# MONITORING OF MARINE MAMMALS IN HONG KONG WATERS (2019-20)

## FINAL REPORT
## (1 April 2019 to 31 March 2020)

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## DRAFT EXECUTIVE SUMMARY

A longitudinal study on Chinese White Dolphins and Indo-Pacific finless porpoises has been conducted in Hong Kong since 1995. The present monitoring study represents a continuation of this long-term research study with the funding support from the Agriculture, Fisheries and Conservation Department of the Hong Kong SAR Government, covering the period of April 2019 to March 2020.

During the one-year study period, 182 line-transect vessel surveys with 5,756.6 km of survey effort were conducted among ten survey areas in Hong Kong. In total, 158 groups of 524 Chinese White Dolphins and 124 groups of 317 finless porpoises were sighted during vessel and helicopter surveys. The dolphins were sighted frequently along the west coast of Lantau Island as well as the northern portion of the SWL survey area, but infrequently occurred in the North Lantau region. On the other hand, the majority of porpoise sightings were found at the offshore waters between Soko Islands and Shek Kwu Chau.

In 2019, the most important dolphin habitats were concentrated along the coast in WL survey area and the western portion of SWL survey area, mainly extending from the Tai O Peninsula toward the Fan Lau Peninsula. In the past nine years, dolphin usage varied in WL and SWL waters, with higher densities recorded in 2014-15, followed by a decline in subsequent years before a slight rebound in 2019. In the North Lantau region, dolphin occurrence has greatly diminished and has been largely confined to the western end of this region in recent years, apparently with no sign of recovery after the completion of Hong Kong-Zhuhai-Macau Bridge (HZMB) construction works. There were also noticeable declines in dolphin usage at the two existing marine parks in the North Lantau region in recent years.

For finless porpoises, their most heavily utilized habitats in 2019 were limited to the offshore waters at the juncture of SEL and SWL survey areas. Even though the waters near Shek Kwu Chau waters have been consistently identified as critical porpoise habitat in the past decade, their usage has sharply dropped to a very low level in two consecutive years of 2018 and 2019, which may be linked to the recent construction works of the Integrated Waste Management Facilities.

In 2019, the combined estimate of dolphin abundance in Hong Kong waters in the four main survey areas of dolphin occurrences (i.e. SWL, WL, NWL and NEL) was 52 (the combined estimates for the last eight years, i.e. 2011 to 2018, were 88, 80, 73, 87, 65, 47, 47 and 32, respectively).  Significant declines in dolphin abundances were detected in each of the three survey areas in NEL, NWL and WL in the past two decades, as well as the combined abundance from the four main areas of dolphin occurrences in the past decade despite a noticeable rebound in 2019.

During the 2019-20 monitoring period, 126 individual dolphins with 311 re-sightings were identified, and two-thirds of all re-sightings were made in WL waters. A total of 44 new individuals have been added to the photo-ID catalogue, with three quarters of them being contributed from surveys conducted across the border in Lingding Bay.  Sixteen individuals that were frequently sighted in Hong Kong waters in the past disappeared in 2019, but five of them have been re-sighted across the border during the same year.  Further studies on dolphins of the Pearl River Estuary would help provide a more comprehensive picture on their movement patterns and overall status in a regional perspective. Continuous decline in dolphin movements between NWL and WL survey areas was evident in recent years, but similar decline in dolphin movements between SWL and WL survey areas was reversed in 2019-20, which coincided well with a marked increase in dolphin abundance in SWL.

Changes in the utilization pattern of Hong Kong waters by individual dolphins, as detected in the recent monitoring periods, were noted upon analysis on temporal changes in their range use.  Out of the 59 individuals from the northern social cluster, 29 of them have shifted part or all of their ranges from North Lantau to WL and SWL waters.  However, nine individuals have apparently reversed such range shifts in 2017-19, albeit with a much lower level of occurrence in North Lantau waters in the past few years.  For the southern social cluster, 62% of the 55 individuals examined have utilized SWL waters progressively more in recent years, with eight individuals showing clear range expansions from WL to SWL waters.  However, some individuals have reversed such range expansions in the past few years.

In 2019-20, HKCRP researchers delivered 13 education seminars at local schools regarding the conservation of local dolphins and porpoises.  Through this integrated approach of long-term research and publicity programme, the Hong Kong public can gain first-hand information from the researchers.

行政摘要草稿 (中文翻譯)

自 1995 年開始，一項有關本地中華白海豚及印度太平洋江豚的長期研究經已展開。此項為期一年 (由 2019 年 4 月至 2020 年 3 月)、獲香港特別行政區政府漁農自然護理署資助的研究工作，正是這長期監察的延伸。

在十二個月研究期間，研究員共進行了 182 次樣條線船上調查，在全港十個調查區航行了 5,756.6 公里，並觀察到共 158 群中華白海豚 (總數達 524 隻) 及 124 群江豚 (總數達 317 隻)。在 2019-20 年間，中華白海豚經常在大嶼山西面水域一帶及西南面之北部水域出沒，卻較少於大嶼山北面水域出沒。另一方面，江豚的目擊記錄主要集中於索罟群島與石鼓洲之間的離岸水域。

中華白海豚在 2019 年的重要棲身地，主要集中在沿大嶼山西面及西南面、即由大澳半島伸延至分流半島的近岸水域。在過去九年，海豚在大嶼山西面及西南面水域之棲息地運用的變化較大，其使用量在 2014-15 年間達最高水平後的數年逐步減少，但在 2019 年卻有所增加。在北大嶼山水域，海豚於近年的使用率大幅下降，在過去三年亦只集中出沒於此水域的西端，而且在港珠澳大橋施工完成後，並未有任何回復較高使用量的跡象。在北大嶼山水域的兩個海岸公園內，海豚使用量於近年均明顯地減少。

此外，江豚在 2019 年錄得最高使用量的棲身地，位處於大嶼山東南及西南調查區交界的離岸海域。過去曾被視為江豚最重要生境的石鼓洲鄰近水域，其使用量在 2018 及 2019 年均明顯地大幅下降，這可能與毗鄰「綜合廢物管理設施」展開的建造工程有關。

在 2019 年，中華白海豚在大嶼山西南、西、西北及東北四個調查區域的整體數目估計為 52 隻 (2011 至 18 年的年度數目分別為 88、80、73、87、65、47、47 及 32 隻)。大嶼山東北、西北及西面的調查區域在過去廿年的海豚數量，均各自錄得明顯下降趨勢；而四個調查區域合共的整體海豚數目雖在 2019 年錄得顯著回升，但整體數目在過去十年仍錄得明顯下降趨勢。

於 2019-20 監察年度期間，研究員辨認出 126 隻個別海豚、共 311 次的目擊紀錄，其中三分之二均出現在大嶼山西面水域；共有 44 隻新的個別海豚亦於此年度被加入相片辨認名錄，當中四份之三的個體是在伶仃洋水域被首次發現。過去一些經常出沒於香港水域的海豚個體，共有 16 隻於 2019 年不見所蹤，但其中五隻卻在伶仃洋出現。珠江口中華白海豚的進一步研究會有助更全面了解牠們於整個區域的移動模式及整體狀況。於大嶼山西北面及西面調查區之間移動的個別海豚，其數量於近數年持續下降；反之，於大嶼山西面及西南面調查區之間移動的

個別海豚數量，經過數年下降後卻於 2019-20 年間有所回升，此趨勢亦與海豚數量在大嶼山西南面水域的上升相當吻合。

近年已發現本港水域內個別海豚的使用模式有所改變，此現象亦再次透過分析個別海豚於不同時間的活動範圍而顯示出來。59 隻屬北大嶼山社群的海豚當中，29 隻個體曾將部份及整個活動範圍由大嶼山北面水域轉移至西面及西南面水域，但於 2017-19 年，卻有九隻個體的活動範圍轉移出現逆轉，並再次回到大嶼山北面水域生活，雖然牠們在該水域出現的頻率已大不如前。此外，55 隻屬南面社群的海豚中，有 62%的個體於近年逐漸增加使用大嶼山西南面水域；雖然曾有八隻個體於過去數年明顯地由大嶼山西面的活動範圍擴張至西南面水域，但亦有少數個體活動範圍的擴張已出現逆轉。

在本年度，研究員為本地中小學主持了共十三場講座，內容主要圍繞香港中華白海豚及江豚的最新保育狀況。透過揉合長期研究監察及公眾教育活動，香港市民可從研究員獲得更多有關鯨豚的最新資訊。

## 1. INTRODUCTION

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 has been conducted by the Hong Kong Cetacean Research Project (HKCRP) since 1995. Primarily funded by the Agriculture, Fisheries and Conservation Department (AFCD) as well as various government departments and consultancy studies, this multi-disciplinary research programme aims to provide critical scientific information to the Hong Kong SAR Government for formulation of sound management and conservation strategies for the local populations of dolphins and porpoises. In the past two decades, HKCRP has also been extensively involved in numerous environmental consultancy studies to assess potential impacts of marine construction works on cetaceans in Hong Kong waters and the Pearl River Estuary, and to provide suggestions and guidance on mitigation measures to lessen the pressures of the development projects 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 and behaviour over time, and to keep track of levels and changes in mortality rates of local cetaceans (e.g. Dungan et al. 2012; Hung 2008, 2018, 2019; Jefferson et al. 2002, 2009, 2012; Marcotte et al. 2015; Sims et al. 2012; Wang and Hung 2018, 2019).

This one-year monitoring project represents a continuation and extension of this multi-disciplinary research programme, with funding support from AFCD of HKSAR Government. The main study goal was to collect systematic data for assessment of the distribution and abundance of Chinese White Dolphins and Indo-Pacific finless porpoises in Hong Kong, to take photographic records of individual dolphins, and to analyze the marine mammal monitoring data for better understanding of the various aspects of local dolphin and porpoise populations. The one-year project covers the period of 1 April 2019 to 31 March 2020. This revised draft final report is submitted to AFCD for a summary of this monitoring project, covering the entire one-year study period.

## 2. OBJECTIVES OF PRESENT STUDY

As a continuation of the previous marine mammal monitoring works commissioned by AFCD, the main goal of this one-year monitoring study was to collect systematic monitoring data for an in-depth analysis and 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 various aspects of local dolphins and porpoises. To achieve this main goal, several specific objectives were set for the present 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 detail. This objective was achieved through data collection on dolphins and porpoises by conducting regular systematic line-transect vessel 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 photographic records of Chinese White Dolphins for photo-identification analysis. Photographs of re-sighted and newly identified individuals were compiled and added to the current photo-identification catalogue, with associated descriptions for each newly identified individual. Photographic records of finless porpoises were also 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 and trends of occurrence of Chinese White Dolphins and finless porpoises using vessel survey data.

The fourth objective was to conduct ranging pattern analysis and residency pattern analysis to study individual core area, ranging pattern, habitat use and movement pattern of Chinese White Dolphins based on the data obtained from both the line-transect vessel surveys and the associated photo-identification works.

The final objective was to educate the members of the public on local dolphins and porpoises, by disseminating the study findings from the long-term monitoring research programme. This objective was achieved by providing public seminars to local primary and secondary school students through the arrangement of 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 monitoring data for assessment on spatial and temporal patterns of distribution, abundance and habitat use of local dolphins and porpoises through systematic line-transect vessel surveys and helicopter surveys;

- to analyze line-transect survey data for assessment on spatial and temporal patterns of distribution, abundance, habitat use and trends of occurrence of dolphins and porpoises in Hong Kong;

- to take photographic records of Chinese White Dolphins for photo-identification analysis and update the photo-identification catalogue;

- to analyze photo-identification data of individual Chinese White Dolphins to assess their ranging patterns, core area use and movement patterns;

- to take photographic records of finless porpoises; and

- to assist AFCD in arousing 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 in the past two decades of marine mammal monitoring surveys in Hong Kong developed by HKCRP (Hung 2005, 2018, 2019; Jefferson 2000a, b; Jefferson et al. 2002). The territorial waters of Hong Kong Special Administrative Region are divided into twelve different survey areas, and line-transect surveys were conducted among ten survey areas (i.e. Northwest (NWL), Northeast (NEL), West

(WL), Southwest (SWL) and Southeast Lantau (SEL), Deep Bay (DB), Lamma (LM), Po Toi (PT), Ninepins (NP) and Sai Kung (SK)) (Figure 1).

For each vessel survey, a 15-m inboard vessel 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 *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 two additional experienced observers were available on board to work in shifts (i.e. rotating 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 and had participated in rigorous at-sea training program provided by the principal investigator.

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 (e.g. *Garmin eTrex*). 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 in Hong Kong waters.

### *4.2. Helicopter Survey*

Several helicopter surveys arranged by the Government Flying Service (GFS) through AFCD were conducted during the 2019-20 monitoring period to survey mainly the remote areas that were relatively inaccessible by boat (e.g. Sai Kung, Mirs Bay) (Figure 2). The survey coverage of each helicopter survey largely depended on weather conditions such as visibility, sea state, cloud cover and wind direction, and the planned flight route could be changed with some flexibility according to the final decision by the GFS pilot.

The helicopter survey usually lasted 1.5 hours, flying at an altitude of about 150 metres and a speed of 150-200 km/hr. Two to three 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 vessel 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 each dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides are not symmetrical. One to two professional digital cameras (e.g. *Canon* EOS 7D Mark II model), each equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.

All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater details, and were carefully compared to all identified dolphins in the PRE Chinese White Dolphin photo-identification catalogue compiled and curated by HKCRP. 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 were also added to the catalogue, along with text descriptions including age class, gender, any nickname or unique markings. The updated photo-identification catalogue incorporated all new photographs of individual dolphins taken during the present study.

### *4.4. Data Analyses*

#### 4.4.1. Distribution pattern analysis

The line-transect survey data were integrated with a Geographic Information System (GIS) to visualize and interpret different spatial and temporal patterns of dolphin and porpoise distribution using their sighting positions collected from vessel and helicopter surveys. 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 details. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, fishing boat associations, young calves and behavioural activities. Data from the long-term sighting databases were used to compare past distribution patterns of dolphins and porpoises in recent years to data from the present study period.

#### 4.4.2. 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 to correct for the uneven survey effort. As such, encounter rates could be an indicator of the relative importance of different regions within the study area to dolphins and porpoises.

#### 4.4.3. Line-transect analysis

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

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

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

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

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

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

Besides estimating dolphin abundance for the four main areas of dolphin occurrences (i.e. NEL, NWL, WL and SWL) in 2019, annual abundance estimates were also generated for every year since 2001 in NWL and NEL survey areas and since 2003 in WL survey areas, to investigate any significant temporal trend using linear regression model. To perform such trend analysis, the linear regression model is considered in the four areas as follow:

$$x_t = a + bt + u_t \qquad \text{for } t = 1, 2, \ldots, n$$

where $x_t$ denotes the abundance data of dolphin at time $t$, $n$ is the number of observations, and $u_t$ is an error term which follows normal distribution with mean zero and variance $\sigma^2$.

4.4.4. Quantitative grid analysis on habitat use

To conduct quantitative grid analysis of habitat use (Hung 2008), positions of on-effort sightings of Chinese White Dolphins and finless porpoises were retrieved from their 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 further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent in 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/porpoises **p**er 100 units of **s**urvey **e**ffort. Among the 1-km$^2$ grids that were partially covered by land, the percentage of sea area was calculated using GIS tools, and their SPSE and DPSE values were adjusted accordingly. The following formulae were used to estimate SPSE and DPSE in each 1-km$^2$ grid within the study area:

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

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

where S = total number of on-effort sightings
D = total number of dolphins/porpoises from on-effort sightings
E = total number of units of survey effort
SA% = percentage of sea area

Both SPSE and DPSE values are useful for examining relative dolphin/porpoise usage within a one square kilometre area. For the present monitoring 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 2019 for both dolphins and porpoises, and in the past five years of monitoring (i.e. 2015-19) for finless porpoises.

#### 4.4.5. Behavioural analysis

When dolphins were sighted during vessel surveys, their behaviours were observed. Different behaviours were categorized (i.e. feeding, milling/resting, traveling, socializing) and recorded on sighting datasheets. These data were then input into a separate database with sighting information, which was 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, and compared with past distribution patterns of such activities.

#### 4.4.6. Ranging pattern analysis

For the examination of individual ranging patterns, location data of identified 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 range for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, created by the Alaska Biological Science Centre, USGS (Hooge and Eichenlaub 1997), was loaded as an extension with ArcView© 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD (utilization distribution) level. The core areas of individuals at two different levels (50% and 25% UD) were also examined to investigate their range use in greater detail.

#### 4.4.7. 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 in the past 12 years (i.e. 2008-2019), or five years in a row within the same period. Other individuals that were intermittently sighted during the past years were defined as "Visitors". In addition, monthly matrix of occurrence was also examined to differentiate individuals that occurred year-round (i.e. individuals that occur in every month of the year) or seasonally (i.e. individuals that occur only in certain months of the year). Using both yearly and monthly matrices of occurrence, "year-round residents" 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.

# 5. RESULTS AND DISCUSSIONS

## *5.1. Summary of Data Collection*

### 5.1.1. Survey effort

During the entire 2019-20 monitoring period (i.e. April 2019 to March 2020), a total of 182 line-transect vessel surveys were conducted among ten survey areas in Hong Kong waters. These included 15 surveys in DB, 18 surveys in NEL, 18 surveys in NWL, 35 surveys in WL, 40 surveys in SWL, 27 surveys in SEL, 13 surveys in LM, ten surveys in PT, five surveys in NP and one survey in SK. The details of these survey effort data collected are presented in Appendix I.

Similar to recent monitoring periods, more survey effort were allocated to survey areas outside of North and West Lantau waters during the 2019-20 monitoring period, as additional surveys have already been conducted in NWL, NEL and WL survey areas concurrently under the Hong Kong Link Road (HKLR) regular line-transect monitoring surveys as part of the EM&A works for the Hong Kong-Zhuhai-Macau Bridge (HZMB) construction. These additional HZMB-related marine mammal monitoring surveys employed the same HKCRP personnel, survey methodology and research vessels to ensure consistency and full compatibility with the AFCD long-term marine mammal monitoring programme. In order to increase the overall sample size for the present monitoring study, such EM&A data were combined with the AFCD monitoring data for various data analyses presented throughout this report, which can provide valuable supplementary information on dolphin and porpoise occurrences.

In addition, two helicopter surveys were conducted with the Government Flying Services through the arrangement of AFCD on May 29th and September 30th of 2019. These surveys mainly covered the eastern and southern waters of Hong Kong, and such off-effort data on local dolphins and porpoises collected from these surveys were also included in the distribution analysis and group size analysis.

Among the ten survey areas, 629.5 hours were spent collecting 5,756.6 km of survey effort during the AFCD vessel line-transect surveys from April 2019 to March 2020. Nearly seventy percent of total survey effort was conducted among six areas where dolphins occurred regularly, which included 19.2% in NEL/NWL, 10.3% in WL, 35.3% in SWL/SEL and 4.8% in DB. On the other hand, 65.6% of total survey effort was allocated to survey areas in southern and eastern waters of Hong Kong (i.e. SWL, SEL, LM, PT, NP and SK) where porpoises regularly occurred.

It should be mentioned that 96.9% of all survey effort was conducted under favourable sea conditions (Beaufort 3 or below, with good visibility). Such high percentage of survey effort conducted in favourable conditions is crucial to the success of the marine mammal data collection programme in Hong Kong, as only such data can be used in various analyses to examine the encounter rates and habitat use of both dolphins and porpoises, as well as to estimate the density and abundance of dolphins.

During the same 12-month monitoring period in 2019-20, a total of 3,949.8 km of survey effort was also conducted in NEL, NWL and WL under the HZMB-related EM&A dolphin monitoring surveys. This brings the total survey effort to 5,653.0 km for the combined dataset from AFCD and HZMB-related surveys among the three survey areas. Over 95% of the survey effort of HZMB-related EM&A surveys was also conducted under favourable sea conditions, which can be combined with the AFCD monitoring data for various analyses.

Since 1996, the long-term marine mammal monitoring programme coordinated by HKCRP has collected a total of 243,332 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 46.2% of the total effort funded by AFCD. The survey effort in 2019 alone comprised 5.1% of the total survey effort collected since 1996.

#### 5.1.2. Marine mammal sightings

<u>Chinese White Dolphins</u> - From the AFCD monitoring surveys, 158 groups of 524 Chinese White Dolphins were sighted between April 2019 and March 2020 (see Appendix II). Combined with the additional sightings (117 groups of 366 dolphins) contributed from various HZMB-related EM&A surveys, a total of 275 groups of 890 dolphins were sighted altogether during the same 12-month period. Among them, 239 were sighted during on-effort line-transect vessel surveys.

During the 2019-20 monitoring period, almost all sightings were made in the WL (195 sightings), SWL (58) and NWL (19) survey areas, comprising 98.9% of the total. In contrast, dolphins rarely occurred in SEL (with two sightings of two lone dolphins) and DB (with one sighting of two dolphins), while none occurred in the NEL survey area, despite a considerable amount of effort surveying these three areas. As in previous monitoring periods, no dolphin was sighted in LM, PT or NP survey areas, where porpoises primarily occur on a regular basis.

The most notable was that no dolphin was sighted in NEL for the entire year of 2019 as well as the first three months of 2020. However, the passive acoustic monitoring (PAM) conducted concurrently by HKCRP with the funding support of AFCD revealed that dolphins have not abandoned this area completely (especially around the Brothers Islands where the C-POD units were deployed) in recent years. For example, there were a total of 36 days in the past three years (including 12 days in the second half of 2017, 17 days in 2018, and 7 days in 2019) where at least 10 DPMs (a **D**etection **P**ositive **M**inute is any one minute period where at least one click train was detected) were recorded per day at Siu Ho Wan. In addition, a C-POD deployed at Tai Mo To also recorded at least 10 DPMs per day during another nine days in the past three years (including two days in the second half of 2017, six days in 2018 and one day in 2019). Notably, in the past two PAM monitoring periods in 2017-18 and 2018-19, a strong diel pattern with significantly more dolphin detections at night than during the day was found among all sites within the Brothers Marine Park (Wang and Hung 2018, 2019). Even though the dolphin detections were still very low around the Brothers Islands in NEL, the continuing night-time usage by dolphins of this once-important habitat should not be overlooked, and the on-going PAM studies would be critical to fill important data gaps in monitoring dolphin occurrences 24 hours a day within this marine park as well as for the NEL survey area.

<u>Finless Porpoises</u> – A total of 124 groups of 317 finless porpoises were sighted from vessel surveys and helicopter surveys during the 2019-20 monitoring period (see Appendix III). Among them, 103 porpoise sightings were made during on-effort search, which can be used in the encounter rate analysis and habitat use analysis. The porpoises were mainly sighted in the SEL and SWL survey areas with 53 and 39 groups, respectively, during the one-year monitoring study. They also occurred regularly in LM and PT survey areas with 14 and 12 sightings in these two areas, respectively. In contrast, porpoises seldom occurred in NP (only six sightings from five sets of surveys) while no porpoise was sighted during the single survey conducted in the SK survey area. As in previous monitoring periods, the porpoises were absent from the WL, NWL, NEL and DB survey areas, where dolphins primarily occur throughout the past two decades.

Even though no porpoise was sighted in survey areas in the North and West Lantau regions where dolphins regularly occurred in the past, there have been some unexpected findings from the recent PAM studies, which revealed the rare presence of porpoises in West and Northwest Lantau waters. For example, the 2017-18 PAM study found that there were very low levels of detections of possible finless porpoise activities at the sites of Tai Mo To and Lung Kwu Chau during November to January (Wang and Hung 2018). However, no such detection was made in the North Lantau region in the subsequent monitoring period in 2018-19, supporting the rarity and likely insignificance of these events (Wang and Hung 2019). Furthermore, there were also some limited detections of porpoises at Fan Lau and Peaked Hill, and such detections were higher during the day (Wang and Hung 2019). Notably, finless porpoises have never been sighted to the north of Fan Lau in more than two decades of visual surveys conducted by HKCRP, and it is possible that the source of these clicks that were automatically classified as finless porpoises were not produced by porpoises, as the source could be from some Chinese White Dolphins, which may periodically produce click trains that resemble porpoises. Even if these detections were finless porpoises, such rare events may have little biological significance. Nevertheless, data from continued PAM monitoring are needed before conclusions can be made about the occurrence of porpoises in the West and North Lantau regions that have long been considered areas not utilized by porpoises.

### 5.1.3. Photo-identification of individual dolphins

From the 2019-20 monitoring period, approximately 16,500 digital photographs of Chinese White Dolphins were taken during AFCD monitoring surveys for the photo-identification of individual dolphins. All photographs taken in the field were compared with existing individuals from the photo-identification catalogue compiled and curated by HKCRP since 1995. All new photographs identified as existing or new individuals during the study period, as well as any updated information on gender and age class of individual dolphins, were incorporated into the photo-identification catalogue. A significant amount of photo-identification data was also contributed from the HZMB-related surveys during the same 12-month period.

Up to January 2020, a cumulative total of 1,119 individual Chinese White Dolphins (including 14 that were confirmed to be dead) have been identified by HKCRP researchers in Hong Kong waters and the rest of the Pearl River Estuary. These included 11 newly identified individuals from Hong Kong waters, and another 33 newly identified individuals from Lingding Bay (from photo-identification data contributed by the South China Sea Fisheries Research Institute (SCSFRI)) being added to the catalogue in 2019. The current catalogue contained 569 individuals being first identified within Hong Kong’s territorial waters and another 550 individuals being first identified in Guangdong waters of the Pearl River Estuary.

The catalogue summary revealed that 251 individuals have been seen 15 times or more; 158 individuals have been seen 30 times or more; and 104 individuals have been seen 50 times or more. In contrast, 40.2% of the identified individuals have only been seen once or twice, with most of these being first identified in Guangdong waters (329 out of 450 individuals). Temporal trends in the total number of identified individuals, the total number of re-sightings made, and the number of individuals within several categories of number of re-sightings showed good advancement in the photo-identification works during the 2019-20 monitoring period (Figure 3).

Between April 2019 and March 2020, a total of 126 individual dolphins, sighted 311 times altogether, were identified during AFCD regular vessel surveys (Appendix IV). With the addition of the HZMB-related monitoring survey data collected in the NWL and WL survey areas, there was a combined total of 159 individual dolphins being identified 549 times during the 12-month period. Approximately 67.4% of the re-sightings of individual dolphins made during the AFCD/HZMB surveys were in the WL survey area, while re-sightings were also made regularly in the SWL (25.3%) and NWL (6.9%) survey areas. Two individual dolphins were also identified in the DB survey area during the lone sighting occurred in the 2019-20 monitoring period. However, no re-sightings of individual dolphins were made in the NEL and SEL survey areas despite a good amount of survey effort in these areas during the monitoring period (Appendix IV).

Among the 159 identified individuals from the AFCD/HZMB combined dataset, most of them were re-sighted only a few times, while some were repeatedly re-sighted, indicating their strong reliance of Hong Kong’s waters as an important part of their home range. For example, 42 individuals were re-sighted five times or more, while nine individuals (CH12, SL60, WL91, WL123, W130, WL131, WL152, WL232 and WL268) were re-sighted ten times or more in the combined dataset during the relatively short study period. And the frequently-sighted individuals are all considered year-round residents from their pattern of occurrences (see Section 5.7.1).

Notably, 22 individuals were sighted with their calves during the 2019-20 monitoring period. Some of the calves were already in their juvenile stage and were already identified individuals in the photo-ID catalogue (e.g. the mother and calf pairs of NL33-NL233, NL202-NL286 and WL28-WL288). The mothers that were re-sighted with young calves (i.e. unspotted calf or unspotted juvenile) will be closely monitored, as their survival is critical for the long-term viability of the dolphin population, especially in light of the dramatic decline in calf occurrence in recent years (see Section 5.4.2).

Since 2015, a total of 62 frequently-occurring individuals (with 15 or more re-sightings during the period of 2012-19) have disappeared from Hong Kong's territorial waters. The total number of missing individuals from Hong Kong's waters reached the highest level in 2019, with a total of 16 individuals missing. For example, NL104 and NL210 were re-sighted 80 and 48 times during the seven-year period of 2012-18 (including 12 re-sightings each in 2017-18), but neither individuals were observed in 2019 or during the first three months of 2020. Notably, five of these 16 individuals were sighted across the border in Lingding Bay in 2019 during the surveys conducted by SCSFRI, so these individuals may have temporarily or permanently shifted their range use away from Hong Kong's waters and into neighbouring waters. However, it should be noted that among the 62 disappeared individuals, only eight of them have been sighted across the border since their absence in Hong Kong's waters. It should be emphasized that the photo-ID works conducted across the border demonstrates the importance of monitoring surveys to be conducted across the entire Pearl River Estuary, as this would not only provide information on cross-boundary movements of individual dolphins, but could also confirm if an individual that has disappeared from Hong Kong's waters may still be alive across the border.

## *5.2. Distribution*

### 5.2.1 Distribution of Chinese White Dolphins

During the 2019-20 monitoring period, Chinese White Dolphins were sighted frequently along the west coast of Lantau Island as well as the northern portion of the SWL survey area (Figure 4). In contrast, they were not sighted at all throughout the North Lantau region, and only a handful of sightings were made in the SEL and DB survey areas (Figure 4).

In 2019 alone, from the combined effort of AFCD and HZMB-related surveys, dolphin occurrence was the highest along the west coast of Lantau, while they regularly occurred in the northwestern portion of South Lantau waters. In comparison, they only occurred near the western end of the North Lantau region and have largely vacated the central and eastern portions of this region (Figure 5).

With a closer look at dolphin distribution in North Lantau waters in 2019, dolphin sightings were mostly made within the Sha Chau and Lung Kwu Chau Marine Park, as well as near Black Point and the southwestern corner of NWL survey area (i.e. adjacent to the HKLR alignment to the west of Shum Wat). Rare sightings were also made to the north and west of the third runway system (3RS) work zone as well as near Pillar Point and the Urmston Road section between Lung Kwu Chau and Lung Kwu Tan (Figure 6). However, dolphins were not sighted in the central and eastern portions of the North Lantau region, including most of the peripheral area of the 3RS work zone, around the HKBCF reclamation site, and near the Tuen Mun-Chek Lap Kok Link (TMCLKL) alignment. Furthermore, despite considerable survey effort in the DB survey area, no dolphins were observed in 2019 (Figure 6).

In contrast, dolphins occurred much more frequently throughout the WL survey area in 2019 (Figure 7), with higher concentrations adjacent to the Tai O Peninsula, near Kai Kung Shan and Peaked Hill, and all around the Fan Lau Peninsula (and extending into the SWL survey area). It appeared that dolphins occurred more often in the inshore waters of WL but less frequently further offshore towards and along the western territorial border. Notably, only a few sightings were made at the northern end of the WL survey area, or near the HKLR09 alignment (Figure 7), even though a number of sightings were also made near the HKLR09 alignment segment in the NWL survey area.

In the South Lantau region, dolphins occurred regularly in the SWL survey area, with fairly even distribution between the southern coast of Lantau and the Soko Islands, while a much higher concentration in dolphin sightings was found near Fan Lau Peninsula within this survey area. In contrast, dolphins seldom occurred in the southern portion of SWL waters including the waters around Tai A Chau, and only a handful of sightings was made in the SEL survey area with no particular concentration (Figure 7).

#### 5.2.2. Distribution of finless porpoises

From April 2019 to March 2020, the main cluster of porpoise occurrences was found in the offshore waters between Soko Islands and Shek Kwu Chau (Figure 8). Outside of this high concentration area, other sightings of porpoises were scattered around the Soko Islands, within Pui O Wan, to the south of Shek Kwu Chau and Cheung Chau, near Lamma Island and Po Toi Islands, as well as at the juncture of PT and NP survey areas (Figure 8). They were generally absent from the western portion of South Lantau region, for the most part of the LM survey area, and in the offshore waters of the PT and NP survey areas.

Examination of temporal changes in porpoise distributions in the past four years (2016-19) revealed that the waters between the Soko Islands and Shek Kwu Chau have been consistently and frequently used by porpoises in recent years (Figure 9), which should constitute the most important habitats for porpoises in Hong Kong. However, a closer examination on their habitat use pattern (see Section 5.3.2) would reveal that porpoise usage around Shek Kwu Chau greatly diminished in 2018 and 2019, and this change could be related to the recent reclamation works in association with the construction of the Integrated Waste Management Facilities (IWMF) Stage I. Another notable difference in the four years of porpoise distribution data is that porpoises occurred less often in LM waters in 2017 and 2019, as well as in the eastern survey area in 2018 (Figure 9). It appeared that outside of the South Lantau region, porpoise occurrences have fluctuated greatly across different years.

### *5.3. Habitat Use*

#### 5.3.1. Habitat use patterns of Chinese White Dolphins

The habitat use patterns of Chinese White Dolphins were examined using the quantitative grid analysis, to calculate the SPSE and DPSE values (i.e. sighting densities and dolphin densities, respectively) in all grids among the six survey areas where they occurred regularly in 2019. These patterns were also compared to the annual patterns observed in recent years.

In 2019, all grids with high dolphin densities were concentrated along the coast in the WL survey area and the western portion of the SWL survey area, mainly extending from Tai O Peninsula to Fan Lau Peninsula (Figure 10). In contrast, with the exception of one grid between Lung Kwu Chau and Sha Chau (which recorded moderate dolphin density), the entire North Lantau region, Deep Bay and the central and eastern portions of South Lantau waters only recorded low to very low dolphin densities for the entire year (Figure 10).

Temporal changes in dolphin habitat use patterns (2011-19)

A comparison was made among the habitat use patterns over the past decade to examine the temporal changes in dolphin densities at various important habitats in the western waters of Hong Kong. In WL, dolphin habitat use varied during the nine-year period, with high densities recorded in most grids in 2011, 2013-15. However, dolphin densities appeared to have progressively diminished in most parts of the WL survey area in 2016 and 2017 and then rebounded somewhat in 2018 and 2019 (Figure 11). Moreover, dolphin usage in the northern portion that overlapped with the HKLR09 alignment was consistently lower in recent years of 2015-17 as well as in

2019 when compared to the earlier years before the HKLR construction (Figure 11). Such usage should be continuously monitored to examine the long-term impact of the bridge alignment on the north-south movement of individual dolphins between the North and West Lantau regions.

In SWL waters, when compared to the earlier years (2011-13), dolphin usage was higher among many grids in 2014-15, and was more evenly spread in 2014-17 as well as in 2019 (Figure 11). Notably, after three consecutive years (2016-18) with low to moderate dolphin densities recorded in most grids in SWL, there appeared to be a rebound in dolphin occurrence in 2019.

In the North Lantau region, temporal changes in dolphin habitat use pattern were more dramatic, with greatly diminished dolphin occurrences since 2013 (Figure 12). In 2012, or the year when the HZMB construction works commenced, dolphin usage was evenly spread throughout the North Lantau region, with high dolphin densities recorded around the Brothers Islands and Shum Shui Kok, Lung Kwu Chau and Sha Chau, as well as near Black Point, Pillar Point and to the west of the airport platform near Shum Wat (Figure 12). However, such usage has been largely confined to the western end of the North Lantau region in recent years, with habitat use further reduced to mostly the waters around Lung Kwu Chau, while dolphins have largely vacated the central and eastern portions of the region with only a handful of sightings recorded since 2014 (Figure 12).

Even though most marine works associated with the HZMB construction was completed in 2016, there is still no sign of recovery in dolphin habitat use in the North Lantau region after the dramatic decline. With the on-going massive reclamation works associated with 3RS construction commencing in mid-2016 and will continue for several more years, it can be reasonably assumed that the dolphins' usage of habitat in North Lantau will likely remain at low levels in the foreseeable future.

Temporal changes in dolphin habitat use patterns at six key habitats (2004-19)

The temporal trends in dolphin usage at six key habitats were also examined for the 16-year period between 2004-19, which included the two existing marine parks around Sha Chau and Lung Kwu Chau as well as the Brothers Islands, the two planned marine parks at Southwest Lantau and South Lantau, and two other "dolphin hot spots" at Tai O and Black Point where they regularly occurred in the past (Figure 13). To examine dolphin usage over these six key habitats that encompass a suite of grids, the number of on-effort sightings and amount of survey effort were pooled together from those grids, to calculate dolphin densities (DPSE) as a whole for each year during the 2004-19 period to examine temporal trends.

Within the Sha Chau and Lung Kwu Chau Marine Park (SCLKCMP, with 17 grids), there was a continuous decline in dolphin usage since 2013, and such usage fell to the lowest level in 2019 (Figure 14). Such an alarming decline raises serious concern, as this area has long been considered important dolphin habitat in Hong Kong (Hung 2008). Even at the historically lowest level of dolphin occurrence in 2019, the waters around Lung Kwu Chau remained the only habitat in the North Lantau region that is still consistently utilized by dolphins. On the other hand, after a dramatic decline in dolphin usage since 2011, the Brothers Marine Park (BMP, with 15 grids) recorded zero dolphin density in five consecutive years in 2015-19. Although dolphin usage was expected to recover after the completion of most marine works associated with HZMB construction as well as with the BMP establishment in December 2016, their occurrence around the Brothers Islands remains extremely rare in the past five years. However, as discussed in Section 5.2.1, the AFCD passive acoustic monitoring study revealed a very low level of dolphin occurrence within this marine park in 2017-19, where the acoustic detections were mostly made during the night-time. It remains to be seen whether there will be any signs of recovery in dolphin usage in the foreseeable future.

Notably, the recent PAM monitoring studies have also revealed significant declines in dolphin usage within SCLKCMP and BMP even just across a single year. For example, in the 2017-18 monitoring period, there were two and 184 days in which there were no dolphin detections in SCLKCMP and BMP respectively, but in the 2018-19 monitoring period, there were six and 227 days in SCLKCMP and BMP without any dolphin detections, respectively. These results indicated an increase in the number of days when no dolphins were detected in these two marine parks (Wang and Hung 2019). Moreover, significant declines in dolphin detections were found across one site in SCLKCMP (i.e. Lung Kwu Chau) and two sites in BMP (i.e. Siu Ho Wan and Tai Mo To) between 2017-18 and 2018-19, with the dolphins becoming even rarer at the two BMP sites in 2018-19 (Wang and Hung 2019). The continuing declines in dolphin detections over just a one-year period is concerning, as this may imply that the continued construction activities in waters adjacent to the marine parks (e.g. the 3RS project and the Tung Chung New Town Development reclamation project) are impacting the dolphin occurrence within the waters of SCLKCMP and BMP. As such, the protections afforded by the marine parks are clearly not effective at stopping these threats, which originate outside of the marine parks (Wang and Hung 2019). To continuously monitor the anthropogenic impacts on the two existing marine parks, both visual monitoring surveys and passive acoustic monitoring conducted concurrently would be essential in the coming years to provide a comprehensive examination of dolphin usage within these two marine parks in the North Lantau region.

Besides a noticeable increase in dolphin usage in 2014 and 2015 within the planned Southwest Lantau Marine Park (SWLMP, with 15 grids), such usage has remained fairly steady and high in the past decade (Figure 14). Notably, this soon-to-be established marine park consistently recorded the highest levels of dolphin usage among all existing and planned marine parks in western Hong Kong during the past 16 years (Figure 14). Furthermore, after a dramatic decline in dolphin densities was detected in the planned South Lantau Marine Park (SLMP, with 30 grids), dolphin usage there rebounded to a slightly higher level in 2019 (Figure 14). This increase could be linked to the decrease in high-speed ferry volume in the South Lantau Vessel Fairway (a 20% drop in ferry volume between 2018 and 2019; unpublished data from the Port Statistics by the Marine Department), which may have provided a safer and less noisy passage for dolphins to reach the South Lantau Marine Park from the southern coast of Lantau.

Once identified as a critical dolphin habitat in the western waters of Hong Kong, the waters around Tai O Peninsula (with four grids) also recorded a steady decline in dolphin densities from the highest in 2009 to the lowest in 2017 and 2018, before a slight rebound in 2019 (Figure 14). The dolphin usage at Black Point (with four grids) fluctuated greatly in earlier years with no apparent trend. After a near complete absence from this area between 2014 and 2018, dolphin usage has climbed back to a slightly higher level in 2019 (Figure 14). As this area is situated at the border of a proposed large-scale reclamation site at Lung Kwu Tan and only a few kilometres away from the Sha Chau and Lung Kwu Chau Marine Park, special attention on dolphin habitat use in this area in the near future is needed.

### 5.3.2. Habitat use patterns of finless porpoises

The spatial pattern of porpoise habitat use revealed that more heavily utilized habitats in 2019 were limited to the offshore waters at the juncture of the SEL and SWL survey areas (Figure 15). In addition, a number of grids in LM, PT and NP also recorded very high porpoise densities (Figure 15), but those results could be heavily biased by the relatively low amount of survey effort conducted during the one-year period and so should be treated with caution.

In order to increase the sample size, the survey effort and porpoise data collected from 2015-19 were pooled and analyzed for a longer period with sufficient amount of survey data, in order to provide a better representation of porpoise habitat use pattern in the southern and eastern waters of Hong Kong. Since finless porpoises in Hong Kong exhibit pronounced seasonal patterns of distribution, with rare occurrence in each survey area during certain periods of the year (Hung 2005, 2008; Jefferson et al. 2002), the five-year dataset was further stratified into winter/spring (December through May) and summer/autumn (June through November) to deduce habitat use patterns of porpoises for the respective dry and wet seasons.

For the examination of porpoise habitat use patterns during the dry season (winter and spring months) in 2015-19, in which the majority of survey effort was allocated to the SWL, SEL and LM survey areas, the grids with high porpoise densities were located to the southwest and southeast of Cheung Chau, to the west and southwest of Shek Kwu Chau, to the east of Soko Islands, and in the area between Soko Islands and Shek Kwu Chau (Figure 16). Porpoises rarely utilized the inshore waters of and western portion of the South Lantau region, the offshore waters to the south of Cheung Chau, and the southwestern and eastern portions of Lamma waters (Figure 16).

In the eastern survey areas, more survey effort was allocated there during the wet season (summer and autumn months) of 2015-19, while the survey effort remained relatively consistent in the SWL and SEL waters year-round, but with many fewer surveys conducted in LM waters. For the five-year period, porpoise densities were moderate around the Po Toi Islands, in the offshore waters in PT survey area, as well as at the juncture of the PT and NP survey areas (Figure 17). Although porpoise densities at some grids in NP and SK waters were very high, these results could be biased as the survey effort accumulated over the five-year period in these survey areas was still relatively low (less than 10 units of survey effort in total for most grids). Furthermore, even though porpoises occurred in the waters of South Lantau and Lamma Island (mostly in offshore waters) during the wet season, densities in these areas were much lower than during the dry season, with no particular habitat preference (Figure 17).

Temporal changes in porpoise habitat use patterns

To examine the recent temporal changes in porpoise densities at various important habitats in the southern waters of Hong Kong, comparisons were made on porpoise habitat use patterns across the past six years in 2014-19. Throughout the four-year period of 2014-17, porpoises were consistently and heavily using the offshore waters between Shek Kwu Chau and the Soko Islands as well as to the south of Cheung Chau. However, such usage changed dramatically in 2018 and 2019 with noticeable declines at the abovementioned important porpoise habitats (Figure 18). In contrast, porpoise usage of the waters to the west of Lamma Island greatly fluctuated during the six-year period, with more extensive and intense usage in 2016-18 but more sporadic occurrences in 2014 and 2019 (Figure 18).

Three key porpoise habitats in South Lantau (including the planned SLMP, Shek Kwu Chau and Pui O Wan) were examined for temporal trends in their usage across a 16-year period between 2004 and 2019 (Figure 13). Similar to the Chinese White Dolphins, to examine temporal trends in the usage by porpoises of these key habitats that encompass a suite of grids, the number of on-effort porpoise sightings and unit of survey effort were pooled together from those grids, to calculate porpoise densities (DPSE) as a whole for each year from 2004 to 2019.

Porpoise usage fluctuated greatly at the planned SLMP (with 30 grids) in the past 16 years, starting with very low levels between 2004-09, albeit a strong surge occurred in 2007 (Figure 19). Since 2010, there was a steady increase in porpoise usage of this area, which reached the highest in 2014. In contrast, porpoise usage within this planned marine park in the past five years has become more unstable, with a notable drop to the lowest level in 2019 since 2014 (Figure 19). Notably, the PAM study conducted within this marine park in recent years also indicated that one site at Tai A Chau S recorded significantly lower DPM metrics in 2018-19 than in 2016-17 (Wang and Hung 2019). Such marked decline in porpoise occurrence coincided with the commencement of IWMF construction works in June 2018 (see below), which implied that impacts of such works could have extended to a much wider region. Such potential impacts should be closely monitored in coming years, especially in light of the commencement of another construction work for the Offshore LNG Terminal in mid-2020, which is situated just to the east of this planned marine park.

The inshore waters of Pui O Wan (with nine grids) were consistently used by porpoises in the earlier years (see Hung 2005 also) and such usage was maintained at a higher level until 2010, when the porpoises began to use these waters infrequently between 2010 and 2013 (Figure 19). Since then, porpoise usage rebounded to a higher level in the subsequent years, with the exception of a noticeable drop on 2018, which coincided with the dramatic decline in porpoise usage at nearby Shek Kwu Chau in the same year (see below).

Since 2007, the surrounding waters of Shek Kwu Chau (with eight grids) were consistently utilized by the porpoises as a critical habitat. In recent years, there was a steady increase from 2013 to a much higher level in 2016, before falling back to moderate level in 2017 (Figure 19). However, there was a sharp decline in porpoise usage in 2018 to the lowest level since 2007. A similarly low level of porpoise usage was also recorded in 2019 (Figure 19). The dramatic decline in porpoise usage of this habitat in the past two consecutive years can be possibly linked to the construction activities near Shek Kwu Chau in association with the reclamation works for IWMF, as the preparation works began in March 2018, while the reclamation works commenced in June 2018. Such a sharp decline at this once-critical porpoise habitat should raise serious concerns about the impacts of the IWMF project and whether the waters around Shek Kwu Chau could still serve important functions for porpoises that regularly occur in Hong Kong waters. It is also uncertain whether the porpoise usage of the entire southern waters of Hong Kong has already been affected by the impacts of IWMF constructions works, as porpoise usage in both SWL and SEL survey areas as well as from the entire southern waters of waters have also fallen to lower levels in the past two consecutive years (see Section 5.5.2). Temporal trends in their habitat use near Shek Kwu Chau as well as for the entire southern waters of Hong Kong should be closely monitored as the IWMF construction works continue over the next few years.

## *5.4. Group Size, Calf Occurrence and Activities*

### 5.4.1. Group sizes of dolphins and porpoises

From April 2019 to March 2020, the group sizes of Chinese White Dolphins varied from singletons to 15 animals, with an overall mean of 3.2 ± 2.78 (n = 275). Among the five areas where dolphins occurred in 2019-20, the mean group size was the lowest in SEL (1.0, with only two lone individuals among two sightings) and the highest in SWL (3.6). The mean group size in WL (3.2) was similar to the overall mean but in NWL, it was lower (2.7) (Table 1a). Among the four seasons, mean group size was the highest in summer months (3.7), while the ones among the other three seasons were very similar (2.8-3.2) and were either close to or below the overall mean. Furthermore, the majority of dolphin groups sighted during the 2019-20 monitoring period were quite small, with 54.9% of the groups composed of 1-2 animals, and 76.4% of the groups with fewer than five animals. Only eight out of the 275 dolphin groups contained more than ten animals (Figure 20).

The examination of long-term trend in annual mean dolphin group sizes since 2002 revealed that the mean group sizes in recent years have stabilized with very similar levels during the four-year period of 2016-19 (Figure 21). However, it should be noted that the mean group size in NWL was at the lowest level in both 2018 and 2019 among all years, while mean group size in SWL was higher in 2019 than in previous years. The mean group size among different years and different areas should be continuously monitored, as this could be indicative of changes in the dolphins' foraging strategies in response to increased disturbance from various sources or changes in prey distribution and overall prey resources in the western waters of Hong Kong.

The distributions of dolphins in different group size categories in 2019 are shown in Figure 22. Larger dolphin groups occurred predominantly along the coastline of the WL survey area, with the very large groups (10+ dolphins per group) mostly centered near the HKLR alignment, between Tai O and Yi O, and around the Fan Lau Peninsula (Figure 22). Other large groups were scattered in the northwest portion of SWL survey area, with a few also occurring between Lung Kwu Chau and Sha Chau as well as near Black Point in NWL waters. In contrast, the smaller groups were evenly distributed throughout the distribution of dolphins around Lantau waters in 2019 (Figure 22). As in previous years, the groups that occurred at the periphery of the distribution, including most of those in South Lantau waters and in the NWL survey area, were all smaller groups.

For the finless porpoises, group size during the 2019-20 monitoring period varied from singletons to 13 animals, with an overall mean of 2.6 ± 2.16 (n=124). The majority of the groups were very small, with 67.7% being composed of 1-2 animals, and all except 14 groups (or 88.7% of all groups) had fewer than five animals (Figure 23). The mean group sizes in the PT (3.4) and NP (3.5) survey areas were well above the overall mean, but the sample sizes for these two areas constituted only 14.5% of the total number of sightings. The mean group sizes in the LM and SWL survey areas were similar to the overall mean, but mean group size in SEL (2.2) was below the overall mean (Table 1b).

#### 5.4.2. Calf occurrence of dolphins

Of the 1,030 dolphins sighted altogether in 2019, 68.2% of them were categorized into six age classes. Among them, the spotted adults (21.4%) and spotted juveniles (18.5%) dominated the largest proportion of dolphins being identified with their age classes. Three unspotted calves (UC, or newborn calves) and 23 unspotted juveniles (UJ, or older calves) were sighted in 2019, with these combined calves comprising only 2.5% of the total. It should also be mentioned that two of the three unspotted calves sighted in 2019 were likely the same newborn calf of a known female identified as

WL145.

After a steady decline in the past six years in young calf occurrence in Hong Kong's waters, falling from the annual percentage of 5.8% in 2013 to the lowest of 1.5% in 2018, there appears to be a slight rebound in 2019 (Table 2; Figure 24). However, calf occurrence in 2019 still remains at a very low level when compared to earlier years. The declining occurrence of dolphin calves in recent years is of great concern because such low levels of recruitment casts a very worrisome future for the local dolphin population. A recent examination on various life history parameters deduced from the long-term photo-identification data showed high calf mortality and low fecundity of reproductive females over the past two decades of dolphin monitoring works in Hong Kong's waters (Hung 2018). As mother-calf pairs are more susceptible to anthropogenic disturbances, the exceptionally low percentages of young calves in recent years raises serious concerns about the suitability of Hong Kong's waters for reproduction and the rearing of calves, in the presence of the adverse impacts of various coastal development projects and high level of vessel activities within their habitats around Lantau Island.

The distribution of young calves in 2019 is shown in Figure 25. They were mostly sighted in the WL survey area with slightly higher concentrations near the HKLR09 alignment, Kai Kung Shan, Peaked Hill and the Fan Lau Peninsula. In contrast, young calves rarely occurred in the SWL survey area (except near Fan Lau) and none occurred in the North Lantau region in 2019.

An examination of the temporal trends in distribution of UCs and UJs in 2012-19 revealed that the changes resembled the overall distribution of dolphins during the eight-year period, with the gradual disappearance of young calves from the NEL region starting in 2013-14, and then expanding to the entire North Lantau region thereafter (Figures 26-27). Moreover, the distribution of young calves further shrunk to the limited area of WL waters, with a gradual decline in the frequency of occurrence for UCs even in this once-important habitat for rearing activities (Figure 26). It should also be noted that even though the UJs still regularly occurred and were evenly distributed in West Lantau over the past several years, their occurrence and distribution has also contracted considerably (Figure 27). And for the first time, no young calf was sighted in North Lantau's waters and even in WL waters to the north of the HKLR alignment in 2019.

### 5.4.3. Activities of dolphins

In 2019, 27 (or 8.5%) and 11 (or 3.4%) groups of all dolphin sightings were observed to be engaged in feeding and socializing activities, respectively. None of the groups was observed to be engaged in traveling or milling/resting activity in 2019.

Temporal trend in annual percentages of feeding and socializing activities revealed that both remained at low levels in recent years (Figure 28). In particular, the percentage of feeding activities in 2019 dropped to the lowest since 2002, while the percentage of socializing activities remained at very low levels in the four consecutive years of 2016-19. The diminished occurrence of both activities in recent years is alarming, as these activities serve important functions in the daily lives of the dolphins. This would also reflect the overall deterioration of habitat quality in western Hong Kong's waters for Chinese White Dolphins, as the anthropogenic disturbances continue to affect their different usage of Hong Kong waters.

The distribution of dolphins engaged in different activities in 2019 is shown in Figure 29. Besides three groups scattered near Sha Chau, Black Point and to the north of the 3RS work zone in NWL and a few other groups located between Fan Lau and the Soko Islands, all other dolphin groups associated with feeding activities were found in WL waters, with an even distribution of such sightings stretching from HKLR alignment to the Fan Lau Peninsula (Figure 29). The sightings associated with socializing activities mostly clustered near Tai O Peninsula and Fan Lau Peninsula, with a few also being made near the HKLR alignment, to the west of Peaked Hill and between the Soko Islands (Figure 29).

Temporal changes in distribution of dolphins engaged in feeding and socializing activities were examined across the eight-year period of 2012-19. For feeding activities, the temporal changes in sighting distribution patterns closely resembled the overall dolphin distribution during the same eight-year period. Feeding activities occurred frequently in the North Lantau region (especially around the Brothers Islands) in 2012, but have quickly diminished first in NEL in 2013-2014 and then the distribution of feeding activities continued to decline throughout the entire North Lantau region in recent years (Figure 30). In contrast, feeding activities were frequently encountered in WL waters throughout the eight-year period while sightings with feeding activity increased in SWL waters in 2015-19, with the exception of 2018 (Figure 30).

The temporal changes in distribution of dolphins engaged in socializing activities in 2012-19 were also similar those observed for feeding activities, with regular occurrences in North Lantau in 2012-14, but such occurrences diminished noticeably in 2015-2018 and became non-existent in 2019 (Figure 31). With the exception of 2018, the occurrence of socializing activities remained regular in WL waters since 2014 (Figure 31). Socializing activities were not observed in South Lantau waters in 2012-13 or in 2018, but a few groups engaged in such activities were sighted in each year of 2014-17 and in 2019.

5.4.4. Dolphin associations with fishing boats

Among the 275 groups of dolphins sighted during the 2019-20 monitoring period, only four (or 1.5% of all groups) were associated with operating fishing boats. All four groups were associated with purse-seiners.

After reaching the lowest level (1.8%) in 2018, the overall percentage of dolphin sightings associated with fishing boats in 2019 bounced back slightly to 2.4%. Three of the seven groups sighted with fishing boats in 2019 were associated with gill-netters, while the other four were associated with purse-seiners. These groups were mostly distributed between Tai O Peninsula and Kai Kung Shan, around Fan Lau Peninsula, and between Kau Ling Chung and the Soko Islands (Figure 32).

## *5.5. Encounter Rate*

5.5.1. Encounter rates of Chinese White Dolphins

To calculate the encounter rates of Chinese White Dolphins, only survey data collected in Beaufort 0-3 conditions was included in the analysis as in past monitoring periods. From April 2019 to March 2020, the combined encounter rates of dolphins from the four survey areas of NEL, NWL, WL and SWL was 3.5, which was the third lowest among all monitoring periods since 2002-03 (with the previous lows of 3.0 occurring in 2018-19 and 3.4 in 2017-18; Figure 33a & Table 3). After a steady decline of dolphin encounter rates in the past ten monitoring periods, a slight rebound in 2019-20 was observed. This was mainly attributed to a rebound in the encounter rate recorded in the SWL survey area (Figure 33b). However, the 2019-20 encounter rate in the NWL survey area was the lowest level ever recorded since monitoring began in 2002-03 (Figure 33b).

As consistently recorded in all past monitoring periods, WL continued to have the highest encounter rate (13.3) among the four survey areas, and which was considerably higher than for SWL (3.8) and NWL (0.7) (Table 3). The encounter rate in NEL was once again zero, as no on-effort dolphin sighting was made during 1,669.6 km of survey effort. Similar to the previous six monitoring periods, dolphin encounter rate in 2019-20 was once again higher in SWL than in NWL, which is the opposite of observations in earlier years (Table 3).

Temporal trend in annual encounter rate

Temporal trends in annual dolphin encounter rates since 2002 were examined for the overall combined areas (i.e. NEL, NWL, WL and SWL), as well as the North Lantau and West/Southwest Lantau regions. The overall encounter rate of the combined areas in 2019 was the second lowest since 2002 (the lowest being recorded in 2018) (Figure 34a). After a steep decline in the past four years between 2015 and 2018, the combined rate in 2019 appears to have rebounded slightly, mostly attributable to the rebound observed in the West/Southwest Lantau region (Figure 34b). However, the dolphin encounter rate for the entire North Lantau region (NEL and NWL areas combined) in 2019 was the lowest level ever observed since 2002 (Figure 34b).

5.5.2. Encounter rates of finless porpoises

Encounter rates of finless porpoises were calculated using data collected in Beaufort 0-2 conditions, since the porpoise encounter rate is once again much lower in Beaufort 3 or more conditions (1.3 porpoises per 100 km of survey effort) than in Beaufort 0-2 conditions (3.4) in 2019-20, similar to the previous monitoring periods.

From April 2019 to March 2020, the combined porpoise encounter rate of SWL, SEL, LM and PT survey areas was 3.3 sightings per 100 km of survey effort (Table 4). Such rate was the third lowest among the past ten monitoring periods, with the lowest and second lowest recorded in 2018-19 and 2007-08 monitoring periods, respectively. After a steady decline in recent years (falling from 6.4 sightings per 100 km of survey effort in 2013-14 to only 2.9 in 2018-19), the combined encounter rate rebounded slightly in 2019-20 (Figure 35; Table 4). Among the five survey areas with porpoise occurrences during the 2019-20 monitoring period, their encounter rate was the highest in SEL (5.6), while the ones in SWL (3.9) and NP (3.6) were slightly higher than the overall encounter rate. In contrast, the porpoise encounter rates for LM (1.9) and PT (2.2) were considerably lower than the overall.

Temporal trend in annual porpoise encounter rates from the combined areas of SWL, SEL, LM and PT indicates that the overall porpoise usage of Hong Kong's waters have fluctuated annually since 2002. In 2019, the combined annual rate continued to decline from the low value in 2008 to the lowest value since 2007 (Figure 36a). Furthermore, to account for potential frequent movements across the SEL, SWL and LM survey areas in winter and spring months (i.e. their peak season of occurrence), data from these three areas were pooled to calculate the annual porpoise encounter rates in the southern waters of Hong Kong collectively for another examination of temporal trends over the past decade. After dropping to the lowest level in 2018 since 2007, the rate continued to drop even further in 2019 (Figure 36b).

Among the four survey areas, the variability in annual porpoise encounter rates was evident, with no apparent long-term trend in any of these four areas (Figure 37). However, both SEL and SWL survey areas experienced a noticeable drop in porpoise encounter rates in 2018 and 2019, which may have contributed to the overall decline in porpoise occurrence as mentioned above. Moreover, the annual encounter rate remained very low in LM for three consecutive years in 2017-19, while the one in PT has fluctuated across years with a relatively higher usage in 2019 (Figure 37).

From the encounter rate analyses, it is apparent that porpoise usage in Hong Kong's waters (especially in South Lantau waters) in the past decade has fallen to a low level in the last two years (2018 and 2019). As discussed in Section 5.3.2, the porpoise densities around Shek Kwu Chau, a critical porpoise habitat, has also shown a marked decline in both years, which could be linked to the recent reclamation works for IWMF. It remains to be seen whether such works in the next several years would continue to affect the overall porpoise occurrence in the southern waters of Hong Kong. Notably, another construction project (an offshore LNG terminal) to the east of Soko Islands will also commence in 2020, and there are other on-going threats for the porpoises such as the high level of high-speed ferry traffic in the South Lantau region, which may altogether contribute to the declining trend in their occurrences. Furthermore, recent marine mammal stranding data included a total of 33 and 42 cases of finless porpoise stranding in 2018 and 2019 respectively, with the 2019 figure being a historical high for the species (AFCD unpublished data). Although it is difficult to draw any direct correlation between the decline in porpoise occurrence and the dramatic increase in their stranding numbers in 2018-19, these multiple lines of evidence raise serious concerns on the future of finless porpoises in Hong Kong.

## *5.6. Density and Abundance*

### 5.6.1. Estimates of dolphin density and abundance in 2019

Densities and abundance of Chinese White Dolphins were estimated for NEL, NWL, WL and SWL survey areas using the line-transect analysis method, following similar approach as in previous years of dolphin monitoring in Hong Kong (see Hung 2018, 2019). The annual estimates deduced from the 2019 monitoring data can be used to assess the long-term temporal trend in dolphin occurrences in Hong Kong. Only effort and sighting data collected from the four areas under Beaufort 0-3 conditions were used in the analysis, which included 7,308.8 km of survey effort and 249 dolphin groups from the four areas for the density and abundance estimations in 2019 (Table 5a).

Among the four survey areas, WL recorded the highest dolphin density, with 103.31 individuals/100 km$^2$, which was 3.6 and 24.8 times higher than the densities in SWL and NWL, respectively (Table 5a). Notably, the WL figure in 2019 was the fourth highest in the past decade and a strong rebound from the previous year (2018), which recorded the third lowest density in WL among all years since 2003. Coincidentally, dolphin density in SWL in 2019 was also the third highest in the past decade, which was more than double the density estimates of the previous three years. In contrast, the density estimate for NWL in 2019 (4.17 individuals/100 km$^2$) was much lower than for SWL. This was also the lowest estimate for NWL across all years since 2001, with the second lowest being recorded in 2018. Furthermore, as in the previous three years, estimating dolphin density and abundance for NEL in 2019 was impossible because no dolphin was sighted in this area for the entire year.

In 2019, the abundance estimates of Chinese White Dolphins were 29, 19 and 4 dolphins in the WL, SWL and NWL survey areas, respectively, while no dolphins were observed in the NEL survey area. The estimate for the four areas combined was 52 dolphins (Table 5b). The coefficient of variations (CVs) remained low to moderate for the 2019 estimates in WL (19%), SWL (28%) and NWL (30%) and therefore the abundance estimates for the year should be reliable (Table 5a). After a steady decline in combined abundance estimates from 188 dolphins in 2003 to the lowest of 32 dolphins in 2018, a noticeable rebound was observed in 2019, which was the highest value since 2015 (Figure 38; Table 5b).

Notably, Chinese White Dolphins in Hong Kong constitute a minor portion of the population inhabiting the Pearl River Estuary (PRE) in which certain degree of connection and interchange of individuals occur across the boundary (see Sections 5.1.3, 5.7.1 and 5.7.2). Recent line-transect monitoring surveys conducted by SCSFRI in Lingding Bay (the eastern part of the PRE, but excluding Hong Kong) was resulted in abundance estimates of 945 in 2017-18 and 641 in 2018-19, which is a sharp decline of 32% in dolphin numbers between the two monitoring periods (SCSFRI 2018, 2019). It was suggested that such decline may have resulted by some dolphins moving away from Lingding Bay further south or west, due to abnormal precipitation recorded in

2018-19. The abnormally high precipitation in 2018-19 (4,849 mm, as compared to 2,678 mm in 2017-18) could affect the distribution pattern of the dolphins' prey species (which are more sensitive to the change in salinity of the waters of Lingding Bay), which in turn would affect overall dolphin distribution (SCSFRI 2019). Continuous monitoring and studies in Mainland waters of PRE would not only provide the long-term monitoring data to understand temporal trends in dolphin abundance in the PRE region, but also provide important references to assess the status of dolphin assemblages in Hong Kong in a wider regional perspective, and allow a better understanding on the spatial dynamics of the whole PRE dolphin population.

5.6.2. Temporal trends in dolphin abundance

Temporal trends of annual dolphin abundance in NWL and NEL (2001-19), SWL (2002-19) as well as WL (2003-19) were further examined, where consistent amount of survey effort (at least 500 km of annual survey effort) has been conducted in these four areas of major dolphin occurrence. For SWL, temporal trend of annual estimates was only examined for the past decade (2010-19) but not for a longer period, as consistent survey effort (at least 500 km of survey effort per year) was not collected annually until after 2010. Alternatively, biennial estimates were deduced in SWL for 2002-03, 2004-05, 2006-07 and 2008-09 to examine the overall temporal trend in dolphin abundance over a longer period.

Firstly, the temporal trend in SWL showed fluctuations across the years, with a marked decline from the highest (30 dolphins) to the lowest in 2006-07 (six dolphins). Since then the abundance estimate remained at a lower level in subsequent periods, before a noticeable rebound in 2014 and 2015. Thereafter, abundance estimates dropped to much lower levels in the three subsequent years of 2016-18, before another strong rebound in 2019 (Figure 39; Table 5b). Notably, besides the biennial estimates in 2002-03 (45%) as well as the annual estimates in 2010 (67%) and 2012 (54%), the associated CVs with the abundance estimates in SWL remained moderate within the range of 20-40%, and therefore the estimates should be reliable for most years.

In WL, individual abundance steadily decreased from 54 dolphins in 2007 to only 17 dolphins in 2012 (Figure 40; Table 5b). After a rebound in 2013 and 2014 (with 23 and 36 dolphins, respectively), there was another steady decline in the four following years of 2015-18, before another noticeable rebound in 2019 (with 29 dolphins). The 2019 estimate in WL was also the fourth highest in the past decade (Figure 40; Table 5b).

In contrast, dolphin abundance in the North Lantau region showed a dramatic decline in the past two decades. In NEL, the decline was shocking, dropping from the highest in 2001 (20 dolphins) to one dolphin in 2014 and then to zero for five consecutive years (2015-19) (Figure 40). Dolphin abundance in NWL also dropped steadily and steeply from the highest in 2003 (84 dolphins) to the lowest in 2019 (four dolphins), which is a 95% decline since 2003, or a 90% drop since 2012 (Figure 40).

Using linear regression models, the test statistics for hypotheses $H_0\!:\!b=0$ vs. $H_1\!:\!b<0$ in the respective four areas were found to be as follow:

- NEL (2001-19): the test statistic for the hypotheses was -8.8072 whose *p*-value was ≈ 0.0000. Therefore, the hypothesis $H_0$ was rejected at the 5% level of significance, so the decline in dolphin abundance in NEL was statistically significant.

- NWL (2001-19): the test statistic for the hypotheses was -14.5905 whose *p*-value was ≈ 0.0000. Therefore, the hypothesis $H_0$ was rejected at the 5% level of significance, so the decline in dolphin abundance in NWL was statistically significant.

- WL (2003-19): the test statistic for the hypotheses was -5.7365 whose *p*-value was ≈ 0.0000. Therefore, the hypothesis $H_0$ was rejected at the 5% level of significance, so the decline in dolphin abundance in WL was statistically significant.

- SWL (2010-19): the test statistic for the hypotheses was -0.0153 whose *p*-value was 0.4941. Therefore, the hypothesis $H_0$ was not rejected at the 5% level of significance, so there was no statistically significant decline.

- Combined estimates from NEL, NWL, WL and SWL (2010-19): the test statistic for the hypotheses was -5.1923 whose *p*-value was 0.0004. Therefore, the hypothesis $H_0$ was rejected at the 5% level of significance, so the decline in the combined dolphin abundance was statistically significant.

In summary, clearly significant declines in annual dolphin abundance were detected in each of the three survey areas in NEL, NWL and WL in the past two decades. When the abundance estimates of SWL were considered together with the other three areas collectively, there was also a significant downward trend in overall annual dolphin abundance over the past decade despite a noticeable rebound in 2019.

### *5.7. Range Use, Residency and Movement Patterns of Individual Dolphins*

5.7.1. Individual range use, residency pattern and core area use

Individual Range Use

In order to examine the range use of individual Chinese White Dolphins, the 95% kernel ranges of 140 individuals that occurred in Hong Kong's survey areas in 2019 (as identified through photo-identification works) were deduced using the fixed kernel method, and their ranging patterns are shown in Appendix V. In addition, 127 of these individual dolphins that occurred in 2019 and also had a history of being sighted ≥15 times were further examined for their range use and residency patterns (Table 6).

Among these individuals, all except one (NL286) had occurred in WL in the past, while the majority of them had also occurred in NWL (72.4%) and SWL (74.0%), and to a lesser extent in NEL (18.9%) and DB (15.0%) (Table 6). In contrast, only five and two individuals had been sighted in the SEL or EL survey areas, respectively, as part of their historical range. Furthermore, 108 of these 127 individuals (or 85.0%) occupied ranges that spanned the waters of Hong Kong and the Mainland (Table 6), indicating cross-boundary movements by many individual dolphins that occur regularly in Hong Kong's waters. However, many of these individuals occurred just to the west of the territorial boundary without venturing much further into Lingding Bay (see Appendix V).

Residency Pattern

The residency patterns of 124 individuals were further assessed by examining their annual and monthly occurrences in Hong Kong (Table 6). Three other individuals (i.e. WL277, WL283 and WL291) were only recently identified and re-sighted in the past several years, and therefore their annual occurrence could not be reliably assessed. Overall, 72 and 42 individuals were identified as year-round and seasonal residents respectively, while ten individuals were identified as seasonal visitors (Table 6). Nearly 92% of the assessed individuals were considered residents in Hong Kong, as they have been sighted consistently in the past decade (i.e. 2010-19), or in at least five consecutive years. However, the proportion of visitors (8%) that utilized Hong Kong's waters could be seriously underestimated, as these visitors would have infrequently utilized Hong Kong waters, and it will be harder for them to reach the minimum requirement on the number of re-sightings required for this analysis. Moreover, based on the monthly occurrences of these 124 individuals, 42% of them only occurred in Hong Kong during certain months of the year, while the rest occurred here year-round (Table 6).

In addition to their residency patterns, attempts were made to classify the 127 individuals into the two social clusters that occurred regularly in Hong Kong (see Dungan et al. 2012), based on their overall range use at 95% UD level as well as core area use at 50% UD and 25% UD levels. Results indicated that 17 individuals (13%) and 92 individuals (72%) belonged to the northern and southern social clusters, respectively (Table 6). In addition, there were also 18 individuals that spanned their range use more or less evenly across North and West Lantau waters with frequent occurrences in both waters, with the majority of them shifting their range use from North Lantau waters to WL and SWL waters in recent years.

Core Area Use

The core area analysis revealed that four major core areas of dolphin activities are located around Lung Kwu Chau, the Brothers Islands, in SWL waters, and along the coast of West Lantau, with the latter further subdivided into Tai O, Peaked Hill and Fan Lau. Among the 127 individuals, 34 and 29 individuals occupied Lung Kwu Chau as their 50% and 25% UD core areas, respectively, while only nine and eight individuals occupied the Brothers Islands as their 50% and 25% UD core areas, respectively (Table 6). About half of these individuals that utilized Lung Kwu Chau and the Brothers Islands as their core areas belonged to the northern social cluster.

In contrast, 110 and 104 individuals utilized the waters along the west coast of Lantau as their 50% UD and 25% UD core areas, respectively, with most of them belonging to the southern social cluster (Table 6). As there has been a surge of individuals expanding or shifting their range use into SWL waters in recent years, there were also seven and four individuals that have utilized South Lantau waters as their 50% and 25% UD core areas, respectively (Table 6).

5.7.2. Individual movement pattern

By combining all photo-identification data collected through the present monitoring study and other studies, movement patterns of individual dolphins within Hong Kong territorial waters in 2019-20 were broadly examined. From April 2019 to March 2020, 168 individuals were re-sighted a total of 644 times, with 123 individuals being sighted more than once (i.e. occurred at more than one location).

The examination of individual movement patterns between re-sightings revealed that 80 individuals moved across different survey areas around Lantau in 2019-20.

That included 19 individuals that occurred across NWL and WL survey areas, and 69 individuals that were re-sighted in both SWL and WL survey areas (Table 7). Moreover, eight individuals occurred in all three areas of NWL, WL and SWL, covering extensive ranges during the 12-month monitoring period. However, observations from their ranging patterns revealed that the movements into NWL survey area of these eight individuals were only limited to the waters near the HKLR alignment, or at the juncture between NWL and WL survey areas (see Appendix V). As in recent monitoring periods, no sighting was made in NEL during the 2019-20 monitoring period so there was no movement of individuals into this once-important habitat.

With an extensive amount of photo-identification data being collected from different surveys during 2019-20, there was still a significant portion of individual dolphins sighted repeatedly within just a single survey area and did not range into neighbouring areas. These included 34 individuals that occurred exclusively in the WL survey area, as well as four and five individuals that were only re-sighted in the NWL and SWL waters, respectively. Their restricted movements within Hong Kong's waters could be a concern, as this could be related to potential obstructions to movements across different survey areas as a result of human activities (e.g. high-speed ferry traffic) or infrastructure projects (e.g. reclamation, bridge construction).

The temporal trend in individual movement patterns across different survey areas was examined for the past ten monitoring periods, in order to provide any insight on the temporal changes in their intensity of movements as a result of various anthropogenic factors. Besides the dramatic decline in dolphin movements between NEL and NWL survey areas due to the near-complete absence of dolphin occurrence in NEL, there were some notable changes. For example, there was a continuous decline in dolphin movements across the NWL and WL survey areas during the past four monitoring periods, and the level in 2019-20 was the lowest among the ten monitoring periods (Figure 41; Table 7), which may have contributed to a further decline in dolphin abundance in NWL (Section 5.6.2). In contrast, after a continuous decline in dolphin movements across SWL and WL in recent years, movement rebounded to a higher level in the 2019-20 monitoring period (Figure 41; Table 7). Such influx of individuals from WL to SWL coincided with a marked increase in dolphin abundance in SWL in 2019 (Section 5.6.2).

### 5.7.3. Temporal changes in range use of individual dolphins

As in the previous five monitoring periods, the examination of temporal changes in range use by individual dolphins continued in the present study in order to gain a better understanding on the underlying dynamics behind the trends in dolphin occurrence in different parts of Lantau waters. The data examined included 114 individuals that occurred regularly in Hong Kong's waters over the eight periods since 2011 (i.e. 2011-12 (the baseline period before the commencement of HZMB construction) as well as the seven consecutive years between 2013 and 2019).

Among these 114 individuals, 59 and 55 were categorized as members of the northern and southern social clusters, respectively. As the individual range use patterns of the two social clusters can differ significantly (Dungan et al. 2012), with the northern one being primarily around the Brothers Islands and the Sha Chau and Lung Kwu Chau Marine Park, while the southern one primarily along the west coast of Lantau, changes in range use among the eight time periods were examined individually. Several parameters were evaluated for such temporal changes including changes in level of utilization, changes in range use including expansion, contraction, shifts (either partial or complete shift to a nearby area) and reversal of shifts, and how shifts from one area to another have occurred. For the individuals of the southern social cluster, further examination was also be made to determine if ranges shifted to avoid the HKLR alignment located southwest of the airport.

Among 59 individuals from the northern social cluster, 31 of them have disappeared over the past six years (including eight individuals in 2014-15, eleven in 2016-17, seven in 2018, and five in 2019). In addition, nearly two-thirds of them (38 individuals) have progressively lessened their usage of North Lantau waters since 2011-12, while 40 and 17 individuals have utilized WL and SWL waters, respectively, more in recent years. Furthermore, the less frequent use of North Lantau waters also resulted in range contraction for 53% of these individuals. Range expansions over the past nine years occurred for only 20% of the individuals.

The increased utilizations of WL and SWL waters in recent years have resulted in range shifts and expansions by some individuals of the northern social cluster. In total, 48 of the 59 individuals have shifted their ranges away from NEL waters, and such shifts have also resulted in a virtual absence of dolphin occurrence in NEL waters in the past five years. Besides the range shifts away from NEL waters, 29 individuals have shifted part or all of their ranges from North Lantau waters to WL waters (with some even to SWL waters). However, nine of these 29 individuals with range shifts to WL/SWL waters in the past have apparently reversed such shifts in 2017-19 (some only temporarily and returning to WL in 2019), albeit with a much lower level of occurrence in NWL waters when compared to the earlier years.

Of the 55 individuals from the southern social cluster, 21 of them have already disappeared over the past several years (including seven individuals in 2015, eight in 2016-2017, and four in 2018-19). More than 40% of the 55 individuals have progressively reduced their utilization of their ranges in Lantau waters since 2011, while only seven dolphins have increased their usage of Hong Kong’s waters at the same time. During the same period, the proportion of these individuals with contracted (40%) or expanded (31%) ranges in Hong Kong’s waters were similar, but seven individuals did not show any apparent change in range use during the nine-year span. Notably, even though the HKLR construction was completed in 2017 with bridge piers already in place for several years, 26 individuals still showed clear avoidance of the bridge alignment with their ranges shifting further south of the bridge alignment. The ranges of only seven individuals did not show any signs of change and still extended across the bridge alignment in recent years.

Furthermore, more than half of these individuals from the southern social cluster (62%) have utilized SWL progressively more in recent years, and eight individuals have shown clear southerly range shifts or expansions from WL to SWL waters as a result of the increased utilization of SWL waters. However, after shifting or expanding into SWL waters, ten individuals have reversed the shifts and expansions in the past few years.

## 6. SCHOOL SEMINARS AND PUBLIC AWARENESS

During the 2019-20 monitoring period, HKCRP researchers continued to provide assistance to AFCD to increase public awareness on the conservation of local cetaceans. In total, HKCRP researchers delivered 13 education seminars at local primary and secondary schools regarding the conservation of Chinese White Dolphins and finless porpoises in Hong Kong.

For these school talks, a PowerPoint presentation was produced with up-to-date information on both dolphins and porpoises gained from the present 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 this 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, and their support will be vital to the long-term success in conservation of local cetaceans.

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**Table 1a. Mean group size of Chinese White Dolphins among different survey areas in recent monitoring periods**
(* denote the mean group size calculated from a sample size of one group)

| Monitoring Period | Overall | Deep Bay | NE Lantau | NW Lantau | W Lantau | SW Lantau | SE Lantau |
|---|---|---|---|---|---|---|---|
| 2013-14 | 3.4 | 4.0 | 3.2 | 3.5 | 3.4 | 3.2 | N/A |
| 2014-15 | 4.1 | 5.1 | 2.7 | 3.5 | 4.4 | 4.0 | 1.0 |
| 2015-16 | 3.8 | 2.0 | 1.0* | 4.1 | 3.8 | 3.7 | 2.5 |
| 2016-17 | 3.3 | N/A | 1.0* | 3.8 | 3.5 | 2.4 | 1.4 |
| 2017-18 | 3.0 | 3.7 | 5.0* | 3.3 | 3.0 | 2.8 | 1.5 |
| 2018-19 | 3.1 | 2.3 | N/A | 2.4 | 3.6 | 2.7 | 1.0 |
| 2019-20 | 3.2 | 2.0 | N/A | 2.7 | 3.2 | 3.6 | 1.0 |

**Table 1b. Mean group size of finless porpoises among different survey areas in recent monitoring periods**
(* denote the mean group size calculated from a sample size of one group)

| Monitoring Period | Overall | SW Lantau | SE Lantau | Lamma | Po Toi | Ninepins | Sai Kung |
|---|---|---|---|---|---|---|---|
| 2013-14 | 2.3 | 2.8 | 1.9 | 2.6 | N/A | 1.3 | N/A |
| 2014-15 | 2.7 | 3.5 | 2.6 | 3.1 | 1.9 | 2.6 | 1.3 |
| 2015-16 | 3.1 | 3.1 | 2.9 | 4.4 | 2.5 | 1.7 | 1.3 |
| 2016-17 | 2.7 | 2.4 | 2.7 | 3.3 | 3.3 | 2.2 | 1.7 |
| 2017-18 | 2.5 | 2.8 | 2.5 | 1.9 | 2.7 | 1.5 | 1.2 |
| 2018-19 | 2.7 | 2.1 | 3.1 | 2.3 | 2.0 | 3.0* | 2.0 |
| 2019-20 | 2.6 | 2.7 | 2.2 | 2.4 | 3.4 | 3.5 | N/A |

**Table 2. Occurrences of unspotted calves (UC) and unspotted juveniles (UJ) in Hong Kong, including the their annual total number and percentage of the total**

| Year | No. of UC | UC% of total | No. of UJ | UJ% of total |
|---|---|---|---|---|
| 2002 | 13 | 1.0% | 74 | 5.5% |
| 2003 | 22 | 1.0% | 153 | 6.9% |
| 2004 | 18 | 1.1% | 75 | 4.7% |
| 2005 | 29 | 1.4% | 123 | 5.9% |
| 2006 | 24 | 1.1% | 97 | 4.4% |
| 2007 | 11 | 0.8% | 56 | 4.1% |
| 2008 | 12 | 1.0% | 58 | 4.7% |
| 2009 | 6 | 0.5% | 87 | 6.9% |
| 2010 | 4 | 0.3% | 91 | 7.2% |
| 2011 | 26 | 1.2% | 80 | 3.7% |
| 2012 | 27 | 1.5% | 59 | 3.2% |
| 2013 | 21 | 1.0% | 102 | 4.8% |
| 2014 | 15 | 0.7% | 64 | 2.9% |
| 2015 | 12 | 0.6% | 32 | 1.6% |
| 2016 | 1 | 0.1% | 20 | 1.7% |
| 2017 | 1 | 0.1% | 20 | 1.7% |
| 2018 | 2 | 0.2% | 14 | 1.3% |
| 2019 | 3 | 0.3% | 23 | 2.2% |

**Table 3. Encounter rates (no. of on-effort sightings per 100 $km^2$) of Chinese White Dolphins among different survey areas in the past 18 monitoring periods**

| Monitoring Period | Overall | NE Lantau | NW Lantau | W Lantau | SW Lantau |
|---|---|---|---|---|---|
| 2002-03 | 8.6 | 4.6 | 10.8 | 22.6 | 2.4 |
| 2003-04 | 10.8 | 5.0 | 11.3 | 25.9 | 2.5 |
| 2004-05 | 8.2 | 2.9 | 8.3 | 21.4 | 2.6 |
| 2005-06 | 7.8 | 2.7 | 8.7 | 20.2 | 1.6 |
| 2006-07 | 6.9 | 2.3 | 5.7 | 20.6 | 1.0 |
| 2007-08 | 9.9 | 4.7 | 10.5 | 26.1 | 3.7 |
| 2008-09 | 7.2 | 2.2 | 7.2 | 17.9 | 2.4 |
| 2009-10 | 6.3 | 1.7 | 4.9 | 18.0 | 2.2 |
| 2010-11 | 6.8 | 2.6 | 7.5 | 13.4 | 2.4 |
| 2011-12 | 7.7 | 5.0 | 8.7 | 15.3 | 2.6 |
| 2012-13 | 7.3 | 1.6 | 7.8 | 19.2 | 3.5 |
| 2013-14 | 7.2 | 0.7 | 6.3 | 19.6 | 6.8 |
| 2014-15 | 5.5 | 0.1 | 3.6 | 18.4 | 5.6 |
| 2015-16 | 4.7 | 0.1 | 2.2 | 15.5 | 5.5 |
| 2016-17 | 4.0 | 0.0 | 1.9 | 14.9 | 3.2 |
| 2017-18 | 3.4 | 0.0 | 2.4 | 11.8 | 4.1 |
| 2018-19 | 3.0 | 0.0 | 1.7 | 13.0 | 2.0 |
| 2019-20 | 3.5 | 0.0 | 0.7 | 13.3 | 3.8 |

**Table 4. Encounter rates (no. of on-effort sightings per 100 km$^2$) of finless porpoises among different survey areas in the past 13 monitoring periods**

| Monitoring Period | Overall | SW Lantau | SE Lantau | Lamma | Po Toi |
|---|---|---|---|---|---|
| 2007-08 | 3.0 | 2.7 | 5.1 | 1.9 | 1.9 |
| 2008-09 | 3.3 | 2.8 | 1.4 | 7.8 | 2.9 |
| 2009-10 | 3.5 | 1.9 | 6.1 | 1.0 | 5.5 |
| 2010-11 | 3.3 | 2.7 | 5.4 | 3.0 | 3.4 |
| 2011-12 | 4.9 | 3.0 | 5.8 | 9.6 | 3.4 |
| 2012-13 | 4.7 | 5.9 | 8.4 | 4.6 | 2.2 |
| 2013-14 | 6.4 | 7.4 | 12.5 | 7.6 | 0.0 |
| 2014-15 | 4.2 | 2.6 | 8.7 | 2.9 | 2.2 |
| 2015-16 | 3.8 | 2.3 | 5.3 | 6.4 | 5.2 |
| 2016-17 | 3.7 | 2.8 | 8.1 | 2.5 | 1.8 |
| 2017-18 | 3.3 | 3.9 | 6.2 | 1.5 | 2.7 |
| 2018-19 | 2.9 | 2.9 | 5.1 | 1.9 | 1.2 |
| 2019-20 | 3.3 | 3.9 | 5.6 | 1.9 | 2.2 |

**Table 5a. Line transects parameters and estimates of density and abundance for Chinese White Dolphins in western waters of Hong Kong in 2019**

([1]unit for encounter rate: number of on-effort sightings per 100 km of survey effort; [2]unit for individual density: number of dolphins per 100 $km^2$)

| | NE Lantau | NW Lantau | W Lantau | SW Lantau |
|---|---|---|---|---|
| Effort | 1705.4 | 2602.3 | 1256.3 | 1744.8 |
| Number of Sightings | N/A | 26 | 161 | 62 |
| Average Group Size | N/A | 2.81 | 3.42 | 3.71 |
| Encounter Rate[1] | N/A | 1.00 | 12.82 | 3.49 |
| Individual Density[2] | N/A | 4.17 | 103.31 | 28.71 |
| Abundance | N/A | 4 | 29 | 19 |
| 95% C.I. (Abundance) | N/A | 2-6 | 20-41 | 11-33 |
| %CV | N/A | 30 | 19 | 28 |

**Table 5b. Annual abundance estimates of Chinese White Dolphins from each survey area in western waters of Hong Kong in 2003-19**

(figures in red derived from biennial estimates; figures in blue indicate no or only one on-effort sighting made in that area for that year)

| Year | *Combined* | NE Lantau | NW Lantau | W Lantau | SW Lantau |
|---|---|---|---|---|---|
| **2003** | *188* | 18 | 84 | 56 | 30 |
| **2004** | *143* | 9 | 62 | 51 | 21 |
| **2005** | *128* | 7 | 58 | 42 | 21 |
| **2006** | *113* | 9 | 54 | 44 | 6 |
| **2007** | *130* | 10 | 60 | 54 | 6 |
| **2008** | *108* | 11 | 42 | 43 | 12 |
| **2009** | *100* | 5 | 40 | 43 | 12 |
| **2010** | *86* | 7 | 35 | 33 | 11 |
| **2011** | *88* | 11 | 39 | 28 | 10 |
| **2012** | *80* | 4 | 40 | 17 | 19 |
| **2013** | *73* | 3 | 36 | 23 | 11 |
| **2014** | *87* | 1 | 24 | 36 | 26 |
| **2015** | *65* | 0 | 10 | 31 | 24 |
| **2016** | *47* | 0 | 11 | 27 | 9 |
| **2017** | *47* | 0 | 21 | 16 | 10 |
| **2018** | *32* | 0 | 6 | 19 | 7 |
| **2019** | *52* | 0 | 4 | 29 | 19 |

## Table 6. Range use (50%/25% UD core areas and sighting coverage) and residency patterns of 127 individuals with 15+ sightings and appeared in 2019

(abbreviations: SR=Seasonal Resident; YR=Year-round Resident; SV=Seasonal Visitor; UD= Utilization Distribution; LKC = Lung Kwu Chau Marine Park; CLK= northeast corner of airport; BR= Brothers Islands; TO= Tai O; PH= Peaked Hill; FL= Fan Lau; SL= South Lantau; 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)

| | | | | Primary | Occurrence in Survey Areas | | | | | | | | 50% UD Core Area | | | | | | 25% UD Core Area | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ID# | # STG | Gender | Residency | Range | DB | EL | NEL | NWL | WL | SWL | SEL | CH | LKC | BR | TO | PH | FL | SL | LKC | BR | TO | PH | FL | SL |
| CH12 | 96 | F? | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| CH34 | 172 | F | YR | NL | √ | | √ | √ | √ | | | √ | √ | | | | | | √ | | | | | |
| CH38 | 105 | ? | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| CH105 | 33 | F | YR | WL | | | | √ | √ | | | √ | | | √ | | | | | | √ | | | |
| CH108 | 128 | F | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| CH112 | 19 | ? | SR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | | √ | √ | |
| CH113 | 58 | F | SR | WL | | | | √ | √ | √ | | √ | | | √ | √ | | | | | √ | √ | | |
| CH141 | 41 | F | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| CH153 | 28 | ? | SR | WL | | | | √ | √ | √ | | √ | | | √ | √ | | | | | √ | | | |
| EL01 | 129 | M* | SR | NL | | √ | √ | √ | √ | √ | | √ | | √ | | | | | | √ | | | | |
| NL33 | 156 | F* | SR | NL | | | √ | √ | √ | √ | | | √ | √ | | | | | | √ | | | | |
| NL37 | 78 | ? | YR | NL | | √ | √ | √ | √ | | | √ | √ | | √ | | | | √ | | | | | |
| NL49 | 68 | F* | SR | NL | | | √ | √ | √ | √ | | | √ | | √ | √ | | | √ | | | | | |
| NL80 | 44 | F | SR | NL | √ | | | √ | √ | | | √ | √ | | | | | | √ | | | | | |
| NL98 | 180 | F* | YR | NL | | | √ | √ | √ | √ | | √ | √ | √ | | | | | √ | √ | | | | |
| NL103 | 61 | ? | SR | NL | √ | | | √ | √ | √ | | √ | √ | | | | | | √ | | | | | |
| NL105 | 34 | ? | SR | NL/WL | | | | √ | √ | | | √ | √ | | √ | | | | √ | | | | | |
| NL120 | 145 | F* | YR | NL/WL | √ | | √ | √ | √ | √ | | √ | | √ | | | | | | √ | | | | |
| NL123 | 187 | F | YR | NL/WL | √ | | √ | √ | √ | √ | | √ | √ | √ | | | | | | √ | | | | |
| NL136 | 164 | F* | YR | NL | √ | | √ | √ | √ | | | | √ | | | | | | √ | | | | | |
| NL156 | 61 | ? | SR | WL | | | | √ | √ | √ | | √ | √ | | √ | √ | | | | | √ | √ | | |
| NL182 | 132 | F | YR | NL | √ | | √ | √ | √ | | | | √ | | | | | | √ | | | | | |
| NL202 | 147 | F | YR | NL | √ | | √ | √ | √ | | | √ | √ | | | | | | √ | | | | | |
| NL206 | 70 | F* | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| NL212 | 73 | F | YR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | √ | √ | √ | |
| NL224 | 78 | ? | YR | NL/WL | √ | | √ | √ | √ | √ | | √ | √ | | √ | √ | | | √ | | √ | | | |
| NL226 | 96 | ? | YR | NL/WL | √ | | √ | √ | √ | √ | | √ | √ | √ | √ | √ | √ | √ | | √ | √ | | | |
| NL242 | 97 | F* | SR | NL | | | √ | √ | √ | √ | | √ | √ | √ | | | | | √ | | | | | |
| NL247 | 37 | ? | SV | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | √ | | |
| NL249 | 19 | ? | SV | NL/WL | | | | √ | √ | √ | | √ | √ | | √ | √ | | | √ | | √ | √ | | |
| NL256 | 28 | F | SR | NL/WL | √ | | | √ | √ | | | √ | √ | | √ | | | | √ | | √ | | | |
| NL259 | 95 | ? | YR | NL/WL | | | √ | √ | √ | | | | √ | | √ | | | | √ | | √ | | | |
| NL260 | 75 | ? | YR | NL/WL | | | √ | √ | √ | √ | | √ | √ | √ | √ | √ | √ | | √ | √ | √ | | | |
| NL261 | 109 | M? | YR | NL/WL | √ | | √ | √ | √ | √ | | √ | √ | √ | √ | | | | √ | √ | | | | |
| NL269 | 66 | ? | SR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | | √ | | |
| NL272 | 93 | ? | YR | NL | √ | | √ | √ | √ | √ | | √ | √ | | | | | | √ | | | | | |
| NL279 | 30 | ? | SR | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | | | |
| NL280 | 32 | ? | SR | NL | √ | | | √ | √ | | | | √ | | | | | | √ | | | | | |
| NL286 | 111 | ? | YR | NL | √ | | √ | √ | | | | √ | √ | | | | | | √ | | | | | |
| NL293 | 42 | ? | SR | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | | | |
| NL295 | 60 | ? | YR | NL/WL | | | √ | √ | √ | √ | | √ | √ | | √ | √ | | | √ | | | | | |
| NL299 | 32 | F? | SR | WL | √ | | | √ | √ | √ | | √ | | | √ | √ | | | | | √ | √ | | |
| NL301 | 33 | ? | SR | NL | √ | | | √ | √ | | | √ | √ | | | | | | √ | | | | | |
| NL306 | 35 | ? | YR | WL | | | | √ | √ | √ | √ | | | | | √ | √ | √ | | | | √ | √ | √ |
| NL311 | 33 | ? | YR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | √ | √ | √ | |
| NL313 | 15 | ? | SV | WL | | | | √ | √ | √ | | √ | | | | √ | | | | | | √ | | |
| NL317 | 18 | ? | SV | NL/WL | | | | √ | √ | | | √ | √ | | √ | √ | | | √ | | √ | | | |
| NL321 | 32 | ? | YR | NL | √ | | | √ | √ | √ | | √ | √ | | | | | | √ | | | | | |
| NL322 | 33 | ? | YR | NL/WL | | | | √ | √ | √ | | | √ | | √ | √ | √ | √ | √ | | √ | √ | √ | √ |
| SL40 | 93 | F | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | | √ | |
| SL42 | 20 | ? | SR | WL | √ | | | √ | √ | √ | | | √ | | √ | √ | | | | | √ | √ | | |

## Table 6. (cont'd)

| | | | | Primary | Occurrence in Survey Areas | | | | | | | | 50% UD Core Area | | | | | | 25% UD Core Area | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ID# | # STG | Gender | Residency | Range | DB | EL | NEL | NWL | WL | SWL | SEL | CH | LKC | BR | TO | PH | FL | SL | LKC | BR | TO | PH | FL | SL |
| SL44 | 52 | ? | YR | WL | | | | | √ | √ | | √ | | | √ | √ | | | | | | √ | | |
| SL58 | 19 | ? | YR | WL | | | | | √ | √ | | | | | √ | √ | | | | | √ | √ | | |
| SL59 | 29 | ? | YR | WL | | | | | √ | √ | | √ | | | √ | √ | √ | | | | √ | √ | √ | |
| SL60 | 50 | ? | YR | WL | | | | | √ | √ | | √ | | | | | √ | | | | | | √ | |
| WL05 | 111 | F? | YR | NL/WL | | | √ | √ | √ | √ | | √ | √ | | √ | | | | √ | | √ | | | |
| WL11 | 72 | F* | SR | NL/WL | | | √ | √ | √ | | | √ | √ | | √ | | | | √ | | | | | |
| WL15 | 120 | M* | YR | WL | | | √ | √ | √ | √ | | | | | √ | √ | √ | | | | | | √ | |
| WL17 | 52 | ? | YR | NL/WL | | | √ | √ | √ | √ | √ | √ | √ | | √ | √ | √ | | √ | | √ | √ | | |
| WL21 | 79 | F | YR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | √ | √ | | |
| WL28 | 40 | F | SR | WL | | | | √ | √ | √ | | √ | | | √ | | | | | | √ | | | |
| WL29 | 52 | F | SR | WL | | | | | √ | √ | | √ | | | | √ | | | | | | √ | | |
| WL42 | 144 | ? | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| WL58 | 22 | ? | SR | WL | | | | | √ | √ | | √ | | | √ | √ | √ | | | | | √ | √ | |
| WL61 | 115 | ? | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | | √ | |
| WL68 | 77 | F* | YR | WL | | | | | √ | √ | | √ | | | | √ | | | | | | √ | | |
| WL72 | 134 | F | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL76 | 16 | F* | SR | WL | | | | | √ | | | √ | | | √ | √ | √ | | | | √ | √ | | |
| WL79 | 98 | ? | YR | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | | | |
| WL91 | 105 | ? | YR | WL | | | | | √ | √ | √ | √ | | | | √ | √ | | | | | | √ | |
| WL92 | 47 | ? | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | | √ | |
| WL94 | 80 | F | YR | WL | | | | | √ | √ | | √ | | | | | √ | | | | | | √ | |
| WL98 | 51 | F | YR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | √ | | | |
| WL100 | 17 | F | SV | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL109 | 114 | ? | YR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | | √ | √ | |
| WL114 | 83 | F? | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| WL118 | 80 | F | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL120 | 73 | ? | SR | WL | | | | √ | √ | | | √ | | | √ | | | | | | √ | | | |
| WL123 | 141 | F? | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | | √ | |
| WL124 | 69 | F | SR | WL | | | | √ | √ | √ | | √ | | | √ | √ | | | | | √ | √ | | |
| WL128 | 61 | ? | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| WL129 | 33 | F | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| WL130 | 98 | ? | YR | WL | | | | √ | √ | √ | | | | | | | √ | | | | | | √ | |
| WL131 | 149 | ? | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| WL137 | 81 | F | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| WL142 | 82 | ? | YR | WL | | | | | √ | √ | | √ | | | | | √ | | | | | | √ | |
| WL145 | 50 | F | SR | WL | | | | √ | √ | | | √ | | | √ | | | | | | √ | | | |
| WL152 | 112 | ? | YR | WL | | | | √ | √ | √ | | | | | | √ | √ | | | | | √ | √ | |
| WL159 | 35 | F | SR | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | | | |
| WL166 | 30 | ? | SR | WL | | | | | √ | √ | | | | | | √ | √ | | | | | √ | | |
| WL167 | 18 | F | SR | NL/WL | | | | √ | √ | | | √ | | | √ | | | | | | √ | | | |
| WL168 | 47 | ? | YR | WL | | | | | √ | √ | | √ | | | √ | √ | √ | | | | √ | √ | √ | |
| WL169 | 16 | ? | SV | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL171 | 36 | F | SR | WL | | | | | √ | √ | | | | | | √ | √ | | | | | √ | √ | |
| WL179 | 46 | F | YR | NL/WL | | | | √ | √ | √ | | √ | √ | | √ | √ | √ | | √ | | | √ | √ | |
| WL180 | 101 | F? | YR | WL | | | | | √ | √ | | √ | | | | | √ | | | | | | √ | |
| WL190 | 16 | ? | SR | WL | | | | | √ | √ | | | | | | √ | | | | | | √ | | |
| WL191 | 36 | ? | SR | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | √ | | |
| WL200 | 20 | F | SV | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | √ | √ | √ | |
| WL207 | 29 | F | SR | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | √ | | |
| WL208 | 48 | F | YR | WL | | | | √ | √ | √ | | | | | √ | √ | √ | | | | | √ | √ | |
| WL210 | 33 | ? | SR | WL | | | | | √ | √ | | √ | | | √ | √ | √ | | | | | √ | √ | |
| WL213 | 18 | ? | SR | WL | | | | √ | √ | | | | | | √ | √ | | | | | √ | √ | | |
| WL214 | 32 | ? | SR | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | √ | | |
| WL216 | 45 | ? | SR | WL | | | | √ | √ | √ | | √ | | | √ | √ | | | | | | √ | | |
| WL217 | 34 | ? | YR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | √ | | | |
| WL218 | 23 | ? | SV | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | √ | √ | | |
| WL220 | 67 | ? | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| WL221 | 67 | ? | YR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | √ | | | √ | | √ | |
| WL226 | 18 | ? | SV | WL | | | | | √ | | | √ | | | √ | √ | | | | | √ | | | |
| WL229 | 31 | ? | SR | WL | | | | | √ | √ | | √ | | | √ | √ | √ | | | | | √ | | |
| WL230 | 32 | ? | SR | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | | √ | √ | |

## Table 6. (cont'd)

| ID# | # STG | Gender | Residency | Primary Range | Occurrence in Survey Areas | | | | | | | | 50% UD Core Area | | | | | | 25% UD Core Area | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | DB | EL | NEL | NWL | WL | SWL | SEL | CH | LKC | BR | TO | PH | FL | SL | LKC | BR | TO | PH | FL | SL |
| WL232 | 54 | ? | YR | WL | | | | √ | √ | √ | | √ | | | √ | | √ | √ | | | √ | | | √ |
| WL233 | 26 | ? | SV | WL | | | | √ | √ | √ | | √ | | | √ | √ | √ | | | | √ | √ | | |
| WL243 | 52 | ? | YR | WL | | | | √ | √ | √ | √ | | | | √ | | | √ | | | √ | | | √ |
| WL245 | 18 | ? | SR | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | | | |
| WL250 | 36 | F | YR | WL | | | | | √ | √ | √ | √ | | | | √ | √ | √ | | | | | √ | |
| WL254 | 24 | F | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL256 | 20 | ? | SR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL260 | 31 | ? | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL268 | 28 | ? | YR | WL | | | | √ | √ | | | √ | | | √ | | | | | | √ | | | |
| WL269 | 27 | ? | YR | WL | | | | | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL273 | 28 | ? | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | √ | |
| WL277 | 15 | ? | N.D. | WL | | | | | √ | | | √ | | | √ | √ | | | | | √ | | | |
| WL281 | 15 | ? | YR | WL | | | | √ | √ | √ | | √ | | | | √ | √ | | | | | √ | | |
| WL283 | 17 | ? | N.D. | WL | | | | √ | √ | | | √ | | | √ | √ | | | | | √ | | | |
| WL291 | 16 | ? | N.D. | WL | | | | √ | √ | √ | | √ | | | √ | √ | | | | | | √ | | |

**Table 7. Number of individual dolphins involved in movements across different survey areas around Lantau in recent mointoring periods**

| Monitoring Period | Total No. of Ind. | NEL-NWL | NWL-WL | WL-SWL | NEL-NWL-WL | NWL-WL-SWL | NEL-NWL-WL-SWL |
|---|---|---|---|---|---|---|---|
| 2010-11 | 169 | 29 | 23 | 14 | 9 | 1 | 0 |
| 2011-12 | 217 | 50 | 66 | 40 | 16 | 8 | 1 |
| 2012-13 | 200 | 39 | 50 | 34 | 18 | 3 | 1 |
| 2013-14 | 199 | 19 | 52 | 52 | 12 | 9 | 2 |
| 2014-15 | 227 | 6 | 62 | 72 | 5 | 14 | 0 |
| 2015-16 | 210 | 1 | 35 | 87 | 1 | 9 | 0 |
| 2016-17 | 208 | 0 | 50 | 81 | 0 | 20 | 0 |
| 2017-18 | 185 | 5 | 48 | 65 | 2 | 17 | 1 |
| 2018-19 | 172 | 0 | 37 | 52 | 0 | 9 | 0 |
| 2019-20 | 168 | 0 | 19 | 69 | 0 | 5 | 0 |

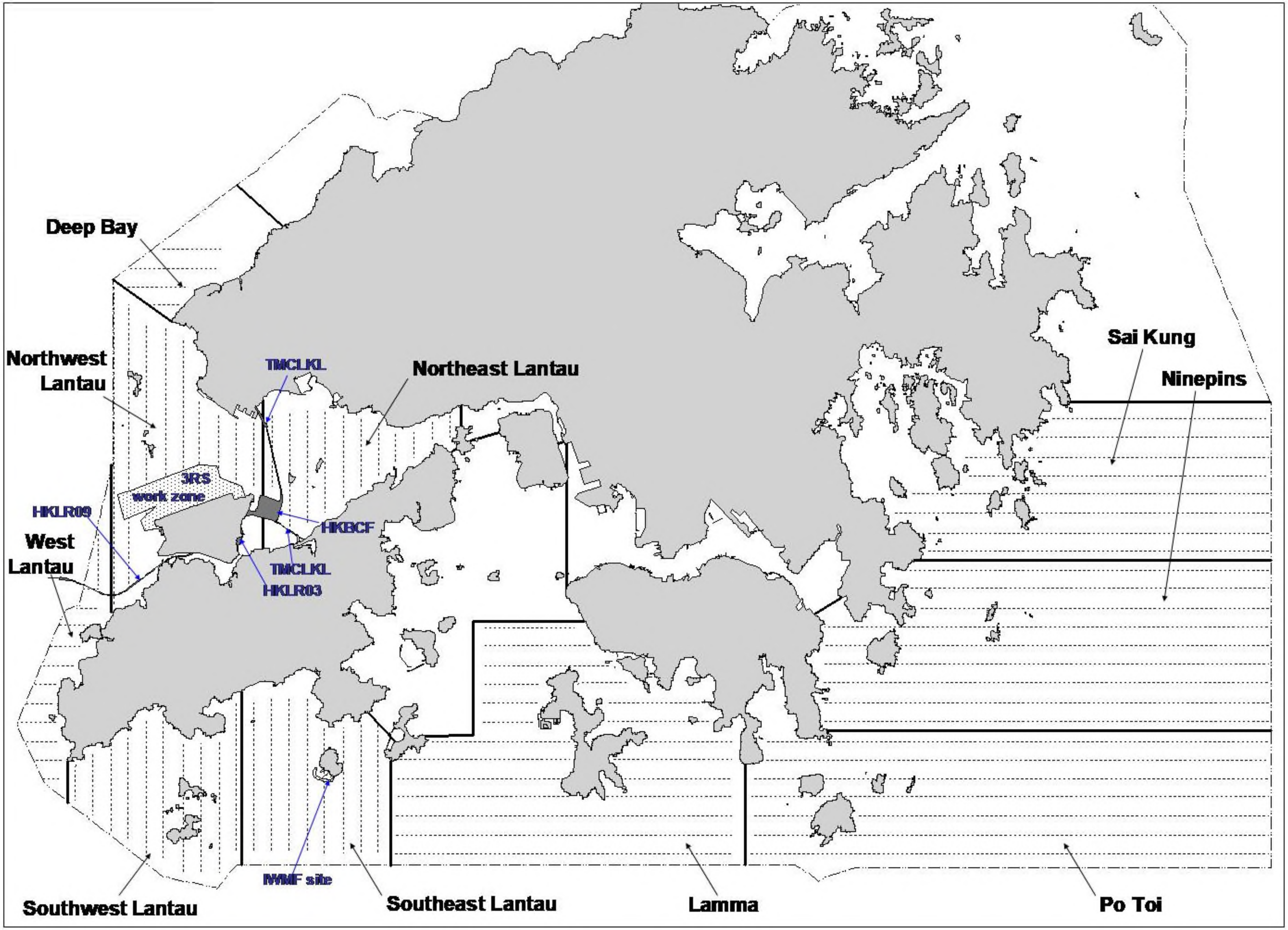



Figure 1. Ten Line-Transect Survey Areas within the Study Area for the 2019-20 Monitoring Study

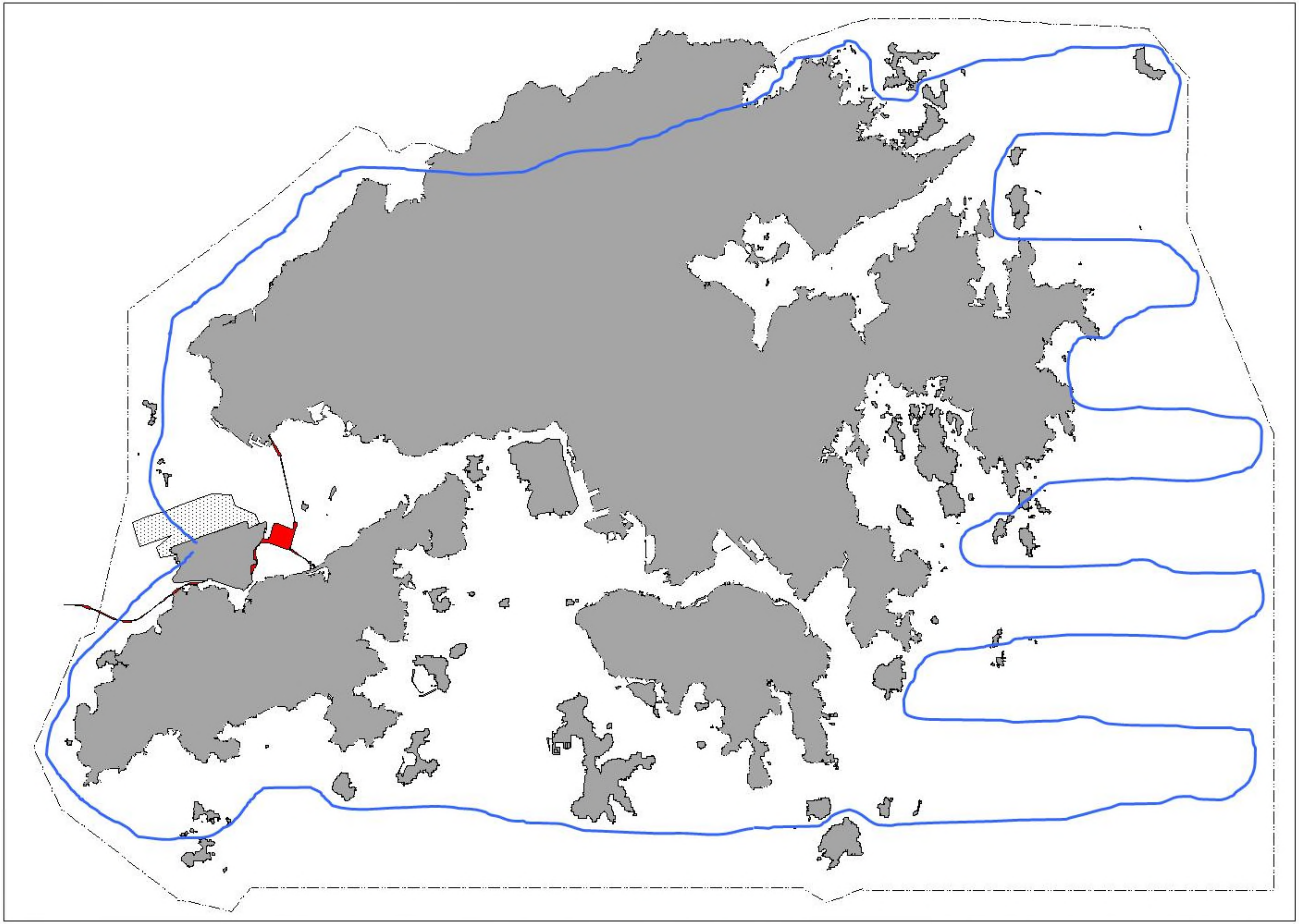


Figure 2. Indicative Survey Route for Helicopter Surveys in Eastern and Southern Waters of Hong Kong

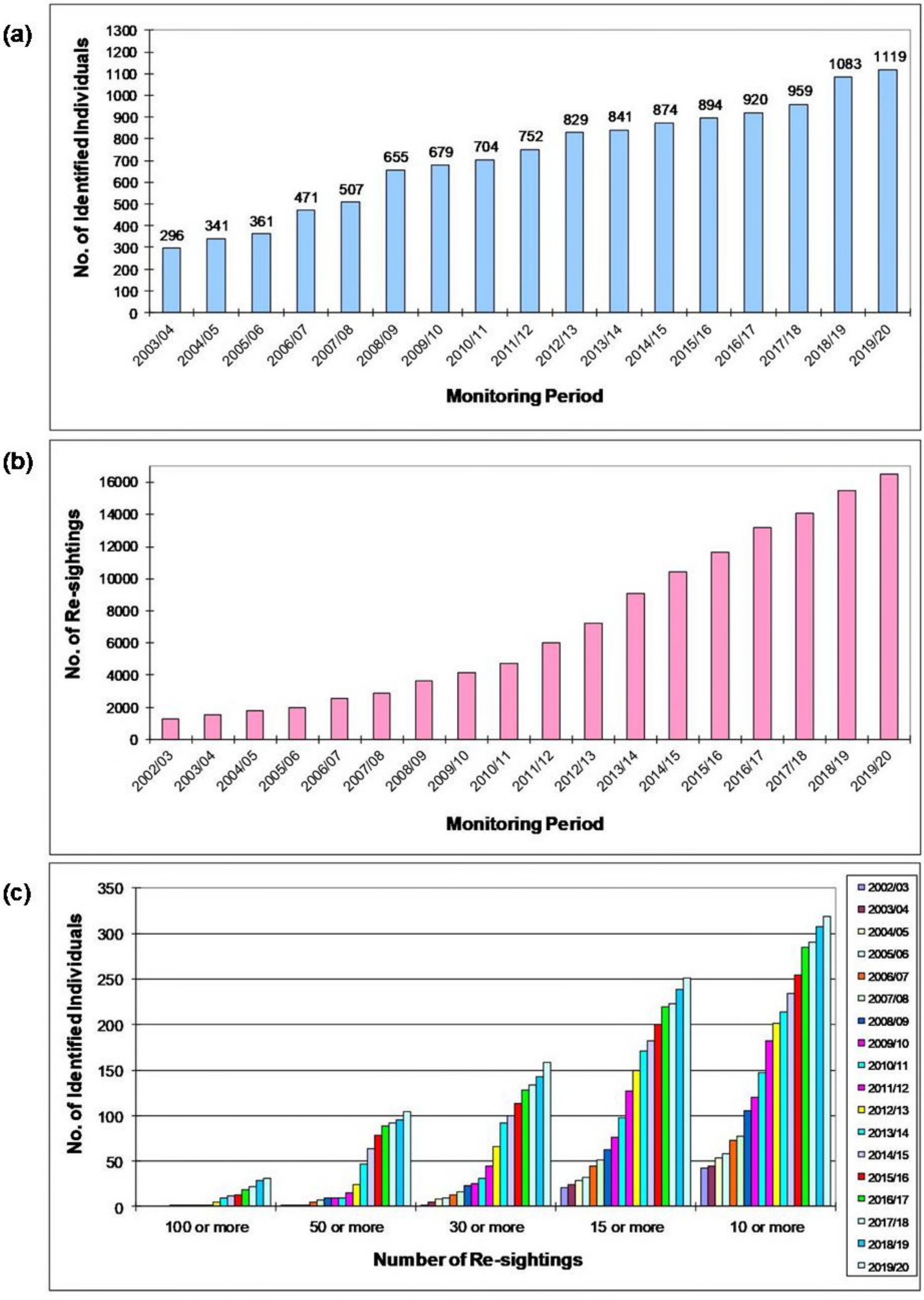



Figure 3. Temporal trends of (a) cumulative number of identified individuals; (b) total number of re-sightings made; and (c) number of identified individuals within several categories of number of re-sightings in the past 18 monitoring periods since 2002

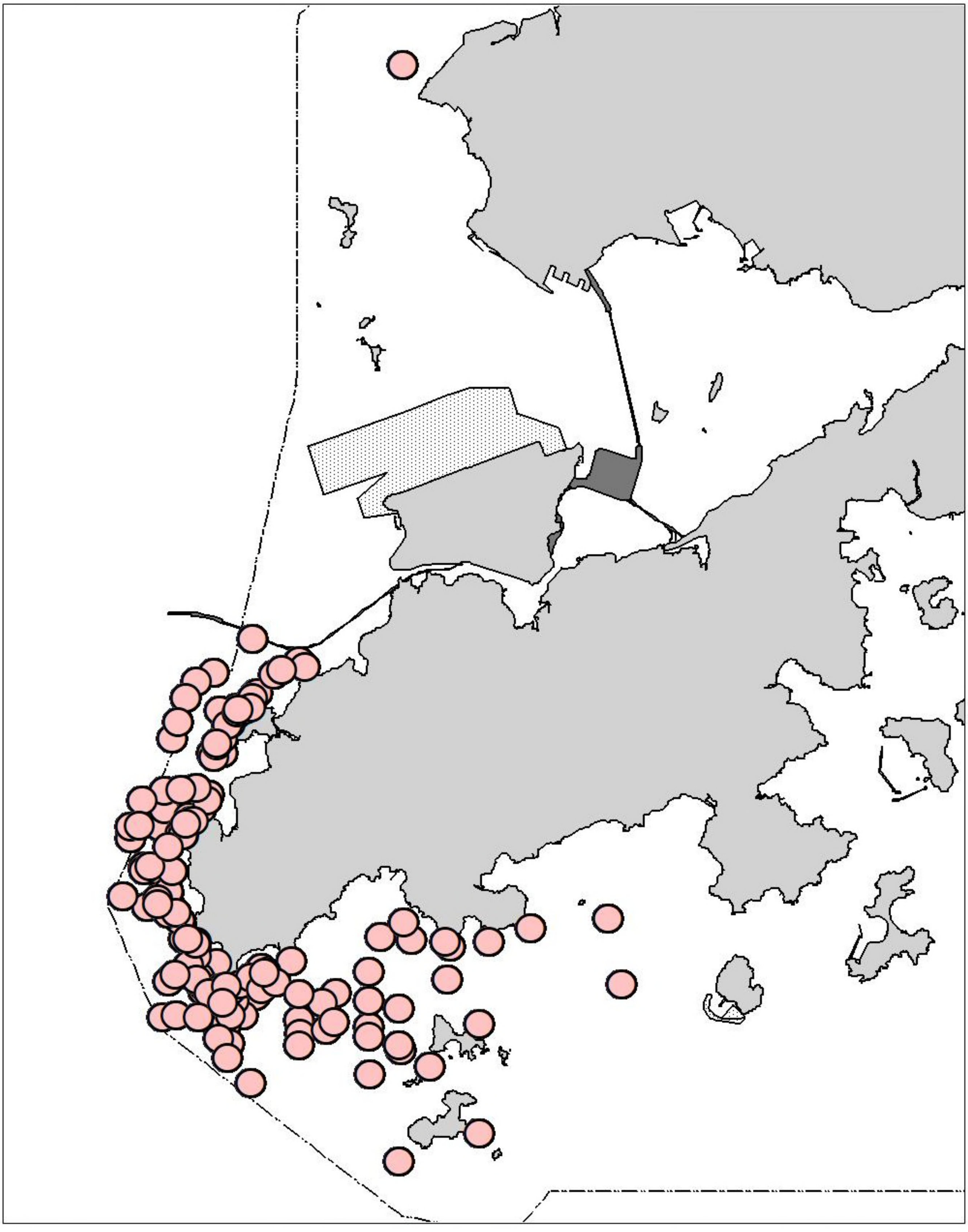


Figure 4. Distribution of CWD sightings in Hong Kong waters during AFCD monitoring surveys (April 2019 – March 2020)

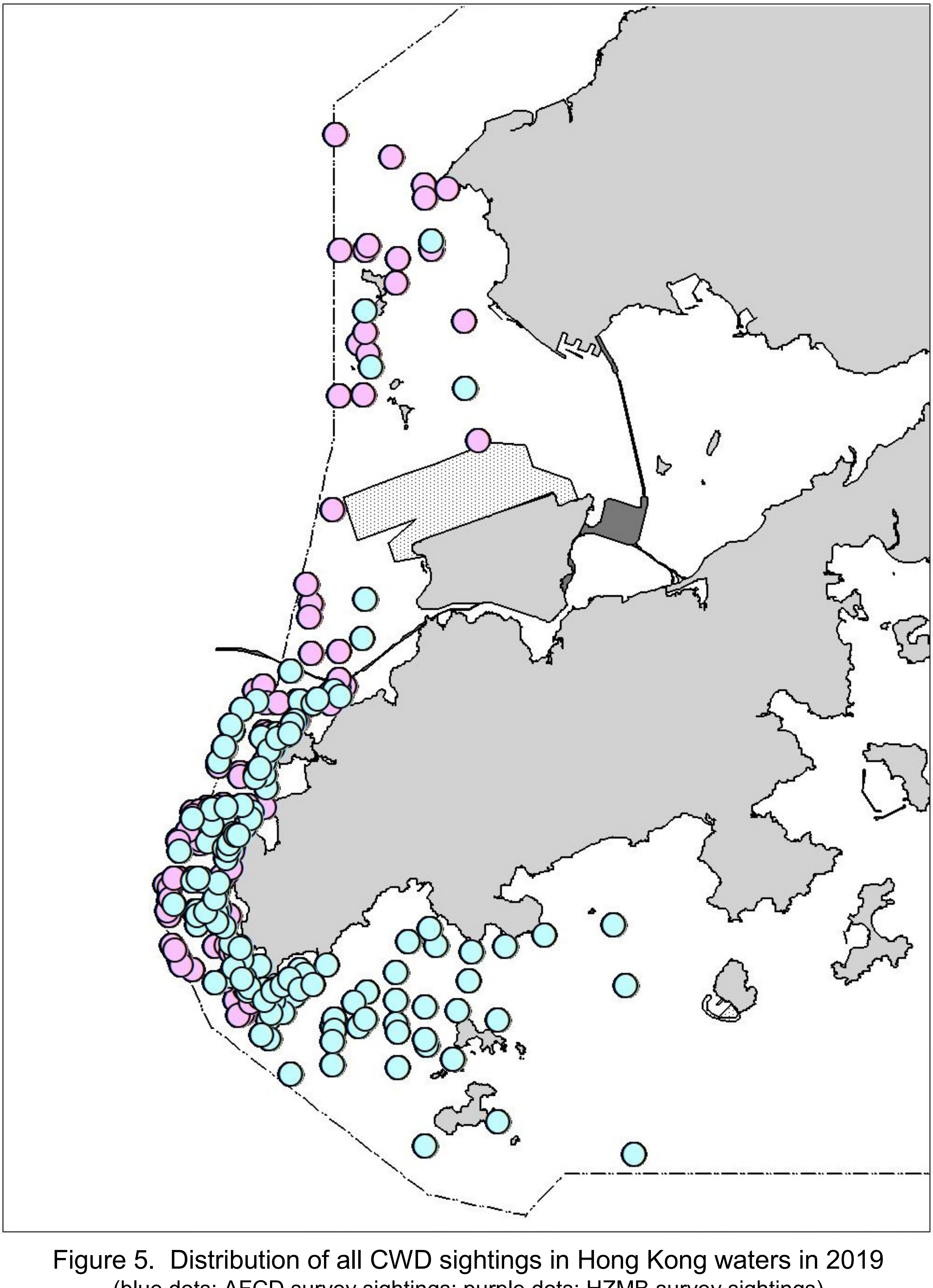


Figure 5. Distribution of all CWD sightings in Hong Kong waters in 2019
(blue dots: AFCD survey sightings; purple dots: HZMB survey sightings)

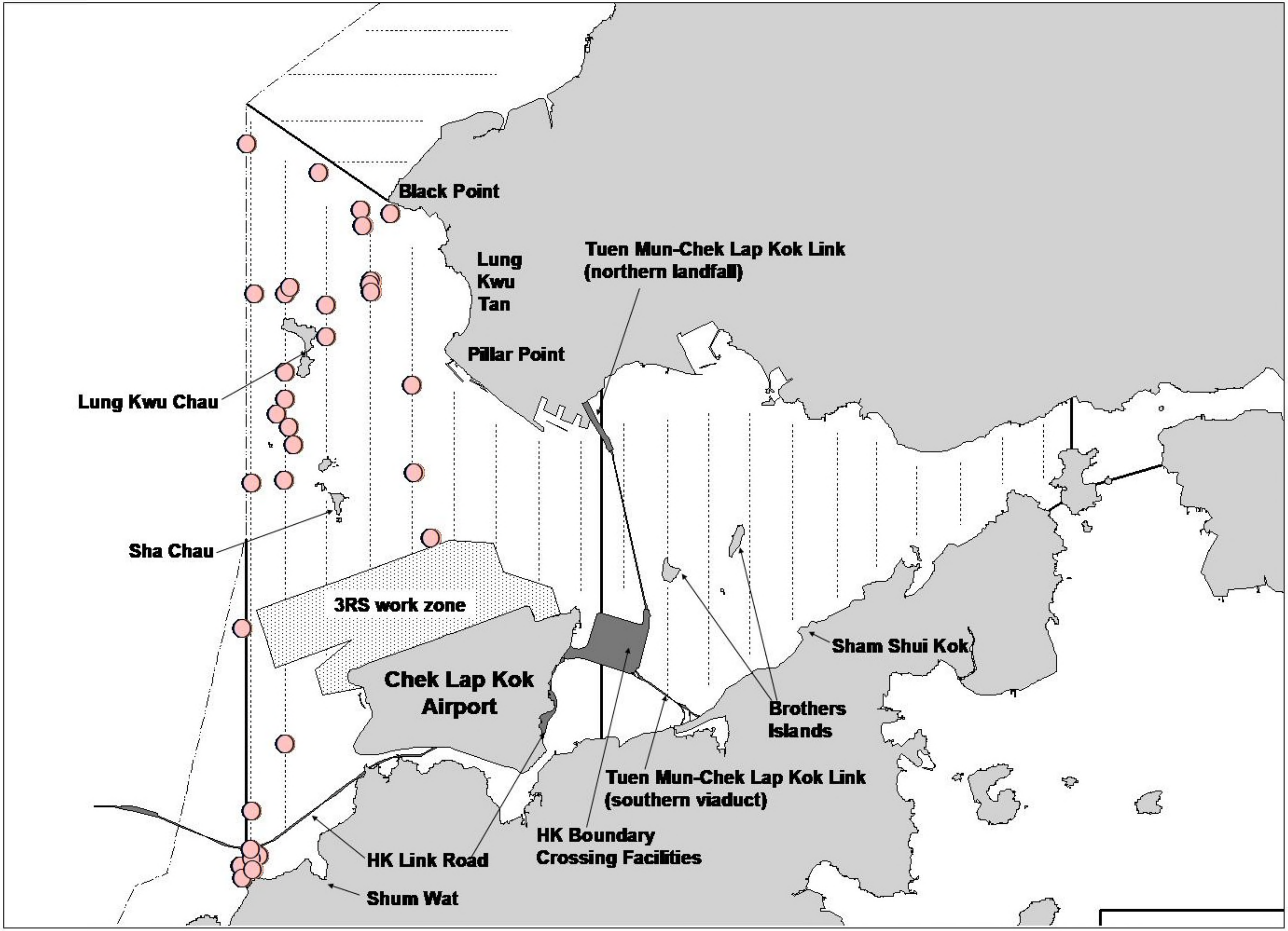



Figure 6. Distribution of Chinese White Dolphin sightings in North Lantau (2019)

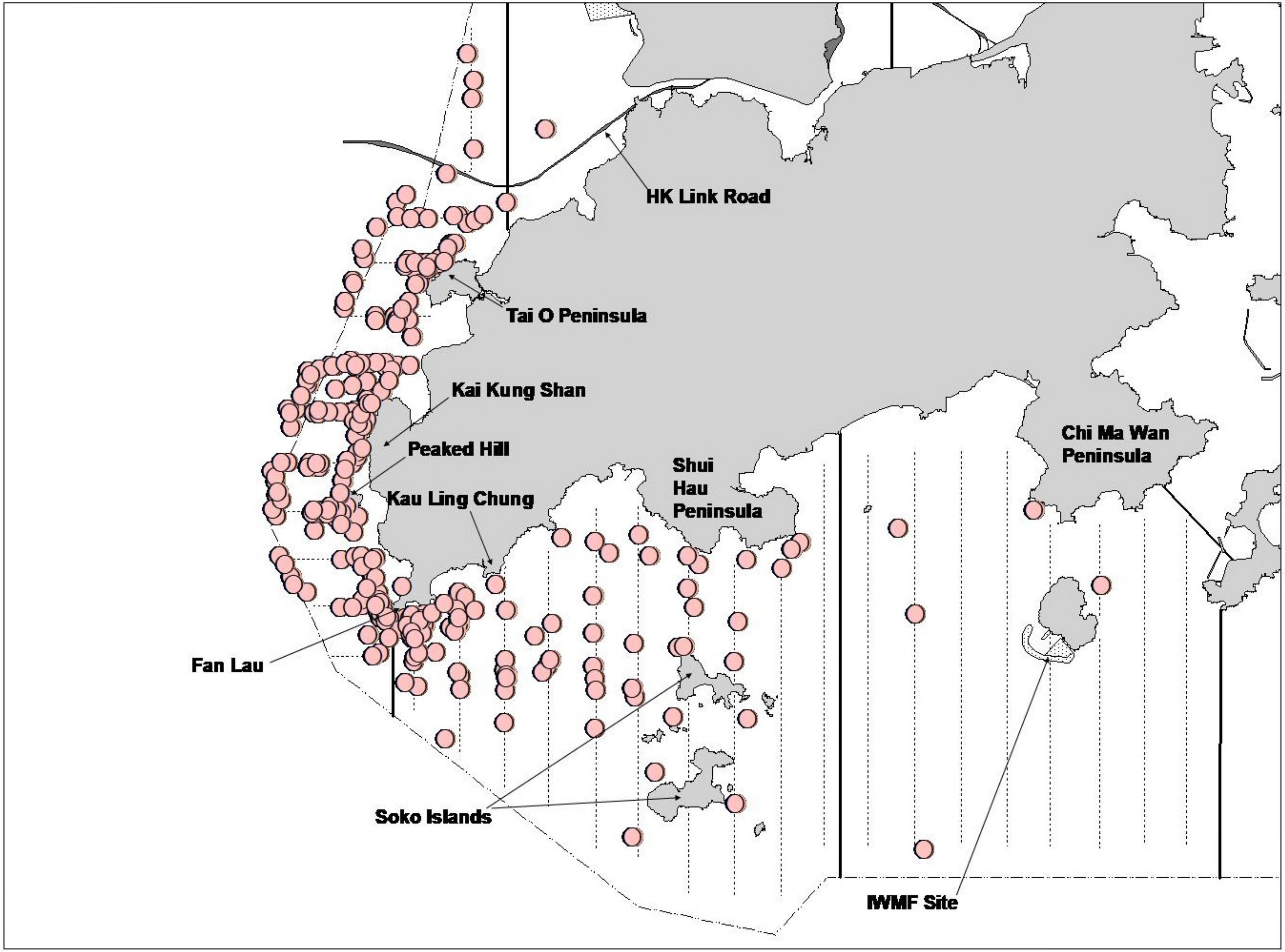



Figure 7. Distribution of Chinese White Dolphin sightings in West and South Lantau waters (2019)

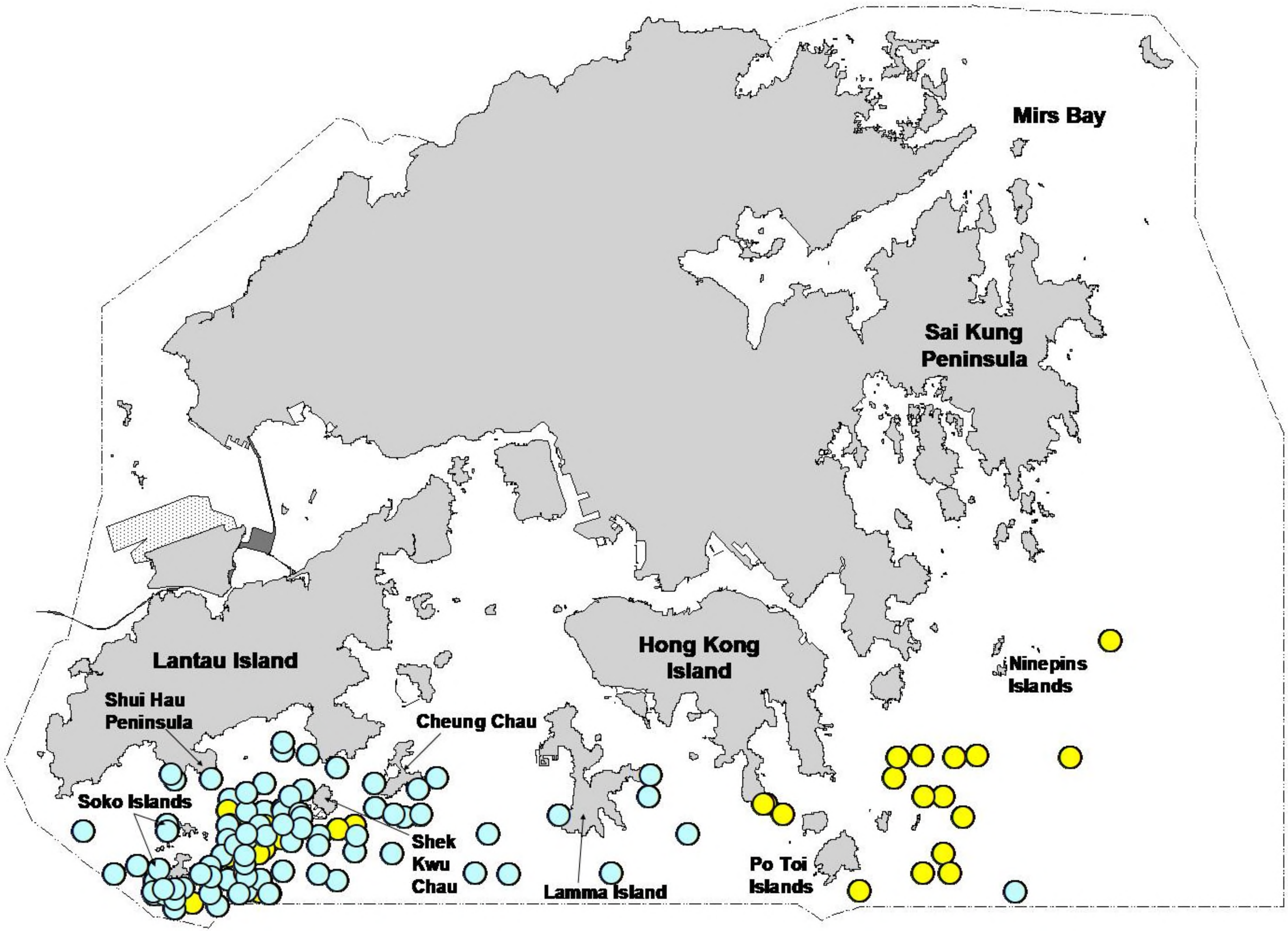



Figure 8. Distribution of finless porpoise sightings made during AFCD surveys (April 2019 – March 2020)
(blue dots: sightings made during winter/spring months; yellow dots: sightings made during summer/autumn months)

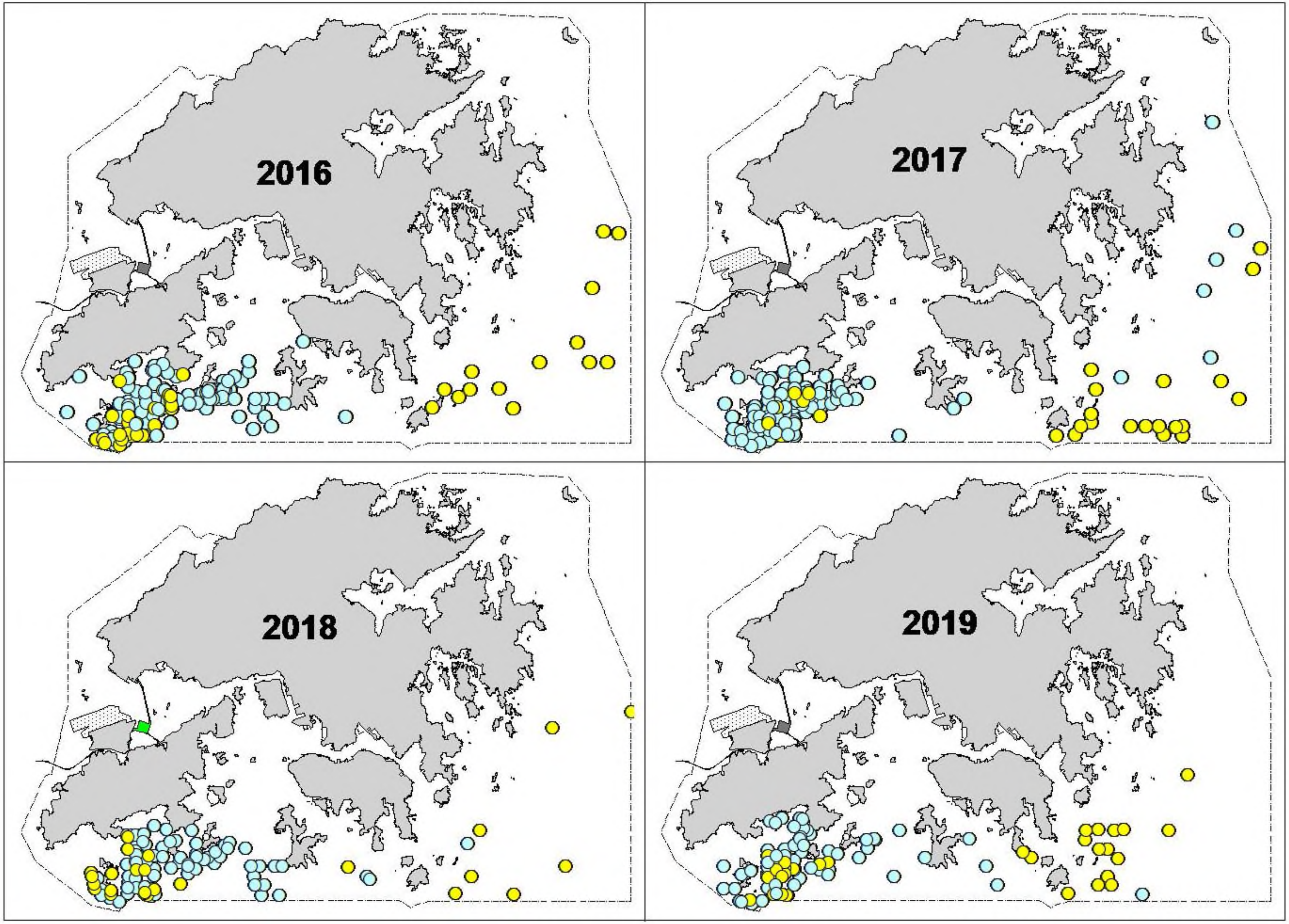
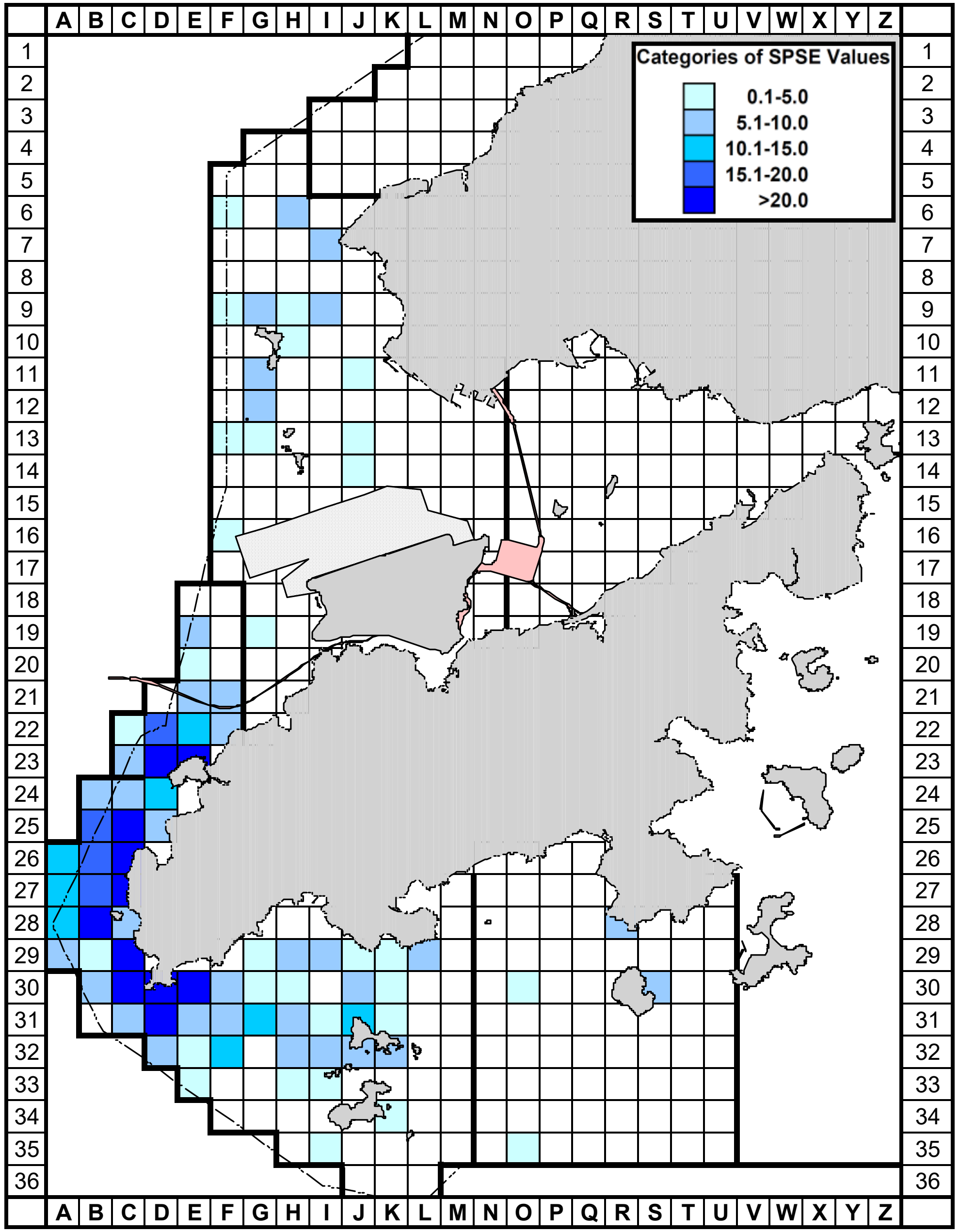



Figure 9. Comparison of annual porpoise distribution patterns from 2016-19
(blue dots: sightings made during winter/spring months; yellow dots: sightings made during summer/autumn months)



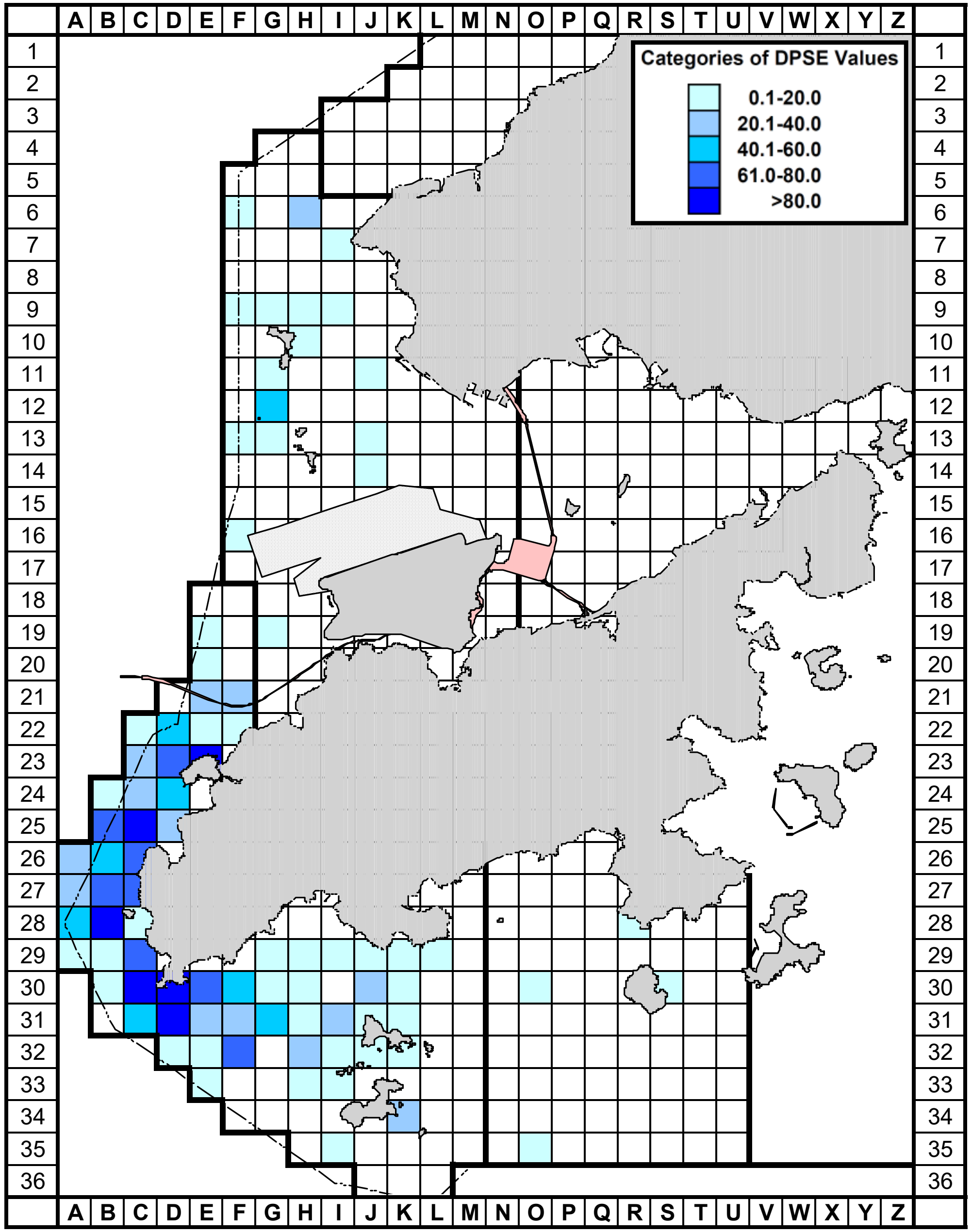




Figure 10. (left) Sighting density of Chinese white dolphins with corrected survey effort per km$^2$ in waters around Lantau Island (number within grids represent "SPSE" no. of on-effort dolphin sightings per 100 units of survey effort) (using data from January - December 2019)

(right) Density of Chinese white dolphins with corrected survey effort per km$^2$ in waters around Lantau Island (number within grids represent "DPSE" = no. o dolphins per 100 units of survey effort) (using data from January - December 2019)

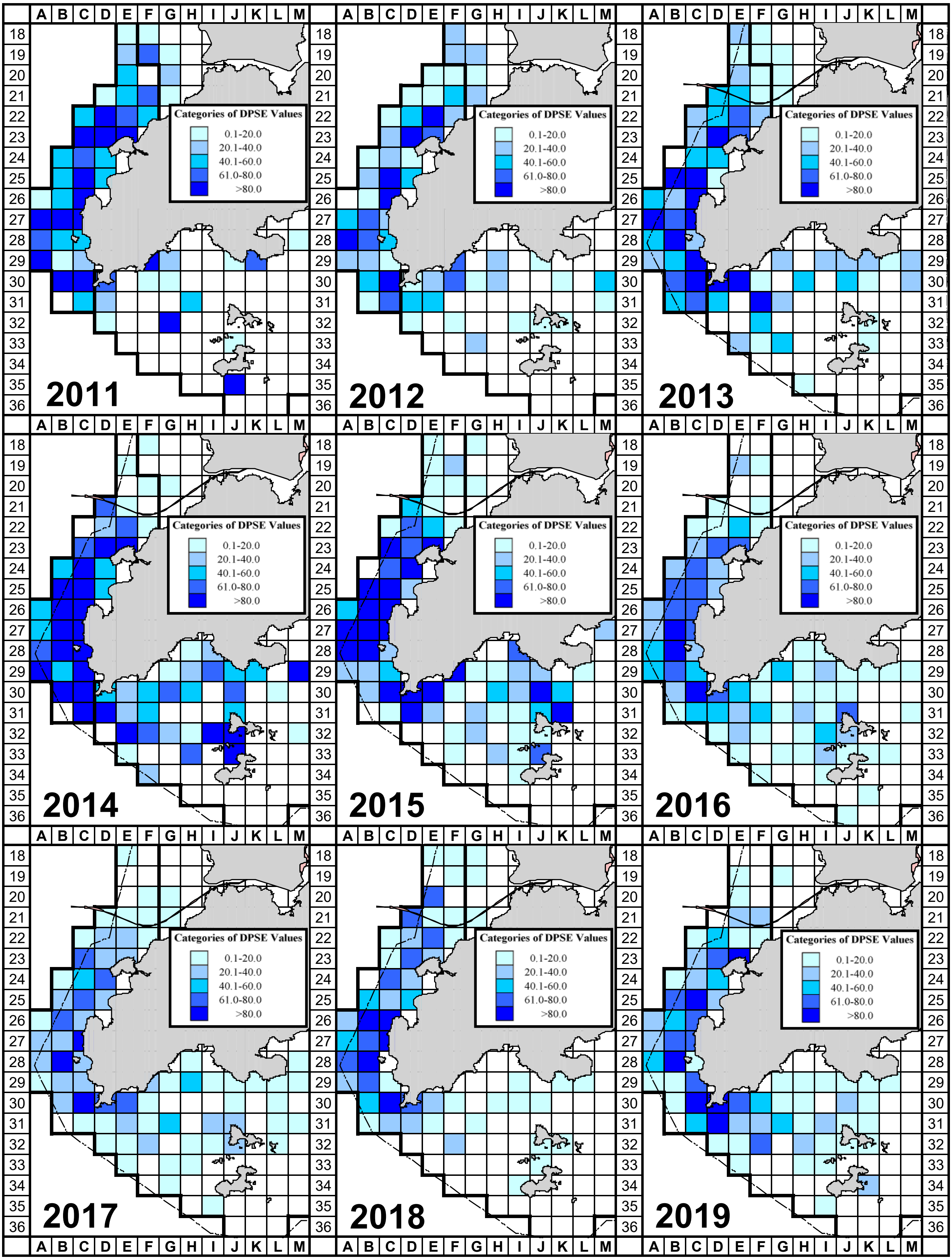



Figure 11. Comparison of Chinese White Dolphin densities with corrected survey effort per km$^2$ in West and Southwest Lantau Waters in 2011-19 (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort)

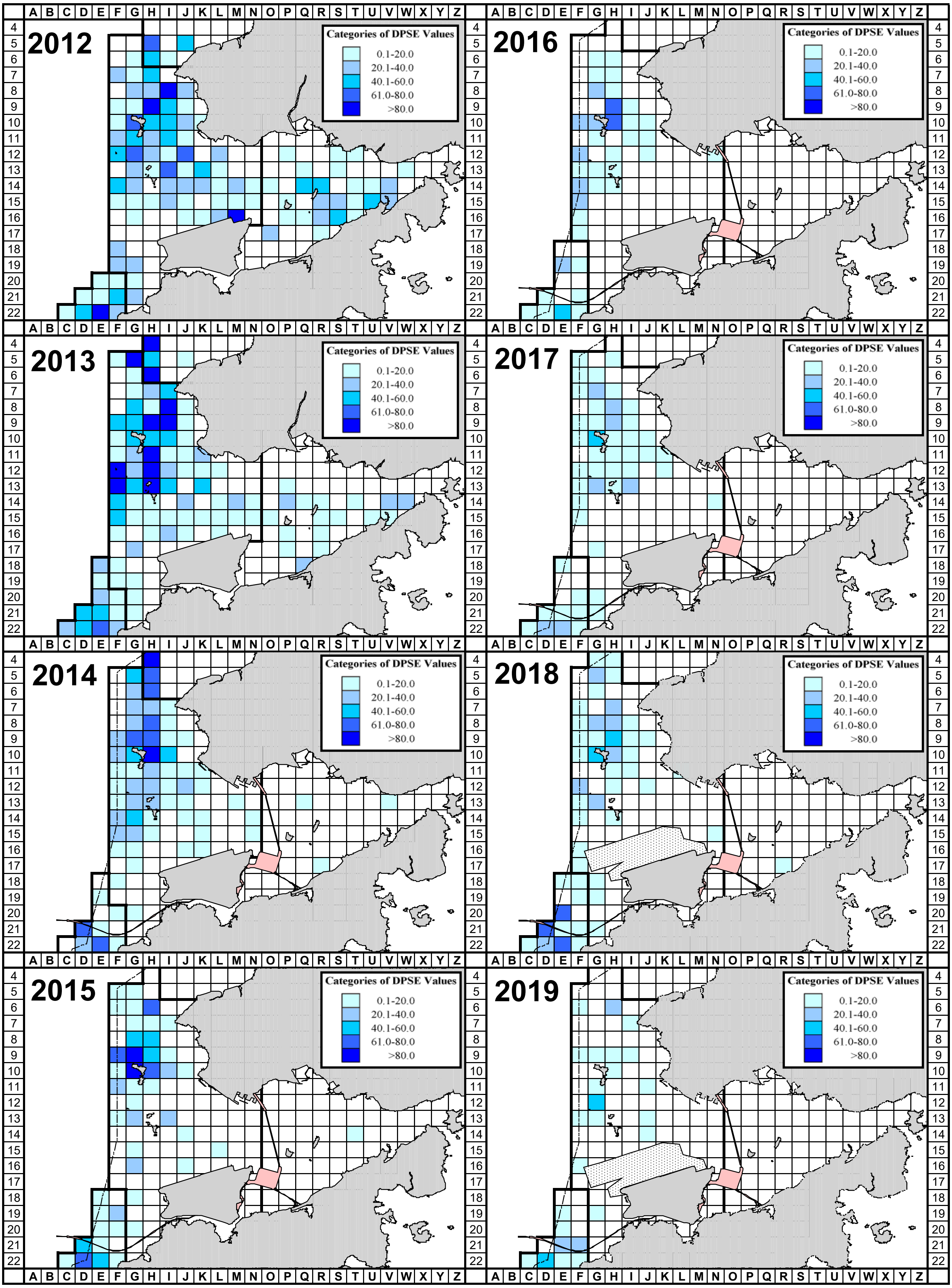



Figure 12. Comparison of dolphin densities with corrected survey effort per km$^2$ in North Lantau waters in 2012-19 (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort)

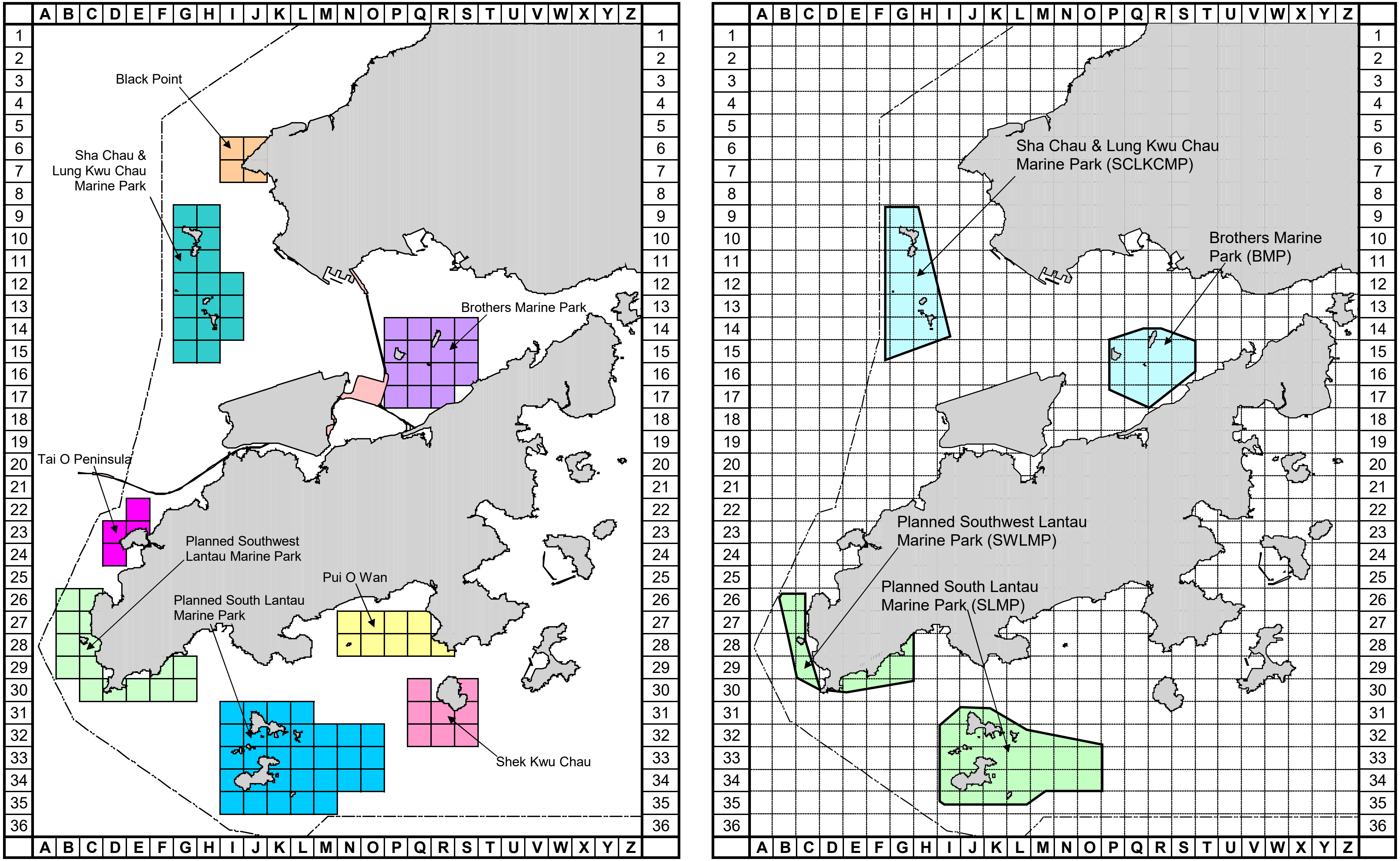



Figure 13. Grids of key marine mammal habitats in western HK waters that were examined for temporal trend in dolphin and porpoise densities

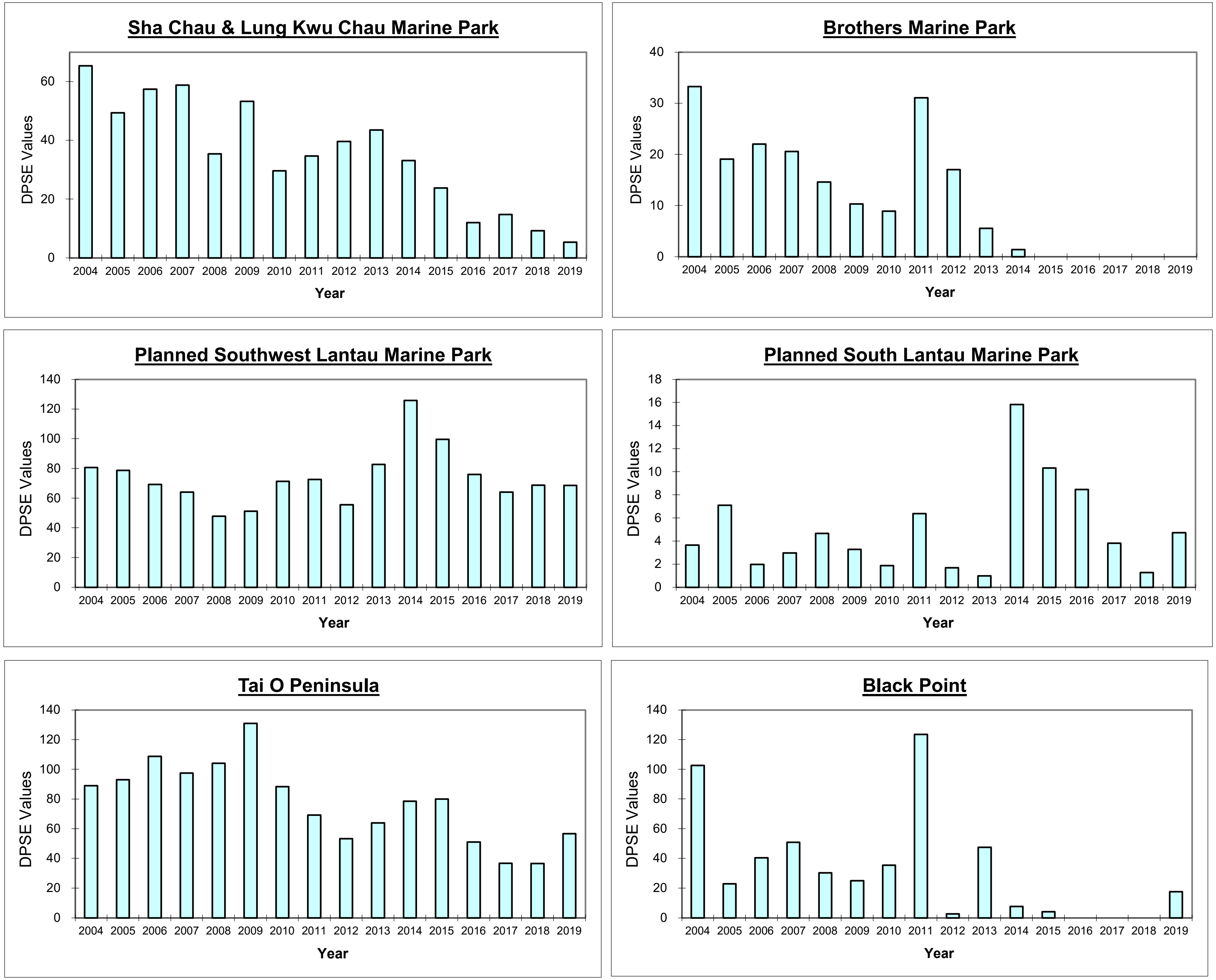



Figure 14. Temporal trend of dolphin densities (DPSE Values) at six key dolphin habitats in Lantau waters

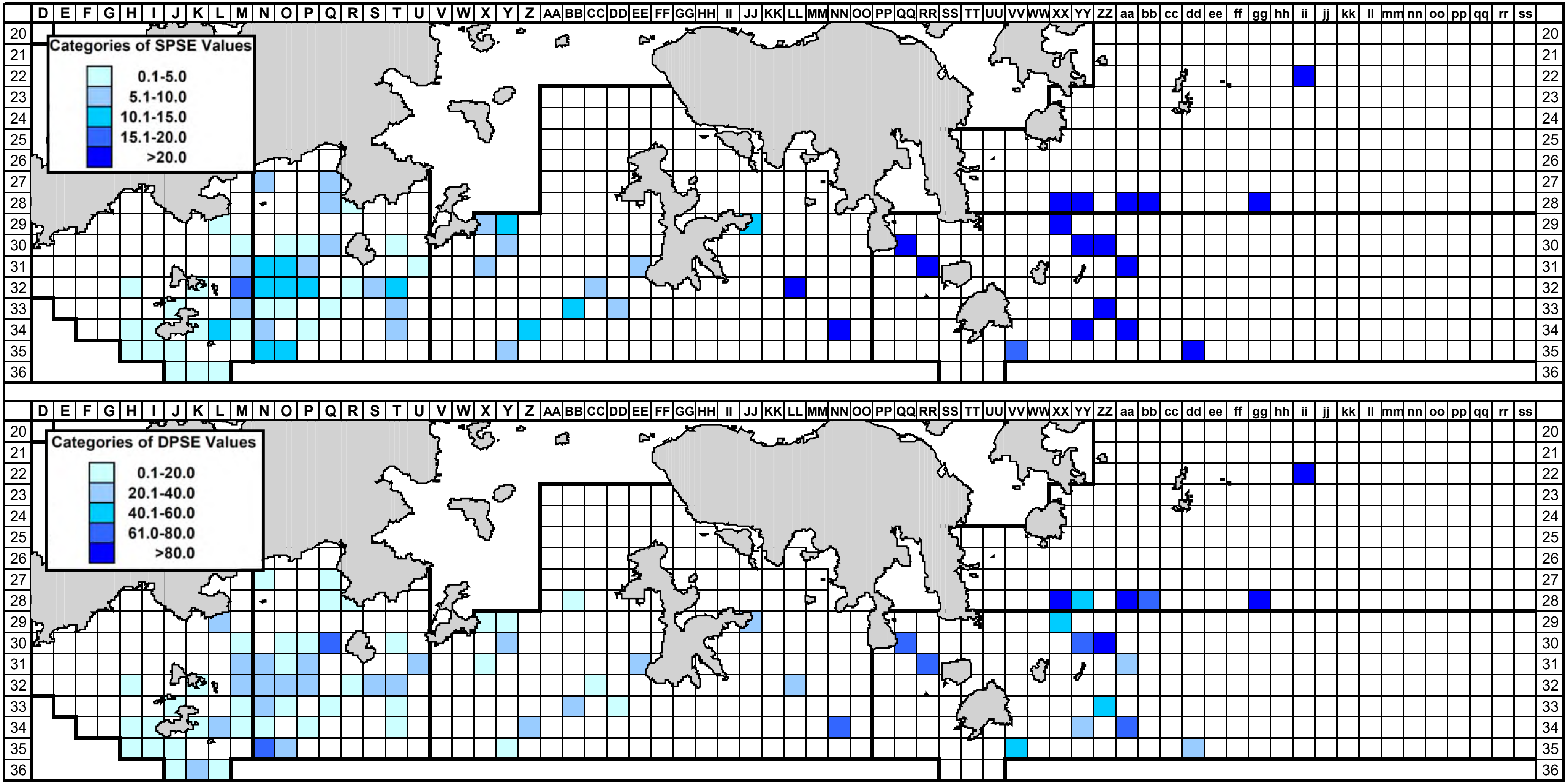



Figure 15. (top) Sighting density of finless porpoises with corrected survey effort per km$^2$ in southern waters of Hong Kong (number within grids represent "SPSE" = no. of on-effort porpoise sightings per 100 units of survey effort) (using data from January - December 2019)

(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 2019)

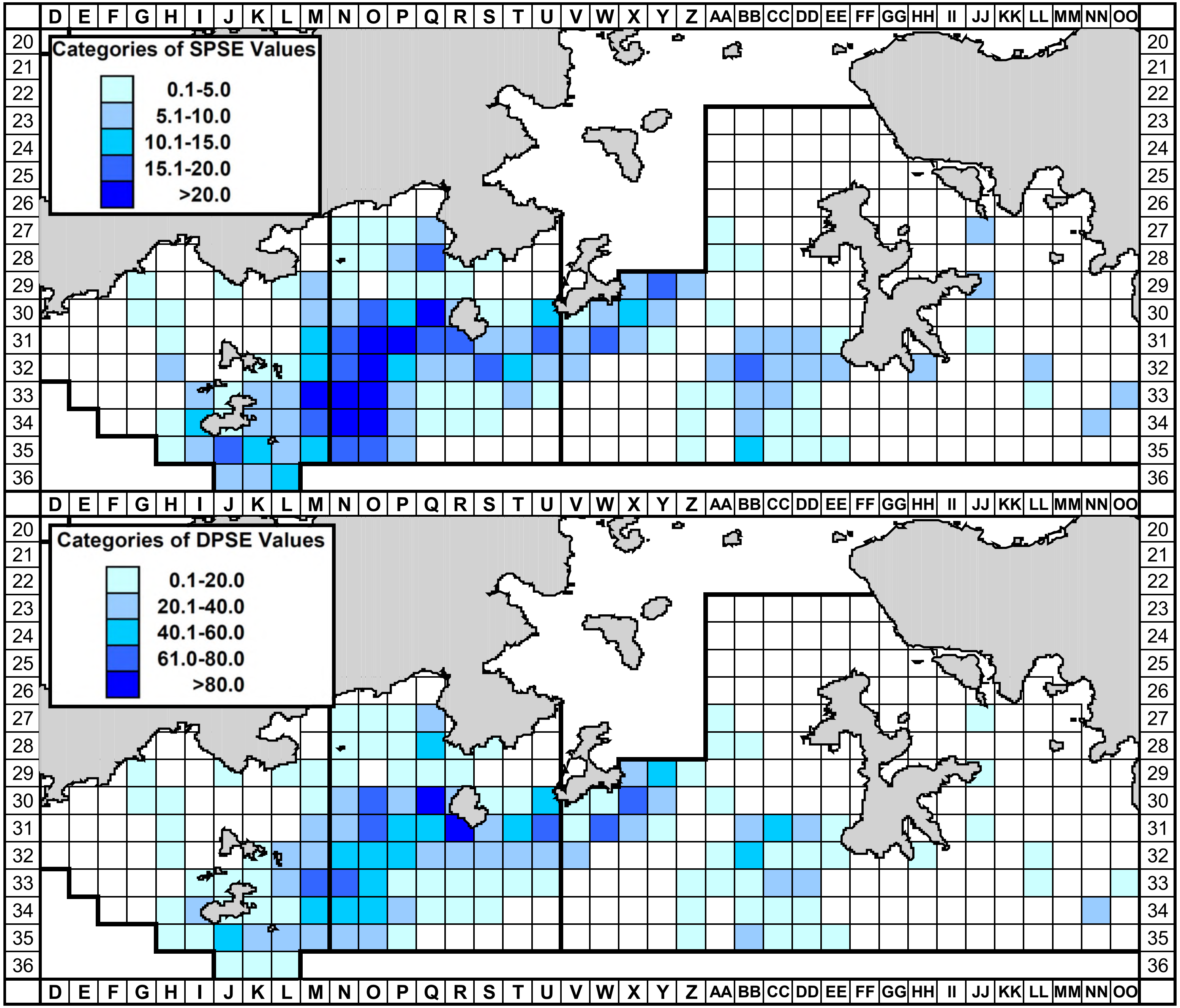



Figure 16. Density of finless porpoises with corrected survey effort per km$^2$ in southern waters of Hong Kong during dry season (December to May), using data collected during 2015-19 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort)

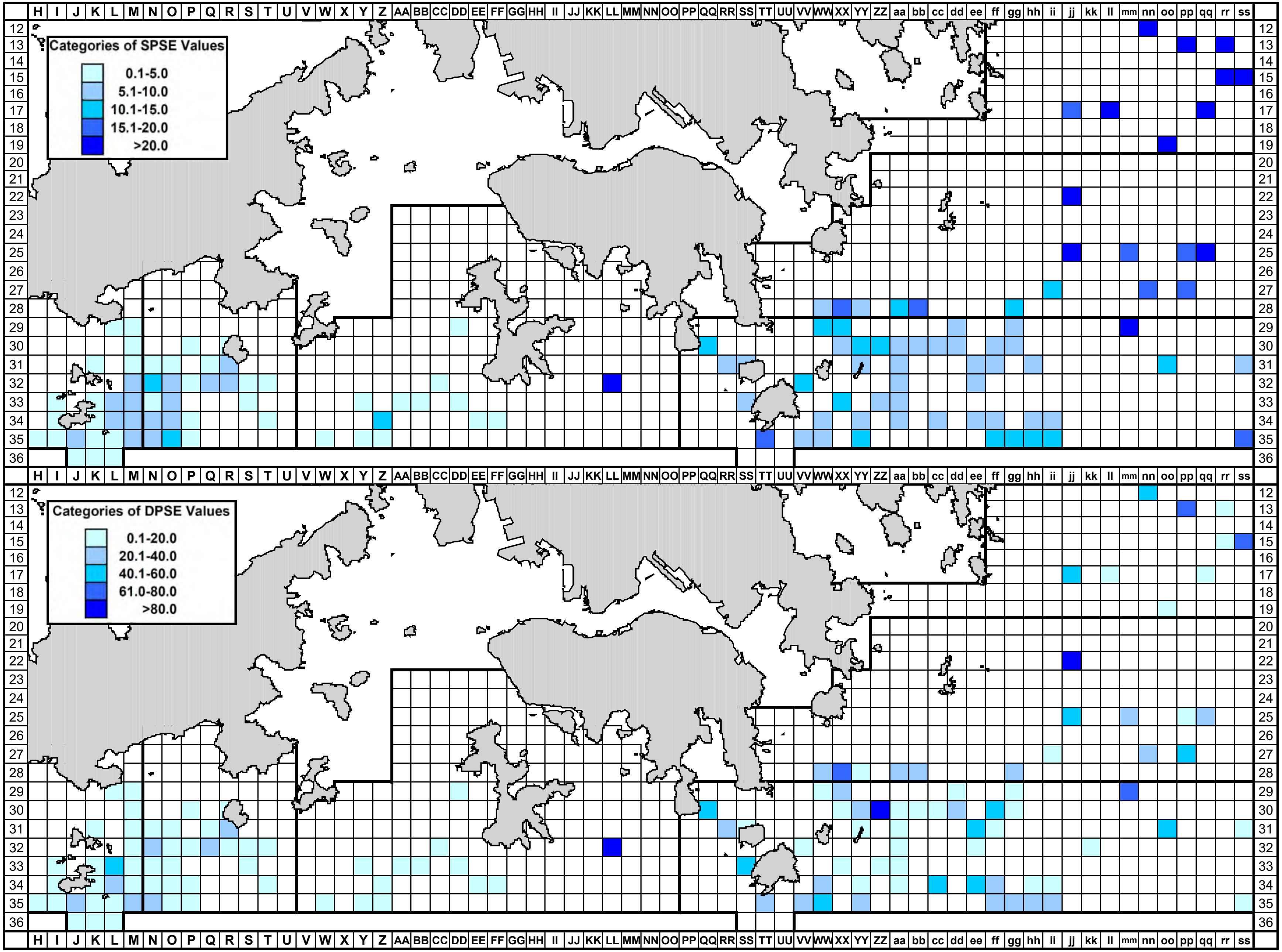



Figure 17. Density of finless porpoises with corrected survey effort per km$^2$ in southern and eastern waters of Hong Kong during wet season (June to November), using data collected during 2015-19 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort

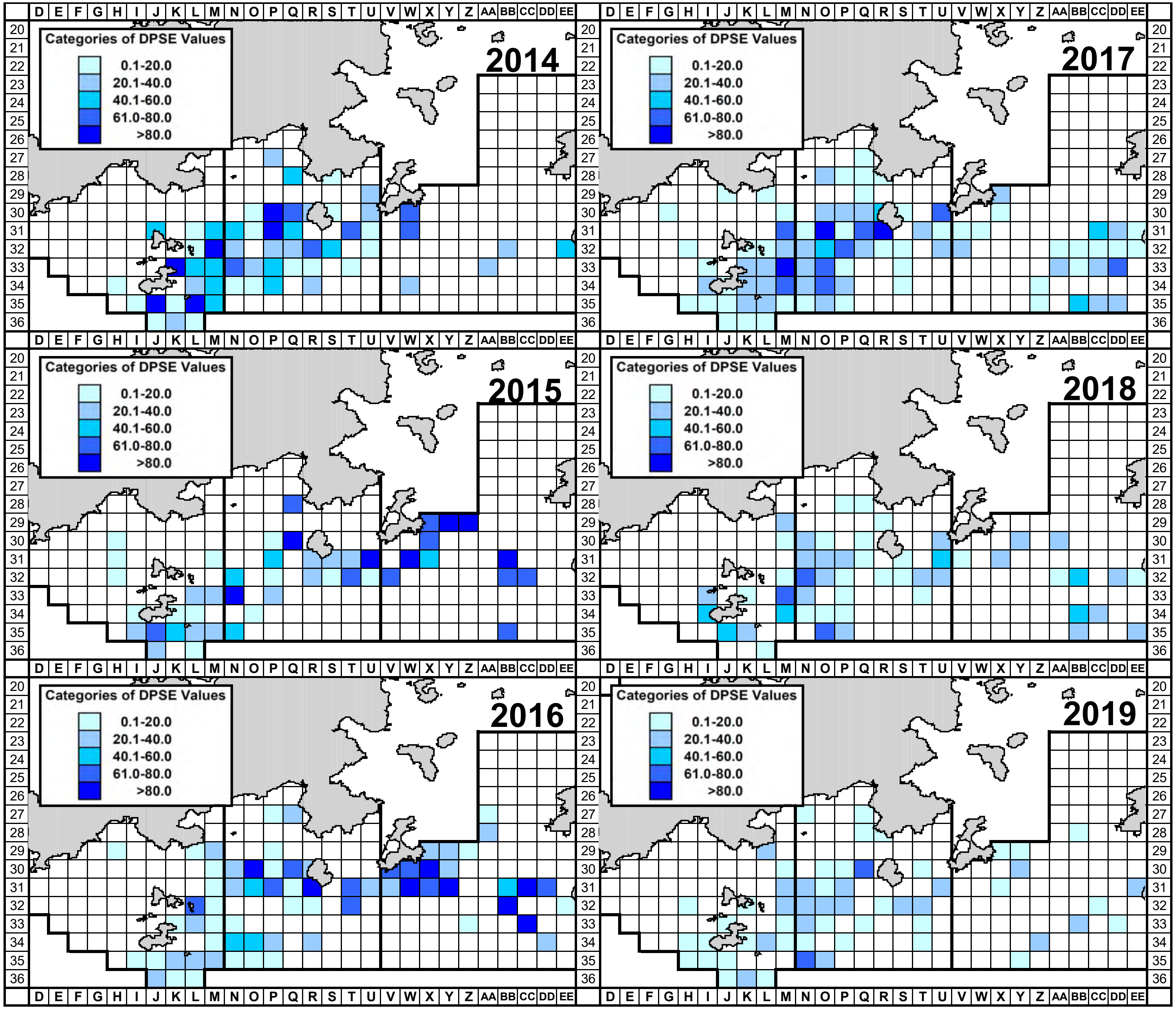
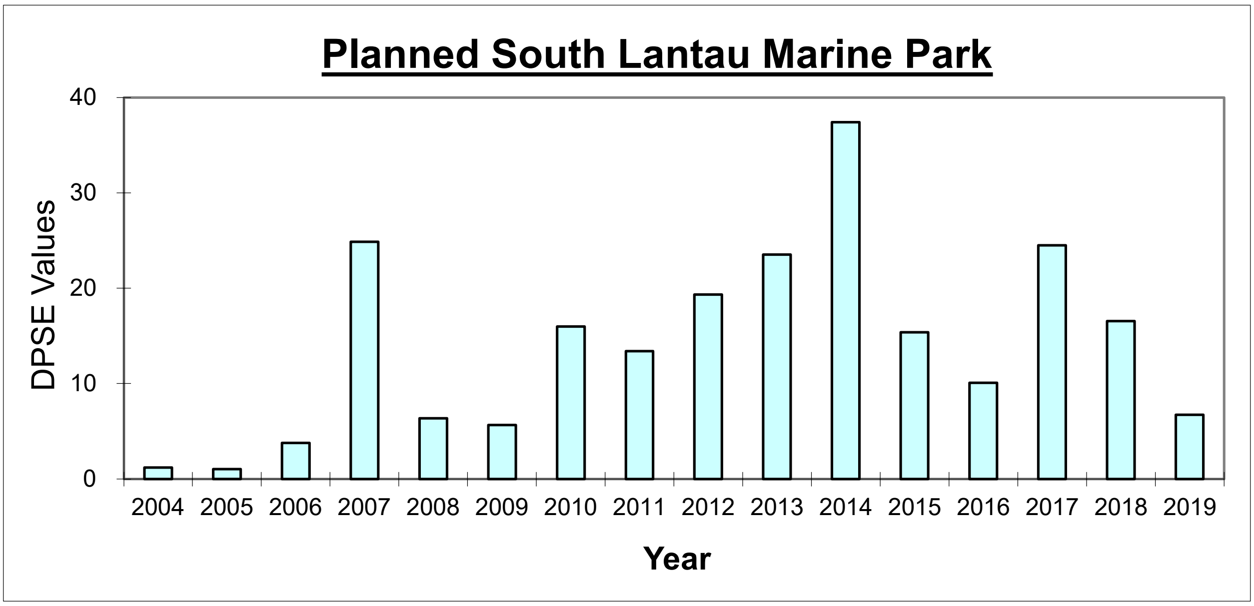
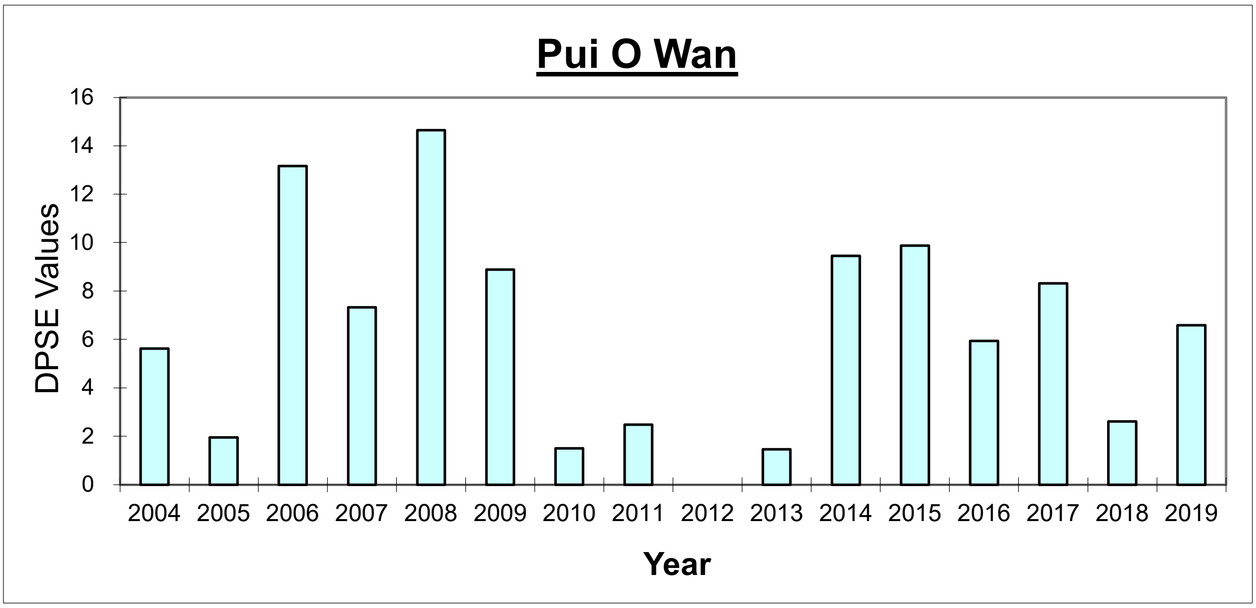



Figure 18. Comparison of porpoise densities with corrected survey effort per km$^2$ in South Lantau and Eastern Lamma waters in 2014-19 (number within grids represent "DPSE" = no. of porpoises per 100 units of survey effort)



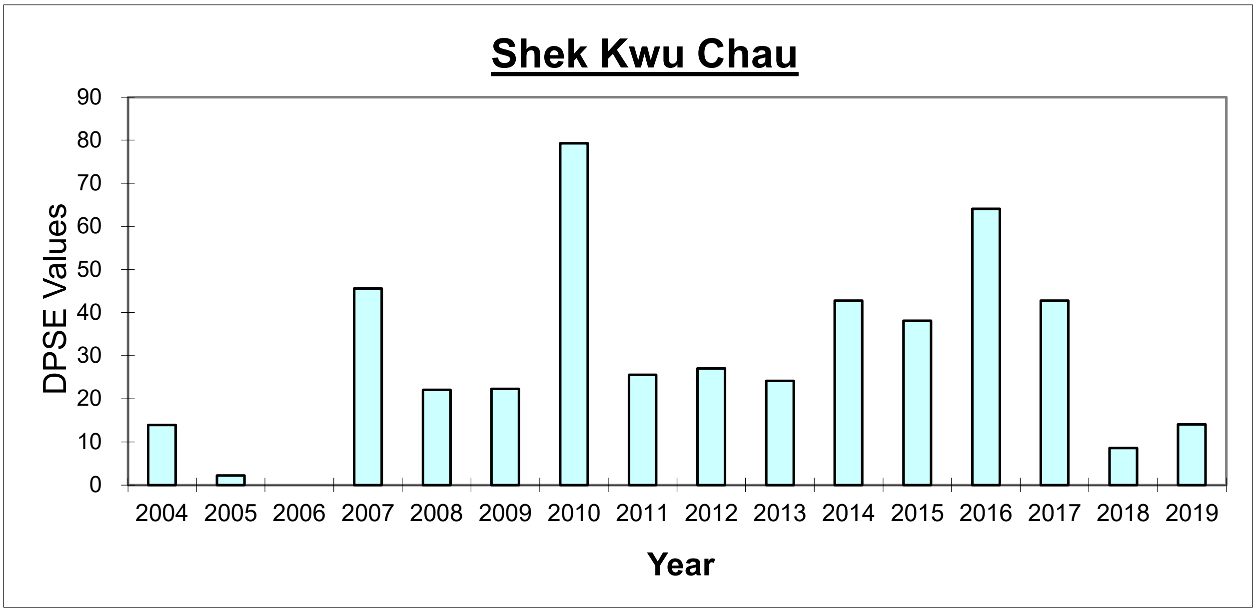




Figure 19. Temporal trend of porpoise densities (DPSE Values) at three key porpoise habitats in South Lantau waters

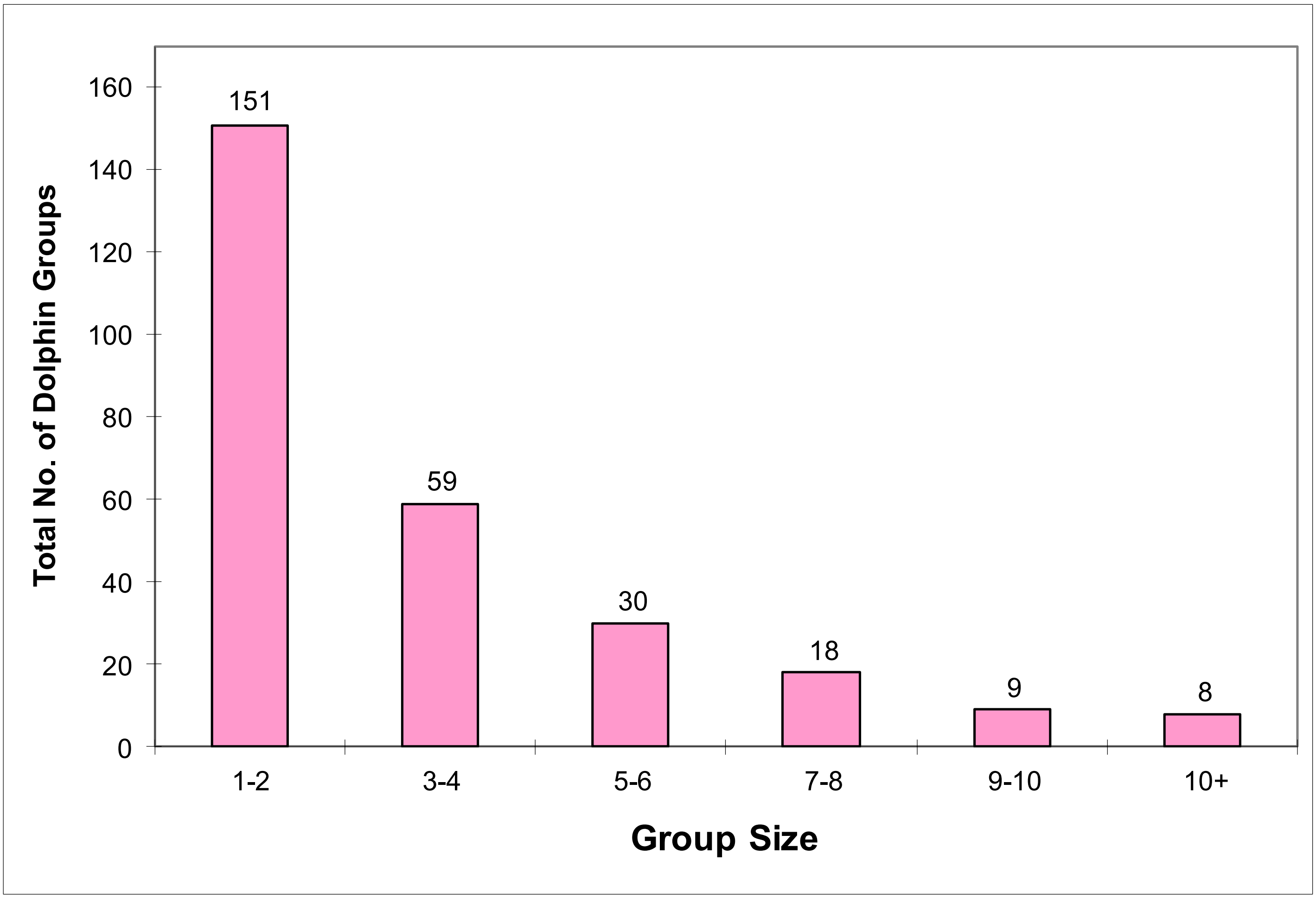



Figure 20. Total number of dolphin groups with different group sizes during April 2019 to March 2020

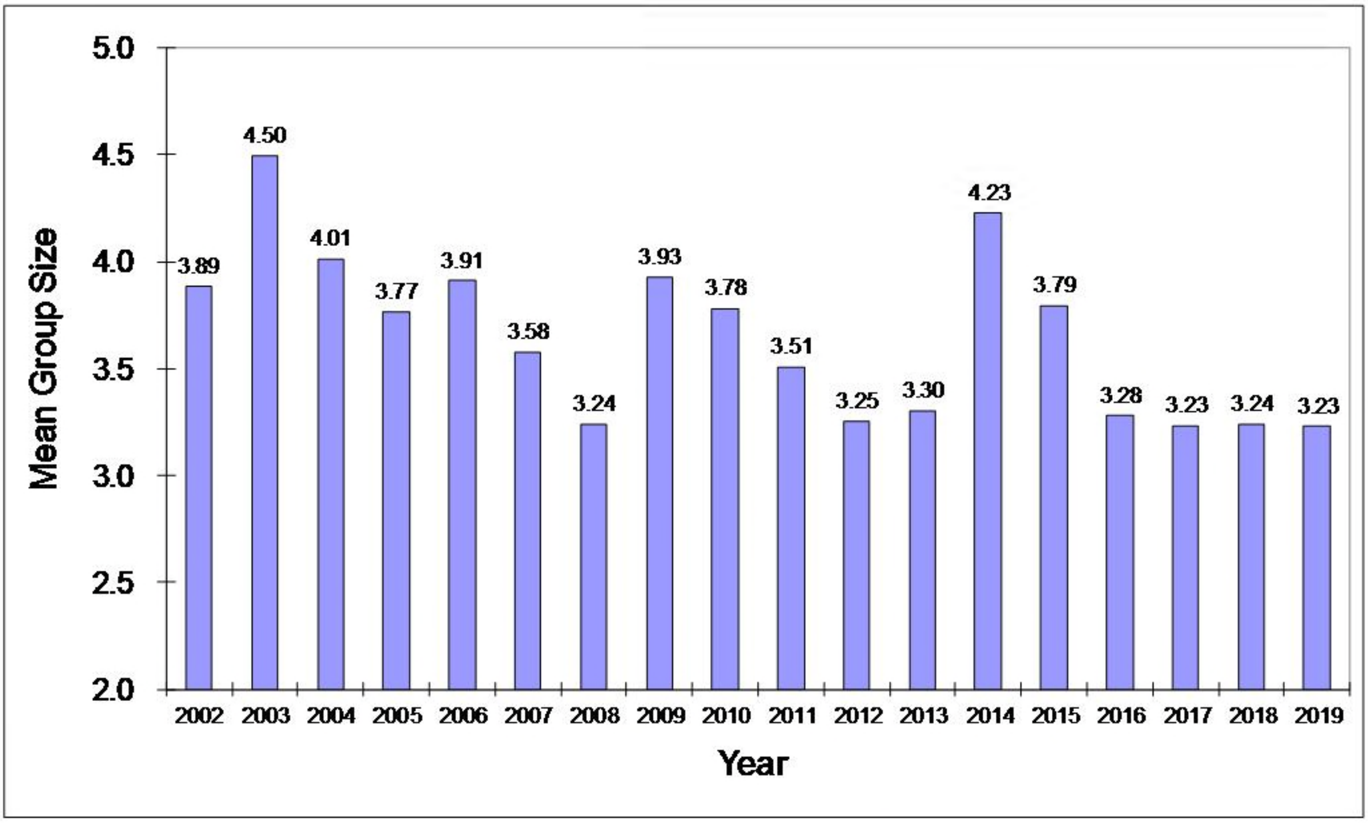



Figure 21. Temporal trend of mean dolphin group size in 2002-19

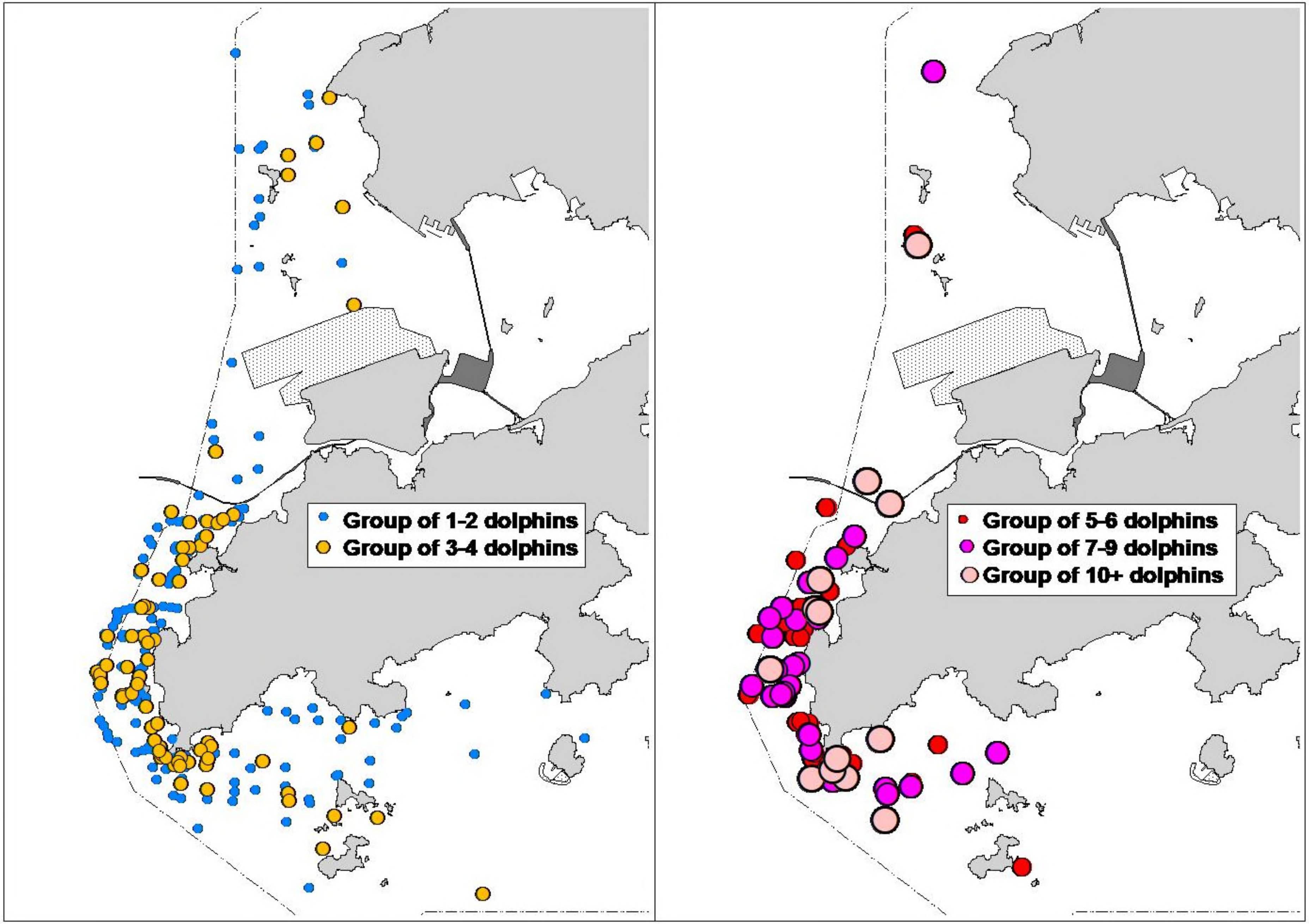



Figure 22. Distribution of Chinese White Dolphins with different group sizes in 2019

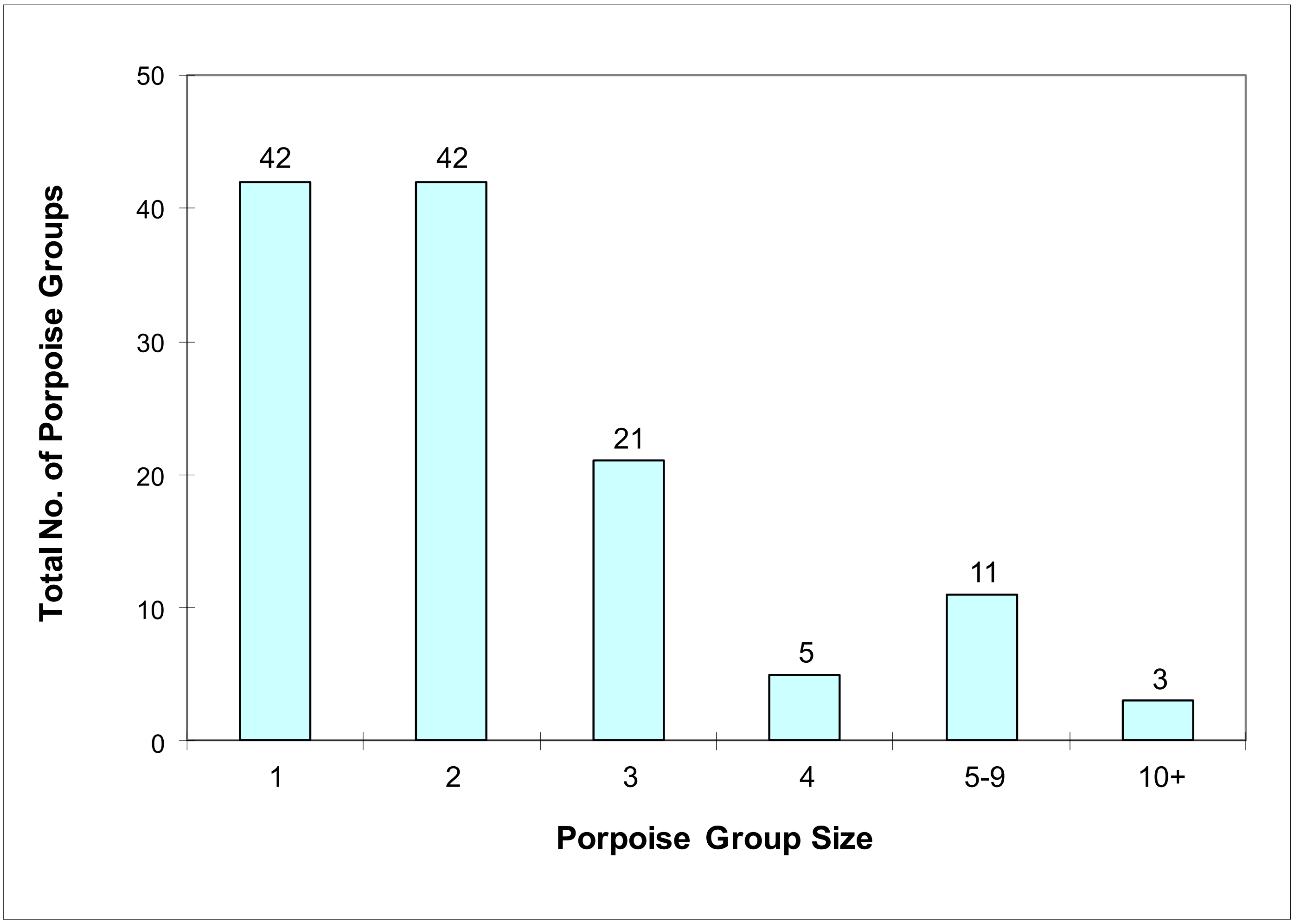



Figure 23. Total number of porpoise groups with different group sizes during April 2019 to March 2020

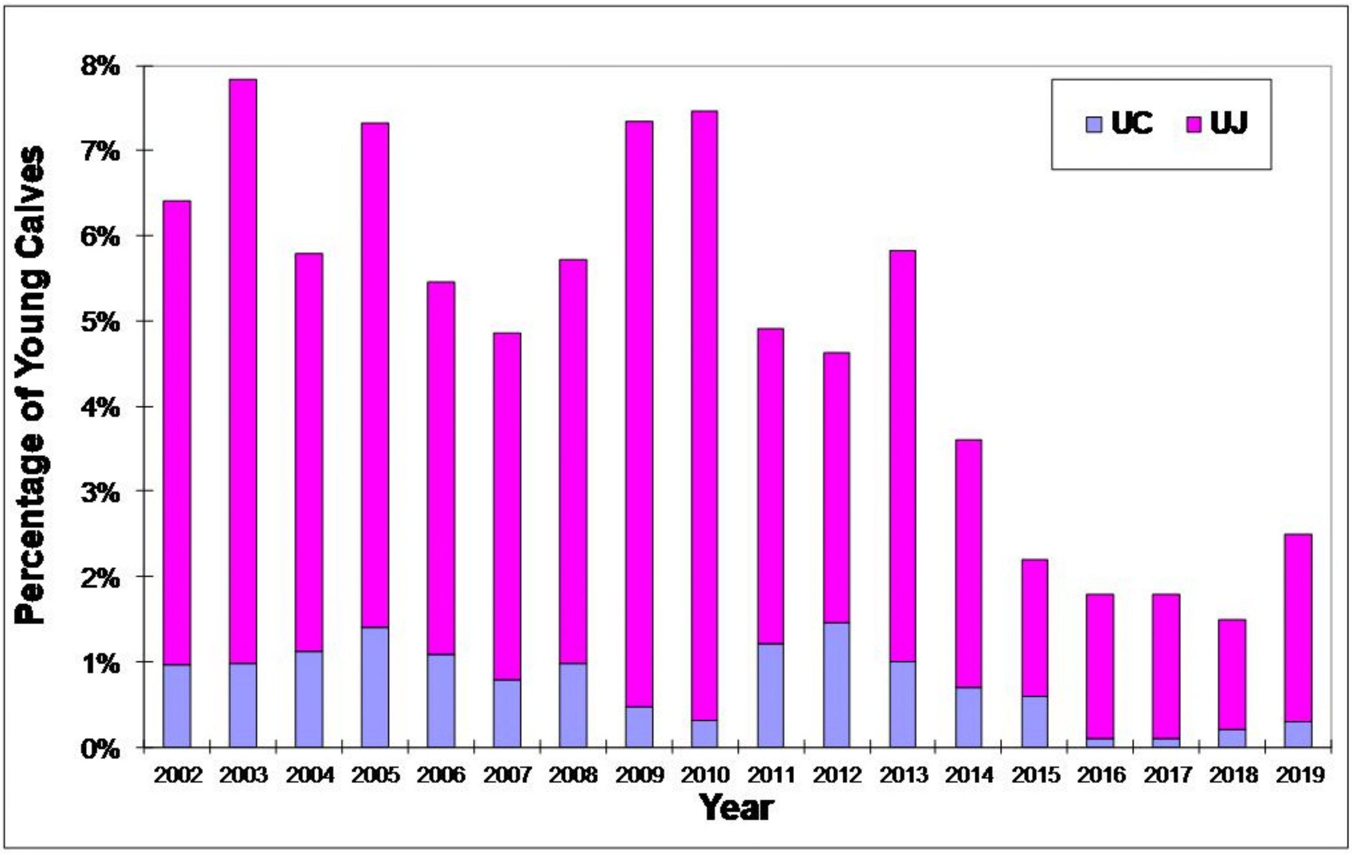



Figure 24. Percentages of young calves (i.e. Unspotted Calves (UC) and Unspotted Juveniles (UJ)) among all dolphin groups during 2002-19

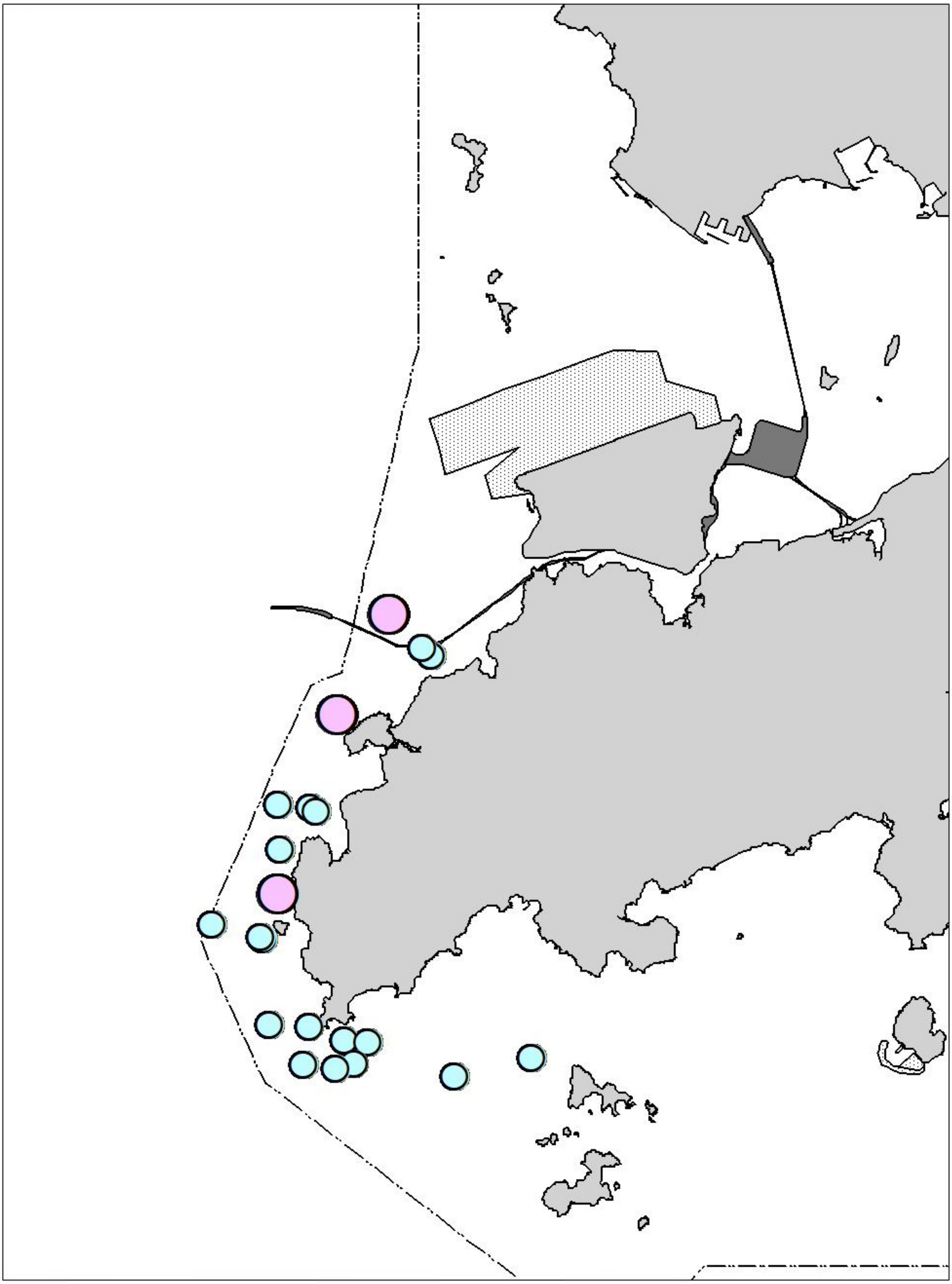


Figure 25. Distribution of Unspotted Calves (purple dots) &
Unspotted Juveniles (blue dots) in 2019

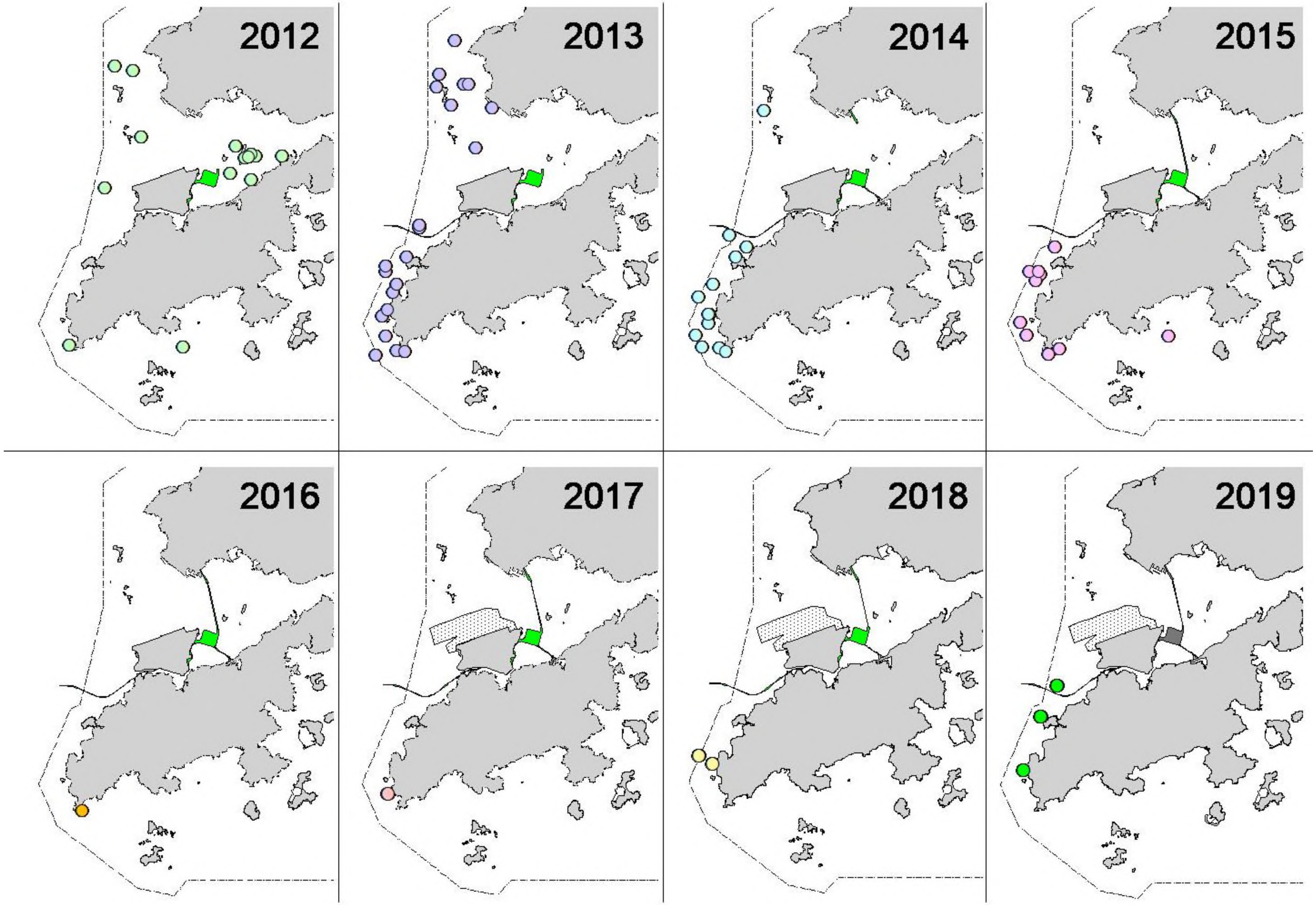



Figure 26. Temporal changes in distribution of unspotted calves (UCs) in 2012-19

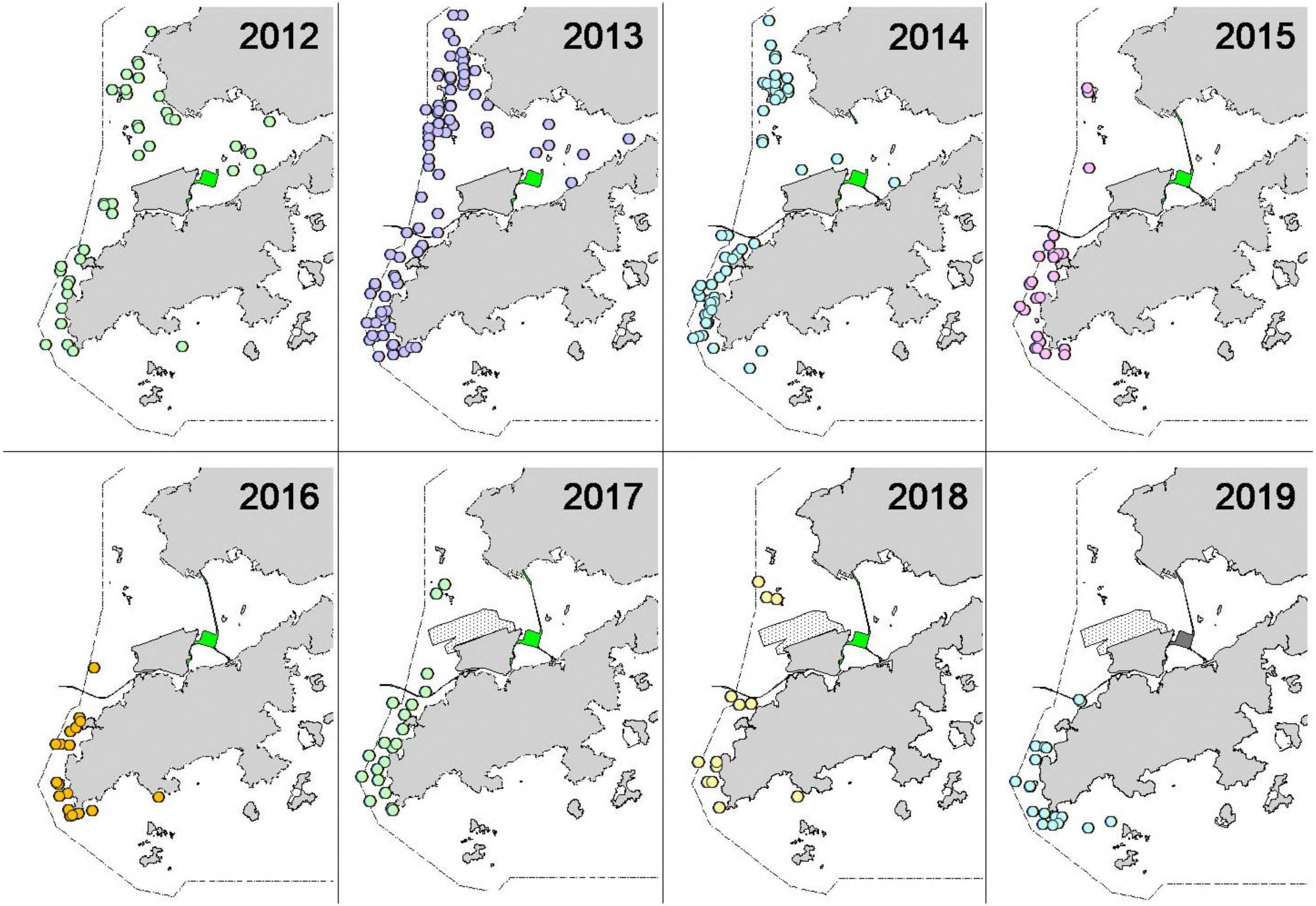



Figure 27. Temporal changes in distribution of unspotted juveniles (UJs) in 2012-19

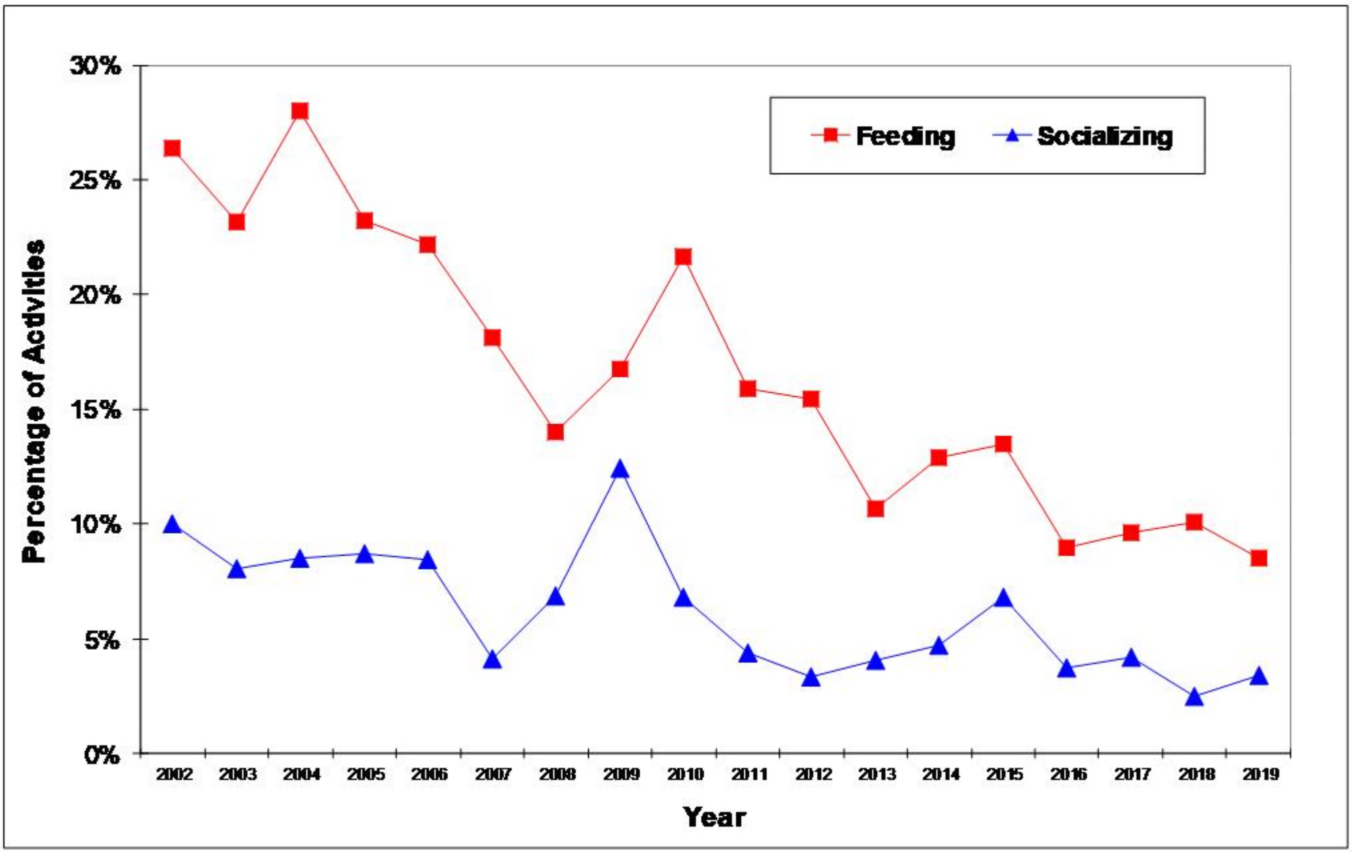



Figure 28. Percentages of feeding and socializing activities among all dolphin groups sighted in Hong Kong during 2002-19

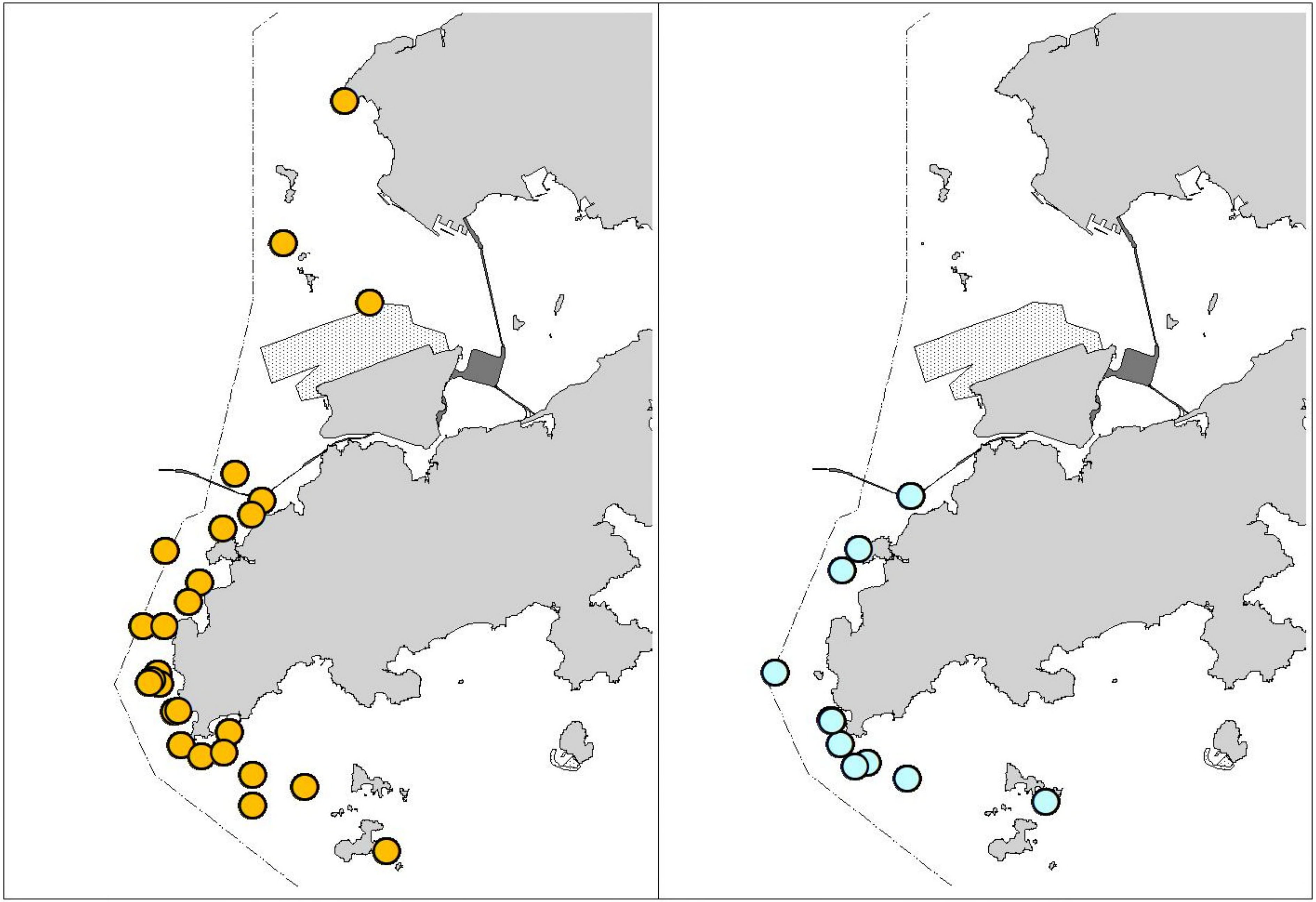


Figure 29. Distribution of Chinese white dolphins engaged in feeding (orange dots) and socializing (blue dots) activities in 2019

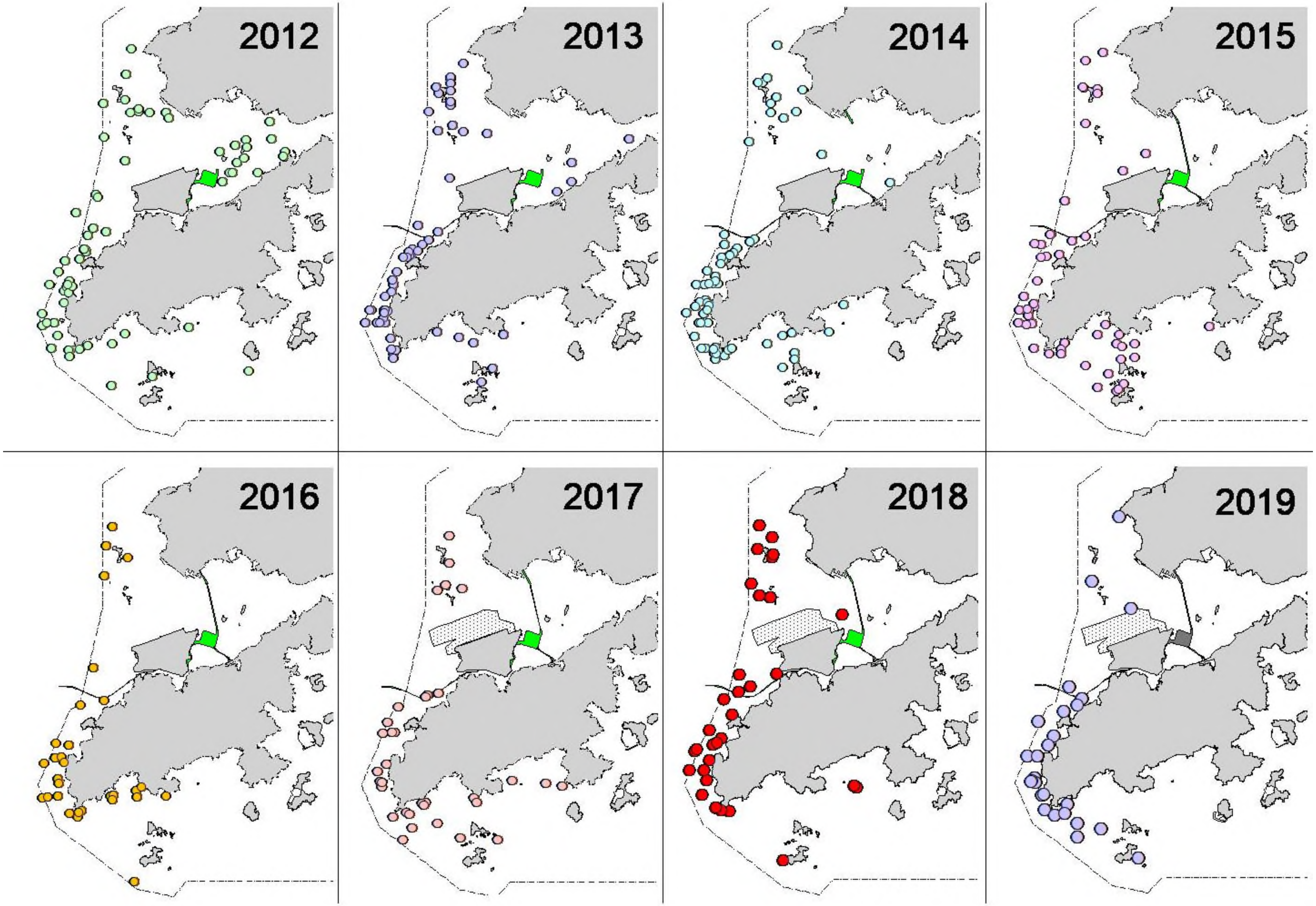



Figure 30. Temporal changes in distribution of dolphin groups engaged in feeding activities in 2012-19

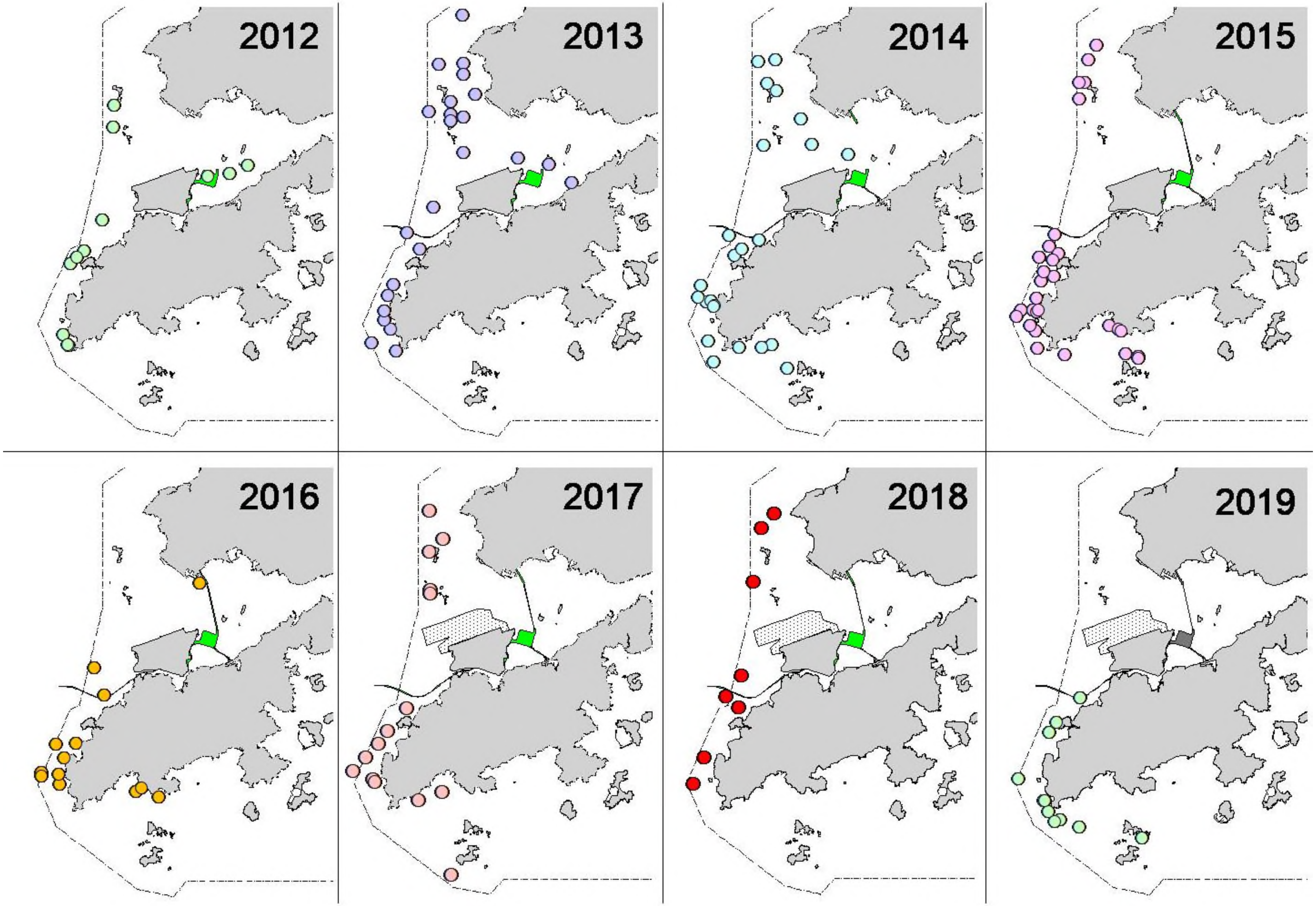



Figure 31. Temporal changes in distribution of dolphin groups engaged in socializing activities in 2012-19

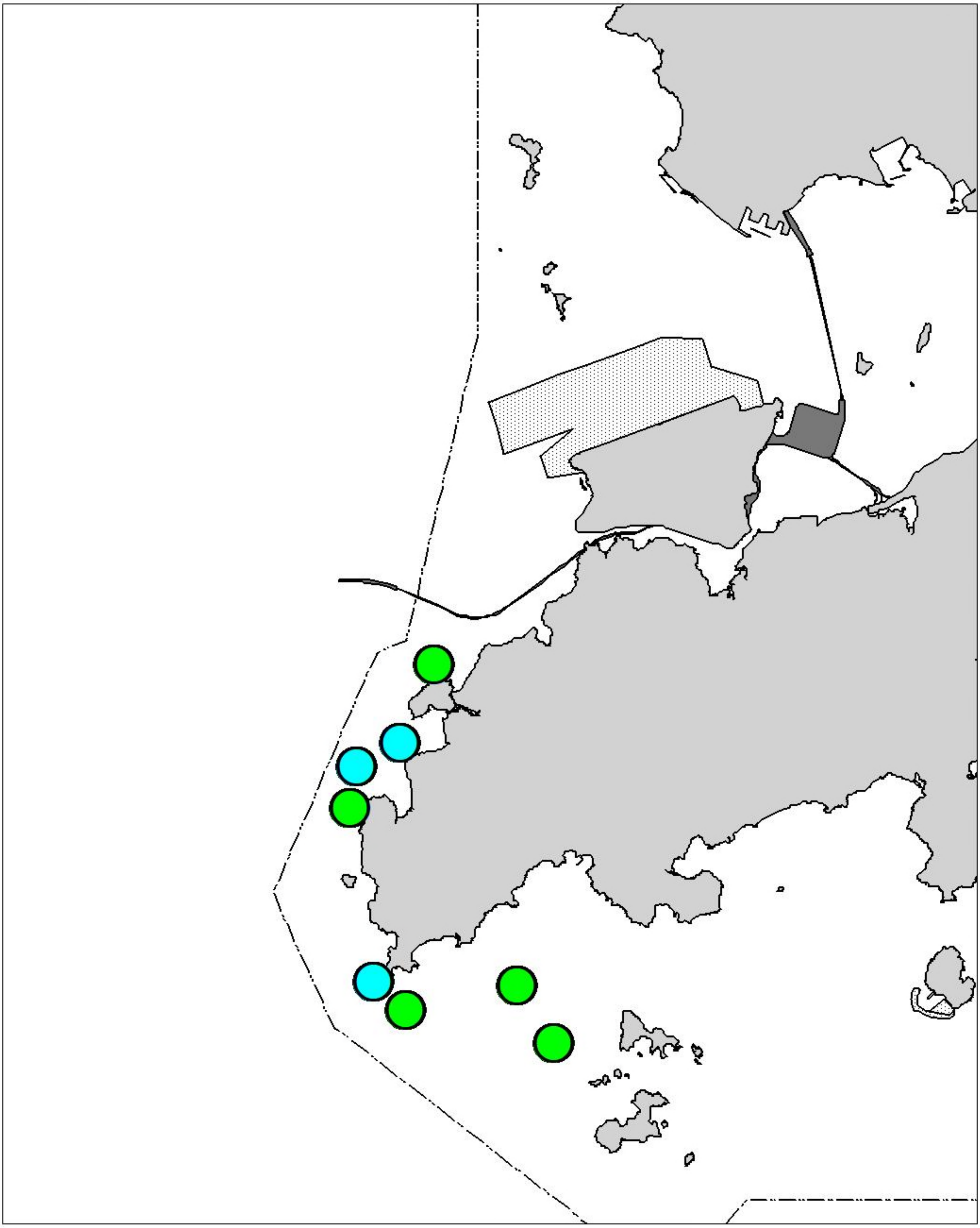


Figure 32. Distribution of dolphin sightings associated with fishing boats (blue dots: gill-netters; green dots: purse-seiners) in 2019

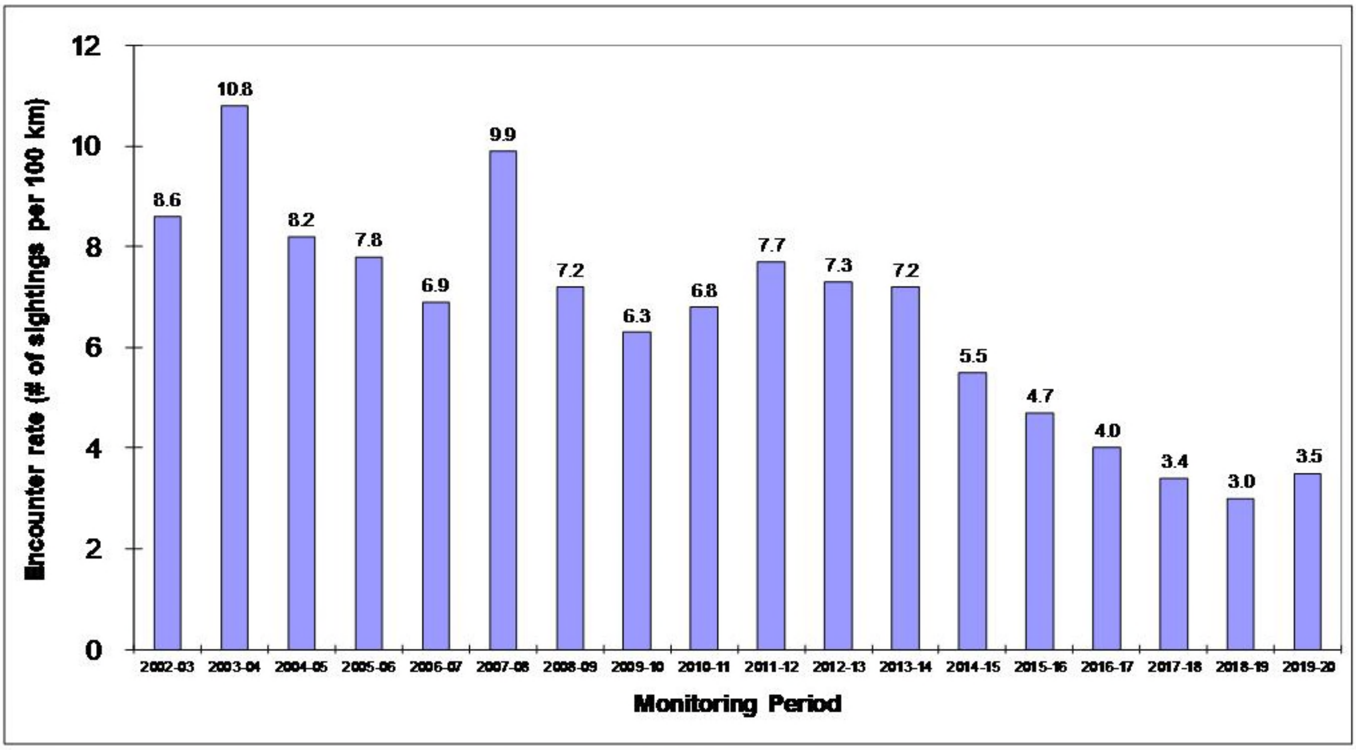



Figure 33a. Temporal trend in encounter rates of Chinese White Dolphins (combined from WL, NWL, NEL and SWL survey areas) in the past 18 monitoring periods from 2002-20

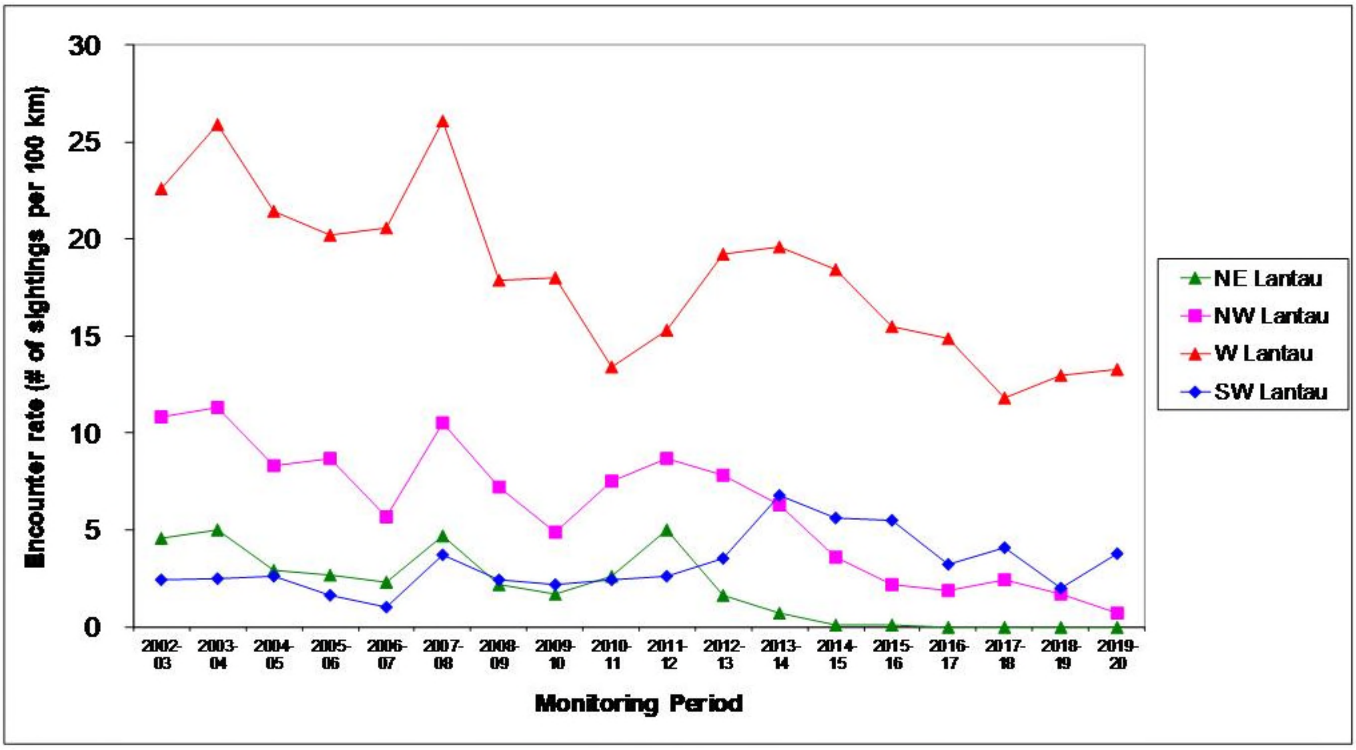



Figure 33b. Temporal trend in encounter rates of Chinese White Dolphins in each of the survey areas in WL, NWL, NEL and SWL waters in the past 18 monitoring periods from 2002-20

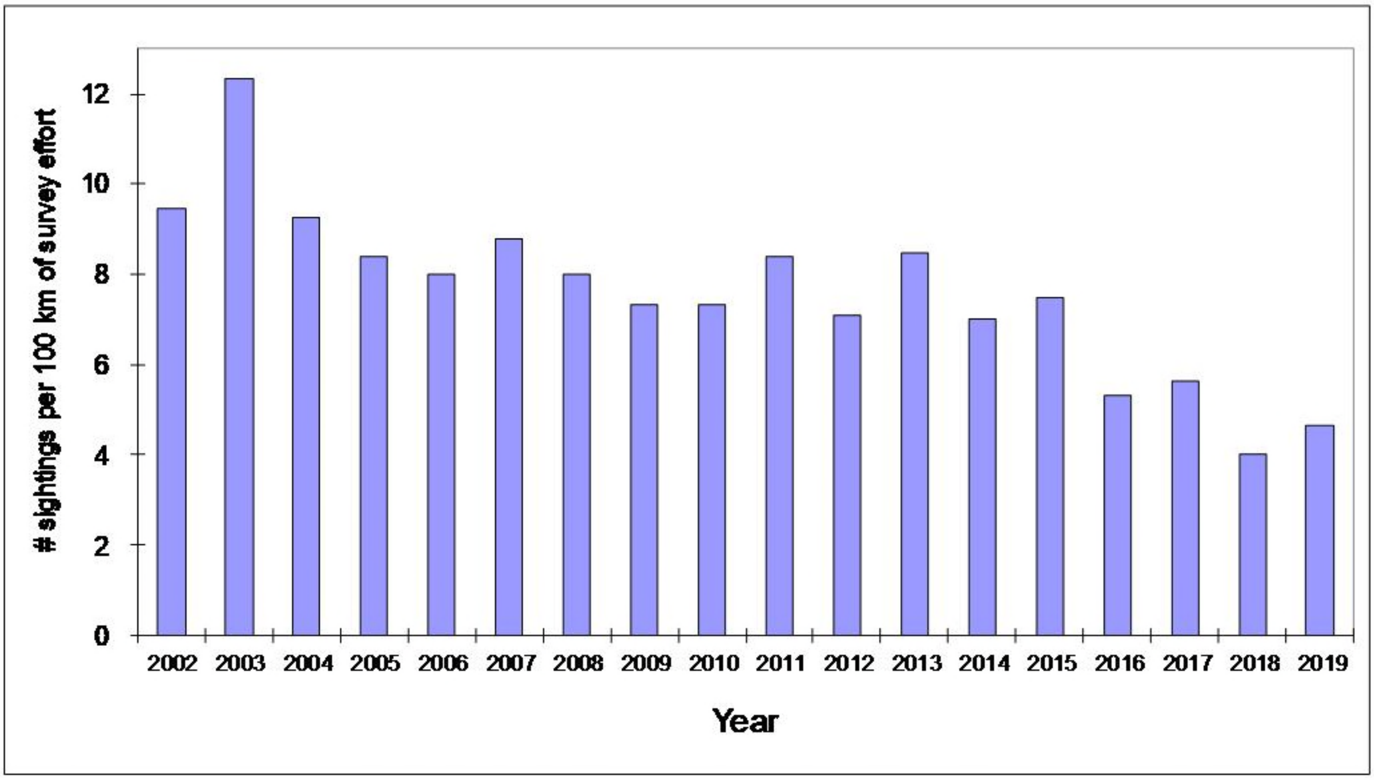



Figure 34a. Temporal trends in combined annual dolphin encounter rates from four survey areas in NEL, NWL, WL and SWL

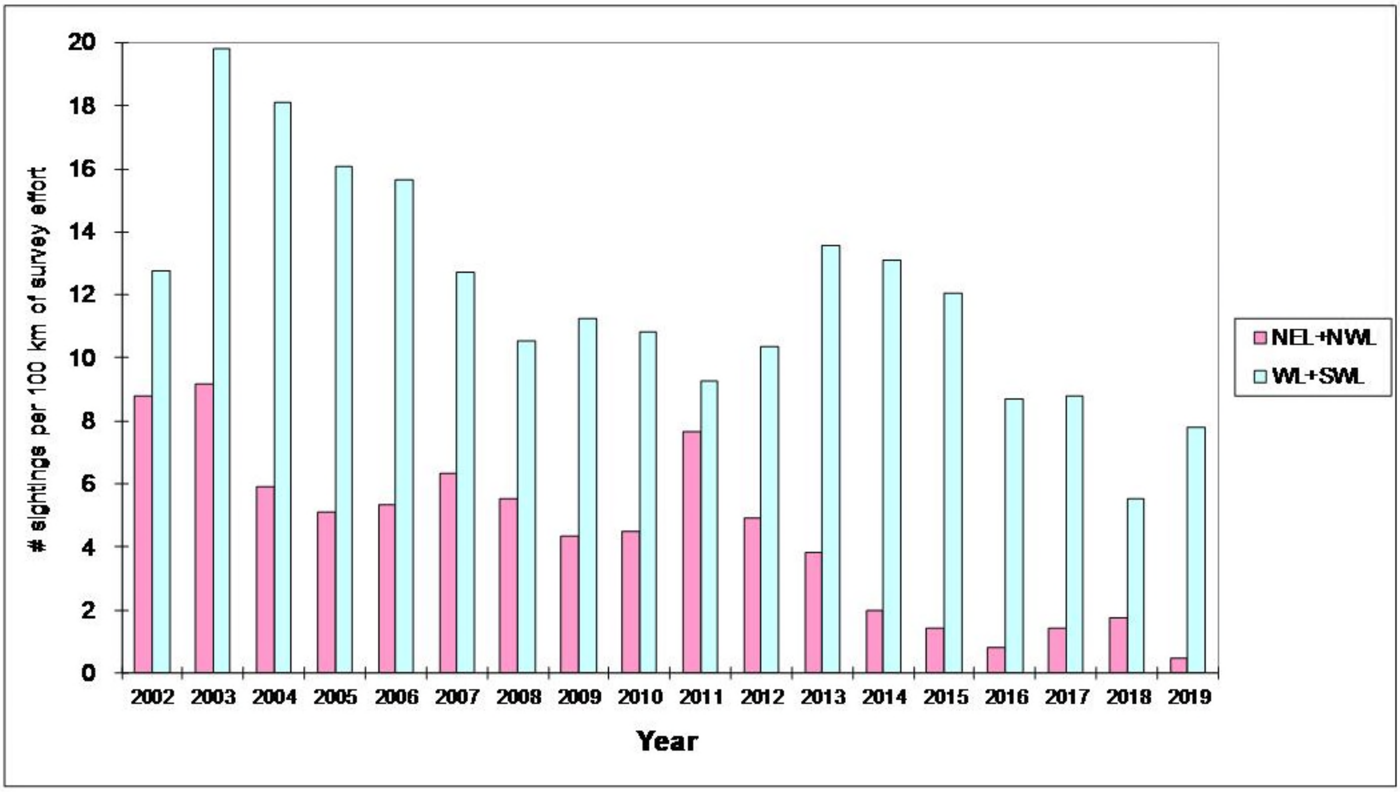



Figure 34b. Temporal trends in annual dolphin encounter rates in North Lantau and West/Southwest Lantau regions

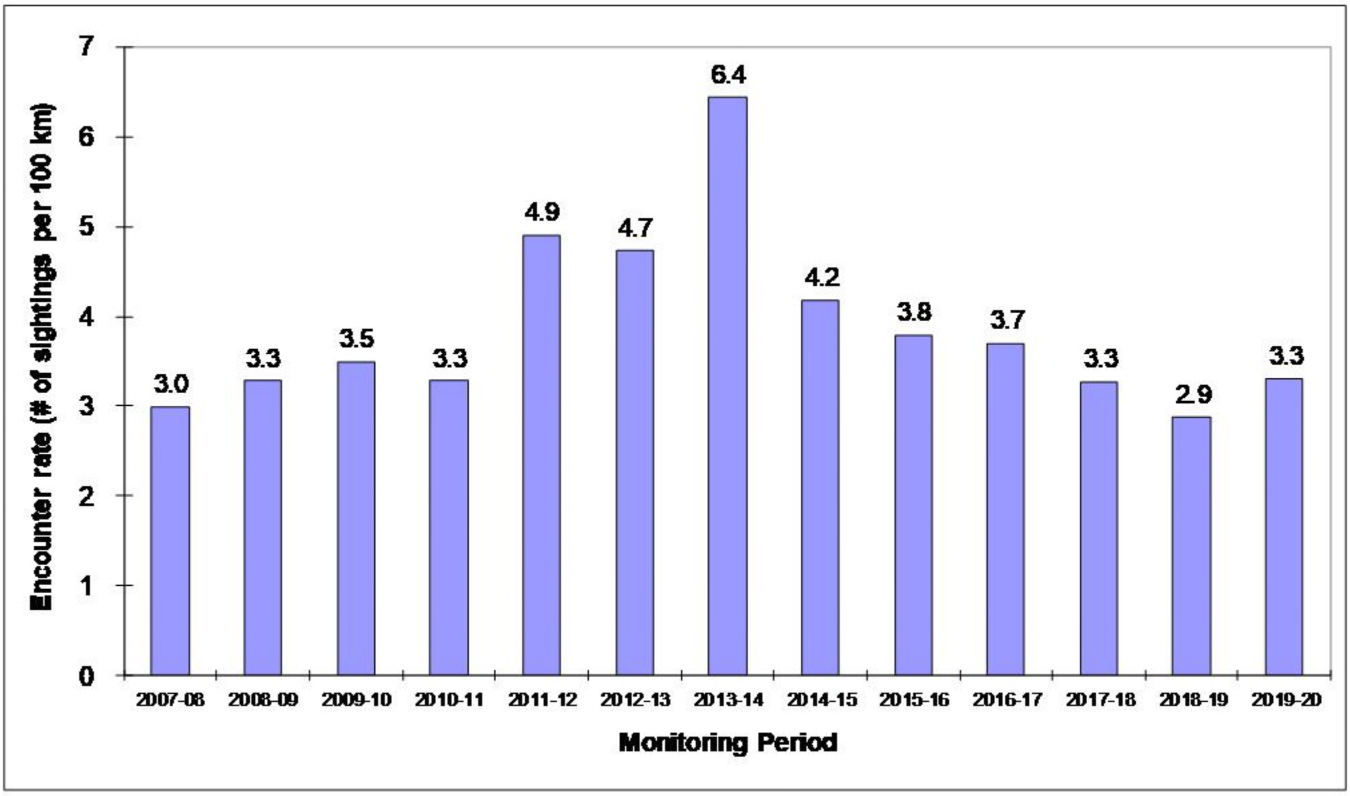



Figure 35. Temporal trend in encounter rates of finless porpoises (combined from SWL, SEL, LM and PT survey areas) in the past twelve monitoring periods from 2007-20

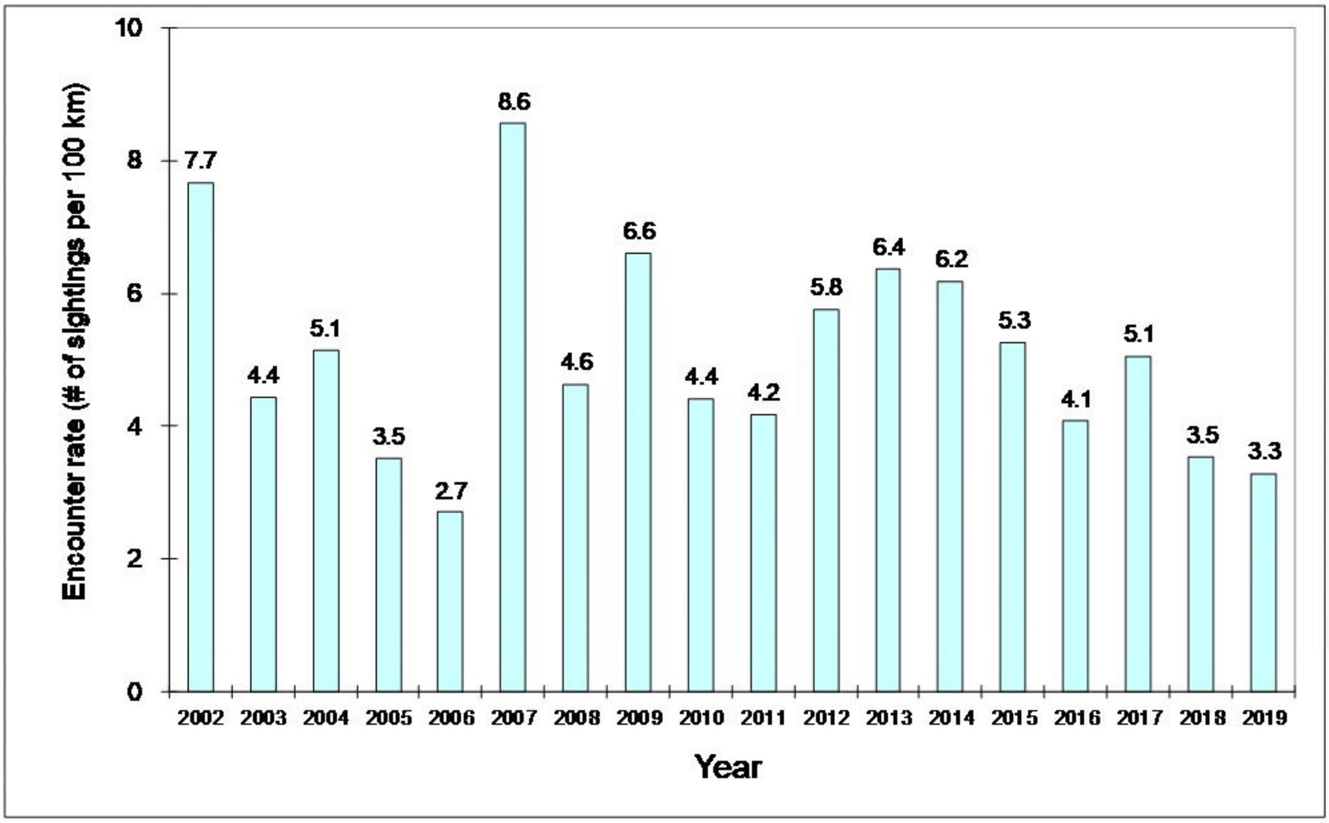



Figure 36a. Temporal trend of annual encounter rates of finless porpoises (combined from SWL, SEL, LM and PT survey areas) from 2002-19

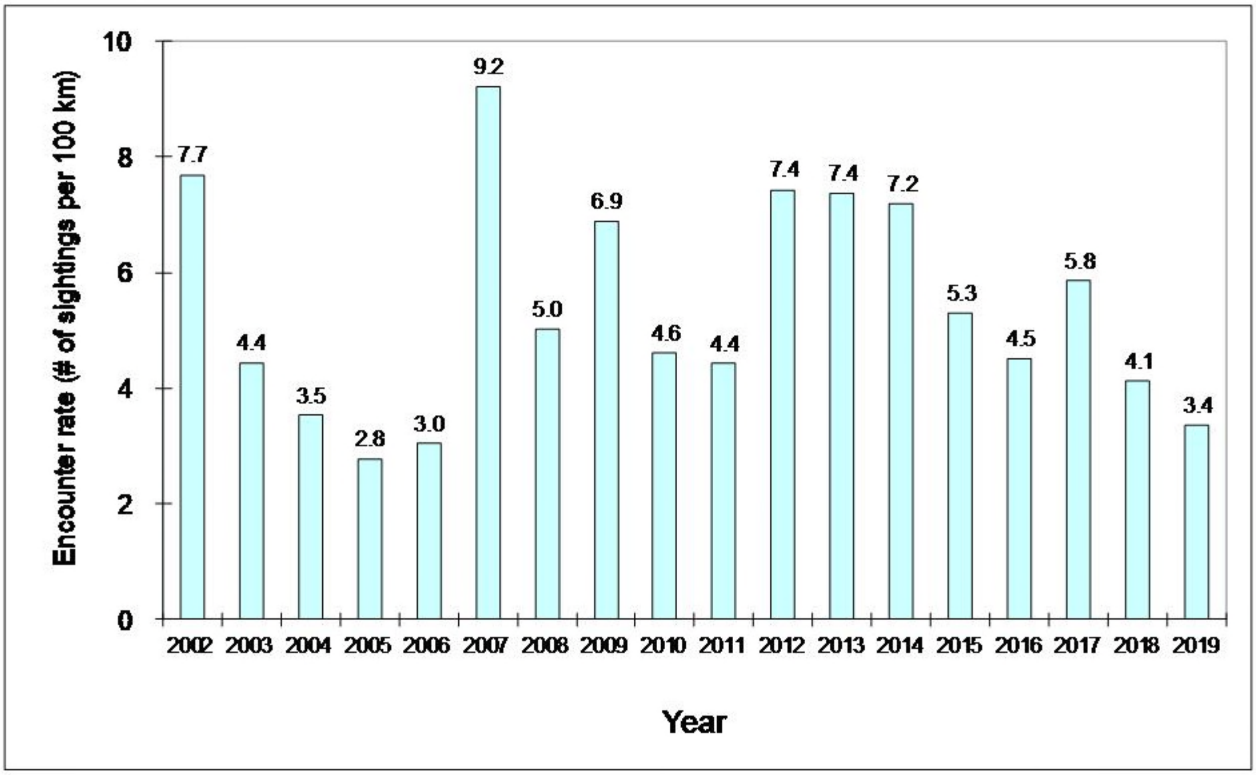



Figure 36b. Temporal trend of porpoise encounter rates in South Lantau and Lamma waters combined from winter/spring months of 2002-19

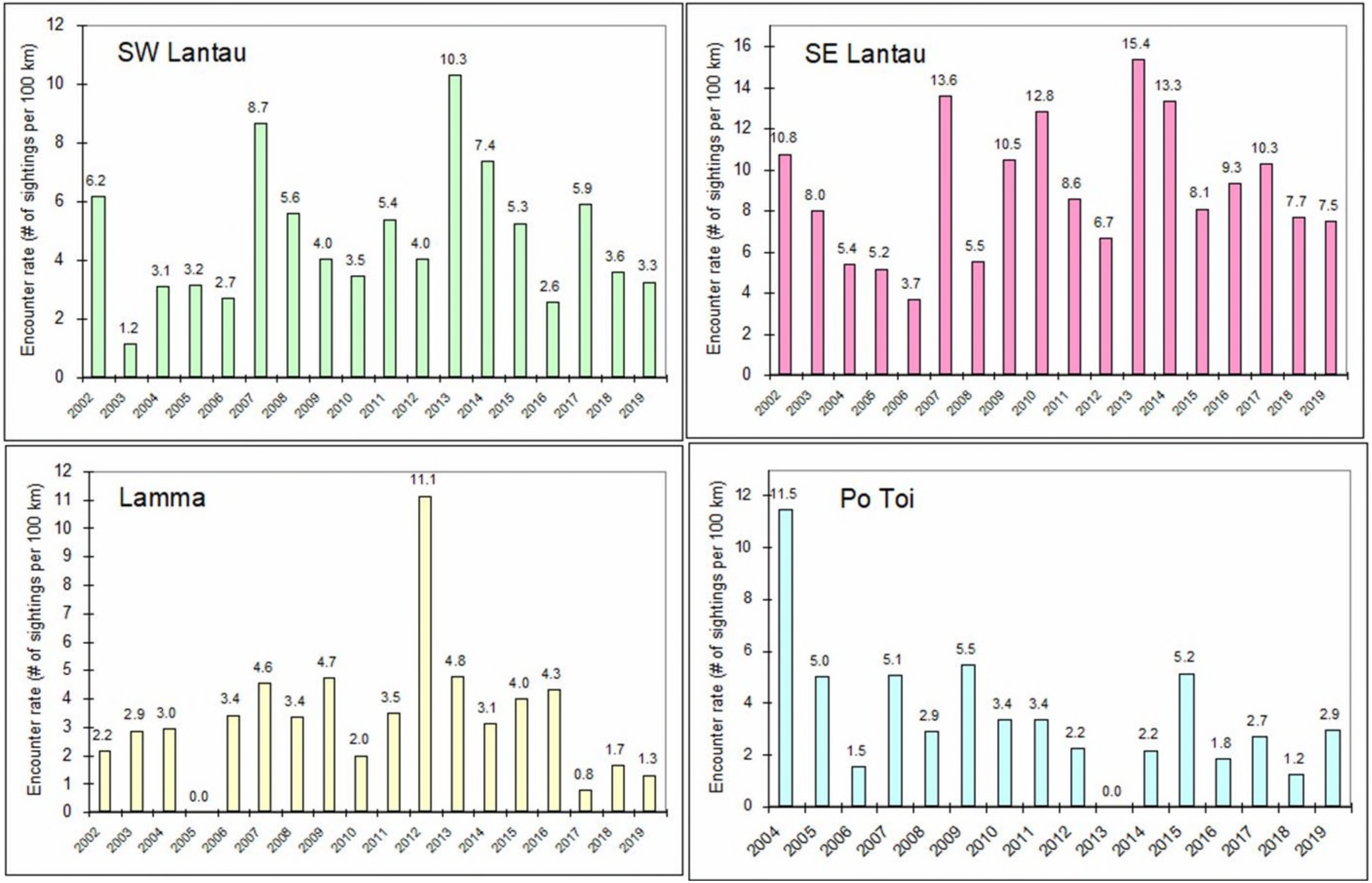



Figure 37. Temporal trends in annual encounter rates of finless porpoises among different survey areas

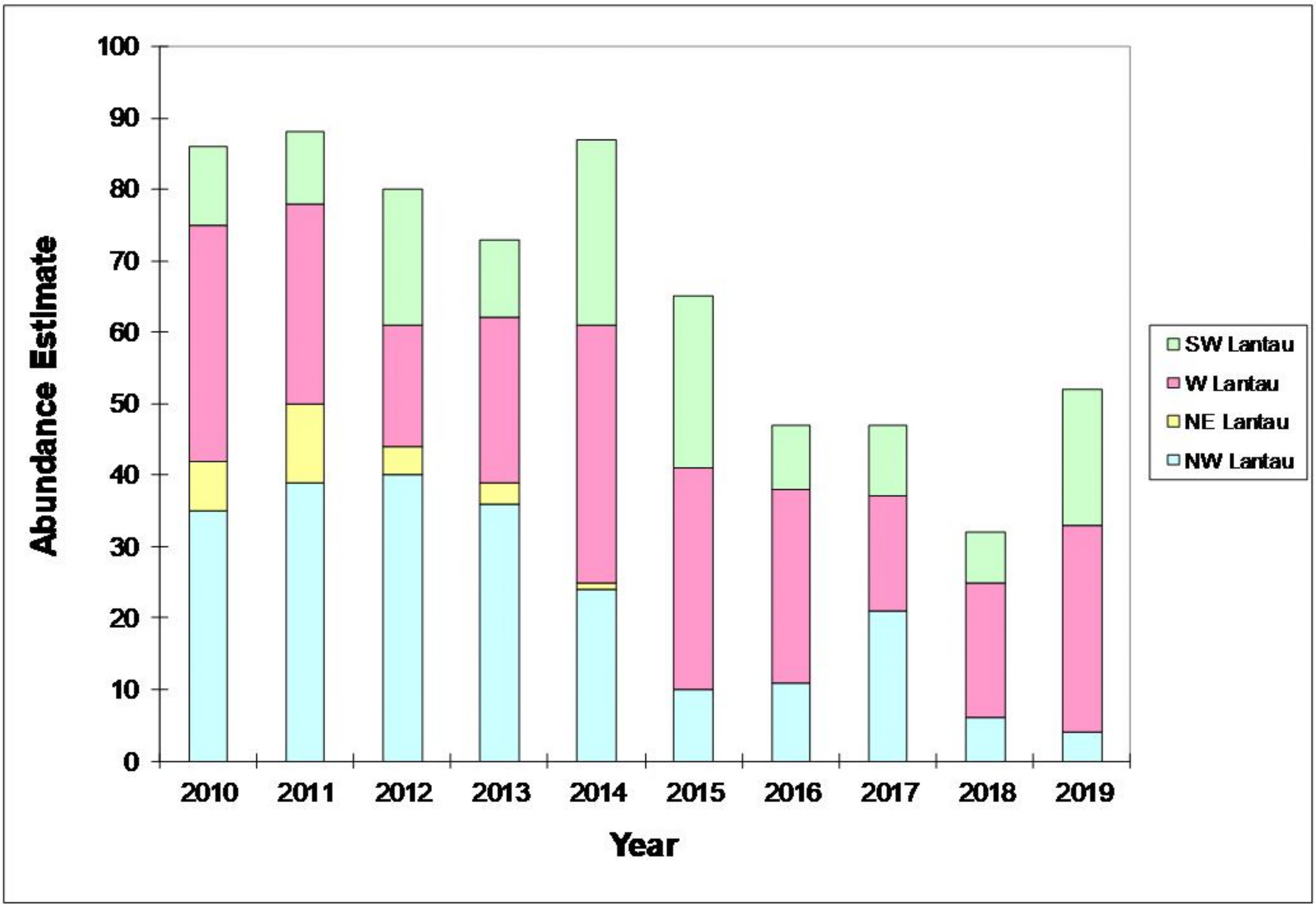



Figure 38. Temporal trends in combined abundance estimates of Chinese White Dolphins in Southwest, West, Northwest & Northeast Lantau from 2010-19

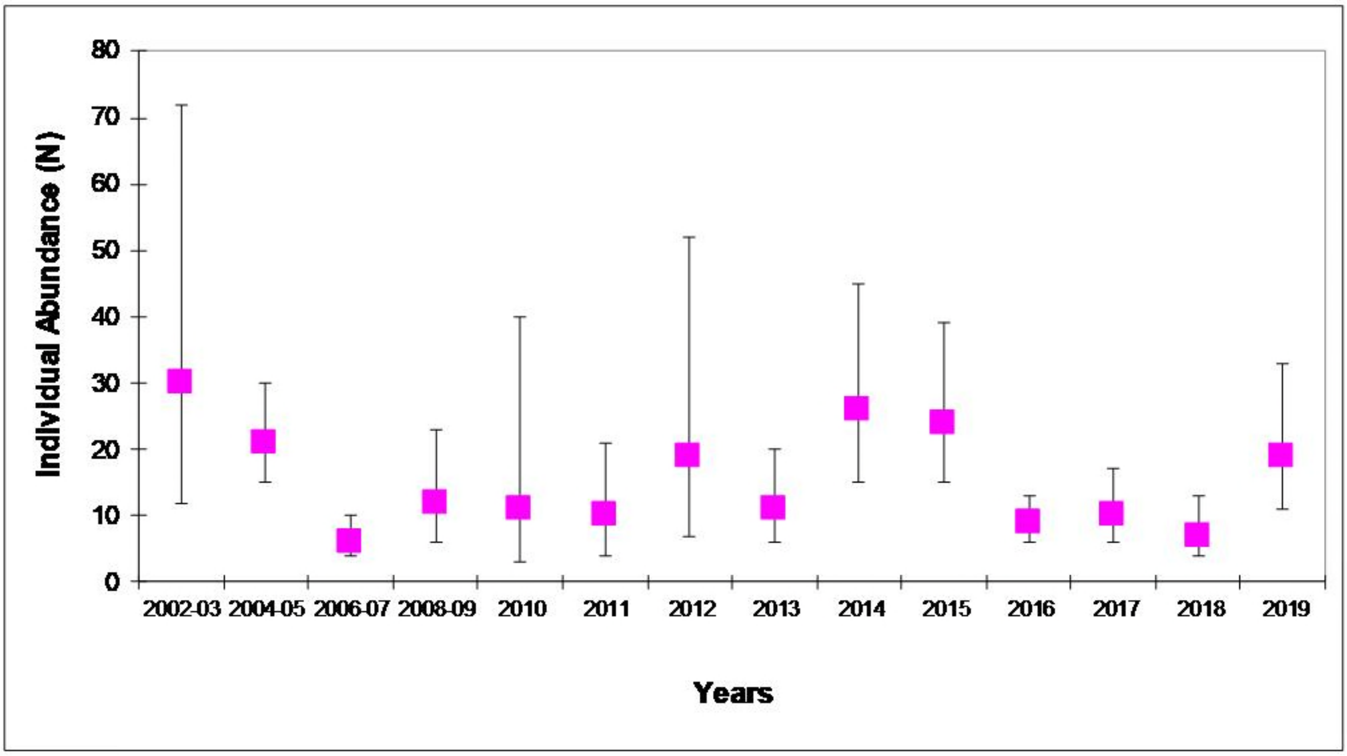



Figure 39. Temporal trend in abundance estimates of Chinese White Dolphins in Southwest Lantau from 2002-19 (error bars: 95% confidence interval of abundance estimates)

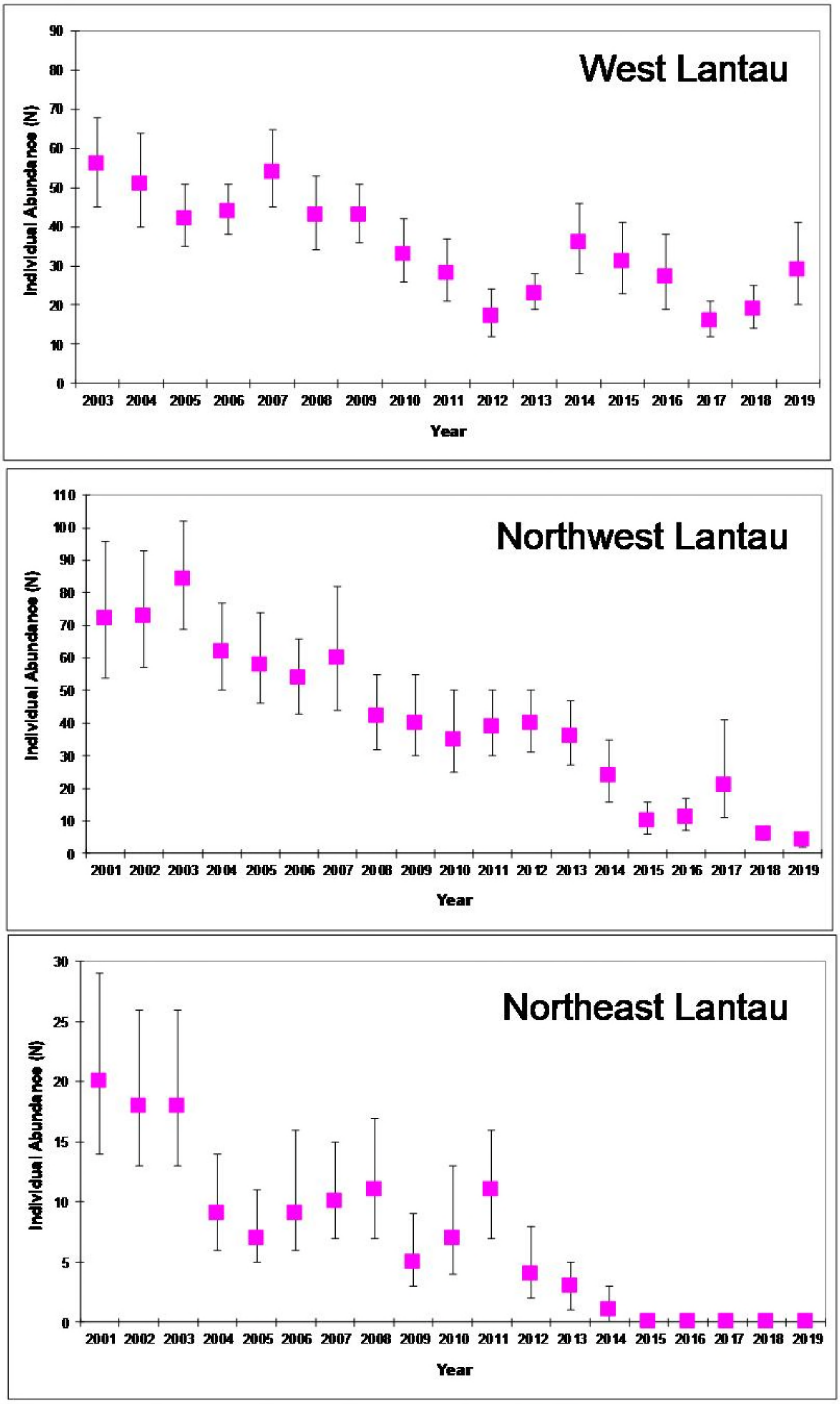



Figure 40. Temporal trends in annual abundance estimates of Chinese White Dolphins in WL, NWL & NEL from 2001-19 (error bars: 95% confidence interval of abundance estimates)

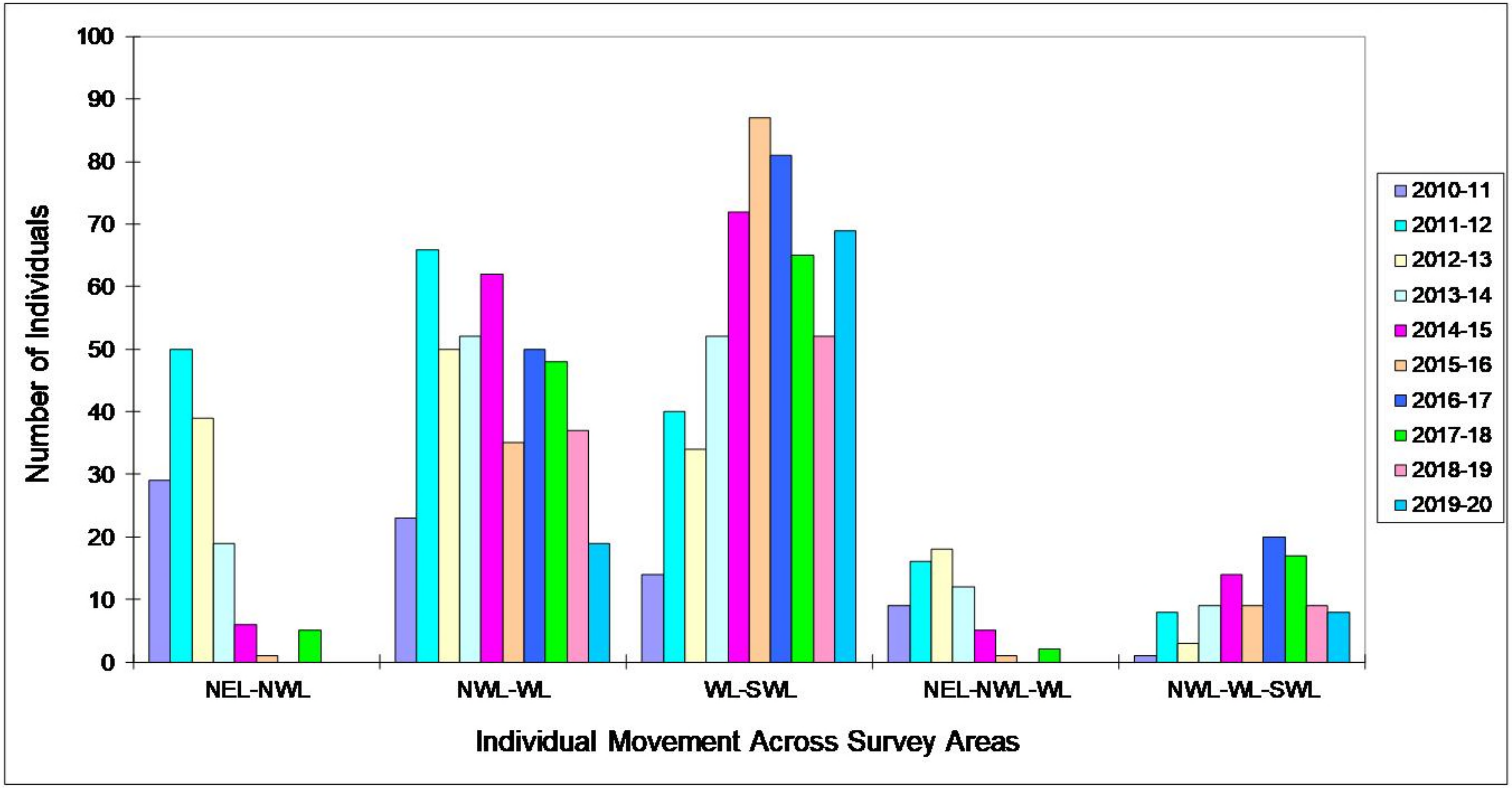



Figure 41. Temporal trends in number of individual dolphins involved in movements across different survey areas around Lantau in the past 10 monitoring periods

## Appendix I. HKCRP-AFCD Survey Effort Database (April 2019 - March 2020)

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

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 2-Apr-19 | NW LANTAU | 2 | 4.19 | SPRING | STANDARD36826 | P |
| 2-Apr-19 | NW LANTAU | 3 | 19.44 | SPRING | STANDARD36826 | P |
| 2-Apr-19 | NW LANTAU | 2 | 2.17 | SPRING | STANDARD36826 | S |
| 2-Apr-19 | NW LANTAU | 3 | 10.18 | SPRING | STANDARD36826 | S |
| 2-Apr-19 | DEEP BAY | 1 | 0.83 | SPRING | STANDARD36826 | P |
| 2-Apr-19 | DEEP BAY | 2 | 11.46 | SPRING | STANDARD36826 | P |
| 2-Apr-19 | DEEP BAY | 2 | 6.91 | SPRING | STANDARD36826 | S |
| 2-Apr-19 | NE LANTAU | 2 | 9.44 | SPRING | STANDARD36826 | P |
| 2-Apr-19 | NE LANTAU | 3 | 8.13 | SPRING | STANDARD36826 | P |
| 2-Apr-19 | NE LANTAU | 2 | 5.70 | SPRING | STANDARD36826 | S |
| 2-Apr-19 | NE LANTAU | 3 | 5.33 | SPRING | STANDARD36826 | S |
| 3-Apr-19 | SW LANTAU | 3 | 13.00 | SPRING | STANDARD36826 | P |
| 3-Apr-19 | SW LANTAU | 4 | 1.15 | SPRING | STANDARD36826 | P |
| 3-Apr-19 | SW LANTAU | 2 | 2.70 | SPRING | STANDARD36826 | S |
| 3-Apr-19 | SW LANTAU | 3 | 6.06 | SPRING | STANDARD36826 | S |
| 3-Apr-19 | SW LANTAU | 4 | 2.39 | SPRING | STANDARD36826 | S |
| 8-Apr-19 | LAMMA | 1 | 3.68 | SPRING | STANDARD36826 | P |
| 8-Apr-19 | LAMMA | 2 | 38.26 | SPRING | STANDARD36826 | P |
| 8-Apr-19 | LAMMA | 2 | 10.22 | SPRING | STANDARD36826 | S |
| 8-Apr-19 | SE LANTAU | 1 | 5.00 | SPRING | STANDARD36826 | P |
| 8-Apr-19 | SE LANTAU | 2 | 19.86 | SPRING | STANDARD36826 | P |
| 8-Apr-19 | SE LANTAU | 2 | 6.74 | SPRING | STANDARD36826 | S |
| 11-Apr-19 | PO TOI | 2 | 53.10 | SPRING | STANDARD36826 | P |
| 11-Apr-19 | PO TOI | 3 | 2.70 | SPRING | STANDARD36826 | P |
| 11-Apr-19 | PO TOI | 1 | 1.50 | SPRING | STANDARD36826 | S |
| 11-Apr-19 | PO TOI | 2 | 4.60 | SPRING | STANDARD36826 | S |
| 11-Apr-19 | LAMMA | 1 | 7.89 | SPRING | STANDARD36826 | P |
| 11-Apr-19 | LAMMA | 2 | 19.59 | SPRING | STANDARD36826 | P |
| 11-Apr-19 | LAMMA | 1 | 3.73 | SPRING | STANDARD36826 | S |
| 11-Apr-19 | LAMMA | 2 | 5.79 | SPRING | STANDARD36826 | S |
| 15-Apr-19 | W LANTAU | 3 | 3.11 | SPRING | STANDARD36826 | P |
| 15-Apr-19 | W LANTAU | 4 | 4.81 | SPRING | STANDARD36826 | P |
| 15-Apr-19 | W LANTAU | 5 | 2.58 | SPRING | STANDARD36826 | P |
| 15-Apr-19 | W LANTAU | 2 | 2.00 | SPRING | STANDARD36826 | S |
| 15-Apr-19 | W LANTAU | 3 | 4.14 | SPRING | STANDARD36826 | S |
| 15-Apr-19 | W LANTAU | 4 | 3.96 | SPRING | STANDARD36826 | S |
| 17-Apr-19 | SE LANTAU | 1 | 4.87 | SPRING | STANDARD36826 | P |
| 17-Apr-19 | SE LANTAU | 2 | 25.85 | SPRING | STANDARD36826 | P |
| 17-Apr-19 | SE LANTAU | 2 | 6.89 | SPRING | STANDARD36826 | S |
| 17-Apr-19 | SW LANTAU | 1 | 4.89 | SPRING | STANDARD36826 | P |
| 17-Apr-19 | SW LANTAU | 2 | 17.84 | SPRING | STANDARD36826 | P |
| 17-Apr-19 | SW LANTAU | 2 | 8.29 | SPRING | STANDARD36826 | S |
| 24-Apr-19 | SW LANTAU | 1 | 1.48 | SPRING | STANDARD36826 | P |
| 24-Apr-19 | SW LANTAU | 2 | 9.83 | SPRING | STANDARD36826 | P |
| 24-Apr-19 | SW LANTAU | 1 | 3.50 | SPRING | STANDARD36826 | S |
| 24-Apr-19 | SW LANTAU | 2 | 2.39 | SPRING | STANDARD36826 | S |
| 25-Apr-19 | W LANTAU | 2 | 3.69 | SPRING | STANDARD36826 | S |
| 25-Apr-19 | W LANTAU | 3 | 5.85 | SPRING | STANDARD36826 | S |
| 25-Apr-19 | SW LANTAU | 2 | 11.93 | SPRING | STANDARD36826 | P |
| 25-Apr-19 | SW LANTAU | 2 | 4.37 | SPRING | STANDARD36826 | S |
| 29-Apr-19 | SE LANTAU | 2 | 12.81 | SPRING | STANDARD36826 | P |
| 29-Apr-19 | SE LANTAU | 3 | 14.55 | SPRING | STANDARD36826 | P |
| 29-Apr-19 | SE LANTAU | 2 | 6.40 | SPRING | STANDARD36826 | S |
| 29-Apr-19 | SE LANTAU | 3 | 4.04 | SPRING | STANDARD36826 | S |
| 29-Apr-19 | SW LANTAU | 2 | 0.60 | SPRING | STANDARD36826 | P |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 29-Apr-19 | SW LANTAU | 3 | 16.38 | SPRING | STANDARD36826 | P |
| 29-Apr-19 | SW LANTAU | 2 | 6.50 | SPRING | STANDARD36826 | S |
| 29-Apr-19 | SW LANTAU | 3 | 3.22 | SPRING | STANDARD36826 | S |
| 30-Apr-19 | NW LANTAU | 2 | 8.31 | SPRING | STANDARD36826 | P |
| 30-Apr-19 | NW LANTAU | 3 | 15.69 | SPRING | STANDARD36826 | P |
| 30-Apr-19 | NW LANTAU | 4 | 1.35 | SPRING | STANDARD36826 | P |
| 30-Apr-19 | NW LANTAU | 2 | 4.19 | SPRING | STANDARD36826 | S |
| 30-Apr-19 | NW LANTAU | 3 | 1.20 | SPRING | STANDARD36826 | S |
| 30-Apr-19 | NW LANTAU | 4 | 2.96 | SPRING | STANDARD36826 | S |
| 30-Apr-19 | DEEP BAY | 3 | 7.14 | SPRING | STANDARD36826 | P |
| 30-Apr-19 | DEEP BAY | 4 | 2.06 | SPRING | STANDARD36826 | P |
| 30-Apr-19 | DEEP BAY | 5 | 1.24 | SPRING | STANDARD36826 | P |
| 30-Apr-19 | DEEP BAY | 3 | 2.87 | SPRING | STANDARD36826 | S |
| 30-Apr-19 | DEEP BAY | 4 | 5.54 | SPRING | STANDARD36826 | S |
| 30-Apr-19 | NE LANTAU | 1 | 1.89 | SPRING | STANDARD36826 | P |
| 30-Apr-19 | NE LANTAU | 2 | 17.95 | SPRING | STANDARD36826 | P |
| 30-Apr-19 | NE LANTAU | 1 | 2.09 | SPRING | STANDARD36826 | S |
| 30-Apr-19 | NE LANTAU | 2 | 8.27 | SPRING | STANDARD36826 | S |
| 7-May-19 | W LANTAU | 2 | 4.66 | SPRING | STANDARD36826 | P |
| 7-May-19 | W LANTAU | 3 | 3.31 | SPRING | STANDARD36826 | P |
| 7-May-19 | W LANTAU | 2 | 5.56 | SPRING | STANDARD36826 | S |
| 7-May-19 | W LANTAU | 3 | 4.69 | SPRING | STANDARD36826 | S |
| 9-May-19 | SW LANTAU | 2 | 7.32 | SPRING | STANDARD36826 | P |
| 9-May-19 | SW LANTAU | 2 | 8.62 | SPRING | STANDARD36826 | S |
| 14-May-19 | W LANTAU | 1 | 1.53 | SPRING | STANDARD36826 | S |
| 14-May-19 | W LANTAU | 2 | 2.63 | SPRING | STANDARD36826 | S |
| 14-May-19 | W LANTAU | 3 | 3.86 | SPRING | STANDARD36826 | S |
| 14-May-19 | SW LANTAU | 2 | 18.68 | SPRING | STANDARD36826 | P |
| 14-May-19 | SW LANTAU | 2 | 9.82 | SPRING | STANDARD36826 | S |
| 14-May-19 | SE LANTAU | 1 | 1.00 | SPRING | STANDARD36826 | P |
| 14-May-19 | SE LANTAU | 2 | 13.11 | SPRING | STANDARD36826 | P |
| 14-May-19 | SE LANTAU | 1 | 2.06 | SPRING | STANDARD36826 | S |
| 14-May-19 | SE LANTAU | 2 | 5.63 | SPRING | STANDARD36826 | S |
| 15-May-19 | LAMMA | 1 | 0.30 | SPRING | STANDARD36826 | P |
| 15-May-19 | LAMMA | 2 | 70.57 | SPRING | STANDARD36826 | P |
| 15-May-19 | LAMMA | 3 | 9.60 | SPRING | STANDARD36826 | P |
| 15-May-19 | LAMMA | 1 | 4.50 | SPRING | STANDARD36826 | S |
| 15-May-19 | LAMMA | 2 | 18.33 | SPRING | STANDARD36826 | S |
| 15-May-19 | LAMMA | 3 | 0.70 | SPRING | STANDARD36826 | S |
| 16-May-19 | SW LANTAU | 2 | 5.72 | SPRING | STANDARD36826 | P |
| 16-May-19 | SW LANTAU | 3 | 0.55 | SPRING | STANDARD36826 | P |
| 16-May-19 | SW LANTAU | 2 | 6.15 | SPRING | STANDARD36826 | S |
| 16-May-19 | SW LANTAU | 3 | 0.90 | SPRING | STANDARD36826 | S |
| 22-May-19 | NW LANTAU | 1 | 4.10 | SPRING | STANDARD36826 | P |
| 22-May-19 | NW LANTAU | 2 | 18.16 | SPRING | STANDARD36826 | P |
| 22-May-19 | NW LANTAU | 3 | 4.25 | SPRING | STANDARD36826 | P |
| 22-May-19 | NW LANTAU | 2 | 7.49 | SPRING | STANDARD36826 | S |
| 22-May-19 | DEEP BAY | 2 | 8.47 | SPRING | STANDARD36826 | P |
| 22-May-19 | DEEP BAY | 3 | 1.80 | SPRING | STANDARD36826 | P |
| 22-May-19 | DEEP BAY | 2 | 11.23 | SPRING | STANDARD36826 | S |
| 22-May-19 | NE LANTAU | 2 | 14.96 | SPRING | STANDARD36826 | P |
| 22-May-19 | NE LANTAU | 3 | 10.01 | SPRING | STANDARD36826 | P |
| 22-May-19 | NE LANTAU | 2 | 11.13 | SPRING | STANDARD36826 | S |
| 22-May-19 | NE LANTAU | 3 | 1.10 | SPRING | STANDARD36826 | S |
| 23-May-19 | W LANTAU | 2 | 3.77 | SPRING | STANDARD36826 | P |
| 23-May-19 | W LANTAU | 3 | 3.08 | SPRING | STANDARD36826 | P |
| 23-May-19 | W LANTAU | 2 | 5.33 | SPRING | STANDARD36826 | S |
| 23-May-19 | W LANTAU | 3 | 3.36 | SPRING | STANDARD36826 | S |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 28-May-19 | PO TOI | 1 | 7.56 | SPRING | STANDARD36826 | P |
| 28-May-19 | PO TOI | 2 | 23.59 | SPRING | STANDARD36826 | P |
| 28-May-19 | PO TOI | 3 | 5.52 | SPRING | STANDARD36826 | P |
| 28-May-19 | PO TOI | 2 | 6.11 | SPRING | STANDARD36826 | S |
| 28-May-19 | PO TOI | 3 | 3.23 | SPRING | STANDARD36826 | S |
| 28-May-19 | LAMMA | 1 | 5.15 | SPRING | STANDARD36826 | P |
| 28-May-19 | LAMMA | 2 | 19.54 | SPRING | STANDARD36826 | P |
| 28-May-19 | LAMMA | 1 | 4.69 | SPRING | STANDARD36826 | S |
| 28-May-19 | LAMMA | 2 | 7.42 | SPRING | STANDARD36826 | S |
| 30-May-19 | NW LANTAU | 2 | 3.54 | SPRING | STANDARD36826 | P |
| 30-May-19 | NW LANTAU | 3 | 25.68 | SPRING | STANDARD36826 | P |
| 30-May-19 | NW LANTAU | 4 | 5.27 | SPRING | STANDARD36826 | P |
| 30-May-19 | NW LANTAU | 3 | 12.31 | SPRING | STANDARD36826 | S |
| 30-May-19 | DEEP BAY | 2 | 10.41 | SPRING | STANDARD36826 | P |
| 30-May-19 | DEEP BAY | 2 | 8.59 | SPRING | STANDARD36826 | S |
| 30-May-19 | NE LANTAU | 2 | 3.41 | SPRING | STANDARD36826 | P |
| 30-May-19 | NE LANTAU | 3 | 9.65 | SPRING | STANDARD36826 | P |
| 30-May-19 | NE LANTAU | 2 | 2.70 | SPRING | STANDARD36826 | S |
| 30-May-19 | NE LANTAU | 3 | 3.04 | SPRING | STANDARD36826 | S |
| 4-Jun-19 | SE LANTAU | 1 | 6.15 | SUMMER | STANDARD36826 | P |
| 4-Jun-19 | SE LANTAU | 2 | 13.06 | SUMMER | STANDARD36826 | P |
| 4-Jun-19 | SE LANTAU | 1 | 4.53 | SUMMER | STANDARD36826 | S |
| 4-Jun-19 | SE LANTAU | 2 | 6.45 | SUMMER | STANDARD36826 | S |
| 5-Jun-19 | W LANTAU | 2 | 5.82 | SUMMER | STANDARD36826 | S |
| 5-Jun-19 | W LANTAU | 3 | 4.36 | SUMMER | STANDARD36826 | S |
| 5-Jun-19 | SW LANTAU | 2 | 13.31 | SUMMER | STANDARD36826 | P |
| 5-Jun-19 | SW LANTAU | 3 | 13.40 | SUMMER | STANDARD36826 | P |
| 5-Jun-19 | SW LANTAU | 4 | 1.30 | SUMMER | STANDARD36826 | P |
| 5-Jun-19 | SW LANTAU | 2 | 8.29 | SUMMER | STANDARD36826 | S |
| 5-Jun-19 | SW LANTAU | 3 | 3.70 | SUMMER | STANDARD36826 | S |
| 5-Jun-19 | SE LANTAU | 2 | 17.93 | SUMMER | STANDARD36826 | P |
| 5-Jun-19 | SE LANTAU | 3 | 8.50 | SUMMER | STANDARD36826 | P |
| 5-Jun-19 | SE LANTAU | 2 | 4.17 | SUMMER | STANDARD36826 | S |
| 5-Jun-19 | SE LANTAU | 3 | 3.00 | SUMMER | STANDARD36826 | S |
| 6-Jun-19 | W LANTAU | 2 | 0.56 | SUMMER | STANDARD36826 | P |
| 6-Jun-19 | W LANTAU | 3 | 8.07 | SUMMER | STANDARD36826 | P |
| 6-Jun-19 | W LANTAU | 4 | 1.28 | SUMMER | STANDARD36826 | P |
| 6-Jun-19 | W LANTAU | 3 | 9.61 | SUMMER | STANDARD36826 | S |
| 6-Jun-19 | W LANTAU | 4 | 0.95 | SUMMER | STANDARD36826 | S |
| 11-Jun-19 | SE LANTAU | 1 | 17.12 | SUMMER | STANDARD36826 | P |
| 11-Jun-19 | SE LANTAU | 2 | 12.65 | SUMMER | STANDARD36826 | P |
| 11-Jun-19 | SE LANTAU | 1 | 2.48 | SUMMER | STANDARD36826 | S |
| 11-Jun-19 | SE LANTAU | 2 | 5.45 | SUMMER | STANDARD36826 | S |
| 11-Jun-19 | SW LANTAU | 1 | 11.01 | SUMMER | STANDARD36826 | P |
| 11-Jun-19 | SW LANTAU | 2 | 10.43 | SUMMER | STANDARD36826 | P |
| 11-Jun-19 | SW LANTAU | 2 | 7.60 | SUMMER | STANDARD36826 | S |
| 17-Jun-19 | W LANTAU | 2 | 5.58 | SUMMER | STANDARD36826 | S |
| 17-Jun-19 | W LANTAU | 3 | 4.49 | SUMMER | STANDARD36826 | S |
| 19-Jun-19 | PO TOI | 1 | 30.90 | SUMMER | STANDARD36826 | P |
| 19-Jun-19 | PO TOI | 2 | 33.09 | SUMMER | STANDARD36826 | P |
| 19-Jun-19 | PO TOI | 1 | 4.03 | SUMMER | STANDARD36826 | S |
| 19-Jun-19 | PO TOI | 2 | 14.02 | SUMMER | STANDARD36826 | S |
| 24-Jun-19 | W LANTAU | 3 | 12.10 | SUMMER | STANDARD36826 | S |
| 25-Jun-19 | NW LANTAU | 1 | 11.14 | SUMMER | STANDARD36826 | P |
| 25-Jun-19 | NW LANTAU | 2 | 7.14 | SUMMER | STANDARD36826 | P |
| 25-Jun-19 | NW LANTAU | 1 | 6.01 | SUMMER | STANDARD36826 | S |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 25-Jun-19 | DEEP BAY | 0 | 1.75 | SUMMER | STANDARD36826 | P |
| 25-Jun-19 | DEEP BAY | 1 | 7.75 | SUMMER | STANDARD36826 | P |
| 25-Jun-19 | DEEP BAY | 2 | 2.78 | SUMMER | STANDARD36826 | P |
| 25-Jun-19 | DEEP BAY | 0 | 1.53 | SUMMER | STANDARD36826 | S |
| 25-Jun-19 | DEEP BAY | 1 | 8.09 | SUMMER | STANDARD36826 | S |
| 25-Jun-19 | NE LANTAU | 2 | 19.85 | SUMMER | STANDARD36826 | P |
| 25-Jun-19 | NE LANTAU | 2 | 9.57 | SUMMER | STANDARD36826 | S |
| 10-Jul-19 | NW LANTAU | 2 | 11.33 | SUMMER | STANDARD36826 | P |
| 10-Jul-19 | NW LANTAU | 3 | 12.40 | SUMMER | STANDARD36826 | P |
| 10-Jul-19 | NW LANTAU | 4 | 1.43 | SUMMER | STANDARD36826 | P |
| 10-Jul-19 | NW LANTAU | 2 | 1.13 | SUMMER | STANDARD36826 | S |
| 10-Jul-19 | NW LANTAU | 3 | 5.29 | SUMMER | STANDARD36826 | S |
| 10-Jul-19 | DEEP BAY | 2 | 5.93 | SUMMER | STANDARD36826 | P |
| 10-Jul-19 | DEEP BAY | 3 | 4.61 | SUMMER | STANDARD36826 | P |
| 10-Jul-19 | DEEP BAY | 2 | 5.36 | SUMMER | STANDARD36826 | S |
| 10-Jul-19 | DEEP BAY | 3 | 3.80 | SUMMER | STANDARD36826 | S |
| 10-Jul-19 | NE LANTAU | 2 | 13.97 | SUMMER | STANDARD36826 | P |
| 10-Jul-19 | NE LANTAU | 2 | 10.23 | SUMMER | STANDARD36826 | S |
| 11-Jul-19 | SW LANTAU | 2 | 5.59 | SUMMER | STANDARD36826 | P |
| 11-Jul-19 | SW LANTAU | 3 | 14.41 | SUMMER | STANDARD36826 | P |
| 11-Jul-19 | SW LANTAU | 2 | 3.80 | SUMMER | STANDARD36826 | S |
| 11-Jul-19 | SW LANTAU | 3 | 5.09 | SUMMER | STANDARD36826 | S |
| 15-Jul-19 | W LANTAU | 2 | 1.95 | SUMMER | STANDARD36826 | P |
| 15-Jul-19 | W LANTAU | 3 | 6.80 | SUMMER | STANDARD36826 | P |
| 15-Jul-19 | W LANTAU | 2 | 4.25 | SUMMER | STANDARD36826 | S |
| 15-Jul-19 | W LANTAU | 3 | 4.13 | SUMMER | STANDARD36826 | S |
| 15-Jul-19 | SW LANTAU | 2 | 14.83 | SUMMER | STANDARD36826 | P |
| 15-Jul-19 | SW LANTAU | 2 | 11.50 | SUMMER | STANDARD36826 | S |
| 15-Jul-19 | SW LANTAU | 3 | 1.94 | SUMMER | STANDARD36826 | S |
| 16-Jul-19 | W LANTAU | 2 | 2.00 | SUMMER | STANDARD36826 | P |
| 16-Jul-19 | W LANTAU | 3 | 4.09 | SUMMER | STANDARD36826 | P |
| 16-Jul-19 | W LANTAU | 2 | 3.18 | SUMMER | STANDARD36826 | S |
| 16-Jul-19 | W LANTAU | 3 | 4.89 | SUMMER | STANDARD36826 | S |
| 16-Jul-19 | SW LANTAU | 2 | 9.68 | SUMMER | STANDARD36826 | S |
| 17-Jul-19 | NINEPINS | 0 | 0.94 | SUMMER | STANDARD36826 | P |
| 17-Jul-19 | NINEPINS | 1 | 21.80 | SUMMER | STANDARD36826 | P |
| 17-Jul-19 | NINEPINS | 2 | 43.47 | SUMMER | STANDARD36826 | P |
| 17-Jul-19 | NINEPINS | 2 | 7.55 | SUMMER | STANDARD36826 | S |
| 23-Jul-19 | W LANTAU | 1 | 1.65 | SUMMER | STANDARD36826 | S |
| 23-Jul-19 | W LANTAU | 2 | 6.28 | SUMMER | STANDARD36826 | S |
| 23-Jul-19 | W LANTAU | 3 | 0.88 | SUMMER | STANDARD36826 | S |
| 24-Jul-19 | W LANTAU | 2 | 1.39 | SUMMER | STANDARD36826 | P |
| 24-Jul-19 | W LANTAU | 3 | 7.55 | SUMMER | STANDARD36826 | P |
| 24-Jul-19 | W LANTAU | 2 | 0.88 | SUMMER | STANDARD36826 | S |
| 24-Jul-19 | W LANTAU | 3 | 7.67 | SUMMER | STANDARD36826 | S |
| 25-Jul-19 | PO TOI | 2 | 23.35 | SUMMER | STANDARD36826 | P |
| 25-Jul-19 | PO TOI | 3 | 29.20 | SUMMER | STANDARD36826 | P |
| 25-Jul-19 | PO TOI | 2 | 3.85 | SUMMER | STANDARD36826 | S |
| 25-Jul-19 | NINEPINS | 2 | 3.89 | SUMMER | STANDARD36826 | P |
| 25-Jul-19 | NINEPINS | 3 | 32.31 | SUMMER | STANDARD36826 | P |
| 25-Jul-19 | NINEPINS | 3 | 3.35 | SUMMER | STANDARD36826 | S |
| 29-Jul-19 | SE LANTAU | 2 | 29.91 | SUMMER | STANDARD36826 | P |
| 29-Jul-19 | SE LANTAU | 2 | 7.19 | SUMMER | STANDARD36826 | S |
| 29-Jul-19 | SW LANTAU | 2 | 15.91 | SUMMER | STANDARD36826 | P |
| 29-Jul-19 | SW LANTAU | 3 | 7.82 | SUMMER | STANDARD36826 | P |
| 29-Jul-19 | SW LANTAU | 2 | 3.50 | SUMMER | STANDARD36826 | S |
| 29-Jul-19 | SW LANTAU | 3 | 3.71 | SUMMER | STANDARD36826 | S |
| 6-Aug-19 | PO TOI | 0 | 3.70 | SUMMER | STANDARD36826 | P |
| 6-Aug-19 | PO TOI | 1 | 19.38 | SUMMER | STANDARD36826 | P |
| 6-Aug-19 | PO TOI | 2 | 36.50 | SUMMER | STANDARD36826 | P |
| 6-Aug-19 | PO TOI | 3 | 2.40 | SUMMER | STANDARD36826 | P |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 6-Aug-19 | PO TOI | 1 | 9.20 | SUMMER | STANDARD36826 | S |
| 6-Aug-19 | PO TOI | 2 | 6.32 | SUMMER | STANDARD36826 | S |
| 7-Aug-19 | SAI KUNG | 1 | 13.90 | SUMMER | STANDARD36826 | P |
| 7-Aug-19 | SAI KUNG | 2 | 40.70 | SUMMER | STANDARD36826 | P |
| 7-Aug-19 | SAI KUNG | 3 | 2.50 | SUMMER | STANDARD36826 | P |
| 7-Aug-19 | SAI KUNG | 1 | 4.40 | SUMMER | STANDARD36826 | S |
| 7-Aug-19 | SAI KUNG | 2 | 4.60 | SUMMER | STANDARD36826 | S |
| 14-Aug-19 | W LANTAU | 3 | 9.94 | SUMMER | STANDARD36826 | P |
| 14-Aug-19 | SW LANTAU | 2 | 5.23 | SUMMER | STANDARD36826 | P |
| 14-Aug-19 | SW LANTAU | 3 | 9.83 | SUMMER | STANDARD36826 | P |
| 14-Aug-19 | SW LANTAU | 2 | 1.88 | SUMMER | STANDARD36826 | S |
| 14-Aug-19 | SW LANTAU | 3 | 4.67 | SUMMER | STANDARD36826 | S |
| 15-Aug-19 | W LANTAU | 1 | 1.17 | SUMMER | STANDARD36826 | P |
| 15-Aug-19 | W LANTAU | 2 | 7.61 | SUMMER | STANDARD36826 | P |
| 15-Aug-19 | W LANTAU | 3 | 0.99 | SUMMER | STANDARD36826 | P |
| 15-Aug-19 | W LANTAU | 2 | 8.80 | SUMMER | STANDARD36826 | S |
| 15-Aug-19 | SW LANTAU | 1 | 3.14 | SUMMER | STANDARD36826 | P |
| 15-Aug-19 | SW LANTAU | 2 | 15.90 | SUMMER | STANDARD36826 | P |
| 15-Aug-19 | SW LANTAU | 3 | 9.76 | SUMMER | STANDARD36826 | P |
| 15-Aug-19 | SW LANTAU | 2 | 8.34 | SUMMER | STANDARD36826 | S |
| 15-Aug-19 | SW LANTAU | 3 | 2.20 | SUMMER | STANDARD36826 | S |
| 15-Aug-19 | SE LANTAU | 3 | 2.99 | SUMMER | STANDARD36826 | P |
| 15-Aug-19 | SE LANTAU | 4 | 1.11 | SUMMER | STANDARD36826 | P |
| 19-Aug-19 | NW LANTAU | 2 | 24.78 | SUMMER | STANDARD36826 | P |
| 19-Aug-19 | NW LANTAU | 2 | 8.32 | SUMMER | STANDARD36826 | S |
| 19-Aug-19 | DEEP BAY | 2 | 9.99 | SUMMER | STANDARD36826 | P |
| 19-Aug-19 | DEEP BAY | 2 | 7.21 | SUMMER | STANDARD36826 | S |
| 19-Aug-19 | NE LANTAU | 0 | 1.60 | SUMMER | STANDARD36826 | P |
| 19-Aug-19 | NE LANTAU | 1 | 2.80 | SUMMER | STANDARD36826 | P |
| 19-Aug-19 | NE LANTAU | 2 | 13.65 | SUMMER | STANDARD36826 | P |
| 19-Aug-19 | NE LANTAU | 3 | 2.60 | SUMMER | STANDARD36826 | P |
| 19-Aug-19 | NE LANTAU | 2 | 8.95 | SUMMER | STANDARD36826 | S |
| 19-Aug-19 | NE LANTAU | 3 | 1.50 | SUMMER | STANDARD36826 | S |
| 20-Aug-19 | W LANTAU | 2 | 4.33 | SUMMER | STANDARD36826 | P |
| 20-Aug-19 | W LANTAU | 3 | 2.13 | SUMMER | STANDARD36826 | P |
| 20-Aug-19 | W LANTAU | 2 | 4.95 | SUMMER | STANDARD36826 | S |
| 20-Aug-19 | W LANTAU | 3 | 3.71 | SUMMER | STANDARD36826 | S |
| 20-Aug-19 | W LANTAU | 4 | 1.77 | SUMMER | STANDARD36826 | S |
| 22-Aug-19 | PO TOI | 0 | 3.70 | SUMMER | STANDARD36826 | P |
| 22-Aug-19 | PO TOI | 1 | 26.10 | SUMMER | STANDARD36826 | P |
| 22-Aug-19 | PO TOI | 2 | 19.66 | SUMMER | STANDARD36826 | P |
| 22-Aug-19 | PO TOI | 1 | 4.67 | SUMMER | STANDARD36826 | S |
| 22-Aug-19 | PO TOI | 2 | 2.37 | SUMMER | STANDARD36826 | S |
| 22-Aug-19 | NINEPINS | 1 | 10.90 | SUMMER | STANDARD36826 | P |
| 22-Aug-19 | NINEPINS | 2 | 15.30 | SUMMER | STANDARD36826 | P |
| 22-Aug-19 | NINEPINS | 2 | 4.30 | SUMMER | STANDARD36826 | S |
| 27-Aug-19 | NINEPINS | 2 | 49.49 | SUMMER | STANDARD138716 | P |
| 27-Aug-19 | NINEPINS | 3 | 28.11 | SUMMER | STANDARD138716 | P |
| 27-Aug-19 | NINEPINS | 2 | 6.20 | SUMMER | STANDARD138716 | S |
| 27-Aug-19 | NINEPINS | 3 | 2.20 | SUMMER | STANDARD138716 | S |
| 28-Aug-19 | SE LANTAU | 1 | 11.99 | SUMMER | STANDARD36826 | P |
| 28-Aug-19 | SE LANTAU | 2 | 7.18 | SUMMER | STANDARD36826 | P |
| 28-Aug-19 | SE LANTAU | 0 | 1.10 | SUMMER | STANDARD36826 | S |
| 28-Aug-19 | SE LANTAU | 1 | 4.90 | SUMMER | STANDARD36826 | S |
| 28-Aug-19 | SE LANTAU | 2 | 1.83 | SUMMER | STANDARD36826 | S |
| 29-Aug-19 | NE LANTAU | 3 | 13.11 | SUMMER | STANDARD36826 | P |
| 29-Aug-19 | NE LANTAU | 2 | 1.85 | SUMMER | STANDARD36826 | S |
| 29-Aug-19 | NE LANTAU | 3 | 3.34 | SUMMER | STANDARD36826 | S |
| 29-Aug-19 | NW LANTAU | 2 | 7.97 | SUMMER | STANDARD36826 | P |
| 29-Aug-19 | NW LANTAU | 3 | 14.47 | SUMMER | STANDARD36826 | P |
| 29-Aug-19 | NW LANTAU | 4 | 4.81 | SUMMER | STANDARD36826 | P |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 29-Aug-19 | NW LANTAU | 2 | 2.14 | SUMMER | STANDARD36826 | S |
| 29-Aug-19 | NW LANTAU | 3 | 2.12 | SUMMER | STANDARD36826 | S |
| 29-Aug-19 | DEEP BAY | 2 | 6.63 | SUMMER | STANDARD36826 | P |
| 29-Aug-19 | DEEP BAY | 3 | 3.51 | SUMMER | STANDARD36826 | P |
| 29-Aug-19 | DEEP BAY | 2 | 5.76 | SUMMER | STANDARD36826 | S |
| 9-Sep-19 | PO TOI | 0 | 2.43 | AUTUMN | STANDARD36826 | P |
| 9-Sep-19 | PO TOI | 1 | 21.37 | AUTUMN | STANDARD36826 | P |
| 9-Sep-19 | PO TOI | 2 | 58.40 | AUTUMN | STANDARD36826 | P |
| 9-Sep-19 | PO TOI | 1 | 3.20 | AUTUMN | STANDARD36826 | S |
| 9-Sep-19 | PO TOI | 2 | 8.10 | AUTUMN | STANDARD36826 | S |
| 11-Sep-19 | W LANTAU | 2 | 2.43 | AUTUMN | STANDARD36826 | P |
| 11-Sep-19 | W LANTAU | 3 | 5.27 | AUTUMN | STANDARD36826 | P |
| 11-Sep-19 | W LANTAU | 2 | 4.55 | AUTUMN | STANDARD36826 | S |
| 11-Sep-19 | W LANTAU | 3 | 4.20 | AUTUMN | STANDARD36826 | S |
| 12-Sep-19 | W LANTAU | 2 | 10.08 | AUTUMN | STANDARD36826 | S |
| 16-Sep-19 | SE LANTAU | 1 | 3.52 | AUTUMN | STANDARD36826 | P |
| 16-Sep-19 | SE LANTAU | 2 | 19.95 | AUTUMN | STANDARD36826 | P |
| 16-Sep-19 | SE LANTAU | 3 | 3.65 | AUTUMN | STANDARD36826 | P |
| 16-Sep-19 | SE LANTAU | 1 | 3.58 | AUTUMN | STANDARD36826 | S |
| 16-Sep-19 | SE LANTAU | 2 | 6.49 | AUTUMN | STANDARD36826 | S |
| 16-Sep-19 | SW LANTAU | 3 | 14.65 | AUTUMN | STANDARD36826 | P |
| 16-Sep-19 | SW LANTAU | 4 | 5.95 | AUTUMN | STANDARD36826 | P |
| 16-Sep-19 | SW LANTAU | 3 | 7.80 | AUTUMN | STANDARD36826 | S |
| 16-Sep-19 | SW LANTAU | 4 | 2.90 | AUTUMN | STANDARD36826 | S |
| 17-Sep-19 | SW LANTAU | 2 | 3.29 | AUTUMN | STANDARD36826 | P |
| 17-Sep-19 | SW LANTAU | 3 | 10.20 | AUTUMN | STANDARD36826 | P |
| 17-Sep-19 | SW LANTAU | 4 | 2.68 | AUTUMN | STANDARD36826 | P |
| 17-Sep-19 | SW LANTAU | 2 | 1.40 | AUTUMN | STANDARD36826 | S |
| 17-Sep-19 | SW LANTAU | 3 | 4.93 | AUTUMN | STANDARD36826 | S |
| 17-Sep-19 | SW LANTAU | 4 | 1.60 | AUTUMN | STANDARD36826 | S |
| 19-Sep-19 | W LANTAU | 2 | 1.24 | AUTUMN | STANDARD36826 | S |
| 19-Sep-19 | W LANTAU | 3 | 11.48 | AUTUMN | STANDARD36826 | S |
| 19-Sep-19 | NE LANTAU | 2 | 16.02 | AUTUMN | STANDARD36826 | P |
| 19-Sep-19 | NE LANTAU | 2 | 6.43 | AUTUMN | STANDARD36826 | S |
| 24-Sep-19 | NW LANTAU | 1 | 2.38 | AUTUMN | STANDARD36826 | P |
| 24-Sep-19 | NW LANTAU | 2 | 24.54 | AUTUMN | STANDARD36826 | P |
| 24-Sep-19 | NW LANTAU | 3 | 8.92 | AUTUMN | STANDARD36826 | P |
| 24-Sep-19 | NW LANTAU | 1 | 0.67 | AUTUMN | STANDARD36826 | S |
| 24-Sep-19 | NW LANTAU | 2 | 10.39 | AUTUMN | STANDARD36826 | S |
| 24-Sep-19 | DEEP BAY | 2 | 10.26 | AUTUMN | STANDARD36826 | P |
| 24-Sep-19 | DEEP BAY | 2 | 6.34 | AUTUMN | STANDARD36826 | S |
| 24-Sep-19 | NE LANTAU | 1 | 0.60 | AUTUMN | STANDARD36826 | P |
| 24-Sep-19 | NE LANTAU | 2 | 16.83 | AUTUMN | STANDARD36826 | P |
| 24-Sep-19 | NE LANTAU | 1 | 1.00 | AUTUMN | STANDARD36826 | S |
| 24-Sep-19 | NE LANTAU | 2 | 5.37 | AUTUMN | STANDARD36826 | S |
| 24-Sep-19 | NE LANTAU | 3 | 3.60 | AUTUMN | STANDARD36826 | S |
| 25-Sep-19 | SW LANTAU | 2 | 11.26 | AUTUMN | STANDARD36826 | P |
| 25-Sep-19 | SW LANTAU | 2 | 8.23 | AUTUMN | STANDARD36826 | S |
| 2-Oct-19 | SW LANTAU | 2 | 14.56 | AUTUMN | STANDARD36826 | P |
| 2-Oct-19 | SW LANTAU | 3 | 8.76 | AUTUMN | STANDARD36826 | P |
| 2-Oct-19 | SW LANTAU | 2 | 8.05 | AUTUMN | STANDARD36826 | S |
| 2-Oct-19 | SW LANTAU | 3 | 0.63 | AUTUMN | STANDARD36826 | S |
| 9-Oct-19 | W LANTAU | 2 | 3.74 | AUTUMN | STANDARD138716 | P |
| 9-Oct-19 | W LANTAU | 3 | 4.02 | AUTUMN | STANDARD36826 | P |
| 9-Oct-19 | W LANTAU | 2 | 1.75 | AUTUMN | STANDARD36826 | S |
| 9-Oct-19 | W LANTAU | 3 | 5.79 | AUTUMN | STANDARD138716 | S |
| 9-Oct-19 | W LANTAU | 4 | 1.57 | AUTUMN | STANDARD36826 | S |
| 10-Oct-19 | W LANTAU | 2 | 9.66 | AUTUMN | STANDARD138716 | S |
| 14-Oct-19 | W LANTAU | 2 | 11.98 | AUTUMN | STANDARD36826 | P |
| 14-Oct-19 | W LANTAU | 3 | 1.06 | AUTUMN | STANDARD36826 | P |
| 14-Oct-19 | W LANTAU | 2 | 9.55 | AUTUMN | STANDARD36826 | S |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 14-Oct-19 | W LANTAU | 3 | 2.15 | AUTUMN | STANDARD36826 | S |
| 15-Oct-19 | NW LANTAU | 2 | 2.50 | AUTUMN | STANDARD36826 | P |
| 15-Oct-19 | NW LANTAU | 3 | 29.70 | AUTUMN | STANDARD36826 | P |
| 15-Oct-19 | NW LANTAU | 2 | 3.62 | AUTUMN | STANDARD36826 | S |
| 15-Oct-19 | NW LANTAU | 3 | 5.48 | AUTUMN | STANDARD36826 | S |
| 15-Oct-19 | DEEP BAY | 2 | 3.78 | AUTUMN | STANDARD36826 | P |
| 15-Oct-19 | DEEP BAY | 3 | 6.17 | AUTUMN | STANDARD36826 | P |
| 15-Oct-19 | DEEP BAY | 2 | 5.28 | AUTUMN | STANDARD36826 | S |
| 15-Oct-19 | DEEP BAY | 3 | 3.57 | AUTUMN | STANDARD36826 | S |
| 15-Oct-19 | NE LANTAU | 2 | 3.15 | AUTUMN | STANDARD36826 | P |
| 15-Oct-19 | NE LANTAU | 3 | 12.38 | AUTUMN | STANDARD36826 | P |
| 15-Oct-19 | NE LANTAU | 2 | 3.79 | AUTUMN | STANDARD36826 | S |
| 15-Oct-19 | NE LANTAU | 3 | 6.28 | AUTUMN | STANDARD36826 | S |
| 16-Oct-19 | W LANTAU | 2 | 4.11 | AUTUMN | STANDARD36826 | S |
| 16-Oct-19 | W LANTAU | 3 | 6.69 | AUTUMN | STANDARD36826 | S |
| 16-Oct-19 | NE LANTAU | 1 | 1.64 | AUTUMN | STANDARD36826 | P |
| 16-Oct-19 | NE LANTAU | 2 | 14.35 | AUTUMN | STANDARD36826 | P |
| 16-Oct-19 | NE LANTAU | 2 | 9.31 | AUTUMN | STANDARD36826 | S |
| 17-Oct-19 | SW LANTAU | 2 | 27.94 | AUTUMN | STANDARD36826 | P |
| 17-Oct-19 | SW LANTAU | 2 | 10.86 | AUTUMN | STANDARD36826 | S |
| 17-Oct-19 | SE LANTAU | 2 | 25.03 | AUTUMN | STANDARD36826 | P |
| 17-Oct-19 | SE LANTAU | 3 | 5.36 | AUTUMN | STANDARD36826 | P |
| 17-Oct-19 | SE LANTAU | 2 | 6.28 | AUTUMN | STANDARD36826 | S |
| 17-Oct-19 | SE LANTAU | 3 | 1.33 | AUTUMN | STANDARD36826 | S |
| 21-Oct-19 | PO TOI | 2 | 3.40 | AUTUMN | STANDARD36826 | P |
| 21-Oct-19 | PO TOI | 3 | 23.33 | AUTUMN | STANDARD36826 | P |
| 21-Oct-19 | PO TOI | 2 | 1.70 | AUTUMN | STANDARD36826 | S |
| 21-Oct-19 | PO TOI | 3 | 12.67 | AUTUMN | STANDARD36826 | S |
| 21-Oct-19 | NINEPINS | 2 | 2.60 | AUTUMN | STANDARD36826 | P |
| 21-Oct-19 | NINEPINS | 3 | 20.30 | AUTUMN | STANDARD36826 | P |
| 21-Oct-19 | NINEPINS | 3 | 5.60 | AUTUMN | STANDARD36826 | S |
| 23-Oct-19 | W LANTAU | 1 | 3.60 | AUTUMN | STANDARD36826 | S |
| 23-Oct-19 | W LANTAU | 2 | 3.26 | AUTUMN | STANDARD36826 | S |
| 23-Oct-19 | W LANTAU | 3 | 2.93 | AUTUMN | STANDARD36826 | S |
| 23-Oct-19 | SW LANTAU | 3 | 14.62 | AUTUMN | STANDARD36826 | P |
| 23-Oct-19 | SW LANTAU | 4 | 2.90 | AUTUMN | STANDARD36826 | P |
| 23-Oct-19 | SW LANTAU | 3 | 11.88 | AUTUMN | STANDARD36826 | S |
| 23-Oct-19 | SW LANTAU | 4 | 2.40 | AUTUMN | STANDARD36826 | S |
| 23-Oct-19 | SE LANTAU | 2 | 3.40 | AUTUMN | STANDARD36826 | P |
| 23-Oct-19 | SE LANTAU | 3 | 18.52 | AUTUMN | STANDARD36826 | P |
| 23-Oct-19 | SE LANTAU | 4 | 4.34 | AUTUMN | STANDARD36826 | P |
| 23-Oct-19 | SE LANTAU | 2 | 3.10 | AUTUMN | STANDARD36826 | S |
| 23-Oct-19 | SE LANTAU | 3 | 4.05 | AUTUMN | STANDARD36826 | S |
| 23-Oct-19 | SE LANTAU | 4 | 4.29 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | NW LANTAU | 1 | 6.17 | AUTUMN | STANDARD36826 | P |
| 28-Oct-19 | NW LANTAU | 2 | 7.11 | AUTUMN | STANDARD36826 | P |
| 28-Oct-19 | NW LANTAU | 3 | 11.20 | AUTUMN | STANDARD36826 | P |
| 28-Oct-19 | NW LANTAU | 1 | 1.12 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | NW LANTAU | 2 | 3.60 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | NW LANTAU | 3 | 4.30 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | NW LANTAU | 4 | 3.10 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | W LANTAU | 3 | 7.13 | AUTUMN | STANDARD36826 | P |
| 28-Oct-19 | W LANTAU | 4 | 2.04 | AUTUMN | STANDARD36826 | P |
| 28-Oct-19 | W LANTAU | 3 | 9.03 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | SW LANTAU | 2 | 1.22 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | SW LANTAU | 3 | 7.43 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | SE LANTAU | 2 | 5.30 | AUTUMN | STANDARD36826 | P |
| 28-Oct-19 | SE LANTAU | 4 | 7.41 | AUTUMN | STANDARD36826 | P |
| 28-Oct-19 | SE LANTAU | 2 | 3.40 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | SE LANTAU | 3 | 2.55 | AUTUMN | STANDARD36826 | S |
| 28-Oct-19 | SE LANTAU | 4 | 1.94 | AUTUMN | STANDARD36826 | S |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 31-Oct-19 | NW LANTAU | 2 | 19.07 | AUTUMN | STANDARD36826 | P |
| 31-Oct-19 | NW LANTAU | 3 | 16.90 | AUTUMN | STANDARD36826 | P |
| 31-Oct-19 | NW LANTAU | 2 | 10.53 | AUTUMN | STANDARD36826 | S |
| 31-Oct-19 | DEEP BAY | 2 | 7.07 | AUTUMN | STANDARD36826 | P |
| 31-Oct-19 | DEEP BAY | 3 | 3.86 | AUTUMN | STANDARD36826 | P |
| 31-Oct-19 | DEEP BAY | 2 | 5.32 | AUTUMN | STANDARD36826 | S |
| 31-Oct-19 | DEEP BAY | 3 | 1.15 | AUTUMN | STANDARD36826 | S |
| 31-Oct-19 | NE LANTAU | 1 | 1.30 | AUTUMN | STANDARD36826 | P |
| 31-Oct-19 | NE LANTAU | 2 | 17.48 | AUTUMN | STANDARD36826 | P |
| 31-Oct-19 | NE LANTAU | 1 | 1.10 | AUTUMN | STANDARD36826 | S |
| 31-Oct-19 | NE LANTAU | 2 | 9.12 | AUTUMN | STANDARD36826 | S |
| 4-Nov-19 | SW LANTAU | 2 | 24.26 | AUTUMN | STANDARD36826 | P |
| 4-Nov-19 | SW LANTAU | 2 | 11.14 | AUTUMN | STANDARD36826 | S |
| 7-Nov-19 | W LANTAU | 2 | 1.97 | AUTUMN | STANDARD36826 | S |
| 7-Nov-19 | W LANTAU | 3 | 7.84 | AUTUMN | STANDARD36826 | S |
| 19-Nov-19 | NE LANTAU | 2 | 16.92 | AUTUMN | STANDARD36826 | P |
| 19-Nov-19 | NE LANTAU | 2 | 9.88 | AUTUMN | STANDARD36826 | S |
| 21-Nov-19 | W LANTAU | 2 | 10.00 | AUTUMN | STANDARD36826 | S |
| 26-Nov-19 | SW LANTAU | 2 | 3.76 | AUTUMN | STANDARD36826 | P |
| 26-Nov-19 | SW LANTAU | 3 | 10.94 | AUTUMN | STANDARD36826 | P |
| 26-Nov-19 | SW LANTAU | 2 | 3.82 | AUTUMN | STANDARD36826 | S |
| 26-Nov-19 | SW LANTAU | 3 | 4.90 | AUTUMN | STANDARD36826 | S |
| 26-Nov-19 | SW LANTAU | 4 | 2.38 | AUTUMN | STANDARD36826 | S |
| 27-Nov-19 | W LANTAU | 2 | 7.98 | AUTUMN | STANDARD36826 | P |
| 27-Nov-19 | W LANTAU | 3 | 2.50 | AUTUMN | STANDARD36826 | P |
| 27-Nov-19 | W LANTAU | 2 | 7.92 | AUTUMN | STANDARD36826 | S |
| 27-Nov-19 | W LANTAU | 3 | 2.20 | AUTUMN | STANDARD36826 | S |
| 27-Nov-19 | SW LANTAU | 3 | 4.22 | AUTUMN | STANDARD36826 | P |
| 27-Nov-19 | SW LANTAU | 4 | 2.32 | AUTUMN | STANDARD36826 | P |
| 27-Nov-19 | SW LANTAU | 4 | 2.18 | AUTUMN | STANDARD36826 | S |
| 2-Dec-19 | SE LANTAU | 2 | 3.00 | WINTER | STANDARD36826 | P |
| 2-Dec-19 | SE LANTAU | 3 | 16.52 | WINTER | STANDARD36826 | P |
| 2-Dec-19 | SE LANTAU | 4 | 4.51 | WINTER | STANDARD36826 | P |
| 2-Dec-19 | SE LANTAU | 2 | 2.30 | WINTER | STANDARD36826 | S |
| 2-Dec-19 | SE LANTAU | 3 | 7.74 | WINTER | STANDARD36826 | S |
| 2-Dec-19 | SE LANTAU | 4 | 0.32 | WINTER | STANDARD36826 | S |
| 4-Dec-19 | SW LANTAU | 2 | 2.10 | WINTER | STANDARD36826 | P |
| 4-Dec-19 | SW LANTAU | 3 | 14.39 | WINTER | STANDARD36826 | P |
| 4-Dec-19 | SW LANTAU | 4 | 6.43 | WINTER | STANDARD36826 | P |
| 4-Dec-19 | SW LANTAU | 3 | 4.10 | WINTER | STANDARD36826 | S |
| 4-Dec-19 | SW LANTAU | 4 | 2.25 | WINTER | STANDARD36826 | S |
| 5-Dec-19 | SE LANTAU | 1 | 0.90 | WINTER | STANDARD36826 | P |
| 5-Dec-19 | SE LANTAU | 2 | 5.90 | WINTER | STANDARD36826 | P |
| 5-Dec-19 | SE LANTAU | 3 | 8.24 | WINTER | STANDARD36826 | P |
| 5-Dec-19 | SE LANTAU | 4 | 4.01 | WINTER | STANDARD36826 | P |
| 5-Dec-19 | SE LANTAU | 1 | 0.80 | WINTER | STANDARD36826 | S |
| 5-Dec-19 | SE LANTAU | 2 | 2.20 | WINTER | STANDARD36826 | S |
| 5-Dec-19 | SE LANTAU | 4 | 2.10 | WINTER | STANDARD36826 | S |
| 5-Dec-19 | SE LANTAU | 5 | 1.95 | WINTER | STANDARD36826 | S |
| 5-Dec-19 | SW LANTAU | 2 | 7.17 | WINTER | STANDARD36826 | P |
| 5-Dec-19 | SW LANTAU | 3 | 23.43 | WINTER | STANDARD36826 | P |
| 5-Dec-19 | SW LANTAU | 1 | 2.60 | WINTER | STANDARD36826 | S |
| 5-Dec-19 | SW LANTAU | 2 | 4.30 | WINTER | STANDARD36826 | S |
| 5-Dec-19 | SW LANTAU | 3 | 6.78 | WINTER | STANDARD36826 | S |
| 9-Dec-19 | SE LANTAU | 2 | 17.80 | WINTER | STANDARD36826 | P |
| 9-Dec-19 | SE LANTAU | 3 | 9.76 | WINTER | STANDARD36826 | P |
| 9-Dec-19 | SE LANTAU | 2 | 8.01 | WINTER | STANDARD36826 | S |
| 9-Dec-19 | SE LANTAU | 3 | 2.03 | WINTER | STANDARD36826 | S |
| 9-Dec-19 | LAMMA | 2 | 9.40 | WINTER | STANDARD36826 | P |
| 9-Dec-19 | LAMMA | 3 | 18.07 | WINTER | STANDARD36826 | P |
| 9-Dec-19 | LAMMA | 4 | 5.78 | WINTER | STANDARD36826 | P |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 9-Dec-19 | LAMMA | 2 | 4.70 | WINTER | STANDARD36826 | S |
| 9-Dec-19 | LAMMA | 3 | 3.95 | WINTER | STANDARD36826 | S |
| 10-Dec-19 | W LANTAU | 2 | 6.27 | WINTER | STANDARD36826 | P |
| 10-Dec-19 | W LANTAU | 2 | 10.58 | WINTER | STANDARD36826 | S |
| 11-Dec-19 | LAMMA | 0 | 1.63 | WINTER | STANDARD36826 | P |
| 11-Dec-19 | LAMMA | 1 | 18.34 | WINTER | STANDARD36826 | P |
| 11-Dec-19 | LAMMA | 2 | 35.57 | WINTER | STANDARD36826 | P |
| 11-Dec-19 | LAMMA | 3 | 3.70 | WINTER | STANDARD36826 | P |
| 11-Dec-19 | LAMMA | 0 | 1.30 | WINTER | STANDARD36826 | S |
| 11-Dec-19 | LAMMA | 1 | 1.30 | WINTER | STANDARD36826 | S |
| 11-Dec-19 | LAMMA | 2 | 7.46 | WINTER | STANDARD36826 | S |
| 11-Dec-19 | PO TOI | 2 | 20.57 | WINTER | STANDARD36826 | P |
| 11-Dec-19 | PO TOI | 3 | 4.82 | WINTER | STANDARD36826 | P |
| 11-Dec-19 | PO TOI | 1 | 2.20 | WINTER | STANDARD36826 | S |
| 11-Dec-19 | PO TOI | 2 | 4.21 | WINTER | STANDARD36826 | S |
| 16-Dec-19 | W LANTAU | 1 | 4.51 | WINTER | STANDARD36826 | P |
| 16-Dec-19 | W LANTAU | 2 | 7.17 | WINTER | STANDARD36826 | P |
| 16-Dec-19 | W LANTAU | 3 | 1.20 | WINTER | STANDARD36826 | P |
| 16-Dec-19 | W LANTAU | 1 | 3.42 | WINTER | STANDARD36826 | S |
| 16-Dec-19 | W LANTAU | 2 | 7.70 | WINTER | STANDARD36826 | S |
| 17-Dec-19 | SE LANTAU | 0 | 9.66 | WINTER | STANDARD36826 | P |
| 17-Dec-19 | SE LANTAU | 1 | 24.55 | WINTER | STANDARD36826 | P |
| 17-Dec-19 | SE LANTAU | 0 | 1.41 | WINTER | STANDARD36826 | S |
| 17-Dec-19 | SE LANTAU | 1 | 9.10 | WINTER | STANDARD36826 | S |
| 17-Dec-19 | SW LANTAU | 0 | 3.75 | WINTER | STANDARD36826 | P |
| 17-Dec-19 | SW LANTAU | 1 | 14.42 | WINTER | STANDARD36826 | P |
| 17-Dec-19 | SW LANTAU | 0 | 7.02 | WINTER | STANDARD36826 | S |
| 17-Dec-19 | SW LANTAU | 1 | 2.06 | WINTER | STANDARD36826 | S |
| 18-Dec-19 | LAMMA | 0 | 2.09 | WINTER | STANDARD36826 | P |
| 18-Dec-19 | LAMMA | 1 | 26.09 | WINTER | STANDARD36826 | P |
| 18-Dec-19 | LAMMA | 2 | 48.49 | WINTER | STANDARD36826 | P |
| 18-Dec-19 | LAMMA | 3 | 11.00 | WINTER | STANDARD36826 | P |
| 18-Dec-19 | LAMMA | 0 | 2.01 | WINTER | STANDARD36826 | S |
| 18-Dec-19 | LAMMA | 1 | 4.50 | WINTER | STANDARD36826 | S |
| 18-Dec-19 | LAMMA | 2 | 14.72 | WINTER | STANDARD36826 | S |
| 18-Dec-19 | LAMMA | 3 | 1.10 | WINTER | STANDARD36826 | S |
| 19-Dec-19 | NW LANTAU | 2 | 17.53 | WINTER | STANDARD36826 | P |
| 19-Dec-19 | NW LANTAU | 3 | 1.85 | WINTER | STANDARD36826 | P |
| 19-Dec-19 | NW LANTAU | 4 | 5.46 | WINTER | STANDARD36826 | P |
| 19-Dec-19 | NW LANTAU | 2 | 4.33 | WINTER | STANDARD36826 | S |
| 19-Dec-19 | NW LANTAU | 3 | 3.53 | WINTER | STANDARD36826 | S |
| 19-Dec-19 | NW LANTAU | 4 | 0.70 | WINTER | STANDARD36826 | S |
| 19-Dec-19 | DEEP BAY | 2 | 9.38 | WINTER | STANDARD36826 | P |
| 19-Dec-19 | DEEP BAY | 1 | 3.03 | WINTER | STANDARD36826 | S |
| 19-Dec-19 | DEEP BAY | 2 | 7.49 | WINTER | STANDARD36826 | S |
| 19-Dec-19 | NE LANTAU | 2 | 14.80 | WINTER | STANDARD36826 | P |
| 19-Dec-19 | NE LANTAU | 3 | 5.74 | WINTER | STANDARD36826 | P |
| 19-Dec-19 | NE LANTAU | 1 | 0.70 | WINTER | STANDARD36826 | S |
| 19-Dec-19 | NE LANTAU | 2 | 8.20 | WINTER | STANDARD36826 | S |
| 19-Dec-19 | NE LANTAU | 3 | 1.26 | WINTER | STANDARD36826 | S |
| 23-Dec-19 | W LANTAU | 2 | 10.18 | WINTER | STANDARD36826 | P |
| 23-Dec-19 | W LANTAU | 3 | 2.00 | WINTER | STANDARD36826 | P |
| 23-Dec-19 | W LANTAU | 2 | 13.38 | WINTER | STANDARD36826 | S |
| 23-Dec-19 | W LANTAU | 3 | 7.22 | WINTER | STANDARD36826 | S |
| 23-Dec-19 | NW LANTAU | 2 | 5.51 | WINTER | STANDARD36826 | P |
| 23-Dec-19 | NW LANTAU | 3 | 11.49 | WINTER | STANDARD36826 | P |
| 23-Dec-19 | NW LANTAU | 2 | 5.80 | WINTER | STANDARD36826 | S |
| 23-Dec-19 | NW LANTAU | 3 | 7.20 | WINTER | STANDARD36826 | S |
| 23-Dec-19 | NE LANTAU | 2 | 8.13 | WINTER | STANDARD36826 | S |
| 3-Jan-20 | W LANTAU | 2 | 10.40 | WINTER | STANDARD36826 | S |
| 3-Jan-20 | SW LANTAU | 2 | 15.52 | WINTER | STANDARD36826 | P |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 3-Jan-20 | SW LANTAU | 3 | 5.82 | WINTER | STANDARD36826 | P |
| 3-Jan-20 | SW LANTAU | 2 | 3.83 | WINTER | STANDARD36826 | S |
| 3-Jan-20 | SW LANTAU | 3 | 9.19 | WINTER | STANDARD36826 | S |
| 3-Jan-20 | SE LANTAU | 2 | 2.00 | WINTER | STANDARD36826 | P |
| 3-Jan-20 | SE LANTAU | 3 | 12.66 | WINTER | STANDARD36826 | P |
| 3-Jan-20 | SE LANTAU | 4 | 5.33 | WINTER | STANDARD36826 | P |
| 3-Jan-20 | SE LANTAU | 2 | 4.20 | WINTER | STANDARD36826 | S |
| 3-Jan-20 | SE LANTAU | 3 | 4.74 | WINTER | STANDARD36826 | S |
| 3-Jan-20 | SE LANTAU | 4 | 1.80 | WINTER | STANDARD36826 | S |
| 6-Jan-20 | W LANTAU | 2 | 9.93 | WINTER | STANDARD36826 | P |
| 6-Jan-20 | W LANTAU | 3 | 3.04 | WINTER | STANDARD36826 | P |
| 6-Jan-20 | W LANTAU | 2 | 9.05 | WINTER | STANDARD36826 | S |
| 6-Jan-20 | W LANTAU | 3 | 1.17 | WINTER | STANDARD36826 | S |
| 7-Jan-20 | LAMMA | 0 | 4.35 | WINTER | STANDARD36826 | P |
| 7-Jan-20 | LAMMA | 1 | 17.65 | WINTER | STANDARD36826 | P |
| 7-Jan-20 | LAMMA | 2 | 55.94 | WINTER | STANDARD36826 | P |
| 7-Jan-20 | LAMMA | 0 | 1.02 | WINTER | STANDARD36826 | S |
| 7-Jan-20 | LAMMA | 1 | 4.64 | WINTER | STANDARD36826 | S |
| 7-Jan-20 | LAMMA | 2 | 18.40 | WINTER | STANDARD36826 | S |
| 8-Jan-20 | SW LANTAU | 1 | 1.84 | WINTER | STANDARD36826 | P |
| 8-Jan-20 | SW LANTAU | 2 | 7.10 | WINTER | STANDARD36826 | P |
| 8-Jan-20 | SW LANTAU | 3 | 15.30 | WINTER | STANDARD36826 | P |
| 8-Jan-20 | SW LANTAU | 2 | 3.30 | WINTER | STANDARD36826 | S |
| 8-Jan-20 | SW LANTAU | 3 | 7.30 | WINTER | STANDARD36826 | S |
| 10-Jan-20 | SE LANTAU | 2 | 5.04 | WINTER | STANDARD36826 | P |
| 10-Jan-20 | SE LANTAU | 3 | 18.52 | WINTER | STANDARD36826 | P |
| 10-Jan-20 | SE LANTAU | 4 | 7.77 | WINTER | STANDARD36826 | P |
| 10-Jan-20 | SE LANTAU | 2 | 3.10 | WINTER | STANDARD36826 | S |
| 10-Jan-20 | SE LANTAU | 4 | 3.10 | WINTER | STANDARD36826 | S |
| 10-Jan-20 | SW LANTAU | 2 | 1.09 | WINTER | STANDARD36826 | P |
| 10-Jan-20 | SW LANTAU | 3 | 15.11 | WINTER | STANDARD36826 | P |
| 10-Jan-20 | SW LANTAU | 4 | 4.65 | WINTER | STANDARD36826 | P |
| 10-Jan-20 | SW LANTAU | 2 | 3.44 | WINTER | STANDARD36826 | S |
| 10-Jan-20 | SW LANTAU | 3 | 2.91 | WINTER | STANDARD36826 | S |
| 10-Jan-20 | SW LANTAU | 4 | 4.40 | WINTER | STANDARD36826 | S |
| 15-Jan-20 | W LANTAU | 3 | 9.57 | WINTER | STANDARD36826 | S |
| 15-Jan-20 | NW LANTAU | 3 | 1.94 | WINTER | STANDARD36826 | P |
| 15-Jan-20 | NW LANTAU | 4 | 5.55 | WINTER | STANDARD36826 | P |
| 15-Jan-20 | NW LANTAU | 3 | 1.20 | WINTER | STANDARD36826 | S |
| 16-Jan-20 | DEEP BAY | 2 | 5.92 | WINTER | STANDARD36826 | P |
| 16-Jan-20 | DEEP BAY | 3 | 3.75 | WINTER | STANDARD36826 | P |
| 16-Jan-20 | DEEP BAY | 2 | 6.35 | WINTER | STANDARD36826 | S |
| 16-Jan-20 | NE LANTAU | 2 | 20.68 | WINTER | STANDARD36826 | P |
| 16-Jan-20 | NE LANTAU | 2 | 10.22 | WINTER | STANDARD36826 | S |
| 21-Jan-20 | NW LANTAU | 2 | 1.20 | WINTER | STANDARD36826 | P |
| 21-Jan-20 | NW LANTAU | 3 | 13.76 | WINTER | STANDARD36826 | P |
| 21-Jan-20 | NW LANTAU | 3 | 6.86 | WINTER | STANDARD36826 | S |
| 21-Jan-20 | NE LANTAU | 2 | 8.80 | WINTER | STANDARD36826 | P |
| 21-Jan-20 | NE LANTAU | 3 | 12.29 | WINTER | STANDARD36826 | P |
| 21-Jan-20 | NE LANTAU | 2 | 6.30 | WINTER | STANDARD36826 | S |
| 21-Jan-20 | NE LANTAU | 3 | 5.31 | WINTER | STANDARD36826 | S |
| 22-Jan-20 | SE LANTAU | 1 | 7.22 | WINTER | STANDARD36826 | P |
| 22-Jan-20 | SE LANTAU | 2 | 7.27 | WINTER | STANDARD36826 | P |
| 22-Jan-20 | SE LANTAU | 1 | 2.16 | WINTER | STANDARD36826 | S |
| 22-Jan-20 | SE LANTAU | 2 | 0.71 | WINTER | STANDARD36826 | S |
| 22-Jan-20 | SW LANTAU | 1 | 13.92 | WINTER | STANDARD36826 | P |
| 22-Jan-20 | SW LANTAU | 2 | 8.22 | WINTER | STANDARD36826 | P |
| 22-Jan-20 | SW LANTAU | 1 | 5.31 | WINTER | STANDARD36826 | S |
| 22-Jan-20 | SW LANTAU | 2 | 3.50 | WINTER | STANDARD36826 | S |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 3-Feb-20 | NW LANTAU | 2 | 23.61 | WINTER | STANDARD36826 | P |
| 3-Feb-20 | NW LANTAU | 3 | 11.66 | WINTER | STANDARD36826 | P |
| 3-Feb-20 | NW LANTAU | 2 | 8.43 | WINTER | STANDARD36826 | S |
| 3-Feb-20 | NW LANTAU | 3 | 2.50 | WINTER | STANDARD36826 | S |
| 3-Feb-20 | DEEP BAY | 2 | 6.35 | WINTER | STANDARD36826 | P |
| 3-Feb-20 | DEEP BAY | 3 | 3.32 | WINTER | STANDARD36826 | P |
| 3-Feb-20 | DEEP BAY | 2 | 9.93 | WINTER | STANDARD36826 | S |
| 3-Feb-20 | NE LANTAU | 2 | 3.86 | WINTER | STANDARD36826 | P |
| 3-Feb-20 | NE LANTAU | 3 | 10.56 | WINTER | STANDARD36826 | P |
| 3-Feb-20 | NE LANTAU | 2 | 7.00 | WINTER | STANDARD36826 | S |
| 3-Feb-20 | NE LANTAU | 3 | 4.98 | WINTER | STANDARD36826 | S |
| 5-Feb-20 | SW LANTAU | 2 | 4.40 | WINTER | STANDARD36826 | P |
| 5-Feb-20 | SW LANTAU | 3 | 10.43 | WINTER | STANDARD36826 | P |
| 5-Feb-20 | SW LANTAU | 2 | 3.00 | WINTER | STANDARD36826 | S |
| 5-Feb-20 | SW LANTAU | 3 | 5.22 | WINTER | STANDARD36826 | S |
| 7-Feb-20 | SE LANTAU | 2 | 14.20 | WINTER | STANDARD36826 | P |
| 7-Feb-20 | SE LANTAU | 3 | 15.41 | WINTER | STANDARD36826 | P |
| 7-Feb-20 | SE LANTAU | 2 | 4.08 | WINTER | STANDARD36826 | S |
| 7-Feb-20 | SE LANTAU | 3 | 4.02 | WINTER | STANDARD36826 | S |
| 7-Feb-20 | SW LANTAU | 2 | 12.20 | WINTER | STANDARD36826 | P |
| 7-Feb-20 | SW LANTAU | 3 | 7.61 | WINTER | STANDARD36826 | P |
| 7-Feb-20 | SW LANTAU | 2 | 2.41 | WINTER | STANDARD36826 | S |
| 7-Feb-20 | SW LANTAU | 3 | 3.41 | WINTER | STANDARD36826 | S |
| 10-Feb-20 | W LANTAU | 2 | 9.15 | WINTER | STANDARD36826 | S |
| 10-Feb-20 | SW LANTAU | 2 | 14.39 | WINTER | STANDARD36826 | P |
| 10-Feb-20 | SW LANTAU | 3 | 0.76 | WINTER | STANDARD36826 | P |
| 10-Feb-20 | SW LANTAU | 2 | 4.18 | WINTER | STANDARD36826 | S |
| 11-Feb-20 | LAMMA | 1 | 3.34 | WINTER | STANDARD36826 | P |
| 11-Feb-20 | LAMMA | 2 | 17.96 | WINTER | STANDARD36826 | P |
| 11-Feb-20 | LAMMA | 3 | 19.54 | WINTER | STANDARD36826 | P |
| 11-Feb-20 | LAMMA | 1 | 2.46 | WINTER | STANDARD36826 | S |
| 11-Feb-20 | LAMMA | 2 | 4.90 | WINTER | STANDARD36826 | S |
| 11-Feb-20 | LAMMA | 3 | 2.30 | WINTER | STANDARD36826 | S |
| 11-Feb-20 | SE LANTAU | 2 | 10.30 | WINTER | STANDARD36826 | P |
| 11-Feb-20 | SE LANTAU | 3 | 13.18 | WINTER | STANDARD36826 | P |
| 11-Feb-20 | SE LANTAU | 2 | 7.61 | WINTER | STANDARD36826 | S |
| 11-Feb-20 | SE LANTAU | 3 | 1.88 | WINTER | STANDARD36826 | S |
| 12-Feb-20 | SW LANTAU | 1 | 1.74 | WINTER | STANDARD36826 | P |
| 12-Feb-20 | SW LANTAU | 2 | 14.17 | WINTER | STANDARD36826 | P |
| 12-Feb-20 | SW LANTAU | 2 | 4.25 | WINTER | STANDARD36826 | S |
| 21-Feb-20 | W LANTAU | 2 | 5.88 | WINTER | STANDARD36826 | P |
| 21-Feb-20 | W LANTAU | 3 | 5.20 | WINTER | STANDARD36826 | P |
| 21-Feb-20 | W LANTAU | 2 | 6.62 | WINTER | STANDARD36826 | S |
| 21-Feb-20 | W LANTAU | 3 | 3.60 | WINTER | STANDARD36826 | S |
| 21-Feb-20 | SW LANTAU | 3 | 22.22 | WINTER | STANDARD36826 | P |
| 21-Feb-20 | SW LANTAU | 4 | 2.47 | WINTER | STANDARD36826 | P |
| 21-Feb-20 | SW LANTAU | 3 | 6.41 | WINTER | STANDARD36826 | S |
| 21-Feb-20 | SW LANTAU | 4 | 4.65 | WINTER | STANDARD36826 | S |
| 21-Feb-20 | SE LANTAU | 2 | 4.35 | WINTER | STANDARD36826 | P |
| 21-Feb-20 | SE LANTAU | 3 | 6.74 | WINTER | STANDARD36826 | P |
| 21-Feb-20 | SE LANTAU | 3 | 2.04 | WINTER | STANDARD36826 | S |
| 24-Feb-20 | W LANTAU | 2 | 4.41 | WINTER | STANDARD36826 | P |
| 24-Feb-20 | W LANTAU | 3 | 5.12 | WINTER | STANDARD36826 | P |
| 24-Feb-20 | W LANTAU | 2 | 8.09 | WINTER | STANDARD36826 | S |
| 24-Feb-20 | W LANTAU | 3 | 3.46 | WINTER | STANDARD36826 | S |
| 24-Feb-20 | SW LANTAU | 3 | 9.64 | WINTER | STANDARD36826 | S |
| 25-Feb-20 | LAMMA | 1 | 20.92 | WINTER | STANDARD36826 | P |
| 25-Feb-20 | LAMMA | 2 | 31.93 | WINTER | STANDARD36826 | P |
| 25-Feb-20 | LAMMA | 1 | 2.07 | WINTER | STANDARD36826 | S |
| 25-Feb-20 | LAMMA | 2 | 10.57 | WINTER | STANDARD36826 | S |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 25-Feb-20 | SE LANTAU | 2 | 11.42 | WINTER | STANDARD36826 | P |
| 25-Feb-20 | SE LANTAU | 2 | 7.62 | WINTER | STANDARD36826 | S |
| 2-Mar-20 | SE LANTAU | 2 | 3.96 | SPRING | STANDARD36826 | P |
| 2-Mar-20 | SE LANTAU | 3 | 11.78 | SPRING | STANDARD36826 | P |
| 2-Mar-20 | SE LANTAU | 4 | 1.11 | SPRING | STANDARD36826 | P |
| 2-Mar-20 | SE LANTAU | 2 | 2.08 | SPRING | STANDARD36826 | S |
| 2-Mar-20 | SE LANTAU | 3 | 2.90 | SPRING | STANDARD36826 | S |
| 2-Mar-20 | SE LANTAU | 4 | 1.75 | SPRING | STANDARD36826 | S |
| 2-Mar-20 | SW LANTAU | 2 | 1.40 | SPRING | STANDARD36826 | P |
| 2-Mar-20 | SW LANTAU | 3 | 25.14 | SPRING | STANDARD36826 | P |
| 2-Mar-20 | SW LANTAU | 4 | 4.40 | SPRING | STANDARD36826 | P |
| 2-Mar-20 | SW LANTAU | 3 | 10.19 | SPRING | STANDARD36826 | S |
| 2-Mar-20 | SW LANTAU | 4 | 3.17 | SPRING | STANDARD36826 | S |
| 3-Mar-20 | W LANTAU | 2 | 4.39 | SPRING | STANDARD36826 | P |
| 3-Mar-20 | W LANTAU | 3 | 4.70 | SPRING | STANDARD36826 | P |
| 3-Mar-20 | W LANTAU | 2 | 4.06 | SPRING | STANDARD36826 | S |
| 3-Mar-20 | W LANTAU | 3 | 5.70 | SPRING | STANDARD36826 | S |
| 6-Mar-20 | SW LANTAU | 2 | 2.58 | SPRING | STANDARD36826 | P |
| 6-Mar-20 | SW LANTAU | 3 | 14.71 | SPRING | STANDARD36826 | P |
| 6-Mar-20 | SW LANTAU | 2 | 3.05 | SPRING | STANDARD36826 | S |
| 6-Mar-20 | SW LANTAU | 3 | 9.04 | SPRING | STANDARD36826 | S |
| 10-Mar-20 | SW LANTAU | 2 | 1.80 | SPRING | STANDARD36826 | P |
| 10-Mar-20 | SW LANTAU | 3 | 21.76 | SPRING | STANDARD36826 | P |
| 10-Mar-20 | SW LANTAU | 2 | 2.00 | SPRING | STANDARD36826 | S |
| 10-Mar-20 | SW LANTAU | 3 | 11.54 | SPRING | STANDARD36826 | S |
| 10-Mar-20 | SE LANTAU | 2 | 10.48 | SPRING | STANDARD36826 | P |
| 10-Mar-20 | SE LANTAU | 3 | 20.64 | SPRING | STANDARD36826 | P |
| 10-Mar-20 | SE LANTAU | 4 | 0.76 | SPRING | STANDARD36826 | P |
| 10-Mar-20 | SE LANTAU | 2 | 9.70 | SPRING | STANDARD36826 | S |
| 10-Mar-20 | SE LANTAU | 3 | 4.35 | SPRING | STANDARD36826 | S |
| 11-Mar-20 | W LANTAU | 2 | 10.25 | SPRING | STANDARD36826 | S |
| 11-Mar-20 | W LANTAU | 3 | 0.80 | SPRING | STANDARD36826 | S |
| 11-Mar-20 | NW LANTAU | 2 | 6.23 | SPRING | STANDARD36826 | P |
| 11-Mar-20 | NW LANTAU | 3 | 10.13 | SPRING | STANDARD36826 | P |
| 11-Mar-20 | NW LANTAU | 2 | 3.04 | SPRING | STANDARD36826 | S |
| 11-Mar-20 | NW LANTAU | 3 | 2.50 | SPRING | STANDARD36826 | S |
| 13-Mar-20 | LAMMA | 1 | 11.29 | SPRING | STANDARD36826 | P |
| 13-Mar-20 | LAMMA | 2 | 65.96 | SPRING | STANDARD36826 | P |
| 13-Mar-20 | LAMMA | 3 | 4.30 | SPRING | STANDARD36826 | P |
| 13-Mar-20 | LAMMA | 1 | 3.96 | SPRING | STANDARD36826 | S |
| 13-Mar-20 | LAMMA | 2 | 19.64 | SPRING | STANDARD36826 | S |
| 18-Mar-20 | DEEP BAY | 1 | 4.75 | SPRING | STANDARD36826 | P |
| 18-Mar-20 | DEEP BAY | 2 | 3.68 | SPRING | STANDARD36826 | P |
| 18-Mar-20 | DEEP BAY | 3 | 1.30 | SPRING | STANDARD36826 | P |
| 18-Mar-20 | DEEP BAY | 1 | 6.09 | SPRING | STANDARD36826 | S |
| 18-Mar-20 | DEEP BAY | 2 | 0.68 | SPRING | STANDARD36826 | S |
| 19-Mar-20 | LAMMA | 2 | 28.43 | SPRING | STANDARD36826 | P |
| 19-Mar-20 | LAMMA | 3 | 0.80 | SPRING | STANDARD36826 | P |
| 19-Mar-20 | LAMMA | 2 | 9.67 | SPRING | STANDARD36826 | S |
| 19-Mar-20 | PO TOI | 2 | 19.00 | SPRING | STANDARD36826 | P |
| 19-Mar-20 | PO TOI | 3 | 24.70 | SPRING | STANDARD36826 | P |
| 19-Mar-20 | PO TOI | 1 | 1.80 | SPRING | STANDARD36826 | P |
| 19-Mar-20 | PO TOI | 2 | 7.30 | SPRING | STANDARD36826 | S |
| 19-Mar-20 | PO TOI | 3 | 6.30 | SPRING | STANDARD36826 | S |
| 23-Mar-20 | SE LANTAU | 1 | 18.98 | SPRING | STANDARD36826 | P |
| 23-Mar-20 | SE LANTAU | 2 | 7.12 | SPRING | STANDARD36826 | P |
| 23-Mar-20 | SE LANTAU | 1 | 7.90 | SPRING | STANDARD36826 | S |
| 23-Mar-20 | SE LANTAU | 2 | 3.12 | SPRING | STANDARD36826 | S |
| 23-Mar-20 | SW LANTAU | 0 | 5.18 | SPRING | STANDARD36826 | P |
| 23-Mar-20 | SW LANTAU | 1 | 3.03 | SPRING | STANDARD36826 | P |

## Appendix I. (cont'd.)

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | P/S |
|---|---|---|---|---|---|---|
| 23-Mar-20 | SW LANTAU | 2 | 9.61 | SPRING | STANDARD36826 | P |
| 23-Mar-20 | SW LANTAU | 0 | 1.95 | SPRING | STANDARD36826 | S |
| 23-Mar-20 | SW LANTAU | 1 | 5.15 | SPRING | STANDARD36826 | S |
| 23-Mar-20 | SW LANTAU | 2 | 2.06 | SPRING | STANDARD36826 | S |

**Appendix II. HKCRP-AFCD Chinese White Dolphin Sighting Database (April 2019 - March 2020)**
(Note: P = sightings made on primary lines; S = sightings made on secondary lines)

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | TYPE | NORTHING | EASTING | SEASON | BOAT ASSOC. | P/S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-Apr-19 | 1 | 1340 | 1 | SW LANTAU | 3 | ND | OFF | HKCRP | 805984 | 802301 | SPRING | NONE | |
| 17-Apr-19 | 9 | 1422 | 6 | SW LANTAU | 1 | 68 | ON | HKCRP | 802382 | 809555 | SPRING | NONE | P |
| 17-Apr-19 | 10 | 1440 | 2 | SW LANTAU | 1 | 121 | ON | HKCRP | 805284 | 809539 | SPRING | NONE | P |
| 24-Apr-19 | 1 | 1537 | 2 | SW LANTAU | 1 | 32 | ON | HKCRP | 807420 | 809790 | SPRING | NONE | S |
| 25-Apr-19 | 1 | 1350 | 1 | W LANTAU | 3 | 25 | ON | HKCRP | 811080 | 801467 | SPRING | NONE | S |
| 25-Apr-19 | 2 | 1526 | 1 | SW LANTAU | 2 | 54 | ON | HKCRP | 804579 | 807351 | SPRING | NONE | P |
| 29-Apr-19 | 1 | 1444 | 1 | SW LANTAU | 3 | 895 | ON | HKCRP | 805201 | 806435 | SPRING | NONE | P |
| 7-May-19 | 1 | 1342 | 1 | W LANTAU | 3 | 406 | ON | HKCRP | 813558 | 802730 | SPRING | NONE | P |
| 7-May-19 | 2 | 1410 | 5 | W LANTAU | 2 | 133 | ON | HKCRP | 811413 | 801220 | SPRING | NONE | P |
| 7-May-19 | 3 | 1428 | 1 | W LANTAU | 2 | 42 | ON | HKCRP | 810154 | 799815 | SPRING | NONE | S |
| 9-May-19 | 1 | 1336 | 4 | SW LANTAU | 2 | 140 | ON | HKCRP | 805973 | 802239 | SPRING | NONE | S |
| 9-May-19 | 2 | 1434 | 3 | SW LANTAU | 2 | 491 | ON | HKCRP | 806110 | 805529 | SPRING | PURSE-SEINE | P |
| 9-May-19 | 3 | 1454 | 1 | SW LANTAU | 2 | 253 | ON | HKCRP | 807548 | 806800 | SPRING | NONE | S |
| 9-May-19 | 4 | 1504 | 1 | SW LANTAU | 2 | 369 | ON | HKCRP | 807491 | 807666 | SPRING | NONE | S |
| 14-May-19 | 1 | 1018 | 1 | W LANTAU | 1 | 186 | ON | HKCRP | 813933 | 803308 | SPRING | NONE | S |
| 14-May-19 | 2 | 1024 | 1 | W LANTAU | 2 | 16 | ON | HKCRP | 813414 | 802503 | SPRING | NONE | S |
| 14-May-19 | 3 | 1032 | 7 | W LANTAU | 2 | 334 | ON | HKCRP | 811014 | 801157 | SPRING | NONE | S |
| 14-May-19 | 4 | 1052 | 2 | W LANTAU | 2 | 377 | ON | HKCRP | 810483 | 800878 | SPRING | NONE | S |
| 14-May-19 | 5 | 1117 | 5 | W LANTAU | 3 | 155 | ON | HKCRP | 806439 | 801817 | SPRING | NONE | S |
| 14-May-19 | 6 | 1128 | 4 | SW LANTAU | 2 | 34 | ON | HKCRP | 806061 | 802744 | SPRING | NONE | S |
| 14-May-19 | 7 | 1143 | 13 | SW LANTAU | 2 | 91 | ON | HKCRP | 806899 | 804283 | SPRING | NONE | S |
| 16-May-19 | 1 | 1404 | 5 | SW LANTAU | 3 | 24 | ON | HKCRP | 806026 | 803301 | SPRING | NONE | S |
| 16-May-19 | 2 | 1454 | 3 | SW LANTAU | 2 | 242 | ON | HKCRP | 804179 | 808186 | SPRING | NONE | S |
| 23-May-19 | 1 | 1326 | 3 | W LANTAU | 2 | 866 | ON | HKCRP | 812764 | 800986 | SPRING | NONE | S |
| 23-May-19 | 2 | 1403 | 1 | W LANTAU | 2 | 0 | ON | HKCRP | 810902 | 801786 | SPRING | NONE | S |
| 23-May-19 | 3 | 1420 | 4 | W LANTAU | 2 | 43 | ON | HKCRP | 810462 | 800651 | SPRING | NONE | P |
| 23-May-19 | 4 | 1446 | 3 | W LANTAU | 3 | 76 | ON | HKCRP | 808348 | 800306 | SPRING | NONE | P |
| 29-May-19 | 1 | 1235 | 2 | W LANTAU | 3 | ND | OFF | HELI | 806584 | 801374 | SPRING | NONE | |
| 29-May-19 | 2 | 1239 | 5 | W LANTAU | 3 | ND | OFF | HELI | 810938 | 800776 | SPRING | NONE | |
| 29-May-19 | 3 | 1242 | 3 | W LANTAU | 3 | ND | OFF | HELI | 813569 | 802802 | SPRING | NONE | |
| 4-Jun-19 | 1 | 1329 | 3 | SW LANTAU | 1 | ND | OFF | HKCRP | 807300 | 808749 | SUMMER | NONE | |
| 5-Jun-19 | 1 | 1010 | 1 | W LANTAU | 2 | ND | OFF | HKCRP | 814805 | 804526 | SUMMER | NONE | |
| 5-Jun-19 | 2 | 1016 | 7 | W LANTAU | 2 | 135 | ON | HKCRP | 813966 | 803349 | SUMMER | PURSE-SEINE | S |

Appendix II.  (cont'd.)

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | TYPE | NORTHING | EASTING | SEASON | BOAT ASSOC. | P/S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5-Jun-19 | 3 | 1056 | 1 | W LANTAU | 2 | 183 | ON | HKCRP | 806573 | 801725 | SUMMER | NONE | S |
| 6-Jun-19 | 1 | 1350 | 1 | W LANTAU | 3 | 86 | ON | HKCRP | 813524 | 803049 | SUMMER | NONE | S |
| 6-Jun-19 | 2 | 1501 | 5 | SW LANTAU | 2 | ND | OFF | HKCRP | 805485 | 802630 | SUMMER | PURSE-SEINE | |
| 6-Jun-19 | 3 | 1521 | 1 | SW LANTAU | 2 | ND | OFF | HKCRP | 805834 | 805157 | SUMMER | NONE | |
| 17-Jun-19 | 1 | 1438 | 1 | W LANTAU | 2 | 92 | ON | HKCRP | 810250 | 801331 | SUMMER | NONE | S |
| 24-Jun-19 | 1 | 1125 | 1 | W LANTAU | 3 | ND | OFF | HKCRP | 806151 | 801868 | SUMMER | NONE | |
| 5-Jul-19 | 1 | 1021 | 13 | SW LANTAU | 3 | ND | OFF | HKCRP | 805518 | 802980 | SUMMER | NONE | |
| 11-Jul-19 | 1 | 1331 | 3 | SW LANTAU | 2 | 560 | ON | HKCRP | 806746 | 803499 | SUMMER | NONE | P |
| 15-Jul-19 | 1 | 1111 | 9 | W LANTAU | 3 | 43 | ON | HKCRP | 808391 | 800739 | SUMMER | NONE | P |
| 15-Jul-19 | 2 | 1138 | 5 | W LANTAU | 2 | 382 | ON | HKCRP | 807436 | 801665 | SUMMER | NONE | S |
| 15-Jul-19 | 3 | 1152 | 9 | W LANTAU | 3 | 374 | ON | HKCRP | 806495 | 801683 | SUMMER | NONE | S |
| 15-Jul-19 | 4 | 1232 | 4 | SW LANTAU | 2 | 265 | ON | HKCRP | 805286 | 802485 | SUMMER | NONE | P |
| 15-Jul-19 | 5 | 1248 | 15 | SW LANTAU | 2 | 69 | ON | HKCRP | 805796 | 802476 | SUMMER | NONE | P |
| 15-Jul-19 | 6 | 1313 | 3 | SW LANTAU | 2 | 5 | ON | HKCRP | 806646 | 803612 | SUMMER | NONE | S |
| 15-Jul-19 | 7 | 1326 | 1 | SW LANTAU | 2 | 710 | ON | HKCRP | 805348 | 804517 | SUMMER | NONE | P |
| 15-Jul-19 | 8 | 1330 | 1 | SW LANTAU | 2 | ND | OFF | HKCRP | 805016 | 804547 | SUMMER | NONE | |
| 15-Jul-19 | 9 | 1334 | 2 | SW LANTAU | 2 | 56 | ON | HKCRP | 804706 | 804505 | SUMMER | NONE | P |
| 15-Jul-19 | 10 | 1405 | 2 | SW LANTAU | 2 | 223 | ON | HKCRP | 803938 | 806474 | SUMMER | NONE | P |
| 15-Jul-19 | 11 | 1418 | 4 | SW LANTAU | 2 | 4 | ON | HKCRP | 804957 | 806465 | SUMMER | NONE | P |
| 15-Jul-19 | 12 | 1426 | 1 | SW LANTAU | 2 | 100 | ON | HKCRP | 805876 | 806436 | SUMMER | NONE | P |
| 15-Jul-19 | 13 | 1432 | 6 | SW LANTAU | 2 | 268 | ON | HKCRP | 806673 | 806438 | SUMMER | NONE | P |
| 15-Jul-19 | 14 | 1455 | 8 | SW LANTAU | 2 | 523 | ON | HKCRP | 806426 | 808634 | SUMMER | NONE | P |
| 16-Jul-19 | 1 | 1346 | 2 | W LANTAU | 2 | 34 | ON | HKCRP | 813137 | 802626 | SUMMER | NONE | S |
| 16-Jul-19 | 2 | 1410 | 1 | W LANTAU | 3 | ND | OFF | HKCRP | 811414 | 800777 | SUMMER | NONE | |
| 16-Jul-19 | 3 | 1435 | 7 | W LANTAU | 3 | 786 | ON | HKCRP | 809322 | 800442 | SUMMER | NONE | P |
| 16-Jul-19 | 4 | 1451 | 6 | W LANTAU | 3 | 26 | ON | HKCRP | 807504 | 801345 | SUMMER | NONE | S |
| 23-Jul-19 | 1 | 1032 | 6 | W LANTAU | 1 | 44 | ON | HKCRP | 813635 | 803050 | SUMMER | NONE | S |
| 23-Jul-19 | 2 | 1054 | 5 | W LANTAU | 2 | 57 | ON | HKCRP | 810704 | 801466 | SUMMER | NONE | S |
| 23-Jul-19 | 3 | 1100 | 2 | W LANTAU | 2 | 178 | ON | HKCRP | 810272 | 801187 | SUMMER | NONE | S |
| 23-Jul-19 | 4 | 1106 | 7 | W LANTAU | 2 | 186 | ON | HKCRP | 808745 | 800894 | SUMMER | NONE | S |
| 23-Jul-19 | 5 | 1115 | 2 | W LANTAU | 3 | 46 | ON | HKCRP | 806859 | 802251 | SUMMER | NONE | S |
| 23-Jul-19 | 6 | 1120 | 5 | W LANTAU | 1 | ND | OFF | HKCRP | 806351 | 801858 | SUMMER | NONE | |
| 24-Jul-19 | 1 | 1354 | 1 | W LANTAU | 3 | 606 | ON | HKCRP | 814511 | 802155 | SUMMER | NONE | P |
| 24-Jul-19 | 2 | 1424 | 14 | W LANTAU | 3 | 29 | ON | HKCRP | 811322 | 802024 | SUMMER | NONE | S |

**Appendix II. (cont'd.)**

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | TYPE | NORTHING | EASTING | SEASON | BOAT ASSOC. | P/S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24-Jul-19 | 3 | 1513 | 4 | W LANTAU | 3 | 375 | ON | HKCRP | 808458 | 800636 | SUMMER | NONE | P |
| 24-Jul-19 | 4 | 1528 | 2 | SW LANTAU | 2 | ND | OFF | HKCRP | 806217 | 802425 | SUMMER | NONE | |
| 29-Jul-19 | 1 | 1410 | 1 | SW LANTAU | 2 | 146 | ON | HKCRP | 807934 | 807440 | SUMMER | NONE | S |
| 29-Jul-19 | 2 | 1432 | 7 | SW LANTAU | 2 | 36 | ON | HKCRP | 805675 | 807323 | SUMMER | NONE | P |
| 29-Jul-19 | 3 | 1448 | 2 | SW LANTAU | 2 | 45 | ON | HKCRP | 804745 | 807311 | SUMMER | NONE | P |
| 29-Jul-19 | 4 | 1502 | 2 | SW LANTAU | 3 | 83 | ON | HKCRP | 801667 | 807305 | SUMMER | NONE | P |
| 29-Jul-19 | 5 | 1534 | 2 | SW LANTAU | 3 | 108 | ON | HKCRP | 805092 | 805310 | SUMMER | NONE | P |
| 29-Jul-19 | 6 | 1621 | 1 | SE LANTAU | 1 | ND | OFF | HKCRP | 808057 | 813112 | SUMMER | NONE | |
| 14-Aug-19 | 1 | 1351 | 2 | SW LANTAU | 2 | 55 | ON | HKCRP | 805884 | 802693 | SUMMER | NONE | P |
| 14-Aug-19 | 2 | 1402 | 1 | SW LANTAU | 2 | 51 | ON | HKCRP | 805485 | 802609 | SUMMER | NONE | P |
| 14-Aug-19 | 3 | 1412 | 1 | SW LANTAU | 3 | 456 | ON | HKCRP | 804777 | 802566 | SUMMER | NONE | P |
| 14-Aug-19 | 4 | 1423 | 2 | SW LANTAU | 3 | 348 | ON | HKCRP | 803723 | 803183 | SUMMER | NONE | S |
| 15-Aug-19 | 1 | 1044 | 7 | W LANTAU | 2 | 97 | ON | HKCRP | 811123 | 801962 | SUMMER | NONE | S |
| 15-Aug-19 | 2 | 1123 | 8 | W LANTAU | 1 | 28 | ON | HKCRP | 808435 | 800677 | SUMMER | NONE | P |
| 15-Aug-19 | 3 | 1143 | 1 | W LANTAU | 3 | 20 | ON | HKCRP | 806528 | 801776 | SUMMER | NONE | P |
| 15-Aug-19 | 4 | 1153 | 2 | W LANTAU | 3 | 389 | ON | HKCRP | 806408 | 800889 | SUMMER | NONE | P |
| 15-Aug-19 | 5 | 1250 | 6 | SW LANTAU | 2 | 44 | ON | HKCRP | 805346 | 805497 | SUMMER | NONE | P |
| 15-Aug-19 | 6 | 1437 | 1 | SW LANTAU | 2 | 39 | ON | HKCRP | 807773 | 810977 | SUMMER | NONE | S |
| 15-Aug-19 | 9 | 1553 | 1 | SE LANTAU | 3 | 183 | ON | HKCRP | 806296 | 813491 | SUMMER | NONE | P |
| 20-Aug-19 | 1 | 1331 | 1 | W LANTAU | 2 | 348 | ON | HKCRP | 814280 | 801690 | SUMMER | NONE | S |
| 20-Aug-19 | 2 | 1341 | 1 | W LANTAU | 2 | 99 | ON | HKCRP | 813481 | 802317 | SUMMER | NONE | P |
| 20-Aug-19 | 3 | 1414 | 9 | W LANTAU | 2 | 105 | ON | HKCRP | 811127 | 800168 | SUMMER | NONE | S |
| 20-Aug-19 | 4 | 1440 | 6 | W LANTAU | 4 | 281 | ON | HKCRP | 809422 | 800205 | SUMMER | NONE | P |
| 20-Aug-19 | 5 | 1510 | 3 | W LANTAU | 4 | ND | OFF | HKCRP | 806229 | 801910 | SUMMER | NONE | |
| 28-Aug-19 | 1 | 1343 | 2 | SW LANTAU | 2 | ND | OFF | HKCRP | 805884 | 802414 | SUMMER | NONE | |
| 29-Aug-19 | 1 | 1521 | 1 | NW LANTAU | 2 | 87 | ON | HKCRP | 814650 | 804701 | SUMMER | NONE | P |
| 11-Sep-19 | 1 | 1404 | 1 | W LANTAU | 3 | 451 | ON | HKCRP | 813827 | 801380 | AUTUMN | NONE | S |
| 11-Sep-19 | 2 | 1425 | 3 | W LANTAU | 3 | 306 | ON | HKCRP | 812385 | 802387 | AUTUMN | NONE | P |
| 11-Sep-19 | 3 | 1504 | 1 | W LANTAU | 2 | 34 | ON | HKCRP | 808379 | 800945 | AUTUMN | NONE | P |
| 11-Sep-19 | 4 | 1518 | 7 | W LANTAU | 2 | 302 | ON | HKCRP | 807027 | 801674 | AUTUMN | NONE | S |
| 12-Sep-19 | 1 | 1013 | 3 | W LANTAU | 2 | 18 | ON | HKCRP | 814430 | 803845 | AUTUMN | NONE | S |
| 12-Sep-19 | 2 | 1023 | 2 | W LANTAU | 2 | 606 | ON | HKCRP | 812374 | 802109 | AUTUMN | NONE | S |
| 12-Sep-19 | 3 | 1026 | 5 | W LANTAU | 2 | 13 | ON | HKCRP | 811489 | 801694 | AUTUMN | NONE | S |
| 12-Sep-19 | 4 | 1040 | 4 | W LANTAU | 2 | 25 | ON | HKCRP | 807980 | 801181 | AUTUMN | NONE | S |

## Appendix II.  (cont'd.)

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | TYPE | NORTHING | EASTING | SEASON | BOAT ASSOC. | P/S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17-Sep-19 | 1 | 1321 | 1 | W LANTAU | 3 | ND | OFF | HKCRP | 812761 | 802398 | AUTUMN | NONE | |
| 19-Sep-19 | 1 | 1014 | 1 | W LANTAU | 3 | 199 | ON | HKCRP | 815395 | 803208 | AUTUMN | NONE | S |
| 19-Sep-19 | 2 | 1048 | 1 | W LANTAU | 3 | 76 | ON | HKCRP | 808637 | 799595 | AUTUMN | NONE | S |
| 25-Sep-19 | 1 | 1407 | 10 | SW LANTAU | 2 | 153 | ON | HKCRP | 806183 | 802683 | AUTUMN | NONE | S |
| 30-Sep-19 | 2 | 1307 | 3 | W LANTAU | 2 | ND | OFF | HELI | 806817 | 801478 | AUTUMN | NONE | |
| 30-Sep-19 | 3 | 1309 | 2 | W LANTAU | 2 | ND | OFF | HELI | 808147 | 800914 | AUTUMN | NONE | |
| 30-Sep-19 | 4 | 1310 | 4 | W LANTAU | 2 | ND | OFF | HELI | 810228 | 801279 | AUTUMN | NONE | |
| 2-Oct-19 | 1 | 1327 | 2 | SW LANTAU | 2 | ND | OFF | HKCRP | 806150 | 802631 | AUTUMN | NONE | |
| 9-Oct-19 | 1 | 1340 | 1 | W LANTAU | 2 | 407 | ON | HKCRP | 813185 | 801152 | AUTUMN | NONE | S |
| 9-Oct-19 | 2 | 1410 | 5 | W LANTAU | 2 | 406 | ON | HKCRP | 810427 | 801331 | AUTUMN | NONE | P |
| 9-Oct-19 | 3 | 1443 | 9 | W LANTAU | 3 | 329 | ON | HKCRP | 808435 | 800605 | AUTUMN | NONE | P |
| 9-Oct-19 | 4 | 1510 | 5 | SW LANTAU | 3 | ND | OFF | HKCRP | 806315 | 802900 | AUTUMN | NONE | |
| 10-Oct-19 | 1 | 1017 | 1 | W LANTAU | 2 | 65 | ON | HKCRP | 813414 | 802812 | AUTUMN | NONE | S |
| 10-Oct-19 | 2 | 1029 | 1 | W LANTAU | 2 | 148 | ON | HKCRP | 810626 | 801497 | AUTUMN | NONE | S |
| 14-Oct-19 | 1 | 1421 | 10 | W LANTAU | 2 | 102 | ON | HKCRP | 809322 | 800195 | AUTUMN | NONE | P |
| 14-Oct-19 | 2 | 1455 | 3 | W LANTAU | 2 | 86 | ON | HKCRP | 807403 | 801623 | AUTUMN | NONE | S |
| 16-Oct-19 | 1 | 1348 | 1 | W LANTAU | 2 | 61 | ON | HKCRP | 810637 | 801579 | AUTUMN | NONE | S |
| 16-Oct-19 | 2 | 1405 | 2 | W LANTAU | 2 | 136 | ON | HKCRP | 813845 | 803236 | AUTUMN | NONE | S |
| 23-Oct-19 | 1 | 1030 | 3 | W LANTAU | 2 | 874 | ON | HKCRP | 813115 | 802543 | AUTUMN | NONE | S |
| 23-Oct-19 | 2 | 1037 | 2 | W LANTAU | 1 | ND | OFF | HKCRP | 812286 | 802129 | AUTUMN | NONE | |
| 23-Oct-19 | 3 | 1053 | 3 | W LANTAU | 1 | 45 | ON | HKCRP | 808789 | 800884 | AUTUMN | NONE | S |
| 4-Nov-19 | 1 | 1306 | 3 | SW LANTAU | 2 | ND | OFF | HKCRP | 806492 | 803179 | AUTUMN | NONE | |
| 7-Nov-19 | 1 | 1033 | 2 | W LANTAU | 3 | 6 | ON | HKCRP | 809287 | 800999 | AUTUMN | NONE | S |
| 7-Nov-19 | 2 | 1054 | 1 | SW LANTAU | 3 | ND | OFF | HKCRP | 804877 | 802298 | AUTUMN | NONE | |
| 21-Nov-19 | 1 | 1019 | 4 | W LANTAU | 2 | 48 | ON | HKCRP | 814563 | 804021 | AUTUMN | NONE | S |
| 21-Nov-19 | 2 | 1028 | 2 | W LANTAU | 2 | 157 | ON | HKCRP | 813458 | 802802 | AUTUMN | NONE | S |
| 21-Nov-19 | 3 | 1034 | 2 | W LANTAU | 2 | 500 | ON | HKCRP | 812595 | 802254 | AUTUMN | NONE | S |
| 4-Dec-19 | 1 | 1320 | 4 | SW LANTAU | 3 | 30 | ON | HKCRP | 806203 | 803498 | WINTER | NONE | P |
| 10-Dec-19 | 1 | 1424 | 2 | W LANTAU | 2 | 41 | ON | HKCRP | 811446 | 801241 | WINTER | NONE | P |
| 10-Dec-19 | 2 | 1512 | 1 | SW LANTAU | 2 | ND | OFF | HKCRP | 806358 | 803849 | WINTER | NONE | |
| 16-Dec-19 | 1 | 1334 | 1 | W LANTAU | 1 | 242 | ON | HKCRP | 813579 | 803173 | WINTER | NONE | P |
| 16-Dec-19 | 2 | 1409 | 2 | W LANTAU | 1 | 103 | ON | HKCRP | 809410 | 800370 | WINTER | NONE | P |
| 23-Dec-19 | 1 | 1206 | 3 | W LANTAU | 3 | 129 | ON | HKCRP | 806462 | 801673 | WINTER | NONE | P |
| 3-Jan-20 | 1 | 1026 | 1 | W LANTAU | 2 | 565 | ON | HKCRP | 810228 | 801279 | WINTER | NONE | S |

**Appendix II.  (cont'd.)**

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | TYPE | NORTHING | EASTING | SEASON | BOAT ASSOC. | P/S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-Jan-20 | 2 | 1037 | 1 | W LANTAU | 2 | 743 | ON | HKCRP | 808191 | 801120 | WINTER | NONE | S |
| 3-Jan-20 | 3 | 1049 | 5 | SW LANTAU | 2 | ND | OFF | HKCRP | 806239 | 802394 | WINTER | NONE | |
| 3-Jan-20 | 4 | 1136 | 5 | SW LANTAU | 2 | 539 | ON | HKCRP | 806079 | 804498 | WINTER | NONE | P |
| 3-Jan-20 | 6 | 1317 | 1 | SW LANTAU | 2 | 87 | ON | HKCRP | 807445 | 808594 | WINTER | NONE | P |
| 6-Jan-20 | 1 | 1352 | 2 | W LANTAU | 2 | 86 | ON | HKCRP | 810453 | 799826 | WINTER | NONE | S |
| 6-Jan-20 | 2 | 1401 | 2 | W LANTAU | 2 | 0 | ON | HKCRP | 810507 | 800063 | WINTER | NONE | P |
| 8-Jan-20 | 1 | 1250 | 8 | SW LANTAU | 2 | ND | OFF | HKCRP | 806085 | 802012 | WINTER | NONE | |
| 8-Jan-20 | 2 | 1314 | 2 | SW LANTAU | 1 | 755 | ON | HKCRP | 806624 | 803581 | WINTER | NONE | P |
| 15-Jan-20 | 1 | 1022 | 5 | W LANTAU | 3 | 45 | ON | HKCRP | 812640 | 802233 | WINTER | NONE | S |
| 15-Jan-20 | 2 | 1045 | 1 | W LANTAU | 3 | 2 | ON | HKCRP | 809930 | 800918 | WINTER | NONE | S |
| 15-Jan-20 | 3 | 1055 | 8 | W LANTAU | 3 | 31 | ON | HKCRP | 808557 | 800595 | WINTER | NONE | S |
| 22-Jan-20 | 7 | 1418 | 5 | SW LANTAU | 1 | 126 | ON | HKCRP | 806272 | 802487 | WINTER | NONE | S |
| 10-Feb-20 | 1 | 1332 | 1 | W LANTAU | 2 | 155 | ON | HKCRP | 810538 | 801362 | WINTER | NONE | S |
| 10-Feb-20 | 2 | 1350 | 3 | W LANTAU | 2 | 50 | ON | HKCRP | 807526 | 801407 | WINTER | NONE | S |
| 24-Feb-20 | 1 | 1423 | 3 | W LANTAU | 3 | 207 | ON | HKCRP | 805434 | 800722 | WINTER | NONE | P |
| 3-Mar-20 | 1 | 1437 | 1 | W LANTAU | 3 | 185 | ON | HKCRP | 808424 | 800615 | SPRING | NONE | P |
| 3-Mar-20 | 2 | 1505 | 2 | W LANTAU | 3 | 175 | ON | HKCRP | 805478 | 801114 | SPRING | NONE | P |
| 3-Mar-20 | 3 | 1515 | 3 | W LANTAU | 3 | ND | OFF | HKCRP | 805476 | 801722 | SPRING | NONE | |
| 3-Mar-20 | 4 | 1518 | 1 | SW LANTAU | 3 | ND | OFF | HKCRP | 805862 | 802404 | SPRING | NONE | |
| 6-Mar-20 | 1 | 1321 | 4 | SW LANTAU | 3 | 65 | ON | HKCRP | 804378 | 802535 | SPRING | NONE | P |
| 11-Mar-20 | 1 | 1025 | 1 | W LANTAU | 2 | 157 | ON | HKCRP | 813547 | 802823 | SPRING | NONE | S |
| 11-Mar-20 | 2 | 1101 | 1 | W LANTAU | 2 | 16 | ON | HKCRP | 806574 | 801065 | SPRING | NONE | S |
| 18-Mar-20 | 1 | 1322 | 2 | DEEP BAY | 2 | 132 | ON | HKCRP | 830469 | 807411 | SPRING | NONE | P |

## Appendix III. HKCRP-AFCD Finless Porpoise Sighting Database (April 2019 - March 2020)

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

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | NORTHING | EASTING | SEASON | P/S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8-Apr-19 | 1 | 1013 | 3 | LAMMA | 2 | 81 | ON | 807459 | 822979 | SPRING | P |
| 8-Apr-19 | 2 | 1054 | 8 | LAMMA | 2 | 161 | ON | 805428 | 829691 | SPRING | S |
| 8-Apr-19 | 3 | 1131 | 2 | LAMMA | 1 | 64 | ON | 805444 | 822029 | SPRING | P |
| 17-Apr-19 | 1 | 1214 | 2 | SE LANTAU | 2 | 3 | ON | 801434 | 813772 | SPRING | S |
| 17-Apr-19 | 2 | 1235 | 1 | SE LANTAU | 2 | 47 | ON | 805200 | 813468 | SPRING | P |
| 17-Apr-19 | 3 | 1241 | 2 | SE LANTAU | 2 | 456 | ON | 805621 | 813448 | SPRING | P |
| 17-Apr-19 | 4 | 1324 | 2 | SW LANTAU | 2 | 42 | ON | 806310 | 811521 | SPRING | P |
| 17-Apr-19 | 5 | 1338 | 2 | SW LANTAU | 2 | 106 | ON | 803841 | 811527 | SPRING | P |
| 17-Apr-19 | 6 | 1345 | 1 | SW LANTAU | 2 | 244 | ON | 803520 | 811506 | SPRING | P |
| 17-Apr-19 | 7 | 1353 | 3 | SW LANTAU | 2 | 71 | ON | 802157 | 811514 | SPRING | P |
| 17-Apr-19 | 8 | 1403 | 2 | SW LANTAU | 2 | 72 | ON | 800796 | 810862 | SPRING | S |
| 25-Apr-19 | 3 | 1548 | 5 | SW LANTAU | 2 | ND | OFF | 804483 | 811539 | SPRING | |
| 14-May-19 | 8 | 1459 | 2 | SE LANTAU | 1 | ND | OFF | 808786 | 814525 | SPRING | |
| 28-May-19 | 1 | 1527 | 1 | LAMMA | 2 | 47 | ON | 804507 | 836766 | SPRING | P |
| 28-May-19 | 2 | 1623 | 2 | LAMMA | 1 | 249 | ON | 807530 | 834734 | SPRING | S |
| 4-Jun-19 | 2 | 1415 | 2 | SE LANTAU | 2 | 47 | ON | 805157 | 812571 | SUMMER | P |
| 4-Jun-19 | 3 | 1450 | 1 | SE LANTAU | 1 | 333 | ON | 804235 | 814447 | SUMMER | P |
| 4-Jun-19 | 4 | 1555 | 3 | SE LANTAU | 2 | 72 | ON | 804949 | 818480 | SUMMER | P |
| 11-Jun-19 | 1 | 1103 | 8 | SE LANTAU | 1 | 124 | ON | 804740 | 817562 | SUMMER | P |
| 11-Jun-19 | 2 | 1230 | 2 | SE LANTAU | 1 | 157 | ON | 804347 | 813446 | SUMMER | P |
| 11-Jun-19 | 3 | 1319 | 7 | SW LANTAU | 1 | 483 | ON | 805690 | 811499 | SUMMER | P |
| 11-Jun-19 | 4 | 1326 | 4 | SW LANTAU | 2 | 65 | ON | 804970 | 811519 | SUMMER | P |
| 11-Jun-19 | 5 | 1336 | 3 | SW LANTAU | 2 | ND | OFF | 803342 | 811475 | SUMMER | |
| 11-Jun-19 | 6 | 1359 | 2 | SW LANTAU | 2 | 142 | ON | 800932 | 809511 | SUMMER | P |
| 19-Jun-19 | 1 | 1017 | 2 | PO TOI | 1 | 33 | ON | 807423 | 848139 | SUMMER | P |
| 19-Jun-19 | 2 | 1042 | 11 | PO TOI | 1 | 175 | ON | 806451 | 850852 | SUMMER | P |
| 19-Jun-19 | 3 | 1054 | 4 | PO TOI | 1 | 67 | ON | 806439 | 849759 | SUMMER | P |
| 19-Jun-19 | 4 | 1136 | 3 | PO TOI | 1 | 248 | ON | 806036 | 841056 | SUMMER | S |
| 19-Jun-19 | 5 | 1149 | 4 | PO TOI | 2 | 12 | ON | 805516 | 842015 | SUMMER | P |
| 19-Jun-19 | 6 | 1431 | 2 | PO TOI | 1 | 244 | ON | 803495 | 850793 | SUMMER | P |
| 19-Jun-19 | 7 | 1449 | 2 | PO TOI | 1 | 212 | ON | 802498 | 851217 | SUMMER | P |
| 19-Jun-19 | 8 | 1456 | 1 | PO TOI | 1 | 51 | ON | 802475 | 849690 | SUMMER | P |
| 19-Jun-19 | 9 | 1609 | 3 | PO TOI | 2 | 175 | ON | 801542 | 846225 | SUMMER | P |
| 19-Jun-19 | 10 | 1645 | 7 | PO TOI | 1 | ND | OFF | 806058 | 840953 | SUMMER | |
| 17-Jul-19 | 1 | 1021 | 8 | NINEPINS | 1 | 75 | ON | 808498 | 848304 | SUMMER | P |
| 17-Jul-19 | 2 | 1032 | 1 | NINEPINS | 1 | 492 | ON | 808543 | 849623 | SUMMER | P |
| 17-Jul-19 | 3 | 1043 | 3 | NINEPINS | 1 | 130 | ON | 808512 | 851500 | SUMMER | P |
| 17-Jul-19 | 4 | 1052 | 2 | NINEPINS | 1 | 62 | ON | 808546 | 852686 | SUMMER | P |
| 17-Jul-19 | 5 | 1118 | 3 | NINEPINS | 1 | 233 | ON | 808486 | 857831 | SUMMER | P |
| 17-Jul-19 | 6 | 1456 | 4 | NINEPINS | 2 | 357 | ON | 814546 | 860049 | SUMMER | P |
| 6-Aug-19 | 1 | 1253 | 1 | PO TOI | 1 | 162 | ON | 805389 | 851916 | SUMMER | P |
| 15-Aug-19 | 7 | 1536 | 1 | SE LANTAU | 3 | 145 | ON | 803771 | 813487 | SUMMER | P |
| 15-Aug-19 | 8 | 1543 | 1 | SE LANTAU | 3 | 63 | ON | 804912 | 813540 | SUMMER | P |
| 28-Aug-19 | 2 | 1458 | 3 | SE LANTAU | 2 | 83 | ON | 801434 | 813700 | SUMMER | S |
| 16-Sep-19 | 1 | 1208 | 1 | SE LANTAU | 2 | ND | OFF | 801468 | 813174 | AUTUMN | |
| 16-Sep-19 | 2 | 1215 | 13 | SE LANTAU | 1 | 43 | ON | 801470 | 812204 | AUTUMN | S |
| 16-Sep-19 | 3 | 1236 | 1 | SE LANTAU | 2 | 35 | ON | 804105 | 812446 | AUTUMN | P |
| 30-Sep-19 | 1 | 1300 | 1 | SE LANTAU | 2 | ND | OFF | 803462 | 813136 | AUTUMN | |
| 2-Dec-19 | 1 | 1409 | 1 | SE LANTAU | 3 | 89 | ON | 802510 | 812433 | WINTER | P |
| 5-Dec-19 | 1 | 1222 | 1 | SW LANTAU | 3 | 152 | ON | 804926 | 811457 | WINTER | P |
| 9-Dec-19 | 1 | 1246 | 1 | SE LANTAU | 2 | 81 | ON | 806802 | 815616 | WINTER | S |
| 11-Dec-19 | 1 | 1503 | 1 | PO TOI | 2 | 148 | ON | 801505 | 854746 | WINTER | P |
| 17-Dec-19 | 1 | 1046 | 3 | SE LANTAU | 1 | 270 | ON | 803598 | 818479 | WINTER | P |
| 17-Dec-19 | 2 | 1139 | 1 | SE LANTAU | 1 | 37 | ON | 804398 | 816479 | WINTER | P |
| 17-Dec-19 | 3 | 1206 | 1 | SE LANTAU | 1 | 147 | ON | 802552 | 814486 | WINTER | P |
| 17-Dec-19 | 4 | 1303 | 1 | SE LANTAU | 0 | 123 | ON | 805655 | 812458 | WINTER | P |
| 17-Dec-19 | 5 | 1322 | 2 | SE LANTAU | 0 | 110 | ON | 801569 | 812442 | WINTER | P |
| 17-Dec-19 | 6 | 1448 | 3 | SW LANTAU | 0 | 281 | ON | 800612 | 808530 | WINTER | P |

## Appendix III. (cont'd)

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | NORTHING | EASTING | SEASON | P/S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3-Jan-20 | 5 | 1303 | 1 | SW LANTAU | 2 | 11 | ON | 804854 | 808177 | WINTER | S |
| 3-Jan-20 | 7 | 1400 | 1 | SE LANTAU | 4 | 178 | ON | 804227 | 812456 | WINTER | P |
| 10-Jan-20 | 1 | 1104 | 2 | SE LANTAU | 2 | 314 | ON | 807985 | 817484 | WINTER | P |
| 10-Jan-20 | 2 | 1230 | 1 | SE LANTAU | 3 | 261 | ON | 807126 | 813471 | WINTER | P |
| 10-Jan-20 | 3 | 1256 | 5 | SE LANTAU | 4 | 99 | ON | 802188 | 813278 | WINTER | P |
| 22-Jan-20 | 1 | 1010 | 1 | SE LANTAU | 2 | ND | OFF | 805845 | 819564 | WINTER | |
| 22-Jan-20 | 2 | 1056 | 8 | SE LANTAU | 2 | 58 | ON | 805774 | 814480 | WINTER | P |
| 22-Jan-20 | 3 | 1119 | 1 | SE LANTAU | 1 | 111 | ON | 809306 | 814495 | WINTER | P |
| 22-Jan-20 | 4 | 1145 | 6 | SE LANTAU | 1 | 213 | ON | 806608 | 812460 | WINTER | P |
| 22-Jan-20 | 5 | 1215 | 2 | SE LANTAU | 2 | 11 | ON | 802300 | 812484 | WINTER | P |
| 22-Jan-20 | 6 | 1221 | 2 | SE LANTAU | 2 | ND | OFF | 801459 | 812060 | WINTER | |
| 5-Feb-20 | 1 | 1515 | 3 | SW LANTAU | 2 | 51 | ON | 804965 | 808126 | WINTER | S |
| 7-Feb-20 | 1 | 1010 | 2 | SE LANTAU | 2 | 76 | ON | 807119 | 819493 | WINTER | P |
| 7-Feb-20 | 2 | 1048 | 1 | SE LANTAU | 3 | 83 | ON | 802116 | 817487 | WINTER | P |
| 7-Feb-20 | 3 | 1226 | 2 | SE LANTAU | 3 | 50 | ON | 804369 | 813488 | WINTER | P |
| 7-Feb-20 | 4 | 1321 | 1 | SW LANTAU | 3 | 10 | ON | 804173 | 811507 | WINTER | P |
| 7-Feb-20 | 5 | 1338 | 2 | SW LANTAU | 3 | 43 | ON | 801450 | 810512 | WINTER | S |
| 10-Feb-20 | 3 | 1426 | 2 | SW LANTAU | 2 | 68 | ON | 802424 | 805222 | WINTER | S |
| 10-Feb-20 | 4 | 1528 | 7 | SW LANTAU | 2 | 69 | ON | 802153 | 807481 | WINTER | P |
| 10-Feb-20 | 5 | 1552 | 2 | SW LANTAU | 1 | ND | OFF | 803443 | 811124 | WINTER | |
| 10-Feb-20 | 6 | 1556 | 1 | SW LANTAU | 2 | ND | OFF | 803951 | 811858 | WINTER | |
| 10-Feb-20 | 7 | 1601 | 3 | SE LANTAU | 2 | ND | OFF | 804956 | 813200 | WINTER | |
| 11-Feb-20 | 1 | 1115 | 2 | LAMMA | 2 | 271 | ON | 805401 | 821142 | WINTER | P |
| 11-Feb-20 | 2 | 1414 | 1 | SE LANTAU | 3 | 29 | ON | 803966 | 816396 | WINTER | P |
| 11-Feb-20 | 3 | 1453 | 1 | SE LANTAU | 3 | 100 | ON | 805674 | 814542 | WINTER | P |
| 12-Feb-20 | 1 | 1516 | 5 | SW LANTAU | 2 | 86 | ON | 802043 | 807460 | WINTER | P |
| 12-Feb-20 | 2 | 1524 | 3 | SW LANTAU | 1 | 101 | ON | 801367 | 807407 | WINTER | P |
| 12-Feb-20 | 3 | 1531 | 2 | SW LANTAU | 1 | ND | OFF | 801355 | 808006 | WINTER | |
| 12-Feb-20 | 4 | 1535 | 1 | SW LANTAU | 1 | ND | OFF | 801686 | 808996 | WINTER | |
| 12-Feb-20 | 5 | 1600 | 1 | SE LANTAU | 1 | ND | OFF | 806438 | 814924 | WINTER | |
| 21-Feb-20 | 1 | 1211 | 1 | SW LANTAU | 3 | 139 | ON | 804675 | 803484 | WINTER | P |
| 21-Feb-20 | 2 | 1448 | 3 | SE LANTAU | 4 | ND | OFF | 804380 | 813570 | WINTER | |
| 21-Feb-20 | 3 | 1543 | 2 | SE LANTAU | 2 | 190 | ON | 805584 | 815459 | WINTER | P |
| 25-Feb-20 | 1 | 1005 | 2 | LAMMA | 2 | 47 | ON | 806456 | 834641 | WINTER | P |
| 25-Feb-20 | 2 | 1135 | 2 | LAMMA | 1 | 132 | ON | 802470 | 832547 | WINTER | P |
| 25-Feb-20 | 3 | 1200 | 3 | LAMMA | 1 | 187 | ON | 802428 | 826884 | WINTER | P |
| 25-Feb-20 | 4 | 1211 | 3 | LAMMA | 1 | 110 | ON | 802485 | 825038 | WINTER | P |
| 25-Feb-20 | 5 | 1236 | 2 | LAMMA | 1 | 488 | ON | 803474 | 820500 | WINTER | S |
| 25-Feb-20 | 6 | 1306 | 1 | LAMMA | 1 | 68 | ON | 804511 | 825792 | WINTER | P |
| 25-Feb-20 | 7 | 1457 | 1 | SE LANTAU | 2 | 102 | ON | 802438 | 816445 | WINTER | P |
| 2-Mar-20 | 1 | 1034 | 1 | SE LANTAU | 2 | 101 | ON | 808629 | 815897 | SPRING | S |
| 2-Mar-20 | 2 | 1109 | 2 | SE LANTAU | 3 | 44 | ON | 804112 | 814962 | SPRING | S |
| 6-Mar-20 | 2 | 1507 | 2 | SW LANTAU | 2 | 50 | ON | 802685 | 807647 | SPRING | S |
| 6-Mar-20 | 3 | 1522 | 2 | SW LANTAU | 2 | 65 | ON | 804655 | 808104 | SPRING | S |
| 6-Mar-20 | 4 | 1536 | 3 | SW LANTAU | 2 | 35 | ON | 807301 | 808542 | SPRING | P |
| 10-Mar-20 | 1 | 1142 | 1 | SE LANTAU | 2 | 34 | ON | 805374 | 815500 | SPRING | P |
| 10-Mar-20 | 2 | 1147 | 2 | SE LANTAU | 2 | 45 | ON | 804765 | 815510 | SPRING | P |
| 10-Mar-20 | 3 | 1208 | 1 | SE LANTAU | 2 | 10 | ON | 801445 | 813741 | SPRING | S |
| 13-Mar-20 | 1 | 1433 | 2 | LAMMA | 2 | 65 | ON | 805544 | 822090 | SPRING | P |
| 13-Mar-20 | 2 | 1442 | 1 | LAMMA | 2 | 214 | ON | 805545 | 820595 | SPRING | P |
| 23-Mar-20 | 1 | 1027 | 2 | SE LANTAU | 1 | 20 | ON | 804374 | 818521 | SPRING | P |
| 23-Mar-20 | 2 | 1154 | 1 | SE LANTAU | 2 | 23 | ON | 805010 | 814489 | SPRING | P |
| 23-Mar-20 | 3 | 1224 | 3 | SE LANTAU | 2 | 117 | ON | 802931 | 812392 | SPRING | P |
| 23-Mar-20 | 4 | 1232 | 3 | SE LANTAU | 2 | 126 | ON | 804548 | 812446 | SPRING | P |
| 23-Mar-20 | 5 | 1307 | 1 | SW LANTAU | 1 | ND | OFF | 807397 | 810584 | SPRING | |
| 23-Mar-20 | 6 | 1326 | 2 | SW LANTAU | 2 | 169 | ON | 802846 | 810515 | SPRING | P |
| 23-Mar-20 | 7 | 1331 | 3 | SW LANTAU | 2 | 83 | ON | 802314 | 810545 | SPRING | P |
| 23-Mar-20 | 8 | 1355 | 2 | SW LANTAU | 2 | 4 | ON | 801133 | 808531 | SPRING | P |
| 23-Mar-20 | 9 | 1402 | 2 | SW LANTAU | 2 | 129 | ON | 801664 | 808512 | SPRING | P |
| 23-Mar-20 | 10 | 1439 | 1 | SW LANTAU | 1 | 134 | ON | 807611 | 808337 | SPRING | S |
| 23-Mar-20 | 11 | 1513 | 10 | SW LANTAU | 1 | 28 | ON | 802886 | 806461 | SPRING | P |
| 23-Mar-20 | 12 | 1531 | 2 | SW LANTAU | 2 | ND | OFF | 801478 | 807325 | SPRING | |
| 23-Mar-20 | 13 | 1533 | 2 | SW LANTAU | 2 | ND | OFF | 801621 | 807903 | SPRING | |

## Appendix III. (cont'd)

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | NORTHING | EASTING | SEASON | P/S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 23-Mar-20 | 14 | 1541 | 4 | SW LANTAU | 1 | ND | OFF | 802448 | 809978 | SPRING | |
| 23-Mar-20 | 15 | 1552 | 2 | SW LANTAU | 1 | ND | OFF | 803441 | 812383 | SPRING | |
| 23-Mar-20 | 16 | 1629 | 1 | SE LANTAU | 0 | ND | OFF | 806817 | 821947 | SPRING | |

## Appendix IV. Individual dolphins identified during AFCD surveys (April 2019 to March 2020)

(***in bold & italics: new individuals***)

| DOLPHIN ID | DATE | STG# | AREA |
|---|---|---|---|
| CH12 | 23/05/19 | 3 | WL |
| | 06/06/19 | 3 | SWL |
| | 15/07/19 | 1 | WL |
| | 15/07/19 | 2 | WL |
| | 15/07/19 | 3 | WL |
| | 15/07/19 | 4 | SWL |
| | 23/07/19 | 6 | WL |
| | 09/10/19 | 4 | SWL |
| | 04/11/19 | 1 | SWL |
| | 08/01/20 | 1 | SWL |
| CH38 | 03/01/20 | 3 | SWL |
| | 03/01/20 | 4 | SWL |
| | 15/01/20 | 3 | WL |
| | 06/03/20 | 1 | SWL |
| CH108 | 07/05/19 | 2 | WL |
| | 09/10/19 | 2 | WL |
| | 08/01/20 | 1 | SWL |
| | 22/01/20 | 7 | SWL |
| CH112 | 14/05/19 | 5 | WL |
| | 15/07/19 | 6 | SWL |
| CH113 | 07/05/19 | 3 | WL |
| | 14/05/19 | 5 | WL |
| | 15/07/19 | 5 | SWL |
| CH141 | 09/10/19 | 4 | SWL |
| CH153 | 07/05/19 | 2 | WL |
| CH205 | 24/07/19 | 4 | SWL |
| CH239 | 08/01/20 | 1 | SWL |
| CH249 | 14/05/19 | 7 | SWL |
| | 05/06/19 | 2 | WL |
| CH287 | 24/07/19 | 4 | SWL |
| CH321 | 24/02/20 | 1 | WL |
| CH322 | 24/07/19 | 2 | WL |
| NL33 | 12/09/19 | 1 | WL |
| NL37 | 20/08/19 | 5 | WL |
| | 08/01/20 | 1 | SWL |
| NL80 | 23/05/19 | 4 | WL |
| NL103 | 23/07/19 | 5 | WL |
| NL120 | 04/11/19 | 1 | SWL |
| NL156 | 15/01/20 | 3 | WL |
| NL202 | 18/03/20 | 1 | DB |
| NL206 | 15/07/19 | 4 | SWL |
| | 11/09/19 | 4 | WL |
| | 14/10/19 | 1 | WL |
| NL212 | 14/05/19 | 6 | SWL |
| | 16/05/19 | 1 | SWL |
| | 05/07/19 | 1 | SWL |
| | 15/07/19 | 11 | SWL |
| | 29/07/19 | 2 | SWL |
| | 29/07/19 | 5 | SWL |
| | 15/08/19 | 5 | SWL |
| NL224 | 24/07/19 | 2 | WL |
| | 09/10/19 | 2 | WL |
| NL226 | 23/07/19 | 5 | WL |
| | 14/10/19 | 1 | WL |
| | 14/10/19 | 2 | WL |
| NL242 | 20/08/19 | 5 | WL |
| NL247 | 07/05/19 | 2 | WL |
| | 16/07/19 | 3 | WL |
| | 24/07/19 | 2 | WL |
| NL249 | 14/08/19 | 1 | SWL |

| DOLPHIN ID | DATE | STG# | AREA |
|---|---|---|---|
| NL259 | 14/05/19 | 2 | WL |
| | 11/09/19 | 1 | WL |
| | 14/10/19 | 1 | WL |
| | 21/11/19 | 2 | WL |
| NL269 | 15/07/19 | 12 | SWL |
| NL286 | 18/03/20 | 1 | DB |
| NL293 | 06/06/19 | 1 | WL |
| | 23/07/19 | 1 | WL |
| NL299 | 15/08/19 | 2 | WL |
| | 20/08/19 | 3 | WL |
| NL311 | 14/05/19 | 5 | WL |
| NL317 | 23/07/19 | 2 | WL |
| NL322 | 21/11/19 | 1 | WL |
| NL328 | 21/11/19 | 1 | WL |
| NL331 | 24/04/19 | 1 | SWL |
| | 15/07/19 | 5 | SWL |
| SL40 | 14/05/19 | 7 | SWL |
| | 05/07/19 | 1 | SWL |
| | 15/07/19 | 6 | SWL |
| | 25/09/19 | 1 | SWL |
| | 04/11/19 | 1 | SWL |
| | 03/01/20 | 3 | SWL |
| | 03/01/20 | 4 | SWL |
| SL42 | 24/07/19 | 2 | WL |
| SL44 | 11/07/19 | 1 | SWL |
| | 15/07/19 | 4 | SWL |
| SL58 | 16/05/19 | 1 | SWL |
| SL60 | 16/05/19 | 2 | SWL |
| | 05/07/19 | 1 | SWL |
| | 15/07/19 | 5 | SWL |
| | 15/08/19 | 6 | SWL |
| | 02/10/19 | 1 | SWL |
| | 09/10/19 | 4 | SWL |
| | 16/12/19 | 1 | WL |
| | 03/01/20 | 6 | SWL |
| | 10/02/20 | 2 | WL |
| SL66 | 16/12/19 | 2 | WL |
| ***SL68*** | ***29/07/19*** | ***4*** | ***SWL*** |
| WL05 | 14/05/19 | 5 | WL |
| WL15 | 15/08/19 | 5 | SWL |
| | 21/11/19 | 1 | WL |
| | 24/02/20 | 1 | WL |
| | 26/02/20 | 1 | SWL |
| | 26/02/20 | 2 | SWL |
| WL21 | 15/07/19 | 3 | WL |
| | 15/08/19 | 1 | WL |
| WL29 | 15/07/19 | 5 | SWL |
| WL42 | 15/01/20 | 3 | WL |
| WL58 | 23/07/19 | 6 | WL |
| WL61 | 14/05/19 | 7 | SWL |
| | 15/01/20 | 3 | WL |
| | 10/02/20 | 1 | WL |
| WL68 | 05/07/19 | 1 | SWL |
| | 25/09/19 | 1 | SWL |
| | 09/10/19 | 3 | WL |
| WL72 | 05/07/19 | 1 | SWL |
| | 29/07/19 | 2 | SWL |
| | 09/10/19 | 2 | WL |
| WL79 | 25/04/19 | 1 | WL |
| | 14/05/19 | 1 | WL |

| DOLPHIN ID | DATE | STG# | AREA |
|---|---|---|---|
| WL91 | 23/07/19 | 4 | WL |
| | 20/08/19 | 2 | WL |
| | 11/09/19 | 4 | WL |
| | 14/10/19 | 1 | WL |
| | 15/01/20 | 1 | WL |
| | 06/03/20 | 1 | SWL |
| WL92 | 15/07/19 | 3 | WL |
| | 15/07/19 | 5 | SWL |
| | 23/10/19 | 3 | WL |
| WL94 | 20/08/19 | 3 | WL |
| | 06/01/20 | 2 | WL |
| | 08/01/20 | 1 | SWL |
| WL98 | 15/07/19 | 3 | WL |
| WL100 | 29/07/19 | 2 | SWL |
| WL109 | 14/05/19 | 3 | WL |
| | 16/05/19 | 1 | SWL |
| | 29/07/19 | 2 | SWL |
| | 20/08/19 | 4 | WL |
| WL114 | 09/05/19 | 1 | SWL |
| | 14/05/19 | 7 | SWL |
| | 20/08/19 | 3 | WL |
| | 14/10/19 | 1 | WL |
| WL118 | 14/05/19 | 3 | WL |
| | 05/06/19 | 2 | WL |
| | 15/07/19 | 5 | SWL |
| | 16/07/19 | 4 | WL |
| | 20/08/19 | 3 | WL |
| | 15/01/20 | 1 | WL |
| WL123 | 09/05/19 | 2 | SWL |
| | 14/05/19 | 7 | SWL |
| | 05/07/19 | 1 | SWL |
| | 25/09/19 | 1 | SWL |
| | 03/01/20 | 3 | SWL |
| | 03/01/20 | 4 | SWL |
| | 08/01/20 | 2 | SWL |
| WL124 | 07/05/19 | 2 | WL |
| | 16/07/19 | 1 | WL |
| | 15/08/19 | 1 | WL |
| | 12/09/19 | 3 | WL |
| WL128 | 15/07/19 | 4 | SWL |
| | 09/10/19 | 3 | WL |
| WL129 | 15/07/19 | 5 | SWL |
| | 15/07/19 | 13 | SWL |
| WL130 | 09/05/19 | 2 | SWL |
| | 14/05/19 | 7 | SWL |
| | 15/07/19 | 5 | SWL |
| | 09/10/19 | 4 | SWL |
| | 14/10/19 | 1 | WL |
| | 04/12/19 | 1 | SWL |
| WL131 | 14/05/19 | 7 | SWL |
| | 05/07/19 | 1 | SWL |
| | 20/08/19 | 3 | WL |
| | 12/09/19 | 4 | WL |
| | 09/10/19 | 2 | WL |
| | 04/12/19 | 1 | SWL |
| WL137 | 09/10/19 | 3 | WL |
| | 23/12/19 | 1 | WL |
| WL142 | 09/05/19 | 1 | SWL |
| | 11/07/19 | 1 | SWL |
| | 09/10/19 | 3 | WL |

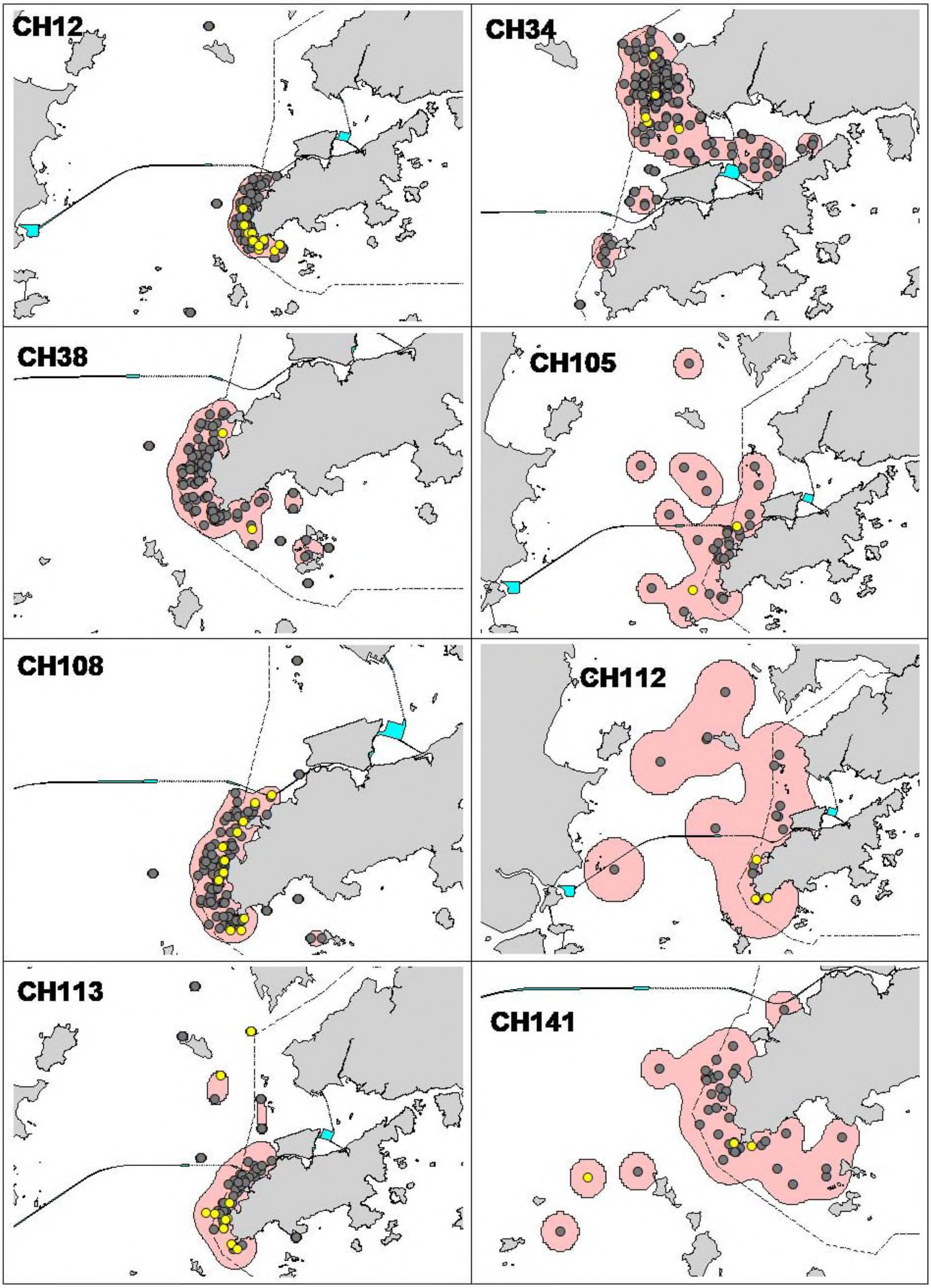
**Appendix IV. (cont'd)**
(***in bold & italics: new individuals*** )

| DOLPHIN ID | DATE | STG# | AREA |
|---|---|---|---|
| WL152 | 14/05/19 | 7 | SWL |
| | 15/07/19 | 2 | WL |
| | 20/08/19 | 4 | WL |
| | 25/09/19 | 1 | SWL |
| | 16/12/19 | 2 | WL |
| | 03/01/20 | 3 | SWL |
| | 03/01/20 | 4 | SWL |
| | 15/01/20 | 3 | WL |
| | 22/01/20 | 7 | SWL |
| WL159 | 14/05/19 | 4 | WL |
| | 05/06/19 | 2 | WL |
| | 15/08/19 | 1 | WL |
| WL160 | 15/07/19 | 2 | WL |
| WL166 | 15/08/19 | 5 | SWL |
| WL168 | 14/05/19 | 7 | SWL |
| WL169 | 23/05/19 | 1 | WL |
| WL171 | 11/09/19 | 4 | WL |
| | 14/10/19 | 1 | WL |
| | 15/01/20 | 3 | WL |
| WL176 | 05/06/19 | 2 | WL |
| WL179 | 06/06/19 | 2 | SWL |
| | 15/07/19 | 10 | SWL |
| | 20/08/19 | 5 | WL |
| | 11/09/19 | 4 | WL |
| | 15/01/20 | 1 | WL |
| WL180 | 09/05/19 | 1 | SWL |
| | 05/07/19 | 1 | SWL |
| | 11/09/19 | 4 | WL |
| | 03/01/20 | 3 | SWL |
| | 03/01/20 | 4 | SWL |
| | 15/01/20 | 3 | WL |
| | 22/01/20 | 7 | SWL |
| WL190 | 14/05/19 | 7 | SWL |
| | 05/06/19 | 2 | WL |
| WL191 | 10/12/19 | 1 | WL |
| WL203 | 24/02/20 | 1 | WL |
| WL208 | 14/05/19 | 6 | SWL |
| | 29/07/19 | 2 | SWL |
| WL210 | 05/07/19 | 1 | SWL |
| WL213 | 24/07/19 | 2 | WL |
| WL214 | 15/07/19 | 1 | WL |
| | 24/07/19 | 2 | WL |
| WL216 | 14/05/19 | 4 | WL |
| | 15/07/19 | 1 | WL |
| | 24/07/19 | 2 | WL |
| WL217 | 05/07/19 | 1 | SWL |
| | 15/07/19 | 5 | SWL |
| | 23/07/19 | 4 | WL |
| | 11/09/19 | 4 | WL |
| | 09/10/19 | 3 | WL |
| WL218 | 23/07/19 | 2 | WL |
| | 11/09/19 | 3 | WL |
| WL220 | 14/05/19 | 7 | SWL |
| | 07/11/19 | 1 | WL |
| | 15/01/20 | 3 | WL |
| WL221 | 25/04/19 | 2 | SWL |
| | 29/04/19 | 1 | SWL |
| | 16/05/19 | 2 | SWL |
| | 04/06/19 | 1 | SWL |
| | 15/07/19 | 5 | SWL |

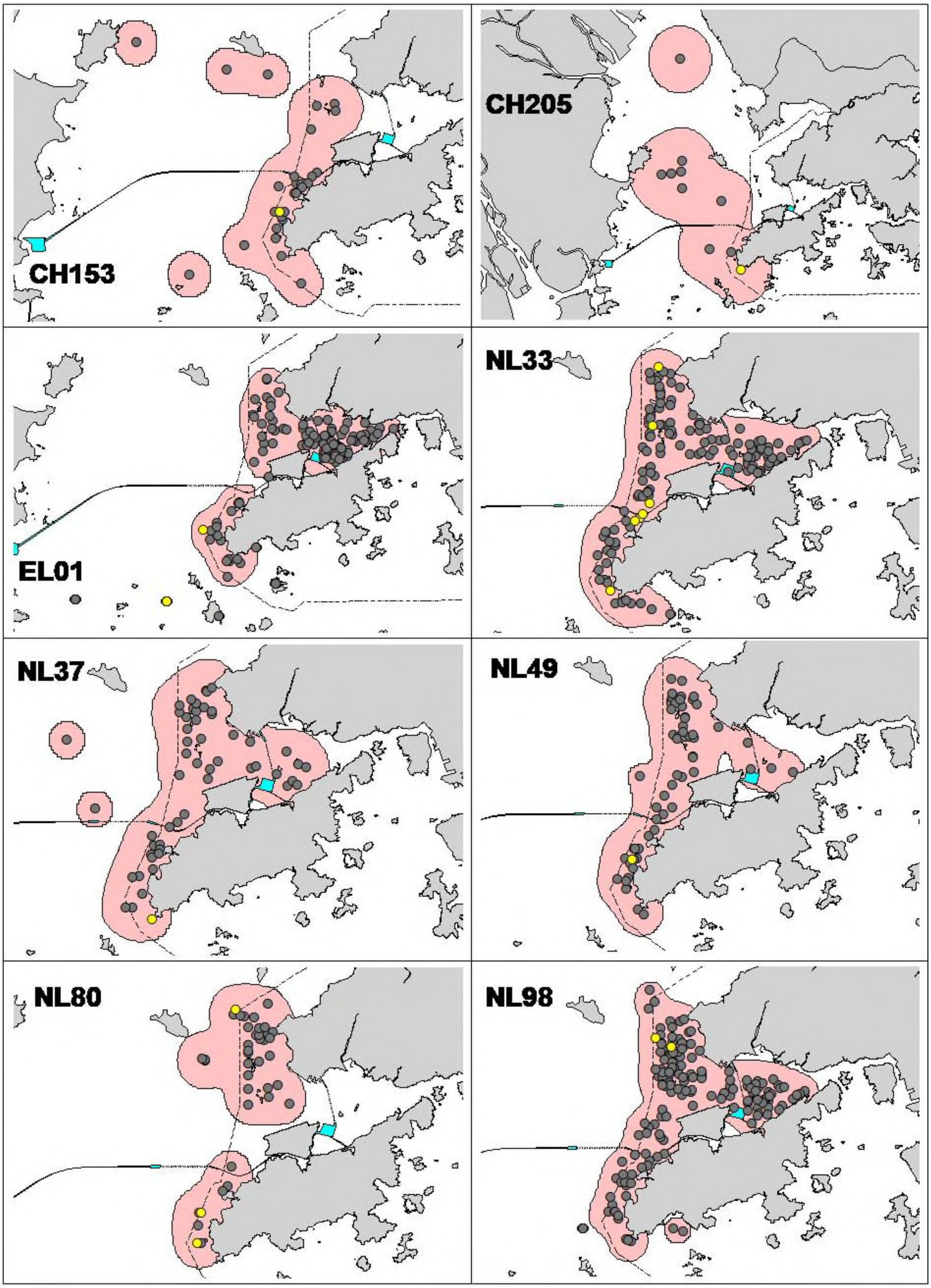
| DOLPHIN ID | DATE | STG# | AREA |
|---|---|---|---|
| WL228 | 15/07/19 | 1 | WL |
| | 16/07/19 | 3 | WL |
| | 15/08/19 | 1 | WL |
| WL229 | 25/09/19 | 1 | SWL |
| | 09/10/19 | 3 | WL |
| WL230 | 17/06/19 | 1 | WL |
| | 20/08/19 | 4 | WL |
| WL232 | 09/05/19 | 3 | SWL |
| | 16/05/19 | 2 | SWL |
| | 04/06/19 | 1 | SWL |
| | 05/07/19 | 1 | SWL |
| | 15/07/19 | 5 | SWL |
| | 21/11/19 | 1 | WL |
| | 10/02/20 | 2 | WL |
| WL233 | 16/05/19 | 1 | SWL |
| WL243 | 03/04/19 | 1 | SWL |
| | 24/04/19 | 1 | SWL |
| WL245 | 24/07/19 | 2 | WL |
| WL250 | 14/05/19 | 7 | SWL |
| | 15/07/19 | 6 | SWL |
| | 02/10/19 | 1 | SWL |
| | 07/11/19 | 1 | WL |
| WL251 | 23/07/19 | 1 | WL |
| WL254 | 05/07/19 | 1 | SWL |
| | 15/07/19 | 1 | WL |
| | 08/01/20 | 1 | SWL |
| WL256 | 15/08/19 | 1 | WL |
| WL260 | 20/08/19 | 3 | WL |
| | 08/01/20 | 1 | SWL |
| WL268 | 05/06/19 | 2 | WL |
| | 15/07/19 | 2 | WL |
| | 11/09/19 | 2 | WL |
| | 16/10/19 | 2 | WL |
| WL269 | 23/10/19 | 3 | WL |
| | 08/01/20 | 1 | SWL |
| WL272 | 06/06/19 | 2 | SWL |
| WL273 | 09/05/19 | 1 | SWL |
| | 14/05/19 | 5 | WL |
| | 09/10/19 | 3 | WL |
| WL277 | 24/07/19 | 2 | WL |
| WL279 | 15/07/19 | 1 | WL |
| | 24/07/19 | 2 | WL |
| WL280 | 14/05/19 | 7 | SWL |
| | 16/05/19 | 1 | SWL |
| WL281 | 15/01/20 | 3 | WL |
| WL283 | 16/07/19 | 3 | WL |
| | 24/07/19 | 2 | WL |
| | 10/12/19 | 1 | WL |
| | 15/01/20 | 1 | WL |
| WL284 | 15/07/19 | 14 | SWL |
| WL286 | 14/05/19 | 3 | WL |
| | 05/06/19 | 2 | WL |
| | 20/08/19 | 3 | WL |
| | 15/01/20 | 1 | WL |
| WL291 | 20/08/19 | 3 | WL |
| WL293 | 23/05/19 | 2 | WL |
| WL294 | 04/06/19 | 1 | SWL |
| | 22/01/20 | 7 | SWL |
| | 11/03/20 | 2 | WL |
| WL295 | 07/05/19 | 2 | WL |
| | 16/07/19 | 1 | WL |

| DOLPHIN ID | DATE | STG# | AREA |
|---|---|---|---|
| WL298 | 20/08/19 | 3 | WL |
| WL299 | 08/01/20 | 1 | SWL |
| | 15/01/20 | 3 | WL |
| ***WL301*** | ***23/10/19*** | ***3*** | ***WL*** |
| ***WL302*** | ***15/08/19*** | ***2*** | ***WL*** |
| ***WL304*** | ***14/05/19*** | ***5*** | ***WL*** |
| | ***15/07/19*** | ***5*** | ***SWL*** |
| | ***15/08/19*** | ***2*** | ***WL*** |
| ***WL305*** | ***15/07/19*** | ***5*** | ***SWL*** |
| ***WL306*** | ***11/09/19*** | ***4*** | ***WL*** |

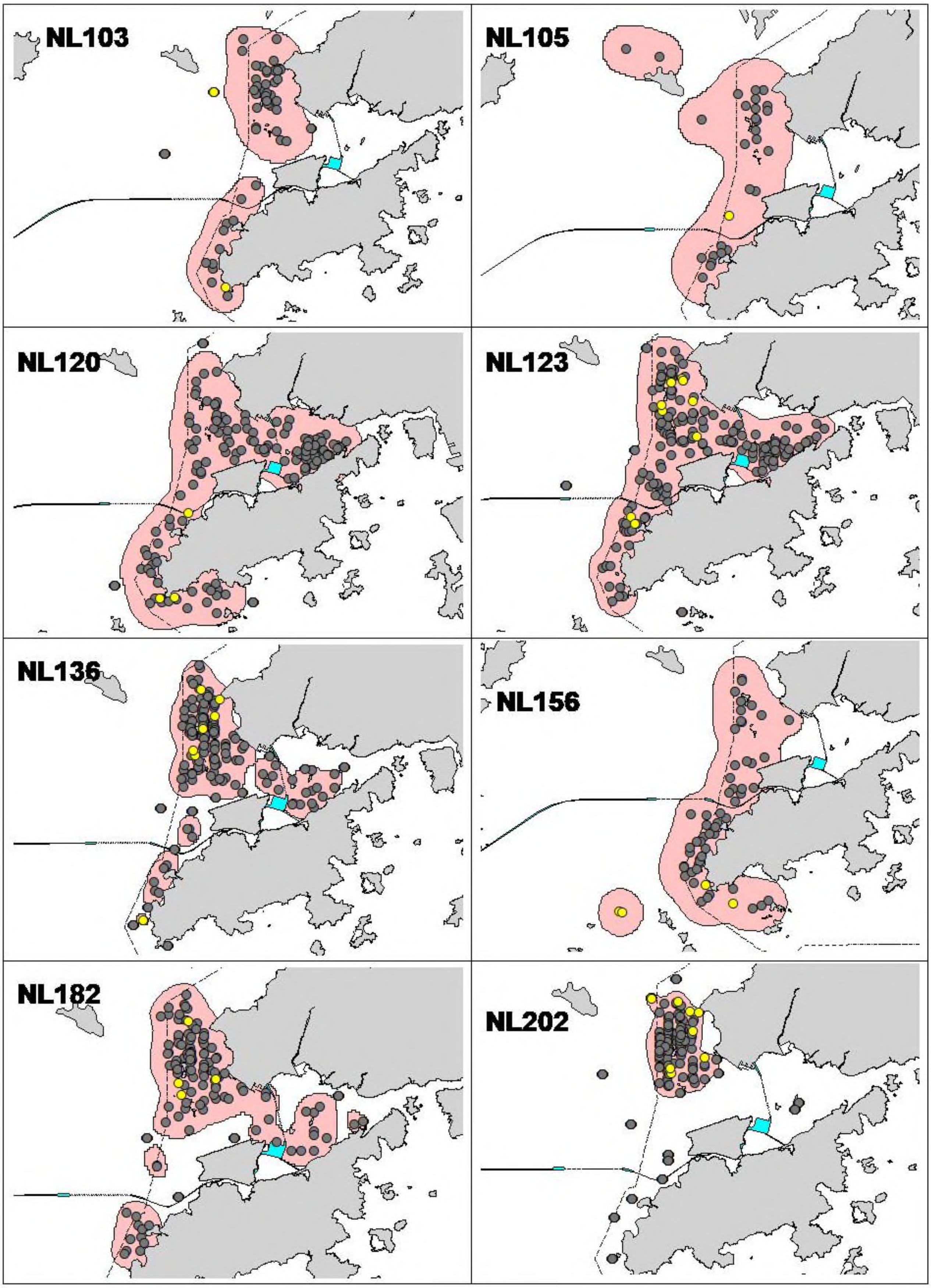
Appendix V. Ranging patterns (95% kernel ranges) of 140 individual dolphins with 10+ re-sightings that were sighted during 2019 (note: yellow dots indicates sightings made in 2019)



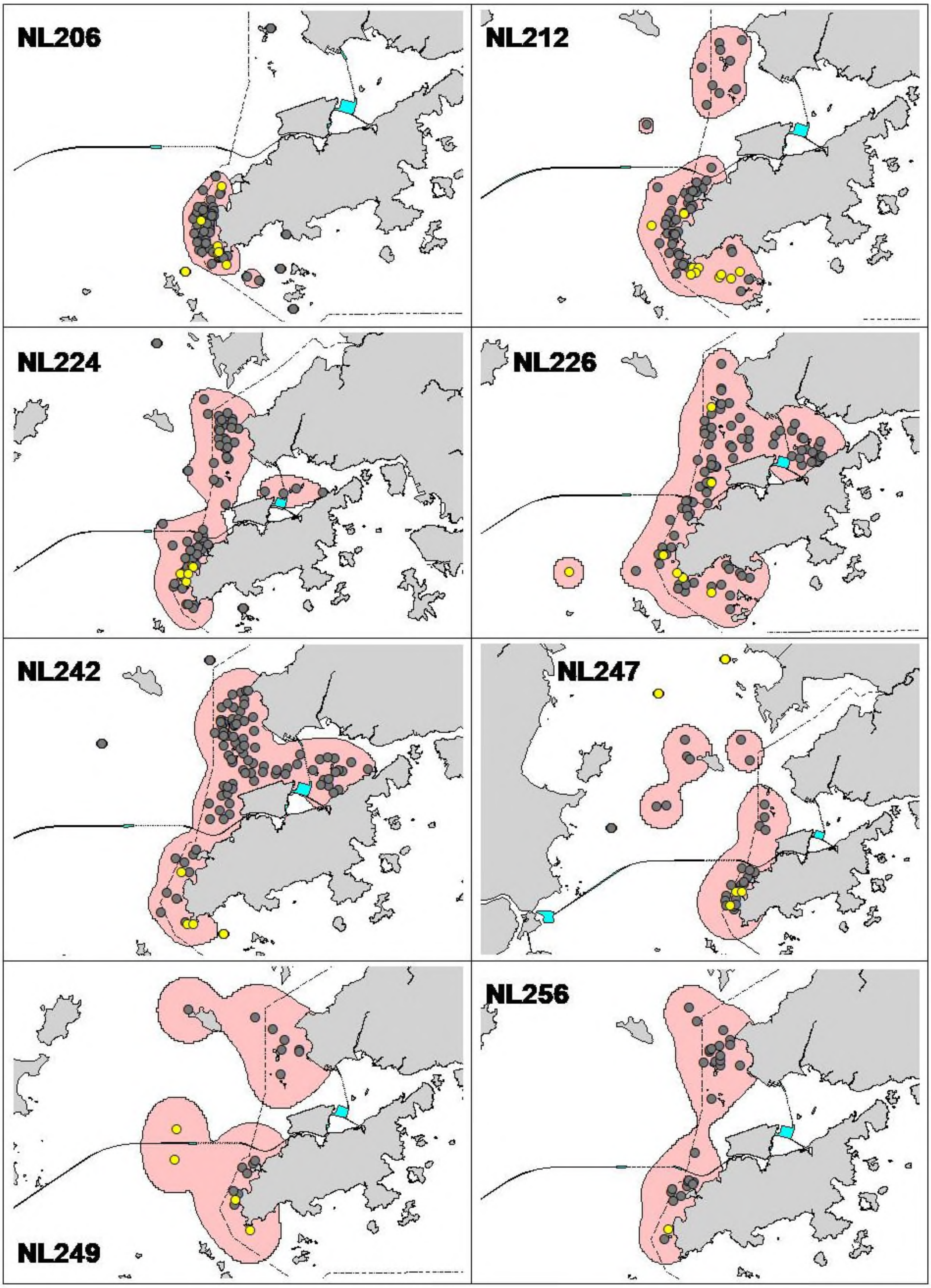
Appendix V. (cont'd).



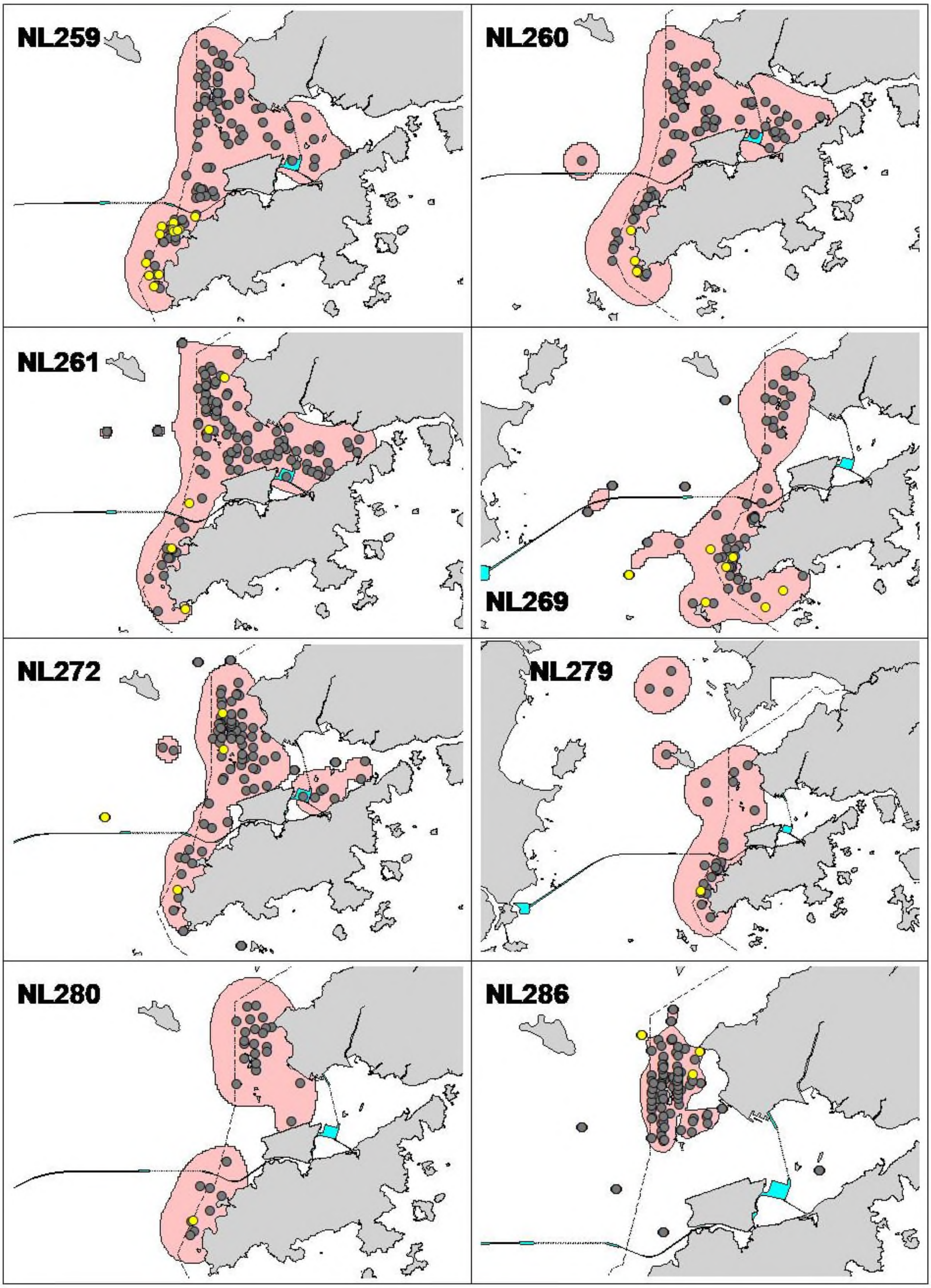
Appendix V. (cont'd).



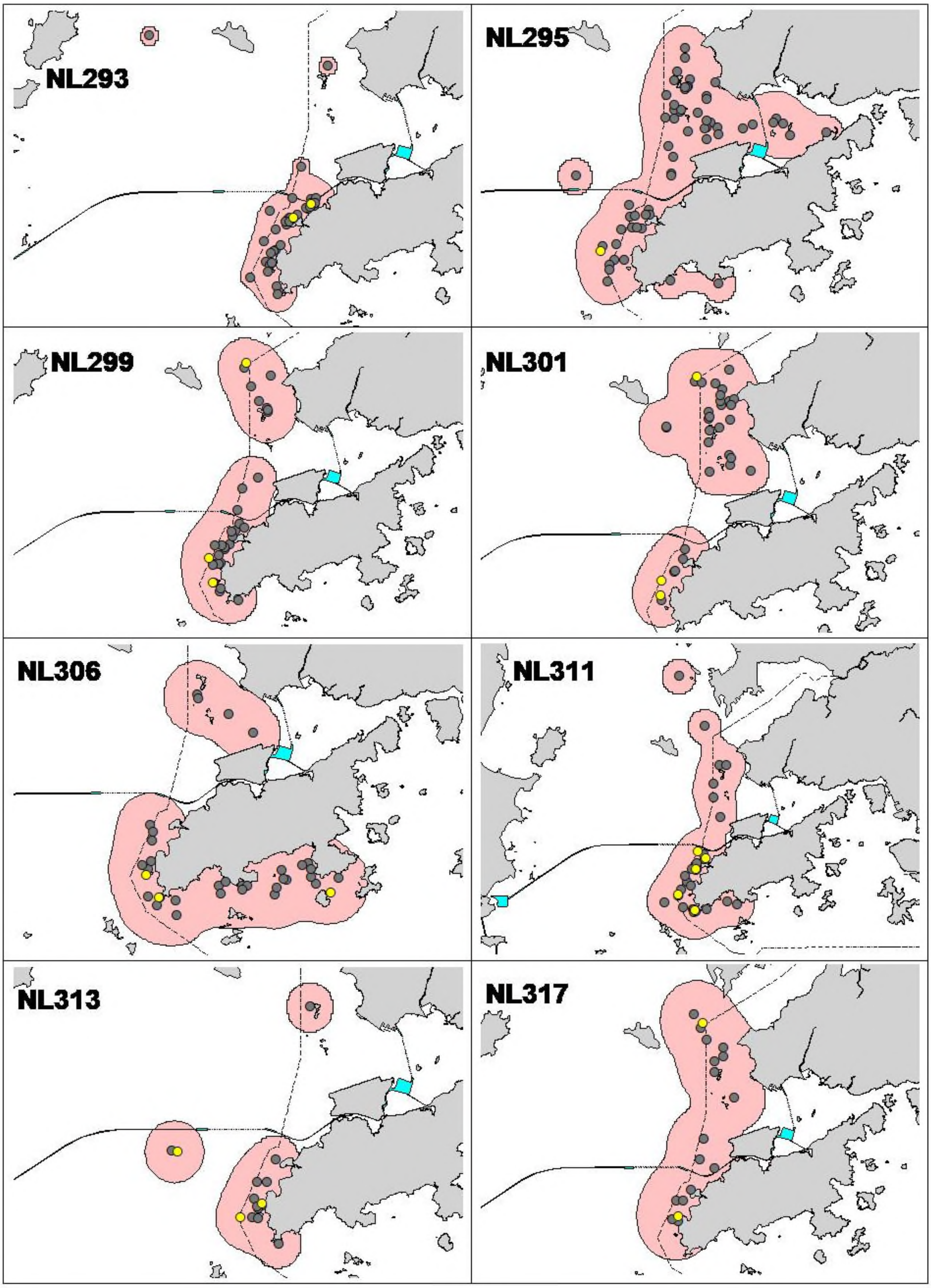
Appendix V. (cont'd).



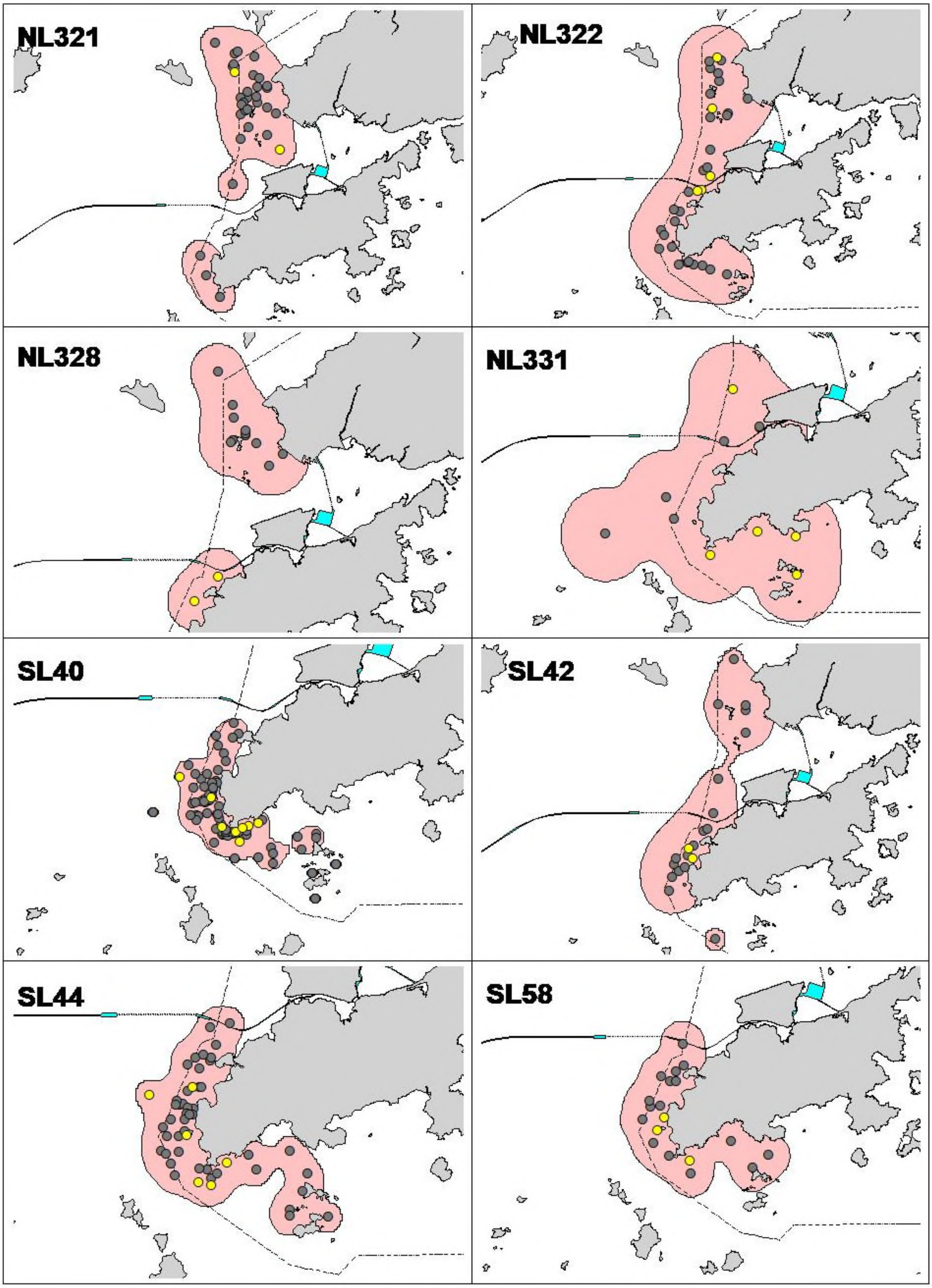
Appendix V. (cont'd).



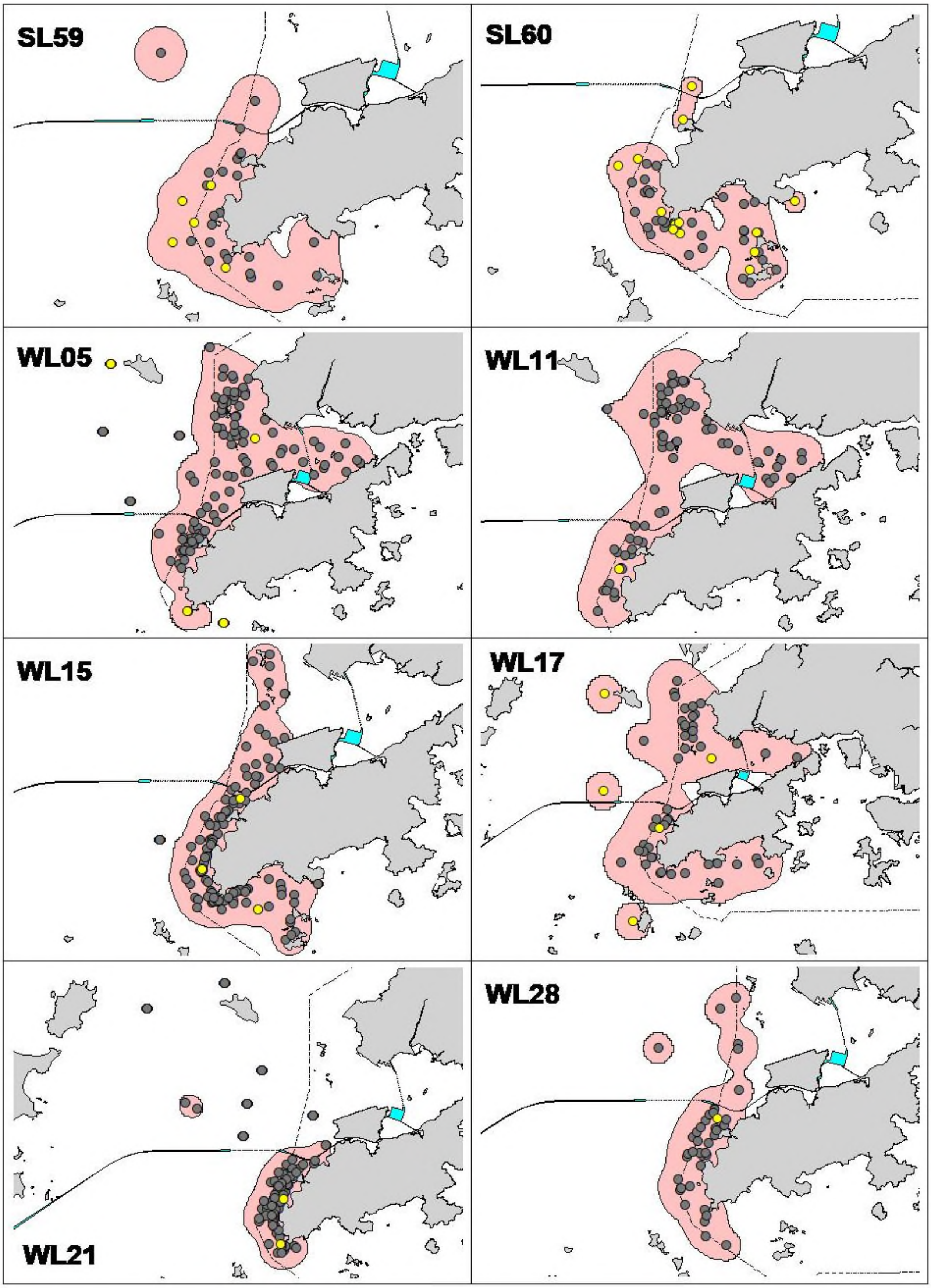
Appendix V. (cont'd).



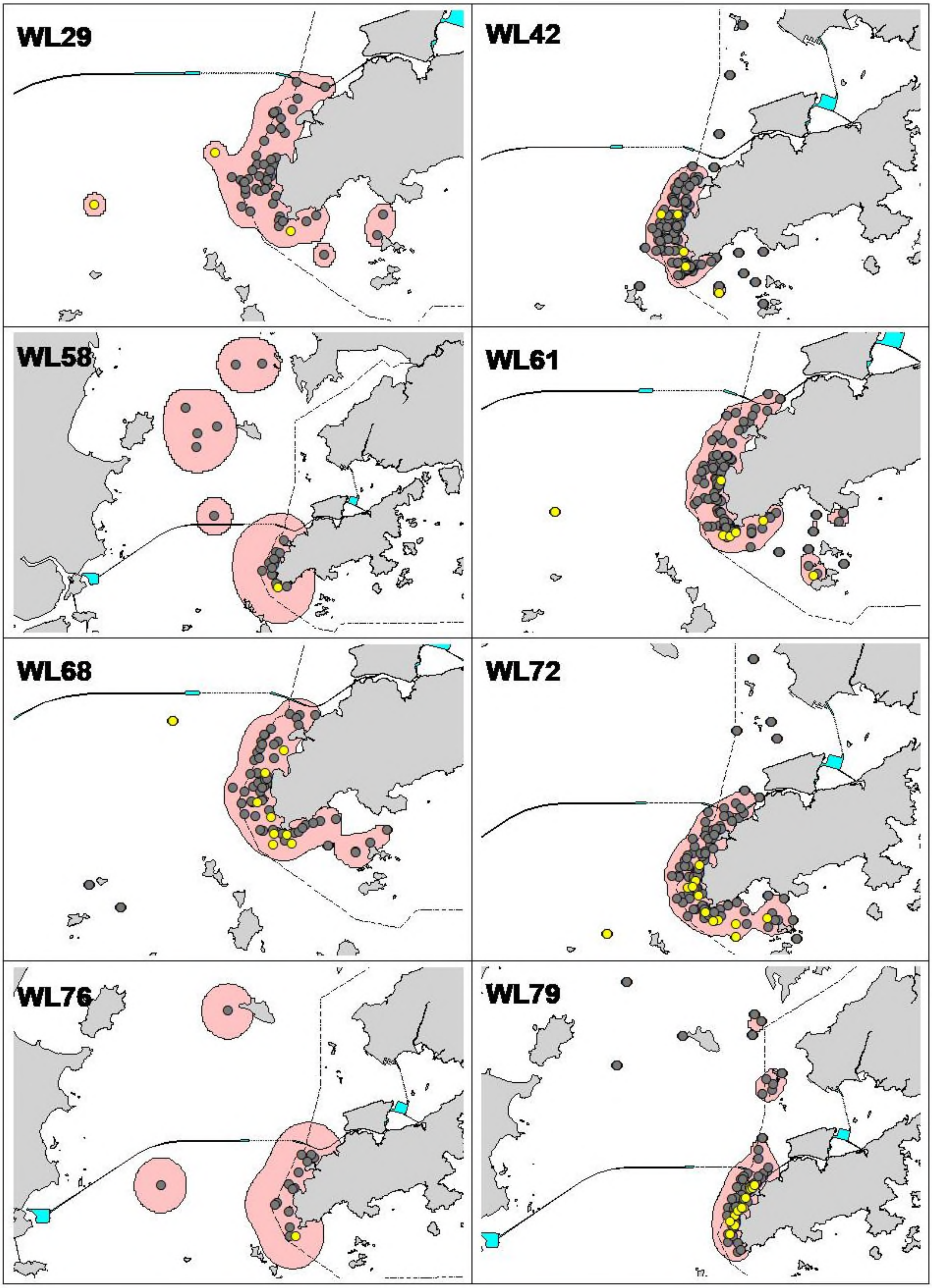
Appendix V. (cont'd).



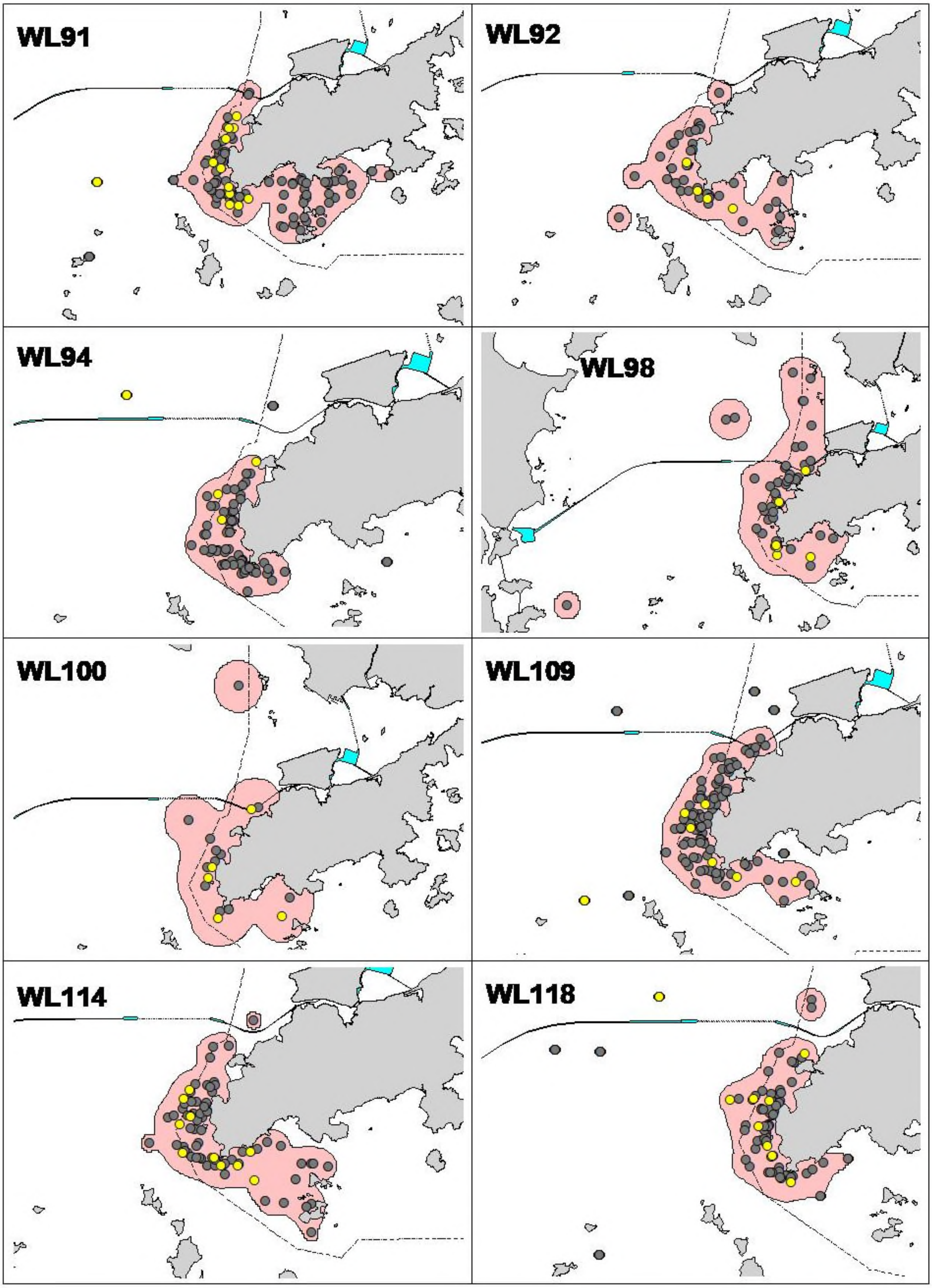
Appendix V. (cont'd).



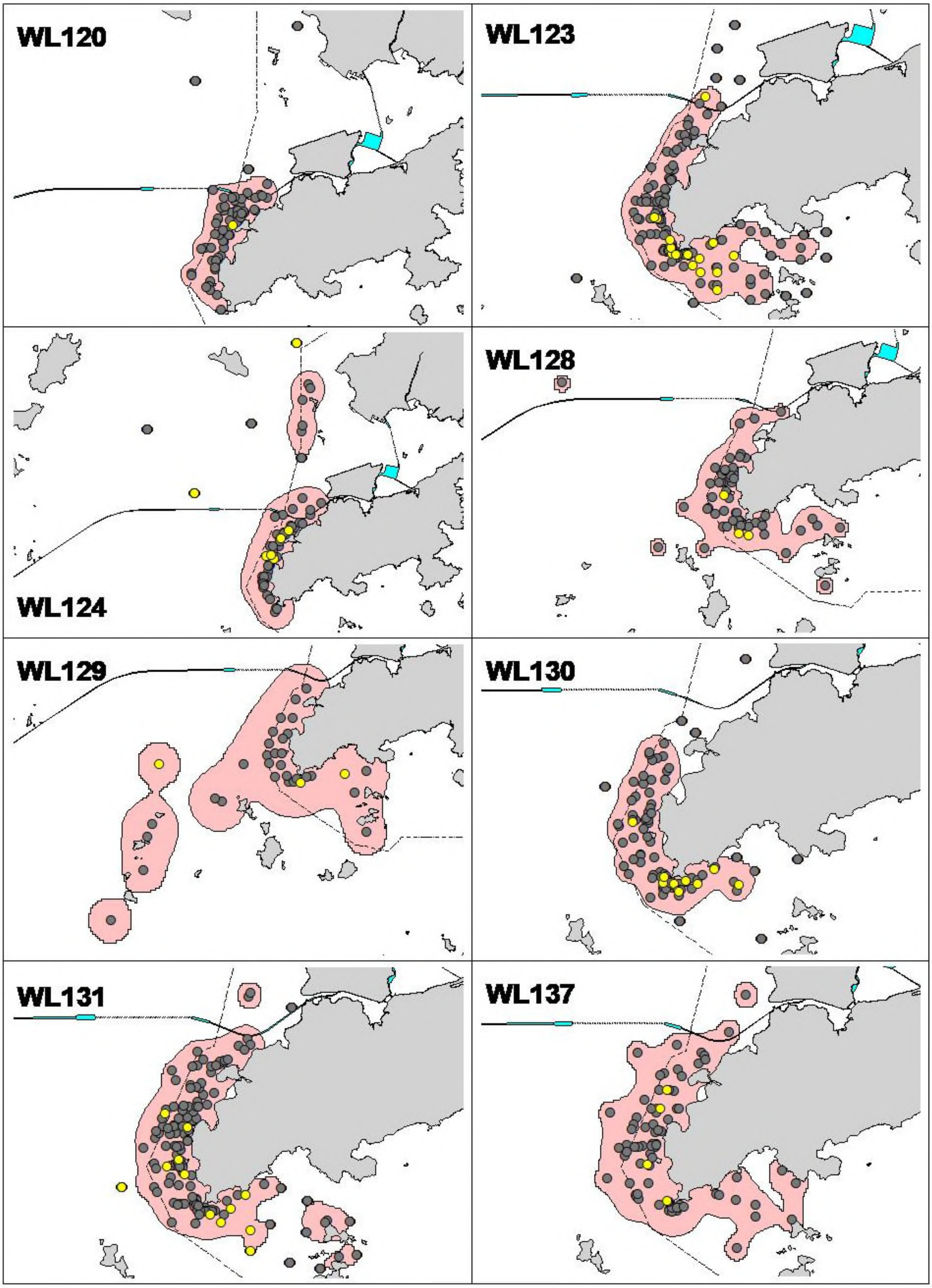
Appendix V. (cont'd).



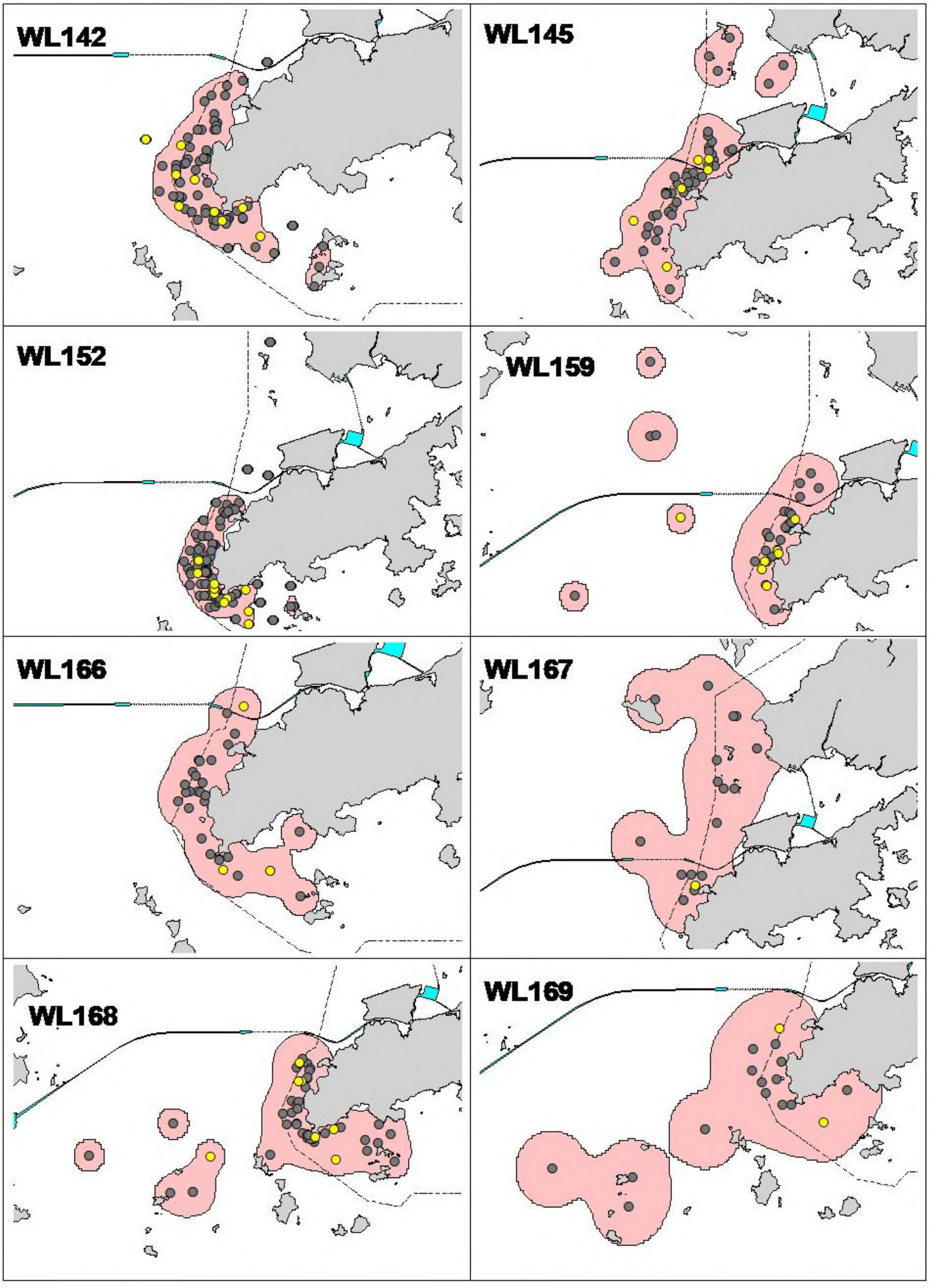
Appendix V. (cont'd).



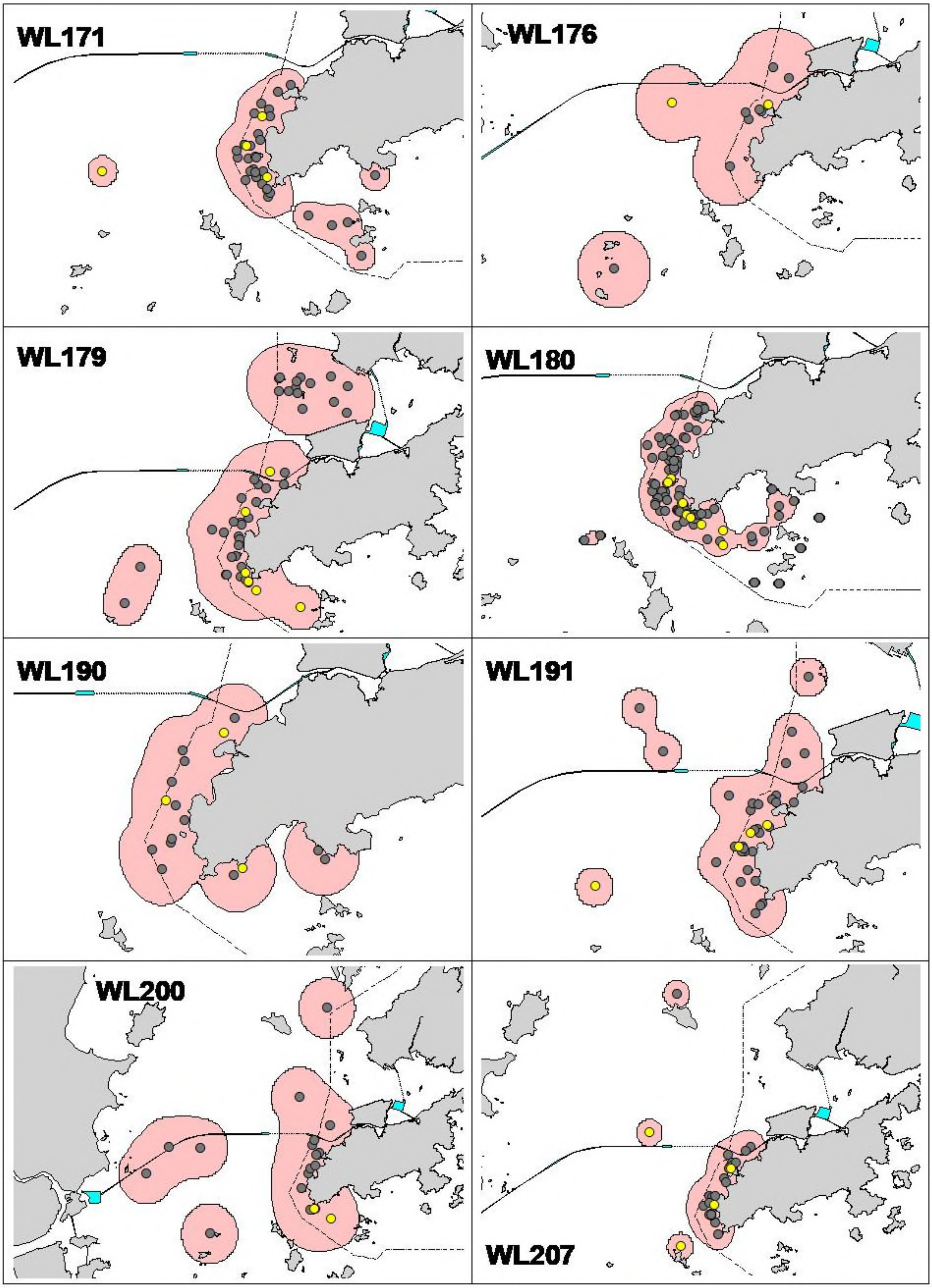
Appendix V. (cont'd).



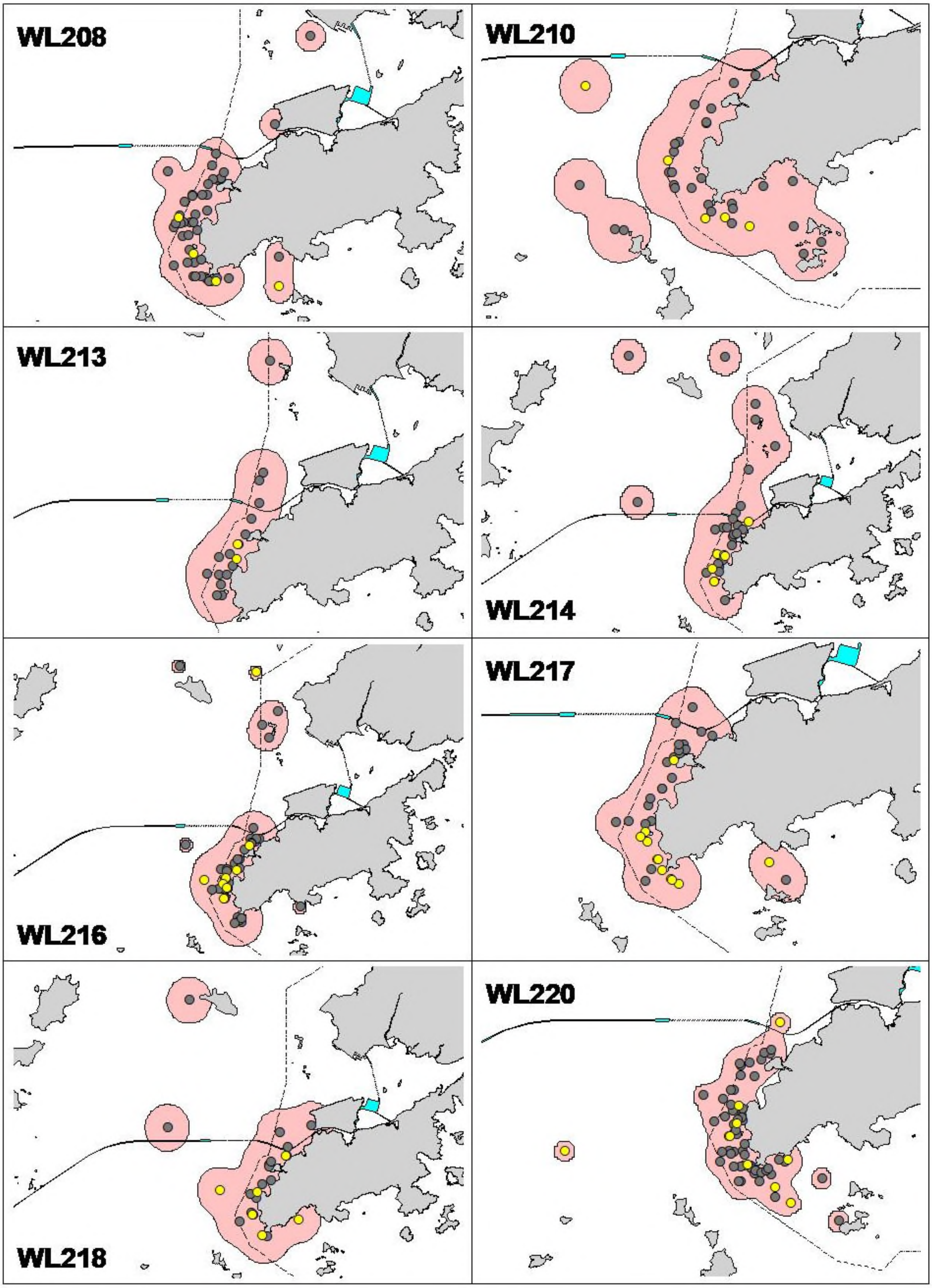
Appendix V. (cont'd).



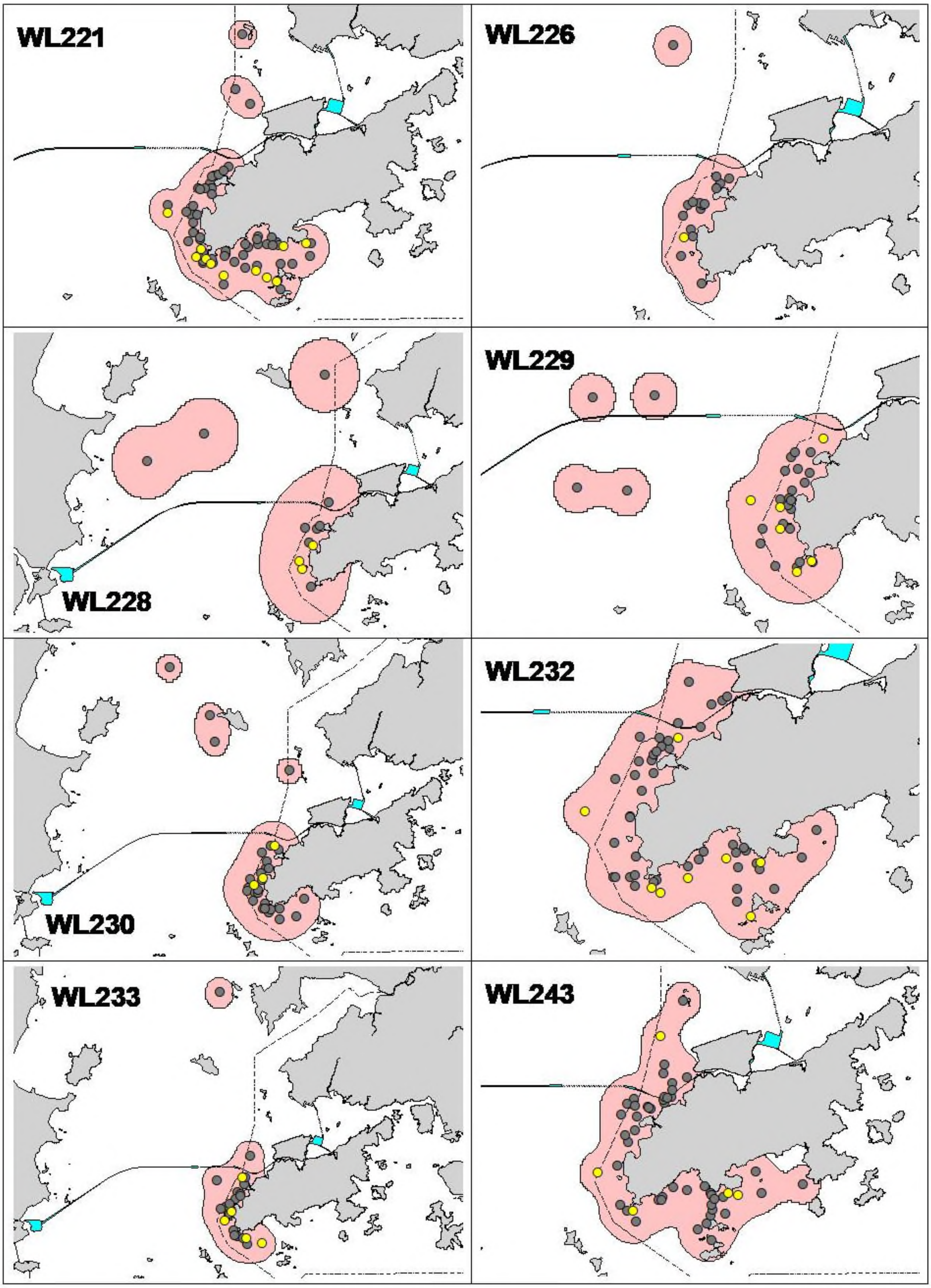
Appendix V. (cont'd).



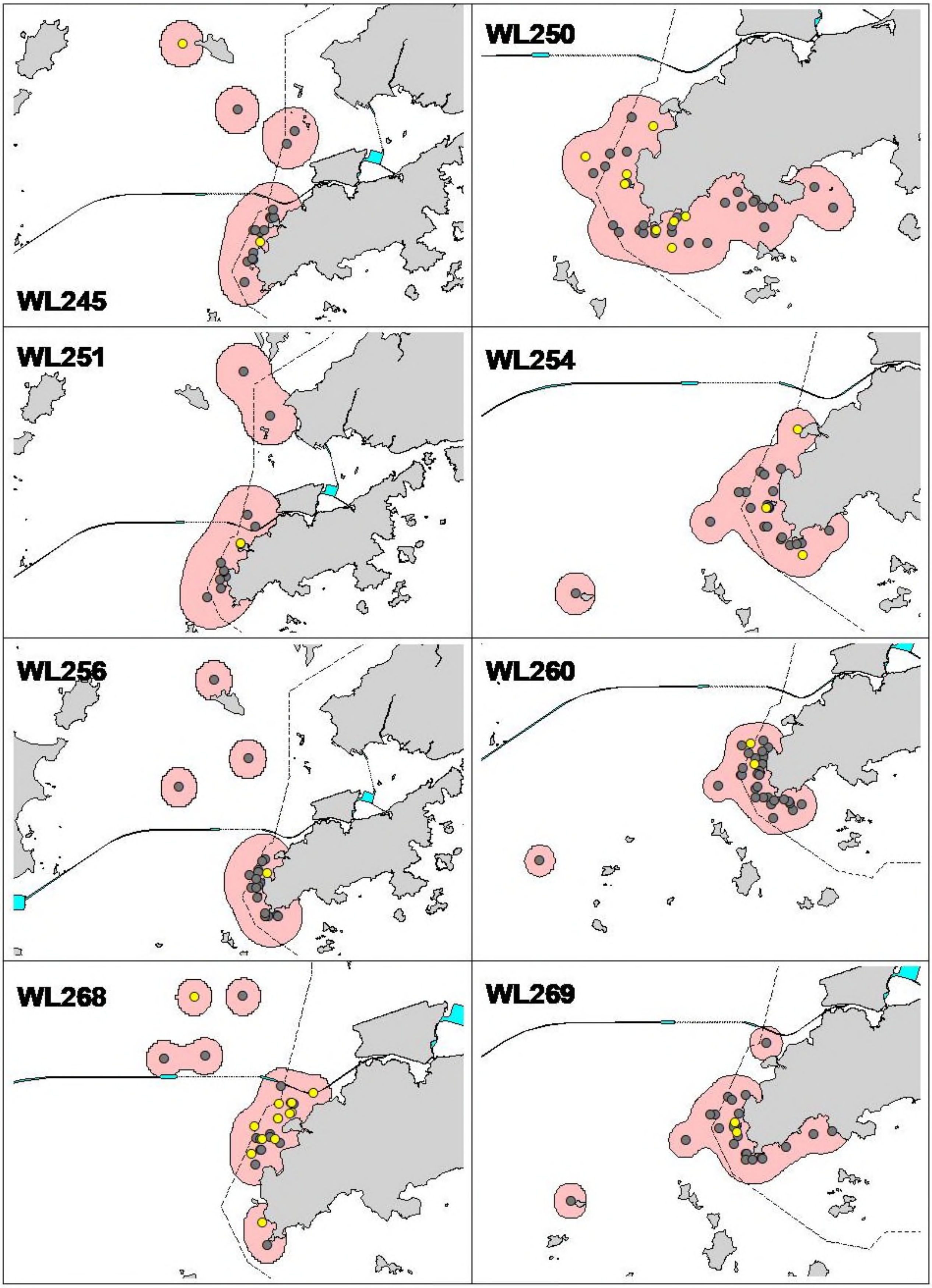
Appendix V. (cont'd).



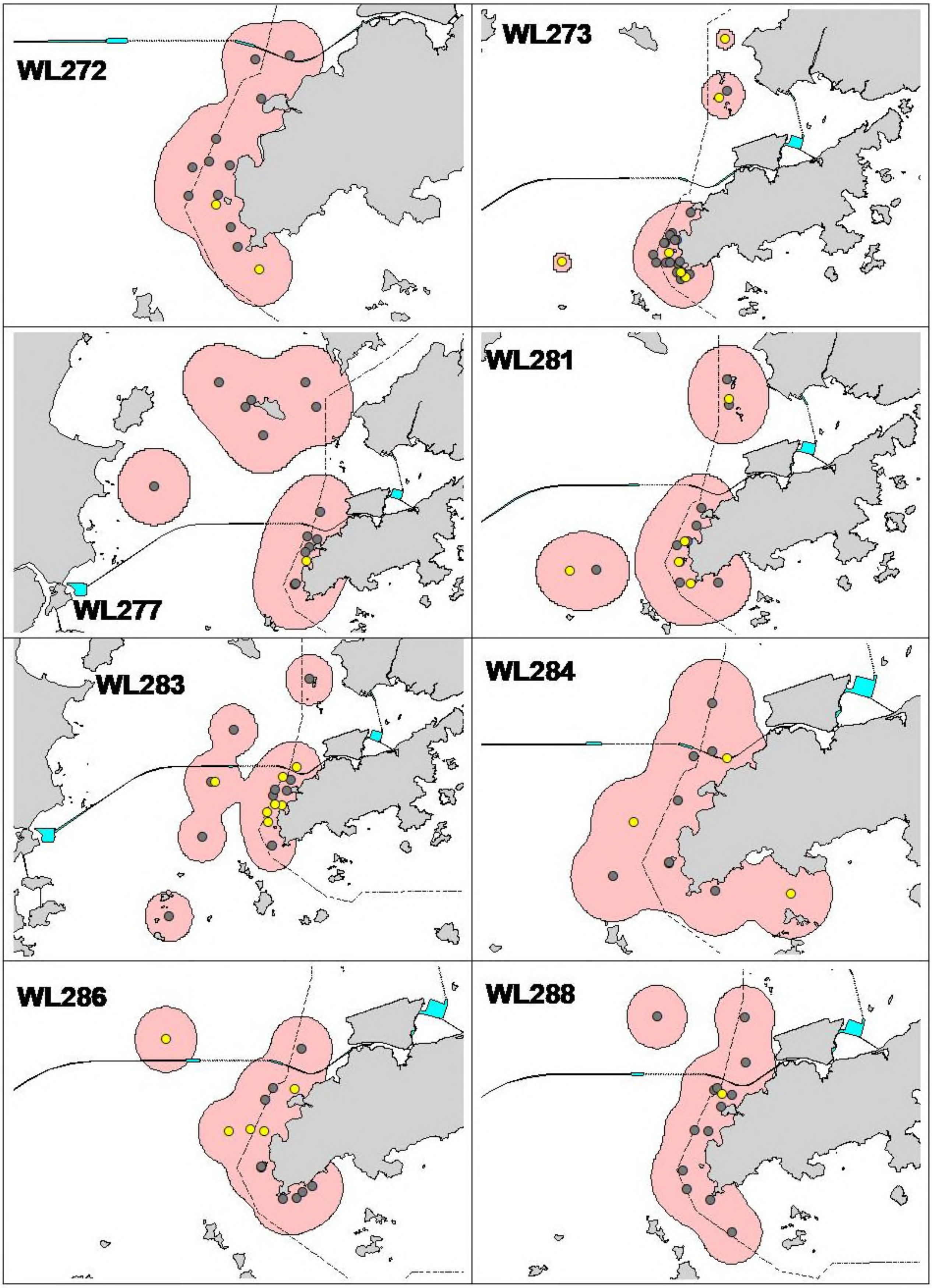
Appendix V. (cont'd).



Appendix V. (cont'd).



Appendix V. (cont'd).



Appendix V. (cont'd).