MONITORING OF MARINE MAMMALS IN HONG KONG WATERS (2011-12)

FINAL REPORT
(1 April 2011 to 31 March 2012)

Submitted by
Samuel K.Y. Hung, Ph.D.
Hong Kong Cetacean Research Project

In collaborations with:
Professor Bernd Würsig (Texas A&M University)
Dr. John Wang (*FormosaCetus* Research & Conservation Group)
Mr. Paul Sims (Oregon State University)
Ms. Sarah Piwetz (Texas A&M University)

Submitted to the Agriculture, Fisheries and Conservation Department
of the Hong Kong SAR Government
Tender Re.: AFCD/SQ/117/10
30 April 2012

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Since 1995, the Hong Kong Cetacean Research Project has been conducting a longitudinal study on Chinese White Dolphins (also known as the Indo-Pacific humpback dolphin, *Sousa chinensis*) and Indo-Pacific finless porpoises (*Neophocaena phocaenoides*) in Hong Kong and the Pearl River Delta region. With funding support from the Agriculture, Fisheries and Conservation Department, the present monitoring project represents a continuation and extension of this long-term research study that covers the period of April 2011 to March 2012.

During the study period, 153 line-transect vessel surveys with 5,038 km of survey effort were conducted among nine survey areas in Hong Kong. A total of 327 groups of 1,134 Chinese White Dolphins and 100 groups of 272 finless porpoises were sighted during vessel and helicopter surveys. Most dolphin sightings were made in West Lantau (WL) and Northwest Lantau (NWL) survey areas, while the porpoise sightings were evenly distributed among the survey areas in the southern waters of Hong Kong. The combined estimate of dolphin abundance in WL, NWL and Northeast Lantau (NEL) survey areas in 2011 was 78 dolphins, which was slightly higher than the lowest estimate in 2010 during the past decade of monitoring. All three areas showed noticeable declining trends during 2001-11, and such trends were significant in NWL and NEL survey areas. In light of the future construction work in association with the Hong Kong-Zhuhai-Macao Bridge (HZMB), trends in annual abundance estimates of dolphins should be continuously examined.

The mean group sizes of dolphins and porpoises during the study period were 3.5 and 2.7 animals per group respectively. During 2006-11, larger groups of porpoises were mainly distributed in the offshore waters of South Lantau, the southwestern waters of Lamma, near Stanley Peninsula and around the Po Toi Islands, where prey resources may potentially be more abundant with better feeding opportunities for them. Temporal trend in occurrence of young dolphin calves indicated that the percentage of older calves dropped noticeably in the present monitoring period, but the percentage of newborn calves has bounced back to a higher level in 2011-12. As more disturbances to mother-calf pairs are expected to occur during the upcoming HZMB construction, their occurrence should be closely monitored in the near future.

Habitat use patterns of dolphins from 2007-11 revealed that their highest densities were recorded near Tai O Peninsula, Kai Kung Shan, Peaked Hill, Fan Lau and Kau Ling Chau in West Lantau, and in the Lung Kwu Chau area in North Lantau. The entire west coast of Lantau should be established as a marine protected area, with stringent conservation measures to prevent the further decline of dolphin abundance in this important habitat in light of future HZMB construction and increased amount of vessel traffic. Moreover, the grids with higher occurrence of feeding and socializing activities during 2002-11 were located around Lung Kwu Chau, Sham Shui Kok, near Tai O Peninsula, Kai Kung Shan and at Kau Ling Chung. The west coast of Lantau and Lung Kwu Chau also appeared to be the most important dolphin areas for nursing activities with higher densities of mother-calf pairs. All these areas should also be viewed as priority habitats for the dolphins, and should warrant better protection, as these activities serve important functions in their daily lives. In contrast, the important porpoise habitats during 2004-11 were identified in the waters to the south of Tai A Chau, southwest of Shek Kwu Chau and Cheung Chau, and the offshore waters in Southeast Lantau during winter and spring months; and around the Po Toi Islands and the offshore waters just south of Ninepins Islands during summer and autumn months.

During the study period, 192 individuals with 635 re-sightings were identified, and 52 of them were new individuals that have been added to the photo-identification catalogue. The majority of re-sightings were made in WL and NWL, and a number of new individuals from the previous monitoring period were also sighted repeatedly in this study period, showing their increased reliance on Hong Kong's waters. Many individuals moved across different survey areas around Lantau Island within the short study period, and their extensive movements facilitated frequent interactions between the two social clusters of dolphins from North and West Lantau. Temporal changes in their movement pattern, range use and residency pattern should be carefully monitored during the next few years of HZMB construction.

Forty-four sessions with nearly 174 hours of theodolite-tracking were conducted from Tai O, Sham Wat and Fan Lau shore-based stations, with the aim of determining if dolphin movement patterns and other behaviours changed in relation to vessel types and speeds. From these observations, 184 sightings of dolphin groups with 4,632 fixes of their positions were collected. Preliminary analysis of the data indicated that dolphin leg speed increased in the presence of commercial trawlers, and their reorientation rate also increased slightly in the presence of small tour boats originating from Tai O. This study suggested that short-term changes in dolphin movement occurred in the presence of different vessel types, but more data will be needed to assess their movement patterns relative to the quantity and distances of vessels.

A total of 10 hours and 49 minutes of acoustic recordings from 139 sound samples were collected from various acoustic monitoring stations around Lantau. Detailed analysis of noise originating from high-speed ferries (HSFs) revealed that the ambient noise within the South Lantau Vessel Fairway (SLVF), an area of intense boat traffic with many HSFs traversing through, was markedly higher. Such high sound pressure levels may induce stress and behavioural changes on the dolphins. In addition, the HSFs themselves were much louder when compared to the ambient noise levels from sites with little or no boat traffic. This highlighted the serious contribution to the local noise levels by HSFs within the vessel fairway, which overlaps with dolphin habitats. When considering the fast speeds of these vessels, the dolphins may not have sufficient time to distance themselves from or avoid the HSFs during close approaches. This problem may be further compounded in areas of high vessel traffic where multiple HSFs are navigating, and it would be stressful for dolphins to navigate based on the unpredictability of the vessel movements with varying speed and distances.

A case study on the impact of HSFs on local dolphins and porpoises revealed that the total number of HSF trips serving to and from Macau and Mainland ports increased by 48% during 1999-2010, and this increase was dominated by the vessel traffic between Hong Kong and Macau. An examination of temporal changes in dolphin usage at several sites at or near two major vessel fairways in North and South Lantau indicated that the notable decline in dolphin densities at Fan Lau, around Soko Islands and the northeast corner of the airport in the past decade correlated closely with the increase in traffic volume of HSFs during the same period. Moreover, the increase in high-speed traffic also corresponded with the significant decline in dolphin abundance in NWL, NEL and WL survey areas. It appears that the new traffic route from the Sky Pier, as well as the significant increase of HSF traffic between Hong Kong and Macau in recent years, may have contributed to the observed abundance decline. Since HSFs contribute significantly to the underwater background noise within dolphin habitats, the dolphins are exposed to greater risks of vessel collision and acoustic disturbance, and they may have been forced to reduce their usage of certain important habitats. In view of this serious problem, several mitigation measures are suggested, including the diversion of vessel traffic away from SLVF, putting a cap on marine traffic volume from the Sky Pier as well as imposing a speed limit within this vessel traffic route.

行政摘要 (中文翻譯)

自 1995 年起，一項有關本地之中華白海豚及印度太平洋江豚的長期研究已展開，現在這個爲期一年 (由 2011 年 4 月至 2012 年 3 月)、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。

在 2011-12 年期間，研究員共進行了 153 次樣條線船上調查，在全港九個調查區共航行了 5,038 公里，並且觀察到共 327 群中華白海豚 (總數達 1,134 隻)及 100 群江豚 (總數達 272 隻)。中華白海豚大多出沒於大嶼山西面及西北面水域，而江豚主要平均分佈於香港南面的水域。在 2011 年間，中華白海豚在三個主要出沒區域的整體數目估計爲 78 隻；此數字雖稍高於 2010 年間錄得的最低數字，但仍發現海豚的數量在三個主要分佈區域均呈現明顯下降趨勢。由於港珠澳大橋的工程即將展開，因此有必要繼續密切監察海豚在香港的數目變化。

中華白海豚及江豚在研究期間的平均組群成員分別爲每群 3.5 及 2.7 隻。在 2006-11 年間，有較大群江豚出現的地方包括大嶼山以南離岸水域、南丫島西南面水域、赤柱半島及蒲台群島附近的一帶水域，江豚在這些水域較大群地聚集，可能與該處擁有較多魚類以提供較好的覓食機會有關。中華白海豚方面，較年長的幼豚佔整體海豚數目的比率在研究期間有明顯下降的趨勢，但與此同時，剛出生幼豚的比率卻在 2011-12 年期掉頭回升。由於即將展開的港珠澳大橋工程將會爲母豚及幼豚帶來更多的滋擾，這些幼豚在香港出現的情況應予以高度關注。

量化生境使用分析顯示，在 2007-11 年間錄得最高海豚密度的重要生境，包括大嶼山以西的大澳半島、雞公山、雞翼角、分流及狗嶺涌一帶水域，及大嶼山以北的龍鼓洲一帶水域。由於大嶼山以西的水域爲海豚最重要的生境，此處應劃作海豚保護區，以採用嚴謹的保育措施，以防止海豚數目在未來港珠澳大橋興建及海上交通越趨繁忙的陰霾下繼續下降。此外，在 2002-11 年間，有一些水域錄得較頻繁進行覓食及社交活動的海豚組群，當中包括龍鼓洲、深水角、大澳半島、雞公山及狗嶺涌等一帶水域；而大嶼山以西水域及龍鼓洲一帶水域，均被確認爲幼豚密度較高、較適合母豚哺育幼豚的理想生境。上述水域應被視爲重要的海豚生境及必需加以保護，因爲這些覓食、社交及育兒活動對海豚而言至爲重要。在 2004-11 年期間，被確認爲重要的江豚生境包括：冬季和春季錄得較高江豚密度的大鴉洲以南水域、石鼓洲及長洲的西南面水域、及大嶼山東南面的離岸水域；在夏季和秋季江豚使用量較高的蒲台群島水域、及果洲群島以南的離岸水域。

在 2011-12 年度，研究員共辨認出 192 隻個別海豚，共 635 次的目擊紀錄，其中 52 隻海豚爲相片名錄的新成員。大部分目擊紀錄均出現在大嶼山北面及西

北面水域，而一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。在爲期一年的研究期間，眾多海豚頻繁地在大嶼山周圍的不同調查區來回穿梭，而這些移動均有利於香港水域內兩個海豚社交群體有更多交往的機會。在未來數年港珠澳大橋工程進行期間，研究重點應密切監察個別海豚的移動模式、活動範圍、及在港停留頻率會否受到影響。

一項嶄新的項目亦於本年度展開，主要是透過精密的經緯儀在陸上追蹤中華白海豚的移動模式及行爲變化，以量化船隻航行對牠們的影響。在 2011-12 年間，研究員進行了 44 次陸上觀察，共花了 174 小時在大澳、深屈及分流的陸上觀察站跟蹤附近出現的中華白海豚及經過的船隻。期間共發現 184 群海豚，並錄取牠們的 4,632 個位置數據，以作初步分析。結果顯示，當跟隨拖網漁船覓食時，海豚的平均速度顯著上升；而當海豚被來自大澳的觀豚小艇跟蹤時，其移動方向改變的頻率亦輕微增加。此研究初步顯示，海豚的移動模式會因應不同船隻的出現而作出短暫改變，但此研究項目仍需在未來搜集更多的數據，以作分析及評估海豚移動模式與船隻的多寡及距離等的相互關係。

在 2011-12 年間，研究員在大嶼山一帶水域的水底聲音監察站，共錄取了 139 個、合共 10 小時 49 分的水底聲音片段。而一項針對高速渡輪所發出之噪音對海豚的影響研究發現，在大嶼山以南一條高速船頻繁航行的主航道之背景噪音水平明顯地高，而此高噪音水平應會對海豚構成某程度上的壓力及行爲改變。高速渡輪所發出的聲響，亦遠高於沒有太多船隻出現的水域之背景噪音水平，此證明當一些繁忙航道與海豚重要生境重疊，行經該航道的高速船所發出的聲響將大幅提高水底噪音的水平，而影響海豚在該處的活動。由於這些船隻以高速航行，當它們在短時間內靠近海豚時，牠們未必有時間作出合適的反應以遠離這些船隻；若同時有數隻高速船在海豚周圍掠過，尤其是當這些船隻航行的速度、及與海豚保持的距離經常改變以致難以揣測，海豚爲要逃避船隻而所承受的壓力亦因而增加，令牠們更易被高速船所撞擊，或逼使牠們放棄一些原適合作覓食活動的生境。

另一項有關高速渡輪對本地中華白海豚及江豚的影響評估發現，在 1999-2010 年間，來往香港及澳門、內地城市之港口的高速船航次已大幅增加了 48%，而此增長的動力均來自香港與澳門之間的渡輪航次。在數個位處大嶼山以北及以南兩條主航道的水域，例如在分流、索罟群島及機場東北角等地方，海豚的密度均錄得明顯下降的趨勢，而此下降趨勢的年份與該處出現的高速船航次數目之上升趨勢極爲吻合。而不同高速渡輪航次數目在不同水域所錄得明顯增長的年份，均與大嶼山東北、西北及西面水域錄得明顯海豚數目下降的年份不謀而合；海豚在某些年份的數目下降，亦似乎與機場航天碼頭所開拓的新航線之航次上升、及來往香港與澳門之間高速船航次的快速增長有一定關係。由於高速船的航行令周邊水底噪音大幅上升，海豚亦更易受這些船隻所撞擊、或受噪音影響其覓食活

動，所以有可能逼使牠們離開一些原本合適的重要生境。爲解決此嚴峻問題，本報告提出數項緩解措施，例如要求利用大嶼山以南主航道的船隻改道，及爲航天碼頭的渡輪航次設定上限，並嚴格限制該處水域航行之船隻的速度，以減輕對中華白海豚的影響。

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 Indo-Pacific finless porpoises (*Neophocaena phocaenoides*) in Hong Kong and the Pearl River Delta region, primarily funded by the Agriculture, Fisheries and Conservation Department (AFCD) of the Hong Kong SAR Government, as well as various government departments, environmental consultants and NGOs. The multi-disciplinary research programme aimed at providing critical scientific information to the Hong Kong SAR Government to formulate sound management and conservation strategies for the local populations of 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, habitat use, behaviour and individual ranging pattern over time, and to keep track of levels and changes in mortality rates of the local cetaceans (e.g. Dungan 2011; Hung 2008; Hung and Jefferson 2004; Jefferson 2000a, b; Jefferson and Hung 2008; Jefferson et al. 2002a, 2006, 2009, 2011; Sims et al. 2012).

The present monitoring project represents a continuation and extension of this research programme, with funding support from AFCD. The one-year project covers the period of 1 April 2011 to 31 March 2012. And this final report is submitted to AFCD to summarize the status of the monitoring project covering the entire period of the 12-month study.

2. OBJECTIVES OF PRESENT STUDY

The main goal of this one-year monitoring study was to collect systematic data for assessment of distribution, abundance and habitat use of Chinese White Dolphins and Indo-Pacific finless porpoises in Hong Kong, to take photographic records of individual dolphins, and to analyze the monitoring data for better understanding of the various aspects of local dolphin and porpoise populations. To achieve this main goal, several specific objectives were set for the study.

The first objective was to assess the spatial and temporal patterns of distribution, abundance and habitat use of Chinese White Dolphins and Indo-Pacific finless porpoises in Hong Kong in great detail. This objective was 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. Photographs of re-sighted and newly identified individuals were compiled and added to the current photo-ID catalogue, with associated descriptions for each newly identified individual. Photographic records of finless porpoises will also be taken during vessel and helicopter surveys for educational purposes.

The third objective was to analyze the monitoring data for better understanding of the various aspects of local dolphin and porpoise populations. This objective was achieved by conducting various data analyses, including line-transect analysis, encounter rate analysis, distribution analysis, behavioural analysis and quantitative grid analysis to assess the spatial and temporal patterns of abundance, distribution and habitat use of local dolphins and porpoises based on systematic line-transect survey data; acoustic data analysis and theodolite tracking data analysis to assess the anthropogenic noise impacts on local dolphins; and ranging pattern analysis and residency pattern analysis to study individual movement and range use based on photo-identification data.

Finally, the fourth objective was to educate the members of the public on local dolphins and porpoises, by disseminating 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

- 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 Chinese White Dolphins for photo-identification analysis and update the photo-identification catalogue;
- to conduct shore-based theodolite tracking;
- to take photographic records of finless porpoises during vessel and helicopter surveys; and
- to assist AFCD in raising public awareness on local dolphins and porpoises through school seminars.

4. METHODOLOGY

4.1 Vessel Survey

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 over the last 16 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (Hung 2005, 2011; Jefferson 2000a, b; Jefferson et al. 2002a). The territorial water of Hong Kong Special Administrative Region is divided into twelve different 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).

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 50 *Brunton* or *Fujinon* 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 record 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 Survey

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) (see flight route in 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 7D and 60D 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 detail, and were carefully compared to over 750 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; Jefferson and Leatherwood 1997). 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 was also added to the catalogue, along with text descriptions including age class, gender, any nickname or unique markings. The updated photo-ID catalogue incorporated 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 to 7 metres below the sea surface by 1-metre long spar buoys from the briefly stopped (mostly 3 to 5 minutes) research vessel engaged in the regular line-transect surveys, with vessel engine noise off and the vessel drifting. The hydrophone set included 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 (Fostex 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 of habitat and existing/potential anthropogenic noises within the dolphin habitat. Date, start and end times, hydrophone and water depths, Beaufort sea state, survey rea, start and end locations, gain, event, and notes were taken for each recording. Additional locations were also included opportunistically, to collect vocalizations of Chinese White Dolphins when they came close to the stern of the research vessel.

In addition, HKCRP research team also used a towed hydrophone array developed by Mr. Josh Jones, research staff at the Whale Acoustic Lab at Scripps Institution of Oceanography, to enhance the overall capability of the current acoustic data collection regime on local dolphins and porpoises. The hydrophone array was set in an oil-filled tube and was composed of two Burns Electronic CR-80 hydrophones with high-pass filters. It was connected to 50 metres of reinforced cable and was plugged into an amplifier/filter box onboard the HKCRP research vessel. The filters were designed to remove ship and flow noise for real-time listening and to facilitate automated detection of clicks and whistles produced by the Chinese White Dolphins (and possibly finless porpoises). The entire system was connected to a laptop with computer programs *Logger* 2000 and *Ishmael* 1.0, which allowed visual display of the signals in a real-time spectrogram, and to perform automated detection and localization of clicks and whistles.

4.5. Shore-based Theodolite Tracking Work

During the present study period, a long-term behavioural study on Chinese White Dolphins using a shore-based theodolite tracking technique has been initiated, to determine if dolphin movement patterns and behaviours change in the presence of different types of vessels. From shore-based theodolite tracking stations, behavioural and position information on dolphins before, during and after potential disturbance by passing vessels and others activities were gathered. This shore-based approach allowed a remote, non-invasive method of studying the movement patterns of dolphins without influencing their behaviour.

With the assistance of Professor Bernd Würsig and Dr. John Wang, the HKCRP research team successfully established three shore-based theodolite tracking stations at Tai O, Sham Wat and Fan Lau during the present study period, with different research goals in mind at each station (Figure 4). Observation from Tai O aimed to examine the impacts of dolphin-watching and trawling activities as well as to collect information on undisturbed behaviours of Chinese White Dolphins. From Fan Lau, shore-based observation targeted the movement of high-speed ferries traversing between Hong Kong, Macau and mainland Chinese cities, which may have created immense acoustic disturbance to dolphins occurring in this area (see Hung 2011). The station near Sham Wat was set up for collecting important baseline information to examine future impacts of Hong Kong-Zhuhai-Macao Bridge (HZMB) construction on dolphins, including the acoustic disturbance from bored piling activities as well as the potential obstruction of limiting north-south movement of dolphins underneath the bridge. All three stations were selected based on height above sea level (>20 metres; Würsig et al. 1991), close proximity to shore, and unobstructed views of dolphin habitat. To maximize the efficiency, research was typically conducted from one station per shore-based study day so that valuable daylight hours were not spent traveling between sites.

For the theodolite-tracking work conducted from these three stations, a digital theodolite (*Sokkia* Model DT5) with 30-power magnification and 5-sec precision was well-positioned from unobstructed vantage points and at such a height above the monitoring area, so that movement and behavioural patterns of Chinese White Dolphins were continuously monitored. The digital theodolite recorded horizontal and vertical angles, while a computer with *Pythagoras* software, tethered to the theodolite, recorded those angles that were then converted to geographic coordinates (latitude and longitude) of objects (dolphin, boats, etc.) being tracked, thus providing information on their distance from shore, distance from other objects, and relative speed and orientations. At Tai O, two theodolites were set up on some survey days for synchronized tracking work to improve the overall data collection efficiency, with one focusing on tracking dolphin movement and behaviour while the other one focusing on tracking vessel movements.

During each theodolite-tracking survey, observers searched for dolphins using the unaided eye and hand-held 7x50 *Brunton* or *Swarovski* binoculars. A tracking session began when an individual dolphin was located. An individual was continuously tracked, with an attempt to record the position each time the dolphin surfaced. Tracking continued until the animal was lost, moved beyond the range of reliable visibility (>5 km), or when environmental conditions obstructed visibility (e.g. intense haze, high Beaufort state, or sunset), in which case the research effort concluded. In addition to tracking dolphins, all vessels that moved within close proximity of shoreline (<5 km) were tracked. An effort was made to obtain at least two positions of each vessel, and additional positions when possible.

4.6 Data Analyses

4.6.1. 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 and porpoise groups were plotted on map layers of Hong Kong using a desktop GIS (ArcView© 3.1) to examine their distribution patterns in detail. 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 of dolphins and porpoises in recent years to the one in the present study period.

4.6.2. 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. In addition, the encounter rates of young dolphin calves, and dolphin groups engaged in different activities were calculated to compare with previous monitoring periods and to detect any temporal changes. The encounter rate could be used as an indicator to determine areas of importance to dolphins and porpoises within the study area.

4.6.3. Line-transect analysis

Density and abundance of Chinese White Dolphins were 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:

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

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

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

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 2011 during this monitoring study, annual abundance estimates were also generated for every year since 2001 in NWL and NEL survey areas and since 2003 in WL survey area, to investigate any significant temporal trend using an 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.

4.6.4. Quantitative grid analysis on habitat use

To conduct a 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. Among the 1-km^2 grids that were partially covered by land, the percentage of the 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 period in 2011, and in recent years of monitoring (i.e. 2007-11 for Chinese White Dolphins and 2004-11 for finless porpoises). In addition, to determine which grids were used more often for nursing, feeding and socializing activities, the subset of dolphin sightings engaged in these activities were used to calculate SPSE and DPSE values for each grid (see Hung 2008).

For the investigation of the vessel traffic impact, the grid analysis was also utilized to examine dolphin usage over the impact areas encompassing a suite of grids, with the number of on-effort sightings and units of survey effort being pooled together from those grids to calculate sighting and dolphin densities as a whole for that suite of grids (see Hung 2008). Temporal trends of dolphin usage among these selected grids were also examined by stratifying the number of on-effort sightings and units of survey effort into specific time frames.

4.6.5. 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 inputted into a separate database of sighting information, which can be used to determine the distribution of behavioural data using a 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 4.6.4) to identify important dolphin habitats for various activities.

4.6.6. Ranging pattern analysis

For the ongoing ranging pattern study, location data of individual dolphins with 10 or more re-sightings that were sighted during the present study period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel method, 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 (utilization distribution) 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 finer detail.

4.6.7. 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 1995-2011, or five years in a row within the same period. Other individuals that were intermittently sighted during the past decade were defined as "Visitors". In addition, a 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" were the individual dolphins that were regularly sighted in Hong Kong throughout the year, while "seasonal visitors" were the ones that were sighted sporadically in Hong Kong and only during certain months of the year within the study period.

4.6.8. Acoustic data analysis

Data analysis of the acoustic recordings was performed by Mr. Paul Sims at Oregon State University under the supervision of Professor Bernd Würsig at Texas A&M University, using state-of-the-art SpectraLAB software (version 4.32), 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). For each clip, the average spectrogram, showing sound pressure level (SPL) vs. frequency, was computed and saved to an excel spreadsheet. Cues of solitary vessels (e.g. no other ships present in the area) and ambient sound levels of areas both with and without vessel traffic were selected and graphed.

For each cue time, approximately a 5 or 10 seconds clip, depending on the general speed (slow: 10 seconds; fast: 5 seconds) of the vessel present, was selected in order to gain an accurate view of its noise contribution without averaging its sound. For ambient noise measurements, 10-second section measurements were taken throughout the recording starting at the beginning. Most recording times were not a multiple of 10 and only the full 10-second clips for these were measured. To avoid sound selection bias, measurements were also repeated starting from the end of the recording. Furthermore, 18 of these selections were randomly selected, and were averaged for each recording to compute ambient noise levels.

4.6.9. Theodolite-tracking data analysis

The theodolite-tracking data was analyzed by Ms. Sarah Piwetz at Texas A&M University, a graduate student of Professor Bernd Würsig, using the *Pythagoras* software (version 1.2; Gailey and Ortega-Ortiz 2002) developed by his team. The program accepts precise measurements of horizontal and vertical angle data from the digital theodolite, and provides a dynamic and user-friendly interface to collect, manage and analyze theodolite data. It also calculates geographical position in real time which allows understanding of the tracked object's distance from the theodolite, bearing and speed information, while also mapping the tracks for visualization.

For the data analysis, dolphin positions and vessel positions were first plotted and overlaid on a map by ArcMap (version 9.3.1) to visually evaluate habitat overlap. Data was then evaluated for dolphin leg speed and bearing changes in the presence of different vessel types. The leg speed of dolphins was calculated by dividing the distance traveled by the duration between two consecutive theodolite recordings (Gailey et al. 2007). Reorientation rate illustrates the change in bearing along individual tracklines. This rate was calculated by adding all bearing changes in degrees along a trackline and dividing by total duration in minutes of that trackline (Smultea and Würsig 1995).

As it is not possible to record two subjects (e.g. a dolphin and a vessel) simultaneously with one theodolite (therefore obtaining the position of the dolphin and vessel at precisely the same time), vessel positions were interpolated post hoc based on dolphin position times. This interpolation allowed a relatively accurate estimation of vessel distance at each dolphin recording. For this analysis, a vessel was considered present if it was within 1 km of the focal dolphin position. Tracklines of dolphins with no vessels present and tracklines of dolphins with one vessel type within the 1 km threshold were included. Individual tracking sessions varied in duration; therefore, all tracks that met the above criteria were separated into approximately 10-minute sections. One 10-minute section per dolphin trackline was selected at random for analysis to reduce the risk of over-sampling and/or under-sampling (Gailey et al. 2007; Lundquist et al. 2008). Tracklines less than 10 minutes in duration were excluded from analysis.

5. RESULTS AND DISCUSSIONS

5.1. Summary of Survey Effort, Dolphin and Porpoise Sightings

5.1.1. Number of surveys

From April 2011 to March 2012, 153 line-transect vessel surveys were conducted among nine survey areas within Hong Kong territorial waters. These included 35 surveys in NWL, 33 surveys in WL, 23 surveys in NEL, 21 surveys in SWL, 19 surveys in SEL, seven surveys in DB, five surveys in LM, six surveys in PT and four surveys in NP. The details of the survey effort are shown in Appendix I.

In addition, with the support of the Government Flying Service, seven helicopter surveys arranged through AFCD were conducted during the 12-month study period, mainly covering the survey areas in the eastern and southern waters of Hong Kong. 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 595.5 hours were spent to collect 5,038 km of survey effort among the nine survey areas in Hong Kong. The majority of survey effort (79.4% of total) was conducted in six survey areas where dolphins regularly occurred, in which 34.8% of the total effort was spent in NEL/NWL, 15.7% in WL, 26.3% in SEL/SWL and 2.6% in DB. In addition, survey effort was also allocated to areas in the southern and eastern waters of Hong Kong (46.9% of total effort) where occurrence of finless porpoises were more frequent. Despite the frequent encounters of adverse weather conditions throughout the study period, HKCRP research team managed to conduct most survey effort (92.9%) under favourable sea conditions (Beaufort 3 or below with good visibility). This percentage was even higher than the previous monitoring periods (Hung 2010, 2011). 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 use and estimation of density and abundance.

Since 1996, the long-term marine mammal monitoring programme coordinated by HKCRP has amassed a total of 132,283 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 over half of the survey effort (52.4%) commissioned and funded by AFCD. The survey effort in 2011 alone comprised 8.1% of the total survey effort collected since 1996.

5.1.3. Chinese White Dolphin sightings

During the 12-month study period, 327 groups of Chinese White Dolphins, numbering 1,134 individuals, were sighted from both vessel and helicopter surveys (Appendix II). Among these dolphin groups, 255 of them were sighted during on-effort line-transect vessel surveys, while the other 72 sightings were recorded during off-effort search. Most dolphin sightings were made in WL (136 sightings) and NWL (110 sightings) survey areas, comprising 75.2% of the total. On the contrary, dolphins occurred less frequently in NEL (43 sightings), SWL (25 sightings) and DB (10 sightings) survey areas. Only three dolphin groups were sighted in SEL survey area, while no dolphin sighting was made in LM, PT or NP survey areas.

5.1.4. Finless porpoise sightings

From April 2011 to March 2012, 100 groups of finless porpoises totaling 272 individuals were sighted during vessel and helicopter surveys (see Appendix III). Eighty-five porpoise sightings were made during on-effort line-transect surveys, which can be used in encounter rate analysis and habitat use analysis. The porpoise sightings were evenly distributed among SEL (28 groups), SWL (16 groups), LM (34 groups) and PT (13 groups) survey areas. Only seven groups of 12 porpoises were sighted in NP survey area, which was partly related to the lower amount of survey effort being conducted there. Eight groups of 23 porpoises were sighted during helicopter surveys, and two groups each were sighted in Mirs Bay and NP survey areas respectively.

5.2. Distribution

5.2.1 Distribution of Chinese White Dolphins

From April 2011 to March 2012, Chinese White Dolphins were sighted throughout the six survey areas around Lantau Island and Deep Bay (Figure 5). In North Lantau, dolphins occurred unevenly in this region, with higher concentrations of sightings around Sha Chau and Lung Kwu Chau, near Black Point and Pillar Point, around the Brothers Islands and along the coastline near Sham Shui Kok (Figure 6). On the contrary, they appeared to occur less frequently around the perimeter of Chek Lap Kok Airport platform, near Lung Kwu Tan, and near the northern and eastern end of NEL survey area (Figure 6). Notably, quite a number of dolphin groups were sighted at the juncture between NWL and WL survey areas (i.e. near Sham Wat and Tai O Peninsula), and this region has been identified as the overlapping area where both northern and western social clusters in Hong Kong come into contact (Dungan 2011).

In West Lantau, dolphins were frequently sighted along the entire coastline, with particularly high concentration near Tai O Peninsula, Kai Kung Shan, Peaked Hill and Fan Lau (Figure 7). It appeared that more dolphins occurred nearshore than offshore, and at the northern end rather than the southern end (Figure 7). Similar to the previous monitoring period in 2010-11, dolphins rarely occurred at the area between Peaked Hill and Fan Lau, which was intensively used by dolphins in the past (Figure 7). Moreover, at the southern end of West Lantau, almost all dolphin sightings were made very close to shore, around the tip of Fan Lau. This is likely due to the dolphins' avoidance of the intense high-speed ferry traffic just a few hundred metres from the coastline.

Dolphin distribution in the present monitoring period was principally similar to the past distribution records in recent years (Figure 8). However, it appeared that during the monitoring period in 2011-12, more dolphins occurred around Sham Shui Kok area, and fewer dolphins were sighted around Lung Kwu Chau and the offshore waters of West Lantau than in previous five monitoring periods (Figure 8). Areas that were consistently used by dolphins throughout the six monitoring periods included the Brothers Islands, Lung Kwu Chau, Black Point and the west coast of Lantau (i.e. from Tai O to Fan Lau) (Figure 8).

Seasonal variation in dolphin distribution was also evident during the 2011-12 monitoring period. In North Lantau, dolphins occurred more regularly in autumn through winter months, and their use of this area declined dramatically during spring months (Figure 9). The Brothers Islands were consistently used by dolphins during autumn and winters months, while the Lung Kwu Chau area recorded frequent dolphin occurrence throughout the year (Figure 9). Dolphin usage was also consistent throughout the year along the west coast of Lantau, but they only occurred very close to shore during the summer months, while most sightings in winter months were made offshore near the boundary (Figure 9). Notably, dolphins mainly occurred in the South Lantau area during autumn months, and generally disappeared from this area during winter months when porpoise occurrence became intensified in this area.

5.2.2. Distribution of finless porpoises

From April 2011 to March 2012, finless porpoises were sighted in the southern waters of Hong Kong, ranging from SWL to the west, to PT and NP areas to the east. A few sightings were also made in the Mirs Bay area during the helicopter surveys. In South Lantau waters, concentration of porpoise sightings was found to the south of Tai A Chau, near Shek Kwu Chau, and the waters between the two islands (Figure 10). They appeared to avoid the most part of SWL and the inshore waters of SEL. Similar to the previous two monitoring periods, porpoises appeared to avoid crossing over the high-speed ferry traffic route, and rarely occurred in the inshore waters of South Lantau. In Lamma, almost all porpoise sightings were made at the southern and eastern portions of the survey area (Figure 10). In PT and NP survey areas, the porpoises were found more frequently in the offshore waters, but they rarely occurred around the Po Toi Islands and the Ninepin Group in 2011 (Figure 10).

Porpoise distribution in 2011-12 was also compared with the past five monitoring periods, and some temporal changes in their distribution were evident (Figure 11). For example, in 2011-12, much fewer porpoises were sighted around Cheung Chau, but they were more frequently found in the eastern offshore waters during the 2011-12 and 2010-11 monitoring periods instead of the inshore water around the Po Toi Islands. On the other hand, the area between Shek Kwu Chau and the Soko Islands have been consistently utilized by finless porpoises since the 2007-08 monitoring period (Figure 11), which should represent the most important porpoise habitat in Hong Kong in recent years.

Distribution patterns of finless porpoises among different survey areas from 2006-2011 were also closely examined for a better understanding of the general occurrence of porpoises in Hong Kong waters in recent years. Porpoises occurred regularly in South Lantau waters during the six-year period, and their distribution was evenly spread across the SWL and SEL survey areas (Figure 12). However, higher concentrations of sightings were found in the offshore waters from Shek Kwu Chau to Soko Islands. Around the Soko Islands, porpoises mostly occurred to the south of Tai A Chau with very high concentration, but their occurrence around Siu A Chau and the waters between the two islands were less frequent (Figure 12). In the Shek Kwu Chau area, porpoise sightings mainly clustered along the southwestern side of the island, where a 31-hectare reclamation project (including breakwaters) has been proposed for the construction of the Integrated Waste Management Facilities (IWMF). In the offshore waters between Shek Kwu Chau and Soko Islands, porpoise occurrence was very frequent, especially in 2010 and 2011. Porpoises were also regularly sighted between Cheung Chau and Shek Kwu Chau. On the contrary, even though porpoises occurred to the western side of Soko Islands and along the coastal waters of South Lantau (especially within Pui O Wan, and near Chi Ma Wan Peninsula and Shui Hau Peninsula), they generally avoided these areas in recent years. It is speculated that porpoises avoided these areas in recent years mainly due to the intensified traffic of high-speed ferries, which is further discussed in Section 5.11.3.

In the Lamma Island area, most finless porpoise groups were found on the southern portion of the survey area, with a particularly high concentration of porpoises at the southwest corner of the island, and the offshore waters between Cheung Chau and Lamma Island (Figure 13). Notably, an offshore windfarm has been proposed to be constructed at the southwestern side of Lamma Island (a few kilometers away from the coastline), where a concentration of porpoise sightings were also found in this area. Porpoises also occurred regularly to the eastern side of Lamma Island, where a marina has been proposed to be constructed within Tung O Wan. Although only a handful of porpoise sightings were made within the bay since 2006, many porpoise groups were sighted only a few kilometres away from Tung O Wan, especially in recent years (Figure 13). In the eastern survey areas of PT and NP, porpoises were regularly sighted around Po Toi Islands as well as the eastern offshore waters (Figure 14). Fewer porpoises occurred near the Po Toi Islands in recent years, where they were regularly found in the summer and autumn months from 2006-09. Although porpoises appeared to occur less frequently in the NP survey area, that could be a result of the smaller amount of survey effort being allocated in this area until fairly recently. Nevertheless, it appeared that the porpoises occurred more frequently in the offshore area than the inshore areas around the Ninepins Group within this survey area (Figure 14).

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 (4.0 sightings per 100 km of survey effort) than in Beaufort 0-3 conditions (7.6) during the present monitoring period. From April 2011 to March 2012, the combined dolphin encounter rate of NWL, NEL, WL and SWL was 7.6, which was slightly higher than the previous monitoring period in 2010-2011, but was similar to most monitoring periods from

2002-12 except the ones in 2003-04 and 2007-08 (Figure 15). Among the five main survey areas around Lantau, the dolphin encounter rate was the highest in WL, which was much higher than the other four survey areas where dolphin occurred regularly during the study period (Figure 16).

Temporal trends in annual dolphin encounter rates have been closely monitored in NWL and NEL survey areas since 1996, and in WL survey area since 2002. Overall, besides the exceptionally high encounter rate in 2003, the combined annual encounter rates from the three areas (i.e. NWL, NEL and WL) were similar during the past decade (Figure 17). There appeared to be a slight decline in annual encounter rates from 2007 to 2010, but in 2011 it has slightly bounced back (Figure 17). Such a rebound in the encounter rate was most evident in NWL and NEL, with the encounters rates in 2011 recorded in both survey areas almost double the encounter rates in 2010 (Figure 17). In fact, besides the exceptionally high encounter rates recorded during 2001-03, the dolphin encounter rate in NEL in 2011 was the highest since 1996 (Figure 17). On the contrary, the apparent declining trend in annual encounter rates in WL continued in 2011. Dolphin usage in this important dolphin habitat should be carefully monitored, especially during the upcoming HZMB construction, as WL has been consistently used by dolphins to a very high extent since systematic surveys commenced there in 2002.

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 4.9 sightings per 100 km of survey effort in Beaufort 0-2 conditions to only 1.8 in Beaufort 3-5 conditions. Even in relatively calm condition (i.e. Beaufort 3 condition), finless porpoises can be much more difficult to locate at sea than the Chinese White Dolphins. Therefore, only the data collected in Beaufort 2 or below conditions should be used in calculating porpoise encounter rates. In 2011-12, the combined encounter rate of SWL, SEL, LM, PT and NP was 4.9 porpoises per 100 km of survey effort, which was higher than the ones recorded during the previous two monitoring periods (i.e. 3.3 in 2010-11 and 3.5 in 2009-10). Among the five survey areas, porpoise encounter rates were higher in LM (9.6) and SEL (5.8), but were lower than the average in SWL (3.0), PT (3.4) and NP (2.0).

The temporal trend in annual encounter rates of finless porpoises indicated that the overall porpoise usage of Hong Kong waters has been inconsistent in the past decade. The annual encounter rates were relatively higher in 2002, 2007 and 2009, but were lower in 2005 and 2006 (Figure 18). Among the four survey areas, the inconsistent trends of porpoise usage were also evident (Figure 19). The inconsistency in porpoise usage may be related to their frequent movements across different areas in any given year during the 10-year study period. However, when the porpoise data collected during the peak months of porpoise occurrence in winter and spring from SWL, SEL and LM were pooled to examine the temporal trend of porpoise encounter rates, a more apparent trend was observed. During the past decade, porpoise usage declined noticeably from 2002 to 2005, then bounced back to a higher level from 2007 to 2010, following by another notable decline in 2011 occurred once again (Figure 20). As several infrastructure projects (e.g. IWMF, offshore windfarm) are currently under planning within the porpoise habitats in the southern waters of Hong Kong, their annual encounter rate, an important indicator of their occurrence, should be continuously monitored to examine the temporal trend of porpoise usage of Hong Kong waters.

5.4. Density and Abundance

Dolphin abundance in NWL, NEL and WL were estimated by line-transect analysis method for 2011. For the analysis, only effort and sighting data collected under conditions of Beaufort 0-3 were used, which resulted in 4,427 km of on-effort systematic survey effort and 417 groups of Chinese White Dolphins during the one-year study period.

In 2011, WL recorded the highest densities among the three survey areas, with 100.40 individuals/100 km^2 for the entire year. On the contrary, NWL and NEL recorded moderate to low densities of dolphins (44.47 and 19.89 respectively). The differentiation of dolphin densities between WL and NWL/NEL was also consistent throughout the entire 10-year period in 2002-11 (see Hung 2011). In addition, the abundance estimates of Chinese White Dolphins in 2011 were 28, 39 and 11 individuals in WL, NWL and NEL respectively, and the combined estimate from the three areas was 78 dolphins. This estimate was only slightly higher than the one recorded in 2010 (75 dolphins), which was the lowest combined estimate during 2003-11 (Figure 21). Notably, the coefficient of variations (%CV) remained fairly low (13-21%) for all three areas. 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 2011.

Temporal trends of annual dolphin abundance in each of the three survey areas were further examined since 2001. All three areas showed noticeable declining trends during the past decade (Figure 22). In WL, individual abundance declined gradually from the highest in 2003 (56 dolphins) to the lowest in 2011 (28 dolphins). In NWL, dolphin abundance also dropped steadily from the highest in 2003 (84 dolphins) to the lowest in 2010 (35 individuals), but have increased slightly in 2011 (39 individuals). Similarly, dolphin abundance in NEL also dropped from the highest in 2001 (20 dolphins) to the lowest in 2009-10 (5-7 dolphins), but have rebounded in 2011 (11 dolphins). The autocorrelation test also found such declining trends in NWL and NEL survey areas during 2001-11 to be significant ($p<0.05$), but not in the WL survey area.

Although the abundance estimates in NWL and NEL have rebounded slightly in 2011, the declining trends in both areas were still significant, and the 2011 estimates were still well below the estimates made in previous years. While the declining trend of dolphin abundance in WL was not significant after adding another data point in 2011, such decline continued in 2011 and reached the lowest point since the surveys commenced there in 2002. Overall, it appeared that the declining trend has been slightly reversed, but dolphin occurrence in Hong Kong was still at a low level. In light of the future construction work being commenced soon in association with the HZMB, trends in annual abundance estimates of dolphins should be continuously examined. If dolphin occurrence in Hong Kong remains steady, it will imply the mitigation measures were being effective to safeguard dolphins from further impacts of habitat deterioration due to the construction activities. However, if the abundance continues to fall in the near future, additional conservation measures should be adopted during the construction period, with a more stringent management of vessel traffic within dolphin habitats (see Section 5.11). On the other hand, the implementation of the trawl ban at the end of 2012 will bring benefits to the availability of prey resources for dolphins in the future. All these positive and negative factors should all be taken into account in the future examination of temporal trends in dolphin abundance estimates.

5.5. Group Size and Group Composition

5.5.1. Group sizes of Chinese White Dolphins

During the 12-month study period, dolphin group sizes ranged from singles to 25 animals, with an overall mean of 3.5 ± 3.29. Among the six survey areas where dolphins occurred, their mean group sizes were slightly higher in SWL (3.8) and WL (3.7), but were lower in NEL and DB (2.7 and 2.8 respectively). When compared to previous monitoring periods, the mean dolphin group size in this study period was still considerably lower, but was similar to the ones in recent years (Figure 23).

The majority of dolphin groups sighted in the 2011-12 monitoring period tended to be small, with 53.2% of the groups composed of 1-2 animals, and 74.6% of the groups with fewer than five animals (Figure 24). The smaller groups were scattered throughout the survey areas around Lantau Island, especially in the peripheral areas of the dolphins' range toward the eastern end of NEL and at the mouth of Deep Bay (Figure 25). Moreover, almost all dolphin groups sighted around Sha Chau were composed of only a few individuals. On the contrary, the large dolphin groups occurred mostly between Lung Kwu Chau and Black Point, near the Brothers Islands, between Sham Wat and Tai O Peninsula, and between Peaked Hill and Fan Lau (Figure 25). Surprisingly, a number of sightings made in South Lantau consisted of large aggregations of dolphins, even though this area was considered to be a marginal habitat for the dolphins.

5.5.2. Group sizes of finless porpoises

From April 2011 to March 2012, group sizes of finless porpoises ranged from singles to eight animals, with an overall mean of 2.7 ± 2.02. This mean group size in 2011-12 was slightly higher than the previous two monitoring periods (Hung 2010, 2011). Most porpoise groups sighted during the 12-month study period tended to be very small, with 64% of porpoise groups composed of 1-2 animals (Figure 26). Only 15 out of 100 porpoise groups consisted of five or more animals per group.

An examination of the distribution of finless porpoises with different group sizes during 2006-11, revealed that the larger groups of porpoises were mainly distributed in the offshore waters of South Lantau (e.g. south of Tai A Chau, around Shek Chau and south of Cheung Chau), the southwestern waters of Lamma Island, near Stanley Peninsula, and around the Po Toi Islands (Figure 27). On the contrary, almost all porpoise groups sighted in the inshore waters of South Lantau and Lamma Island, as well as the eastern offshore waters in PT and NP survey areas were composed of only a few individuals (Figure 27). It appeared that the larger aggregations of porpoises tended to occur near islands and around the headlands, where prey resources are potentially more abundant, thus presenting better feeding opportunities to them.

5.5.3. Group composition and calves of Chinese White Dolphins

Of the 1,134 dolphins sighted during the 12-month period, 68.4% were categorized into six age classes (Jefferson 2000). The spotted juveniles (SJ) and spotted adults (SA) comprised of the majority of dolphins that were identified with their age classes (25.0% and 16.8% respectively). On the other hand, a total of 11 unspotted calves (UC) and 40 unspotted juveniles were sighted in Hong Kong, and these young calves comprised of 4.5% of the total. As special attention has been given to the status of dolphin calves in the past monitoring periods, their distribution and temporal trend in occurrence were also examined in detail. During the study period, the UCs were mainly sighted along the coastline of WL, and sporadically in SWL, near Black Point and at Sham Shui Kok (Figure 28). Moreover, the UJs were spotted more often off the coast of West Lantau, and around the Lung Kwu Chau area (Figure 28). It appeared that the distribution of young calves followed the general distribution of dolphins, with the exception of their rare occurrence in NEL with only two calves sighted out of the 117 animals that occurred there.

The temporal trend in occurrence of young calves (i.e. UCs and UJs) indicated that after a steady increase in percentage of UJs from the lowest in 2006-07 to the highest in 2010-11, it dropped noticeably in the 2011-12 monitoring period. In fact, the percentages of UJs as well as the overall percentage of all young calves in 2011-12 were the lowest during the past decade of dolphin monitoring in Hong Kong (Figure 29a). With the exception of SWL, the occurrence of young calves in all three main areas of dolphin occurrence (i.e. NWL, NEL and WL) also dropped to a very low level (Figure 29b). The low percentage of UJs may be partly be attributed to the fact that many young juveniles have slowly grown into the spotted juvenile stage, or the mother-calf pairs have chosen to spend less time in Hong Kong due to other disturbance factors or the lack of fishery resource. Nevertheless, it is encouraging to observe that even though the percentage of UCs recorded in the previous monitoring period dropped to the lowest since 2002, it has bounced back to a higher level in 2011-12, implying that more newborn calves were utilizing Hong Kong waters during the present study period. As more disturbances to mother-calf pairs are expected to occur within their habitats shortly due to the HZMB construction (especially along the alignment of the Hong Kong Link Road), the occurrence as well as mortality level of young calves should be closely monitored in the near future.

5.6. Activities and Associations with Fishing Boats

The behaviour and engaged activities of Chinese White Dolphins were regularly observed and recorded during the systematic line-transect vessel surveys. During the 12-month period, a total of 56 and 7 sightings were associated with feeding and socializing activities respectively, comprising of 17.1% and 2.1% of the total dolphin sightings. Only two groups of dolphins were engaged in traveling activity, and no dolphin was observed in any milling or resting activity. Most of the feeding activities occurred along the west coast of Lantau, while the rest were scattered around Lung Kwu Chau and the Brothers Islands (Figure 30). On the other hand, five of the seven sightings engaged in socializing activities occurred in WL, and only two dolphin groups in North Lantau region (near Black Point and at northeast corner of airport) were engaged in socializing activity (Figure 30).

Temporal trends in percentages of activities among all dolphin groups showed that the frequencies of feeding activities remained the same in the past three monitoring periods, after a steady decline from 2002-03 to 2007-08 and another gradual increase from 2007-08 to 2009-10 (Figure 31). On the other hand, socializing activities in 2011-12 monitoring were exceptionally rare, with the percentage dropped to the lowest in the past decade. This declining trend should be continuously monitored, as the frequencies of such important activities spent by dolphins could provide important implications to their usage of Hong Kong that are vital to their survival. Socializing activities certainly serve an important function to the dolphins, as they need to spend time to bond with others and look for mates during their reproductive season. Although there is a possibility that dolphins spend less time socializing due to longer foraging periods, it appeared that the correlation between the percentage of feeding and socializing activities was not strong in the past decade of dolphin monitoring (Figure 31). In the near future, focal follow observations of individual dolphins or small stable groups of dolphins (Mann 2000) should be conducted to gain a better understanding of the daylight behaviours of local dolphins over extended periods.

From April 2011 to March 2012, 31 dolphin groups were associated with operating fishing vessels, or 9.5% of all dolphin groups. Among these 31 groups, 13 of them were associated with hang trawlers, while the rest were associated with pair trawlers (nine groups), shrimp trawlers (four groups), gill-netters (two groups) and single trawler (three groups). Most of these associations occurred in spring months (41.9% of the total), and in West Lantau region (51.6% of the total). Distribution of these boat-associated sightings occurred mostly along the west coast of Lantau, while a few others were also scattered in SWL, SEL, around Lung Kwu Chau and near Tai Mo To (Figure 32). Notably, the easternmost sightings recorded in SEL were also associated with operating fishing boats, and it is likely that dolphins only occurred there due to their associations with trawlers luring them into this marginal habitat.

5.7. Habitat Use

5.7.1. General patterns of habitat use of Chinese White Dolphins

The SPSE (i.e. sighting densities) and DPSE values (i.e. dolphin densities) were calculated among all grids in the six survey areas where Chinese White Dolphins occurred regularly (i.e. DB, NWL, NEL, WL, SWL and SEL), for the entire year of 2011 as well as the five-year period in 2007-11. In 2011, the most heavily utilized habitats by Chinese White Dolphins that recorded high sighting and dolphin densities included the waters between Lung Kwu Chau and Black Point, and near Sha Chau, Tai Mo To and Sham Shui Kok in North Lantau region (Figure 33). Moreover, dolphin densities were very high throughout the WL survey area, with particularly high levels of usage around Tai O Peninsula, Kai Kung Shan and Fan Lau. Dolphins also occurred in higher densities at the mouth of Deep Bay, along the coast of SWL, and around Soko Islands (Figure 33). Two grids in SEL also recorded high dolphin densities, but notably these few grids only had one sighting with an unusually large group of dolphins (Figure 33). Despite the even amount of survey effort throughout the six survey areas during 2011, some areas appeared to be avoided by the dolphins, which included the inner part of Deep Bay, around the airport platform, near Tuen Mun and Siu Lam, the offshore waters in SWL, and almost the entire area of SEL (Figure 33).

To examine dolphin habitat use in recent years, all survey effort and on-effort dolphin sightings from 2007-11 were pooled to calculate the overall SPSE and DPSE values during the five-year period. The longer study period with a much larger sample size should depict a more accurate picture where important dolphin habitats were located in the western waters of Hong Kong in recent years. During this period, almost all grids in NWL, NEL, WL and SWL survey areas were utilized by dolphins in various degrees (Figure 34). Among these four areas, only a few locations were avoided by the dolphins, which included the perimeter of the airport platform, near Tuen Mun, the eastern end of NEL near Ma Wan, near Shek Pik, north of Siu A Chau and southeast of Tai A Chau (Figure 34). Dolphins occurred less frequently in Deep Bay (especially the inner part) as well as the entire SEL survey area, which were considered to be the marginal habitats for the local dolphins (Figure 34).

On the contrary, the west coast of Lantau and the water around Lung Kwu Chau represented the most important habitats for Chinese White Dolphins during 2007-11. Many grids in WL recorded very high dolphin densities, including the ones around Tai O Peninsula (Grids D23-24, E23), near Kai Kung Shan and Peaked Hill (Grids

C25-27, B27, A26-27), at Fan Lau (Grids C30 and D30) and Kau Ling Chung (Grid F29) (Figure 34). The Lung Kwu Chau area also recorded high dolphin densities during 2007-11 (Grids G8-10, H8-11, I10) (Figure 34). All these grids with high dolphin usage should be considered important habitats, and special attention should be paid to these areas for any potential overlap with future infrastructure projects (e.g. HZMB Hong Kong Projects) and with intense human activities such as the marine traffic along the Urmston Road and South Lantau Vessel Fairway. Moreover, the entire west coast of Lantau should be established as a marine protected area, as this area has been consistently identified as the most important habitat for dolphins in Hong Kong. In light of the disturbance from dolphin-watching activities (see Section 5.10), the increasing amount of high-speed ferry traffic (see Section 5.11), and the potential impacts associated with the construction of HZMB in the next few years, stringent conservation measures should be considered in WL to prevent the further decline of dolphin usage in this important habitat.

In the past, the Brothers Islands were considered an important dolphin habitat (Hung 2008), but this area only recorded low to moderate dolphin densities during the five-year period (Figure 34). This coincided with the significant decline in dolphin abundance detected in NEL during recent years, which was possibly linked to the increased amount of vessel traffic originating from the Sky Pier, thereby affecting the movements of individuals dolphins moving from the Lung Kwu Chau area to the Brothers Islands (see Section 5.11). Dolphin usage should be continuously monitored around this group of islands, as this area will be designated as a marine park in the next few years as a habitat compensation measure for the reclamation project of the Hong Kong Boundary Crossing Facilities nearby.

5.7.2. Important dolphin habitats for feeding and socializing activities

To determine which grids were used more frequently for feeding and socializing activities by the Chinese White Dolphins in Hong Kong, the subsets of dolphin sightings engaged in these two activities in the past decade were used to calculate SPSE values for each grid. In total, there were 657 and 267 confirmed sightings where dolphins were engaged in feeding and socializing activities respectively from 2002 to 2011. Most grids in NWL, NEL and SWL survey areas recorded dolphins engaged in feeding activities, while almost the entire area of WL was used by dolphins as their feeding habitat (Figure 35). Grids with higher sighting densities in association with feeding activities can be found around the Lung Kwu Chau area, at Sham Shui Kok, near Tai O Peninsula and Kai Kung Shan, at Kau Ling Chau and between the Soko Islands. The areas between Black Point and Lung Kwu Chau, around Sha Chau and the Brothers Islands were also moderately used by dolphins for their feeding activities (Figure 35). On the other hand, even though socializing activities were recorded throughout the main area of dolphin occurrence, these sighting densities were particularly higher in grids around Lung Kwu Chau and at Kau Ling Chung, and were moderately higher near Sham Shui Kok, around Tai O Peninsula and at the mouth of Deep Bay (Figure 35).

Where the grids recorded a higher occurrence of feeding and socializing activities these should be viewed as important dolphin habitats, as the two activities serve important functions in the daily lives of dolphins. In order to meet their energetic needs, dolphins need to find enough food resources in order to survive and reproduce. In addition, dolphins socialize to create and reinforce social bonds, and sometimes social gathering provide mating opportunities for them. Therefore, the areas with higher concentrations of feeding and socializing activities should be protected from further human disturbance (e.g. vessel traffic, trawling activities), and future development pressure should be avoided among these important habitats for the dolphins.

5.7.3. Important habitat for nursing activity of Chinese White Dolphins

Besides feeding and socializing activities, frequent occurrence of mother-calf pairs in certain areas should also deserve more attention for conservation effort, as these areas serve an important function for nursing activities of the dolphins. To deduce these important nursing habitats, the number of calves (presumably accompanied by their mother) was calculated in each grid and normalized by the amount of survey effort to deduce DPSE values for the grid. The calves are categorized into newborn calves (i.e. unspotted calves) and older calves (i.e. unspotted juveniles). From 2002 to 2011, a total of 144 newborn calves and 762 older calves were sighted among the survey areas around Lantau Island. Overall, the grids recorded the occurrence of newborn calves mainly clustered along the west coast of Lantau, and between Lung Kwu Chau and Black Point (Figure 36). In particular, several grids recorded higher densities of newborn calves were located around Lung Kwu Chau and near Tai O Peninsula. On the contrary, newborn calves only occurred sporadically in NWL and SWL survey areas, and around the Brothers Islands in lower density (Figure 36). In comparison, older calves occurred throughout different survey areas around Lantau except in SEL. Particularly higher densities of older calves could be found to the east of Lung Kwu Chau, at Tai O Peninsula, near Kai Kung Shan, at Fan Lau and Kau Ling Chung (Figure 36). Almost all grids in SWL, NEL and DB survey areas only recorded low densities of older calves (Figure 36).

Overall, the west coast of Lantau and Lung Kwu Chau appeared to be the most important dolphin habitat for nursing activities in Hong Kong, and these two areas were also identified as important habitat for their feeding activities. As dolphin calves are still largely dependent on their mother, the mothers need to find abundant and concentrated food resources in order to meet their own energetic demands as well as nursing their young. Besides feeding opportunities, mother-calf pairs are more susceptible to disturbances in their surrounding environment (e.g. underwater noise from vessel traffic), and their nursing activities more likely occur in areas that are relatively less disturbed by human activities. However, the intense acoustic disturbance by small-scale dolphin-watching activities originating from Tai O as well as the increased amount of vessel traffic near Lung Kwu Chau and Fan Lau may have already contributed to the significant decline in dolphin abundance in NWL and WL survey areas (see Section 5.10 & 5.11). In the near future, the HZMB construction will inevitably cause even more disturbance to the local dolphin population, especially to the mother-calf pairs. Therefore, there is an urgent need to protect these important habitats for nursing activities with the most conservative approach, in order to ensure their continuous reliance of Hong Kong waters.

5.7.4. Habitat use patterns of finless porpoises

To examine the habitat use patterns of finless porpoises, their sightings densities (SPSE) and porpoise densities (DPSE) were calculated among all grids in the five survey areas where they occurred regularly (i.e. SWL, SEL, LM, PT and NP), for the entire year of 2011 as well as the eight-year period in 2004-11. In 2011, spatial patterns of porpoise habitat use revealed that some grids were utilized more often by the porpoises as their important habitats. These areas included the waters just south of Tai A Chau, east of Siu A Chau, the southwest and southeast sides of Shek Kwu Chau and Lamma Island, as well as the offshore waters of PT survey area (Figure 37). However, it should be noted that the deduced porpoise densities in PT and NP should be treated with caution, as the amount of survey effort among the grids in these two areas were relatively low during the 2011 monitoring surveys.

To reveal a more representative picture of porpoise habitat use in recent years, all survey effort and on-effort porpoise sightings from 2004-11 were pooled to calculate SPSE and DPSE values of porpoise densities among the five survey areas with a larger sample size and a longer study period. Since finless porpoises in Hong Kong exhibit distinct seasonal variations in distribution with rare occurrence in each survey area during certain months of the year (Hung 2005, 2008; Jefferson et al. 2002a), 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.

Porpoise habitat use during winter and spring months (i.e. dry season) in 2004-11 was mainly examined at SWL, SEL and LM survey areas, as the amount of survey effort allocated in PT and NP during these months was much lower. During the eight-year period, most grids in SWL and SEL survey areas as well as the southern portion of LM survey area recorded regular porpoise usage, but the important porpoise habitats with high SPSE and DPSE values were mostly located in South Lantau, including the waters to the south of Tai A Chau, southwest of Shek Kwu Chau and Cheung Chau, and the offshore waters of SEL (Figure 38). The waters between Shek Kwu Chau and the Soko Islands, the offshore area of LM survey areas, and the eastern side of Lamma Island was also moderately used by the porpoises (Figure 38). However, porpoises seemed to avoid the western end of SWL survey area, the waters between Chi Ma Wan Peninsula and the islands of Shek Kwu Chau / Cheung Chau, as well as the offshore waters bordering between SEL and LM (Figure 38). This could be related to the intense high-speed ferry traffic in these areas, as the porpoises appeared to be more sensitive to boat engine noise than the Chinese White Dolphins.

During summer and autumn months (i.e. wet season), more survey effort was allocated to the eastern survey areas in PT and NP, while the survey effort remained the same in SWL and SEL. However, a much lower amount of survey effort was allocated to survey for porpoises in LM survey area, and therefore their habitat use pattern there should be treated with caution. During the wet season, most grids in South Lantau that recorded the presence of porpoises had very low densities, reflecting their infrequent use of this area during the wet season (Figure 39). However, porpoises were regularly sighted in PT and NP, and with higher porpoise density grids concentrated around the Po Toi Islands, as well as the offshore area just south of the Ninepins (Figure 39). The few grids that recorded very high porpoise density in the offshore waters of Ninepins should also be treated with caution though, as most of these grids recorded only one porpoise sighting with only a few units of survey effort during the eight-year period, resulted in biased results of very high SPSE and DPSE values. Considerably more effort will be needed among grids in the eastern survey areas in the future, in order to depict a better picture of porpoise habitat use pattern during the wet season.

5.8. Photo-identification Work

5.8.1 Summary of photo-ID data collection

During the 2011-12 monitoring period, over 30,000 digital photographs of Chinese White Dolphins were taken from vessel surveys, helicopter surveys and shore-based theodolite tracking for the photo-identification of individual dolphins. All photographs taken in the field were compared with the existing individuals in the photo-identification catalogue. Any new photographs identified as existing or new individuals during the study period, as well as updated information on their gender and age class were also incorporated into the catalogue and database.

As of March 2012, a total of 752 individual Chinese White Dolphins have been identified in Hong Kong waters and the rest of the Pearl River Estuary. These included 52 new individuals being added to the catalogue during the present study period. Within the catalogue, 445 individual dolphins were first identified within Hong Kong territorial waters, while the rest were first identified in Guangdong waters of the Pearl River Estuary. In the entire catalogue, 182 individuals were seen 10 times or more; 127 individuals were seen 15 times or more; 44 individuals were seen 30 times or more; and 15 individuals were seen 50 times or more. One individual NL24 had the highest number of re-sightings, and has been seen 161 times since 1996. In contrast, 51.7% of all identified individuals were seen only once or twice, and most of these were first identified in Guangdong waters.

In recent years, the photo-identification work has progressed well, with the total number of identified individuals, total number of re-sightings made, and the number of individuals within several categories of number of re-sightings increased noticeably every year (Figure 40). This is partly due to the invaluable experience gained by HKCRP research team in photographing dolphins at sea and the matching of photographs with the identified individuals in the catalogue. Moreover, photo-ID data collected from consultancy studies and dolphin-watching trips has also contributed significantly to the overall catalogue, especially the data collected in Guangdong waters, which allowed the examination of cross-boundary movement of individual dolphins.

From April 2011 to March 2012, a total of 192 individuals, sighted 635 times altogether, were identified during AFCD monitoring surveys and shore-based theodolite tracking sessions (Appendices IV-V). Among them, 52 individuals were newly-identified for the first time, while the rest were existing individuals in the photo-ID catalogue. The majority of re-sightings during the 12-month period were made in WL and NWL survey areas, comprising 39.5% and 34.5% of the total respectively. Moreover, many re-sightings of individuals were made in NEL (85) and SWL (56) survey areas, while there were only 9 and 15 re-sightings made in SEL and DB survey areas respectively. Notably, many newly identified individuals from the previous monitoring period were also sighted repeatedly in this study period (e.g. WL157, WL167), showing their increased reliance on Hong Kong waters in the past two years.

Although most identified individuals were sighted only once or twice during the 12-month study period, some were sighted repeatedly and showed strong reliance on Hong Kong waters as an important part of their home range. For example, WL25 and NL24 were sighted 14 times and 10 times respectively, while NL284 and NL285 were both sighted six times during the 12-month period. Most of these individuals are considered year-round residents, and their range use should be closely monitored in the near future to detect any temporal changes of their occurrence in Hong Kong waters.

5.8.2. Individual movement and range use

Combined with all photo-ID data collected from the present monitoring study and other studies, movement patterns of individual dolphins within Hong Kong territorial waters were examined from April 2011 to March 2012. During the 12 month study period, a total of 219 individuals were sighted, and many of them moved extensively across different survey areas around Lantau Island despite the relatively short study period. In particular, 70 individuals were sighted in both NWL and WL survey areas, while another 43 individuals were sighted in both NWL and NEL survey areas. A total of 38 individuals were also sighted across SWL and WL survey areas. Some individuals also showed long-range movements across several areas. For example, six individuals moved between SWL, WL and NWL survey areas, while another six individuals moved across SEL, SWL and WL survey areas. Two extraordinary cases were observed: WL88 was sighted across SEL, SWL, WL and NWL survey areas; and NL128 moved from SEL to NEL through SWL, WL and NWL survey areas during the 12-month period.

The extensive movement of individual dolphins across several survey areas around Lantau is noteworthy, particularly in light of the commencement of the HZMB construction in the coming months. Recently, two social clusters were identified in North Lantau and West Lantau respectively (Dungan 2011), and the key overlapping area to facilitate the interaction between the two clusters lies along the coastal waters between Sham Wat and Peaked Hill. Currently, the extensive movements of individuals from the two social clusters facilitate frequent interactions between the two, but it is uncertain whether these movements will be affected by the construction activities of HZMB. The alignment of Hong Kong Link Road lies between the juncture of NWL and WL survey areas, while the reclamation site of the Hong Kong Boundary Crossing Facilities as well as the alignment of Tuen Mun-Chek Lap Kok Link are both situated at the border of NWL and NEL survey areas. Many individuals that utilize Hong Kong on a regularly basis will be undoubtedly affected by these projects to a certain degree, and therefore the movements of individual dolphins around Lantau Island should be carefully monitored during the next few years of HZMB construction work.

To combat this issue, the mitigation measures suggested in the EM&A programme of HZMB Hong Kong Projects for the construction work should be strictly implemented, in order to safeguard the dolphins from potential disturbance by various construction activities (e.g. reclamation work, bored piling work) and vessel movements. The cross-boundary movements of individual dolphins in and out of Hong Kong waters should also be carefully examined, to fully understand whether there is any temporal change in individual range use during HZMB construction. Moreover, it is strongly recommended that any large-scale infrastructure project should be avoided in the next few years, in order to allow a full evaluation of the potential adverse impacts on the utilization of Hong Kong waters by the dolphins during and after HZMB construction. In light of the importance of West Lantau waters to many dolphins as noted in previous sections, this area should receive stringent conservation measures during HZMB construction, in order to allow the continued interactions between the two identified social clusters in the area of their overlapping ranges.

Using the fixed kernel method, the 95% kernel ranges of 120 individuals observed in 2011 were deduced, and their ranging patterns are shown in Appendix VI. Moreover, 97 individual dolphins that were sighted 15+ times and occurred in recent years were further examined for their range use (Table 1). Among these individuals, most of them were sighted in NWL (81 dolphins), NEL (46), WL (84) and SWL (35) survey areas, but only a few used DB , EL or SEL survey areas as part of their ranges (Table 1). Moreover, nearly half of these 97 individual dolphins also occupied ranges that spanned from Hong Kong across the border to Guangdong waters, implying that the range use of many dolphins sighted in Hong Kong extend further west to the rest of Lingding Bay area.

5.8.3. Residency pattern

To understand the residency patterns of the 97 individual dolphins sighted 15+ times in recent years, their annual and monthly occurrences were examined. All except six were considered residents in Hong Kong, which means they have been sighted in at least eight years since 1997, or five years in a row. However, the low proportion of visitors could be underrepresented, as they utilized Hong Kong waters much less frequently than the residents, and the number of re-sightings usually takes much longer to accumulate in order to reach the minimum requirement of 15 re-sightings for this analysis. For monthly occurrence, about two thirds of the 97 individual dolphins showed distinct seasonal occurrence (absent from Hong Kong certain months of the year), while one third of them occurred year-round in Hong Kong waters (Table 1). Overall, 32 and 59 dolphins were identified as year-round and seasonal residents respectively. Another five dolphins were classified as seasonal visitors, and only one individual (NL224) was considered a year-round visitor.

It appeared that more seasonal residents (30 dolphins) utilized the marine park as their 25% UD core areas than the year-round residents (12 dolphins), while slightly more year-round residents (10 dolphins) utilized the Brothers Islands as their 25% UD core areas than the seasonal residents (7 dolphins). On the other hand, the ratio of year-round and seasonal residents utilizing the west coast of Lantau as their core areas was 1:2, which was similar to the overall proportion of the two types of residents. Notably, nearly 40% of the individuals utilizing the marine park and the Brothers Islands as their core areas were also sighted across the border. In comparison, more than 60% of the individuals utilizing the west coast of Lantau as their core areas were also sighted in Guangdong waters. It is likely that individuals occurred regularly along the narrow strip of coastal waters in West Lantau spent a significant portion of their time across the border. During the construction work of HZMB (especially the piling activities along the alignment of the Hong Kong Link Road in WL) in the coming years, it will be important to examine any temporal changes in range use as well as residency patterns of individual dolphins in light of some potential disturbance they may endure.

5.9. Dolphin-related Acoustic Studies

5.9.1. Summary of acoustic data collection

The long-term acoustic monitoring work aims to improve the understanding of the natural sound habitat and anthropogenic noise around Lantau in relation to the acoustic behaviour of local Chinese White Dolphins. During the present monitoring period, a total of 10 hours and 49 minutes of acoustic recordings in 139 sound samples were collected from various acoustic monitoring stations around Lantau and in Deep Bay (see Appendix VII). Several opportunistic recordings of dolphin sounds were also made at different locations from the stationary hydrophone system as well as the towed hydrophone array. The acoustic data collected under the present study were all integrated into a long-term database, and can serve as useful baseline information for further studies (e.g. construction phase monitoring of HZMB Hong Kong Projects) in the near future. The data will also allow further investigations on anthropogenic noise and dolphin vocalizations in Hong Kong waters, and the relationship between the two. In this report, some detailed analyses of anthropogenic noise, with an emphasis on noise originating from fast-moving vessels, are provided as follows.

5.9.2. Sound analysis with special emphasis on sounds of ferry traffic

Noise recordings were taken off Lantau Island in Hong Kong during 52 survey days between April 2010 and August 2011. Recordings of four solitary high-speed ferries (HSFs) were obtained from different survey areas. The sounds made by "wala wala", a type of small speed boats that took visitors to and from Tai O fishing village for dolphin-watching activities, were also recorded. Ambient noise recordings at three sites (WL Station #2 (WL#2), within South Lantau Vessel Fairway (SLVF) at Fan Lau near WL Station #3, and SWL Station #3 (SWL#3); see Figure 3) were made to assess the relative noise contributions of the HSFs. WL#2 was used as a comparison of a natural habitat with minimal anthropogenic noise influence. The SLVF area at Fan Lau was used to compare sounds relative to a period of busy vessel traffic (e.g. the presence of a shrimp trawler and several HSFs) in a generally high-level traffic area. Lastly, SWL#3 was used to investigate the noise levels near a high-level traffic area when no vessels were present at the time of recording.

5.9.2.1. *Ambient noise*

A comparison of ambient noise levels for the three sites revealed several notable differences. The ambient noise levels at SLVF were markedly higher than the ones at both WL#2 and SWL#3 with frequencies mainly between 100 and 31,000 Hz (Figure 41). However, the relatively high sound pressure levels associated with the recordings at SLVF corresponded with the presence of several vessels, a shrimp trawler and three HSFs. SLVF at Fan Lau is generally considered to be an intense traffic area, which appeared to be correlated with increases in sound pressure levels. WL#2 had the lowest sound pressure levels among the three sites, and is considered to be generally free from vessel traffic, with no vessels present in the vicinity of the station during the recordings. In comparison, ambient noise levels at SWL#3 were higher, particularly in the lower frequencies from 50-300 Hz, and this was probably related to the busy vessel traffic just 1-2 km south of this station. Thus the relatively higher noise levels at SLVF at Fan Lau were likely a combination of higher ambient noise levels and active moving vessels in this area.

It is unlikely that these differences were attributed to Beaufort sea state, as recordings made at WL#2 had the highest Beaufort sea state of 4, yet maintained the lowest sound pressure levels among the three sites (Figure 41). When considering SWL#3, the difference in ambient noise levels compared to the one at SLVF was less pronounced, especially at frequency 1,000 Hz, where the sound pressure levels of both stations were largely overlapped. SWL#3 is only situated 1-2 kilometres away from the busy vessel traffic route without many vessels transiting directly through this area. This suggested that ambient noise levels are generally higher in this area even without the direct presence of vessels, perhaps due to the busy vessel movements in the immediate vicinity.

The sound pressure levels for SLVF at Fan Lau peaked at around 100 dB from around 800-10,000 Hz, at the hydrophone (with unknown levels at a standard 1-metre distance from the sound source), well within the lower audible range of common bottlenose dolphins (*Tursiops truncatus*). While no audiograms exist for Chinese White Dolphins, recent research on their communication frequencies (Van Parijs and Corkeron 2001; Sims et al. 2012) indicated that they share many similarities in vocal repertoire to bottlenose dolphins, and therefore they may also share similar audiograms. With reference to the audiogram of bottlenose dolphins, it is unlikely that the ambient noise of this level will cause physiological damage to the local Chinese White Dolphins, but induced stress and behavioural changes should be further investigated.

The ambient noise level at SLVF may be a conservative estimate since the data was collected during the presence of multiple vessels, all of which changed in proximity to the hydrophone throughout the recording. No vessels were present during the recordings at WL#2 and SWL#3, so this issue does not pertain to them.

As a consequence of the random nature of the selected sites, it is likely that the represented noise levels are a mixture of both near and far vessel distances. Moving vessels closer in proximity will generate higher sound pressure levels, thus the estimated ambient noise level is likely more representative of the average sound levels recorded from the average distance of moving vessels during the recording. This is potentially problematic in determining the effects of noise on the local dolphins, as it is presently unknown at what distances dolphins maintain (or attempt to maintain) themselves from vessels. The HSFs could alter their proximity to dolphins and sound pressure levels could increase very rapidly, potentially causing startle or other reactions. The potential magnitude of ambient noise levels at SLVF is dependent upon the assumption that the dolphins maintain distances similar to the average distances between the hydrophone and vessel recorded in the analyzed selections. This highlights a need for research on dolphin proximity and behaviour in the presence of vessels, through the coordinated effort of synchronized shore-based theodolite tracking work and acoustics recordings.

5.9.2.2. Noise from fast moving vessels

At most distances, the HSFs and wala wala (small speed boats engaged in dolphin-watching activities) were much louder when compared to the ambient noise levels recorded from WL#2 (Figures 42-45). Their sound pressure levels were also generally higher than the ambient noise at SLVF, but this tended to be at the closer distances (Figures 42-45), such as between 100-400 metres of the apparent sound sources. Sound pressure levels also tended to peak between 100-3,000 Hz, although this varied between ferries (Figures 43-45). The highest sound pressure levels peaked around 120 dB, except for one HSF (Figure 46). These peaks were associated with distances from 100-1,000 metres. These results suggest individual differences in sound output between ferries; however, it is unclear whether these discrepancies are from unique vessel structure, differences in vessel speeds, or local habitat characteristics among different survey areas.

The difference in most sound pressure levels between HSFs and the ambient noise recordings highlighted a serious contribution to the local noise levels. In most cases, these higher sound pressure levels were associated with shorter distances, between 100-400 metres of apparent sound sources. Thus, the impacts of these increased levels mainly depend on the proximity of dolphins to the HSFs. However, considering the fast speeds that these vessels can undertake, dolphins may not have adequate time to distance themselves during such close approaches in a relatively short period of time, and they may suffer physiological impairment or stress. In addition, this problem may be further compounded in areas of high vessel traffic where multiple HSFs are navigating, presumably maintaining at certain acceptable distances from each other. The spacing of these HSFs might be seen as a dynamic, heterogeneous noise environment that in theory would be stressful for dolphins to navigate based on the unpredictability of the HSFs movements. The higher sound pressure levels within SLVF may also mask the sound of dolphins and affect their foraging activities if this is also an area frequently used by them as a desirable source of prey despite the noise.

Notably, one HSF at NEL Station #1 displayed sound pressure levels that were consistently lower throughout its frequency range than both ambient noise levels for WL#2 and at SLVF (Figure 46). This may have resulted from individual variations in vessel structure and speed, but it could also be related to the distance between the station and noise source as well as the underwater topography, as this station is situated at least 500 metres away from the vessel traffic route and the water depth there is much shallower (~5 metres deep) than at other stations.

In summary, the results showed that HSFs made considerable contributions to the noise found in the environment within dolphin habitats, though the factors affecting their individual sound outputs need to be investigated further. As there are many HSFs traversing through the waters off Lantau Island where dolphins frequently occur, management of their speeds and distribution is important in mitigating their potential effects on the local dolphin population. Future research should focus on understanding how dolphins distribute themselves spatially in relation to HSFs, and how this may vary with differing speeds and distances. The ultimate goal should also be set to determine the effects of different sound pressure levels originating from HSF traffic on the physiology and behaviour of local dolphins, which will help to assess and manage anthropogenic acoustic disturbances by ferry traffic to protect the local dolphin population.

5.10. Shore-based Theodolite Tracking

5.10.1. Summary of theodolite tracking data collection

From April 2011 to March 2012, a total of 44 sessions with nearly 174 hours of theodolite-tracking were conducted from Tai O, Sham Wat and Fan Lau shore-based stations (see Figure 4; Appendix VIII). Most of the effort was spent at the Tai O stations, where dolphin occurrence was the most frequent. To improve the efficiency of the overall tracking work, two theodolites were set up on several days at

Tai O for synchronized tracking sessions, with one focusing on tracking dolphin movement and behaviour, while the other one focused on tracking the movement of vessels passing by. Boat surveys with underwater acoustic recordings, synchronized with shore-based theodolite tracking of dolphins, were also obtained on a number of days for experimental purposes.

From the shore-based observation sessions, 184 sightings of Chinese White Dolphin groups with 4,632 fixes of their positions were collected. Another 6,194 fixes were also collected from locations of dolphin-watching boats, fishing boats, high-speed ferries and other vessels, to examine the level of vessel traffic as well as their effects on dolphin behaviour (see Appendix VIII).

5.10.2. Preliminary analysis of theodolite tracking data

The collected data was analyzed by Ms. Sarah Piwetz and Professor Bernd Würsig of the Marine Mammal Behavioural Ecology Group at Texas A& M University using the *Pythagoras* software developed by their research team. The short-term goals for the theodolite tracking study are to describe the extent of overlap between vessel routes and dolphin habitats off Lantau Island, and to determine if dolphin movement patterns and other behaviours (e.g. speed, reorientation rate, grouping) change in relation to vessel types and speeds. These short-term goals are preliminarily addressed in this report. The long-term objectives of this study, with data collected over an extended period of time, are to assess dolphin movement patterns relative to the quantity and types of vessels present, as well as vessel distance from the dolphins. This endeavor will help evaluate potential long-term biological effects of vessel traffic on the dolphins.

From April to December 2011, approximately 123 hours of tracks were obtained for this preliminary analysis, which included theodolite tracking data that was filtered to meet inclusion criteria. For example, only data obtained by experienced theodolite operators were included, and potentially erroneous recordings were excluded. Useable data during this nine-month period totaled 80 hours of tracking, with most of the effort being spent at Tai O station.

Results showed that in the western waters of Lantau, many types of vessels overlapped with dolphin habitat, including high-speed ferries, marine police vessels, research boats, sand barges, container ships, speedboats, dolphin tour boats (i.e. wala wala originating from Tai O), commercial trawlers and other personal boats (Figure 47). Dolphin behaviour varied in the presence of some of these vessel types. Only dolphin movement in the presence of tour boats and trawlers were examined because sample sizes for other vessel types were too small (n<10) to evaluate. The preliminary results indicated that dolphin leg speed increased in the presence of commercial trawlers (Figure 48a), and their reorientation rate also increased slightly in the presence of small tour boats (Figure 48b).

Field observations were consistent with these preliminary results. Commercial trawlers did not target dolphins directly, but dolphins changed course and increased speed to follow and forage behind and around them, potentially increasing the risk of vessel collision or net entanglement. Small tour boats from Tai O that targeted dolphins remained in the area of dolphin occurrence for only short periods. However, they engaged and departed from the dolphins abruptly and at high speeds. Dolphins changed directions more often when tour boats were present, possibly to avoid these fast moving boats.

Quantile-Quantile plots and Shapiro-Wilk normality tests showed that data was not normally distributed. Initial data analysis suggested that short-term changes in dolphin movement occurred in the presence of different vessel types, but more data is necessary to apply meaningful statistical analyses. The variance of dolphin leg speed in the absence of vessels may be overestimated at times when incoming trawlers were detected by dolphins before moving within the observers' view.

In addition to the short-term goals that were preliminarily detailed here, on-going research will continue in an effort to assess the long-term objectives, including dolphin movement patterns relative to the quantity and distances of vessels. Moreover, the dedicated study with stationary boat-based underwater sound monitoring (synchronized with shore-based theodolite tracking of dolphins) will be continued in the future. This specific study attempts to correlate underwater noises of different types of vessels with potential effects on dolphins. The study results will help in understanding the volume and noise signature effects of vessel movements in relation to the potential behavioural changes displayed by dolphins within areas of intense vessel traffic. More importantly, longitudinal research using the theodolite tracking method will continue in the coming years, to evaluate potential biological effects of vessel traffic that require a larger dataset and longer study period.

5.11. Case Study: Impact of High-speed Vessel Traffic on Hong Kong Cetaceans

5.11.1. Background

Chinese White Dolphins and Indo-Pacific finless porpoises in Hong Kong are well-known to live in marine habitats that are greatly influenced by various human activities (Hung 2008; Jefferson et al. 2009). In the past decade of longitudinal research on these dolphins and porpoises in Hong Kong, it has long been suspected that the local resident cetaceans are affected by the busy vessel traffic within their habitat around Lantau Island (Jefferson and Hung 2004; Jefferson et al. 2009; Parsons 2004). Several stranded dolphins and porpoises in Hong Kong exhibited wounds that were consistent with blunt-force trauma injuries caused by vessel collisions (Jefferson 2000; Parsons and Jefferson 2000), and a good proportion of known individual dolphins in the photo-identification catalogue also bear injuries, apparently caused by propellers (Jefferson 2000a; HKCRP unpublished data). The negative effects of vessel traffic on the dolphins' habitat preference and behaviour were also preliminarily examined (Hung 2008; Ng and Leung 2003), but the extent of such adverse impacts, such as the acoustic disturbance, displacement from favourable foraging grounds, and long-term effects on population status, remains equivocal. In the previous monitoring period, a significant decline in dolphin abundance in Hong Kong was documented (Hung 2011), and one of the plausible explanations for such an observed decline was the increased amount of marine traffic within the dolphins' habitat. This again raised the concern of whether marine traffic caused significant impacts, which led to the diminished usage of Hong Kong waters by local Chinese White Dolphins.

The effects of vessel traffic on cetaceans around the world have been well documented in the past. Behavioural changes such as spatial avoidance, increase in swimming speed, changes in diving behaviour and acoustic behaviour have been studied extensively in various studies (e.g. Au and Perryman 1982; Kruse 1991; Evans et al. 1992; Janik and Thompson 1995; Allen and Read 2000; Van Parijs and Corkeron 2001). High levels of vessel traffic within cetacean habitat not only expose them to greater risk of vessel collisions (Van Waerebeek et al. 2007) but also add background noise to the underwater environment. Previous studies showed that persistent background noise can result in the masking of dolphin sound protection, affecting their ability to forage and socialize (Bejder et al. 2006; Lusseau 2005; Constantine et al. 2004). This can potentially displace dolphins from their important habitats and affect their energy and activity budgets.

In order to further examine the impacts of high-speed ferry (HSF) traffic on the dolphins and porpoises in Hong Kong, this case study aims to investigate the area where marine traffic routes and habitats of dolphins and porpoises overlap, and the temporal trend in high-speed ferry traffic volume. It also provides evidence on the adverse impacts of marine traffic on local dolphins and porpoises during the past decade of cetacean monitoring work, as well as some potential mitigation measures to combat this serious problem.

5.11.2. Marine traffic route and volume

Within the dolphin and porpoise habitat around Lantau Island, most of the vessel traffic is concentrated within the two major vessel fairways, one in North Lantau along the Urmston Road extending to Ma Wan Channel (i.e. North Lantau Vessel Fairway, NLVF), and the other one in South Lantau stretching along the coast from Chi Ma Wan Peninsula to Fan Lau (i.e. South Lantau Vessel Fairway, SLVF) (Figure 49). In recent years, after the opening of the Sky Pier in September 2003 at the northeast corner of Chek Lap Kok Airport, another ferry route from this pier also began contributing significant HSF traffic to NLVF. The NLVF and the ferry route from Sky Pier overlaps with major areas of dolphin occurrence in North Lantau waters (e.g. Lung Kwu Chau, the Brothers Islands), while SLVF overlaps with the habitats of both dolphins and porpoises in West and South Lantau waters (e.g. Fan Lau, Soko Islands) (Figure 49).

Although vessel traffic is composed of a variety of vessel types (e.g. container ships, fishing boats, high-speed and slow-moving ferries), the noise from HSFs (e.g. catamarans and jetfoils) was thought to cause the most significant acoustic disturbance to Chinese White Dolphins, due to their fast speed and the loud, high frequency sounds that are generated (Hung 2008, 2011; Ng and Leung 2003; Sims et al. in prep.). As a result, the traffic route and annual vessel traffic volume of all HSFs departing from Hong Kong in 1999 through 2010 to major cities within the Pearl River Delta (e.g. Shekou, Shenzhen, Zhuhai) and Macau SAR were obtained from the Marine Department through their website and the assistance of AFCD for detailed examination.

According to the information received by AFCD from the Marine Department, the number of passengers using HSF services in Hong Kong to and from Macau and the Mainland ports increased by 16%, from about 20.9 million in 2006 to 24.3 million in 2010. The increase was mainly attributable to passengers traveling to and from Macau, which has increased by 37%, from 14.5 million in 2006 to 19.8 million in 2010. In contrast, passengers traveling to and from Mainland ports decreased by

30% during this five-year period, from 6.5 to 4.5 million. The 2010 data also showed that 81% of the total passengers were attributable to the Macau ferry services, which has dominated the overall temporal trend.

Besides the passenger throughput, the total number of HSF trips serving Hong Kong and Macau and all Mainland ports increased by 48%, from 119,810 trips in 1999 to 177,877 trips in 2010 (Figure 50a). More specifically, the Hong Kong-Macau HSF service has increased by 77%, from 68,060 trips in 1999 to 120,499 trips in 2010 (Figure 50b) while the HSF traffic serving Hong Kong and mainland Chinese cities (i.e. excluding Macau) has increased by 46% from 1999 to 2007, but the trend reversed from 2007 to 2010 with a decline of 31% (Figure 50b).

Notably, the increase in the number of Hong Kong-Macau HSF trips appeared to take off after 2003 (9.9% between 2003 and 2004), and again after 2007 (8.5%-11.0% increase per annum) (Figure 50b). The number of daily trips going to and from Macau also increased dramatically from 185-194 trips per day during 1999-2003 to 330 trips in 2010. In contrast, the increase in the number of daily ferry trips to mainland Chinese cities from Hong Kong remained relatively stable from 1999-2003, but a notable increase occurred starting in 2004 and subsequently peaking in 2007. The trend then reversed with a marked decline from 2007 to 2009-10, with the number of trips in 2009-10 reverting to the earlier levels in 1999-2003 (Figure 50b).

Apparently, major increases in HSF volume occurred both in SLVF and NLVF from 1999 to 2003 and from 2004 to 2007. Since then, the traffic volume has been on a steady decline in NLVF where most ferries operate between Hong Kong and mainland Chinese cities. But the traffic volume mostly service between Hong Kong and Macau ports in the SLVF continued to soar. Such a steady increase was partly attributed to the opening of the Taipa ferry terminal in Macau.

5.11.3. Impacts on local dolphins and porpoises

Distribution and Habitat Use ~ In a previous study, Hung (2008) examined the densities of Chinese White Dolphins (i.e. DPSE values) in grids within and near NLVF and SLVF from 1995 to 2005 using quantitative grid analysis, to detect any differences in dolphin densities within and near vessel traffic. That study revealed that there was a significant decrease in mean DPSE values between grids with traffic and those near traffic along a section of the NLVF (Hung 2008), suggesting that dolphins may have avoided the deep-water channels within intense vessel traffic despite better feeding opportunities.

In addition, temporal changes in overall dolphin densities (DPSE values) at several areas of interests in the past decade were examined here, including the suite of grids at Fan Lau (seven grids), the Soko Islands (20 grids) near SLVF, at the northeast corner of the airport near the Sky Pier (ten grids), and on the eastern side of Lung Kwu Chau adjacent to NLVF (seven grids) (Figure 51). At Fan Lau, where marine traffic was the most intense among all areas based on observations during shore-based theodolite tracking work, dolphin densities have dropped steadily from the highest in 2003, to the lowest in 2007 with a slight rebound during 2008-10 (Figure 52). The notable decline in dolphin occurrence between 2003-04 and 2006-07 coincided with the marked increase in volume of high-speed ferries to and from Macau (Figure 50b), implying that dolphins were avoiding this busy section of SLVF when the number of high-speed ferries increased. Interestingly, the densities of dolphins rebounded after the decline observed in 2007. Some dolphins may have become habituated to the high-speed ferry traffic in recent years, but dolphin density was still much lower in this area than in previous years (Figure 52). Furthermore, it should be noted that the annual dolphin abundance in West Lantau has also dropped noticeably since 2007 (Figure 22), which coincided well with the increase in HSF traffic volume between Hong Kong and Macau. It is possible that besides the decline in dolphin occurrence at Fan Lau, the entire West Lantau area may have been affected by the marked increase of high-speed ferry traffic in SLVF as well.

As Chinese White Dolphins tended to occur around the Soko Islands seasonally and less frequently (Hung 2008), a larger sample size would be needed for dolphin habitat use analysis, and therefore the survey effort and sighting data were pooled to examine dolphin densities among the 20 grids around the Soko Islands in three different 5-year periods (i.e. 1996-2000, 2001-05 and 2006-10). Notably, the DPSE values dropped steadily and dramatically during these three periods, with the density in 2006-2010 being only 25% of that in 1996-2000 (Figure 53). Besides the prominent decline in dolphin usage of the Soko Islands, the average group sizes of dolphins during 2001-06 and 2006-2010 were also much smaller than during 1996-2000. As the dolphins need to move across SLVF from Fan Lau and Kau Ling Chung to the Soko Islands (see Figure 49), the notable decline in dolphin densities and average dolphin group size could be an avoidance of dolphins to utilize this group of islands as favourable habitat, as the increased amounts of HSF traffic may deter their transit through the SLVF to the Soko Islands. Another plausible explanation to the decline in dolphin group size around the Soko Islands after 2000 could be a reduction of prey resources in this area, but porpoise usage around the Soko Islands appeared not to have changed much in the past decade (see below). Since both species utilize presumably similar prey species around the Soko Islands, an overall decrease in prey would reasonably also affect porpoises. Therefore, the underlying reason of avoidance of the Soko Islands by the dolphins was less likely related to prey depletion.

On the other hand, the annual dolphin densities to the east of Lung Kwu Chau near NLVF, an area identified as critical dolphin habitat in Hong Kong (Hung 2008), fluctuated during the period of 2002-10 (Figure 54a). Nevertheless, two declining trends in dolphin densities appeared to occur during 2004-06 and 2007-10. The first decline in 2004-06 coincided well with the marked increase in traffic volume to Mainland ports from 2003 to 2004, which was likely related to the opening of the Sky Pier in 2003 (Figure 54a). As the high-speed ferries departing from and arriving at the Sky Pier also travel through NLVF, the decline in dolphin usage at LKC during 2004-06 could be related to the disturbance from the increased amount of HSF traffic. However, both the ferry traffic and dolphin usage were also on a decline from 2007-10, and there could be other contributing factors that were related to their diminished use of this important habitat for the dolphins in recent years.

Near the Sky Pier, dolphin densities at the northeast corner of the airport revealed a dramatic decline from 2003 to 2004, but rebounded to a relatively higher level in 2005 (Figure 54b). Since then, a steady decline in dolphin usage of this area was observed from 2005-10. The notable decline from 2003 to 2004 coincided with the opening of the Sky Pier, as well as a significant increase in ferries traveling to and from Mainland ports (Figure 50b). Although the annual number of ferry trips to and from Sky Pier was not available from the Marine Department, the indirect evidence in annual passenger throughput from this ferry terminal indicated that the volume dramatically increased more than nine-fold from 91,000 passengers in 2003 to 861,4000. Moreover, it has been steadily increasing since then, reaching the highest total in 2010 of 2,242,000 passengers (Figure 55).

This new vessel traffic route from Sky Pier has likely contributed to the significant increased amount of traffic in NLVF, as well as the decline in dolphin usage around Lung Kwu Chau. Notably, the abundance estimate of Chinese White Dolphins in NEL survey area also dropped significantly from 2003 to 2004, and remained at a lower level since then (Figure 22). As the traffic route of vessels departing from the Sky Pier is situated at the boundary of NEL and NWL survey areas, many individual dolphins that move frequently between the core areas of Lung Kwu

Chau and the Brothers Islands may have been seriously affected by the increased amount of high-speed ferry traffic, forcing them to spend less time in the NEL survey area. Moreover, with the additional traffic in NLVF contributed by the opening of the Sky Pier, dolphin abundance estimates in the NWL survey area also dropped noticeably between 2003 and 2004, with a continuing decline since then (Figure 22). These results provided evidence that the increased amount of high-speed ferry traffic from the Sky Pier could possibly be the main contributing factor in the continuous decline in dolphin usage in both NEL and NWL survey areas.

The high-speed ferry traffic traversing through SLVF may have seriously affected the inshore movement of finless porpoises in South Lantau waters as well. By examining the temporal changes in porpoise distribution in SWL and SEL survey areas, it was clear that porpoises utilized the coastal waters of South Lantau coastline previously and were frequently sighted near Chi Ma Wan Peninsula and Shui Hau Peninsula during the earlier years in 1999-2006 (Figure 56). In fact, porpoises were observed regularly within Pui O Wan from land-based observation conducted in 2003-05 (Hung 2005), but they rarely occurred around Shek Kwu Chau or around the Soko Islands in these earlier years. However, more porpoises started to utilize the waters around Shek Kwu Chau, to the south of Tai A Chau, and the waters between the two islands during 2007-09, while they occurred less frequently near Chi Ma Wan Peninsula (Figure 56). Furthermore, the porpoises rarely occurred to the north of the SLVF in the past two years in 2010-11, with sightings being mostly concentrated between Shek Kwu Chau and Soko Islands (Figure 56). Similar to the declining usage of the Soko Islands by the dolphins, it is possible that the porpoises avoided moving across the SLVF to the inshore waters of South Lantau, and spent most of their time to the south of the SLVF between Shek Kwu Chau and the Soko Islands.

This avoidance behaviour of inshore waters could be significant to the future survival of local porpoise population. In Hong Kong, porpoises showed distinct reproductive seasonality, with most births occurring between October and January (Jefferson et al. 2002b). During the winter and spring months when they frequently occurred in South Lantau, observations from land often found mother-calf pairs close to shore (Hung 2005). The apparent inshore movement of porpoises during their calving season may be related to finding sheltered bays with abundant food resources in order to nurse their young (Hung 2008). Thus, avoidance of inshore waters due to the increased amount of high-speed ferry traffic may seriously affect their nursing activities and overall reproductive success.

Acoustic Behaviour ~ In Section 5.9.2.1, analysis of background noise within the SLVF with intense HSF traffic was conducted. The results indicated that the ambient noise levels at the SLVF were markedly higher than the ones in nearby sites with little or no vessel traffic. Moreover, the presence of multiple HSFs at the SLVF near Fan Lau appeared to be correlated with a significant increase in sound pressure levels in the ambient noise.

Moreover, the sound pressure levels of additional high-speed ferries were higher than the ambient noise within the vessel fairway, but this tended to be at the closer distance as discussed in Section 5.9.2.2. This difference highlighted a serious contribution to the local noise levels by the HSF. And the impacts of these increased levels mainly depend on the proximity of dolphins and porpoises to the HSFs. When the ferries move at great speeds, dolphins and porpoises may not have adequate time to adjust and distance themselves from fast approaching ferries in such a relatively short period of time. This problem is compounded by the increased amount of high-speed ferries. When multiple ferries are passing through important dolphin and porpoise habitats (such as in the SLVF near Fan Lau), their spacing may result in a dynamic and heterogeneous noise environment that can be very stressful and confusing for dolphins and porpoises trying to navigate around the unpredictable movements of the ferries. Therefore, the increased amount of HSF traffic at the SLVF can result in either chronic physiological damage in their hearing or displacing them from their favourable habitat within the shipping channel.

Because the HSFs are proving to be the major contributor to the noise environment within cetacean habitats as indicated above, the negative impact on their acoustic behaviour and habitat use can be significant. With an ever increasing amount of vessel traffic within their habitats, the local dolphins and porpoises are being exposed to greater risks of vessel collision and acoustic disturbance, and they may be forced to reduce their usage of certain important habitats, as reported in earlier sections. In fact, the increasing amount of HSF traffic in the past decade may have already contributed to the significant decline in dolphin abundance throughout the main areas of their occurrence in Hong Kong.

5.11.4. Suggestions on mitigation measures

This case study provided solid evidence that the increasing amount of vessel traffic within dolphin and porpoise habitats have resulted in a decline in their usage in certain areas, as well as an overall decline in dolphin abundance. Moreover, their acoustic behaviour has likely been affected by the higher levels of noise generated from intense vessel traffic, and they may be displaced from their favourable habitats to avoid the risk of vessel collision or overall noise disturbance. To combat these serious problems, a series of recommendations are suggested here for consideration by the government authorities.

Since the SLVF overlapped with some important habitats of both dolphins and porpoises, the high-speed ferry traffic route could be re-aligned and diverted further south, preferably to the south of Shek Kwu Chau and the Soko Islands, or outside of Hong Kong waters after passing near Cheung Chau. This will provide less disturbed habitats for dolphins and porpoises in the inshore waters of South Lantau, and a safer passage for dolphins to move from Fan Lau to the Soko Islands or for porpoises to move from the waters near Shek Kwu Chau and the Soko Islands to Chi Ma Wan Peninsula and Shui Hau Peninsula while only adding a limited amount of the ferries' travel time. A feasibility study on such a management plan to re-route ferry traffic should be conducted immediately.

Moreover, the proposed Southwest Lantau Marine Park and Soko Islands Marine Park should be established as soon as possible (see Hung 2008). With the diversion of marine traffic within the SLVF, these two proposed marine parks should be connected in order to provide a larger marine protected area with a protected movement corridor instead of two smaller fragmented habitats for local dolphins.

Finally, the increased traffic from the Sky Pier is a major concern. The authority should consider capping the marine traffic volume in this area, and impose a speed limit within this vessel traffic route connecting to the NLVF. In light of the imminent construction of the Hong Kong Boundary Crossing Facilities and the Tuen Mun-Chek Lap Kok Link adjacent to the Sky Pier, this should be a high priority for further action.

5.12. 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 20 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. 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. ACKNOWLEDGEMENTS

The author expresses his gratitude to a group of people for their integral involvement in the AFCD long-term monitoring project in 2011-12. First and foremost, the PI wants to thank his research associates and assistants, Mr. Vincent Ho, Mr. Perry Chan, Mr. Ng Yan Lung, Ms. Yeung Ka Ying and Ms. Theresa Webb for their dedicated work and diligent support throughout the project. He also wants to thank his research interns, John Tsang (City University of Hong Kong), Nekky Tang (Baptist University College of International Education), Paul Ho (Oxford Brookes University) and Christie Wong (University of Sydney) for their involvement in the field survey programme.

The author also offers his heartfelt thanks to his main collaborators, Dr. John Wang and Professor Bernd Würsig, for overseeing several components of the long-term cetacean monitoring programme, and supervising a group of dedicated graduate students, including Mr. Paul Sims (Oregon State University) for the dolphin-related acoustic studies; Ms. Sarah Piwetz (Texas A&M University) for the shore-based theodolite-tracking setup and data analysis; and Mr. Jordan Hoffman and Ms. Lauren Dares (Trent University) for their assistance in the theodolite tracking field work. He is also grateful to the generous donation of the towed hydrophone system by Mr. Doug Woodring (Ocean Recovery Alliance), and the assistance by Mr. Josh Jones from Scripps Institute of Oceanography for his visit to Hong Kong in setting up the system and offering his technical support. The author would also acknowledge the support of Ms. Maria Qingzhi Kallamma 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. He is also deeply appreciative of the support by the South China Sea Fisheries Research Institute, Hong Kong Dolphin Conservation Society and Hong Kong Dolphinwatch Limited, in providing valuable photo-identification data of individual dolphins to HKCRP.

Our 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, Mr. Dick Choi, Mr. Joseph Sham, Mr. C. P. Lam and Dr. Ivan Chan, have been very helpful and supportive throughout, and we also thank Mrs. Chan and Mr. Ng Chi-Wah for their assistance on the arrangements of school seminars and helicopter surveys.

7. LITERATURE CITED

Allen, M. C. and Read, A. J. 2000. Habitat selection of foraging bottlenose dolphins in relation to boat density near Clearwater, Florida. Marine Mammal Science 16: 815-824.

Au, D. W. K. and Perryman, W. L. 1982. Movement and speed of dolphin schools responding to an approaching ship. Fishery Bulletin 80: 371-379.

Bejder, L., Samuels, A., Whitehead, H., Gales, N., Mann, J., Connor, R., Heithaus, M., Watson-Capps, J., Flaherty, C. and Krützen, M. 2006. Decline in relative abundance of bottlenose dolphins exposed to long-term disturbance. Conservation Biology 20: 1791-1798.

Buckland, S. T., Anderson, D. R., Burnham, K. P., Laake, J. L., Borchers, D. L., and Thomas, L. 2001. Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press, London.

Constantine, R., Brunton, D. H. and Dennis, T. 2004. Dolphin-watching tour boats change bottlenose dolphin (*Tursiops truncatus*) behaviour. Biological Conservation 117: 299-307.

Dungan, S. Z. 2011. Comparing the social structures of Indo-Pacific humpback dolphins (*Sousa chinensis*) from the Pearl River Estuary and eastern Taiwan Strait. M.Sc. thesis. Trent University, 112 p.

Evans, P. G. H., Canwell, P. J. and Lewis, E. J. 1992. An experimental study of the effects of pleasure craft noise upon bottle-nosed dolphins in Cardigan Bay, West Wales. Pages 43-46 in Evans, P. G. H., Editor. European research on cetaceans. European Cetacean Society, Cambridge.

Gailey, G. A. and Ortega-Ortiz, J. 2002. A note on a computer-based system for theodolite tracking of cetaceans. Journal of Cetacean Research & Management 4: 213-218.

Gailey, G. A, Würsig, B. and McDonald, T. L. 2007. Abundance, behavior, and movement patterns of western gray whales in relation to a 3-D seismic survey, Northeast Sakhalin Island, Russia. Environmental Monitoring and Assessment 134: 75-91.

Hooge, P. N. and Eichenlaub, B. 1997. Animal movement extension to ArcView (version 1.1). Alaska Biological Science Center, United States Geological Survey, Anchorage.

Hung, S. K. 2005. Monitoring of finless porpoise (*Neophocaena phocaenoides*) in Hong Kong waters: final report (2003-05). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 95 pp.

Hung, S. K. 2008. Habitat use of Indo-Pacific humpback dolphins (*Sousa chinensis*) in Hong Kong. Ph.D. dissertation. University of Hong Kong, Hong Kong, 266 p.

Hung, S. K. 2010. Monitoring of marine mammals in Hong Kong waters – data collection: final report (2009-10). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 117 pp.

Hung, S. K. 2011. Monitoring of marine mammals in Hong Kong waters – data collection: final report (2010-11). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 158 pp.

Hung, S. K. and Jefferson, T. A. 2004. Ranging patterns of Indo-Pacific humpback dolphins (*Sousa chinensis*) in the Pearl River Estuary, People's Republic of China. Aquatic Mammals 30: 157-172.

Janik, V. M. and Thompson, P. M. 1996. Changes in surfacing patterns of bottlenose dolphins in response to boat traffic. Marine Mammal Science 12: 597-602.

Jefferson, T. A. 2000a. Population biology of the Indo-Pacific hump-backed dolphin in Hong Kong waters. Wildlife Monographs 144:1-65.

Jefferson, T. A. (ed.) 2000b. Conservation biology of the finless porpoise (*Neophocaena phocaenoides*) in Hong Kong waters: final report. Unpublished report submitted to the Hong Kong Agriculture, Fisheries and Conservation Department.

Jefferson, T. A. and Hung, S. K. 2004. A review of the status of Indo-Pacific humpback dolphins (*Sousa chinensis*) in Chinese waters. Aquatic Mammals 30: 149-158.

Jefferson, T. A. and Hung, S. K. 2008. Effects of biopsy sampling on Indo-Pacific humpback dolphins (*Sousa chinensis*) in a polluted coastal environment. Aquatic Mammals 34: 310-316.

Jefferson, T. A. and Leatherwood, S. 1997. Distribution and abundance of Indo-Pacific hump-backed dolphins (*Sousa chinensis* Osbeck, 1765) in Hong

Kong waters. Asian Marine Biology 14: 93-110.

Jefferson, T. A, Hung, S. K. and Lam, P. K. S. 2006. Strandings, mortality and morbidity of Indo-Pacific humpback dolphins in Hong Kong, with emphasis on the role of organochlorine contaminants. Journal of Cetacean research and Management 8: 181-193.

Jefferson, T. A., Hung, S. K., Law, L., Torey, M. and Tregenza, N. 2002a. Distribution and abundance of finless porpoises in waters of Hong Kong and adjacent areas of China. Raffles Bulletin of Zoology, Supplement 10: 43-55.

Jefferson, T. A., Hung, S. K., Robertson, K. M. and Archer, F. I. 2011. Life history of the Indo-Pacific humpback dolphin (*Sousa chinensis*) in the Pearl River Estuary, southern China. Marine Mammal Science 28: 84-104.

Jefferson, T. A., Hung, S. K. and Würsig, B. 2009. Protecting small cetaceans from coastal development: Impact assessment and mitigation experience in Hong Kong. Marine Policy 33: 305-311.

Jefferson, T. A., Robertson, K. M. and Wang, J. Y. 2002b. Growth and reproduction of the finless porpoise in southern China. Raffles Bulletin of Zoology, Supplement 10: 105-113.

Kruse, S. 1991. The interactions between killer whales and boats in Johnstone Strait, B. C. Pages 149-159 in Pryor, K. and Norris, K. S., editors. Dolphin Societies: Discoveries and Puzzles. University of California Press, Berkeley, California.

Lundquist, D., Sironi, M., Würsig, B. and Rowntree, V. 2008. Behavioural responses of southern right whales to simulated swim-with-whale tourism at Peninsula Valdes, Argentina. Journal of Cetacean Research Management 60: 1-15.

Lusseau, D. 2005. Residency pattern of bottlenose dolphins *Tursiops* spp. in Milford Sound, New Zealand is related to boat traffic. Marine Ecology Progress Series 295: 265-272.

Mann, J. 2000. Unraveling the dynamics of social life: long-term studies and observational method. Pages 45-64 in Mann, J., Connor, R. C., Tyack, P. L. and Whitehead, H., editors. Cetacean Societies: Field Studies of Dolphins and Whales. The University of Chicago Press.

Ng, S. L. and Leung S. 2003. Behavioral response of Indo-Pacific humpback dolphin (*Sousa chinensis*) to vessel traffic. Marine Environmental Research 56: 555-567.

Parsons, E. C. M. 2004. The behavior and ecology of the Indo-Pacific humpback dolphin (*Sousa chinensis*). Aquatic Mammals 30: 38-55.

Parsons, E. C. M. and Jefferson, T. A. 2000. Post-mortem investigations on stranded dolphins and porpoises from Hong Kong waters. Journal of Wildlife Diseases 36: 342-356.

Sims, P., Vaughn, R., Hung, S. K. and Würsig, B. 2011. Sounds of Indo-Pacific humpback dolphins (*Sousa chinensis*) in west Hong Kong: a preliminary description. Journal of the Acoustical Society of America 131: EL48-EL53.

Sims, P., Vaughn, R., Hung, S. K. and Würsig, B. In prep. Anthropogenic noises in West Hong Kong waters. To be submitted to Journal of the Acoustic Society of America.

Smultea, M. A. and Würsig, B. 1995. Behavioral reactions of bottlenose dolphins to the Mega Borg oil spill, Gulf of Mexico 1990. Aquatic Mammals 21:171-181.

Thomas, L., Laake, J. L., Rexstad, E. A., Strindberg, S., Marques, F. F. C., Buckland, S. T., Borchers, D. L., Anderson, D. R., Burnham, K. P., Burt, M. L., Hedley, S. L., Pollard, J. H., Bishop, J. R. B. and Marques, T. A. 2009. Distance 6.0 Release 2. Research Unit for Wildlife Population Assessment, University of St. Andrews, UK.

Van Parijs, S. M. and Corkeron, P. J. 2001. Vocalizations and behaviour of Pacific humpback dolphins *Sousa chinensis*. Ethology 107:701-716.

Van Waerebeek, K., Baker, A. N., Felix F., Gedamke, J., Iniguez, M., Sanino, G. P., Secchi, E., Sutaria, D., Van Helden, A. and Wang, Y. 2007. Vessel collisions with small cetaceans worldwide and with larger whales in the Southern Hemisphere, an initial assessment. Latin American Journal of Aquatic Mammal 6: 43-69.

Würsig, B, Cipriano, F. and Würsig, M. 1991. Dolphin movement patterns: information from radio and theodolite tracking studies. Pages 79-112 in Pryor K. and Norris, K. S., editors. Dolphin Societies: discoveries and puzzles. University of California Press, Los Angeles, CA.

Table 1. Range use (50%/25% UD core areas and sighting coverage) and residency pattern of 97 individuals with 15+ sightings from the PRE humpback dolphin photo-ID catalogue during 1995-2011.

(abbreviations: SR=Seasonal Resident; YR=Year-round Resident; SV=Seasonal Visitor; YV=Year-round Visitor; UD= Utilization Distribution; 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			Occurrence in Survey Areas								50% UD Core Area				25% UD Core Area			
ID#	# STG	Class	Gender	Residency	DB	EL	NEL	NWL	WL	SWL	SEL	CH	MP	CLK	BR	WL	MP	CLK	BR	WL
CH06	33	SA	?	SR					√	√		√				√				√
CH12	21	SA	?	SR					√	√		√				√				√
CH25	16	SS	F	SR				√	√			√				√				√
CH34	53	UA	F	YR	√		√	√				√	√		√				√	
CH37	16	SS	?	SR					√	√		√				√				√
CH38	27	SA	?	SR					√	√		√				√				√
CH98	44	UA	?	YR	√			√	√				√				√			
CH108	25	SS	F	SR					√	√		√				√				√
CH113	17	SS	F	SR				√	√			√				√				√
EL01	71	UA	M*	YR		√	√	√	√				√		√				√	
EL07	62	SJ	M*	YR		√	√	√	√						√				√	
NL06	18	UA	?	YR			√	√					√		√		√			
NL11	73	SA	F	SR	√			√				√	√				√			
NL12	22	SA	F	SR			√	√		√		√	√				√			
NL18	81	SA	F	YR			√	√	√			√	√		√				√	
NL19	31	SA	F	SR			√	√				√		√	√				√	
NL20	38	UA	F	YR			√	√	√	√		√	√				√			
NL24	158	SA	F	YR			√	√	√			√	√		√		√			
NL33	57	SS	F*	YR			√	√	√				√		√		√		√	
NL37	50	SJ	?	SR		√	√	√	√				√	√	√		√	√	√	
NL46	44	SA	F*	SR				√	√			√	√				√			
NL48	49	SA	?	SR			√	√	√				√				√			
NL49	22	SA	F*	SR			√	√	√				√				√			
NL60	28	UA	?	SR	√			√				√	√				√			
NL75	28	SA	F	SR			√	√					√	√	√				√	
NL93	33	SS	F	SR			√	√	√				√		√		√			
NL98	92	SS	F*	YR			√	√	√			√	√	√	√		√		√	
NL103	36	SA	?	SR				√	√				√				√			
NL104	58	SA	F	YR			√	√	√			√	√	√	√		√			
NL105	18	SA	?	SR				√	√			√	√			√	√			
NL112	18	SJ	M*	SR	√		√	√	√				√				√			
NL118	40	SS	F*	YR			√	√	√				√		√		√			
NL120	62	SS	F*	YR			√	√	√						√				√	
NL123	88	SS	F	YR			√	√	√			√	√	√	√			√	√	
NL128	37	SA	M*	YR			√	√	√	√	√	√				√				√
NL136	36	UA	F*	SR			√	√	√				√				√			
NL139	75	UA	F	YR			√	√	√			√			√				√	
NL145	24	SS	F	SR			√	√	√				√				√			
NL149	20	SS	?	SR				√	√			√				√				√
NL150	17	SS	?	SR			√	√	√				√				√			
NL153	17	SS	F	SR				√				√	√				√			
NL156	17	SS	?	SR				√	√				√			√	√			
NL165	37	SS	?	YR			√	√	√				√		√		√		√	
NL169	19	SJ	?	SR	√			√					√				√			
NL176	48	SS	F*	SR			√	√	√				√		√		√		√	
NL179	35	SJ	?	SR			√	√						√	√				√	
NL181	19	SS	M*	SV	√			√				√	√				√			
NL188	34	SS	?	SR			√	√	√				√				√			

Table 1. (cont'd)

ID#	# STG	Age Class	Gender	Residency	Occurrence in Survey Areas								50% UD Core Area				25% UD Core Area			
					DB	EL	NEL	NWL	WL	SWL	SEL	CH	MP	CLK	BR	WL	MP	CLK	BR	WL
NL191	37	SS	?	SR			√	√	√			√	√		√		√		√	
NL202	35	SA	F	SR			√	√	√				√				√			
NL206	24	SJ	F*	SR				√	√	√						√				√
NL210	26	SJ	?	SR			√	√	√				√				√			
NL212	16	SS	F	SR				√	√			√				√				√
NL215	18	UA	F	SR			√	√	√					√	√			√		
NL219	17	SA	?	SR				√					√				√			
NL220	22	SA	?	SR			√	√	√				√				√			
NL224	26	SS	?	YV	√		√	√	√			√	√				√			
NL226	20	SA	?	SV	√		√	√	√						√				√	
NL233	30	SS	F	SR			√	√	√				√				√			
NL242	25	SA	F*	SR			√	√	√				√		√		√			
NL244	29	UA	F	YR			√	√	√				√				√			
NL246	22	SJ	?	SR			√	√					√	√	√		√		√	
NL258	15	SA	?	SR				√	√	√			√			√	√			√
SL05	27	UA	F	SR					√	√						√				√
SL07	24	UA	?	SR					√	√	√	√				√				√
SL27	23	SJ	M	YR				√	√	√						√				√
SL35	52	SS	?	YR				√	√	√	√	√				√				√
SL40	27	SS	F	YR					√	√		√				√				√
WL04	27	SS	?	SR	√			√	√				√				√			
WL05	28	SS	?	YR			√	√	√			√	√				√			
WL09	20	SJ	?	SR				√	√	√		√				√				√
WL11	49	SS	F*	YR			√	√	√			√	√				√			
WL15	45	SS	M*	YR			√	√	√	√						√				√
WL21	31	SS	F	SR				√	√	√		√				√				√
WL25	91	SA	F	YR				√	√	√		√				√				√
WL29	19	SS	F	SR					√			√				√				√
WL37	16	SS	?	SR					√	√		√				√				√
WL40	18	SA	F*	SV				√	√			√	√				√			
WL42	45	SS	?	YR				√	√	√		√				√				√
WL46	17	SJ	?	SV			√	√	√							√				√
WL47	15	SA	?	SV	√			√	√	√	√	√	√			√	√			√
WL50	32	SJ	F*	YR				√	√	√		√				√				√
WL55	25	SJ	?	YR				√	√	√						√				√
WL61	24	SJ	?	SR					√							√				√
WL62	34	UA	F	SR				√	√	√	√	√				√				√
WL69	30	SA	?	YR					√	√		√				√				√
WL72	35	SS	F	YR				√	√	√						√				√
WL73	20	SJ	?	SR					√	√						√				√
WL84	15	SA	F	SR					√	√						√				√
WL86	27	SS	F	YR					√	√						√				√
WL87	26	SA	?	SR					√	√	√	√				√				√
WL88	31	UA	F	YR				√	√	√	√					√				√
WL93	15	SS	?	SR				√	√	√						√				√
WL109	31	SJ	?	SR				√	√	√		√				√				√
WL111	17	SJ	F*	SR			√	√	√				√				√			
WL130	17	SJ	?	SR				√	√	√						√				√
WL138	18	SJ	?	SR				√	√							√				√

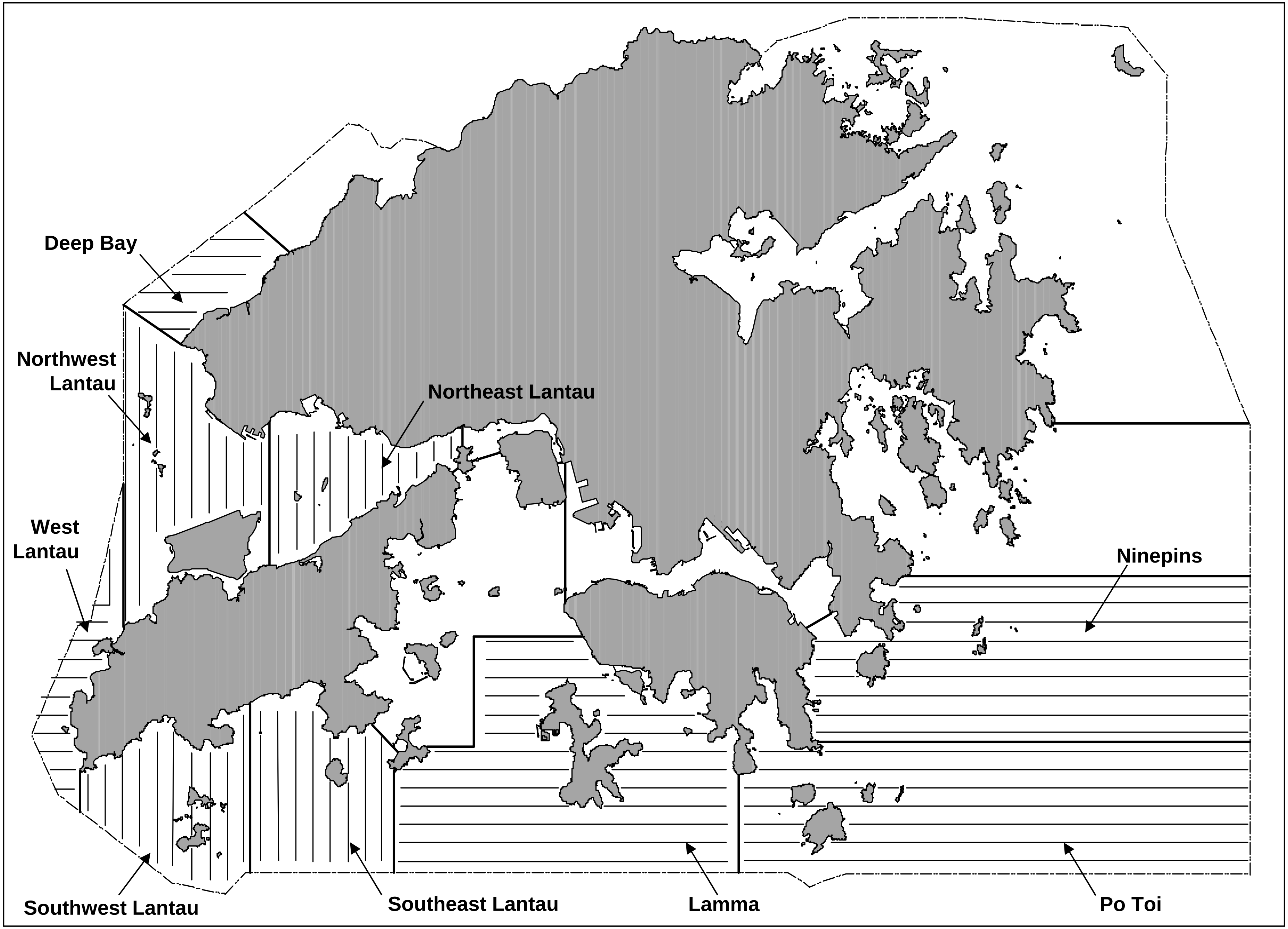


Figure 1. Nine Line-Transect Survey Areas within the Study Area

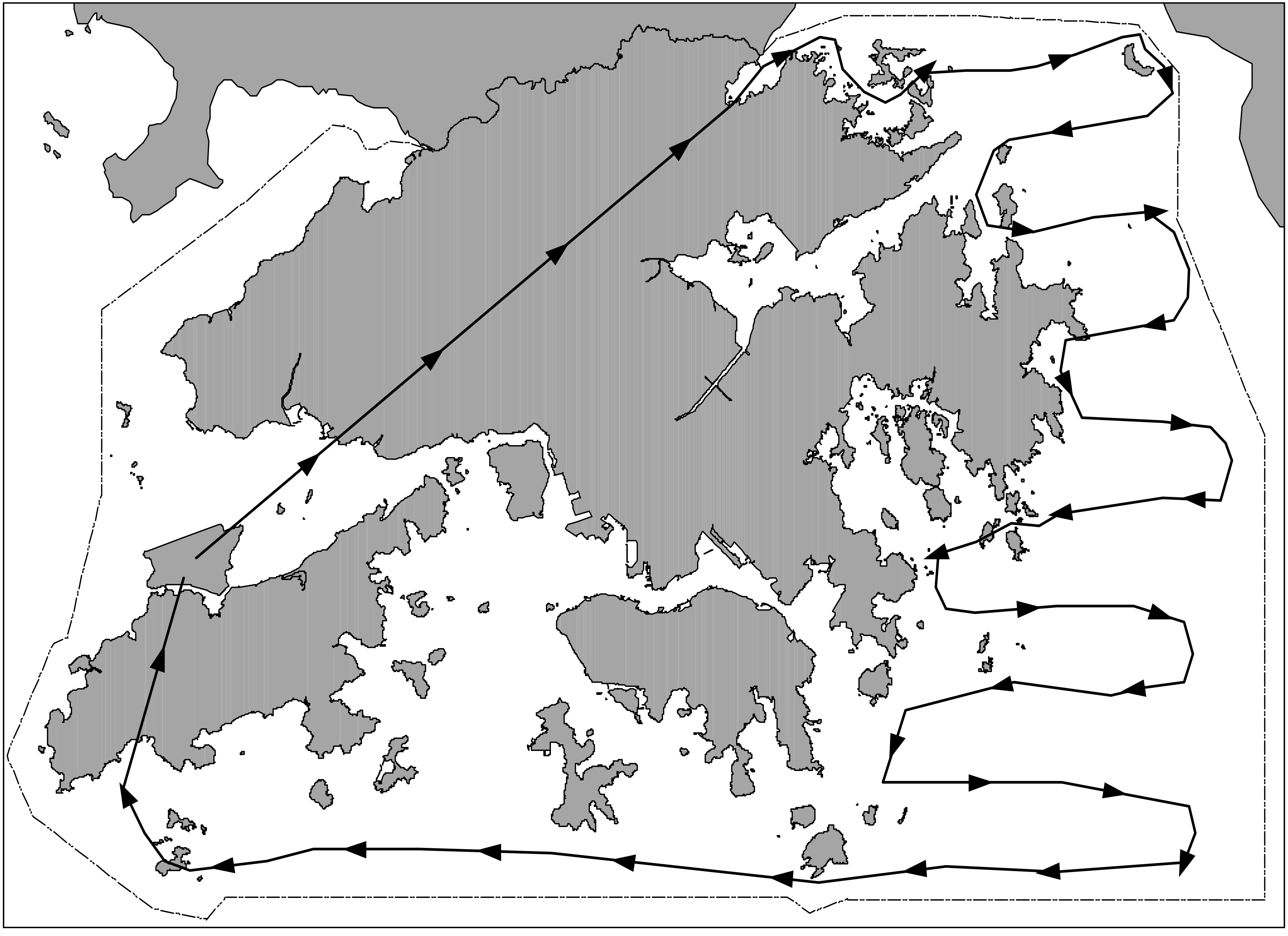


Figure 2. Survey Route for Helicopter Surveys in Eastern and Southern Waters of Hong Kong

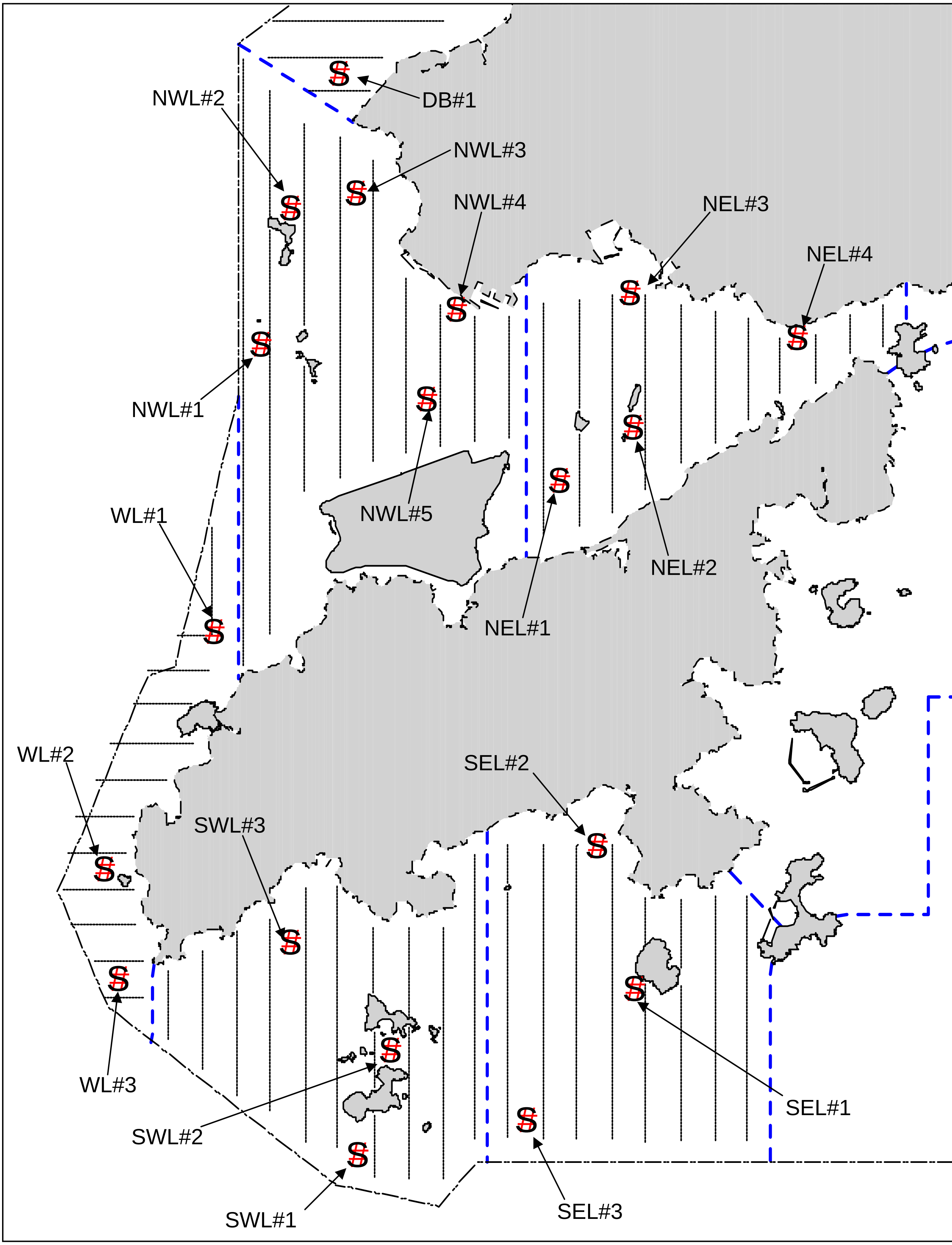


Figure 3. Locations of various acoustic monitoring stations around Lantau waters

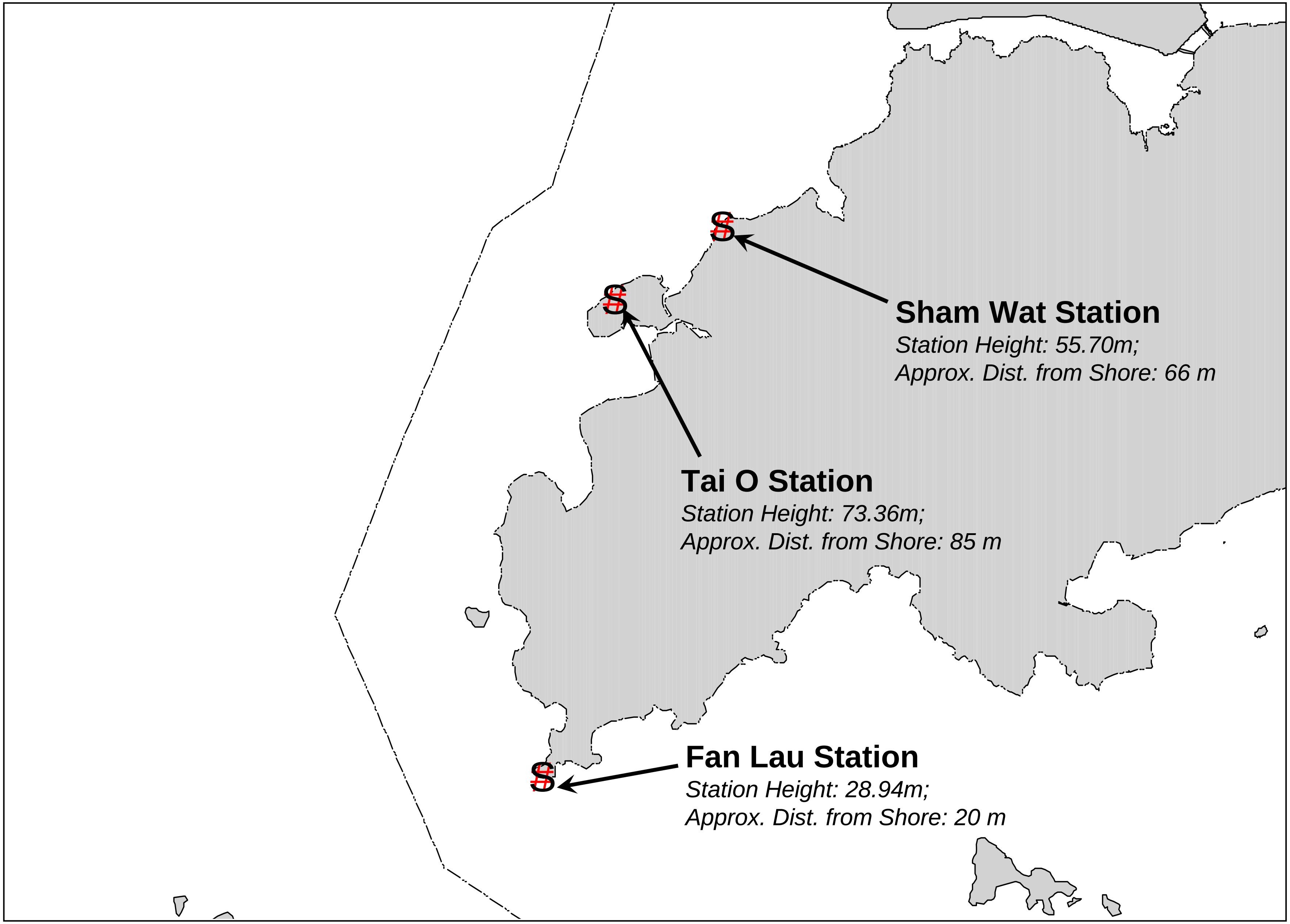


Figure 4. Three theodolite-tracking stations set up along the western coastline of Lantau Island

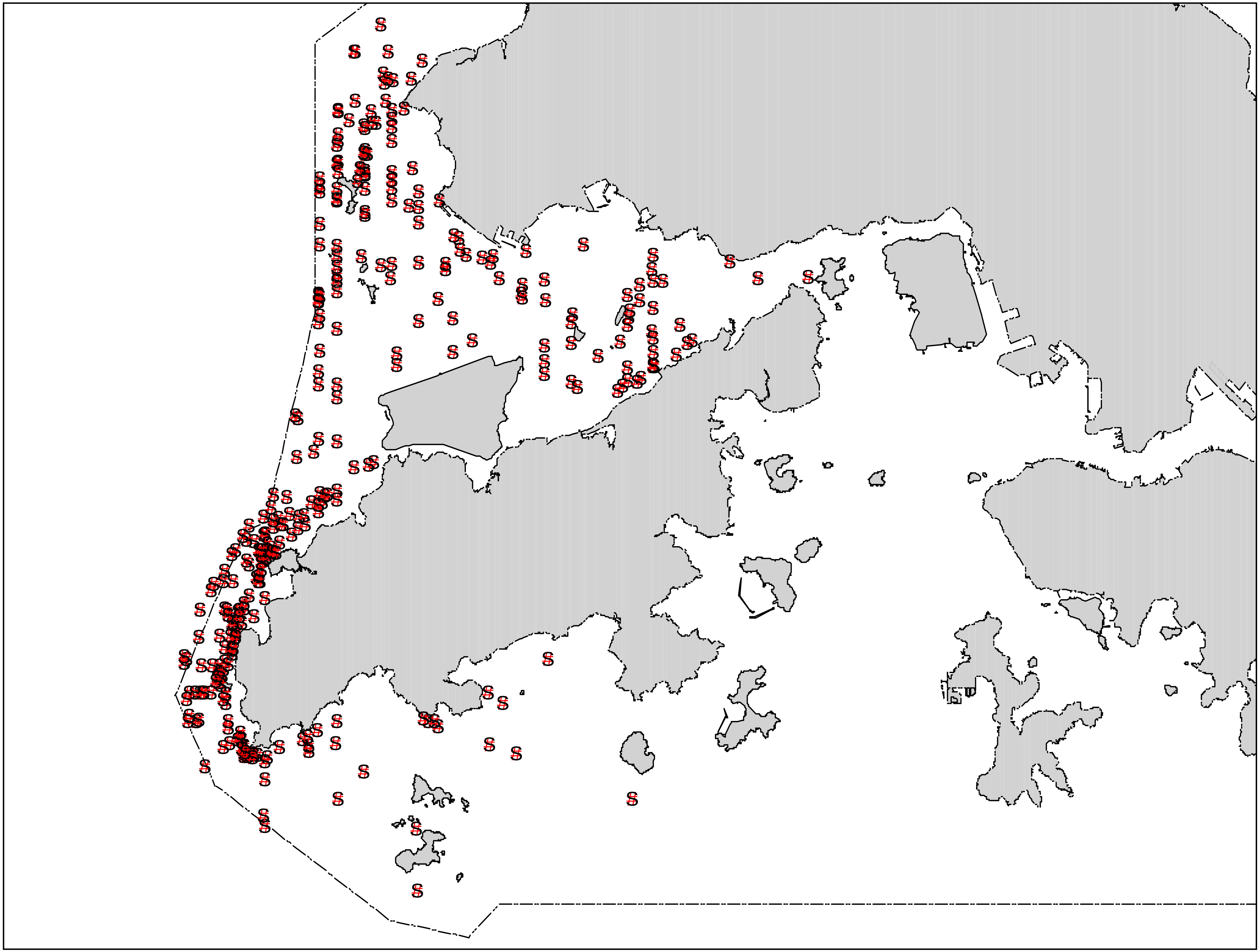


Figure 5. Distribution of Chinese white dolphin sightings in Hong Kong waters (April 2011 – March 2012)

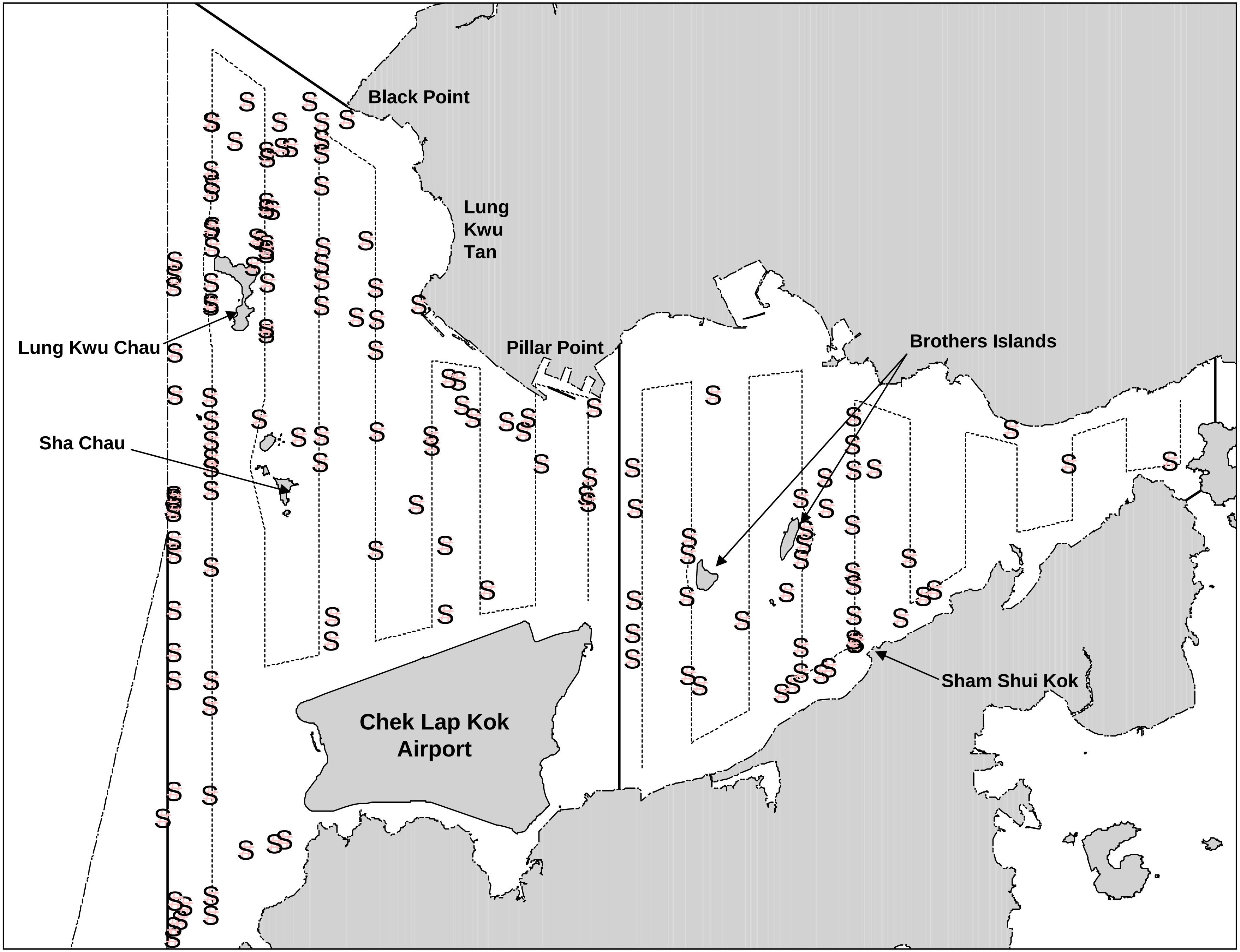


Figure 6. Distribution of Chinese white dolphin sightings in North Lantau waters (April 2011 – March 2012)

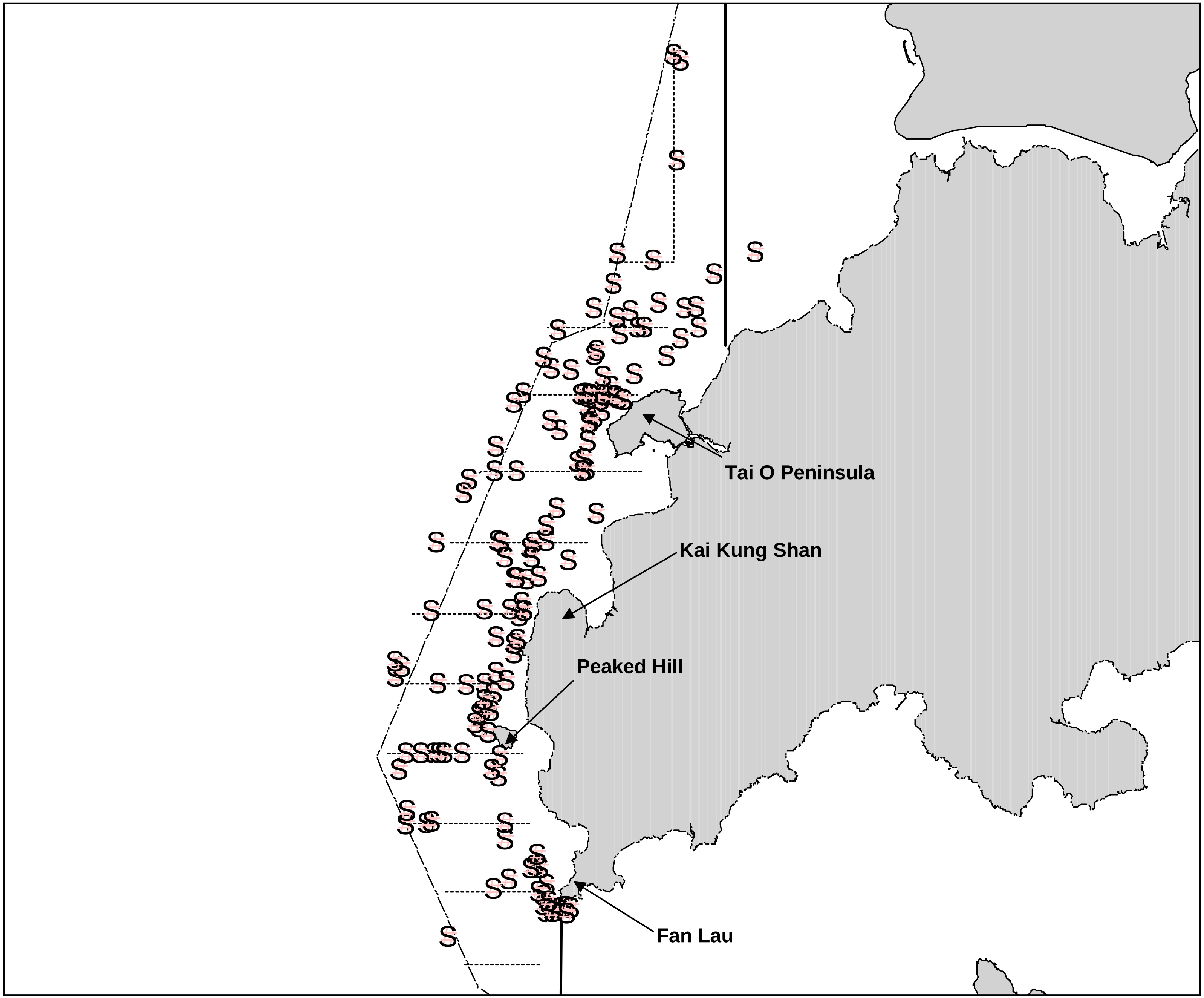


Figure 7. Distribution of Chinese white dolphin sightings in West Lantau waters (April 2011 – March 2012)

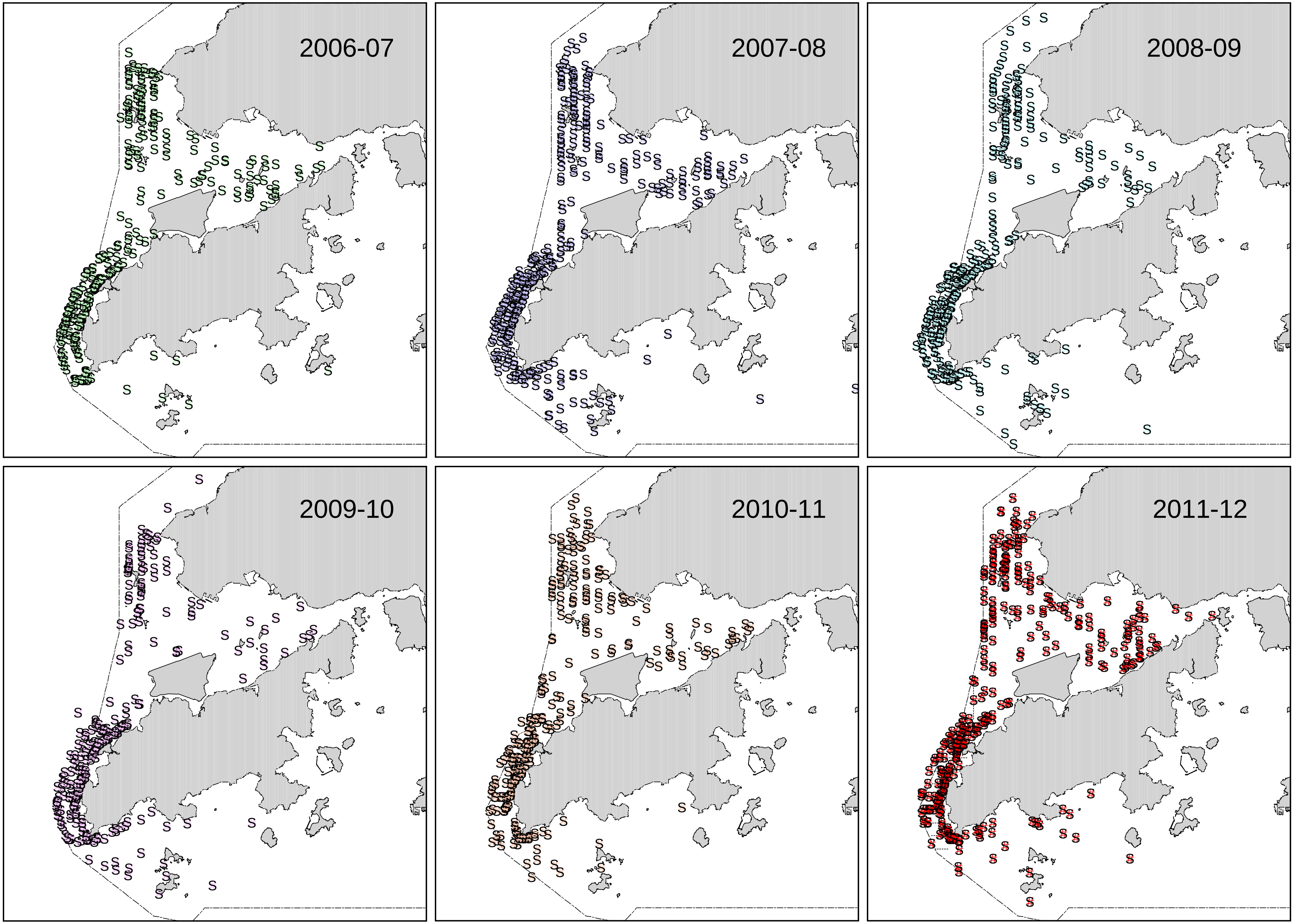


Figure 8. Comparison of dolphin distribution patterns from the past six years of monitoring period (2006-12)

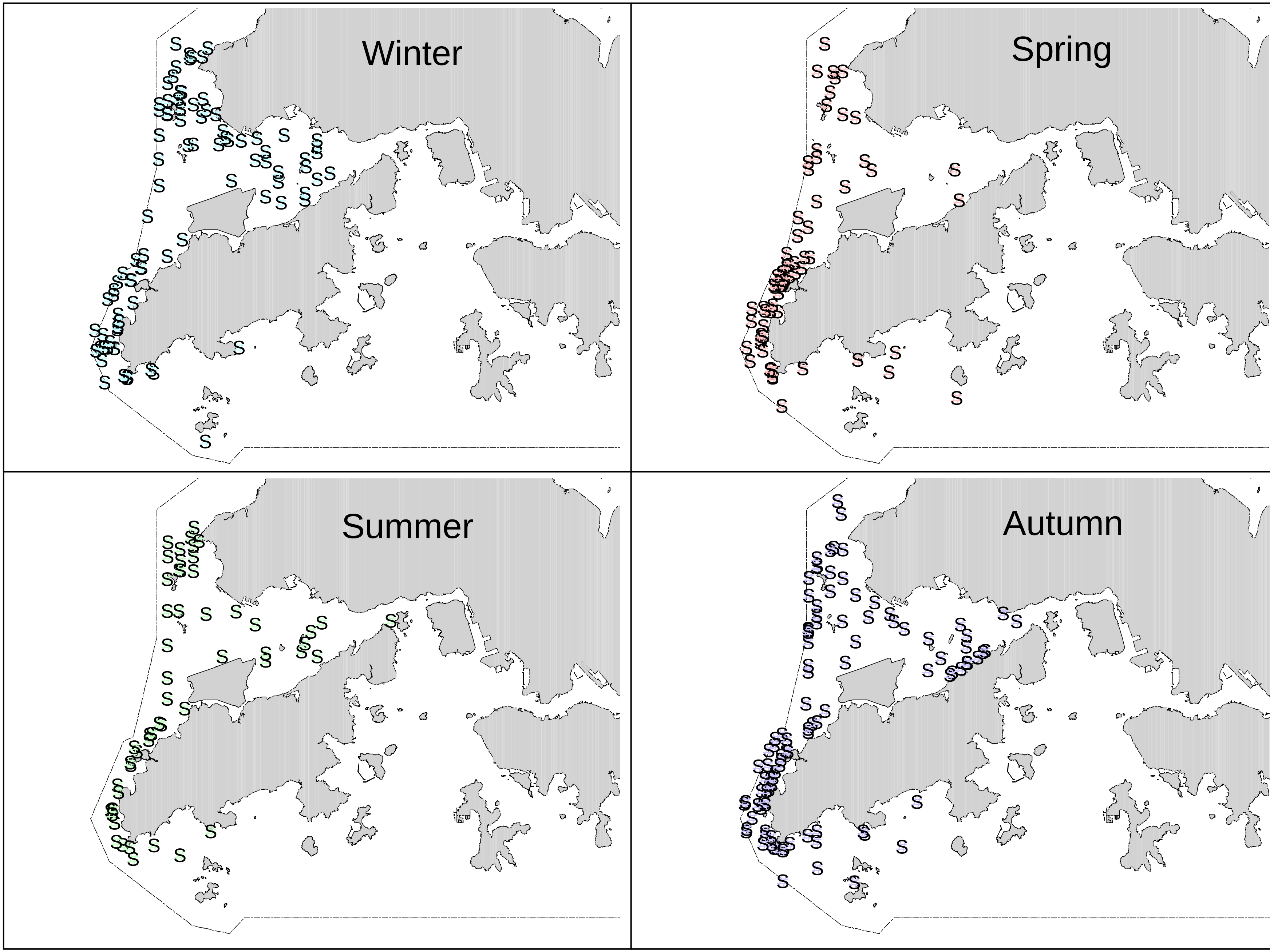


Figure 9. Seasonal distribution of Chinese white dolphins in Hong Kong waters (April 2011 – March 2012)

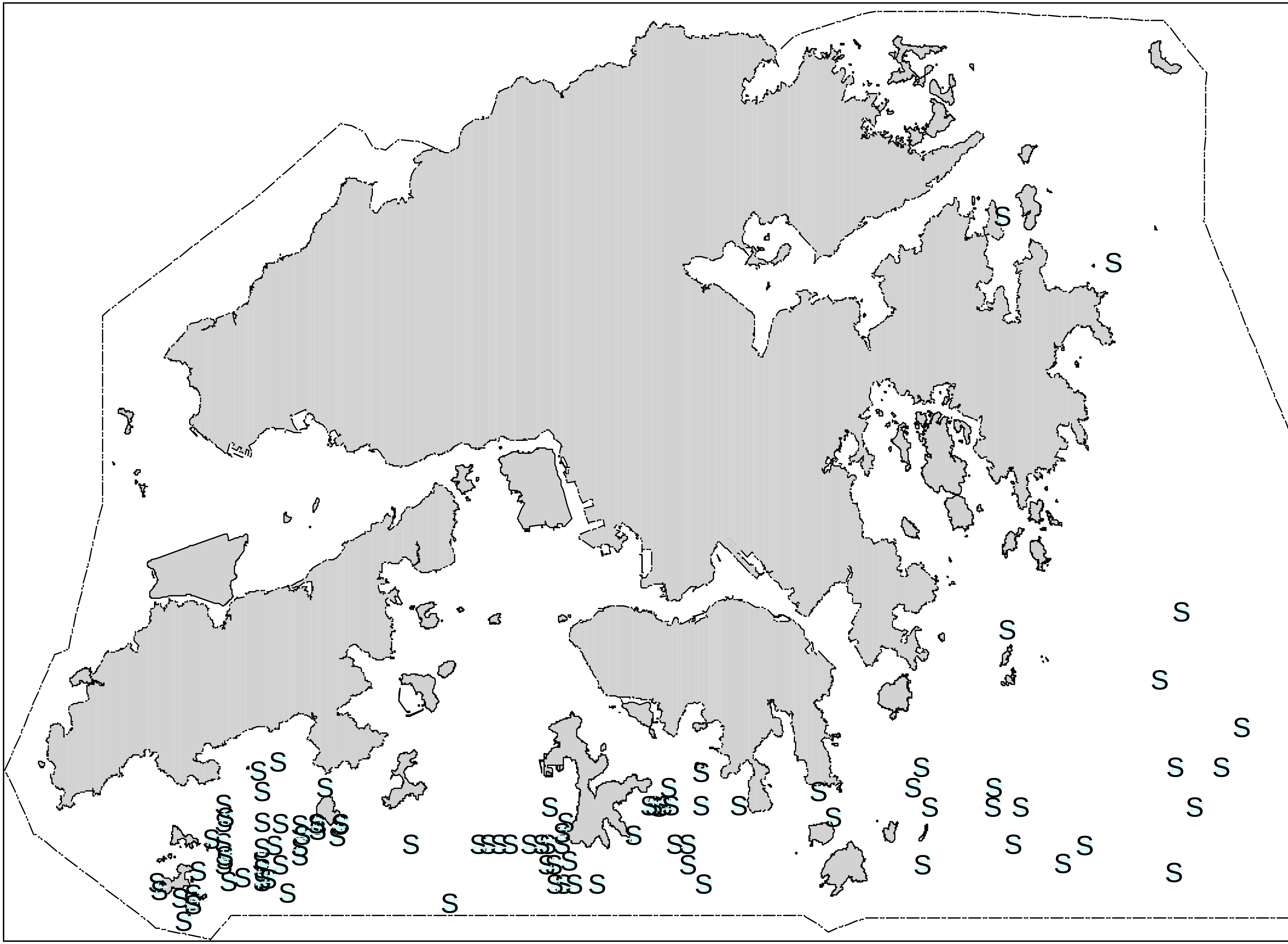


Figure 10. Distribution of finless porpoise sightings (April 2011 – March 2012)

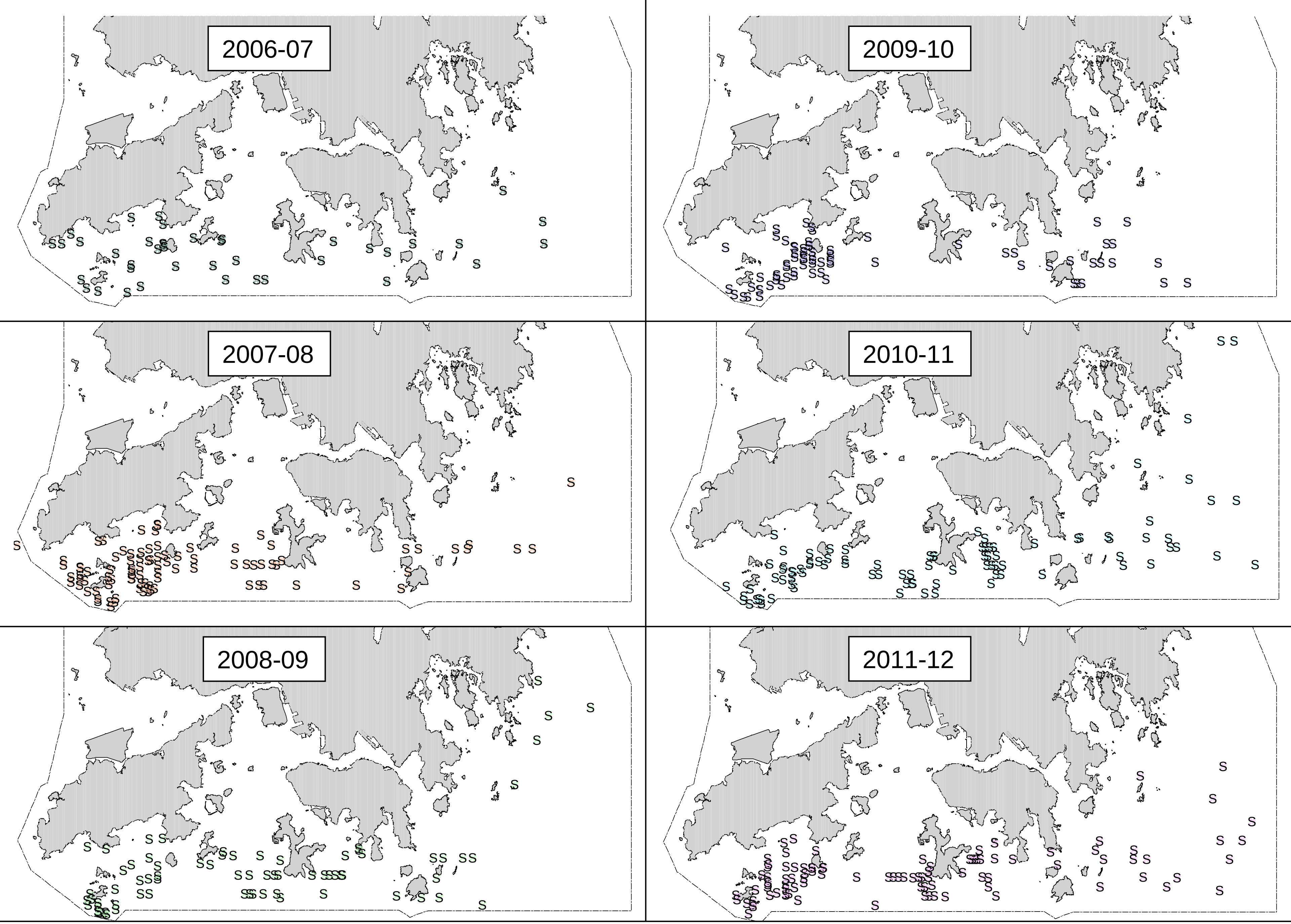


Figure 11. Comparison of porpoise distribution patterns from the past six years of monitoring period (2006-12)

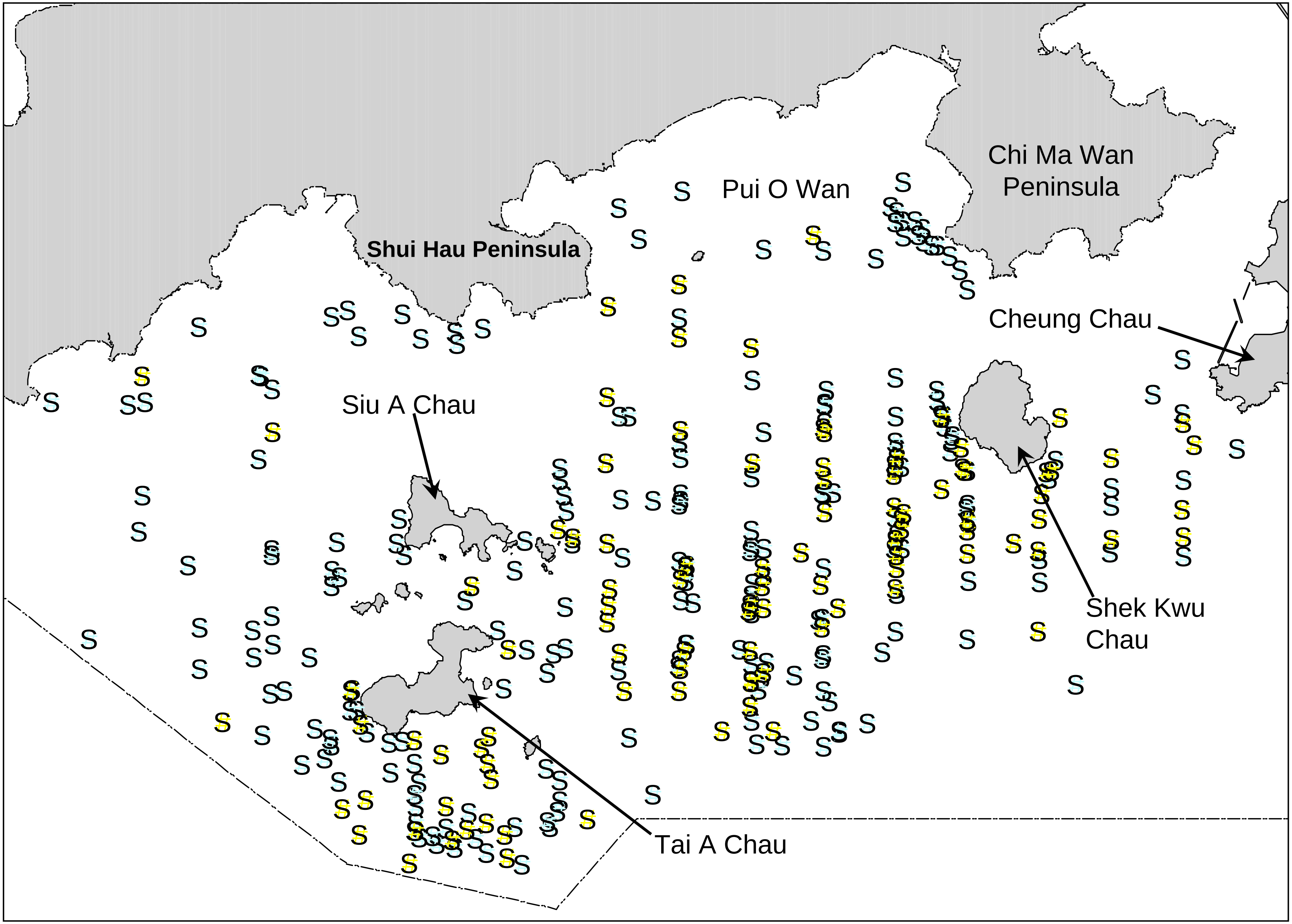


Figure 12. Distribution of finless porpoise sightings in South Lantau waters (2006-11)
(yellow dots: porpoise sightings made in 2010 and 2011)

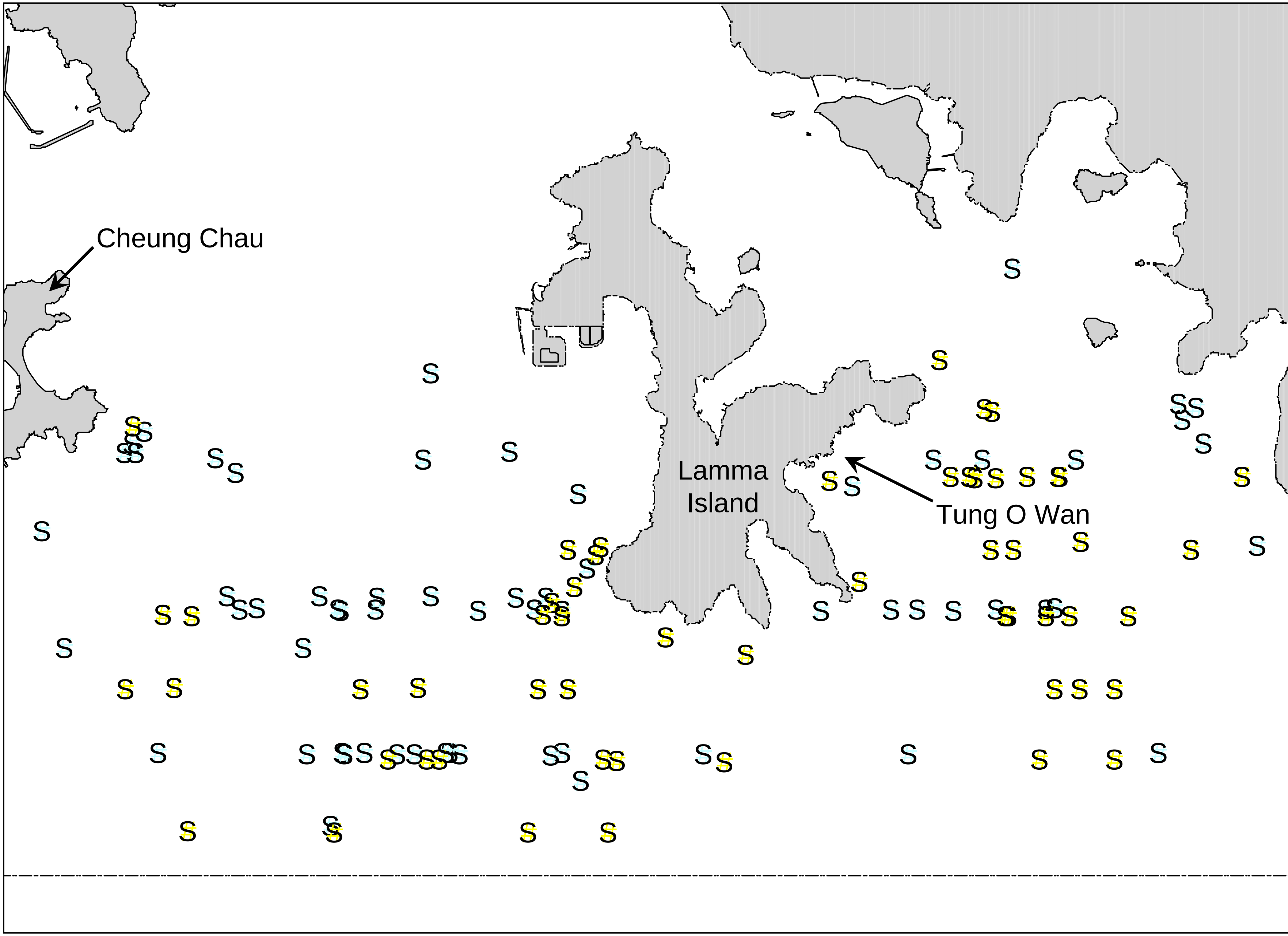


Figure 13. Distribution of finless porpoise sightings around Lamma Island (2006-11)
(yellow dots: porpoise sightings made in 2010 and 2011)

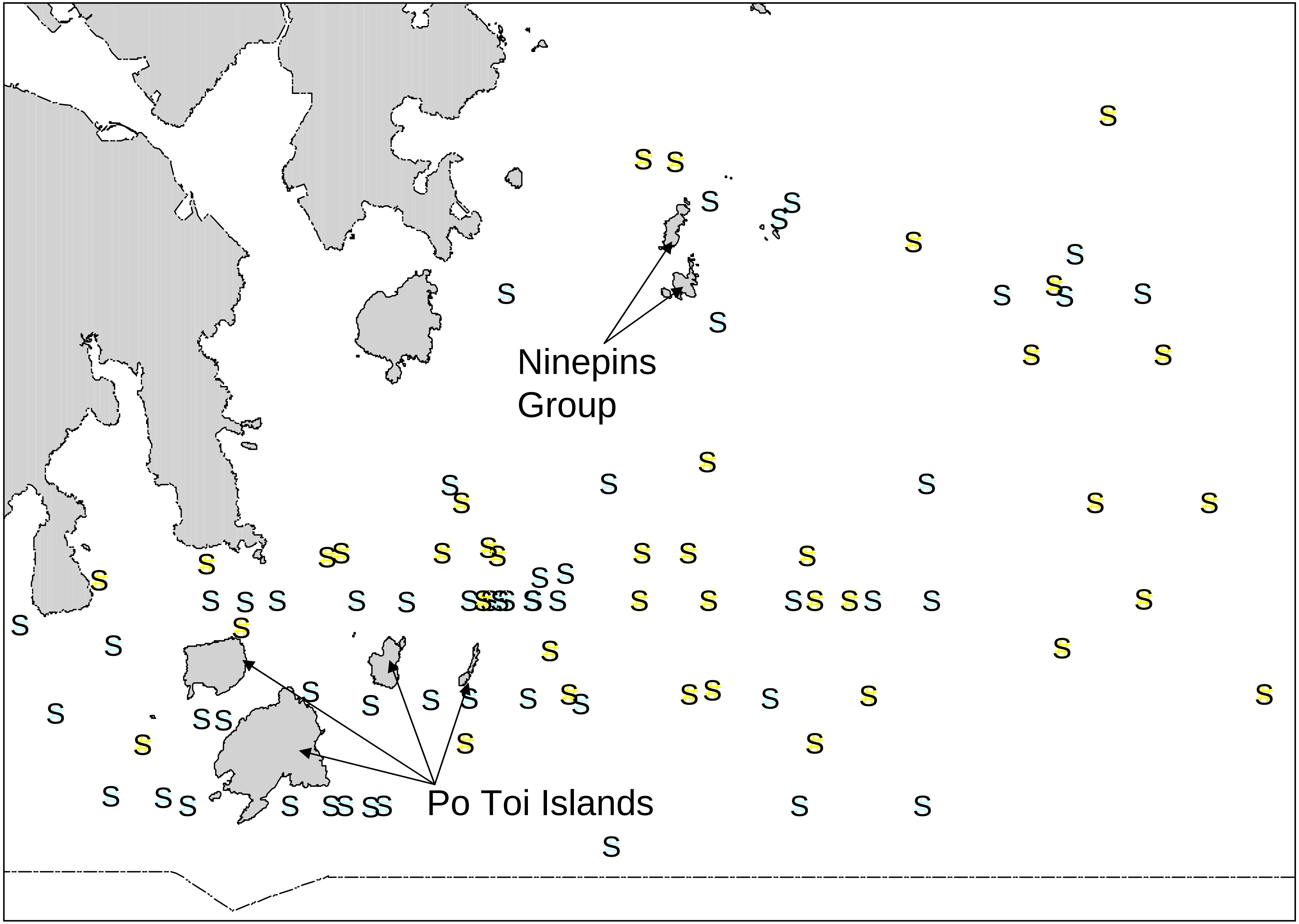


Figure 14. Distribution of finless porpoise sightings in Po Toi and Ninepins survey areas (2006-11)
(yellow dots: porpoise sightings made in 2010 and 2011)

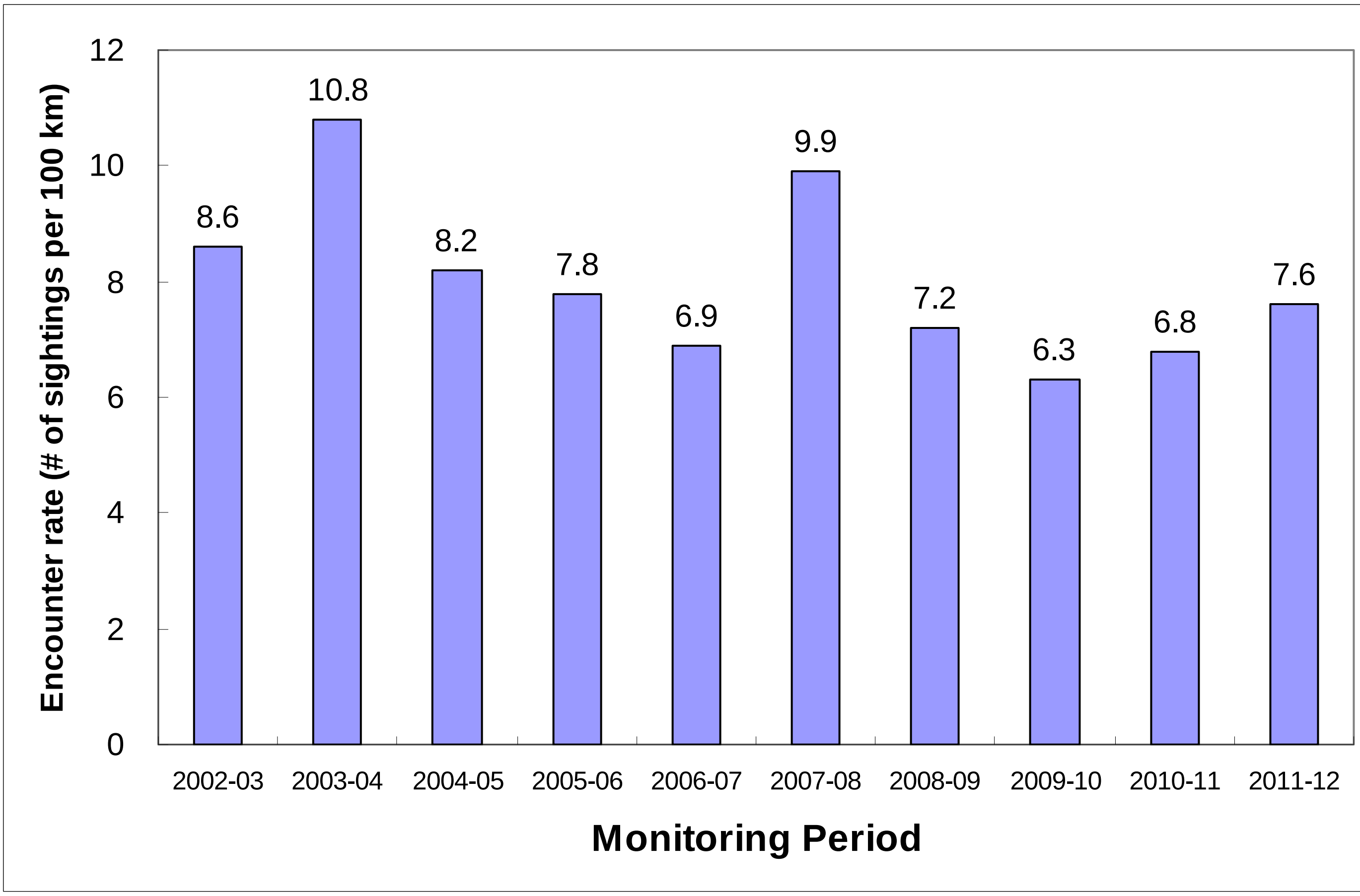


Figure 15. Temporal trend in encounter rates of Chinese white dolphins (combined from WL, NWL, NEL and SWL survey areas) in the past ten monitoring periods from 2002-12

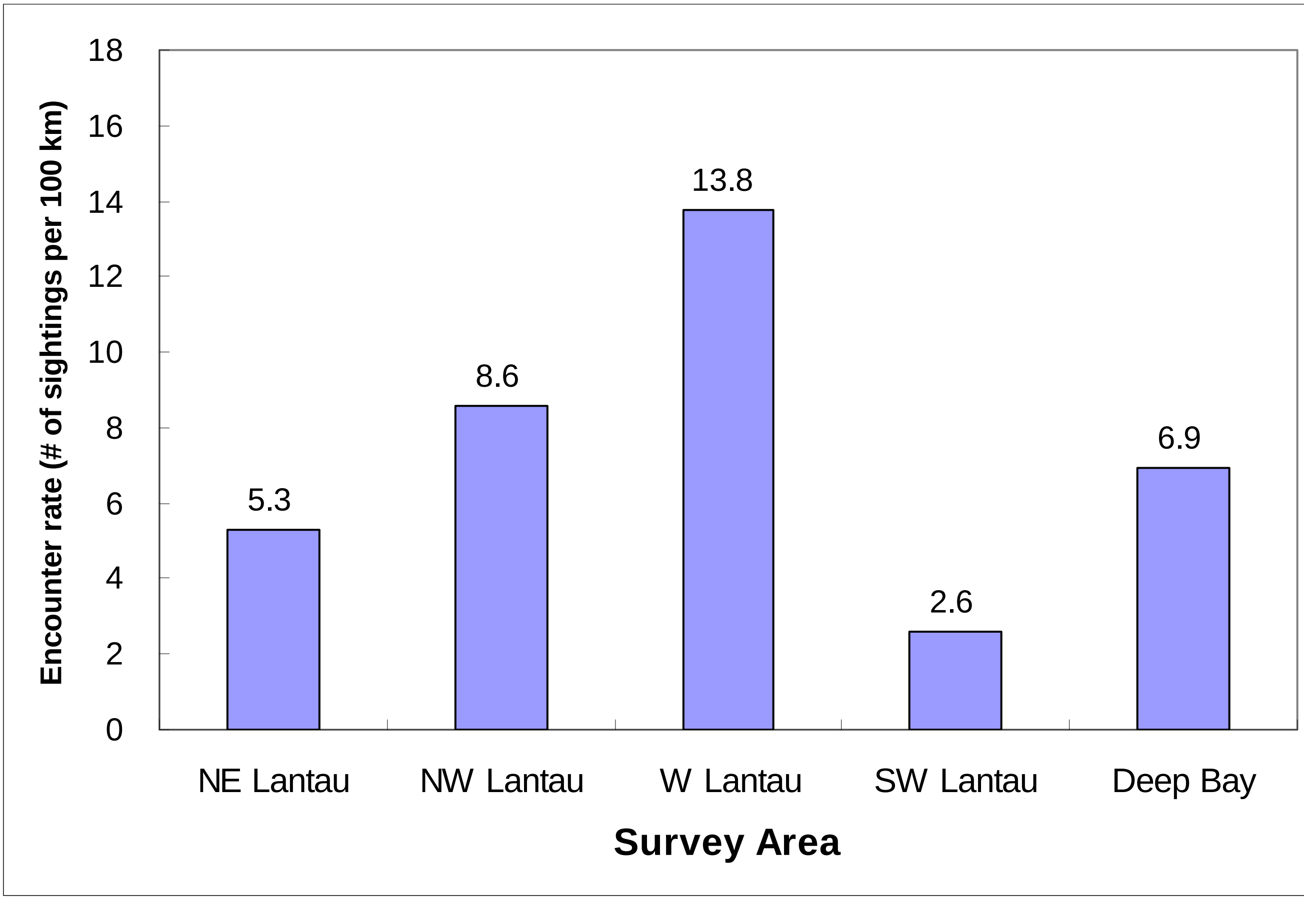


Figure 16. Encounter rates of Chinese white dolphins among different survey areas (April 2011 – March 2012)

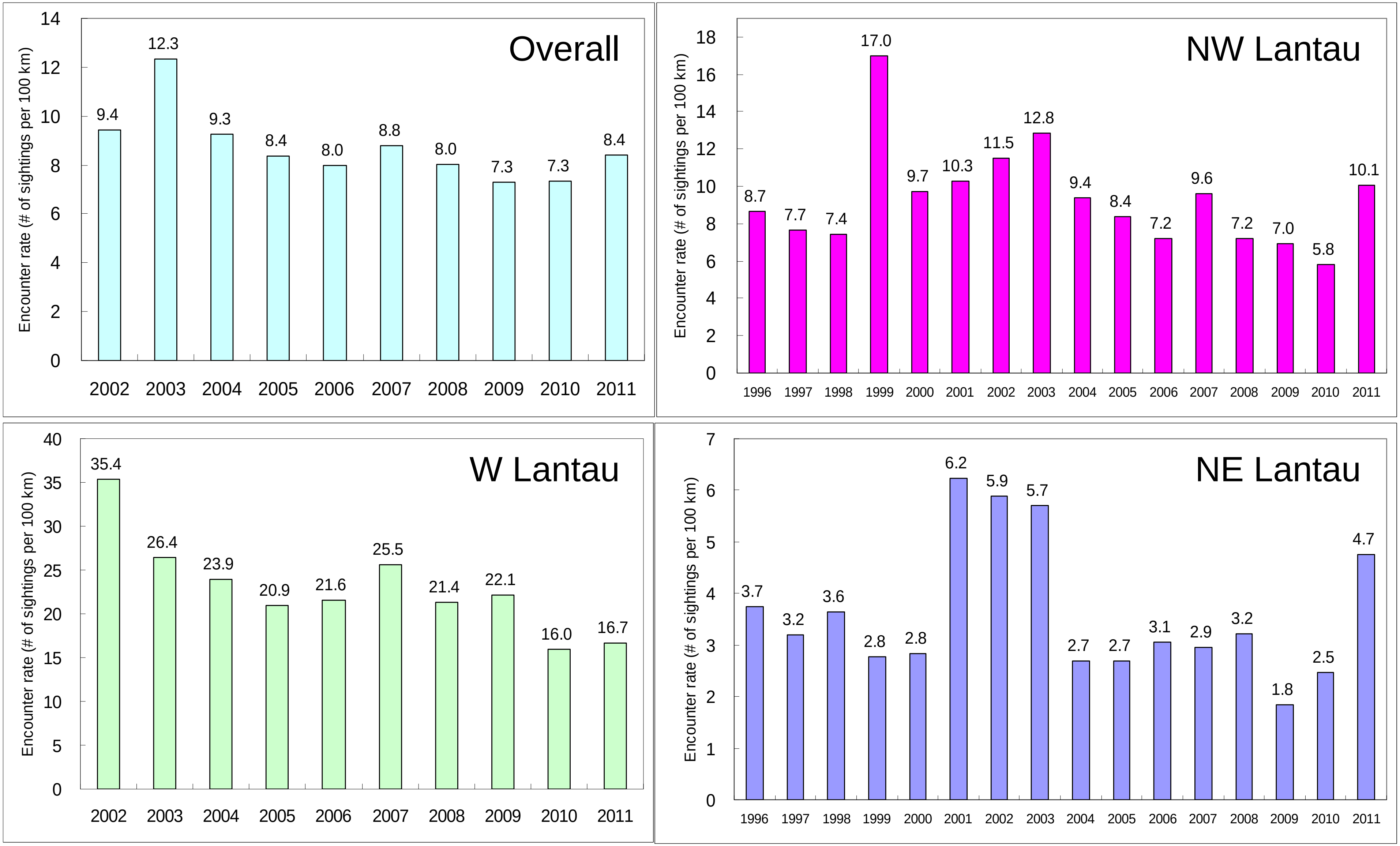


Figure 17. Long-term trends in annual encounter rates of Chinese white dolphins in different survey areas

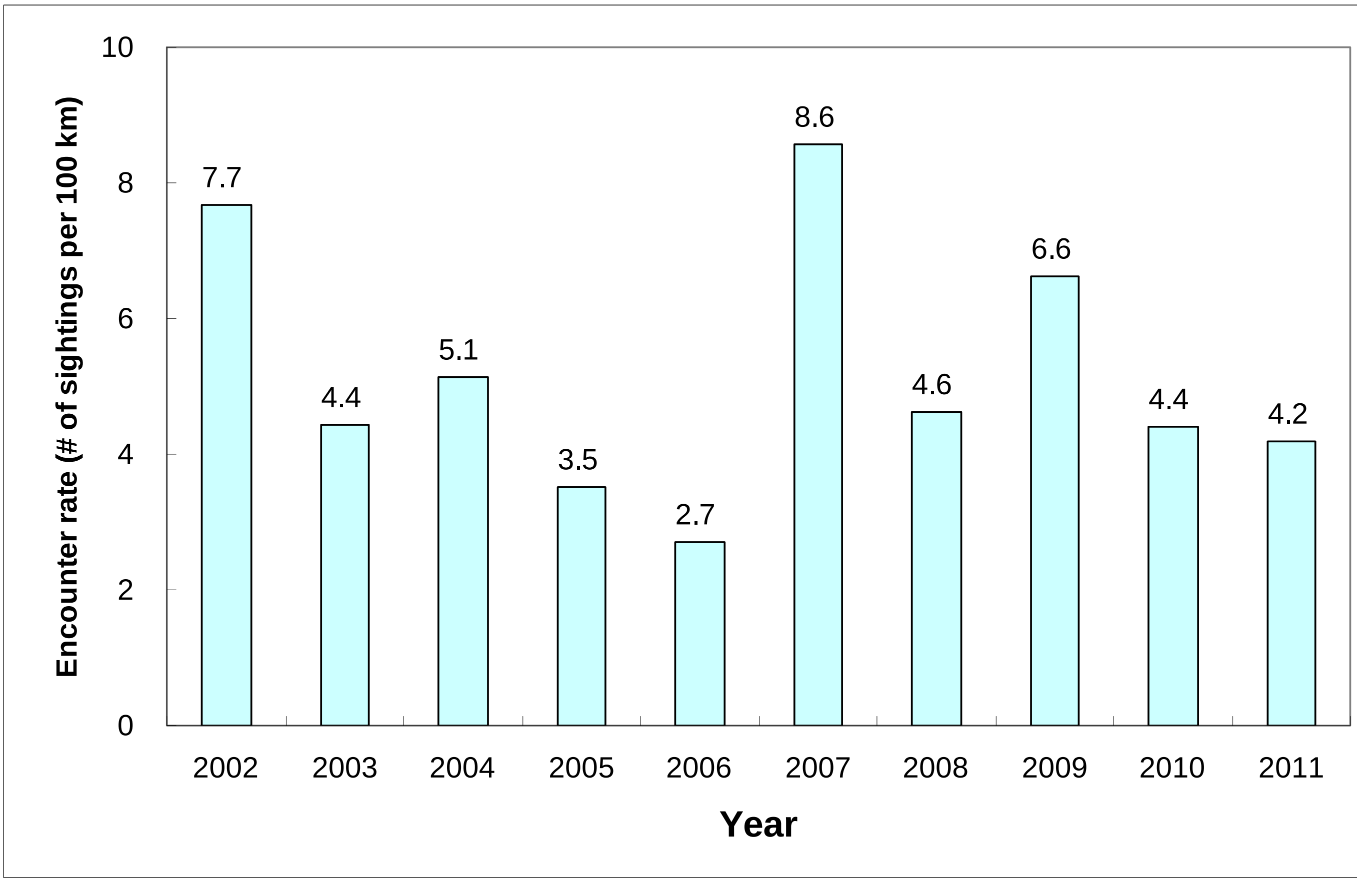


Figure 18. Temporal trend of annual encounter rates of finless porpoises (combined from SWL, SEL, LM and PT survey areas) from 2002-11

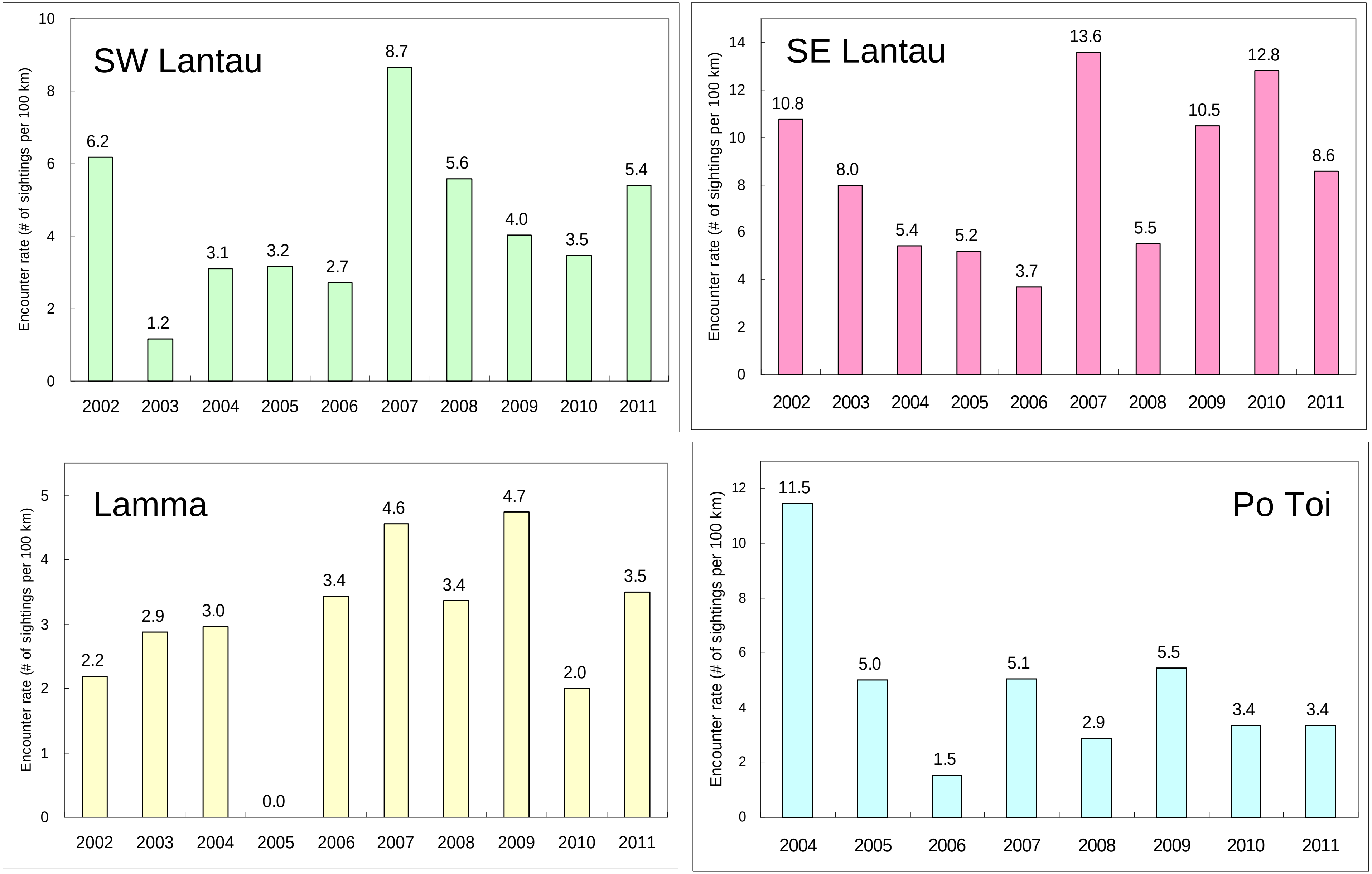


Figure 19. Temporal trends in annual encounter rates of finless porpoises among different survey areas

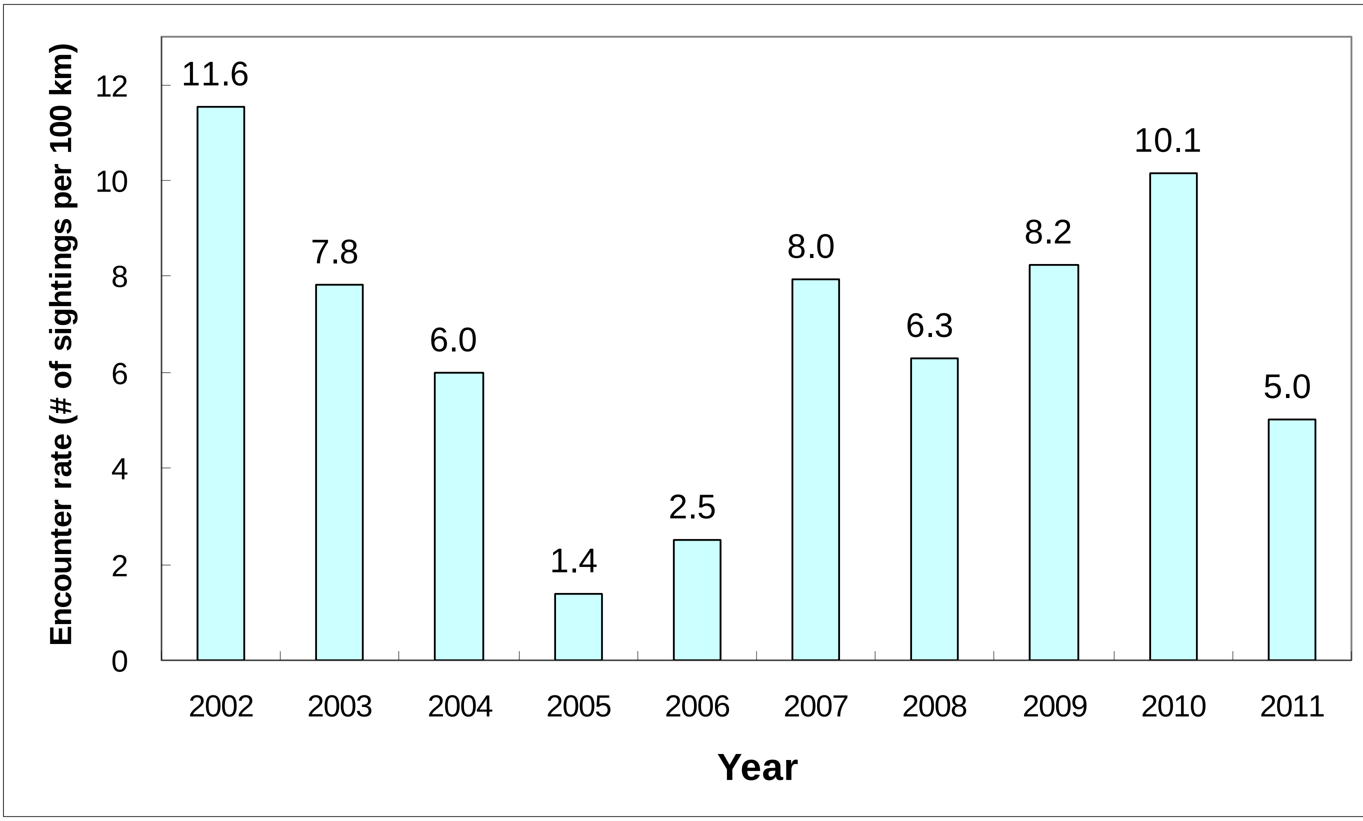


Figure 20. Temporal trend of porpoise encounter rates in South Lantau and Lamma waters combined from winter/spring months of 2002-11

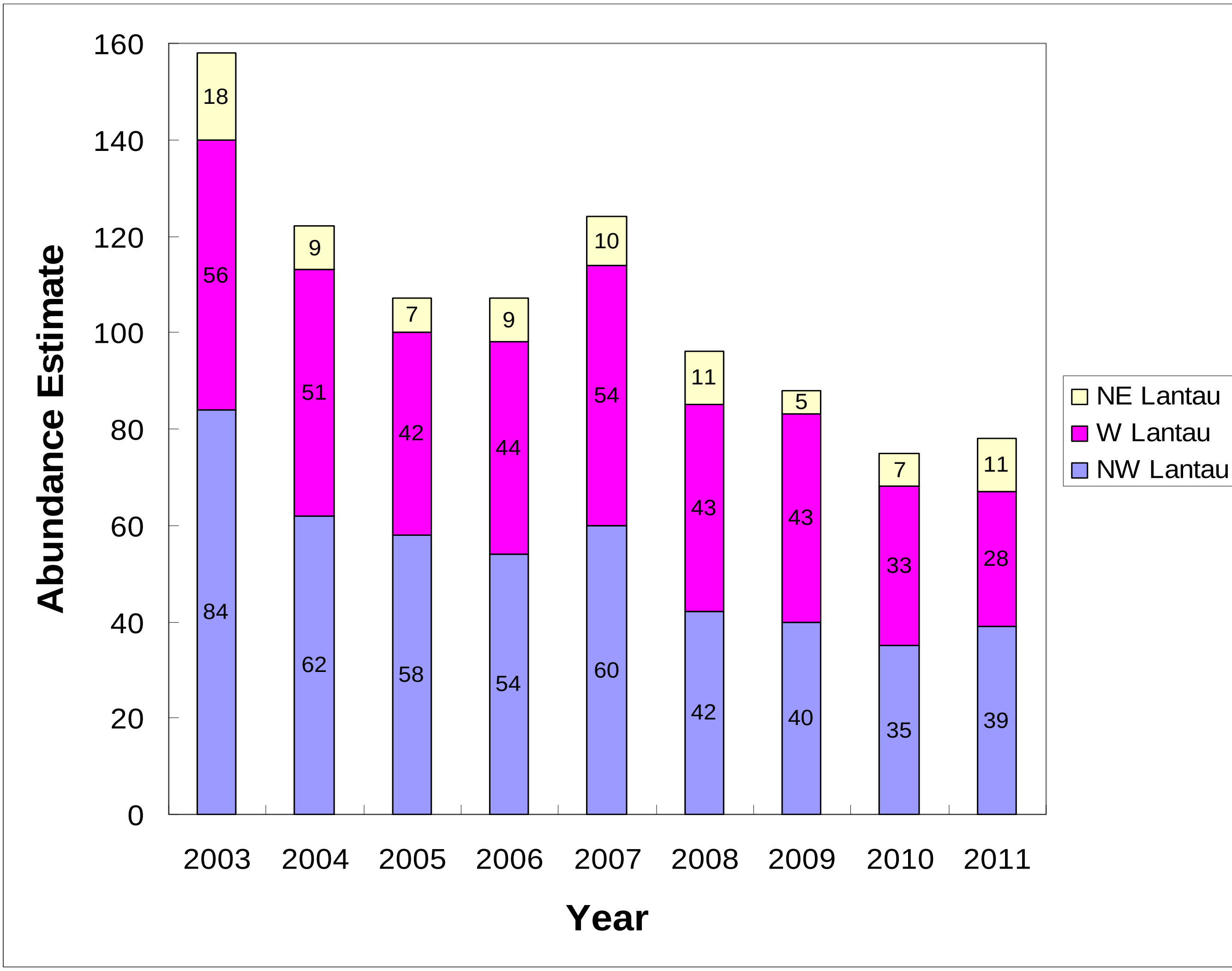


Figure 21. Temporal trends in combined abundance estimates of Chinese white dolphins in West, Northwest & Northeast Lantau from 2003-11

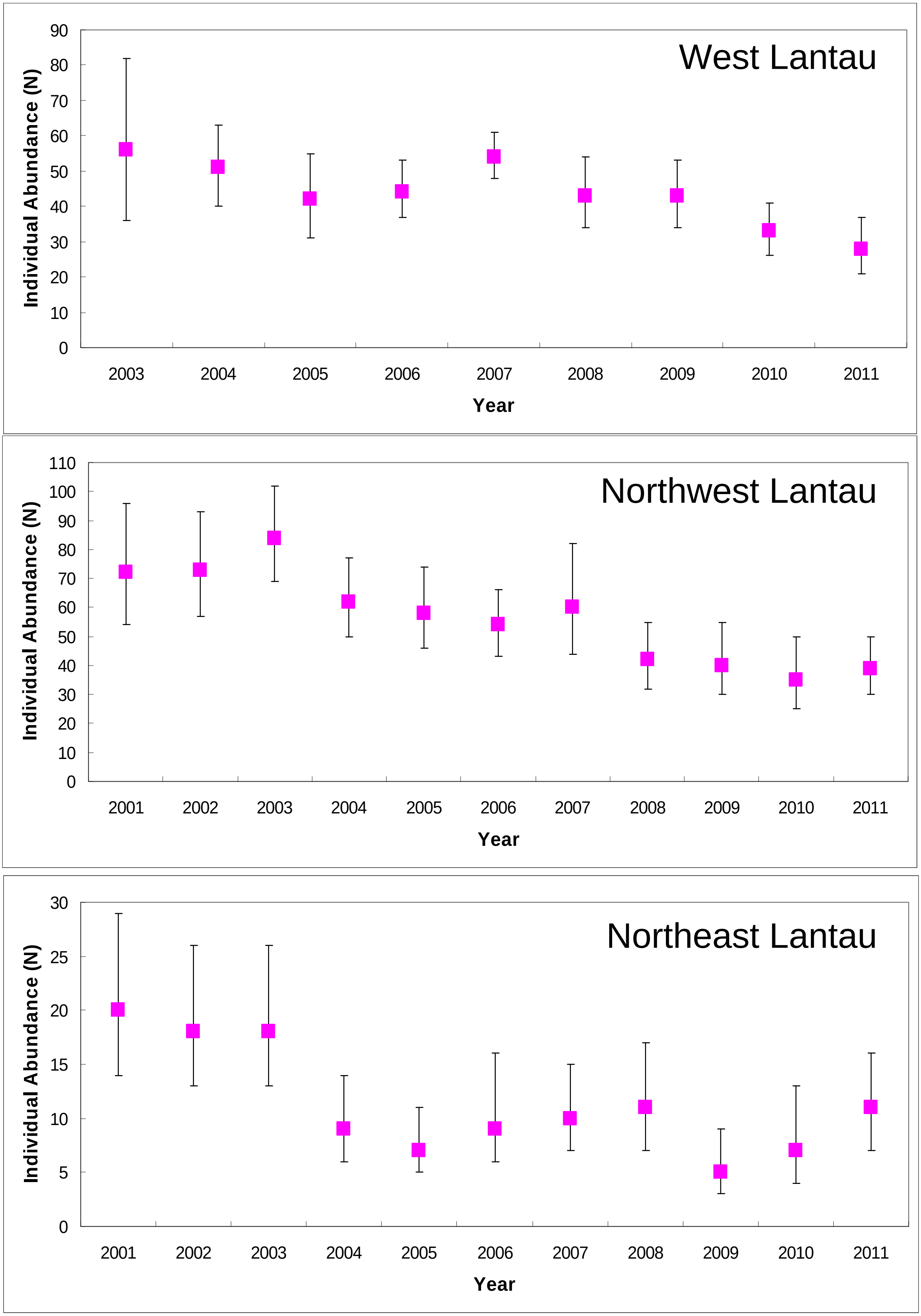


Figure 22. Temporal trends in abundance estimates of Chinese white dolphins in West, Northwest & Northeast Lantau from 2001-11 (error bars: 95% confidence interval of abundance estimates)

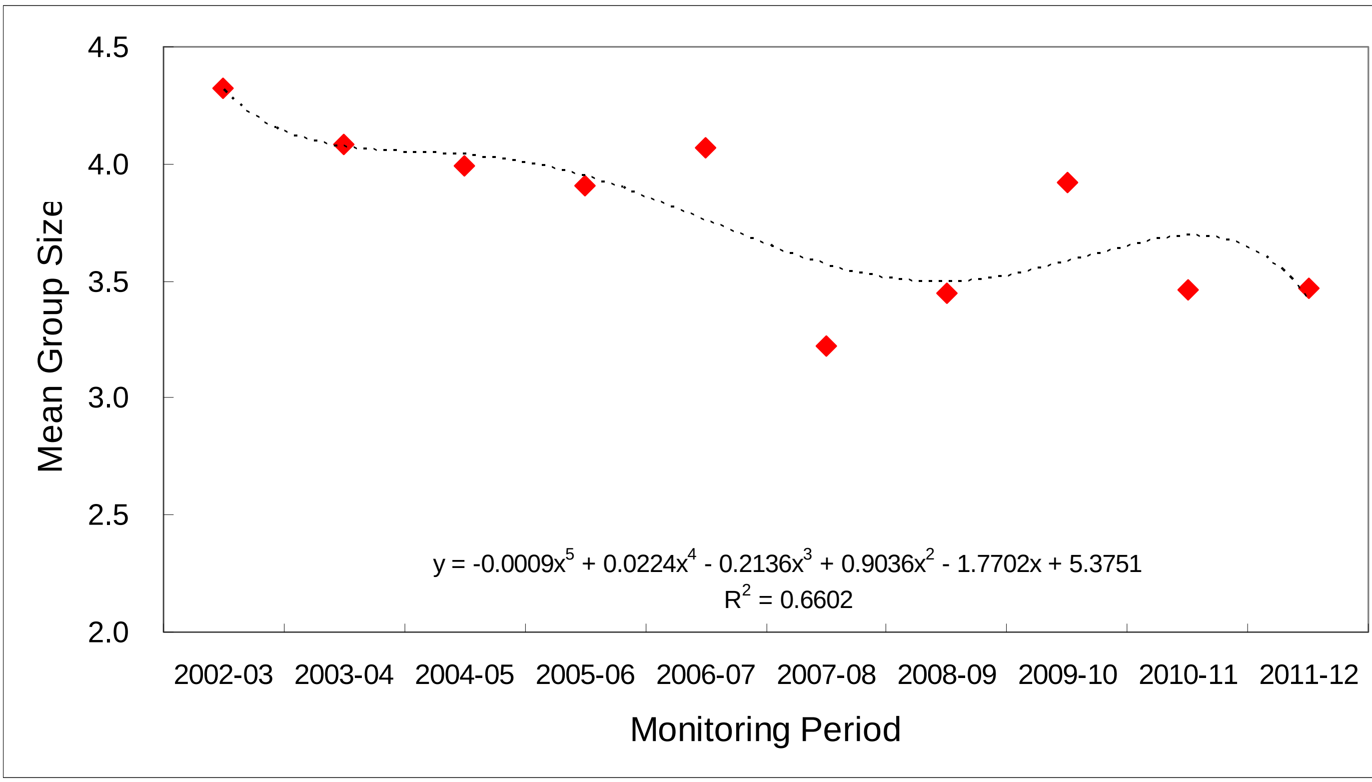


Figure 23. Temporal trend of mean dolphin group size in 2002-12

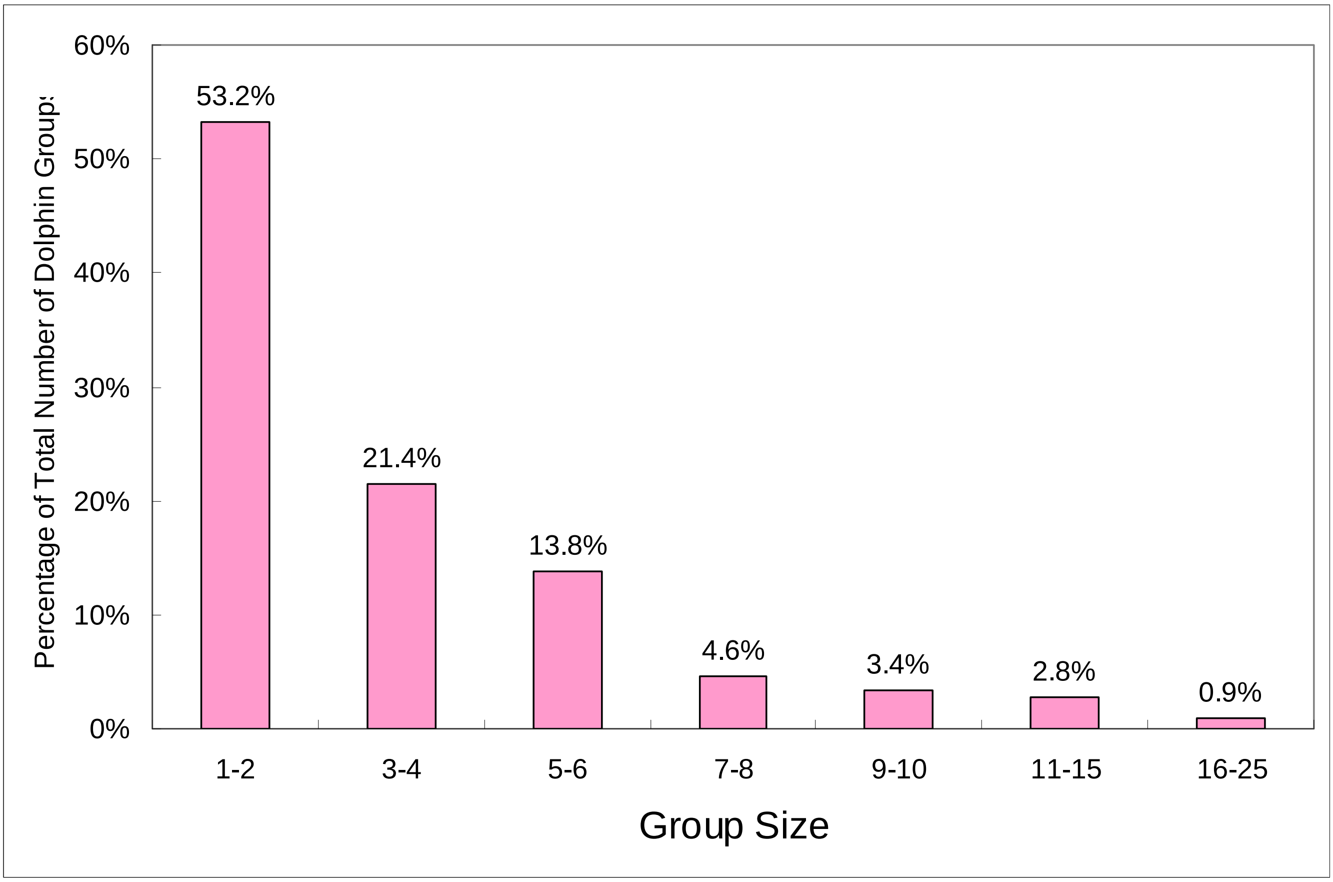


Figure 24. Percentages of different group sizes of Chinese white dolphins in Hong Kong during April 2011 to March 2012

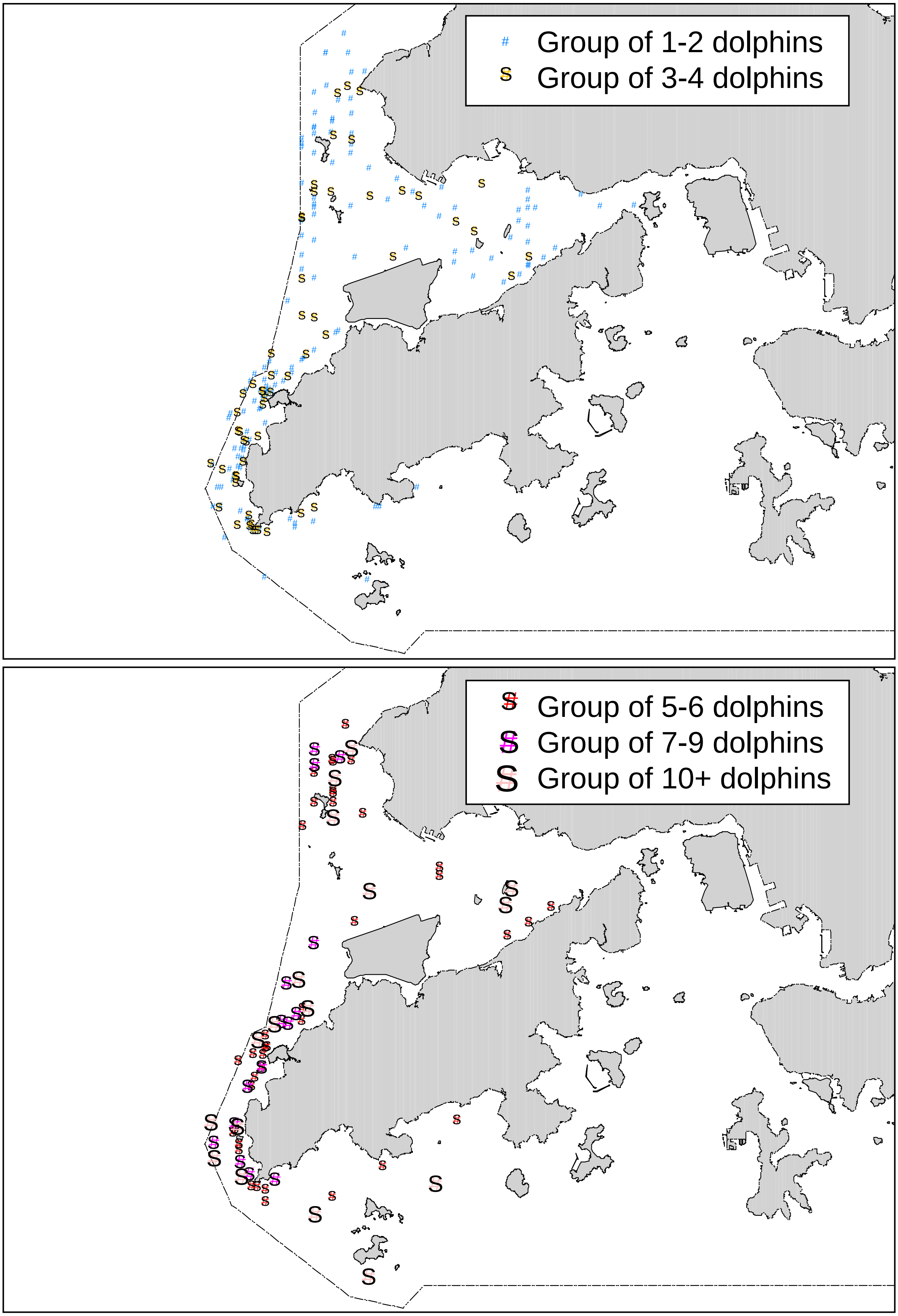


Figure 25. Distribution of Chinese white dolphins with different group sizes (April 2011 – March 2012)

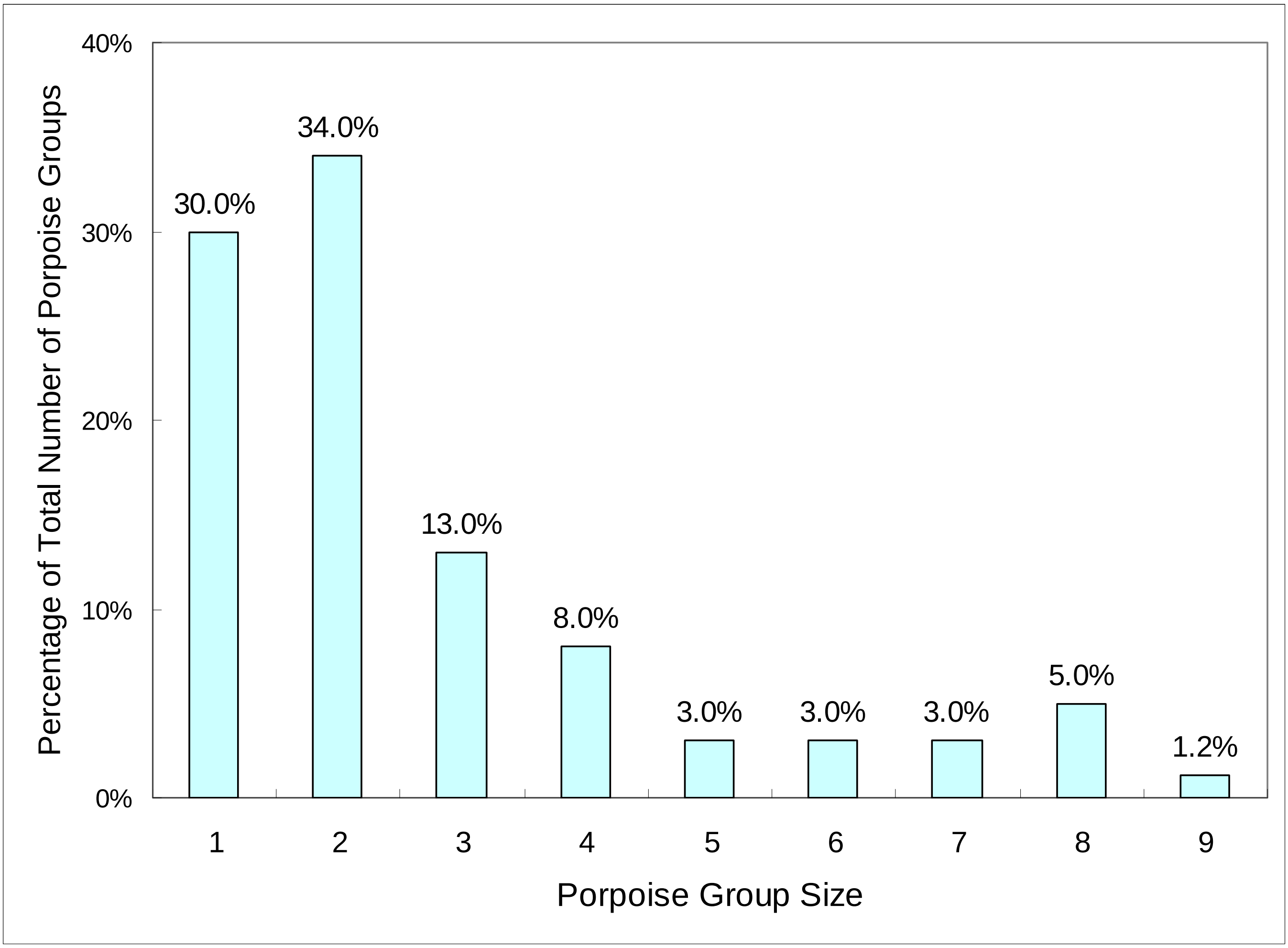
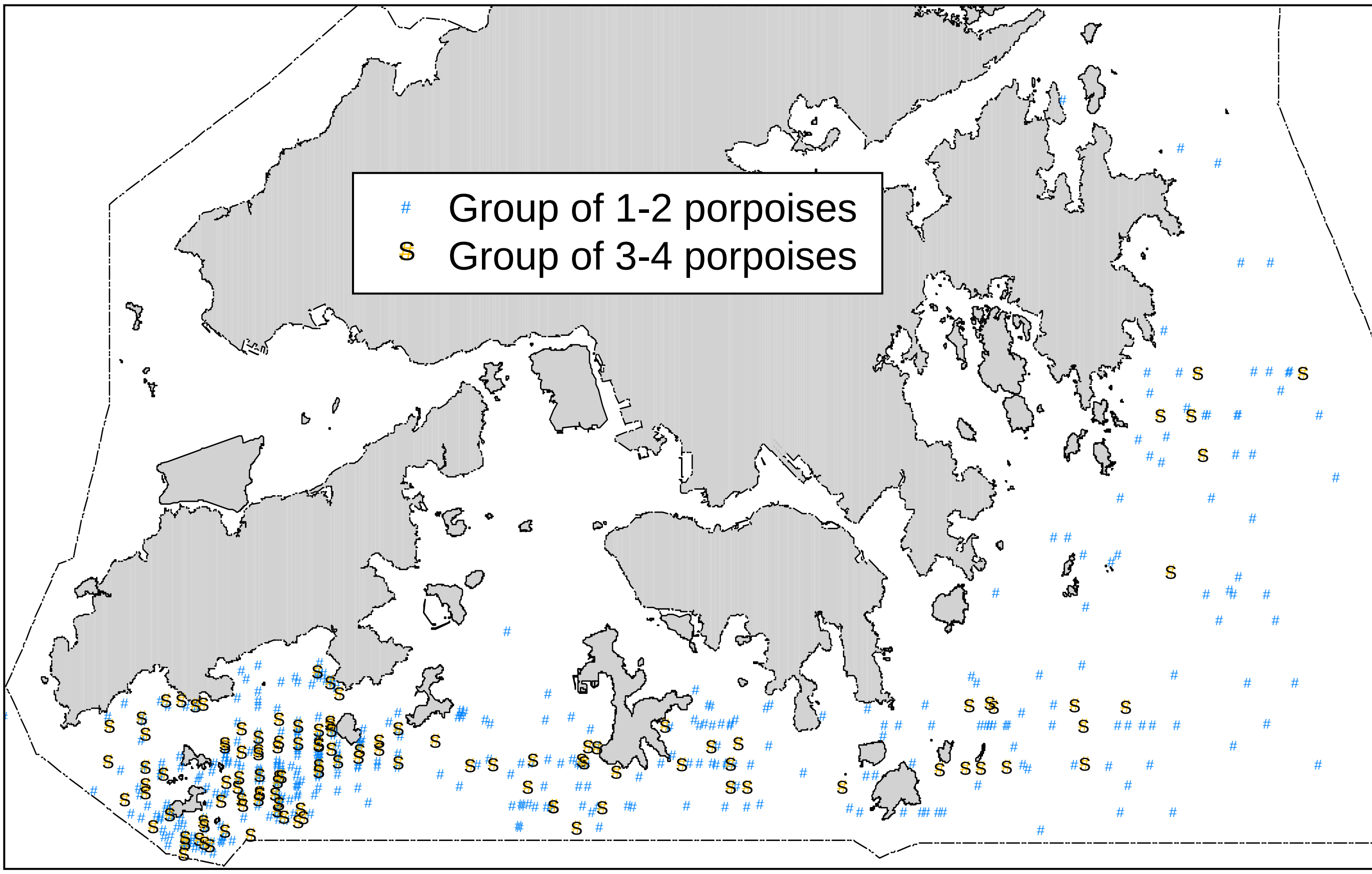


Figure 26. Percentages of different group sizes of finless porpoises in Hong Kong during April 2011 to March 2012



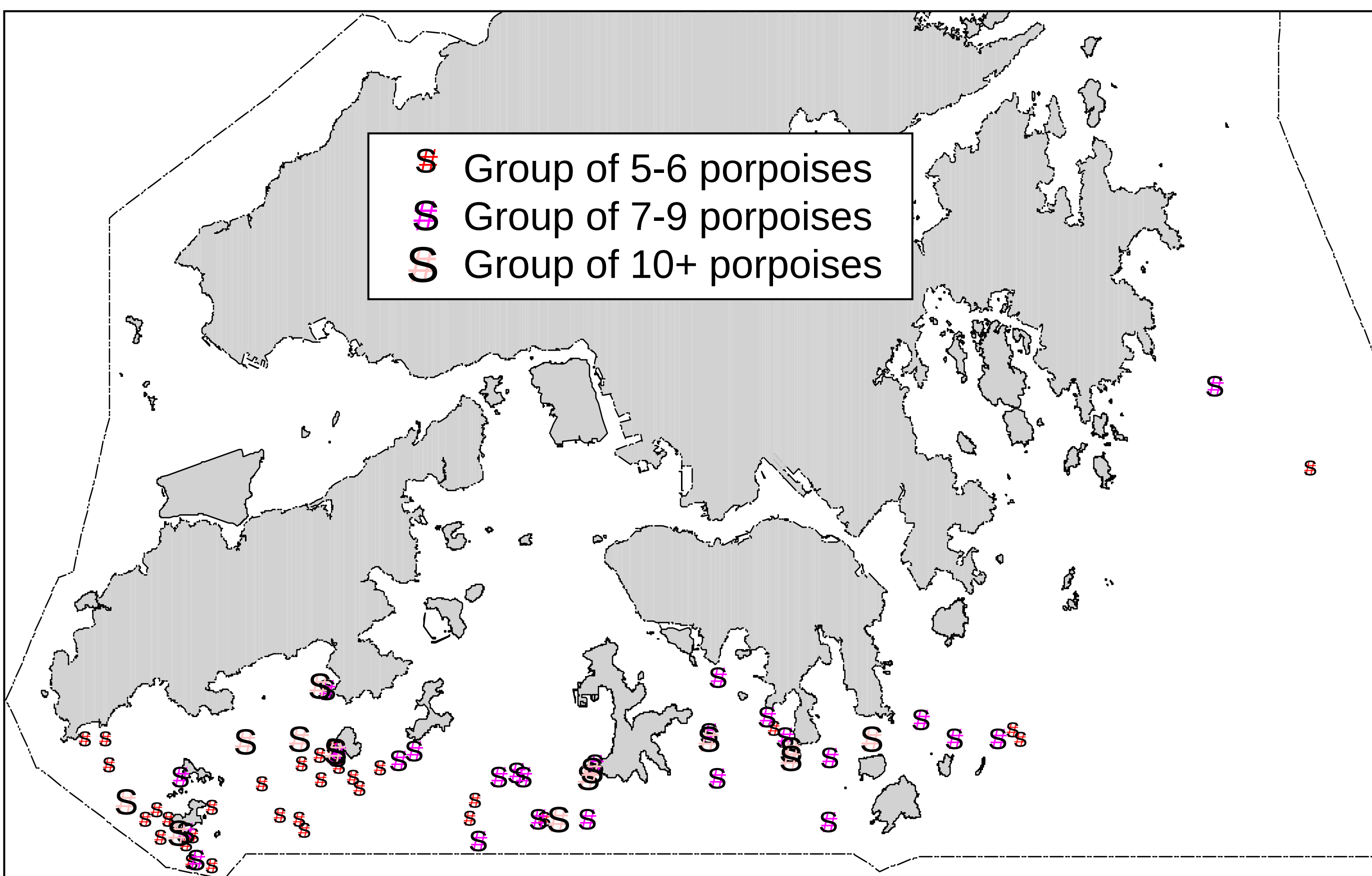


Figure 27. Distribution of finless porpoises with different group sizes (2006-11)

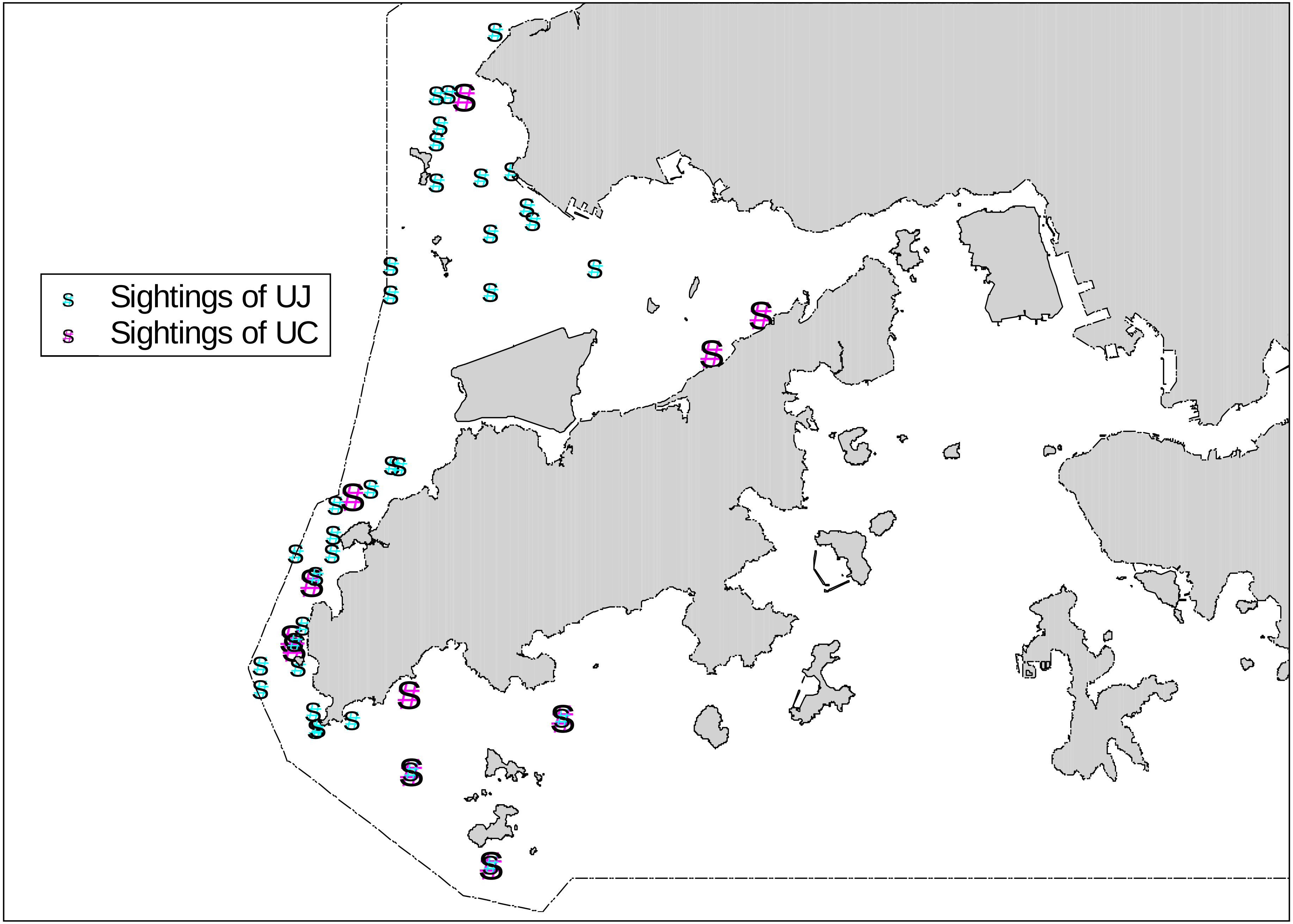


Figure 28. Distribution of Unspotted Calves (UC) & Unspotted Juveniles (UJ) (April 2011 – March 2012)

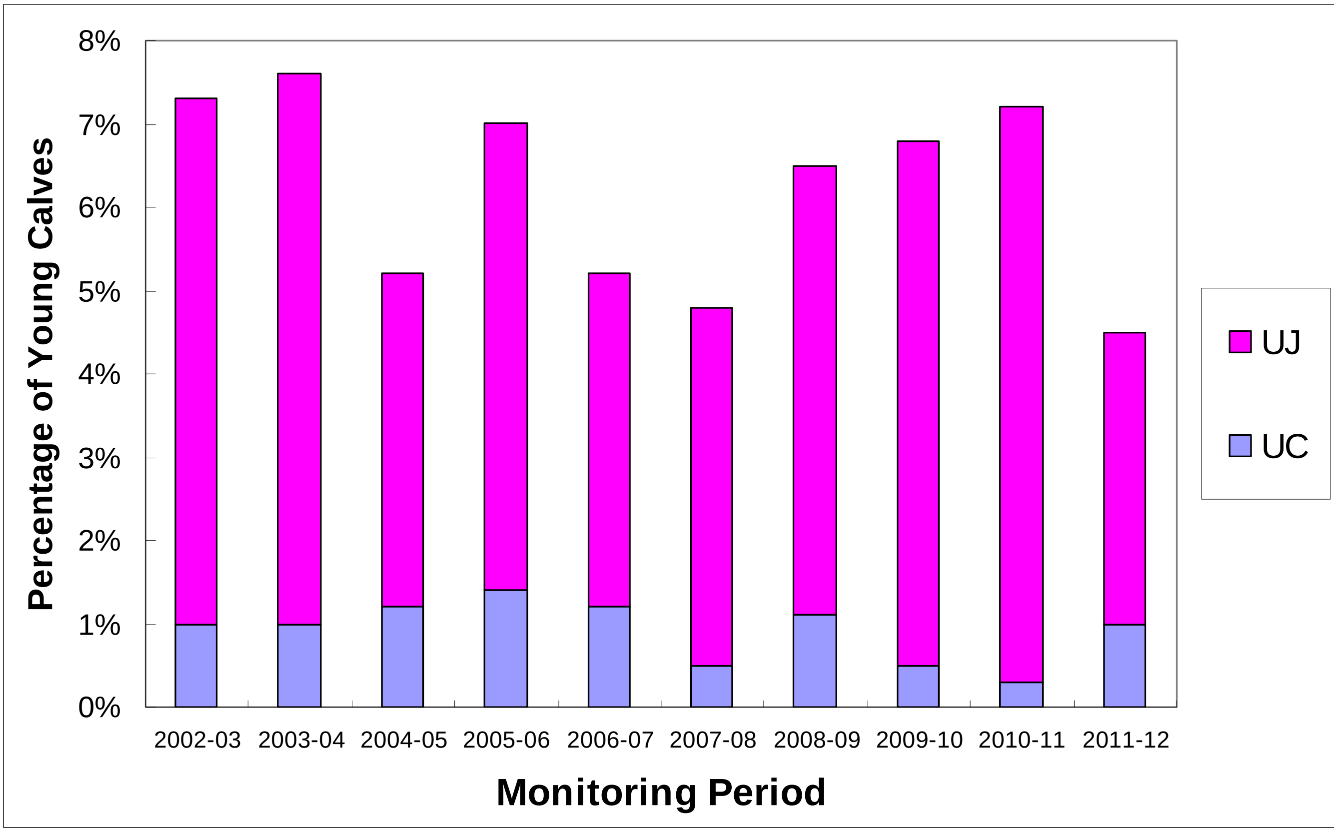


Figure 29a. Percentages of young calves (i.e. unspotted calves (UC) and unspotted juveniles (UJ)) among dolphin groups during 2002-12

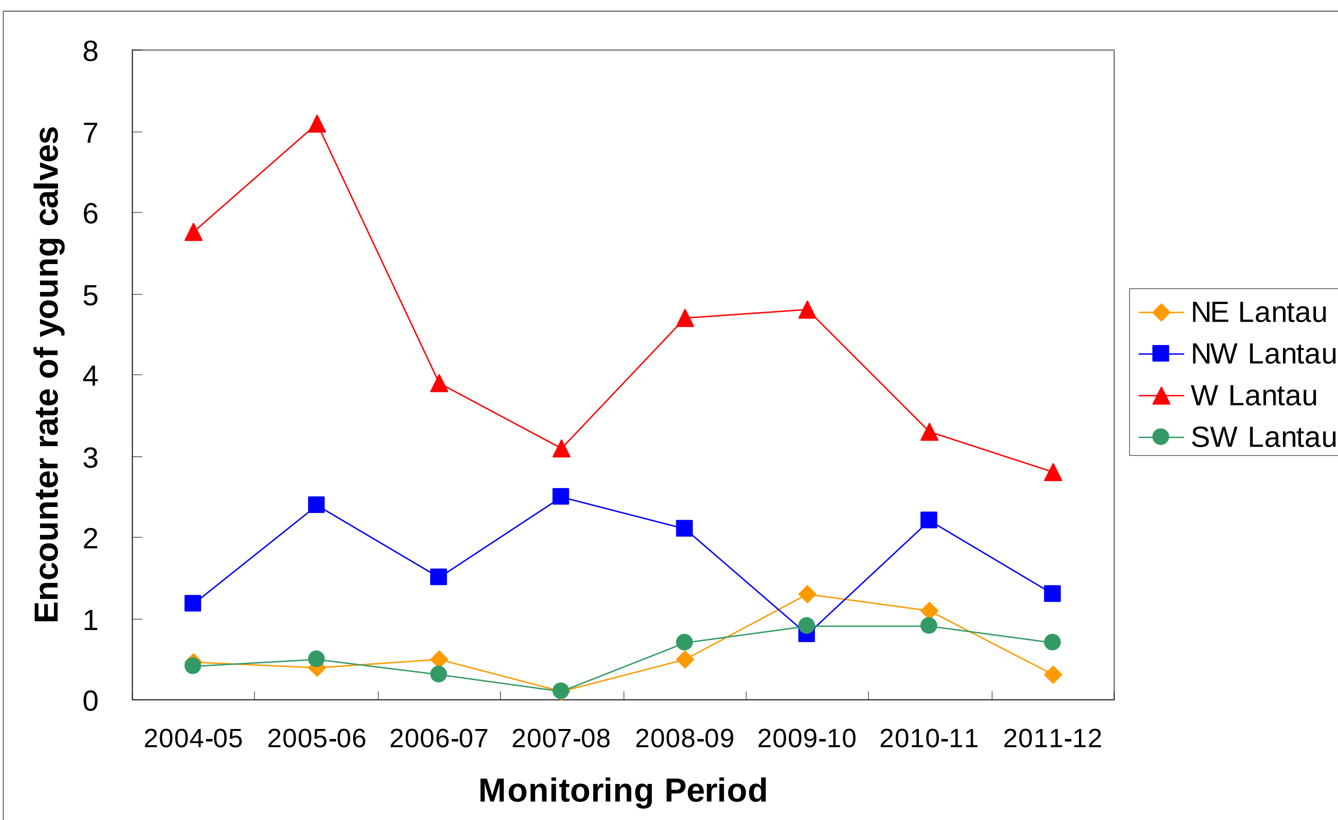


Figure 29b. Temporal trends of encounter rates of young calves (including unspotted calves and unspotted juveniles) in 2004-12

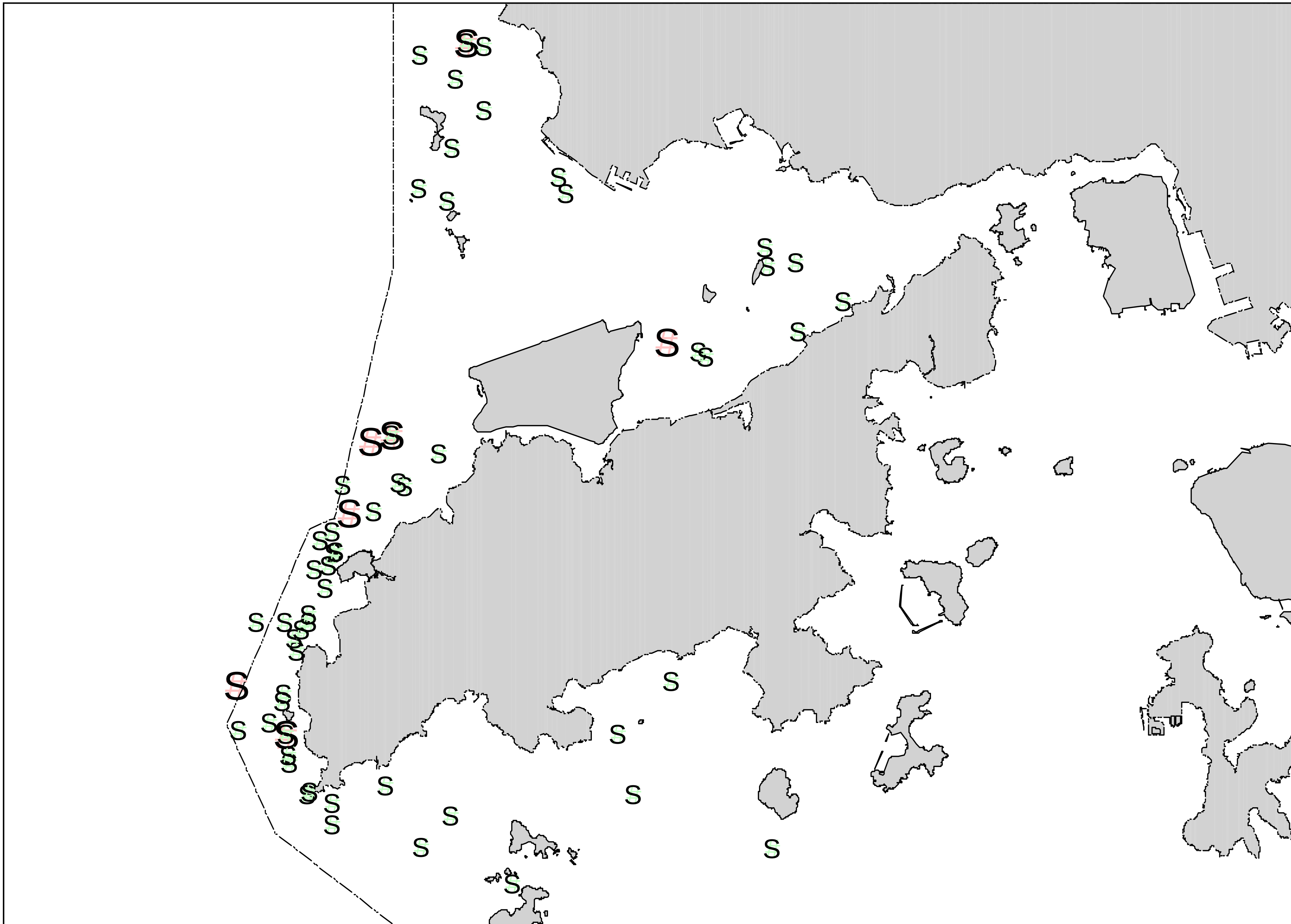


Figure 30. Distribution of Chinese white dolphins engaged in feeding (green dots) and socializing (pink dots) activities (April 2011 – March 2012)

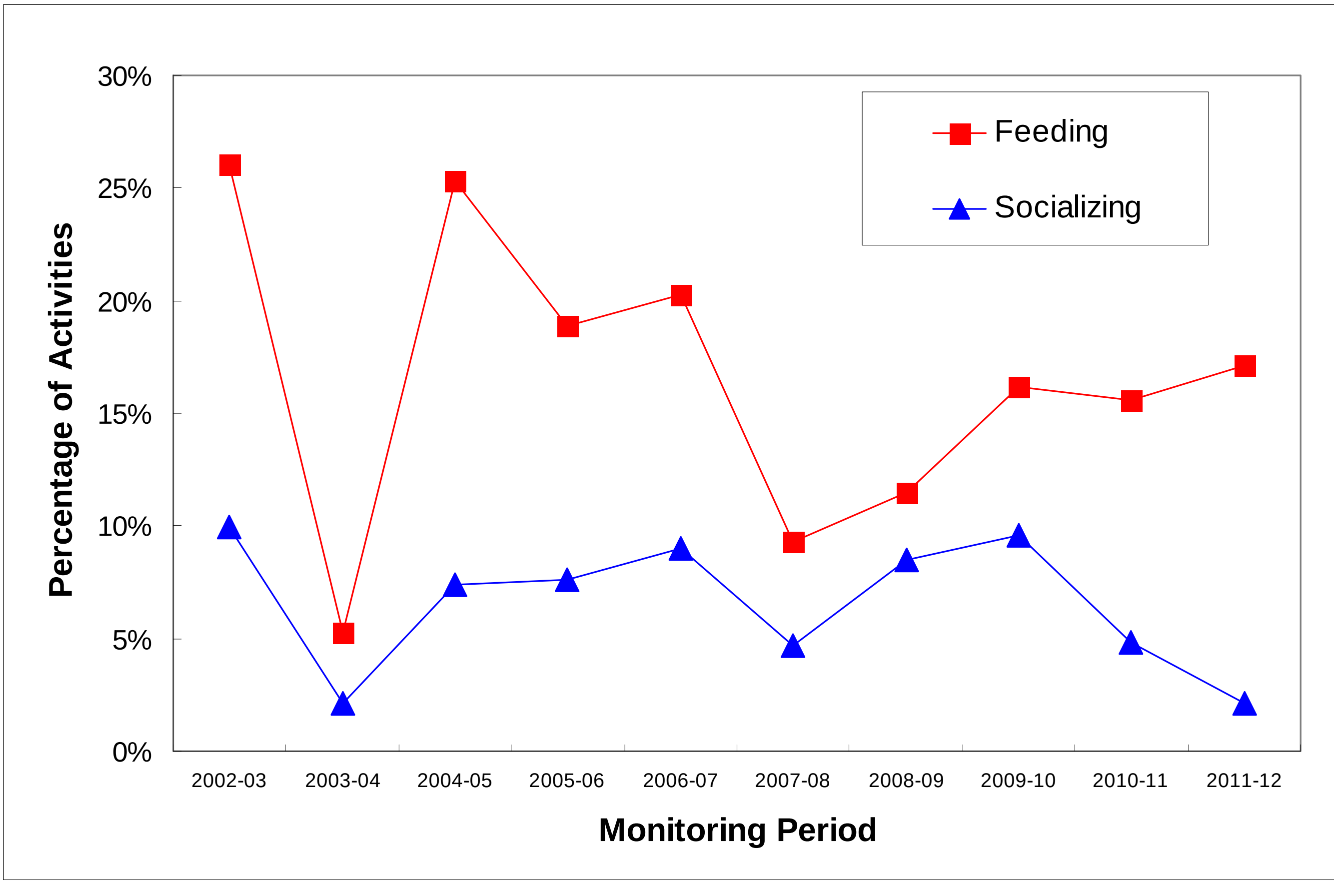


Figure 31. Percentages of feeding and socializing activities among all dolphin groups sighted in Hong Kong during 2002-11

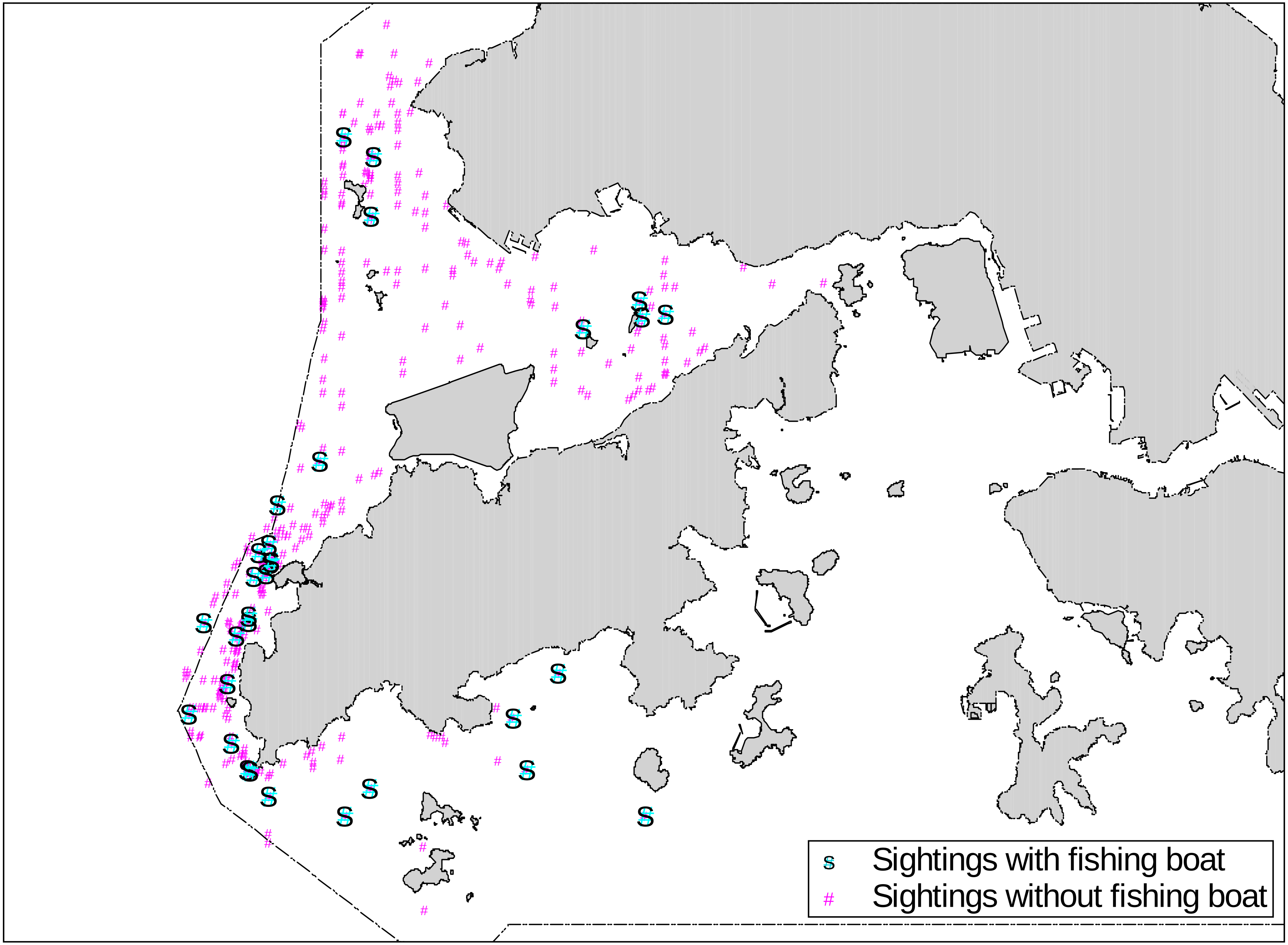
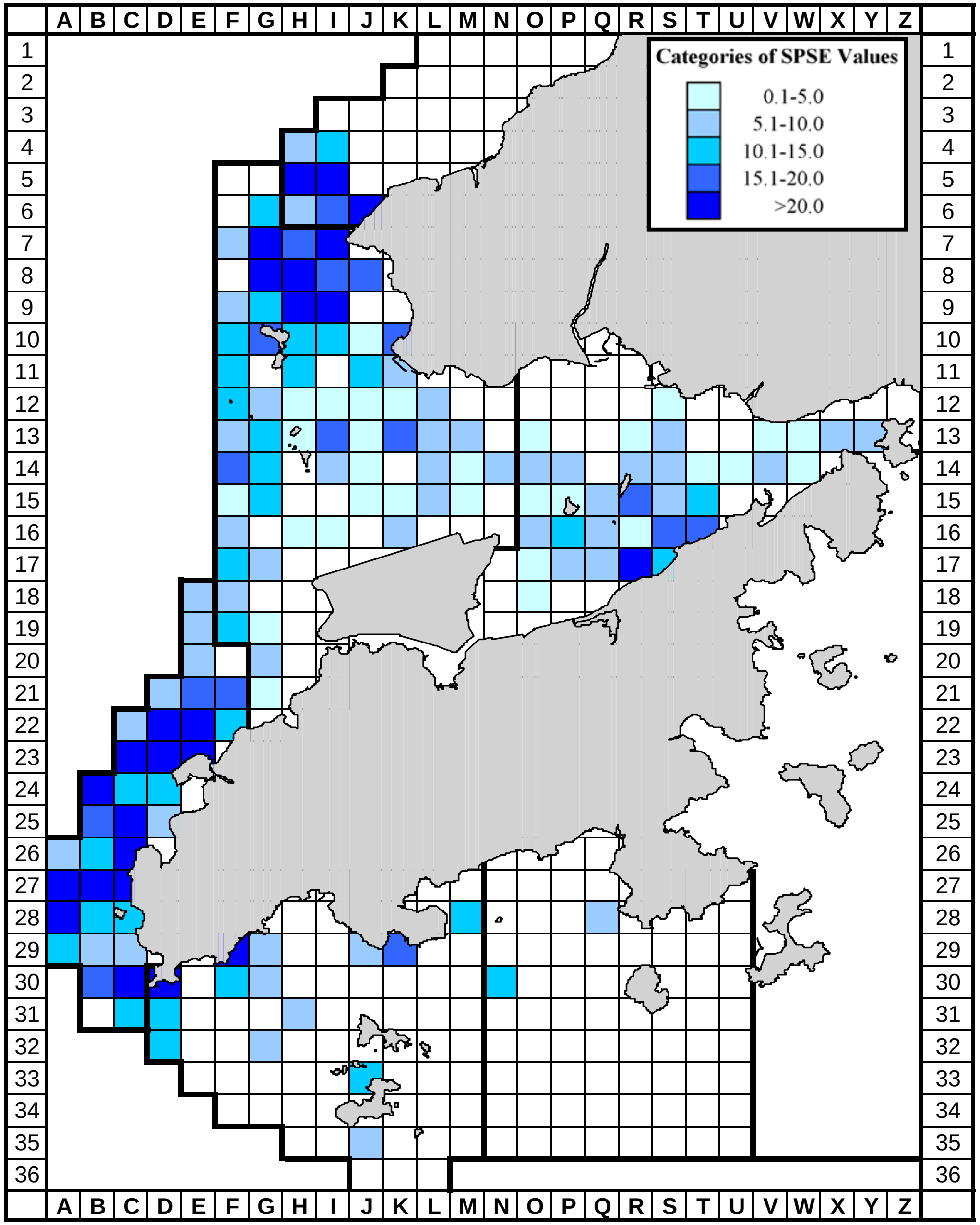


Figure 32. Distribution of dolphin sightings associated with and without fishing boats (April 2011 – March 2012)



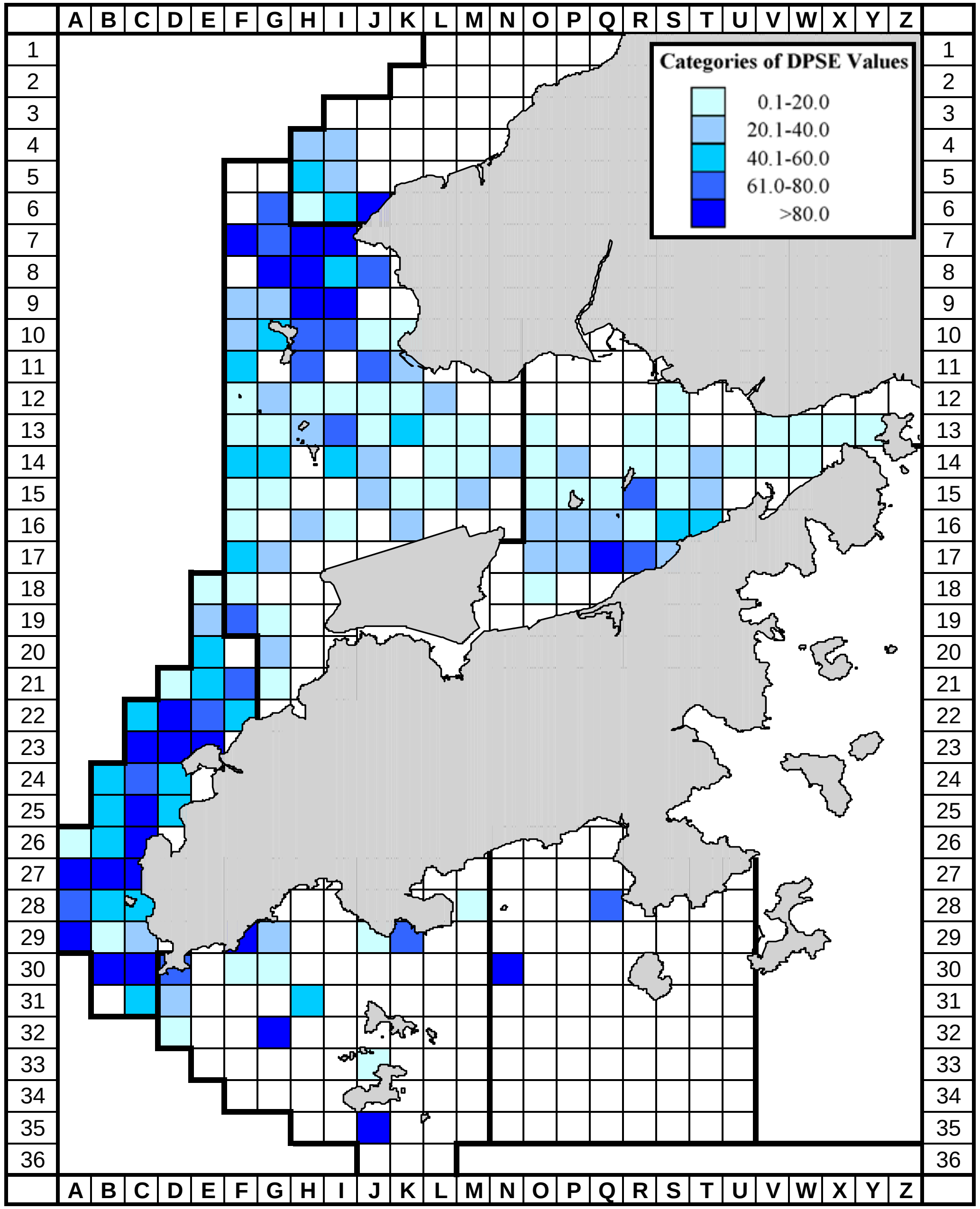
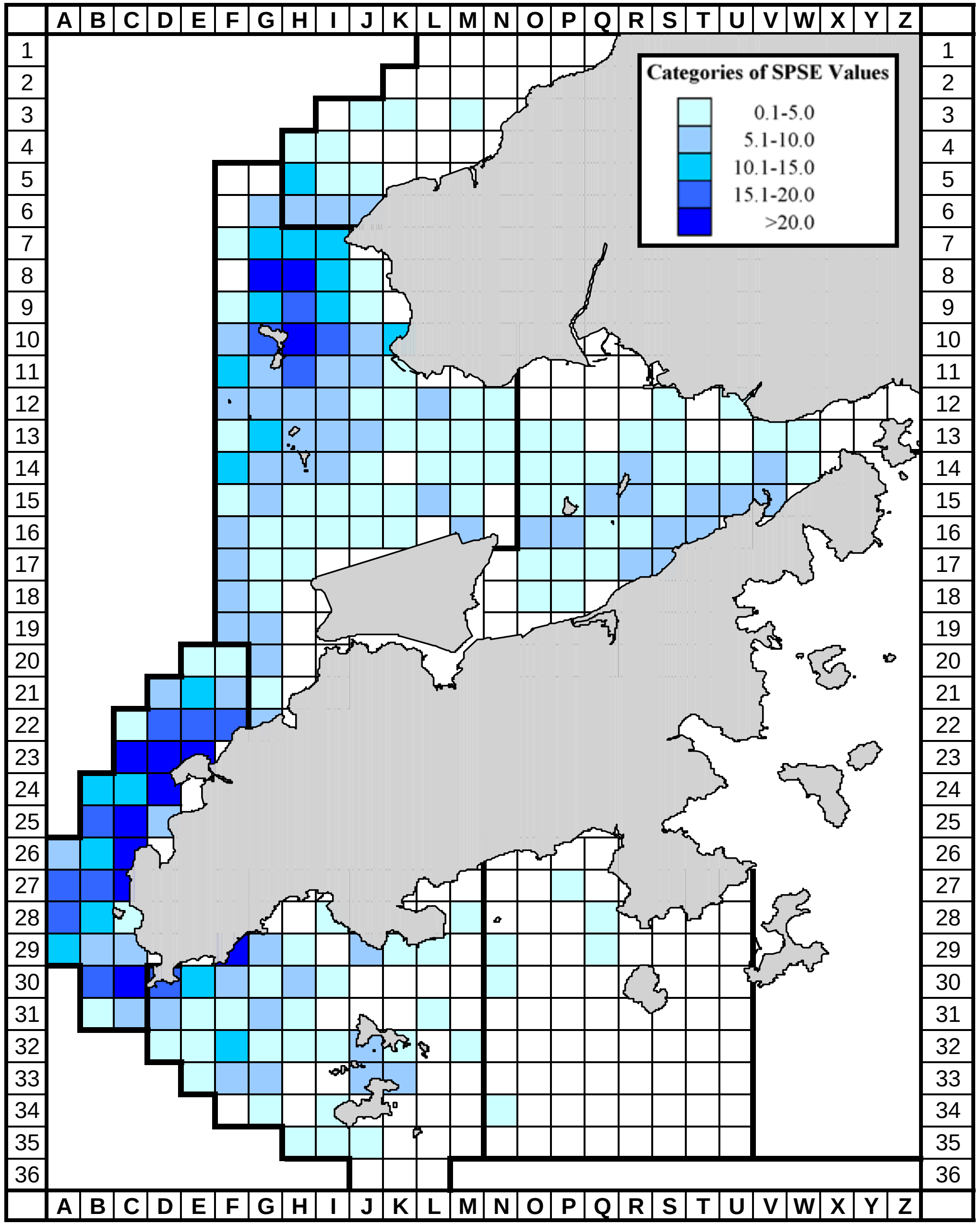


Figure 33. (left) Sighting density of Chinese white dolphins with corrected survey effort per km² in waters around Lantau Island (number within grids represent "SPSE" = no. of on-effort dolphin sightings per 100 units of survey effort) (using data from January - December 2011)

(right) Density of Chinese white dolphins with corrected survey effort per km² in waters around Lantau Island (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort) (using data from January - December 2011)



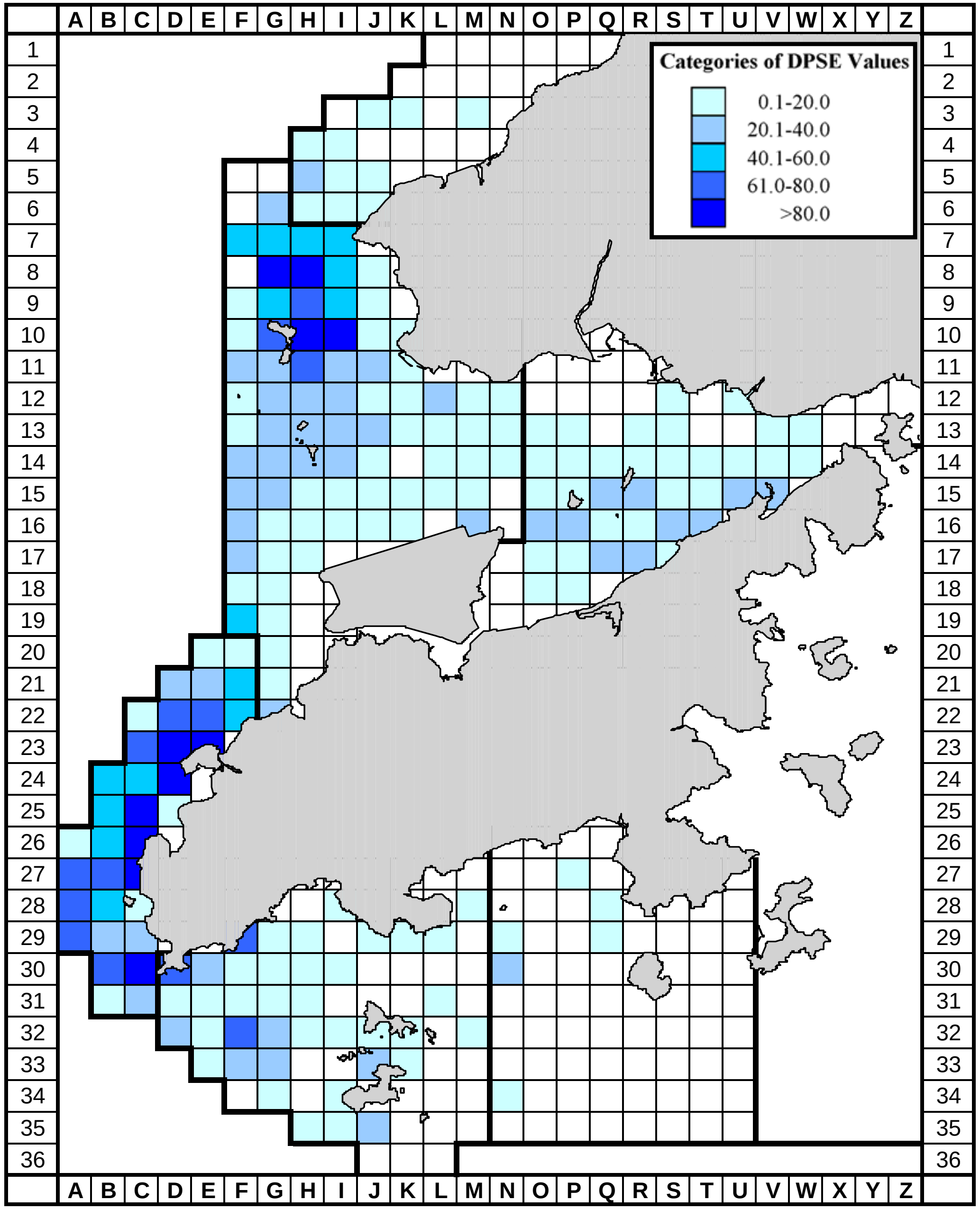


Figure 34. (left) Sighting density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island during 2007-11 (number within grids represent "SPSE" = no. of on-effort sightings per 100 units of survey effort)

(right) Density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island during 2007-11 (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort)

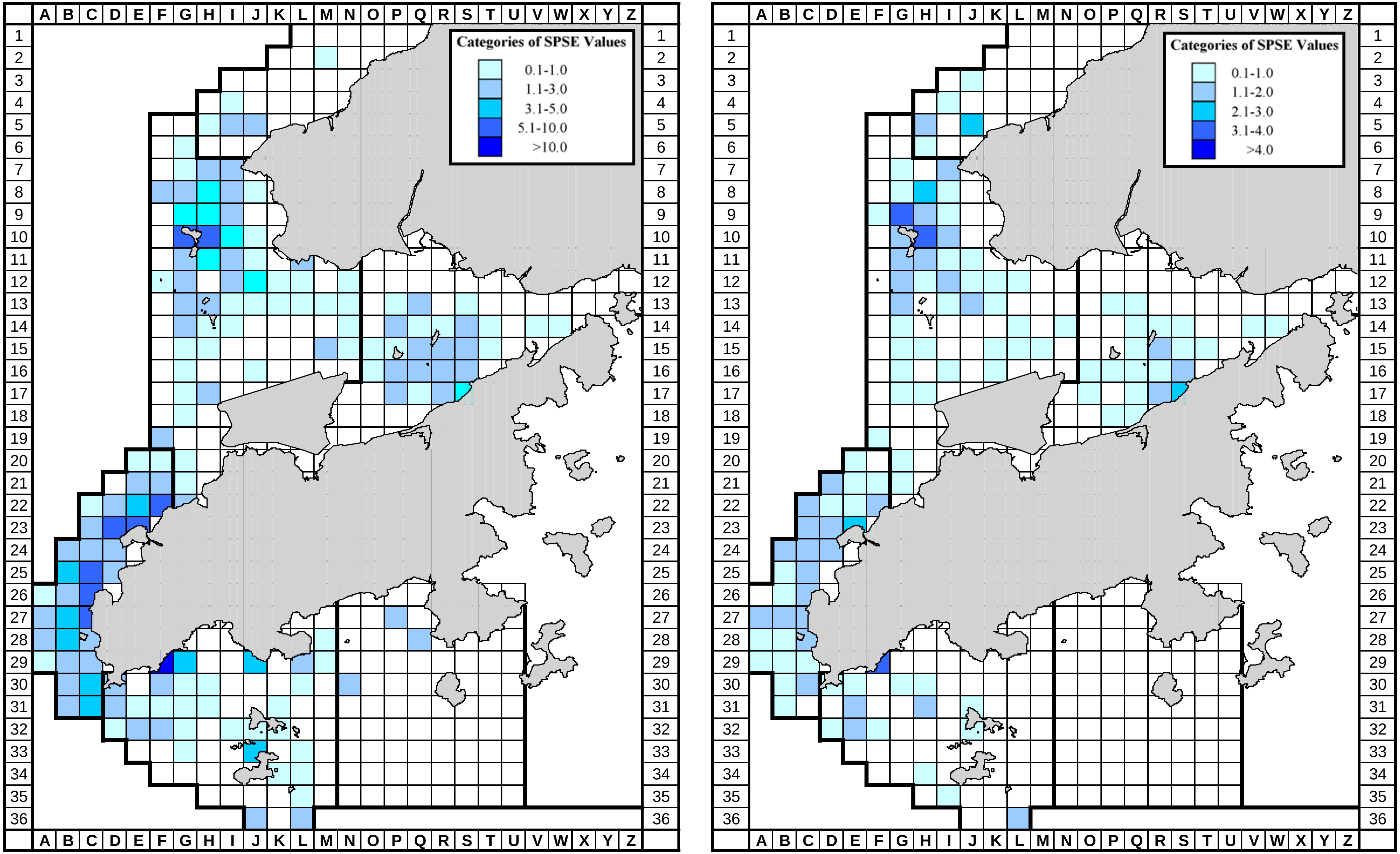


Figure 35. Sighting density of Chinese white dolphins with corrected survey effort per km^2 engaged in **feeding (left)** and **socializing activities (right)** in waters around Lantau Island during 2002-11 (number within grids represent "SPSE" = no. of on-effort sightings per 100 units of survey effort)

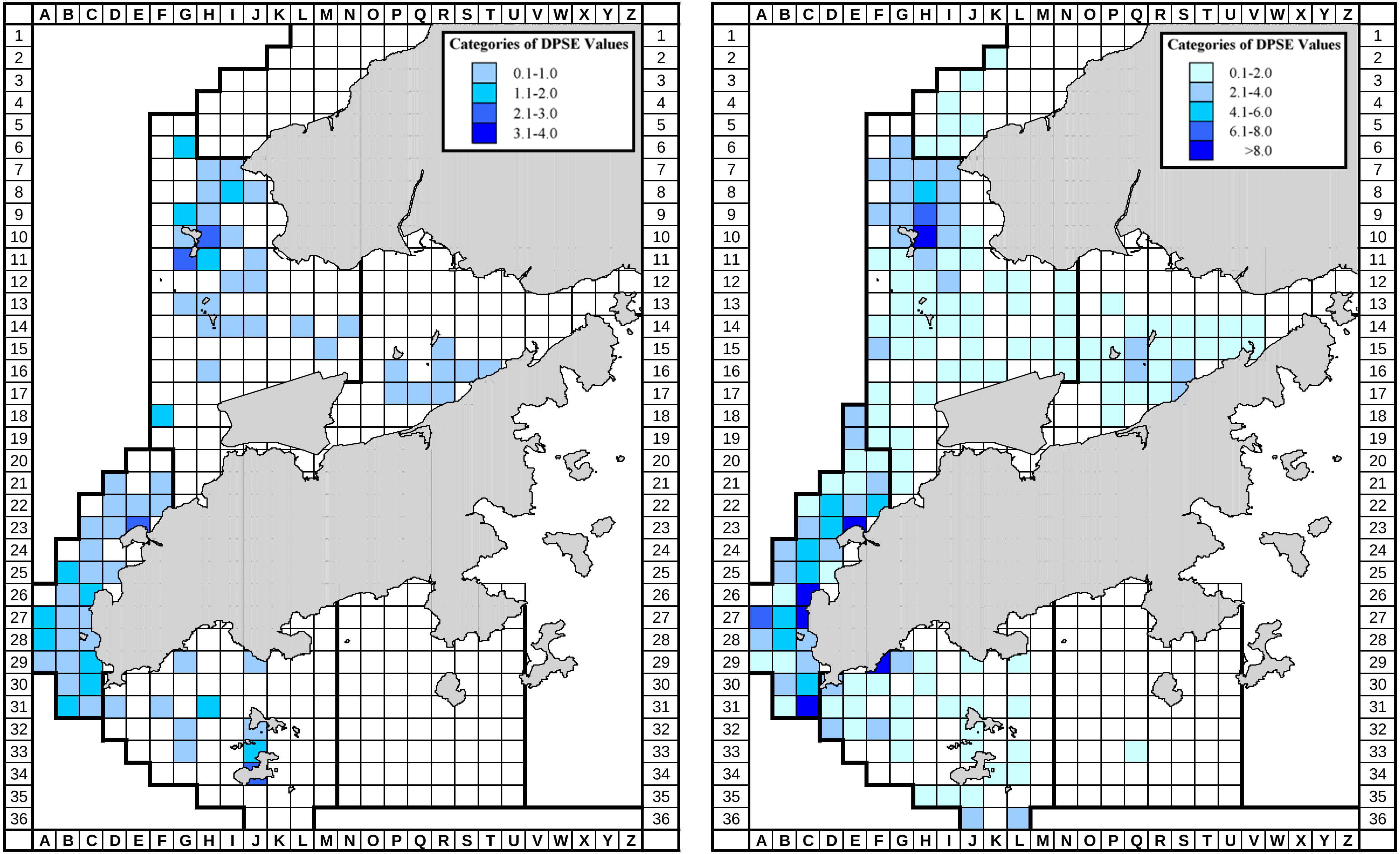


Figure 36. Density of **newborn calves (left)** and **older calves (right)** of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island during 2002-11
(number within grids represent "DPSE" = no. of newborn calves and older calves per 100 units of survey effort)

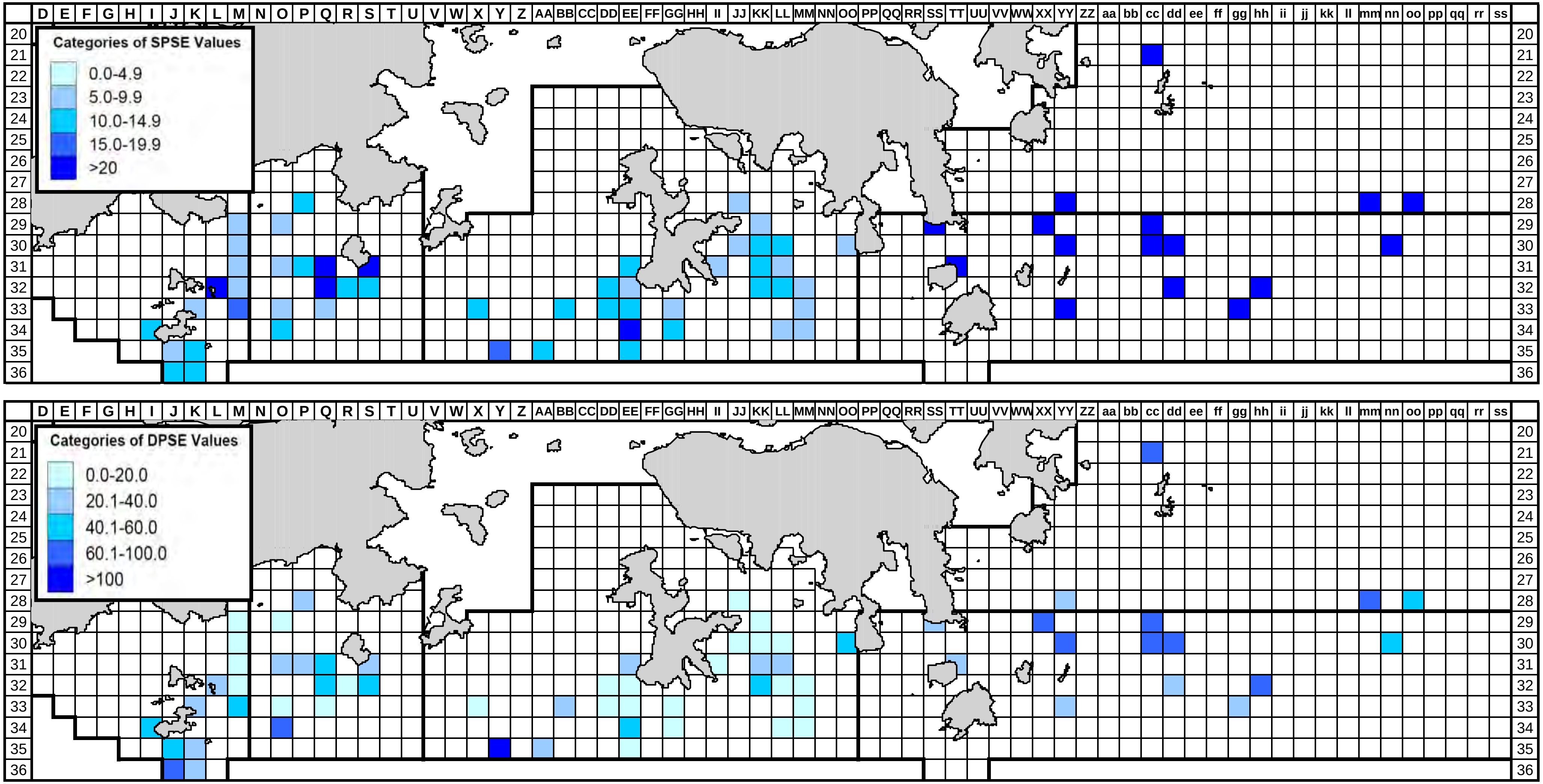


Figure 37. (top) Sighting density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong (number within grids represent "SPSE" = no. of on-effort porpoise sightings per 100 units of survey effort) (using data from January - December 2011)

(bottom) Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong (number within grids represents "DPSE" = no. of porpoises per 100 units of survey effort) (using data from January - December 2011)

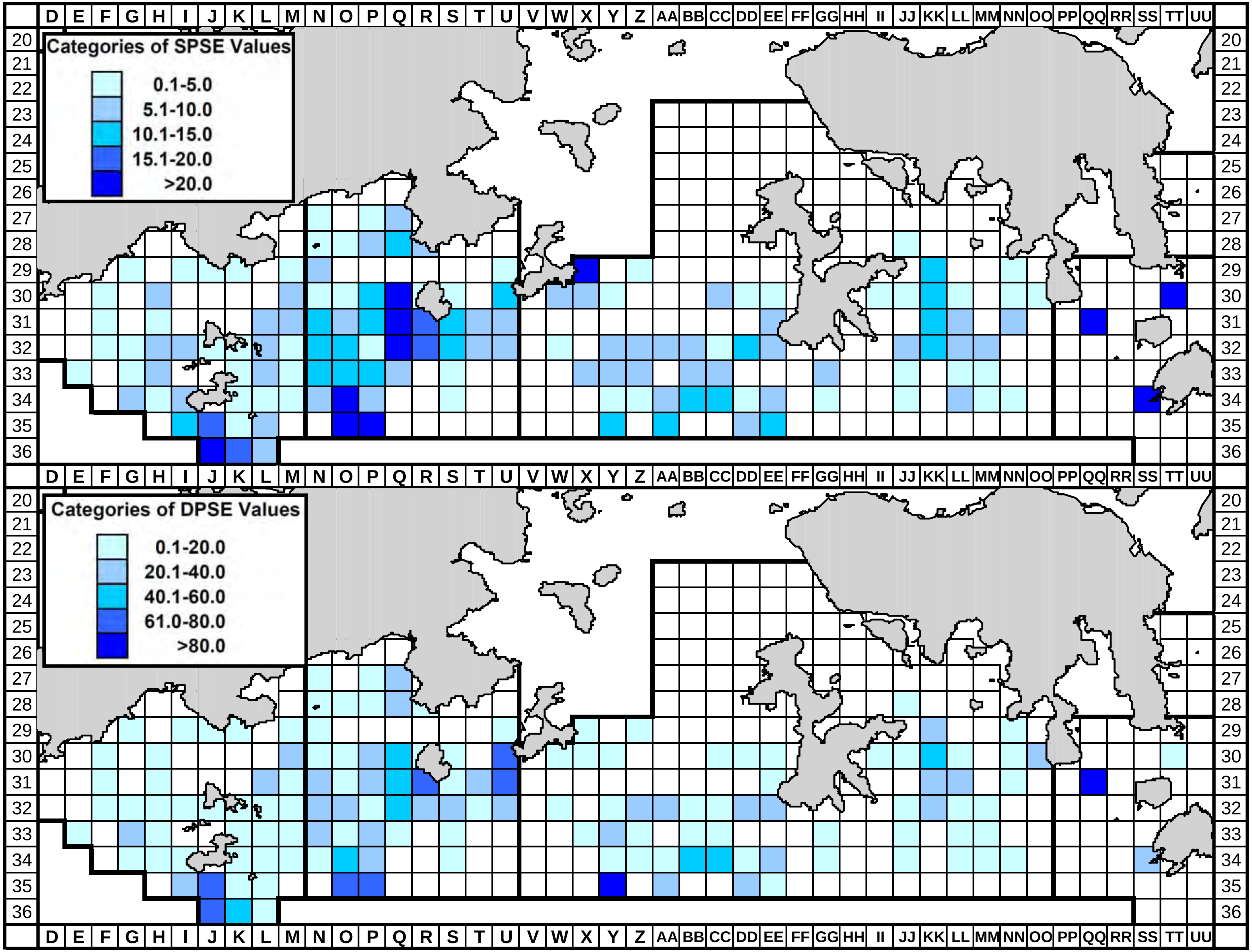


Figure 38. Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong during dry season (December to May), using data collected during 2004-11 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort)

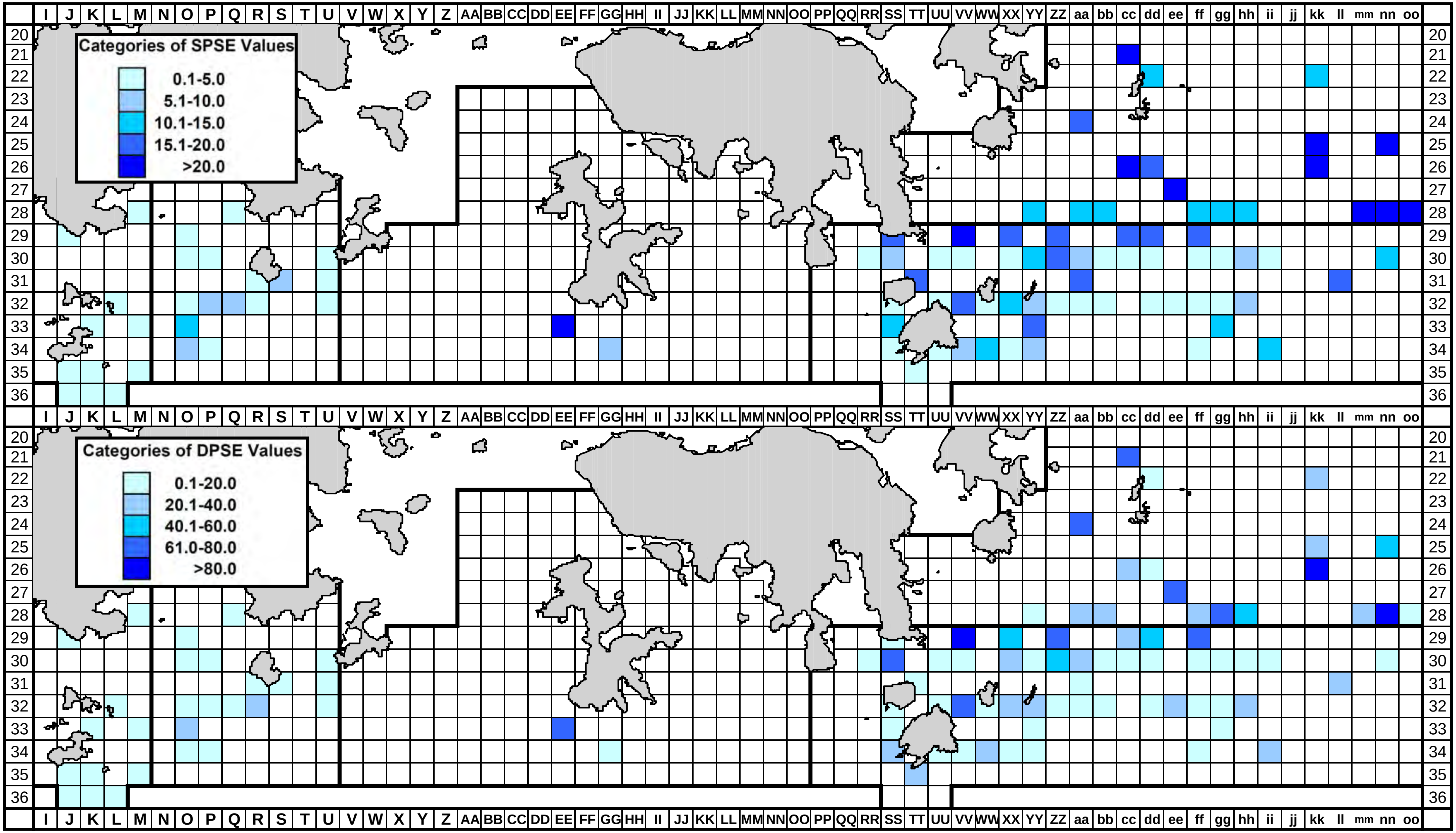


Figure 39. Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong during wet season (June to November), using data collected during 2004-11 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort

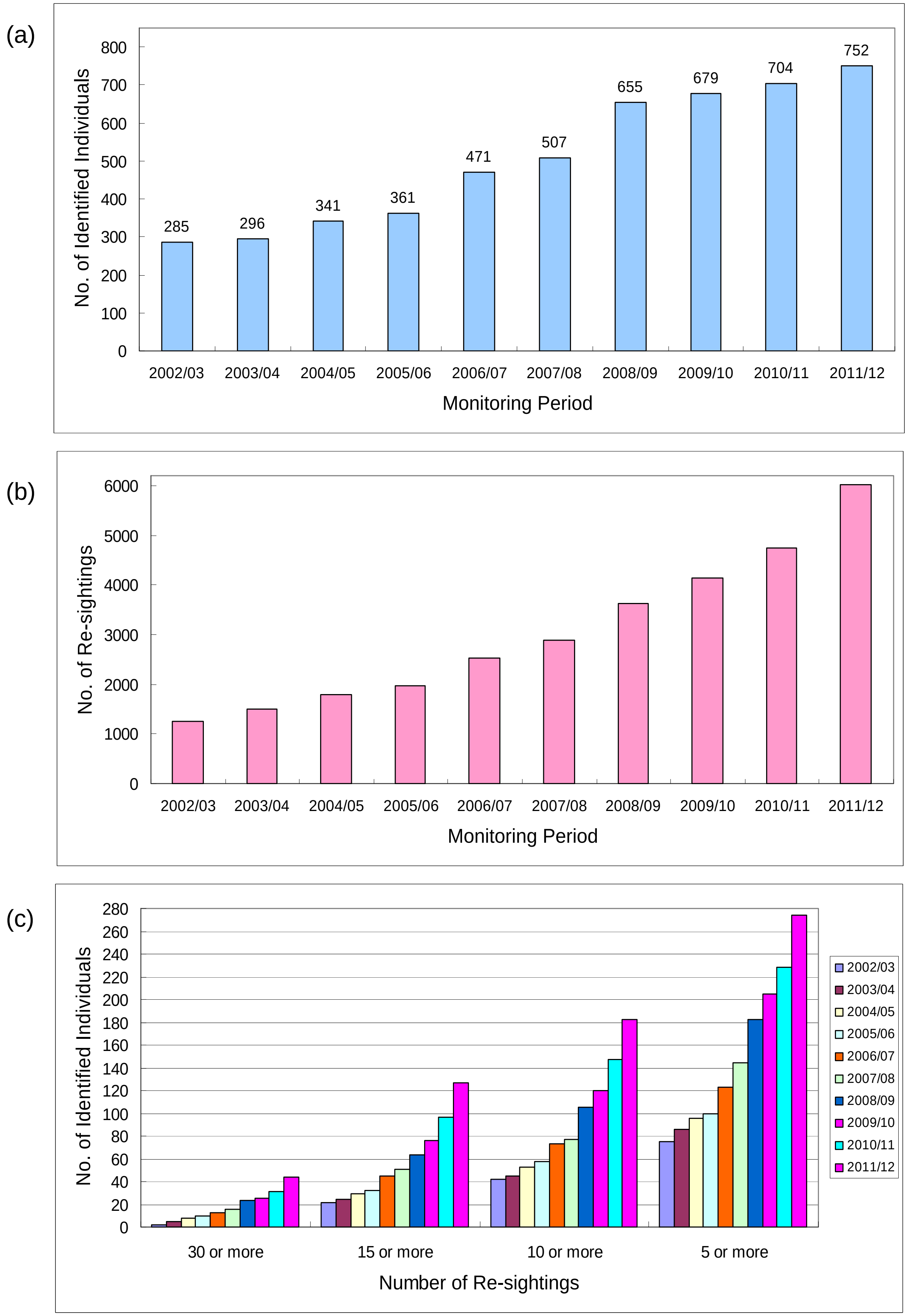


Figure 40. Temporal trends of (a) total number of identified individuals; (b) total number of re-sightings made; and (c) number of identified individuals within several categories of number of re-sightings in the past nine monitoring periods since 2002

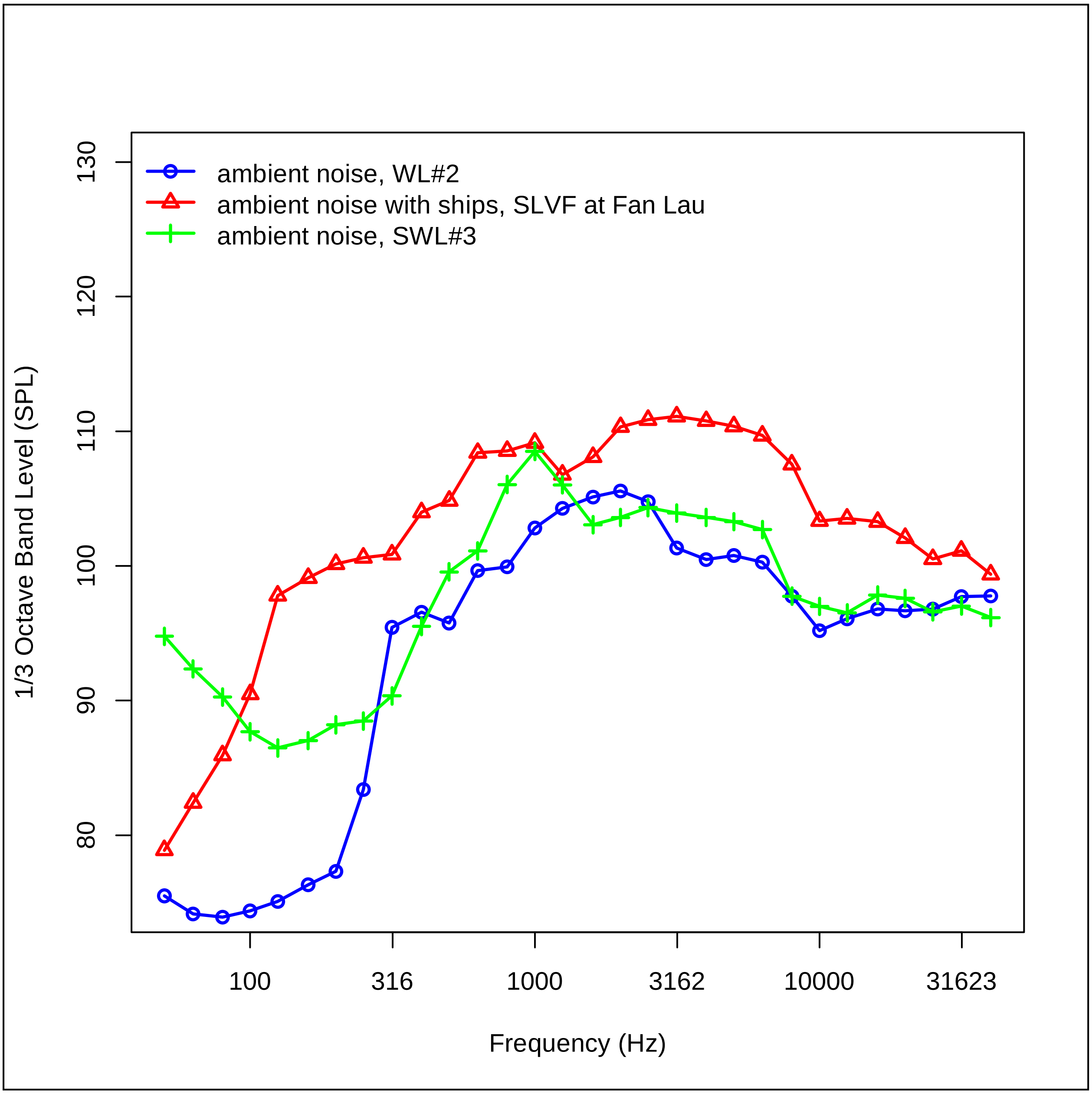


Figure 41. Ambient noise levels of three areas varying in general ship traffic and types of ships present. West Lantau Station #2 (WL#2) is a relatively pristine site with little anthropogenic disturbance, recorded during a Beaufort sea state of 4. South Lantau Vessel Fairway (SLVF) at Fan Lau is a busy traffic area, especially for ferries. SLVF at Fan Lau was recorded with several ferries and a shrimp trawler present during a Beaufort sea state of 0. Southwest Lantau Station #3 (SWL#3) is a busy shipping lane; however, this recording took place when no ships were present, Beaufort sea state of 2.

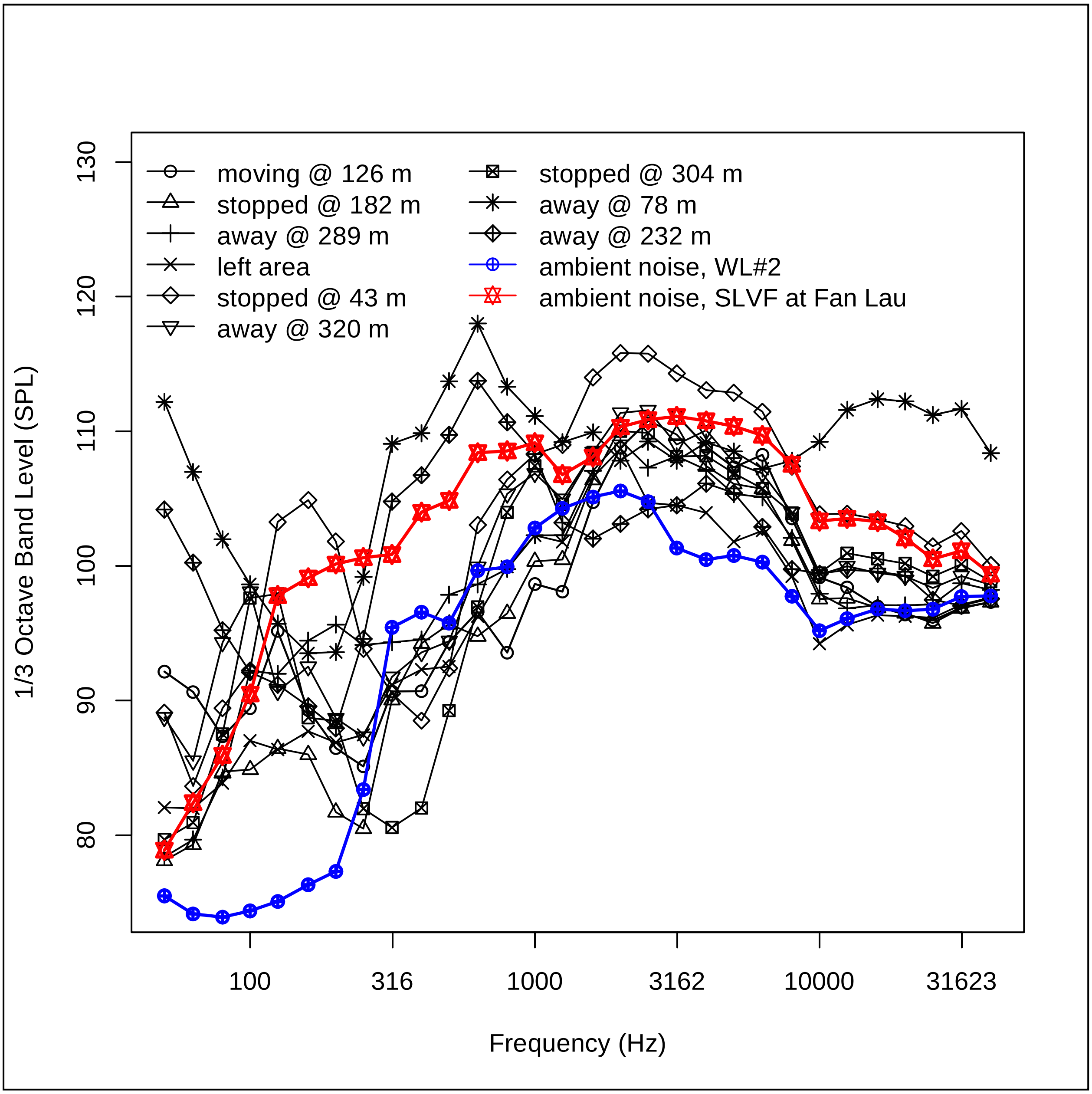


Figure 42. 1/3 octave band sound pressure levels for the Wala Wala (a type of small speed boats used for dolphin-watching activities) in West Lantau, Beaufort sea state of 1. The blue line indicates the ambient noise level of West Lantau Station#2, a relatively pristine area with natural coastline and rare boat traffic. No boats were present during the ambient noise recording. The red indicates South Lantau Vessel Fairway (SLVF) at Fan Lau, a busy traffic area, especially for ferries. SLVF at Fan Lau was recorded with several ferries and a shrimp trawler present during a Beaufort sea state of 0.

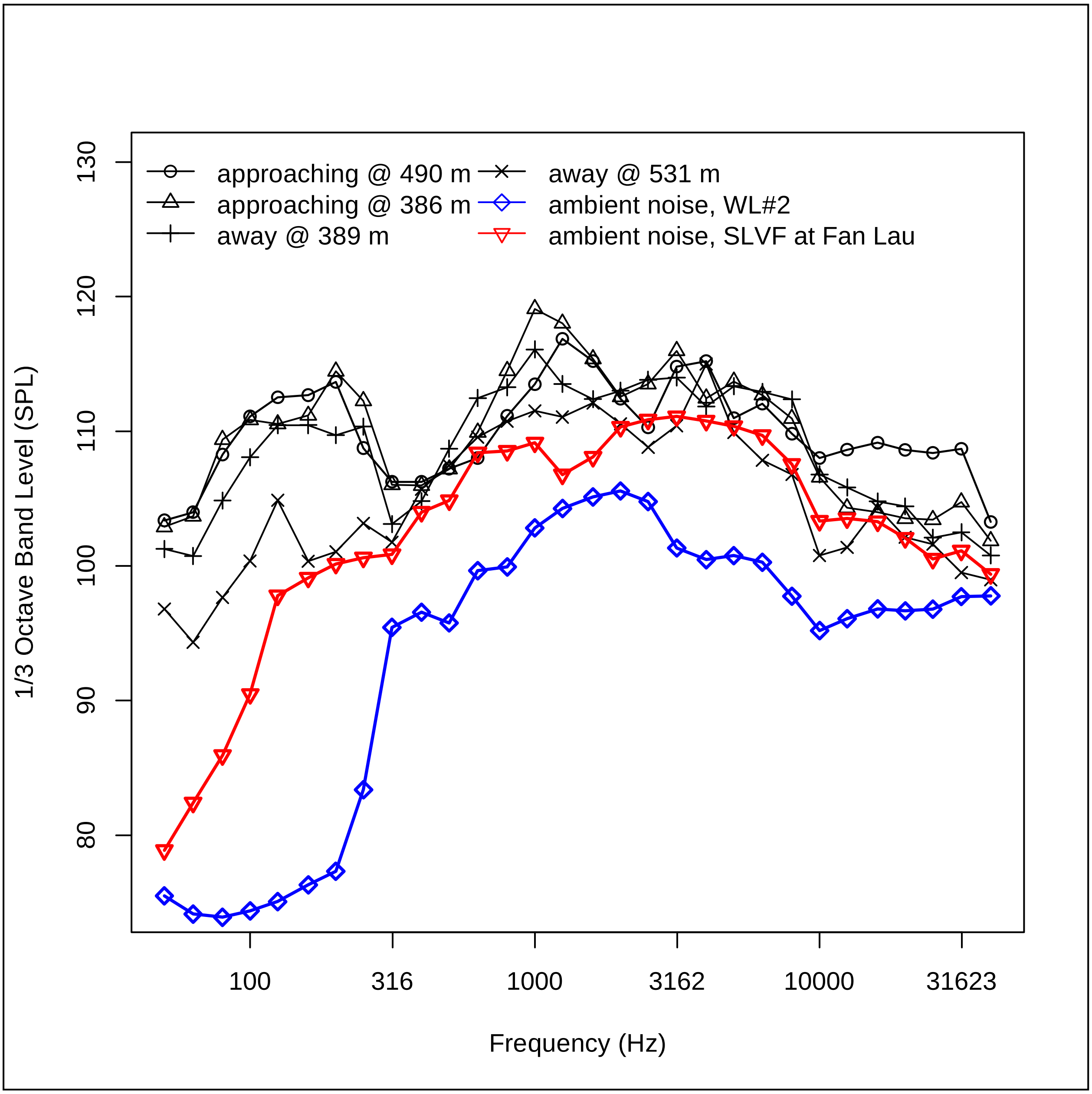


Figure 43. The distribution of sound pressure levels for the Jetfoil Hi-Speed Ferry at varying distances, with a Beaufort sea state of 4 at West Lantau Station #3. The ambient noise level (represented in blue) was taken from West Lantau Station #2 (WL#2), a relatively pristine site with little anthropogenic disturbance, recorded during a Beaufort sea state of 4. The red indicates South Lantau Vessel Fairway (SLVF) at Fan Lau, a busy traffic area, especially for ferries. SLVF at Fan Lau was recorded with several ferries and a shrimp trawler present during a Beaufort sea state of 0.

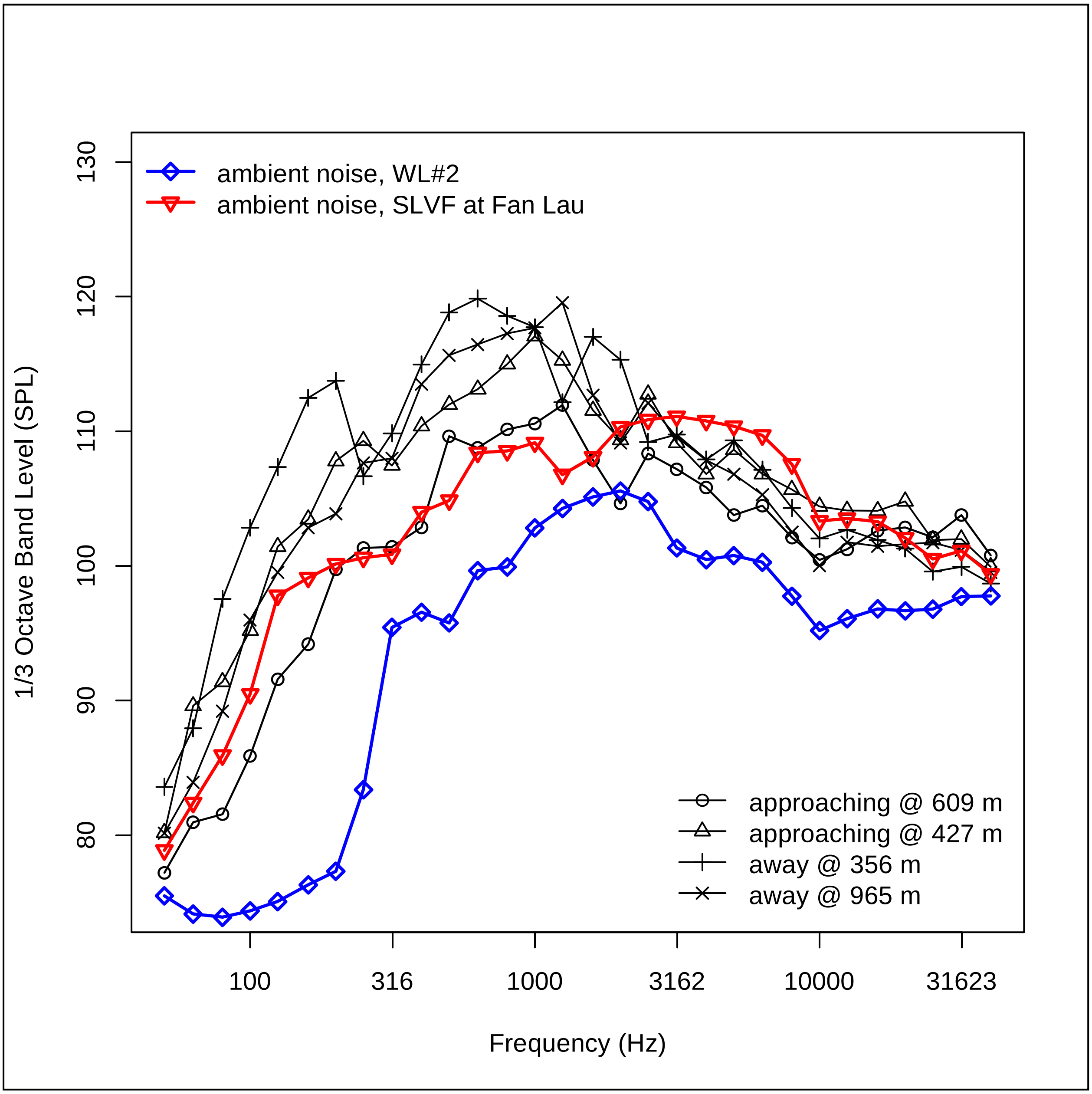


Figure 44. The various sound pressure level contributions of a Hi-Speed Ferry, at West Lantau Station#3 (WL#3) with a Beaufort sea state of 2. The ambient noise level (represented in blue) was taken from West Lantau Station #2 (WL#2), a relatively pristine site with little anthropogenic disturbance, recorded during a Beaufort sea state of 4. The red indicates South Lantau Vessel Fairway (SLVF) at Fan Lau, a busy traffic area, especially for ferries. SLVF at Fan Lau was recorded with several ferries and a shrimp trawler present during a Beaufort sea state of 0.

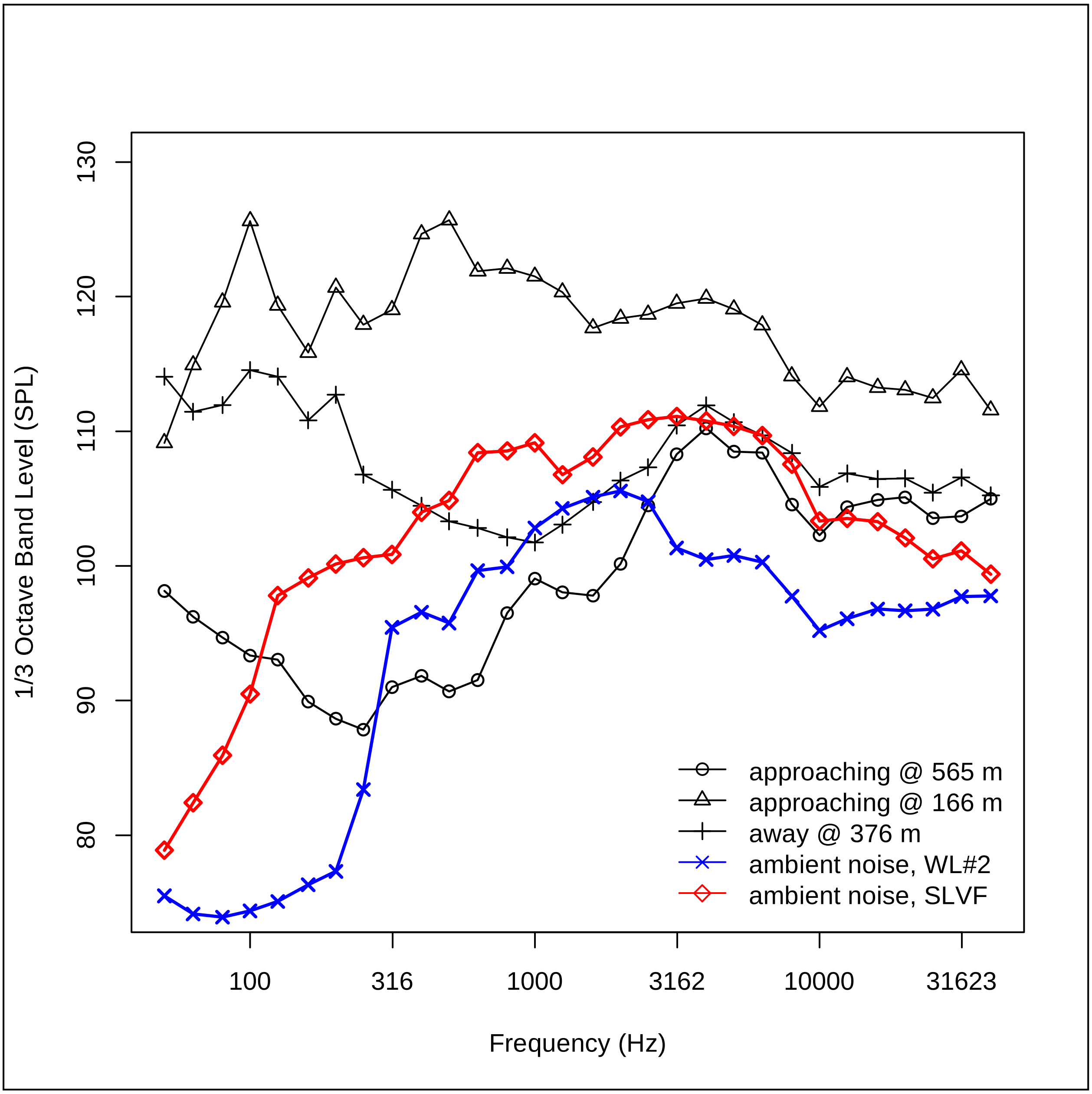


Figure 45. The various sound pressure level contributions of a Hi-Speed Ferry, at Northwest Lantau Station #5 with a Beaufort sea state of 4. The ambient noise level (represented in blue) was taken from West Lantau Station #2 (WL#2), a relatively pristine site with little anthropogenic disturbance, recorded during a Beaufort sea state of 4. The red indicates South Lantau Vessel Fairway (SLVF) at Fan Lau, a busy traffic area, especially for ferries. SLVF at Fan Lau was recorded with several ferries and a shrimp trawler present during a Beaufort sea state of 0.

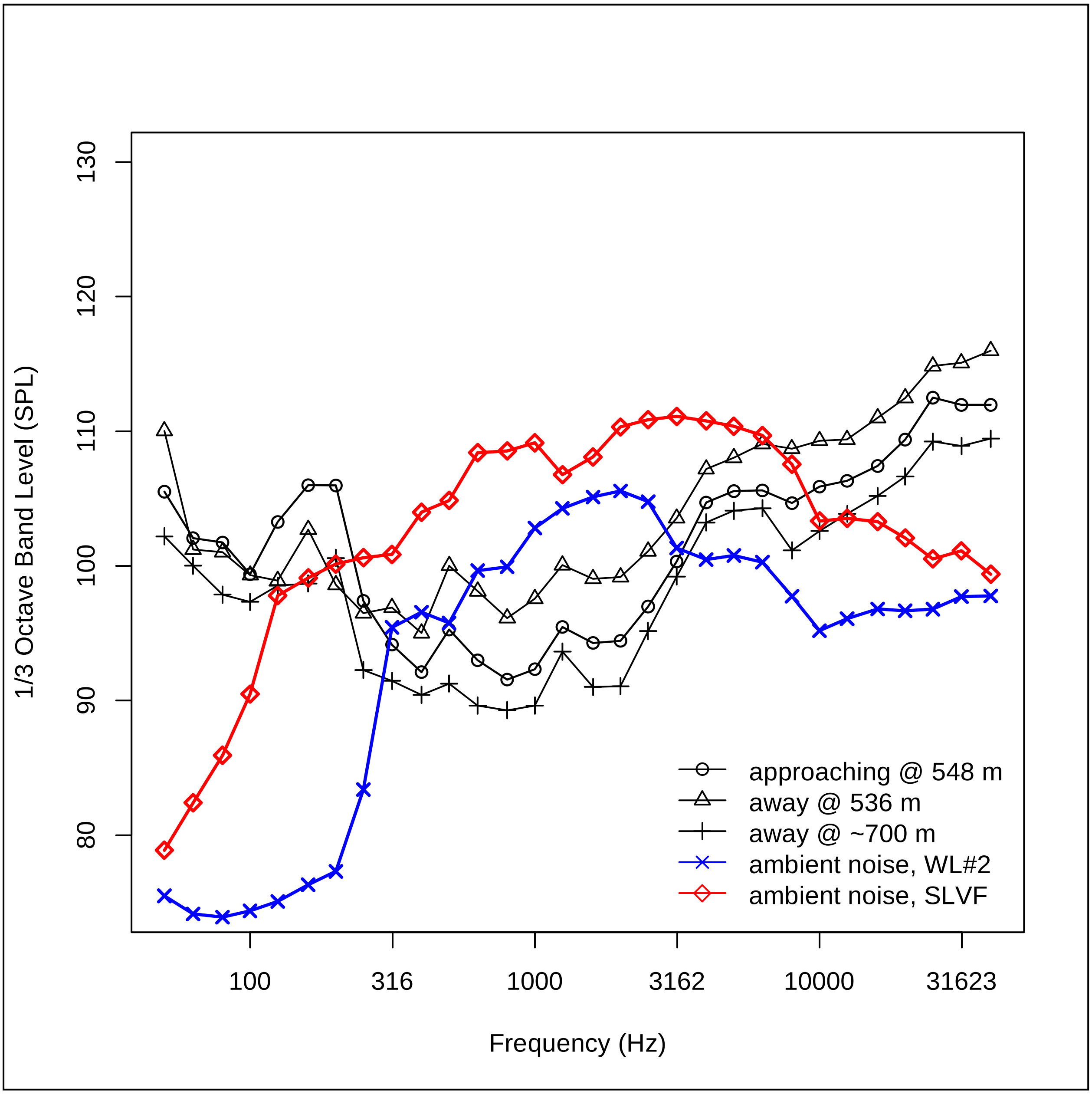


Figure 46. The various sound pressure level contributions of a Hi-Speed Ferry, at Northeast Lantau Station #1 with a Beaufort sea state of 4. The ambient noise level (represented in blue) was taken from West Lantau Station #2 (WL#2), a relatively pristine site with little anthropogenic disturbance, recorded during a Beaufort sea state of 4. The red indicates South Lantau Vessel Fairway (SLVF) at Fan Lau, a busy traffic area, especially for ferries. SLVF at Fan Lau was recorded with several ferries and a shrimp trawler present during a Beaufort sea state of 0.

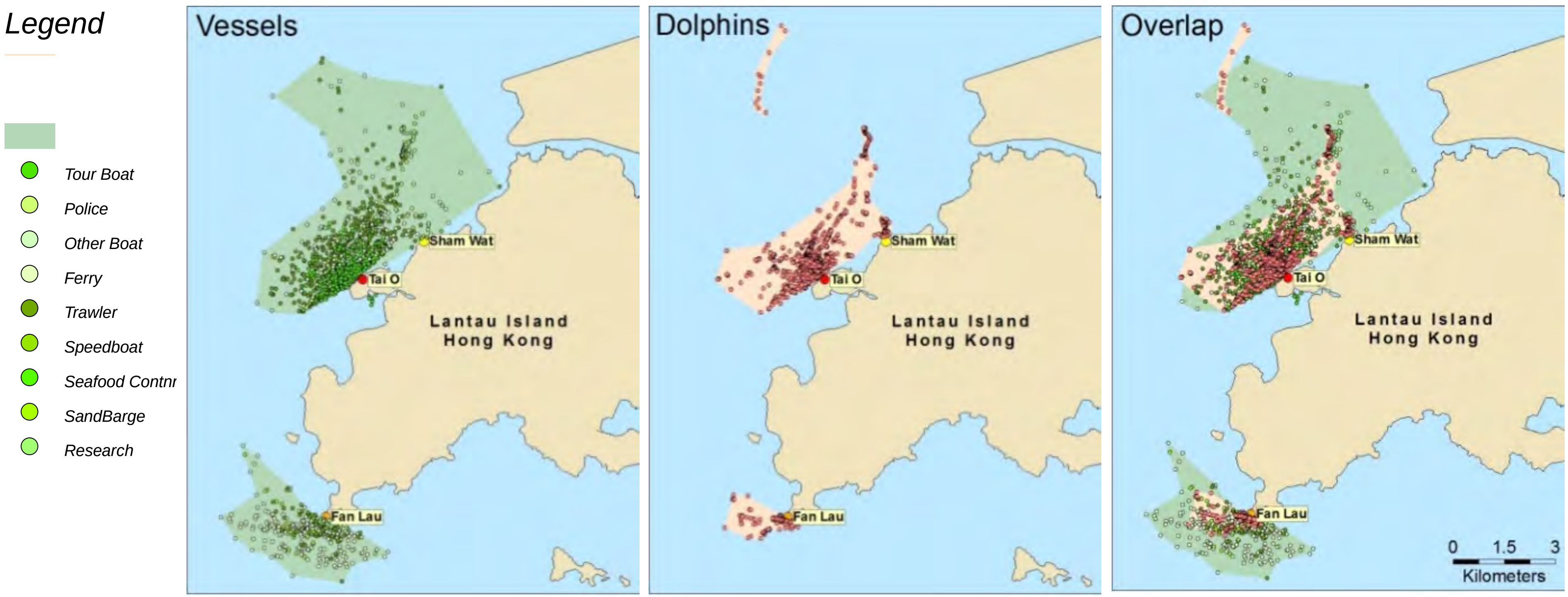


Figure 47. Geographic coordinates of vessels and dolphins taken from shore-based stations on Lantau Island, Hong Kong.

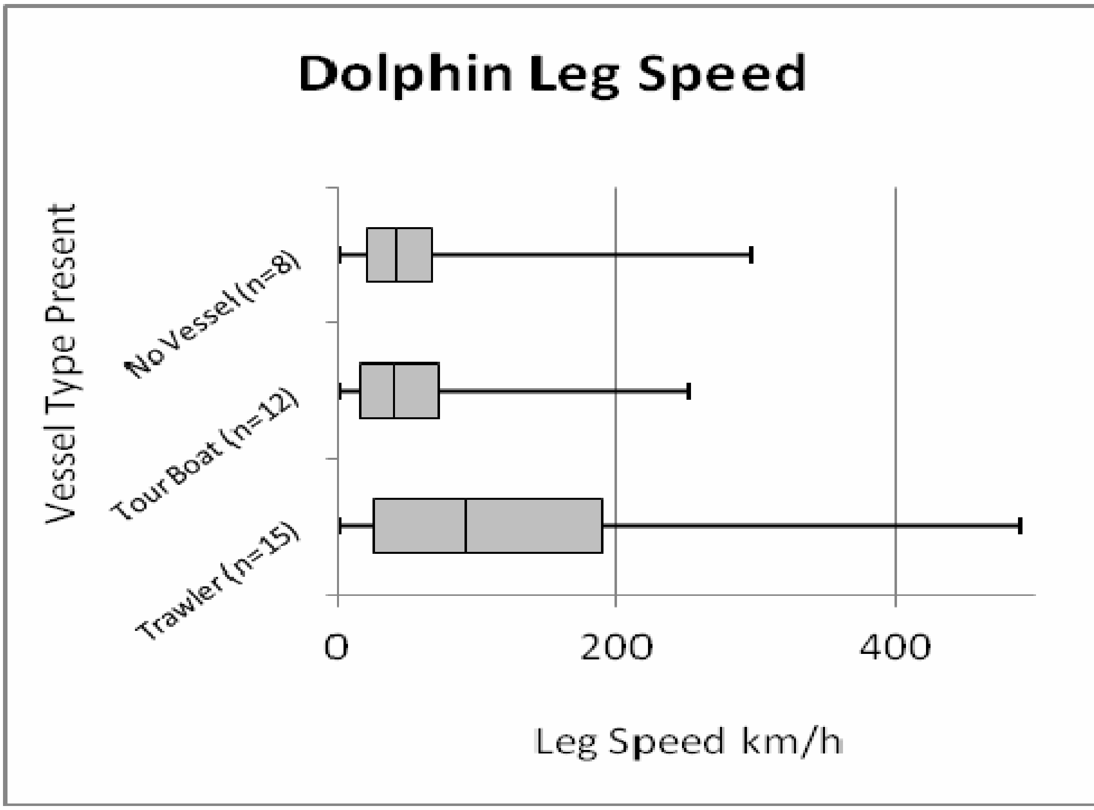


Figure 48a. Dolphin leg speed in the presence of different vessel types

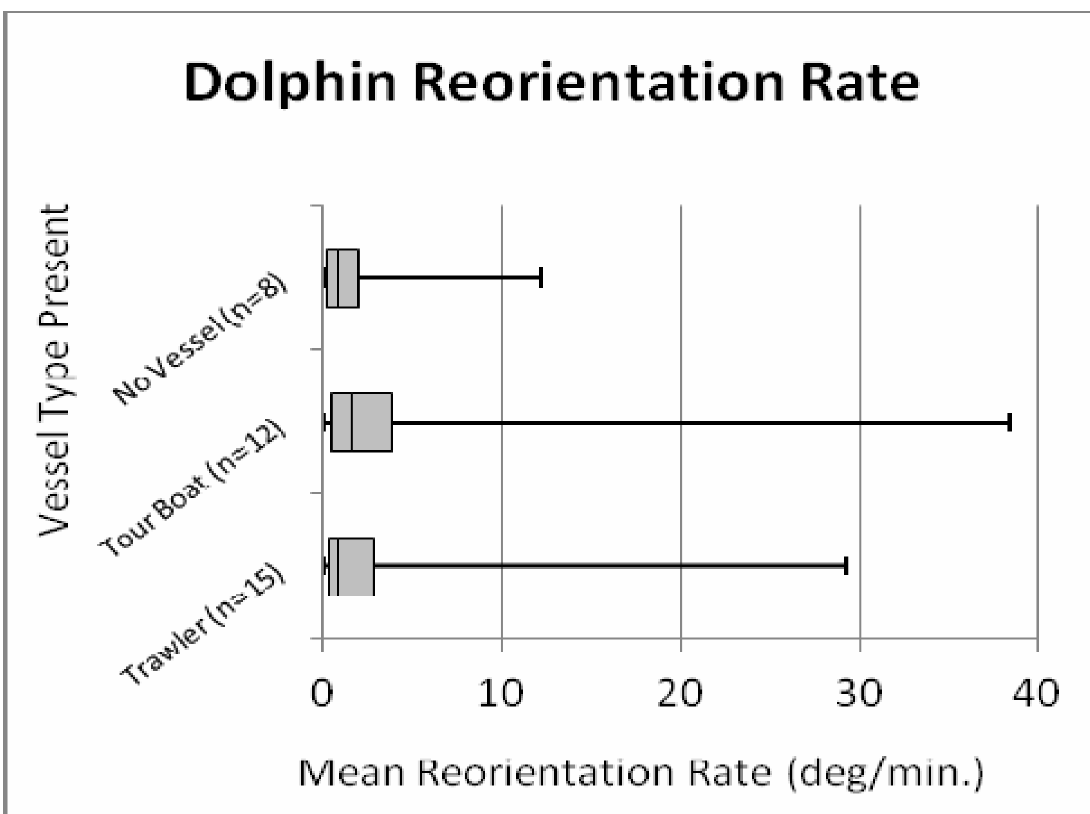


Figure 48b. Dolphin reorientation rate in the presence of different vessel types

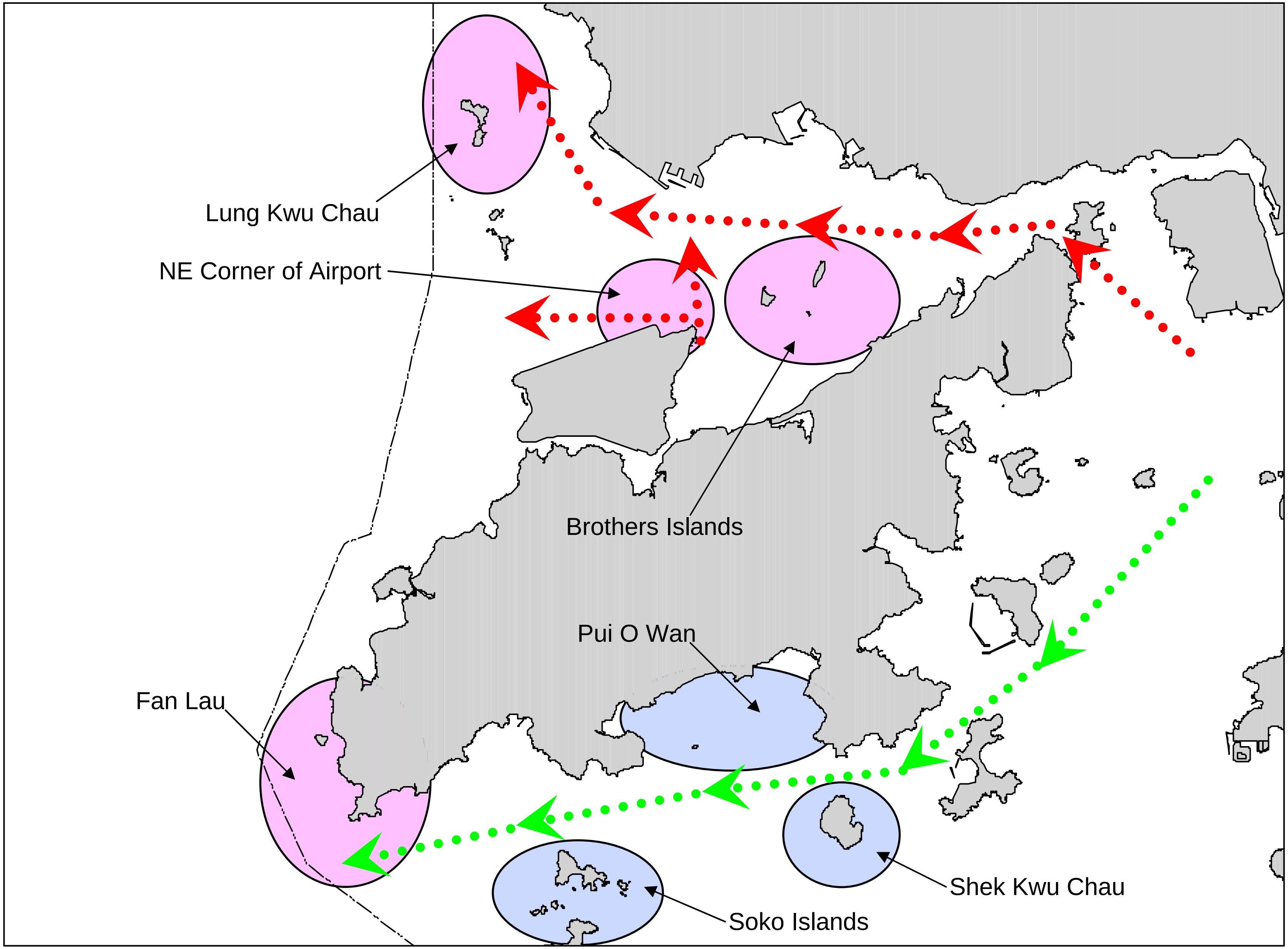


Figure 49. Existing vessel fairways (red arrows: NLVF; green arrows: SLVF) around Lantau Island, overlapping with areas of importance to Chinese white dolphins (purple patches) and finless porpoises (blue patches)

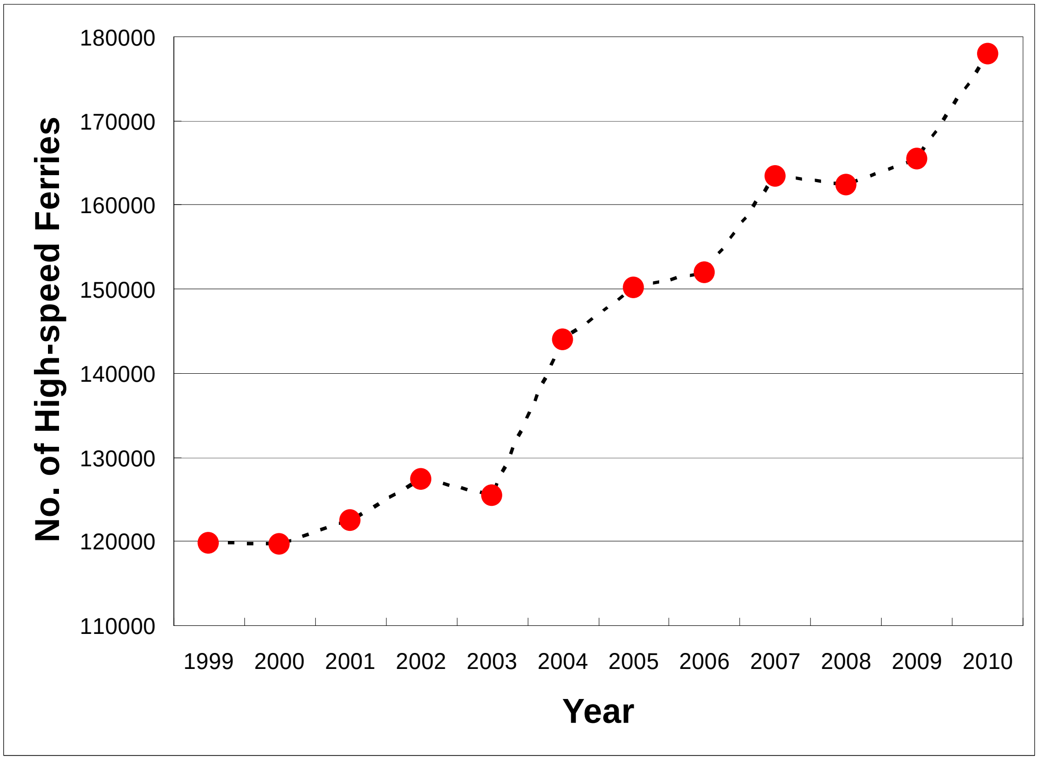


Figure 50a. Annual number of high-speed ferries departing from and arriving at Hong Kong ports during 1999-2010

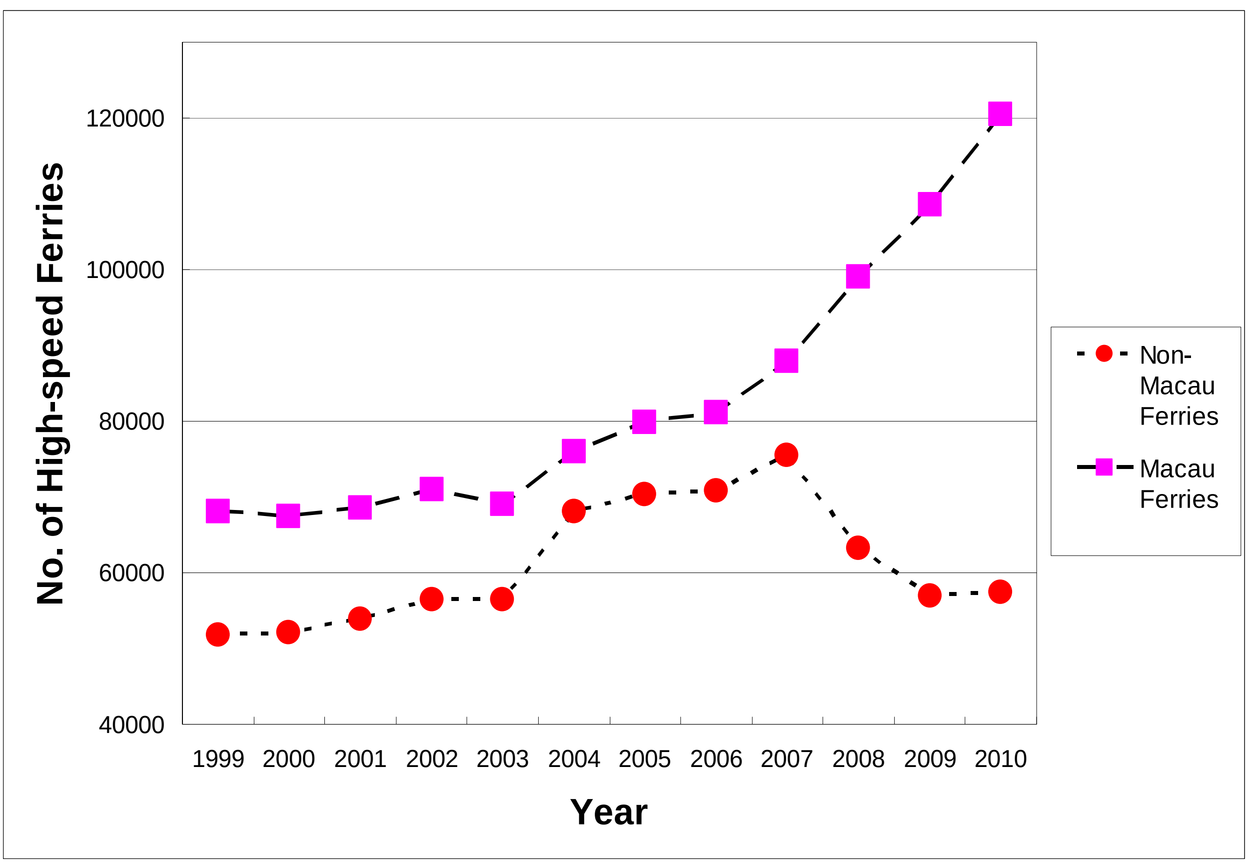


Figure 50b. Annual number of high-speed ferries from Hong Kong to Macau and Non-Macau ports (i.e. Mainland cities) during 1999-2010

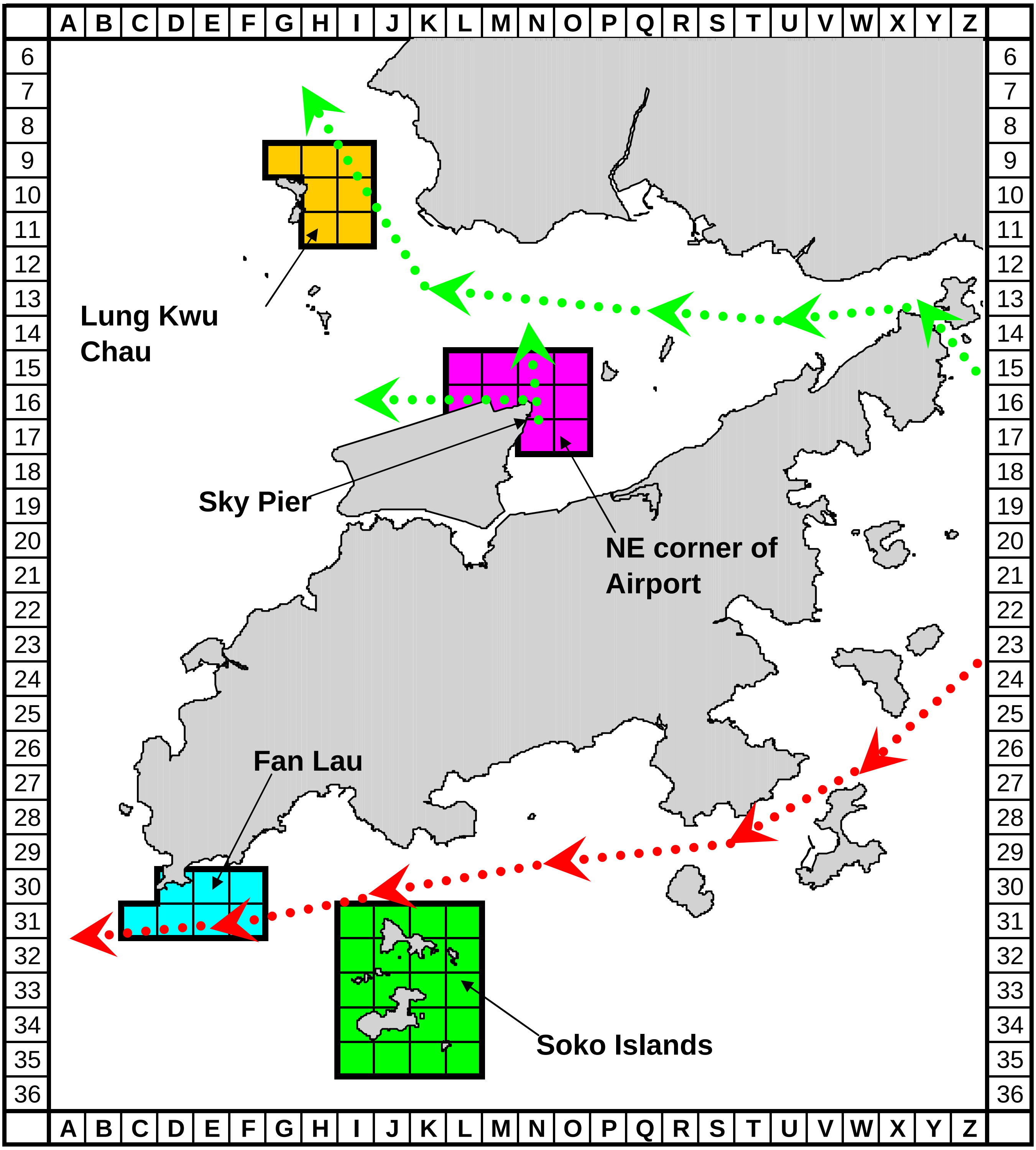


Figure 51. Four specific areas of interests overlapped with NLVF and SLVF that were examined for temporal trends in dolphin usage (green dotted lines: NLVF; red dotted lines: SLVF)

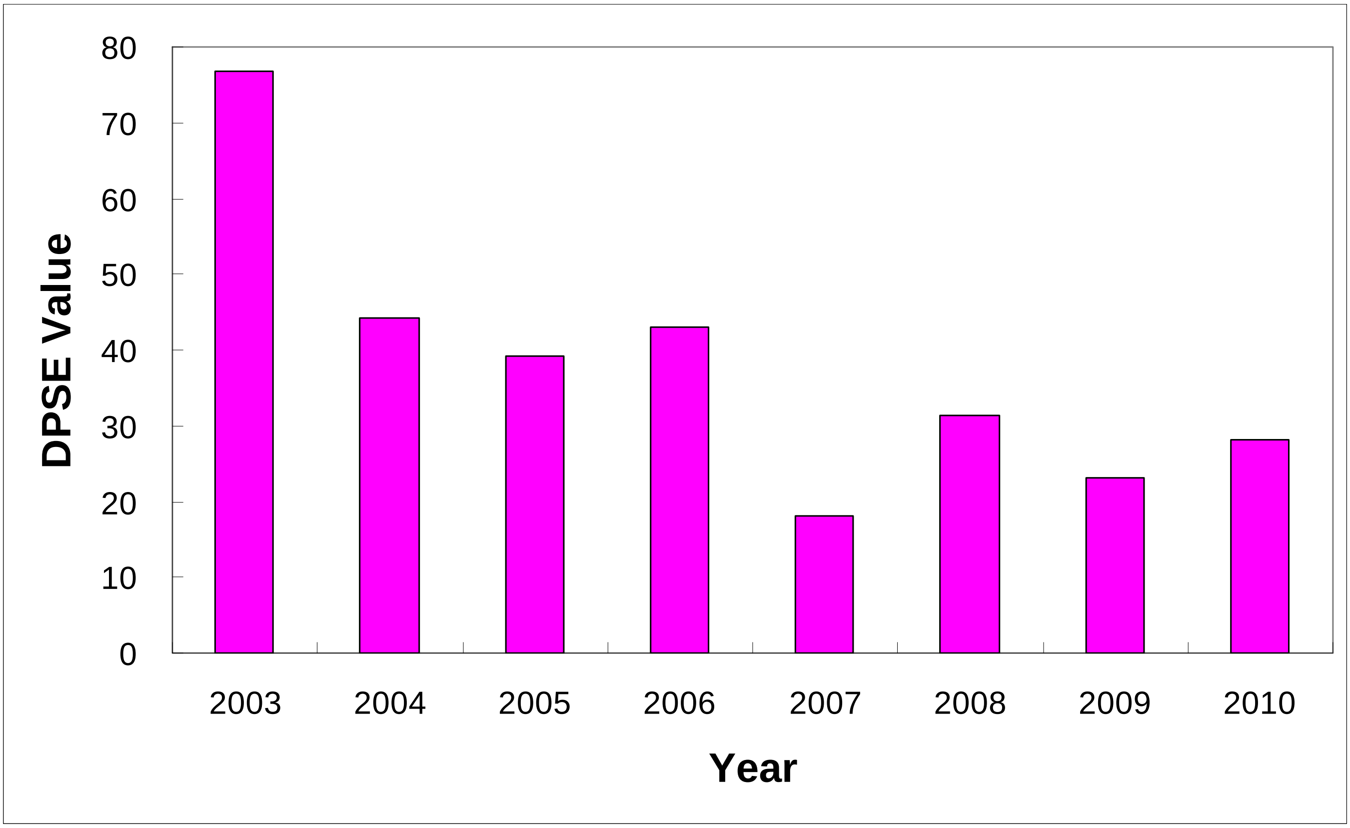


Figure 52. Temporal trend in dolphin densities (DPSE values: number of dolphins per 100 unit of survey effort) at the seven grids around Fan Lau just north of SLVF during 2003-10

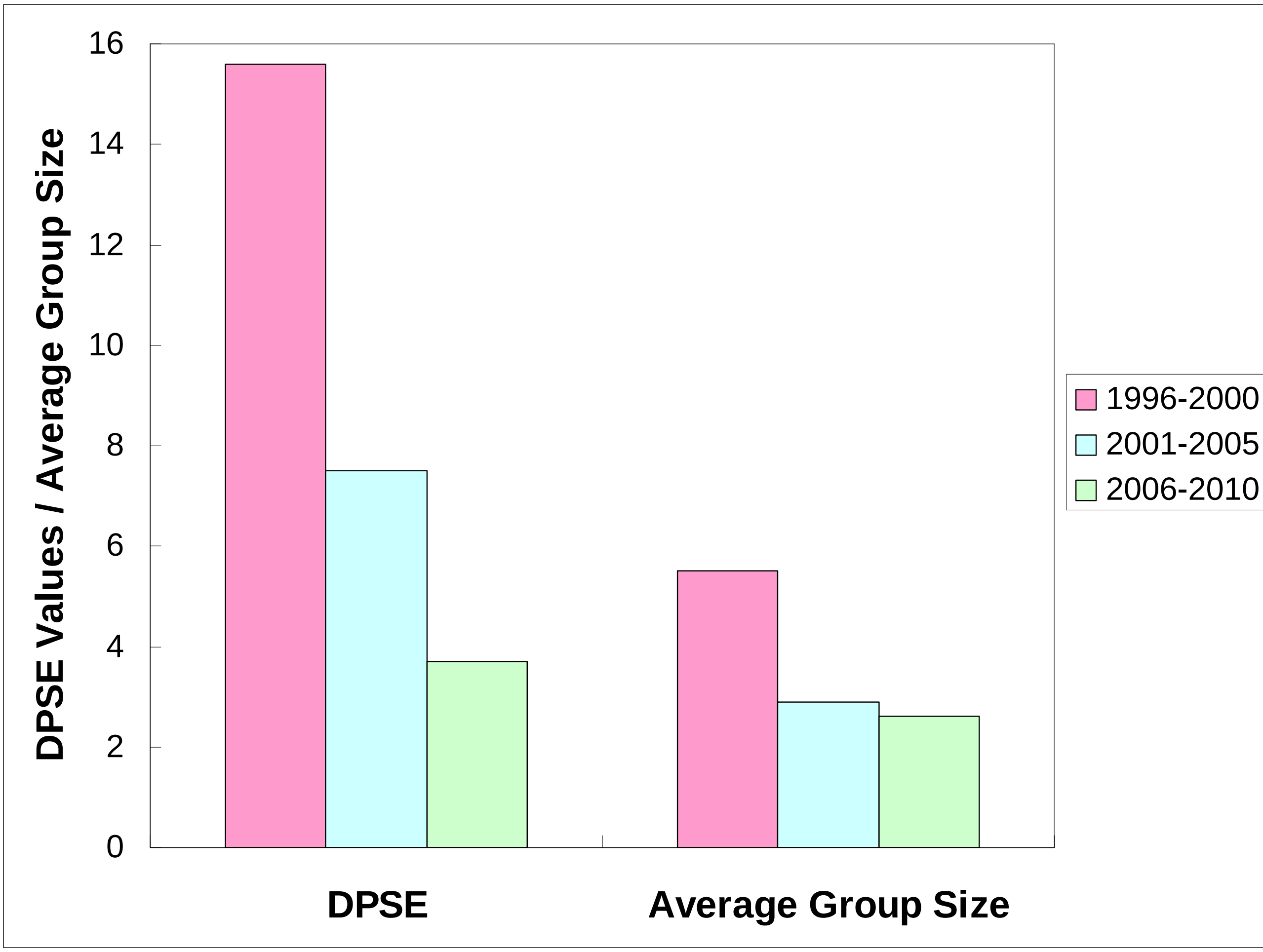


Figure 53. Temporal trend in dolphin densities (DPSE values: number of dolphins per 100 unit of survey effort) and average group size at the 20 grids around the Soko Islands just south of SLVF during three different periods of 1996-2000, 2001-05, and 2006-10

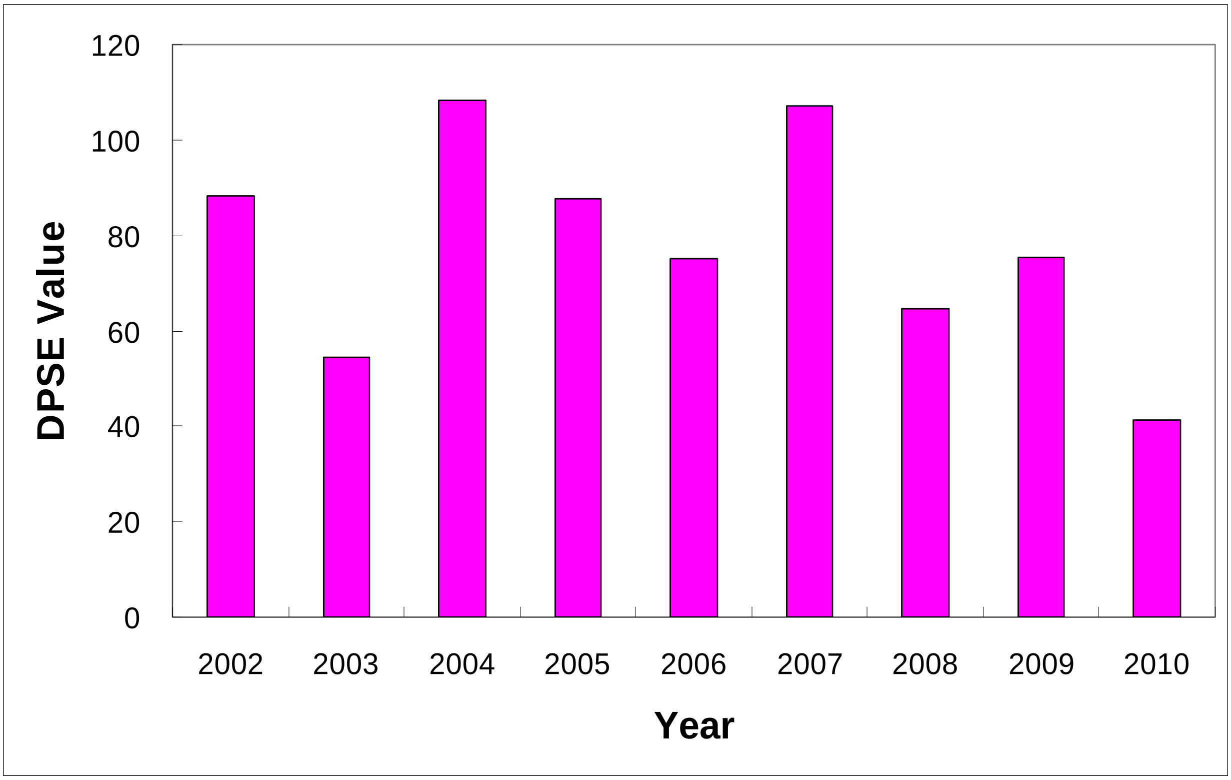


Figure 54a. Temporal trend in dolphin densities (DPSE values: number of dolphins per 100 unit of survey effort) at the seven grids at the eastern side of Lung Kwu Chau adjacent to NLVF during 2002-10

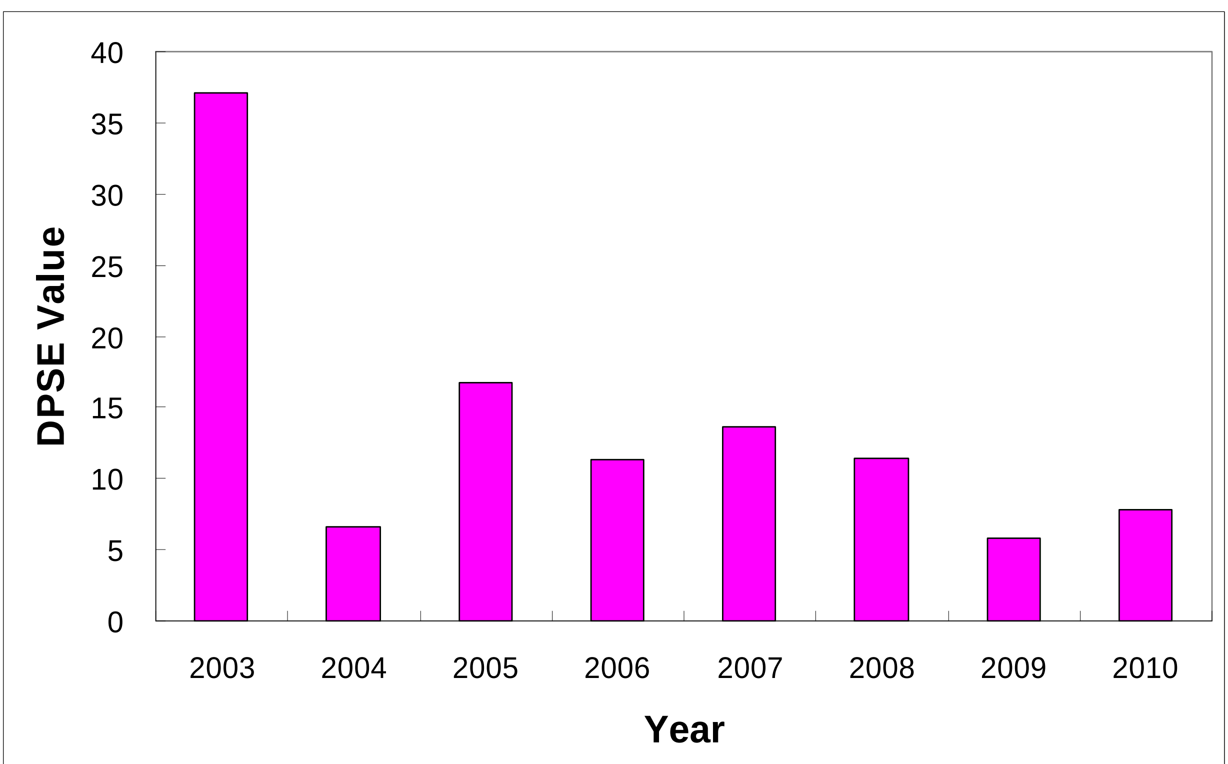


Figure 54b. Temporal trend in dolphin densities (DPSE values: number of dolphins per 100 unit of survey effort) at the 10 grids at the northeast corner of the airport near the Sky Pier during 2003-10

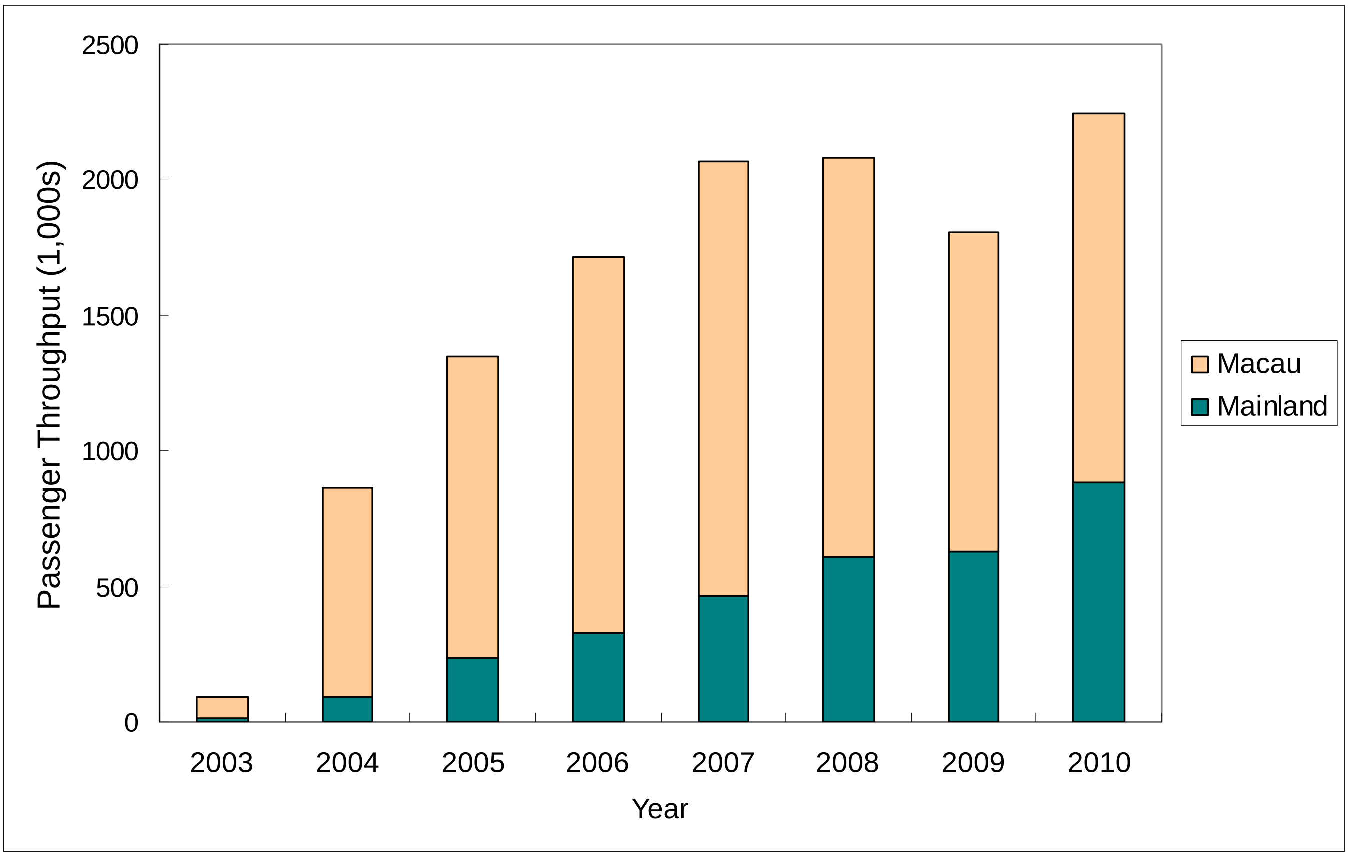


Figure 55. Annual number of passenger throughput to Mainland and Macau ports from the Sky Pier during 2003-10

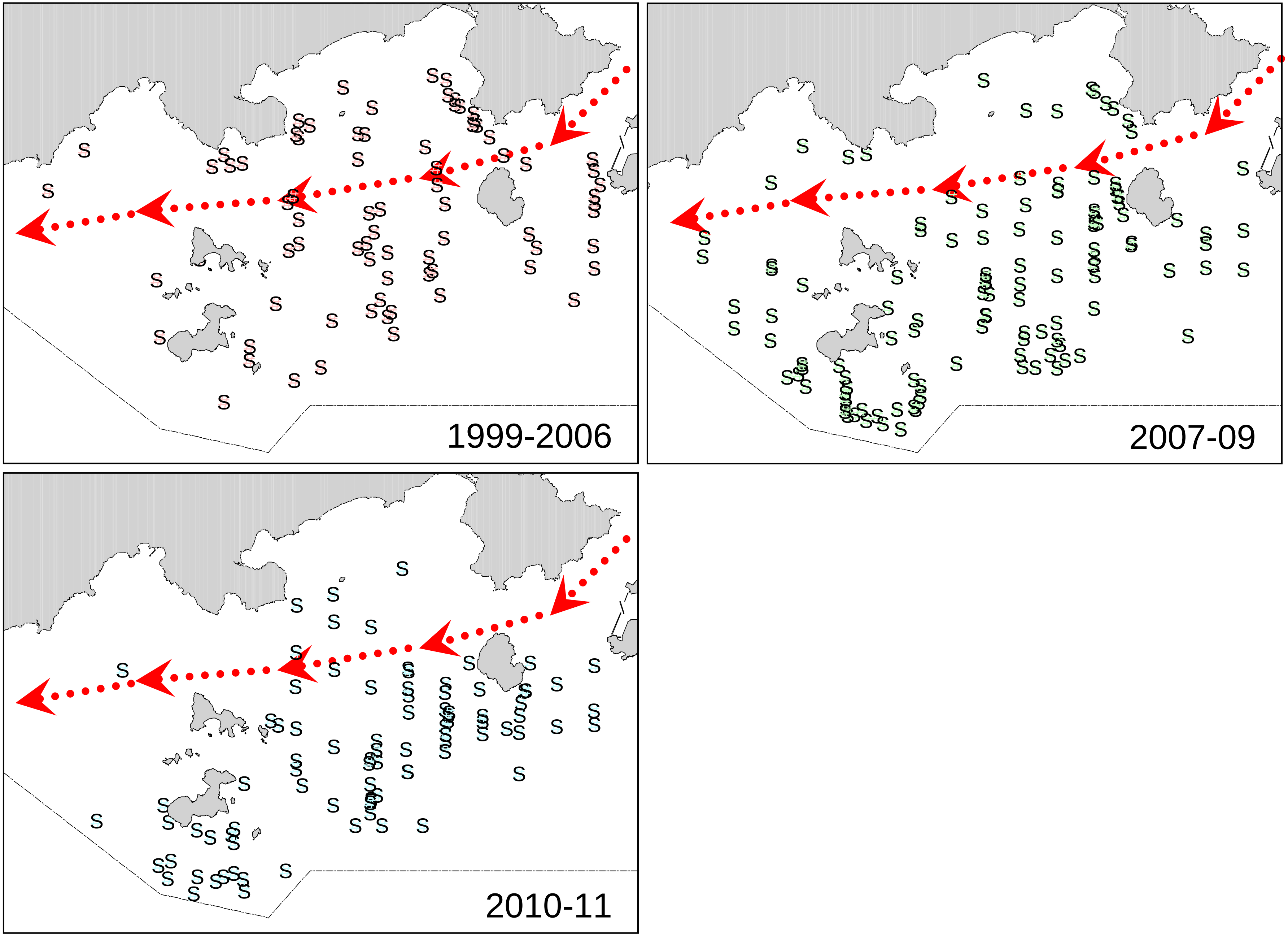


Figure 56. Temporal changes in distribution of finless porpoises in South Lantau waters from 1999-2011, in relation to the vessel traffic in SLVF (red dotted line)

Appendix I. Survey Effort Database (April 2011 - March 2012)

(Note: P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
3-Apr-11	W LANTAU	1	1.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
3-Apr-11	W LANTAU	2	2.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
3-Apr-11	W LANTAU	3	6.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
3-Apr-11	SE LANTAU	1	11.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
3-Apr-11	SE LANTAU	2	7.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
3-Apr-11	SE LANTAU	1	4.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
3-Apr-11	SW LANTAU	1	3.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
3-Apr-11	SW LANTAU	2	7.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
3-Apr-11	SW LANTAU	0	1.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
3-Apr-11	SW LANTAU	1	5.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
3-Apr-11	SW LANTAU	2	5.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-Apr-11	NW LANTAU	2	4.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Apr-11	NW LANTAU	3	17.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Apr-11	NW LANTAU	4	3.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Apr-11	NW LANTAU	2	1.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-Apr-11	NW LANTAU	3	4.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-Apr-11	NW LANTAU	4	5.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-Apr-11	NE LANTAU	0	2.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Apr-11	NE LANTAU	1	1.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Apr-11	NE LANTAU	2	3.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Apr-11	NE LANTAU	2	3.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-Apr-11	W LANTAU	3	1.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-Apr-11	W LANTAU	2	3.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-Apr-11	W LANTAU	3	6.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-Apr-11	SW LANTAU	1	2.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-Apr-11	SW LANTAU	2	13.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-Apr-11	SW LANTAU	3	4.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-Apr-11	SW LANTAU	2	10.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-Apr-11	SW LANTAU	3	3.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-Apr-11	SE LANTAU	1	5.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-Apr-11	SE LANTAU	2	7.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-Apr-11	SE LANTAU	3	1.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-Apr-11	SE LANTAU	4	1.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
18-Apr-11	SE LANTAU	1	5.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
18-Apr-11	SE LANTAU	2	2.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
27-Apr-11	W LANTAU	2	11.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
27-Apr-11	W LANTAU	3	8.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
27-Apr-11	W LANTAU	2	12.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
27-Apr-11	W LANTAU	3	4.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
27-Apr-11	NW LANTAU	2	13.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
27-Apr-11	DEEP BAY	2	1.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
27-Apr-11	DEEP BAY	3	6.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
27-Apr-11	DEEP BAY	2	2.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
27-Apr-11	DEEP BAY	3	5.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-11	W LANTAU	1	3.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-11	W LANTAU	2	8.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-11	W LANTAU	3	5.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-11	W LANTAU	4	0.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-11	W LANTAU	2	14.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-11	W LANTAU	3	6.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-11	W LANTAU	4	2.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
5-May-11	NW LANTAU	1	1.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-11	NW LANTAU	2	12.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-11	NW LANTAU	3	3.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
5-May-11	NW LANTAU	2	1.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
5-May-11	NW LANTAU	3	3.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
6-May-11	NW LANTAU	1	3.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
6-May-11	NW LANTAU	2	12.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
6-May-11	NW LANTAU	1	0.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
6-May-11	NW LANTAU	2	4.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
6-May-11	NE LANTAU	2	6.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
6-May-11	NE LANTAU	3	11.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
6-May-11	NE LANTAU	4	12.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
6-May-11	NE LANTAU	2	1.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
6-May-11	NE LANTAU	3	7.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
6-May-11	NE LANTAU	4	0.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
14-May-11	NW LANTAU	2	1.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
14-May-11	NW LANTAU	3	4.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
14-May-11	NW LANTAU	4	20.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
14-May-11	NW LANTAU	5	1.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
14-May-11	NW LANTAU	3	0.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
14-May-11	NW LANTAU	4	3.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
14-May-11	W LANTAU	2	5.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
14-May-11	W LANTAU	3	2.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
14-May-11	W LANTAU	4	1.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
26-May-11	W LANTAU	2	3.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-11	W LANTAU	3	7.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
26-May-11	W LANTAU	2	1.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
26-May-11	W LANTAU	3	8.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Jun-11	SE LANTAU	2	7.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Jun-11	SE LANTAU	3	19.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Jun-11	SE LANTAU	4	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Jun-11	SE LANTAU	2	3.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Jun-11	SE LANTAU	3	6.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Jun-11	SE LANTAU	4	0.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Jun-11	SW LANTAU	2	10.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Jun-11	SW LANTAU	3	10.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
1-Jun-11	SW LANTAU	2	4.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
2-Jun-11	LAMMA	2	69.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
2-Jun-11	LAMMA	3	2.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
2-Jun-11	LAMMA	2	13.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jun-11	NW LANTAU	1	1.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jun-11	NW LANTAU	2	5.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jun-11	NW LANTAU	3	19.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jun-11	NW LANTAU	4	3.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jun-11	NW LANTAU	1	1.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jun-11	NW LANTAU	2	0.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jun-11	NW LANTAU	3	2.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jun-11	DEEP BAY	2	5.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jun-11	DEEP BAY	3	12.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jun-11	DEEP BAY	3	10.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jun-11	NE LANTAU	3	6.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jun-11	NE LANTAU	4	4.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jun-11	NE LANTAU	3	4.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jun-11	NE LANTAU	4	1.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Jun-11	SE LANTAU	1	2.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Jun-11	SE LANTAU	2	11.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Jun-11	SE LANTAU	3	7.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Jun-11	SE LANTAU	4	5.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Jun-11	SE LANTAU	2	5.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Jun-11	SE LANTAU	4	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Jun-11	SW LANTAU	2	15.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Jun-11	SW LANTAU	3	5.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
20-Jun-11	SW LANTAU	2	9.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Jun-11	SW LANTAU	3	2.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jun-11	W LANTAU	1	2.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jun-11	W LANTAU	2	4.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jun-11	W LANTAU	3	4.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jun-11	W LANTAU	2	9.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jun-11	W LANTAU	3	3.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jun-11	NW LANTAU	2	13.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jun-11	NW LANTAU	3	12.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jun-11	NW LANTAU	4	9.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jun-11	NW LANTAU	2	3.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jun-11	NW LANTAU	3	4.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jun-11	NW LANTAU	4	3.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jun-11	NW LANTAU	2	16.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jun-11	NW LANTAU	3	3.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jun-11	NW LANTAU	2	0.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jun-11	NW LANTAU	3	2.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-11	W LANTAU	3	1.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-11	W LANTAU	4	5.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-11	W LANTAU	5	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-11	W LANTAU	3	1.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-11	W LANTAU	4	3.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-11	W LANTAU	5	2.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-11	NW LANTAU	3	3.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-11	NW LANTAU	4	4.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-11	NW LANTAU	4	1.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Jun-11	DEEP BAY	4	2.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Jun-11	DEEP BAY	4	1.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
5-Jul-11	W LANTAU	2	5.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
5-Jul-11	W LANTAU	3	4.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
5-Jul-11	SW LANTAU	2	12.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
5-Jul-11	SW LANTAU	3	8.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
5-Jul-11	SW LANTAU	2	10.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
5-Jul-11	SW LANTAU	3	1.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
5-Jul-11	SE LANTAU	2	5.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
5-Jul-11	SE LANTAU	3	9.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
5-Jul-11	SE LANTAU	4	0.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
5-Jul-11	SE LANTAU	2	1.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
5-Jul-11	SE LANTAU	3	2.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
5-Jul-11	SE LANTAU	4	1.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-11	NE LANTAU	0	0.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	NE LANTAU	1	1.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	NE LANTAU	2	16.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	NE LANTAU	3	1.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	NE LANTAU	0	0.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-11	NE LANTAU	1	5.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-11	NE LANTAU	2	3.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-11	NW LANTAU	0	1.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	NW LANTAU	1	1.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	NW LANTAU	2	4.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	NW LANTAU	1	4.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-11	NW LANTAU	2	1.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-11	DEEP BAY	1	2.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	DEEP BAY	2	7.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
12-Jul-11	DEEP BAY	1	0.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
12-Jul-11	DEEP BAY	2	3.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
25-Jul-11	PO TOI	2	40.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
25-Jul-11	PO TOI	3	32.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
25-Jul-11	PO TOI	2	11.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
25-Jul-11	PO TOI	3	7.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jul-11	SE LANTAU	2	12.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jul-11	SE LANTAU	3	10.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jul-11	SE LANTAU	2	4.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jul-11	SE LANTAU	3	3.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jul-11	SW LANTAU	2	3.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jul-11	SW LANTAU	3	19.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jul-11	SW LANTAU	4	0.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jul-11	SW LANTAU	2	4.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
27-Jul-11	SW LANTAU	3	6.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jul-11	SW LANTAU	4	2.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jul-11	W LANTAU	1	3.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jul-11	W LANTAU	2	3.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
27-Jul-11	W LANTAU	3	1.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jul-11	NW LANTAU	1	5.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jul-11	NW LANTAU	2	11.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jul-11	NW LANTAU	3	5.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jul-11	NW LANTAU	4	1.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jul-11	NW LANTAU	2	3.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jul-11	NW LANTAU	3	2.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jul-11	NE LANTAU	2	0.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jul-11	NE LANTAU	3	14.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jul-11	NE LANTAU	4	4.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
28-Jul-11	NE LANTAU	3	8.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
28-Jul-11	NE LANTAU	4	1.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
3-Aug-11	NINEPINS	1	8.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
3-Aug-11	NINEPINS	2	15.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
3-Aug-11	NINEPINS	3	42.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
3-Aug-11	NINEPINS	4	9.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
3-Aug-11	NINEPINS	1	1.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
3-Aug-11	NINEPINS	3	2.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
3-Aug-11	NINEPINS	4	1.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Aug-11	NINEPINS	1	11.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-11	NINEPINS	2	12.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-11	PO TOI	1	15.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-11	PO TOI	2	38.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-11	PO TOI	3	12.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
4-Aug-11	PO TOI	2	3.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
4-Aug-11	PO TOI	3	2.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Aug-11	SE LANTAU	2	5.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Aug-11	SE LANTAU	3	6.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Aug-11	SE LANTAU	2	4.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Aug-11	SE LANTAU	3	3.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Aug-11	SW LANTAU	1	0.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Aug-11	SW LANTAU	2	22.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Aug-11	SW LANTAU	3	11.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Aug-11	SW LANTAU	1	3.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Aug-11	SW LANTAU	2	11.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Aug-11	SW LANTAU	3	2.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Aug-11	W LANTAU	1	3.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Aug-11	W LANTAU	2	5.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Aug-11	W LANTAU	3	7.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Aug-11	W LANTAU	4	3.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Aug-11	SW LANTAU	2	5.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
17-Aug-11	SW LANTAU	3	30.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
17-Aug-11	SW LANTAU	4	3.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
17-Aug-11	SW LANTAU	2	7.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
17-Aug-11	SW LANTAU	3	11.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
17-Aug-11	SW LANTAU	4	3.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-11	NW LANTAU	1	1.0	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-11	NW LANTAU	2	15.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-11	NW LANTAU	3	13.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-11	NW LANTAU	1	1.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-11	NW LANTAU	2	2.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-11	NW LANTAU	3	4.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-11	NE LANTAU	2	11.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-11	NE LANTAU	3	13.3	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-11	NE LANTAU	4	6.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Aug-11	NE LANTAU	2	4.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Aug-11	NE LANTAU	3	3.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Aug-11	PO TOI	2	58.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Aug-11	PO TOI	3	22.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Aug-11	PO TOI	2	12.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Aug-11	PO TOI	3	2.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
26-Aug-11	NINEPINS	2	39.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
26-Aug-11	NINEPINS	3	31.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
26-Aug-11	NINEPINS	4	5.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
26-Aug-11	NINEPINS	2	8.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
26-Aug-11	NINEPINS	3	2.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Aug-11	PO TOI	2	7.9	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Aug-11	PO TOI	3	38.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Aug-11	PO TOI	4	19.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Aug-11	PO TOI	2	3.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Aug-11	PO TOI	3	6.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
30-Aug-11	NINEPINS	3	8.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
30-Aug-11	NINEPINS	4	1.1	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-11	NE LANTAU	2	12.7	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-11	NE LANTAU	3	16.2	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-11	NE LANTAU	4	1.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-11	NE LANTAU	2	2.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Aug-11	NE LANTAU	3	7.4	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Aug-11	NW LANTAU	2	24.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-11	NW LANTAU	3	0.5	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Aug-11	NW LANTAU	2	5.8	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Aug-11	NW LANTAU	3	0.6	SUMMER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-11	W LANTAU	2	10.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-11	W LANTAU	3	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-11	SW LANTAU	2	13.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-11	SW LANTAU	3	19.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-11	SW LANTAU	2	4.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-11	SW LANTAU	3	4.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-11	SE LANTAU	2	5.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-11	SE LANTAU	3	10.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
1-Sep-11	SE LANTAU	2	2.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
1-Sep-11	SE LANTAU	3	2.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
6-Sep-11	W LANTAU	1	1.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
6-Sep-11	W LANTAU	2	7.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
6-Sep-11	W LANTAU	3	13.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
6-Sep-11	SW LANTAU	0	1.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
6-Sep-11	SW LANTAU	1	12.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
6-Sep-11	SW LANTAU	2	15.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
6-Sep-11	SW LANTAU	1	5.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
6-Sep-11	SW LANTAU	2	7.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
6-Sep-11	SW LANTAU	3	3.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
14-Sep-11	NW LANTAU	2	8.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-11	NW LANTAU	3	8.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-11	NE LANTAU	2	4.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-11	NE LANTAU	3	18.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Sep-11	NE LANTAU	4	2.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
14-Sep-11	NE LANTAU	2	1.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
14-Sep-11	NE LANTAU	3	8.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
15-Sep-11	W LANTAU	2	5.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
15-Sep-11	W LANTAU	3	13.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
15-Sep-11	W LANTAU	4	1.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
15-Sep-11	W LANTAU	2	6.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
15-Sep-11	W LANTAU	3	8.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
15-Sep-11	W LANTAU	4	3.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
15-Sep-11	NW LANTAU	2	3.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
15-Sep-11	NW LANTAU	3	20.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
15-Sep-11	NW LANTAU	4	2.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
15-Sep-11	NW LANTAU	3	9.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
15-Sep-11	NW LANTAU	4	1.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Sep-11	SE LANTAU	2	7.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Sep-11	SE LANTAU	3	17.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Sep-11	SE LANTAU	2	2.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Sep-11	SE LANTAU	3	6.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Sep-11	SW LANTAU	2	7.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Sep-11	SW LANTAU	3	18.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Sep-11	SW LANTAU	2	2.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Sep-11	SW LANTAU	3	5.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Sep-11	W LANTAU	2	8.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Sep-11	W LANTAU	3	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
7-Oct-11	W LANTAU	2	10.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Oct-11	W LANTAU	3	7.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Oct-11	W LANTAU	2	15.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
7-Oct-11	W LANTAU	3	4.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
7-Oct-11	NW LANTAU	1	3.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Oct-11	NW LANTAU	2	11.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Oct-11	NW LANTAU	3	9.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
7-Oct-11	NW LANTAU	2	2.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
7-Oct-11	NW LANTAU	3	3.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
13-Oct-11	NW LANTAU	2	1.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
13-Oct-11	NW LANTAU	3	9.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Oct-11	W LANTAU	2	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
14-Oct-11	W LANTAU	3	6.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
14-Oct-11	SW LANTAU	1	0.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Oct-11	SW LANTAU	2	28.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Oct-11	SW LANTAU	2	9.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
14-Oct-11	SE LANTAU	1	2.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Oct-11	SE LANTAU	2	10.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
14-Oct-11	SE LANTAU	2	7.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Oct-11	NE LANTAU	1	10.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Oct-11	NE LANTAU	2	13.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Oct-11	NE LANTAU	3	2.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Oct-11	NE LANTAU	1	2.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Oct-11	NE LANTAU	2	4.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Oct-11	NE LANTAU	3	2.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Oct-11	W LANTAU	2	11.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Oct-11	W LANTAU	3	3.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Oct-11	W LANTAU	4	1.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Oct-11	W LANTAU	2	12.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Oct-11	W LANTAU	3	6.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Oct-11	W LANTAU	4	0.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Oct-11	NW LANTAU	2	24.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Oct-11	NW LANTAU	3	5.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Oct-11	NW LANTAU	2	8.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Oct-11	NW LANTAU	3	2.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Oct-11	NE LANTAU	2	9.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Oct-11	NE LANTAU	3	22.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
19-Oct-11	NE LANTAU	4	2.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
19-Oct-11	NE LANTAU	2	4.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Oct-11	NE LANTAU	3	3.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
19-Oct-11	NE LANTAU	4	1.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
27-Oct-11	NE LANTAU	2	20.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
27-Oct-11	NE LANTAU	3	11.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
27-Oct-11	NE LANTAU	2	8.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
27-Oct-11	NE LANTAU	3	1.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
27-Oct-11	NW LANTAU	0	1.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
27-Oct-11	NW LANTAU	1	2.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
27-Oct-11	NW LANTAU	2	13.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
27-Oct-11	NW LANTAU	3	0.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
27-Oct-11	NW LANTAU	1	0.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
27-Oct-11	NW LANTAU	2	5.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
27-Oct-11	NW LANTAU	3	0.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
31-Oct-11	NE LANTAU	2	15.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
31-Oct-11	NE LANTAU	3	3.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
31-Oct-11	NE LANTAU	2	8.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
31-Oct-11	NE LANTAU	3	2.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
31-Oct-11	NW LANTAU	2	1.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
31-Oct-11	NW LANTAU	3	5.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
31-Oct-11	NW LANTAU	2	4.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
31-Oct-11	NW LANTAU	3	2.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
31-Oct-11	DEEP BAY	1	4.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
31-Oct-11	DEEP BAY	2	8.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
31-Oct-11	DEEP BAY	3	1.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
31-Oct-11	DEEP BAY	1	1.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
31-Oct-11	DEEP BAY	2	8.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
16-Nov-11	NE LANTAU	1	16.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
16-Nov-11	NE LANTAU	2	5.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
16-Nov-11	NE LANTAU	1	5.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
16-Nov-11	NE LANTAU	2	12.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
16-Nov-11	NE LANTAU	3	2.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
16-Nov-11	NW LANTAU	1	11.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
16-Nov-11	NW LANTAU	2	14.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
16-Nov-11	NW LANTAU	1	2.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
16-Nov-11	NW LANTAU	2	14.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-11	PO TOI	1	3.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-11	PO TOI	2	54.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-11	PO TOI	3	2.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
18-Nov-11	PO TOI	1	1.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
18-Nov-11	PO TOI	2	15.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
21-Nov-11	W LANTAU	2	11.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
21-Nov-11	W LANTAU	3	8.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
21-Nov-11	W LANTAU	4	1.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
21-Nov-11	W LANTAU	2	10.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
21-Nov-11	W LANTAU	3	6.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
21-Nov-11	NW LANTAU	2	11.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
21-Nov-11	NW LANTAU	3	4.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
21-Nov-11	NW LANTAU	2	7.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
21-Nov-11	NW LANTAU	3	2.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-11	W LANTAU	3	10.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-11	W LANTAU	4	0.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-11	SW LANTAU	2	16.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Nov-11	SW LANTAU	3	10.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Nov-11	SW LANTAU	2	9.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-11	SW LANTAU	3	3.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-11	SE LANTAU	2	18.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
22-Nov-11	SE LANTAU	1	2.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
22-Nov-11	SE LANTAU	2	4.0	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
28-Nov-11	PO TOI	3	36.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
28-Nov-11	PO TOI	4	10.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
28-Nov-11	PO TOI	3	6.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
28-Nov-11	PO TOI	4	3.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
28-Nov-11	NINEPINS	3	12.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
28-Nov-11	NINEPINS	4	8.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
29-Nov-11	SE LANTAU	2	2.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
29-Nov-11	SE LANTAU	3	6.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
29-Nov-11	SE LANTAU	4	9.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
29-Nov-11	SE LANTAU	2	1.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
29-Nov-11	SE LANTAU	3	2.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
29-Nov-11	SE LANTAU	4	4.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
29-Nov-11	SW LANTAU	2	0.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
29-Nov-11	SW LANTAU	3	7.3	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
29-Nov-11	SW LANTAU	4	16.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
29-Nov-11	SW LANTAU	2	3.2	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
29-Nov-11	SW LANTAU	3	2.5	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
29-Nov-11	SW LANTAU	4	8.1	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
29-Nov-11	W LANTAU	1	3.8	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
29-Nov-11	W LANTAU	2	6.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-11	NW LANTAU	2	27.6	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-11	NW LANTAU	2	9.4	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
30-Nov-11	NE LANTAU	2	18.9	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	P
30-Nov-11	NE LANTAU	2	10.7	AUTUMN	STANDARD31516	OPERATIONAL	HKCRP	S
6-Dec-11	W LANTAU	2	18.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
6-Dec-11	W LANTAU	3	2.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
6-Dec-11	W LANTAU	2	17.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
6-Dec-11	W LANTAU	3	3.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
6-Dec-11	NW LANTAU	2	16.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
6-Dec-11	NW LANTAU	2	1.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Dec-11	NW LANTAU	2	15.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Dec-11	NW LANTAU	3	6.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Dec-11	NW LANTAU	2	8.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Dec-11	NE LANTAU	2	16.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Dec-11	NE LANTAU	3	11.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
7-Dec-11	NE LANTAU	2	6.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
7-Dec-11	NE LANTAU	3	3.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-11	SW LANTAU	3	7.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-11	SW LANTAU	4	3.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-11	SW LANTAU	5	16.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-11	SW LANTAU	2	0.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-11	SW LANTAU	3	0.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-11	SW LANTAU	4	3.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-11	SW LANTAU	5	4.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-11	SE LANTAU	3	14.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-11	SE LANTAU	4	5.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-11	SE LANTAU	5	0.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
8-Dec-11	SE LANTAU	3	6.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
8-Dec-11	SE LANTAU	5	1.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
15-Dec-11	NW LANTAU	2	5.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
15-Dec-11	NW LANTAU	3	23.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
15-Dec-11	NW LANTAU	2	2.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
15-Dec-11	NW LANTAU	3	3.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
15-Dec-11	DEEP BAY	2	16.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
15-Dec-11	DEEP BAY	3	1.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
15-Dec-11	DEEP BAY	2	8.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
15-Dec-11	DEEP BAY	3	2.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
15-Dec-11	NE LANTAU	2	8.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
15-Dec-11	NE LANTAU	2	8.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
19-Dec-11	NE LANTAU	1	6.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
19-Dec-11	NE LANTAU	2	23.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
19-Dec-11	NE LANTAU	3	5.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
19-Dec-11	NE LANTAU	1	2.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
19-Dec-11	NE LANTAU	2	14.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
19-Dec-11	NW LANTAU	2	4.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
19-Dec-11	NW LANTAU	3	9.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
19-Dec-11	NW LANTAU	2	0.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
19-Dec-11	NW LANTAU	3	9.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
21-Dec-11	LAMMA	1	4.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
21-Dec-11	LAMMA	2	48.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
21-Dec-11	LAMMA	3	24.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
21-Dec-11	LAMMA	1	0.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
21-Dec-11	LAMMA	2	12.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
21-Dec-11	LAMMA	3	2.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Dec-11	SE LANTAU	2	15.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Dec-11	SE LANTAU	3	9.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Dec-11	SE LANTAU	2	8.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Dec-11	SE LANTAU	3	7.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Dec-11	SW LANTAU	2	1.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Dec-11	SW LANTAU	3	16.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Dec-11	SW LANTAU	4	2.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
23-Dec-11	SW LANTAU	2	2.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Dec-11	SW LANTAU	3	11.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
23-Dec-11	SW LANTAU	4	5.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jan-12	SE LANTAU	2	23.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jan-12	SE LANTAU	3	3.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jan-12	SE LANTAU	2	4.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jan-12	SE LANTAU	3	2.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jan-12	SW LANTAU	2	14.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jan-12	SW LANTAU	3	13.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jan-12	SW LANTAU	4	1.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
9-Jan-12	SW LANTAU	2	7.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jan-12	SW LANTAU	3	1.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jan-12	SW LANTAU	4	1.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jan-12	W LANTAU	2	3.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
9-Jan-12	W LANTAU	3	6.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
10-Jan-12	W LANTAU	2	4.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
10-Jan-12	W LANTAU	3	12.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
10-Jan-12	W LANTAU	4	3.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
10-Jan-12	W LANTAU	2	4.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
10-Jan-12	W LANTAU	3	14.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
10-Jan-12	W LANTAU	4	2.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
10-Jan-12	NW LANTAU	2	18.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
10-Jan-12	NW LANTAU	3	10.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
10-Jan-12	NW LANTAU	2	9.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
11-Jan-12	NW LANTAU	2	8.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
11-Jan-12	NW LANTAU	3	24.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
11-Jan-12	NW LANTAU	2	2.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
11-Jan-12	NW LANTAU	3	4.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
11-Jan-12	NE LANTAU	2	31.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
11-Jan-12	NE LANTAU	3	3.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
11-Jan-12	NE LANTAU	2	10.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-12	W LANTAU	2	12.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-12	W LANTAU	3	1.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-12	W LANTAU	4	3.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-12	W LANTAU	2	12.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-12	W LANTAU	3	4.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-12	W LANTAU	4	3.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
18-Jan-12	NW LANTAU	2	4.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-12	NW LANTAU	3	15.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
18-Jan-12	NW LANTAU	3	5.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-12	W LANTAU	3	3.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-12	W LANTAU	4	7.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-12	SW LANTAU	2	13.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
31-Jan-12	SW LANTAU	3	7.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Jan-12	SW LANTAU	4	1.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Jan-12	SW LANTAU	2	5.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-12	SW LANTAU	3	6.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-12	SW LANTAU	4	1.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
31-Jan-12	SE LANTAU	2	22.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
31-Jan-12	SE LANTAU	2	6.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
6-Feb-12	LAMMA	2	30.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
6-Feb-12	LAMMA	3	24.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
6-Feb-12	LAMMA	4	11.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
6-Feb-12	LAMMA	2	12.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
6-Feb-12	LAMMA	3	5.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
6-Feb-12	LAMMA	4	1.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
11-Feb-12	NW LANTAU	2	3.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
11-Feb-12	NW LANTAU	3	8.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
11-Feb-12	NW LANTAU	2	4.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
11-Feb-12	NW LANTAU	3	2.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
11-Feb-12	NE LANTAU	1	7.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
11-Feb-12	NE LANTAU	2	26.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
11-Feb-12	NE LANTAU	2	10.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Feb-12	NE LANTAU	1	9.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Feb-12	NE LANTAU	2	7.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Feb-12	NE LANTAU	1	7.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Feb-12	NE LANTAU	2	3.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Feb-12	W LANTAU	1	8.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Feb-12	W LANTAU	2	1.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Feb-12	W LANTAU	3	5.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
13-Feb-12	W LANTAU	1	7.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Feb-12	W LANTAU	2	5.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
13-Feb-12	W LANTAU	3	4.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
14-Feb-12	W LANTAU	1	13.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Feb-12	W LANTAU	2	6.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Feb-12	W LANTAU	3	0.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Feb-12	W LANTAU	1	13.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
14-Feb-12	W LANTAU	2	7.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
14-Feb-12	NW LANTAU	1	13.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Feb-12	DEEP BAY	1	7.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Feb-12	DEEP BAY	2	2.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
14-Feb-12	DEEP BAY	1	10.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Feb-12	W LANTAU	1	1.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Feb-12	W LANTAU	2	18.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Feb-12	W LANTAU	2	18.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Feb-12	W LANTAU	3	1.1	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Feb-12	NW LANTAU	1	5.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Feb-12	NW LANTAU	2	23.3	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
20-Feb-12	NW LANTAU	1	1.7	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
20-Feb-12	NW LANTAU	2	5.2	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Feb-12	NE LANTAU	2	5.4	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Feb-12	NE LANTAU	3	25.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Feb-12	NE LANTAU	4	2.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Feb-12	NE LANTAU	2	2.6	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Feb-12	NE LANTAU	3	8.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Feb-12	NE LANTAU	4	1.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Feb-12	NW LANTAU	2	9.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Feb-12	NW LANTAU	3	15.5	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Feb-12	NW LANTAU	4	3.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	P
29-Feb-12	NW LANTAU	2	3.8	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Feb-12	NW LANTAU	3	1.9	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
29-Feb-12	NW LANTAU	4	1.0	WINTER	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-12	W LANTAU	2	20.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Mar-12	W LANTAU	3	1.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	PHASE	TYPE	P/S
1-Mar-12	W LANTAU	2	19.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-12	NW LANTAU	2	26.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Mar-12	NW LANTAU	3	5.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
1-Mar-12	NW LANTAU	2	8.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
1-Mar-12	NW LANTAU	3	2.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
2-Mar-12	W LANTAU	1	11.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
2-Mar-12	SW LANTAU	1	6.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
2-Mar-12	SW LANTAU	2	17.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
2-Mar-12	SW LANTAU	3	7.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
2-Mar-12	SW LANTAU	1	2.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
2-Mar-12	SW LANTAU	2	7.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
2-Mar-12	SE LANTAU	2	8.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
2-Mar-12	SE LANTAU	3	5.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
2-Mar-12	SE LANTAU	2	1.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
2-Mar-12	SE LANTAU	3	4.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-Mar-12	LAMMA	0	1.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Mar-12	LAMMA	1	32.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Mar-12	LAMMA	2	24.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
17-Mar-12	LAMMA	1	7.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
17-Mar-12	LAMMA	2	12.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Mar-12	SE LANTAU	2	5.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
19-Mar-12	SE LANTAU	3	18.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
19-Mar-12	SE LANTAU	2	2.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Mar-12	SE LANTAU	3	5.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Mar-12	SW LANTAU	2	2.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
19-Mar-12	SW LANTAU	3	17.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
19-Mar-12	SW LANTAU	2	2.6	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
19-Mar-12	SW LANTAU	3	8.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Mar-12	NE LANTAU	2	5.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Mar-12	NE LANTAU	3	14.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Mar-12	NE LANTAU	4	0.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Mar-12	NE LANTAU	2	7.1	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Mar-12	NE LANTAU	3	3.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Mar-12	W LANTAU	2	4.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Mar-12	W LANTAU	3	10.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Mar-12	W LANTAU	4	4.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
29-Mar-12	W LANTAU	2	3.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Mar-12	W LANTAU	3	6.4	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
29-Mar-12	W LANTAU	4	7.8	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Mar-12	W LANTAU	2	5.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Mar-12	W LANTAU	3	3.7	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Mar-12	SW LANTAU	1	9.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Mar-12	SW LANTAU	2	20.2	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Mar-12	SW LANTAU	1	0.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Mar-12	SW LANTAU	2	9.9	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S
30-Mar-12	SE LANTAU	1	1.3	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Mar-12	SE LANTAU	2	16.5	SPRING	STANDARD31516	OPERATIONAL	HKCRP	P
30-Mar-12	SE LANTAU	2	6.0	SPRING	STANDARD31516	OPERATIONAL	HKCRP	S

Appendix II. Chinese White Dolphin Sighting Database (April 2011 - March 2012)

(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
3-Apr-11	1	1017	2	W LANTAU	1	331	ON	HKCRP	814110	803628	SPRING	NONE	OPERATIONAL	S
3-Apr-11	2	1022	1	W LANTAU	3	67	ON	HKCRP	813314	802647	SPRING	NONE	OPERATIONAL	S
3-Apr-11	3	1027	1	W LANTAU	3	734	ON	HKCRP	812595	802285	SPRING	NONE	OPERATIONAL	S
3-Apr-11	4	1044	1	W LANTAU	3	726	ON	HKCRP	808811	800802	SPRING	NONE	OPERATIONAL	S
4-Apr-11	1	1004	1	W LANTAU	2	ND	OFF	HKCRP	813679	802802	SPRING	NONE	OPERATIONAL	
4-Apr-11	2	1027	2	W LANTAU	2	ND	OFF	HKCRP	813536	802720	SPRING	NONE	OPERATIONAL	
6-Apr-11	1	1016	1	W LANTAU	1	ND	OFF	HKCRP	814518	804113	SPRING	NONE	OPERATIONAL	
6-Apr-11	2	1024	2	W LANTAU	2	ND	OFF	HKCRP	814123	802546	SPRING	NONE	OPERATIONAL	
6-Apr-11	3	1039	6	W LANTAU	2	ND	OFF	HKCRP	813547	802606	SPRING	HANG	OPERATIONAL	
6-Apr-11	4	1101	2	W LANTAU	1	ND	OFF	HKCRP	813856	803153	SPRING	NONE	OPERATIONAL	
6-Apr-11	5	1118	1	W LANTAU	2	ND	OFF	HKCRP	813381	802451	SPRING	NONE	OPERATIONAL	
6-Apr-11	6	1154	1	W LANTAU	2	ND	OFF	HKCRP	813481	802627	SPRING	NONE	OPERATIONAL	
9-Apr-11	1	1021	6	W LANTAU	3	ND	OFF	HKCRP	814189	802577	SPRING	HANG	OPERATIONAL	
9-Apr-11	2	1126	2	W LANTAU	2	ND	OFF	HKCRP	813039	802007	SPRING	HANG	OPERATIONAL	
9-Apr-11	3	1221	3	W LANTAU	1	ND	OFF	HKCRP	813215	802533	SPRING	NONE	OPERATIONAL	
17-Apr-11	1	1020	2	NW LANTAU	3	ND	OFF	HKCRP	815292	804764	SPRING	NONE	OPERATIONAL	
17-Apr-11	2	1045	3	NW LANTAU	2	679	ON	HKCRP	817574	804655	SPRING	NONE	OPERATIONAL	P
18-Apr-11	1	1013	2	W LANTAU	3	231	ON	HKCRP	818317	803843	SPRING	NONE	OPERATIONAL	P
18-Apr-11	2	1026	8	W LANTAU	3	44	ON	HKCRP	816900	803788	SPRING	NONE	OPERATIONAL	P
18-Apr-11	3	1059	2	W LANTAU	3	115	ON	HKCRP	813171	802471	SPRING	HANG	OPERATIONAL	S
18-Apr-11	4	1109	1	W LANTAU	3	87	ON	HKCRP	811379	801560	SPRING	NONE	OPERATIONAL	S
18-Apr-11	5	1116	2	W LANTAU	3	106	ON	HKCRP	810107	801062	SPRING	NONE	OPERATIONAL	S
18-Apr-11	6	1121	1	W LANTAU	2	127	ON	HKCRP	809044	800833	SPRING	NONE	OPERATIONAL	S
18-Apr-11	7	1132	4	W LANTAU	2	175	ON	HKCRP	806561	801817	SPRING	NONE	OPERATIONAL	S
20-Apr-11	1	1156	6	W LANTAU	2	ND	OFF	HELI	813194	801884	SPRING	NONE	OPERATIONAL	
27-Apr-11	1	1039	4	W LANTAU	2	337	ON	HKCRP	813570	802400	SPRING	NONE	OPERATIONAL	P
27-Apr-11	2	1106	4	W LANTAU	2	27	ON	HKCRP	811189	802158	SPRING	NONE	OPERATIONAL	S
27-Apr-11	3	1125	9	W LANTAU	2	329	ON	HKCRP	809442	800886	SPRING	NONE	OPERATIONAL	P
27-Apr-11	4	1207	3	W LANTAU	2	311	ON	HKCRP	807451	800005	SPRING	NONE	OPERATIONAL	P
27-Apr-11	5	1221	6	W LANTAU	2	231	ON	HKCRP	806174	801817	SPRING	NONE	OPERATIONAL	S
27-Apr-11	6	1302	8	W LANTAU	3	120	ON	HKCRP	808449	799687	SPRING	NONE	OPERATIONAL	P
27-Apr-11	7	1425	1	NW LANTAU	3	358	ON	HKCRP	819510	805350	SPRING	NONE	OPERATIONAL	P
27-Apr-11	8	1508	1	NW LANTAU	3	506	ON	HKCRP	829366	805370	SPRING	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
27-Apr-11	9	1520	2	DEEP BAY	3	460	ON	HKCRP	831457	806002	SPRING	NONE	OPERATIONAL	P
5-May-11	1	1056	6	W LANTAU	2	82	ON	HKCRP	813558	802678	SPRING	HANG	OPERATIONAL	P
5-May-11	2	1302	1	W LANTAU	4	0	ON	HKCRP	806850	801643	SPRING	NONE	OPERATIONAL	S
5-May-11	3	1542	1	NW LANTAU	2	237	ON	HKCRP	823430	805347	SPRING	NONE	OPERATIONAL	P
5-May-11	4	1645	1	NW LANTAU	3	213	ON	HKCRP	820635	807619	SPRING	NONE	OPERATIONAL	S
6-May-11	1	0915	8	W LANTAU	2	ND	OFF	HKCRP	815282	804362	SPRING	NONE	OPERATIONAL	
6-May-11	2	0937	9	W LANTAU	2	ND	OFF	HKCRP	814863	803506	SPRING	NONE	OPERATIONAL	
6-May-11	3	0958	25	W LANTAU	2	ND	OFF	HKCRP	813902	802195	SPRING	PAIR	OPERATIONAL	
6-May-11	4	1015	4	W LANTAU	2	ND	OFF	HKCRP	815562	802899	SPRING	HANG	OPERATIONAL	
6-May-11	5	1113	2	NW LANTAU	2	45	ON	HKCRP	827824	806386	SPRING	NONE	OPERATIONAL	P
6-May-11	6	1124	9	NW LANTAU	2	61	ON	HKCRP	828909	806831	SPRING	NONE	OPERATIONAL	S
6-May-11	7	1548	10	NE LANTAU	2	137	ON	HKCRP	821928	816440	SPRING	NONE	OPERATIONAL	P
14-May-11	1	1112	2	NW LANTAU	4	252	ON	HKCRP	826117	807413	SPRING	NONE	OPERATIONAL	P
14-May-11	2	1141	14	NW LANTAU	4	154	ON	HKCRP	829362	807419	SPRING	NONE	OPERATIONAL	P
14-May-11	3	1235	3	NW LANTAU	3	ND	OFF	HKCRP	829352	806626	SPRING	NONE	OPERATIONAL	
14-May-11	4	1306	1	NW LANTAU	3	ND	OFF	HKCRP	822876	805346	SPRING	NONE	OPERATIONAL	
14-May-11	5	1340	11	W LANTAU	2	146	ON	HKCRP	814742	803093	SPRING	NONE	OPERATIONAL	S
26-May-11	1	1059	3	W LANTAU	3	107	ON	HKCRP	811469	801076	SPRING	NONE	OPERATIONAL	P
26-May-11	2	1158	7	W LANTAU	3	56	ON	HKCRP	806805	801725	SPRING	NONE	OPERATIONAL	S
26-May-11	3	1222	1	W LANTAU	4	ND	OFF	HKCRP	806273	801786	SPRING	HANG	OPERATIONAL	
26-May-11	4	1235	1	W LANTAU	3	ND	OFF	HKCRP	806794	801581	SPRING	NONE	OPERATIONAL	
26-May-11	5	1246	10	W LANTAU	4	ND	OFF	HKCRP	809298	801019	SPRING	HANG	OPERATIONAL	
1-Jun-11	6	1453	1	SW LANTAU	2	100	ON	HKCRP	807433	808800	SUMMER	NONE	OPERATIONAL	S
9-Jun-11	1	1010	3	NW LANTAU	3	794	ON	HKCRP	817495	805335	SUMMER	NONE	OPERATIONAL	P
20-Jun-11	1	1543	1	SW LANTAU	3	70	ON	HKCRP	806357	804282	SUMMER	NONE	OPERATIONAL	P
27-Jun-11	1	1209	5	W LANTAU	2	ND	OFF	HKCRP	809011	800792	SUMMER	NONE	OPERATIONAL	
27-Jun-11	2	1312	7	W LANTAU	2	132	ON	HKCRP	812473	802418	SUMMER	NONE	OPERATIONAL	P
28-Jun-11	1	1126	2	NW LANTAU	2	241	ON	HKCRP	828269	805378	SUMMER	NONE	OPERATIONAL	P
28-Jun-11	2	1140	8	NW LANTAU	2	93	ON	HKCRP	829355	805360	SUMMER	NONE	OPERATIONAL	P
28-Jun-11	3	1211	3	NW LANTAU	3	177	ON	HKCRP	829717	807183	SUMMER	NONE	OPERATIONAL	S
28-Jun-11	4	1220	1	NW LANTAU	2	222	ON	HKCRP	828243	807427	SUMMER	NONE	OPERATIONAL	P
28-Jun-11	5	1229	1	NW LANTAU	3	8	ON	HKCRP	827158	807435	SUMMER	NONE	OPERATIONAL	P
28-Jun-11	6	1402	1	NE LANTAU	3	ND	OFF	HKCRP	823244	817760	SUMMER	NONE	OPERATIONAL	
29-Jun-11	1	1212	5	NW LANTAU	4	ND	OFF	HKCRP	828843	806378	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
29-Jun-11	2	1518	10	NE LANTAU	2	ND	OFF	HKCRP	821076	816119	SUMMER	NONE	OPERATIONAL	
5-Jul-11	1	0959	2	NW LANTAU	2	ND	OFF	HKCRP	816717	806715	SUMMER	NONE	OPERATIONAL	
5-Jul-11	2	1021	7	W LANTAU	2	374	ON	HKCRP	814784	803908	SUMMER	NONE	OPERATIONAL	S
5-Jul-11	3	1103	2	W LANTAU	2	ND	OFF	HKCRP	810936	801332	SUMMER	NONE	OPERATIONAL	
5-Jul-11	4	1118	1	W LANTAU	2	ND	OFF	HKCRP	810394	801414	SUMMER	NONE	OPERATIONAL	
5-Jul-11	5	1125	4	W LANTAU	2	101	ON	HKCRP	809121	800936	SUMMER	NONE	OPERATIONAL	S
5-Jul-11	6	1146	1	W LANTAU	3	137	ON	HKCRP	806417	801776	SUMMER	NONE	OPERATIONAL	S
5-Jul-11	7	1204	5	SW LANTAU	2	80	ON	HKCRP	805353	802578	SUMMER	PAIR	OPERATIONAL	P
12-Jul-11	1	1043	1	NE LANTAU	1	20	ON	HKCRP	823382	823292	SUMMER	NONE	OPERATIONAL	S
12-Jul-11	2	1311	1	NE LANTAU	2	124	ON	HKCRP	820349	813233	SUMMER	NONE	OPERATIONAL	P
12-Jul-11	3	1406	3	NW LANTAU	2	19	ON	HKCRP	820676	809731	SUMMER	NONE	OPERATIONAL	S
12-Jul-11	4	1523	3	NW LANTAU	1	15	ON	HKCRP	829416	807882	SUMMER	NONE	OPERATIONAL	S
12-Jul-11	5	1541	1	DEEP BAY	2	404	ON	HKCRP	830436	807452	SUMMER	NONE	OPERATIONAL	P
27-Jul-11	1	1441	5	SW LANTAU	2	447	ON	HKCRP	805633	806343	SUMMER	PAIR	OPERATIONAL	P
27-Jul-11	2	1557	2	SW LANTAU	3	47	ON	HKCRP	806239	802291	SUMMER	NONE	OPERATIONAL	S
27-Jul-11	3	1614	6	W LANTAU	3	55	ON	HKCRP	808102	801089	SUMMER	NONE	OPERATIONAL	S
27-Jul-11	4	1633	3	W LANTAU	2	35	ON	HKCRP	809055	800978	SUMMER	NONE	OPERATIONAL	S
27-Jul-11	5	1656	2	W LANTAU	2	499	ON	HKCRP	812639	802377	SUMMER	NONE	OPERATIONAL	S
28-Jul-11	1	0952	7	NW LANTAU	2	123	ON	HKCRP	819078	805339	SUMMER	NONE	OPERATIONAL	P
28-Jul-11	2	1042	2	NW LANTAU	1	150	ON	HKCRP	821514	805344	SUMMER	NONE	OPERATIONAL	P
28-Jul-11	3	1102	4	NW LANTAU	2	202	ON	HKCRP	824106	805349	SUMMER	NONE	OPERATIONAL	P
28-Jul-11	4	1122	6	NW LANTAU	3	769	ON	HKCRP	826531	805354	SUMMER	NONE	OPERATIONAL	P
28-Jul-11	5	1149	2	NW LANTAU	2	55	ON	HKCRP	827260	806272	SUMMER	NONE	OPERATIONAL	S
28-Jul-11	6	1411	1	NE LANTAU	4	45	ON	HKCRP	821662	816378	SUMMER	NONE	OPERATIONAL	P
11-Aug-11	1	956	1	NW LANTAU	2	ND	OFF	HKCRP	824084	810870	SUMMER	NONE	OPERATIONAL	
11-Aug-11	2	1325	5	NW LANTAU	3	ND	OFF	HKCRP	823096	812424	SUMMER	NONE	OPERATIONAL	
11-Aug-11	3	1350	1	NE LANTAU	2	ND	OFF	HKCRP	822558	816863	SUMMER	NONE	OPERATIONAL	
17-Aug-11	1	1014	3	W LANTAU	1	336	ON	HKCRP	814353	803855	SUMMER	NONE	OPERATIONAL	S
17-Aug-11	2	1022	1	W LANTAU	1	60	ON	HKCRP	813502	802905	SUMMER	NONE	OPERATIONAL	S
17-Aug-11	3	1055	4	W LANTAU	3	147	ON	HKCRP	808734	800936	SUMMER	NONE	OPERATIONAL	S
17-Aug-11	4	1632	10	W LANTAU	3	24	ON	HKCRP	806640	801250	SUMMER	NONE	OPERATIONAL	S
17-Aug-11	5	1725	2	W LANTAU	3	57	ON	HKCRP	813802	802669	SUMMER	NONE	OPERATIONAL	S
17-Aug-11	6	1735	1	W LANTAU	2	60	ON	HKCRP	814806	804083	SUMMER	NONE	OPERATIONAL	S
18-Aug-11	1	1005	3	NW LANTAU	2	ND	OFF	HKCRP	815535	804868	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
18-Aug-11	2	1015	5	NW LANTAU	2	942	ON	HKCRP	815636	804682	SUMMER	NONE	OPERATIONAL	P
18-Aug-11	3	1133	1	NW LANTAU	3	781	ON	HKCRP	827935	806386	SUMMER	NONE	OPERATIONAL	P
18-Aug-11	4	1140	5	NW LANTAU	3	223	ON	HKCRP	827193	806385	SUMMER	NONE	OPERATIONAL	P
18-Aug-11	5	1211	3	NW LANTAU	2	ND	OFF	HKCRP	824115	806245	SUMMER	NONE	OPERATIONAL	
18-Aug-11	6	1301	4	NW LANTAU	3	276	ON	HKCRP	823889	808449	SUMMER	NONE	OPERATIONAL	P
18-Aug-11	7	1608	3	NE LANTAU	3	842	ON	HKCRP	820664	817376	SUMMER	NONE	OPERATIONAL	P
31-Aug-11	1	1334	2	NE LANTAU	2	208	ON	HKCRP	820925	813255	SUMMER	NONE	OPERATIONAL	P
31-Aug-11	2	1549	2	NW LANTAU	2	251	ON	HKCRP	829041	807408	SUMMER	NONE	OPERATIONAL	P
1-Sep-11	1	1026	6	W LANTAU	2	282	ON	HKCRP	813149	802461	AUTUMN	NONE	OPERATIONAL	S
6-Sep-11	1	1013	3	W LANTAU	2	22	ON	HKCRP	813535	802854	AUTUMN	NONE	OPERATIONAL	S
6-Sep-11	2	1023	6	W LANTAU	2	76	ON	HKCRP	811932	801964	AUTUMN	NONE	OPERATIONAL	S
6-Sep-11	3	1047	4	W LANTAU	2	16	ON	HKCRP	810914	801528	AUTUMN	NONE	OPERATIONAL	S
6-Sep-11	4	1055	2	W LANTAU	3	ND	OFF	HKCRP	809586	801051	AUTUMN	NONE	OPERATIONAL	
6-Sep-11	5	1059	6	W LANTAU	2	3	ON	HKCRP	809199	800885	AUTUMN	NONE	OPERATIONAL	S
6-Sep-11	6	1110	2	W LANTAU	2	170	ON	HKCRP	807216	801200	AUTUMN	HANG	OPERATIONAL	S
6-Sep-11	7	1121	4	W LANTAU	2	152	ON	HKCRP	806229	801899	AUTUMN	HANG	OPERATIONAL	S
6-Sep-11	8	1143	3	SW LANTAU	2	ND	OFF	HKCRP	806127	802662	AUTUMN	NONE	OPERATIONAL	
6-Sep-11	9	1239	4	SW LANTAU	2	238	ON	HKCRP	807429	805315	AUTUMN	NONE	OPERATIONAL	P
6-Sep-11	14	1508	1	SW LANTAU	1	411	ON	HKCRP	803580	808340	AUTUMN	NONE	OPERATIONAL	S
6-Sep-11	17	1658	3	W LANTAU	3	40	ON	HKCRP	813925	801896	AUTUMN	NONE	OPERATIONAL	S
14-Sep-11	1	1002	4	NW LANTAU	2	ND	OFF	HKCRP	816530	805993	AUTUMN	NONE	OPERATIONAL	
14-Sep-11	2	1036	1	NW LANTAU	2	533	ON	HKCRP	823264	805347	AUTUMN	NONE	OPERATIONAL	P
14-Sep-11	3	1040	2	NW LANTAU	2	573	ON	HKCRP	823751	805348	AUTUMN	NONE	OPERATIONAL	P
14-Sep-11	4	1104	2	NW LANTAU	2	ND	OFF	HKCRP	827516	805366	AUTUMN	NONE	OPERATIONAL	
14-Sep-11	5	1348	1	NW LANTAU	3	ND	OFF	HKCRP	826582	807424	AUTUMN	NONE	OPERATIONAL	
14-Sep-11	6	1455	2	NE LANTAU	3	183	ON	HKCRP	819605	814283	AUTUMN	NONE	OPERATIONAL	P
15-Sep-11	1	1111	7	W LANTAU	3	206	ON	HKCRP	811456	801612	AUTUMN	NONE	OPERATIONAL	P
15-Sep-11	2	1250	11	W LANTAU	3	434	ON	HKCRP	809545	799525	AUTUMN	NONE	OPERATIONAL	S
15-Sep-11	3	1432	2	NW LANTAU	3	373	ON	HKCRP	821748	804654	AUTUMN	NONE	OPERATIONAL	P
15-Sep-11	4	1442	4	NW LANTAU	3	78	ON	HKCRP	822767	804646	AUTUMN	NONE	OPERATIONAL	P
15-Sep-11	5	1454	1	NW LANTAU	3	146	ON	HKCRP	822679	804666	AUTUMN	NONE	OPERATIONAL	P
15-Sep-11	6	1602	1	NW LANTAU	3	339	ON	HKCRP	825632	806382	AUTUMN	NONE	OPERATIONAL	P
22-Sep-11	2	1415	6	SW LANTAU	2	244	ON	HKCRP	807255	809182	AUTUMN	NONE	OPERATIONAL	S
22-Sep-11	3	1434	1	SW LANTAU	2	82	ON	HKCRP	807422	809038	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
22-Sep-11	4	1542	2	SW LANTAU	3	271	ON	HKCRP	806654	805303	AUTUMN	NONE	OPERATIONAL	P
22-Sep-11	5	1554	4	SW LANTAU	3	45	ON	HKCRP	807098	804603	AUTUMN	NONE	OPERATIONAL	S
22-Sep-11	6	1611	7	SW LANTAU	3	ND	OFF	HKCRP	806525	803158	AUTUMN	NONE	OPERATIONAL	
22-Sep-11	7	1624	4	W LANTAU	2	ND	OFF	HKCRP	806240	802013	AUTUMN	NONE	OPERATIONAL	
22-Sep-11	8	1648	1	W LANTAU	2	229	ON	HKCRP	810582	801455	AUTUMN	NONE	OPERATIONAL	S
22-Sep-11	9	1656	1	W LANTAU	2	180	ON	HKCRP	810958	801704	AUTUMN	NONE	OPERATIONAL	S
22-Sep-11	10	1710	3	W LANTAU	2	102	ON	HKCRP	812883	802440	AUTUMN	NONE	OPERATIONAL	S
7-Oct-11	1	1100	2	W LANTAU	3	19	ON	HKCRP	813572	801472	AUTUMN	NONE	OPERATIONAL	P
7-Oct-11	2	1204	1	W LANTAU	2	59	ON	HKCRP	807430	799685	AUTUMN	NONE	OPERATIONAL	S
7-Oct-11	3	1220	8	W LANTAU	2	259	ON	HKCRP	807437	801190	AUTUMN	NONE	OPERATIONAL	P
7-Oct-11	4	1252	2	W LANTAU	2	104	ON	HKCRP	806184	801920	AUTUMN	NONE	OPERATIONAL	S
7-Oct-11	5	1339	1	W LANTAU	3	ND	OFF	HKCRP	809678	799628	AUTUMN	NONE	OPERATIONAL	
7-Oct-11	6	1351	1	W LANTAU	2	142	ON	HKCRP	810483	800888	AUTUMN	NONE	OPERATIONAL	P
7-Oct-11	7	1408	6	W LANTAU	2	698	ON	HKCRP	812462	802356	AUTUMN	NONE	OPERATIONAL	P
7-Oct-11	8	1436	1	W LANTAU	2	133	ON	HKCRP	814479	802000	AUTUMN	NONE	OPERATIONAL	S
7-Oct-11	9	1442	2	W LANTAU	2	297	ON	HKCRP	814787	802547	AUTUMN	NONE	OPERATIONAL	P
7-Oct-11	10	1548	1	NW LANTAU	2	412	ON	HKCRP	827472	805356	AUTUMN	NONE	OPERATIONAL	P
7-Oct-11	11	1715	4	NW LANTAU	3	30	ON	HKCRP	823907	811199	AUTUMN	NONE	OPERATIONAL	S
13-Oct-11	1	1026	10	NW LANTAU	3	148	ON	HKCRP	821807	808435	AUTUMN	NONE	OPERATIONAL	P
13-Oct-11	2	1330	5	NW LANTAU	3	35	ON	HKCRP	828797	807428	AUTUMN	NONE	OPERATIONAL	P
14-Oct-11	1	944	13	W LANTAU	2	136	ON	HKCRP	815591	804971	AUTUMN	NONE	OPERATIONAL	S
14-Oct-11	2	1200	14	SW LANTAU	2	94	ON	HKCRP	804660	805402	AUTUMN	PAIR	OPERATIONAL	P
18-Oct-11	1	1106	6	NE LANTAU	2	66	ON	HKCRP	820188	817427	AUTUMN	NONE	OPERATIONAL	S
18-Oct-11	2	1128	2	NE LANTAU	2	160	ON	HKCRP	820608	818241	AUTUMN	NONE	OPERATIONAL	S
18-Oct-11	3	1218	2	NE LANTAU	2	133	ON	HKCRP	820177	817385	AUTUMN	NONE	OPERATIONAL	P
18-Oct-11	4	1224	1	NE LANTAU	2	192	ON	HKCRP	819735	816911	AUTUMN	NONE	OPERATIONAL	S
18-Oct-11	5	1229	5	NE LANTAU	2	87	ON	HKCRP	819459	816230	AUTUMN	NONE	OPERATIONAL	S
18-Oct-11	6	1250	2	NE LANTAU	2	247	ON	HKCRP	820567	815294	AUTUMN	NONE	OPERATIONAL	P
18-Oct-11	7	1513	3	W LANTAU	2	149	ON	HKCRP	811457	801127	AUTUMN	NONE	OPERATIONAL	P
18-Oct-11	8	1616	3	W LANTAU	3	77	ON	HKCRP	806473	801704	AUTUMN	NONE	OPERATIONAL	P
18-Oct-11	9	1718	1	W LANTAU	2	192	ON	HKCRP	813469	802987	AUTUMN	NONE	OPERATIONAL	S
19-Oct-11	1	1021	4	NW LANTAU	2	228	ON	HKCRP	819523	804649	AUTUMN	NONE	OPERATIONAL	P
19-Oct-11	2	1233	6	NW LANTAU	2	274	ON	HKCRP	820214	807597	AUTUMN	NONE	OPERATIONAL	S
19-Oct-11	3	1310	2	NW LANTAU	3	793	ON	HKCRP	825329	808431	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
19-Oct-11	4	1358	1	NW LANTAU	3	262	ON	HKCRP	822775	812372	AUTUMN	NONE	OPERATIONAL	P
27-Oct-11	1	1340	1	NW LANTAU	2	2	ON	HKCRP	823341	811528	AUTUMN	NONE	OPERATIONAL	P
27-Oct-11	2	1409	1	NW LANTAU	2	106	ON	HKCRP	824795	809985	AUTUMN	NONE	OPERATIONAL	S
27-Oct-11	3	1431	1	NW LANTAU	2	117	ON	HKCRP	823655	809479	AUTUMN	NONE	OPERATIONAL	P
27-Oct-11	4	1603	1	NW LANTAU	3	656	ON	HKCRP	828920	806677	AUTUMN	NONE	OPERATIONAL	S
27-Oct-11	5	1622	5	NW LANTAU	1	589	ON	HKCRP	828114	805357	AUTUMN	NONE	OPERATIONAL	P
27-Oct-11	6	1648	4	NW LANTAU	1	216	ON	HKCRP	824504	805339	AUTUMN	NONE	OPERATIONAL	P
27-Oct-11	7	1709	1	NW LANTAU	1	ND	OFF	HKCRP	823360	807387	AUTUMN	NONE	OPERATIONAL	
31-Oct-11	1	1103	2	NE LANTAU	2	52	ON	HKCRP	821105	818880	AUTUMN	NONE	OPERATIONAL	S
31-Oct-11	2	1112	6	NE LANTAU	2	516	ON	HKCRP	820995	818685	AUTUMN	NONE	OPERATIONAL	S
31-Oct-11	3	1130	1	NE LANTAU	2	393	ON	HKCRP	820243	817365	AUTUMN	NONE	OPERATIONAL	P
31-Oct-11	4	1142	2	NE LANTAU	3	198	ON	HKCRP	821428	817346	AUTUMN	NONE	OPERATIONAL	P
31-Oct-11	5	1448	2	DEEP BAY	2	284	ON	HKCRP	832463	807013	AUTUMN	NONE	OPERATIONAL	P
31-Oct-11	6	1620	2	DEEP BAY	3	25	ON	HKCRP	831455	807269	AUTUMN	NONE	OPERATIONAL	P
16-Nov-11	1	1036	1	NE LANTAU	2	99	ON	HKCRP	823340	821396	AUTUMN	NONE	OPERATIONAL	P
16-Nov-11	2	1047	1	NE LANTAU	2	311	ON	HKCRP	823939	820316	AUTUMN	NONE	OPERATIONAL	S
16-Nov-11	3	1125	2	NE LANTAU	1	53	ON	HKCRP	822270	817357	AUTUMN	SHRIMP	OPERATIONAL	P
16-Nov-11	4	1134	1	NE LANTAU	1	144	ON	HKCRP	823101	816843	AUTUMN	NONE	OPERATIONAL	
21-Nov-11	1	1038	4	W LANTAU	2	202	ON	HKCRP	814421	802928	AUTUMN	NONE	OPERATIONAL	S
21-Nov-11	2	1105	1	W LANTAU	3	298	ON	HKCRP	812355	800655	AUTUMN	NONE	OPERATIONAL	S
21-Nov-11	3	1117	6	W LANTAU	3	211	ON	HKCRP	811467	801808	AUTUMN	HANG	OPERATIONAL	P
21-Nov-11	4	1150	1	W LANTAU	2	205	ON	HKCRP	809475	801205	AUTUMN	NONE	OPERATIONAL	S
21-Nov-11	5	1156	1	W LANTAU	2	548	ON	HKCRP	809421	800607	AUTUMN	NONE	OPERATIONAL	P
21-Nov-11	6	1210	10	W LANTAU	3	237	ON	HKCRP	807618	799716	AUTUMN	NONE	OPERATIONAL	S
21-Nov-11	7	1255	3	W LANTAU	2	234	ON	HKCRP	807004	801684	AUTUMN	NONE	OPERATIONAL	S
21-Nov-11	8	1326	3	W LANTAU	3	79	ON	HKCRP	806508	801023	AUTUMN	NONE	OPERATIONAL	P
21-Nov-11	9	1345	2	W LANTAU	2	708	ON	HKCRP	808437	800120	AUTUMN	NONE	OPERATIONAL	P
21-Nov-11	10	1404	1	W LANTAU	1	136	ON	HKCRP	810483	801270	AUTUMN	NONE	OPERATIONAL	P
21-Nov-11	11	1425	1	W LANTAU	1	349	ON	HKCRP	812465	801377	AUTUMN	NONE	OPERATIONAL	P
21-Nov-11	12	1523	2	NW LANTAU	2	31	ON	HKCRP	822557	804635	AUTUMN	NONE	OPERATIONAL	P
21-Nov-11	13	1544	2	NW LANTAU	2	283	ON	HKCRP	826654	804664	AUTUMN	NONE	OPERATIONAL	P
22-Nov-11	1	1021	6	SW LANTAU	3	139	ON	HKCRP	806017	802579	AUTUMN	NONE	OPERATIONAL	P
22-Nov-11	2	1043	1	SW LANTAU	2	81	ON	HKCRP	803691	802574	AUTUMN	NONE	OPERATIONAL	P
22-Nov-11	3	1404	5	SE LANTAU	2	ND	OFF	HKCRP	809685	813382	AUTUMN	PAIR	OPERATIONAL	

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
29-Nov-11	2	1215	14	SE LANTAU	4	318	ON	HKCRP	806276	812191	AUTUMN	PAIR	OPERATIONAL	P
30-Nov-11	1	1005	2	NW LANTAU	2	ND	OFF	HKCRP	815723	805352	AUTUMN	NONE	OPERATIONAL	
30-Nov-11	2	1017	5	NW LANTAU	2	71	ON	HKCRP	814982	804640	AUTUMN	NONE	OPERATIONAL	P
30-Nov-11	3	1031	2	NW LANTAU	2	83	ON	HKCRP	815182	804651	AUTUMN	NONE	OPERATIONAL	P
30-Nov-11	4	1045	15	NW LANTAU	2	176	ON	HKCRP	817098	804459	AUTUMN	GILL NET	OPERATIONAL	P
30-Nov-11	5	1122	1	NW LANTAU	2	1070	ON	HKCRP	820010	804650	AUTUMN	NONE	OPERATIONAL	P
30-Nov-11	6	1143	6	NW LANTAU	2	119	ON	HKCRP	825292	804671	AUTUMN	NONE	OPERATIONAL	P
30-Nov-11	7	1226	5	NW LANTAU	2	143	ON	HKCRP	828732	806398	AUTUMN	NONE	OPERATIONAL	P
30-Nov-11	8	1237	5	NW LANTAU	2	95	ON	HKCRP	827038	806395	AUTUMN	NONE	OPERATIONAL	P
30-Nov-11	9	1458	4	NE LANTAU	2	53	ON	HKCRP	822042	814287	AUTUMN	NONE	OPERATIONAL	P
30-Nov-11	10	1535	1	NE LANTAU	2	162	ON	HKCRP	819304	816024	AUTUMN	NONE	OPERATIONAL	S
6-Dec-11	1	1132	1	W LANTAU	2	33	ON	HKCRP	815130	802836	WINTER	NONE	OPERATIONAL	S
6-Dec-11	2	1156	2	W LANTAU	3	ND	OFF	HKCRP	812145	800562	WINTER	NONE	OPERATIONAL	
6-Dec-11	3	1229	3	W LANTAU	2	558	ON	HKCRP	809873	801320	WINTER	NONE	OPERATIONAL	S
6-Dec-11	4	1304	2	W LANTAU	2	374	ON	HKCRP	807462	800077	WINTER	NONE	OPERATIONAL	P
6-Dec-11	5	1440	3	W LANTAU	2	180	ON	HKCRP	813439	801338	WINTER	NONE	OPERATIONAL	S
6-Dec-11	6	1453	2	W LANTAU	2	302	ON	HKCRP	814520	803196	WINTER	NONE	OPERATIONAL	P
6-Dec-11	7	1601	7	NW LANTAU	2	373	ON	HKCRP	828513	805358	WINTER	SHRIMP	OPERATIONAL	P
6-Dec-11	8	1633	3	NW LANTAU	2	272	ON	HKCRP	826870	807425	WINTER	NONE	OPERATIONAL	P
7-Dec-11	1	1008	2	NW LANTAU	3	350	ON	HKCRP	820752	804662	WINTER	NONE	OPERATIONAL	P
7-Dec-11	2	1021	3	NW LANTAU	3	203	ON	HKCRP	822734	804656	WINTER	NONE	OPERATIONAL	P
7-Dec-11	3	1037	2	NW LANTAU	3	35	ON	HKCRP	824550	804670	WINTER	NONE	OPERATIONAL	P
7-Dec-11	4	1054	2	NW LANTAU	3	22	ON	HKCRP	826466	804664	WINTER	NONE	OPERATIONAL	P
7-Dec-11	5	1125	1	NW LANTAU	2	171	ON	HKCRP	829719	806030	WINTER	NONE	OPERATIONAL	S
7-Dec-11	6	1139	4	NW LANTAU	2	ND	OFF	HKCRP	827105	806395	WINTER	NONE	OPERATIONAL	
7-Dec-11	7	1200	13	NW LANTAU	2	282	ON	HKCRP	825720	806382	WINTER	GILL NET	OPERATIONAL	P
7-Dec-11	8	1636	1	NE LANTAU	2	237	ON	HKCRP	823676	817349	WINTER	NONE	OPERATIONAL	P
8-Dec-11	1	1315	1	SW LANTAU	4	173	ON	HKCRP	808437	811112	WINTER	NONE	OPERATIONAL	S
15-Dec-11	1	1048	6	NW LANTAU	3	410	ON	HKCRP	826529	806404	WINTER	NONE	OPERATIONAL	P
15-Dec-11	2	1125	2	DEEP BAY	2	350	ON	HKCRP	830490	808173	WINTER	NONE	OPERATIONAL	P
15-Dec-11	3	1142	5	DEEP BAY	2	116	ON	HKCRP	830669	807102	WINTER	NONE	OPERATIONAL	P
15-Dec-11	4	1337	1	DEEP BAY	3	514	ON	HKCRP	831457	806023	WINTER	NONE	OPERATIONAL	P
15-Dec-11	5	1602	6	NW LANTAU	2	123	ON	HKCRP	822653	812403	WINTER	NONE	OPERATIONAL	P
15-Dec-11	6	1629	3	NE LANTAU	2	279	ON	HKCRP	822552	813288	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
19-Dec-11	1	1204	1	NE LANTAU	1	318	ON	HKCRP	820990	814244	WINTER	NONE	OPERATIONAL	P
19-Dec-11	2	1234	1	NW LANTAU	2	ND	OFF	HKCRP	824325	812529	WINTER	NONE	OPERATIONAL	
19-Dec-11	3	1302	2	NW LANTAU	3	274	ON	HKCRP	821117	810515	WINTER	NONE	OPERATIONAL	S
19-Dec-11	4	1336	5	NW LANTAU	3	379	ON	HKCRP	825928	808072	WINTER	NONE	OPERATIONAL	S
19-Dec-11	5	1518	1	NE LANTAU	3	311	ON	HKCRP	823272	813238	WINTER	NONE	OPERATIONAL	P
19-Dec-11	6	1623	1	NE LANTAU	2	199	ON	HKCRP	823233	817369	WINTER	NONE	OPERATIONAL	P
19-Dec-11	7	1630	2	NE LANTAU	2	385	ON	HKCRP	824164	817370	WINTER	NONE	OPERATIONAL	P
21-Dec-11	1	0747	2	W LANTAU	2	ND	OFF	THEO	806262	802106	WINTER	NONE	OPERATIONAL	
21-Dec-11	2	0832	4	W LANTAU	2	ND	OFF	THEO	806228	802178	WINTER	NONE	OPERATIONAL	
21-Dec-11	3	1004	5	W LANTAU	2	ND	OFF	THEO	806151	802136	WINTER	NONE	OPERATIONAL	
23-Dec-11	1	1328	19	SW LANTAU	4	170	ON	HKCRP	801343	808408	WINTER	NONE	OPERATIONAL	P
23-Dec-11	2	1529	2	SW LANTAU	3	104	ON	HKCRP	806545	804261	WINTER	NONE	OPERATIONAL	P
10-Jan-12	1	1046	1	W LANTAU	2	198	ON	HKCRP	813559	802338	WINTER	NONE	OPERATIONAL	P
10-Jan-12	2	1328	2	W LANTAU	3	81	ON	HKCRP	814091	801773	WINTER	NONE	OPERATIONAL	S
10-Jan-12	3	1455	1	NW LANTAU	3	223	ON	HKCRP	826909	804675	WINTER	NONE	OPERATIONAL	P
10-Jan-12	4	1637	4	NW LANTAU	2	105	ON	HKCRP	824152	810252	WINTER	NONE	OPERATIONAL	S
11-Jan-12	1	1043	2	NW LANTAU	3	10	ON	HKCRP	826121	805353	WINTER	NONE	OPERATIONAL	P
11-Jan-12	2	1423	3	NE LANTAU	2	178	ON	HKCRP	824544	814733	WINTER	NONE	OPERATIONAL	S
11-Jan-12	3	1514	3	NE LANTAU	2	616	ON	HKCRP	819647	816385	WINTER	NONE	OPERATIONAL	P
18-Jan-12	1	1045	4	W LANTAU	2	280	ON	HKCRP	813558	802472	WINTER	NONE	OPERATIONAL	P
18-Jan-12	2	1102	6	W LANTAU	2	ND	OFF	HKCRP	812809	801058	WINTER	NONE	OPERATIONAL	
18-Jan-12	3	1136	2	W LANTAU	3	500	ON	HKCRP	809995	801320	WINTER	NONE	OPERATIONAL	S
18-Jan-12	4	1154	3	W LANTAU	2	141	ON	HKCRP	809444	800174	WINTER	NONE	OPERATIONAL	P
18-Jan-12	5	1245	1	W LANTAU	4	109	ON	HKCRP	805823	800331	WINTER	NONE	OPERATIONAL	S
18-Jan-12	6	1308	6	W LANTAU	3	187	ON	HKCRP	808412	801120	WINTER	NONE	OPERATIONAL	S
18-Jan-12	7	1332	2	W LANTAU	2	537	ON	HKCRP	808448	799924	WINTER	NONE	OPERATIONAL	P
18-Jan-12	8	1343	4	W LANTAU	2	424	ON	HKCRP	809745	799536	WINTER	NONE	OPERATIONAL	S
18-Jan-12	9	1402	1	W LANTAU	2	16	ON	HKCRP	811864	802582	WINTER	NONE	OPERATIONAL	S
18-Jan-12	10	1418	3	W LANTAU	2	53	ON	HKCRP	812454	801027	WINTER	NONE	OPERATIONAL	P
18-Jan-12	11	1533	2	NW LANTAU	3	126	ON	HKCRP	827162	805365	WINTER	NONE	OPERATIONAL	P
18-Jan-12	12	1545	10	NW LANTAU	3	234	ON	HKCRP	827802	806499	WINTER	SINGLE	OPERATIONAL	S
31-Jan-12	1	0955	1	NW LANTAU	3	ND	OFF	HKCRP	816651	806550	WINTER	NONE	OPERATIONAL	
31-Jan-12	2	1032	4	W LANTAU	4	175	ON	HKCRP	810947	801363	WINTER	HANG	OPERATIONAL	S
31-Jan-12	3	1115	2	SW LANTAU	3	43	ON	HKCRP	806778	804014	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
11-Feb-12	1	1105	1	NW LANTAU	2	ND	OFF	HKCRP	826447	808433	WINTER	NONE	OPERATIONAL	
11-Feb-12	2	1118	7	NW LANTAU	2	ND	OFF	HKCRP	826136	809246	WINTER	NONE	OPERATIONAL	
11-Feb-12	3	1156	5	NW LANTAU	2	311	ON	HKCRP	827835	806376	WINTER	NONE	OPERATIONAL	P
11-Feb-12	4	1231	4	NW LANTAU	2	ND	OFF	HKCRP	823814	806996	WINTER	NONE	OPERATIONAL	
11-Feb-12	5	1340	3	NE LANTAU	1	160	ON	HKCRP	819895	813233	WINTER	NONE	OPERATIONAL	P
11-Feb-12	6	1515	9	NE LANTAU	2	412	ON	HKCRP	822725	816389	WINTER	SINGLE	OPERATIONAL	P
11-Feb-12	7	1553	1	NE LANTAU	2	48	ON	HKCRP	821196	817376	WINTER	NONE	OPERATIONAL	P
11-Feb-12	8	1628	1	NE LANTAU	2	141	ON	HKCRP	821682	818407	WINTER	NONE	OPERATIONAL	P
13-Feb-12	1	1114	1	NE LANTAU	1	440	ON	HKCRP	820112	816386	WINTER	NONE	OPERATIONAL	P
13-Feb-12	2	1146	2	NE LANTAU	1	175	ON	HKCRP	822171	816471	WINTER	SHRIMP	OPERATIONAL	P
13-Feb-12	3	1352	4	W LANTAU	1	908	ON	HKCRP	814509	803309	WINTER	NONE	OPERATIONAL	P
13-Feb-12	4	1458	1	W LANTAU	3	244	ON	HKCRP	808436	800553	WINTER	NONE	OPERATIONAL	P
13-Feb-12	5	1546	1	W LANTAU	3	86	ON	HKCRP	806329	801858	WINTER	NONE	OPERATIONAL	S
13-Feb-12	6	1624	4	W LANTAU	1	17	ON	HKCRP	810061	801392	WINTER	NONE	OPERATIONAL	S
13-Feb-12	7	1716	1	NW LANTAU	2	ND	OFF	HKCRP	815379	805352	WINTER	NONE	OPERATIONAL	
14-Feb-12	1	1012	1	W LANTAU	1	73	ON	HKCRP	818395	803740	WINTER	NONE	OPERATIONAL	P
14-Feb-12	2	1235	1	W LANTAU	2	85	ON	HKCRP	808447	800203	WINTER	NONE	OPERATIONAL	P
14-Feb-12	3	1429	1	NW LANTAU	1	94	ON	HKCRP	826176	805353	WINTER	NONE	OPERATIONAL	P
14-Feb-12	4	1452	7	DEEP BAY	1	ND	OFF	HKCRP	830348	807133	WINTER	NONE	OPERATIONAL	
14-Feb-12	5	1512	1	DEEP BAY	2	270	ON	HKCRP	830503	807277	WINTER	NONE	OPERATIONAL	P
14-Feb-12	6	1641	5	DEEP BAY	1	52	ON	HKCRP	831131	808586	WINTER	NONE	OPERATIONAL	S
14-Feb-12	7	1658	1	NW LANTAU	3	ND	OFF	HKCRP	827267	808239	WINTER	NONE	OPERATIONAL	
19-Feb-12	1	1058	4	NW LANTAU	2	ND	OFF	HKCRP	824850	809810	WINTER	NONE	OPERATIONAL	
19-Feb-12	2	1144	5	NW LANTAU	3	ND	OFF	HKCRP	827304	806210	WINTER	NONE	OPERATIONAL	
19-Feb-12	3	1221	7	NW LANTAU	2	ND	OFF	HKCRP	824363	810046	WINTER	NONE	OPERATIONAL	
19-Feb-12	4	1319	6	NE LANTAU	2	ND	OFF	HKCRP	819439	814489	WINTER	NONE	OPERATIONAL	
20-Feb-12	1	1031	1	W LANTAU	2	85	ON	HKCRP	815461	803435	WINTER	NONE	OPERATIONAL	P
20-Feb-12	2	1140	14	W LANTAU	2	712	ON	HKCRP	808205	799594	WINTER	PAIR	OPERATIONAL	S
20-Feb-12	3	1202	1	W LANTAU	2	ND	OFF	HKCRP	808878	800750	WINTER	NONE	OPERATIONAL	
20-Feb-12	4	1252	2	W LANTAU	2	27	ON	HKCRP	808436	800265	WINTER	NONE	OPERATIONAL	P
20-Feb-12	5	1319	1	W LANTAU	2	73	ON	HKCRP	810471	801476	WINTER	NONE	OPERATIONAL	P
20-Feb-12	6	1523	3	NW LANTAU	2	5	ON	HKCRP	829033	805812	WINTER	NONE	OPERATIONAL	S
20-Feb-12	7	1555	3	NW LANTAU	2	100	ON	HKCRP	823836	807419	WINTER	NONE	OPERATIONAL	P
29-Feb-12	1	1004	5	NE LANTAU	3	149	ON	HKCRP	821743	814276	WINTER	HANG	OPERATIONAL	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	PHASE	P/S
29-Feb-12	2	1438	2	NW LANTAU	3	ND	OFF	HKCRP	824139	811282	WINTER	NONE	OPERATIONAL	
29-Feb-12	3	1453	3	NW LANTAU	3	165	ON	HKCRP	823843	809469	WINTER	NONE	OPERATIONAL	P
1-Mar-12	1	1356	2	NW LANTAU	2	220	ON	HKCRP	821992	804665	SPRING	NONE	OPERATIONAL	P
1-Mar-12	2	1403	3	NW LANTAU	2	66	ON	HKCRP	822490	804655	SPRING	NONE	OPERATIONAL	P
1-Mar-12	3	1605	1	NW LANTAU	3	234	ON	HKCRP	825872	808442	SPRING	NONE	OPERATIONAL	P
2-Mar-12	1	1029	4	W LANTAU	1	246	ON	HKCRP	811224	801601	SPRING	NONE	OPERATIONAL	S
2-Mar-12	2	1114	1	SW LANTAU	1	ND	OFF	HKCRP	804035	802565	SPRING	NONE	OPERATIONAL	
2-Mar-12	3	1140	1	SW LANTAU	1	101	ON	HKCRP	806899	804211	SPRING	NONE	OPERATIONAL	S
2-Mar-12	4	1403	4	SW LANTAU	2	145	ON	HKCRP	806599	811150	SPRING	NONE	OPERATIONAL	P
5-Mar-12	1	1453	4	W LANTAU	3	ND	OFF	HELI	808213	800996	SPRING	NONE	OPERATIONAL	
5-Mar-12	2	1502	2	SE LANTAU	2	ND	OFF	HELI	804642	816603	SPRING	SINGLE	OPERATIONAL	
5-Mar-12	4	1550	1	NW LANTAU	2	ND	OFF	HELI	826828	806147	SPRING	NONE	OPERATIONAL	
19-Mar-12	4	1254	2	SW LANTAU	4	ND	OFF	HKCRP	808093	811679	SPRING	PAIR	OPERATIONAL	
29-Mar-12	1	1118	3	NE LANTAU	2	136	ON	HKCRP	819635	816777	SPRING	NONE	OPERATIONAL	S
29-Mar-12	2	1310	1	NW LANTAU	3	ND	OFF	HKCRP	821905	809733	SPRING	NONE	OPERATIONAL	
29-Mar-12	3	1314	1	NW LANTAU	3	ND	OFF	HKCRP	822614	809199	SPRING	NONE	OPERATIONAL	
29-Mar-12	4	1409	5	W LANTAU	2	180	ON	HKCRP	814654	802897	SPRING	NONE	OPERATIONAL	S
29-Mar-12	5	1455	1	W LANTAU	4	115	ON	HKCRP	811449	800148	SPRING	SHRIMP	OPERATIONAL	S
29-Mar-12	6	1602	1	W LANTAU	3	20	ON	HKCRP	810463	800074	SPRING	NONE	OPERATIONAL	P
30-Mar-12	1	1029	21	W LANTAU	3	714	ON	HKCRP	811688	801808	SPRING	PAIR	OPERATIONAL	S
30-Mar-12	2	1049	1	W LANTAU	2	67	ON	HKCRP	811225	801199	SPRING	NONE	OPERATIONAL	S
30-Mar-12	3	1306	1	SW LANTAU	2	55	ON	HKCRP	807544	808615	SPRING	NONE	OPERATIONAL	S

Appendix III. Finless Porpoise Sighting Database (April 2011 - March 2012)

(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
03-Apr-11	5	1212	4	804918	817346	SE LANTAU	1	186	ON	HKCRP	SPRING	P
03-Apr-11	6	1248	2	803979	815282	SE LANTAU	1	234	ON	HKCRP	SPRING	P
03-Apr-11	7	1259	4	805518	815274	SE LANTAU	1	203	ON	HKCRP	SPRING	P
03-Apr-11	8	1324	2	808742	814103	SE LANTAU	1	65	ON	HKCRP	SPRING	S
03-Apr-11	9	1344	3	805665	813232	SE LANTAU	2	82	ON	HKCRP	SPRING	P
03-Apr-11	10	1406	6	802742	813227	SE LANTAU	2	48	ON	HKCRP	SPRING	P
03-Apr-11	11	1419	4	802601	811391	SW LANTAU	1	ND	OFF	HKCRP	SPRING	
03-Apr-11	12	1426	4	803520	811155	SW LANTAU	2	135	ON	HKCRP	SPRING	P
03-Apr-11	13	1432	2	804583	811157	SW LANTAU	1	164	ON	HKCRP	SPRING	P
03-Apr-11	14	1439	1	805668	811138	SW LANTAU	1	2	ON	HKCRP	SPRING	P
03-Apr-11	15	1445	2	806565	811160	SW LANTAU	2	216	ON	HKCRP	SPRING	P
03-Apr-11	16	1524	6	801741	808780	SW LANTAU	1	166	ON	HKCRP	SPRING	S
18-Apr-11	8	1533	3	805619	814253	SE LANTAU	2	263	ON	HKCRP	SPRING	P
14-May-11	6	1558	2	804457	813931	SE LANTAU	3	ND	OFF	HKCRP	SPRING	
14-May-11	7	1617	5	805561	816284	SE LANTAU	3	ND	OFF	HKCRP	SPRING	
01-Jun-11	1	1104	2	805549	817460	SE LANTAU	2	38	ON	HKCRP	SUMMER	S
01-Jun-11	2	1212	2	804433	815293	SE LANTAU	2	185	ON	HKCRP	SUMMER	P
01-Jun-11	3	1237	3	802708	813227	SE LANTAU	2	80	ON	HKCRP	SUMMER	P
01-Jun-11	4	1302	1	807227	813224	SE LANTAU	3	49	ON	HKCRP	SUMMER	P
01-Jun-11	5	1347	1	803742	811166	SE LANTAU	2	92	ON	HKCRP	SUMMER	P
02-Jun-11	1	1230	2	803501	829195	LAMMA	2	230	ON	HKCRP	SUMMER	P
05-Jul-11	8	1611	2	804987	815397	SE LANTAU	3	184	ON	HKCRP	SUMMER	P
25-Jul-11	1	1449	1	803524	857002	PO TOI	2	328	ON	HKCRP	SUMMER	P
01-Aug-11	1	1508	2	836829	853655	MIRS BAY	2	ND	OFF	HELI	SUMMER	
01-Aug-11	2	1532	2	816523	863437	NINEPINS	2	ND	OFF	HELI	SUMMER	
01-Aug-11	3	1540	2	812988	862247	NINEPINS	2	ND	OFF	HELI	SUMMER	
04-Aug-11	1	1007	1	808509	865657	NINEPINS	1	96	ON	HKCRP	SUMMER	P
04-Aug-11	2	1141	3	806477	854658	PO TOI	1	30	ON	HKCRP	SUMMER	P
04-Aug-11	3	1152	2	806487	853131	PO TOI	2	158	ON	HKCRP	SUMMER	P
04-Aug-11	4	1404	2	804511	858177	PO TOI	2	175	ON	HKCRP	SUMMER	P
08-Aug-11	1	1228	4	803974	811197	SW LANTAU	2	ND	OFF	HKCRP	SUMMER	
08-Aug-11	2	1600	1	804784	810456	SW LANTAU	2	204	ON	HKCRP	SUMMER	P

Appendix III. (cont'd)

DATE	STG #	TIME	HRD SZ	NORTHING	EASTING	AREA	BEAU	PSD	EFFORT	TYPE	SEASON	P/S
23-Aug-11	1	1024	3	807457	848820	PO TOI	2	131	ON	HKCRP	SUMMER	P
23-Aug-11	2	1355	1	805904	844407	PO TOI	2	138	ON	HKCRP	SUMMER	S
23-Aug-11	3	1505	1	803515	849318	PO TOI	2	49	ON	HKCRP	SUMMER	P
26-Aug-11	1	1629	1	815557	853936	NINEPINS	2	314	ON	HKCRP	SUMMER	P
30-Aug-11	1	1503	2	806472	849728	PO TOI	3	111	ON	HKCRP	SUMMER	P
06-Sep-11	10	1354	7	800589	808933	SW LANTAU	1	8	ON	HKCRP	AUTUMN	S
06-Sep-11	11	1404	3	801607	809440	SW LANTAU	1	54	ON	HKCRP	AUTUMN	P
06-Sep-11	12	1409	1	801973	809451	SW LANTAU	1	66	ON	HKCRP	AUTUMN	P
06-Sep-11	13	1416	5	803146	809731	SW LANTAU	1	55	ON	HKCRP	AUTUMN	P
06-Sep-11	15	1524	5	802585	807482	SW LANTAU	2	30	ON	HKCRP	AUTUMN	S
06-Sep-11	16	1529	3	802142	807615	SW LANTAU	2	18	ON	HKCRP	AUTUMN	S
22-Sep-11	1	1102	1	805571	817522	SE LANTAU	3	119	ON	HKCRP	AUTUMN	S
10-Nov-11	1	1122	2	834489	859762	MIRS BAY	5	ND	OFF	HELI	AUTUMN	
18-Nov-11	1	1548	2	807450	853213	PO TOI	2	173	ON	HKCRP	AUTUMN	P
18-Nov-11	2	1629	1	807244	843633	PO TOI	2	179	ON	HKCRP	AUTUMN	P
28-Nov-11	1	1124	1	804528	854247	PO TOI	3	61	ON	HKCRP	AUTUMN	P
28-Nov-11	2	1419	1	806491	864207	PO TOI	3	158	ON	HKCRP	AUTUMN	P
28-Nov-11	3	1501	2	808505	863151	NINEPINS	4	184	ON	HKCRP	AUTUMN	P
28-Nov-11	4	1600	1	808487	849232	NINEPINS	3	159	ON	HKCRP	AUTUMN	P
29-Nov-11	1	1158	1	803672	813177	SE LANTAU	4	111	ON	HKCRP	AUTUMN	S
7-Dec-11	1	1605	1	801408	809491	SW LANTAU	3	ND	OFF	HELI	WINTER	
21-Dec-11	1	1027	1	806500	835198	LAMMA	2	77	ON	HKCRP	WINTER	P
21-Dec-11	2	1310	1	802493	829710	LAMMA	2	160	ON	HKCRP	WINTER	P
21-Dec-11	3	1439	1	804542	828814	LAMMA	3	148	ON	HKCRP	WINTER	P
09-Jan-12	1	1204	2	802053	814660	SE LANTAU	2	17	ON	HKCRP	WINTER	S
09-Jan-12	2	1217	1	802653	813217	SE LANTAU	2	77	ON	HKCRP	WINTER	P
19-Jan-12	1	1212	1	802482	830309	LAMMA	2	49	ON	HKCRP	WINTER	P
19-Jan-12	2	1316	3	804537	821368	LAMMA	2	176	ON	HKCRP	WINTER	P
19-Jan-12	3	1406	1	805671	829836	LAMMA	2	110	ON	HKCRP	WINTER	S
31-Jan-12	4	1502	1	803460	814250	SE LANTAU	2	60	ON	HKCRP	WINTER	P
1-Feb-12	1	1522	3	810571	866787	NINEPINS	3	ND	OFF	HELI	WINTER	
1-Feb-12	2	1529	2	803101	863047	PO TOI	3	ND	OFF	HELI	WINTER	
2-Mar-12	5	1505	2	803273	813228	SE LANTAU	3	ON	193	HKCRP	SPRING	P

Appendix III. (cont'd)

DATE	STG #	TIME	HRD SZ	NORTHING	EASTING	AREA	BEAU	PSD	EFFORT	TYPE	SEASON	P/S
2-Mar-12	6	1517	4	802763	813558	SE LANTAU	3	ON	51	HKCRP	SPRING	S
5-Mar-12	3	1518	9	803678	830000	LAMMA	2	ND	OFF	HELI	SPRING	
17-Mar-12	1	1013	3	808272	837230	LAMMA	1	281	ON	HKCRP	SPRING	P
17-Mar-12	2	1126	1	806511	837219	LAMMA	1	100	ON	HKCRP	SPRING	P
17-Mar-12	3	1135	2	806500	835590	LAMMA	2	41	ON	HKCRP	SPRING	P
17-Mar-12	4	1141	3	806500	834683	LAMMA	2	24	ON	HKCRP	SPRING	P
17-Mar-12	5	1145	2	806500	834404	LAMMA	2	191	ON	HKCRP	SPRING	P
17-Mar-12	6	1214	8	804518	836498	LAMMA	1	102	ON	HKCRP	SPRING	P
17-Mar-12	7	1327	2	802493	829236	LAMMA	2	36	ON	HKCRP	SPRING	P
17-Mar-12	8	1415	3	804533	825060	LAMMA	2	299	ON	HKCRP	SPRING	P
17-Mar-12	9	1420	1	804533	825596	LAMMA	2	ND	OFF	HKCRP	SPRING	
17-Mar-12	10	1424	2	804533	826174	LAMMA	1	584	ON	HKCRP	SPRING	P
17-Mar-12	11	1428	2	804532	826772	LAMMA	1	447	ON	HKCRP	SPRING	P
17-Mar-12	12	1435	8	804521	827814	LAMMA	1	23	ON	HKCRP	SPRING	P
17-Mar-12	13	1440	2	804531	828484	LAMMA	1	451	ON	HKCRP	SPRING	P
17-Mar-12	14	1457	4	804531	829660	LAMMA	1	327	ON	HKCRP	SPRING	P
17-Mar-12	15	1503	7	805129	829608	LAMMA	1	402	ON	HKCRP	SPRING	S
17-Mar-12	16	1517	1	806491	828959	LAMMA	2	96	ON	HKCRP	SPRING	P
19-Mar-12	1	1102	4	805240	816305	SE LANTAU	3	86	ON	HKCRP	SPRING	P
19-Mar-12	2	1111	8	805572	816202	SE LANTAU	2	29	ON	HKCRP	SPRING	P
19-Mar-12	3	1227	2	802832	812165	SE LANTAU	3	42	ON	HKCRP	SPRING	P
30-Mar-12	4	1410	2	805945	811252	SW LANTAU	2	250	ON	HKCRP	SPRING	P
30-Mar-12	5	1428	6	808290	813019	SE LANTAU	1	ND	OFF	HKCRP	SPRING	
30-Mar-12	6	1450	2	804336	813220	SE LANTAU	2	86	ON	HKCRP	SPRING	P
30-Mar-12	7	1552	1	807432	816679	SE LANTAU	2	44	ON	HKCRP	SPRING	S

Appendix IV. Individual dolphins identified during AFCD surveys (April 2011 to March 2012)

DOLPHIN ID	DATE	STG#	AREA
CH12	27/04/11	2	WL
	27/04/11	3	WL
	22/09/11	6	SWL
CH25	06/05/11	3	WL
CH34	14/05/11	2	NWL
	18/08/11	6	NWL
	18/08/11	7	NEL
	13/10/11	2	NWL
	06/12/11	8	NWL
	19/12/11	4	NWL
CH37	21/11/11	6	WL
CH38	27/04/11	2	WL
	27/04/11	3	WL
	27/04/11	6	WL
	17/08/11	3	WL
	06/09/11	9	SWL
	07/10/11	3	WL
	23/12/11	1	SWL
CH61	27/04/11	3	WL
CH98	28/06/11	2	NWL
	31/10/11	5	DB
	06/12/11	7	NWL
	07/12/11	6	NWL
	14/02/12	4	DB
CH108	06/05/11	3	WL
	07/10/11	2	WL
	18/10/11	8	WL
	21/11/11	6	WL
	30/11/11	2	NWL
	02/03/12	1	WL
	30/03/12	1	WL
CH112	28/06/11	1	NWL
CH113	14/05/11	5	WL
	27/06/11	1	WL
	18/08/11	1	NWL
	20/02/12	2	WL
CH153	14/05/11	5	WL
EL01	12/07/11	1	NEL
	28/07/11	1	NWL
	18/10/11	1	NEL
	27/10/11	1	NWL
	16/11/11	1	NEL
	19/12/11	7	NEL
	11/01/12	2	NEL
	11/02/12	8	NEL
	13/02/12	1	NEL
NL06	15/09/11	4	NWL
	11/01/12	3	NEL
NL11	31/10/11	5	DB
	06/12/11	7	NWL
	14/02/12	4	DB
NL18	13/10/11	1	NWL
	18/10/11	2	NEL
	16/11/11	3	NEL
	19/02/12	4	NEL
NL24	06/05/11	7	NEL
	26/05/11	1	WL
	26/05/11	5	WL
	28/07/11	1	NWL
	11/08/11	2	NWL
	07/10/11	11	NWL
	31/10/11	2	NEL
	15/12/11	5	NWL
	18/01/12	12	NWL
	19/02/12	1	NWL

DOLPHIN ID	DATE	STG#	AREA
NL33	26/05/11	1	WL
	29/06/11	2	NEL
	07/10/11	11	NWL
	31/10/11	2	NEL
	15/12/11	5	NWL
	18/01/12	12	NWL
NL37	10/01/12	3	NWL
NL46	28/06/11	5	NWL
	28/07/11	4	NWL
	18/08/11	4	NWL
	30/11/11	8	NWL
	07/12/11	6	NWL
	11/02/12	3	NWL
NL48	31/08/11	2	NWL
	06/12/11	7	NWL
	18/01/12	12	NWL
NL49	18/10/11	1	NEL
	18/10/11	6	NEL
	19/10/11	2	NWL
NL75	28/07/11	3	NWL
	16/11/11	3	NEL
	11/01/12	3	NEL
	11/02/12	6	NEL
	13/02/12	2	NEL
NL80	14/05/11	2	NWL
	14/09/11	4	NWL
NL93	06/05/11	6	NWL
	18/08/11	6	NWL
	13/10/11	1	NWL
NL98	06/05/11	7	NEL
	29/06/11	2	NEL
	11/08/11	2	NWL
	13/10/11	1	NWL
	31/10/11	1	NEL
	11/02/12	2	NWL
NL103	14/02/12	4	DB
NL104	13/10/11	2	NWL
	19/12/11	4	NWL
	11/02/12	2	NWL
	19/02/12	3	NWL
NL105	07/12/11	7	NWL
NL118	18/01/12	12	NWL
	11/02/12	6	NEL
NL120	31/10/11	2	NEL
	11/01/12	2	NEL
	11/02/12	6	NEL
NL123	29/06/11	2	NEL
	14/09/11	1	NWL
	13/10/11	1	NWL
	18/10/11	5	NEL
	31/10/11	2	NEL
	18/01/12	12	NWL
NL128	05/05/11	3	NWL
	26/05/11	5	WL
	22/11/11	3	SEL
	23/12/11	1	SWL
	18/01/12	12	NWL
NL136	28/07/11	3	NWL
	31/08/11	1	NEL
	15/09/11	4	NWL
	19/10/11	2	NWL
	11/02/12	3	NWL
	11/02/12	6	NEL

DOLPHIN ID	DATE	STG#	AREA
NL139	28/07/11	3	NWL
	31/08/11	1	NEL
	15/09/11	4	NWL
	19/10/11	2	NWL
	30/11/11	9	NEL
	19/02/12	4	NEL
NL145	14/05/11	2	NWL
	27/10/11	6	NWL
	30/11/11	8	NWL
NL150	12/07/11	3	NWL
	06/12/11	7	NWL
	14/02/12	4	DB
NL156	28/06/11	1	NWL
	19/10/11	1	NWL
	30/11/11	4	NWL
	07/12/11	7	NWL
	10/01/12	4	NWL
	11/01/12	1	NWL
	20/02/12	4	WL
NL165	06/05/11	7	NEL
	15/09/11	2	WL
	29/03/12	4	WL
NL176	18/10/11	4	NEL
	18/01/12	12	NWL
	29/03/12	1	NEL
NL179	06/05/11	6	NWL
	06/05/11	7	NEL
	30/11/11	9	NEL
	11/02/12	7	NEL
NL188	15/12/11	5	NWL
NL191	06/05/11	6	NWL
	06/05/11	7	NEL
	18/08/11	4	NWL
	19/02/12	4	NEL
NL202	29/06/11	2	NEL
	14/09/11	3	NWL
	21/11/11	13	NWL
	07/12/11	4	NWL
	18/01/12	11	NWL
	19/02/12	2	NWL
NL206	17/08/11	4	WL
	15/09/11	2	WL
	23/12/11	1	SWL
	20/02/12	2	WL
NL210	06/05/11	6	NWL
NL212	07/10/11	7	WL
	11/02/12	4	NWL
NL214	28/06/11	3	NWL
NL215	19/10/11	3	NWL
NL216	28/06/11	2	NWL
NL219	06/05/11	6	NWL
	14/05/11	2	NWL
	19/12/11	4	NWL
	18/01/12	12	NWL
	11/02/12	6	NEL
	13/02/12	2	NEL
NL220	07/10/11	11	NWL
	19/10/11	2	NWL
	30/11/11	9	NEL
	19/02/12	4	NEL
NL224	28/06/11	2	NWL
	27/10/11	5	NWL
	15/12/11	3	DB
	14/02/12	4	DB

Appendix IV. (cont'd)

DOLPHIN ID	DATE	STG#	AREA
NL226	28/07/11	1	NWL
	31/10/11	3	NEL
	15/12/11	5	NWL
	18/01/12	12	NWL
NL230	07/10/11	7	WL
	11/02/12	3	NWL
NL233	14/05/11	2	NWL
	12/07/11	3	NWL
	27/10/11	5	NWL
	14/02/12	4	DB
NL236	06/04/11	3	WL
	27/10/11	5	NWL
	11/02/12	3	NWL
NL241	11/02/12	1	NWL
	11/02/12	2	NWL
	19/02/12	2	NWL
NL242	28/07/11	1	NWL
	30/11/11	6	NWL
	18/01/12	12	NWL
	11/02/12	6	NEL
	29/03/12	1	NEL
NL244	28/07/11	1	NWL
	18/08/11	4	NWL
	06/12/11	7	NWL
NL246	06/05/11	7	NEL
	18/08/11	5	NWL
	11/01/12	2	NEL
NL256	14/05/11	2	NWL
	27/10/11	5	NWL
NL258	28/07/11	1	NWL
NL259	06/05/11	6	NWL
	13/10/11	1	NWL
	30/11/11	4	NWL
	11/02/12	5	NEL
NL260	18/10/11	5	NEL
	19/10/11	2	NWL
	11/02/12	5	NEL
NL261	06/05/11	7	NEL
	18/08/11	5	NWL
	30/11/11	9	NEL
NL262	28/07/11	4	NWL
	18/08/11	4	NWL
	07/12/11	6	NWL
	11/02/12	3	NWL
NL264	13/10/11	1	NWL
	18/10/11	1	NEL
	18/10/11	3	NEL
	15/12/11	1	NWL
	19/02/12	3	NWL
	20/02/12	7	NWL
	29/03/12	4	WL
NL272	15/12/11	3	DB
	19/02/12	4	NEL
NL275	07/12/11	3	NWL
NL276	18/08/11	2	NWL
NL278	14/05/11	2	NWL
NL280	14/05/11	2	NWL
	12/07/11	3	NWL
	27/10/11	5	NWL
	14/02/12	4	DB

DOLPHIN ID	DATE	STG#	AREA
NL281	28/06/11	2	NWL
	07/12/11	7	NWL
NL282	30/11/11	4	NWL
NL284	06/05/11	7	NEL
	29/06/11	2	NEL
	11/08/11	2	NWL
	13/10/11	1	NWL
	31/10/11	1	NEL
	11/02/12	2	NWL
NL285	29/06/11	2	NEL
	14/09/11	1	NWL
	13/10/11	1	NWL
	18/10/11	5	NEL
	31/10/11	2	NEL
	18/01/12	12	NWL
NL286	29/06/11	2	NEL
	14/09/11	3	NWL
	07/12/11	4	NWL
	18/01/12	11	NWL
	19/02/12	2	NWL
NL287	14/05/11	2	NWL
	28/06/11	2	NWL
	27/10/11	6	NWL
	30/11/11	8	NWL
NL288	31/08/10	7	WL
	08/02/11	13	NWL
	13/10/11	1	NWL
	18/10/11	1	NEL
	18/10/11	3	NEL
	15/12/11	1	NWL
	19/02/12	3	NWL
	29/03/12	4	WL
NL289	07/10/11	7	WL
NL290	18/08/11	6	NWL
	18/08/11	7	NEL
	19/12/11	2	NWL
	11/01/12	3	NEL
	11/02/12	6	NEL
NL291	12/10/10	1	NWL
	06/12/11	7	NWL
	18/01/12	12	NWL
	14/02/12	4	DB
NL292	31/10/11	2	NEL
NL293	17/04/11	1	NWL
	26/05/11	5	WL
	22/09/11	8	WL
NL295	29/06/11	2	NEL
	28/07/11	1	NWL
	11/02/12	2	NWL
NL296	29/06/11	2	NEL
	18/10/11	5	NEL
	11/02/12	5	NEL
NL298	15/09/11	3	NWL
SL05	15/09/11	2	WL
	30/03/12	1	WL
SL27	18/04/11	7	WL
	23/12/11	2	SWL
SL35	09/04/11	1	WL
	26/05/11	2	WL
	26/05/11	4	WL
	01/06/11	6	SWL
	06/09/11	14	SWL
	14/10/11	2	SWL
	30/03/12	3	SWL

DOLPHIN ID	DATE	STG#	AREA
SL40	09/04/11	1	WL
	26/05/11	5	WL
	01/09/11	1	WL
	06/09/11	7	WL
	14/10/11	2	SWL
	06/12/11	3	WL
	23/12/11	1	SWL
SL42	19/10/11	1	NWL
SL44	01/09/11	1	WL
SL46	14/10/11	2	SWL
	23/12/11	1	SWL
SL47	06/05/11	3	WL
	14/05/11	5	WL
	26/05/11	2	WL
	20/02/12	2	WL
	30/03/12	1	WL
SL48	27/04/11	3	WL
	06/09/11	7	WL
SL49	01/12/10	10	SWL
	14/05/11	5	WL
	07/10/11	3	WL
	14/10/11	2	SWL
	29/11/11	2	SEL
WL04	15/12/11	3	DB
	19/12/11	4	NWL
WL05	18/10/11	1	NEL
	18/10/11	6	NEL
	19/10/11	2	NWL
	10/01/12	4	NWL
	29/03/12	4	WL
WL11	29/06/11	2	NEL
	28/07/11	3	NWL
	30/11/11	6	NWL
	15/12/11	5	NWL
WL15	26/05/11	2	WL
	26/05/11	5	WL
	27/07/11	1	SWL
	22/09/11	9	WL
	30/11/11	4	NWL
	02/03/12	3	SWL
WL17	18/01/12	12	NWL
	11/02/12	6	NEL
WL21	27/06/11	2	WL
	13/02/12	6	WL
WL25	09/04/11	3	WL
	26/05/11	5	WL
	27/07/11	4	WL
	17/08/11	4	WL
	06/09/11	5	WL
	15/09/11	1	WL
	15/09/11	2	WL
	14/10/11	1	WL
	30/11/11	4	NWL
	18/01/12	1	WL
	18/01/12	3	WL
	13/02/12	3	WL
	13/02/12	6	WL
	20/02/12	2	WL
WL28	20/02/12	2	WL

Appendix IV. (cont'd)

DOLPHIN ID	DATE	STG#	AREA
WL29	21/11/11	1	WL
	30/11/11	3	NWL
	06/12/11	5	WL
	20/02/12	2	WL
WL33	07/12/11	7	NWL
WL40	14/05/11	2	NWL
WL42	21/11/11	6	WL
	30/11/11	4	NWL
	18/01/12	6	WL
	30/03/12	1	WL
WL44	27/06/11	1	WL
	05/07/11	7	SWL
	06/09/11	9	SWL
	06/12/11	6	WL
	23/12/11	1	SWL
	18/01/12	6	WL
WL46	06/05/11	2	WL
	06/05/11	3	WL
	07/12/11	6	NWL
WL47	06/12/11	2	WL
WL48	06/09/11	2	WL
	07/12/11	3	NWL
	11/02/12	6	NEL
WL50	06/04/11	4	WL
	17/04/11	2	NWL
	27/04/11	2	WL
	27/04/11	3	WL
	05/07/11	5	WL
	30/11/11	4	NWL
	10/01/12	2	WL
	01/03/12	2	NWL
WL60	30/11/11	7	NWL
WL61	27/04/11	2	WL
	05/07/11	3	WL
	07/10/11	3	WL
	14/10/11	2	SWL
	18/10/11	8	WL
	20/02/12	5	WL
WL62	27/04/11	5	WL
	06/05/11	3	WL
	22/09/11	2	SWL
	29/11/11	2	SEL
WL66	14/05/11	5	WL
WL68	27/04/11	3	WL
	21/11/11	6	WL
	22/11/11	1	SWL
WL69	26/05/11	5	WL
	05/07/11	7	SWL
	14/10/11	2	SWL
	23/12/11	1	SWL
WL72	06/05/11	2	WL
	15/09/11	2	WL
	22/09/11	5	SWL
	14/10/11	1	WL
	21/11/11	6	WL
	18/01/12	6	WL
	01/03/12	2	NWL
	02/03/12	1	WL
	30/03/12	1	WL
WL73	03/04/11	2	WL
	18/10/11	8	WL
	21/11/11	6	WL
	22/11/11	1	SWL
	30/11/11	4	NWL

DOLPHIN ID	DATE	STG#	AREA
WL74	04/04/11	2	WL
	30/03/12	1	WL
WL79	06/05/11	1	WL
WL84	27/04/11	3	WL
	22/09/11	5	SWL
	30/03/12	1	WL
WL86	18/04/11	2	WL
	06/09/11	17	WL
	15/09/11	2	WL
	21/11/11	7	WL
	22/11/11	1	SWL
	23/12/11	1	SWL
WL87	05/07/11	7	SWL
	06/09/11	6	WL
	07/10/11	6	WL
	21/11/11	3	WL
	22/11/11	3	SEL
	29/11/11	2	SEL
	02/03/12	1	WL
WL88	17/08/11	2	WL
	22/09/11	2	SWL
	29/11/11	2	SEL
WL91	27/04/11	3	WL
	30/03/12	1	WL
WL92	06/09/11	8	SWL
	30/03/12	1	WL
WL93	18/04/11	7	WL
	26/05/11	2	WL
	27/07/11	1	SWL
	14/09/11	1	NWL
	30/03/12	1	WL
WL94	02/03/12	4	SWL
	30/03/12	1	WL
WL98	15/09/11	1	WL
	07/12/11	2	NWL
WL99	18/04/11	3	WL
	06/05/11	4	WL
	08/12/11	1	SWL
	19/03/12	4	SWL
WL100	15/09/11	1	WL
WL109	14/10/11	1	WL
	30/11/11	2	NWL
	18/01/12	7	WL
	30/03/12	1	WL
WL111	18/08/11	4	NWL
WL114	23/12/11	1	SWL
	30/03/12	1	WL
WL116	04/04/11	2	WL
	15/09/11	2	WL
	30/03/12	1	WL
WL118	05/07/11	5	WL
WL120	27/06/11	2	WL
WL122	06/05/11	1	WL
WL123	27/04/11	6	WL
	27/07/11	3	WL
	15/09/11	1	WL
	15/09/11	2	WL
	30/11/11	4	NWL
	30/03/12	1	WL
WL124	27/06/11	2	WL
WL128	23/12/11	1	SWL
WL129	21/11/11	6	WL
	23/12/11	1	SWL

DOLPHIN ID	DATE	STG#	AREA
WL130	27/04/11	3	WL
	26/05/11	5	WL
	17/08/11	4	WL
	18/01/12	2	WL
WL131	06/04/11	4	WL
	09/04/11	3	WL
	05/07/11	3	WL
	27/07/11	3	WL
	06/09/11	5	WL
	30/11/11	4	NWL
	02/03/12	1	WL
	30/03/12	1	WL
WL132	01/09/11	1	WL
	07/10/11	3	WL
	14/10/11	2	SWL
	22/11/11	3	SEL
	23/12/11	1	SWL
WL135	07/10/11	3	WL
	29/11/11	2	SEL
	23/12/11	1	SWL
WL137	27/07/11	1	SWL
	15/09/11	2	WL
	14/10/11	1	WL
WL138	18/04/11	7	WL
	27/07/11	3	WL
	14/09/11	1	NWL
	18/01/12	8	WL
	20/02/12	2	WL
WL140	06/05/11	3	WL
	26/05/11	5	WL
	06/09/11	6	WL
WL142	09/04/11	1	WL
	17/08/11	4	WL
	06/09/11	8	SWL
	22/09/11	6	SWL
	22/09/11	7	WL
	14/10/11	1	WL
	22/11/11	1	SWL
WL144	21/11/11	6	WL
WL145	06/04/11	3	WL
	06/05/11	2	WL
	06/05/11	3	WL
	07/12/11	7	NWL
WL151	21/11/11	6	WL
	30/11/11	3	NWL
WL152	27/04/11	6	WL
	27/07/11	4	WL
	30/11/11	4	NWL
	10/01/12	1	WL
	18/01/12	3	WL
	13/02/12	4	WL
	14/02/12	2	WL
	20/02/12	4	WL
WL153	18/04/11	1	WL
	18/04/11	2	WL
	14/05/11	5	WL
	22/09/11	10	WL
WL155	06/12/11	2	WL
WL156	06/05/11	1	WL
WL157	18/04/11	2	WL
	06/05/11	2	WL
	06/05/11	3	WL
	27/07/11	3	WL
	22/09/11	7	WL
	07/10/11	3	WL

Appendix IV. (cont'd)

DOLPHIN ID	DATE	STG#	AREA
WL164	06/09/11	5	WL
	07/10/11	3	WL
	20/02/12	2	WL
WL165	18/04/11	2	WL
	27/04/11	3	WL
	06/09/11	17	WL
	15/09/11	2	WL
	21/11/11	7	WL
	23/12/11	1	SWL
WL167	19/10/11	1	NWL
WL170	18/04/11	7	WL
	27/07/11	3	WL
	07/10/11	3	WL
	23/12/11	2	SWL
WL171	23/12/11	1	SWL
WL172	14/05/11	2	NWL
	12/07/11	5	DB
WL173	08/02/11	9	WL
WL174	22/09/11	3	SWL
WL177	06/05/11	3	WL
	22/11/11	1	SWL
WL178	06/05/11	3	WL
	27/07/11	1	SWL
	06/09/11	2	WL
WL179	17/08/11	4	WL
	19/12/11	3	NWL
WL180	23/12/11	1	SWL
	30/03/12	1	WL
WL181	21/11/11	1	WL
	21/11/11	3	WL
	20/02/12	2	WL
WL182	21/11/11	3	WL
	22/11/11	3	SEL
	20/02/12	2	WL
WL183	30/11/11	4	NWL
WL184	18/04/11	2	WL
	06/05/11	2	WL
	06/05/11	3	WL
	07/10/11	1	WL
WL187	04/04/11	1	WL
	05/07/11	7	SWL
	21/11/11	10	WL
WL188	15/12/11	3	DB
WL189	06/05/11	6	NWL
	14/05/11	2	NWL
	18/08/11	1	NWL
WL190	05/07/11	2	WL
WL191	22/09/11	7	WL
WL192	06/04/11	2	WL
WL193	09/04/11	1	WL
	06/05/11	1	WL
	14/05/11	5	WL
	15/09/11	2	WL
WL194	06/05/11	1	WL
	06/05/11	3	WL
WL196	27/06/11	1	WL
WL198	30/11/11	4	NWL
WL199	15/09/11	1	WL
	30/11/11	4	NWL
	07/12/11	2	NWL
	15/12/11	1	NWL
WL200	30/11/11	4	NWL
WL201	30/11/11	2	NWL
	30/03/12	1	WL
WL202	21/11/11	6	WL
	20/02/12	2	WL

Appendix V. Association of Identified Dolphins on Each Survey Day (April 2011-March 2012)

DATE	STG#	AREA	DOLPHIN ID
03/04/11	2	WL	WL73
04/04/11	1	WL	WL187
"	2	WL	WL74, WL116
06/04/11	2	WL	WL192
"	3	WL	NL236, WL145
"	4	WL	WL50, WL131
09/04/11	1	WL	SL35, SL40, WL142, WL193
"	3	WL	WL25, WL131
17/04/11	1	NWL	NL283
"	2	NWL	WL50
18/04/11	1	WL	WL153
"	2	WL	WL86, WL153, WL157, WL165, WL184
"	3	WL	WL99
"	7	WL	SL27, WL93, WL138, WL170
27/04/11	2	WL	CH12, CH38, WL50, WL61
"	3	WL	CH12, CH38, CH61, SL48, WL50, WL68, WL84, WL91, WL130, WL165
"	5	WL	WL62
"	6	WL	CH38, WL123, WL152
05/05/11	3	NWL	NL128
06/05/11	1	WL	WL79, WL122, WL156, WL193, WL194
"	2	WL	WL46, WL72, WL145, WL157, WL184
"	3	WL	CH25, CH108, SL47, WL46, WL62, WL140, WL145, WL157, WL177, WL178, WL184, WL194
"	4	WL	WL99
"	6	NWL	NL93, NL179, NL191, NL210, NL219, NL259, WL189
"	7	NEL	NL24, NL98, NL165, NL179, NL191, NL246, NL261, NL284
14/05/11	2	NWL	CH34, NL80, NL145, NL219, NL233, NL256, NL278, NL280, NL287, WL40, WL172, WL189
"	5	WL	CH113, CH153, SL47, SL49, WL66, WL153, WL193
26/05/11	1	WL	NL24, NL33
"	2	WL	SL35, SL47, WL15, WL93
"	4	WL	SL35
"	5	WL	NL24, NL128, NL293, SL40, WL15, WL25, WL69, WL130, WL140
01/06/11	6	SWL	SL35
27/06/11	1	WL	CH113, WL185, WL196
"	2	WL	WL21, WL120, WL124
28/06/11	1	NWL	CH112, NL156
"	2	NWL	CH98, NL216, NL224, NL281, NL287
"	3	NWL	NL214
"	5	NWL	NL46
29/06/11	2	NEL	NL33, NL98, NL123, NL202, NL284, NL285, NL286, NL295, NL296, WL11
05/07/11	2	WL	WL190
"	3	WL	WL61, WL131
"	5	WL	WL50, WL118
"	7	SWL	WL44, WL69, WL87, WL187

DATE	STG#	AREA	DOLPHIN ID
12/07/11	1	NEL	EL01
"	3	NWL	NL150, NL233, NL280
"	5	DB	WL172
27/07/11	1	SWL	WL15, WL93, WL137, WL178
"	3	WL	WL123, WL131, WL138, WL157, WL170
"	4	WL	WL25, WL152
28/07/11	1	NWL	EL01, NL24, NL226, NL242, NL244, NL258, NL295
"	3	NWL	NL75, NL136, NL139, WL11
"	4	NWL	NL46, NL262
11/08/11	2	NWL	NL24, NL98, NL284
17/08/11	2	WL	WL88
"	3	WL	CH38
"	4	WL	NL206, WL25, WL130, WL142, WL179
18/08/11	1	NWL	CH113, WL189
"	2	NWL	NL276
"	4	NWL	NL46, NL191, NL244, NL262, WL111
"	5	NWL	NL246, NL261
"	6	NWL	CH34, NL93, NL290
"	7	NEL	CH34, NL290
31/08/11	1	NEL	NL136, NL139
"	2	NWL	NL48
01/09/11	1	WL	SL40, SL44, WL132
06/09/11	2	WL	WL48, WL178
"	5	WL	WL25, WL131, WL164
"	6	WL	WL87, WL140
"	7	WL	SL40, SL48
"	8	SWL	WL92, WL142
"	9	SWL	CH38, WL44
"	14	SWL	SL35
"	17	WL	WL86, WL165
14/09/11	1	NWL	NL123, NL285, WL93, WL138
"	3	NWL	NL202, NL286
"	4	NWL	NL80
"	6	NEL	EL01, NL118
15/09/11	1	WL	WL25, WL98, WL100, WL123, WL199
"	2	WL	NL165, NL206, SL05, WL25, WL72, WL86, WL116, WL123, WL137, WL165, WL193
"	3	NWL	NL298
"	4	NWL	NL06, NL136, NL139
22/09/11	2	SWL	WL62, WL88
"	3	SWL	WL174
"	5	SWL	WL72, WL84
"	6	SWL	CH12, WL142
"	7	WL	WL142, WL157, WL191
"	8	WL	NL293
"	9	WL	WL15
"	10	WL	WL153

Appendix V. (cont'd)

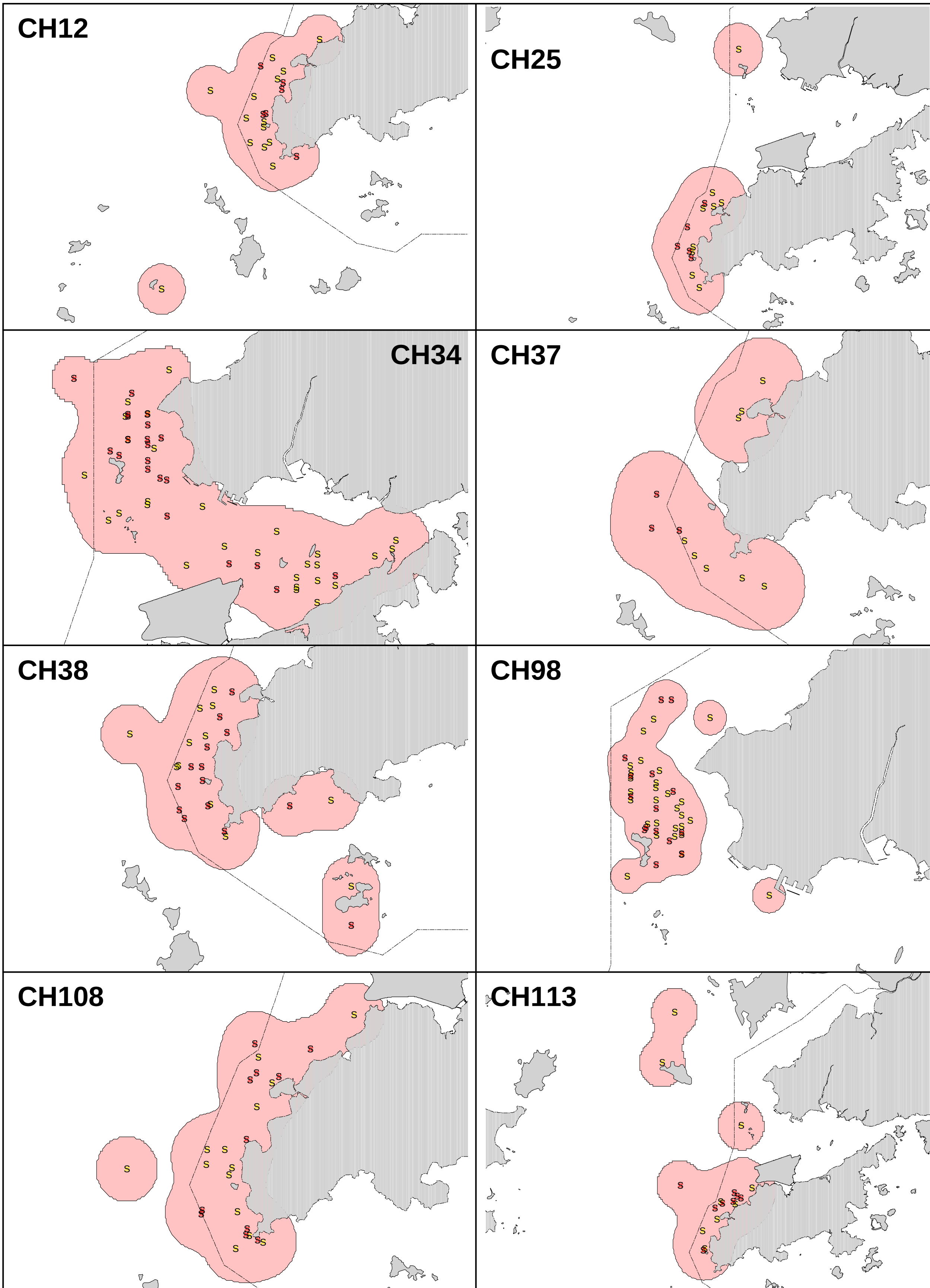
DATE	STG#	AREA	DOLPHIN ID
07/10/11	1	WL	WL184
"	2	WL	CH108
"	3	WL	CH38, SL49, WL61, WL132, WL135, WL157, WL164, WL170
"	6	WL	WL87
"	7	WL	NL212, NL230, NL289
"	11	NWL	NL24, NL33, NL220
13/10/11	1	NWL	NL18, NL93, NL98, NL123, NL259, NL264, NL284, NL285, NL288
"	2	NWL	CH34, NL104
14/10/11	1	WL	WL25, WL72, WL109, WL137, WL142
"	2	SWL	SL35, SL40, SL46, SL49, WL61, WL69, WL132
18/10/11	1	NEL	EL01, NL49, NL264, NL288, WL05
"	2	NEL	NL18
"	3	NEL	NL264, NL288
"	4	NEL	NL176
"	5	NEL	NL123, NL260, NL285, NL296
"	6	NEL	NL49, WL05
"	8	WL	CH108, WL61, WL73
19/10/11	1	NWL	NL156, SL42, WL167
"	2	NWL	NL49, NL136, NL139, NL220, NL260, WL05
"	3	NWL	NL215
27/10/11	1	NWL	EL01
"	5	NWL	NL224, NL233, NL236, NL256, NL280
"	6	NWL	NL145, NL287
31/10/11	1	NEL	NL98, NL284
"	2	NEL	NL24, NL33, NL120, NL123, NL285, NL292
"	3	NEL	NL226
"	5	DB	CH98, NL11
16/11/11	1	NEL	EL01
"	3	NEL	NL18, NL75
21/11/11	1	WL	WL29, WL181
"	3	WL	WL87, WL181, WL182
"	6	WL	CH37, CH108, WL42, WL68, WL72, WL73, WL129, WL144, WL151, WL202
"	7	WL	WL86, WL165
"	10	WL	WL187
"	13	NWL	NL202
22/11/11	1	SWL	WL68, WL73, WL86, WL142, WL177
"	3	SEL	NL128, WL87, WL132, WL182
29/11/11	2	SEL	SL49, WL62, WL87, WL88, WL135
30/11/11	2	NWL	CH108, WL109, WL201
"	3	NWL	WL29, WL151
"	4	NWL	NL156, NL259, NL282, WL15, WL25, WL42, WL50, WL73, WL123, WL131, WL152, WL183, WL198, WL199, WL200
"	6	NWL	NL242, WL11
"	7	NWL	WL60
"	8	NWL	NL46, NL145, NL287
"	9	NEL	NL139, NL179, NL220, NL261

DATE	STG#	AREA	DOLPHIN ID
06/12/11	2	WL	WL47, WL155
"	3	WL	SL40
"	5	WL	WL29
"	6	WL	WL44
"	7	NWL	CH98, NL11, NL48, NL150, NL244, NL291
"	8	NWL	CH34
07/12/11	2	NWL	WL98, WL199
"	3	NWL	NL275, WL48
"	4	NWL	NL202, NL286
"	6	NWL	CH98, NL46, NL262, WL46
"	7	NWL	NL105, NL156, NL281, WL33, WL145
08/12/11	1	SWL	WL99
15/12/11	1	NWL	NL264, NL288, WL199
"	3	DB	NL224, NL272, WL04, WL188
"	5	NWL	NL24, NL33, NL188, NL226, WL11
19/12/11	2	NWL	NL290
"	3	NWL	WL179
"	4	NWL	CH34, NL104, NL219, WL04
"	7	NEL	EL01
21/12/11	1	WL	WL86, WL165
"	2	WL	WL164
"	3	WL	WL109
23/12/11	1	SWL	CH38, NL128, NL206, SL40, SL46, WL44, WL69, WL86, WL114, WL128, WL129, WL132, WL135, WL165, WL171, WL180
"	2	SWL	SL27, WL170
10/01/12	1	WL	WL152
"	3	NWL	NL37
"	4	NWL	NL156, WL05
11/01/12	1	NWL	NL156
"	2	NEL	EL01, NL120, NL246
"	3	NEL	NL06, NL75, NL290
18/01/12	1	WL	WL25
"	2	WL	WL130
"	3	WL	WL25, WL152
"	6	WL	WL42, WL44, WL72
"	7	WL	WL109
"	8	WL	WL138
"	11	NWL	NL202, NL286
"	12	NWL	NL24, NL33, NL48, NL118, NL123, NL128, NL176, NL219, NL226, NL242, NL285, NL291, NL294
11/02/12	1	NWL	NL241
"	2	NWL	NL98, NL104, NL241, NL284, NL295
"	3	NWL	NL46, NL136, NL230, NL236, NL262
"	4	NWL	NL212
"	5	NEL	NL259, NL260, NL296
"	6	NEL	NL75, NL118, NL120, NL136, NL219, NL242, NL290, WL17, WL48
"	7	NEL	NL179
"	8	NEL	EL01
13/02/12	1	NEL	EL01
"	2	NEL	NL75, NL219
"	3	WL	WL25
"	4	WL	WL152
"	6	WL	WL21, WL25

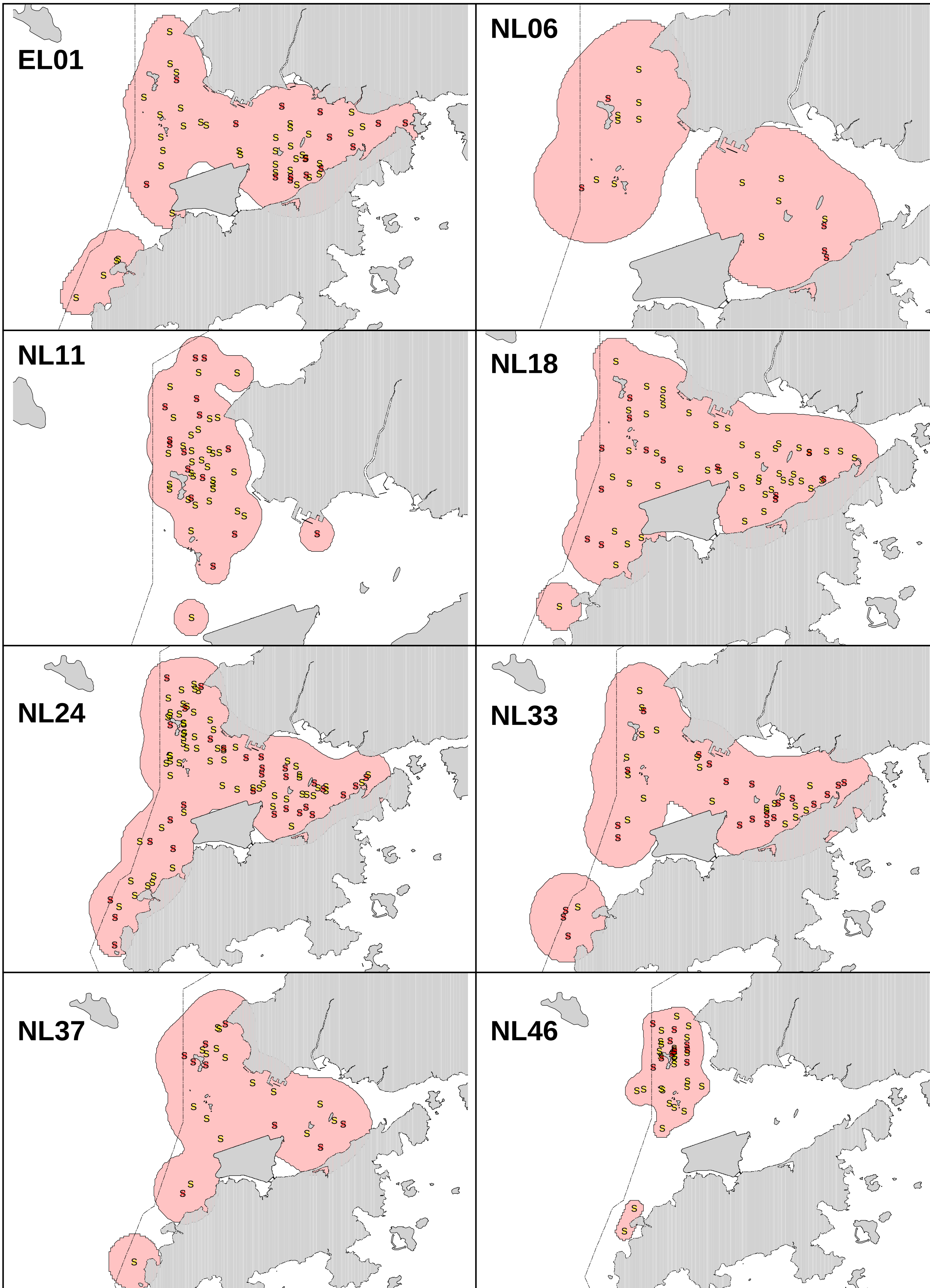
Appendix V. (cont'd)

DATE	STG#	AREA	DOLPHIN ID
14/02/12	2	WL	WL152
"	4	DB	CH98, NL11, NL103, NL150, NL224, NL233, NL280, NL291
19/02/12	1	NWL	NL24
"	2	NWL	NL202, NL241, NL286
"	3	NWL	NL104, NL264, NL288
"	4	NEL	NL18, NL139, NL191, NL220, NL272
20/02/12	2	WL	CH113, NL206, SL47, WL25, WL28, WL29, WL138, WL164, WL181, WL182, WL202
"	4	WL	NL156, WL152
"	5	WL	WL61
"	7	NWL	NL264
01/03/12	2	NWL	WL50, WL72
02/03/12	1	WL	CH108, WL72, WL87, WL131
"	3	SWL	WL152
"	4	SWL	WL94
19/03/12	4	SWL	WL99
29/03/12	1	NEL	NL176, NL242
"	4	WL	NL165, NL264, NL288, WL05
30/03/12	1	WL	CH108, SL05, SL47, WL42, WL72, WL74, WL84, WL91, WL92, WL93, WL94, WL109, WL114, WL116, WL123, WL131, WL180, WL201
"	3	SWL	SL35

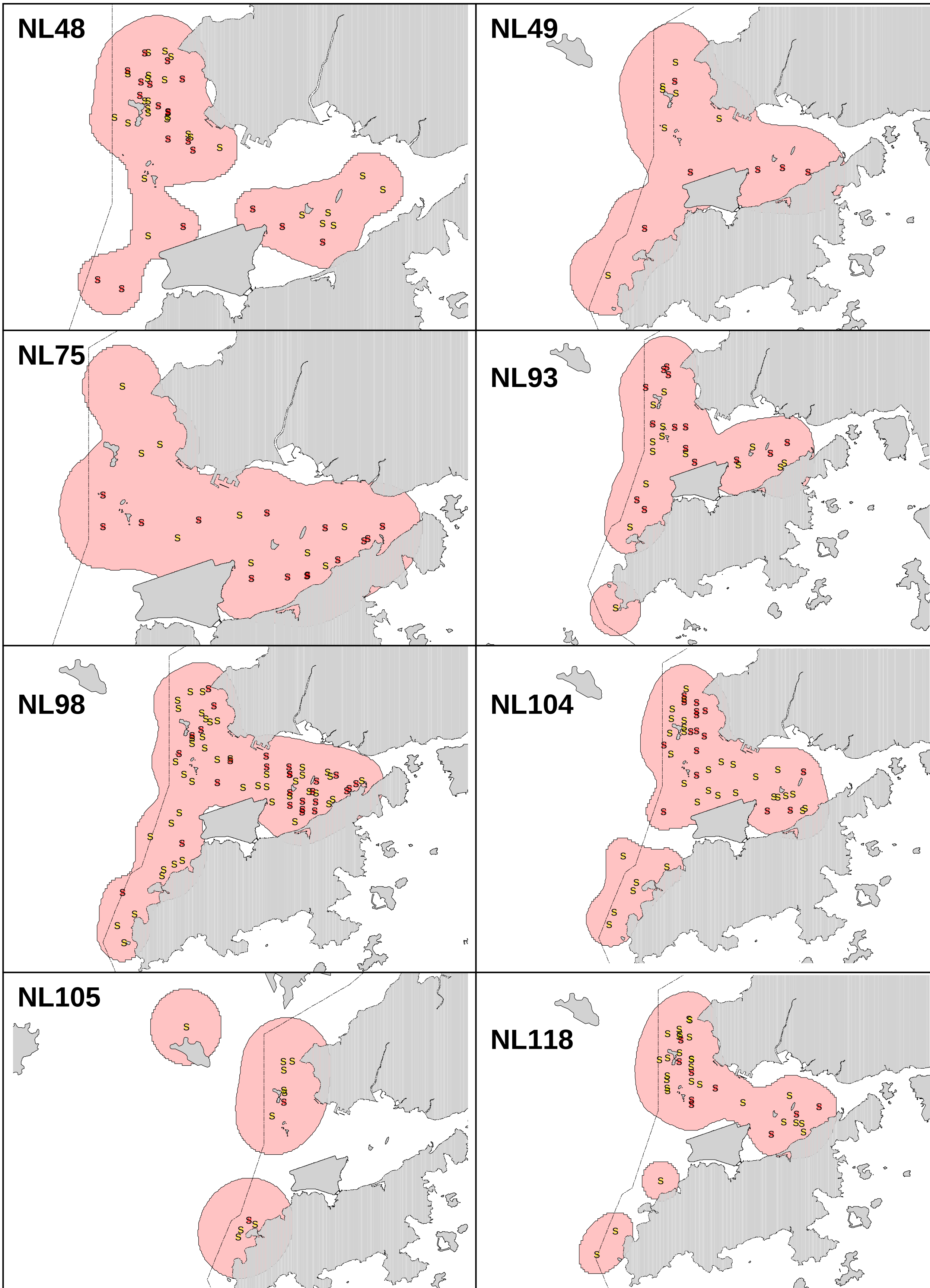
Appendix VI. Ranging patterns (95% kernel ranges) of 120 individual dolphins with 10+ re-sightings that were sighted during 2011-12 AFCD monitoring period (note: red dots indicates sightings made in 2010 & 2011)



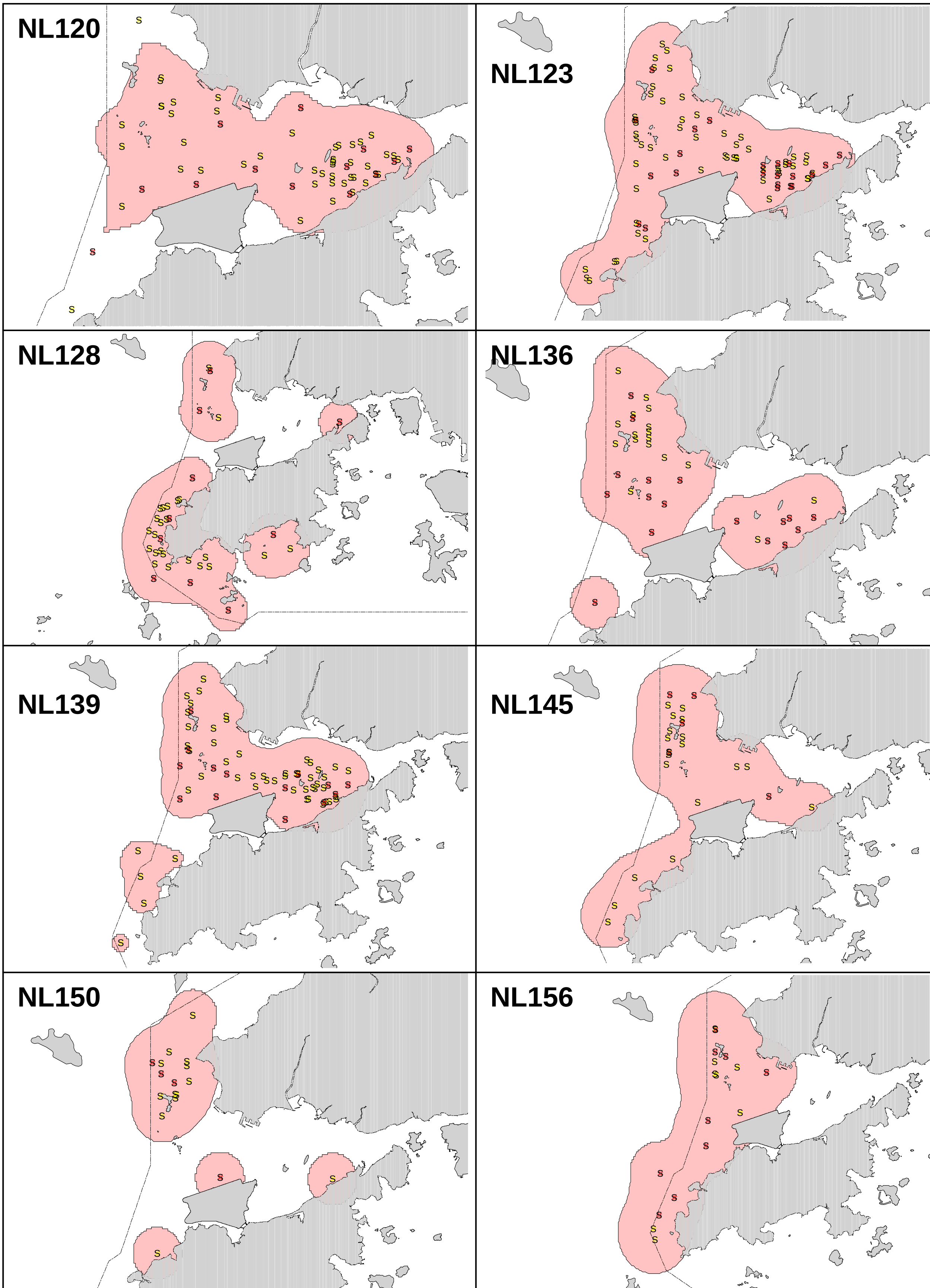
Appendix VI (cont'd).



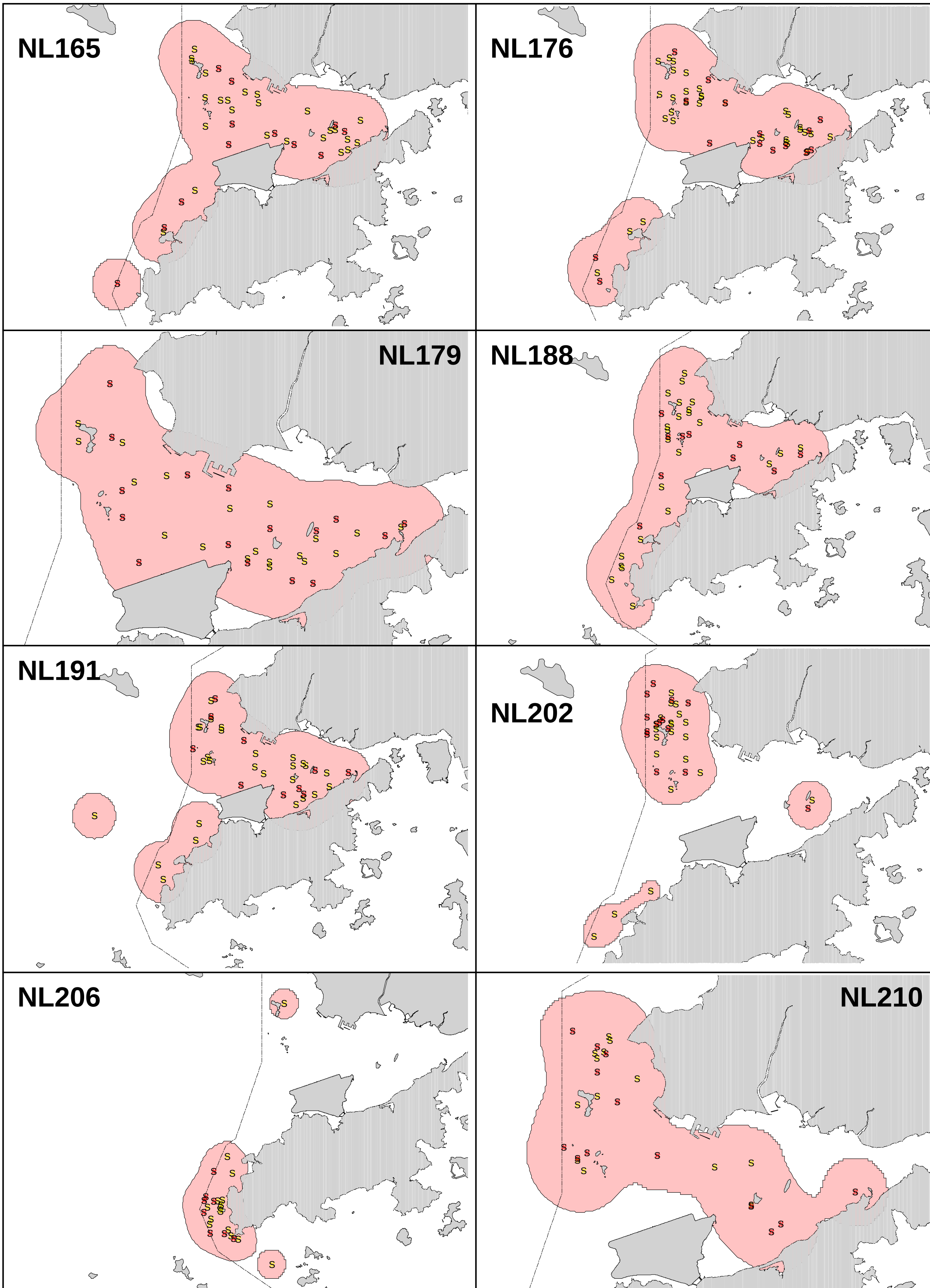
Appendix VI (cont'd).



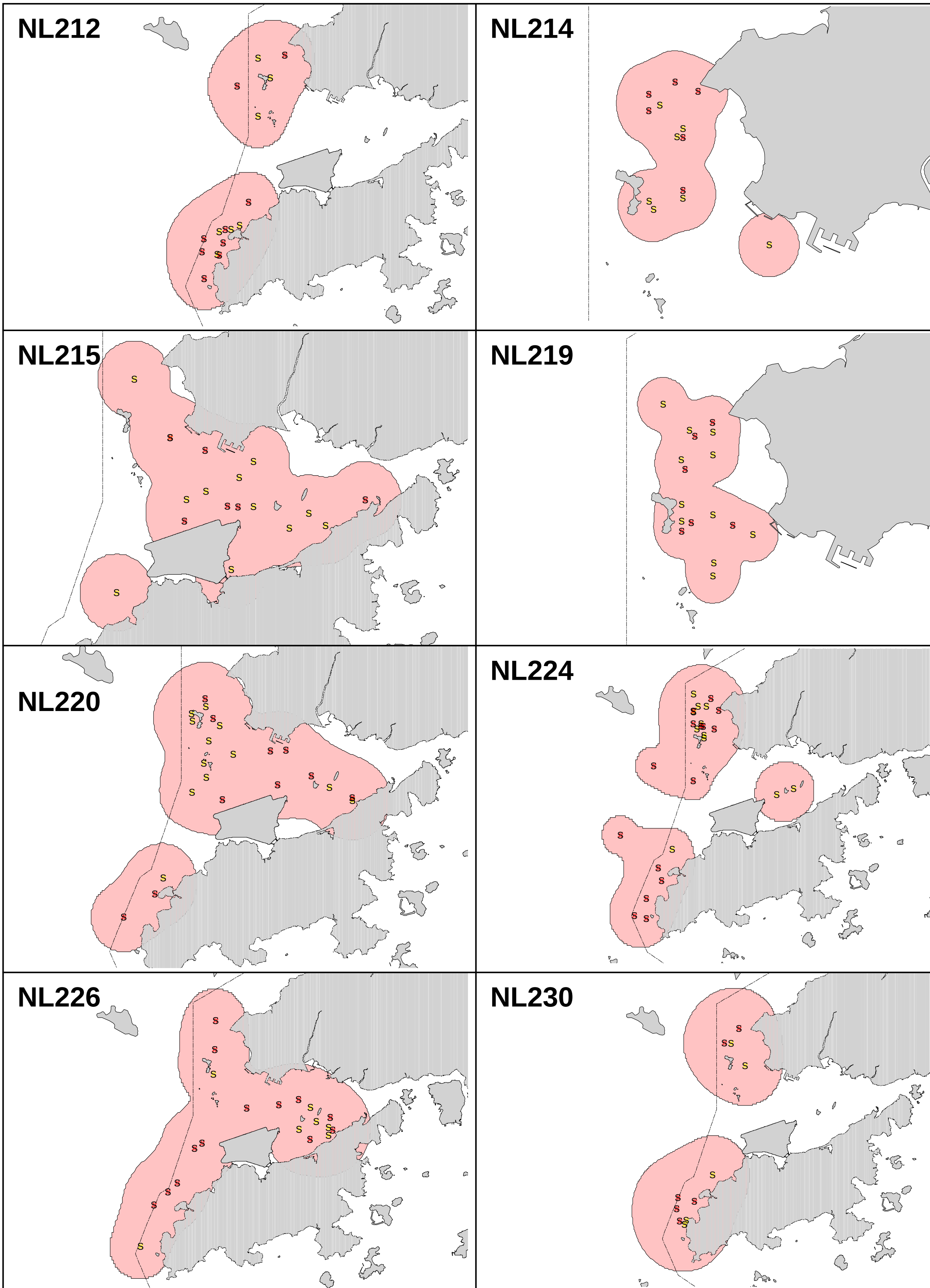
Appendix VI (cont'd).



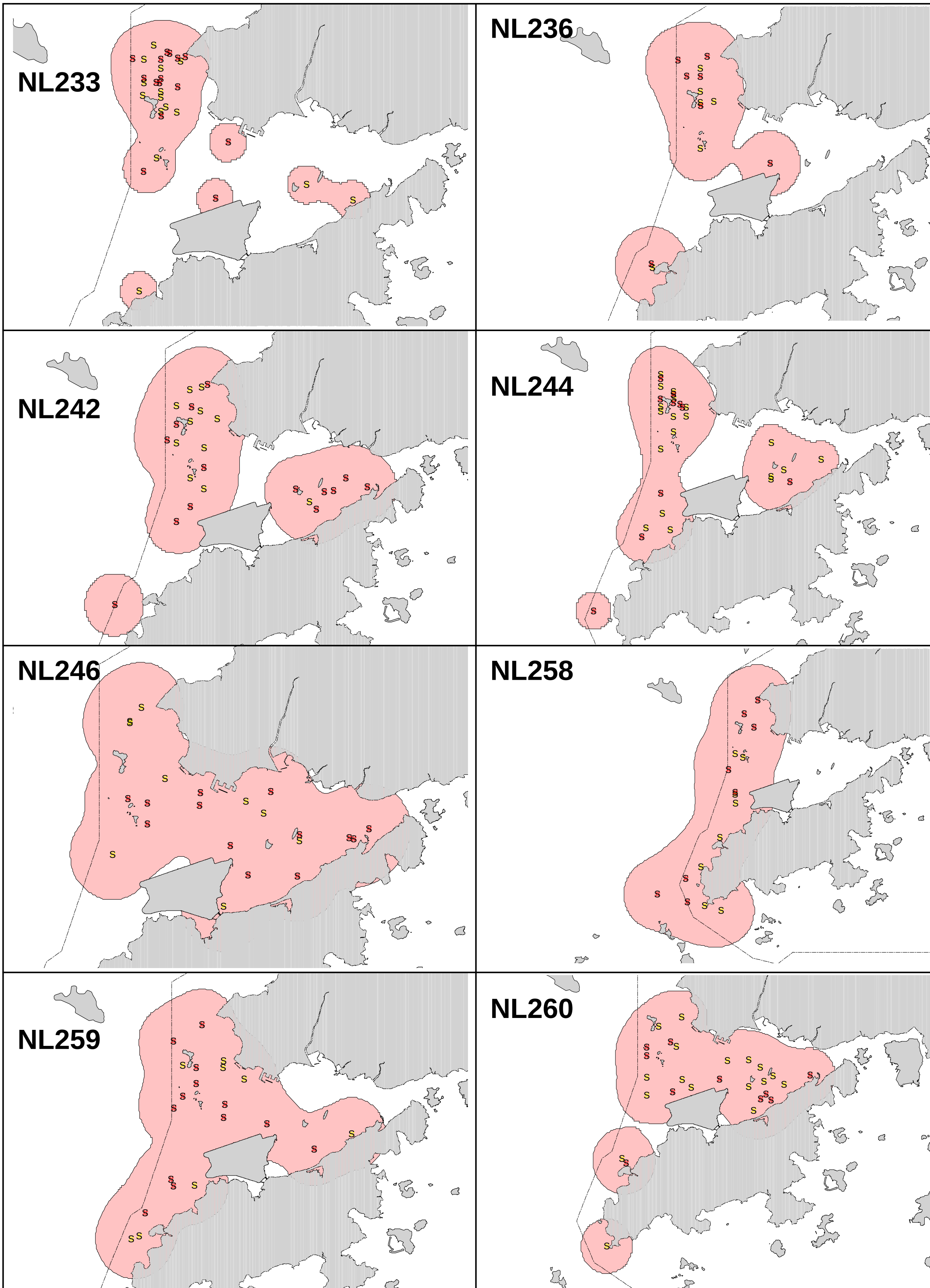
Appendix VI (cont'd).



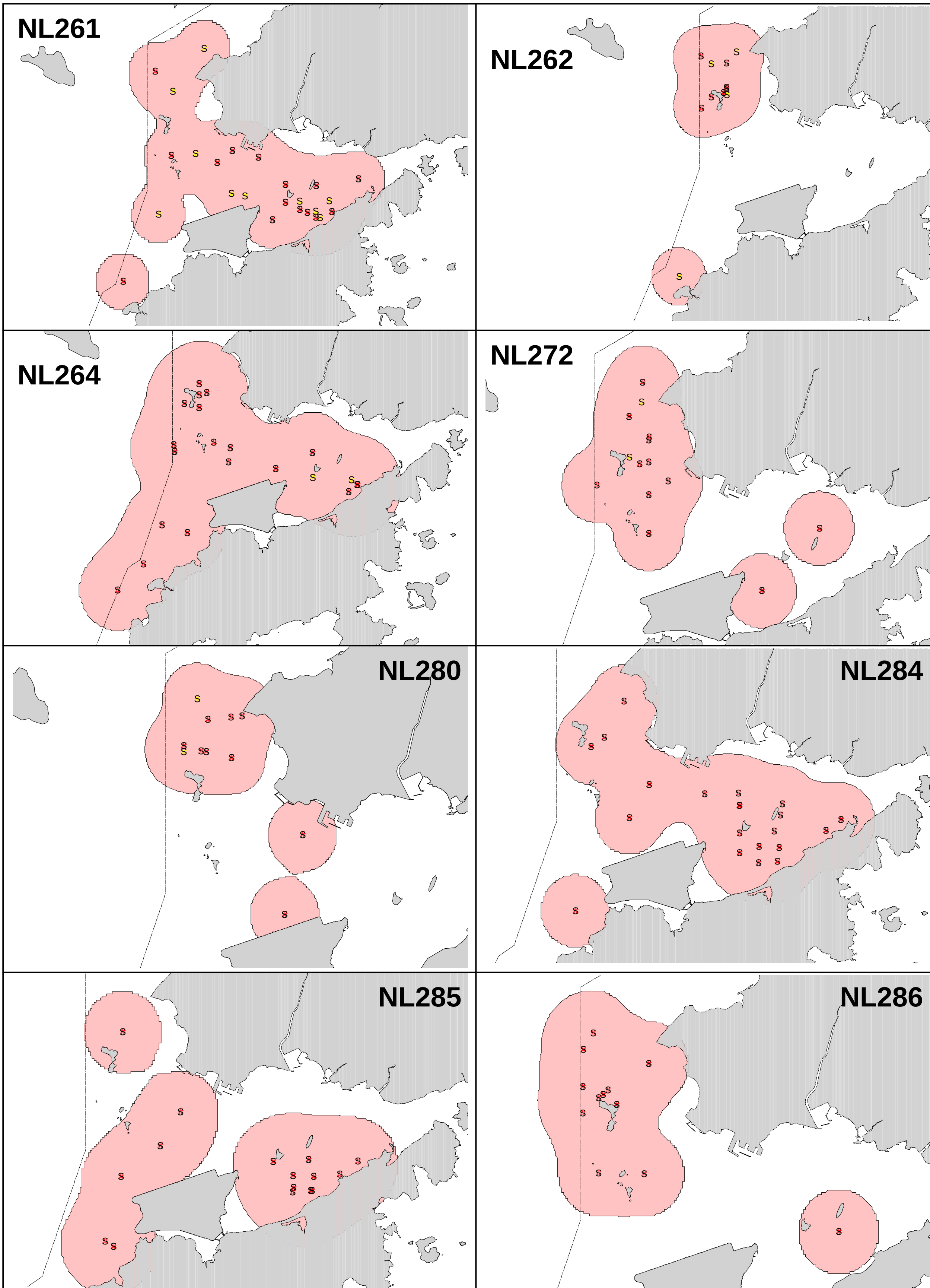
Appendix VI (cont'd).



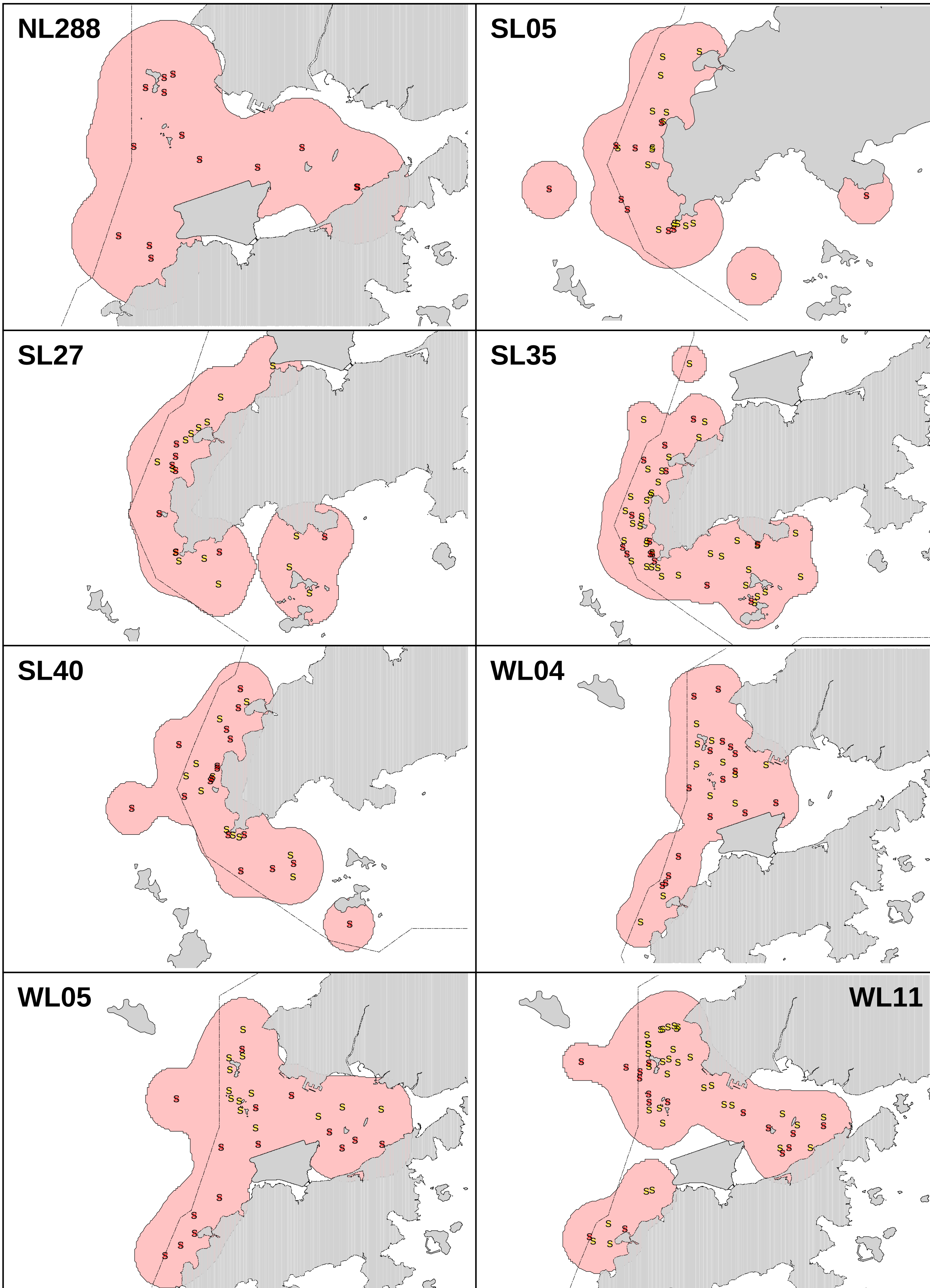
Appendix VI (cont'd).



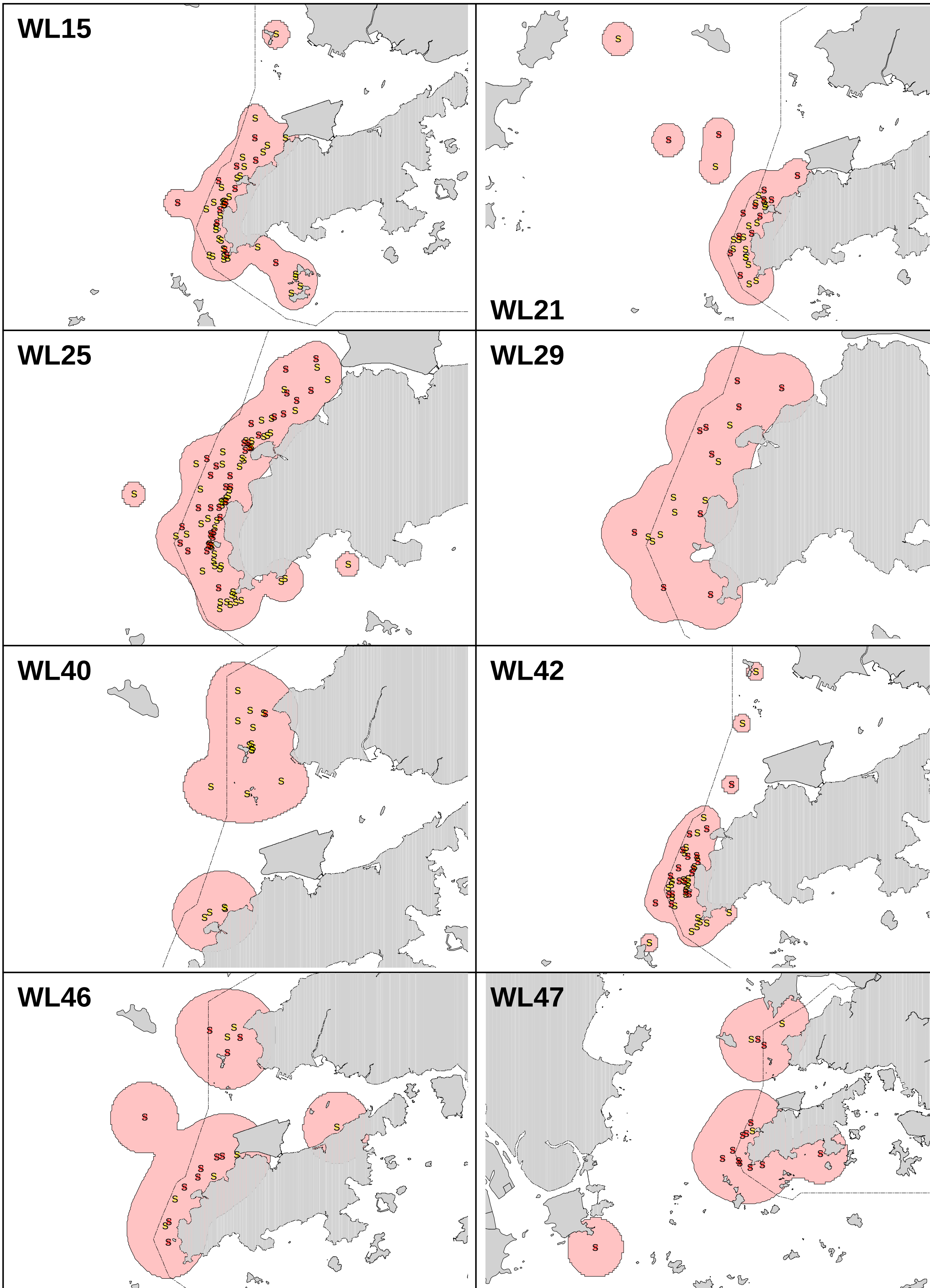
Appendix VI (cont'd).



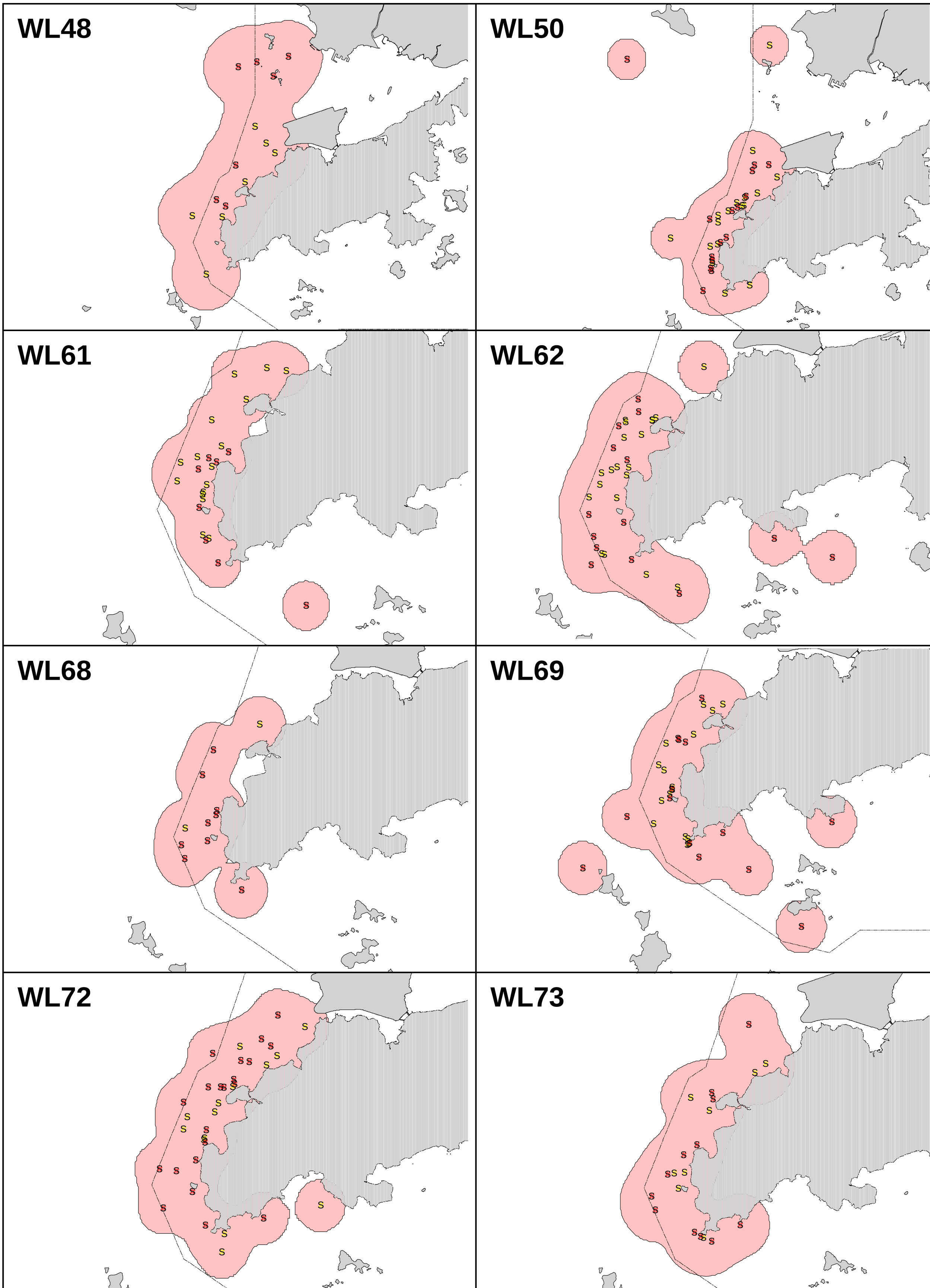
Appendix VI (cont'd).



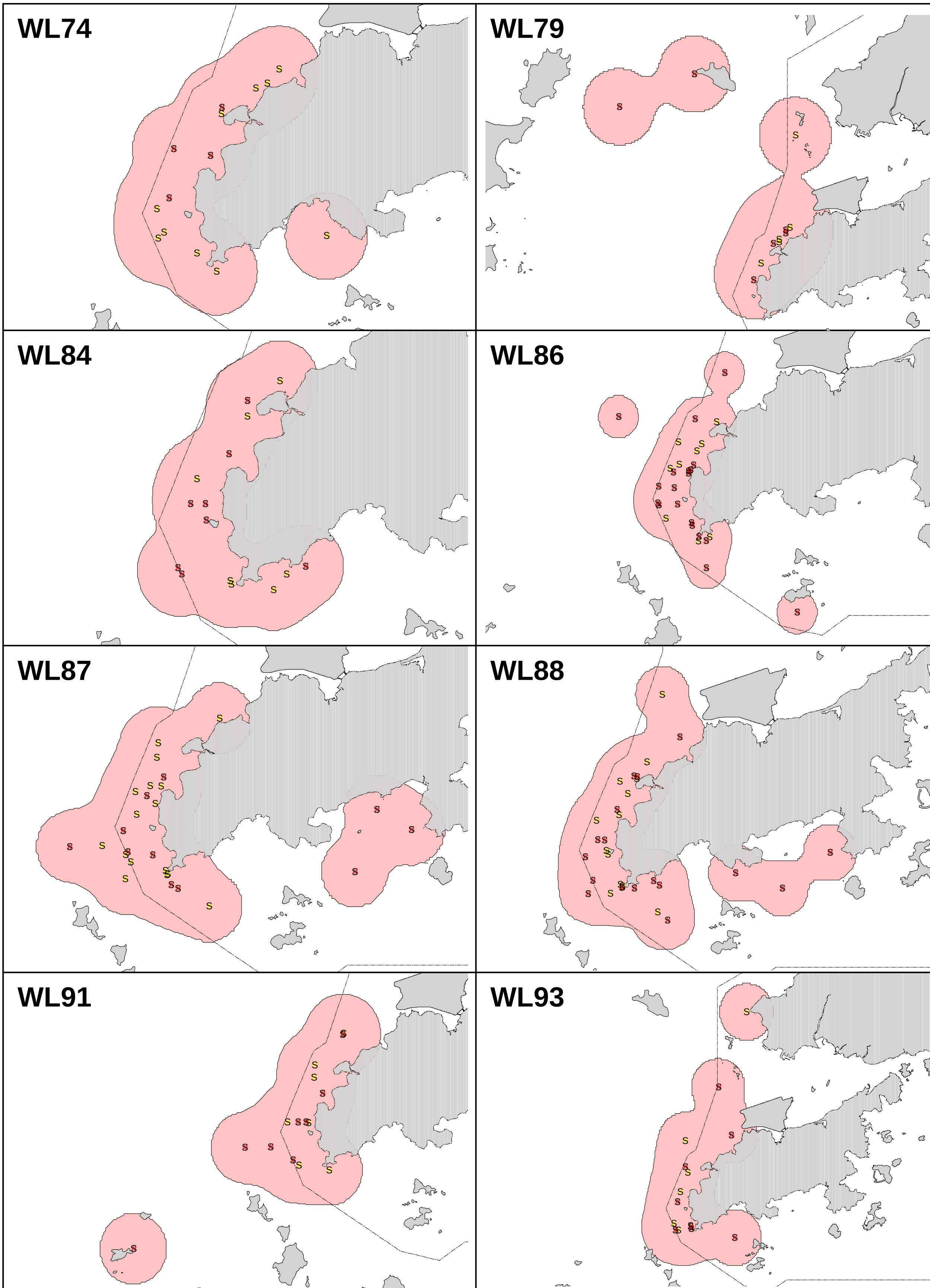
Appendix VI (cont'd).



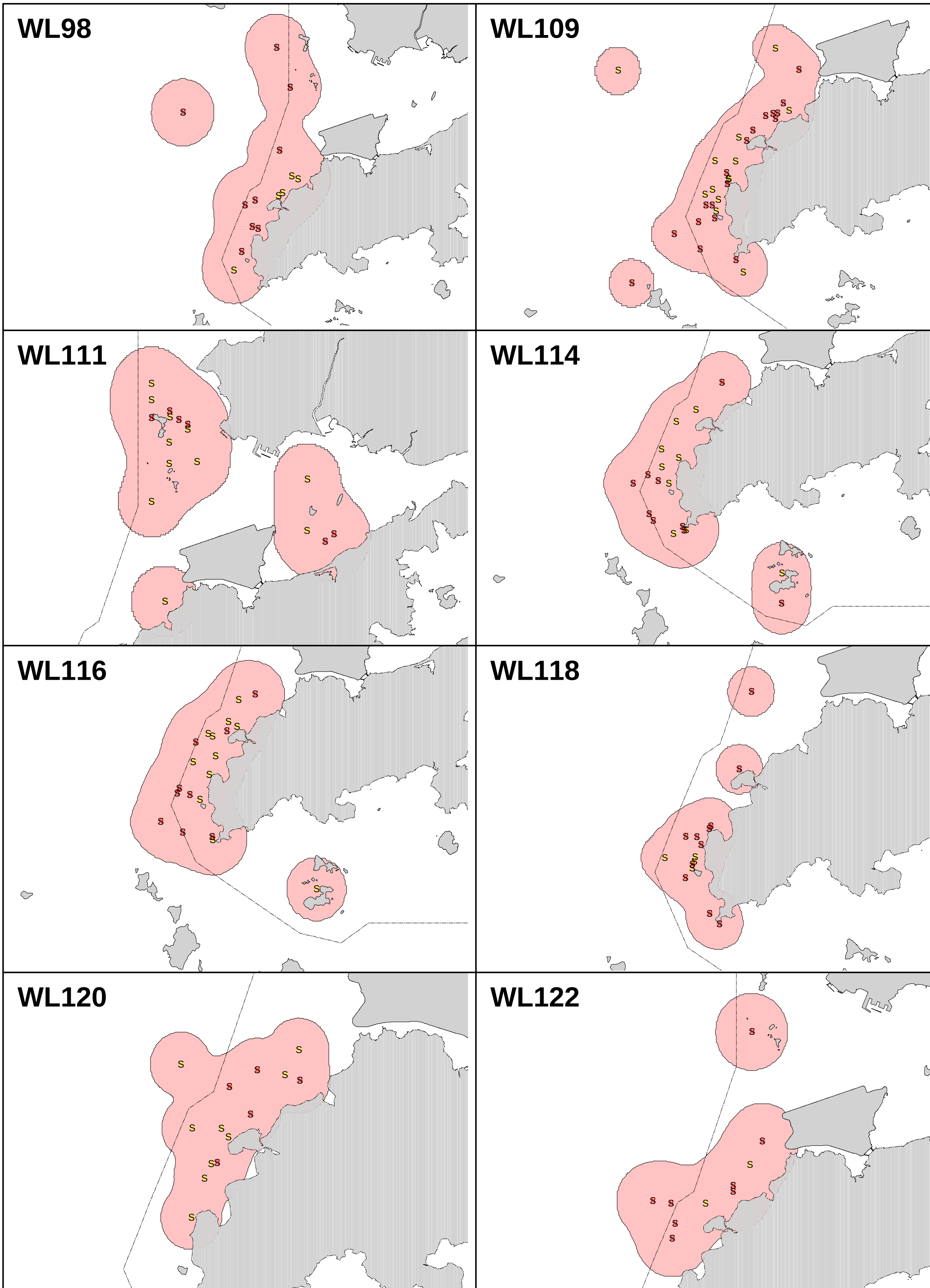
Appendix VI (cont'd).



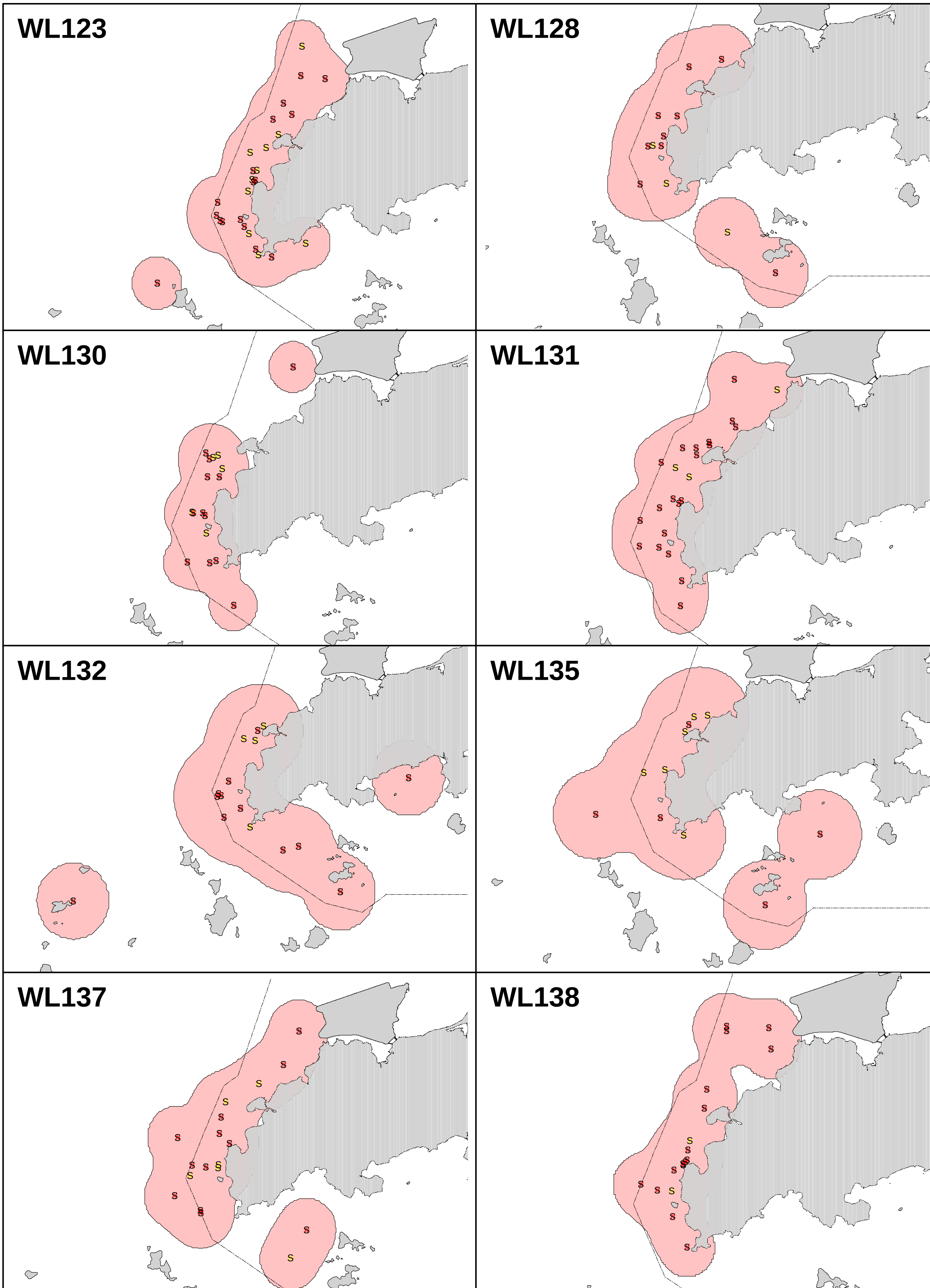
Appendix VI (cont'd).



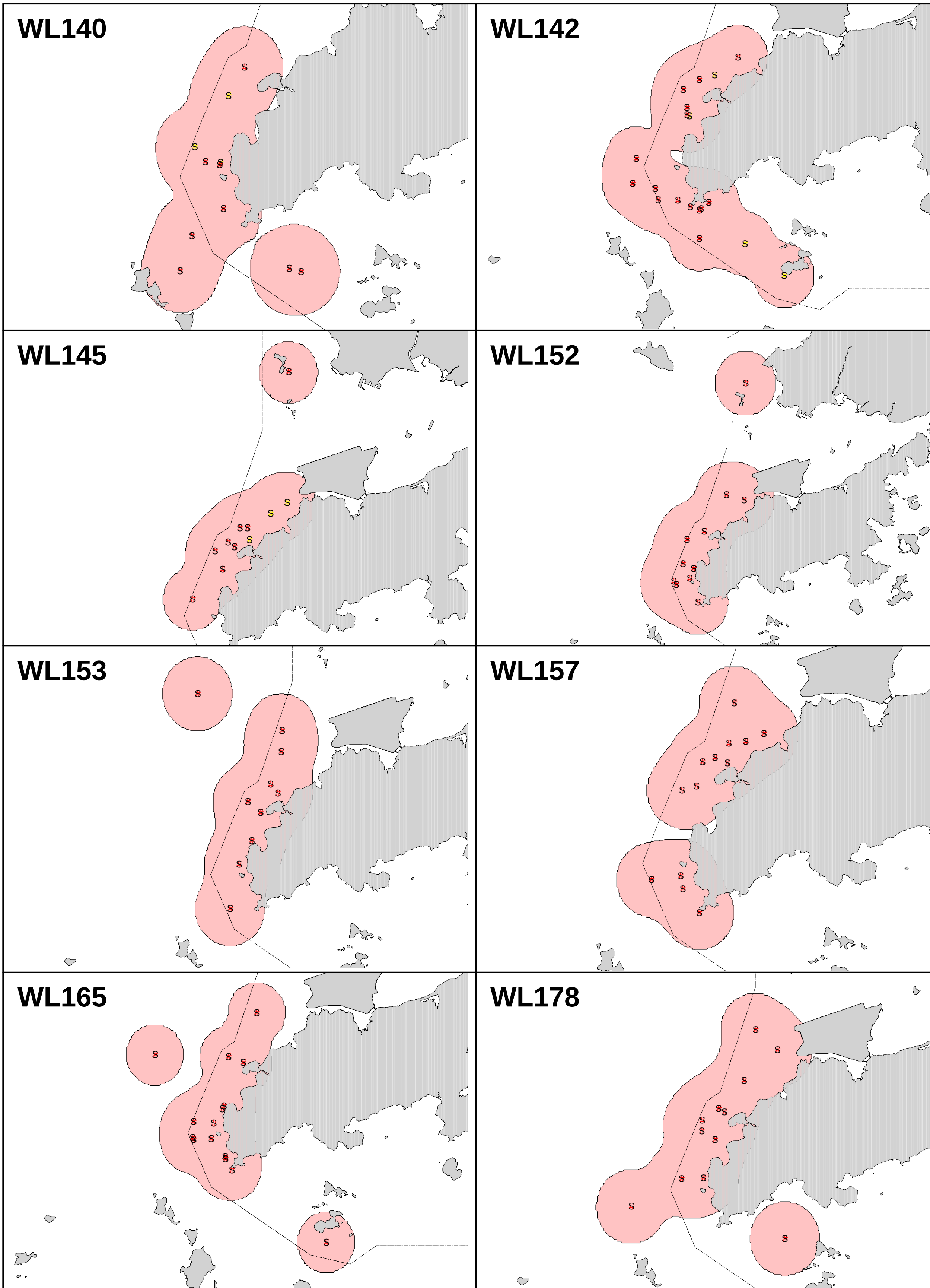
Appendix VI (cont'd).



Appendix VI (cont'd).



Appendix VI (cont'd).



Appendix VII. Underwater Acoustic Database (April 2011 - March 2012)

Date	File #	Begin Time	End Time	Location Latitude	Longitude	Area	Event	Beau	Hp	Water Depth	Hp Depth	HPF	ICP Gain	Note(s)
9-Apr-11	1	11:32:21	11:42:31	22.2487	113.8398	W LANTAU	With Theo-Tracking	2	CR1	14.1	7	N	10x	Position to be in front of hang trawler (HT); faint croaking sound
9-Apr-11	2	11:44:04	11:49:38	22.2488	113.8399	W LANTAU	With Theo-Tracking	2	CR1	14.1	7	N	10x	Continue from File #1; dolphin close by @ 4:24; faint croaking sound
9-Apr-11	3	12:04:08	12:05:49	22.2588	113.8493	W LANTAU	With Theo-Tracking	2	CR1	14.2	7	N	10x	Continue from File #2; change CF card and batteries at the end
9-Apr-11	4	12:07:39	12:23:42	22.2587	113.8494	W LANTAU	With Theo-Tracking	2	CR1	14.2	7	N	10x	Continue from File #3: start off with 3 wala wala behind HT; faint croaking noise
9-Apr-11	5	12:29:33	12:43:13	22.2574	113.8496	W LANTAU	With Theo-Tracking	1	CR1	14.2	7	N	10x	Continue from File #4; croaking sound
9-Apr-11	7	16:03:44	16:17:44	22.2736	113.8679	W LANTAU	With Theo-Tracking	2	CR1	8.3	7	Y	10x	amplifier turned on @ 0:14; faint croaking sound
18-Apr-11	1	12:38:13	12:43:13	22.2030	113.8874	SW LANTAU	SWL Station #3	2	CR1	8.5	7	N	10x	
18-Apr-11	2	13:24:01	13:29:04	22.1559	113.9062	SW LANTAU	SWL Station #1	2	CR1	14.7	7	N	10x	snapping shrimp sound
18-Apr-11	3	13:46:08	13:50:38	22.1754	113.9098	SW LANTAU	SWL Station #2	2	CR1	18.3	7	N	10x	snapping shrimp sound
18-Apr-11	5	15:11:29	15:16:01	22.2226	113.9638	SE LANTAU	SEL Station #2	1	CR1	7.1	6	N	10x	
18-Apr-11	6	16:00:44	16:04:51	22.1858	113.9834	SE LANTAU	SEL Station #1	1	CR1	14.8	7	N	10x	snapping shrimp sound; seafood carrier ~1km
5-May-11	1	10:34:16	10:39:16	22.2771	113.8620	W LANTAU	WL Station #1	1	CR1	10	7	N	10x	
5-May-11	2	11:51:33	11:56:33	22.2219	113.8329	W LANTAU	WL Station #2	3	CR1	13.8	7	N	10x	seafood container boat ~ 1.5km; snapping shrimp sound
5-May-11	3	12:39:34	12:44:36	22.1875	113.8351	W LANTAU	WL Station #3	3	CR1	26.4	7	N	10x	
5-May-11	4	15:32:48	15:36:26	22.3444	113.8758	NW LANTAU	NWL Station #1	2	CR1	6.4	5.5	N	10x	faint croaking sound
5-May-11	5	16:16:06	16:20:11	22.3839	113.8868	NW LANTAU	NWL Station #2	2	CR1	19.7	7	N	10x	faint croaking sound
6-May-11	1	12:13:26	12:18:26	22.3445	113.9221	NW LANTAU	NWL Station #5	1	CR1	12	7	N	10x	snapping shrimp sound; fishing boat ~1.5km
6-May-11	2	13:53:20	13:58:47	22.3638	113.9725	NE LANTAU	NEL Station #3	4	CR1	8.4	7	N	10x	
6-May-11	3	14:20:05	14:24:05	22.3318	113.9738	NE LANTAU	NEL Station #2	4	CR1	6.1	5.5	N	10x	snapping shrimp sound
1-Jun-11	2	11:42:34	11:45:41	22.2226	113.9736	SE LANTAU	SEL Station #2	4	CR1	7.4	7	N	10x	pair trawler non-operating ~1.2km
1-Jun-11	3	12:04:58	12:08:12	22.1878	113.9735	SE LANTAU	SEL Station #1	3	CR1	14.6	7	N	10x	faint croaking sound
1-Jun-11	4	14:29:22	14:34:26	22.1745	113.9165	SW LANTAU	SWL Station #2	2	CR1	23.2	7	N	10x	
8-Jun-11	1	15:10:54	15:16:16	22.3174	113.9529	NE LANTAU	NEL Station #1	3	CR1	5.7	5	N	10x	faint snapping shrimp sound
8-Jun-11	2	15:44:12	15:49:25	22.3603	113.9733	NE LANTAU	NEL Station #3	2	CR1	9.7	7	N	10x	snapping shrimp sound
8-Jun-11	3	16:09:28	16:14:33	22.3300	113.9732	NE LANTAU	NEL Station #2	3	CR1	6.7	5.5	N	10x	faint snapping shrimp sound
9-Jun-11	1	10:45:54	10:50:58	22.3493	113.8760	NW LANTAU	NWL Station #1	3	CR1	6.1	5.5	N	10x	unknow radio interference; faint croaking sound
9-Jun-11	2	11:10:01	11:15:04	22.3850	113.8770	NW LANTAU	NWL Station #2	3	CR1	7.7	7	N	10x	croaking sound
9-Jun-11	3	11:46:15	11:51:26	22.4134	113.8965	DEEP BAY	DB Station #1	3	CR1	11	7	N	10x	
20-Jun-11	1	12:13:08	12:18:18	22.1594	113.9432	SE LANTAU	SEL Station#3	3	CR1	15.7	7	N	10x	hang trawler ~1km
20-Jun-11	2	13:45:57	13:51:25	22.1439	113.9069	SW LANTAU	SWL Station#1	3	CR1	16.9	7	N	10x	croaking sound
20-Jun-11	3	14:51:17	14:56:28	22.1903	113.8873	SW LANTAU	SWL Station#3	2	CR1	9.8	7	N	10x	croaking sound; snapping shrimp sound
27-Jun-11	1	10:42:53	10:53:39	22.2752	113.8617	W LANTAU	WL Station #1	2	CR1	8.9	7	N	10x	
27-Jun-11	2	12:04:10	12:09:13	22.2230	113.8332	W LANTAU	WL Station #2	3	CR1	11.3	7	N	10x	container boat ~1-1.5km; snapping shrimp sound
28-Jun-11	3	13:36:13	13:40:32	22.3364	113.9641	NE LANTAU	NEL Station #1	2	CR1	9.5	7	N	10x	raining
5-Jul-11	3	11:53:25	11:58:29	22.1934	113.8438	W LANTAU	WL Station#3	3	CR1	20.8	7	N	10x	snapping shrimp sound
5-Jul-11	4	13:28:37	13:33:38	22.1511	113.8965	SW LANTAU	SWL Station#1	3	CR1	16.4	7	N	10x	snapping shrimp sound
5-Jul-11	5	14:24:10	14:29:19	22.1750	113.9170	SW LANTAU	SWL Station#2	2	CR1	19.1	7	N	10x	snapping shrimp sound
5-Jul-11	6	15:40:18	15:43:52	22.2253	113.9693	SE LANTAU	SEL Station#2	3	CR1	7.2	7	N	10x	snapping shrimp sound
5-Jul-11	7	16:05:10	16:08:45	22.1895	113.9737	SE LANTAU	SEL Station#1	3	CR1	13.5	7	N	10x	snapping shrimp sound
12-Jul-11	4	11:08:59	11:14:16	22.3545	114.0333	NE LANTAU	NEL Station#4	2	CR1	21.5	7	N	10x	
12-Jul-11	5	12:21:33	12:26:49	22.3619	113.9760	NE LANTAU	NEL Station#3	2	CR1	8.7	7	N	10x	snapping shrimp sound ; first 2mins may have buzzing interference
12-Jul-11	6	13:41:50	13:47:02	22.3581	113.9356	NW LANTAU	NWL Station#4	1	CR1	19.3	7	N	10x	croaking sound ; snapping shrimp sound ; raining
12-Jul-11	7	14:35:31	14:40:31	22.3335	113.9164	NW LANTAU	NWL Station#5	1	CR1	7.2	7	N	10x	faint croaking sound ; snapping shrimp sound
12-Jul-11	8	15:57:32	16:03:31	22.4092	113.8977	DEEP BAY	DB Station#1	2	CR1	11.5	7	N	10x	faint croaking sound ; 3 dolphins near the station (about 200m)
27-Jul-11	1	12:23:11	12:28:11	22.1611	113.9435	SE LANTAU	SEL Station#3	2	CR1	14.5	7	N	10x	snapping shrimp sound
27-Jul-11	2	13:40:33	13:45:33	22.1475	113.9072	SW LANTAU	SWL Station#1	3	CR1	15	7	N	10x	snapping shrimp sound

Appendix VII. (cont'd)

Date	File #	Begin Time	End Time	Location Latitude	Longitude	Area	Event	Beau	Hp	Water Depth	Hp Depth	HPF	ICP Gain	Note(s)
28-Jul-11	1	11:42:50	11:48:10	22.3868	113.8819	NW LANTAU	NWL Station#2	2	CR1	8.7	7	N	10x	
28-Jul-11	2	12:03:21	12:08:26	22.3822	113.8978	NW LANTAU	NWL Station#3	2	CR1	22.3	7	N	10x	
28-Jul-11	3	14:21:42	14:26:52	22.3299	113.9847	NE LANTAU	NEL Station#2	4	CR1	10.3	7	N	10x	radio sound heard; sanpping shrimp sound
8-Aug-11	1	10:43:36	10:48:37	22.1856	113.9841	SE LANTAU	SEL Station#1	2	CR1	15.3	7	N	10x	
8-Aug-11	2	11:24:17	11:29:21	22.1635	113.9536	SE LANTAU	SEL Station#3	3	CR1	15.3	7	N	10x	snapping shrimp sound
8-Aug-11	3	13:14:46	13:19:49	22.1751	113.9184	SW LANTAU	SWL Station#2	2	CR1	16.3	7	N	10x	
8-Aug-11	4	14:17:34	14:21:41	22.1487	113.8971	SW LANTAU	SWL Station#1	2	CR1	14.5	7	N	10x	faint croaking sound ; snapping shrimp sound
17-Aug-11	4	11:22:01	11:27:10	22.1932	113.8440	W LANTAU	WL Station#3	3	CR1	20.3	7	N	10x	
17-Aug-11	1	12:24:29	12:28:33	22.2038	113.8766	SW LANTAU	SWL Station#3	2	CR1	9.4	7	N	10x	snapping shrimp sound
18-Aug-11	3	13:26:18	13:31:22	22.3581	113.9265	NW LANTAU	NWL Station#4	3	CR1	13	7	N	10x	faint croaking sound
18-Aug-11	4	13:50:02	13:56:09	22.3373	113.9361	NW LANTAU	NWL Station#5	3	CR1	11.3	7	N	10x	operating CMP Dredger 360m; snapping shrimp sound
18-Aug-11	5	15:21:45	15:25:50	22.3640	113.9829	NE LANTAU	NEL Station#3	3	CR1	10.6	7	N	10x	snapping shrimp sound
18-Aug-11	7	15:49:59	15:53:08	22.3316	113.9846	NE LANTAU	NEL Station#2	4	CR1	11.5	7	N	10x	snapping shrimp sound
18-Aug-11	8	17:33:05	17:38:16	22.3534	114.0338	NE LANTAU	NEL Station#4	2	CR1	38.5	7	N	10x	
31-Aug-11	1	10:42:51	10:47:54	22.3545	114.0331	NE LANTAU	NEL Station#4	3	CR1	23.1	7	N	10x	
31-Aug-11	2	13:49:45	13:54:46	22.3221	113.9549	NE LANTAU	NEL Station#1	2	CR1	10.5	7	N	10x	snapping shrimp sound
31-Aug-11	3	14:47:26	14:51:29	22.3245	113.9153	NW LANTAU	NWL Station#5	2	CR1	6.3	5.5	N	10x	
31-Aug-11	4	16:42:28	16:45:28	22.3512	113.8763	NW LANTAU	NWL Station#1	2	CR1	5.6	5.5	N	10x	croaking sound
1-Sep-11	1	11:09:04	11:14:06	22.2204	113.8346	W LANTAU	WL Station#2	3	CR1	10.7	7	N	10x	snapping shrimp sound
1-Sep-11	2	12:14:59	12:18:02	22.2054	113.8772	SW LANTAU	SWL Station#3	2	CR1	10.2	7	N	10x	
1-Sep-11	3	16:00:27	16:04:34	22.2234	113.9729	SE LANTAU	SEL Station#2	2	CR1	6.5	5.5	N	10x	
6-Sep-11	1	11:35:15	11:41:56	22.1902	113.8428	W LANTAU	WL Station #3	2	CR1	22.6	7	N	10x	
6-Sep-11	2	15:03:18	15:08:23	22.1737	113.9094	SW LANTAU	SWL Station#2	2	CR1	13.9	7	N	10x	
15-Sep-11	1	10:33:22	10:37:22	22.2774	113.8625	W LANTAU	WL Station#1	3	CR1	9.5	7	N	10x	stationary platform 412m
15-Sep-11	2	13:06:17	13:09:20	22.2282	113.8194	W LANTAU	Sighting#2	3	CR1	21.8	7	N	10x	
15-Sep-11	3	15:54:15	15:59:15	22.3844	113.8868	NW LANTAU	NWL Station#2	4	CR1	17	7	N	10x	
22-Sep-11	1	11:37:42	11:41:41	22.2214	113.9726	SE LANTAU	SEL Station#2	3	CR1	6.9	6	N	10x	
22-Sep-11	2	12:00:36	12:04:36	22.1887	113.9739	SE LANTAU	SEL Station#1	2	CR1	13.6	7	N	10x	snapping shrimp sound
7-Oct-11	1	10:35:17	10:40:18	22.2777	113.8615	W LANTAU	WL Station#1	3	CR1	8.7	7	N	10x	snapping shrimp sound
7-Oct-11	4	11:46:03	11:51:07	22.2230	113.8330	W LANTAU	WL Station#2	2	CR1	11.3	7	N	10x	snapping shrimp sound; speedboat ~1km approaching
14-Oct-11	1	10:12:47	10:18:18	22.2738	113.8624	W LANTAU	STG#1	3	CR1	9.5	7	Y	10x	dolphins within 50m @~01:00 with click-train; dolphins ~80m @ 01:40
14-Oct-11	2	11:50:36	11:54:17	22.1979	113.8768	SW LANTAU	SWL Station#3	2	CR1	7.4	7	N	10x	
14-Oct-11	4	13:36:12	13:41:11	22.1725	113.9214	SW LANTAU	SWL Station#2	2	CR1	16.3	7	N	10x	snapping shrimp sound; croaking sound; speedboat ~1 km
14-Oct-11	6	15:36:02	15:39:19	22.2155	113.9745	SE LANTAU	SEL Station#2	2	CR1	8.3	7	N	10x	faint croaking sound
18-Oct-11	1	9:56:35	9:59:34	22.3167	113.9634	NE LANTAU	NEL Station#1	2	CR1	5.5	4	N	10x	
18-Oct-11	2	10:29:50	10:35:32	22.3627	113.9798	NE LANTAU	NEL Station#3	1	CR1	11.3	7	N	10x	tug boat, sand barge, container boat x 2 ~800-1000m
18-Oct-11	3	10:56:07	11:01:08	22.3305	113.9847	NE LANTAU	NEL Station#2	1	CR1	10.3	7	N	10x	tug boat ~1km; snapping shrimp sound; container boat ~1.2km
18-Oct-11	4	16:30:09	16:35:09	22.1969	113.8424	W LANTAU	WL Station#3	2	CR1	8.5	7	Y	10x	snapping shrimp sound
19-Oct-11	5	11:00:01	11:05:19	22.3497	113.8696	NW LANTAU	NWL Station#1	2	CR1	6.1	5.5	N	10x	snapping shrimp sound
19-Oct-11	6	11:56:58	12:01:00	22.3846	113.8875	NW LANTAU	NWL Station#2	2	CR1	18.4	7	N	10x	snapping shrimp sound; container boats x 4 ~1km
19-Oct-11	7	17:00:13	17:05:29	22.3537	114.0253	NE LANTAU	NEL Station#4	3	CR1	21	7	N	10x	
27-Oct-11	1	14:53:22	14:57:23	22.3348	113.9164	NW LANTAU	NWL Station#5	2	CR1	7.7	7	N	10x	snapping shrimp sound; radio interference
27-Oct-11	2	15:51:44	15:56:52	22.3871	113.8962	NW LANTAU	NWL Station#3	2	CR1	21	7	N	10x	
31-Oct-11	1	12:30:54	12:34:10	22.3317	113.9739	NE LANTAU	NEL Station#2	2	CR1	5.9	5.5	N	10x	snapping shrimp sound
31-Oct-11	2	14:29:52	14:32:59	22.4135	113.8973	DEEP BAY	DB Station#1	3	CR1	10.5	7	N	10x	
16-Nov-11	1	12:02:19	12:07:26	22.3633	113.9782	NE LANTAU	NEL Station #3	1	CR1	10.8	7	N	10x	snapping shrimp sound
16-Nov-11	2	12:57:17	13:00:38	22.3217	113.9530	NE LANTAU	NEL Station #1	1	CR1	7.7	7	N	10x	snapping shrimp sound
16-Nov-11	3	13:52:27	13:55:27	22.3327	113.9161	NW LANTAU	NWL Station #5	2	CR1	8.4	7	N	10x	snapping shrimp sound
16-Nov-11	4	17:09:59	17:15:24	22.3532	114.0298	NE LANTAU	NEL Station #4	2	CR1	28.4	7	N	10x	

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)
21-Nov-11	1	10:32:14	10:36:15	22.2768	113.8607	W LANTAU	WL Station#1	2	CR1	8.8	7	N	10x	Two operating hang trawlers ~ 1-1.5 km; snapping shrimp sound
21-Nov-11	2	12:36:20	12:45:34	22.2033	113.8207	W LANTAU	STG#6	3	CR1	27.7	7	N	10x	snapping shrimp sound; dolphins within 50m of boat
21-Nov-11	3	15:33:28	15:36:29	22.3478	113.8700	NW LANTAU	NWL Station#1	2	CR1	6.6	5.5	N	10x	snapping shrimp sound; marine park vessel ~ 2km
22-Nov-11	1	11:57:04	12:02:10	22.1517	113.8977	SW LANTAU	SWL Station#1	2	CR1	14.6	7	N	10x	snapping shrimp sound
22-Nov-11	2	13:00:21	13:04:35	22.1742	113.9193	SW LANTAU	SWL Station#2	2	CR1	18.4	7	N	10x	snapping shrimp sound
29-Nov-11	1	11:00:50	11:03:50	22.1928	113.9804	SE LANTAU	SEL Station#1	4	CR1	11.7	7	N	10x	snapping shrimp sound
29-Nov-11	2	11:18:37	11:21:46	22.2223	113.9717	SE LANTAU	SEL Station#2	2	CR1	7.1	7	N	10x	
29-Nov-11	3	14:22:22	14:25:25	22.2070	113.8865	SW LANTAU	SWL Station#3	4	CR1	8.7	7	N	10x	faint snapping shrimp sound
30-Nov-11	1	15:49:27	15:53:07	22.3310	113.9834	NE LANTAU	NEL Station#2	2	CR1	11.6	7	N	10x	snapping shrimp sound
6-Dec-11	1	11:18:41	11:22:47	22.2775	113.8619	W LANTAU	WL Station#1	3	CR1	8.8	7	N	10x	
7-Dec-11	1	13:38:48	13:41:49	22.3182	113.9530	NE LANTAU	NEL Station#1	2	CR1	4.9	4	N	10x	
8-Dec-11	1	12:42:17	12:45:19	22.1751	113.9173	SW LANTAU	SWL Station#2	4	CR1	18	7	N	10x	
8-Dec-11	2	14:51:51	14:54:57	22.2258	113.9735	SE LANTAU	SEL Station#2	3	CR1	6.6	5.5	N	10x	snapping shrimp sound
15-Dec-11	1	11:32:55	11:38:58	22.4139	113.8968	DEEP BAY	DB Station#1	2	CR1	10.3	7	N	10x	seafood container boat ~1.2km; sand barge ~600m approaching
15-Dec-11	2	14:11:16	14:16:19	22.3903	113.9067	NW LANTAU	NWL Station#3	2	CR1	8.2	7	N	10x	
9-Jan-12	1	11:28:13	11:31:24	22.2214	113.9728	SE LANTAU	SEL Station #2	2	CR1	7.5	7	N	10x	snapping shrimp sound; high speed ferry ~1.5km pass by
9-Jan-12	2	12:25:09	12:28:13	22.1633	113.9534	SE LANTAU	SEL Station #3	2	CR1	16.1	7	N	10x	
9-Jan-12	3	15:28:59	15:32:04	22.2004	113.8766	SW LANTAU	SWL Station #3	2	CR1	7.8	7	N	10x	
10-Jan-12	1	11:33:57	11:37:03	22.2235	113.8325	W LANTAU	WL Station #2	2	CR1	12.4	7	N	10x	snapping shrimp sound
10-Jan-12	2	14:30:32	14:34:39	22.3491	113.8700	NW LANTAU	NWL Station #1	2	CR1	6.4	5.5	N	10x	
11-Jan-12	1	10:57:14	11:00:22	22.3851	113.8767	NW LANTAU	NWL Station #2	3	CR1	8.2	7	N	10x	faint snapping shrimp sound
11-Jan-12	3	15:36:12	15:39:29	22.3313	113.9837	NE LANTAU	NEL Station #2	2	CR1	11.1	7	N	10x	
18-Jan-12	1	10:26:33	10:29:35	22.2789	113.8623	W LANTAU	WL Station #1	2	CR1	8.6	7	N	10x	snapping shrimp sound
18-Jan-12	2	12:39:37	12:42:38	22.1873	113.8358	W LANTAU	WL Station #3	4	CR1	26.2	7	N	10x	snapping shrimp sound
18-Jan-12	3	16:08:25	16:13:33	22.3975	113.8969	NW LANTAU	NW Station #3	2	CR1	18.8	7	N	10x	snapping shrimp sound
31-Jan-12	1	12:54:38	12:59:10	22.1747	113.9116	SW LANTAU	SWL Station #2	2	CR1	21.4	7	N	10x	
31-Jan-12	2	13:20:42	13:23:42	22.1473	113.9066	SW LANTAU	SWL Station #1	3	CR1	16.5	7	N	10x	
31-Jan-12	3	15:47:17	15:50:38	22.1879	113.9835	SE LANTAU	SEL Station #1	2	CR1	15.4	7	N	10x	
13-Feb-12	2	11:41:46	11:45:10	22.3339	113.9837	NE LANTAU	NEL Station #2	1	CR1	8.9	7	N	10x	shrimp trawler operating & approaching~900m
13-Feb-12	3	15:24:50	15:29:52	22.1963	113.8350	W LANTAU	WL Station #3	3	CR1	21.1	7	N	10x	
14-Feb-12	1	10:32:10	10:35:11	22.2789	113.8616	W LANTAU	WL Station #1	1	CR1	8.7	7	N	10x	snapping shrimp sound
14-Feb-12	2	15:29:08	15:33:43	22.4166	113.8867	DEEP BAY	DB Station #1	2	CR1	22.6	7	N	10x	snapping shrimp sound
20-Feb-12	1	11:24:58	11:29:06	22.2230	113.8339	W LANTAU	WL Station #1	2	CR1	11.4	7	N	10x	
20-Feb-12	2	14:42:49	14:45:49	22.3460	113.8698	NW LANTAU	NWL Station #1	2	CR1	6.3	5.5	N	10x	
20-Feb-12	3	15:34:48	15:38:53	22.3922	113.8968	NW LANTAU	NWL Station #3	2	CR1	20.1	7	N	10x	
29-Feb-12	2	12:45:04	12:48:34	22.3323	113.9736	NE LANTAU	NEL Station#2	2	CR1	7.7	7	N	10x	
29-Feb-12	3	14:30:06	14:35:43	22.3569	113.9371	NW LANTAU	NWL Station#4	4	CR1	20.6	7	N	10x	fishing boat 256m stationary
29-Feb-12	4	16:18:42	16:21:44	22.3850	113.8767	NW LANTAU	NWL Station#2	3	CR1	8.6	7	N	10x	
1-Mar-12	1	11:21:15	11:24:16	22.2234	113.8316	W LANTAU	WL Station#2	3	CR1	13.6	7	N	10x	snapping shrimp sound
1-Mar-12	2	12:00:38	12:03:42	22.1870	113.8366	W LANTAU	WL Station#3	2	CR1	26	7	N	10x	low visibility, low boat traffic
1-Mar-12	3	16:37:30	16:42:31	22.3599	113.9257	NW LANTAU	NWL Station#4	2	CR1	22.3	7	N	10x	
2-Mar-12	1	11:55:07	11:58:07	22.2001	113.8767	SW LANTAU	SWL Station#3	1	CR1	7.9	7	N	10x	
2-Mar-12	2	15:15:29	15:16:55	22.1626	113.9534	SE LANTAU	SEL Station#3	3	CR1	16.6	7	N	10x	

Appendix VIII. Land-based Theodolite Tracking Database (April 2011 - March 2012)

Date	Station	Start Time	End Time	Duration	Beaufort	Visibility	Number of Dolphin Groups	Total No. of Fixes	No. of fix (dolphin)	No. of fix (dolphin-tour boat)	No. of fix (fishing boat)	No. of fix (high-speed ferry)	No. of fix (other vessels)	Note
05/04/11	Tai O	10:26	12:42	2:16	2-3	U	8	238	134	70	0	0	32	Station Setup with Boat
06/04/11	Tai O	9:10	15:37	6:27	2-3	U	16	510	200	78	0	0	156	Station Setup with Boat
07/04/11	Tai O	9:10	11:00	1:50	2-3	U	2	49	30	4	4	4	6	
07/04/11	Fan Lau	12:00	16:20	4:20	3-5	U	3	168	70	0	4	80	12	Station Setup
08/04/11	Tai O	9:15	16:06	6:51	1-4	2-3	8	935	521	198	104	10	98	
09/04/11	Tai O	9:23	13:01	3:38	2-5	2	8	680	321	136	116	8	96	Acoustic Recordings Taken
09/04/11	Shum Wat	14:11	16:16	2:05	2	2	0	0	0	0	0	0	0	Station Setup with Boat
12/04/11	Tai O	9:30	14:15	4:45	2-3	3	6	527	222	70	170	16	48	
13/04/11	Tai O	9:21	14:15	4:54	2	1-2	7	634	318	58	160	18	79	
14/04/11	Shum Wat	10:00	13:16	3:16	2-4	1-2	2	261	126	0	92	8	34	Station Setup (Calibration)
15/04/11	Fan Lau	10:07	14:27	4:20	2-4	2	8	640	306	0	8	218	104	Station Setup (Calibration)
28/04/11	Tai O	9:41	13:31	3:50	2	3	5	244	157	39	19	9	19	
04/05/11	Tai O	9:53	12:05	2:12	3-5	2	1	50	3	9	19	5	11	Station Setup (Calibration)
15/05/11	Tai O	8:48	12:42	3:54	2-3	2	4	143	68	46	11	5	11	
31/05/11	Tai O	9:54	13:31	3:37	2-3	2	1	24	3	1	2	2	14	
06/07/11	Tai O	9:49	13:18	3:29	1-4	4	3	232	144	50	13	4	19	
02/08/11	Tai O	7:19	11:48	4:29	1-2	4	5	237	149	16	53	2	13	
02/08/11	Tai O	17:13	18:58	1:45	3-5	4	0	61	0	20	0	7	31	
03/08/11	Shum Wat	7:22	13:10	5:48	1-2	4	4	206	78	0	41	9	75	
04/08/11	Fan Lau	9:31	15:03	5:32	2-3	4	10	544	189	0	40	188	122	
05/08/11	Tai O	6:49	12:25	5:36	1-2	4	12	477	277	7	74	8	107	Mother w/ dead calf discovered
19/08/11	Tai O	10:42	11:13	0:31	2	4	1	42	16	16	9	0	0	
29/08/11	Tai O	9:44	13:39	3:55	3-4	2	7	160	99	26	7	6	17	
09/09/11	Shum Wat	9:42	13:42	4:00	3	3	0	59	0	5	7	6	38	
27/09/11	Fan Lau	9:53	15:07	5:14	2-3	2.5	0	240	0	0	53	120	64	
28/09/11	Tai O	6:44	12:00	5:16	3-4	1.5-2	2	173	34	2	116	6	13	
09/10/11	Tai O	9:17	13:44	4:27	2-3	1	1	175	17	46	35	19	54	

Appendix VIII. (cont'd)

Date	Station	Start Time	End Time	Duration	Beaufort	Visibility	Number of Dolphin Groups	Total No. of Fixes	No. of fix (dolphin)	No. of fix (dolphin-tour boat)	No. of fix (fishing boat)	No. of fix (high-speed ferry)	No. of fix (other vessels)	Note
24/11/11	Tai O	9:21	13:32	4:11	2	1.5	3	138	42	26	24	6	37	
13/12/11	Tai O	10:30	13:08	2:38	2-3	1.5-2	1	68	5	2	28	0	31	
14/12/11	Tai O	8:54	13:01	4:07	2-3	2	1	93	50	8	16	1	18	
15/12/11	Tai O	7:48	13:31	5:43	2-4	1.5	4	143	89	0	31	4	18	
17/12/11	Tai O	8:30	14:06	5:36	3-4	2.5	3	358	70	20	89	22	152	Dual Stations
18/12/11	Tai O	7:34	13:17	5:43	2-4	2.5	7	303	148	19	64	5	65	
19/12/11	Tai O	9:04	11:00	1:56	3	2.5	5	174	144	4	6	4	15	
20/12/11	Tai O	9:11	13:44	4:33	2-3	2.5-3	4	264	25	39	103	16	77	Dual Stations
21/12/11	Fan Lau	7:42	12:40	4:58	2	3	11	352	89	0	11	162	89	
24/12/11	Tai O	8:07	9:14	1:07	4-6	2.5-3	0	38	0	0	13	0	23	Dual Stations
25/12/11	Shum Wat	9:04	10:55	1:51	4	1.5	2	64	26	2	14	8	13	
26/12/11	Tai O	10:04	12:52	2:48	3	3.5	5	259	88	71	36	8	53	
03/01/12	Tai O	9:06	13:21	4:15	2-3	3	3	200	94	31	9	4	59	
03/02/12	Tai O	8:56	12:43	3:47	3	2	0	90	0	0	35	10	42	
08/03/12	Tai O	8:56	13:01	4:05	1-2	2-2.5	3	202	97	16	66	7	15	
15/03/12	Shum Wat	9:17	13:30	4:13	2	2	0	88	0	0	30	11	46	
27/03/12	Tai O	8:52	12:57	4:05	3	1.5	8	283	183	28	18	13	40	