MONITORING OF MARINE MAMMALS IN HONG KONG WATERS (2023-24)

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FINAL REPORT
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TABLE OF CONTENTS

EXECUTIVE SUMMARY

A longitudinal study on Chinese White Dolphins and Indo-Pacific finless porpoises has been conducted in Hong Kong for more than two decades. With the funding support from the Agriculture, Fisheries and Conservation Department of the Hong Kong SAR Government, the present monitoring study represents a continuation and extension of this research programme, covering the period of April 2023 to March 2024.

During the one-year study period, 132 line-transect vessel surveys with 3,794.9 km of survey effort were conducted among six survey areas in Hong Kong. A total of 163 groups of 569 Chinese White Dolphins and 77 groups of 279 Indo-Pacific finless porpoises were sighted during the vessel surveys.

Overall pattern of dolphin distribution in 2023-24 indicated that they were frequently sighted along the coastal waters to the west and southwest of Lantau Island, extending from Tai O Peninsula toward Kau Ling Chung and Shui Hau Peninsula. The most important dolphin habitats in 2023 were concentrated along the coast of WL and the western end of SWL. In the past decade, there was a marked decline in dolphin occurrence in the North Lantau region, and such occurrence has also been increasingly confined to the western end of the region in the past several years. In addition, their usage within the Southwest Lantau Marine Park remained fairly steady and high in the past decade.

For finless porpoises, concentration of their sightings could be found around Tai A Chau and the eastern edge of the Soko Islands in 2023-24. The most heavily utilized porpoise habitats in 2023 were largely concentrated to the offshore waters in SWL survey area. Temporal changes in porpoise habitat use revealed a rebound over the past two years in South Lantau Marine Park, Shek Kwu Chau and Pui O. Nevertheless, the noticeable decline near Shek Kwu Chau across the seven-year period of 2016-22 should be monitored closely.

In 2023, 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 34 (the combined estimates for the last six years, i.e. 2017 to 2022, were 47, 32, 52, 37, 40 and 34 respectively). Large declines in dolphin abundance were detected over the past two decades in both NEL and NWL survey areas, and noticeable decline was also detected in WL waters but has stabilized in recent years.

Passive acoustic monitoring (PAM) was also conducted under the present study with a focus on deploying F-POD units among four locations within BMP and SCLKCMP as a complementary data collection approach to the vessel-based survey programme that has been increasingly ineffective to monitor dolphin occurrence in North Lantau waters through abundance estimation. During the study, the four F-POD units collected PAM data from January 2023 to January 2024 for a combined total of 1,484.75 logged days. The results revealed that more than 1,400 DPMs (almost all were classified as dolphin detections with a few having characteristics of porpoises) were recorded among the four North Lantau sites. Most detections were from Lung Kwu Chau N, where dolphins were detected on approximately one-third of the logged days. Detection level at both BMP sites were low, with fewer than 30 DPMs and detections occurring on about 2% of the logged days throughout the study period. The patterns of dolphin detections appear to vary with sites and diel phases. Year-over-year comparisons utilizing PAM data showed an overall decrease in dolphin detections at the four sites over the past seven years from 2017 to 2023, and the detected pattern corresponded with the decline in annual estimated abundance of CWD in the North Lantau region during the same period as determined from line-transect vessel survey data.

Using the photo-identification technique,99 individual dolphins were identified with 375 re-sightings during the 2023-24 monitoring period, reflecting that at least 99 individual dolphins had utilized Hong Kong waters as part of their habitat. More than two-third of all re-sightings were made in WL waters. Moreover, a total of five new individuals have been added to the photo-ID catalogue.

HKCRP researchers delivered a total of eight education seminars at local schools regarding the conservation of local dolphins and porpoises in 2023-24. 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 (中文翻譯)

一項有關本地中華白海豚及印度太平洋江豚的長期研究，在過去二十多年以來一直在進行中，而此項為期一年 (由 2023 年 4 月至 2024 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，正是這長期監察項目的延伸。

在十二個月研究期間內，研究員共進行了 132 次樣條線船上調查，在全港六個調查區航行 3,794.9 公里，並在船上共觀察到 163 群中華白海豚 (總數 569 隻) 及 77 群江豚 (總數 279 隻)。

在 2023-24 年的監察年度，中華白海豚的整體分佈模式顯示牠們經常出沒在大嶼山西面及西南面的近岸水域， 由大澳半島延伸至狗嶺涌及水口半島一帶。中華白海豚在 2023 年的重要棲身地主要集中在西大嶼山近岸及西南大嶼山西端的水域。在過去十年，海豚在北大嶼山水域的使用率顯著下降，並在過去數年越來越收窄至此水域的西端近邊界位置。另一方面，大嶼山西南海岸公園在過去十年仍錄得穩定而持續高企的海豚使用量。

另一方面，江豚在 2023-24 年間的目擊記錄集中在大鴉洲附近及索罟群島的東側水域。在 2023 年錄得最高使用量的江豚棲身地，主要集中在西南大嶼山的外海水域。江豚於 2023 年在南大嶼海岸公園、石鼓洲和貝澳灣的使用量較前兩年為高。然而，在 2016 至 2022 年間，於石鼓洲附近水域的使用量下降的情況應繼續密切監察。

在 2023 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 34 隻 (過去六年的年度數目分別為 47、32、52、37、40 及 34 隻)。在過去二十年，大嶼山東北及西北調查區域的海豚數量均錄得大幅度減少，同樣地在大嶼山西面調查區的海豚數目亦錄得明顯下降，但在近年已轉趨平穩。

在本研究中還進行了「被動水底聲音監察方法」(PAM)，重點是在北大嶼山水域的大小磨刀和沙洲龍鼓洲海岸公園中的四個位置部署 F-POD 裝置，作為一種補充資料收集方法，以監測海豚出現情況。因為基於過去一直沿用的船上調查方法來估計海豚在大嶼山北部水域的數量，成效越來越低，無法通過數量估計來監測北大嶼山水域的海豚出現情況。於 2023 年 1 月至 2024 年 1 月期間，四個 F-POD 水底監聽器共搜集了 1,484.75 天的研究數據。分析數據顯示共錄得超過 1,400 個 DPM (註：每一分鐘內存有至少一次海豚卡嗒聲音調即為一個 DPM)，當中絕大部份均屬於中華白海豚的發聲記錄 (並有數個有江豚特徵的發聲記錄)。這些海豚發聲記錄大部份來自龍鼓洲北的監察點，在這處有三分之一的日數均錄得海豚的出沒記錄；此外，在研究期間，兩個位處大小磨刀海岸公園的監察點海豚發聲記錄

較低(錄得少於 30 個 DPM、並於兩處分別只有約 2% 的日數錄得海豚出沒記錄)。海豚發聲記錄的模式於不同監察點及日夜之間均存有差異。在 2017 至 2023 年間，於四個監察點的海豚發聲記錄數據整體呈現下降趨勢，跟同期透過船上調查估算出來的大嶼山北部水域海豚年度數量所呈現的趨勢大致吻合。

於 2023-24 監察年度期間，研究員利用照片識別技術辨認出 99 隻個別海豚、共 375 次的目擊紀錄，顯示至少有 99 隻中華白海豚利用香港水域作為棲息地的一部分。超過三分之二的目擊紀錄是出現在大嶼山西面水域。此外，2023 年內共有五隻新的個別海豚被加入相片辨認名錄。

在本年度，研究員為本地中小學主持了共八場講座，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

For more than two decades, HKCRP has been conducting a longitudinal study on Chinese White Dolphins (*Sousa chinensis*) and Indo-Pacific finless porpoises (*Neophocaena phocaenoides*) in Hong Kong and the Pearl River Delta region. Such multi-disciplinary research study in the past two decades has been primarily funded by AFCD as well as various government departments and NGOs, aiming 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 addition, HKCRP has 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. Hung 2008, 2022, 2023; Jefferson et al. 2002, 2009, 2012; Wang and Hung 2018, 2022, 2023).

The present monitoring project represents a continuation and extension of this research programme, with funding support from AFCD of HKSAR Government. The main goal of this one-year monitoring study is to collect systematic monitoring data for in-depth analysis and assessment of spatial and temporal patterns on distribution, abundance and habitat use of Chinese White Dolphins and Indo-Pacific finless porpoises in Hong Kong, to take photographic records of individual dolphins, to analyze the monitoring data for better understanding of various aspects of local dolphins and porpoises, and to conduct passive acoustic monitoring to supplement the vessel surveys in North Lantau waters. The one-year project covers the period of 1 April 2023 to 31 March 2024, and this final report is submitted to AFCD as a summary of this monitoring project, covering the entire period of the 12-month study.

2. OBJECTIVES OF PRESENT STUDY

The main goal of this one-year monitoring study was to collect systematic monitoring data for an in-depth analysis and assessment of distribution, abundance and habitat use of Chinese White Dolphins (CWD) and Finless Porpoises (FP) 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, 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 CWD and FP 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 CWD by their natural markings using photo-identification technique. This objective was achieved by obtaining high-quality photographs of CWD 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 FP were also taken during surveys for educational purposes.

The third objective was to analyze the monitoring data for better understanding of the various aspects of local populations of CWD and FP. 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 CWD and FP 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 CWD based on the data obtained from both the line-transect vessel surveys and the associated photo-identification works.

The fifth objective was to carry out passive acoustic monitoring (PAM) to supplement the line-transect vessel surveys in assessing the spatial and temporal patterns of Chinese White Dolphins and finless porpoises. This objective was achieved through repeated periodic deployments, retrieval and redeployments of F-POD units in North Lantau waters, and utilizing specialized computer software to conduct objective automated detection and identification of echolocation click trains produced by dolphins and porpoises in the PAM data obtained from this study. 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, seven tasks were completed to satisfy the objectives set for the present marine mammal monitoring study. These seven specific 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;
- 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 CWD for photo-identification analysis and update the photo-identification catalogue;
- to analyze photo-identification data of individual CWD to assess their ranging patterns, core area use and movement patterns;
- to conduct passive acoustic monitoring to supplement line-transect survey data in assessing the spatio-temporal patterns of CWD and FP;
- to take photographic records of FP; 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, 2022, 2023; 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 six survey areas (i.e. Northwest (NWL), Northeast (NEL), West (WL), Southwest (SWL) and Southeast Lantau (SEL), and Deep Bay (DB); 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 using 7 x 50 *Fujinon* or *Steiner* marine binoculars. Both observers searched the sea ahead of the vessel, between 270º and 90º (in relation to the bow, which is defined as 0º). 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 CWD and FP in Hong Kong waters.

4.2. Photo-identification Work

When a group of CWD 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 differ. One or 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 Pearl River Estuary CWD 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 database. Any individuals not in the current catalogue were given a new identification number and added to the catalogue along with their data and 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.

4.3. Passive Acoustic Monitoring

In recent years, the dolphin numbers in North Lantau waters have dramatically dropped to extremely low level (Hung 2022, 2023). As a result, estimating their abundance in this region with reasonable precision becomes increasingly difficult to near impossible. As part of a rethink of monitoring strategy to avoid the ineffectiveness in monitoring dolphin occurrence in North Lantau waters through the traditional line-transect vessel survey method adopted in nearly three decades, passive acoustic monitoring was conducted under the present marine mammal monitoring study with a focus on deploying F-POD units among four locations within the two marine parks in North Lantau waters. Recent PAM studies demonstrated that this monitoring approach is extremely valuable in assessing dolphin occurrences, especially in North Lantau waters where such occurrence has remained at historical low and near-absent level in recent years. Another consideration for such complementary approach to adopt the “hybrid” approach of shipboard and passive acoustic monitoring is related to the fact that most dolphin activities within the two marine parks in North Lantau, namely the Sha Chau and Lung Kwu Chau Marine Park (SCLKCMP) and the Brothers

Marine Park (BMP), occurred primarily outside of daily hours (see Wang and Hung 2018, 2022, 2023). The distinct diel pattern of dolphin occurrence in North Lantau waters provides strong argument that PAM method is evidently superior to the visual monitoring method in assessing dolphin occurrence and associated temporal trend in this specific region.

For the present study, besides the on-going line-transect vessel surveys in North Lantau waters, the HKCRP team also deployed and installed four F-POD units within SCLKCMP and BMP for a period of 12 months from mid-April 2023 to mid-April 2024. These four sites ("Lung Kwu Chau N" and "Sha Chau SE" in SCLKCMP; "Siu Ho Wan" and "Tai Mo To" in BMP) for the F-POD deployments are shown in Figure 1 and are the same sites (with exactly the same deployment locations) used in previous PAM studies funded by AFCD during the seven consecutive years of 2017-24 (see Wang and Hung 2018, 2022, 2023).

During the first deployment on April 14th, 2023, the F-PODs with their associated underwater frames were installed by the professional dive team from Oceanway Corporation Limited at each of the four sites within BMP and SCLKCMP. Subsequently, three events of retrieval and data recovery of the units were arranged by the dive team on July 10th, 2023, October 18th, 2023 and January 30th, 2024 (each with approximately three-month interval of data collection). During these events, HKCRP researchers were onboard to replace the batteries and SD cards, and recalibrate the clock for each unit after retrieval and refurbishment of the unit surface. The units were then re-deployed and re-attached to the underwater frame immediately so minimal time was lost for data collection. Spare F-POD units were brought on board for each dive trip, and in the event of any loss of, or damage to, the units during the retrieval process, the spare unit could be deployed immediately to avoid or reduce any data gaps in deployment period at each location. The serial number of all F-POD units as well as the time and date of deployment were recorded during each deployment. One final trip was made on April 17th, 2024 to recover the units and underwater frames from the four deployment sites with the final three months of data being retrieved.

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 detail. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, fishing boat associations, young calves and 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 CWD and FP (number of on-effort sightings per 100 km of survey effort) were calculated separately for each survey area to correct for the uneven survey effort. As such, encounter rates could be useful indicators of the relative importance of different regions within the study area to the dolphins and porpoises.

4.4.3. Line-transect analysis

Density and abundance of CWD for the four main areas of their occurrences (i.e. NEL, NWL, WL and SWL) in 2023 were estimated by line-transect analysis using systematic line-transect vessel survey data collected during the present study. To examine the long-term trend in dolphin abundance, the annual estimates in 2023 from the four areas were also compared with the ones generated for every year since 2001 in the NWL and NEL survey areas and since 2003 in the WL survey area, as well as the biennial and annual periods since 2002 in the SWL survey area.

For the line-transect 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:

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

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

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

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.

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 CWD and FP 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 2023 for both CWD and FP, and in the past five years of monitoring (i.e. 2019-23) for FP.

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. 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. The behavioural data was also used in the quantitative analysis on habitat use to identify important dolphin habitats for feeding and socializing activities and examine trends in habitat use over the past two decades.

4.4.6. Ranging pattern analysis

For the examination of individual ranging patterns, location data of identified dolphins with 10 or more re-sightings and 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 of 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 with 15 or more re-sightings, 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. 2012-2023), 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.

4.4.8. PAM data analysis

Upon retrieval and refurbishment of each F-POD unit in each recovery event, their lids were opened, and the SD cards with the F-POD data were removed from the units for data download. The data were then opened on the *FPOD.exe* software for further analyses by the data analyst, Mr. Daniel Murphy, who is uniquely authorized to carry out the data analysis on behalf of *Chelonia Limited*. The raw click data would first be converted to "FP1" files, and then processed to identify click trains and their likely sources using the new KERNO-F classifier. Notably, the two resident cetacean species in Hong Kong's waters can be differentiated with fairly high confidence because the click trains of porpoises are characterized by being narrow band, high frequency (NBHF), containing many cycles per click and are comparatively quieter than dolphins. In contrast, dolphins produce shorter clicks (i.e. less cycles per click) that are broadband across the detection range. Dolphin clicks are also much louder than porpoises in general, so multi-path detections (i.e. when the reflections of clicks off the water surface or other objects are detected) are more likely to occur. Although possible, it appears rare for dolphins to emit click trains that are more characteristic of porpoises.

The classified click trains were recorded into "FP3" files, and their visual validation were performed to assess the overall rate of false positive Detection Positive Minutes (DPM) as identified by the classifier. This validation was based on a representative sampling of all detections and examining the characteristics of clicks, multi-path clusters, and click trains. Additional criteria based on the characteristics of the ambient noise regime could also be used, particularly in relation to boat sonar and sediment transport noise, which can generate a large number of ultrasonic “clicks”

After visual validation, parameters such as DPMs were then assessed for dolphin and porpoise occurrences at each of the four deployment locations within SCLKCMP and BMP. In particular, the DPM was used by calculating the total amount of minutes where at least one click train is detected within a one-minute period, in order to measure the duration of time at least one dolphin (or porpoise) spent in an area. The DPM is useful to detect diel and seasonal patterns in dolphin (and porpoise) occurrences, and proper statistical testing were then performed to identify the effects of location, season, time of day and known possible impacts on such occurrences based on various parameters such as DPM and related metrics.

Two common metrics related to DPM are DPD % of logged days (the proportion of all logged days with one or more detections) and mean DPM/day. Discrepancies between the rank order of sites with regards to DPD % of logged days and mean DPM/day suggest that at different sites, animals may differ in how long they remained at a site, their group size or their rate of production of detectable sounds (e.g., mean DPM/day may be inflated if animals spent a greater amount of time foraging and thus emitting more clicks, and more often, at some sites). Repeated consistent discrepancies between these two metrics over a longer period may help to shed insight into the behaviour of the animals at each site as well as the importance of each site to the animals.

For the comparison to the vessel-based line-transect survey data, the PAM data from the four North Lantau sites (Siu Ho Wan and Tai Mo To at BMP, and Sha Chau SE and Lung Kwu Chau N at SCLKCMP) covering the time period from January 19th, 2023 (from the previous deployment as part of AFCD PAM study) to January 30th, 2024 were included in the analysis for this marine mammal monitoring project.

5. RESULTS AND DISCUSSIONS

5.1. Summary of Data Collection

5.1.1. Survey effort

During the entire one-year monitoring period, a total of 132 line-transect vessel surveys were conducted among six survey areas in Hong Kong waters from April 2023 to March 2024. These included 11 surveys in DB, 13 surveys in NEL, 11 surveys in NWL, 37 surveys in WL, 37 surveys in SWL and 23 surveys in SEL. The details of these survey effort data collected are presented in Appendix I.

As in the recent past years, more effort was allocated to survey areas outside of North Lantau waters during the 2023-24 monitoring period, since additional surveys have already been conducted in NWL and NEL 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, thereby providing valuable supplementary information on dolphin and porpoise occurrences.

From April 2023 to March 2024, a total of 427.0 hours were spent collecting 3,794.9 km of survey effort during the AFCD vessel line-transect surveys among the six survey areas. Notably, 97.6% of all survey effort was conducted under favourable sea conditions (Beaufort 3 or below, with good visibility). The extremely 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 2023-24, a total of 3,208.0 km of survey effort was also conducted in NEL and NWL survey areas under the HKLR EM&A dolphin monitoring surveys. This brings the total survey effort to 4,019.5 km for the combined dataset from AFCD and HZMB-related surveys in North Lantau waters. 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 288,031 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 47.0% of the total effort funded by AFCD. The survey effort in 2023 alone comprised 4.1% of the total survey effort collected since 1996.

5.1.2. Marine mammal sightings

Chinese White Dolphins - From the AFCD monitoring surveys alone, 163 groups of 569 dolphins were sighted during the 2023-24 monitoring period (see Appendix II). Combined with the additional sightings (seven groups of 19 dolphins) contributed from the HKLR EM&A surveys, a total of 170 groups of 588 dolphins were sighted altogether during the same 12-month period. Among them, 155 groups of 552 dolphins were sighted during on-effort line-transect vessel surveys.

In 2023-24, the majority of dolphin sightings were made in the WL (115 sightings), SWL (42) and NWL (9) survey areas, but only four sightings (all were single animals) were made in SEL survey area and none was sighted in DB or NEL survey area, despite a considerable amount of effort (>2,500 km) surveying these three areas.

Similar to the survey results from recent years of AFCD monitoring work, no dolphin was sighted in NEL for the entire year of 2023 as well as the first three months of 2024. However, the passive acoustic monitoring (PAM) conducted concurrently by HKCRP with the funding support of AFCD revealed that dolphins have not completely abandoned this area (at least not around the Brothers Islands where the PAM units were deployed) in recent years (Wang and Hung 2018, 2022, 2023) and during the present monitoring period in 2023-24 (see Sections 5.1.4 and 5.7). Even though dolphin detections have been extremely low and still declining around the Brothers Islands in NEL in recent years, the continuing usage by dolphins (especially outside of the daylight hours) of this once-important habitat should not be overlooked, and the complementary approach of passive acoustic monitoring is critical to fill important data gaps in monitoring dolphin occurrences 24 hours a day within BMP as well as for the NEL survey area.

Finless Porpoises – A total of 77 groups of 279 porpoises were sighted from vessel surveys during the 2023-24 monitoring period (see Appendix III). Among these porpoise sightings, 62 of them were made during on-effort search, which can be used in the encounter rate analysis and habitat use analysis. The porpoises were sighted in both SWL and SEL survey areas with 47 and 30 groups, respectively. 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.

5.1.3. Photo-identification of individual dolphins

During the 2023-24 monitoring period, approximately 17,500 digital photographs of CWD were taken during the 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. Some photo-identification data was also contributed from the HZMB-related surveys during the same 12-month period.

Up to January 2024, a cumulative total of 1,143 individual dolphins (including 16 that were confirmed to be dead) have been identified by HKCRP researchers in Hong Kong waters and the rest of the Pearl River Estuary. The current catalogue contained 593 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. In 2023, five newly identified individuals from Hong Kong waters were added to the catalogue.

The catalogue summary revealed that 267 individuals have been seen 15 times or more; 167 individuals have been seen 30 times or more; and 110 individuals have been seen 50 times or more. In contrast, 38.8% of the identified individuals have only been seen once or twice, with most of these being first identified in Guangdong waters (326 out of 444 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 steady advancement in the photo-identification works during the 2023-24 monitoring period (Figure 2).

Between April 2023 and March 2024, a total of 99 individual dolphins, sighted 375 times altogether, were identified during the AFCD regular vessel surveys (Appendix IV). With the addition of the HZMB-related monitoring survey data collected in the NWL survey area, there was a combined total of 101 individual dolphins being identified 387 times during the same 12-month period. More than two-third (68.7%) of all re-sightings made during the AFCD/HZMB surveys were in the WL survey area. A total of 103 and 14 re-sightings were made in SWL and NWL respectively, while only one individual dolphin (NL306) was re-sighted four times in SEL waters. On the contrary, no individual dolphin was sighted at all in NEL or DB survey area during the 2023-24 monitoring period.

Among the 101 identified individuals from the AFCD/HZMB combined dataset, the majority of them were re-sighted only a few times, but some of them were repeatedly re-sighted, indicating their strong reliance on Hong Kong's waters as an important part of their home range. For example, 29 individuals were re-sighted five times or more, while seven individuals (NL306, SL40, WL79, WL109, WL123, WL152 and WL220) were re-sighted ten times or more in the combined dataset during the relatively short study period. Furthermore, only 13 individuals were re-sighted with their calves in 2023-24. The mothers that were re-sighted with young calves (either unspotted calf or unspotted juvenile) will be closely monitored, as their survival is critical for the long-term viability of the dolphin population.

5.1.4. Deployment summary for passive acoustic monitoring

Upon examination of the PAM data that were retrieved for the four deployment periods between January 2023 and January 2024, all four F-PODs appeared to have functioned normally. The four F-PODs combined for a total of 1,484.75 logged days (i.e. the number of days the F-PODs were on and recording) during the period from the first deployments on January 19th, 2023 to the last retrievals on January 30th, 2024. The number of days logged by individual F-POD units varied from 357.00 (Siu Ho Wan) to 375.93 (Sha Chau SE) (Table 1). The numbers of logged days at the other sites were 375.90 at Tai Mo To and 375.92 at Lung Kwu Chau N. The total logged days in each area were 732.90 in BMP and 751.85 days in SCLKCMP.

During this sampling period, no time lost was registered by any of the F-PODs. The amount of time lost is related to the minute click limit being reached (i.e., "maxed out") so that no further clicks are detected/recorded by the F-POD until the start of the next minute. The click limit per minute can be exceeded in noisy environments. The most common causes of such time loss for click detections include: loud boat sonar, sediment transport noise (caused by the collisions of small particles of sediments during movement), snapping shrimps and occasionally storms or rougher sea conditions. Although both boat sonar (around 50, 95, 104 and 109 kHz) and sediment transport noise were detected by F-PODs at the four sites, the amount of noise did not max out any recording minutes of any of the F-PODs during the deployment period (Table 1), even at sites that were generally identified as “noisy” in the past by C-PODs. The complete lack of time lost by all F-PODs during the current deployment was not surprising given the superior ability of the F-POD to filter out boat sonar without compromising cetacean detections (this was also observed consistently in the F-POD data obtained during the 2021-22 and 2022-23 AFCD PAM studies). Although these are very positive results of the abilities of the F-POD, it is unknown if the noisier conditions in Hong Kong’s waters in the past would have resulted in any time lost by the F-POD. With so little noise, none of the F-PODs had stopped operating due to drained batteries or SD cards reaching capacity (all were still recording when retrieved).

Furthermore, the false positive rates of CWD detections were assessed by visual validation and found to be zero, except at one site (Lung Kwu Chau N) where it was very low at 1.00%. Consequently, for the two marine park areas, the false positive rate was also absent (0.00% for BMP) or very low (0.29% for SCLKCMP). However, there were notably very few DPMs at Siu Ho Wan (27), Tai Mo To (21) and Sha Chau SE (103) (Table 1). Nevertheless, the lack or very low levels of false positives provides high confidence in the dolphin detections.

A summary of the data obtained from the four retrieved F-PODs along with detection statistics for dolphins and porpoises are shown in Table 1. It was assumed that all dolphins detected belonged to Chinese White Dolphins because they are the only delphinid species that are residents of Hong Kong’s waters while the occurrence of other similar species are rare or non-existent. A total of 1,442 dolphin DPMs and four DPMs with porpoise characteristics were recorded. Although finless porpoises are present in Hong Kong’s waters, they have not been confidently confirmed from the waters of these two marine parks. A few DPMs with porpoise characteristics have been recorded from North Lantau sites previously but none of these DPMs could be confirmed to have originated from porpoises and more research is needed into the possibility of dolphins mimicking porpoise clicks.

5.2. Distribution

5.2.1 Distribution of Chinese White Dolphins

During the 2023-24 monitoring period, CWD were frequently sighted along the coastal waters to the west and southwest of Lantau Island, extending from Tai O Peninsula in WL toward Kau Ling Chung and Shui Hau Peninsula in SWL (Figure 3). On the contrary, they have mostly disappeared from the entire NWL survey area, with the exception of two rare sightings made to the southwest of Lung Kwu Chau and at the northwestern corner of the survey area (i.e. a few kilometres to the west of Black Point), and also seldom occurred in the southern and eastern portions of South Lantau waters. Moreover, no dolphins were sighted at all in DB or NEL where are part of the historically known dolphin habitat (Figure 3).

In 2023 alone, from the combined effort of the AFCD and HZMB-related surveys, dolphin occurrence was the highest along the west coast of Lantau, while they also occurred regularly in the northwest portion of the South Lantau waters (Figure 4). A closer look at the North Lantau region revealed that CWD mostly occurred in southwestern end of the region (i.e. just to the north of the HKLR alignment, a few kilometers to the southwest of the airport platform), but rarely occurred to the north of the airport (Figure 5). As consistently recorded in recent years of monitoring surveys in North Lantau waters, no dolphin was found at all in the central and eastern portions of the region, including the peripheral area of the airport's third runway land mass, as well as the footprints of the Hong Kong Boundary Crossing Facilities at the juncture of the NWL and NEL survey areas.

In WL waters, dolphins occurred much more frequently and evenly distributed throughout the area in 2023 (Figure 6). Higher concentration of dolphin sightings can be found in inshore waters near Tai O Peninsula, Kai Kung Shan, Peaked Hill and all around the Fan Lau Peninsula. As in recent years, the dolphins generally occur more frequently along the inshore waters of WL, but less frequently further offshore along the western territorial border. Notably, dolphins appeared to avoid the northern end of the WL survey area with the overlap of the HKLR alignment.

In the South Lantau region, the only concentration of dolphin sightings was found toward the northwestern end near the Fan Lau Peninsula, while other sightings were scattered along the coastal waters between Kau Ling Chung and the Shui Hau Peninsula (Figure 6). On the contrary, with the exception a handful of sighting made in the upper portion of the Soko Islands Marine Park, the dolphins have mostly disappeared in the southern half of the SWL survey area, as well as the entire SEL survey area (except a few dolphin groups, all involved single animals, sighted to the southwest of Chi Ma Wan Peninsula and to the southeast of Shui Hau Peninsula).

5.2.2. Distribution of finless porpoises

From April 2023 to March 2024, concentrations of porpoise sightings in South Lantau waters could only be found around Tai A Chau, the eastern edge of the Soko

Islands, and between Shek Kwu Chau and Cheung Chau (Figure 7). On the contrary, the rest of the porpoise sightings were scattered to the south of Shui Hau Peninsula, the waters between Shek Kwu Chau and the Soko Islands, as well as a few kilometres to the south and west of Shek Kwu Chau.

Examination of temporal changes in porpoise distributions in South Lantau Waters in the past four years (2019-22) revealed that such distribution is more restricted at the southern and eastern sides of the Soko Islands in 2023 than in previous years, when porpoise distribution appeared to be more widespread (especially in 2020; Figure 8). When compared to the earlier years as well as in 2020, porpoise usage has dramatically diminished around Shek Kwu Chau in 2022 and 2023. Notably, porpoise occurrences appeared to be much higher in summer and autumn months during 2023 when compared to the previous years.

5.3. Habitat Use

5.3.1. Habitat use patterns of Chinese White Dolphins

Habitat use patterns of CWD 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 the past (see Hung 2008). These patterns were also compared to the annual patterns observed in recent years.

Similar to previous years, all grids with high dolphin densities in 2023 were concentrated along the coast of WL and the western end of SWL, mainly extending from Tai O Peninsula toward Fan Lau Peninsula (Figure 9). On the contrary, only six grids recorded dolphin occurrence in NWL, with half of them located at the southwest corner of the area just to the north of the HKLR alignment (i.e. at the border between WL and NWL survey areas). The three grids to the west and northwest of Lung Kwu Chau were all in very low densities (with only a single sighting containing only a few individuals in each of these grids). The rest of the North Lantau region (including Deep Bay) did not record any dolphin occurrence at all (Figure 9).

In the South Lantau region, while the few high density grids were only concentrated toward the western end near Fan Lau Peninsula and Kau Ling Chung, most of the grids along the coastal waters in SWL survey area (along a few within Pui O Wan in SEL survey area) recorded dolphin occurrence, albeit in low to moderately low densities (Figure 9). They also occurred around the Soko Islands in low to moderately low densities, and mostly around Siu A Chau. On the contrary, no dolphin occurred at all in the southern and eastern ends of the South Lantau region.

Temporal changes in dolphin habitat use patterns

A comparison was made among the habitat use patterns over the past nine years (2015-23) to examine the temporal changes in dolphin densities in the western waters of Hong Kong. In WL, more intense habitat use was recorded with high densities among most grids in 2015 (Figure 10). Since then, dolphin densities diminished progressively for the most parts of the area, even though there appears to be slight rebounds observed in 2018-19 as well as in 2022. Notably, dolphin usage in the northern portion of the WL survey area, which overlapped with the HKLR09 alignment, have been consistently low (except in 2018 when densities were moderately higher), when compared to the earlier years before and during the initial phase of HKLR construction. Dolphin usage should be continuously monitored in their priority habitats in WL waters, especially for the examination of 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, after a resurgence of dolphin habitat use in 2015-16, such use has continued to diminish in recent years, especially around the Soko Islands (Figure 10). In the past few years, the few grids around the Fan Lau Peninsula has been the only area in SWL waters with consistently high dolphin densities, whereas their usage elsewhere has been low to moderately low, and quite scattered mostly in the northern portion of the survey area.

In the North Lantau region, a dramatic decline in dolphin habitat use pattern has been well documented in the past decade, with greatly diminished dolphin occurrences throughout the entire region. Such trend continued in 2023, with dolphin occurrence declining to extremely low level in this region (Figure 11). In recent years, dolphin usage has been increasingly confined to the western end of the North Lantau region, and in 2020-22, their habitat utilization was mostly restricted to the SCLKCMP in generally low densities. And for the first time, such occurrence around the marine park was close to non-existent in 2023. The continuous absence of dolphins in the central and eastern portions of the region since 2015 is of great concern, as there have been no signs of recovery in dolphin habitat use for quite some time now after the completion of marine works associated with the HZMB construction as well as the massive reclamation works associated with the 3RS project.

Temporal changes in dolphin habitat use patterns among six key habitats

Temporal trends in dolphin usage at six key habitats were examined for the past two decades (2003-23), which included the four existing marine parks around Sha Chau and Lung Kwu Chau, the Brothers Islands, the southwestern corner of Lantau, and the Soko Islands, as well as two other "hot spots" at Tai O and Black Point where dolphins regularly occurred in the past (Figure 12). 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 2003-23 period and track any changes over the years.

There has been a continuous decline in dolphin usage within SCLKCMP (with 17 grids) since 2013, and such usage fell even further to an extremely low level in the past four years of 2019-22, before dropping to zero dolphin density (i.e. complete absence) for the first time in 2023 (Figure 13). Such an alarming decline raises serious concerns because this area has long been considered important dolphin habitat in Hong Kong (Hung 2008). Similar to the situation in BMP, the traditional visual monitoring survey may no longer be a viable research tool to examine long-term trend in dolphin usage at this once-important habitat when dolphin occurrences dropped to a near-absent level, and passive acoustic monitoring therefore will be extremely valuable and increasingly critical as a complementary approach to detect whether there is any sign of recovery in dolphin usage within this marine park (see PAM results at this marine park in Section 5.7)

Furthermore, after a dramatic decline in dolphin usage since 2011, the BMP (with 15 grids) recorded zero dolphin density in nine consecutive years in 2015-23 (Figure 13). Although dolphin usage was expected to recover after the completion of most marine works associated with HZMB construction and the establishment of the BMP in December 2016, their occurrence around the Brothers Islands remains non-existent in recent years. Notably, passive acoustic monitoring revealed that a very low level of dolphin detections was recorded within this marine park in the past several years, and most of these rare detections were made during night-time (Wang and Hung 2022, 2023, and present study as detailed in Section 5.7). With the near-absence of dolphins in this dolphin habitat for quite a long time now, continuous acoustic monitoring of this area has become even more critical for detecting any sign of recovery in dolphin usage.

Besides a noticeable spike in dolphin usage in 2014 and 2015 within the Southwest Lantau Marine Park (SWLMP, with 15 grids), such usage has remained fairly steady and high in the past decade (Figure 13). Notably, this marine park has consistently recorded the highest levels of dolphin usage among all key dolphin habitats in western Hong Kong in the past two decades, and this last remaining stronghold of the top priority dolphin habitats should be closely monitored to examine any sign of temporal changes in their future usage.

After a dramatic decline in dolphin densities was detected in the South Lantau Marine Park (SLMP, with 30 grids) in 2018, dolphin usage there rebounded to a slightly higher level in 2019, before another steady decline to the lowest level in 2022. However such usage has slightly rebounded once again in 2023 (Figure 13), despite the resumption of the high-speed ferry traffic in the South Lantau Vessel Fairway after the Covid-19 restriction has been lifted. Nevertheless, the long-term trend in dolphin usage within this marine park should be continuously monitored to determine whether this temporary recovery in dolphin usage remains steady over time.

Once identified as a critical dolphin habitat in the western waters of Hong Kong, the waters around Tai O Peninsula (with four grids) recorded a steady decline in dolphin densities from the highest in 2009 to the lowest in 2022, although there have been more fluctuations in recent years with slight rebounds recorded in 2019, 2021 and 2023 (Figure 13). On the other hand, 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, there was a small spike in dolphin usage in 2019 before falling to a very low level in 2020 and then a complete absence once again in three consecutive years of 2021-23 (Figure 13). 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 SCLKCMP, special attention on dolphin habitat use in this area in the near future is needed.

5.3.2. Habitat use patterns of finless porpoises

In 2023, the more heavily utilized habitats of the finless porpoises were largely restricted to the offshore waters in SWL survey area, especially around Tai A Chau and to the east of the Soko Islands (Figure 14), as consistently recorded in the recent years. On the contrary, even though porpoise occurrences were recorded among most grids in SEL survey area, such occurrences were infrequent and resulted in low to moderately low densities, with the exception of a grid to the east of Shek Kwu Chau with a larger group of porpoises sighted there. Notably, the waters near Shek Kwu Chau were once again seldom utilized by porpoises in 2023 (Figure 14), and such diminished occurrences of porpoises have occurred since the construction activities for IWMF phase 1 commenced in this area since 2018. The reclamation works for IWMF phase 1 has been completed by 2022 (see below).

In order to increase the overall sample size, the survey effort and porpoise data collected from 2019-23 for SWL and SEL survey areas were pooled and analyzed for a longer period in order to obtain sufficient survey data to provide a better representation of porpoise habitat use pattern South Lantau waters in recent years. Since the 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 for SWL and SEL survey areas was further stratified into winter/spring (December through May) and summer/autumn (June through November) periods to deduce habitat use patterns of porpoises for the respective dry and wet seasons.

During the dry season (i.e. winter and spring months) in 2019-23, the grids with high porpoise densities in South Lantau waters mainly clustered at the offshore waters to the south and east of Tai A Chau, as well as between Shek Kwu Chau and the Soko Islands (Figure 15). However, the porpoises seldom utilized the western and northern portions of the South Lantau region. On the contrary, the porpoise usage during the wet season in South Lantau waters was drastically different from the dry season (Figure 16). During the wet season, with the exception of a few grids near Shui Hau Peninsula, almost all grids recorded porpoise usage in South Lantau waters were located at the offshore waters with low to moderately low densities.

<u>Temporal changes in porpoise habitat use patterns</u>

To examine the recent temporal changes in porpoise densities in South Lantau waters, comparisons were made on annual patterns of porpoise habitat use across nine-year period in 2015-23 (Figure 17). In the earlier years, porpoise usage at the offshore waters between Shek Kwu Chau and the Soko Islands (2016-17) was at a consistently high level. However, such usage has progressively diminished in recent years, with noticeable decline near Shek Kwu Chau. Such dramatic decline can be linked to the reclamation and other construction activities in relation to the construction of IWMF phase 1 that commenced in 2018. The reclamation works for IWMF phase 1 has been completed by 2022 (see below).

Three key porpoise habitats in South Lantau (including the SLMP, Shek Kwu Chau and Pui O Wan; see Figure 12) were examined for temporal trends in their usage across the 16-year period between 2008 and 2023. Similar to the CWD, to examine temporal trends in porpoise usage 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 2008 to 2023.

Porpoise usage fluctuated greatly at the SLMP (with 30 grids) in the past 16 years, starting at a lower level in 2008-09 (Figure 18). Since then, there was a steady increase in porpoise usage of this area to the highest level in 2014. However, in the past recent years, porpoise usage within this marine park has become less stable, with notable drops in 2016, 2019 and 2021-22, followed by moderate rebounds in subsequent years of 2017, 2020 and 2023. Continuous monitoring would be needed to determine any long-term trend in porpoise occurrence within this marine park.

The inshore waters of Pui O Wan (with nine grids) were more intensely used by porpoises in the earlier years in 2008-09, but then such usage became infrequent between 2010 and 2013 (Figure 18). Even though the porpoise usage rebounded to a higher level in the subsequent years, there were noticeable drop and remained at a low level in the past four years of 2020-23. On the other hand, the surrounding waters of Shek Kwu Chau (with eight grids) were consistently utilized by the porpoises as an important habitat in the first decade of the 15-year period (i.e. 2008-17), especially with a steady increase in porpoise usage starting from 2013 to reach a much higher level in 2016 (Figure 18). However, there has been a sharp decline in porpoise usage since 2018 to reach to the lowest level with nearly complete absence in 2021 and 2022, then followed by a small rebound in 2023. The dramatic decline in porpoise usage of this once critical porpoise habitat after 2017 has been closely linked to the construction activities near Shek Kwu Chau in association with the reclamation works for IWMF phase 1 since mid-2018 and this raises some grave concerns. Undoubtedly with the permanent loss of this critical porpoise habitat due to the reclamation work, the waters around Shek Kwu Chau can no longer serve the important functions for the porpoises that regularly occur in southern waters of Hong Kong. Future trends in their habitat use near Shek Kwu Chau as well as for the entire southern waters of Hong Kong should be closely monitored after the completion of the reclamation works for IWMF phase 1 in 2022. To compensate for the permanent loss of habitat for Finless Porpoise as a result of the reclamation works and breakwater construction for IWMF phase 1, a compensatory marine park has been proposed and later combined with the proposed Soko Islands Marine Park into a larger single marine park of approximately 2,067 hectares, namely the South Lantau Marine Park and was designated on 30 June 2022.

In recent years, a marine infrastructure project, namely the Hong Kong Offshore LNG Terminal (HKOLNG) construction, commenced in late 2020 through late 2022 at the offshore waters in South Lantau region adjacent to the South Lantau Marine Park. To examine the potential impact of jetty construction and terminal operation for the project, porpoise usage within the project footprint (overlapped with three grids O35, P34 and P35) is examined for the past eight years with consistent annual survey effort among the three grids overlapping the project site. After an increase in porpoise usage to the highest level in 2018, such usage dropped noticeably in 2019 before a marked increase in 2020 and 2021, followed by another drop in 2022 and 2023 (Figure 18). It appeared that the fluctuation in porpoise usage in these offshore waters of South Lantau did not correspond well with the construction schedule of HKOLNG, as the drop in porpoise usage during 2019 was observed well before the commencement of construction, while the rebound in porpoise usage in 2020 and 2021 happened during the bulk of the construction. It remains to be seen though whether the existence and operation of the HKOLNG jetty would impact porpoise usage in a long run, which should be closely monitored.

5.4. Group Size, Calf Occurrence and Activities

5.4.1. Group sizes of dolphins and porpoises

During the 2023-24 monitoring period, the group sizes of CWD varied from singletons to 18 animals, with an overall mean of 3.5 ± 3.04 (n = 170). Among the three areas where dolphins regularly occurred in 2023-24, the mean group sizes were the lowest in NWL (2.7, but based on a very small sample size of nine sightings) and the highest in WL (3.6) and SWL (3.4) (Table 2a). Only four singletons were sighted in SEL. Mean group sizes were similar across the four seasons as it was only higher in summer (3.9) while the other three seasons were fairly similar (3.2-3.3). Similar to past monitoring periods, the majority of dolphin groups sighted in 2023-24 were small, with 52.4% of the groups composed of 1-2 animals, and 73.5% of the groups with fewer than five animals. Only eight out of the 170 dolphin groups consisted of more than ten animals (Figure 19).

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 remarkably similar levels (i.e. 3.23-3.28) during the six consecutive years of 2016-21, which was then followed by a modest increase in the following consecutive years in 2022 (3.55) and 2023 (3.55) (Figure 20). However, it should be noted that among different survey areas, after dropping to the lowest level in the past five consecutive years of 2018-22, the mean group size in NWL increased considerably in 2023. After dropping steadily in the recent years of 2019-21, the mean group size in SWL also experienced a strong surge in 2022 and 2023. Temporal changes in mean dolphin group sizes should be continuously monitored, as this could be indicative of changes in their 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.

Distribution of dolphins in different group size categories in 2023 is shown in Figure 21. Larger dolphin groups occurred predominantly along the WL coastline, around the tip of Fan Lau Peninsula and near Kau Ling Chung, with the very large groups (10+ dolphins per group) occurring near Tai O Peninsula, Peaked Hill, and Kau Ling Chung (Figure 21). Elsewhere, only two medium-sized groups occurred in the North Lantau region, and both were located at the southwestern corner of NWL survey area (or to the west of the airport platform). In contrast, distribution of the smaller dolphin groups closely resembled the overall distribution around Lantau waters, even though almost all groups that occurred at the periphery of the overall distribution (e.g. in NWL waters and within Pui O Wan) were very small (Figure 21).

For the finless porpoises, their group sizes during the 2023-24 monitoring period varied from singletons to 14 animals, with an overall mean of 3.6 ± 2.98 (n=77). The majority of these groups were very small, with half of them being composed of 1-2 animals, and all except 21 groups (or 72.7% of all groups) had fewer than five animals (Figure 22). Within the two survey areas in South Lantau region, their mean porpoise group sizes were fairly similar (3.5 in SWL and 3.8 in SEL) (Table 2b).

Temporal trend in annual mean porpoise group sizes were examined in the past decade between 2014 and 2023 (Figure 23). Over the decade, mean porpoise group sizes fluctuated but after a spike in 2020, it dropped to the lowest level in 2021 and 2022, before rising noticeably to the highest level in 2023 (Figure 23). It would be critical to continuously monitor the trend in porpoise group sizes, as that would provide insights on whether there are any changes in the porpoises' foraging strategies in response to anthropogenic impacts such as increased vessel traffic disturbance or changes in prey distribution and resources.

Distribution of porpoises in different group sizes in 2023 showed that the several larger porpoise groups mainly occurred at the offshore waters around the Soko Islands in South Lantau waters (Figure 24). On the contrary, the smaller porpoise groups resembled the overall distribution pattern, and all porpoise groups within Pui O Wan and to the west of Shek Kwu Chau were generally small (Figure 24).

5.4.2. Occurrence of dolphin calves

Of the 653 dolphins sighted altogether in 2023, a total of seven unspotted calves (UC, or newborn calf) and 11 unspotted juveniles (UJ, or older calves) were identified with their respective age classes, with these young calves (i.e. UC and UJ combined) comprising 2.8% of the total. After a large and steady decline between 2013 and 2018, the annual percentage of young calves in Hong Kong waters appeared to rebound slightly in 2019-21 and 2023 despite a slump in 2022 (Table 3; Figure 25). Notably, when compared to the earlier years, calf occurrence in recent years remained at a very low level, but a notable increase of UCs was observed in 2023. Such trend should be closely monitored as the infrequent occurrence of dolphin calves in the past decade or so has been a great concern as that casts a worrisome future for the local dolphin population.

Distribution pattern of young calves in 2023 revealed that their sightings were mostly concentrated at the small stretch of coastal waters between Tai O Peninsula and Peaked Hill, the coastal waters near Kau Ling Chung, and to the north of Siu A Chau (Figure 26). On the contrary, no young calves were found throughout the North Lantau Region and for the most part of the South Lantau region.

5.4.3. Activities of dolphins

In 2023, 38 (or 20.7% of the total) and seven (or 3.8%) groups of dolphins were observed to be engaged in feeding and socializing activities, respectively, while none was observed to be engaged in traveling or milling/resting activity. Annual percentages of socializing activities remained at similarly low levels over the past eight consecutive years, but the percentage of feeding activities has rebounded noticeably in three consecutive years in 2021-2023 after remaining at very a low level during the five consecutive years of 2016-20 (Figure 27). In fact, the figure in 2023 (20.7%) was the highest level recorded since 2010 (and the second highest level since 2006), although it should be considered that the sample size in total number of dolphin sightings have diminished dramatically in the past decade.

Distribution of dolphins engaged in different activities in 2023 is shown in Figure 28. Besides the single group to the north of Lung Kwu Chau, and a few groups scattered within Pui O Wan and near Siu Ho Wan, the majority of dolphin groups associated with feeding activities were found along the stretch of WL coastlines extending toward Shui Hau Peninsula, with particularly higher concentrations near Tai O Peninsula, Peaked Hill, Fan Lau Peninsula and near Shek Pik. On the contrary, dolphin sightings associated with socializing activities were mostly concentrated between Peaked Hill and Fan Lau Peninsula, with another two scattered near Tai O Peninsula and to the west of the airport platform.

5.4.4. Dolphin associations with fishing boats

Of the 170 groups of dolphins sighted during the 2023-24 monitoring period, 24 (or 14.1% of all groups) were associated with operating fishing boats. The vast majority of these groups (20) were associated with purse-seiners, while four other groups were associated with gill-netters during the 12-month monitoring period.

After remaining at a low level during 2018-20, the overall annual percentage of dolphin sightings associated with fishing boats was at a higher level in three consecutive years of 2021-23. In fact, the level in 2023 was the highest since such examination commenced two decades ago in 2002. However, the sample size in the total number of dolphin sightings have fallen dramatically in the past several years so cautions should be taken with the increase in percentage of fishing boat associations in recent years.

In 2023, the few dolphin groups associated with operating gill-netters were scattered to the north of HKLR alignment, a few kilometers to the west of Tai O Peninsula, and near Chi Ma Wan Peninsula in Pui O Wan (Figure 29). On the contrary, the frequent occurrence of dolphin groups associated with operating purse-seiners were mostly concentrated near Kai Kung Shan and Peaked Hill, around the Fan Lau Peninsula and within the coastal waters near Shek Pik (Figure 29).

5.5. Encounter Rate

5.5.1. Encounter rates of Chinese White Dolphins

To calculate the encounter rates of CWD, only survey data collected in Beaufort 0-3 conditions was included in the analysis as in past monitoring periods. From April 2023 to March 2024, the combined encounter rate of dolphins from the four survey areas of NEL, NWL, WL and SWL was 2.6, which was very similar to the figure in the previous two monitoring periods in 2021-22 and 2022-23 (Figure 30a & Table 4). Notably, the combined dolphin encounter rates recorded in these three recent periods were also at the lowest level among all monitoring periods in the past two decades. Among different survey areas, the encounter rates in NWL during the past five monitoring periods were at the historic low, while the 2023-24 encounter rate in the WL survey area dropped once again after slight rebound in the previous two monitoring periods, and was only slightly higher than the lowest level recorded in 2020-21 (Figure

30b). A slight rebound in dolphin encounter rate in SWL was also noted in 2023-24, after a steady but small decline in the previous four monitoring periods.

As consistently recorded in past monitoring periods during the past two decades, WL continued to have the highest dolphin encounter rate (12.6) among the four survey areas with their occurrences, and was considerably higher than the ones in SWL (3.0) and NWL (0.4) (Table 4). The encounter rate in NEL was once again zero in 2023-24, as no on-effort dolphin sighting was made during 1,532.3 km of survey effort. Similar to the previous ten monitoring periods, dolphin encounter rate in the present period was once again higher in SWL than in NWL, which is the opposite to the observations made in earlier years (Table 4).

<u>Temporal trend in annual encounter rate</u>

Temporal trends in annual dolphin encounter rates in the past two decades were examined for the overall combined areas (i.e. NEL, NWL, WL and SWL), as well as in the North and West/Southwest Lantau regions. After a slight rebound in 2021 from the previous low level in 2018-20, another steady decline was observed in the past two years with a drop to the lowest level in 2023 during the past two decades of dolphin monitoring in western waters of Hong Kong (Figure 31a). Furthermore, the dolphin encounter rate in the entire North Lantau region (NEL and NWL survey areas combined) in 2023 stayed at the same lowest level as in 2022, and such rate has remained at an exceptionally low level in five consecutive years from 2019-23 (Figure 31b). After fluctuating at a lower level since 2016, the dolphin encounter rate for the West/Southwest Lantau region dropped to the lowest level in 2023 (Figure 31b).

5.5.2. Encounter rates of finless porpoises

Porpoise encounter rates were calculated using data collected in Beaufort 0-2 conditions as in past monitoring periods. From April 2023 to March 2024, the combined porpoise encounter rate of SWL and SEL survey areas was 4.4 sightings per 100 km of survey effort (Table 5). When compared to the past ten monitoring periods since 2014-15, such encounter rate has remained fairly stable in the earlier years with the exception of a dip in 2015-16. However, there was a sharp drop in porpoise encounter rate between 2019-20 and 2020-21, followed by a small increase in 2021-22 and 2022-23 and then a notable increase in 2023-24 (Figure 32). Among the two survey areas, porpoise occurrence in SWL (5.1) was much higher than in SEL (3.7) during the 2023-24 monitoring period.

Annual porpoise encounter rate from the combined areas of SWL and SEL indicates that porpoise usage in South Lantau waters have steadily increased from the lowest in 2009 to the highest in 2014, then followed by a steady decline from 2014 to the lowest level in 2021, following by a small but steady increase in 2022 and 2023 (Figure 33a). Furthermore, great fluctuation in their annual encounter rates was evident between the two survey areas in South Lantau waters (Figure 33b).

5.6. Density and Abundance

5.6.1. Estimates of dolphin density and abundance in 2023

Densities and abundance of CWD were estimated for the 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 2022, 2023). The annual estimates deduced from the 2023 vessel survey data can be used to assess the long-term temporal trend in dolphin occurrence in Hong Kong. Only effort and sighting data collected from the four areas during Beaufort 0-3 conditions were used in the analysis and this included 7,470 km of survey effort and 186 dolphin groups from the four areas for density and abundance estimation in 2023 (Table 6a).

Among the four survey areas, WL recorded the highest dolphin density, with 75.27 individuals/100 km^2, which was more than five times and 17 times higher than the densities in SWL and NWL, respectively (Table 6a). In recent years, the WL figures have fluctuated with no consistent trend, as they have dropped once again in 2023 after slight rebounds in 2021 and 2022. On the contrary, dolphin density in SWL fell in three consecutive years of 2020-22 and stayed at a low level in 2023. In contrast, after dropping to the lowest level in 2022, the density estimate for NWL in 2023 returned to similar levels in 2019-22. Furthermore, as in the previous eight years, dolphin density and abundance could not be estimated for NEL in 2023 because no dolphin was sighted in this area for the entire year.

In 2023, the abundance estimates of CWD were 21, 9 and four dolphins in the WL, SWL and NWL survey areas, respectively, while no dolphin was observed in the NEL survey area. As a result, the combined estimate for the four areas was 34 dolphins (Table 6b). After a steady decline in combined abundance estimates from 188 dolphins in 2003 to the lowest of 32 dolphins in 2018, a sharp rebound was observed in 2019 (52 dolphins), but followed by noticeable drops in the most recent estimates in 2020 and 2021, then to the second lowest level in both 2022 and 2023 (Figure 34; Table 6b).

5.6.2. Temporal trends in dolphin abundance

Temporal trends of annual dolphin abundance in NWL and NEL (2001-23), SWL (2002-23) as well as WL (2003-23) 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. In SWL, temporal trend of annual estimates was only examined since 2010 but not for a longer period, as consistent survey effort (at least 500 km of survey effort per year) was not collected annually prior to 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 in 2002-03 (30 dolphins) to the lowest in 2006-07 (six dolphins) (Figure 35). Since then, the annual abundance estimates have 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 rebound occurred in 2019, then followed by a steady decline in three consecutive years of 2020-22 and stabilized in 2023 (Figure 35; Table 6b). Notably, the associated CVs of the annual abundance estimates in SWL have been moderate and within the range of 20-40% (except for the biennial estimates in 2002-03 (45%) as well as the annual estimates in 2010 (67%) and 2012 (54%)), so the estimates should be reliable for most years.

In WL, dolphin abundance steadily decreased from 54 dolphins in 2007 to only 17 dolphins in 2012 (Figure 36; Table 6b). After a rebound in 2013 and 2014 (with 23 and 36 dolphins, respectively), there was another steady decline in the following years of 2015-17 to the lowest level of 16 dolphins in 2017. Thereafter, the annual abundance varied moderately within the range of 19-29 dolphins in the past six years of 2018-23 (Figure 36).

In contrast, dolphin abundance in the North Lantau region has shown a dramatic and consistent decline in the past two decades. In NEL, the decline was appalling, dropping from the highest in 2001 (20 dolphins) to only one dolphin in 2014 and then to zero for nine consecutive years (2015-23) (Figure 36). Dolphin abundance in NWL also dropped steadily and steeply from the highest in 2003 (84 dolphins) to an extremely low level in the past five years with only 1-4 dolphins, and such decline was more than 95% since 2003, or 90% since 2012. Notably, cautions should be taken for the slight rebound in dolphin abundance in NWL between 2022 (with one dolphin) and

2023 (with four dolphins). First, the associated CVs for the abundance estimates in 2022 (44%) and 2023 (54%) were both high due to the small sample size of on-effort dolphin sightings for both year (i.e. 11 in 2022 and nine in 2023). Moreover, six of the nine dolphin sightings made in NWL in 2023 were located at the boundary of NWL and WL survey areas, with only three dolphin sightings (all very small groups of 1-3 animals) to the north of the airport platform (Figure 5). If those sightings being made adjacent to the WL survey areas are excluded, the abundance estimate in NWL in 2013 would certainly be much lower (but that would also be offset by the increase in abundance estimate in WL so the overall abundance estimate would remain the same).

As the dolphin numbers in North Lantau waters have dropped to extremely low levels (with zero dolphin in NEL since 2015, and only a few dolphins in NWL in recent years), estimating their abundance with reasonable precision becomes increasingly difficult to near impossible. Although increasing survey effort may compensate for decreasing sighting rates, there have already been large amount of survey effort allocated to North Lantau waters with the additional HZMB-related EM&A data, and it is still impossible to estimate dolphin abundance with any reliability when the number drops to extremely low numbers. Therefore, a change in monitoring strategy has been implemented starting from this monitoring period in 2023-24 to adopt a hybrid and complementary approach of conducting both line-transect vessel surveys and passive acoustic monitoring to paint a better picture of dolphin occurrences and associated temporal trend in North Lantau waters. If resources are limited in the future and a decision is needed to be made between the two monitoring methods, there should be a strong consideration to continue the PAM studies instead of vessel-based monitoring for the long-term monitoring of cetaceans in North Lantau waters.

5.7. Dolphin Occurrences Assessed by Passive Acoustic Monitoring

5.7.1. Overall occurrence in BMP and SCLKCMP

Based on the 1,442 CWD DPMs recorded among the four North Lantau sites between January 2023 and January 2024, detailed assessment was conducted to understand the occurrences of Chinese White Dolphins through passive acoustic monitoring as a complementary approach to the vessel-based line-transect monitoring method with the results detailed in Sections 5.2 to 5.6.

Dolphin activity, as measured by the proportion of all logged days with one or more detections (DPD % of logged days) varied greatly: 1.96% of 357.00 logged days (Siu Ho Wan); 2.36% of 375.90 logged days (Tai Mo To); 10.08% of 375.93 logged days (Sha Chau SE); and 33.69% of 375.92 logged days (Lung Kwu Chau N) (Table 1).

Comparing across areas, BMP had very few logged days with detections (only 4.24% of 738.90 logged days), whereas SCLKCMP had 38.73% of 751.85 logged days with at least one detection.

The mean dolphin DPM/day metric also varied greatly (in increasing order): 0.06 (Tai Mo To), 0.08 (Siu Ho Wan), 0.27 (Sha Chau SE) and 3.47 (Lung Kwu Chau N) (see Table 1). By area, the mean DPM/day for BMP was only 0.07 ± 0.54 (Coefficient of Variation (CV) = 8.32) and for SCLKCMP was 1.85 ± 9.88 (CV = 5.34). The general (but usually imperfect) pattern observed in past years (where the rank order of sites based on DPD% of logged days matched the rank order of sites based on mean DPM/day) was also seen during this deployment. This general pattern was also observed across the areas. Only one discrepancy between the rank orders of dolphin DPD% of logged days and mean dolphin DPM/day was observed (that being the rank position of Tai Mo To being higher for DPD % of logged days than for mean dolphin DPM/day compared with Siu Ho Wan). However, given how few DPMs were recorded at Siu Ho Wan and Tai Mo To, any interpretations of these metrics would be premature.

As in previous years of PAM works, it was clear that the Lung Kwu Chau N site continued to have the highest dolphin detection metrics (by far) of these four sites. It was followed next (but distantly) by the other SCLKCMP site at Sha Chau SE. Both BMP sites had very minimal detection. Although there have been very few DPMs since January 2020, there may be some seasonal regularity in the presence of dolphins at BMP sites, with most occurring during the dry season (see Figure 37). This same pattern of greater detections being found during the dry season was even clearer for the SCLKCMP sites (Figure 38).

5.7.2. Overall diel patterns of occurrence

The F-POD data obtained during this study revealed some clear differences in peak activity periods during different times of the day and at different sites. For Siu Ho Wan and Tai Mo To, there was a clear diurnal pattern with higher CWD activity periods occurring during the overnight hours from about 22:00 to 04:00 and this pattern appears to be maintained regardless of season (Figures 39a-c). However, with the few DPMs overall, the same cautious caveat remains with regards to interpreting these data. At SCLKCMP, the daily patterns are less pronounced and appears to be bimodal with a peak in activity overnight (between about 20:00 to 03:00) and one during mid-day (about 12:00 to 14:00) (Figure 40a). Because there were very few DPMs recorded during the wet season, the apparently un-patterned data at SCLKCMP sites

(Figure 40b) need to be interpreted cautiously. And given that the majority of the detections were made during the dry season, it is not surprising that the dry season pattern (Figure 40c) is a close reflection of the overall pattern (Figure 40a). Because Lung Kwu Chau N had an overwhelmingly higher number of detections (compared with Sha Chau SE), the overall diel patterns for SCLKMP were driven by the patterns observed at Lung Kwu Chau N.

5.7.3. Statistical analyses on the spatio-temporal effects on occurrence

To identify the effects of location, season, and time of day, proper statistical testing of the F-POD data was also be performed. However, given the low levels of detections at Siu Ho Wan, Tai Mo To and Sha Chau SE, the results must be interpreted cautiously. For location, the data were grouped based on area or specific sites within an area. For the seasons, the groupings was based on the wet and dry monsoon seasons (with clear differences in monthly rainfall amounts over many years in the region according to data maintained by the Hong Kong Observatory) rather than the four solar/astronomical seasons (i.e., spring, summer, autumn, winter) because the former appears to be more biologically important to the local CWDs and FPs. However, the two methods of seasonal classification correspond closely with each other in Hong Kong (i.e., the wet season spanned from about April to September, which matches well with the solar spring and summer used for the analyses associated with the vessel-based survey data, and the dry season extended from about October to March, which represent autumn and winter). For the diel periods, the hours of the day were separated into “day” and “night”, and six hours were omitted around the “transitional” periods when sunrise and sunset occurred (three hours each for sunrise and sunset). The omitted hours included the hours immediately preceding and following, as well as the hour in which sunrise/sunset occurred. The omission of the “transitional” periods helps to reduce the confounding issues of including possible different activity levels during transitional periods and autocorrelations between two periods of time being adjacent to one another.

To examine interannual changes, F-POD data from 2023 (mostly obtained during the current marine mammal monitoring study but supplemented by another PAM study also funded by AFCD) were compared with available F-POD data from past studies: Siu Ho Wan (2020, 2021 and 2022), Tai Mo To (2021 and 2022), Lung Kwu Chau N (2020, 2021 and 2022), Sha Chau SE (2020, 2021 and 2022). Daily DPM data from the same sites and calendar dates (and times to the nearest hour) were compared year-over-year to determine if and how CWD acoustic activities have changed over time at each site. For comparison, data for each calendar year (January 1st to

December 31st) were used.

All subsets of data, which were used in various comparisons to better understand the effects of location, season and diel period on dolphin acoustic activity as well as the comparisons with data from past years where available (for interannual differences), were assumed to deviate from either the normal distribution or homogeneity of variance assumption of parametric analyses. This assumption was based on a long history of testing C-POD and F-POD data for these characteristics and observing an overwhelming number of the subsets of C-POD and F-POD data used for analyses were either significantly different from normality or were heteroscedastic (see Wang and Hung 2018, 2019, 2020, 2021, 2022). As such, non-parametric statistical methods were employed. When comparisons were made across two independent groups, the Mann-Whitney U test was employed. When comparisons were made between or across dependent groups (i.e., for repeated measures where pairs of data are available for the same sample, such as the comparisons of data obtained during the day vs. night for the same day, which was the sample, or comparing data obtained in different years but on the same calendar day), the Wilcoxon matched pairs test (for paired groups) or the Friedman ANOVA test by ranks (for multiple groups) was used.

With the exception of the summary of data from the current study period (January 19th, 2023 to January 30th, 2024) presented in Table 1, all other statistical analyses were performed based on the calendar year (from January 1st to December 31st) rather than based on logistical deployment/retrieval dates that have little bearing on biology. And although the calendar year also likely has minimal importance to biology, the calendar year facilitates comparisons (especially in the future) with data from the long-term vessel-based monitoring program in Hong Kong. Given that the current study approximated the calendar year 2023, data for only a few days in early January 2023 (obtained from the previous deployment) were included to complete the calendar year while data obtained after December 31st, 2023 during this PAM work were omitted from current statistical analyses. To better visualize long-term changes and patterns, available data from past years were also included in graphs of dolphin detections across time (year-over-year).

<u>Comparison of dolphin occurrence among sites and between different areas</u>

Not surprisingly, statistical analyses (Mann-Whitney U test) showed significant differences in daily CWD DPM between the two marine park areas U=214894.5 ($p<<0.0001$). These results strongly support that for further examinations of sites as well as diel and seasonal patterns, data from the different areas should be analyzed separately to prevent sites with large numbers of detections from overwhelming sites with many fewer detections. Mann-Whitney U tests were used to determine if the two sites within each of the BMP and SCLKCMP areas differed from each other with regards to daily dolphin DPMs. Siu Ho Wan had slightly more DPMs than Tai Mo To but the two BMP sites were not statistically different from each other ($U=66051$, $p=0.475$). At SCLKCMP, Lung Kwu Chau N had significantly more CWD detections than Sha Chau SE ($U=51990$, $p<<0.0001$).

These PAM results are consistent with the findings of visual surveys in the past five years where dolphin density was consistently higher in SCLKCMP than in BMP (Hung 2022, 2023). The current F-POD data were also consistent with the general patterns of the C-POD data from past years with regards to relative spatial differences in CWD detections (e.g. Wang and Hung 2022, 2023).

Comparison of dolphin occurrence across different seasons

There were clear seasonal differences in the daily CWD DPM metrics at both marine park areas with the dry season having more detection (Table 7; Figures 37 and 38). For both areas, the seasonal differences were significant: BMP ($U=64223.5$, $p<0.005$); SCLKCMP ($U=50702.5$, $p<<0.0001$). For all sites, there were more detections during the dry season than the wet season. However, for Tai Mo To, this difference was not statistically significant ($U=16467.5$; $p=0.854$). The seasonal differences for the other three sites were all significant: Siu Ho Wan ($U=15646.5$; $p<0.001$); Lung Kwu Chau N ($U=9730.5$; $p<<0.0001$); and Sha Chau SE ($U=15498$; $p<0.05$) (Table 7). These results showed that the general seasonal spatial pattern in 2023 was clearly higher in detections during the dry season in the waters of North Lantau, which is similar to the pattern observed in the F-POD data for 2021-22 and 2022-23 and C-POD data for 2020-21 but different from that observed in the 2019-20 C-POD dataset.

Comparison of dolphin occurrence between different times of day

From the statistical analyses of the two marine park areas, the results showed a strong overall diel pattern, with significantly more dolphin DPMs at night than during the day at BMP (Wilcoxon $T=0.00$, $z=3.516$, $p<0.005$) and SCLKCMP (Wilcoxon $T=2382$, $z=5.487$, $p<0.0001$) (Table 8 and Figures 39 and 40). The same general pattern of high and low acoustic activities for night time and daytime hours seemed to be maintained regardless of the seasons but this pattern was not significant at BMP during the wet season (Table 8). However, very few DPMs were recorded from BMP overall and during each season as well as from one of the SCLKCMP sites (Sha Chau SE) during the wet season so conclusions should be considered cautiously.

For three of the sites, the same overall pattern of higher DPMs at night was observed and all were statistically higher: Siu Ho Wan (Wilcoxon $T=0.00$, $z=2.666$, $p<0.01$), Tai Mo To (Wilcoxon $T=0.00$, $z=2.366$, $p<0.01$) and Sha Chau SE (Wilcoxon $T=111.5$, $z=3.480$, $p<0.001$) (Table 8). On the contrary, the opposite diel pattern was found at Lung Kwu Chau N with significantly more detections during the day than night (Wilcoxon $T=1450$, $z=4.367$, $p<<0.0001$). When the diel patterns were analyzed separately for wet and dry seasons, all sites (except one) showed more detections at night regardless of season but only during the dry season were these differences statistically significant (see Table 8). For Lung Kwu Chau N, the opposite pattern (i.e. more detections during the daytime) was observed during the dry season and this was statistically significant (Wilcoxon $T=906.5$, $z=4.151$, $p<<0.0001$). Because there were considerably more detections during the dry season for all sites (and areas) (Table 7), the diel patterns observed during the dry season were the main drivers of the patterns observed at each site (and area) when season was not considered.

Considering all the results together, it is clear that strong diel patterns exist in CWD DPMs and the diel patterns may be very different seasonally at different sites. In general, there appears to be more detection at night but an interesting reversal of this most common pattern was found at Lung Kwu Chau N. Similar finding was observed previously at this site during the wet season in 2017-18 (Wang and Hung 2018) and at several sites in 2018-19 (Wang and Hung 2019), 2019-20 (Wang and Hung 2020), 2020-21 (Wang and Hung 2021) and 2021-22 (Wang and Hung 2022), especially during the wet season and at SWLMP sites. The biological reasons for these diel differences and at different sites should be investigated further in future years when more data become available.

<u>Comparison of dolphin occurrence across different years</u>

For each site, data from the current study (i.e. 2023) were compared with available F-POD data from earlier years obtained from previous studies: Siu Ho Wan (2020, 2021 and 2022), Tai Mo To (2021 and 2022), Lung Kwu Chau N (2020, 2021 and 2022), Sha Chau SE (2020, 2021 and 2022) (see Figures 41-44). The summary deployment and detection statistics for each year and site are shown in Table 9. Although some data from 2024 were collected during the current project, they were too limited for meaningful interannual comparisons and so were omitted here. Comparisons across sites with widely-varying levels of dolphin detections are less meaningful than within each site, especially when determining if temporal changes have occurred (and without adding potential confounding spatial factors when examining temporal changes). Thus, all sites were compared year-over-year using the calendar year (i.e. January 1st to December 31st). Some sites had data gaps due to equipment loss, malfunction, early stoppage due to battery drainage or memory capacity being exceeded as a result of excessive environmental noise, different deployment/retrieval dates, or other reasons (see Figures 41-44). Dates with missing data in any of the calendar years being compared were omitted from the year-over-year pairwise analyses. Such year-over-year comparisons between even just two or three years can be useful for checking for short-term changes at these sites because massive construction activities continue at a rapid pace in waters adjacent to the BMP and SCLKCMP.

Although it was not possible to compare detection metrics obtained from C-PODs and F-PODs directly at this time, the general trends in each dataset across multiple years provide an understanding of the trajectories of the detections over time. This is as important, if not more so, in understanding the status of marine mammals inhabiting Hong Kong's water because currently, there is no reliable method to determine the absolute number of individuals from acoustic detection data.

At Siu Ho Wan within BMP, CWD detections from 2020 to 2023 showed no significant difference across the years using a Friedman ANOVA test (χ^2=5.658, n=349, df=3, p=0.129). Thus, year-over-year pairwise comparisons were not needed because none would be significant (Table 10). The DPD % of logged days increased slightly from 2020 to 2021 and 2022 (both had the same level) before a larger decline in 2023 from the 2021 and 2022 levels (Table 9). The DPM and mean DPM/day metrics also showed this general pattern of increase from 2020 to 2021 and 2022 (peaking in 2022) before declining in 2023. However, none of the year-over-year differences in these metrics were statistically significant. Unlike the large and continuing decline in detections recorded by C-PODs from 2017-18 to 2020-21, which was already much reduced from data obtained in 2013-14 (see Wang and Hung 2021), the F-POD data did not show any declines until this year (2023) and in fact, slight increases in detections were observed each year from 2020 to 2022 (Figure 45). However, these data must be interpreted carefully as total DPMs were very low every year (Table 9).

For Tai Mo To, CWD detections from 2021 to 2023 also showed no significant difference across the years using a Friedman ANOVA test (χ2=4.000, n=126, df=2, p=0.135). Thus, year-over-year pairwise comparisons were also not needed because none would be significant (Table 10). The DPD % of logged days increased slightly from 2021 to 2022 before a larger decline in 2023 to the lowest level (Table 9). The

DPM and mean DPM/day metrics also showed this general pattern of increase from 2021 to 2022 before declining again in 2023 to levels lower than in 2022 (but not as low as in 2021). However, none of the year-over-year differences in these metrics were statistically significant. Unlike the large and continuing decline in detections recorded by C-PODs from 2017-18 to 2020-21, the F-POD data did not show a continuing decline and in fact, a slight increase in detections was observed from 2021 to 2022 (Figure 46). However, there were far too few DPMs each year (Table 9) for meaningful statistical analyses.

All year-over-year F-POD data for BMP sites must be interpreted carefully. Because total annual detections were very low, even a single rare event can have a disproportionate influence on annual metrics and thus, the observed trends. Statistically, the lack of significance across the years indicated no noticeable changes in detections and any indications of an increase in 2021 and/or 2022 was not supported by the data obtained in 2023, which further reinforces the need for cautious interpretation of early results. The only more reliable conclusion that can be made currently is that detections have declined greatly from 2017-18 to very low levels in 2020 and appears to be unchanged in recent years.

At Lung Kwu Chau N , the Friedman ANOVA test showed significant year-over-year changes in dolphin detections at Lung Kwu Chau N from 2020 to 2023 (χ^2=158.33, n=223, df=3, p<<0.0001). Pairwise comparisons showed a slight but non-significant increase from 2020 and 2021 (Wilcoxon T=8349.5, z=0.095, p=0.924) but there were significantly fewer detections in 2022 relative to 2020 (Wilcoxon T=4855.5, z=7.976, p<<0.0001) and to 2021 (Wilcoxon T=2714, z=6.799, p<<0.0001) (Table 10). The lowest values of the detection metrics were reached in 2023 with significantly few detections than in 2020 (Wilcoxon T=4633.5, z=8.620, p<<0.0001), 2021 (Wilcoxon T=1640.5, z=8.296, p<<0.0001) and 2022 (Wilcoxon T=7001, z=2.625, p<0.01). The increase in DPMs and mean DPM/day values from 2020 to 2021 and then significantly decreasing in 2022 and then again in 2023 were also observed in DPD % of logged days (Table 9). Although there appeared to be a recovery in 2021, CWD detections (as determined by F-PODs) dropped to the lowest levels in 2022 and then even further in 2023. These results further support that the overall decline in detections observed in the C-POD data from 2017-18 to 2020-21 (see Wang and Hung 2021) was still continuing (Figure 47).

At Sha Chau SE, the Friedman ANOVA test showed significant changes in dolphin detections from 2020 to 2023 (χ^2=30.705, n=168, df=3, p<<0.0001).

Year-over-year pairwise comparisons showed no significant changes from 2020 to 2021 (Wilcoxon T=753, z=0.996, p=0.319) but there were significantly more detections in 2022 as compared with 2020 (Wilcoxon T=351.5, z=3.074, p<0.005) and a significant decrease from 2021 to 2022 (Wilcoxon T=3209, z=2.68, p<0.01) (Table 10). The lowest values of the detection metrics were reached in 2023 with significantly few detections than in 2020 (Wilcoxon T=89, z=4.738, p<<0.0001), 2021 (Wilcoxon T=1614, z=5.371, p<<0.0001) and 2022 (Wilcoxon T=1595.5, z=2.677, p<0.01). The above changes (i.e., increasing from 2020 to 2021 before declining steadily to the lowest levels in 2023) were also mirrored in the DPD % of logged days (Table 9). Although there appeared to be a recovery in 2021, CWD detections (as determined by F-PODs) dropped considerably in 2022 and reached the lowest levels in 2023. These results further support that an overall decline in detections observed in the C-POD data from 2017-18 to 2020-21 (see Wang and Hung 2021) was still continuing (Figure 48).

The significant declines in CWD detections observed in previous C-POD data showed early signs of possible recoveries in detection levels at Siu Ho Wan, Tai Mo To, Lung Kwu Chau N and Sha Chau SE. However, F-POD data from 2023 has shown those signs were premature and the declines appear to be continuing. This continuing decline supports the hypothesis that ongoing construction activities are impacting the occurrence of CWD, even within these established marine parks. Thus, the protections currently afforded by the marine parks (and overall) to the CWD are clearly ineffective at stopping the declining usage of the marine parks' waters by CWD. The decrease in CWD detections at these sites over the past seven years from 2017 to 2023 corresponded well (but not perfectly) with the decline in annual estimated abundance of CWD in the North Lantau region during the same period (as determined from line-transect vessel survey data) from 21 dolphins in 2017 to six in 2018, four in 2019, three in 2020, four in 2021, only one in 2022 (the lowest level since 2001) and four in 2023.

The lack of perfect correspondence between the two datasets may be related to visual detections being only during the day whereas more acoustic detections were recorded during the night time. Furthermore, the PAM study in North Lantau waters were confined to four specific locations within the two marine parks, while the survey areas in NWL and NEL encompass a much larger area (see Figure 1). For example, even though there were four dolphins estimated in 2023, all sightings made were away from the SCLKCMP and BMP and the majority of them were even located at the southwest corner of NWL survey area far away from the closest marine park at SCLKCMP (Figure 4). Nevertheless, the general pattern of a large decrease in detections from 2017 to 2018 and then remaining at extremely low levels since 2018 is well supported by data from both the vessel survey and PAM studies.

Comparison of diel pattern of dolphin occurrence across different years

Although there were few CWD detections recorded at Siu Ho Wan, the diel pattern appears to remain the same across the years (including in 2023) with most of the detections occurring between about 21:00 and 07:00 (Figure 49a). There were even fewer CWD detections at Tai Mo To for comparing diel patterns across years but there is some suggestion of a pattern that is similar to that of Siu Ho Wan with most of the detections being during the night time hours (Figure 49b).

At both Lung Kwu Chau N and Sha Chau SE, there was no strong consistent diel pattern in CWD detections that spanned across the years. Instead, there seemed to be less defined diel patterns and the patterns seem to differ across the years (Figures 50a and 50b). In some years there were strong peaks of activity during specific times of the day but these were not present in other years; 2023 was no different and did not seem to follow closely any other year's pattern. It is unclear if this lack of clear diel patterning at these two sites was the result of a rapid decline in CWD numbers over the last few years due to increased disturbances in the general area.

5.8. Range Use, Residency and Movement Patterns of Individual Dolphins

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

Individual Range Use

In order to examine the range use of individual dolphins based on the photo-identification data collected during the present monitoring period, the 95% UD kernel ranges of 96 individuals that occurred in Hong Kong's survey areas in 2023 (as identified through photo-identification works) were deduced using the fixed kernel method, and their ranging patterns are shown in Appendix V. In addition, 85 of these individual dolphins that occurred in 2023 and also had a history of being sighted ≥15 times were further examined for their range use and residency patterns (Table 11).

Among these 85 individuals, all of them had occurred in WL in the past, while the majority of them had also occurred in NWL (63.5%) and SWL (85.9%), and to a lesser extent in NEL (14.1%) and DB (10.6%) (Table 11). In contrast, only three and one individuals had been re-sighted in the SEL or EL survey area, respectively, as part of their historical range. Furthermore, 68 of these 85 individuals (or 80.0%) occupied ranges that spanned the waters of Hong Kong and the Mainland (Table 11), indicating cross-boundary movements by many individual dolphins that occur regularly in Hong

Kong's waters. However, some 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 the 85 individuals were further assessed by examining their annual and monthly occurrences in Hong Kong. Overall, 54 and 25 individuals were identified as year-round and seasonal residents respectively (Table 11). Therefore, all of the assessed individuals were considered residents in Hong Kong, as they have been sighted consistently in the past 12 years (i.e. 2012-23), or in at least the past five consecutive years. Furthermore, based on the monthly occurrences of these individuals, more than one third of them only occurred in Hong Kong during certain months of the year, while the rest occurred here year-round (Table 11).

In addition to their residency patterns, attempts were made to classify the 85 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 seven and 66 individuals belonged to the northern and southern social clusters, respectively (Table 11). In addition, there were also 12 individuals that spanned their range use more or less evenly across North and West Lantau waters with frequent occurrences in both waters, and some of them (e.g. NL123, NL156, NL259) actually shifted their range use from North Lantau waters to WL and SWL waters in the past decade (see Appendix V).

Core Area Use

The analysis on individual core area use 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 85 individuals, 16 and 14 individuals occupied Lung Kwu Chau as their 50% and 25% UD core areas, respectively, while only three individuals (EL01, NL33 and NL123) occupied the Brothers Islands as their 50% core area as well as 25% UD core area in the earlier years before abandoning this habitat as part of their ranges almost a decade ago (Table 11). Notably, less than half of these individuals that utilized Lung Kwu Chau and the Brothers Islands as their core areas belonged to the northern social cluster, and the rest of them spanned their range use across North and West Lantau waters.

In contrast, 73 individuals utilized the waters along the west coast of Lantau as their 50% UD and 25% UD core areas, respectively, with the vast majority of them belonging to the southern social cluster (Table 11). As there has been a surge of individuals expanding or shifting their range use into SWL waters in the past decade, there were also five and one individuals that have utilized South Lantau waters as their 50% and 25% UD core areas, respectively.

5.8.2. 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 2023-24 were broadly examined. From April 2023 to March 2024, 101 individuals were re-sighted a total of 387 times, with 78 individuals being re-sighted more than once (i.e. occurred at more than one location).

The examination of individual movement patterns between re-sightings revealed that only 47 individuals moved across different survey areas around Lantau in 2023-24. That included 11 individuals that occurred across NWL and WL survey areas, and 41 individuals that were re-sighted in both SWL and WL survey areas (Table 12). Moreover, five individuals (WL28, WL79, WL294, WL304 and WL315) occurred in all three areas of NWL, WL and SWL, covering extensive ranges during the ten-month study period. As in recent monitoring periods, no sighting was made in NEL during the 2023-24 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, there were still a significant portion of individual dolphins sighted repeatedly within just a single survey area and did not range into neighbouring areas. These included 30 individuals that occurred exclusively in the WL survey area, and one in the SWL survey area. The restricted movement within the small survey area of WL raises some concern, as this could be related to potential obstructions to movements across different survey areas as a result of human activities (e.g. vessel traffic) or infrastructure projects (e.g. reclamation platform or bridge structure as physical barrier).

The temporal trend in individual movement patterns across different survey areas was examined among the past 14 monitoring periods (Figure 51; Table 12), in order to provide insights into 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 absence of dolphin occurrence in NEL in recent years, there were other notable changes. For example, there was a continuous sharp decline in dolphin movements across the NWL and WL survey areas in recent monitoring periods, but such level was the lowest in 2023-24 among all monitoring periods. Notably, most of the individual movements into NWL from WL survey areas were near the boundary between these two areas without venturing further north to the Sha Chau and Lung Kwu Chau Marine Park (see Appendix V). Furthermore, there was also a continuous decline in dolphin movements across SWL and WL in recent years but a slight rebound also occurred in both 2022-23 and 2023-24 for such movement between the two areas.

6. SCHOOL SEMINARS AND PUBLIC AWARENESS

During the 2023-24 monitoring period, HKCRP researchers were able to deliver eight education seminars at local primary and secondary schools (with some held online) on behalf of AFCD to increase public awareness on the conservation of local cetaceans. PowerPoint presentations were prepared for the school talks with up-to-date information on both dolphins and porpoises gained from the present long-term monitoring programme. The talk materials 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 1. Summary data statistics on detection of Chinese White Dolphins as recorded by F-PODs during the current study (from January 19th, 2023 to January 30th, 2024) for Brothers Marine Park (BMP) and Sha Chau & Lung Kwu Chau Marine Park (SCLKCMP) and each site within these areas. (Note: "Logged Days": no. logged days the C-POD was on and recording; "DPD% of Days": detection positive days as a percentage of logged days; DPM: detection positive minutes, minutes where at least one dolphin click train was detected; “% Time Lost”: percentage of time lost because the minute click limit has been reached and no subsequent data could be recorded for that minute)

Site / Area	Logged Days	% Time Lost	DPD% of Days	DPM	Mean DPM/Day	% False Positive DPM
BMP	732.90	0	4.24	48	0.07	0.00
SCLKCMP	751.85	0	38.73	1394	1.85	0.29
Siu Ho Wan (BMP)	357.00	0	1.96	27	0.08	0.00
Tai Mo To (BMP)	375.90	0	2.39	21	0.06	0.00
Lung Kwu Chau N (SCLKCMP)	375.92	0	33.69	1291	3.47	1.00
Sha Chau SE (SCLKCMP)	375.93	0	10.08	103	0.27	0.00
Totals:	**1484.75**	**0**		**1442**	**0.97**	**0.25**

Table 2a. 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
2020-21	3.1	N/A	N/A	2.4	3.3	3.1	1.0*
2021-22	3.4	N/A	N/A	2.9	3.7	2.4	N/A
2022-23	3.6	N/A	N/A	4.4	3.4	4.1	1.0*
2023-24	3.5	N/A	N/A	2.7	3.6	3.4	1.0

Table 2b. 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
2013-14	2.3	2.8	1.9	2.6	N/A	1.3
2014-15	2.7	3.5	2.6	3.1	1.9	2.6
2015-16	3.1	3.1	2.9	4.4	2.5	1.7
2016-17	2.7	2.4	2.7	3.3	3.3	2.2
2017-18	2.5	2.8	2.5	1.9	2.7	1.5
2018-19	2.7	2.1	3.1	2.3	2.0	3.0*
2019-20	2.6	2.7	2.2	2.4	3.4	3.5
2020-21	2.7	2.8	3.2	2.1	1.8	3.5
2021-22	2.0	1.5	2.6	2.1	2.1	2.0
2022-23	2.2	2.5	1.6	1.0*	2.2	N/A
2023-24	3.6	3.5	3.8	N/A	N/A	N/A

Table 3. 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%
2020	3	0.4%	14	1.8%
2021	1	0.2%	17	2.6%
2022	1	0.2%	10	1.7%
2023	7	1.1%	11	1.7%

Table 4. Encounter rates (no. of on-effort sightings per 100 km^2) of Chinese White Dolphins among different survey areas in the past 22 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
2020-21	3.3	0.0	1.1	11.6	3.1
2021-22	2.5	0.0	0.5	13.9	2.7
2022-23	2.5	0.0	0.2	13.5	2.7
2023-24	2.6	0.0	0.4	12.6	3.0

Table 5. Encounter rates (no. of on-effort sightings per 100 km^2) of finless porpoises in South Lantau waters in the past 17 monitoring periods

Monitoring Period	Overall	SW Lantau	SE Lantau
2007-08	3.8	2.7	5.1
2008-09	2.2	2.8	1.4
2009-10	3.9	1.9	6.1
2010-11	3.9	2.7	5.4
2011-12	4.1	3.0	5.8
2012-13	7.4	5.9	8.4
2013-14	9.6	7.4	12.5
2014-15	5.6	2.6	8.7
2015-16	3.0	2.3	5.3
2016-17	4.5	2.8	8.1
2017-18	4.9	3.9	6.2
2018-19	4.1	2.9	5.1
2019-20	4.7	3.9	5.6
2020-21	2.6	2.8	2.3
2021-22	2.9	3.2	1.7
2022-23	2.8	3.2	1.8
2023-24	4.4	5.1	3.7

Table 6a. Line transects parameters and estimates of density and abundance for Chinese White Dolphins in western waters of Hong Kong in 2023

([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	1554.9	2462.2	962.5	2490.4
Number of Sightings	N/A	9	125	52
Average Group Size	N/A	4.25	3.65	3.69
Encounter Rate[1]	N/A	0.32	11.43	2.09
Individual Density[2]	N/A	4.32	75.27	14.36
Abundance	N/A	4	21	9
95% C.I. (Abundance)	N/A	1-11	15-29	6-15
%CV	N/A	54	17	25

Table 6b. Annual abundance estimates of Chinese White Dolphins from each survey area in western waters of Hong Kong in 2003-23

(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
2020	*37*	0	3	19	15
2021	*40*	0	4	24	12
2022	*34*	0	1	24	9
2023	*34*	0	4	21	9

Table 7. Values of U statistics for comparing differences in daily DPMs for Chinese White Dolphins as detected by F-PODs during wet and dry seasons from January 1st to December 31st, 2023 using the Mann-Whitney U test for BMP and SCLKCMP and the sites within these areas. (Note: red font – significant at the α = 0.05 level; blue font – atypical pattern; *=very few dolphin detections).

Areas	U-values	p-values	direction
*BMP	64223.5	<0.005	dry > wet
SCLKCMP	50702.5	<<0.0001	dry > wet

Sites	U-values	p-values	direction
*Siu Ho Wan	15646	<0.001	dry > wet
*Tai Mo To	16467.5	0.469	wet ~ dry
Lung Kwu Chau N	9730.5	<<0.0001	dry > wet
Sha Chau SE	15498	<0.05	dry > wet

Table 8. Wilcoxon T statistics for comparing differences in hourly DPM of Chinese White Dolphins as recorded by F-PODs during the day vs night for all data and during the wet and dry seasons from January 1st to December 31st, 2023 for BMP and SCLKCMP and the sites within these areas. (Note: red font – significant at the α = 0.05 level; blue font – atypical pattern; * = very few dolphin detections).

	ALL			WET SEASON			DRY SEASON		
Sites or Areas	**T-values**	**p-values**	**direction**	**T-values**	**p-values**	**direction**	**T-values**	**p-values**	**direction**
*BMP	0	<<0.0005	night > day	0	0.18	night > day	0	<<0.0001	night > day
SCLKCMP	2382	<<0.0001	night > day	167	<0.05	night > day	1294.5	<<0.0001	night > day

	ALL			WET SEASON			DRY SEASON		
Sites or Areas	**T-values**	**p-values**	**direction**	**T-values**	**p-values**	**direction**	**T-values**	**p-values**	**direction**
*Siu Ho Wan	0	<0.01	night > day	-	-	-	0	<0.01	night > day
*Tai Mo To	0	<0.05	night > day	0	0.18	night > day	0	<0.05	night > day
Lung Kwu Chau N	1450	<<0.0001	day > night	69	0.179	night > day	906.5	<<0.0001	day > night
Sha Chau SE	111.5	<0.001	night > day	23.5	0.124	night > day	25	<0.001	night > day

Table 9. Summary deployment data and statistics on annual (standardized to the calendar year, January 1st to December 31st) F-POD detections of Chinese White Dolphins at all sites for 2020 (where available), 2021, 2022 and 2023. (Note: "Logged Days": number of logged days the F-POD was on and recording; "DPD% of Days": detection positive days as a percentage of logged days; DPM: detection positive minutes, minutes where at least one cetacean click train was detected).

Site	Year	Logged Days	DPD% of Days	DPM	Mean DPM/Day
Siu Ho Wan	2020	348.36	6.02	62	0.18
	2021	364.91	6.3	155	0.42
	2022	364.92	6.3	268	0.73
	2023	364.92	3.01	101	0.28
Tai Mo To	2021	178.35	3.35	6	0.03
	2022	310.75	3.85	38	0.12
	2023	364.92	2.19	18	0.05
Lung Kwu Chau N	2020	348.43	61.32	2661	7.63
	2021	237.95	65.27	5371	22.48
	2022	364.89	41.1	1429	3.92
	2023	364.91	32.33	1328	3.64
Sha Chau SE	2020	167.44	24.4	125	0.74
	2021	364.87	26.3	554	1.52
	2022	364.92	16.99	359	0.98
	2023	364.93	11.51	107	0.29

Table 10. Year-over-year (based on the calendar year of January 1st to December 31st) comparisons of F-POD detections of Chinese White dolphins using the Wilcoxon paired test at all sites for 2020 (where available), 2021, 2022 and 2023. (Note: red font – significant at the α=0.05 level); blue font – higher detections from earlier year(s); * – because the Friedman ANOVA test resulted in no significance, pairwise comparison tests were not needed because none would be significantly different).

Sites	Direction	T-values	p-values
*Siu Ho Wan	2020 < 2021	-	n.s.
	2020 < 2022	-	n.s.
	2020 < 2023	-	n.s.
	2021 < 2022	-	n.s.
	2021 > 2023	-	n.s.
	2022 > 2023	-	n.s.
*Tai Mo To	2021 < 2022	-	n.s.
	2021 < 2023	-	n.s.
	2022 > 2023	-	n.s.
Lung Kwu Chau	2020 < 2021	8349.5	0.924
	2020 > 2022	4855.5	<<0.0001
	2020 > 2023	4633.5	<<0.0001
	2021 > 2022	2714	<<0.0001
	2021 > 2023	1640.5	<<0.0001
	2022 > 2023	7001	<0.1
Sha Chau SE	2020 < 2021	753	0.319
	2020 < 2022	351.5	<0.005
	2020 > 2023	89	<<0.0001
	2021 > 2022	3209	<0.01
	2021 > 2023	1614	<<0.0001
	2022 > 2023	1595.5	<0.01

Table 11. Range use (50%/25% UD core areas and sighting coverage) and residency patterns of 85 individuals with 15+ sightings and appeared in 2023

(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	108	F?	YR	WL					√	√		√				√	√					√	√	
CH38	150	?	YR	WL					√	√		√				√	√					√	√	
CH105	36	F	SV	WL				√	√			√			√						√			
CH108	155	F	YR	WL				√	√	√		√				√	√						√	
CH112	30	?	SR	WL				√	√	√		√			√	√	√					√	√	
CH113	71	F	SR	WL				√	√	√		√			√	√						√		
CH141	68	F	YR	WL					√	√		√				√	√					√	√	
EL01	150	M*	SR	NL		√	√	√	√	√		√		√						√				
NL33	166	F*	YR	NL			√	√	√	√			√	√						√				
NL46	100	F*	SR	NL				√	√	√		√	√						√					
NL104	146	F	YR	NL	√		√	√	√	√		√	√						√					
NL123	201	F	YR	NL/WL	√		√	√	√	√		√	√	√					√	√				
NL156	95	?	YR	NL/WL				√	√	√		√			√	√	√				√	√		
NL182	141	F	YR	NL	√		√	√	√	√			√						√					
NL202	166	F	YR	NL	√		√	√	√			√	√						√					
NL236	47	?	SR	NL/WL				√	√			√	√						√					
NL242	112	F*	YR	NL/WL			√	√	√	√		√	√						√					
NL256	38	F	YR	NL/WL	√			√	√			√	√		√	√			√		√			
NL259	105	?	YR	NL/WL			√	√	√				√		√				√		√			
NL261	124	M?	YR	NL/WL	√		√	√	√	√		√	√						√					
NL269	81	?	YR	NL/WL				√	√	√		√				√	√					√		
NL296	81	F?	SR	NL/WL			√	√	√	√		√	√		√	√			√			√		
NL299	34	?	SR	WL	√			√	√	√		√			√	√					√	√		
NL301	38	?	SR	NL/WL	√			√	√			√	√						√					
NL306	63	?	YR	WL				√	√	√	√						√	√					√	√
NL311	40	?	YR	WL				√	√	√		√			√	√	√				√	√	√	
NL321	47	?	YR	NL	√			√	√	√		√	√						√					
NL332	16	?	SV	WL				√	√	√							√						√	
SL40	142	F	YR	WL					√	√		√					√						√	
SL44	99	?	YR	WL					√	√		√			√	√	√					√	√	
SL58	26	?	YR	WL					√	√					√	√					√	√		
SL59	43	?	YR	WL				√	√	√		√			√	√	√				√	√	√	
SL60	98	?	YR	WL					√	√		√					√						√	
SL66	16	?	SV	WL					√	√						√	√						√	
SL68	17	?	YR	WL					√	√						√	√					√		
WL11	75	F*	YR	NL/WL			√	√	√			√	√		√				√					
WL21	85	F	SR	WL				√	√	√		√			√	√	√				√	√		
WL28	48	F	YR	WL				√	√	√		√			√						√			
WL29	62	F	SR	WL					√	√		√				√						√		
WL42	181	?	YR	WL				√	√	√		√				√	√					√	√	
WL46	101	?	YR	WL			√	√	√	√		√			√	√					√			
WL61	152	?	YR	WL				√	√	√		√				√	√						√	
WL72	157	F	YR	WL				√	√	√		√				√	√					√	√	
WL79	156	?	YR	WL				√	√			√			√	√					√			
WL91	152	?	YR	WL					√	√	√	√				√	√					√	√	
WL92	63	?	YR	WL					√	√		√				√	√						√	
WL94	97	F	YR	WL					√	√		√				√	√						√	
WL109	152	F	YR	WL				√	√	√		√			√	√	√					√	√	
WL114	110	F?	YR	WL				√	√	√		√				√	√					√	√	
WL118	90	F	YR	WL					√	√		√				√	√					√		
WL123	202	F?	YR	WL				√	√	√		√				√	√						√	

Table 11. (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
WL128	65	?	SR	WL					√	√		√				√	√					√	√	
WL129	43	F	SR	WL					√	√		√				√	√					√	√	
WL130	140	?	YR	WL				√	√	√							√						√	
WL131	189	F?	YR	WL				√	√	√		√				√	√					√	√	
WL142	102	?	YR	WL					√	√		√					√						√	
WL145	66	F	YR	WL				√	√	√		√			√						√			
WL152	180	F?	YR	WL				√	√	√						√	√						√	
WL166	34	?	SR	WL					√	√						√	√					√		
WL169	25	F	SR	WL					√	√		√				√	√					√		
WL171	45	F	SR	WL					√	√		√				√	√					√	√	
WL179	68	F	YR	NL/WL				√	√	√		√	√		√	√	√					√	√	
WL191	39	?	SR	WL				√	√			√			√	√					√	√		
WL200	27	F	SR	WL				√	√	√		√			√	√	√	√			√	√	√	
WL208	66	F	YR	WL				√	√	√					√	√	√					√	√	
WL210	43	F?	YR	WL					√	√		√			√	√	√					√	√	
WL213	34	F	SR	WL				√	√						√	√						√		
WL216	49	?	SR	WL				√	√	√		√			√	√						√		
WL220	128	?	YR	WL					√	√		√				√	√					√	√	
WL221	99	?	YR	WL				√	√	√		√			√	√	√	√					√	
WL229	40	?	YR	WL					√	√		√			√	√	√					√	√	
WL236	20	?	SR	WL					√	√		√			√	√						√		
WL249	17	?	SV	WL					√			√				√	√					√		
WL250	69	F	YR	WL					√	√	√	√					√	√					√	
WL254	42	F	YR	WL					√	√		√				√	√					√		
WL256	27	?	SR	WL					√	√		√				√	√					√		
WL273	52	F?	YR	WL				√	√	√		√				√	√						√	
WL283	22	?	SR	WL				√	√			√			√	√					√			
WL288	16	?	SV	WL				√	√	√		√			√						√			
WL294	33	?	YR	WL				√	√	√		√			√	√	√	√			√	√	√	
WL295	18	?	SR	WL					√	√		√				√						√		
WL301	19	?	SR	WL				√	√	√					√	√					√			
WL304	25	?	SR	WL				√	√	√						√						√		
WL305	28	?	YR	WL					√	√						√	√					√	√	
WL317	18	?	N.D.	WL					√	√						√						√		

Table 12. Number of individual dolphins involved in movements across different survey areas around Lantau in the past 14 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	8	0
2020-21	129	0	25	61	0	13	0
2021-22	111	0	12	31	0	4	0
2022-23	117	0	18	41	0	9	0
2023-24	101	0	11	41	0	5	0

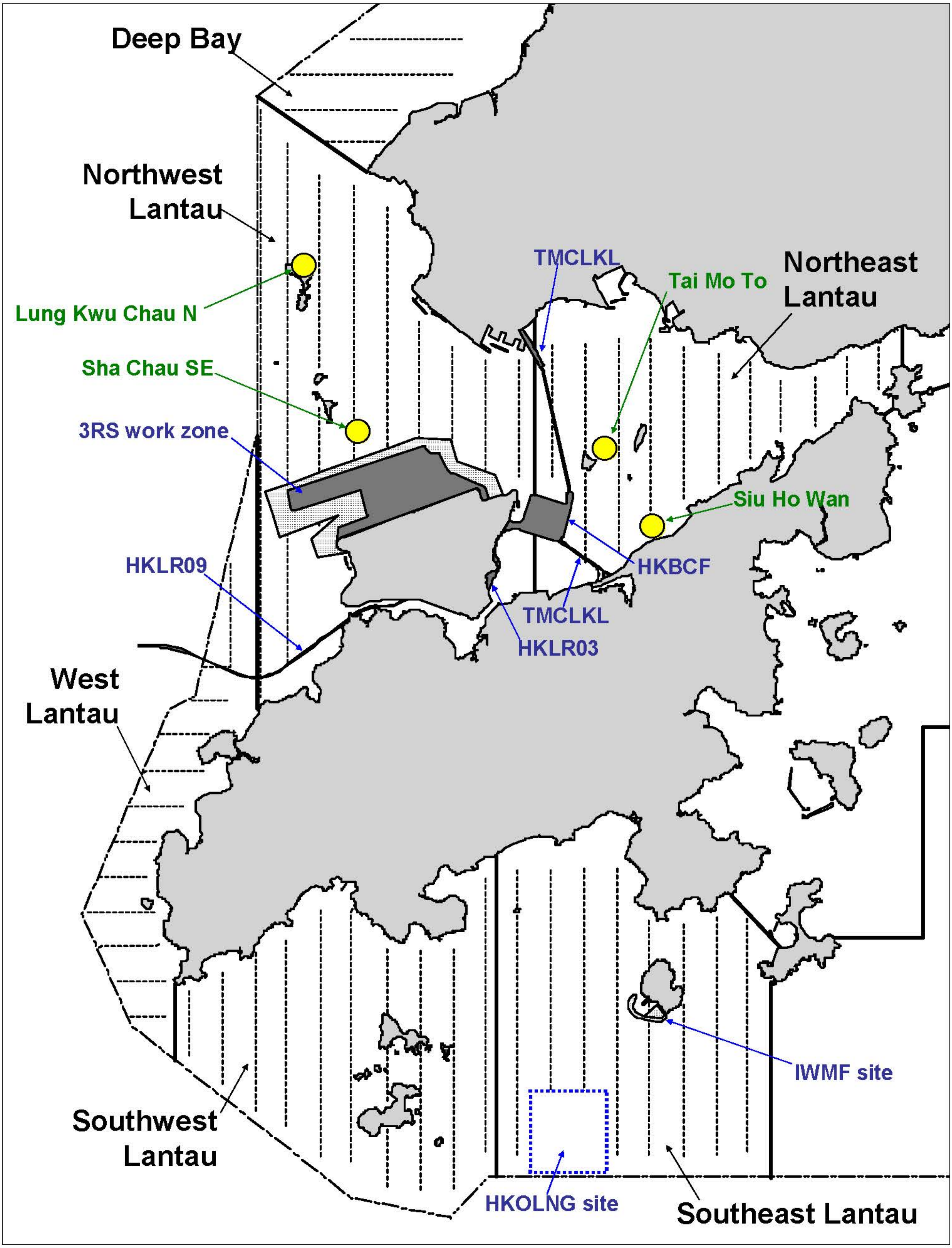


Figure 1. Six Line-Transect Survey Areas and Four Deployment Locations (yellow dots) within two Marine Parks in North Lantau Waters for the 2023-24 AFCD Monitoring Study

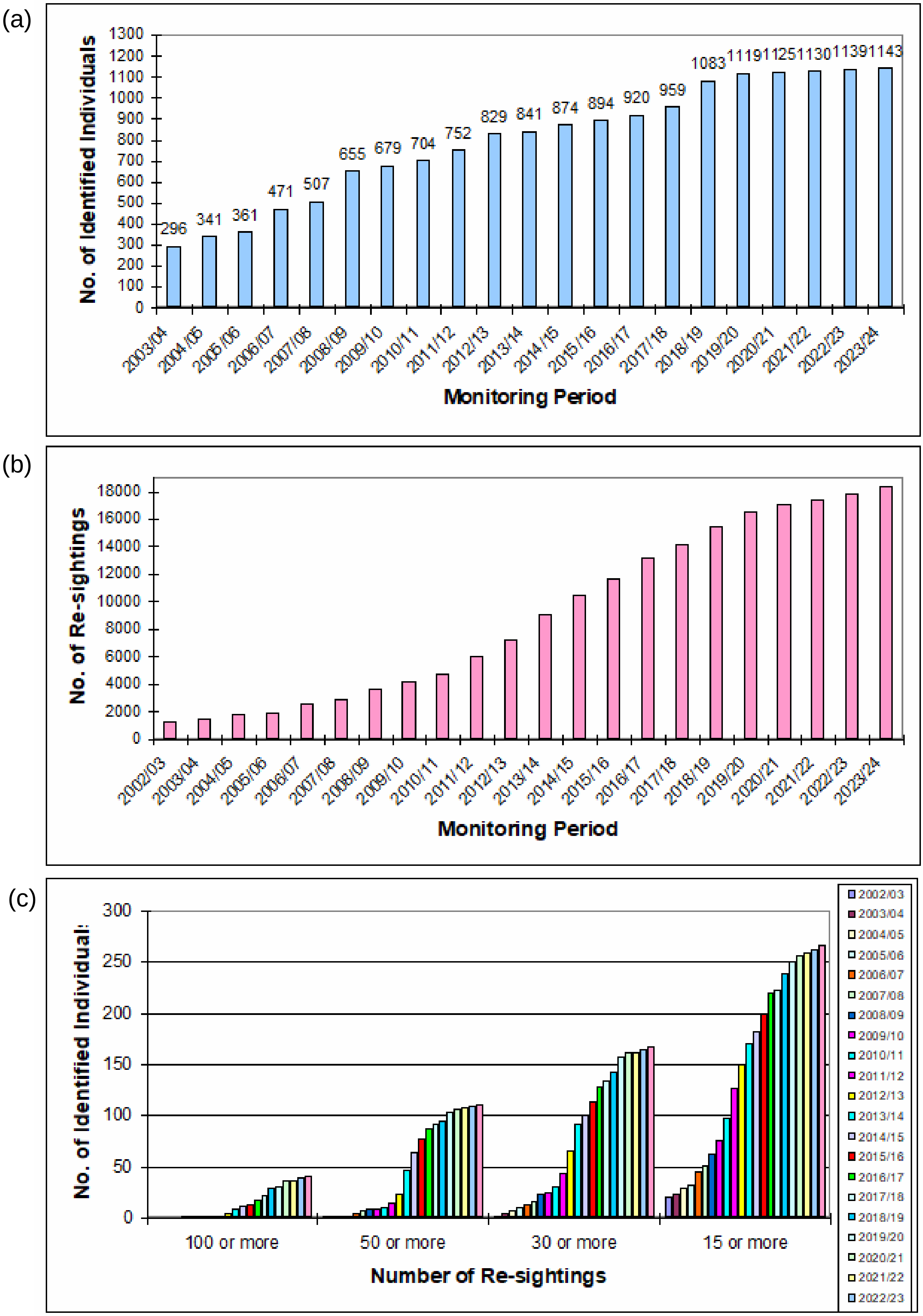


Figure 2. Temporal trends of (a) cumulative number of identified individuals; (b) total number of re-sightings made; and (c) number of identified individuals within several categories of number of re-sightings in the past 22 monitoring periods (2002-2024)

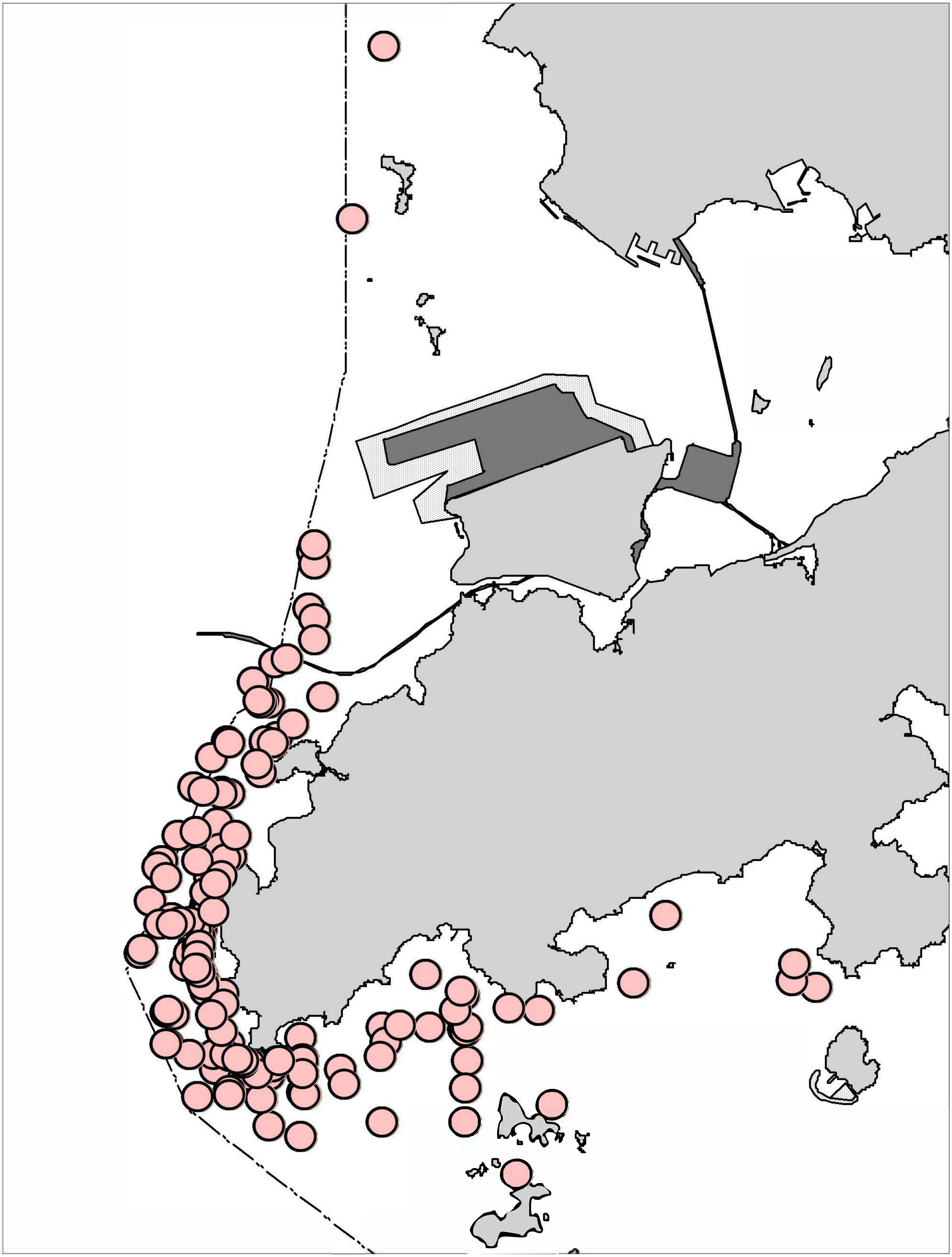


Figure 3. Distribution of CWD sightings in Hong Kong waters during AFCD monitoring surveys (April 2023 – March 2024)

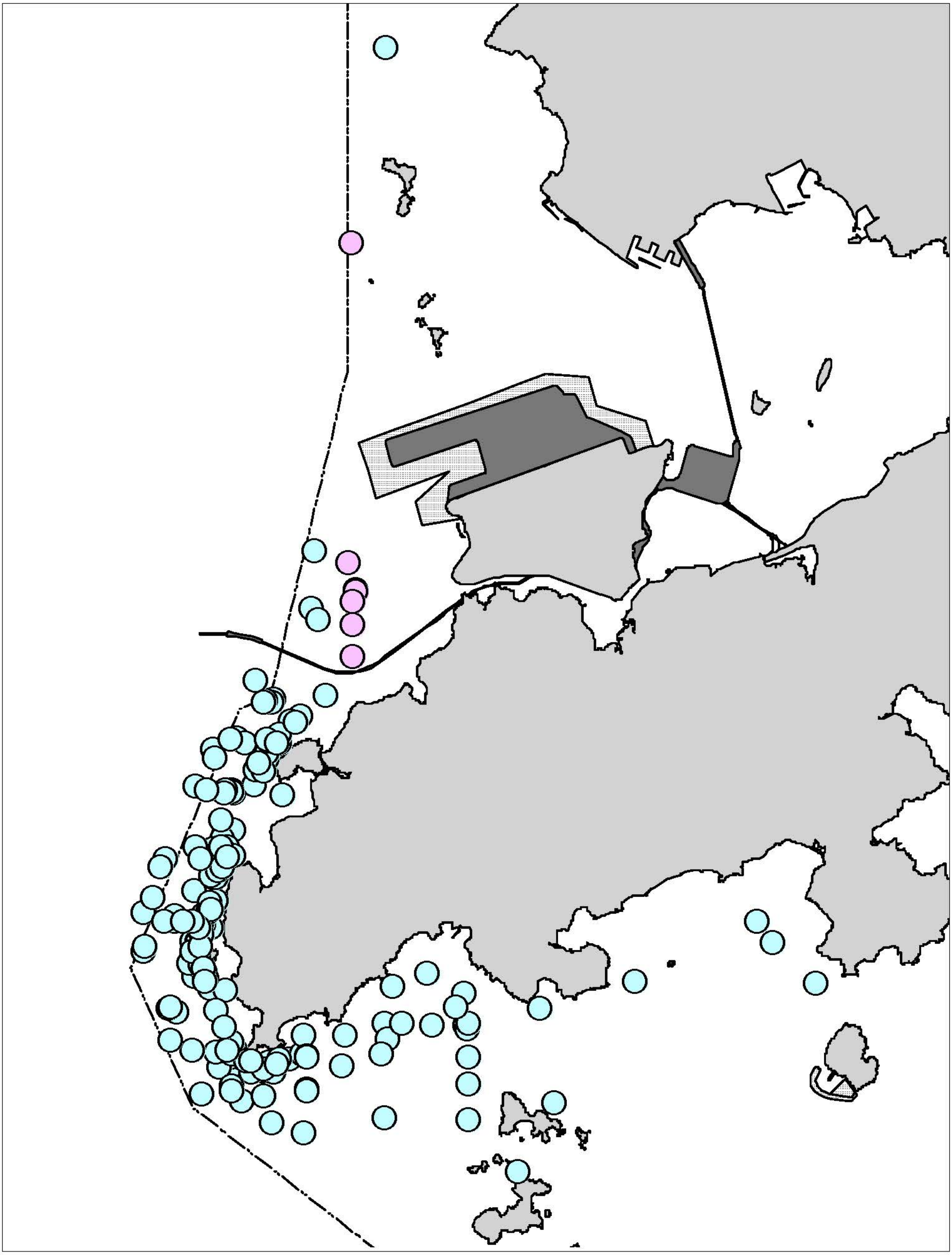


Figure 4. Distribution of all CWD sightings in Hong Kong waters in 2023
(blue dots: AFCD survey sightings; purple dots: HZMB survey sightings)

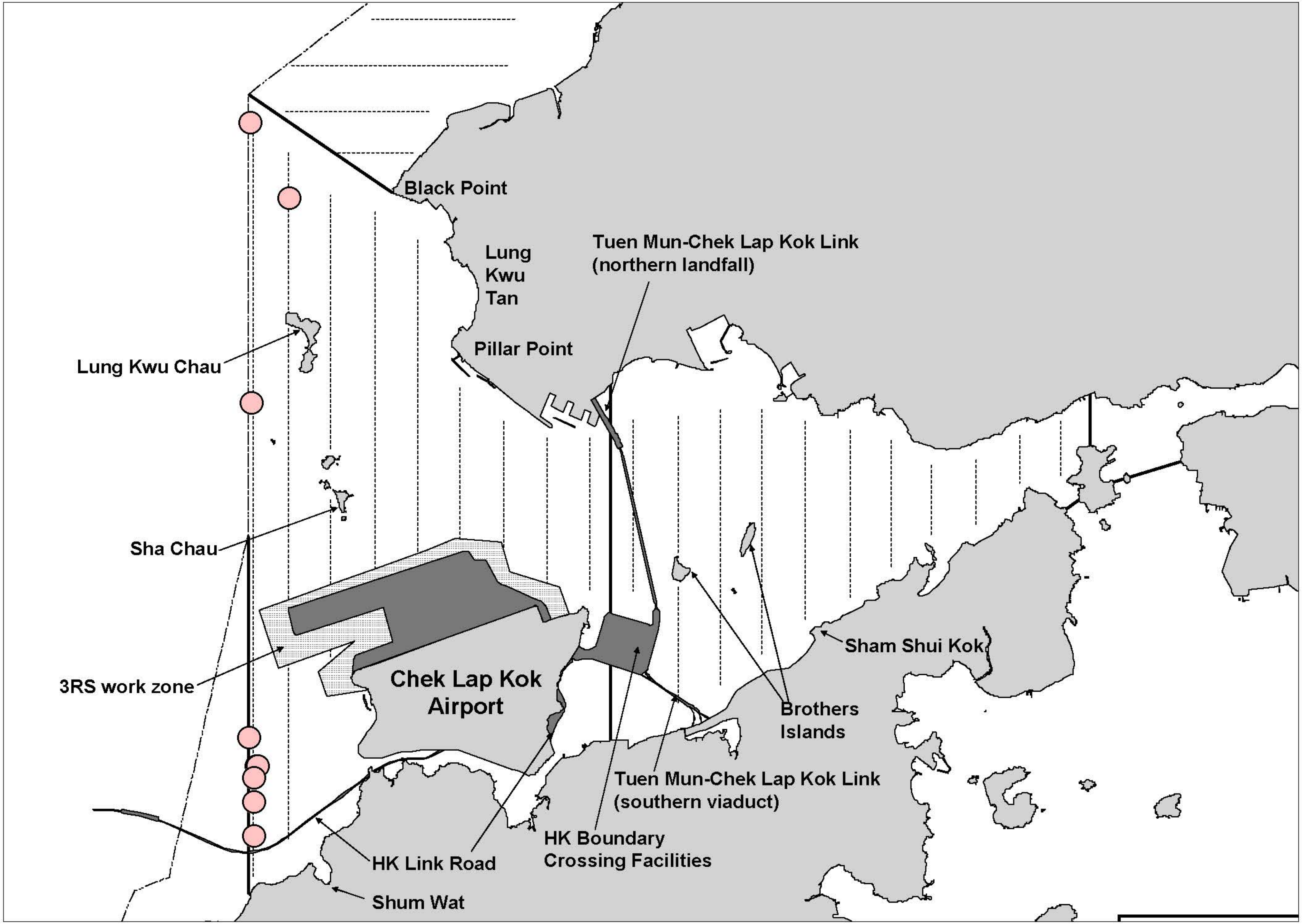


Figure 5. Distribution of Chinese White Dolphin sightings in North Lantau (2023)

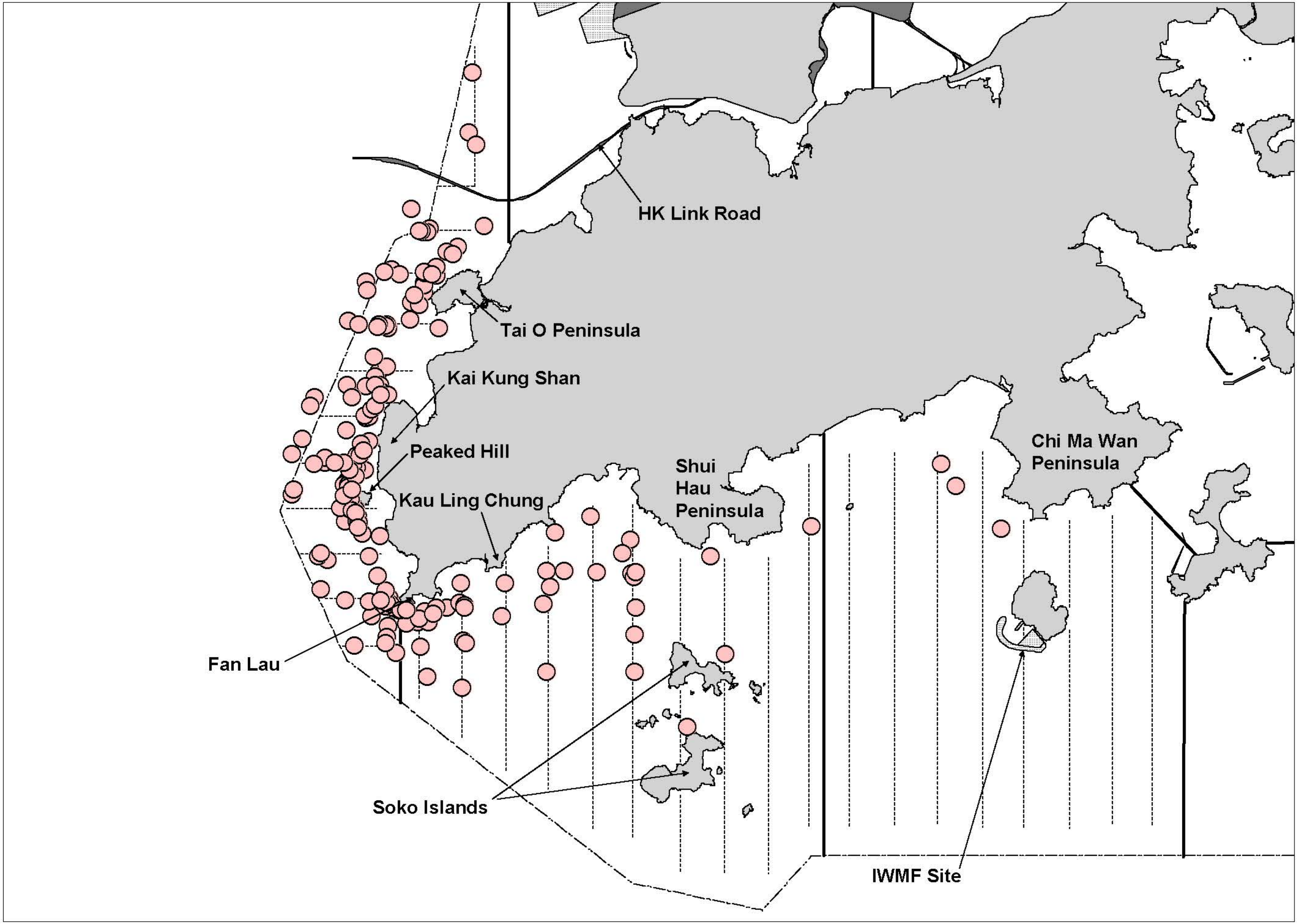


Figure 6. Distribution of Chinese White Dolphin sightings in West and South Lantau waters (2023)

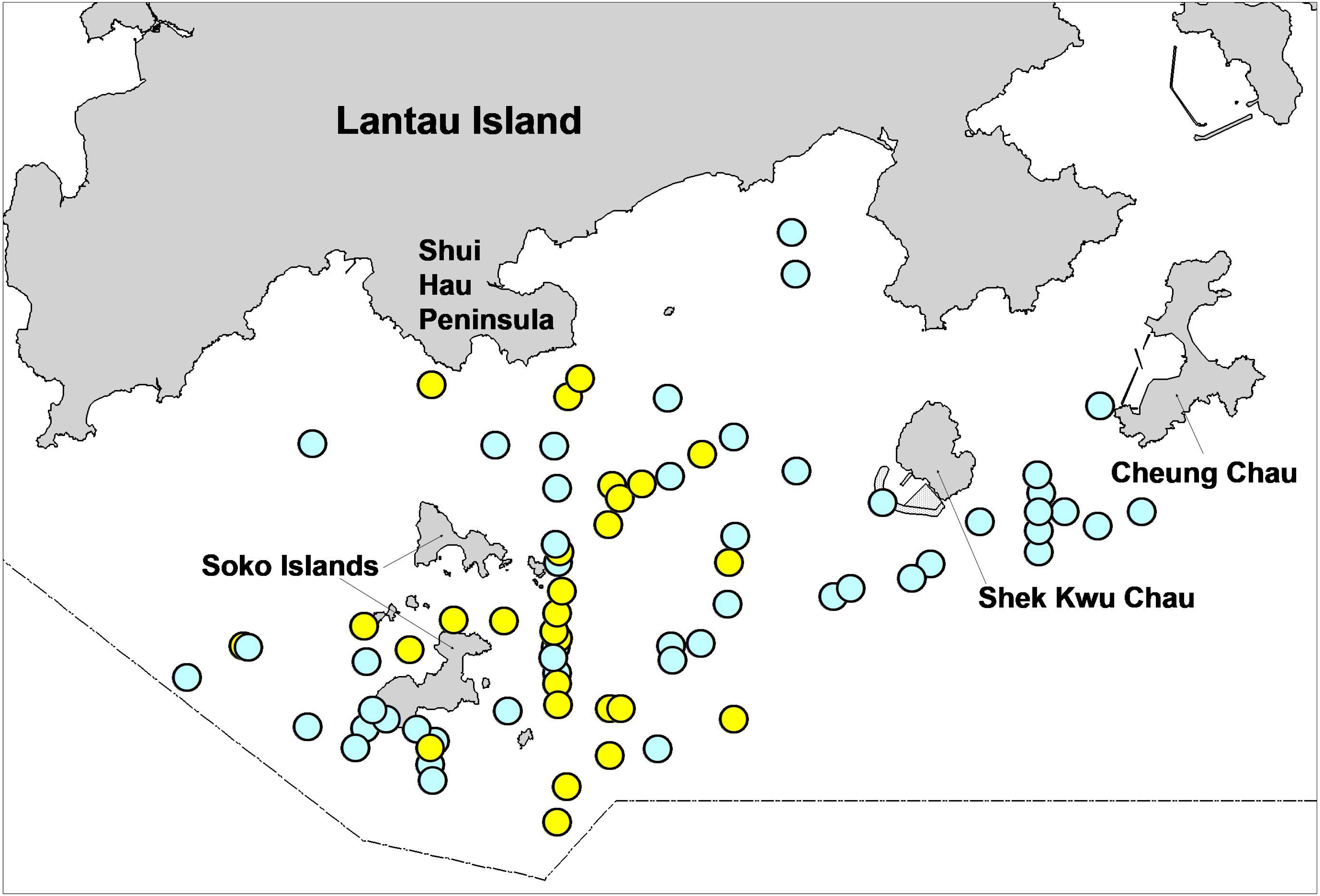


Figure 7. Distribution of finless porpoise sightings made during AFCD surveys (April 2023 – March 2024)
(blue dots: sightings made during winter/spring months; yellow dots: sightings made during summer/autumn months)

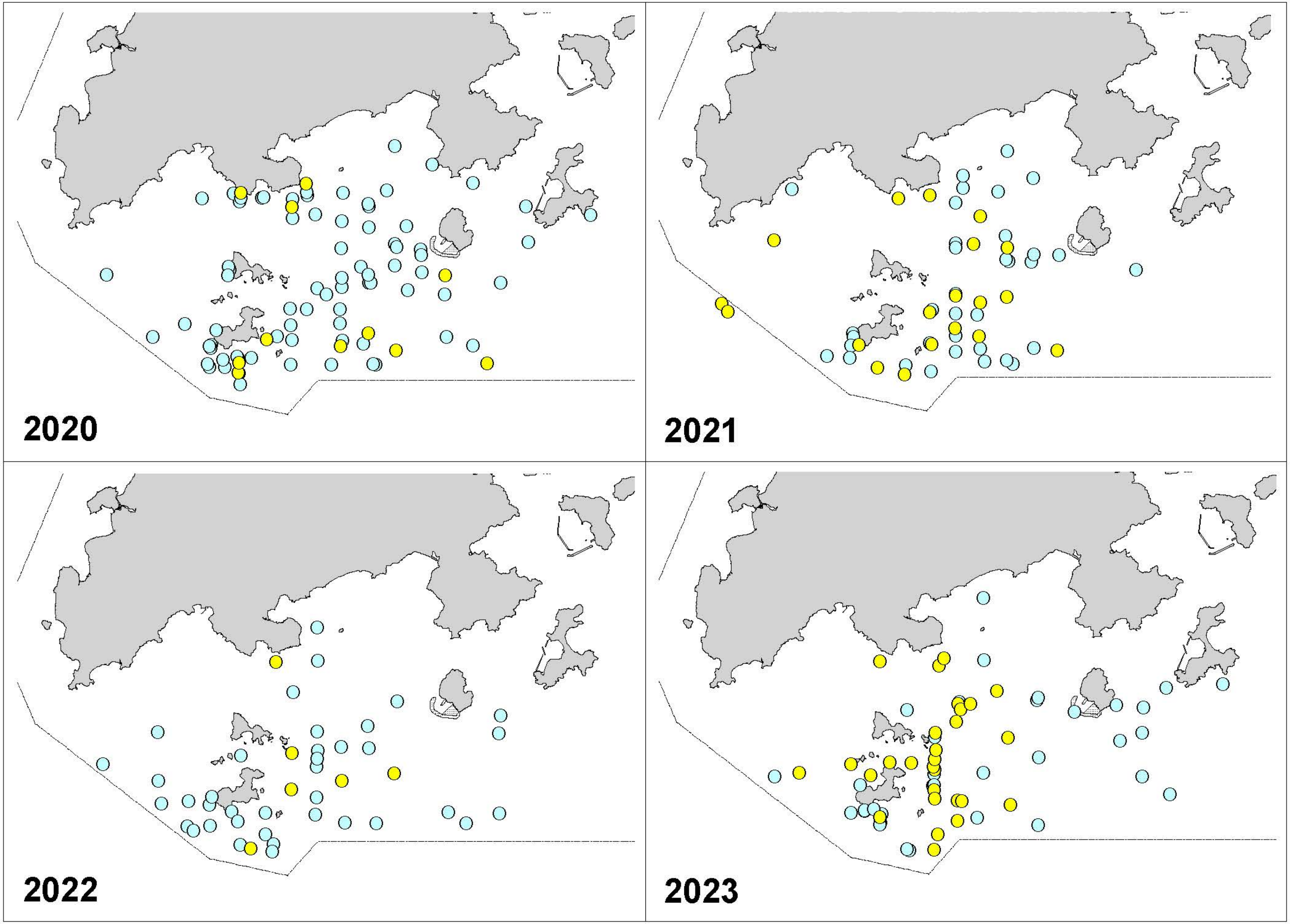


Figure 8. Comparison of annual porpoise distribution patterns in South Lantau waters from 2020-23
(blue dots: sightings made during winter/spring months; yellow dots: sightings made during summer/autumn months)

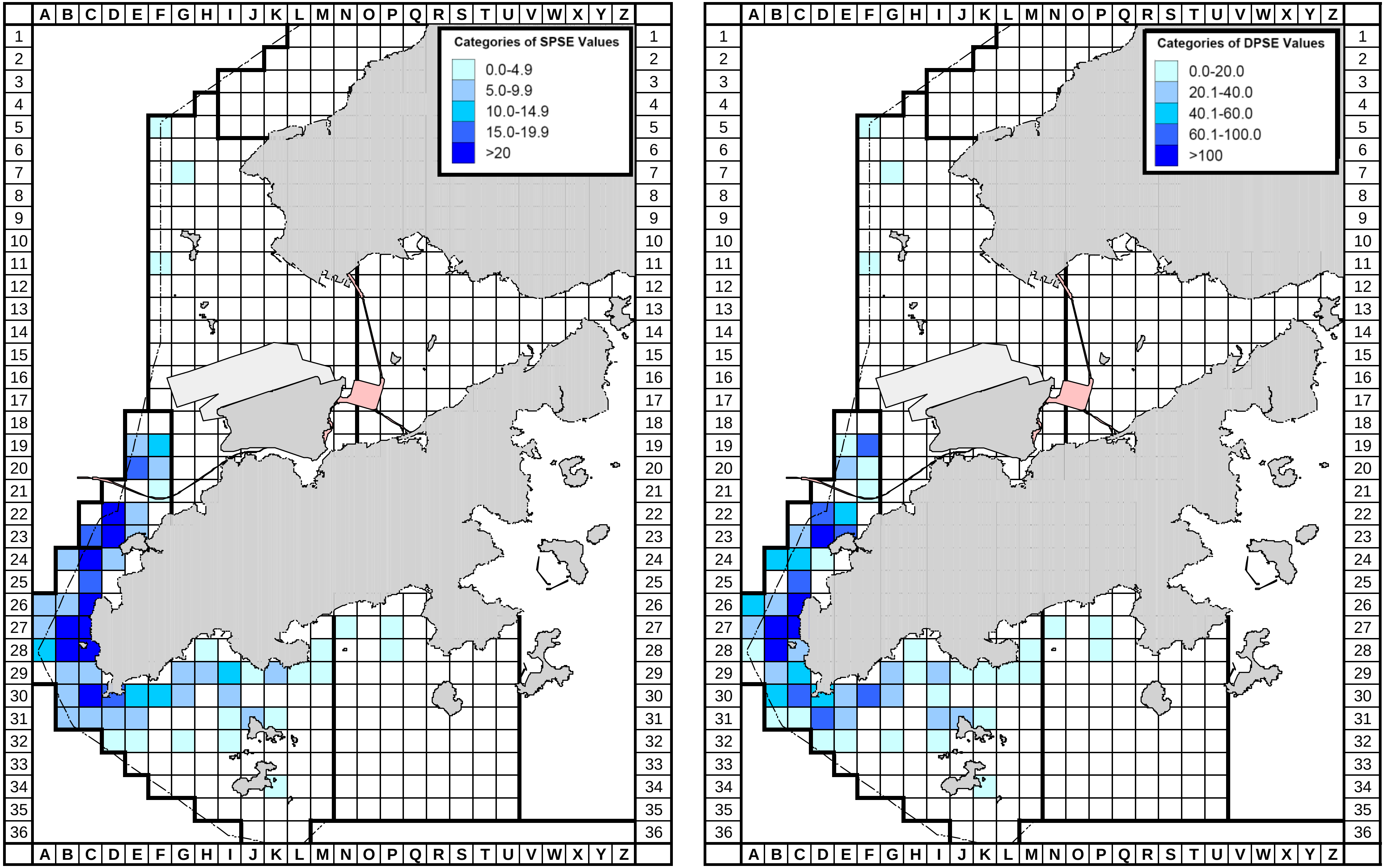


Figure 9. (left) Sighting density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island (number within grids represent "SPSE" no. of on-effort dolphin sightings per 100 units of survey effort) (using data from January - December 2023)
(right) Density of Chinese 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 2023)

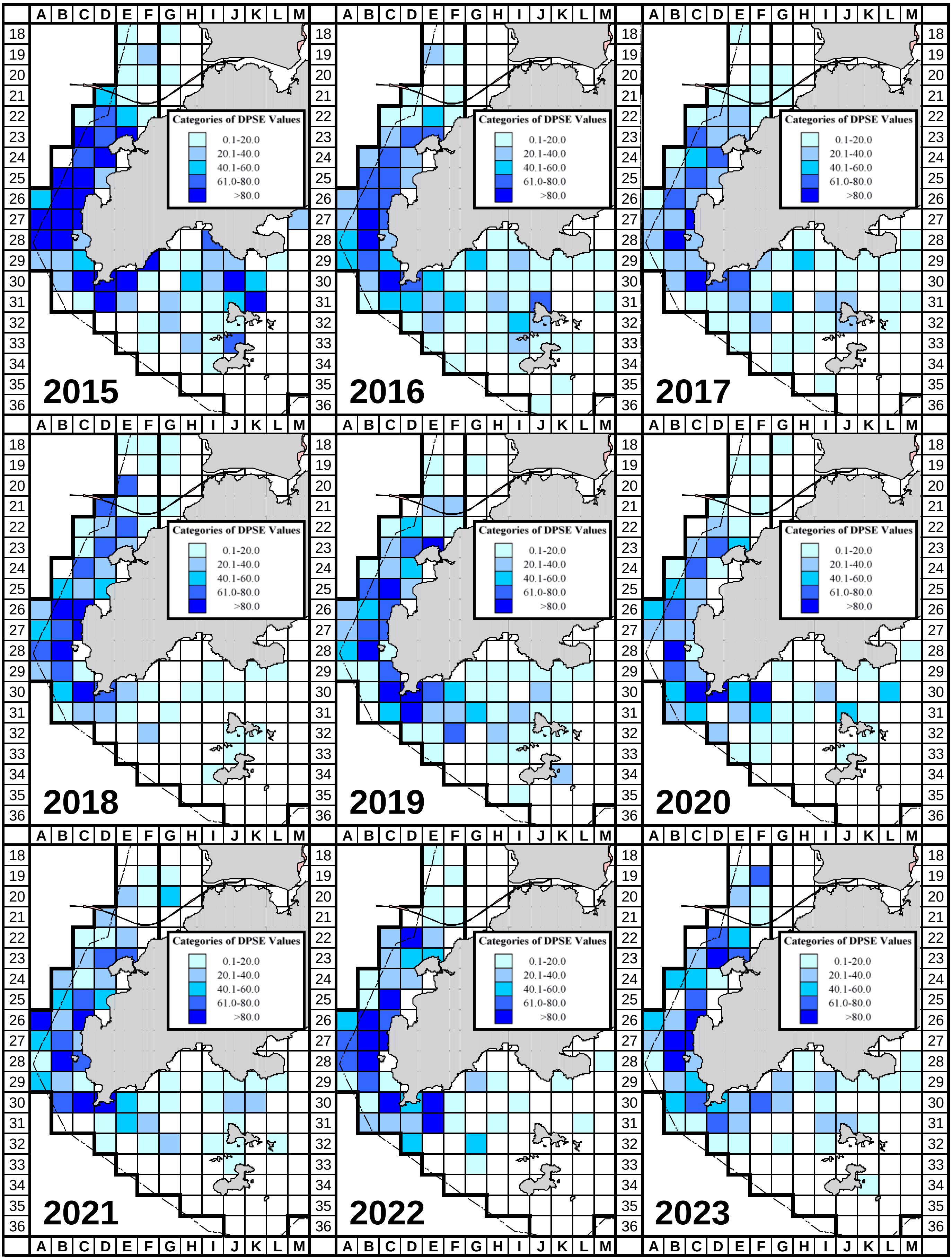


Figure 10. Comparison of Chinese White Dolphin densities with corrected survey effort per km^2 in West and Southwest Lantau Waters in 2015-23 (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort)

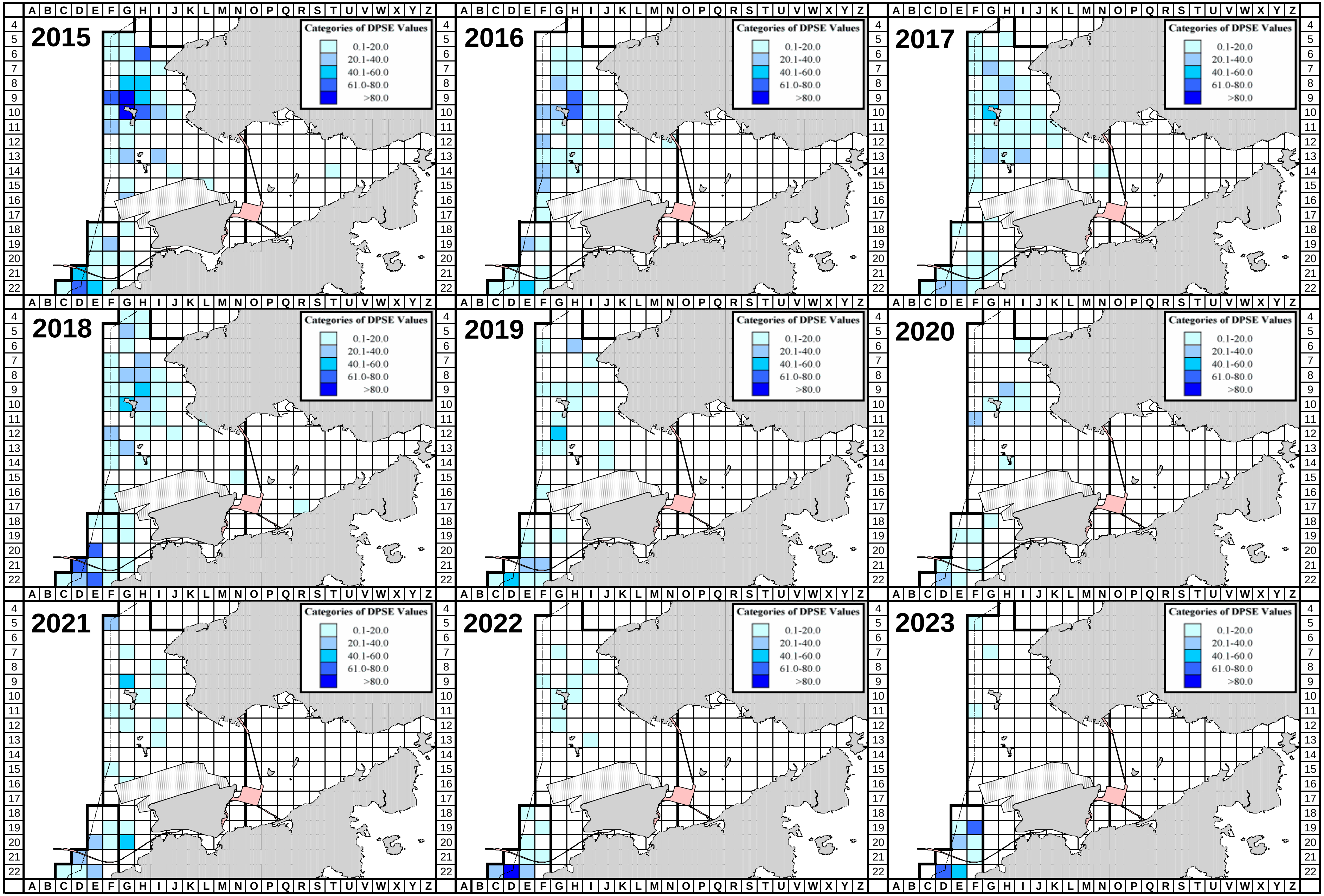


Figure 11. Comparison of dolphin densities with corrected survey effort per km^2 in North Lantau waters in 2015-23 (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort)

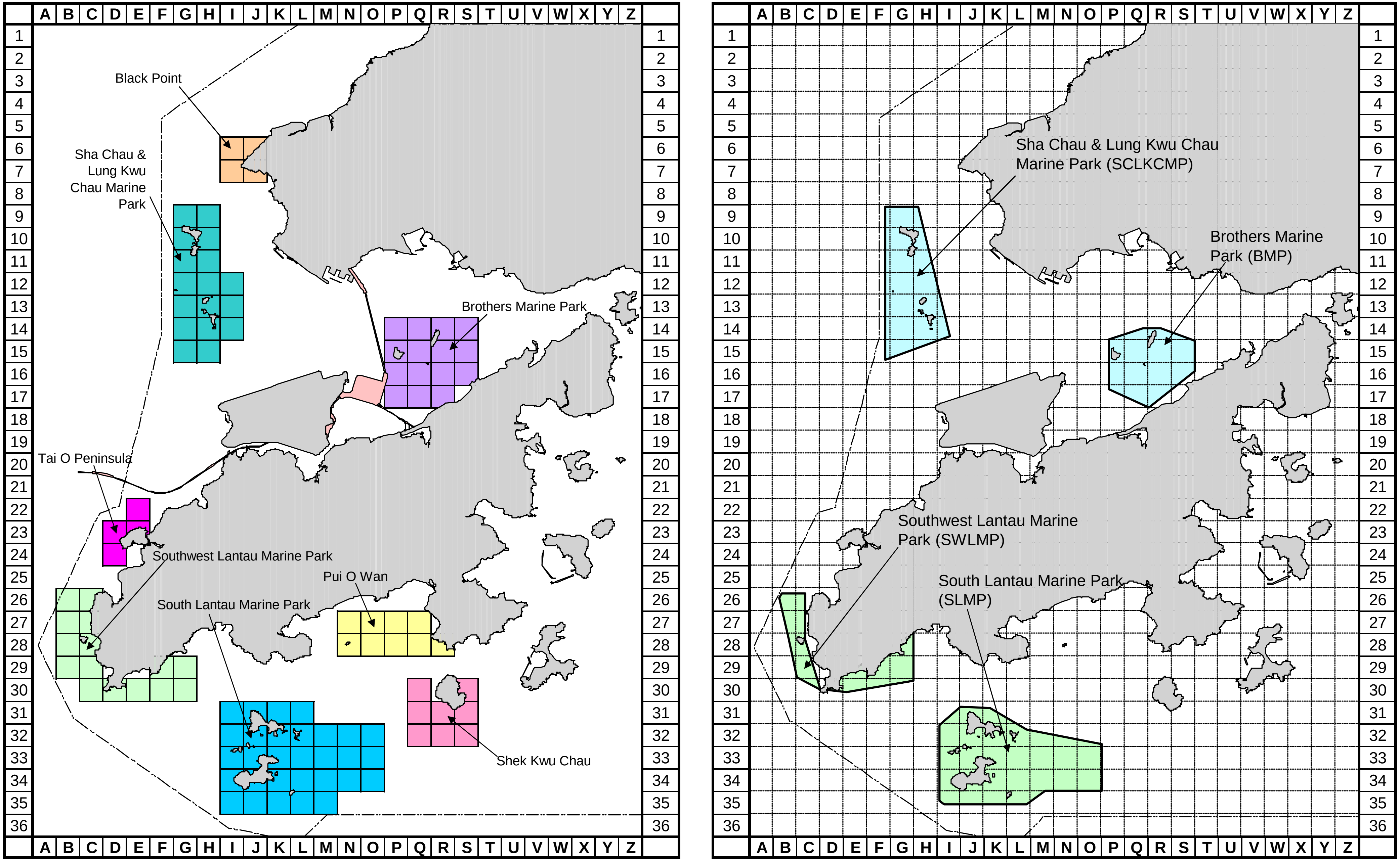


Figure 12. Grids of key marine mammal habitats in western HK waters that were examined for temporal trend in dolphin and porpoise densities

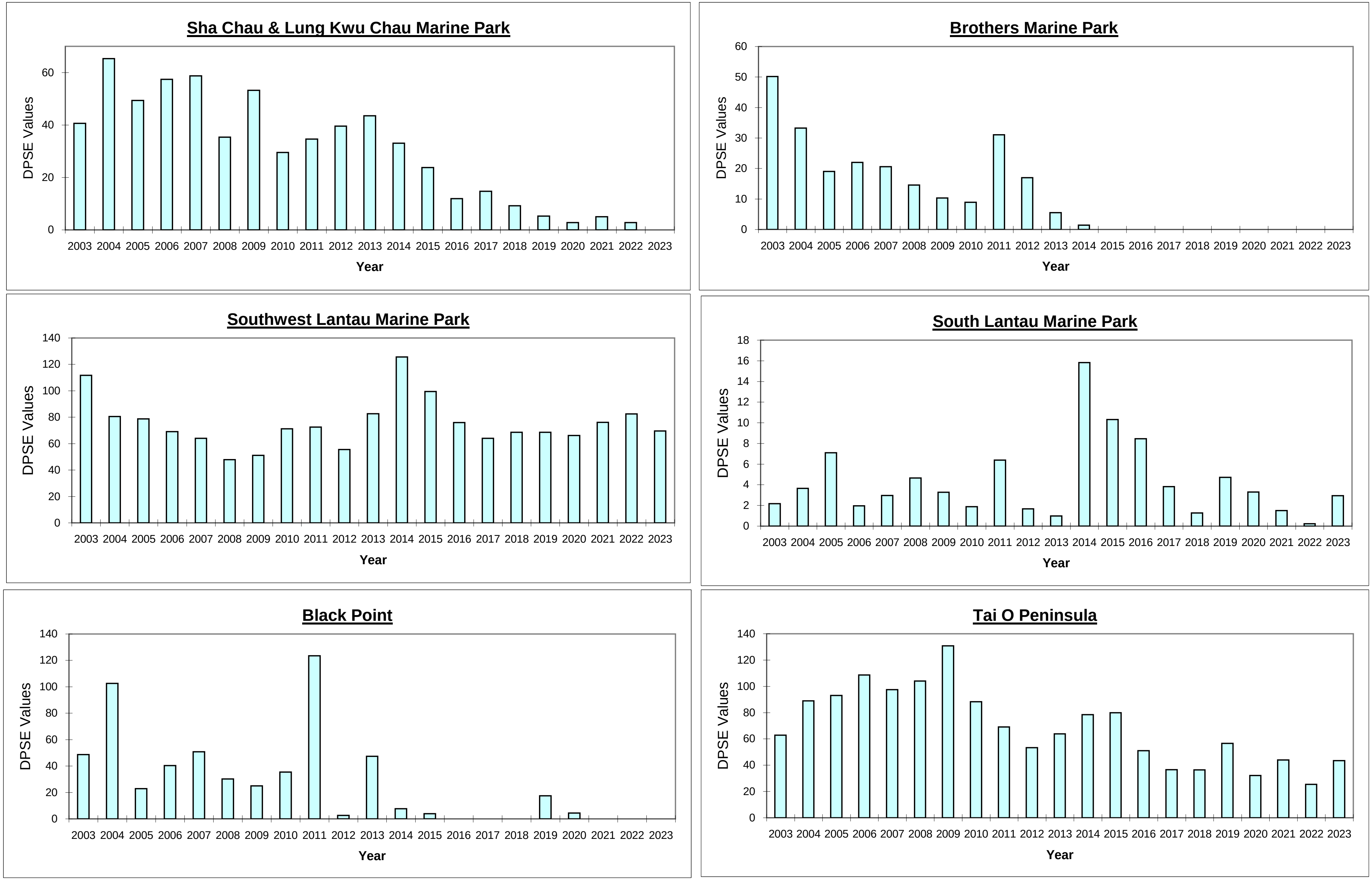


Figure 13. Temporal trend of dolphin densities (DPSE Values) at six key dolphin habitats in Lantau waters

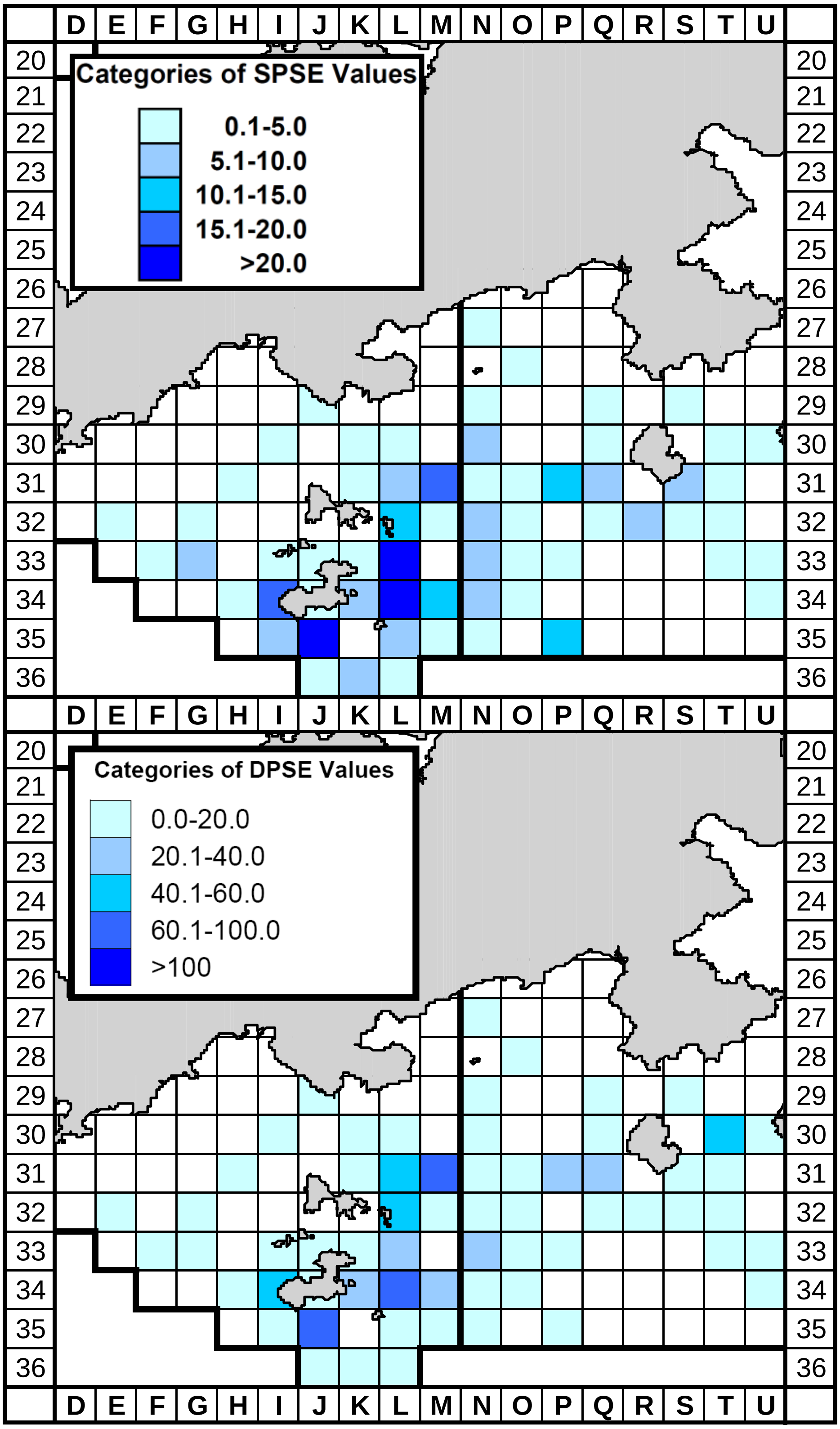


Figure 14. Density of finless porpoises with corrected survey effort per km^2 in South Lantau waters, using data collected during January - December 2023 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort)

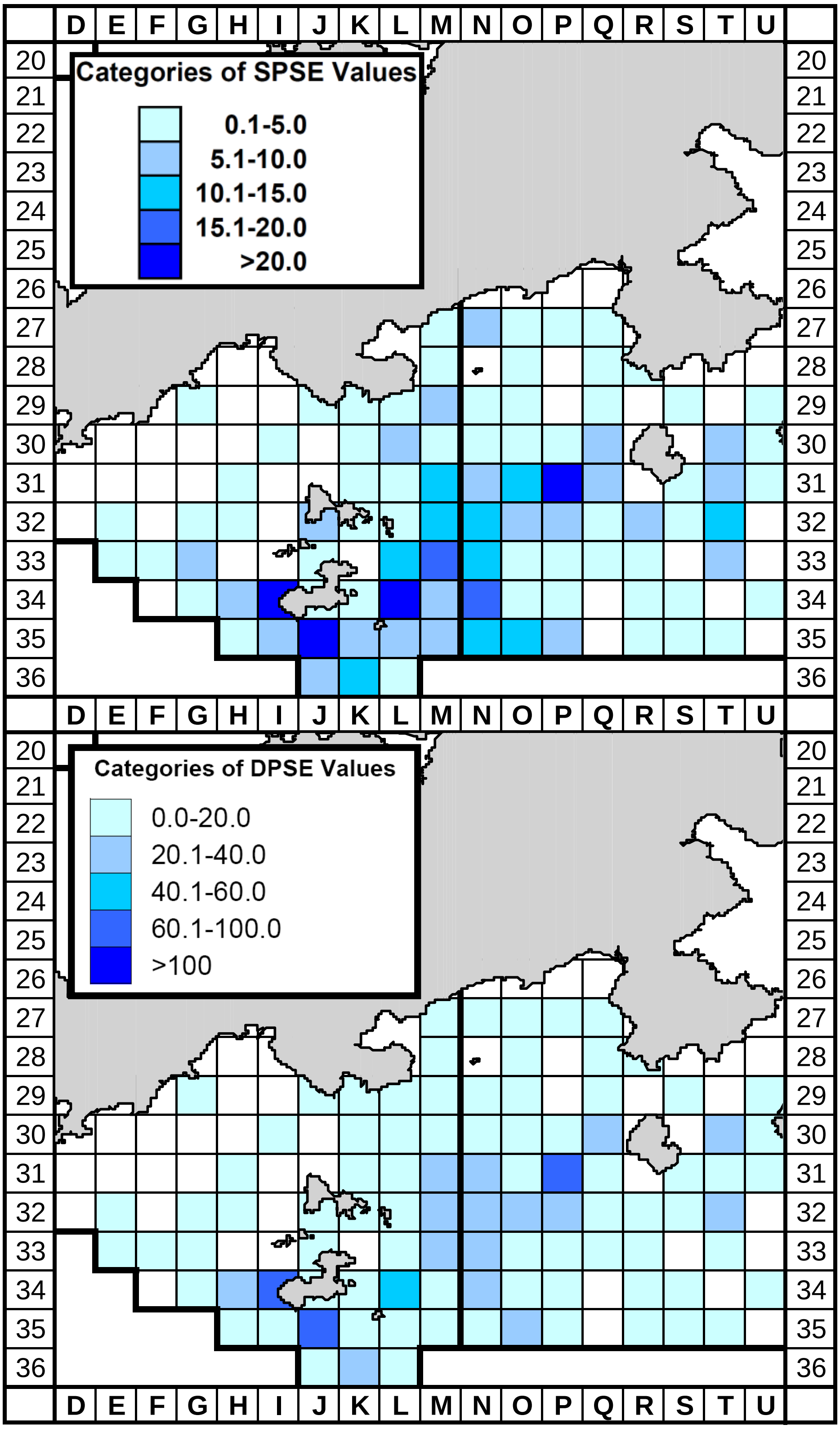


Figure 15. Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong during dry season (December to May), using data collected during 2019-23 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort)

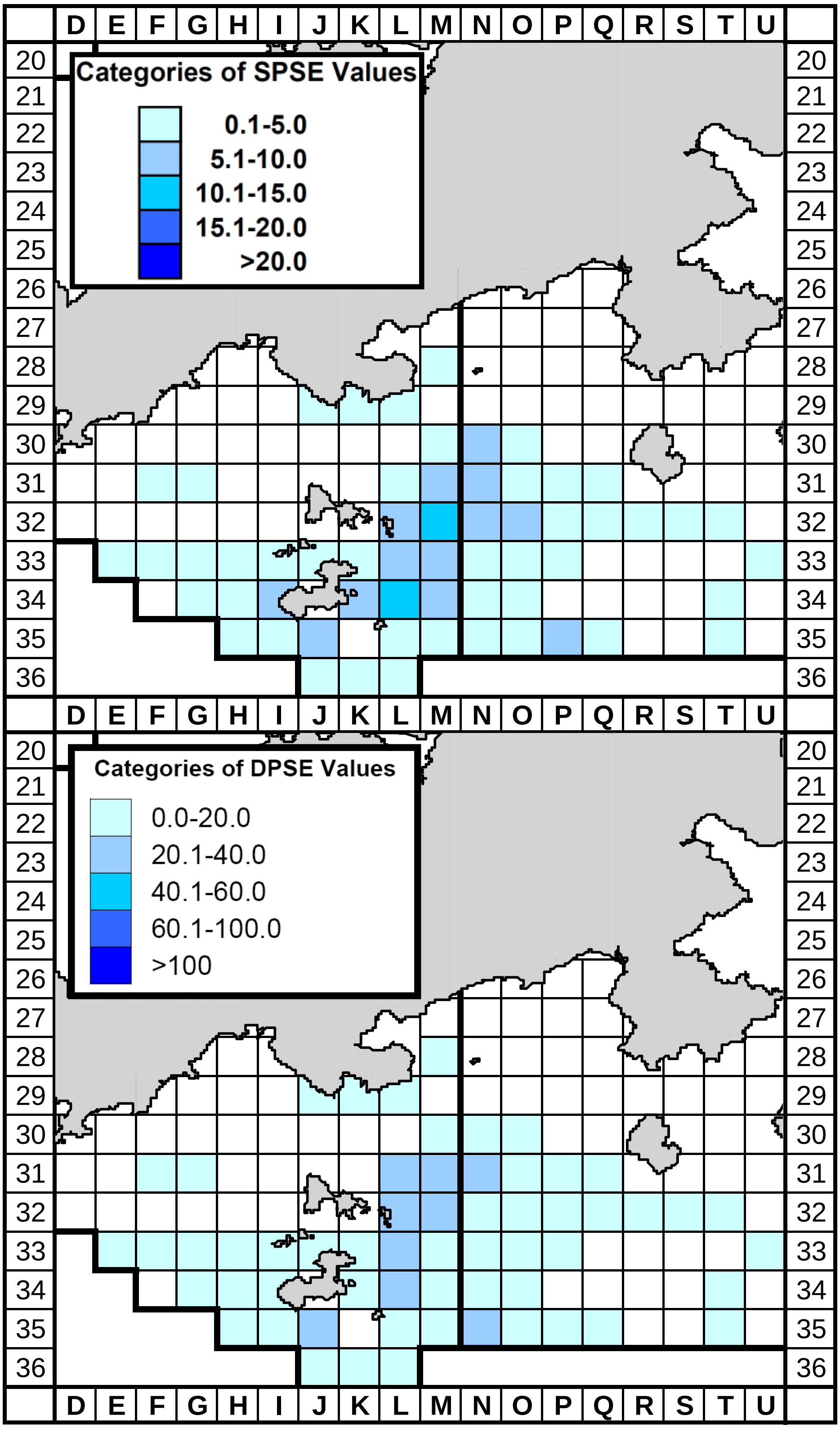


Figure 16. Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong during wet season (June to Novbember), using data collected during 2019-23 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort)

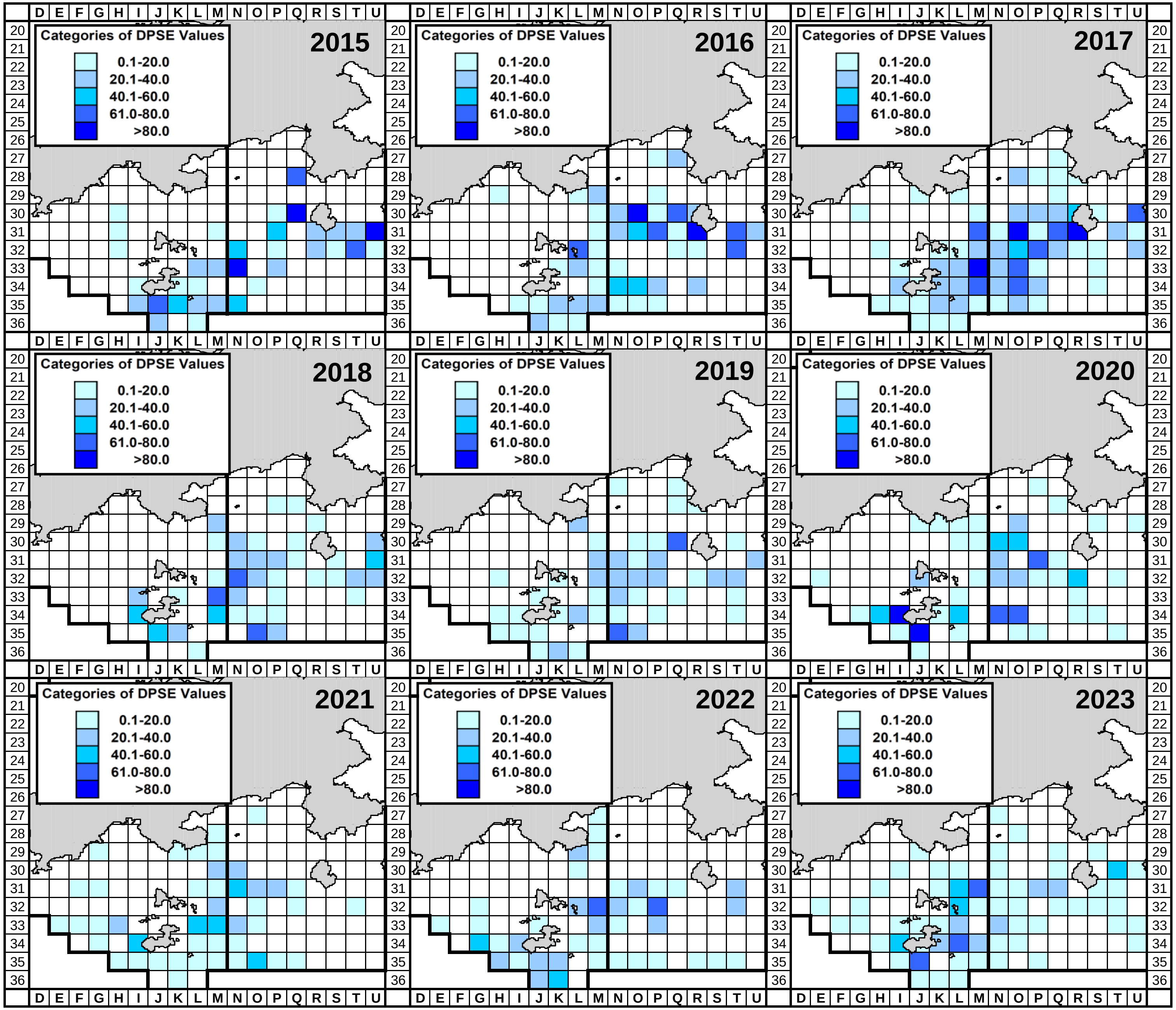


Figure 17. Comparison of porpoise densities with corrected survey effort per km^2 in South Lantau and Western Lamma waters in 2015-23 (number within grids represent "DPSE" = no. of porpoises per 100 units of survey effort)

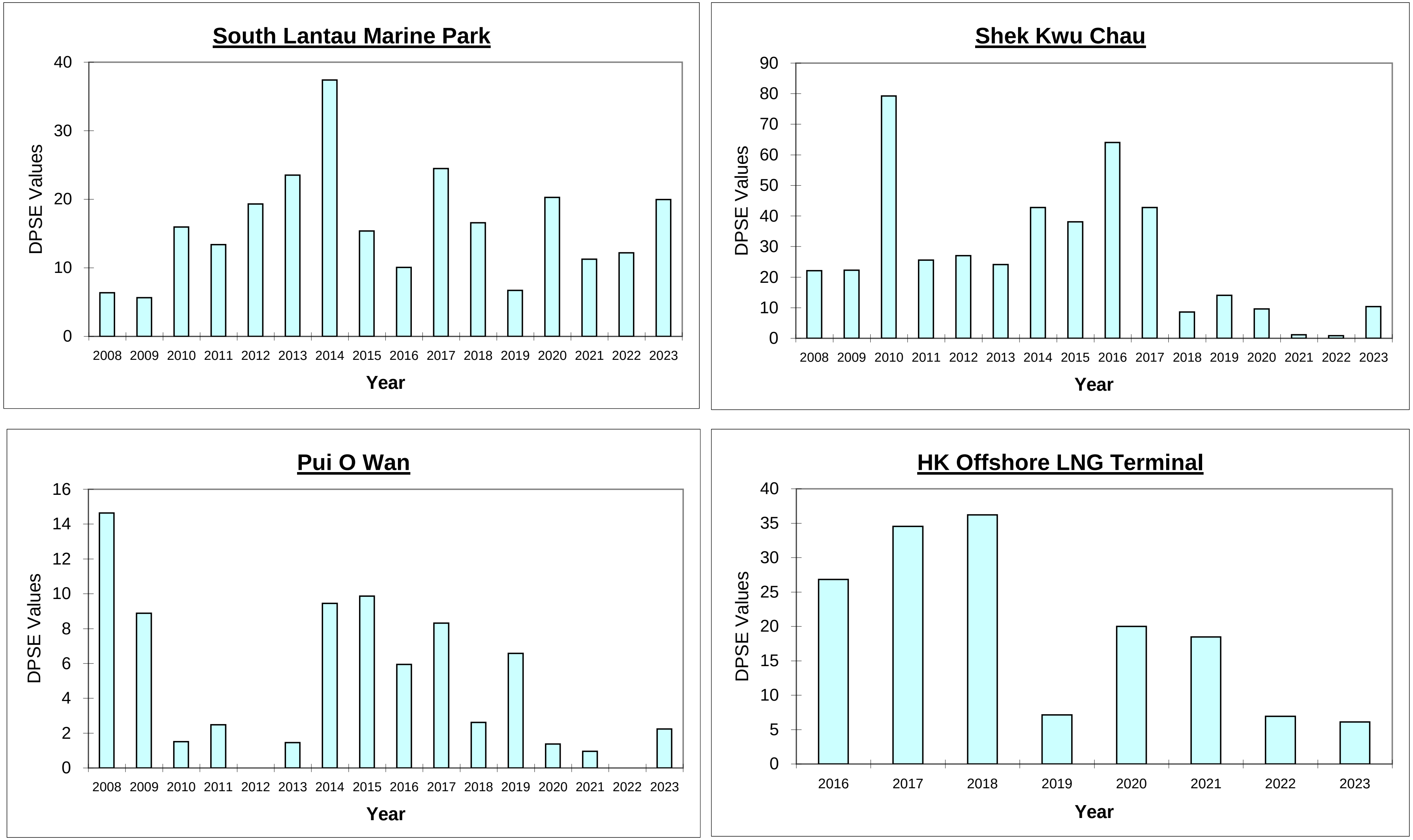


Figure 18. Temporal trend of porpoise densities (DPSE Values) at key porpoise habitats in South Lantau waters

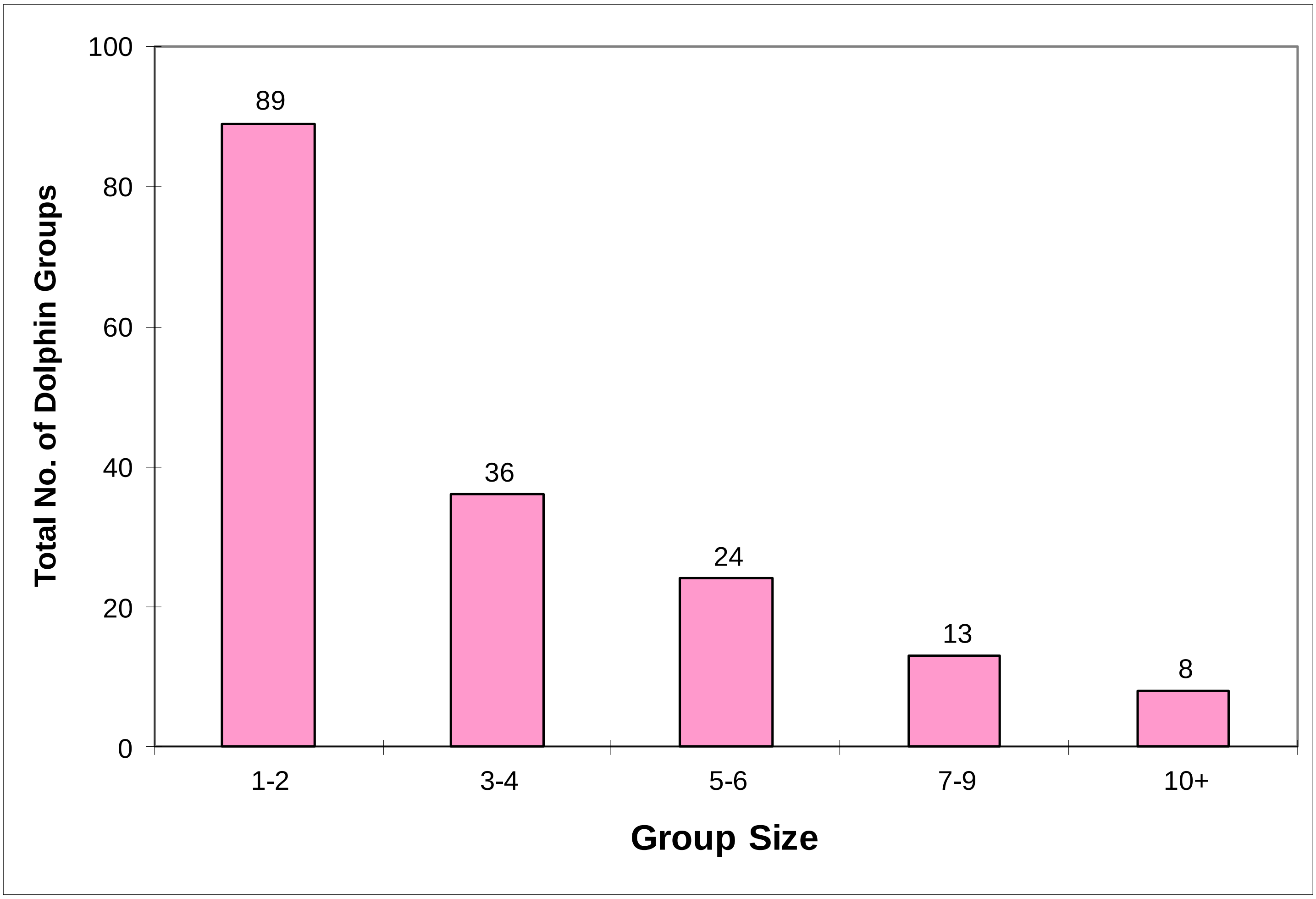


Figure 19. Total number of dolphin groups with different group sizes during April 2023 to March 2024

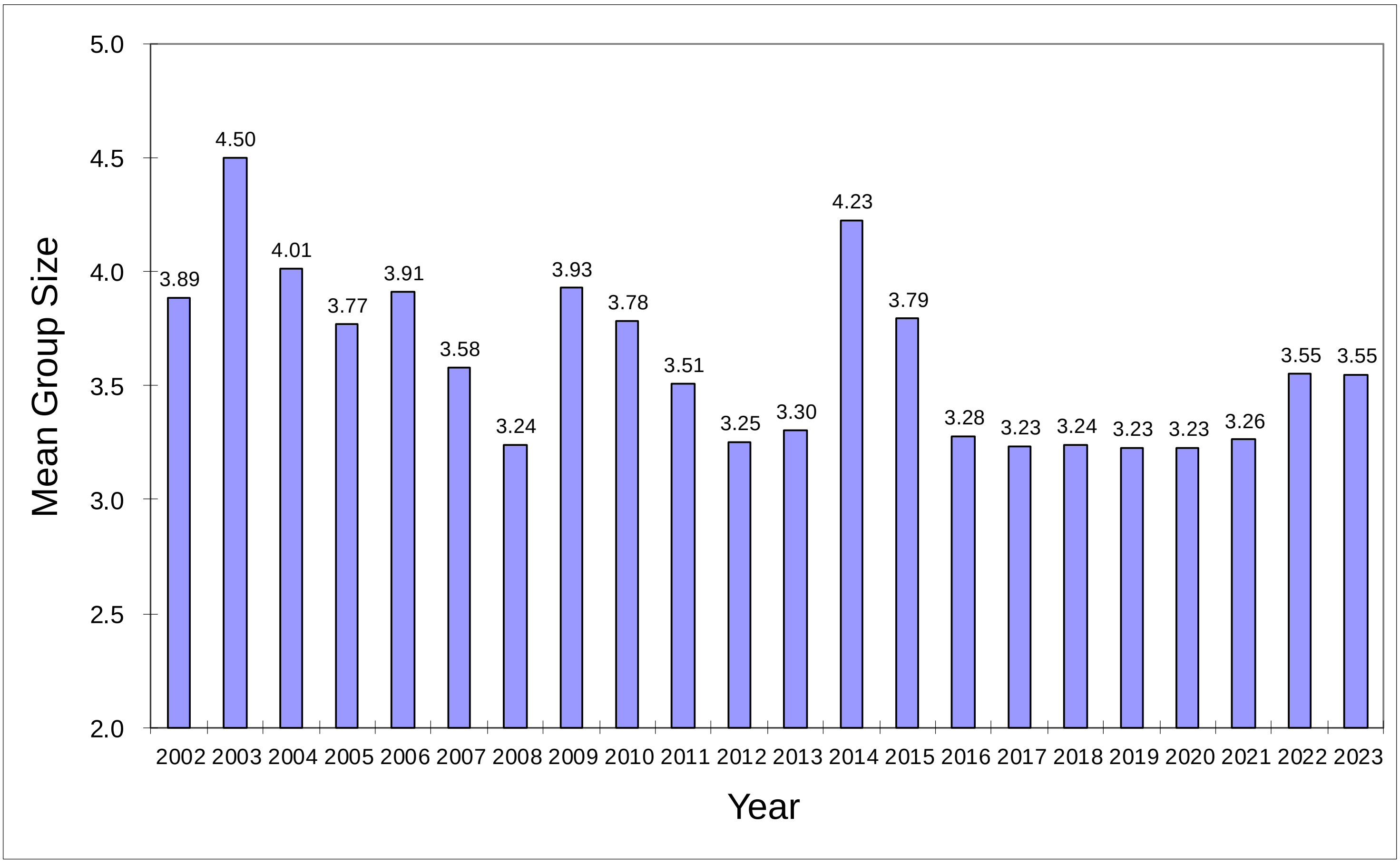


Figure 20. Temporal trend of mean dolphin group size in 2002-23

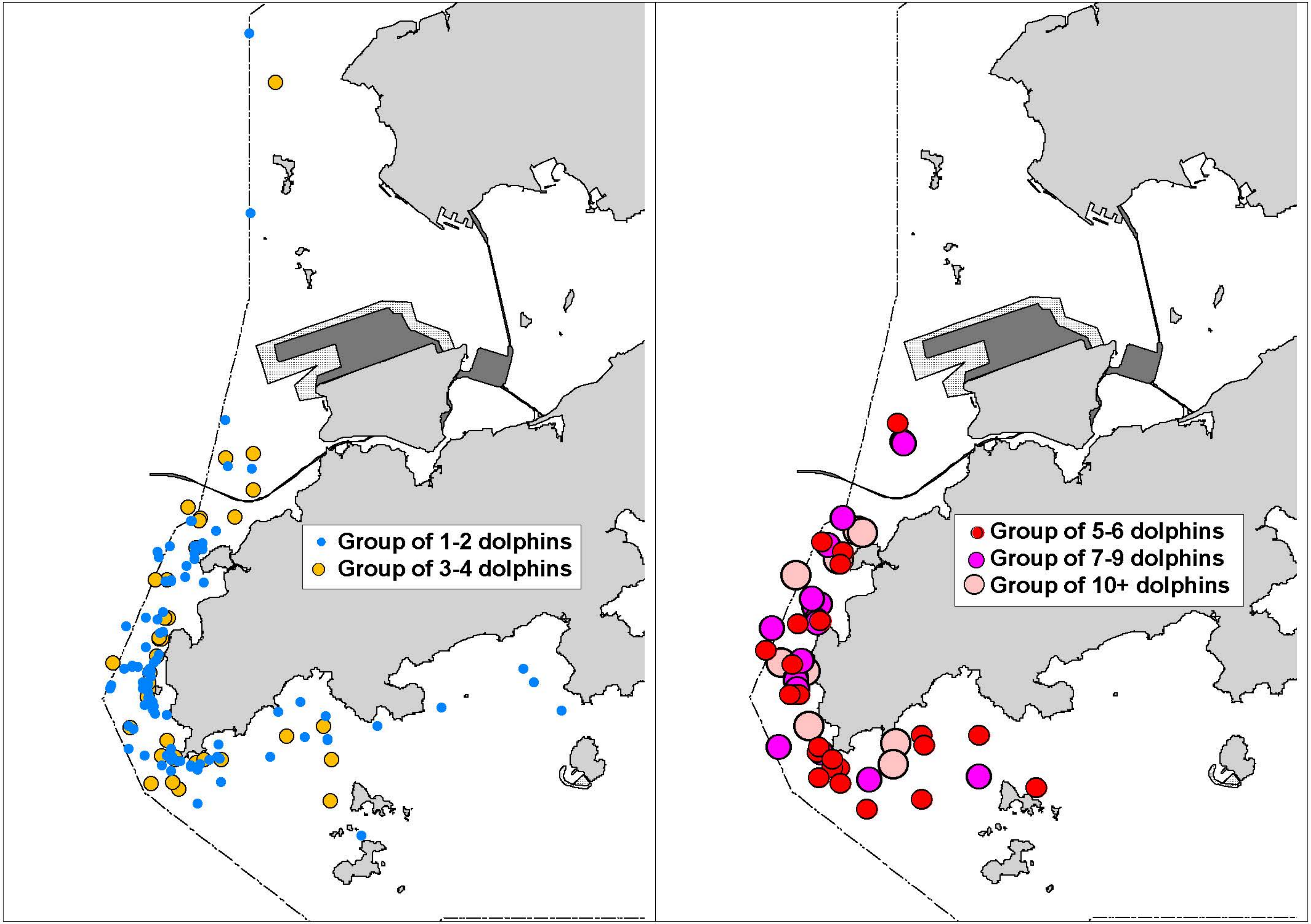


Figure 21. Distribution of Chinese White Dolphins with different group sizes in 2023

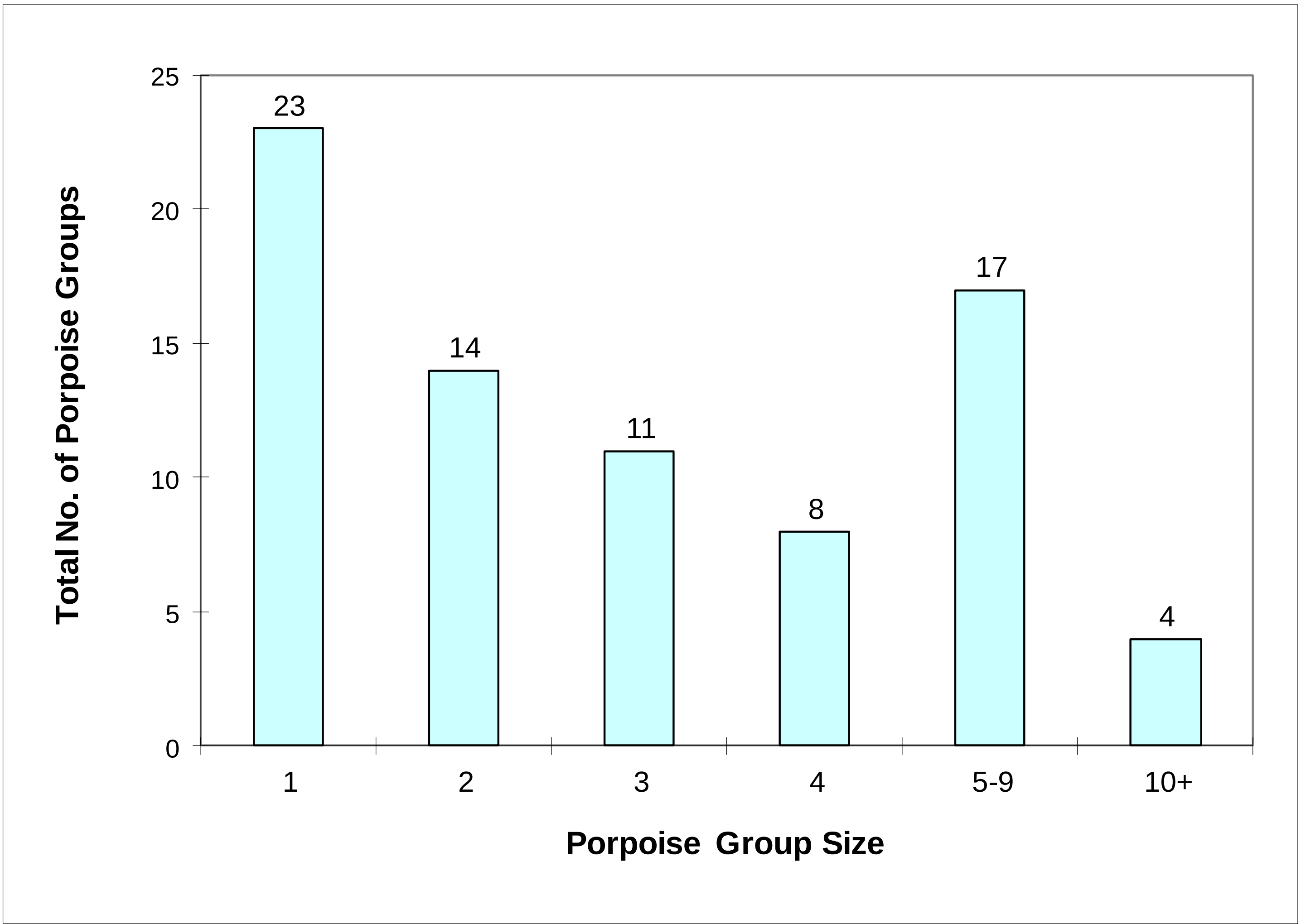


Figure 22. Total number of porpoise groups with different group sizes during April 2023 to March 2024

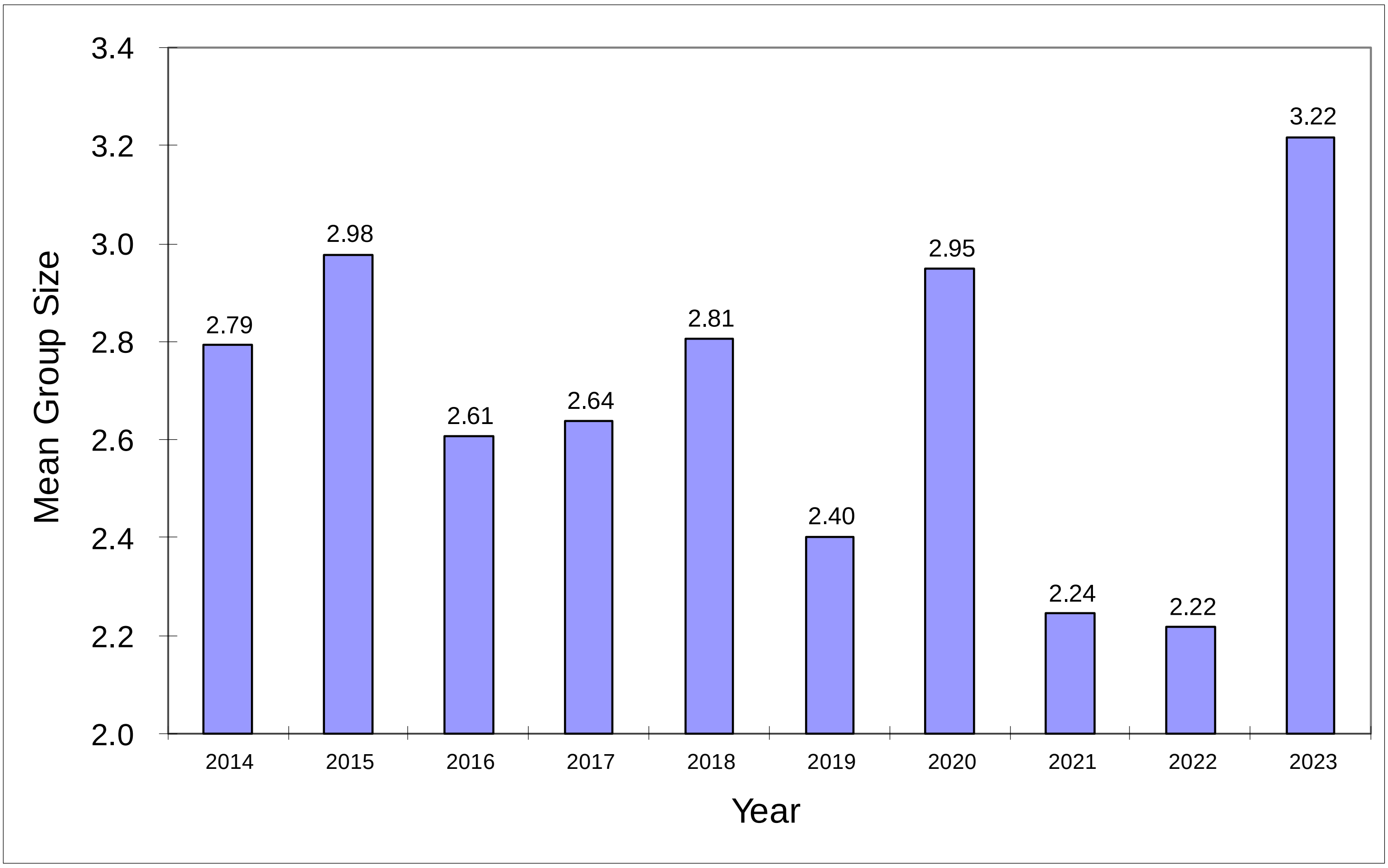


Figure 23. Temporal trend of mean porpoise group size in South Lantau waters in 2014-23

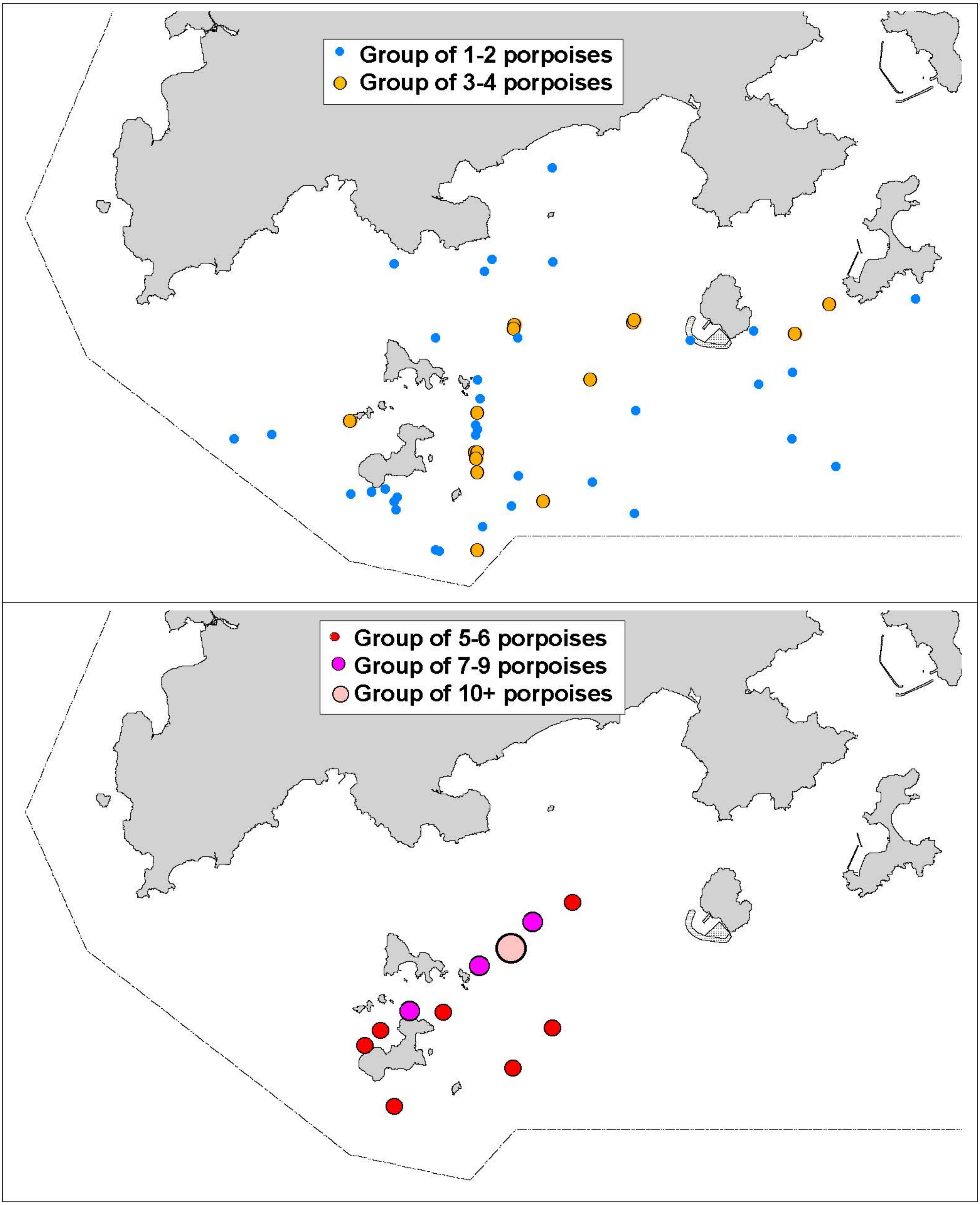


Figure 24. Distribution of finless porpoises with different group sizes in 2023

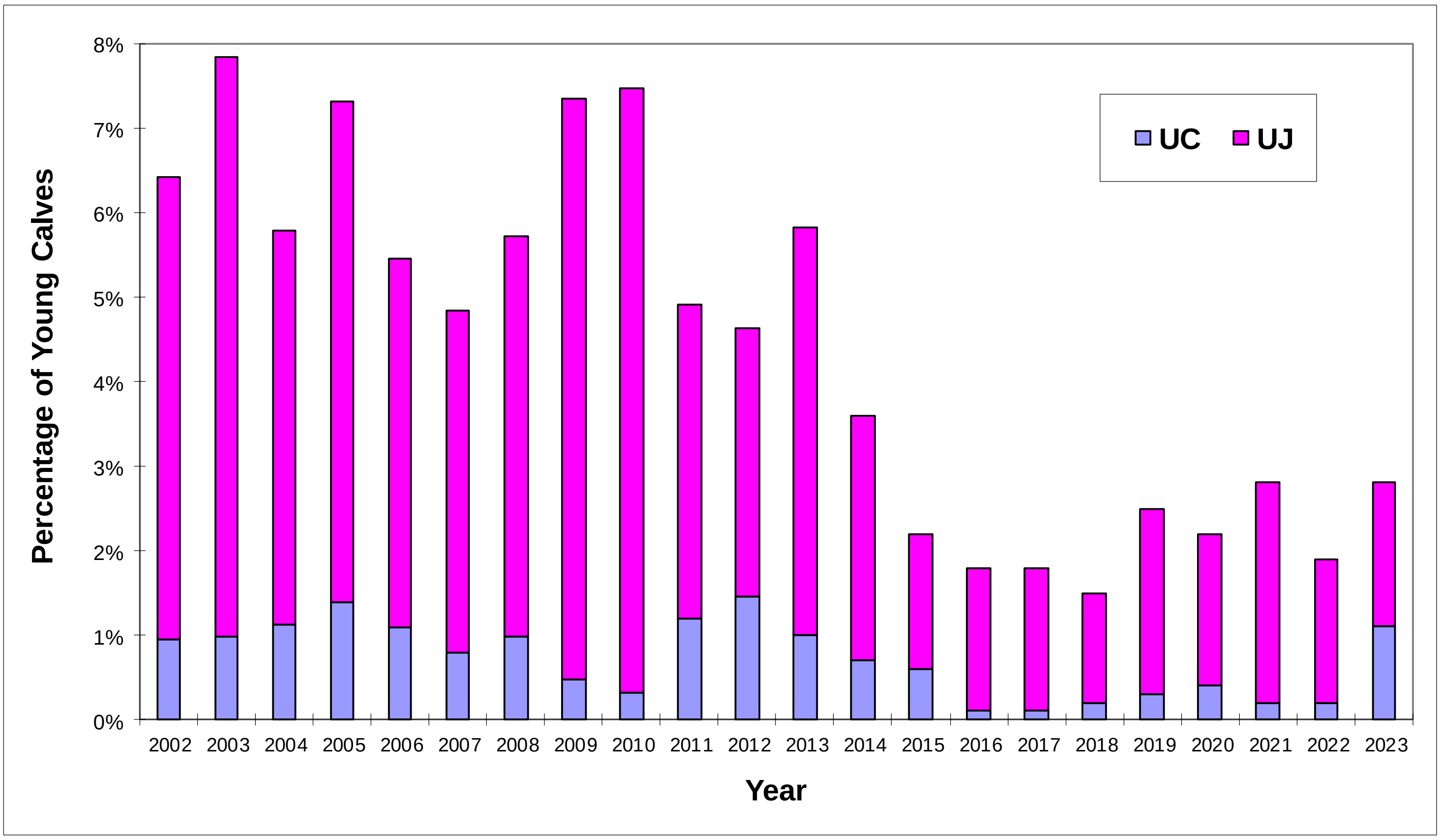


Figure 25. Percentages of young calves (i.e. Unspotted Calves (UC) and Unspotted Juveniles (UJ)) among all dolphin groups during 2002-23

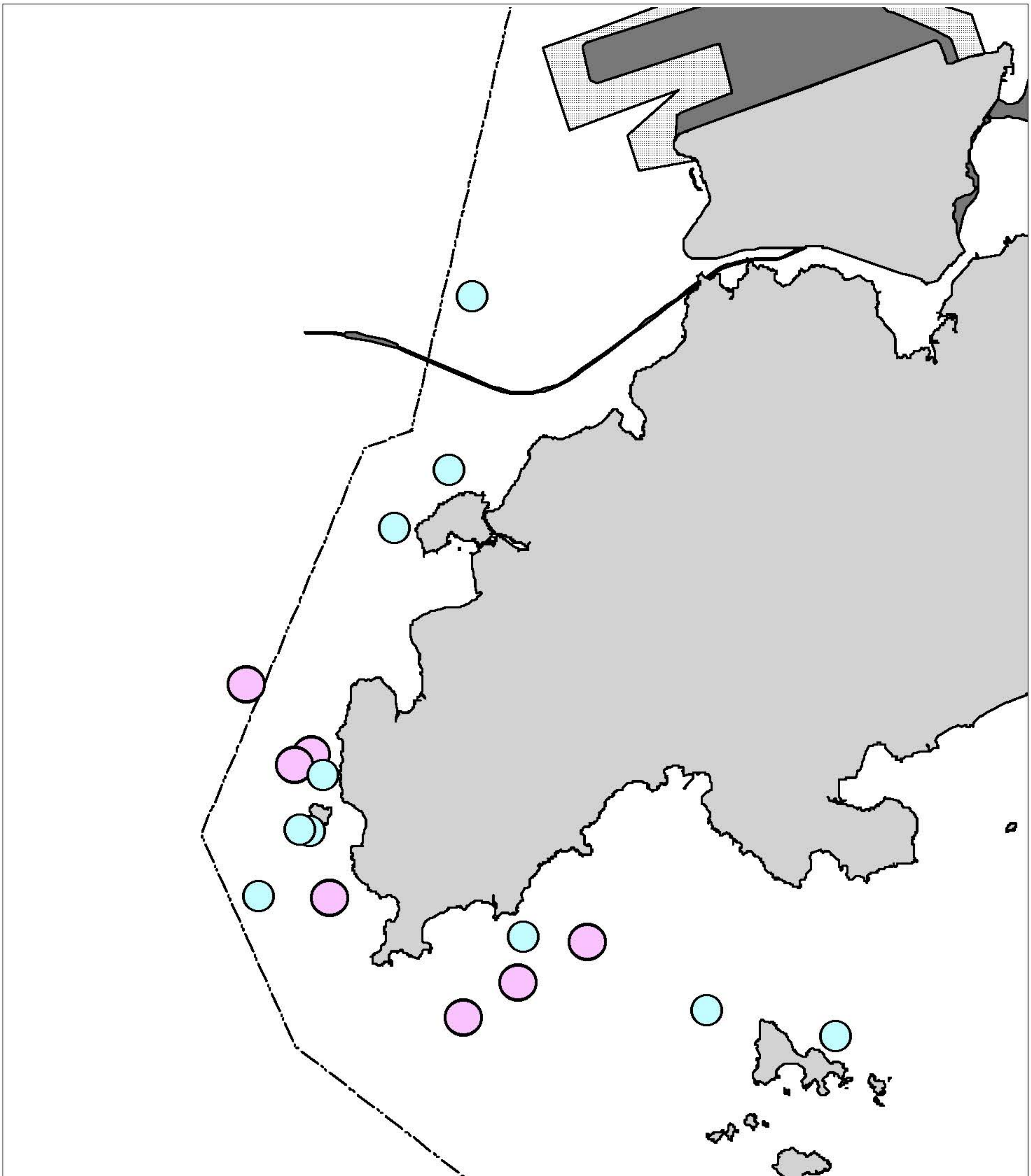


Figure 26. Distribution of Unspotted Calves (purple dots) &
Unspotted Juveniles (blue dots) in 2023

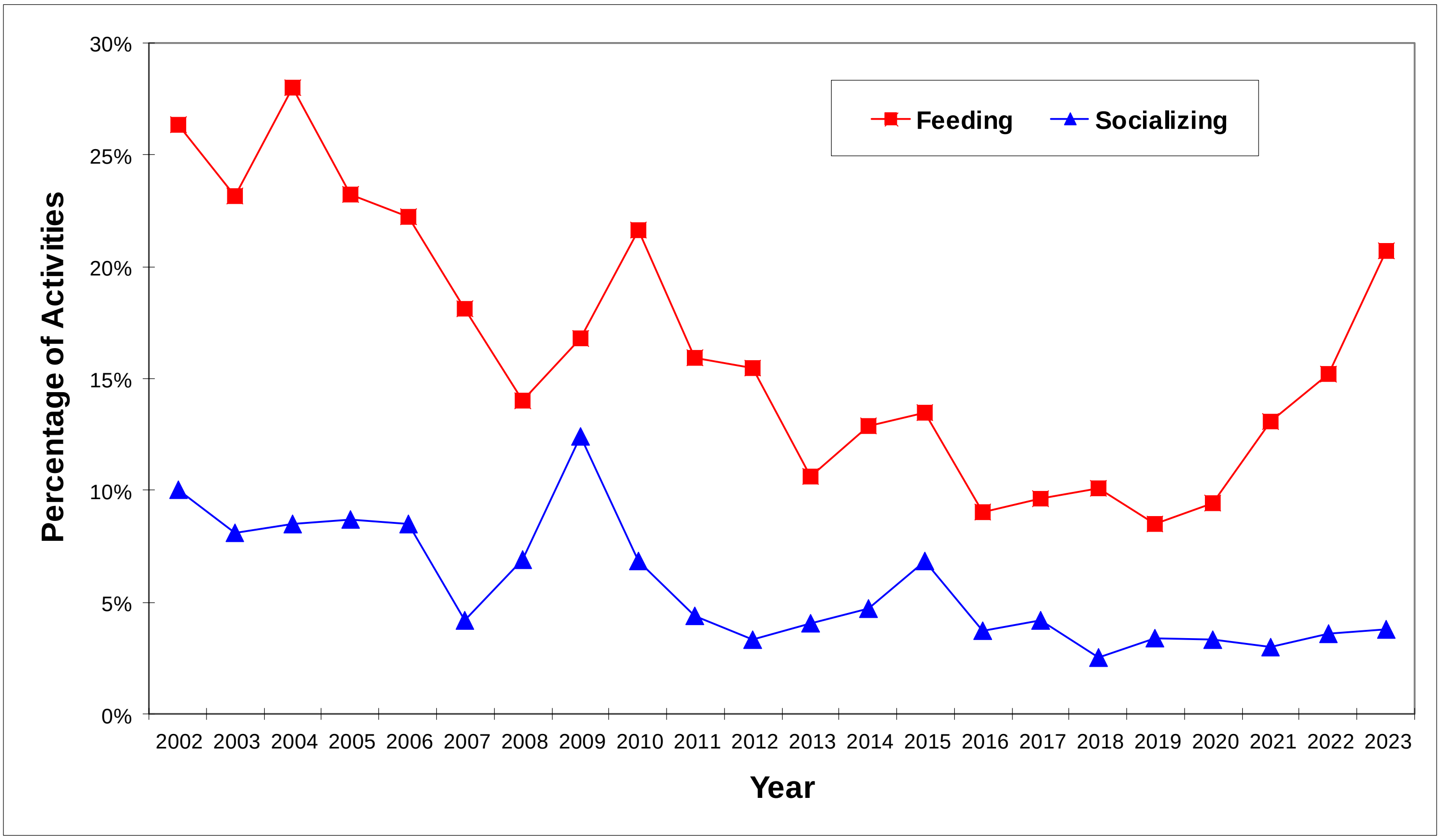


Figure 27. Percentages of feeding and socializing activities among all dolphin groups sighted in Hong Kong during 2002-23

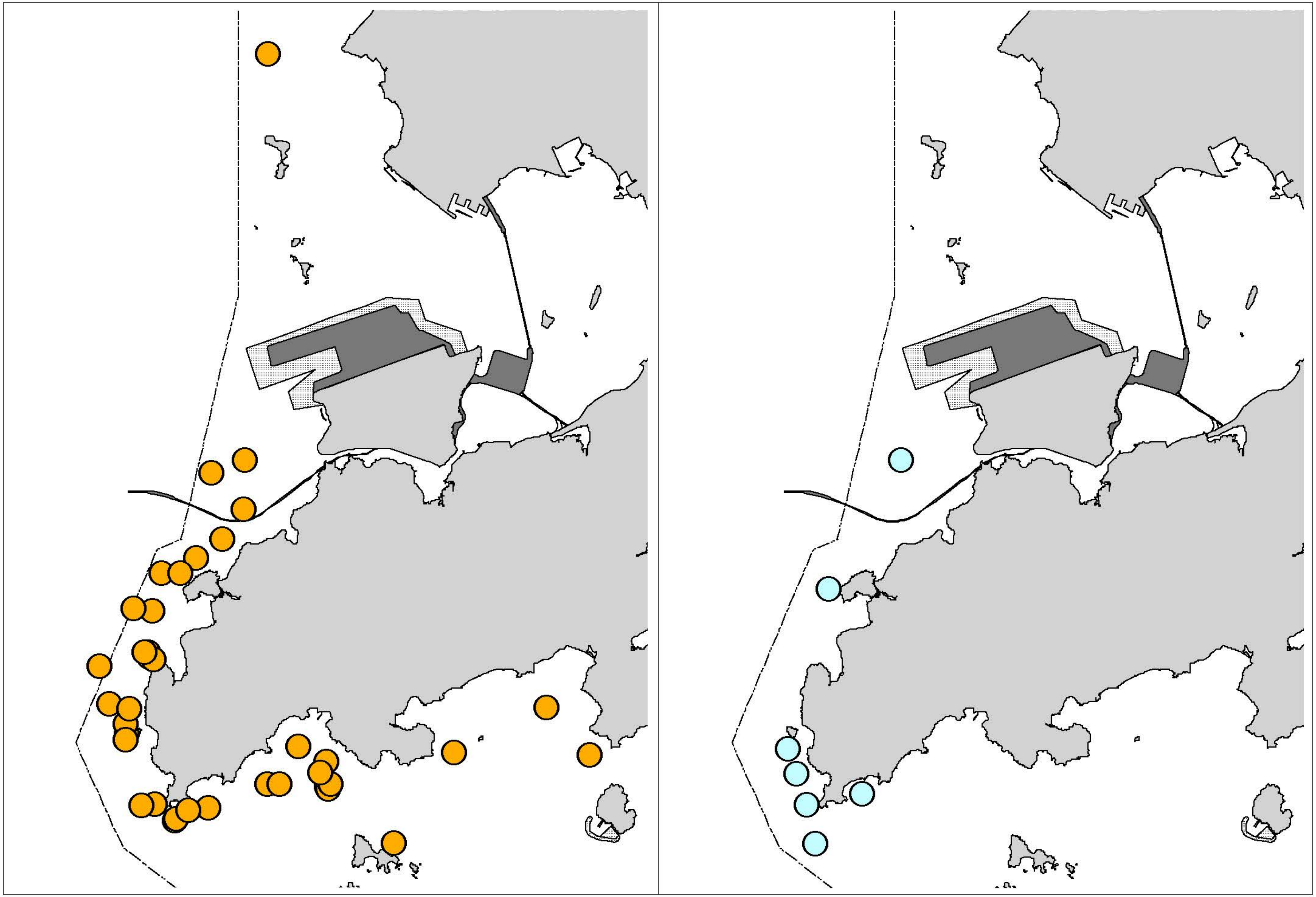


Figure 28. Distribution of Chinese white dolphins engaged in feeding (orange dots) and socializing (blue dots) activities in 2023

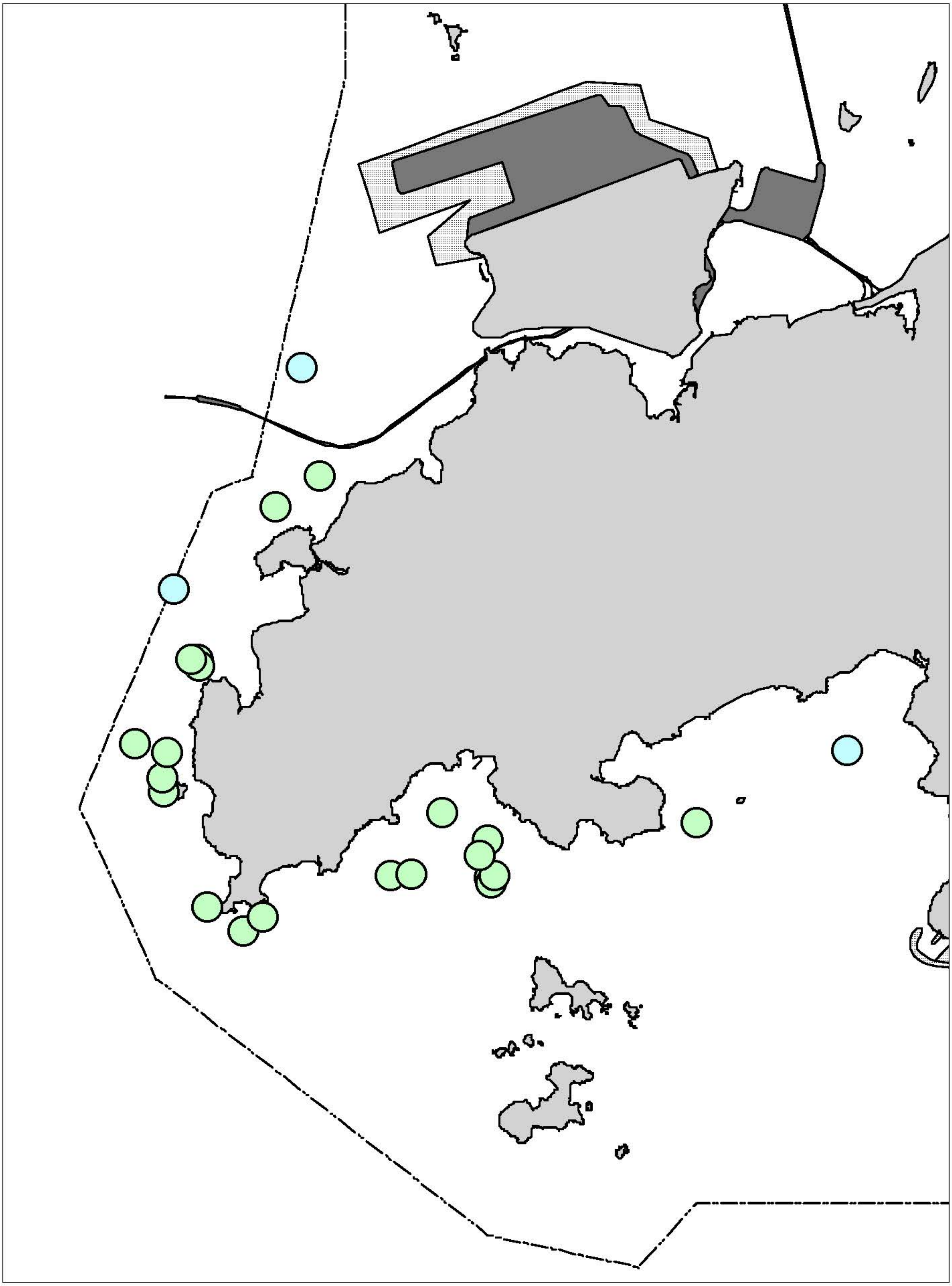


Figure 29. Distribution of dolphin sightings associated with fishing boats (green dots: purse-seiners; blue dots: gill-netters) in 2023

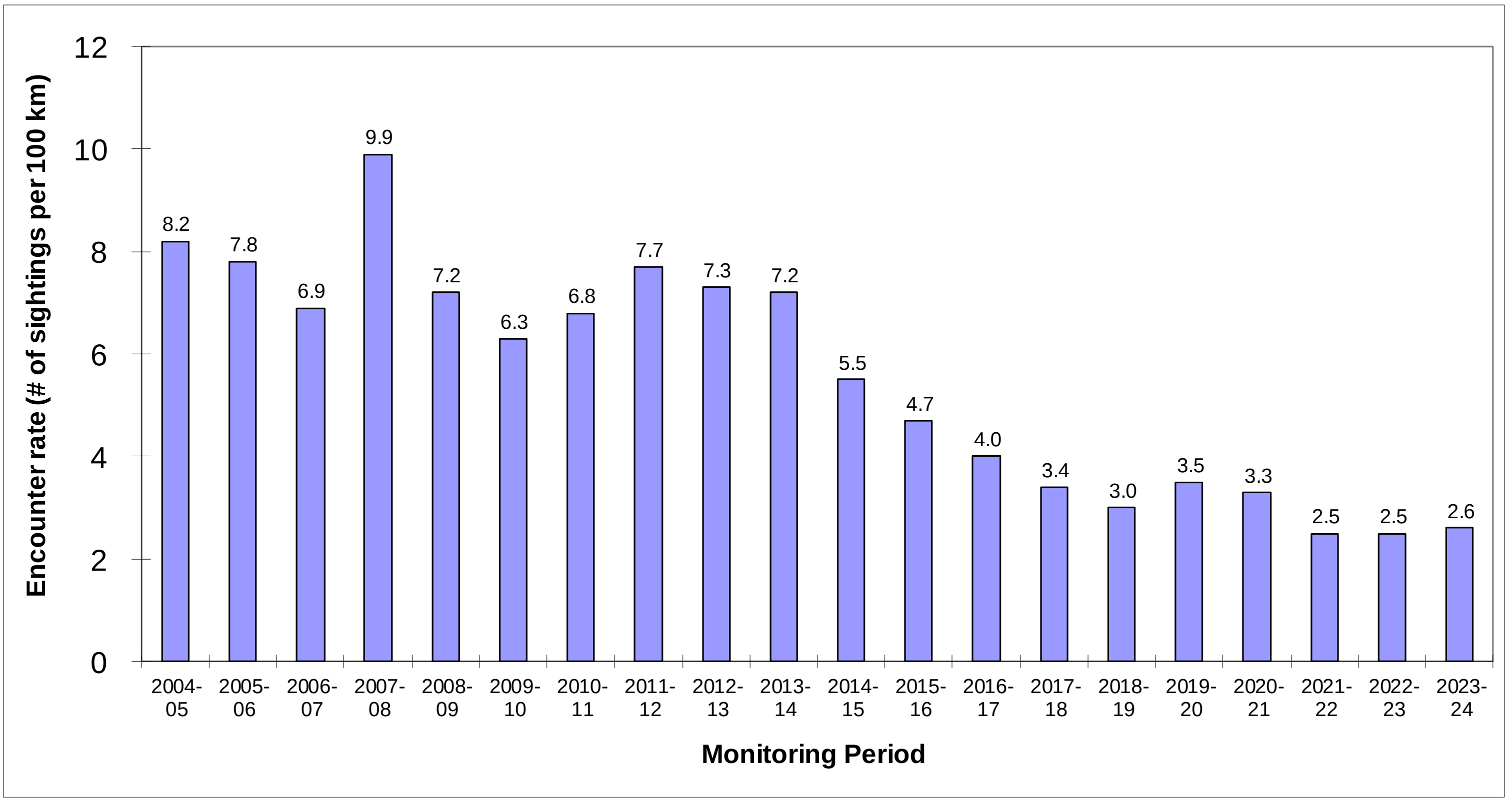


Figure 30a. Temporal trend in encounter rates of Chinese White Dolphins (combined from WL, NWL, NEL and SWL survey areas) in the past 20 monitoring periods from 2004/05 to 2023/24

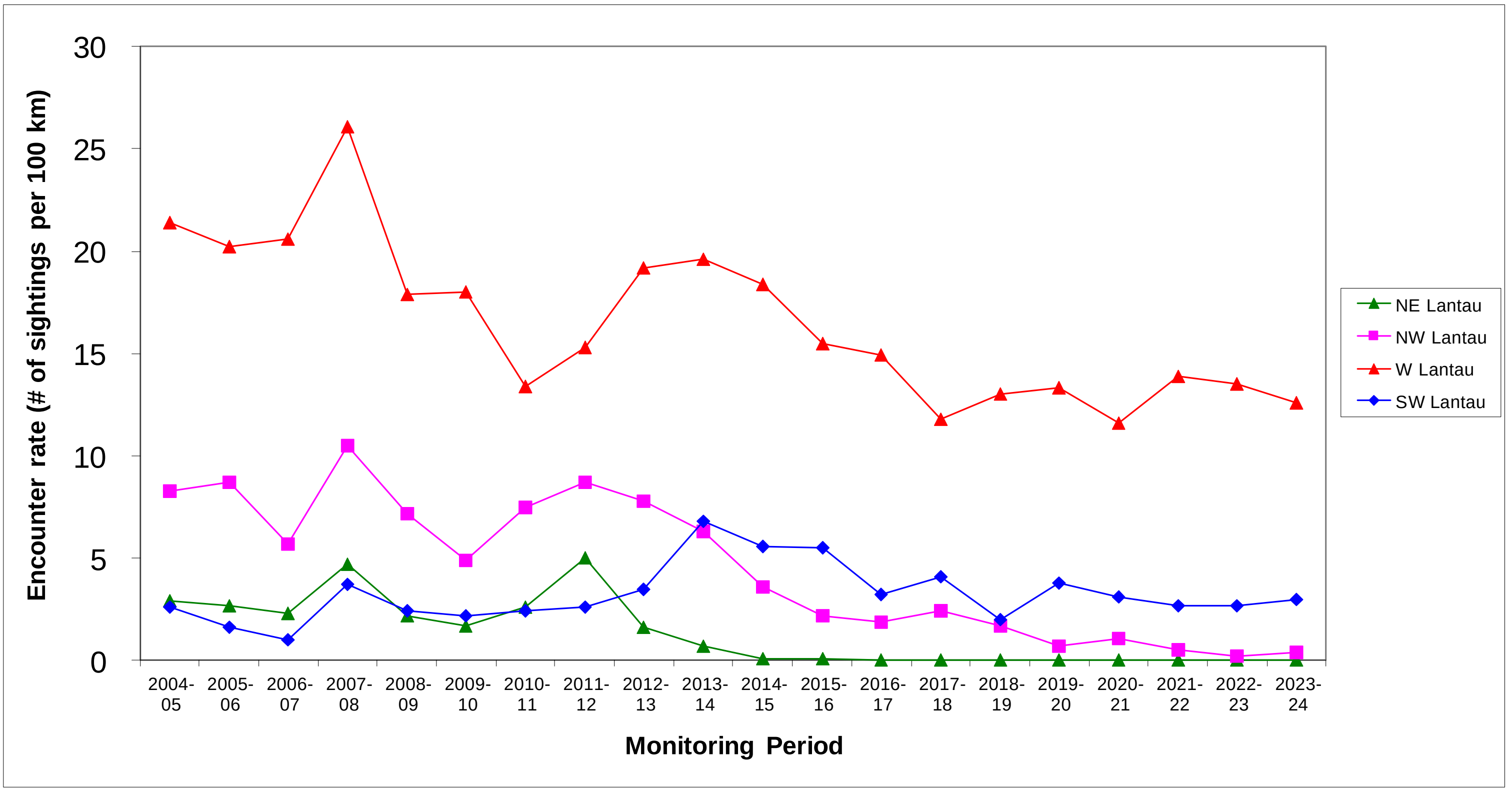


Figure 30b. Temporal trend in encounter rates of Chinese White Dolphins in each of the survey areas in WL, NWL, NEL and SWL waters in the past 20 monitoring periods from 2004/05 to 2023/24

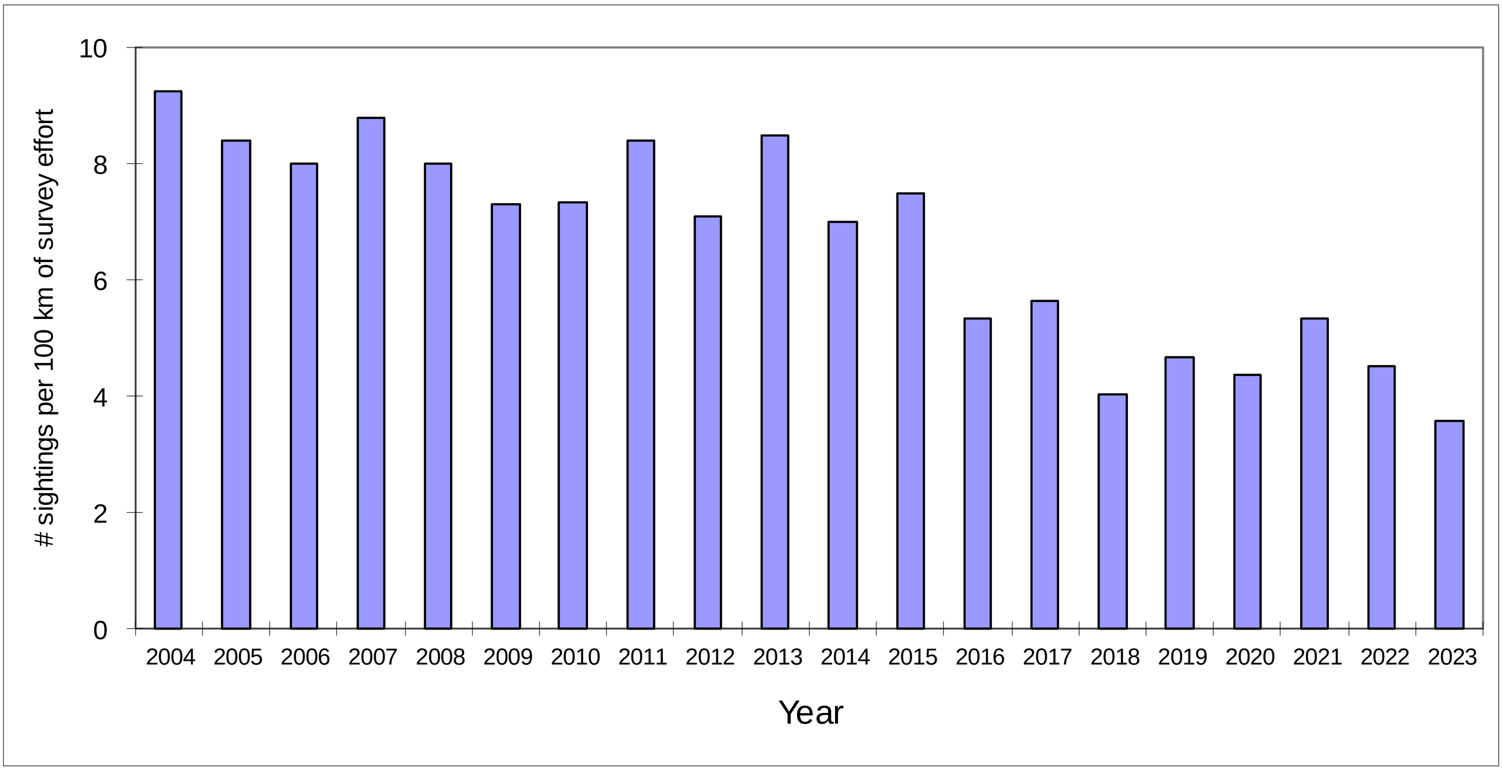


Figure 31a. Temporal trends in combined annual dolphin encounter rates from four survey areas in NEL, NWL, WL and SWL

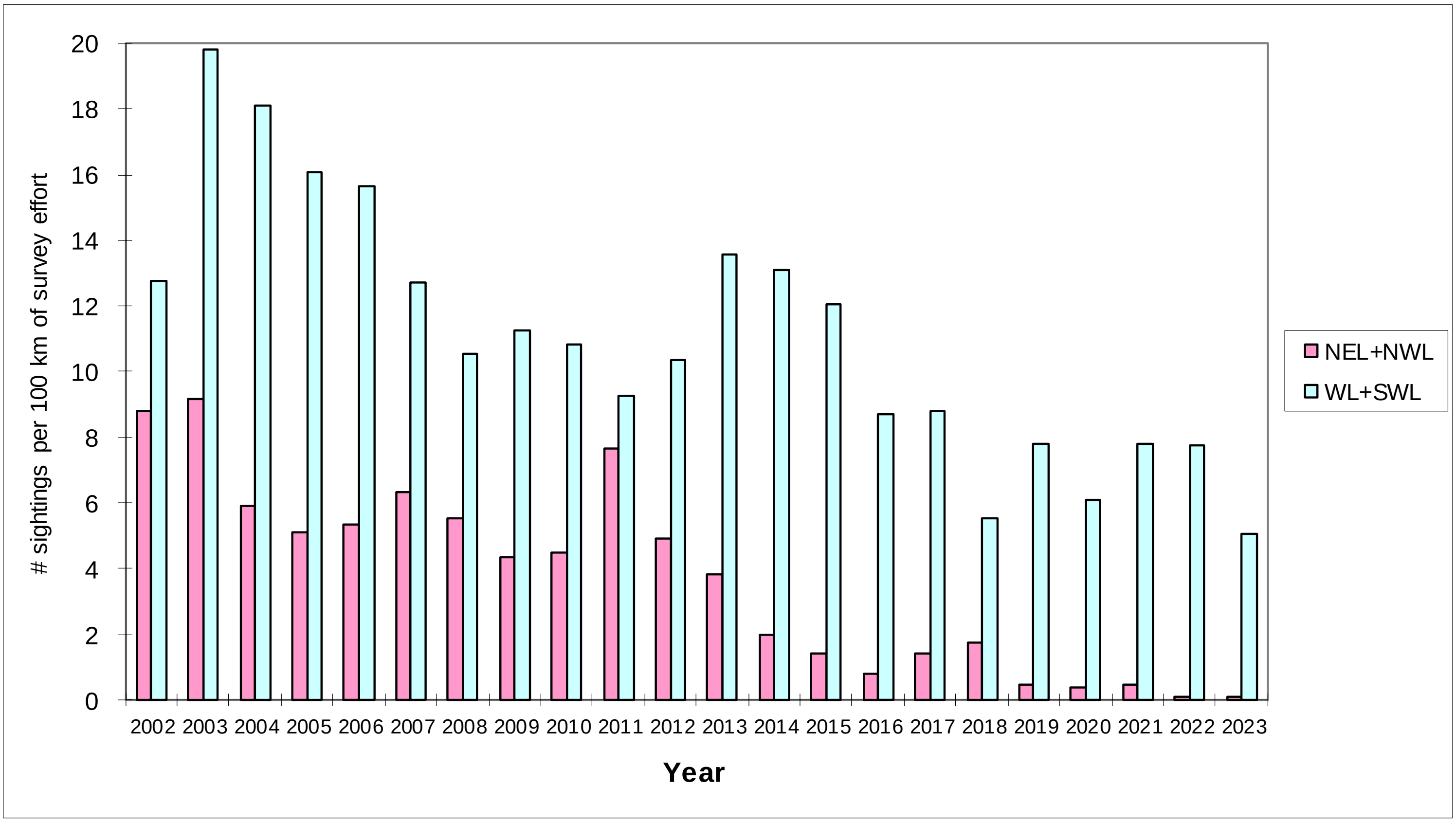


Figure 31b. Temporal trends in annual dolphin encounter rates in North Lantau and West/Southwest Lantau regions

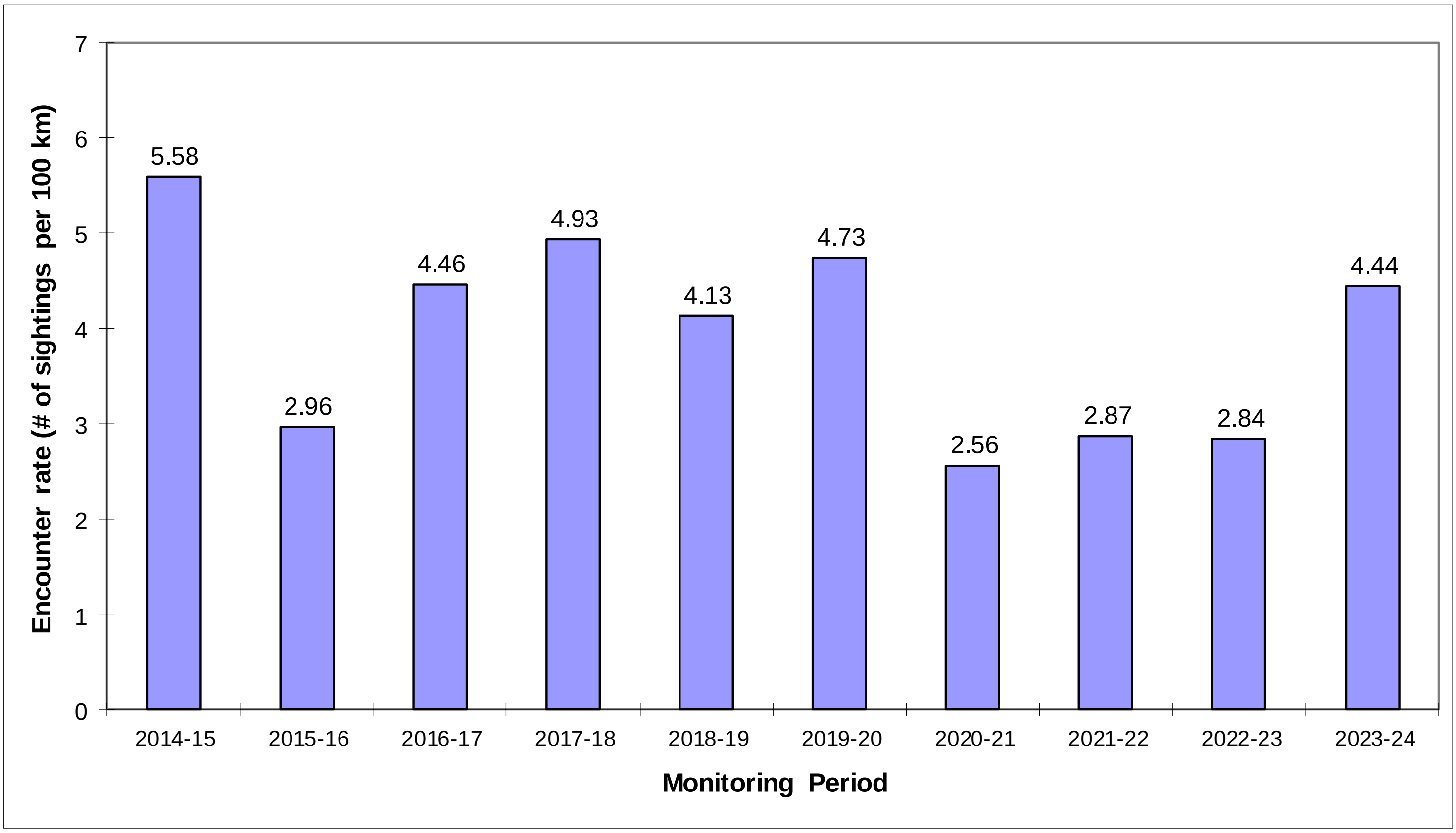


Figure 32. Temporal trend in encounter rates of finless porpoises (combined from SWL and SEL survey areas) in the past 10 monitoring periods from 2014/15 to 2023/24

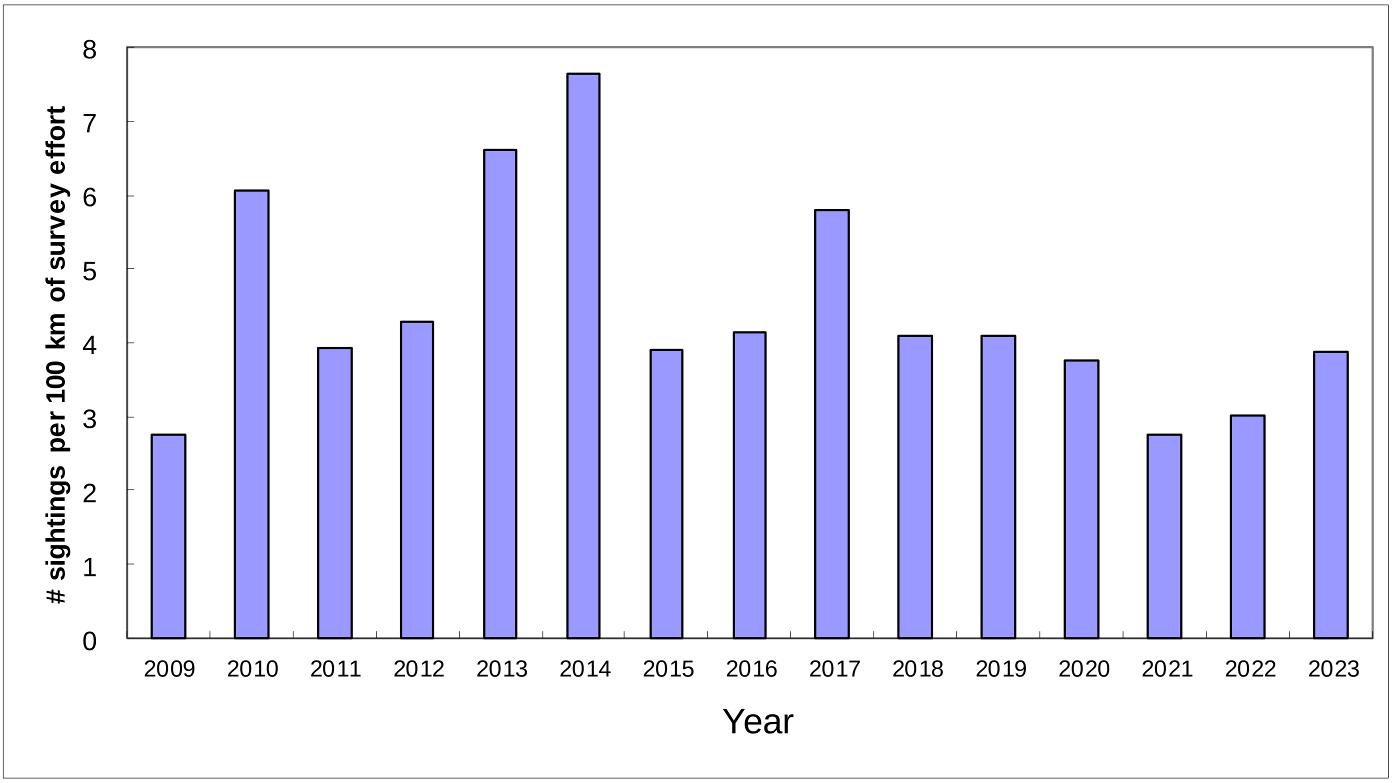


Figure 33a. Temporal trend of annual encounter rates of finless porpoises (combined from SWL and SEL survey areas)

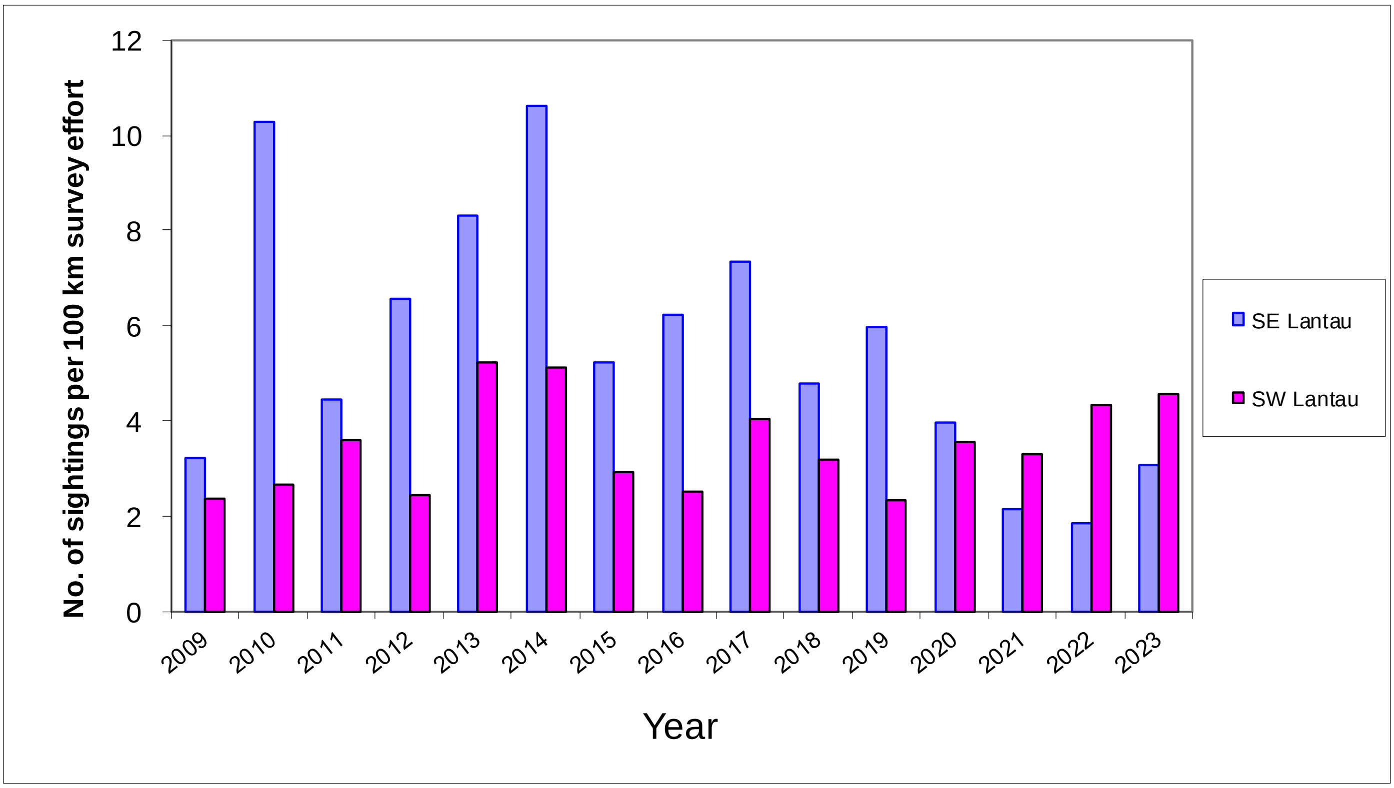


Figure 33b. Temporal trend of annual porpoise encounter rates among the SWL and SEL Lantau survey areas respectively

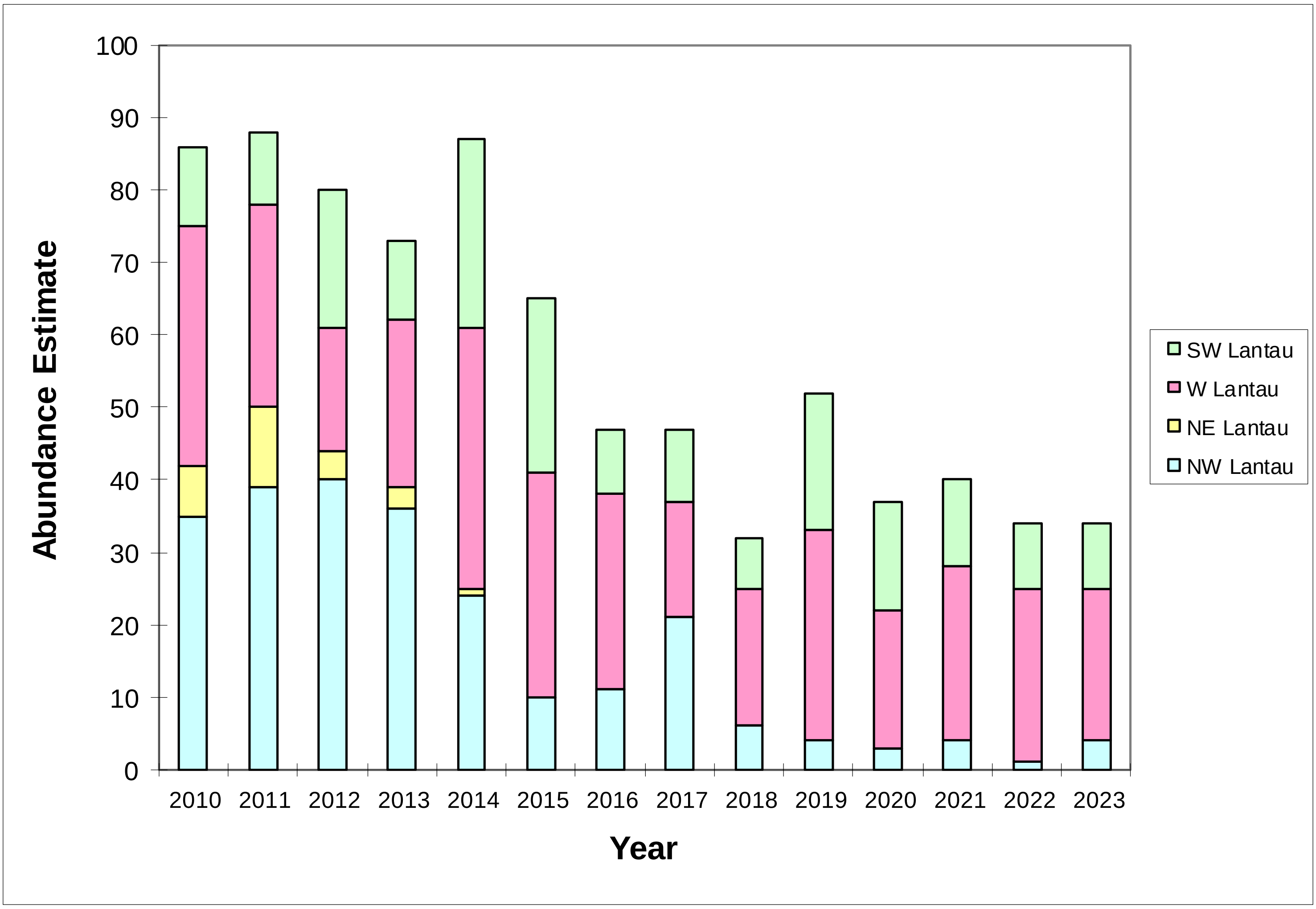


Figure 34. Temporal trends in combined abundance estimates of Chinese White Dolphins in SWL, WL, NWL and NEL from 2010-23

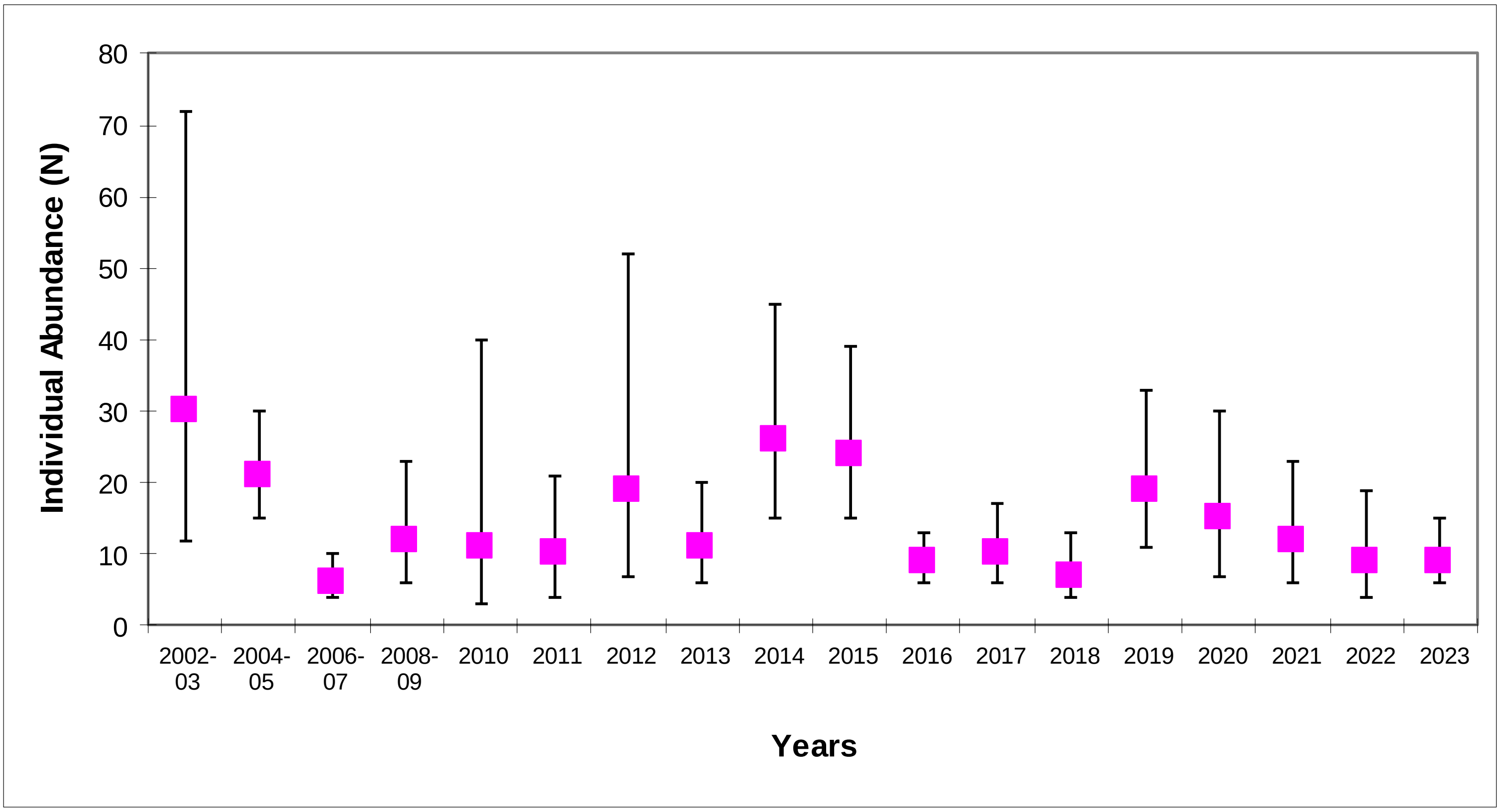


Figure 35. Temporal trend in abundance estimates of Chinese White Dolphins in Southwest Lantau from 2002-23 (error bars: 95% confidence interval of abundance estimates)

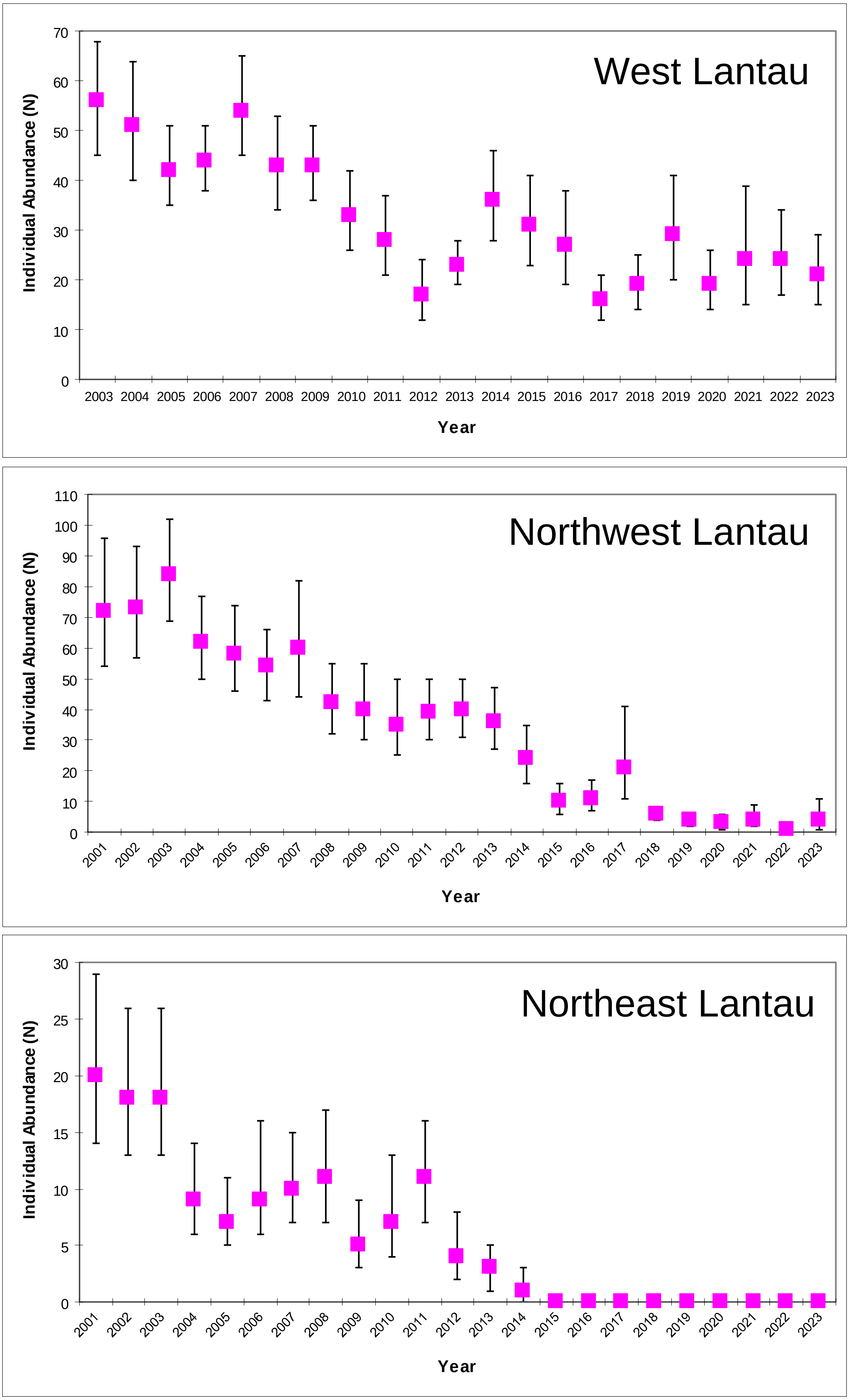


Figure 36. Temporal trends in annual abundance estimates of Chinese White Dolphins in WL (since 2003) & NWL/NEL (since 2001) (error bars: 95% confidence interval of abundance estimates)

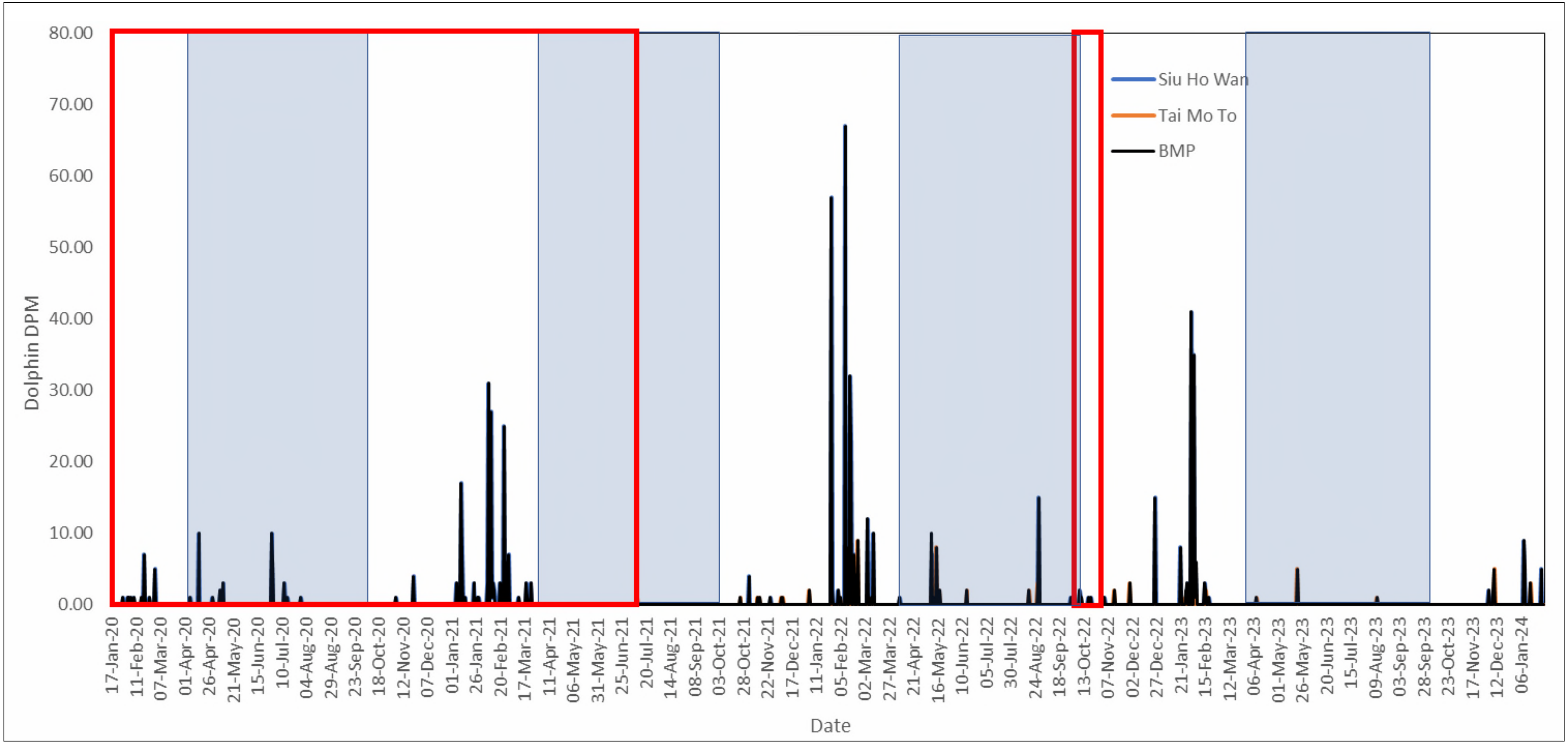


Figure 37. Dolphin DPM per day in the BMP area from January 17th, 2020 to January 30th, 2024 (the shaded and white areas represent the wet and dry seasons, respectively). Note: the red boxes show periods when the Tai Mo To F-POD was not recording data so the observed patterns for BMP should be interpreted accordingly.

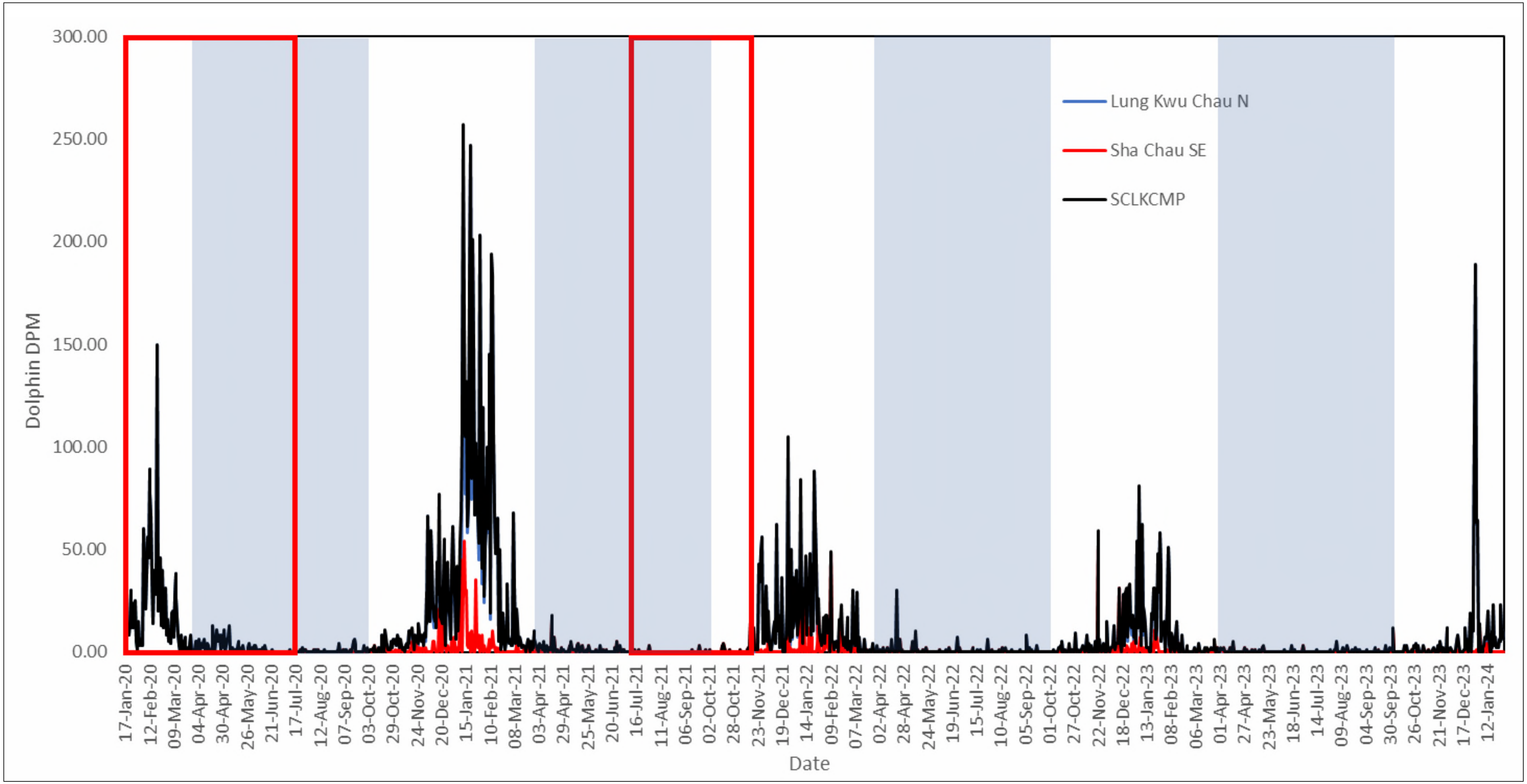


Figure 38. Dolphin DPM per day in the SCLKCMP area from January 17th, 2020 to January 30th, 2024 (the shaded and white areas represent the wet and dry seasons, respectively). Note: the red boxes show periods when at least one F-POD was not recording data so the observed patterns for SCLKCMP should be interpreted accordingly.

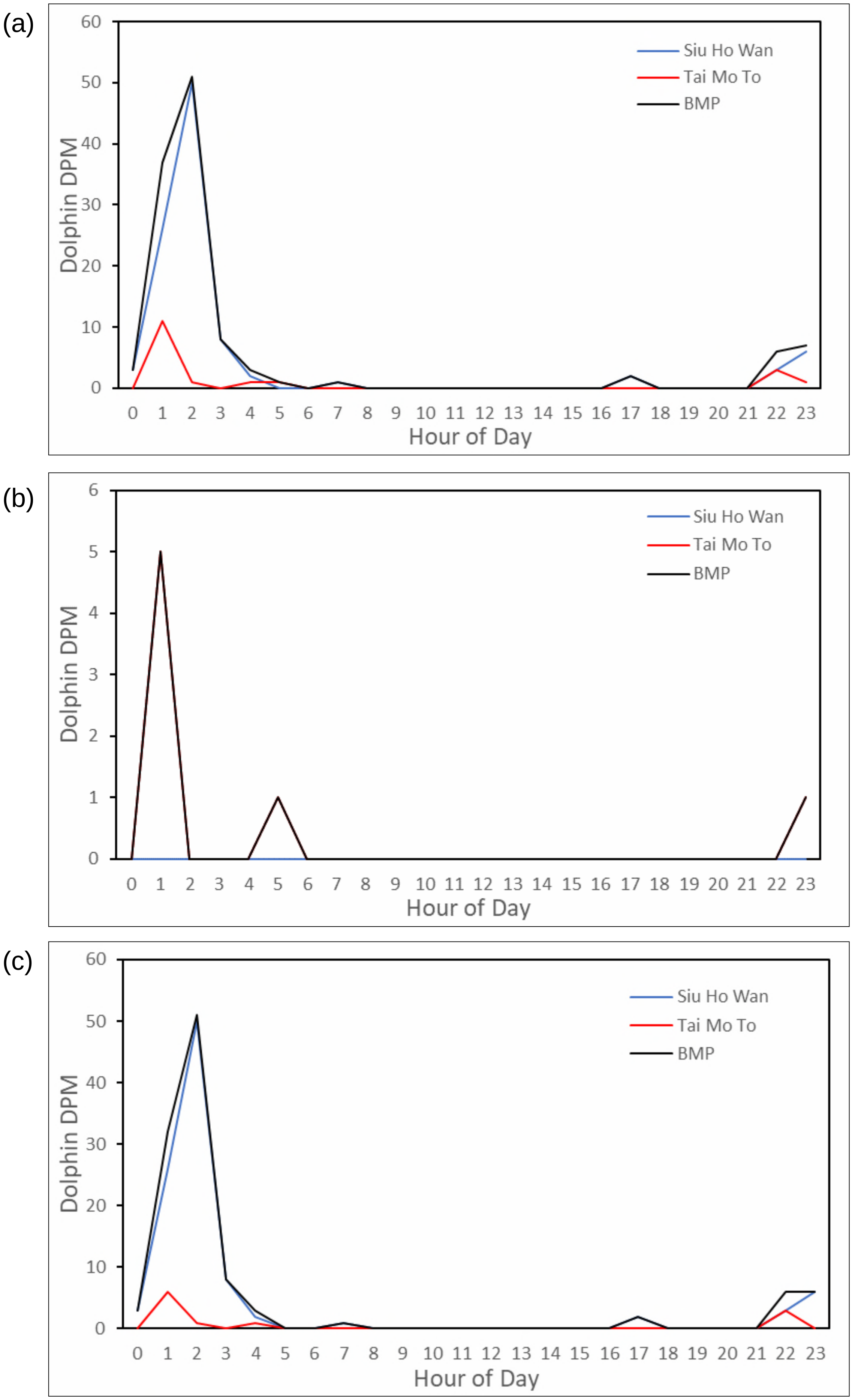


Figure 39. Dolphin DPM diel pattern at BMP (a) from January 1st to December 31st, 2023; (b) in the wet season (April to September, 2023); and c) in the dry season (October to March, 2023)

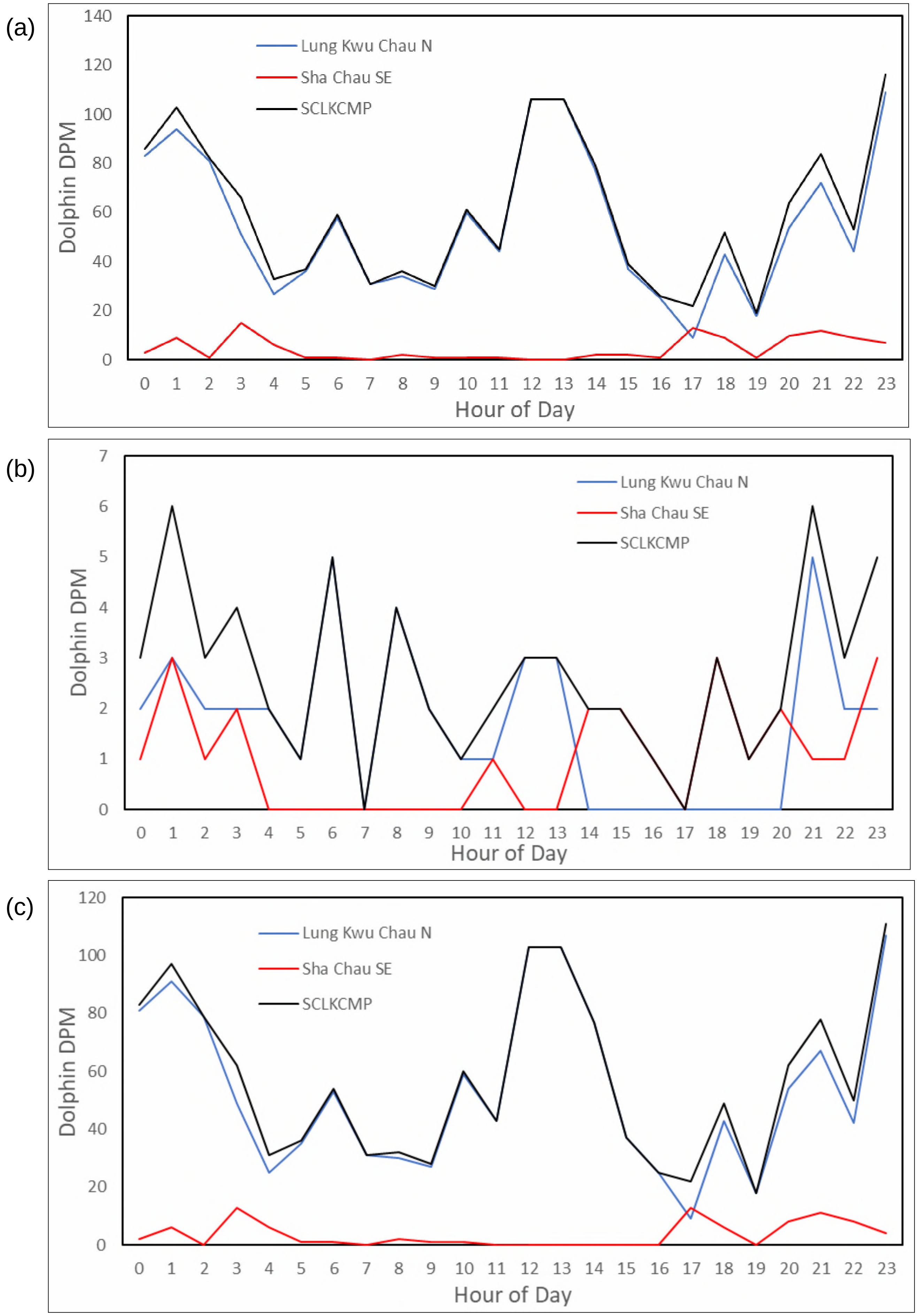


Figure 40. Dolphin DPM diel pattern at SCLKCMP (a) from January 1st to December 31st, 2023; (b) in the wet season (April to September, 2023); and c) in the dry season (October to March, 2023)

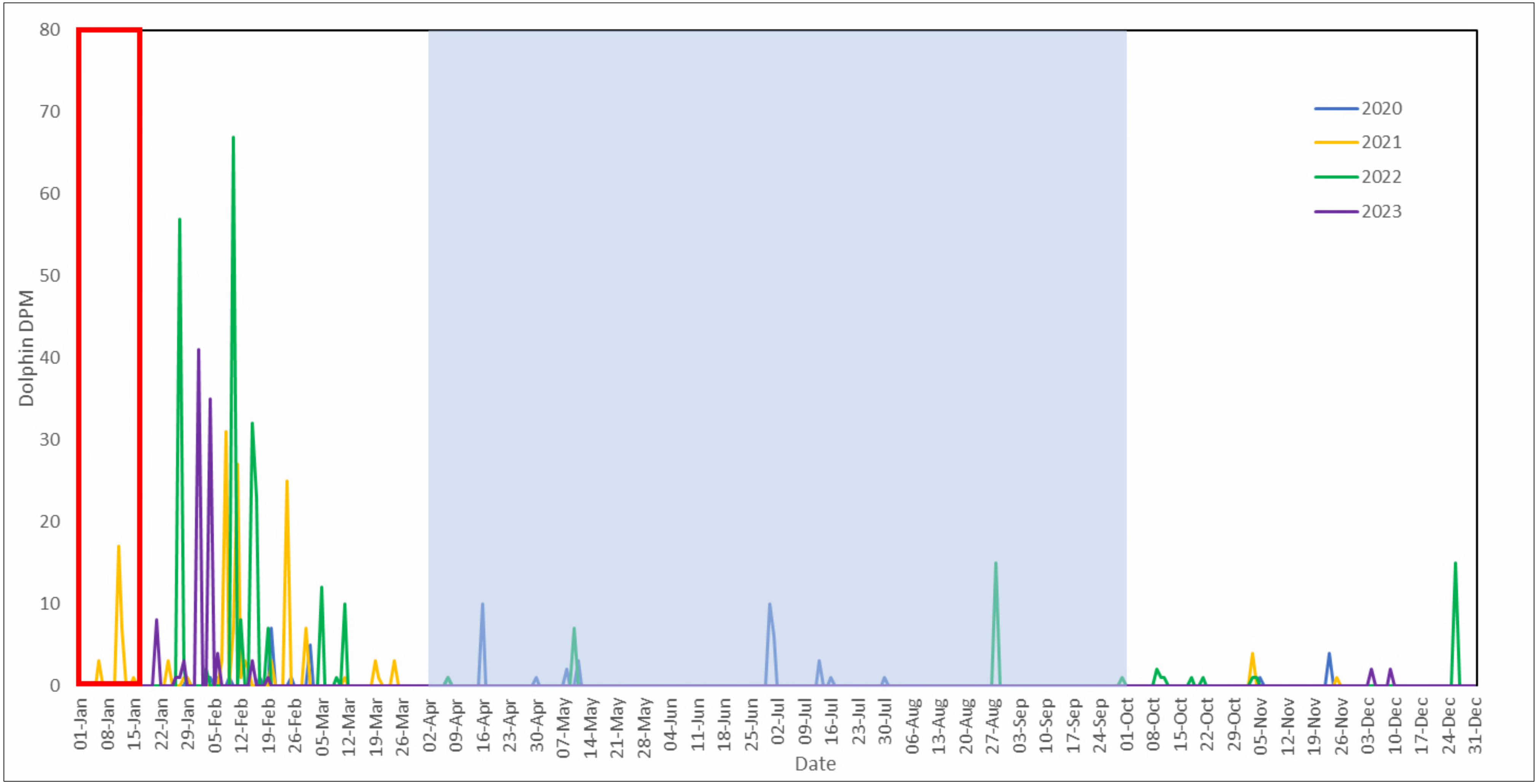


Figure 41. Total dolphin DPM for each day at Siu Ho Wan in 2020, 2021, 2022 and 2023 (from January 1st to December 31st for each year). The shaded box represents the wet season and the red outlined box represents dates for which data were not available for at least one of the years.

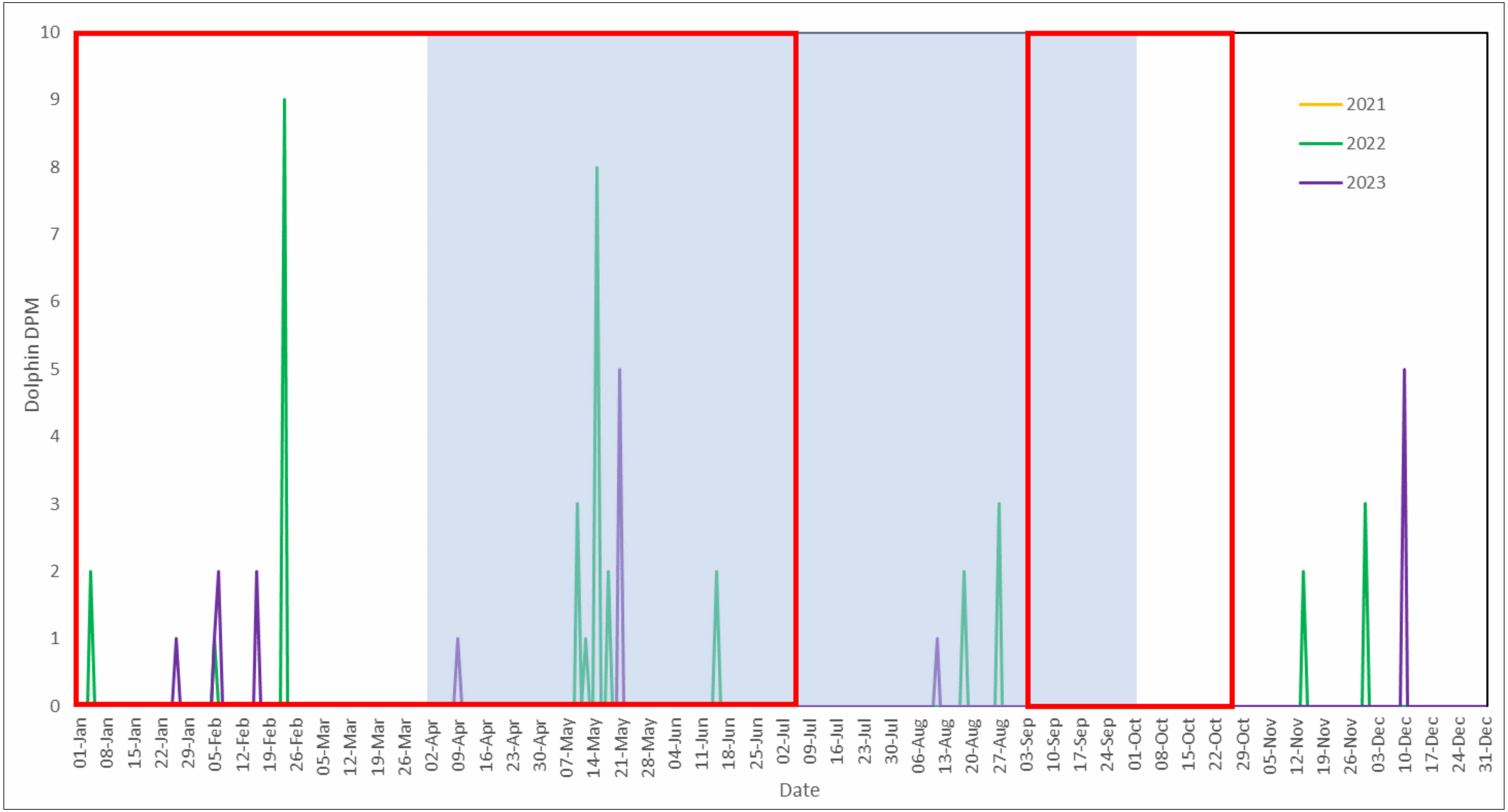


Figure 42. Total dolphin DPM for each day at Tai Mo To in 2021, 2022 and 2023 (from January 1st to December 31st for each year). The shaded box represents the wet season and the red outlined box represents dates for which data were not available for at least one of the years.

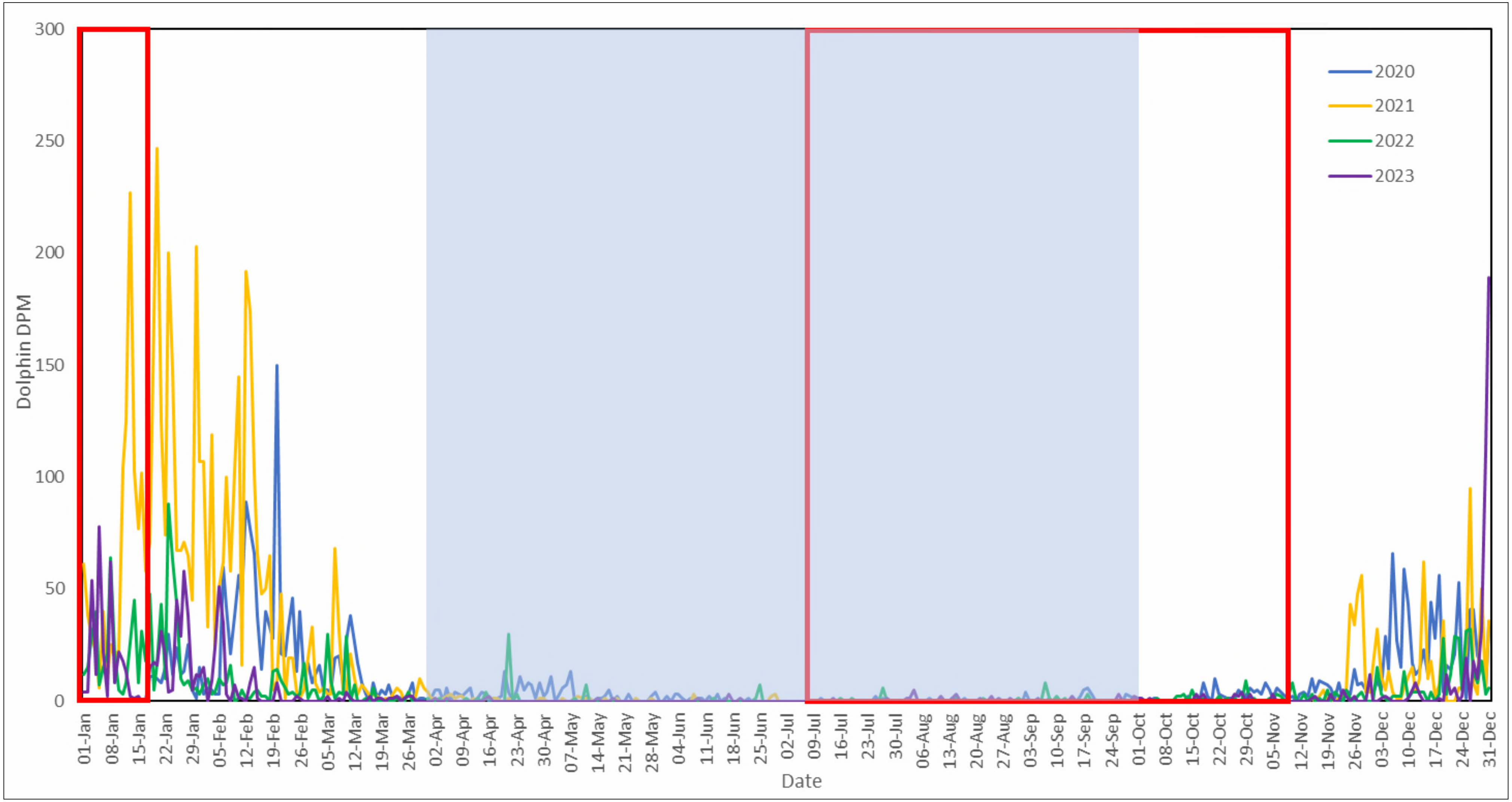


Figure 43. Total dolphin DPM for each day at Lung Kwu Chau N in 2020, 2021, 2022 and 2023 (from January 1st to December 31st for each year). The shaded box represents the wet season and the red outlined box represents dates for which data were not available for at least one of the years.

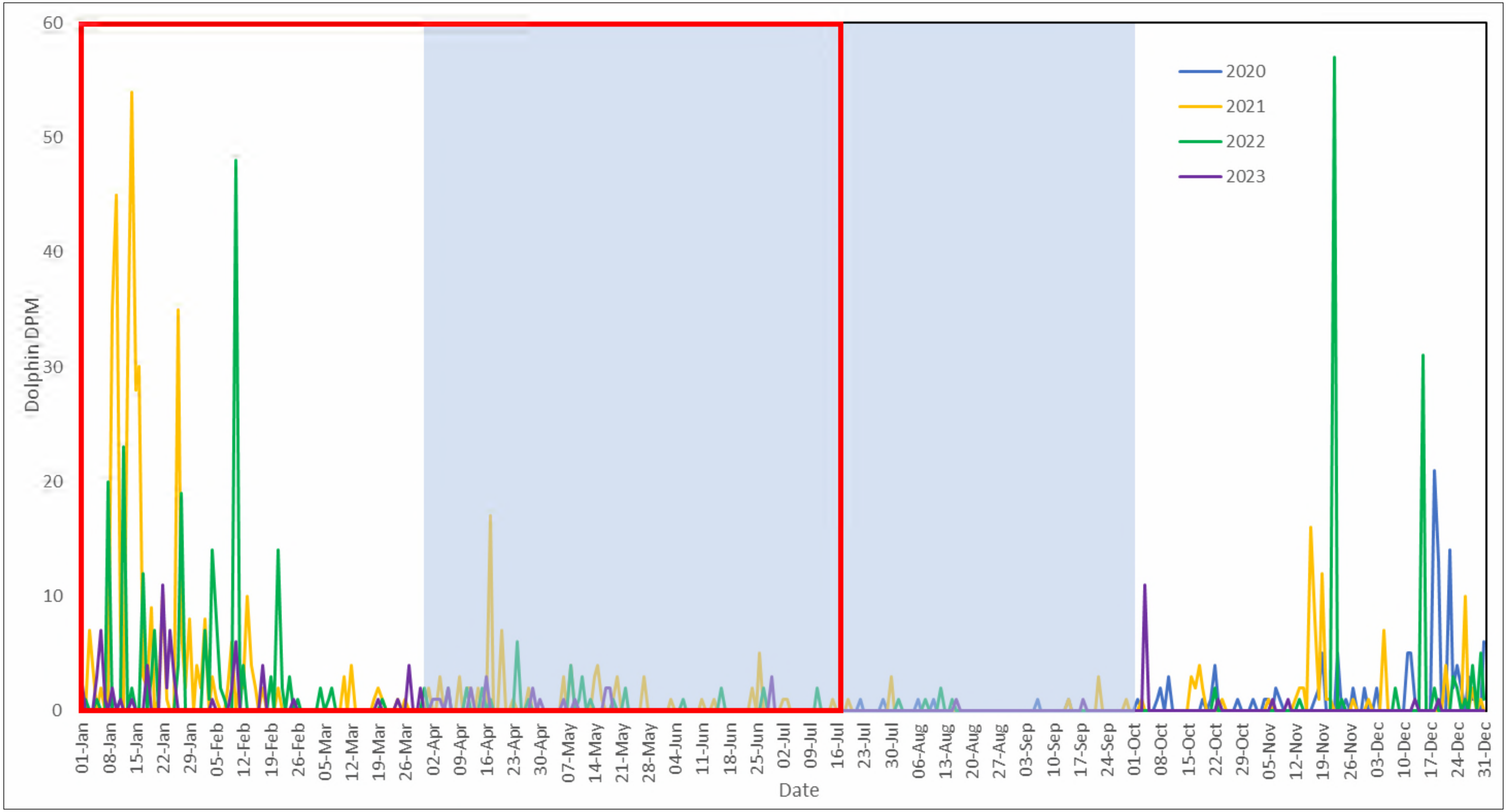


Figure 44. Total dolphin DPM for each day at Sha Chau SE in 2020, 2021, 2022 and 2023 (from January 1st to December 31st for each year). The shaded box represents the wet season and the red outlined box represents dates for which data were not available for at least one of the years.

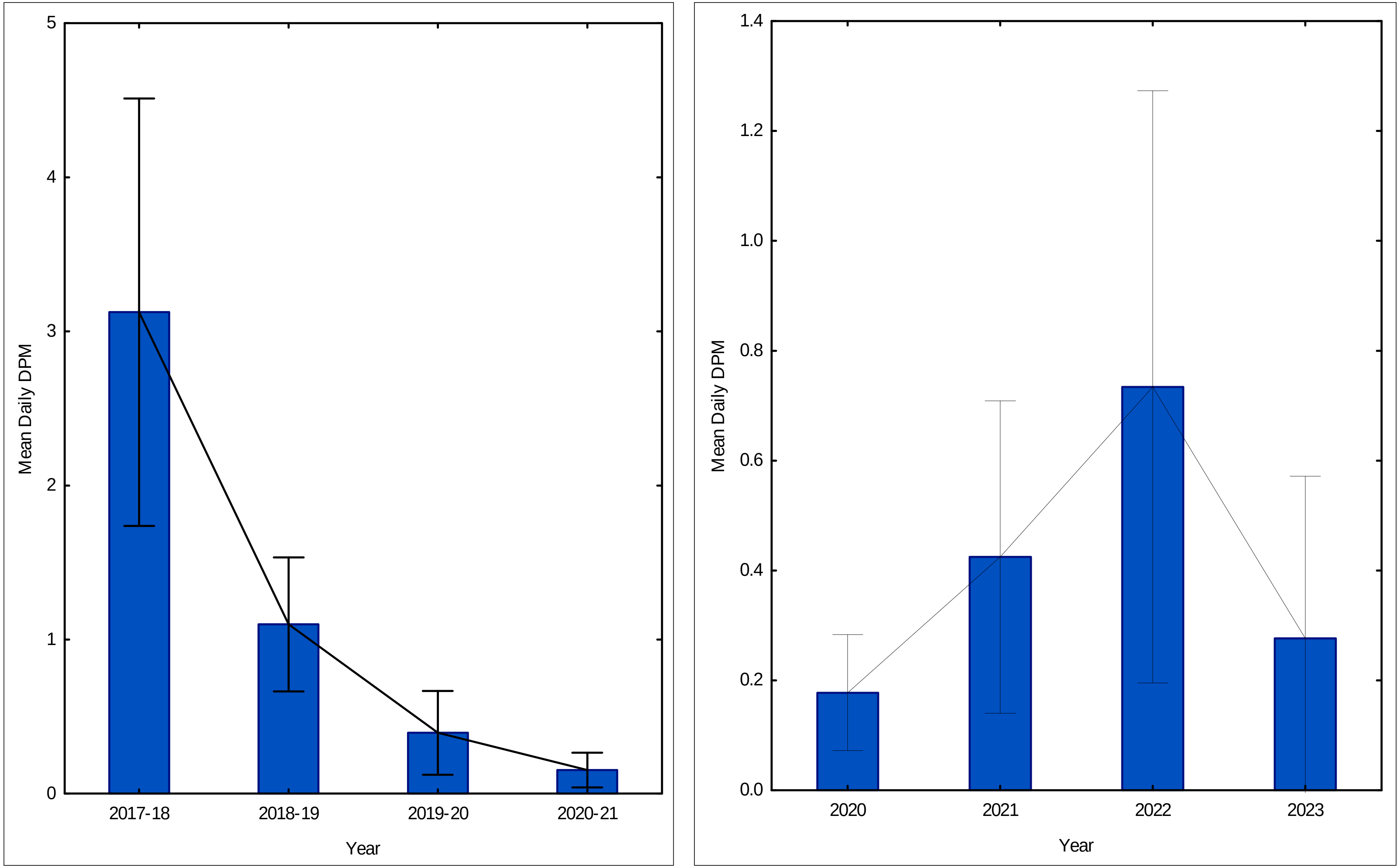


Figure 45. Dolphin mean daily DPMs at Siu Ho Wan as calculated for C-POD data (left) from 2017-18 to 2020-21 and F-POD data from 2020-2023 (right). Error bars represent 95% confidence intervals. Note: the y-axes scales are different.

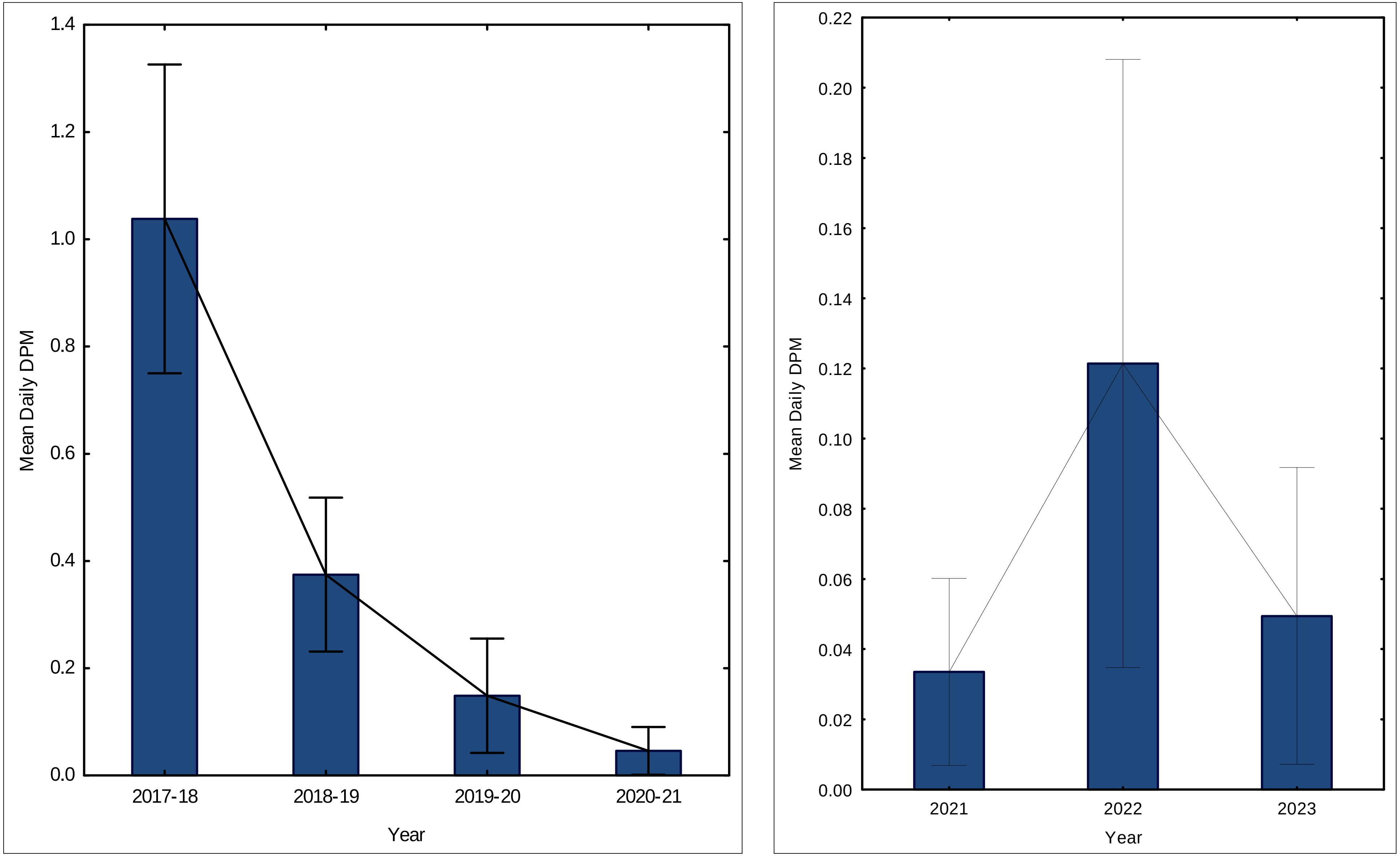


Figure 46. Dolphin mean daily DPMs at Tai Mo To as calculated for C-POD data (left) from 2017-18 to 2020-21 and F-POD data from 2021-2023 (right). Error bars represent 95% confidence intervals. Note: the y-axes scales are different.

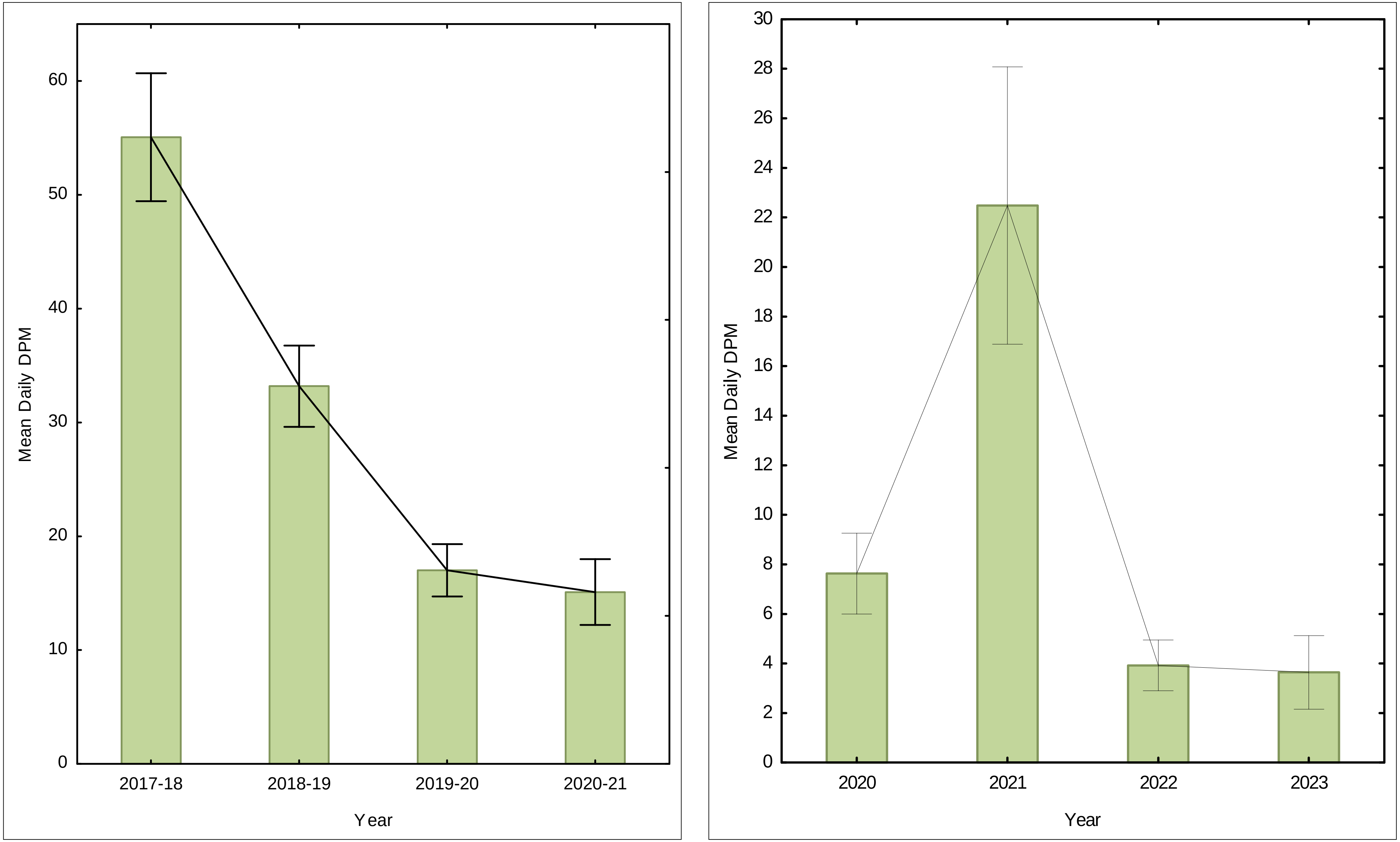


Figure 47. Dolphin mean daily DPMs at Lung Kwu Chau N as calculated for C-POD data (left) from 2017-18 to 2020-21 and F-POD data from 2020-2023 (right). Error bars represent 95% confidence intervals. Note: the y-axes scales are different.

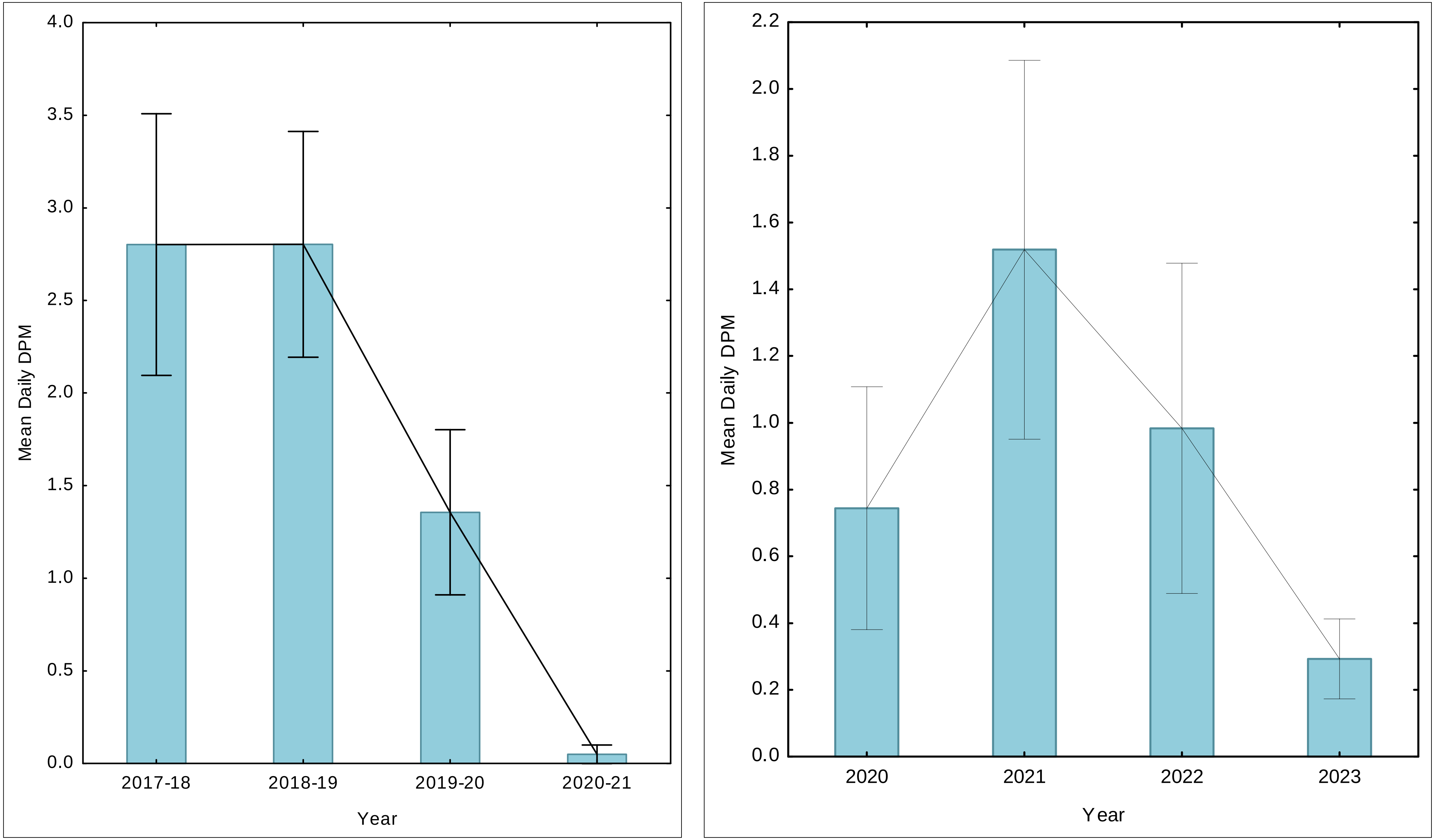


Figure 48. Dolphin mean daily DPMs at Sha Chau SE as calculated for C-POD data (left) from 2017-18 to 2020-21 and F-POD data from 2020-2023 (right). Error bars represent 95% confidence intervals. Note: the y-axes scales are different.

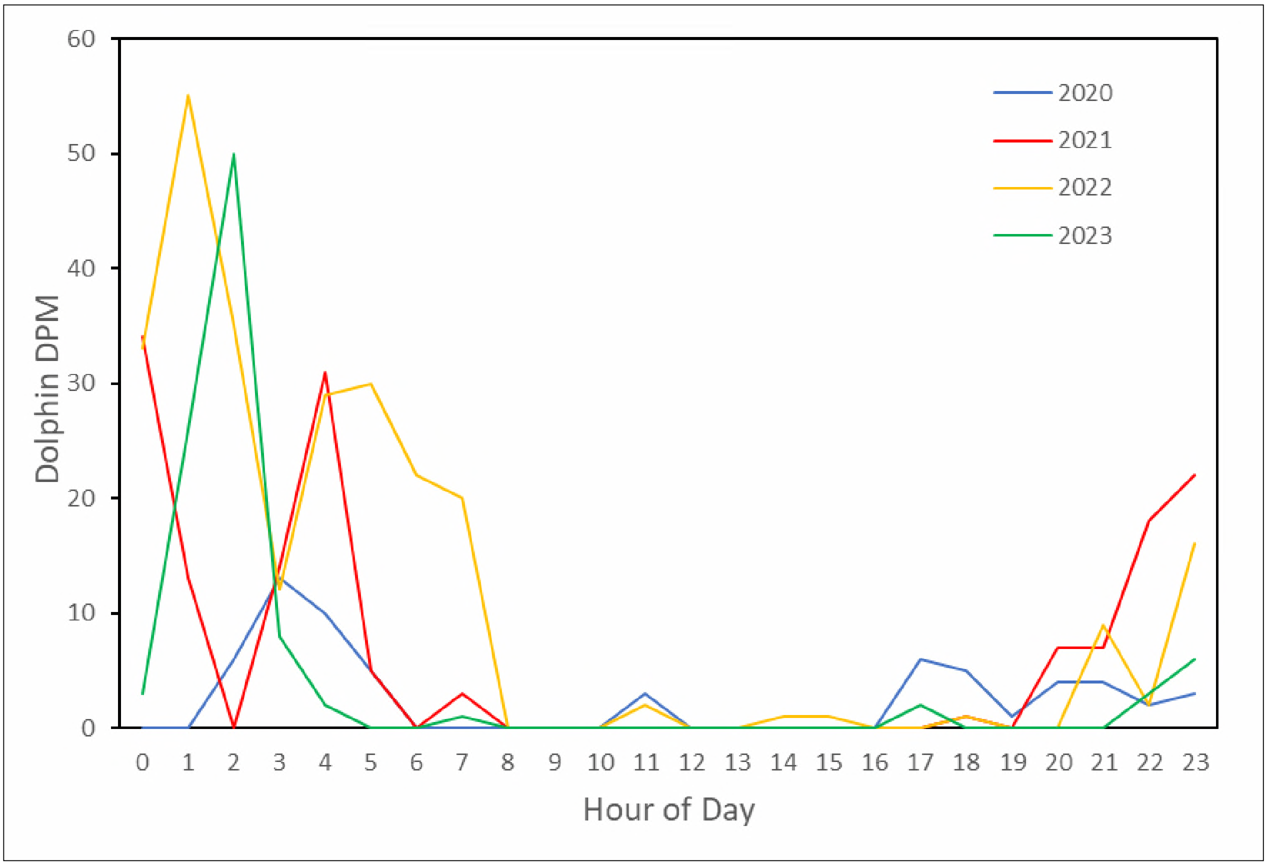


Figure 49a. Dolphin DPM for each hour of day at Siu Ho Wan (2020-23)

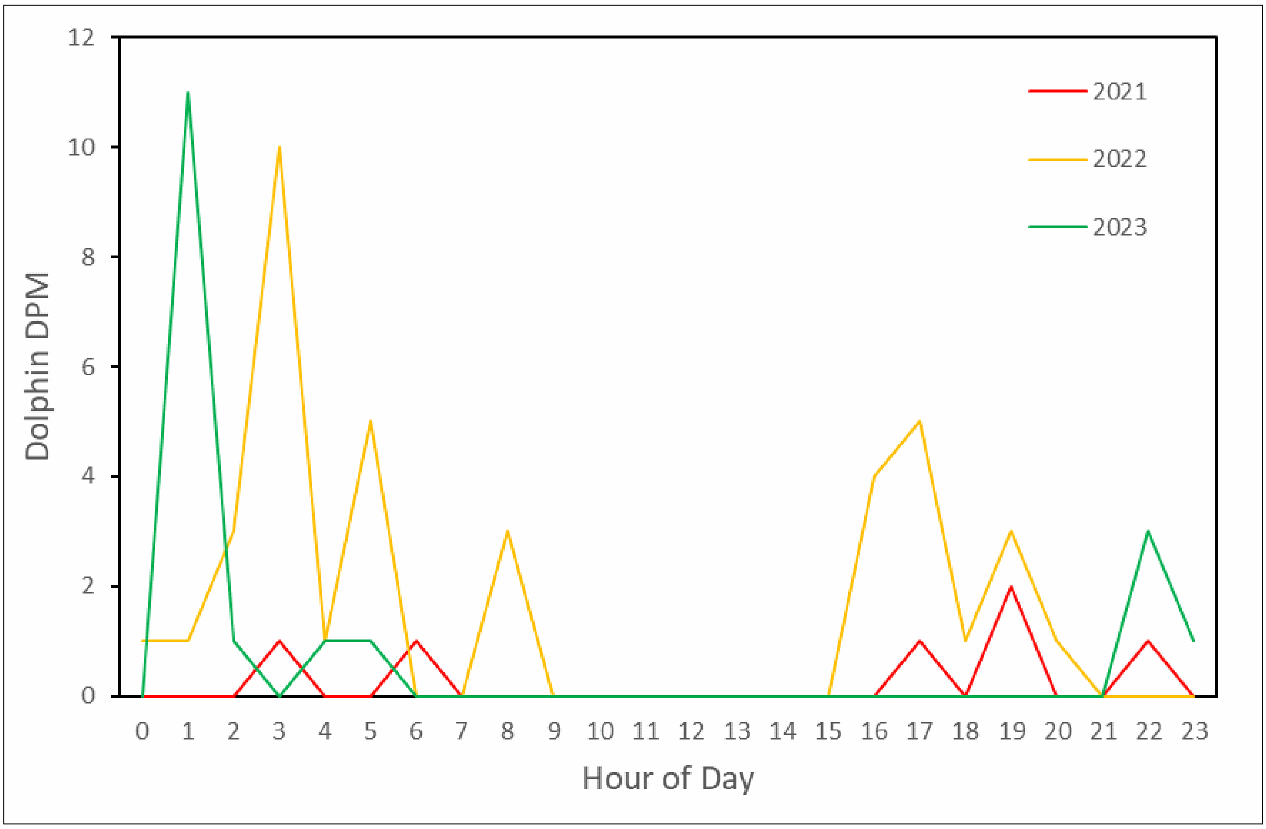


Figure 49b. Dolphin DPM for each hour of day at Tai Mo To (2021-23).

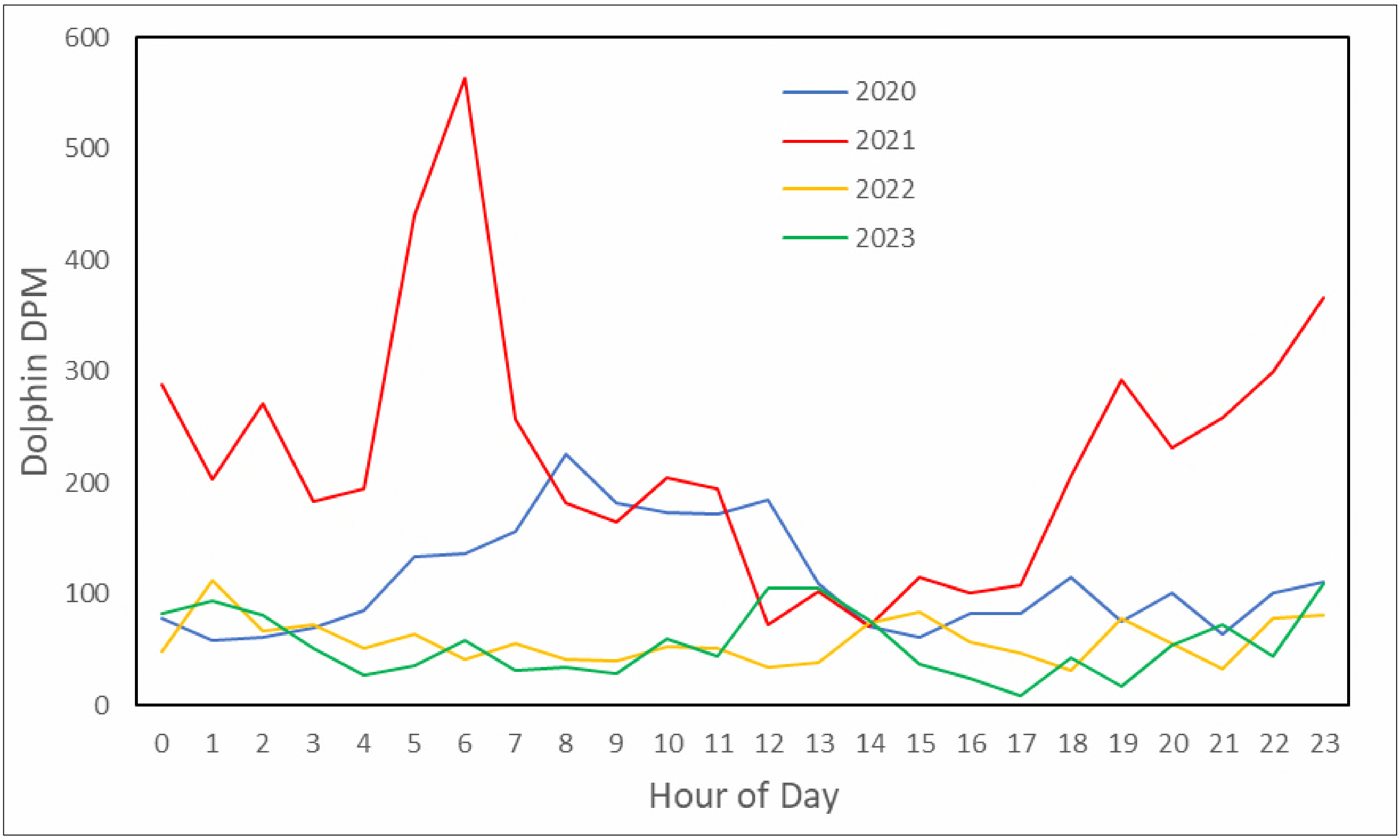


Figure 50a. Dolphin DPM for each hour of day at Lung Kwu Chau N (2020-23)

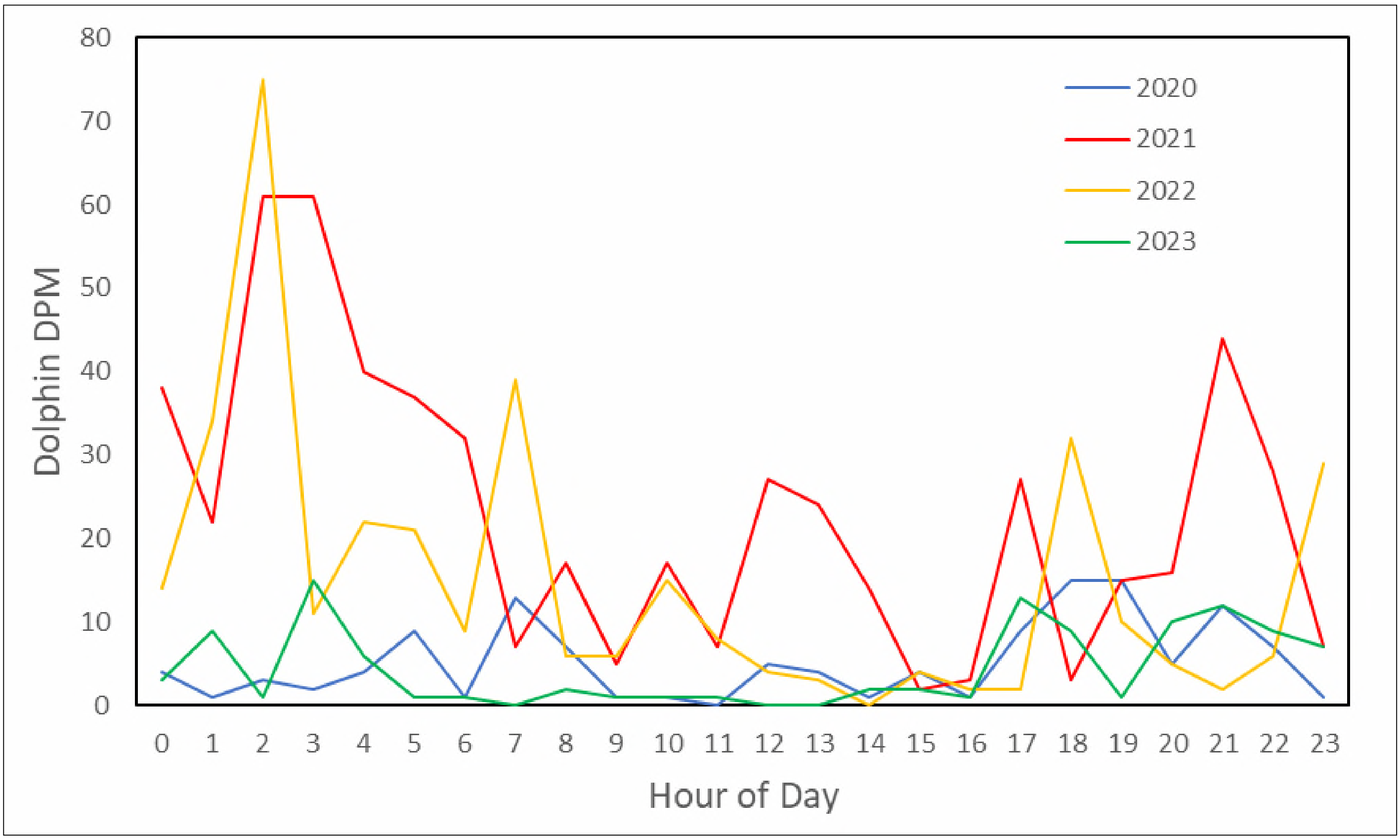


Figure 50b. Dolphin DPM for each hour of day at Sha Chau SE (2021-23).

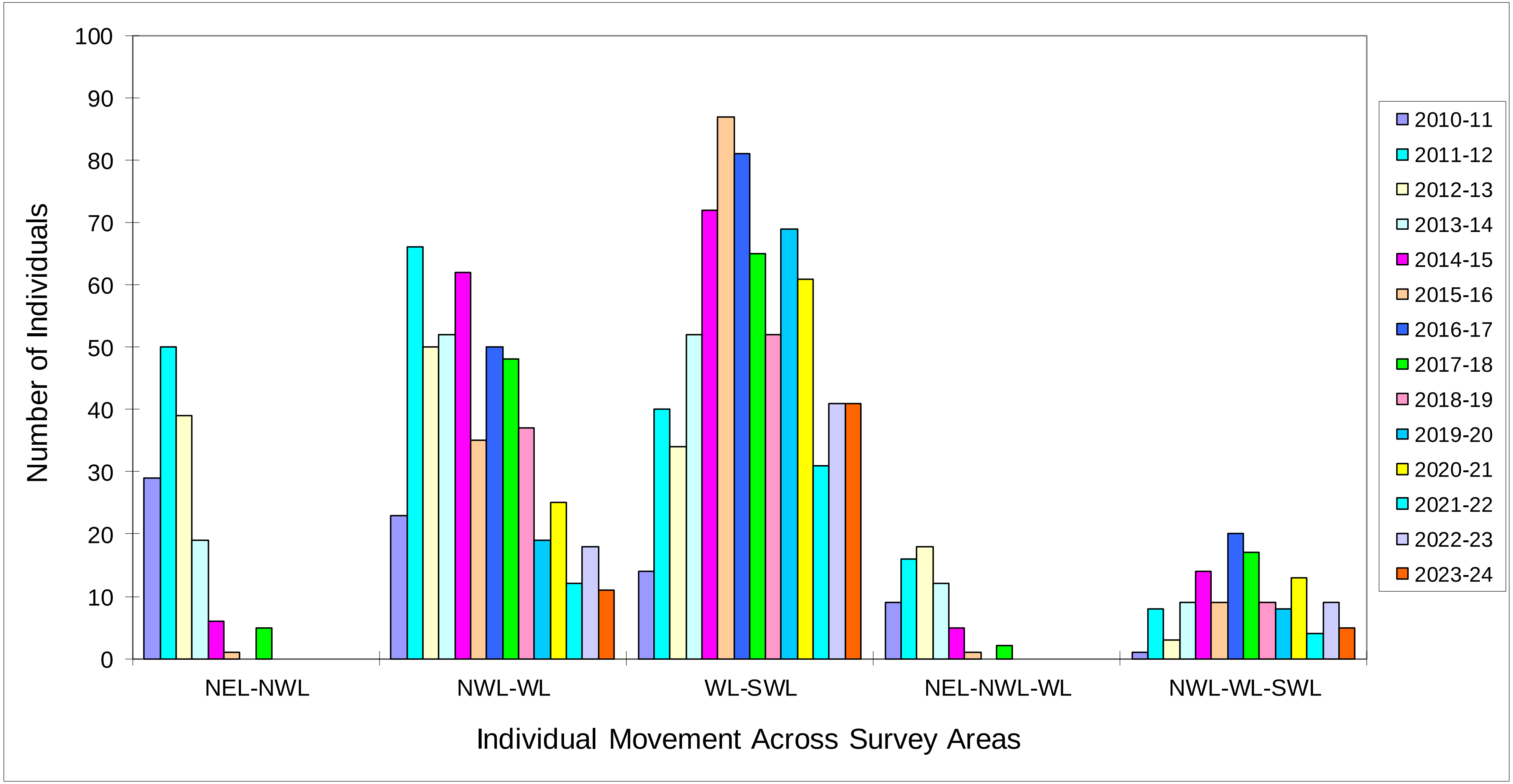


Figure 51. Temporal trends in number of individual dolphins involved in movements across different survey areas around Lantau in the past 14 monitoring periods

Appendix I. HKCRP-AFCD Survey Effort Database (April 2023 - March 2024)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
12-Apr-23	W LANTAU	2	9.28	SPRING	STANDARD138716	S
18-Apr-23	W LANTAU	3	12.65	SPRING	STANDARD138716	P
18-Apr-23	W LANTAU	3	11.72	SPRING	STANDARD138716	S
18-Apr-23	SW LANTAU	2	21.76	SPRING	STANDARD138716	P
18-Apr-23	SW LANTAU	3	3.55	SPRING	STANDARD138716	P
18-Apr-23	SW LANTAU	2	11.82	SPRING	STANDARD138716	S
18-Apr-23	SW LANTAU	3	2.06	SPRING	STANDARD138716	S
24-Apr-23	W LANTAU	2	9.95	SPRING	STANDARD138716	S
24-Apr-23	W LANTAU	3	1.01	SPRING	STANDARD138716	S
26-Apr-23	W LANTAU	3	8.77	SPRING	STANDARD138716	P
26-Apr-23	W LANTAU	2	2.15	SPRING	STANDARD138716	S
26-Apr-23	W LANTAU	3	7.03	SPRING	STANDARD138716	S
26-Apr-23	SW LANTAU	1	0.10	SPRING	STANDARD138716	P
26-Apr-23	SW LANTAU	2	14.00	SPRING	STANDARD138716	P
26-Apr-23	SW LANTAU	2	11.46	SPRING	STANDARD138716	S
27-Apr-23	W LANTAU	2	7.19	SPRING	STANDARD138716	P
27-Apr-23	W LANTAU	3	6.97	SPRING	STANDARD138716	P
27-Apr-23	W LANTAU	4	3.10	SPRING	STANDARD138716	P
27-Apr-23	W LANTAU	2	5.22	SPRING	STANDARD138716	S
27-Apr-23	W LANTAU	3	6.67	SPRING	STANDARD138716	S
27-Apr-23	SW LANTAU	3	7.60	SPRING	STANDARD138716	P
27-Apr-23	SW LANTAU	3	1.68	SPRING	STANDARD138716	S
04-May-23	SE LANTAU	2	26.80	SPRING	STANDARD25686	P
04-May-23	SE LANTAU	2	10.41	SPRING	STANDARD25686	S
04-May-23	SW LANTAU	2	8.21	SPRING	STANDARD25686	P
04-May-23	SW LANTAU	3	6.92	SPRING	STANDARD25686	P
04-May-23	SW LANTAU	2	6.25	SPRING	STANDARD25686	S
04-May-23	SW LANTAU	3	1.95	SPRING	STANDARD25686	S
05-May-23	DEEP BAY	2	3.87	SPRING	STANDARD25686	P
05-May-23	DEEP BAY	3	4.17	SPRING	STANDARD25686	P
05-May-23	DEEP BAY	2	6.76	SPRING	STANDARD25686	S
05-May-23	NE LANTAU	2	14.30	SPRING	STANDARD25686	P
05-May-23	NE LANTAU	3	9.68	SPRING	STANDARD25686	P
05-May-23	NE LANTAU	2	5.74	SPRING	STANDARD25686	S
05-May-23	NE LANTAU	3	2.90	SPRING	STANDARD25686	S
10-May-23	DEEP BAY	2	7.62	SPRING	STANDARD25686	P
10-May-23	DEEP BAY	2	6.38	SPRING	STANDARD25686	S
10-May-23	NE LANTAU	2	4.80	SPRING	STANDARD25686	P
10-May-23	NE LANTAU	3	28.28	SPRING	STANDARD25686	P
10-May-23	NE LANTAU	2	3.66	SPRING	STANDARD25686	S
10-May-23	NE LANTAU	3	6.16	SPRING	STANDARD25686	S
11-May-23	NW LANTAU	2	13.11	SPRING	STANDARD25686	P
11-May-23	NW LANTAU	3	16.57	SPRING	STANDARD25686	P
11-May-23	NW LANTAU	2	1.40	SPRING	STANDARD25686	S
11-May-23	NW LANTAU	3	13.22	SPRING	STANDARD25686	S
11-May-23	W LANTAU	2	9.66	SPRING	STANDARD25686	P
11-May-23	W LANTAU	3	3.20	SPRING	STANDARD25686	P
11-May-23	W LANTAU	2	7.27	SPRING	STANDARD25686	S
11-May-23	W LANTAU	3	1.90	SPRING	STANDARD25686	S
15-May-23	W LANTAU	2	9.30	SPRING	STANDARD25686	S
16-May-23	W LANTAU	2	5.38	SPRING	STANDARD25686	S
16-May-23	W LANTAU	3	4.26	SPRING	STANDARD25686	S
16-May-23	SW LANTAU	2	25.08	SPRING	STANDARD25686	P
16-May-23	SW LANTAU	2	8.61	SPRING	STANDARD25686	S
16-May-23	SW LANTAU	3	3.80	SPRING	STANDARD25686	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
16-May-23	SE LANTAU	2	26.02	SPRING	STANDARD25686	P
16-May-23	SE LANTAU	2	6.78	SPRING	STANDARD25686	S
17-May-23	SE LANTAU	2	12.45	SPRING	STANDARD36826	P
17-May-23	SE LANTAU	3	11.75	SPRING	STANDARD36826	P
17-May-23	SE LANTAU	2	7.07	SPRING	STANDARD36826	S
17-May-23	SE LANTAU	3	2.18	SPRING	STANDARD36826	S
17-May-23	SW LANTAU	2	15.99	SPRING	STANDARD36826	P
17-May-23	SW LANTAU	3	6.06	SPRING	STANDARD36826	P
17-May-23	SW LANTAU	2	7.51	SPRING	STANDARD36826	S
17-May-23	SW LANTAU	3	4.18	SPRING	STANDARD36826	S
23-May-23	W LANTAU	2	9.97	SPRING	STANDARD36826	S
23-May-23	W LANTAU	3	0.83	SPRING	STANDARD36826	S
24-May-23	NW LANTAU	3	24.24	SPRING	STANDARD36826	P
24-May-23	NW LANTAU	3	10.86	SPRING	STANDARD36826	S
24-May-23	DEEP BAY	2	6.45	SPRING	STANDARD36826	P
24-May-23	DEEP BAY	3	1.41	SPRING	STANDARD36826	P
24-May-23	DEEP BAY	2	6.64	SPRING	STANDARD36826	S
24-May-23	NE LANTAU	2	26.61	SPRING	STANDARD36826	P
24-May-23	NE LANTAU	3	8.05	SPRING	STANDARD36826	P
24-May-23	NE LANTAU	2	8.64	SPRING	STANDARD36826	S
24-May-23	NE LANTAU	3	3.10	SPRING	STANDARD36826	S
25-May-23	SE LANTAU	2	4.25	SPRING	STANDARD25686	P
25-May-23	SE LANTAU	3	12.21	SPRING	STANDARD25686	P
25-May-23	SE LANTAU	2	1.06	SPRING	STANDARD25686	S
25-May-23	SE LANTAU	3	5.58	SPRING	STANDARD25686	S
25-May-23	SW LANTAU	2	1.60	SPRING	STANDARD25686	P
25-May-23	SW LANTAU	3	30.79	SPRING	STANDARD25686	P
25-May-23	SW LANTAU	3	9.71	SPRING	STANDARD25686	S
31-May-23	SE LANTAU	2	5.69	SPRING	STANDARD25686	P
31-May-23	SE LANTAU	3	24.36	SPRING	STANDARD25686	P
31-May-23	SE LANTAU	2	2.90	SPRING	STANDARD25686	S
31-May-23	SE LANTAU	3	3.95	SPRING	STANDARD25686	S
31-May-23	SW LANTAU	2	20.58	SPRING	STANDARD25686	P
31-May-23	SW LANTAU	3	3.38	SPRING	STANDARD25686	P
31-May-23	SW LANTAU	2	8.94	SPRING	STANDARD25686	S
05-Jun-23	W LANTAU	3	7.47	SUMMER	STANDARD36826	P
05-Jun-23	W LANTAU	4	2.57	SUMMER	STANDARD36826	P
05-Jun-23	W LANTAU	3	8.70	SUMMER	STANDARD36826	S
05-Jun-23	W LANTAU	4	1.03	SUMMER	STANDARD36826	S
05-Jun-23	SW LANTAU	3	2.84	SUMMER	STANDARD36826	P
05-Jun-23	SW LANTAU	4	0.59	SUMMER	STANDARD36826	P
05-Jun-23	SW LANTAU	3	7.58	SUMMER	STANDARD36826	S
05-Jun-23	SW LANTAU	4	1.55	SUMMER	STANDARD36826	S
08-Jun-23	W LANTAU	2	6.94	SUMMER	STANDARD25686	S
08-Jun-23	W LANTAU	3	3.31	SUMMER	STANDARD25686	S
12-Jun-23	NW LANTAU	2	20.37	SUMMER	STANDARD25686	P
12-Jun-23	NW LANTAU	3	8.00	SUMMER	STANDARD25686	P
12-Jun-23	NW LANTAU	2	10.63	SUMMER	STANDARD25686	S
12-Jun-23	W LANTAU	2	3.61	SUMMER	STANDARD25686	P
12-Jun-23	W LANTAU	3	4.70	SUMMER	STANDARD25686	P
12-Jun-23	W LANTAU	2	6.43	SUMMER	STANDARD25686	S
12-Jun-23	W LANTAU	3	2.48	SUMMER	STANDARD25686	S
13-Jun-23	W LANTAU	2	8.10	SUMMER	STANDARD36826	P
13-Jun-23	W LANTAU	3	1.71	SUMMER	STANDARD36826	P
13-Jun-23	W LANTAU	2	8.65	SUMMER	STANDARD36826	S
13-Jun-23	SW LANTAU	2	11.11	SUMMER	STANDARD36826	P
13-Jun-23	SW LANTAU	3	5.71	SUMMER	STANDARD36826	P
13-Jun-23	SW LANTAU	2	9.29	SUMMER	STANDARD36826	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
13-Jun-23	SW LANTAU	3	4.57	SUMMER	STANDARD36826	S
13-Jun-23	SE LANTAU	2	4.37	SUMMER	STANDARD36826	P
13-Jun-23	SE LANTAU	3	1.84	SUMMER	STANDARD36826	P
13-Jun-23	SE LANTAU	2	3.84	SUMMER	STANDARD36826	S
13-Jun-23	SE LANTAU	3	0.65	SUMMER	STANDARD36826	S
20-Jun-23	W LANTAU	3	9.13	SUMMER	STANDARD36826	P
20-Jun-23	W LANTAU	4	0.20	SUMMER	STANDARD36826	P
20-Jun-23	W LANTAU	3	11.03	SUMMER	STANDARD36826	S
20-Jun-23	W LANTAU	4	0.54	SUMMER	STANDARD36826	S
20-Jun-23	SW LANTAU	2	2.10	SUMMER	STANDARD36826	P
20-Jun-23	SW LANTAU	3	8.50	SUMMER	STANDARD36826	P
20-Jun-23	SW LANTAU	3	4.38	SUMMER	STANDARD36826	S
27-Jun-23	W LANTAU	2	9.78	SUMMER	STANDARD25686	S
04-Jul-23	NW LANTAU	2	29.37	SUMMER	STANDARD36826	P
04-Jul-23	NW LANTAU	3	7.90	SUMMER	STANDARD36826	P
04-Jul-23	NW LANTAU	4	0.70	SUMMER	STANDARD36826	P
04-Jul-23	NW LANTAU	2	8.22	SUMMER	STANDARD36826	S
04-Jul-23	NW LANTAU	3	6.31	SUMMER	STANDARD36826	S
04-Jul-23	DEEP BAY	2	2.22	SUMMER	STANDARD36826	P
04-Jul-23	DEEP BAY	3	5.92	SUMMER	STANDARD36826	P
04-Jul-23	DEEP BAY	3	7.05	SUMMER	STANDARD36826	S
04-Jul-23	NE LANTAU	2	6.38	SUMMER	STANDARD36826	P
04-Jul-23	NE LANTAU	2	5.92	SUMMER	STANDARD36826	S
06-Jul-23	W LANTAU	2	2.95	SUMMER	STANDARD25686	S
06-Jul-23	W LANTAU	3	7.95	SUMMER	STANDARD25686	S
07-Jul-23	W LANTAU	3	10.30	SUMMER	STANDARD25686	S
07-Jul-23	SW LANTAU	2	5.85	SUMMER	STANDARD25686	P
07-Jul-23	SW LANTAU	2	7.16	SUMMER	STANDARD25686	S
07-Jul-23	SW LANTAU	3	2.19	SUMMER	STANDARD25686	S
07-Jul-23	SE LANTAU	2	4.21	SUMMER	STANDARD25686	P
07-Jul-23	SE LANTAU	3	11.60	SUMMER	STANDARD25686	P
07-Jul-23	SE LANTAU	2	2.30	SUMMER	STANDARD25686	S
07-Jul-23	SE LANTAU	3	5.59	SUMMER	STANDARD25686	S
20-Jul-23	W LANTAU	2	7.60	SUMMER	STANDARD138716	S
20-Jul-23	W LANTAU	3	2.08	SUMMER	STANDARD138716	S
25-Jul-23	W LANTAU	1	2.59	SUMMER	STANDARD36826	S
25-Jul-23	W LANTAU	2	6.62	SUMMER	STANDARD36826	S
25-Jul-23	SW LANTAU	2	4.46	SUMMER	STANDARD36826	P
25-Jul-23	SW LANTAU	3	3.80	SUMMER	STANDARD36826	P
25-Jul-23	SW LANTAU	2	8.90	SUMMER	STANDARD36826	S
25-Jul-23	SE LANTAU	3	7.90	SUMMER	STANDARD36826	P
25-Jul-23	SE LANTAU	3	7.30	SUMMER	STANDARD36826	S
31-Jul-23	SE LANTAU	2	10.04	SUMMER	STANDARD25686	P
31-Jul-23	SE LANTAU	3	20.14	SUMMER	STANDARD25686	P
31-Jul-23	SE LANTAU	2	2.70	SUMMER	STANDARD25686	S
31-Jul-23	SE LANTAU	3	3.92	SUMMER	STANDARD25686	S
31-Jul-23	SW LANTAU	2	1.40	SUMMER	STANDARD25686	P
31-Jul-23	SW LANTAU	3	15.01	SUMMER	STANDARD25686	P
31-Jul-23	SW LANTAU	4	5.84	SUMMER	STANDARD25686	P
31-Jul-23	SW LANTAU	2	0.73	SUMMER	STANDARD25686	S
31-Jul-23	SW LANTAU	3	5.79	SUMMER	STANDARD25686	S
31-Jul-23	SW LANTAU	4	6.43	SUMMER	STANDARD25686	S
01-Aug-23	W LANTAU	2	0.96	SUMMER	STANDARD25686	S
01-Aug-23	W LANTAU	3	9.05	SUMMER	STANDARD25686	S
08-Aug-23	W LANTAU	2	19.44	SUMMER	STANDARD36826	P
08-Aug-23	W LANTAU	3	1.59	SUMMER	STANDARD36826	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
08-Aug-23	W LANTAU	2	9.15	SUMMER	STANDARD36826	S
08-Aug-23	W LANTAU	3	2.49	SUMMER	STANDARD36826	S
08-Aug-23	SW LANTAU	2	6.92	SUMMER	STANDARD36826	P
08-Aug-23	SW LANTAU	3	10.52	SUMMER	STANDARD36826	P
08-Aug-23	SW LANTAU	2	7.26	SUMMER	STANDARD36826	S
08-Aug-23	SW LANTAU	3	5.80	SUMMER	STANDARD36826	S
08-Aug-23	SW LANTAU	4	1.00	SUMMER	STANDARD36826	S
09-Aug-23	W LANTAU	2	10.21	SUMMER	STANDARD25686	S
11-Aug-23	DEEP BAY	2	8.68	SUMMER	STANDARD25686	P
11-Aug-23	DEEP BAY	2	6.92	SUMMER	STANDARD25686	S
11-Aug-23	NE LANTAU	1	3.60	SUMMER	STANDARD25686	P
11-Aug-23	NE LANTAU	2	22.54	SUMMER	STANDARD25686	P
11-Aug-23	NE LANTAU	3	0.90	SUMMER	STANDARD25686	P
11-Aug-23	NE LANTAU	1	1.00	SUMMER	STANDARD25686	S
11-Aug-23	NE LANTAU	2	6.86	SUMMER	STANDARD25686	S
11-Aug-23	NE LANTAU	3	2.30	SUMMER	STANDARD25686	S
15-Aug-23	SE LANTAU	1	10.53	SUMMER	STANDARD36826	P
15-Aug-23	SE LANTAU	2	9.67	SUMMER	STANDARD36826	P
15-Aug-23	SE LANTAU	3	5.50	SUMMER	STANDARD36826	P
15-Aug-23	SE LANTAU	1	1.60	SUMMER	STANDARD36826	S
15-Aug-23	SE LANTAU	2	8.80	SUMMER	STANDARD36826	S
15-Aug-23	SW LANTAU	2	18.14	SUMMER	STANDARD36826	P
15-Aug-23	SW LANTAU	3	0.77	SUMMER	STANDARD36826	P
15-Aug-23	SW LANTAU	2	6.20	SUMMER	STANDARD36826	S
16-Aug-23	W LANTAU	2	2.55	SUMMER	STANDARD25686	S
16-Aug-23	W LANTAU	3	6.70	SUMMER	STANDARD25686	S
16-Aug-23	SW LANTAU	2	16.72	SUMMER	STANDARD25686	P
16-Aug-23	SW LANTAU	3	4.42	SUMMER	STANDARD25686	P
16-Aug-23	SW LANTAU	2	4.90	SUMMER	STANDARD25686	S
16-Aug-23	SW LANTAU	3	6.42	SUMMER	STANDARD25686	S
24-Aug-23	W LANTAU	2	13.99	SUMMER	STANDARD25686	P
24-Aug-23	W LANTAU	2	8.33	SUMMER	STANDARD25686	S
24-Aug-23	W LANTAU	3	2.68	SUMMER	STANDARD25686	S
28-Aug-23	SE LANTAU	1	14.86	SUMMER	STANDARD36826	P
28-Aug-23	SE LANTAU	2	21.70	SUMMER	STANDARD36826	P
28-Aug-23	SE LANTAU	1	0.92	SUMMER	STANDARD36826	S
28-Aug-23	SE LANTAU	2	6.68	SUMMER	STANDARD36826	S
28-Aug-23	SW LANTAU	2	15.53	SUMMER	STANDARD36826	P
28-Aug-23	SW LANTAU	2	6.68	SUMMER	STANDARD36826	S
29-Aug-23	W LANTAU	2	18.35	SUMMER	STANDARD36826	P
29-Aug-23	W LANTAU	2	10.68	SUMMER	STANDARD36826	S
29-Aug-23	SW LANTAU	1	14.16	SUMMER	STANDARD36826	P
29-Aug-23	SW LANTAU	2	6.52	SUMMER	STANDARD36826	P
29-Aug-23	SW LANTAU	1	2.23	SUMMER	STANDARD36826	S
29-Aug-23	SW LANTAU	2	6.61	SUMMER	STANDARD36826	S
30-Aug-23	NW LANTAU	2	14.69	SUMMER	STANDARD25686	P
30-Aug-23	NW LANTAU	3	10.90	SUMMER	STANDARD25686	P
30-Aug-23	NW LANTAU	2	4.74	SUMMER	STANDARD25686	S
30-Aug-23	NW LANTAU	3	6.47	SUMMER	STANDARD25686	S
30-Aug-23	W LANTAU	3	15.80	SUMMER	STANDARD25686	P
30-Aug-23	W LANTAU	3	8.96	SUMMER	STANDARD25686	S
04-Sep-23	W LANTAU	2	4.54	AUTUMN	STANDARD25686	S
04-Sep-23	W LANTAU	3	5.25	AUTUMN	STANDARD25686	S
11-Sep-23	NE LANTAU	2	9.12	AUTUMN	STANDARD25686	P
11-Sep-23	NE LANTAU	3	7.31	AUTUMN	STANDARD25686	P
11-Sep-23	NE LANTAU	2	5.40	AUTUMN	STANDARD25686	S
11-Sep-23	NE LANTAU	3	4.67	AUTUMN	STANDARD25686	S
19-Sep-23	W LANTAU	1	0.83	AUTUMN	STANDARD36826	P
19-Sep-23	W LANTAU	2	5.04	AUTUMN	STANDARD36826	P
19-Sep-23	W LANTAU	3	6.56	AUTUMN	STANDARD36826	P
19-Sep-23	W LANTAU	1	1.61	AUTUMN	STANDARD36826	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
19-Sep-23	W LANTAU	2	2.39	AUTUMN	STANDARD36826	S
19-Sep-23	W LANTAU	3	5.32	AUTUMN	STANDARD36826	S
20-Sep-23	W LANTAU	1	6.52	AUTUMN	STANDARD140232	S
20-Sep-23	W LANTAU	2	4.82	AUTUMN	STANDARD140232	S
21-Sep-23	W LANTAU	1	4.90	AUTUMN	STANDARD36826	S
21-Sep-23	W LANTAU	2	4.70	AUTUMN	STANDARD36826	S
21-Sep-23	SW LANTAU	2	23.32	AUTUMN	STANDARD36826	P
21-Sep-23	SW LANTAU	3	4.70	AUTUMN	STANDARD36826	P
21-Sep-23	SW LANTAU	2	12.49	AUTUMN	STANDARD36826	S
21-Sep-23	SE LANTAU	2	13.01	AUTUMN	STANDARD36826	P
21-Sep-23	SE LANTAU	2	2.69	AUTUMN	STANDARD36826	S
27-Sep-23	NW LANTAU	2	17.46	AUTUMN	STANDARD25686	P
27-Sep-23	NW LANTAU	3	5.48	AUTUMN	STANDARD25686	P
27-Sep-23	NW LANTAU	2	10.16	AUTUMN	STANDARD25686	S
27-Sep-23	W LANTAU	2	7.67	AUTUMN	STANDARD25686	P
27-Sep-23	W LANTAU	3	4.47	AUTUMN	STANDARD25686	P
27-Sep-23	W LANTAU	4	1.68	AUTUMN	STANDARD25686	P
27-Sep-23	W LANTAU	2	3.36	AUTUMN	STANDARD25686	S
27-Sep-23	W LANTAU	3	3.52	AUTUMN	STANDARD25686	S
27-Sep-23	W LANTAU	4	3.57	AUTUMN	STANDARD25686	S
10-Oct-23	NW LANTAU	2	20.75	AUTUMN	STANDARD36826	P
10-Oct-23	NW LANTAU	3	14.11	AUTUMN	STANDARD36826	P
10-Oct-23	NW LANTAU	2	10.57	AUTUMN	STANDARD36826	S
10-Oct-23	NW LANTAU	3	1.47	AUTUMN	STANDARD36826	S
10-Oct-23	DEEP BAY	2	7.96	AUTUMN	STANDARD36826	P
10-Oct-23	DEEP BAY	2	6.84	AUTUMN	STANDARD36826	S
10-Oct-23	NE LANTAU	2	16.46	AUTUMN	STANDARD36826	P
10-Oct-23	NE LANTAU	2	9.74	AUTUMN	STANDARD36826	S
12-Oct-23	W LANTAU	2	9.51	AUTUMN	STANDARD25686	S
19-Oct-23	W LANTAU	2	5.96	AUTUMN	STANDARD25686	P
19-Oct-23	W LANTAU	3	11.67	AUTUMN	STANDARD25686	P
19-Oct-23	W LANTAU	2	4.32	AUTUMN	STANDARD25686	S
19-Oct-23	W LANTAU	3	6.65	AUTUMN	STANDARD25686	S
20-Oct-23	W LANTAU	2	7.02	AUTUMN	STANDARD25686	S
20-Oct-23	W LANTAU	3	3.88	AUTUMN	STANDARD25686	S
25-Oct-23	W LANTAU	2	10.28	AUTUMN	STANDARD25686	S
25-Oct-23	SW LANTAU	2	0.70	AUTUMN	STANDARD25686	P
25-Oct-23	SW LANTAU	3	14.33	AUTUMN	STANDARD25686	P
25-Oct-23	SW LANTAU	2	1.90	AUTUMN	STANDARD25686	S
25-Oct-23	SW LANTAU	3	9.97	AUTUMN	STANDARD25686	S
02-Nov-23	W LANTAU	2	8.62	AUTUMN	STANDARD25686	P
02-Nov-23	W LANTAU	3	2.33	AUTUMN	STANDARD25686	P
02-Nov-23	W LANTAU	2	8.20	AUTUMN	STANDARD25686	S
02-Nov-23	W LANTAU	3	3.89	AUTUMN	STANDARD25686	S
02-Nov-23	SW LANTAU	3	12.60	AUTUMN	STANDARD25686	P
02-Nov-23	SW LANTAU	4	4.78	AUTUMN	STANDARD25686	P
02-Nov-23	SW LANTAU	3	5.62	AUTUMN	STANDARD25686	S
02-Nov-23	SW LANTAU	4	2.10	AUTUMN	STANDARD25686	S
03-Nov-23	SE LANTAU	2	8.02	AUTUMN	STANDARD25686	P
03-Nov-23	SE LANTAU	3	21.25	AUTUMN	STANDARD25686	P
03-Nov-23	SE LANTAU	4	4.84	AUTUMN	STANDARD25686	P
03-Nov-23	SE LANTAU	2	3.70	AUTUMN	STANDARD25686	S
03-Nov-23	SE LANTAU	3	2.00	AUTUMN	STANDARD25686	S
03-Nov-23	SE LANTAU	4	2.99	AUTUMN	STANDARD25686	S
03-Nov-23	SW LANTAU	2	4.00	AUTUMN	STANDARD25686	P
03-Nov-23	SW LANTAU	3	13.35	AUTUMN	STANDARD25686	P
03-Nov-23	SW LANTAU	4	2.02	AUTUMN	STANDARD25686	P
03-Nov-23	SW LANTAU	2	4.60	AUTUMN	STANDARD25686	S
03-Nov-23	SW LANTAU	3	6.13	AUTUMN	STANDARD25686	S
13-Nov-23	W LANTAU	3	0.71	AUTUMN	STANDARD25686	P
13-Nov-23	W LANTAU	4	3.98	AUTUMN	STANDARD25686	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
13-Nov-23	W LANTAU	5	1.22	AUTUMN	STANDARD25686	P
13-Nov-23	W LANTAU	3	2.14	AUTUMN	STANDARD25686	S
13-Nov-23	W LANTAU	4	2.75	AUTUMN	STANDARD25686	S
13-Nov-23	W LANTAU	5	3.99	AUTUMN	STANDARD25686	S
14-Nov-23	SW LANTAU	2	24.05	AUTUMN	STANDARD36826	P
14-Nov-23	SW LANTAU	3	1.60	AUTUMN	STANDARD36826	P
14-Nov-23	SW LANTAU	2	10.25	AUTUMN	STANDARD36826	S
14-Nov-23	SE LANTAU	2	26.42	AUTUMN	STANDARD36826	P
14-Nov-23	SE LANTAU	3	4.00	AUTUMN	STANDARD36826	P
14-Nov-23	SE LANTAU	2	7.40	AUTUMN	STANDARD36826	S
14-Nov-23	SE LANTAU	3	1.98	AUTUMN	STANDARD36826	S
15-Nov-23	W LANTAU	2	2.62	AUTUMN	STANDARD25686	P
15-Nov-23	W LANTAU	3	8.96	AUTUMN	STANDARD25686	P
15-Nov-23	W LANTAU	2	2.56	AUTUMN	STANDARD25686	S
15-Nov-23	W LANTAU	3	8.34	AUTUMN	STANDARD25686	S
15-Nov-23	SW LANTAU	2	2.16	AUTUMN	STANDARD25686	P
15-Nov-23	SW LANTAU	3	28.37	AUTUMN	STANDARD25686	P
15-Nov-23	SW LANTAU	4	0.88	AUTUMN	STANDARD25686	P
15-Nov-23	SW LANTAU	2	1.30	AUTUMN	STANDARD25686	S
15-Nov-23	SW LANTAU	3	7.02	AUTUMN	STANDARD25686	S
15-Nov-23	SW LANTAU	4	0.94	AUTUMN	STANDARD25686	S
20-Nov-23	DEEP BAY	2	5.61	AUTUMN	STANDARD25686	P
20-Nov-23	DEEP BAY	3	3.47	AUTUMN	STANDARD25686	P
20-Nov-23	DEEP BAY	2	6.32	AUTUMN	STANDARD25686	S
20-Nov-23	NE LANTAU	2	10.28	AUTUMN	STANDARD25686	P
20-Nov-23	NE LANTAU	2	9.22	AUTUMN	STANDARD25686	S
22-Nov-23	W LANTAU	2	7.26	AUTUMN	STANDARD25686	S
22-Nov-23	SW LANTAU	2	9.16	AUTUMN	STANDARD25686	P
22-Nov-23	SW LANTAU	3	10.32	AUTUMN	STANDARD25686	P
22-Nov-23	SW LANTAU	4	0.40	AUTUMN	STANDARD25686	P
22-Nov-23	SW LANTAU	2	7.64	AUTUMN	STANDARD25686	S
22-Nov-23	SW LANTAU	3	4.60	AUTUMN	STANDARD25686	S
22-Nov-23	SW LANTAU	4	0.50	AUTUMN	STANDARD25686	S
22-Nov-23	SE LANTAU	2	9.06	AUTUMN	STANDARD25686	P
22-Nov-23	SE LANTAU	3	7.23	AUTUMN	STANDARD25686	P
22-Nov-23	SE LANTAU	2	3.91	AUTUMN	STANDARD25686	S
22-Nov-23	SE LANTAU	3	5.30	AUTUMN	STANDARD25686	S
23-Nov-23	SE LANTAU	2	30.35	AUTUMN	STANDARD25686	P
23-Nov-23	SE LANTAU	2	7.11	AUTUMN	STANDARD25686	S
23-Nov-23	SW LANTAU	2	25.69	AUTUMN	STANDARD25686	P
23-Nov-23	SW LANTAU	2	8.51	AUTUMN	STANDARD25686	S
29-Nov-23	W LANTAU	2	9.91	AUTUMN	STANDARD25686	P
29-Nov-23	W LANTAU	3	9.03	AUTUMN	STANDARD25686	P
29-Nov-23	W LANTAU	2	12.97	AUTUMN	STANDARD25686	S
29-Nov-23	W LANTAU	3	7.20	AUTUMN	STANDARD25686	S
29-Nov-23	NW LANTAU	2	21.33	AUTUMN	STANDARD25686	P
29-Nov-23	NW LANTAU	3	1.70	AUTUMN	STANDARD25686	P
29-Nov-23	NW LANTAU	2	10.67	AUTUMN	STANDARD25686	S
05-Dec-23	SW LANTAU	2	13.35	WINTER	STANDARD25686	P
05-Dec-23	SW LANTAU	3	6.28	WINTER	STANDARD25686	P
05-Dec-23	SW LANTAU	2	6.74	WINTER	STANDARD25686	S
05-Dec-23	SW LANTAU	3	1.28	WINTER	STANDARD25686	S
05-Dec-23	SE LANTAU	2	17.57	WINTER	STANDARD25686	P
05-Dec-23	SE LANTAU	2	11.63	WINTER	STANDARD25686	S
06-Dec-23	W LANTAU	3	7.09	WINTER	STANDARD25686	P
06-Dec-23	W LANTAU	4	1.26	WINTER	STANDARD25686	P
06-Dec-23	W LANTAU	3	10.34	WINTER	STANDARD25686	S
06-Dec-23	W LANTAU	4	1.27	WINTER	STANDARD25686	S
06-Dec-23	SW LANTAU	2	3.09	WINTER	STANDARD25686	P
06-Dec-23	SW LANTAU	3	5.87	WINTER	STANDARD25686	P
06-Dec-23	SW LANTAU	2	2.82	WINTER	STANDARD25686	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
06-Dec-23	SW LANTAU	3	2.92	WINTER	STANDARD25686	S
08-Dec-23	NE LANTAU	2	30.15	WINTER	STANDARD25686	P
08-Dec-23	NE LANTAU	2	10.15	WINTER	STANDARD25686	S
08-Dec-23	DEEP BAY	2	7.91	WINTER	STANDARD25686	P
08-Dec-23	DEEP BAY	2	7.09	WINTER	STANDARD25686	S
03-Jan-24	W LANTAU	3	6.45	WINTER	STANDARD36826	P
03-Jan-24	W LANTAU	2	0.60	WINTER	STANDARD36826	S
03-Jan-24	W LANTAU	3	3.22	WINTER	STANDARD36826	S
03-Jan-24	W LANTAU	4	3.50	WINTER	STANDARD36826	S
03-Jan-24	W LANTAU	5	3.33	WINTER	STANDARD36826	S
03-Jan-24	SW LANTAU	2	3.24	WINTER	STANDARD36826	P
03-Jan-24	SW LANTAU	3	12.38	WINTER	STANDARD36826	P
03-Jan-24	SW LANTAU	4	1.64	WINTER	STANDARD36826	P
03-Jan-24	SW LANTAU	2	2.31	WINTER	STANDARD36826	S
03-Jan-24	SW LANTAU	3	6.81	WINTER	STANDARD36826	S
03-Jan-24	SW LANTAU	4	1.85	WINTER	STANDARD36826	S
03-Jan-24	SE LANTAU	2	3.45	WINTER	STANDARD36826	P
03-Jan-24	SE LANTAU	3	11.42	WINTER	STANDARD36826	P
03-Jan-24	SE LANTAU	2	4.83	WINTER	STANDARD36826	S
03-Jan-24	SE LANTAU	3	3.60	WINTER	STANDARD36826	S
09-Jan-24	W LANTAU	2	18.02	WINTER	STANDARD36826	P
09-Jan-24	W LANTAU	2	10.84	WINTER	STANDARD36826	S
10-Jan-24	SE LANTAU	2	22.97	WINTER	STANDARD36826	P
10-Jan-24	SE LANTAU	3	6.98	WINTER	STANDARD36826	P
10-Jan-24	SE LANTAU	2	7.43	WINTER	STANDARD36826	S
10-Jan-24	SE LANTAU	3	0.92	WINTER	STANDARD36826	S
10-Jan-24	SW LANTAU	1	0.50	WINTER	STANDARD36826	P
10-Jan-24	SW LANTAU	2	17.22	WINTER	STANDARD36826	P
10-Jan-24	SW LANTAU	3	2.36	WINTER	STANDARD36826	P
10-Jan-24	SW LANTAU	2	6.29	WINTER	STANDARD36826	S
10-Jan-24	SW LANTAU	3	0.93	WINTER	STANDARD36826	S
18-Jan-24	NW LANTAU	2	32.62	WINTER	STANDARD25686	P
18-Jan-24	NW LANTAU	2	10.08	WINTER	STANDARD25686	S
18-Jan-24	DEEP BAY	2	8.11	WINTER	STANDARD25686	P
18-Jan-24	DEEP BAY	2	7.39	WINTER	STANDARD25686	S
25-Jan-24	W LANTAU	2	1.44	WINTER	STANDARD25686	S
25-Jan-24	W LANTAU	3	8.66	WINTER	STANDARD25686	S
25-Jan-24	SW LANTAU	2	10.43	WINTER	STANDARD25686	P
25-Jan-24	SW LANTAU	3	8.87	WINTER	STANDARD25686	P
25-Jan-24	SW LANTAU	4	1.99	WINTER	STANDARD25686	P
25-Jan-24	SW LANTAU	2	9.30	WINTER	STANDARD25686	S
25-Jan-24	SW LANTAU	4	2.01	WINTER	STANDARD25686	S
26-Jan-24	W LANTAU	3	9.44	WINTER	STANDARD25686	S
26-Jan-24	SW LANTAU	2	20.91	WINTER	STANDARD25686	P
26-Jan-24	SW LANTAU	3	1.01	WINTER	STANDARD25686	P
26-Jan-24	SW LANTAU	2	13.80	WINTER	STANDARD25686	S
26-Jan-24	SW LANTAU	3	1.85	WINTER	STANDARD25686	S
26-Jan-24	SE LANTAU	2	25.48	WINTER	STANDARD25686	P
26-Jan-24	SE LANTAU	2	7.09	WINTER	STANDARD25686	S
29-Jan-24	W LANTAU	2	2.06	WINTER	STANDARD25686	P
29-Jan-24	W LANTAU	3	6.37	WINTER	STANDARD25686	P
29-Jan-24	W LANTAU	2	2.50	WINTER	STANDARD25686	S
29-Jan-24	W LANTAU	3	16.00	WINTER	STANDARD25686	S
29-Jan-24	NW LANTAU	2	16.63	WINTER	STANDARD25686	P
29-Jan-24	NW LANTAU	3	15.43	WINTER	STANDARD25686	P
29-Jan-24	NW LANTAU	2	9.50	WINTER	STANDARD25686	S
29-Jan-24	NW LANTAU	3	2.74	WINTER	STANDARD25686	S
29-Jan-24	NE LANTAU	1	5.35	WINTER	STANDARD25686	P
29-Jan-24	NE LANTAU	2	11.53	WINTER	STANDARD25686	P
29-Jan-24	NE LANTAU	1	2.30	WINTER	STANDARD25686	S
29-Jan-24	NE LANTAU	2	8.52	WINTER	STANDARD25686	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
02-Feb-24	W LANTAU	1	6.31	WINTER	STANDARD25686	P
02-Feb-24	W LANTAU	2	12.38	WINTER	STANDARD25686	P
02-Feb-24	W LANTAU	3	3.37	WINTER	STANDARD25686	P
02-Feb-24	W LANTAU	1	2.25	WINTER	STANDARD25686	S
02-Feb-24	W LANTAU	2	6.85	WINTER	STANDARD25686	S
02-Feb-24	W LANTAU	3	1.88	WINTER	STANDARD25686	S
02-Feb-24	SW LANTAU	2	8.22	WINTER	STANDARD25686	P
02-Feb-24	SW LANTAU	3	10.62	WINTER	STANDARD25686	P
02-Feb-24	SW LANTAU	2	2.48	WINTER	STANDARD25686	S
02-Feb-24	SW LANTAU	3	5.97	WINTER	STANDARD25686	S
07-Feb-24	NW LANTAU	3	3.39	WINTER	STANDARD36826	P
07-Feb-24	NW LANTAU	4	4.23	WINTER	STANDARD36826	P
07-Feb-24	NW LANTAU	3	0.71	WINTER	STANDARD36826	S
07-Feb-24	NW LANTAU	4	2.19	WINTER	STANDARD36826	S
15-Feb-24	SE LANTAU	1	3.44	WINTER	STANDARD36826	P
15-Feb-24	SE LANTAU	2	22.91	WINTER	STANDARD36826	P
15-Feb-24	SE LANTAU	1	2.12	WINTER	STANDARD36826	S
15-Feb-24	SE LANTAU	2	8.39	WINTER	STANDARD36826	S
15-Feb-24	SW LANTAU	1	1.50	WINTER	STANDARD36826	P
15-Feb-24	SW LANTAU	2	15.51	WINTER	STANDARD36826	P
15-Feb-24	SW LANTAU	2	10.06	WINTER	STANDARD36826	S
16-Feb-24	DEEP BAY	2	3.00	WINTER	STANDARD36826	P
16-Feb-24	DEEP BAY	3	3.82	WINTER	STANDARD36826	P
16-Feb-24	DEEP BAY	2	4.02	WINTER	STANDARD36826	S
16-Feb-24	DEEP BAY	3	2.56	WINTER	STANDARD36826	S
16-Feb-24	NE LANTAU	2	1.30	WINTER	STANDARD36826	P
16-Feb-24	NE LANTAU	3	14.34	WINTER	STANDARD36826	P
16-Feb-24	NE LANTAU	4	3.10	WINTER	STANDARD36826	P
16-Feb-24	NE LANTAU	2	2.10	WINTER	STANDARD36826	S
16-Feb-24	NE LANTAU	3	7.56	WINTER	STANDARD36826	S
21-Feb-24	W LANTAU	2	6.34	WINTER	STANDARD36826	S
21-Feb-24	W LANTAU	3	2.68	WINTER	STANDARD36826	S
21-Feb-24	SW LANTAU	2	20.96	WINTER	STANDARD36826	P
21-Feb-24	SW LANTAU	1	1.20	WINTER	STANDARD36826	S
21-Feb-24	SW LANTAU	2	8.82	WINTER	STANDARD36826	S
21-Feb-24	SW LANTAU	3	1.52	WINTER	STANDARD36826	S
29-Feb-24	SW LANTAU	2	7.03	WINTER	STANDARD36826	P
29-Feb-24	SW LANTAU	3	10.37	WINTER	STANDARD36826	P
29-Feb-24	SW LANTAU	4	2.70	WINTER	STANDARD36826	P
29-Feb-24	SW LANTAU	2	5.55	WINTER	STANDARD36826	S
29-Feb-24	SW LANTAU	3	7.35	WINTER	STANDARD36826	S
29-Feb-24	SW LANTAU	4	0.90	WINTER	STANDARD36826	S
29-Feb-24	SE LANTAU	2	4.33	WINTER	STANDARD36826	P
29-Feb-24	SE LANTAU	3	13.90	WINTER	STANDARD36826	P
29-Feb-24	SE LANTAU	4	1.60	WINTER	STANDARD36826	P
29-Feb-24	SE LANTAU	2	1.05	WINTER	STANDARD36826	S
29-Feb-24	SE LANTAU	3	2.34	WINTER	STANDARD36826	S
29-Feb-24	SE LANTAU	4	5.13	WINTER	STANDARD36826	S
05-Mar-24	W LANTAU	3	10.47	SPRING	STANDARD36826	P
05-Mar-24	W LANTAU	2	1.57	SPRING	STANDARD36826	S
05-Mar-24	W LANTAU	3	8.05	SPRING	STANDARD36826	S
06-Mar-24	SE LANTAU	1	15.25	SPRING	STANDARD36826	P
06-Mar-24	SE LANTAU	2	11.89	SPRING	STANDARD36826	P
06-Mar-24	SE LANTAU	3	0.93	SPRING	STANDARD36826	P
06-Mar-24	SE LANTAU	1	5.13	SPRING	STANDARD36826	S
06-Mar-24	SE LANTAU	2	4.30	SPRING	STANDARD36826	S
06-Mar-24	SW LANTAU	2	7.85	SPRING	STANDARD36826	P
06-Mar-24	SW LANTAU	3	15.07	SPRING	STANDARD36826	P
06-Mar-24	SW LANTAU	2	1.20	SPRING	STANDARD36826	S
06-Mar-24	SW LANTAU	3	6.87	SPRING	STANDARD36826	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
12-Mar-24	W LANTAU	2	6.58	SPRING	STANDARD36826	P
12-Mar-24	W LANTAU	3	6.91	SPRING	STANDARD36826	P
12-Mar-24	W LANTAU	2	12.46	SPRING	STANDARD36826	S
12-Mar-24	W LANTAU	3	6.55	SPRING	STANDARD36826	S
12-Mar-24	NE LANTAU	2	2.20	SPRING	STANDARD36826	P
12-Mar-24	NE LANTAU	3	11.91	SPRING	STANDARD36826	P
12-Mar-24	NE LANTAU	2	2.30	SPRING	STANDARD36826	S
12-Mar-24	NE LANTAU	3	5.69	SPRING	STANDARD36826	S
20-Mar-24	DEEP BAY	2	5.83	SPRING	STANDARD36826	P
20-Mar-24	DEEP BAY	3	2.41	SPRING	STANDARD36826	P
20-Mar-24	DEEP BAY	2	6.59	SPRING	STANDARD36826	S
20-Mar-24	DEEP BAY	3	0.27	SPRING	STANDARD36826	S
20-Mar-24	NE LANTAU	2	8.80	SPRING	STANDARD36826	P
20-Mar-24	NE LANTAU	3	11.21	SPRING	STANDARD36826	P
20-Mar-24	NE LANTAU	2	5.30	SPRING	STANDARD36826	S
20-Mar-24	NE LANTAU	3	5.19	SPRING	STANDARD36826	S
25-Mar-24	SE LANTAU	1	23.63	SPRING	STANDARD36826	P
25-Mar-24	SE LANTAU	2	3.33	SPRING	STANDARD36826	P
25-Mar-24	SE LANTAU	1	9.38	SPRING	STANDARD36826	S
25-Mar-24	SE LANTAU	2	0.70	SPRING	STANDARD36826	S
25-Mar-24	SW LANTAU	1	11.24	SPRING	STANDARD36826	P
25-Mar-24	SW LANTAU	2	5.53	SPRING	STANDARD36826	P
25-Mar-24	SW LANTAU	1	5.29	SPRING	STANDARD36826	S
25-Mar-24	SW LANTAU	2	7.93	SPRING	STANDARD36826	S
28-Mar-24	W LANTAU	2	20.91	SPRING	STANDARD36826	P
28-Mar-24	W LANTAU	2	10.08	SPRING	STANDARD36826	S
28-Mar-24	SE LANTAU	1	9.74	SPRING	STANDARD36826	P
28-Mar-24	SE LANTAU	2	18.69	SPRING	STANDARD36826	P
28-Mar-24	SE LANTAU	1	5.26	SPRING	STANDARD36826	S
28-Mar-24	SE LANTAU	2	4.32	SPRING	STANDARD36826	S

Appendix II. HKCRP-AFCD Chinese White Dolphin Sighting Database (April 2023 - March 2024)
(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
12-Apr-23	1	1042	4	W LANTAU	2	374	ON	HKCRP	811113	801570	SPRING	PURSE-SEINE	S
12-Apr-23	2	1100	7	W LANTAU	2	21	ON	HKCRP	808933	800843	SPRING	NONE	S
12-Apr-23	3	1142	1	SW LANTAU	2	ND	OFF	HKCRP	805939	802693	SPRING	NONE	
18-Apr-23	1	1147	3	W LANTAU	3	82	ON	HKCRP	808690	800863	SPRING	NONE	S
18-Apr-23	2	1227	6	SW LANTAU	3	ND	OFF	HKCRP	805918	802187	SPRING	NONE	
18-Apr-23	3	1240	3	SW LANTAU	3	196	ON	HKCRP	806172	802600	SPRING	NONE	P
18-Apr-23	4	1343	2	SW LANTAU	2	227	ON	HKCRP	807027	806593	SPRING	NONE	P
24-Apr-23	1	1029	8	W LANTAU	2	496	ON	HKCRP	810980	801590	SPRING	PURSE-SEINE	S
26-Apr-23	1	1112	5	W LANTAU	3	233	ON	HKCRP	809943	799773	SPRING	NONE	S
26-Apr-23	2	1135	2	W LANTAU	3	343	ON	HKCRP	808579	800904	SPRING	NONE	P
26-Apr-23	3	1318	1	SW LANTAU	1	424	ON	HKCRP	807004	807397	SPRING	PURSE-SEINE	P
27-Apr-23	1	1427	2	W LANTAU	3	335	ON	HKCRP	806274	801703	SPRING	NONE	S
11-May-23	1	1357	1	W LANTAU	2	498	ON	HKCRP	813582	801679	SPRING	NONE	P
11-May-23	2	1434	2	W LANTAU	2	266	ON	HKCRP	810851	800064	SPRING	NONE	S
11-May-23	3	1447	4	W LANTAU	2	52	ON	HKCRP	810449	801208	SPRING	NONE	P
11-May-23	4	1459	2	W LANTAU	2	157	ON	HKCRP	809320	801019	SPRING	NONE	S
11-May-23	5	1510	2	W LANTAU	2	18	ON	HKCRP	807858	801150	SPRING	NONE	S
11-May-23	6	1521	1	SW LANTAU	3	ND	OFF	HKCRP	806259	803116	SPRING	NONE	
15-May-23	1	1032	7	W LANTAU	2	399	ON	HKCRP	811722	801437	SPRING	NONE	S
15-May-23	2	1059	2	W LANTAU	2	360	ON	HKCRP	808246	801048	SPRING	NONE	S
16-May-23	1	1032	1	W LANTAU	3	66	ON	HKCRP	810593	801363	SPRING	NONE	S
16-May-23	2	1040	7	W LANTAU	3	128	ON	HKCRP	808634	800884	SPRING	PURSE-SEINE	S
16-May-23	3	1113	5	SW LANTAU	2	66	ON	HKCRP	807052	805428	SPRING	PURSE-SEINE	P
16-May-23	4	1332	1	SW LANTAU	2	277	ON	HKCRP	808038	811534	SPRING	PURSE-SEINE	P
23-May-23	1	1038	1	W LANTAU	2	281	ON	HKCRP	810659	801455	SPRING	NONE	S
05-Jun-23	1	1317	2	W LANTAU	3	38	ON	HKCRP	812397	801707	SUMMER	NONE	P
05-Jun-23	2	1345	6	W LANTAU	3	79	ON	HKCRP	810913	801755	SUMMER	NONE	S
05-Jun-23	3	1504	2	SW LANTAU	3	168	ON	HKCRP	806006	802466	SUMMER	PURSE-SEINE	P
05-Jun-23	4	1521	1	SW LANTAU	3	8	ON	HKCRP	804754	802669	SUMMER	NONE	S
08-Jun-23	1	1038	4	W LANTAU	2	522	ON	HKCRP	809829	801144	SUMMER	NONE	S
08-Jun-23	2	1049	3	W LANTAU	2	38	ON	HKCRP	808900	800843	SUMMER	PURSE-SEINE	S
12-Jun-23	1	1453	11	W LANTAU	3	217	ON	HKCRP	809521	800298	SUMMER	PURSE-SEINE	P
12-Jun-23	2	1526	1	SW LANTAU	3	ND	OFF	HKCRP	806369	803426	SUMMER	NONE	

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
13-Jun-23	1	1036	3	W LANTAU	2	110	ON	HKCRP	812420	801532	SUMMER	NONE	P
13-Jun-23	2	1131	1	W LANTAU	2	80	ON	HKCRP	808737	799523	SUMMER	NONE	S
13-Jun-23	3	1141	4	W LANTAU	2	175	ON	HKCRP	808424	800821	SUMMER	NONE	P
13-Jun-23	4	1204	1	W LANTAU	2	692	ON	HKCRP	807813	801562	SUMMER	NONE	S
13-Jun-23	5	1212	7	W LANTAU	2	393	ON	HKCRP	806462	801766	SUMMER	PURSE-SEINE	S
13-Jun-23	6	1241	2	W LANTAU	2	ND	OFF	HKCRP	806064	801383	SUMMER	NONE	
13-Jun-23	7	1251	6	SW LANTAU	2	50	ON	HKCRP	805408	802496	SUMMER	NONE	P
20-Jun-23	1	1422	2	SW LANTAU	2	362	ON	HKCRP	806790	803437	SUMMER	NONE	P
20-Jun-23	2	1433	2	SW LANTAU	2	316	ON	HKCRP	806325	803508	SUMMER	NONE	P
27-Jun-23	1	1050	1	W LANTAU	2	245	ON	HKCRP	806628	801704	SUMMER	NONE	S
20-Jul-23	1	1031	3	W LANTAU	2	135	ON	HKCRP	811124	801446	SUMMER	PURSE-SEINE	S
25-Jul-23	1	1246	4	W LANTAU	2	165	ON	HKCRP	814585	803990	SUMMER	PURSE-SEINE	S
25-Jul-23	2	1314	8	W LANTAU	2	192	ON	HKCRP	809586	801020	SUMMER	NONE	S
25-Jul-23	3	1341	3	W LANTAU	1	238	ON	HKCRP	806340	801807	SUMMER	NONE	S
25-Jul-23	4	1350	3	SW LANTAU	2	154	ON	HKCRP	806260	802869	SUMMER	PURSE-SEINE	S
01-Aug-23	1	1018	1	W LANTAU	3	ND	OFF	HKCRP	813701	802875	SUMMER	NONE	
01-Aug-23	2	1046	2	W LANTAU	3	788	ON	HKCRP	806351	801796	SUMMER	NONE	S
08-Aug-23	1	1140	2	W LANTAU	2	509	ON	HKCRP	809376	800958	SUMMER	PURSE-SEINE	P
08-Aug-23	2	1231	9	W LANTAU	2	142	ON	HKCRP	806665	800199	SUMMER	NONE	P
08-Aug-23	3	1307	3	W LANTAU	2	31	ON	HKCRP	806407	801332	SUMMER	NONE	P
08-Aug-23	4	1322	3	W LANTAU	2	441	ON	HKCRP	805434	800959	SUMMER	NONE	P
09-Aug-23	1	1038	2	W LANTAU	2	99	ON	HKCRP	809597	801113	SUMMER	NONE	S
09-Aug-23	2	1042	2	W LANTAU	2	67	ON	HKCRP	809121	800988	SUMMER	NONE	S
09-Aug-23	3	1050	2	W LANTAU	2	84	ON	HKCRP	808135	801037	SUMMER	NONE	S
15-Aug-23	3	1506	3	SW LANTAU	2	207	ON	HKCRP	806262	807489	SUMMER	NONE	P
15-Aug-23	4	1518	3	SW LANTAU	2	360	ON	HKCRP	804855	807455	SUMMER	NONE	P
15-Aug-23	5	1555	1	SW LANTAU	2	ND	OFF	HKCRP	803646	808680	SUMMER	NONE	
16-Aug-23	1	1104	9	W LANTAU	3	227	ON	HKCRP	810892	801600	SUMMER	NONE	S
16-Aug-23	2	1134	1	W LANTAU	3	66	ON	HKCRP	809685	801185	SUMMER	NONE	S
16-Aug-23	3	1224	8	SW LANTAU	2	123	ON	HKCRP	805539	803506	SUMMER	NONE	P
16-Aug-23	4	1313	5	SW LANTAU	1	201	ON	HKCRP	806708	805510	SUMMER	NONE	P
16-Aug-23	5	1420	8	SW LANTAU	2	200	ON	HKCRP	805664	807457	SUMMER	NONE	P
16-Aug-23	6	1539	5	SW LANTAU	2	231	ON	HKCRP	805250	809570	SUMMER	NONE	P
24-Aug-23	1	1430	6	W LANTAU	2	67	ON	HKCRP	808435	800656	SUMMER	NONE	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
24-Aug-23	2	1503	1	W LANTAU	2	60	ON	HKCRP	807318	800355	SUMMER	NONE	P
24-Aug-23	3	1517	2	W LANTAU	3	59	ON	HKCRP	806362	801724	SUMMER	NONE	S
24-Aug-23	4	1545	1	SW LANTAU	2	ND	OFF	HKCRP	806127	802786	SUMMER	NONE	
29-Aug-23	1	1201	18	W LANTAU	2	7	ON	HKCRP	807382	801314	SUMMER	NONE	P
29-Aug-23	2	1254	6	W LANTAU	2	ND	OFF	HKCRP	805609	801712	SUMMER	NONE	
29-Aug-23	3	1322	2	SW LANTAU	1	158	ON	HKCRP	805494	803537	SUMMER	NONE	P
29-Aug-23	4	1333	5	SW LANTAU	1	233	ON	HKCRP	804520	803463	SUMMER	NONE	P
29-Aug-23	5	1409	6	SW LANTAU	1	98	ON	HKCRP	804870	805413	SUMMER	NONE	P
30-Aug-23	1	1434	2	W LANTAU	3	32	ON	HKCRP	808390	800924	SUMMER	NONE	P
30-Aug-23	2	1452	6	W LANTAU	3	81	ON	HKCRP	806628	801704	SUMMER	NONE	S
19-Sep-23	1	1258	3	W LANTAU	1	334	ON	HKCRP	814433	802660	AUTUMN	NONE	P
19-Sep-23	2	1320	3	W LANTAU	2	242	ON	HKCRP	813547	802596	AUTUMN	NONE	P
19-Sep-23	3	1345	11	W LANTAU	2	754	ON	HKCRP	812510	800831	AUTUMN	NONE	S
19-Sep-23	4	1501	1	W LANTAU	3	ND	OFF	HKCRP	806420	800755	AUTUMN	NONE	
19-Sep-23	5	1512	4	W LANTAU	2	215	ON	HKCRP	805487	801702	AUTUMN	NONE	P
20-Sep-23	1	1038	2	W LANTAU	2	15	ON	HKCRP	808712	800740	AUTUMN	NONE	S
21-Sep-23	1	1021	6	W LANTAU	1	941	ON	HKCRP	812850	802471	AUTUMN	NONE	S
21-Sep-23	2	1040	1	W LANTAU	2	54	ON	HKCRP	808844	800926	AUTUMN	NONE	S
21-Sep-23	3	1057	2	W LANTAU	2	383	ON	HKCRP	806217	802044	AUTUMN	NONE	S
21-Sep-23	4	1112	3	SW LANTAU	2	111	ON	HKCRP	806270	803508	AUTUMN	NONE	S
27-Sep-23	1	1154	3	NW LANTAU	2	53	ON	HKCRP	829498	805473	AUTUMN	NONE	P
27-Sep-23	2	1344	1	W LANTAU	2	45	ON	HKCRP	812376	801521	AUTUMN	NONE	P
12-Oct-23	1	1012	12	W LANTAU	2	149	ON	HKCRP	813966	803246	AUTUMN	NONE	S
25-Oct-23	1	1317	1	W LANTAU	2	53	ON	HKCRP	809254	800875	AUTUMN	NONE	S
25-Oct-23	2	1331	1	W LANTAU	2	132	ON	HKCRP	808113	801078	AUTUMN	NONE	S
02-Nov-23	1	1019	2	W LANTAU	2	35	ON	HKCRP	817930	803718	AUTUMN	NONE	P
02-Nov-23	2	1041	4	W LANTAU	2	295	ON	HKCRP	816623	803623	AUTUMN	GILLNET	P
02-Nov-23	3	1112	1	W LANTAU	2	1209	ON	HKCRP	814477	802515	AUTUMN	NONE	P
02-Nov-23	4	1127	1	W LANTAU	2	52	ON	HKCRP	813580	802575	AUTUMN	NONE	P
02-Nov-23	5	1138	1	W LANTAU	2	18	ON	HKCRP	813185	801276	AUTUMN	NONE	S
02-Nov-23	6	1156	4	W LANTAU	2	26	ON	HKCRP	812443	801078	AUTUMN	GILLNET	P
02-Nov-23	7	1252	4	W LANTAU	3	334	ON	HKCRP	807396	800149	AUTUMN	NONE	P
03-Nov-23	1	1517	2	SW LANTAU	3	287	ON	HKCRP	808235	806451	AUTUMN	PURSE-SEINE	S
13-Nov-23	1	1340	3	W LANTAU	3	99	ON	HKCRP	814954	802279	AUTUMN	NONE	S

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
13-Nov-23	2	1404	1	W LANTAU	4	99	ON	HKCRP	813536	802771	AUTUMN	NONE	P
13-Nov-23	3	1507	6	W LANTAU	3	55	ON	HKCRP	806206	802178	AUTUMN	NONE	S
13-Nov-23	4	1540	2	SW LANTAU	3	ND	OFF	HKCRP	806926	807428	AUTUMN	PURSE-SEINE	
15-Nov-23	1	1022	1	W LANTAU	3	118	ON	HKCRP	816357	803798	AUTUMN	NONE	P
15-Nov-23	2	1044	2	W LANTAU	3	407	ON	HKCRP	814466	802464	AUTUMN	NONE	P
15-Nov-23	3	1120	9	W LANTAU	3	38	ON	HKCRP	810674	799961	AUTUMN	NONE	S
15-Nov-23	4	1202	1	W LANTAU	3	177	ON	HKCRP	806654	800188	AUTUMN	NONE	S
15-Nov-23	5	1214	1	W LANTAU	3	93	ON	HKCRP	806429	801601	AUTUMN	NONE	P
22-Nov-23	1	1015	15	W LANTAU	2	258	ON	HKCRP	813071	802368	AUTUMN	NONE	S
22-Nov-23	2	1050	6	W LANTAU	2	234	ON	HKCRP	810860	800930	AUTUMN	NONE	S
22-Nov-23	3	1100	6	W LANTAU	2	137	ON	HKCRP	809432	800741	AUTUMN	NONE	S
22-Nov-23	4	1114	2	W LANTAU	2	317	ON	HKCRP	808335	801007	AUTUMN	NONE	S
22-Nov-23	5	1129	3	W LANTAU	2	174	ON	HKCRP	806961	801509	AUTUMN	NONE	S
22-Nov-23	6	1343	1	SW LANTAU	2	78	ON	HKCRP	807399	809223	AUTUMN	NONE	S
23-Nov-23	4	1424	2	SW LANTAU	2	57	ON	HKCRP	807735	807368	AUTUMN	PURSE-SEINE	P
23-Nov-23	5	1529	2	SW LANTAU	2	107	ON	HKCRP	806343	805354	AUTUMN	NONE	P
29-Nov-23	1	1047	2	W LANTAU	2	297	ON	HKCRP	808014	801058	AUTUMN	NONE	S
29-Nov-23	2	1128	2	W LANTAU	3	153	ON	HKCRP	807440	800190	AUTUMN	NONE	P
29-Nov-23	3	1200	1	W LANTAU	2	264	ON	HKCRP	808837	799564	AUTUMN	NONE	S
05-Dec-23	1	1021	1	SE LANTAU	2	ND	OFF	HKCRP	807965	815958	WINTER	NONE	
05-Dec-23	2	1100	6	SW LANTAU	2	ND	OFF	HKCRP	807048	807490	WINTER	PURSE-SEINE	
05-Dec-23	3	1207	15	SW LANTAU	3	254	ON	HKCRP	806080	804384	WINTER	NONE	P
05-Dec-23	4	1244	3	SW LANTAU	2	305	ON	HKCRP	807073	805840	WINTER	PURSE-SEINE	S
05-Dec-23	5	1254	3	SW LANTAU	2	120	ON	HKCRP	807436	807182	WINTER	PURSE-SEINE	S
06-Dec-23	1	1335	1	W LANTAU	3	49	ON	HKCRP	809411	800030	WINTER	NONE	P
06-Dec-23	2	1344	2	W LANTAU	2	9	ON	HKCRP	809421	800514	WINTER	NONE	P
03-Jan-24	1	1105	5	W LANTAU	4	ND	OFF	HKCRP	810504	801527	WINTER	NONE	
03-Jan-24	2	1145	1	SW LANTAU	3	64	ON	HKCRP	805984	802404	WINTER	NONE	P
03-Jan-24	3	1220	11	SW LANTAU	3	609	ON	HKCRP	805747	804518	WINTER	NONE	P
03-Jan-24	4	1340	1	SW LANTAU	4	134	ON	HKCRP	807456	808501	WINTER	NONE	P
09-Jan-24	1	1244	3	W LANTAU	2	94	ON	HKCRP	815385	802816	WINTER	NONE	P
10-Jan-24	1	1208	1	SE LANTAU	2	195	ON	HKCRP	808076	815391	WINTER	NONE	P
10-Jan-24	3	1521	1	SW LANTAU	2	254	ON	HKCRP	807845	807358	WINTER	NONE	P
25-Jan-24	1	1312	1	W LANTAU	3	165	ON	HKCRP	806217	802054	WINTER	NONE	S

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
25-Jan-24	2	1325	5	SW LANTAU	3	52	ON	HKCRP	805982	803476	WINTER	NONE	P
26-Jan-24	1	1033	2	W LANTAU	3	191	ON	HKCRP	810106	801145	WINTER	NONE	S
26-Jan-24	2	1044	3	W LANTAU	3	113	ON	HKCRP	808933	800967	WINTER	NONE	S
26-Jan-24	3	1102	2	W LANTAU	3	118	ON	HKCRP	806251	802054	WINTER	NONE	S
29-Jan-24	1	1135	1	W LANTAU	3	80	ON	HKCRP	808667	800925	WINTER	NONE	S
29-Jan-24	2	1257	2	NW LANTAU	3	66	ON	HKCRP	825535	804703	WINTER	NONE	P
02-Feb-24	1	1016	10	W LANTAU	1	319	ON	HKCRP	817631	803769	WINTER	GILLNET	P
02-Feb-24	2	1151	1	W LANTAU	2	173	ON	HKCRP	811415	800437	WINTER	NONE	P
02-Feb-24	3	1242	1	W LANTAU	3	33	ON	HKCRP	808390	800924	WINTER	NONE	P
02-Feb-24	4	1250	1	W LANTAU	3	178	ON	HKCRP	807581	801583	WINTER	GILLNET	S
02-Feb-24	5	1313	3	W LANTAU	2	46	ON	HKCRP	806295	801889	WINTER	NONE	P
02-Feb-24	6	1348	1	SW LANTAU	2	58	ON	HKCRP	806249	802920	WINTER	NONE	S
21-Feb-24	1	1253	6	W LANTAU	2	282	ON	HKCRP	811491	800901	WINTER	NONE	S
05-Mar-24	1	1345	9	W LANTAU	3	649	ON	HKCRP	810452	800187	SPRING	NONE	P
05-Mar-24	2	1432	6	W LANTAU	3	126	ON	HKCRP	809663	801309	SPRING	NONE	S
05-Mar-24	3	1501	1	W LANTAU	3	211	ON	HKCRP	808291	800976	SPRING	NONE	S
06-Mar-24	3	1307	1	SE LANTAU	2	ND	OFF	HKCRP	809587	812300	SPRING	NONE	
12-Mar-24	1	1019	6	W LANTAU	3	21	ON	HKCRP	818040	803791	SPRING	NONE	P
12-Mar-24	2	1049	4	W LANTAU	3	152	ON	HKCRP	815892	803797	SPRING	NONE	P
12-Mar-24	3	1105	7	W LANTAU	2	189	ON	HKCRP	815451	803105	SPRING	NONE	P
12-Mar-24	4	1123	5	W LANTAU	3	181	ON	HKCRP	814478	802423	SPRING	NONE	P
12-Mar-24	5	1148	3	W LANTAU	3	63	ON	HKCRP	813527	801730	SPRING	NONE	P
12-Mar-24	6	1241	3	W LANTAU	2	472	ON	HKCRP	809400	800318	SPRING	NONE	P
12-Mar-24	7	1313	1	W LANTAU	2	40	ON	HKCRP	807349	801273	SPRING	NONE	P
12-Mar-24	8	1337	1	W LANTAU	2	574	ON	HKCRP	810327	801383	SPRING	NONE	S
12-Mar-24	9	1346	1	W LANTAU	2	39	ON	HKCRP	811400	801849	SPRING	NONE	S
28-Mar-24	1	1150	1	W LANTAU	2	133	ON	HKCRP	808368	800873	SPRING	NONE	P
28-Mar-24	5	1438	1	SE LANTAU	1	284	ON	HKCRP	808486	815453	SPRING	NONE	P

Appendix III. HKCRP-AFCD Finless Porpoise Sighting Database (April 2023 - March 2024)
(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
18-Apr-23	5	1520	1	SW LANTAU	3	58	ON	804573	810600	SPRING	P
04-May-23	1	1022	4	SE LANTAU	2	48	ON	805647	818574	SPRING	P
04-May-23	2	1029	2	SE LANTAU	2	561	ON	804728	818532	SPRING	P
04-May-23	3	1118	2	SE LANTAU	2	439	ON	805495	815954	SPRING	S
04-May-23	4	1208	3	SE LANTAU	2	47	ON	805984	814542	SPRING	P
04-May-23	5	1251	5	SE LANTAU	2	105	ON	803274	812465	SPRING	P
04-May-23	6	1355	1	SW LANTAU	3	91	ON	803244	810567	SPRING	P
04-May-23	7	1358	3	SW LANTAU	3	148	ON	802846	810587	SPRING	P
04-May-23	8	1423	5	SW LANTAU	3	87	ON	801421	808501	SPRING	P
04-May-23	9	1430	1	SW LANTAU	2	60	ON	801797	808584	SPRING	P
04-May-23	10	1436	2	SW LANTAU	2	99	ON	801975	808275	SPRING	S
18-May-23	1	1512	4	SE LANTAU	2	ND	OFF	801669	812246	SPRING	
13-Jun-23	8	1503	1	SW LANTAU	2	60	ON	807312	808512	SUMMER	P
15-Aug-23	1	1316	12	SW LANTAU	2	165	ON	805147	811426	SUMMER	P
15-Aug-23	2	1425	5	SW LANTAU	1	518	ON	803655	809712	SUMMER	P
16-Aug-23	7	1600	6	SE LANTAU	2	ND	OFF	806241	812975	SUMMER	
28-Aug-23	1	1243	4	SE LANTAU	2	159	ON	804557	813426	SUMMER	P
28-Aug-23	2	1358	5	SW LANTAU	2	59	ON	802302	811463	SUMMER	P
28-Aug-23	3	1416	3	SW LANTAU	2	44	ON	805767	811499	SUMMER	P
28-Aug-23	4	1454	9	SW LANTAU	2	179	ON	804728	810631	SUMMER	P
28-Aug-23	5	1507	2	SW LANTAU	2	187	ON	803388	810609	SUMMER	P
28-Aug-23	6	1514	3	SW LANTAU	2	181	ON	802679	810576	SUMMER	P
28-Aug-23	7	1554	6	SW LANTAU	2	192	ON	803204	808153	SUMMER	S
28-Aug-23	8	1602	7	SW LANTAU	2	ND	OFF	803668	808887	SUMMER	
28-Aug-23	9	1614	2	SW LANTAU	2	ND	OFF	805568	811613	SUMMER	
28-Aug-23	10	1617	9	SW LANTAU	2	ND	OFF	805778	811974	SUMMER	
29-Aug-23	6	1542	1	SW LANTAU	1	45	ON	803499	810547	SUMMER	P
21-Sep-23	5	1305	2	SW LANTAU	2	212	ON	801686	808501	AUTUMN	P
21-Sep-23	6	1405	3	SW LANTAU	2	245	ON	803776	810589	AUTUMN	P
21-Sep-23	7	1414	3	SW LANTAU	2	376	ON	802358	810597	AUTUMN	P
21-Sep-23	8	1429	3	SW LANTAU	2	198	ON	800531	810583	AUTUMN	P
13-Nov-23	5	1557	1	SW LANTAU	2	ND	OFF	807142	810770	AUTUMN	
14-Nov-23	1	1325	1	SW LANTAU	2	219	ON	802290	811638	AUTUMN	P
14-Nov-23	2	1354	1	SW LANTAU	2	91	ON	804119	810661	AUTUMN	P
14-Nov-23	3	1556	1	SW LANTAU	2	ND	OFF	807418	810976	AUTUMN	
15-Nov-23	6	1319	1	SW LANTAU	3	27	ON	803276	805420	AUTUMN	P
15-Nov-23	7	1430	3	SW LANTAU	2	210	ON	803582	807401	AUTUMN	P
23-Nov-23	1	1214	2	SE LANTAU	2	41	ON	802132	813495	AUTUMN	P
23-Nov-23	2	1329	2	SW LANTAU	2	101	ON	801560	811462	AUTUMN	P
23-Nov-23	3	1337	1	SW LANTAU	2	237	ON	801085	810739	AUTUMN	S
10-Jan-24	2	1410	1	SW LANTAU	1	18	ON	806380	809562	WINTER	P
25-Jan-24	3	1440	6	SW LANTAU	2	151	ON	801987	807419	WINTER	P
26-Jan-24	4	1319	1	SW LANTAU	2	152	ON	805714	810592	WINTER	P
26-Jan-24	5	1431	2	SE LANTAU	2	116	ON	809683	814455	WINTER	S
26-Jan-24	6	1557	4	SE LANTAU	2	5	ON	806997	819534	WINTER	P
26-Jan-24	7	1609	2	SE LANTAU	2	ND	OFF	805357	820234	WINTER	
15-Feb-24	1	1024	1	SE LANTAU	2	154	ON	805924	818512	WINTER	P
15-Feb-24	2	1029	3	SE LANTAU	2	28	ON	805060	818522	WINTER	P
15-Feb-24	3	1143	1	SE LANTAU	2	131	ON	809052	814505	WINTER	P
15-Feb-24	4	1237	1	SE LANTAU	2	281	ON	803053	812485	WINTER	P
15-Feb-24	5	1257	2	SE LANTAU	2	ND	OFF	807128	812409	WINTER	
15-Feb-24	6	1329	1	SW LANTAU	2	65	ON	806378	810541	WINTER	P
15-Feb-24	7	1346	1	SW LANTAU	2	101	ON	803089	810526	WINTER	P
15-Feb-24	8	1419	10	SW LANTAU	2	225	ON	802131	807759	WINTER	S
15-Feb-24	9	1543	1	SW LANTAU	1	130	ON	802011	806480	WINTER	P
15-Feb-24	10	1550	3	SW LANTAU	2	ND	OFF	801689	807263	WINTER	
15-Feb-24	11	1600	4	SW LANTAU	2	ND	OFF	802260	809781	WINTER	
15-Feb-24	12	1611	3	SE LANTAU	2	ND	OFF	803318	812950	WINTER	
15-Feb-24	13	1619	2	SE LANTAU	2	ND	OFF	804035	815148	WINTER	
15-Feb-24	14	1625	7	SE LANTAU	2	ND	OFF	804542	816737	WINTER	
15-Feb-24	15	1634	1	SE LANTAU	1	ND	OFF	805348	818945	WINTER	

Appendix III. (cont'd)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	NORTHING	EASTING	SEASON	P/S
21-Feb-24	2	1457	4	SW LANTAU	2	25	ON	803028	807441	WINTER	P
29-Feb-24	1	1228	1	SW LANTAU	2	215	ON	806419	806551	WINTER	P
29-Feb-24	2	1407	4	SE LANTAU	4	78	ON	805899	812448	WINTER	P
29-Feb-24	3	1525	4	SE LANTAU	2	89	ON	805194	817542	WINTER	P
06-Mar-24	1	1024	7	SE LANTAU	2	63	ON	805137	819491	SPRING	P
06-Mar-24	2	1237	1	SE LANTAU	1	40	ON	803926	813405	SPRING	P
06-Mar-24	4	1530	1	SW LANTAU	2	143	ON	803242	805503	SPRING	P
25-Mar-24	1	1023	9	SE LANTAU	1	78	ON	805348	818522	SPRING	P
25-Mar-24	2	1104	7	SE LANTAU	1	178	ON	804332	816437	SPRING	P
25-Mar-24	3	1320	7	SW LANTAU	2	97	ON	804850	810570	SPRING	P
25-Mar-24	4	1357	14	SW LANTAU	1	43	ON	801188	808531	SPRING	P
25-Mar-24	5	1425	9	SW LANTAU	2	306	ON	802286	807553	SPRING	S
25-Mar-24	6	1536	2	SW LANTAU	2	139	ON	802790	804491	SPRING	S
28-Mar-24	2	1326	10	SE LANTAU	2	288	ON	806517	813501	SPRING	P
28-Mar-24	3	1342	2	SE LANTAU	2	275	ON	804967	813530	SPRING	P
28-Mar-24	4	1416	8	SE LANTAU	1	122	ON	804167	815416	SPRING	P

Appendix IV. Individual dolphins identified during AFCD surveys (April 2023 to March 2024)

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

DOLPHIN ID	DATE	STG#	AREA
CH12	29/08/23	1	WL
	15/11/23	3	WL
	22/11/23	3	WL
	05/03/24	2	WL
CH38	25/07/23	3	WL
	16/08/23	6	SWL
	29/08/23	1	WL
	29/08/23	2	WL
	21/09/23	4	SWL
	25/10/23	1	WL
	05/12/23	3	SWL
	21/02/24	1	WL
CH105	12/06/23	1	WL
	16/08/23	2	WL
CH108	16/05/23	2	WL
	05/06/23	4	SWL
	15/11/23	3	WL
	22/11/23	3	WL
	03/01/24	3	SWL
	25/01/24	2	SWL
	26/01/24	2	WL
	12/03/24	3	WL
CH112	05/06/23	2	WL
	13/06/23	5	WL
	25/07/23	1	WL
	09/08/23	3	WL
	16/08/23	1	WL
CH113	24/08/23	3	WL
	19/09/23	3	WL
CH141	11/05/23	3	WL
	15/05/23	1	WL
	16/05/23	3	SWL
	12/06/23	1	WL
	27/06/23	1	WL
	25/07/23	4	SWL
	22/11/23	1	WL
CH238	12/03/24	3	WL
	12/03/24	5	WL
CH320	15/05/23	1	WL
	16/08/23	1	WL
CH321	12/03/24	2	WL
EL01	25/07/23	4	SWL
	15/08/23	5	SWL
NL33	16/05/23	2	WL
NL46	30/08/23	1	WL
NL104	21/09/23	3	WL
NL123	05/06/23	1	WL
	05/06/23	2	WL
	21/09/23	3	WL
NL156	12/04/23	2	WL
	22/11/23	1	WL
	29/11/23	1	WL
	03/01/24	3	SWL
	12/03/24	2	WL
NL182	27/09/23	1	NWL
	12/03/24	4	WL
NL202	19/09/23	2	WL
	27/09/23	1	NWL
NL236	13/06/23	1	WL
NL242	15/05/23	1	WL
	16/05/23	2	WL
	25/07/23	1	WL
	09/08/23	1	WL
	15/11/23	1	WL

DOLPHIN ID	DATE	STG#	AREA
NL256	29/08/23	1	WL
	12/03/24	1	WL
NL261	24/08/23	1	WL
NL269	29/08/23	1	WL
	05/12/23	3	SWL
NL299	29/08/23	1	WL
	12/03/24	1	WL
NL301	08/08/23	2	WL
	29/08/23	1	WL
NL306	12/04/23	2	WL
	18/04/23	4	SWL
	26/04/23	3	SWL
	11/05/23	1	WL
	11/05/23	5	WL
	16/05/23	4	SWL
	05/12/23	1	SEL
	10/01/24	1	SEL
	06/03/24	3	SEL
	28/03/24	5	SEL
NL317	12/03/24	1	WL
NL321	09/08/23	3	WL
NL332	13/11/23	1	WL
SL40	05/06/23	3	SWL
	08/06/23	1	WL
	12/06/23	1	WL
	20/07/23	1	WL
	08/08/23	1	WL
	16/08/23	5	SWL
	16/08/23	6	SWL
	29/11/23	2	WL
	05/12/23	2	SWL
	05/12/23	4	SWL
SL44	12/04/23	1	WL
	18/04/23	2	SWL
	23/05/23	1	WL
	13/06/23	2	WL
	13/11/23	3	WL
	21/02/24	1	WL
SL59	11/05/23	2	WL
	12/06/23	1	WL
	12/03/24	3	WL
SL60	27/04/23	1	WL
	08/08/23	2	WL
	24/08/23	1	WL
	13/11/23	3	WL
	05/12/23	3	SWL
	03/01/24	3	SWL
SL66	11/05/23	3	WL
	13/06/23	1	WL
	29/08/23	3	SWL
	30/08/23	2	WL
SL68	15/11/23	3	WL
	22/11/23	2	WL
WL11	13/06/23	1	WL
WL21	09/08/23	2	WL
	19/09/23	3	WL
	05/03/24	1	WL
WL28	15/08/23	3	SWL
	19/09/23	2	WL
WL29	19/09/23	3	WL

DOLPHIN ID	DATE	STG#	AREA
WL42	25/07/23	2	WL
	29/08/23	1	WL
	19/09/23	5	WL
	15/11/23	3	WL
	22/11/23	1	WL
	05/12/23	3	SWL
	03/01/24	3	SWL
WL61	08/06/23	1	WL
	12/06/23	1	WL
	13/06/23	5	WL
	16/08/23	3	SWL
	05/12/23	3	SWL
	03/01/24	3	SWL
	02/02/24	3	WL
	12/03/24	3	WL
WL72	22/11/23	1	WL
	02/02/24	1	WL
WL79	24/04/23	1	WL
	11/05/23	3	WL
	15/05/23	1	WL
	05/06/23	2	WL
	12/06/23	1	WL
	13/06/23	3	WL
	20/07/23	1	WL
	25/07/23	1	WL
	16/08/23	4	SWL
	29/08/23	5	SWL
	19/09/23	1	WL
	12/10/23	1	WL
	13/11/23	2	WL
	26/01/24	1	WL
	02/02/24	1	WL
	21/02/24	1	WL
	12/03/24	1	WL
	12/03/24	9	WL
WL91	12/04/23	1	WL
	24/04/23	1	WL
	13/06/23	5	WL
	25/07/23	2	WL
	29/08/23	5	SWL
	22/11/23	1	WL
	05/12/23	2	SWL
	05/12/23	4	SWL
	28/03/24	1	WL
WL92	12/10/23	1	WL
	22/11/23	4	WL
WL94	29/08/23	1	WL
	22/11/23	1	WL
	05/03/24	2	WL
WL109	12/04/23	2	WL
	16/08/23	5	SWL
	16/08/23	6	SWL
	29/08/23	1	WL
	29/08/23	2	WL
	02/11/23	7	WL
	22/11/23	1	WL
	05/12/23	3	SWL
	03/01/24	1	WL
	26/01/24	2	WL
WL114	18/04/23	2	SWL
	08/08/23	2	WL
	29/08/23	2	WL
	05/12/23	3	SWL
	03/01/24	3	SWL

Appendix IV. (cont'd)

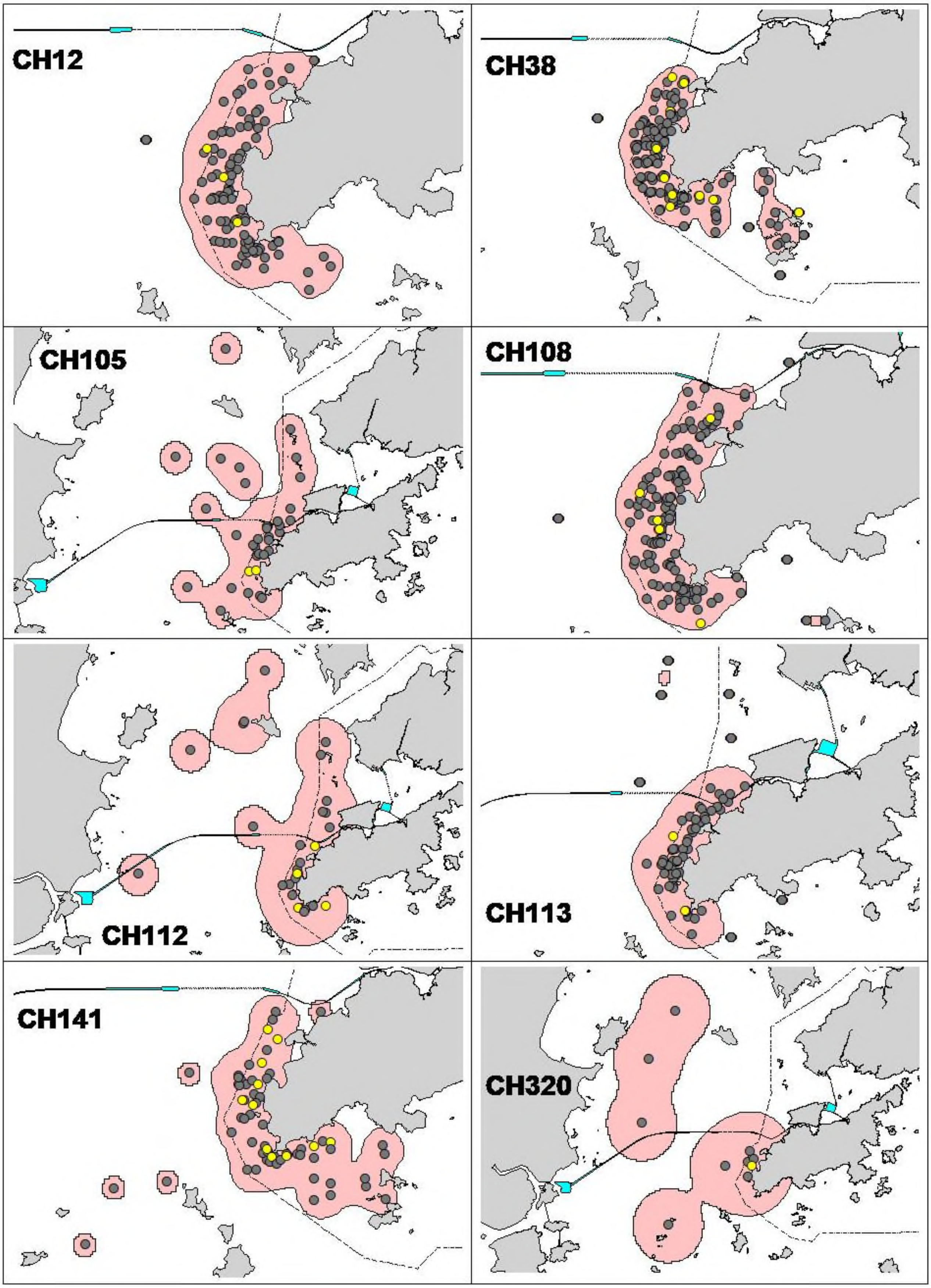
(***in bold & italics: new individuals***)

DOLPHIN ID	DATE	STG#	AREA
WL118	16/08/23	3	SWL
	22/11/23	1	WL
WL123	18/04/23	2	SWL
	25/07/23	3	WL
	02/11/23	7	WL
	03/11/23	1	SWL
	15/11/23	5	WL
	23/11/23	4	SWL
	23/11/23	5	SWL
	05/12/23	2	SWL
	05/12/23	4	SWL
	10/01/24	3	SWL
	02/02/24	4	WL
WL128	29/08/23	1	WL
	03/01/24	3	SWL
WL130	12/04/23	1	WL
	24/04/23	1	WL
	15/05/23	1	WL
	16/05/23	3	SWL
	25/07/23	2	WL
	03/01/24	3	SWL
	25/01/24	2	SWL
	21/02/24	1	WL
WL131	26/04/23	2	WL
	25/07/23	2	WL
	13/11/23	3	WL
	22/11/23	2	WL
	05/12/23	3	SWL
	06/12/23	2	WL
	25/01/24	2	SWL
WL142	16/08/23	1	WL
	24/08/23	1	WL
	12/10/23	1	WL
	22/11/23	4	WL
	05/12/23	3	SWL
	03/01/24	3	SWL
WL145	24/04/23	1	WL
	12/06/23	1	WL
	02/11/23	2	WL
	02/02/24	1	WL
	05/03/24	1	WL
	12/03/24	6	WL
WL152	12/04/23	2	WL
	18/04/23	1	WL
	26/04/23	2	WL
	25/07/23	3	WL
	16/08/23	5	SWL
	16/08/23	6	SWL
	29/08/23	5	SWL
	22/11/23	2	WL
	29/11/23	1	WL
	29/11/23	2	WL
	05/12/23	3	SWL
	06/12/23	2	WL
	25/01/24	2	SWL
	02/02/24	5	WL
WL166	13/06/23	7	SWL
	12/03/24	2	WL
WL169	12/06/23	1	WL
	16/08/23	5	SWL
	15/11/23	3	WL
	22/11/23	3	WL

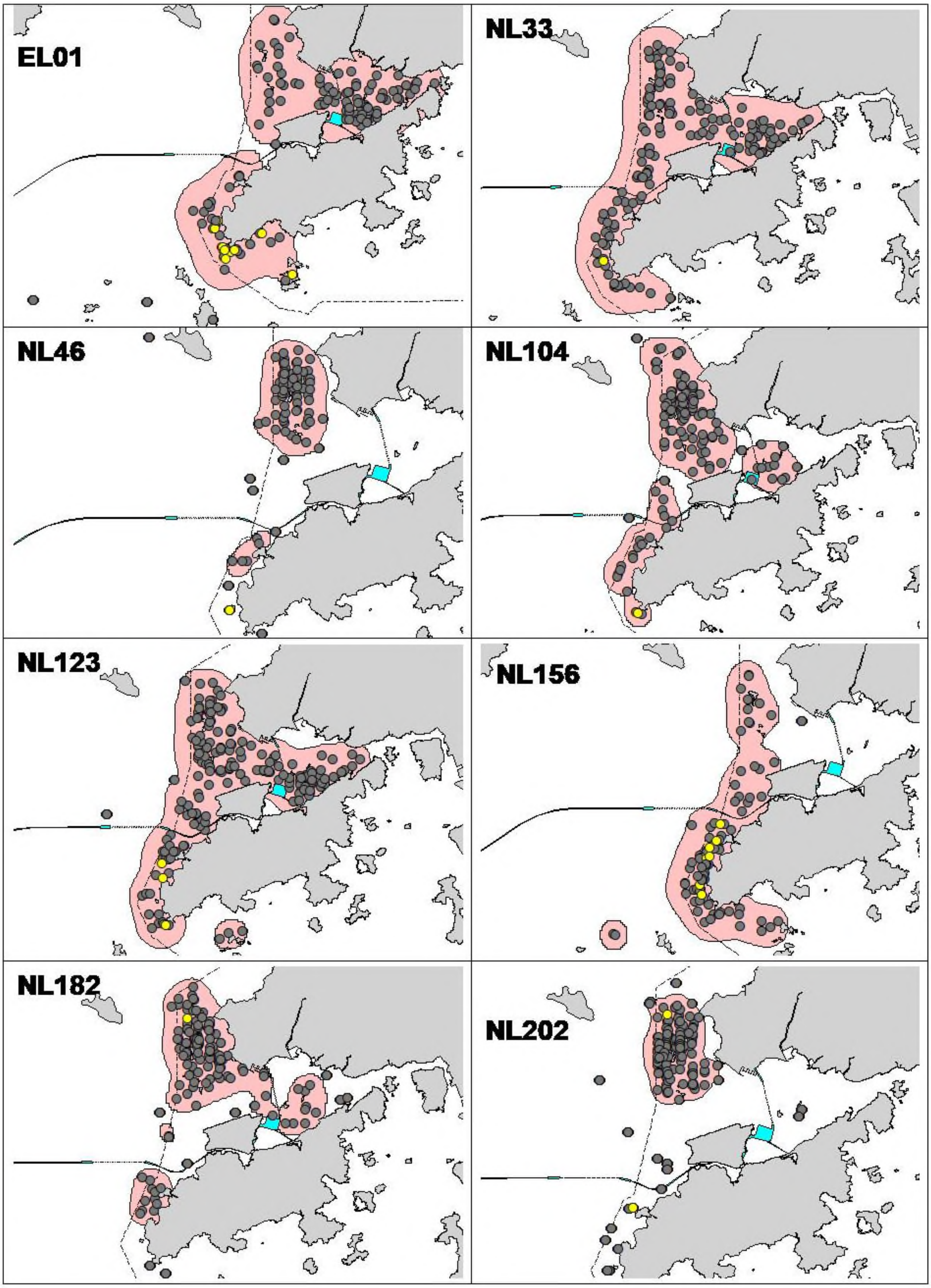
DOLPHIN ID	DATE	STG#	AREA
WL171	20/07/23	1	WL
	05/12/23	2	SWL
	05/12/23	3	SWL
WL176	02/11/23	6	WL
WL179	16/08/23	1	WL
	30/08/23	2	WL
	25/10/23	2	WL
WL191	22/11/23	1	WL
WL200	08/06/23	1	WL
	13/06/23	5	WL
	25/07/23	1	WL
	09/01/24	1	WL
WL208	11/05/23	4	WL
	13/06/23	5	WL
	13/06/23	7	SWL
	16/08/23	3	SWL
	16/08/23	4	SWL
WL210	12/10/23	1	WL
WL213	02/02/24	1	WL
WL220	24/04/23	1	WL
	16/05/23	3	SWL
	12/06/23	1	WL
	20/06/23	2	SWL
	29/08/23	5	SWL
	21/09/23	4	SWL
	03/11/23	1	SWL
	22/11/23	5	WL
	23/11/23	4	SWL
	23/11/23	5	SWL
	05/12/23	2	SWL
	05/12/23	3	SWL
	02/02/24	5	WL
	02/02/24	6	SWL
	12/03/24	4	WL
WL221	18/04/23	2	SWL
	27/04/23	1	WL
	13/11/23	4	SWL
	03/01/24	4	SWL
WL229	29/08/23	1	WL
	22/11/23	1	WL
WL236	12/06/23	1	WL
	29/08/23	1	WL
WL249	22/11/23	1	WL
WL250	16/05/23	3	SWL
	08/06/23	1	WL
	16/08/23	5	SWL
	22/11/23	5	WL
	05/12/23	2	SWL
	05/12/23	5	SWL
	05/03/24	2	WL
WL254	05/12/23	3	SWL
	03/01/24	3	SWL
	29/01/24	1	WL
WL256	08/08/23	2	WL
	09/08/23	2	WL
	19/09/23	3	WL
	05/03/24	1	WL
WL259	12/06/23	1	WL
	29/08/23	1	WL
WL273	24/04/23	1	WL
	30/08/23	2	WL
	21/09/23	2	WL
	15/11/23	4	WL
	22/11/23	5	WL

DOLPHIN ID	DATE	STG#	AREA
WL273	03/01/24	3	SWL
	12/03/24	7	WL
WL288	15/08/23	3	SWL
WL294	29/08/23	3	SWL
	13/11/23	1	WL
WL299	16/08/23	1	WL
	05/12/23	3	SWL
	05/03/24	2	WL
WL301	13/06/23	7	SWL
	02/11/23	2	WL
	12/03/24	6	WL
WL302	26/01/24	1	WL
WL304	20/06/23	1	SWL
WL305	20/06/23	1	SWL
WL312	13/06/23	5	WL
	02/11/23	6	WL
WL314	24/08/23	1	WL
WL315	13/06/23	7	SWL
	19/09/23	3	WL
	12/10/23	1	WL
WL316	12/03/24	3	WL
	12/03/24	5	WL
WL317	16/08/23	5	SWL
	29/08/23	1	WL
	19/09/23	3	WL
	15/11/23	3	WL
	03/01/24	2	SWL
	25/01/24	2	SWL
	26/01/24	3	WL
WL321	19/09/23	2	WL
WL323	24/04/23	1	WL
	11/05/23	2	WL
	19/09/23	1	WL
	02/11/23	1	WL
	02/02/24	1	WL
WL324	13/06/23	3	WL
WL325	29/08/23	1	WL
WL326	13/06/23	5	WL
	19/09/23	3	WL
	12/10/23	1	WL
	15/11/23	3	WL
WL328	15/11/23	3	WL
WL330	12/04/23	2	WL
	08/08/23	3	WL
	16/08/23	5	SWL
	02/02/24	2	WL
WL331	12/04/23	2	WL
	16/08/23	5	SWL
	16/08/23	6	SWL
	29/08/23	1	WL
	29/08/23	2	WL
	02/11/23	7	WL
	22/11/23	1	WL
	05/12/23	3	SWL
	26/01/24	2	WL
WL332	05/06/23	2	WL
	25/07/23	2	WL
WL333	19/09/23	1	WL
	02/11/23	5	WL
	02/11/23	6	WL
WL334	02/11/23	2	WL

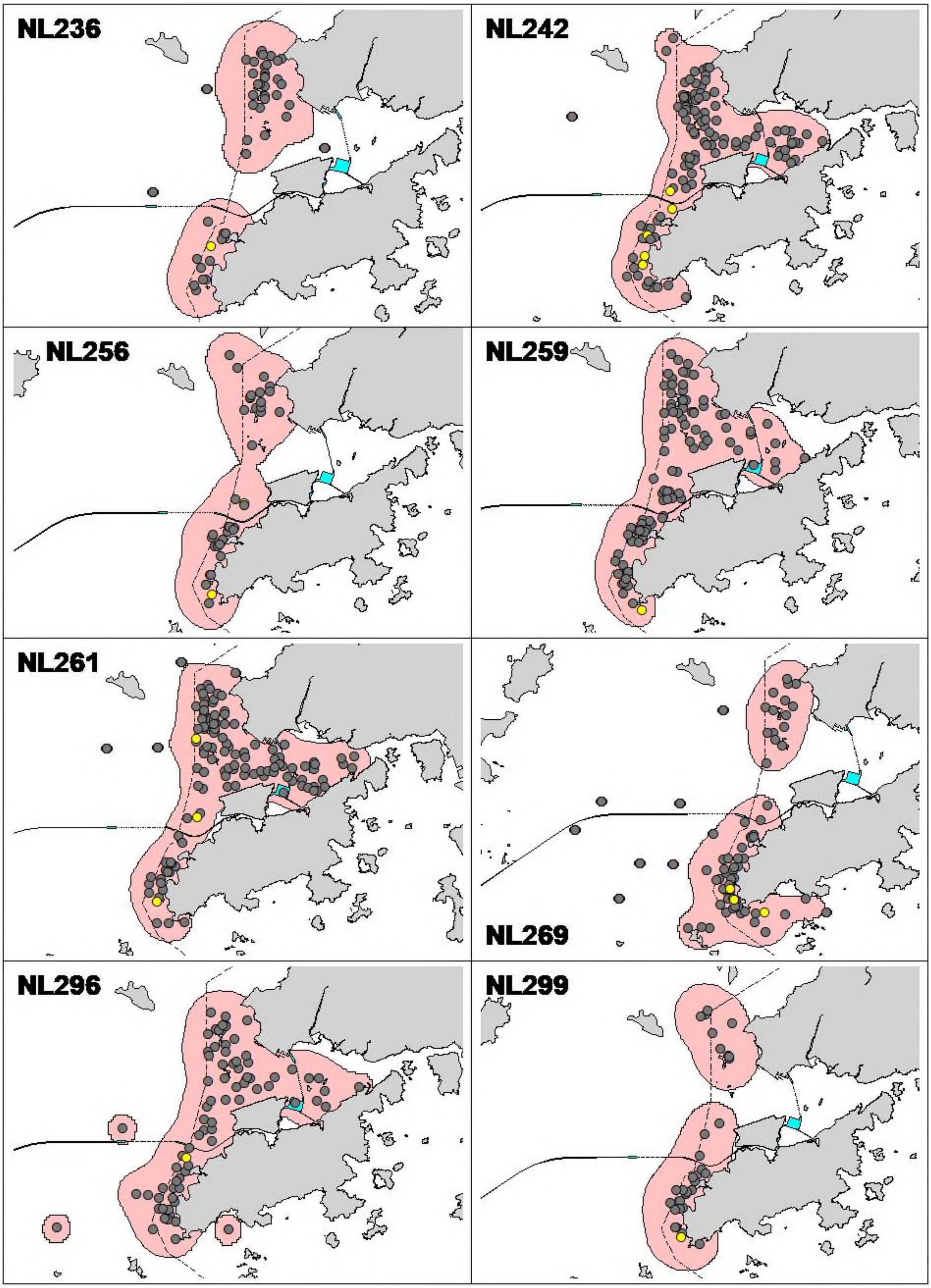
Appendix V. Ranging patterns (95% kernel ranges) of 96 individual dolphins with 10+ re-sightings that were sighted during 2023 (note: yellow dots indicates sightings made in 2023)



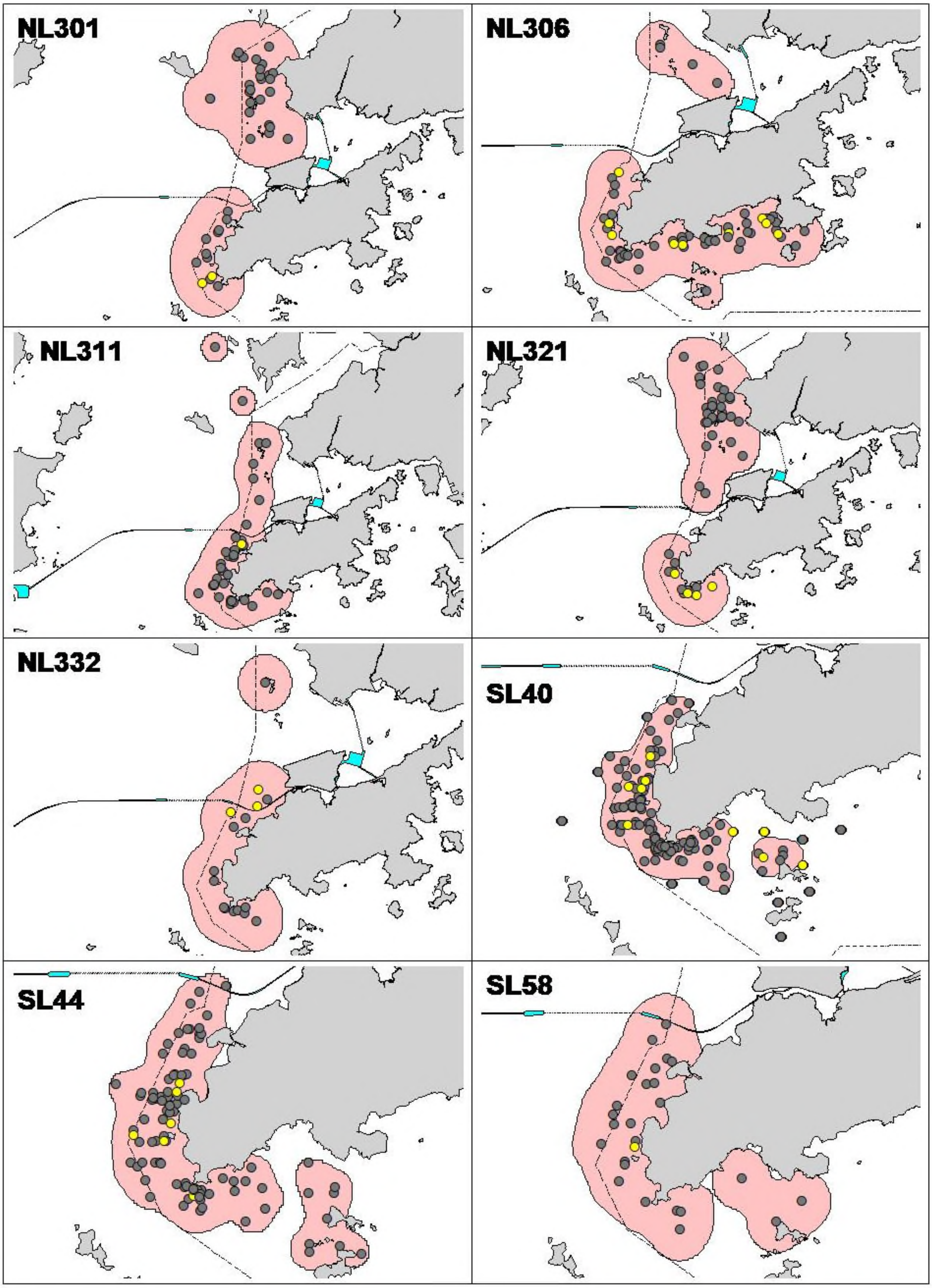
Appendix V. (cont'd).



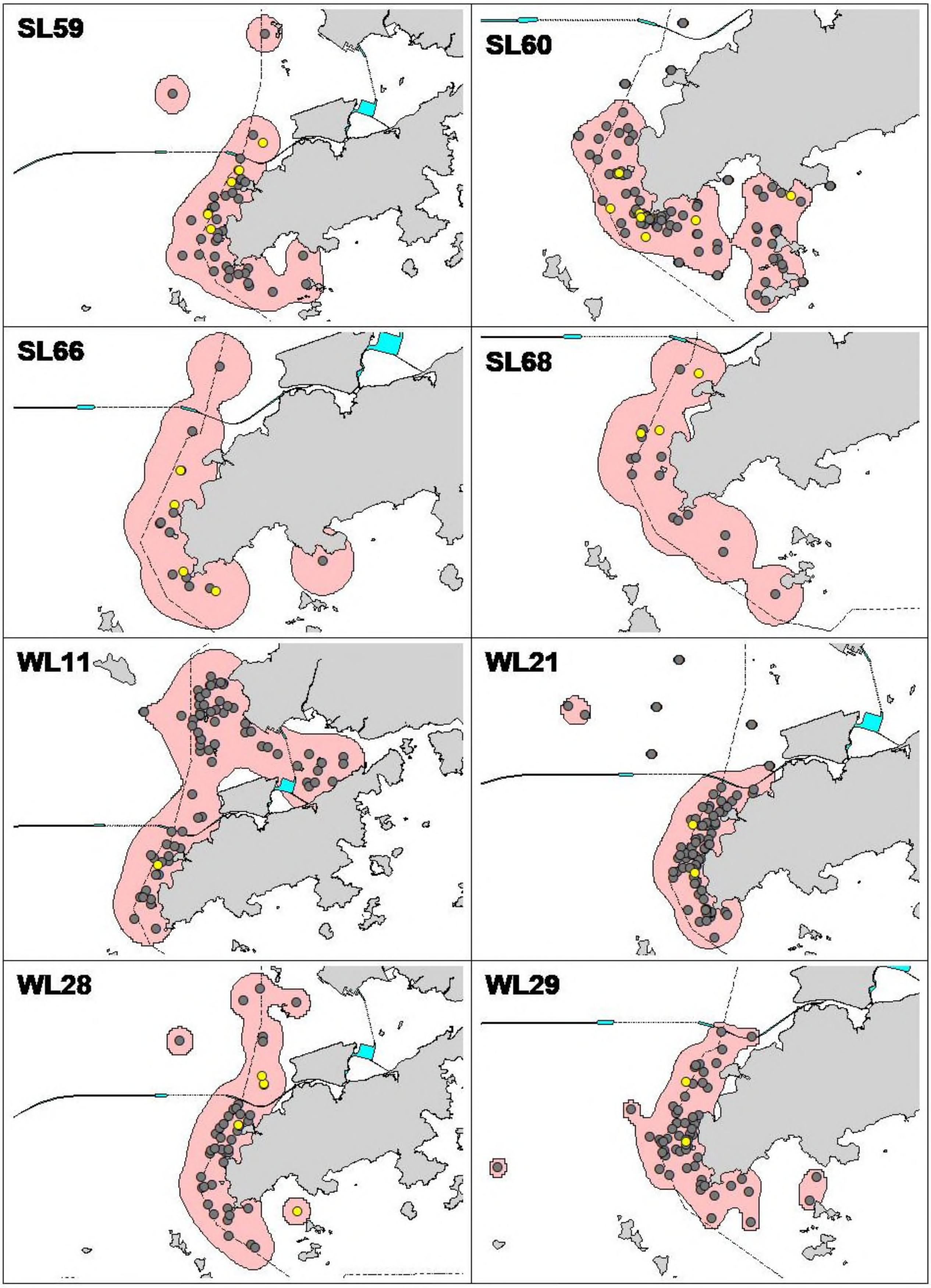
Appendix V. (cont'd).



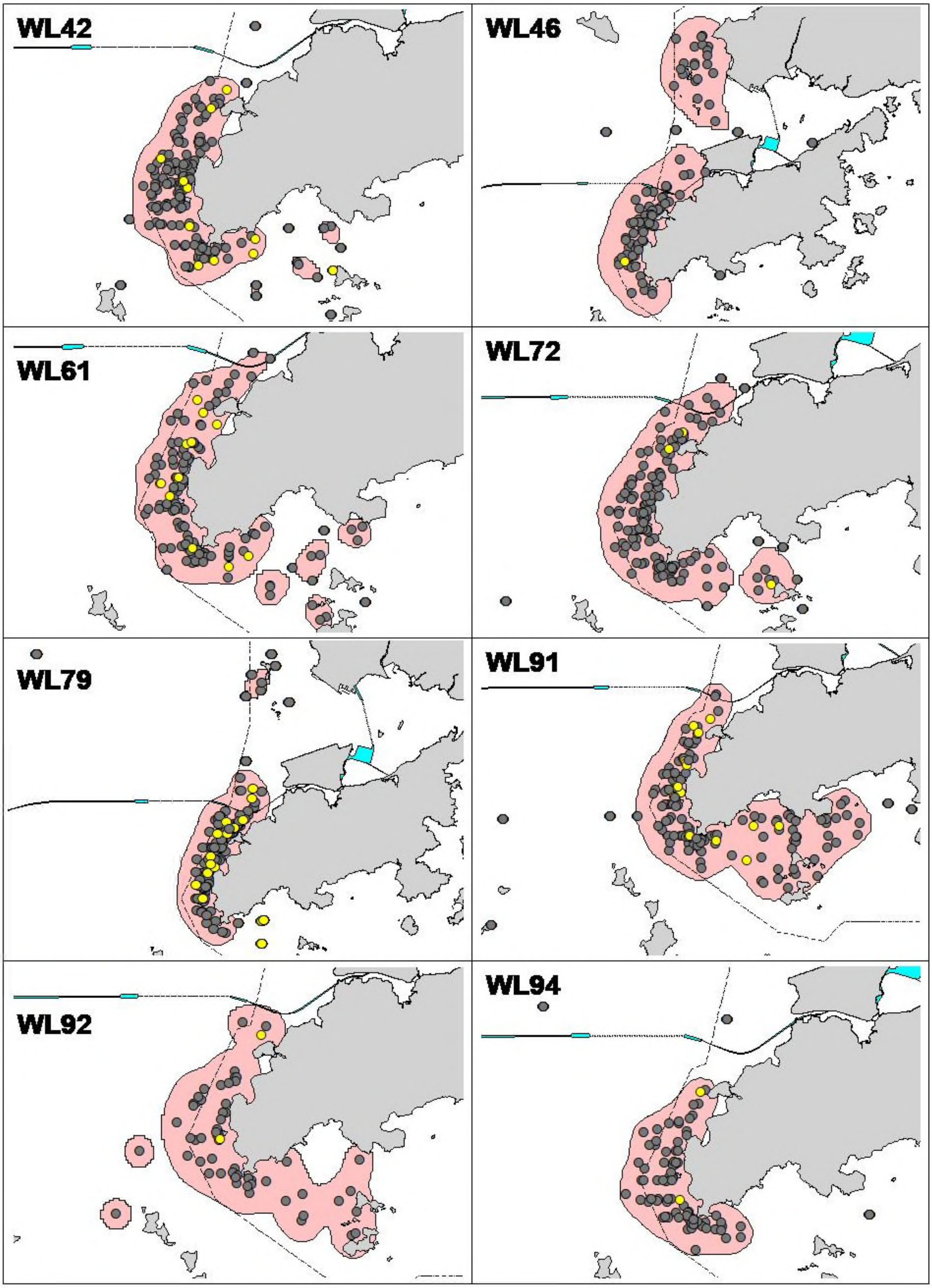
Appendix V. (cont'd).



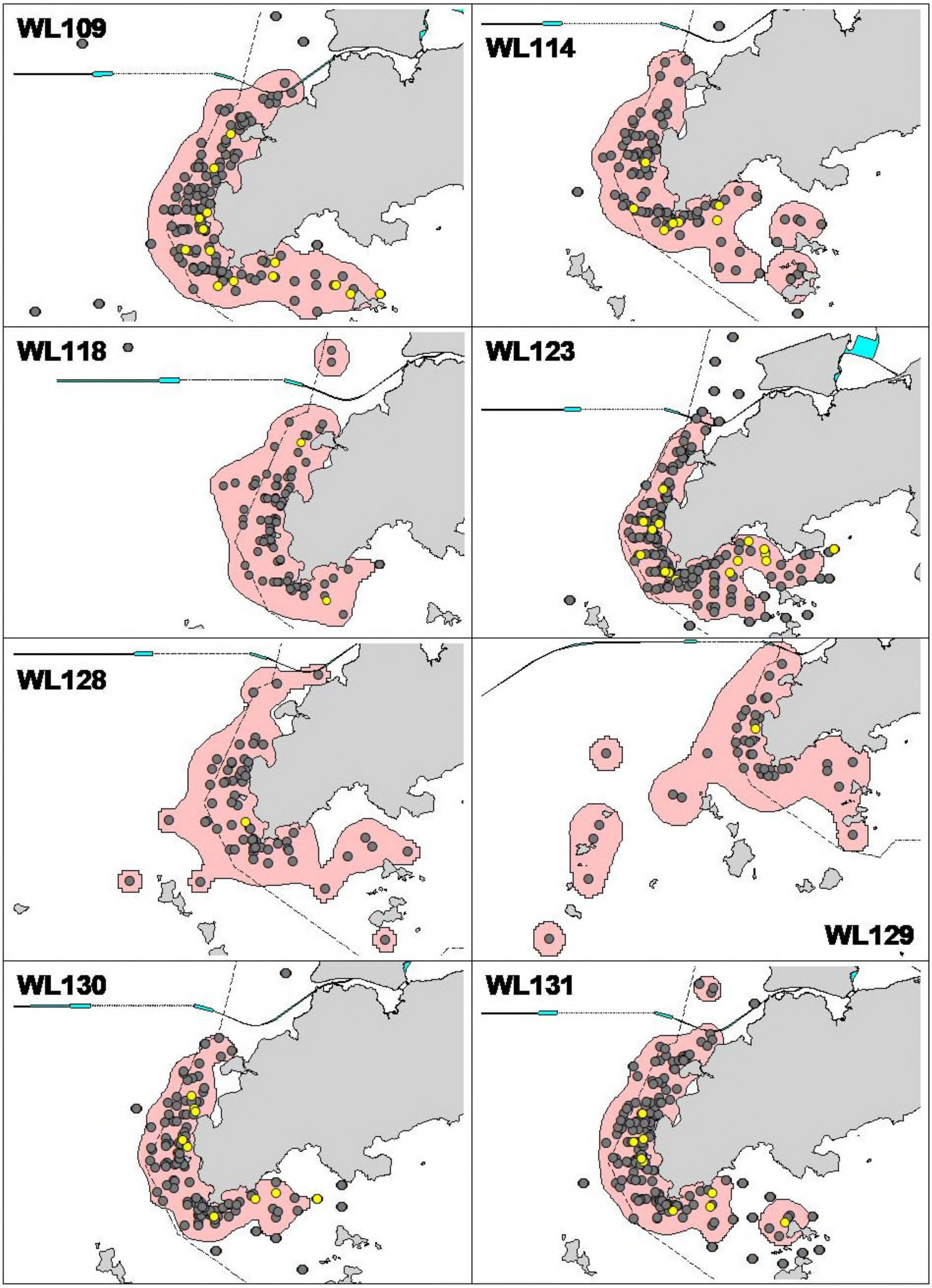
Appendix V. (cont'd).



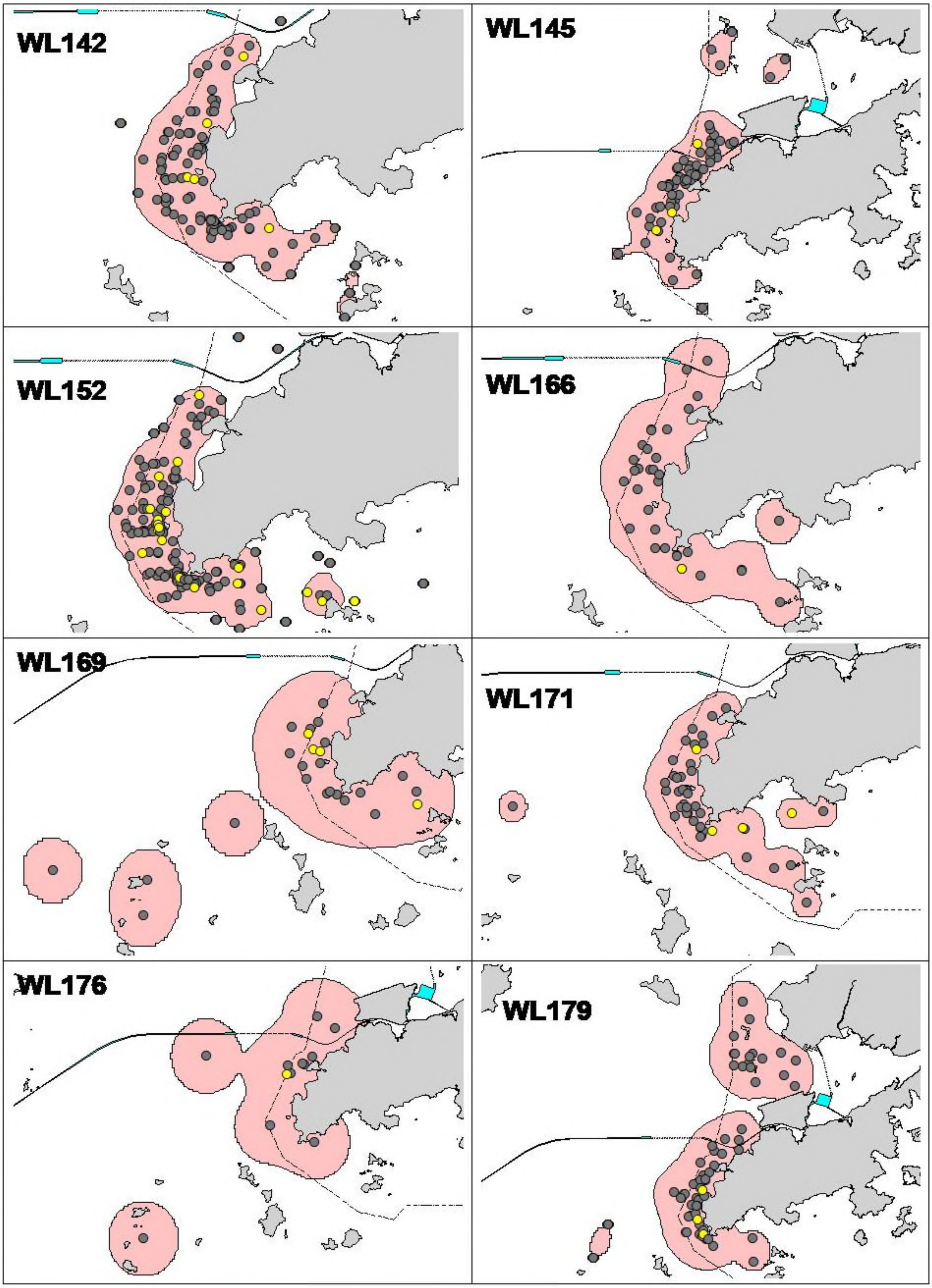
Appendix V. (cont'd).



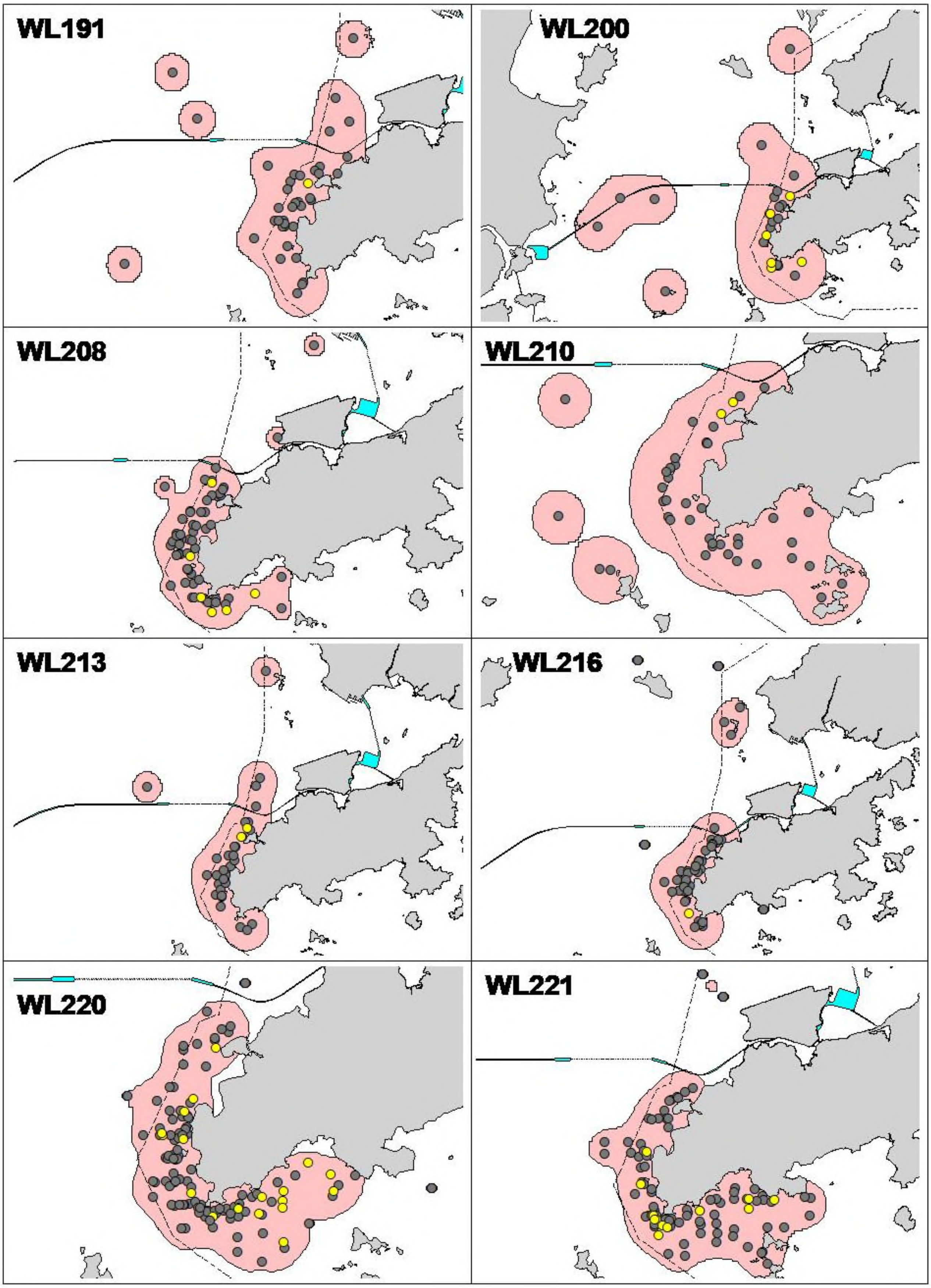
Appendix V. (cont'd).



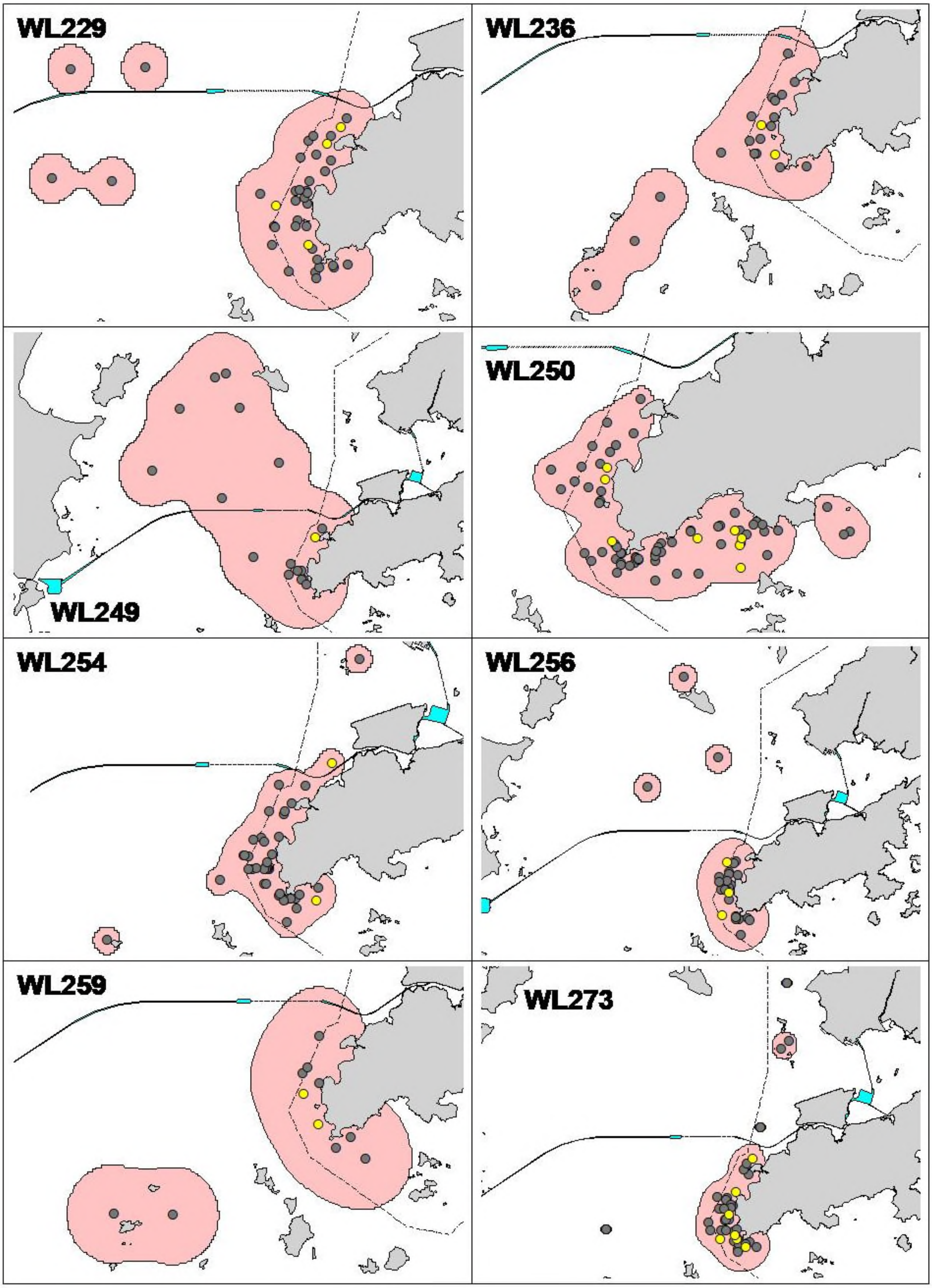
Appendix V. (cont'd).



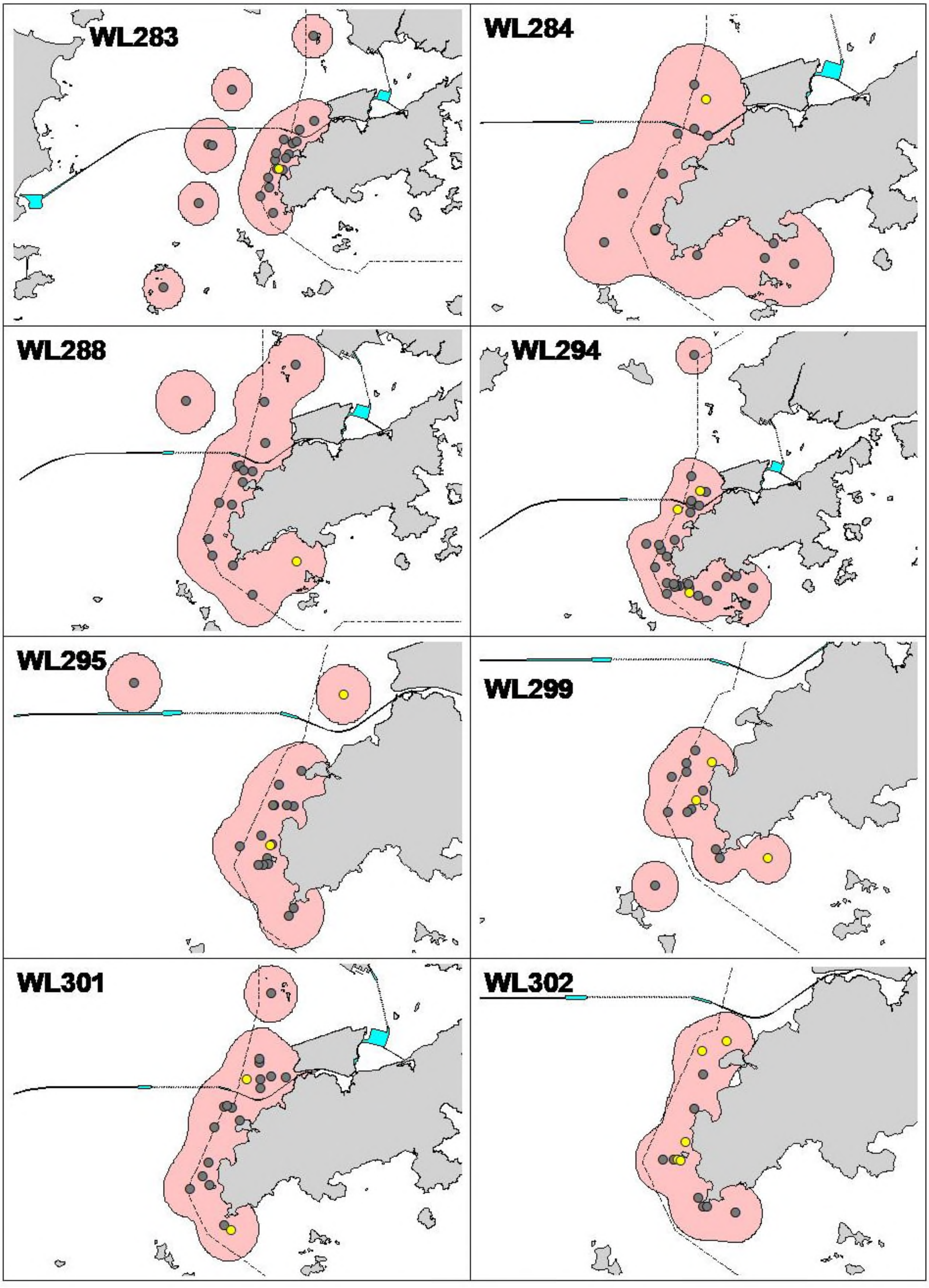
Appendix V. (cont'd).



Appendix V. (cont'd).



Appendix V. (cont'd).



Appendix V. (cont'd).