU	1	9.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Feb-11	W LANTAU	2	6.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Feb-11	W LANTAU	3	2.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Feb-11	NW LANTAU	1	7.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Feb-11	NW LANTAU	2	10.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Feb-11	NW LANTAU	1	4.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-11	SE LANTAU	2	4.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
1-Mar-11	SE LANTAU	3	20.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Mar-11	SE LANTAU	4	1.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Mar-11	SE LANTAU	2	2.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-11	SE LANTAU	3	4.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-11	SW LANTAU	2	13.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Mar-11	SW LANTAU	3	5.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Mar-11	SW LANTAU	2	10.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-11	SW LANTAU	3	3.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-11	W LANTAU	1	5.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-11	W LANTAU	2	4.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-11	W LANTAU	3	1.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
8-Mar-11	NE LANTAU	2	22.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
8-Mar-11	NE LANTAU	2	9.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
8-Mar-11	NW LANTAU	2	7.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
8-Mar-11	NW LANTAU	1	2.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
8-Mar-11	NW LANTAU	2	2.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
8-Mar-11	DEEP BAY	1	5.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
8-Mar-11	DEEP BAY	2	8.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
8-Mar-11	DEEP BAY	1	7.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
8-Mar-11	DEEP BAY	2	3.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
10-Mar-11	NW LANTAU	1	2.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
10-Mar-11	NW LANTAU	2	9.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
10-Mar-11	NW LANTAU	3	16.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
10-Mar-11	NW LANTAU	4	1.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
10-Mar-11	NW LANTAU	2	3.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
10-Mar-11	NW LANTAU	3	5.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
10-Mar-11	NW LANTAU	4	1.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
10-Mar-11	W LANTAU	2	0.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
10-Mar-11	W LANTAU	3	13.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
10-Mar-11	W LANTAU	4	0.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
10-Mar-11	W LANTAU	2	2.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
10-Mar-11	W LANTAU	3	16.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
10-Mar-11	W LANTAU	4	1.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
15-Mar-11	LAMMA	2	16.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
15-Mar-11	LAMMA	3	26.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
15-Mar-11	LAMMA	4	18.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
15-Mar-11	LAMMA	2	8.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
15-Mar-11	LAMMA	3	8.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
15-Mar-11	LAMMA	4	5.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
15-Mar-11	LAMMA	5	1.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
21-Mar-11	LAMMA	1	8.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
21-Mar-11	LAMMA	2	45.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
21-Mar-11	LAMMA	3	15.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
21-Mar-11	LAMMA	1	2.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
21-Mar-11	LAMMA	2	21.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
21-Mar-11	LAMMA	3	1.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
22-Mar-11	SE LANTAU	1	4.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
22-Mar-11	SE LANTAU	2	4.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
22-Mar-11	SE LANTAU	3	8.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
22-Mar-11	SE LANTAU	4	7.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
22-Mar-11	SE LANTAU	2	5.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
22-Mar-11	SE LANTAU	3	1.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
22-Mar-11	SE LANTAU	4	1.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
22-Mar-11	SW LANTAU	3	5.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
22-Mar-11	SW LANTAU	4	16.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
22-Mar-11	SW LANTAU	5	2.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
22-Mar-11	SW LANTAU	3	2.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
22-Mar-11	SW LANTAU	4	5.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
22-Mar-11	SW LANTAU	5	3.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
23-Mar-11	NW LANTAU	2	11.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
23-Mar-11	NW LANTAU	3	10.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
23-Mar-11	NW LANTAU	4	4.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
23-Mar-11	NW LANTAU	2	4.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
23-Mar-11	NW LANTAU	3	2.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
23-Mar-11	NE LANTAU	1	7.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
23-Mar-11	NE LANTAU	2	10.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
23-Mar-11	NE LANTAU	1	6.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
23-Mar-11	NE LANTAU	2	2.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix II. Chinese White Dolphin Sighting Database (April 2010 - March 2011)

(Note: P = sightings made on primary lines; S = sightings made on secondary line

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
19-Apr-10	1	1057	7	W LANTAU	1	1197	ON	HKCRP	815472	803425	SPRING	NONE	OPERATIONAL	P
19-Apr-10	2	1118	8	W LANTAU	1	427	ON	HKCRP	815473	802858	SPRING	NONE	OPERATIONAL	P
19-Apr-10	3	1253	6	W LANTAU	3	226	ON	HKCRP	810714	801631	SPRING	NONE	OPERATIONAL	S
19-Apr-10	4	1420	11	W LANTAU	4	ND	OFF	HKCRP	805913	799722	SPRING	PAIR	OPERATIONAL	
22-Apr-10	1	1157	1	NW LANTAU	3	130	ON	HKCRP	827317	805355	SPRING	NONE	OPERATIONAL	P
30-Apr-10	1	1048	6	W LANTAU	2	396	ON	HKCRP	813582	801823	SPRING	HANG	OPERATIONAL	P
30-Apr-10	2	1154	25	W LANTAU	2	827	ON	HKCRP	809444	800349	SPRING	PAIR	OPERATIONAL	P
30-Apr-10	3	1249	3	W LANTAU	3	ND	OFF	HKCRP	814170	801505	SPRING	HANG	OPERATIONAL	
30-Apr-10	4	1638	1	NW LANTAU	2	11	ON	HKCRP	819797	806010	SPRING	NONE	OPERATIONAL	S
4-May-10	1	1313	5	NW LANTAU	3	138	ON	HKCRP	824873	809553	SPRING	NONE	OPERATIONAL	S
4-May-10	2	1425	2	NW LANTAU	3	143	ON	HKCRP	826582	807414	SPRING	NONE	OPERATIONAL	P
5-May-10	4	1553	1	W LANTAU	3	ND	OFF	HKCRP	808656	800925	SPRING	NONE	OPERATIONAL	
17-May-10	1	1029	1	W LANTAU	2	120	ON	HKCRP	815516	803806	SPRING	NONE	OPERATIONAL	P
17-May-10	2	1047	2	W LANTAU	2	ND	OFF	HKCRP	815449	803796	SPRING	NONE	OPERATIONAL	
17-May-10	3	1055	2	W LANTAU	2	ND	OFF	HKCRP	815461	803249	SPRING	NONE	OPERATIONAL	
17-May-10	4	1101	2	W LANTAU	2	353	ON	HKCRP	815285	802785	SPRING	NONE	OPERATIONAL	S
17-May-10	5	1107	1	W LANTAU	3	ND	OFF	HKCRP	814421	803031	SPRING	NONE	OPERATIONAL	
17-May-10	6	1111	10	W LANTAU	3	68	ON	HKCRP	813944	803164	SPRING	NONE	OPERATIONAL	P
17-May-10	7	1131	2	W LANTAU	2	23	ON	HKCRP	813625	802586	SPRING	NONE	OPERATIONAL	P
17-May-10	8	1150	8	W LANTAU	3	544	ON	HKCRP	811402	801024	SPRING	NONE	OPERATIONAL	P
17-May-10	9	1213	2	W LANTAU	4	283	ON	HKCRP	809321	800834	SPRING	NONE	OPERATIONAL	P
17-May-10	10	1317	6	W LANTAU	3	57	ON	HKCRP	810394	801445	SPRING	NONE	OPERATIONAL	S
17-May-10	11	1336	1	W LANTAU	4	840	ON	HKCRP	812151	802820	SPRING	NONE	OPERATIONAL	S
17-May-10	12	1342	1	W LANTAU	4	91	ON	HKCRP	812419	801892	SPRING	NONE	OPERATIONAL	P
17-May-10	13	1413	10	W LANTAU	2	ND	OFF	HKCRP	814950	804361	SPRING	NONE	OPERATIONAL	
18-May-10	1	1004	10	W LANTAU	3	51	ON	HKCRP	815335	805280	SPRING	NONE	OPERATIONAL	S
18-May-10	2	1030	12	W LANTAU	2	166	ON	HKCRP	814639	804515	SPRING	NONE	OPERATIONAL	S
18-May-10	3	1057	5	W LANTAU	3	100	ON	HKCRP	811611	801736	SPRING	NONE	OPERATIONAL	S
18-May-10	4	1103	3	W LANTAU	3	90	ON	HKCRP	810482	801331	SPRING	NONE	OPERATIONAL	S
18-May-10	5	1122	1	W LANTAU	2	33	ON	HKCRP	806661	801745	SPRING	NONE	OPERATIONAL	S
18-May-10	6	1132	2	SW LANTAU	1	ND	OFF	HKCRP	806349	802797	SPRING	NONE	OPERATIONAL	
18-May-10	7	1210	1	SW LANTAU	2	79	ON	HKCRP	803641	805307	SPRING	NONE	OPERATIONAL	P
19-May-10	2	1040	8	NE LANTAU	1	ND	OFF	HELI	820731	817355	SPRING	NONE	OPERATIONAL	

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
25-May-10	1	1340	3	SW LANTAU	3	ND	OFF	HKCRP	806294	802704	SPRING	NONE	OPERATIONAL	
25-May-10	2	1500	1	W LANTAU	3	1016	ON	HKCRP	811886	802448	SPRING	NONE	OPERATIONAL	S
25-May-10	3	1509	3	W LANTAU	3	22	ON	HKCRP	812431	801346	SPRING	NONE	OPERATIONAL	P
25-May-10	4	1520	11	W LANTAU	3	64	ON	HKCRP	812941	801059	SPRING	NONE	OPERATIONAL	S
26-May-10	1	1027	2	NW LANTAU	3	753	ON	HKCRP	818769	804658	SPRING	NONE	OPERATIONAL	P
26-May-10	2	1042	1	NW LANTAU	2	ND	OFF	HKCRP	821638	804633	SPRING	HANG	OPERATIONAL	P
26-May-10	3	1416	3	NW LANTAU	2	ND	OFF	HKCRP	828731	807078	SPRING	NONE	OPERATIONAL	
26-May-10	4	1717	3	NE LANTAU	2	45	ON	HKCRP	821271	819097	SPRING	NONE	OPERATIONAL	S
26-May-10	5	1730	1	NE LANTAU	2	583	ON	HKCRP	821691	819736	SPRING	NONE	OPERATIONAL	S
26-May-10	6	1737	3	NE LANTAU	3	ND	OFF	HKCRP	822587	820860	SPRING	NONE	OPERATIONAL	
4-Jun-10	9	1626	1	SW LANTAU	1	10	ON	HKCRP	806206	802384	SUMMER	NONE	OPERATIONAL	P
22-Jun-10	1	1158	4	NE LANTAU	3	16	ON	HKCRP	822858	816420	SUMMER	NONE	OPERATIONAL	P
22-Jun-10	2	1603	6	NW LANTAU	2	ND	OFF	HKCRP	826067	804663	SUMMER	NONE	OPERATIONAL	
23-Jun-10	1	1014	1	W LANTAU	2	ND	OFF	HKCRP	817829	804038	SUMMER	NONE	OPERATIONAL	
23-Jun-10	2	1110	2	W LANTAU	3	ND	OFF	HKCRP	813482	802019	SUMMER	NONE	OPERATIONAL	
23-Jun-10	3	1141	1	W LANTAU	3	87	ON	HKCRP	809685	801257	SUMMER	NONE	OPERATIONAL	S
23-Jun-10	4	1216	2	W LANTAU	3	ND	OFF	HKCRP	806495	801632	SUMMER	NONE	OPERATIONAL	
29-Jun-10	1	1123	1	NE LANTAU	3	48	ON	HKCRP	822480	817378	SUMMER	NONE	OPERATIONAL	P
29-Jun-10	2	1453	6	NW LANTAU	1	63	ON	HKCRP	824655	807420	SUMMER	NONE	OPERATIONAL	P
29-Jun-10	3	1520	5	NW LANTAU	2	237	ON	HKCRP	826726	807435	SUMMER	NONE	OPERATIONAL	P
29-Jun-10	4	1558	5	NW LANTAU	3	124	ON	HKCRP	829284	807367	SUMMER	NONE	OPERATIONAL	P
29-Jun-10	5	1631	8	NW LANTAU	2	254	ON	HKCRP	828768	805369	SUMMER	NONE	OPERATIONAL	P
29-Jun-10	6	1645	1	NW LANTAU	3	ND	OFF	HKCRP	827250	805695	SUMMER	NONE	OPERATIONAL	
29-Jun-10	7	1655	2	NW LANTAU	3	ND	OFF	HKCRP	826473	806487	SUMMER	NONE	OPERATIONAL	
30-Jun-10	1	1000	1	NW LANTAU	1	410	ON	HKCRP	823020	811527	SUMMER	NONE	OPERATIONAL	P
30-Jun-10	2	1009	1	NW LANTAU	3	994	ON	HKCRP	824527	811159	SUMMER	NONE	OPERATIONAL	S
30-Jun-10	3	1014	3	NW LANTAU	2	449	ON	HKCRP	824794	810336	SUMMER	NONE	OPERATIONAL	S
30-Jun-10	4	1022	8	NW LANTAU	1	158	ON	HKCRP	824629	809470	SUMMER	NONE	OPERATIONAL	P
30-Jun-10	5	1116	1	NW LANTAU	1	432	ON	HKCRP	824622	807420	SUMMER	NONE	OPERATIONAL	P
30-Jun-10	6	1121	12	NW LANTAU	1	155	ON	HKCRP	825275	807422	SUMMER	NONE	OPERATIONAL	P
30-Jun-10	7	1155	7	NW LANTAU	2	758	ON	HKCRP	828831	806924	SUMMER	NONE	OPERATIONAL	S
30-Jun-10	8	1210	2	NW LANTAU	2	287	ON	HKCRP	828523	805965	SUMMER	NONE	OPERATIONAL	S
30-Jun-10	9	1218	1	NW LANTAU	2	243	ON	HKCRP	827993	805377	SUMMER	NONE	OPERATIONAL	P
30-Jun-10	10	1228	9	NW LANTAU	1	230	ON	HKCRP	826819	805293	SUMMER	NONE	OPERATIONAL	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
30-Jun-10	11	1243	1	NW LANTAU	1	146	ON	HKCRP	825789	805363	SUMMER	NONE	OPERATIONAL	P
30-Jun-10	12	1248	1	NW LANTAU	1	ND	OFF	HKCRP	824936	805351	SUMMER	NONE	OPERATIONAL	
30-Jun-10	13	1255	7	NW LANTAU	1	422	ON	HKCRP	823463	805358	SUMMER	NONE	OPERATIONAL	P
30-Jun-10	14	1354	1	W LANTAU	3	1413	ON	HKCRP	815184	803414	SUMMER	NONE	OPERATIONAL	P
30-Jun-10	15	1401	2	W LANTAU	3	331	ON	HKCRP	814288	803072	SUMMER	OTHER	OPERATIONAL	S
30-Jun-10	16	1527	1	W LANTAU	2	520	ON	HKCRP	806045	800156	SUMMER	NONE	OPERATIONAL	S
30-Jun-10	17	1632	3	W LANTAU	3	248	ON	HKCRP	812418	802428	SUMMER	OTHER	OPERATIONAL	S
12-Jul-10	1	1411	4	SW LANTAU	1	58	ON	HKCRP	803945	808660	SUMMER	NONE	OPERATIONAL	P
12-Jul-10	2	1427	2	SW LANTAU	3	ND	OFF	HKCRP	805817	808509	SUMMER	NONE	OPERATIONAL	
12-Jul-10	3	1616	1	W LANTAU	3	46	ON	HKCRP	807082	801623	SUMMER	NONE	OPERATIONAL	S
12-Jul-10	4	1653	1	W LANTAU	3	172	ON	HKCRP	812916	802595	SUMMER	NONE	OPERATIONAL	S
13-Jul-10	1	1008	2	NW LANTAU	1	ND	OFF	HKCRP	817059	807313	SUMMER	NONE	OPERATIONAL	
13-Jul-10	2	1042	10	W LANTAU	1	86	ON	HKCRP	817465	803790	SUMMER	NONE	OPERATIONAL	P
13-Jul-10	3	1108	4	W LANTAU	2	108	ON	HKCRP	815296	802826	SUMMER	NONE	OPERATIONAL	P
13-Jul-10	4	1128	3	W LANTAU	2	89	ON	HKCRP	813602	802730	SUMMER	NONE	OPERATIONAL	P
13-Jul-10	5	1140	3	W LANTAU	3	57	ON	HKCRP	812554	800934	SUMMER	NONE	OPERATIONAL	S
13-Jul-10	6	1155	9	W LANTAU	3	188	ON	HKCRP	811379	801581	SUMMER	NONE	OPERATIONAL	P
13-Jul-10	7	1241	1	W LANTAU	2	50	ON	HKCRP	806694	801704	SUMMER	NONE	OPERATIONAL	S
13-Jul-10	8	1332	2	W LANTAU	3	10	ON	HKCRP	808348	800089	SUMMER	NONE	OPERATIONAL	P
13-Jul-10	9	1404	2	W LANTAU	3	67	ON	HKCRP	810506	800837	SUMMER	NONE	OPERATIONAL	P
29-Jul-10	1	1436	1	SW LANTAU	3	87	ON	HKCRP	807561	805573	SUMMER	NONE	OPERATIONAL	S
29-Jul-10	2	1542	1	SW LANTAU	2	32	ON	HKCRP	806392	803240	SUMMER	NONE	OPERATIONAL	S
29-Jul-10	3	1554	2	SW LANTAU	2	ND	OFF	HKCRP	806228	802240	SUMMER	NONE	OPERATIONAL	
30-Jul-10	1	1123	3	NW LANTAU	3	889	ON	HKCRP	828378	806387	SUMMER	NONE	OPERATIONAL	P
30-Jul-10	2	1156	1	NW LANTAU	2	238	ON	HKCRP	826806	806405	SUMMER	NONE	OPERATIONAL	P
30-Jul-10	3	1308	1	NW LANTAU	3	199	ON	HKCRP	826857	808444	SUMMER	NONE	OPERATIONAL	P
30-Jul-10	4	1349	3	NW LANTAU	3	80	ON	HKCRP	824461	810551	SUMMER	NONE	OPERATIONAL	P
30-Jul-10	5	1553	1	NE LANTAU	3	ND	OFF	HKCRP	821008	816624	SUMMER	NONE	OPERATIONAL	
30-Jul-10	6	1651	1	NE LANTAU	1	210	ON	HKCRP	822765	820458	SUMMER	NONE	OPERATIONAL	P
12-Aug-10	1	1031	2	W LANTAU	1	ND	OFF	HKCRP	816020	806178	SUMMER	NONE	OPERATIONAL	
12-Aug-10	2	1125	4	W LANTAU	2	26	ON	HKCRP	811366	802220	SUMMER	NONE	OPERATIONAL	S
12-Aug-10	3	1140	5	W LANTAU	2	557	ON	HKCRP	811068	802013	SUMMER	NONE	OPERATIONAL	S
12-Aug-10	4	1200	1	W LANTAU	3	450	ON	HKCRP	809667	799649	SUMMER	NONE	OPERATIONAL	S
12-Aug-10	5	1217	1	W LANTAU	2	ND	OFF	HKCRP	809021	801070	SUMMER	NONE	OPERATIONAL	

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
12-Aug-10	6	1223	4	W LANTAU	3	293	ON	HKCRP	809454	800597	SUMMER	NONE	OPERATIONAL	P
12-Aug-10	7	1235	2	W LANTAU	2	91	ON	HKCRP	809988	799722	SUMMER	NONE	OPERATIONAL	S
12-Aug-10	8	1241	2	W LANTAU	3	403	ON	HKCRP	810685	799940	SUMMER	NONE	OPERATIONAL	S
12-Aug-10	9	1255	4	W LANTAU	3	20	ON	HKCRP	811478	801736	SUMMER	NONE	OPERATIONAL	P
12-Aug-10	10	1316	3	W LANTAU	2	9	ON	HKCRP	813314	802781	SUMMER	NONE	OPERATIONAL	S
12-Aug-10	11	1454	12	NW LANTAU	2	46	ON	HKCRP	823971	812374	SUMMER	NONE	OPERATIONAL	P
12-Aug-10	12	1647	3	NW LANTAU	3	57	ON	HKCRP	825163	808451	SUMMER	NONE	OPERATIONAL	P
13-Aug-10	1	1137	1	DEEP BAY	3	281	ON	HKCRP	830480	807524	SUMMER	NONE	OPERATIONAL	P
13-Aug-10	2	1422	10	NW LANTAU	3	41	ON	HKCRP	827326	806396	SUMMER	NONE	OPERATIONAL	P
13-Aug-10	3	1702	3	NW LANTAU	3	70	ON	HKCRP	824705	810449	SUMMER	NONE	OPERATIONAL	S
16-Aug-10	1	1056	2	NE LANTAU	1	220	ON	HKCRP	822299	820664	SUMMER	NONE	OPERATIONAL	S
18-Aug-10	1	1115	1	W LANTAU	1	210	ON	HKCRP	811478	801808	SUMMER	NONE	OPERATIONAL	P
18-Aug-10	2	1156	4	W LANTAU	1	114	ON	HKCRP	806639	801776	SUMMER	NONE	OPERATIONAL	S
18-Aug-10	3	1240	3	W LANTAU	1	40	ON	HKCRP	808391	800698	SUMMER	NONE	OPERATIONAL	P
18-Aug-10	4	1307	1	W LANTAU	1	111	ON	HKCRP	810254	799743	SUMMER	NONE	OPERATIONAL	S
31-Aug-10	1	1026	5	W LANTAU	2	263	ON	HKCRP	815471	803806	SUMMER	NONE	OPERATIONAL	P
31-Aug-10	2	1045	1	W LANTAU	2	300	ON	HKCRP	815439	803270	SUMMER	NONE	OPERATIONAL	P
31-Aug-10	3	1059	4	W LANTAU	3	160	ON	HKCRP	813723	803235	SUMMER	NONE	OPERATIONAL	P
31-Aug-10	4	1217	3	W LANTAU	2	16	ON	HKCRP	805775	801826	SUMMER	NONE	OPERATIONAL	S
31-Aug-10	5	1253	7	W LANTAU	2	61	ON	HKCRP	808380	800729	SUMMER	NONE	OPERATIONAL	P
31-Aug-10	6	1345	5	W LANTAU	3	346	ON	HKCRP	812374	802078	SUMMER	NONE	OPERATIONAL	P
31-Aug-10	7	1507	2	W LANTAU	2	141	ON	HKCRP	825944	805363	SUMMER	NONE	OPERATIONAL	P
31-Aug-10	8	1534	2	NW LANTAU	2	ND	OFF	HKCRP	828912	805379	SUMMER	NONE	OPERATIONAL	
31-Aug-10	9	1611	1	NW LANTAU	2	32	ON	HKCRP	825442	807432	SUMMER	NONE	OPERATIONAL	P
31-Aug-10	10	1638	7	NW LANTAU	2	154	ON	HKCRP	820446	808175	SUMMER	NONE	OPERATIONAL	S
01-Sep-10	1	1018	4	W LANTAU	3	50	ON	HKCRP	813093	802533	AUTUMN	NONE	OPERATIONAL	S
01-Sep-10	2	1029	2	W LANTAU	3	32	ON	HKCRP	812064	802077	AUTUMN	NONE	OPERATIONAL	S
01-Sep-10	3	1039	1	W LANTAU	3	446	ON	HKCRP	810825	801518	AUTUMN	NONE	OPERATIONAL	S
01-Sep-10	4	1103	3	SW LANTAU	3	104	ON	HKCRP	806227	802745	AUTUMN	NONE	OPERATIONAL	S
01-Sep-10	5	1119	3	SW LANTAU	3	30	ON	HKCRP	806767	803922	AUTUMN	NONE	OPERATIONAL	S
14-Sep-10	1	1101	1	NE LANTAU	2	194	ON	HKCRP	821725	819376	AUTUMN	NONE	OPERATIONAL	S
14-Sep-10	2	1601	3	NW LANTAU	2	770	ON	HKCRP	824888	807410	AUTUMN	SHRIMP	OPERATIONAL	P
12-Oct-10	1	1514	9	NW LANTAU	1	238	ON	HKCRP	825720	806382	AUTUMN	SHRIMP	OPERATIONAL	P
12-Oct-10	2	1624	2	NW LANTAU	1	55	ON	HKCRP	825757	804672	AUTUMN	NONE	OPERATIONAL	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
13-Oct-10	1	1016	4	W LANTAU	2	198	ON	HKCRP	817620	803800	AUTUMN	NONE	OPERATIONAL	P
13-Oct-10	2	1050	3	W LANTAU	1	376	ON	HKCRP	814864	802990	AUTUMN	NONE	OPERATIONAL	S
13-Oct-10	3	1110	3	W LANTAU	1	339	ON	HKCRP	813580	802617	AUTUMN	NONE	OPERATIONAL	P
13-Oct-10	4	1115	6	W LANTAU	2	146	ON	HKCRP	813571	801596	AUTUMN	NONE	OPERATIONAL	P
13-Oct-10	5	1134	2	W LANTAU	2	ND	OFF	HKCRP	812221	801397	AUTUMN	NONE	OPERATIONAL	
13-Oct-10	6	1142	4	W LANTAU	2	ND	OFF	HKCRP	812132	801438	AUTUMN	NONE	OPERATIONAL	
13-Oct-10	7	1151	1	W LANTAU	1	ND	OFF	HKCRP	812079	800387	AUTUMN	NONE	OPERATIONAL	
13-Oct-10	8	1219	2	W LANTAU	1	365	ON	HKCRP	809434	799968	AUTUMN	NONE	OPERATIONAL	P
13-Oct-10	9	1227	15	W LANTAU	1	45	ON	HKCRP	808338	799543	AUTUMN	NONE	OPERATIONAL	S
13-Oct-10	10	1252	2	W LANTAU	2	117	ON	HKCRP	807341	799674	AUTUMN	NONE	OPERATIONAL	P
13-Oct-10	11	1343	3	W LANTAU	2	104	ON	HKCRP	808437	799749	AUTUMN	NONE	OPERATIONAL	P
13-Oct-10	12	1416	2	W LANTAU	1	537	ON	HKCRP	812461	802779	AUTUMN	NONE	OPERATIONAL	P
13-Oct-10	13	1420	4	W LANTAU	1	725	ON	HKCRP	812464	801820	AUTUMN	NONE	OPERATIONAL	P
13-Oct-10	14	1633	3	NW LANTAU	2	185	ON	HKCRP	820587	809463	AUTUMN	NONE	OPERATIONAL	S
02-Nov-10	1	1144	2	NW LANTAU	3	ND	OFF	HKCRP	824801	806391	AUTUMN	NONE	OPERATIONAL	
02-Nov-10	2	1209	1	NW LANTAU	3	62	ON	HKCRP	823218	806017	AUTUMN	NONE	OPERATIONAL	S
02-Nov-10	3	1253	8	NW LANTAU	3	40	ON	HKCRP	823967	808439	AUTUMN	NONE	OPERATIONAL	P
02-Nov-10	4	1320	2	NW LANTAU	3	238	ON	HKCRP	826912	808537	AUTUMN	NONE	OPERATIONAL	P
02-Nov-10	5	1435	7	NE LANTAU	2	172	ON	HKCRP	820692	813244	AUTUMN	NONE	OPERATIONAL	P
02-Nov-10	6	1529	1	NE LANTAU	2	ND	OFF	HKCRP	820358	814274	AUTUMN	NONE	OPERATIONAL	
02-Nov-10	7	1537	1	NE LANTAU	2	1620	ON	HKCRP	822030	814266	AUTUMN	NONE	OPERATIONAL	P
02-Nov-10	8	1617	1	NE LANTAU	3	794	ON	HKCRP	820354	817169	AUTUMN	NONE	OPERATIONAL	P
04-Nov-10	1	1230	4	W LANTAU	3	155	ON	HKCRP	810463	800001	AUTUMN	NONE	OPERATIONAL	S
04-Nov-10	2	1320	1	W LANTAU	2	131	ON	HKCRP	814521	802742	AUTUMN	NONE	OPERATIONAL	P
04-Nov-10	3	1426	11	NW LANTAU	2	686	ON	HKCRP	824205	805339	AUTUMN	NONE	OPERATIONAL	P
04-Nov-10	4	1447	2	NW LANTAU	1	154	ON	HKCRP	826475	805354	AUTUMN	NONE	OPERATIONAL	P
08-Nov-10	1	1535	5	SW LANTAU	1	781	ON	HKCRP	806489	804292	AUTUMN	PAIR	OPERATIONAL	P
08-Nov-10	2	1557	3	SW LANTAU	1	ND	OFF	HKCRP	806591	803251	AUTUMN	NONE	OPERATIONAL	
09-Nov-10	1	1046	3	W LANTAU	3	ND	OFF	HKCRP	810924	801786	AUTUMN	NONE	OPERATIONAL	
09-Nov-10	2	1127	4	W LANTAU	3	ND	OFF	HKCRP	806340	801899	AUTUMN	NONE	OPERATIONAL	
09-Nov-10	3	1212	5	W LANTAU	3	25	ON	HKCRP	810537	801466	AUTUMN	NONE	OPERATIONAL	S
18-Nov-10	1	1340	2	NW LANTAU	3	18	ON	HKCRP	824864	808451	AUTUMN	NONE	OPERATIONAL	P
18-Nov-10	2	1423	6	DEEP BAY	3	46	ON	HKCRP	830504	806649	AUTUMN	NONE	OPERATIONAL	P
18-Nov-10	3	1435	1	DEEP BAY	3	589	ON	HKCRP	830969	806423	AUTUMN	NONE	OPERATIONAL	S

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
19-Nov-10	1	1007	1	W LANTAU	3	221	ON	HKCRP	813524	802884	AUTUMN	NONE	OPERATIONAL	P
19-Nov-10	2	1134	1	W LANTAU	3	16	ON	HKCRP	806561	801879	AUTUMN	NONE	OPERATIONAL	S
19-Nov-10	3	1139	2	W LANTAU	3	90	ON	HKCRP	806727	801807	AUTUMN	NONE	OPERATIONAL	S
19-Nov-10	4	1148	1	W LANTAU	3	132	ON	HKCRP	807448	801593	AUTUMN	NONE	OPERATIONAL	S
30-Nov-10	1	1121	3	NW LANTAU	2	103	ON	HKCRP	822429	807416	AUTUMN	SHRIMP	OPERATIONAL	P
30-Nov-10	2	1512	1	W LANTAU	4	34	ON	HKCRP	811632	802241	AUTUMN	NONE	OPERATIONAL	S
30-Nov-10	3	1546	2	W LANTAU	3	ND	OFF	HKCRP	814729	804145	AUTUMN	NONE	OPERATIONAL	
30-Nov-10	4	1557	1	W LANTAU	3	ND	OFF	HKCRP	814993	805021	AUTUMN	NONE	OPERATIONAL	
01-Dec-10	1	1011	1	W LANTAU	3	191	ON	HKCRP	813579	803029	WINTER	NONE	OPERATIONAL	S
01-Dec-10	2	1018	3	W LANTAU	3	121	ON	HKCRP	813248	802420	WINTER	NONE	OPERATIONAL	S
01-Dec-10	3	1037	2	W LANTAU	3	398	ON	HKCRP	809497	801092	WINTER	NONE	OPERATIONAL	S
01-Dec-10	4	1044	6	W LANTAU	3	ND	OFF	HKCRP	808546	800863	WINTER	NONE	OPERATIONAL	
01-Dec-10	5	1105	1	W LANTAU	3	9	ON	HKCRP	806273	802002	WINTER	OTHER	OPERATIONAL	S
01-Dec-10	6	1118	10	SW LANTAU	3	208	ON	HKCRP	804267	802576	WINTER	NONE	OPERATIONAL	P
01-Dec-10	7	1133	1	SW LANTAU	3	324	ON	HKCRP	803248	802996	WINTER	NONE	OPERATIONAL	S
01-Dec-10	8	1144	1	SW LANTAU	3	104	ON	HKCRP	804531	803432	WINTER	NONE	OPERATIONAL	P
01-Dec-10	9	1151	2	SW LANTAU	3	515	ON	HKCRP	805395	803424	WINTER	NONE	OPERATIONAL	P
01-Dec-10	10	1224	8	SW LANTAU	1	482	ON	HKCRP	804218	804834	WINTER	PAIR	OPERATIONAL	P
08-Dec-10	1	1103	2	NE LANTAU	2	414	ON	HKCRP	821570	819458	WINTER	NONE	OPERATIONAL	S
08-Dec-10	2	1124	2	NE LANTAU	2	165	ON	HKCRP	822157	819417	WINTER	NONE	OPERATIONAL	P
08-Dec-10	3	1333	4	NE LANTAU	3	460	ON	HKCRP	820403	814284	WINTER	NONE	OPERATIONAL	P
08-Dec-10	4	1545	1	NW LANTAU	3	460	ON	HKCRP	823016	807386	WINTER	NONE	OPERATIONAL	P
09-Dec-10	1	1002	1	NW LANTAU	2	ND	OFF	HKCRP	817129	805314	WINTER	NONE	OPERATIONAL	
09-Dec-10	2	1018	1	W LANTAU	2	139	ON	HKCRP	818461	803812	WINTER	NONE	OPERATIONAL	P
09-Dec-10	3	1107	1	W LANTAU	3	686	ON	HKCRP	812289	800696	WINTER	NONE	OPERATIONAL	S
09-Dec-10	4	1200	2	W LANTAU	3	219	ON	HKCRP	807171	801633	WINTER	NONE	OPERATIONAL	S
09-Dec-10	5	1331	1	W LANTAU	2	484	ON	HKCRP	812462	802439	WINTER	NONE	OPERATIONAL	P
09-Dec-10	6	1352	5	W LANTAU	1	187	ON	HKCRP	814510	802804	WINTER	NONE	OPERATIONAL	P
09-Dec-10	7	1445	7	NW LANTAU	3	356	ON	HKCRP	821615	804664	WINTER	NONE	OPERATIONAL	P
09-Dec-10	8	1509	2	NW LANTAU	3	37	ON	HKCRP	825170	804671	WINTER	NONE	OPERATIONAL	P
09-Dec-10	9	1539	2	NW LANTAU	3	452	ON	HKCRP	829829	806102	WINTER	SHRIMP	OPERATIONAL	S
18-Dec-10	1	1015	2	NW LANTAU	3	ND	OFF	HKCRP	816507	806199	WINTER	NONE	OPERATIONAL	
18-Dec-10	2	1050	6	W LANTAU	4	7	ON	HKCRP	813063	801162	WINTER	SHRIMP	OPERATIONAL	S
18-Dec-10	3	1131	9	W LANTAU	2	264	ON	HKCRP	810039	801351	WINTER	NONE	OPERATIONAL	S

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
18-Dec-10	4	1152	2	W LANTAU	3	ND	OFF	HKCRP	810095	801279	WINTER	NONE	OPERATIONAL	
18-Dec-10	5	1203	4	W LANTAU	3	126	ON	HKCRP	809420	801009	WINTER	NONE	OPERATIONAL	P
18-Dec-10	6	1246	1	W LANTAU	3	38	ON	HKCRP	805656	800475	WINTER	NONE	OPERATIONAL	S
18-Dec-10	7	1255	4	W LANTAU	3	598	ON	HKCRP	806476	800425	WINTER	NONE	OPERATIONAL	P
18-Dec-10	8	1405	3	W LANTAU	3	313	ON	HKCRP	812465	801305	WINTER	NONE	OPERATIONAL	P
18-Dec-10	9	1537	4	NE LANTAU	1	ND	OFF	HKCRP	822451	814267	WINTER	NONE	OPERATIONAL	
22-Dec-10	1	1740	1	W LANTAU	3	ND	OFF	HELI	814510	802804	WINTER	NONE	OPERATIONAL	
29-Dec-10	1	1013	3	NW LANTAU	1	161	ON	HKCRP	816566	804643	WINTER	NONE	OPERATIONAL	P
29-Dec-10	2	1151	5	NW LANTAU	2	92	ON	HKCRP	828843	806388	WINTER	NONE	OPERATIONAL	P
29-Dec-10	3	1229	3	NW LANTAU	2	ND	OFF	HKCRP	824414	806380	WINTER	NONE	OPERATIONAL	
29-Dec-10	4	1531	1	NE LANTAU	2	152	ON	HKCRP	820757	814285	WINTER	NONE	OPERATIONAL	P
29-Dec-10	5	1540	1	NE LANTAU	2	72	ON	HKCRP	820225	814408	WINTER	NONE	OPERATIONAL	P
13-Jan-11	1	1508	9	NE LANTAU	2	400	ON	HKCRP	820257	815304	WINTER	NONE	OPERATIONAL	P
17-Jan-11	1	1342	1	NW LANTAU	3	3	ON	HKCRP	824904	804660	WINTER	NONE	OPERATIONAL	P
17-Jan-11	2	1406	15	NW LANTAU	3	497	ON	HKCRP	829345	804680	WINTER	NONE	OPERATIONAL	P
17-Jan-11	3	1537	6	NW LANTAU	2	450	ON	HKCRP	822073	808456	WINTER	NONE	OPERATIONAL	S
17-Jan-11	4	1608	1	NW LANTAU	3	174	ON	HKCRP	826326	808453	WINTER	NONE	OPERATIONAL	P
17-Jan-11	5	1706	2	NE LANTAU	2	ND	OFF	HKCRP	819763	812686	WINTER	NONE	OPERATIONAL	
18-Jan-11	1	0945	2	W LANTAU	2	400	ON	HKCRP	813933	803277	WINTER	NONE	OPERATIONAL	S
18-Jan-11	2	1011	2	W LANTAU	2	91	ON	HKCRP	808645	800873	WINTER	NONE	OPERATIONAL	P
27-Jan-11	1	1218	9	NE LANTAU	2	250	ON	HKCRP	819507	813366	WINTER	NONE	OPERATIONAL	P
27-Jan-11	2	1341	2	NW LANTAU	3	366	ON	HKCRP	823910	809469	WINTER	NONE	OPERATIONAL	S
27-Jan-11	3	1416	1	DEEP BAY	2	ND	OFF	HKCRP	830502	807730	WINTER	NONE	OPERATIONAL	
27-Jan-11	4	1437	3	DEEP BAY	3	87	ON	HKCRP	832464	806601	WINTER	NONE	OPERATIONAL	P
27-Jan-11	5	1642	1	NW LANTAU	2	ND	OFF	HKCRP	829649	807492	WINTER	NONE	OPERATIONAL	
28-Jan-11	1	1022	2	W LANTAU	4	69	ON	HKCRP	806239	802198	WINTER	NONE	OPERATIONAL	S
31-Jan-11	1	1329	1	NW LANTAU	3	429	ON	HKCRP	821260	810937	WINTER	NONE	OPERATIONAL	S
31-Jan-11	2	1439	20	NE LANTAU	2	257	ON	HKCRP	819604	815324	WINTER	NONE	OPERATIONAL	P
7-Feb-11	1	1109	2	NE LANTAU	2	354	ON	HKCRP	820519	818045	WINTER	NONE	OPERATIONAL	S
7-Feb-11	2	1323	2	W LANTAU	1	214	ON	HKCRP	818550	803916	WINTER	NONE	OPERATIONAL	P
7-Feb-11	3	1434	1	W LANTAU	1	ND	OFF	HKCRP	811222	802199	WINTER	NONE	OPERATIONAL	
7-Feb-11	4	1438	6	W LANTAU	1	76	ON	HKCRP	810759	801610	WINTER	NONE	OPERATIONAL	S
7-Feb-11	5	1458	1	W LANTAU	2	298	ON	HKCRP	809552	801236	WINTER	NONE	OPERATIONAL	S
7-Feb-11	6	1515	1	W LANTAU	3	101	ON	HKCRP	809422	800030	WINTER	NONE	OPERATIONAL	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
8-Feb-11	1	1003	1	W LANTAU	2	ND	OFF	HKCRP	817218	805026	WINTER	NONE	OPERATIONAL	
8-Feb-11	2	1021	3	W LANTAU	2	384	ON	HKCRP	817675	803800	WINTER	NONE	OPERATIONAL	P
8-Feb-11	3	1047	3	W LANTAU	2	120	ON	HKCRP	815231	802136	WINTER	NONE	OPERATIONAL	P
8-Feb-11	4	1113	1	W LANTAU	2	703	ON	HKCRP	813558	802534	WINTER	SHRIMP	OPERATIONAL	P
8-Feb-11	5	1120	5	W LANTAU	1	447	ON	HKCRP	813571	801916	WINTER	NONE	OPERATIONAL	P
8-Feb-11	6	1158	1	W LANTAU	1	262	ON	HKCRP	811479	801560	WINTER	NONE	OPERATIONAL	P
8-Feb-11	7	1212	2	W LANTAU	1	27	ON	HKCRP	810770	801652	WINTER	NONE	OPERATIONAL	S
8-Feb-11	8	1221	2	W LANTAU	1	517	ON	HKCRP	809541	801257	WINTER	NONE	OPERATIONAL	S
8-Feb-11	9	1311	6	W LANTAU	2	358	ON	HKCRP	806454	800105	WINTER	NONE	OPERATIONAL	S
8-Feb-11	10	1357	3	W LANTAU	2	112	ON	HKCRP	810483	801290	WINTER	NONE	OPERATIONAL	P
8-Feb-11	11	1420	3	W LANTAU	1	480	ON	HKCRP	812464	801470	WINTER	NONE	OPERATIONAL	P
8-Feb-11	12	1449	1	NW LANTAU	2	176	ON	HKCRP	815856	805353	WINTER	NONE	OPERATIONAL	P
8-Feb-11	13	1632	3	NW LANTAU	1	185	ON	HKCRP	823182	807418	WINTER	NONE	OPERATIONAL	P
1-Mar-11	1	1134	8	SE LANTAU	3	175	ON	HKCRP	808586	815268	SPRING	PAIR	OPERATIONAL	P
1-Mar-11	3	1639	2	W LANTAU	2	388	ON	HKCRP	811599	801952	SPRING	NONE	OPERATIONAL	S
1-Mar-11	4	1655	1	W LANTAU	1	533	ON	HKCRP	813215	802647	SPRING	NONE	OPERATIONAL	S
8-Mar-11	1	1338	1	NW LANTAU	2	53	ON	HKCRP	821172	810886	SPRING	NONE	OPERATIONAL	S
8-Mar-11	2	1348	3	NW LANTAU	2	ND	OFF	HKCRP	820787	809597	SPRING	NONE	OPERATIONAL	
8-Mar-11	3	1449	9	NW LANTAU	1	16	ON	HKCRP	829438	807883	SPRING	NONE	OPERATIONAL	S
8-Mar-11	4	1656	3	DEEP BAY	1	219	ON	HKCRP	831922	806250	SPRING	NONE	OPERATIONAL	S
8-Mar-11	5	1712	1	DEEP BAY	2	28	ON	HKCRP	831432	807577	SPRING	NONE	OPERATIONAL	P
10-Mar-11	1	1015	1	NW LANTAU	2	126	ON	HKCRP	826590	809020	SPRING	NONE	OPERATIONAL	S
10-Mar-11	2	1154	3	NW LANTAU	3	417	ON	HKCRP	824502	806380	SPRING	NONE	OPERATIONAL	P
10-Mar-11	3	1227	5	NW LANTAU	3	ND	OFF	HKCRP	829275	806399	SPRING	NONE	OPERATIONAL	
10-Mar-11	4	1304	5	NW LANTAU	4	357	ON	HKCRP	825779	804693	SPRING	HANG	OPERATIONAL	P
10-Mar-11	5	1411	1	W LANTAU	3	132	ON	HKCRP	814499	802680	SPRING	NONE	OPERATIONAL	P
10-Mar-11	6	1526	4	W LANTAU	3	102	ON	HKCRP	805798	801517	SPRING	NONE	OPERATIONAL	S
22-Mar-11	3	1537	1	W LANTAU	5	ND	OFF	HKCRP	806218	801992	SPRING	NONE	OPERATIONAL	
23-Mar-11	1	1049	2	NW LANTAU	3	32	ON	HKCRP	826863	805334	SPRING	NONE	OPERATIONAL	P
23-Mar-11	2	1117	2	NW LANTAU	3	99	ON	HKCRP	829399	805360	SPRING	NONE	OPERATIONAL	P
23-Mar-11	3	1141	3	NW LANTAU	3	193	ON	HKCRP	829430	806235	SPRING	SHRIMP	OPERATIONAL	S
23-Mar-11	4	1210	3	NW LANTAU	2	277	ON	HKCRP	827734	807436	SPRING	NONE	OPERATIONAL	P
23-Mar-11	5	1248	2	NW LANTAU	2	224	ON	HKCRP	822197	807416	SPRING	NONE	OPERATIONAL	P

Appendix III. Finless Porpoise Sighting Database (April 2010 - March 2011)
(Note: P = sightings made on primary lines; S = sightings made on secondary lines)

DATE	STG #	TIME	HRD SZ	NORTHING	EASTING	AREA	BEAU	PSD	EFFORT	TYPE	SEASON	P/S
01-Apr-10	1	1200	1	802168	805645	SW LANTAU	3	149	ON	HKCRP	SPRING	S
01-Apr-10	2	1327	6	800344	809727	SW LANTAU	2	36	ON	HKCRP	SPRING	S
01-Apr-10	3	1347	1	800863	810873	SW LANTAU	2	105	ON	HKCRP	SPRING	S
01-Apr-10	4	1400	1	803099	811330	SW LANTAU	2	74	ON	HKCRP	SPRING	P
01-Apr-10	5	1459	1	803716	813394	SE LANTAU	2	290	ON	HKCRP	SPRING	P
01-Apr-10	6	1527	2	804787	815365	SE LANTAU	2	187	ON	HKCRP	SPRING	P
01-Apr-10	7	1606	2	806290	817636	SE LANTAU	1	93	ON	HKCRP	SPRING	S
01-Apr-10	8	1615	4	805250	817387	SE LANTAU	2	107	ON	HKCRP	SPRING	S
12-Apr-10	1	1250	2	802495	826482	LAMMA	2	39	ON	HKCRP	SPRING	P
12-Apr-10	2	1255	1	802506	827070	LAMMA	2	46	ON	HKCRP	SPRING	P
12-Apr-10	3	1308	3	801475	828586	LAMMA	1	86	ON	HKCRP	SPRING	S
20-Apr-10	1	1252	2	801123	807696	SW LANTAU	2	239	ON	HKCRP	SPRING	S
05-May-10	1	1249	7	801930	808399	SW LANTAU	1	100	ON	HKCRP	SPRING	P
05-May-10	2	1432	2	804271	812281	SE LANTAU	2	ND	OFF	HKCRP	SPRING	
05-May-10	3	1522	2	806843	804489	SW LANTAU	1	ND	OFF	HKCRP	SPRING	
18-May-10	8	1310	1	800658	807602	SW LANTAU	2	15	ON	HKCRP	SPRING	S
18-May-10	9	1324	4	800269	808323	SW LANTAU	1	107	ON	HKCRP	SPRING	S
18-May-10	10	1448	2	804105	812198	SE LANTAU	1	99	ON	HKCRP	SPRING	P
18-May-10	11	1454	4	802898	812196	SE LANTAU	1	ND	OFF	HKCRP	SPRING	
18-May-10	12	1506	3	802044	813526	SE LANTAU	1	38	ON	HKCRP	SPRING	S
19-May-10	1	1013	1	828938	864373	SAI KUNG	1	ND	OFF	HELI	SPRING	
24-May-10	1	1039	11	806467	835281	LAMMA	3	29	ON	HKCRP	SPRING	P
04-Jun-10	1	1020	2	806222	819410	SE LANTAU	1	167	ON	HKCRP	SUMMER	P
04-Jun-10	2	1026	1	805037	819398	SE LANTAU	1	86	ON	HKCRP	SUMMER	P
04-Jun-10	3	1030	4	804683	819408	SE LANTAU	1	123	ON	HKCRP	SUMMER	P
04-Jun-10	4	1107	6	804586	816984	SE LANTAU	1	83	ON	HKCRP	SUMMER	P
04-Jun-10	5	1219	1	802376	813206	SE LANTAU	1	70	ON	HKCRP	SUMMER	P
04-Jun-10	6	1224	1	803129	813207	SE LANTAU	1	7	ON	HKCRP	SUMMER	P
04-Jun-10	7	1230	4	803772	813208	SE LANTAU	1	107	ON	HKCRP	SUMMER	P
04-Jun-10	8	1347	3	800655	809686	SW LANTAU	2	213	ON	HKCRP	SUMMER	S
14-Jul-10	1	1332	3	803500	842232	PO TOI	2	53	ON	HKCRP	SUMMER	P
04-Aug-10	1	1008	2	807456	846593	PO TOI	3	126	ON	HKCRP	SUMMER	P

Appendix III. (cont'd)

DATE	STG #	TIME	HRD SZ	NORTHING	EASTING	AREA	BEAU	PSD	EFFORT	TYPE	SEASON	P/S
04-Aug-10	2	1039	3	807451	854213	PO TOI	2	121	ON	HKCRP	SUMMER	P
04-Aug-10	3	1309	1	805422	851173	PO TOI	2	53	ON	HKCRP	SUMMER	P
07-Sep-10	1	1201	2	804536	866851	PO TOI	5	73	ON	HKCRP	AUTUMN	P
07-Sep-10	2	1314	1	804525	851586	PO TOI	3	173	ON	HKCRP	AUTUMN	P
07-Sep-10	3	1509	1	806480	857009	PO TOI	3	25	ON	HKCRP	AUTUMN	P
07-Sep-10	4	1514	1	806470	857751	PO TOI	3	85	ON	HKCRP	AUTUMN	P
08-Sep-10	1	1203	2	811564	864631	NINEPINS	1	121	ON	HKCRP	AUTUMN	P
08-Sep-10	2	1218	1	811559	861755	NINEPINS	1	25	ON	HKCRP	AUTUMN	P
08-Sep-10	3	1559	2	815600	853225	NINEPINS	2	66	ON	HKCRP	AUTUMN	P
17-Sep-10	1	1019	8	807378	846283	PO TOI	1	282	ON	HKCRP	AUTUMN	P
17-Sep-10	2	1044	4	807392	850016	PO TOI	1	61	ON	HKCRP	AUTUMN	P
17-Sep-10	3	1112	3	807399	856822	PO TOI	1	184	ON	HKCRP	AUTUMN	P
17-Sep-10	4	1238	2	805480	862424	PO TOI	2	59	ON	HKCRP	AUTUMN	P
22-Sep-10	1	1635	3	807569	849820	PO TOI	3	ND	OFF	HELI	AUTUMN	
03-Nov-10	1	1437	1	804025	814209	SE LANTAU	2	98	ON	HKCRP	AUTUMN	P
22-Nov-10	1	948	1	806900	841282	PO TOI	1	ND	OFF	HKCRP	AUTUMN	
01-Dec-10	11	1442	1	806110	812212	SE LANTAU	2	250	ON	HKCRP	WINTER	P
07-Jan-11	1	1205	1	804632	815283	SE LANTAU	3	33	ON	HKCRP	WINTER	P
10-Jan-11	1	1508	3	813902	859153	NINEPINS	3	ND	OFF	HELI	WINTER	
10-Jan-11	2	1519	4	804617	854742	PO TOI	3	ND	OFF	HELI	WINTER	
10-Jan-11	3	1538	1	803714	814456	SE LANTAU	2	ND	OFF	HELI	WINTER	
18-Jan-11	3	1358	1	804661	810662	SW LANTAU	4	156	ON	HKCRP	WINTER	P
28-Jan-11	2	1218	1	800722	809150	SW LANTAU	2	121	ON	HKCRP	WINTER	S
28-Jan-11	3	1224	4	800810	809428	SW LANTAU	2	84	ON	HKCRP	WINTER	S
09-Feb-11	1	1457	2	828913	862839	MIRS BAY	2	ND	OFF	HELI	WINTER	
09-Feb-11	2	1509	2	820480	859020	SAI KUNG	2	ND	OFF	HELI	WINTER	
09-Feb-11	3	1519	1	809334	854623	NINEPINS	2	ND	OFF	HELI	WINTER	
01-Mar-11	2	1210	2	805740	815295	SE LANTAU	3	23	ON	HKCRP	SPRING	P
15-Mar-11	1	1316	2	804531	829103	LAMMA	3	159	ON	HKCRP	SPRING	P
21-Mar-11	1	1131	1	804518	835796	LAMMA	2	285	ON	HKCRP	SPRING	P
21-Mar-11	2	1137	2	804518	836343	LAMMA	2	85	ON	HKCRP	SPRING	P
21-Mar-11	3	1245	3	802482	829917	LAMMA	2	157	ON	HKCRP	SPRING	P
22-Mar-11	1	1100	1	804908	816314	SE LANTAU	3	195	ON	HKCRP	SPRING	P
22-Mar-11	2	1250	2	807794	811173	SW LANTAU	4	116	ON	HKCRP	SPRING	P

Appendix IV. Individual dolphins identified during AFCD surveys (April 2010 to March 2011)

DOLPHIN ID	DATE	STG#	AREA
CH12	30/11/10	2	WL
CH34	10/03/11	3	NWL
	23/03/11	4	NWL
CH38	30/04/10	2	WL
	01/12/10	2	WL
CH98	26/05/10	3	NWL
	12/10/10	1	NWL
	27/01/11	4	DB
	23/03/11	3	NWL
CH108	29/07/10	3	SWL
	08/02/11	3	WL
	08/02/11	5	WL
CH110	19/04/10	2	WL
CH113	17/05/10	13	WL
	18/05/10	1	WL
CH153	30/06/10	13	NWL
EL01	31/01/11	2	NEL
EL03	30/04/10	2	WL
NL11	12/08/10	11	NWL
	12/10/10	1	NWL
	02/11/10	3	NWL
	18/11/10	2	DB
	30/11/10	1	NWL
	27/01/11	4	DB
NL12	22/06/10	2	NWL
	30/06/10	6	NWL
	30/06/10	10	NWL
	17/01/11	2	NWL
NL18	30/11/10	1	NWL
	29/12/10	1	NWL
	29/12/10	3	NWL
	31/01/11	2	NEL
NL24	30/06/10	4	NWL
	12/08/10	11	NWL
	04/11/10	4	NWL
	18/12/10	9	NEL
	27/01/11	1	NEL
	31/01/11	2	NEL
NL33	26/05/10	6	NEL
	18/12/10	9	NEL
	13/01/11	1	NEL
	27/01/11	1	NEL
	31/01/11	2	NEL
NL37	31/01/11	2	NEL
	08/03/11	3	NWL
NL46	29/12/10	2	NWL
	17/01/11	2	NWL
	10/03/11	4	NWL
NL48	31/08/10	10	NWL
	18/11/10	1	NWL
	31/01/11	2	NEL
	08/02/11	1	WL
	08/02/11	2	WL
	23/03/11	3	NWL
NL49	31/08/10	1	WL
NL60	12/08/10	11	NWL
	02/11/10	3	NWL
NL75	08/12/10	1	NEL
	27/01/11	1	NEL
	31/01/11	2	NEL
	07/02/11	1	NEL
NL80	30/06/10	7	NWL
NL93	02/11/10	5	NEL
	04/11/10	3	NWL

DOLPHIN ID	DATE	STG#	AREA
NL98	26/05/10	4	NEL
	12/08/10	11	NWL
	04/11/10	3	NWL
	18/12/10	9	NEL
	13/01/11	1	NEL
	31/01/11	2	NEL
NL103	30/06/10	6	NWL
	30/06/10	10	NWL
	08/03/11	3	NWL
NL104	22/06/10	1	NEL
	29/06/10	2	NWL
	09/12/10	8	NWL
	29/12/10	2	NWL
	27/01/11	1	NEL
	31/01/11	2	NEL
	23/03/11	4	NWL
NL118	23/03/11	5	NWL
NL120	08/12/10	3	NEL
NL123	31/08/10	10	NWL
	04/11/10	3	NWL
	08/12/10	3	NEL
	13/01/11	1	NEL
	31/01/11	2	NEL
NL136	31/08/10	1	WL
	17/01/11	3	NWL
	31/01/11	2	NEL
	23/03/11	3	NWL
NL139	17/01/11	3	NWL
NL145	13/08/10	2	NWL
NL150	17/01/11	2	NWL
NL153	17/01/11	2	NWL
NL156	13/10/10	6	WL
	04/11/10	1	WL
NL165	17/05/10	6	WL
	31/08/10	10	NWL
	17/01/11	3	NWL
	31/01/11	2	NEL
NL176	13/01/11	1	NEL
NL179	29/06/10	1	NEL
	12/08/10	11	NWL
	31/08/10	10	NWL
	31/01/11	2	NEL
NL182	18/11/10	1	NWL
	31/01/11	2	NEL
	23/03/11	1	NWL
NL188	10/03/11	4	NWL
NL191	04/05/10	1	NWL
	27/01/11	1	NEL
	31/01/11	2	NEL
NL202	17/01/11	2	NWL
NL205	02/11/10	3	NWL
	18/11/10	1	NWL
	30/11/10	1	NWL
NL206	30/04/10	2	WL
	13/10/10	7	WL
NL210	31/01/11	2	NEL
	10/03/11	3	NWL
NL213	12/10/10	1	NWL
NL214	29/12/10	2	NWL
	08/03/11	3	NWL
NL219	12/10/10	1	NWL
NL220	12/08/10	11	NWL
	01/09/10	1	WL
NL224	30/04/10	1	WL

DOLPHIN ID	DATE	STG#	AREA
NL233	17/01/11	2	NWL
	08/03/11	3	NWL
	10/03/11	3	NWL
NL236	17/01/11	2	NWL
NL241	02/11/10	3	NWL
	08/03/11	3	NWL
	23/03/11	3	NWL
NL242	04/11/10	4	NWL
	08/02/11	13	NWL
NL244	31/08/10	1	WL
NL246	30/07/10	4	NWL
	14/09/10	1	NWL
	27/01/11	1	NEL
NL258	26/05/10	2	NWL
	08/03/11	3	NWL
NL259	29/12/10	1	NWL
	29/12/10	3	NWL
NL260	29/06/10	2	NWL
	04/11/10	3	NWL
	31/01/11	2	NEL
NL261	30/07/10	4	NWL
	12/08/10	11	NWL
	29/12/10	4	NEL
	13/01/11	1	NEL
	27/01/11	1	NEL
NL262	29/12/10	2	NWL
	17/01/11	2	NWL
	10/03/11	4	NWL
NL264	13/08/10	2	NWL
	31/08/10	7	WL
	08/02/11	13	NWL
NL265	30/04/10	2	WL
	17/05/10	6	WL
	17/05/10	13	WL
NL272	22/06/10	1	NEL
	29/06/10	2	NWL
	09/12/10	8	NWL
	29/12/10	2	NWL
	27/01/11	1	NEL
	23/03/11	4	NWL
NL275 (new)	19/04/10	2	WL
NL278 (new)	30/06/10	6	NWL
	30/06/10	10	NWL
NL279 (new)	30/06/10	10	NWL
SL05	30/04/10	2	WL
	09/11/10	3	WL
SL35	30/04/10	2	WL
SL40	01/09/10	4	SWL
	13/10/10	9	WL
	01/12/10	6	SWL
SL47	30/04/10	2	WL
	01/12/10	10	SWL
SL48 (new)	19/04/10	4	WL
	31/08/10	5	WL
WL04	02/11/10	3	NWL
WL05	01/09/10	1	WL
	13/10/10	6	WL
	08/02/11	13	NWL
WL09	30/04/10	2	WL
	13/10/10	9	WL
WL11	31/01/11	2	NEL
	10/03/11	4	NWL
WL15	09/12/10	6	WL
	08/02/11	10	WL

Appendix IV. (cont'd)

DOLPHIN ID	DATE	STG#	AREA
WL21	18/12/10	7	WL
	07/02/11	4	WL
	08/02/11	5	WL
WL25	17/05/10	6	WL
	17/05/10	13	WL
	12/08/10	10	WL
	18/08/10	3	WL
	09/12/10	6	WL
	18/01/11	2	WL
	07/02/11	4	WL
	08/02/11	10	WL
WL29	19/04/10	2	WL
	13/10/10	4	WL
	13/10/10	13	WL
	18/12/10	3	WL
WL30	29/06/10	3	NWL
WL33	31/01/11	2	NEL
WL42	30/04/10	2	WL
	17/05/10	8	WL
	17/05/10	10	WL
	12/08/10	9	WL
	13/10/10	9	WL
	01/12/10	4	WL
WL43	18/05/10	2	WL
WL44	31/08/10	5	WL
	04/11/10	3	NWL
WL47	08/11/10	1	SWL
	17/01/11	2	NWL
	01/03/11	1	SEL
WL48	19/04/10	2	WL
WL50	19/04/10	3	WL
	08/02/11	9	WL
WL55	13/07/10	5	WL
	09/12/10	6	WL
WL56	01/12/10	1	WL
WL62	19/04/10	4	WL
	13/07/10	6	WL
WL66	17/05/10	6	WL
	13/10/10	4	WL
	18/12/10	5	WL
	18/12/10	7	WL
WL68	13/10/10	9	WL
	01/12/10	4	WL
WL69	01/09/10	5	SWL
	13/10/10	5	WL
	13/10/10	6	WL
	04/11/10	2	WL
WL72	30/04/10	2	WL
	17/05/10	6	WL
	09/12/10	1	NWL
	08/02/11	3	WL
	08/02/11	5	WL
WL73	30/04/10	2	WL
	17/05/10	7	WL
	13/10/10	9	WL
	01/12/10	5	WL
WL74	30/04/10	2	WL
	12/08/10	2	WL
WL79	17/05/10	6	WL
	17/05/10	13	WL
WL84	30/04/10	2	WL

DOLPHIN ID	DATE	STG#	AREA
WL86	31/08/10	5	WL
	13/10/10	9	WL
	09/11/10	1	WL
	09/11/10	3	WL
	01/12/10	6	SWL
	09/12/10	4	WL
WL87	19/04/10	4	WL
	30/04/10	2	WL
	09/11/10	2	WL
	18/12/10	3	WL
	01/03/11	1	SEL
WL88	19/04/10	4	WL
	30/04/10	2	WL
	25/05/10	1	WL
	13/07/10	6	WL
	01/09/10	5	SWL
	13/10/10	9	WL
	08/11/10	1	SWL
	09/11/10	2	WL
	01/12/10	10	SWL
	01/03/11	1	SEL
WL91	19/04/10	1	WL
	30/04/10	2	WL
WL93	30/04/10	2	WL
	09/12/10	7	NWL
WL98	30/04/10	1	WL
	13/10/10	1	WL
WL100	12/08/10	3	WL
WL108	30/04/10	2	WL
	18/05/10	5	WL
WL109	19/04/10	3	WL
	30/04/10	2	WL
	17/05/10	6	WL
	17/05/10	13	WL
	18/05/10	2	WL
	13/07/10	6	WL
	12/08/10	10	WL
	18/01/11	2	WL
WL111	31/01/11	2	NEL
WL114	30/04/10	2	WL
WL116	30/04/10	2	WL
WL118	13/07/10	2	WL
	29/07/10	3	SWL
WL120	18/05/10	1	WL
WL121	18/12/10	3	WL
WL123	19/04/10	1	WL
	25/05/10	1	WL
	01/12/10	4	WL
	09/12/10	6	WL
	08/02/11	7	WL
WL127	17/05/10	13	WL
WL128	30/04/10	2	WL
	17/05/10	8	WL
	12/08/10	2	WL
	30/11/10	4	WL
WL129	13/10/10	9	WL
WL130	30/04/10	2	WL
	01/12/10	6	SWL
WL131	19/04/10	3	WL
	30/04/10	1	WL
	17/05/10	13	WL
	18/05/10	2	WL
WL132	30/04/10	2	WL
	13/10/10	9	WL

DOLPHIN ID	DATE	STG#	AREA
WL135	17/05/10	6	WL
WL137	30/04/10	2	WL
WL138	19/04/10	3	WL
	30/04/10	2	WL
	13/07/10	2	WL
WL140	30/04/10	2	WL
WL141	01/09/10	1	WL
WL142	13/10/10	4	WL
	13/10/10	13	WL
	01/12/10	6	SWL
WL144	17/05/10	8	WL
	17/05/10	10	WL
WL145	13/10/10	2	WL
WL146	18/12/10	2	WL
WL149 (new)	30/04/10	1	WL
	17/05/10	13	WL
	18/05/10	1	WL
	25/05/10	4	WL
WL150 (new)	19/04/10	4	WL
	01/12/10	10	SWL
WL151 (new)	18/12/10	3	WL
WL153 (new)	13/10/10	4	WL
	18/12/10	5	WL
	18/12/10	7	WL
WL154 (new)	18/12/10	4	WL
WL155 (new)	19/04/10	1	WL
	30/04/10	2	WL
WL156 (new)	19/04/10	2	WL
	13/10/10	4	WL
WL157 (new)	17/05/10	13	WL
	18/05/10	1	WL
WL158 (new)	17/05/10	13	WL
	30/06/10	13	NWL
WL160 (new)	18/12/10	2	WL
WL162 (new)	08/03/11	3	NWL
WL163 (new)	13/07/10	3	WL
	13/07/10	6	WL
	18/12/10	3	WL
WL164 (new)	12/08/10	9	WL
	01/03/11	3	WL
WL165 (new)	31/08/10	5	WL
	13/10/10	9	WL
	09/11/10	1	WL
	09/12/10	4	WL
WL167 (new)	13/10/10	6	WL
WL168 (new)	13/10/10	9	WL
WL169 (new)	13/10/10	9	WL
WL170 (new)	01/12/10	10	SWL
WL171 (new)	01/12/10	2	WL

Appendix V. Association of Identified Dolphins on Each Survey Day During the Study Period

DATE	STG#	AREA	DOLPHIN ID
19/04/10	1	WL	WL91, WL123, WL155
"	2	WL	CH110, NL275, WL29, WL48, WL156
"	3	WL	WL50, WL109, WL131, WL138
"	4	WL	SL48, WL62, WL87, WL88, WL150
30/04/10	1	WL	NL224, WL98, WL131, WL149
"	2	WL	CH38, EL03, NL206, NL265, SL05, SL35, SL47, WL09, WL42, WL72, WL73, WL74, WL84, WL87, WL88, WL91, WL93, WL108, WL109, WL114, WL116, WL128, WL130, WL132, WL137, WL138, WL140, WL155
04/05/10	1	NWL	NL191
17/05/10	6	WL	NL165, NL265, WL25, WL66, WL72, WL79, WL109, WL135
"	7	WL	WL73
"	8	WL	WL42, WL128, WL144
"	10	WL	WL42, WL144
"	13	WL	CH113, NL265, WL25, WL79, WL109, WL127, WL131, WL149, WL157, WL158
18/05/10	1	WL	CH113, WL120, WL149, WL157
"	2	WL	WL43, WL109, WL131
"	5	WL	WL108
25/05/10	1	WL	WL88, WL123
"	4	WL	WL149
26/05/10	2	NWL	NL258
"	3	NWL	CH98
"	4	NEL	NL98
"	6	NEL	NL33
22/06/10	1	NEL	NL104, NL272
"	2	NWL	NL12
29/06/10	1	NEL	NL179
"	2	NWL	NL104, NL260, NL272
"	3	NWL	WL30
30/06/10	4	NWL	NL24
"	6	NWL	NL12, NL103, NL278
"	7	NWL	NL80
"	10	NWL	NL12, NL103, NL278, NL279
"	13	NWL	CH153, WL158
13/07/10	2	WL	WL118, WL138
"	3	WL	WL163
"	5	WL	WL55
"	6	WL	WL62, WL88, WL109, WL163
29/07/10	3	SWL	CH108, WL118
30/07/10	4	NWL	NL246, NL261
12/08/10	2	WL	WL74, WL128
"	3	WL	WL100
"	9	WL	WL42, WL164
"	10	WL	WL25, WL109
"	11	NWL	NL11, NL24, NL60, NL98, NL179, NL220, NL261
13/08/10	2	NWL	NL145, NL264
18/08/10	3	WL	WL25

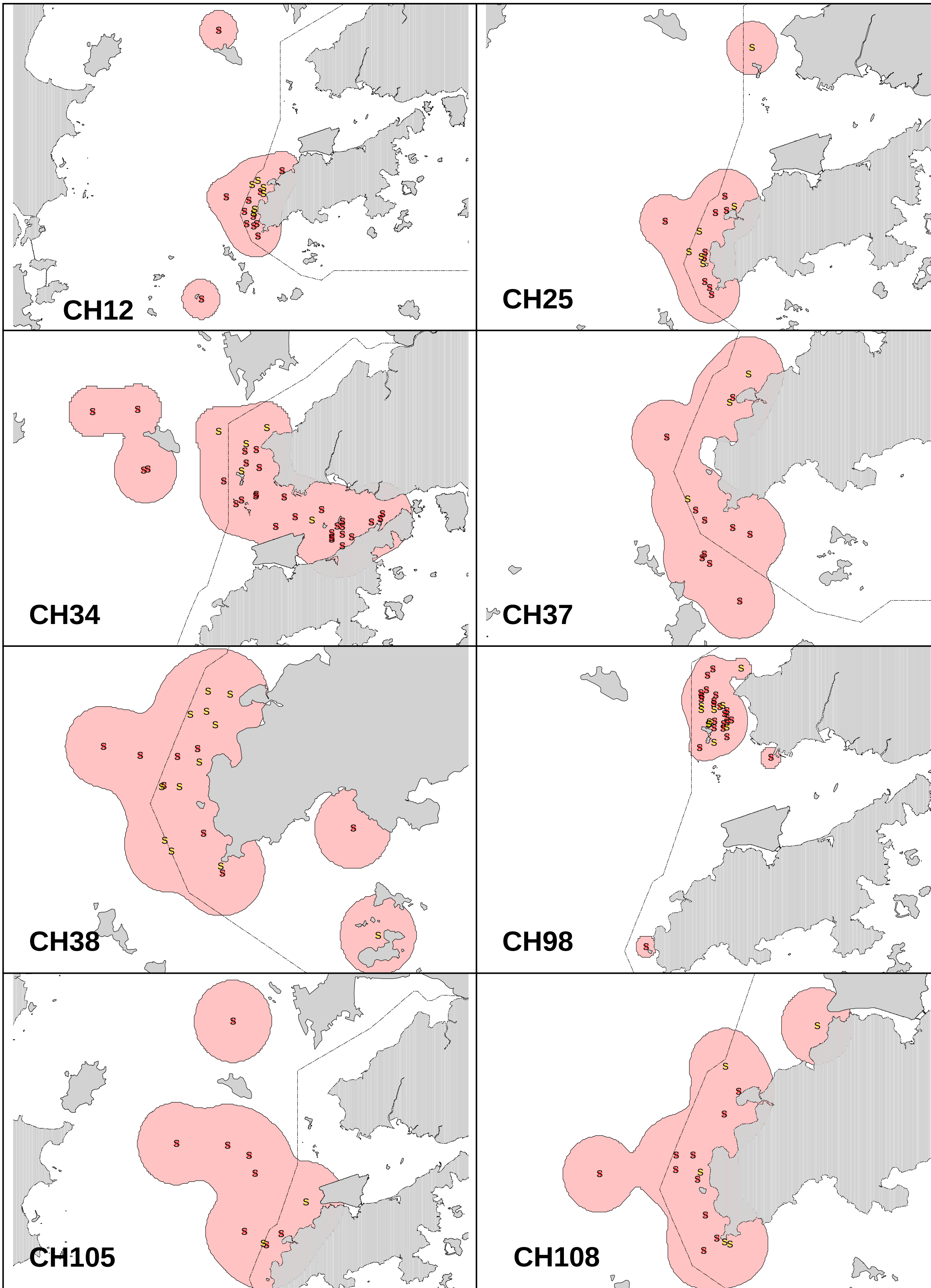
DATE	STG#	AREA	DOLPHIN ID
31/08/10	1	WL	NL49, NL136, NL244
"	5	WL	SL48, WL44, WL86, WL165
"	7	WL	NL264
"	10	NWL	NL48, NL123, NL165, NL179
01/09/10	1	WL	NL220, WL05, WL141
"	4	SWL	SL40
"	5	SWL	WL69, WL88
14/09/10	1	NWL	NL246
12/10/10	1	NWL	CH98, NL11, NL213, NL219
13/10/10	1	WL	WL98
"	2	WL	WL145
"	4	WL	WL29, WL66, WL142, WL153, WL156
"	5	WL	WL69
"	6	WL	NL156, WL05, WL69, WL167
"	7	WL	NL206
"	9	WL	SL40, WL09, WL42, WL68, WL73, WL86, WL88, WL129, WL132, WL165, WL168, WL169
"	13	WL	WL29, WL142
02/11/10	3	NWL	NL11, NL60, NL205, NL241, WL04
"	5	NEL	NL93
04/11/10	1	WL	NL156
"	2	WL	WL69
"	3	NWL	NL93, NL98, NL123, NL260, WL44
"	4	NWL	NL24, NL242
08/11/10	1	SWL	WL47, WL88
09/11/10	1	WL	WL86, WL165
"	2	WL	WL87, WL88
"	3	WL	SL05, WL86
18/11/10	1	NWL	NL48, NL182, NL205
"	2	DB	NL11
30/11/10	1	NWL	NL11, NL18, NL205
"	2	WL	CH12
"	4	WL	WL128
01/12/10	1	WL	WL56
"	2	WL	CH38, WL171
"	4	WL	WL42, WL68, WL123
"	5	WL	WL73
"	6	SWL	SL40, WL86, WL130, WL142
"	10	SWL	SL47, WL88, WL150, WL170
08/12/10	1	NEL	NL75
"	3	NEL	NL120, NL123
09/12/10	1	NWL	WL72
"	4	WL	WL86, WL165
"	6	WL	WL15, WL25, WL55, WL123
"	7	NWL	WL93
"	8	NWL	NL104, NL272
18/12/10	2	WL	WL146, WL160
"	3	WL	WL29, WL87, WL121, WL151, WL163
"	4	WL	WL154
"	5	WL	WL66, WL153
"	7	WL	WL21, WL66, WL153
"	9	NEL	NL24, NL33, NL98

Appendix V. (cont'd)

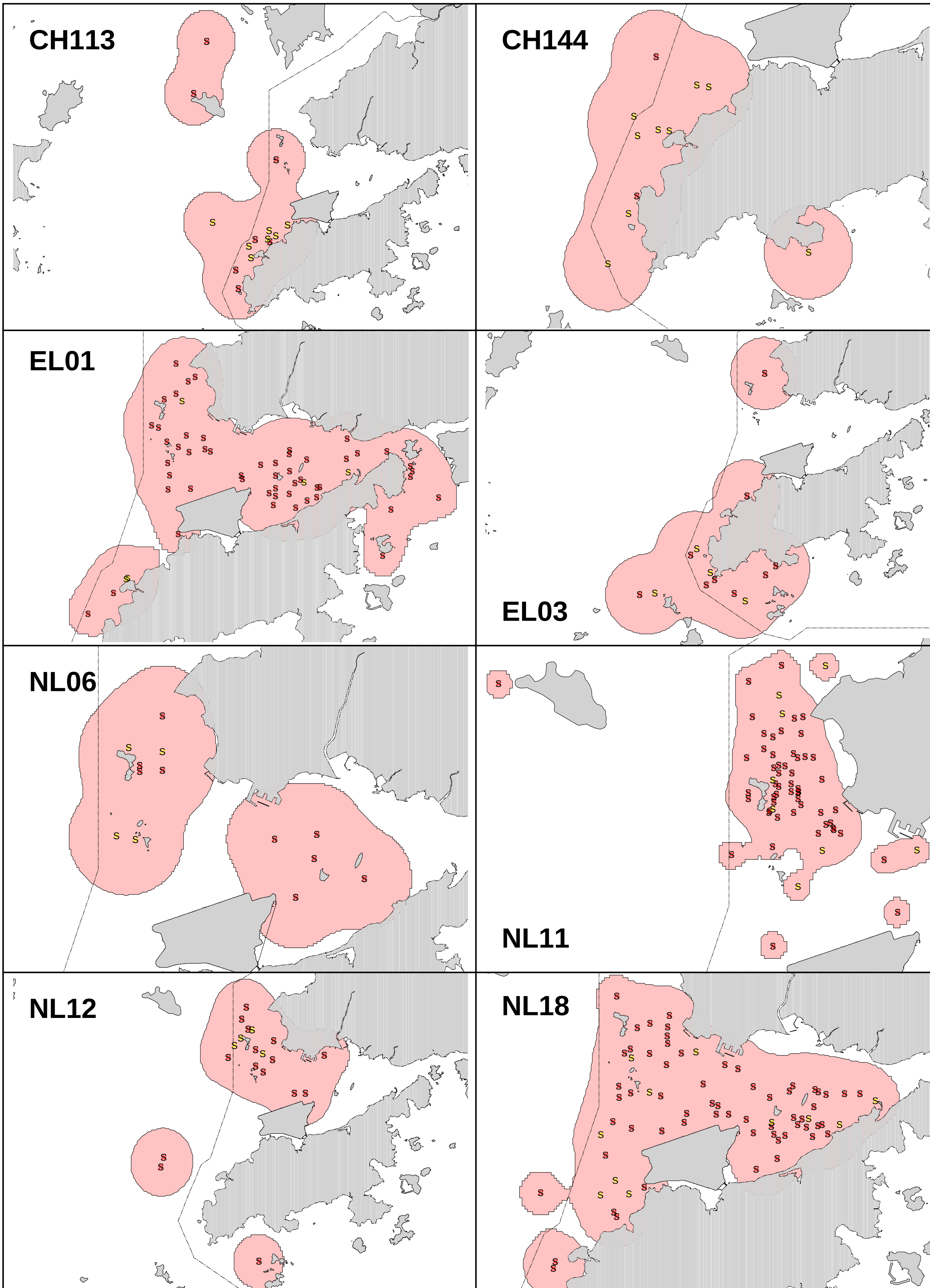
DATE	STG#	AREA	DOLPHIN ID
29/12/10	1	NWL	NL18, NL259
"	2	NWL	NL46, NL104, NL214, NL262, NL272
"	3	NWL	NL18, NL259
"	4	NEL	NL261
09/01/11	1	SWL	WL73
13/01/11	1	NEL	NL33, NL98, NL123, NL176, NL261
17/01/11	2	NWL	NL12, NL46, NL150, NL153, NL202, NL233, NL236, NL262, WL47
"	3	NWL	NL136, NL139, NL165
18/01/11	2	WL	WL25, WL109
27/01/11	1	NEL	NL24, NL33, NL75, NL104, NL191, NL246, NL261, NL272
"	4	DB	CH98, NL11
31/01/11	2	NEL	EL01, NL18, NL24, NL33, NL37, NL48, NL75, NL98, NL104, NL123, NL136, NL165, NL179, NL182, NL191, NL210, NL260, WL11, WL33, WL111
07/02/11	1	NEL	NL75
"	4	WL	WL21, WL25
08/02/11	1	WL	NL48
"	2	WL	NL48
"	3	WL	CH108, WL72
"	5	WL	CH108, WL21, WL72
"	7	WL	WL123
"	9	WL	WL50
"	10	WL	WL15, WL25
"	13	NWL	NL242, NL264, WL05
01/03/11	1	SEL	WL47, WL87, WL88
"	3	WL	WL164
08/03/11	3	NWL	NL37, NL103, NL214, NL233, NL241, NL258, WL162
10/03/11	3	NWL	CH34, NL210, NL233
"	4	NWL	NL46, NL188, NL262, WL11
23/03/11	1	NWL	NL182
"	3	NWL	CH98, NL48, NL136, NL241
"	4	NWL	CH34, NL104, NL272
"	5	NWL	NL118

Appendix VI. Ranging patterns (95% kernel ranges) of 107 individual dolphins with 10+ re-sightings that were sighted in 2009 and 2010

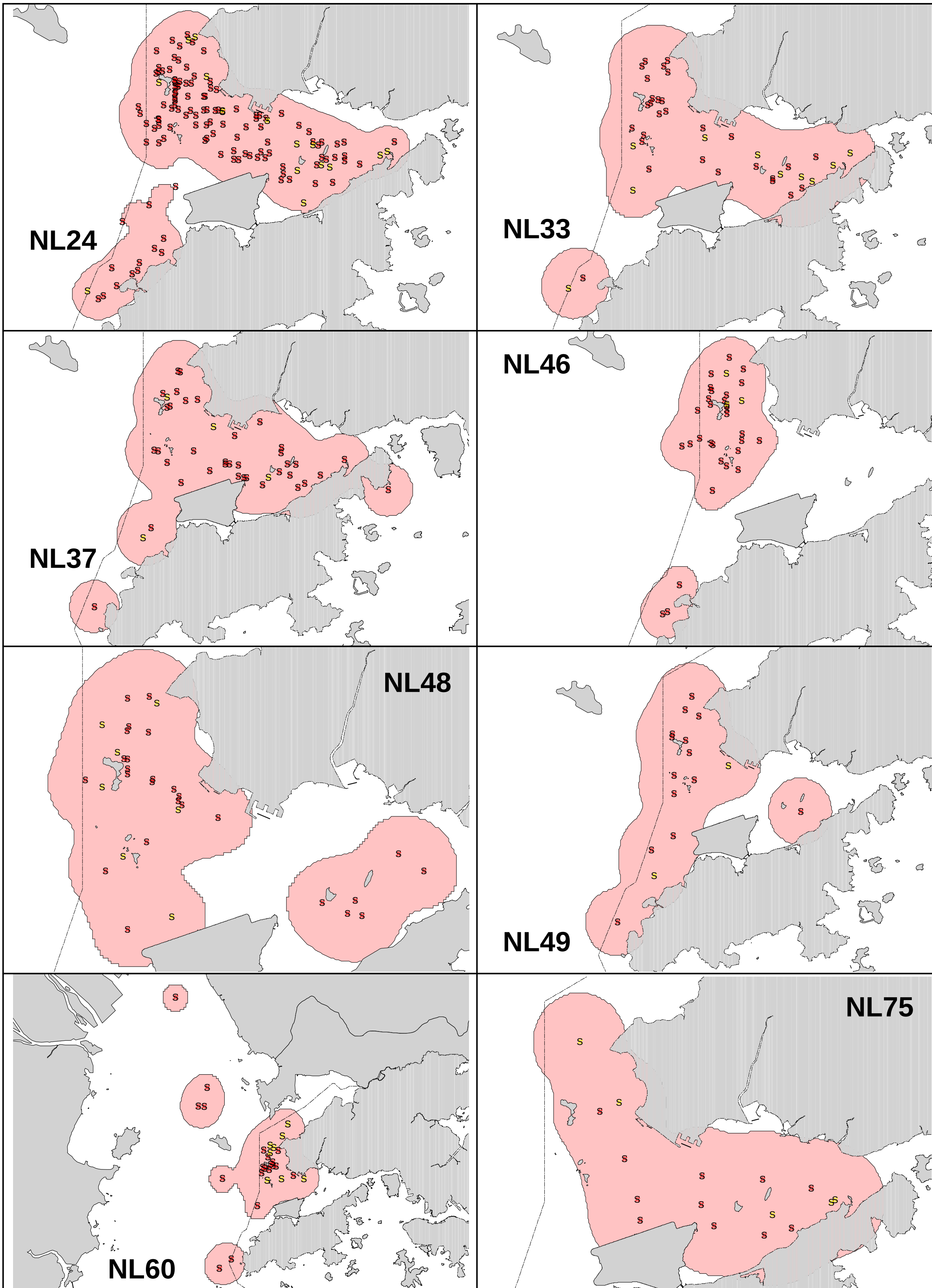
(note: yellow dots indicates sightings made in 2009 & 2010)



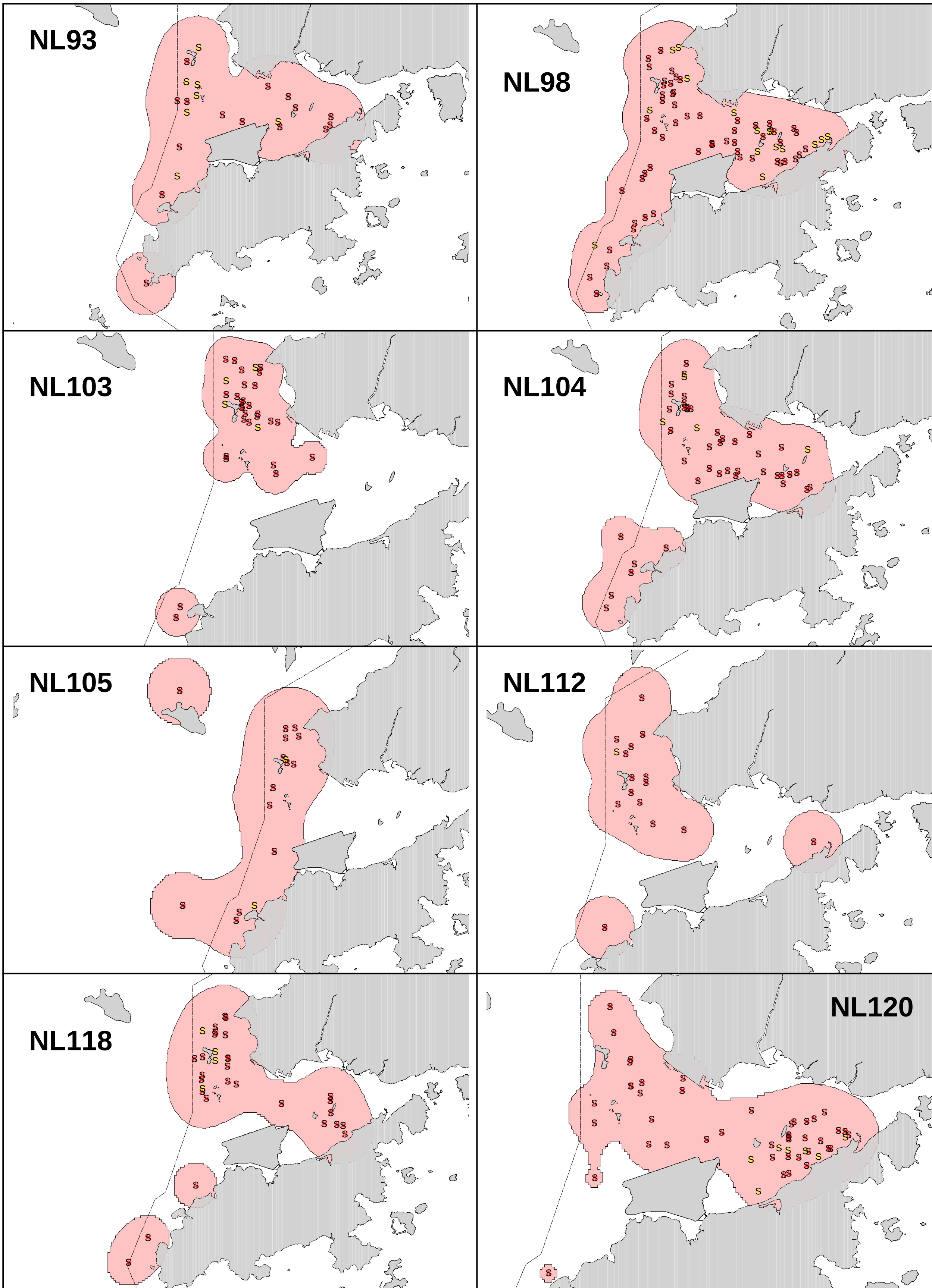
Appendix VI (cont'd).



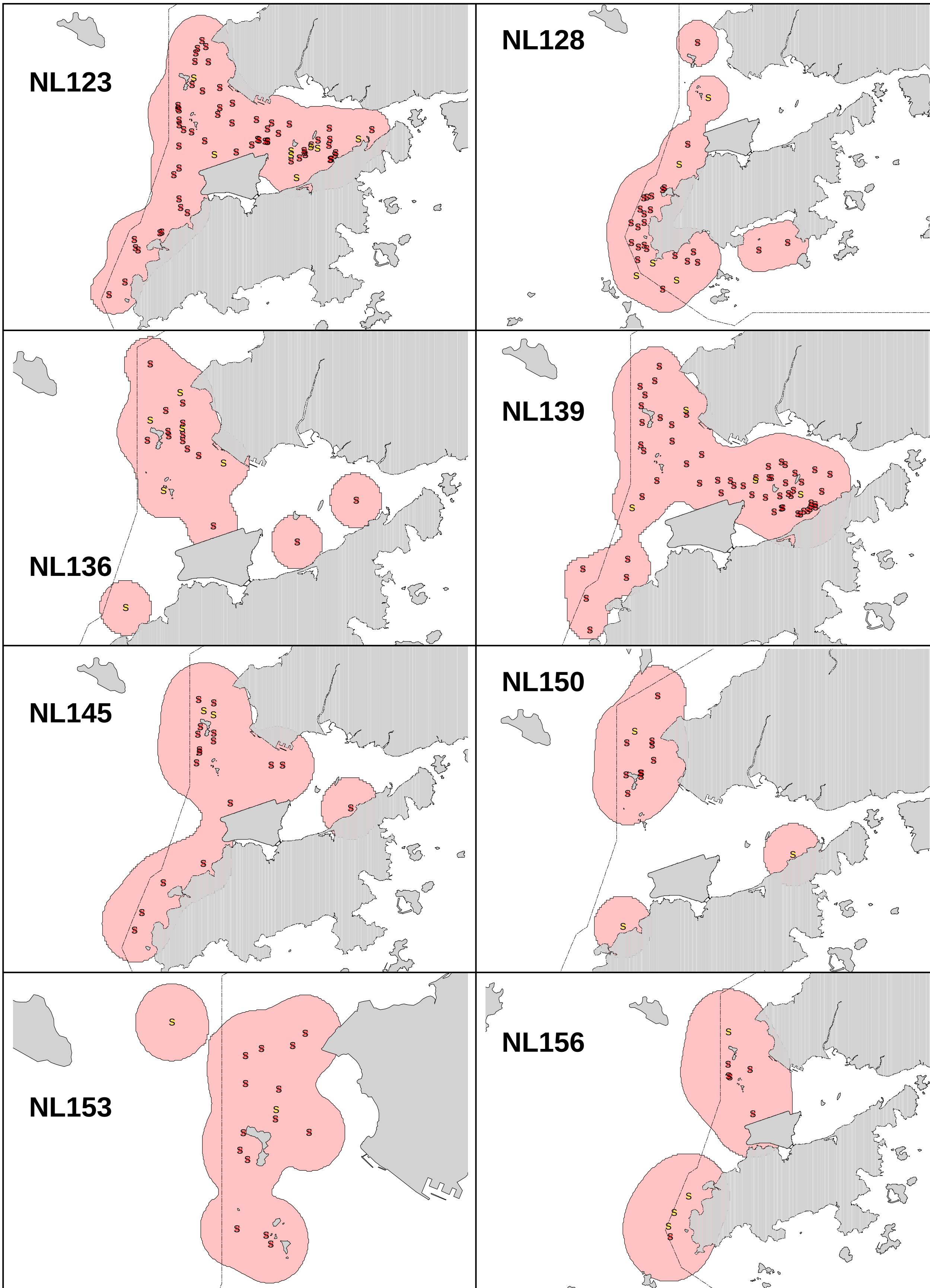
Appendix VI (cont'd).



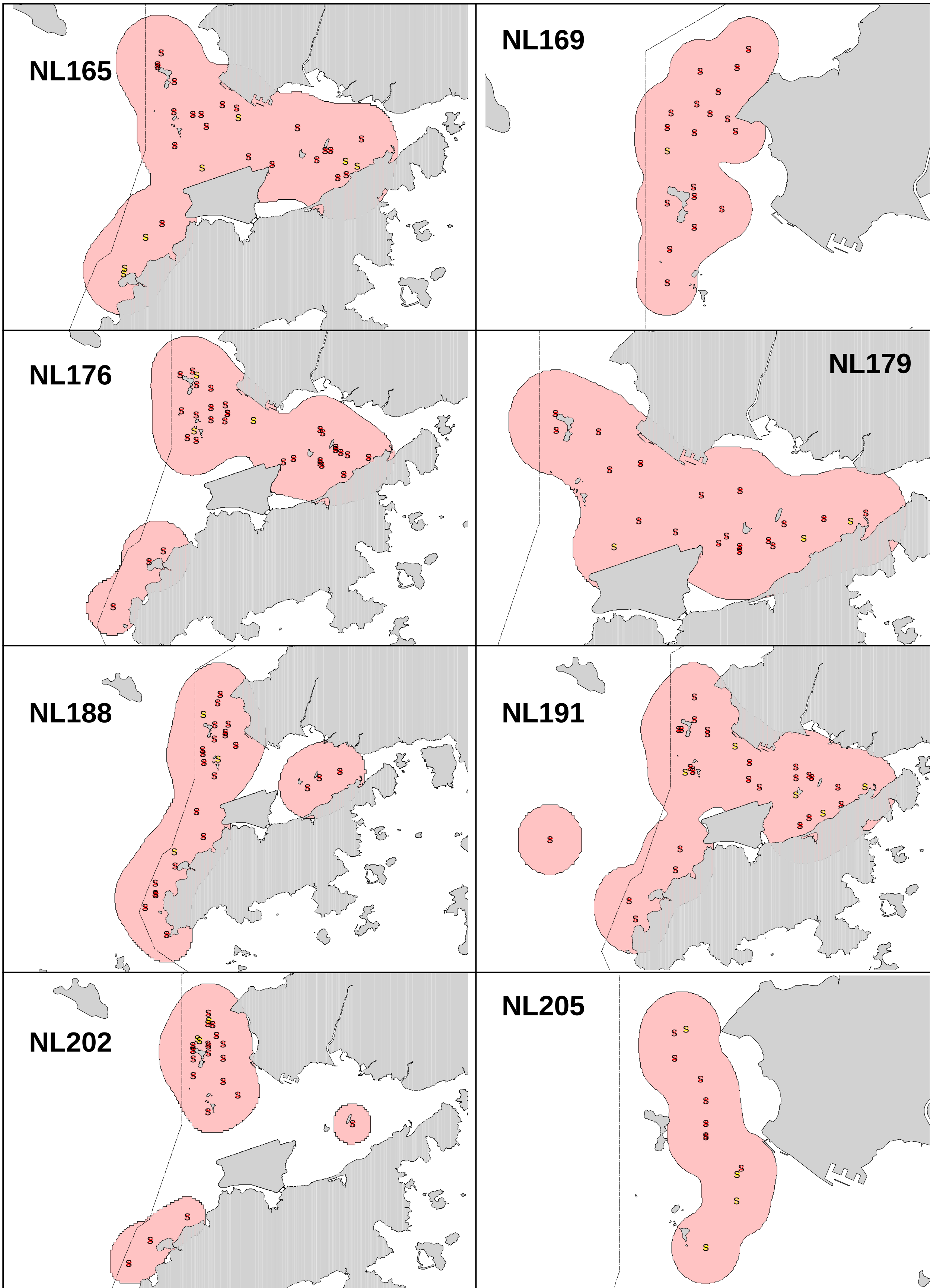
Appendix VI (cont'd).



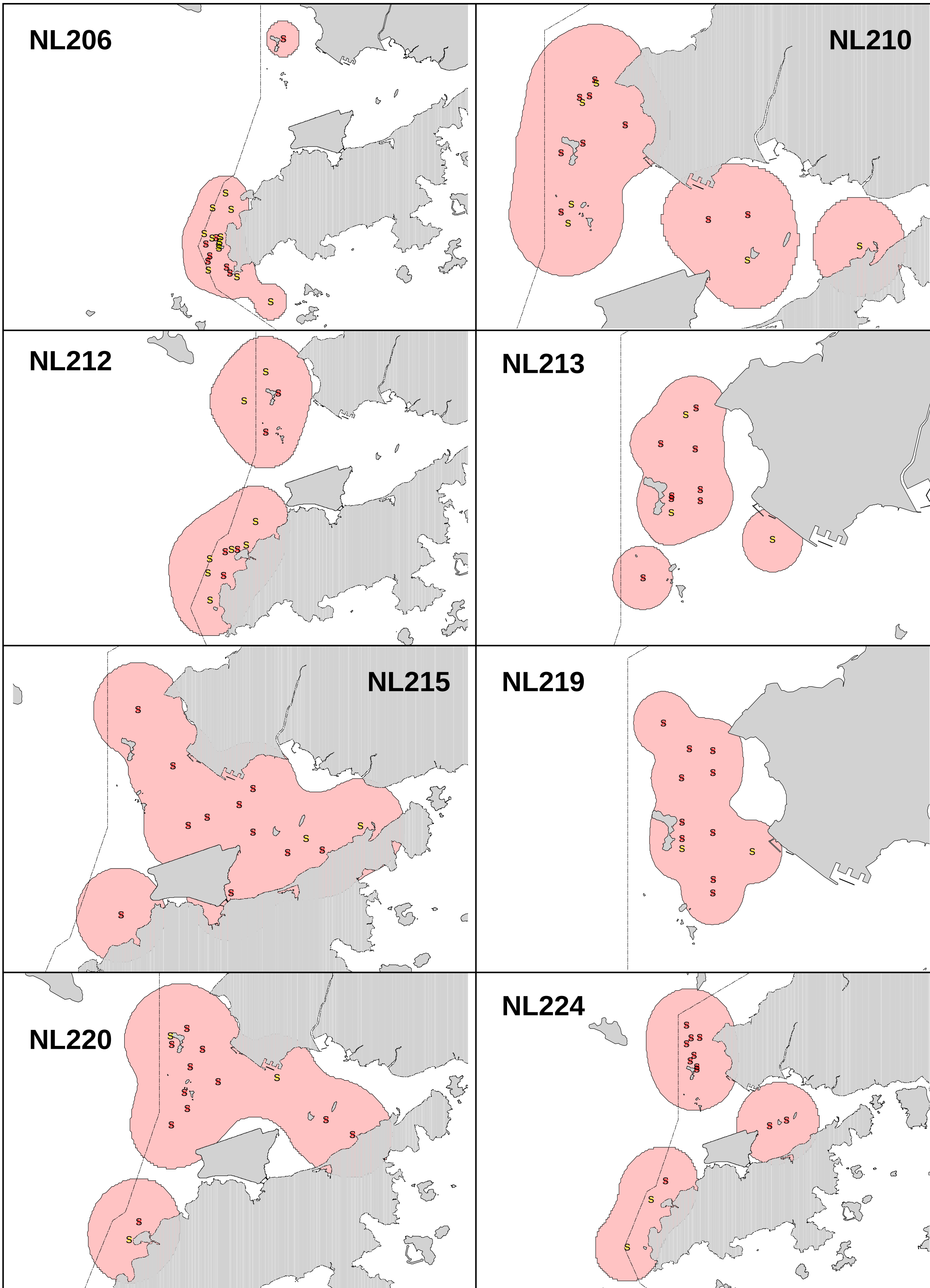
Appendix VI (cont'd).



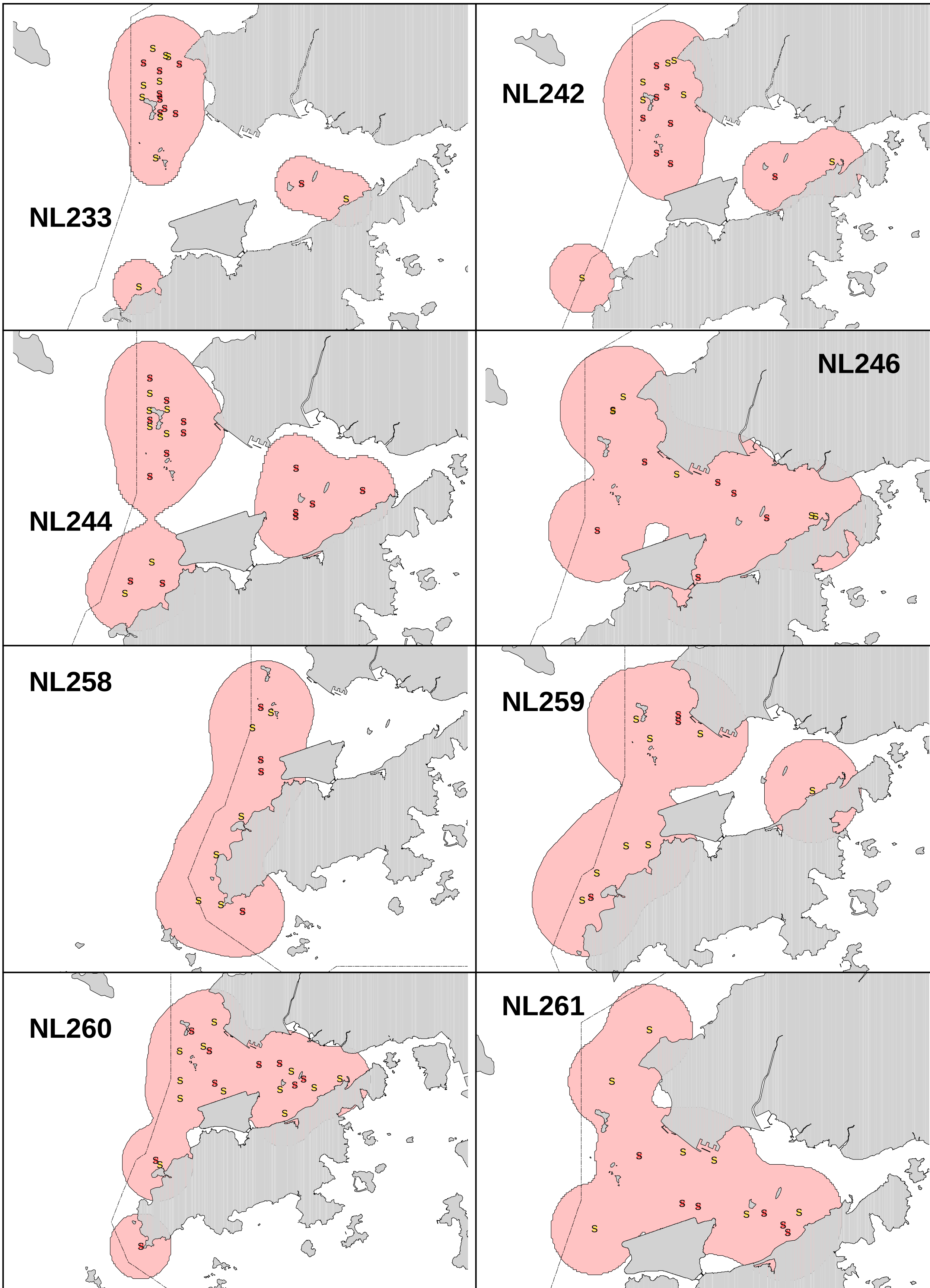
Appendix VI (cont'd).



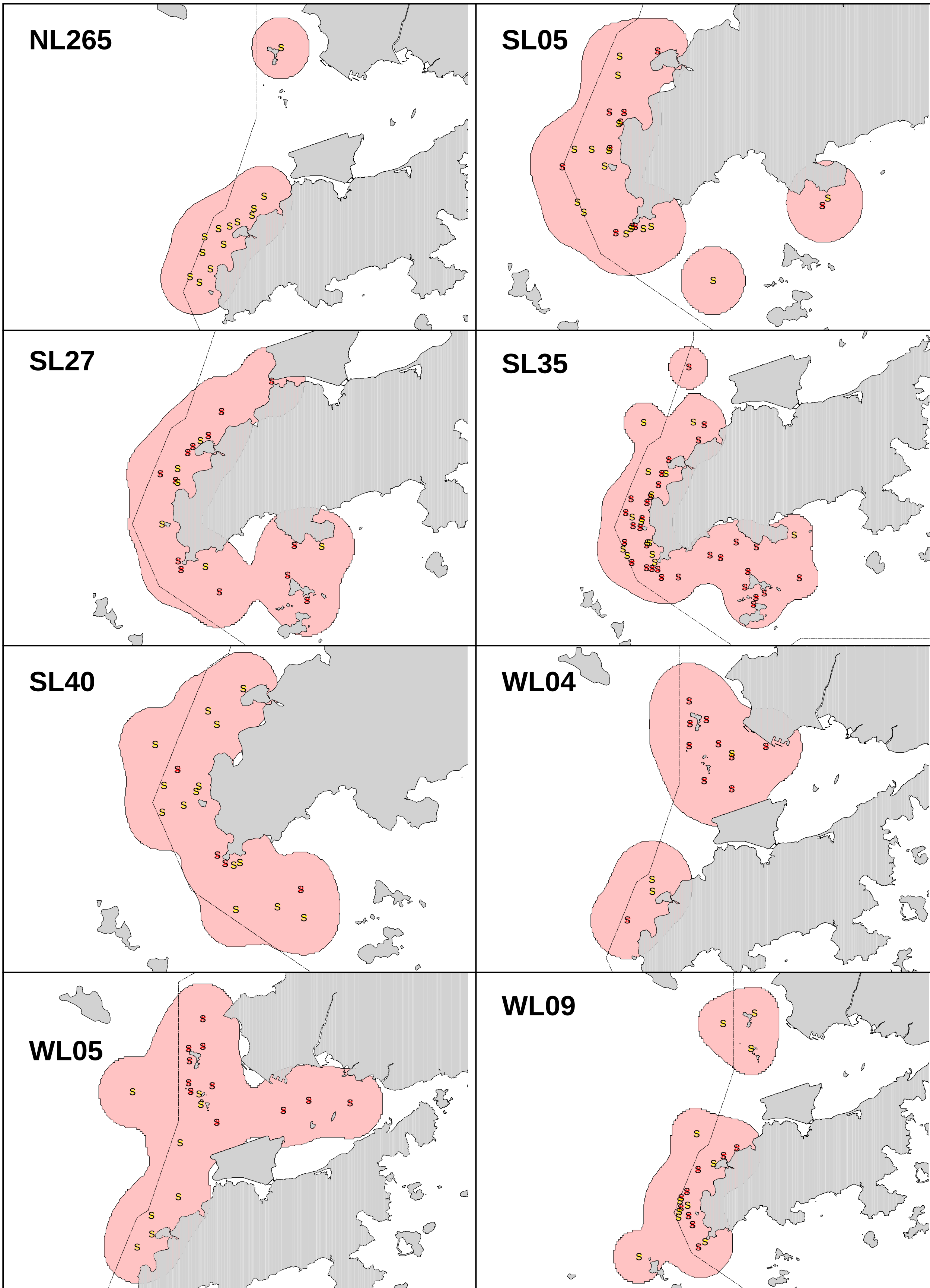
Appendix VI (cont'd).



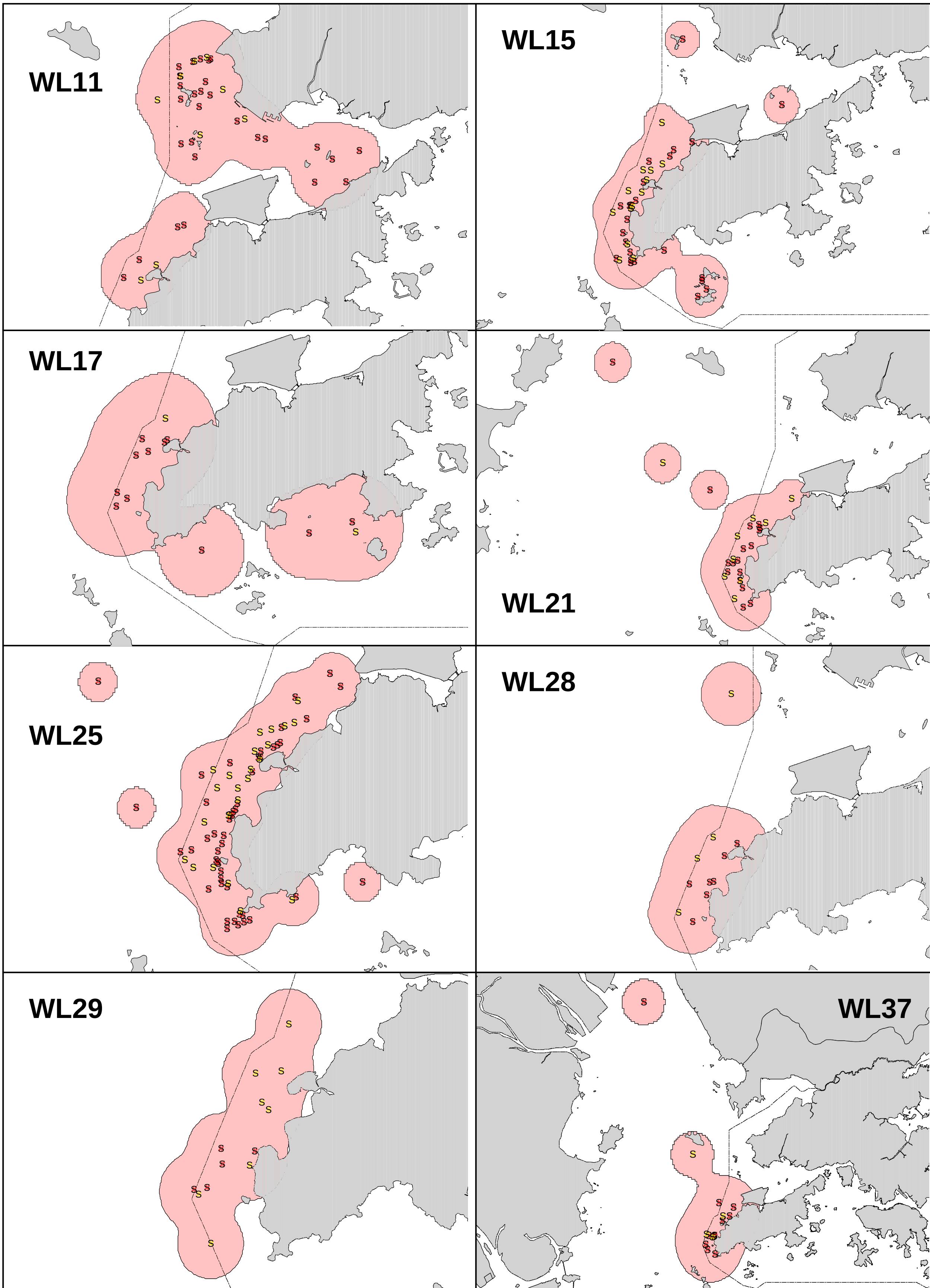
Appendix VI (cont'd).



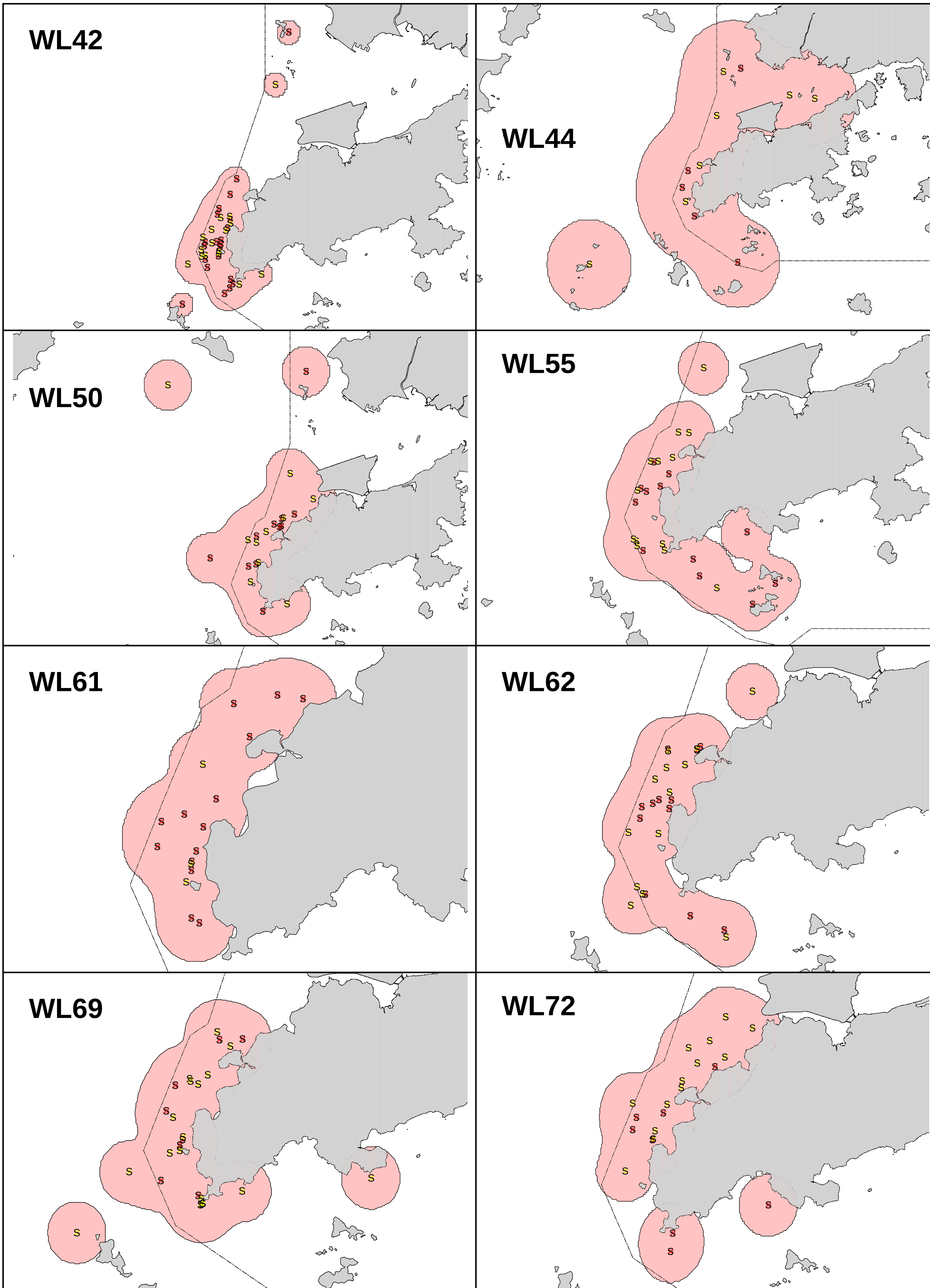
Appendix VI (cont'd).



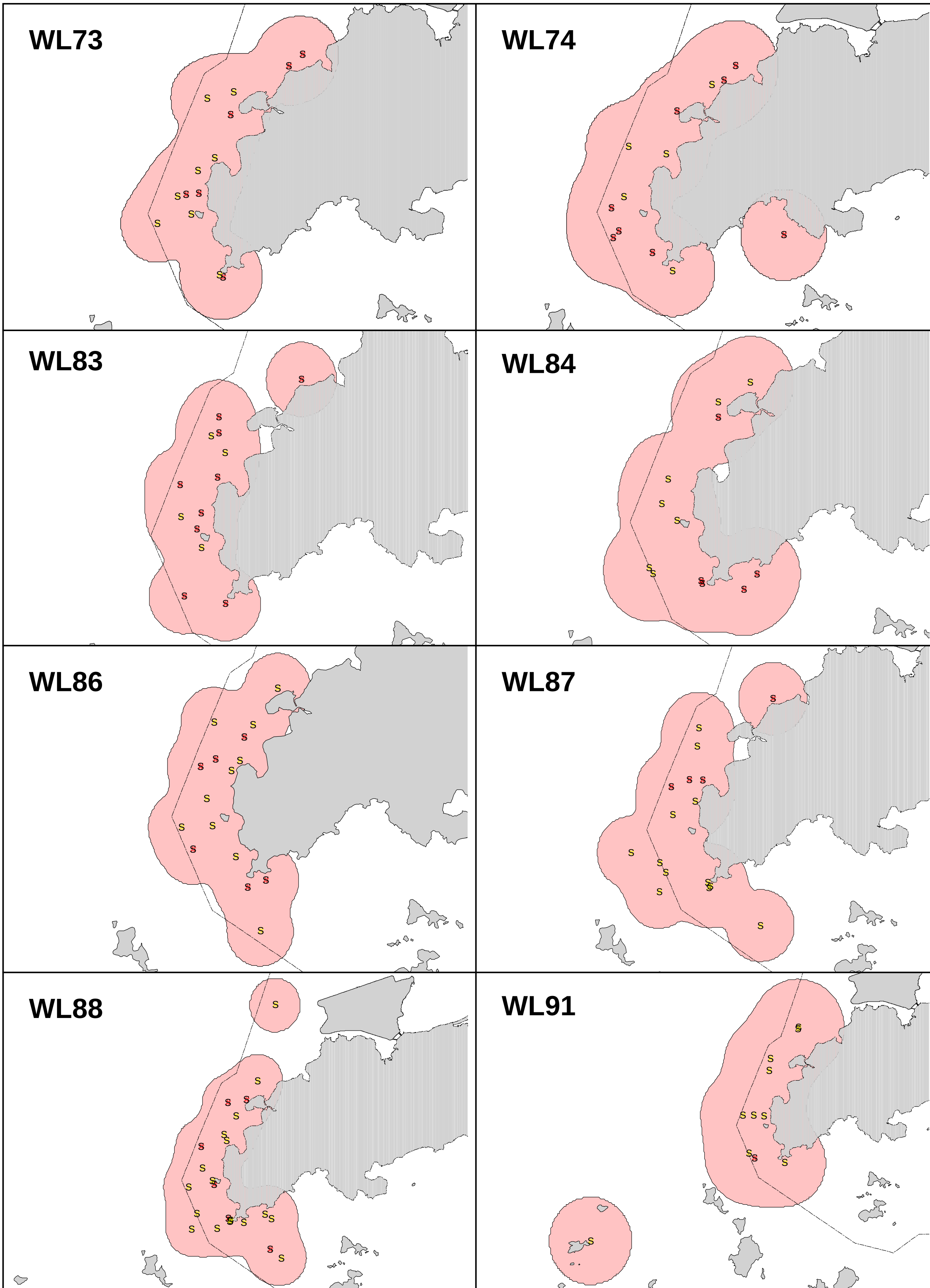
Appendix VI (cont'd).



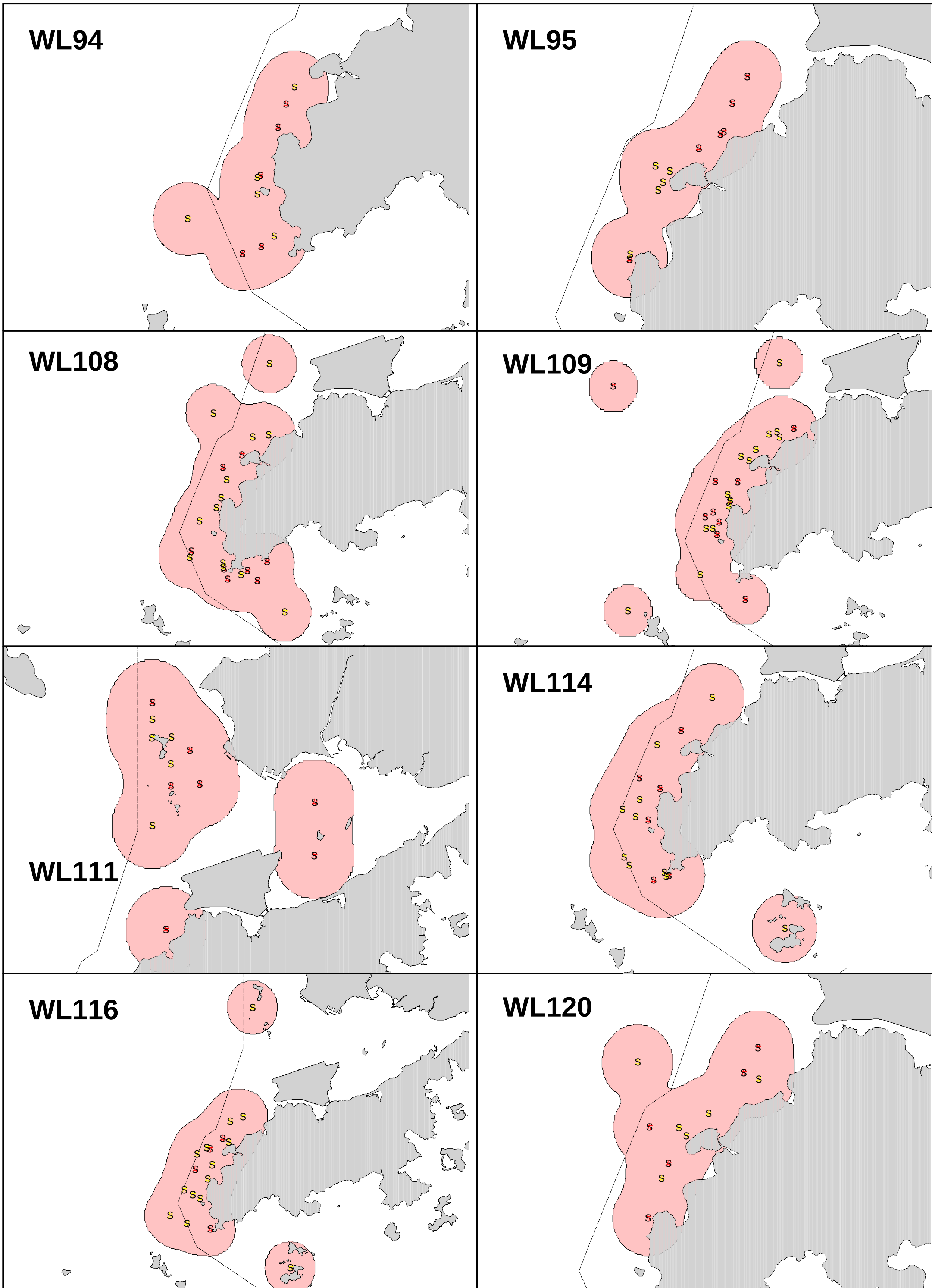
Appendix VI (cont'd).



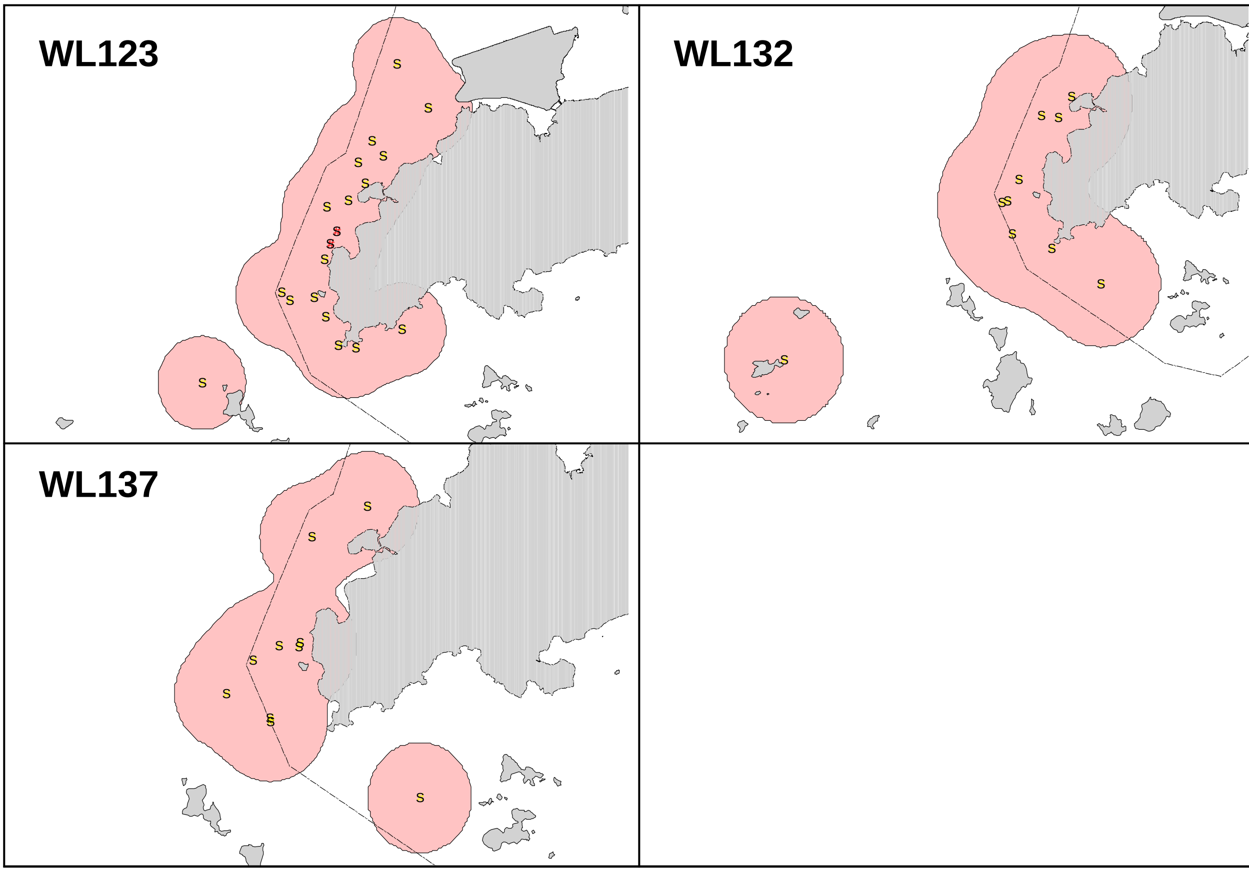
Appendix VI (cont'd).



Appendix VI (cont'd).



Appendix VI (cont'd).



Appendix VII. Underwater Acoustic Database (April 2010 - March 2011)

Date	File #	Begin Time	End Time	Location Latitude	Location Longitude	Area	Event	Beau	Hp	Water Depth	Hp Depth	HPF	ICP Gain	Note(s)
19-Apr-10	1	10:37:03	10:49:03	22.2777	113.8617	W LANTAU	WL Station #1	2	CR1/3	9.6	7	N	100x	near HKLR alignment
19-Apr-10	2	11:03:43	11:08:51	22.2769	113.8572	W LANTAU	Plane Noise Measurement	2	CR1/3	---	7	N	---	
19-Apr-10	3	11:12:39	11:13:00	22.2781	113.8586	W LANTAU	Idling Engine Noise	2	CR1/3	9.9	7	N	---	
19-Apr-10	4	11:27:35	11:35:35	22.2828	113.8509	W LANTAU	Dolphin Sighting	2	CR1/3	---	7	N	100x	dolphin socializing close to boat
19-Apr-10	5	11:36:43	11:40:30	22.2791	113.8517	W LANTAU	Dolphin Sighting	2	CR1/3	10.6	7	N	10x	dolphin socializing close to boat
19-Apr-10	6	11:51:43	11:54:20	22.2845	113.8517	W LANTAU	Dolphin Sighting	2	CR1/3	---	7	N	10x	dolphin socializing close to boat
19-Apr-10	7	12:31:59	12:42:00	22.2409	113.8399	W LANTAU	WL Station #2	2	CR1/3	11.0	7	N	100x	middle of WL survey area
19-Apr-10	8	12:58:53	13:03:40	22.2348	113.8402	W LANTAU	Dolphin Sighting	2	CR1/3	11.0	7	N	100x	CR3 - 2m below water; wala wala around
19-Apr-10	9	13:07:35	13:09:05	22.2353	113.8401	W LANTAU	Leaving Wala Wala	2	CR1/3	11.2	7	N	100x	
19-Apr-10	10	14:02:28	14:05:10	22.1899	113.8292	W LANTAU	WL Station #3	4	CR1/3	28.6	7	N	10x	near high-speed ferry lane at Fan Lau
19-Apr-10	11	14:07:33	14:11:03	22.1898	113.8287	W LANTAU	WL Station #3	4	CR1/3	28.6	7	N	100x	near high-speed ferry lane at Fan Lau
19-Apr-10	12	16:35:25	16:41:30	22.3099	113.9446	NE LANTAU	E of Airport Flight Path	2	CR1/3	3.4	1.5	N	---	CR1 was underneath boat for cue #1-5
19-Apr-10	13	16:45:22	16:49:25	22.3093	113.9429	NE LANTAU	E of Airport Flight Path	2	CR1/3	3.4	1.5	N	---	first plane directly overhead after 5 sec.
22-Apr-10	1	10:54:46	10:57:51	22.2994	113.8769	NW LANTAU	NWL Station #1	4	CR1/3	7.6	7	N	10x	west of airport platform
22-Apr-10	2	11:00:02	11:03:08	22.3020	113.8774	NW LANTAU	Shrimp Trawler	4	CR1/3	7.3	7	N	10x	
22-Apr-10	3	11:37:18	11:39:47	22.3540	113.8770	NW LANTAU	NWL Station #2	4	CR1/3	7.9	7	N	10x	near Pak Chau inside SCLKC MP
22-Apr-10	4	12:55:44	12:58:47	22.4208	113.9081	DEEP BAY	DB Station #1	3	CR1	8.8	7	N	10x	near Black Point Power Station; lite rain
22-Apr-10	5	13:31:22	13:33:43	22.3919	113.9029	NW LANTAU	NWL Station #3	2	CR1	14.5	7	N	10x	at Urmston Road off Lung Kwu Tan
22-Apr-10	6	14:33:12	14:36:15	22.3527	113.8915	NW LANTAU	E of AFRF (~100m)	2	CR1	10.5	7	N	10x	record off-loading tanker noise near AFRF; lite rain
22-Apr-10	7	14:43:25	14:46:30	22.3549	113.8905	NW LANTAU	E of AFRF (~100m)	2	CR1	11.2	7	N	10x	record off-loading tanker noise near AFRF
22-Apr-10	8	14:53:27	14:56:55	22.3516	113.8950	NW LANTAU	E of AFRF (~500m)	2	CR1	10.5	7	N	10x	record off-loading tanker noise near AFRF
22-Apr-10	9	15:12:11	15:15:31	22.3557	113.8987	NW LANTAU	E of AFRF (~1000m)	2	CR1	10.3	7	N	10x	record off-loading tanker noise near AFRF
22-Apr-10	10	15:29:02	15:33:36	22.3404	113.9214	NW LANTAU	Near dredger#1 at CMP V	2	CR1	17.4	7	N	10x	record noise of grab-dredger at CMP#5 (108m to begin)
22-Apr-10	11	15:42:02	15:45:05	22.3401	113.9250	NW LANTAU	Near dredger#2 at CMP V	2	CR1	20.2	7	N	10x	record noise of grab-dredger at CMP#5 (70m to begin)
22-Apr-10	12	16:04:51	16:06:27	22.3165	113.9538	NE LANTAU	At future BCF area	2	CR1	5.6	7	N	10x	Hp was on the sea bottom
22-Apr-10	13	16:09:44	16:12:54	22.3159	113.9544	NE LANTAU	At future BCF area	2	CR1	5.6	3	N	10x	stationary working boat 208m nearby
22-Apr-10	14	16:30:10	16:36:04	22.3309	113.9843	NE LANTAU	NEL Station #1	2	CR1	12.6	7	N	10x	b/w Brothers Islands; Hang trawler >2km approaching with prob. sound; croaking noise
22-Apr-10	15	16:40:17	16:48:32	22.3294	113.9892	NE LANTAU	NEL Station #1	2	CR1	12.6	7	N	10x	b/w Brothers Islands; hang trawler approaching; croaking noise quite loud esp. begin.
22-Apr-10	16	17:10:44	17:26:00	22.3533	114.0257	NE LANTAU	NEL Station #2	2	CR1	22.4	7	N	10x	at Urmston Road off Siu Lam; very busy shipping traffic
30-Apr-10	1	11:59:03	12:04:07	22.2218	113.8274	W LANTAU	WL Station #2	2	CR1	17.9	7	N	10x	from stereo to mono at 2m11s
30-Apr-10	2	14:32:27	14:39:31	22.3593	113.9271	NW LANTAU	S of PAFF	2	CR1	20.8	7	N	10x	
30-Apr-10	3	16:07:48	16:13:06	22.3769	113.8868	NW LANTAU	E of LKC Jetty	2	CR1	7.6	7	N	10x	faint croaking sound
17-May-10	1	10:47:10	10:52:15	22.2776	113.8618	W LANTAU	WL Station #1	2	CR1	10.7	7	N	10x	
17-May-10	2	11:21:55	11:24:57	22.2801	113.8585	W LANTAU	Dolphin Sighting	2	CR1/3	8.5	7	N	10x	dolphins swimming past by boat slowly
17-May-10	3	14:36:26	14:42:39	22.2710	113.8742	W LANTAU	Dolphin Sighting	2	CR1/3	7.6	7	N	10x	several dolphins 120m away breaching/feeding; croaking sound; strange noises
17-May-10	4	15:47:43	15:52:44	22.3175	113.9522	NE LANTAU	NEL Station #3	3	CR1	5.1	3	N	10x	at BCF reclamation site; faint croaking sound
17-May-10	5	16:59:58	17:03:07	22.3238	113.9844	NE LANTAU	NEL Station #1	4	CR1	11.7	7	N	10x	
18-May-10	1	10:11:33	10:14:19	22.2742	113.8742	W LANTAU	Dolphin Sighting	3	CR1/3	8.5	7	N	10x	dolphins socializing close to boat
18-May-10	2	10:22:18	10:24:19	22.2726	113.8759	W LANTAU	Dolphin Sighting	2	CR1/3	8.2	7	Y	10x	dolphins breaching further away from boat
18-May-10	3	13:16:27	13:20:29	22.1434	113.8991	SW LANTAU	SWL Station #1	1	CR1	18.6	7	N	10x	south of Tai A Chau
18-May-10	4	16:07:34	16:10:35	22.1891	113.9843	SE LANTAU	SEL Station #1	1	CR1	15.7	7	N	10x	southwest of Shek Kwu Chau
23-Jun-10	1	10:38:50	10:43:54	22.2768	113.8620	W LANTAU	WL Station #1	2	CR1	8.9	7	N	10x	
23-Jun-10	2	12:07:03	12:13:05	22.2042	113.8326	W LANTAU	WL Station #2	3	CR1	14.9	7	N	10x	faint croaking sound
23-Jun-10	3	15:14:45	15:19:50	22.3222	113.9535	NE LANTAU	NEL Station #1	2	CR1	7.5	5.5	N	10x	two stationary barges 313m & ~1km away
23-Jun-10	4	16:04:04	16:07:07	22.3272	113.9734	NE LANTAU	NEL Station #2	2	CR1	8.1	7	N	10x	faint croaking sound; shrimp trawler ~2km away
23-Jun-10	5	17:00:38	17:05:41	22.3536	114.0336	NE LANTAU	NEL Station #3	3	CR1	31.3	7	N	10x	heavy rain and thunderstorm

Appendix VII. (cont'd)

Date	File #	Begin Time	End Time	Location Latitude	Location Longitude	Area	Event	Beau	Hp	Water Depth	Hp Depth	HPF	ICP Gain	Note(s)
29-Jun-10	1	13:31:55	13:37:27	22.3584	113.9361	NW LANTAU	S of PAFF	2	CR1	18.9	7	N	10x	
29-Jun-10	2	14:08:12	14:11:28	22.3365	113.9288	NW LANTAU	Near Dredger at CMP V	3	CR1	8.8	7	N	10x	stationary sand barge 570 m away
29-Jun-10	3	15:32:26	15:38:12	22.3828	113.9028	NW LANTAU	NWL Station #3	2	CR1	20.1	7	N	10x	at Urmston Road
29-Jun-10	4	16:55:50	16:58:53	22.3772	113.8877	NW LANTAU	NE of LKC	3	CR1	15.7	7	N	10x	faint croaking sound dolphins close by @ 16:55
30-Jun-10	1	13:08:06	13:13:05	22.3445	113.8761	NW LANTAU	SW of Sha Chau	1	CR1/3	7.7	3	Y	10x	ICP gain switch to 100x @ 1:16; dolphin very close by; faint croaking sound
30-Jun-10	2	13:50:43	13:53:46	22.2762	113.8615	W LANTAU	WL Station #1	3	CR1	9.7	7	N	10x	small boat moving away 1 km; shrimp trawler moving away 1.5 km
30-Jun-10	3	15:13:35	15:16:47	22.1909	113.8425	W LANTAU	WL Station #3	3	CR1	22.7	7	N	10x	
30-Jun-10	4	16:03:28	16:06:32	22.2189	113.8321	W LANTAU	WL Station #2	4	CR1	12.7	7	N	10x	croaking sound
13-Jul-10	1	11:04:15	11:07:18	22.2755	113.8612	W LANTAU	WL Station #1	2	CR1	10.4	7	N	10x	
13-Jul-10	2	12:54:09	12:58:12	22.1877	113.8428	W LANTAU	WL Station #3	2	CR1	23.9	7	N	10x	
13-Jul-10	3	13:42:07	13:45:21	22.2125	113.8246	W LANTAU	WL Station #2	3	CR1	21.1	7	N	10x	
13-Jul-10	4	16:16:11	16:19:40	22.3750	113.8887	NW LANTAU	NWL Station #2	4	CR1	11.8	7	N	10x	croaking sound
13-Jul-10	5	17:00:41	17:04:04	22.3277	113.9171	NW LANTAU	NWL Station #5	4	CR1	5.5	7	N	10x	snapping shrimp sound
30-Jul-10	1	11:45:55	11:51:23	22.3836	113.8825	NW LANTAU	NWL Station #2	2	CR1	8.7	7	N	10x	Buoy hit side of the boat; a dolphin 50 m away
30-Jul-10	3	13:18:39	13:22:43	22.3840	113.9070	NW LANTAU	NWL Station #3	3	CR1	13.9	7	N	10x	
30-Jul-10	4	14:15:20	14:18:37	22.3612	113.9254	NE LANTAU	NEL Station #3	3	CR1	20.9	7	N	10x	
30-Jul-10	5	15:50:42	15:54:47	22.3281	113.9844	NE LANTAU	NEL Station #2	3	CR1	9.8	7	N	10x	snapping shrimp sound and faint croaking sound at background
12-Aug-10	1	16:04:40	16:07:51	22.3579	113.9271	NW LANTAU	NWL Station #4	3	CR1	21.1	7	N	10x	buoy hit side of the boat
12-Aug-10	2	17:13:04	17:16:08	22.3897	113.9073	NW LANTAU	NWL Station #3	3	CR1	6.9	7	N	10x	
13-Aug-10	1	10:51:39	10:54:44	22.3517	113.8716	NW LANTAU	NWL Station #1	3	CR1	7.3	7	N	10x	
13-Aug-10	2	11:48:05	11:52:25	22.4143	113.8969	DEEP BAY	DB Station #1	3	CR1	11.3	7	N	10x	
13-Aug-10	3	15:20:28	15:24:14	22.3807	113.8880	NW LANTAU	NWL Station #2	3	CR1	16.8	7	N	10x	
13-Aug-10	4	17:27:04	17:30:10	22.3369	113.9183	NW LANTAU	NWL Station #5	3	CR1	7.1	7	N	10x	Stationary Dredger 459 m
1-Sep-10	1	12:29:08	12:32:12	22.2016	113.8859	SW LANTAU	SWL Station #3	3	CR1	7.9	7	N	10x	faint croaking sound; sand barge moving away
1-Sep-10	2	13:09:38	13:12:42	22.1735	113.9095	SW LANTAU	SWL Station #2	3	CR1	14.9	7	N	10x	
1-Sep-10	3	13:29:04	13:32:39	22.1438	113.9066	SW LANTAU	SWL Station #1	3	CR1	16.0	7	N	10x	
1-Sep-10	4	15:01:50	15:05:11	22.1564	113.9445	SE LANTAU	SEL Station #3	2	CR1	15.0	7	N	10x	Shrimp trawler; fishery boat 624 m
1-Sep-10	5	15:49:26	15:52:27	22.2228	113.9652	SE LANTAU	SEL Station #2	2	CR1	7.6	7	N	10x	
1-Sep-10	6	16:16:35	16:19:48	22.1892	113.9816	SE LANTAU	SEL Station #1	2	CR1	13.5	7	N	10x	marine police ~1 km
14-Sep-10	1	10:40:32	10:45:43	22.3539	114.0334	NE LANTAU	NEL Station #4	2	CR1	23.3	7	N	10x	trash boat 190 m
14-Sep-10	2	12:02:49	12:05:57	22.3285	113.9832	NE LANTAU	NEL Station #2	2	CR1	10.0	7	N	10x	
14-Sep-10	3	12:23:52	12:27:10	22.3622	113.9841	NE LANTAU	NEL Station #3	2	CR1	14.0	7	N	10x	
14-Sep-10	4	13:13:01	13:16:05	22.3152	113.9634	NE LANTAU	NEL Station #1	3	CR1	5.9	5	N	10x	exploring platform 502 m, croaking sound
14-Sep-10	5	14:40:31	14:43:35	22.3573	113.9365	NW LANTAU	NWL Station #4	3	CR1	19.0	7	N	10x	
14-Sep-10	6	15:22:49	15:25:52	22.3300	113.9164	NW LANTAU	NWL Station #5	2	CR1	7.0	7	N	10x	
14-Sep-10	7	16:17:52	16:21:10	22.3850	113.8960	NW LANTAU	NWL Station #3	2	CR1	22.1	7	N	10x	
14-Sep-10	8	16:56:05	16:59:06	22.3773	113.8685	NW LANTAU	West of Lung Kwu Chau	2	CR1	6.8	7	N	10x	croaking sound
14-Sep-10	9	17:14:30	17:17:33	22.3521	113.8765	NW LANTAU	NWL Station #1	2	CR1	6.3	4	N	10x	croaking sound
15-Sep-10	10	12:14:28	12:24:07	22.2376	113.8284	W LANTAU	WL	3	CR1/3	15.2	4/7	N	10x	dolphin ~20 m; snapping shrimp sound
15-Sep-10	11	14:18:54	14:22:02	22.3840	113.8839	NW LANTAU	NWL Station #2	4	CR1	9.8	7	N	10x	
12-Oct-10	1	10:32:09	10:35:17	22.3534	114.0274	NE LANTAU	NEL Station #4	2	CR1	23.7	7	N	10x	
12-Oct-10	3	11:20:27	11:23:31	22.3641	113.9823	NE LANTAU	NEL Station #3	2	CR1	11.3	7	N	10x	
12-Oct-10	4	11:46:09	11:49:18	22.3314	113.9837	NE LANTAU	NEL Station #2	2	CR1	11.2	7	N	10x	croaking sound
12-Oct-10	5	12:16:17	12:19:29	22.3169	113.9634	NE LANTAU	NEL Station #1	2	CR1	6.3	6	N	10x	
12-Oct-10	6	13:14:56	13:18:18	22.3382	113.9268	NW LANTAU	NWL Station #5	2	CR1	8.2	7	N	10x	snapping shrimp sound
12-Oct-10	7	13:30:56	13:34:15	22.3619	113.9265	NW LANTAU	NWL Station #4	3	CR1	19.5	7	N	10x	
12-Oct-10	8	14:02:29	14:06:45	22.3897	113.9066	NW LANTAU	NWL Station #3	1	CR1	8.8	7	N	10x	
12-Oct-10	9	15:43:37	15:46:49	22.3822	113.8863	NW LANTAU	NWL Station #2	1	CR1	14.7	7	N	10x	snapping shrimp sound
12-Oct-10	10	16:47:46	16:50:50	22.3465	113.8699	NW LANTAU	NWL Station #1	1	CR1	6.3	6	N	10x	croaking sound

Appendix VII. (cont'd)

Date	File #	Begin Time	End Time	Location Latitude	Location Longitude	Area	Event	Beau	Hp	Water Depth	Hp Depth	HPF	ICP Gain	Note(s)
1-Feb-11	1	14:31:26	14:36:39	22.3597	113.9746	NE LANTAU	NEL Station #3	3	CR1	10.2	7	N	10x	
1-Feb-11	2	15:54:40	15:59:39	22.3247	113.9837	NE LANTAU	NEL Station #2	3	CR1	12.2	7	N	10x	
7-Feb-11	1	13:54:23	13:57:28	22.2772	113.8609	W LANTAU	WL Station #1	2	CR1	9.2	7	N	10x	single trawler ~1 km
7-Feb-11	2	15:12:16	15:15:19	22.2232	113.8327	W LANTAU	WL Station #2	2	CR1	12.1	7	N	10x	
7-Feb-11	3	15:57:05	16:00:09	22.1873	113.8371	W LANTAU	WL Station# 3	4	CR1	25.2	7	N	10x	
8-Feb-11	4	15:38:02	15:41:05	22.3497	113.8770	NW LANTAU	NWL Station #1	2	CR1	6.9	7	N	10x	
8-Feb-11	5	16:04:34	16:07:40	22.3849	113.8826	NW LANTAU	NWL Station #2	2	CR1	8	7	N	10x	
8-Feb-11	6	16:17:05	16:20:09	22.3863	113.8983	NW LANTAU	NWL Station #3	2	CR1	21.8	7	N	10x	fishing boat ~1 km
1-Mar-11	1	11:24:35	11:29:38	22.2227	113.9732	SE LANTAU	SEL Station #2	2	CR1	7.5	7	N	10x	pair trawler ~1.5 km
1-Mar-11	2	11:48:48	11:52:18	22.2230	113.9736	SE LANTAU	Dolphin Sighting	2	CR1/3	7	7	Y	10x	at Mong Tung Wan; 8 dolphins feeding inside pair trawl net 300-400 m away
1-Mar-11	3	12:15:35	12:19:42	22.1902	113.9726	SE LANTAU	SEL Station #1	3	CR1	13.5	7	N	10x	strange engine noise but no boat around, snapping shrimp sound
1-Mar-11	4	12:50:17	12:54:22	22.1613	113.9533	SE LANTAU	SEL Station #3	2	CR1	16	7	N	10x	fishing boat ~2 km
1-Mar-11	5	14:13:06	14:17:10	22.1543	113.9062	SW LANTAU	SWL Station #1	2	CR1	15.2	7	N	10x	container boat ~2 km
1-Mar-11	6	14:33:00	14:37:17	22.1740	113.9108	SW LANTAU	SWL Station #2	2	CR1	17.8	7	N	10x	snapping shrimp sound
1-Mar-11	7	15:13:11	15:17:25	22.2025	113.8867	SW LANTAU	SWL Station #3	2	CR1	9	7	N	10x	
8-Mar-11	1	10:40:17	10:45:38	22.3537	114.0314	NE LANTAU	NEL Station#4	2	CR1	26.5	7	N	10x	
8-Mar-11	2	11:45:30	11:50:36	22.3644	113.9806	NE LANTAU	NEL Station#3	2	CR1	12.4	7	N	10x	
8-Mar-11	3	12:14:45	12:19:13	22.3247	113.9739	NE LANTAU	NEL Station#2	2	CR1	11.8	7	N	10x	faint croaking sound
8-Mar-11	4	13:16:31	13:21:48	22.3571	113.9365	NW LANTAU	NWL Station#4	2	CR1	20.1	7	N	10x	
8-Mar-11	6	14:10:06	14:14:11	22.3416	113.9170	NW LANTAU	NWL Station#5	2	CR1	8.2	7	N	10x	snapping shrimp sound; high speed ferry ~1 km
8-Mar-11	7	15:13:53	15:18:12	22.4149	113.9049	DEEP BAY	DB Station#1	2	CR1	7.2	7	N	10x	snapping shrimp sound
10-Mar-11	1	10:38:49	10:43:51	22.3937	113.9066	NW LANTAU	NWL Station#3	3	CR1	6.4	5.5	N	10x	
10-Mar-11	2	15:19:31	15:23:33	22.1947	113.8400	W LANTAU	WL Station#3	3	CR1	21.9	7	N	10x	

Appendix VIII. Description of Various Acoustic Monitoring Stations around Lantau Island

Station Name	Survey Area	Descriptions / Characteristics
NEL#1	Northeast Lantau	near the future construction site for the Boundary Crossing Facilities (160 hectares of reclamation)
NEL#2	Northeast Lantau	around the Brothers Islands where a future marine protected area is proposed
NEL#3	Northeast Lantau	near a very busy anchorage area where dolphins were rarely sighted
NEL#4	Northeast Lantau	within the very busy shipping route at Urmston Road
NWL#1	Northwest Lantau	within the Sha Chau and Lung Kwu Chau Marine Park with very little boat traffic
NWL#2	Northwest Lantau	to the north of Lung Kwu Chau where a dolphin hotspot is identified
NWL#3	Northwest Lantau	within the very busy shipping route at Urmston Road
NWL#4	Northwest Lantau	near the operating area of the Permanent Aviation Fuel Receiving Facility (some fuel offloading activities)
NWL#5	Northwest Lantau	around an area where frequent dredging activites occur at the Contaiminated Mud Pit V
DB#1	Deep Bay	near the future site for pipeline laying activities for the Liqueified Natural Gas receiving station
WL#1	West Lantau	along the future route of the Hong Kong Link Road (HK section of the Hong Kong-Zhuhai-Macau Bridge)
WL#2	West Lantau	a relatively pristine area with natural coastline and very little boat traffic
WL#3	West Lantau	within the very busy shipping route at South Lantau Vessel Fairway
SWL#1	Southwest Lantau	a relatively pristine area with natural coastline and rare boat traffic as well as frequent porpoise occurrence
SWL#2	Southwest Lantau	between the Soko Islands with very little boat traffic
SWL#3	Southwest Lantau	within the very busy shipping route at South Lantau Vessel Fairway
SEL#1	Southeast Lantau	near the proposed site of reclamation for the Integrated Waste Management Facilities (~ 50 hectares); a porpoise hotspot as well
SEL#2	Southeast Lantau	within Pui O Bay with minimal boat traffic; used to be a porpoise hotspot
SEL#3	Southeast Lantau	offshore area with very little boat traffic and relatively pristine