MONITORING OF MARINE MAMMALS IN HONG KONG WATERS (2015-16)

FINAL REPORT
(1 April 2015 to 31 March 2016)

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TABLE OF CONTENTS

EXECUTIVE SUMMARY …………………………………………….…….…………...... 4

行政摘要 (中文翻譯) ……………………………………………..………….. 7

1. INTRODUCTION ………………………………………………….……..... 9

2. OBJECTIVES OF PRESENT STUDY ……………………….………………. 10

3. RESEARCH TASKS …………………………………….…………………. 11

4. METHODOLOGY ………….……………………………….…………….. 11

4.1. Vessel Survey

4.2. Helicopter Survey

4.3. Photo-identification Work

4.4. Shore-based Theodolite Tracking Work

4.5. Data Analyses

4.5.1. Distribution pattern analysis

4.5.2. Encounter rate analysis

4.5.3. Line-transect analysis

4.5.4. Quantitative grid analysis on habitat use

4.5.5. Behavioural analysis

4.5.6. Ranging pattern analysis

4.5.7. Residency pattern analysis

5. RESULTS AND DISCUSSIONS

5.1. Summary of Data Collection ……………………………….…..….….. 19

5.1.1. Survey effort

5.1.2. Marine Mammal Sightings

5.1.3. Photo-identification of Individual Dolphins

5.1.4. Shore-based Theodolite Tracking

5.2. Distribution ……… …..…………….. ………………………………. 23

5.2.1. Distribution of Chinese White Dolphins

5.2.2. Distribution of finless porpoises

5.3. Habitat Use ………..…………………….…………………………… 26

5.3.1. Habitat use patterns of Chinese White Dolphins
5.3.2. Habitat use patterns of finless porpoises
5.4. Group Size, Calf Occurrence and Activities …………………….………… 31
5.4.1. Group sizes of dolphins and porpoises
5.4.2. Calf occurrence of dolphins
5.4.3. Activities of dolphins
5.4.4. Dolphin associations with fishing boats
5.5. Encounter Rate ……..……………………….……………………….…. 34
5.5.1. Encounter rates of Chinese White Dolphins
5.5.2. Encounter rates of finless porpoises
5.6. Density and Abundance ……….…………………….………………… 37
5.6.1. Estimates of dolphin density and abundance in 2015
5.6.2. Temporal trend in dolphin abundance
5.7. Range Use, Residency and Movement Pattern ….……………….....… 41
5.7.1. Individual range use and residency pattern
5.7.2. Individual movement pattern
5.7.3. Temporal changes in range use of individual dolphins
5.7.4. Cross-boundary movements beyond Hong Kong waters
5.8. Synopsis on the Latest Status of Dolphin Occurrence in Hong Kong ...…53

6. SCHOOL SEMINARS AND PUBLIC AWARENESS ……………………... 57

7. ACKNOWLEDGEMENTS …..……………………………………...... 57

8. LITERATURE CITED ……………………………………………….. 58

TABLE 1 ……...……………………….………………………….......... 61

FIGURES 1-54 ..………………………………………………………. 64

APPENDICES I-V ……………………….………….………….……... 118

EXECUTIVE SUMMARY

Since 1995, a longitudinal study on Chinese White Dolphins and Indo-Pacific finless porpoises has been conducted in Hong Kong. The present monitoring study represents a continuation of this long-term research study with the funding support from the Agriculture, Fisheries and Conservation Department of the Hong Kong SAR Government, covering the period of April 2015 to March 2016. During this one-year study period, 170 line-transect vessel surveys with 5,273.5 km of survey effort were conducted among ten survey areas in Hong Kong. In total, 250 groups of 946 Chinese White Dolphins and 165 groups of 508 finless porpoises were sighted during vessel and helicopter surveys. Most dolphin sightings were made in West Lantau (WL) and Southwest Lantau (SWL) survey areas. In North Lantau waters, their occurrence mainly concentrated around Lung Kwu Chau, and they had nearly disappeared from Northeast Lantau (NEL) waters in 2015. There were continuous declining usage of dolphins in both NEL and Northwest Lantau (NWL) waters since the commencement of Hong Kong-Zhuhai-Macau Bridge (HZMB), while a surge of dolphin usage was found in SWL in recent years. The majority of finless porpoise sightings were clustered between Shek Kwu Chau and the Soko Islands in 2015-16, where porpoises had also consistently utilized in the past several years.

In 2015, important habitats for Chinese White Dolphins were identified along the west coast of Lantau as well as around Lung Kwu Chau in NWL. The dolphin habitat use patterns revealed a progressive decline in their densities in North Lantau waters from 2011-2015. Their occurrence was largely restricted to the waters around Lung Kwu Chau in 2015, while their densities had dramatically declined from a high usage to virtual absence around the Brothers Islands and Sham Shui Kok during the five-year period. On the other hand, the important porpoise habitats during 2006-15 were located to the south of Tai A Chau, west and southwest of Shek Kwu Chau, south of Cheung Chau, and the waters between Shek Kwu Chau and Soko Islands in the dry season, while their habitats at the juncture of Po Toi and Ninepins survey areas were identified as important during the wet season.

There was a marked decline in dolphin encounter rate in North Lantau region since 2011 to an exceptionally low level in 2015, but the combined one in WL and SWL remained at a higher level in 2015. Since the commencement of HZMB-related construction works in 2012, there were dramatic declines in quarterly dolphin encounter rates first in NEL, and subsequently expanded to the entire North Lantau region in the past five years.

With the decline in habitat use of dolphins in North Lantau waters in recent years and a corresponding increase in habitat use in WL and SWL waters, SWL waters had become an important dolphin habitat and contributed to a greater portion of the total abundance of dolphins in Hong Kong. As such, starting from 2015, instead of examining three survey areas (i.e. WL, NWL and NEL), the abundance estimate of dolphins also included SWL, in order to present a more complete picture of the occurrence of dolphins in Hong Kong waters.

In 2015, the combined estimate of dolphin abundance in Hong Kong waters in the four survey areas comprising SWL, WL, NWL and NEL was 65 (the estimates for the last five years, i.e. 2010 to 2014, were 86, 88, 80, 73 and 87, respectively). The combined estimate for WL, NWL and NEL was 41 individuals in 2015 (the estimates for the last five years, i.e. 2010 to 2014, were 75, 78, 61, 62 and 61, respectively), and the estimate for SWL in 2015 was 24 (the estimates for the last five years, i.e. 2010 to 2014, were 11, 10, 19, 11 and 26, respectively).

In 2015-16, 180 individual dolphins with 566 re-sightings were identified, with most of these made in WL and SWL. Many year-round residents that were frequently sighted in Hong Kong waters in the past have disappeared or only occurred occasionally during the present study period. Temporal trend in individual movements across different survey areas revealed that the ones between NEL and NWL had greatly diminished in recent monitoring periods, while there was an emerging intensity of individual movements between WL and SWL in the past six monitoring periods.

Range use of individual dolphins indicated that there were changes in the utilization pattern of dolphins in Hong Kong waters. Out of the 59 individuals from the northern social cluster, 38 individuals had utilized Lantau waters progressively less since 2011, 44 of them (75%) had started to utilize west Lantau waters more, with 10 individuals even starting to utilize SWL waters more in 2015. Similarly, nearly half of 55 individuals from the western social cluster examined had utilized SWL waters progressively more in recent years, and eight individuals had actually shown clear range shifts from WL to SWL waters.

In addition, the decline of dolphin abundance in Hong Kong was also partly due to the expansion or shifting of habitat use of some dolphins from Hong Kong waters into Mainland waters. Surveys conducted by Mainland researchers in Lingding Bay between August 2015 and March 2016 had identified 23 and 25 individuals that were members of the western social cluster and northern social cluster, respectively, showing that they had expanded or shifted their habitat use into Mainland waters.

Evidently, the changes in dolphins' distribution, habitat use, abundance and individual range use in recent years are the consequences stemmed from the combination of existing threats and additional threats from coastal development. There could still be some lingering effects from the HZMB construction works, and several additional threats such as the increased volume of high-speed ferries may have further compounded the problems for dolphins in 2015 and beyond. To address these issues, several recommendations are made, including a presumption against further reclamation around Lantau waters until a thorough assessment of cumulative impacts from different construction works is completed, a better control of marine traffic volume of high speed ferries, and a proposal of establishing a large marine protected area connecting the existing and proposed marine parks in the western waters of Hong Kong.

行政摘要 (中文翻譯)

自 1995 年開始，一項有關本地中華白海豚及印度太平洋江豚的長期研究經已展開。此項為期一年 (由 2015 年 4 月至 2016 年 3 月)、獲香港特別行區政府漁農自然護理署資助的研究工作，正是這長期監察的延伸。在長達十二個月的研究期間，研究員共進行了 170 次樣條線船上調查，在全港十個調查區共航行了 5,273.5 公里，並觀察到共 250 群中華白海豚 (總數達 946 隻) 及 165 群江豚 (總數達 508 隻)。大部份中華白海豚均在大嶼山西面及西南面水域出沒；在大嶼山北面水域，白海豚大多只出現在龍鼓洲一帶水域，同時卻差不多絕跡於大嶼山東北面水域。在過往數年，自港珠澳大橋興建以來，白海豚在大嶼山東北面及西北面的使用量持續減少，但同時間在大嶼山西南面水域的使用量卻逐漸提升。另一方面，在 2015-16 年間江豚主要出沒於石鼓洲與索罟群島之間一帶水域，而這片水域亦是江豚在過去數年恆常使用的生境。

中華白海豚在 2015 年的重要棲身地，主要集中在大嶼山西面整片水域及西北大嶼山的龍鼓洲一帶水域。2011-2015 期間，中華白海豚於北大嶼山水域的使用率逐漸下降，至 2015 年僅限於使用龍鼓洲附近水域；牠們在大小磨刀洲及深水角一帶水域亦由使用率甚高的水平，大幅下降至差不多完全消失於該片水域。此外，在 2006-15 年期間，在枯水期被確認為重要的江豚生境包括大鴉洲以南、石鼓洲西面及西南面、長洲以南、及大鴉洲與石鼓洲之間一帶水域；另一方面，江豚在豐水期間使用量較高的生境，則集中在及蒲台與果洲兩個調查區域交界之水域。

中華白海豚於北大嶼山區域的目擊率，自 2011 年起大幅下降至 2015 年之極低水平；反之，大嶼山西面及西南面水域之合併目擊率，於 2015 年仍維持在較高的水平。在過去五年間，自港珠澳大橋相關工程於 2012 年開展，東北大嶼山的季度海豚目擊率首先明顯下降，此現象隨後更蔓延至西北大嶼山水域。

隨着近年中華白海豚於大嶼山北面的使用量有所下降，同時在大嶼山西及西南面的使用量相應上升，大嶼山西南面水域近年已成為海豚另一重要生境，佔本港整體海豚數量的比重有所增加。因此，由 2015 年開始，中華白海豚的數目估算，會由以往三個調查區，即大嶼山西、西北及東北面，增加第四個調查區，即大嶼山西南水域，以更全面展示中華白海豚於本港水域出沒的情況。

在 2015 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 65 隻（2010 至 14 年的數目分別為 86，88，80，73 及 87 隻），其中大嶼山西、西北及東北面水域共有 41 隻(2010 至 2014 年的數目分別為 75、78、61、62 及 61 隻)，而大嶼山西南面水域的海豚數目為 24 隻(2010 至 14 年的數目

分別為 11、10、19、11 及 26 隻)。

研究員於 2015-16 年間辨認出 180 隻個別海豚、共 566 次的目擊紀錄，其中大部分均出現在大嶼山西面及西南面水域；過去一些經常出沒於香港水域的海豚個體，卻於 2015-16 年間不見其蹤影，或只有零星的出沒紀錄。個別海豚來往不同調查區之年度趨勢變化顯示，白海豚來往西北及東北大嶼山水域的頻密程度已大不如前，但在過去六個年度來往大嶼山西面及西南面水域之移動卻持續增加。

個別海豚活動範圍分析顯示海豚在本港水域內的活動範圍有所改變。59 隻屬北大嶼山社群的海豚當中，38 隻自 2011 年起逐漸減少使用該水域，44 隻(百分之七十五)增加使用大嶼山西面水域，10 隻甚至於 2015 年開始增加使用大嶼山西南面水域。同時，55 隻屬西大嶼山社群的海豚中，近年接近一半已逐漸增加使用大嶼山西南面水域，有 8 隻更已明顯地由大嶼山西面轉移到大嶼山西南面活動。

此外，本港海豚數目減少的部分原因是個別海豚擴展或轉移活動範圍至內地水域。內地於在 2015 年 8 月至本年 3 月期間於伶仃洋進行的調查顯示，23 及 25 條分別屬於北大嶼山社群及西大嶼山社群的海豚已擴展或轉移活動範圍至內地水域。

種種證據顯示，在香港生活的中華白海豚，無論在其分佈、棲息地使用、數量及個體活動範圍使用於近年所呈現的種種變化，均與牠們每天面對的一些長久存在的威脅、及近期一些與沿岸發展有關的額外威脅有密切的關係。雖然港珠澳大橋工程的施工高峰期已過，但與其相關的延後影響可能仍然存在；再加上一些額外威脅，例如仍在增長的高速船航次，這些影響有可能令海豚於 2015 年及往後所面對的問題更趨複雜。為達致中華白海豚繼續使用香港水域的目標，我們建議有關部門應積極考慮推行一系列海豚保育措施，包括在未完全掌握不同工程對白海豚的累積影響之前，應避免在大嶼山水域進行額外的基建工程；妥善管理高速船隻的交通量；並儘快在大嶼山西面水域設立一大型海豚保育區，將現有的沙洲及龍鼓洲海岸公園、擬建中的西南大嶼山海岸公園及索罟群島海岸公園連接起來。

1. INTRODUCTION

Since 1995, the Hong Kong Cetacean Research Project (HKCRP) has been conducting a longitudinal study on Chinese White Dolphins (also known as the Indo-Pacific humpback dolphin, *Sousa chinensis*) and Indo-Pacific finless porpoises (*Neophocaena phocaenoides*) in Hong Kong and the Pearl River Delta region. The study has been primarily funded by the Agriculture, Fisheries and Conservation Department (AFCD) as well as various government departments and NGOs. The multi-disciplinary research programme aims at providing critical scientific information to the Hong Kong SAR Government to formulate sound management and conservation strategies for the local populations of dolphins and porpoises (Hung 2014, 2015).

In addition, HKCRP has been extensively involved in numerous environmental consultancy studies to assess potential and actual 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, 2014, 2015; Jefferson et al. 2002, 2006, 2009, 2012).

The present monitoring project represents a continuation and extension of this research programme, with funding support from AFCD of the HKSAR Government. The main goal of this one-year monitoring study is to collect systematic data for assessment of the distribution and abundance of Chinese White Dolphins and Indo-Pacific finless porpoises in Hong Kong, to take photographic records of individual dolphins, and to analyze the monitoring data for better understanding of the various aspects of local dolphin and porpoise populations. The one-year project covers the period of 1 April 2015 to 31 March 2016, and this draft final report is submitted to AFCD to summarize the status of the monitoring project covering the entire 12-month study period.

2. OBJECTIVES OF PRESENT STUDY

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

The first one was to assess the spatial and temporal patterns of distribution, abundance and habitat use of Chinese White Dolphins and Indo-Pacific finless porpoises in Hong Kong in detail. This objective was achieved through data collection on dolphins and porpoises by conducting regular systematic line-transect vessel surveys and helicopter surveys. The second objective was to identify individual Chinese White Dolphins by their natural markings using photo-identification technique. This objective was achieved by taking high-quality photographic records of Chinese White Dolphins for photo-identification analysis. Photographs of re-sighted and newly identified individuals were compiled and added to the current photo-identification catalogue, with associated descriptions for each newly identified individual. Photographic records of finless porpoises were also taken during vessel and helicopter surveys for educational purposes.

The third objective was to analyze the monitoring data for better understanding of the various aspects of local dolphin and porpoise populations. This objective was achieved by conducting various data analyses, including line-transect analysis, encounter rate analysis, distribution analysis, behavioural analysis and quantitative grid analysis to assess the spatial and temporal patterns of abundance, distribution, habitat use and trends of occurrence of local dolphins and porpoises using systematic line-transect survey data. The fourth objective was to conduct ranging pattern and residency pattern analyses to examine individual core area use, ranging pattern and movement pattern of Chinese White Dolphins based on the data obtained from both the line-transect survey and the photo-identification work.

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 through the arrangement of AFCD.

3. RESEARCH TASKS

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

- to collect data for assessment on spatial and temporal patterns of distribution, abundance and habitat use of local dolphins and porpoises through systematic line-transect vessel surveys and helicopter surveys;
- to analyze data for assessment on spatial and temporal patterns of distribution, abundance, habitat use and trends of occurrence of dolphins and porpoises in Hong Kong;
- to take photographic records of Chinese White Dolphins for photo-identification analysis and update the photo-identification catalogue;
- to analyze photo-identification data of individual Chinese White Dolphins to assess their ranging patterns, core area use and movement patterns;
- to take photographic records of finless porpoises; and
- to assist AFCD in arousing public awareness on local dolphins and porpoises through school seminars.

4. METHODOLOGY

4.1. Vessel Survey

The survey team used standard line-transect methods (Buckland et al. 2001) to conduct regular vessel surveys, and followed the same technique of data collection that has been adopted in the past 18 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (Hung 2005, 2015; Jefferson 2000a, b; Jefferson et al. 2002). The territorial waters of Hong Kong Special Administrative Region are divided into twelve different survey areas, and line-transect surveys were conducted among ten survey areas (i.e. Northwest (NWL), Northeast (NEL), West (WL), Southwest (SWL) and Southeast Lantau (SEL), Deep Bay (DB), Lamma (LM), Po Toi (PT), Ninepins (NP) and Sai Kung (SK)) (Figure 1).

For each vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars. Both observers searched the sea ahead of the vessel, between 270^o and 90^o (in relation to the bow, which is defined as 0^o). One to two additional experienced observers were available on board to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species. Beforehand they had participated in rigorous at-sea training program provided by the author.

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

4.2. Helicopter Survey

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

4.3. Photo-identification Work

When a group of Chinese White Dolphins were sighted during the line-transect vessel survey, the survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph each dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical. One to two professional digital cameras (*Canon* EOS 7D 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 nearly 900 identified dolphins in the PRE Chinese White Dolphin photo-identification catalogue curated by HKCRP team. Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson 2000a; Jefferson and Leatherwood 1997). All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database. Any new individuals were given a new identification number, and their data were also added to the catalogue, along with text descriptions including age class, gender, any nickname or unique markings. The updated photo-identification catalogue incorporated all new photographs of individual dolphins taken during the present study.

4.4. Shore-based Theodolite Tracking Work

During the present study period, the feasibility study on theodolite tracking of Indo-Pacific finless porpoises was conducted at the Shek Kwu Chau tracking station, as an extension from the previous monitoring period in 2014-15 (see Hung 2015). On each survey day, observers searched systematically throughout the study area for finless porpoises using the unaided eye and 7 x 50 handheld binoculars. A theodolite tracking session was initiated when an individual or group of porpoises was located, and focal follow methods were adopted to track the porpoise movement. Within a group, a focal individual was selected for the purposes of tracking the behaviour and movement of the group, based on its distinctive feature such as colouration or severe injury mark. The focal individual was then tracked continuously via the theodolite, with positions recorded whenever the porpoise surfaced. If an individual could not be positively distinguished from other members, the group would be tracked by recording positions based on a central point within the group when the porpoises surfaced. Tracking would continue until animals were lost from view, moved beyond the range of reliable visibility (>5 km), or when environmental conditions obstructed visibility (e.g. intense haze, high sea state, or sunset). Behavioural state data were also recorded every 5 minutes for the focal individual or group. This interval was long enough to allow for determination of the behavioural state, and short enough to capture behavioural responses to activities nearby. Moreover, when multiple groups or individuals were present in the study area, attempts would be made to record the behaviours of all groups or individuals every 10 minutes, with spotters assisting in determining behaviour of the porpoises.

Positions of porpoises and boat activities were measured using a Sokkisha DT5 digital theodolite with ± 5-sec precision and 30-power magnification connected to a laptop computer running the program *Pythagoras* Version 1.2 (Gailey and Ortega-Ortiz 2002). This program calculates a real-time conversion of horizontal and vertical angles collected by the theodolite into geographic positions of latitude and longitude each time a fix is initiated. *Pythagoras* also displays positions, movements, and distances in real-time. When possible, the position of the focal porpoise was recorded at every surfacing with use of *Pythagoras*. The position, type, and activity of all vessels within 5 km of the focal individual were also recorded. An effort was made to obtain at least several positions for each vessel, and additional positions were acquired when vessels changed course or speed.

4.5. Data Analyses

4.5.1. Distribution pattern analysis

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

4.5.2. Encounter rate analysis

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

4.5.3. Line-transect analysis

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

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

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

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

where D = density (of individuals),
n = number of on-effort sightings,
f(0) = trackline probability density at zero distance,
E(s) = unbiased estimate of average group size,
L = length of transect lines surveyed on effort,
g(0) = trackline detection probability,

N = abundance,
A = size of the survey area,
CV = coefficient of variation, and
var = variance.

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

Besides estimating dolphin abundance in 2015, annual abundance estimates were also generated for every year since 2001 in NWL and NEL survey areas and since 2003 in WL survey area, to investigate any significant temporal trend using linear regression model. To perform such trend analysis, the linear regression model is considered in the three areas by Dr. Gilbert Lui from the Department of Statistics and Actuarial Science of the University of Hong Kong, as follow:

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

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

4.5.4. Quantitative grid analysis on habitat use

To conduct quantitative grid analysis of habitat use (see Hung 2008), positions of on-effort sightings of Chinese White Dolphins and finless porpoises were retrieved from their long-term sighting databases, and then plotted onto 1-km^2 grids among the nine survey areas on GIS. Sighting densities (number of on-effort sightings per km^2) and dolphin/porpoise densities (total number of dolphins/porpoises from on-effort sightings per km^2) were then calculated for each 1 km by 1 km grid with the aid of GIS. Sighting density grids and dolphin/porpoise density grids were then further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid was calculated by examining the survey coverage on each line-transect survey to determine how many times the grid was surveyed during the study period. For example, when the survey boat traversed through a specific grid 50 times, 50 units of survey effort were counted for that grid. With the amount of survey effort calculated for each grid, the sighting density and dolphin/porpoise density of each grid were then normalized (i.e. divided by the unit of survey effort).

The newly-derived unit for sighting density was termed SPSE, representing the number of on-effort **s**ightings **p**er 100 units of **s**urvey **e**ffort. In addition, the derived unit for actual dolphin/porpoise density was termed DPSE, representing the number of **d**olphins **p**er 100 units of **s**urvey **e**ffort. Among the 1-km^2 grids that were partially covered by land, the percentage of 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 can be useful in examining dolphin/porpoise usage within a one square kilometre area. For the present study, both SPSE and DPSE values were calculated in each 1-km^2 grid among all survey areas for the entire one-year period in 2015 for both dolphins and porpoises, and in the past decade of monitoring (i.e. 2006-15) for finless porpoises.

4.5.5. Behavioural analysis

When dolphins were sighted during vessel surveys, their behaviour was observed. Different behaviours were categorized (i.e. feeding, milling/resting, traveling, socializing) and recorded on sighting datasheets. This data 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.

4.5.6. Ranging pattern analysis

For the ongoing ranging pattern study, location data of individual dolphins with 10 or more re-sightings that were sighted during the present study period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home range for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, created by the Alaska Biological Science Centre, USGS (Hooge and Eichenlaub 1997), was loaded as an extension with ArcView© 3.1 along with another extension Spatial Analyst 2.0.

Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD (utilization distribution) level. The core areas of individuals at two different levels (50% and 25% UD) were also examined to investigate their range use in greater detail.

4.5.7. Residency pattern analysis

To examine the monthly and annual occurrence patterns of individual dolphins, their residency patterns in Hong Kong were carefully evaluated. "Residents" were defined as individuals that were regularly sighted in Hong Kong for at least eight years in the past 12 years (i.e. 2004-2015), or five years in a row within the same period. Other individuals that were intermittently sighted during the past years were defined as "Visitors". In addition, monthly matrix of occurrence was also examined to differentiate individuals that occurred year-round (i.e. individuals that occur in every month of the year) or seasonally (i.e. individuals that occur only in certain months of the year). Using both yearly and monthly matrices of occurrence, "year-round residents" were the individual dolphins that were regularly sighted in Hong Kong throughout the year, while "seasonal visitors" were the ones that were sighted sporadically in Hong Kong and only during certain months of the year within the study period.

5. RESULTS AND DISCUSSIONS

5.1. Summary of Data Collection

5.1.1. Survey effort

During the 12-month monitoring period in April 2015 to March 2016, a total of 170 line-transect vessel surveys were conducted among ten survey areas in Hong Kong waters. These included 18 surveys in NEL, 24 surveys in NWL, 28 surveys in WL, 37 surveys in SWL, 22 surveys in SEL, 16 surveys in DB, seven surveys in LM, nine surveys in PT, seven surveys in NP and two surveys in Sai Kung. The details of these survey effort data are shown in Appendix I.

As in the previous monitoring periods, more survey effort were allocated to survey areas outside of North and West Lantau waters during the present monitoring period, as additional surveys have been conducted in NWL, NEL and WL survey areas concurrently under the Hong Kong Link Road (HKLR) regular line-transect monitoring surveys as part of the EM&A works for the Hong Kong-Zhuhai-Macau Bridge (HZMB) construction. In addition, supplementary surveys have been commenced in SWL survey area since March 2015 commissioned by the Highways Department through their Environmental Project Office (ENPO). These additional HZMB-related dolphin monitoring surveys employed the same survey methodology, HKCRP personnel and research vessel to ensure consistency and compatibility with the AFCD long-term dolphin monitoring programme, and the survey data have been made publicly available with regular updates through the HZMB ENPO website (www.hzmbenpo.com). Such EM&A data were combined with the AFCD monitoring data for various data analyses presented throughout this report to increase the overall sample size and to provide important supplementary information on dolphin occurrence during the present monitoring period.

In addition, three helicopter surveys were conducted with the Government Flying Services through the arrangement of AFCD on June 15th, August 5th and October 28th of 2015 during the study period. These surveys mainly covered the eastern and southern waters of Hong Kong, and such off-effort data on local dolphins and porpoises collected from these surveys were also included in the distribution analysis and group size analysis.

Among the ten survey areas, 604.0 hours were spent to collect 5,273.5 km of survey effort during the AFCD monitoring surveys. The majority of these effort (71.9% of total) was conducted in six areas where dolphins regularly occurred, in which 23.3% of total effort were spent in NEL/NWL, 13.2% in WL, 29.5% in SWL/SEL and 5.9% in DB. In addition, 57.5% of total survey effort was allocated to survey areas in southern and eastern waters of Hong Kong (i.e. SWL, SEL, LM, PT, NP and SK) where porpoise occurrences were more frequent. It should be mentioned that 95.3% of all survey effort was conducted under favourable sea conditions (Beaufort 3 or below, with good visibility). Such high percentage of survey effort conducted in favourable conditions is crucial to the success of the marine mammal data collection programme in Hong Kong, as only such data can be used in various analyses to examine their encounter rates, habitat use, and estimations of density and abundance.

During the same 12-month monitoring period in 2015-16, a total of 5,247.5 km of survey effort was conducted in NEL, NWL, WL and SWL under the HZMB-related EM&A dolphin monitoring surveys respectively. This brings the total survey effort to 8,158.0 km for the combined dataset from AFCD and HKLR surveys among the four survey areas. Notably, over 90% 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 survey data for various analyses.

Since 1996, the long-term marine mammal monitoring programme coordinated by HKCRP has collected a total of 169,301 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 52.7% of the effort funded by AFCD. The survey effort in 2015 alone comprised 5.9% of the total survey effort collected since 1996.

5.1.2. Marine Mammal Sightings

<u>Chinese White Dolphin</u> - From AFCD surveys alone, 250 groups of 946 Chinese White Dolphins were sighted during April 2015 to March 2016 (see Appendix II). With the additional sightings from HZMB-related EM&A surveys, a total of 451 groups of 1,699 dolphins were sighted during the same 12-month period. Among these 451 dolphin groups from the combined dataset, 387 were sighted during on-effort line-transect vessel surveys, while the rest were made during off-effort search. Most dolphin sightings were made in WL (252 sightings) and SWL (124 sightings), comprising 83.4% of the total. On the other hand, dolphins occurred in a lesser extent in NWL (68 sightings), and very infrequently in SEL (two sightings), DB (two sightings) and NEL (one sighting) despite extensive amount of survey effort being conducted in these three areas. As in previous monitoring periods, no dolphin

was sighted at all in LM, PT, NP or SK survey areas.

Finless porpoise - During the 12-month study period, 165 groups of 508 finless porpoises were sighted during vessel and helicopter surveys (see Appendix III). During on-effort search, a total of 116 porpoise sightings were made, which can be used in the encounter rate analysis and habitat use analysis. The porpoise groups were mainly sighted in SWL (36 groups), SEL (56 groups) and LM (35 groups) survey areas. Twenty-five porpoise groups were also sighted in PT survey area, while another six and seven groups were sighted in NP and SK survey areas respectively. As in the past, no porpoise was sighted in DB, NWL, NEL and WL survey areas during the monitoring period.

5.1.3. Photo-Identification of Individual Dolphins

From April 2015 to March 2016, over 25,000 digital photographs of Chinese White Dolphin were taken during AFCD monitoring surveys for the photo-identification of individual dolphins. All photographs taken in the field were compared with existing individuals in the photo-identification catalogue that has been compiled 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. Significant amount of photo-identification data were also contributed from the HZMB-related surveys during the same period.

Up to January 2016, a total of 894 individual Chinese White Dolphins have been identified by HKCRP researchers in Hong Kong waters and the rest of the Pearl River Estuary. These included 28 new individuals being added to the catalogue during 2015, all of which were newly-identified in Hong Kong waters for the first time. In the current catalogue, 527 individuals were first identified within Hong Kong territorial waters, while the rest were first identified in Guangdong waters of the Pearl River Estuary. Moreover, 255 individuals have been seen 10 times or more; 200 individuals have been seen 15 times or more; 113 individuals have been seen 30 times or more; and 78 individuals have been seen 50 times or more. On the contrary, nearly half of the identified individuals (47.7%) have only been seen once or twice, with most of these being first identified in Guangdong waters (300 out of 426 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 that significant progress in photo-identification work has been made in the 2015-16 monitoring period (Figure 3).

During the present monitoring period (April 2015-March 2016), a total of 180 individuals, sighted 566 times altogether, were identified during AFCD regular vessel surveys (Appendix IV). In addition, 170 individuals were also identified 511 times during HZMB-related monitoring surveys in NEL, NWL, WL and SWL during the same 12-month period. More than half of the re-sightings of individual dolphins made during AFCD/HZMB surveys were in WL survey area, comprising 52.8% of the total, while many re-sightings were also made in SWL (25.8%) and NWL (20.3%) survey areas. On the contrary, nine re-sightings were made in SEL survey areas, and only one individual were re-sighted in DB (individual CH34) and NEL (individual NL285) survey areas respectively during the 12-month study period.

Among the identified individuals sighted over the 12-month study period, most of them were sighted only a few times, but some have been repeatedly sighted, indicating their strong reliance of Hong Kong as an important part of their home range. For example, 32 individuals were sighted more than 10 times from the combined dataset, with three of them (individuals NL48, NL202 and NL286) sighted more than 15 times during the relatively short study period. The majority of these repeatedly-sighted individuals are considered year-round residents (see Section 5.7.1), and centered their range use in WL and SWL waters. This is in contrast to past monitoring periods that most frequently sighted individuals centered their range use in North Lantau waters.

Moreover, many year-round residents that were frequently sighted in Hong Kong waters in the past have only occurred occasionally, or even disappeared during the present monitoring period. For example, with similar amount of survey effort during the past three monitoring periods, NL24 (one of the most frequently sighted individual in HKCRP photo-ID catalogue) has disappeared since April 2014, even though it was sighted 82 times during 2012-14. NL139 and WL25 have both disappeared since July and August 2014 respectively, even though the two individuals were sighted 59 and 64 times respectively during 2012-14. In fact, there were a total of 19 frequently-sighted individuals that have disappeared from Hong Kong waters in 2015, and many of them were considered year-round or seasonal residents in the past. It is unknown whether they have been dead, or have moved permanently into Mainland waters. This will be further examined in Section 5.7.4.

Moreover, it was noted that many individuals have diminished their usage of Hong Kong waters during the present monitoring period. For example, NL259 was sighted 5 and 12 times in 2013-14 and 2014-15 respectively, but it was only sighted once in 2015-16. Similarly, NL156 was sighted only once in 2015-16, but it was sighted five and seven times in 2013-14 and 2014-15 respectively. Their greatly diminished usage or even complete absence from Hong Kong waters during the present monitoring period raises serious concerns. This issue will be further examined in Section 5.7.4 for any possible cross-boundary movements by individual dolphins which have resulted in their diminished use of Hong Kong waters.

5.1.4. Shore-based Theodolite Tracking

In the present and previous monitoring periods, shore-based theodolite tracking works were conducted at Shek Kwu Chau as a feasibility study on the application of such tracking technique on finless porpoises for the first time. In 2015-16 monitoring period, four theodolite-tracking sessions were conducted from Shek Kwu Chau station to assess whether the porpoises can be reliably tracked from this land-based station, and to study their behaviours and movements in southern waters of Hong Kong.

During 2014-16, a total of eight sessions of theodolite tracking were conducted at Shek Kwu Chau, and 32 groups of finless porpoises with 332 fixes of their positions were collected from this site. Moreover, another 492 fixes were also made from locations of fishing boats, high-speed ferries and other types of vessels from this tracking station. As the sample size of porpoise tracks is still fairly small, continuous porpoise tracking should be conducted at Shek Kwu Chau during their peak occurrence (i.e. January to May) in order to increase the sample size and develop some baseline information on porpoise occurrence, behaviour and movement patterns at this important porpoise habitat.

5.2. Distribution

5.2.1 Distribution of Chinese White Dolphins

During the 12-month monitoring period in 2015-16, Chinese White Dolphins were frequently sighted to the west and southwest of Lantau Island, but to only a moderate extent in Northwest Lantau waters (Figures 4-5).

In 2015 alone, with the combined effort from AFCD and HZMB-related surveys, the dolphin sightings were mainly concentrated along the west coast of Lantau, extending from Tai O Peninsula to Fan Lau (Figure 6). Their distribution in SWL waters was somewhat even, with higher concentrations along the stretch of coastlines from Fan Lau to Kau Ling Chung as well as to the south of Shui Hau Peninsula

(Figure 6). Dolphins were also sighted all around the Soko Islands, especially to the north of Siu A Chau. Moreover, a few sightings were made in SEL survey area, mainly in the inshore waters of Pui O Wan (Figure 6).

On the other hand, their occurrence in North Lantau waters mainly concentrated around and to the north of Lung Kwu Chau (Figure 7). For the rest of North Lantau waters, dolphin sightings were sparsely distributed to the west and north of the airport platform, but they were mostly absent at the central portion of the North Lantau region. Most notably, they have nearly disappeared from NEL waters in 2015 with only a single dolphin sighted very briefly between Sham Shui Kok and Yam O (Figure 7).

As in the previous two years, dolphin occurrence near HZMB-related work areas was generally low in 2015 (Figures 6-7). Dolphins were not sighted at all near the HKBCF and HKLR03 reclamation sites, and they have also avoided the northern landfall and southern viaduct of the Tuen Mun-Chek Lap Kok Link (TMCLKL) construction sites. On the other hand, some dolphin sightings were made along the alignment of HKLR to the west of the airport, but their occurrence there was still relatively infrequent (Figures 6-7).

<u>Temporal change in annual distribution records (2010-15)</u>

Using AFCD survey data alone, dolphin distribution records in the previous five years was compared with the one in 2015 to examine any temporal change in dolphin usage around Lantau waters (Figure 8). Several notable differences were observed. First, dolphin occurrence in NEL has progressively diminished starting in 2013, and reached to the lowest point in 2015 with no dolphin being sighted there at all, even though this area has been frequently utilized by dolphins as their important habitat in 2010-12, especially around the Brothers Islands (Figure 8). The significant decline in usage of the NEL waters has raised serious concerns on whether the on-going construction works of HZMB since 2012 has been seriously affecting dolphin usage in this area in addition to the other anthropogenic disturbances.

In addition to the dramatic decline in dolphin usage of NEL waters in recent years, such decline has also been extended to the rest of North Lantau waters in 2014 and 2015 (Figure 8). In the past, the waters within and around Sha Chau and Lung Kwu Chau Marine Park, as well as the adjacent waters between Pillar Point and the airport platform (including the Urmston Road) have served as important dolphin habitats with their frequent occurrence (see also Hung 2008, 2014). However, their occurrence in NWL in 2014 was largely limited to the northwestern portion of the survey area, and such occurrence have further shrunk with very limited occurrence just around Lung Kwu Chau in 2015 (Figure 8). Even though the peak of HZMB construction activities occurred in 2014, there appeared to be some lingering effects of anthropogenic disturbance from the bridge works that have further restricted dolphin usage in North Lantau waters in 2015. This critical issue would be further addressed throughout the rest of the present report.

In addition, the paucity of dolphin sightings made to the west of airport platform was observed in 2013-15 (Figure 8), where dolphins were frequently sighted in 2010-12. In the past, this area at the juncture of NWL and WL survey areas has served as an important habitat for dolphins where individual dolphins from both northern and southern social clusters in Hong Kong come into contact (Dungan et al. 2012). Through focal follow study and shored-based theodolite tracking study, this area has also been identified as an important traveling corridor for dolphins to move between WL and NWL survey areas before HKLR construction (Hung 2014). The rare occurrence of dolphins from the coastal waters between Sham Wat and the western end of airport platform coincided well with the construction period of HKLR09 with works commenced in early 2013, and it is likely that dolphin occurrence in this important habitat has been seriously affected by the associated construction works (including bored piling activities) and increased construction vessel movements in this area (see Hung 2014, 2015). As the bridge piers will pose obstructions in the water, the overall dolphin usage over the bridge alignment as well as the north-south movement pattern of individual dolphins would become a major concern, and this will be further examined in Section 5.7.2.

On the contrary, evidently there has been a surge of dolphin usage in SWL waters in 2014 and 2015 as compared to the earlier years, especially along the coastal waters between Fan Lau and Shui Hau Peninsula as well as around the Soko Islands (Figure 8). As the dolphin usage has progressively declined in North Lantau waters and increased in SWL waters, it warrants the investigation on whether some individual dolphins from the northern social cluster may have shifted or expanded their range use to WL and SWL. Such potential range shift and expansion would be further examined in details in Section 5.7.3.

Finally, it should be emphasized that the coastal waters of West Lantau was the only area in Hong Kong where consistent and frequent occurrence of dolphins was recorded in the past six years (Figure 8). This highlights the urgent needs for the protection of this remaining important dolphin habitat in Hong Kong, in light of the continuous development pressure and anthropogenic activities seriously affecting dolphin occurrence in other parts of their local range.

5.2.2. Distribution of finless porpoises

During the 12-month period in 2015-16, the majority of finless porpoise sightings were clustered between the Soko Islands and Shek Kwu Chau as well as to the south of Cheung Chau (Figure 9). In addition, some porpoise sightings were also made to the south of Soko Islands, between Lamma Island and Cheung Chau, around and to the east of Po Toi Islands, and in the offshore waters to the east of Sai Kung Peninsula (Figure 9). On the contrary, porpoises rarely occurred in the inshore portion of South Lantau waters (except a few sightings within Pui O Wan), between Lamma Island and Po Toi Islands, and near Ninepins Islands (Figure 9).

All porpoise sightings in the eastern waters were made during summer and autumn when line-transect survey effort was allocated in these waters (Figure 9), even though some effort from helicopter surveys was also spent there in winter and spring months. In South Lantau waters, where the survey effort has been fairly consistent throughout the year, seasonal occurrence of porpoises was evident, with the majority of sightings made in summer and autumn months located in the offshore waters (Figure 9). On the contrary, porpoise sightings were more evenly distributed in these waters during winter and spring months.

A comparison of annual porpoise distribution patterns from 2012-2015 revealed that porpoise occurrence was a lot more frequent in South Lantau waters in 2013-2014 than in either 2012 or 2015 (Figure 10). Moreover, porpoises have rarely occurred on both sides of Lamma Island in 2014 and 2015, where they were frequently sighted in 2012 and 2013. Another notable difference was the more frequent occurrence of porpoises in the eastern waters in 2015, especially around the Po Toi Islands. During the four-year period, the most consistently utilized areas by the porpoises were located around the Soko Islands, and in the waters between Shek Kwu Chau and the Soko Islands (Figure 10). Most of these areas have been proposed to be established as marine parks in the near future, which would certainly offer some protection for these important porpoise habitats.

5.3. Habitat Use

5.3.1. Habitat use patterns of Chinese White Dolphins

For the quantitative grid analysis on habitat use, the SPSE and DPSE values (i.e.

sighting densities and dolphin densities respectively) were calculated in all grids among the six survey areas where Chinese White Dolphins regularly occurred during 2015, which was also compared to the annual patterns in the past four years.

In 2015, the important habitats of Chinese white dolphins in WL and SWL waters that recorded high dolphin densities were identified near Tai O Peninsula, Kai Kung Shan, Peaked Hill, around Fan Lau and Kau Ling Chung (Figure 11). In North Lantau waters, the only area with high dolphin densities was located among a few grids around Lung Kwu Chau, while the rest of the region recorded low to very low density of dolphins (Figure 11). Notably, only one grid in NEL recorded dolphin occurrence with very low density, since only a single dolphin was sighted for the entire year, despite a considerable amount of survey effort being conducted in this area in 2015.

<u>Temporal changes in dolphin habitat use patterns (2011-15)</u>

A comparison was made among the habitat use patterns in the past five years to examine whether there was any recent temporal change in densities at various important dolphin habitats. Dolphin habitat use patterns in WL waters were similar across the five-year period, although their densities were generally lower among some WL grids in 2012 while more WL grids recorded very high densities in 2014 and 2015 (Figure 12). It was also noted that the usage of SWL waters have greatly increased in 2014 and 2015 when compared to the earlier years, with many grids recorded moderate to high densities, especially around the Soko Islands (Figure 12).

In contrast, with the exception of the waters around Lung Kwu Chau being utilized by dolphins at a high level throughout the five-year period, dolphin densities in NWL survey area have been declining progressively for the rest of the North Lantau region, especially in the waters between Pillar Point and the airport platform as well as around Sha Chau (Figure 13). In 2015, dolphin usage was largely confined to the waters around Lung Kwu Chau. In NEL waters, there was a even more dramatic decline in dolphin densities during the five-year period, from high to very high usage around the Brothers Islands and Sham Shui Kok in 2011, to a virtual absence from this same area in 2015 (Figure 13). In fact, only one grid recorded very low dolphin density in NEL during 2015 (with only a lone dolphin sighted for the entire year), while there were 33 and 25 grids that recorded dolphin occurrence in NEL during 2011 and 2012 respectively. This general area has been identified as important dolphin habitat in the past (Hung 2008, 2014), but dolphin usage has diminished dramatically since the construction of HZMB-related projects commenced in mid-2012.

Temporal changes in habitat use patterns at six key habitats (2004-15)

The temporal trends in dolphin usage at six key habitats were also examined between 2004-15, which included an existing marine park around Sha Chau and Lung Kwu Chau, three proposed marine parks at the Brothers Islands, Fan Lau (i.e. Southwest Lantau) and the Soko Islands, and two other "dolphin hot spots" at Tai O and Black Point where they regularly occurred in the past (Figure 14). To examine dolphin usage over these six key habitats that encompass a suite of grids, the number of on-effort sightings and unit of survey effort were pooled together from those grids, to calculate dolphin densities (DPSE) as a whole for each year during the 12-year study period of 2004-15 for examination of their temporal trends.

Among the existing marine park and three proposed marine parks, the proposed Southwest Lantau Marine Park (12 grids) recorded the highest level of dolphin usage during the 12-year period (Figure 15). After an apparent decline in dolphin usage from 2004-2009, the DPSE values rose back to a higher level there in recent years, with a noticeable increase between 2012 and 2015. As the only marine park established in the western waters of Hong Kong, the Sha Chau and Lung Kwu Chau Marine Park (17 grids) recorded a declining usage from the highest in 2004 to the second lowest in 2010 (Figure 15). Since then, there was another increasing trend from 2010 to 2013 before another noticeable drop occurred during 2013-15. In fact, the dolphin density within this existing marine park dropped to the lowest in 2015 since 2004, with a 64% drop in DPSE values during the 12-year period. As the only existing marine park that was established for dolphin conservation purposes, dolphin usage there would present useful reference on whether such conservation measure would be an effective tool to safeguard dolphins from further development and some potential threats (e.g. vessel traffic and lack of prey resources). Therefore, the recent noticeable decline in dolphin usage of this marine park should be a great concern. Such usage should be closely monitored in upcoming years, especially in light of the recent route diversion of Sky Pier high-speed ferries that have brought significant amount of vessel traffic to this area with increased acoustic disturbance, which would be further discussed in Section 5.8.

Within the proposed Brothers Marie Park (12 grids), there was a consistent declining trend from the highest in 2004 to the relatively low level in 2010, and this coincided well with the temporal trend within the Sha Chau and Lung Kwu Chau Marine Park during the same period (Figure 15). After a marked rebound to a higher level in 2011, DPSE values at this proposed Brothers Marine Park plummeted to zero in 2015 (Figure 15). In fact, dolphin usage in this soon-to-be established marine park was the worst among all six key dolphin habitats in 2015. As this area will soon be established to become a marine park in 2016 as a compensation measure for the habitat loss resulted from the HKBCF reclamation, any sign of recovery in dolphin usage at this once-important dolphin habitat should be closely monitored, and any protective measure should be implemented as soon as possible to reverse the alarming trend in dolphin usage around the Brothers Islands.

Throughout the 12-year period, dolphin densities at the proposed Soko Islands Marine Park (20 grids) remained at a low level with no consistent trend. However, following the exceptionally low densities in 2012 and 2013, dolphin usage was much higher in this area in 2014 and 2015 (Figure 15). Both dolphin and porpoise usage should be continuously monitored around the Soko Islands, as a proposed marine park is aimed to be established in 2017 in this area where both resident cetacean species in Hong Kong regularly occur (Hung 2008).

As one of the dolphin hot spots in western waters of Hong Kong, the waters around Tai O Peninsula (four grids) consistently recorded high dolphin densities throughout the past decade (Figure 15). However, after a gradual increasing trend from 2004 to the highest in 2009, dolphin usage of this important habitat has declined noticeably to the lowest level in 2012, before rising to a relatively higher level in 2014 and 2015 (Figure 15). The diminished usage of dolphins in this important habitat in recent years could be related to the dolphin-watching activities originated from Tai O fishing village as well as the nearby HZMB construction in both Hong Kong and Mainland waters. On the other hand, dolphin usage at Black Point (four grids) has greatly fluctuated with no apparent trend, but apparently the usage has been exceptionally low in both 2014 and 2015 (Figure 15). As this area is situated at the border of a proposed large-scale reclamation site at Lung Kwu Tan, special attention should be paid on dolphin occurrence in this general area in the upcoming years.

5.3.2. Habitat use patterns of finless porpoises

The habitat use patterns of finless porpoises were examined by calculating SPSE and DPSE values in grids across the five areas where they regularly occurred (i.e. SWL, SEL, LM, PT and NP) for the entire year of 2015 as well as the 10-year period of 2006-15. The spatial pattern of porpoise habitat use revealed that their most heavily utilized habitats in 2015 included the waters to the south of Cheung Chau, near Shek Kwu Chau and around the Soko Islands (Figure 16). A number of grids in

LM, PT and SK survey areas also recorded high to very high porpoise densities in 2015 (Figure 16), but those results could also be biased by the relatively low amount of survey effort conducted during the 12-month study period. Therefore, survey effort and porpoise data collected from the past monitoring periods should be pooled and analyzed for a longer period with sufficient amount of data, in order to present a better picture of porpoise habitat use in eastern waters of Hong Kong.

For that reason, the SPSE and DPSE values of porpoise habitat use were also calculated by pooling the survey effort and on-effort porpoise sightings from 2006-15 with a much larger sample size and a longer study period. Since finless porpoises in Hong Kong exhibited pronounced seasonal pattern of distribution, with rare occurrence in each survey area during certain period of the year (Hung 2005, 2008; Jefferson et al. 2002), the ten-year dataset was further stratified into winter/spring (December through May) and summer/autumn (June through November) to deduce habitat use patterns of porpoises for the dry and wet seasons respectively.

For the examination of porpoise habitat use patterns during the dry season (winter and spring months) in 2006-15, in which the majority of survey effort was allocated to SWL, SEL and LM survey areas, the grids with high porpoise densities were mostly located in offshore waters in South Lantau region (Figure 17). In particular, important porpoise habitats during the dry season were located to the south of Tai A Chau, west and southwest of Shek Kwu Chau, south of Cheung Chau, and the waters between Shek Kwu Chau and the Soko Islands (Figure 17). Moreover, porpoise densities were also moderately high at the southwest corner (i.e. near Ha Mei Tsui) and eastern side (i.e. a few kilometres away from Tung O Wan) of Lamma Island (Figure 17). On the contrary, most grids toward the western end of SWL, the coastal waters between Fan Lau and Chi Ma Wan Peninsula (including Pui O Wan) and the southern waters of Lamma only recorded moderately low to low densities of porpoises. They also generally avoided the northern end of Lamma Island, and the offshore area at the juncture of SEL and LM survey areas (Figure 17).

During the wet season (summer and autumn months), more survey effort were allocated to the eastern survey areas (i.e. PT and NP), while the survey effort remained relatively consistent in SWL and SEL waters year-round. Much fewer surveys were conducted in LM waters during the wet seasons of 2006-15. In summer and autumn months, porpoise densities were generally higher at the juncture of PT and NP survey areas (Figure 18). Although porpoise densities at some grids in NP waters were very high, these results could be biased as the survey effort accumulated over the ten-year period in this survey area was still relatively low (less than 10 units of survey effort in total for most grids). On the other hand, even though porpoises occurred in South Lantau and Lamma waters during the wet season, their densities were generally low with no particular habitat preference in these areas during these months. In fact, most of the grids that recorded porpoise densities in the wet season were located to the southern ends of SWL, SEL and LM survey areas (Figure 18), indicating their infrequent visits across the southern territorial boundary of Hong Kong during the wet seasons.

5.4. Group Size, Calf Occurrence and Activities

5.4.1. Group sizes of dolphins and porpoises

During the 12-month study period, group sizes of Chinese White Dolphins ranged from singles to 22 animals, with an overall mean of 3.8 ± 3.31. Among the six areas where dolphins occurred in 2015-16, the mean group size was the lowest in NEL (1.0, with only a single dolphin sighted) and SEL (2.5) but the highest in NWL (4.1). Among the four seasons, mean group sizes were higher in autumn and winter (4.3 and 4.1 dolphins per group respectively), while the one during spring (3.0) was lower than the overall mean.

Most dolphin groups sighted during the 2015-16 monitoring period were quite small, with 49.2% of the groups composed of 1-2 animals, and 69.6% of the groups with fewer than five animals (Figure 19). Only 35 out of the 451 groups contained more than ten animals per group.

In 2015, the smaller groups were found throughout the distribution range of dolphins in North, West and South Lantau waters. In particular, most dolphin groups in the peripheral distribution range in South Lantau waters as well as the central and eastern portions of North Lantau waters were dominated by these smaller groups (Figure 20). In contrast, the larger groups were mainly concentrated along the coastal waters of WL survey area as well as near Lung Kwu Chau where higher densities of dolphins were found in 2015 (Figure 20). These larger aggregations could possibly be related to good feeding opportunities for the dolphins.

Long-term trend in annual mean dolphin group sizes since 2002 revealed that the one in 2015 (3.79 dolphins per group) was the third highest in the past decade, following an exceptionally high annual mean recorded in the previous year of 2014 (Figure 21). The noticeable change in group dynamics in 2014 and 2015 could potentially be linked with changes in foraging strategies adopted by the dolphins in midst of increased disturbance from the construction activities in recent years, or it could also be a response to changes in prey distribution and overall prey resources in western waters of Hong Kong, especially after the trawl ban has been implemented for several years. Such temporal trend in dolphin group size should therefore be continuously monitored in the future.

In 2015-16, porpoise group sizes ranged from singles to 20 animals, with an overall mean of 3.1 ± 2.87. This mean group size was similar to the ones in recent monitoring periods. Most of the porpoise groups sighted during the monitoring period were fairly small, with 60.6% of porpoises groups composed of 1-2 animals, and all except 33 groups had less than five animals per group (Figure 22). The mean group sizes in SWL (3.1), SEL (2.9) and PT (2.5) were close to or slightly lower than the overall mean, while the one in LM (4.4) were much higher than the overall mean. Distinct seasonal variation in mean group sizes was evident, with lower mean group size in summer and autumn months but higher mean in winter and spring months.

5.4.2. Calf occurrence of dolphins

Of the 1,553 dolphins sighted during the 2015-16 monitoring study period, 72.1% of them were categorized into six age classes. Among these age classes, the spotted juveniles (28.4%) dominated the largest proportion of dolphins being identified with their age classes. Moreover, a total of 11 unspotted calves (UC) and 34 unspotted juveniles (UJ) were sighted during the 12-mnoth period, with these young calves comprised of only 2.6% of the total.

Temporal trend in annual occurrence of young calves revealed that the percentage of UJs in 2015 was the lowest during the 14-year period of 2002-15, while the percentage of UCs in 2015 was also among one of the lowest in recent years (Figure 23). As mother-calf pairs are more susceptible to anthropogenic disturbances, the exceptionally low percentages of young calves in the past two years raised grave concerns on their survival as well as the suitability of Hong Kong waters for nursing activities for mother-calf pairs, in light of the impacts of HZMB construction works and high level of vessel activities within their habitats as discussed in previous sections.

Distribution of young calves in 2015 was somewhat similar to the overall dolphin distribution, with almost all of them occurred along the west coast of Lantau (Figure 24). Concentrations of young calf occurrence were found near Tai O Peninsula, between Tai O and Yi O, and near Fan Lau. On the contrary, these young calves were rarely sighted in NWL and SWL waters, despite their frequent occurrence in SWL waters in 2015 (Figure 24).

5.4.3. Activities of dolphins

A total of 45 and 28 groups of dolphins were observed to be engaged in feeding and socializing activities during the 2015-16 AFCD monitoring period, comprising of 10.0% and 6.2% of the total dolphin groups respectively. In addition, there were two other groups engaged in traveling activity, but none was engaged in milling activity during the one-year study period.

Temporal trend in annual percentages of feeding and socializing activities revealed that both activities have continued to rebound slightly from the previous lows in 2013 for two consecutive years in 2014 and 2015, but the percentages still remained at a relatively low level when compared to the earlier years (Figure 25).

In 2015, most of the feeding activities occurred along the west coast of Lantau and throughout SWL waters, with particularly higher concentrations between the bridge alignment and Tai O Peninsula, near Peaked Hill, between Shui Hau Peninsula and Siu A Chau, and between the Soko Islands (Figure 26). Occasional feeding activities also occurred around Lung Kwu Chau and to the north of the airport in NWL. Similarly, dolphin sightings associated with socializing activities also occurred more frequently throughout the coastal waters of WL survey area (Figure 26). On the contrary, concentrations of this type of activity were only found between Shui Hau Peninsula and Siu A Chau in SWL, and near Lung Kwu Chau in NWL. The two sightings engaged in traveling and milling activities in 2015 were located near Black Point in NWL and near Shui Hau Peninsula in SWL respectively (Figure 26).

5.4.4. Dolphin associations with fishing boats

Among the 451 groups of dolphins sighted in 2015-16, only 13 were associated with operating fishing boats including purse-seiners (nine groups), gill-netters (three groups) and a hang trawler (one group), or 2.9% of all dolphin groups. Notably, such percentage in 2015 (3.0%, or 16 groups among 526 groups sighted in 2015) was the lowest since 2002. The dramatic decline in fishing boat association in recent years was partly related to the trawling ban implemented in December 2012. Although illegal trawling activities were still often observed near the western and southwestern borders of Hong Kong, dolphins rarely associated with them but mostly with purse-seiners and gill-netters. It is possible that the implementation of trawl ban has increased the fishery resources and resulted in less reliance of fishing boat associations by the dolphins, while the operation of purse-seiners and gill-netters would concentrate the fisheries resources better for dolphins to find more benefits in association with them.

Spatial distribution of dolphin groups associated with different types of fishing boats in 2015 revealed that the associations with purse-seiners occurred predominantly along the west and southwest coasts of Lantau (Figure 27). Associations with other types of fishing boats were exceptionally rare in 2015, which only included the association with a hang trawler near the HKLR alignment, and another association with a gill-netter near Fan Lau (Figure 27).

5.5. Encounter Rate

5.5.1. Encounter rates of Chinese White Dolphins

For the calculations of dolphin encounter rates, only survey data collected in Beaufort 0-3 conditions was included in the analysis as in previous monitoring periods (e.g. Hung 2014, 2015).

From April 2015 to March 2016, the combined encounter rates of dolphins from NEL, NWL, WL and SWL was 4.7, which was the lowest among all monitoring periods since 2002 (the previous low was 5.5 in 2014-15; Figure 28). In fact, there has been a steady decline of dolphin encounter rates in the past three monitoring periods. Among the four survey areas around Lantau, the encounter rate was the highest in WL (15.5), which was considerably higher than in SWL (5.5) and NWL (2.2). The encounter rate in NEL was only 0.1 as a result of one on-effort sighting out of 1,860.9 km of survey effort, which was a tiny fraction of all other survey areas. It should be noted that similar to the previous two monitoring periods, dolphin encounter rate in SWL was much higher than the one in NWL in 2015-16.

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

Temporal trends in annual dolphin encounter rates were examined for the overall combined areas, as well as the two main areas of dolphin occurrence in North Lantau and WL/SWL regions, where the two social clusters of individual dolphins occur respectively. Overall, after the combined encounter rate among the four survey areas of NEL, NWL, WL and SWL reached the lowest in 2014, it has slightly bounced back in 2015, but was still remained at a lower level in recent years (Figure 29).

In North Lantau region (with NEL and NWL combined), there was a dramatic decline in dolphin encounter rate since 2011 to an exceptionally low level in 2015

(Figure 29). In fact, the encounter rate in North Lantau region in 2015 was less than one fifth of the one in 2011, showing an astonishing rate of diminished dolphin usage in this area in recent years. In contrast, even though there was a slight decline between 2013 and 2015, the combined dolphin encounter rate in WL/SWL region remained at a higher level during the three-year period, after a noticeable decline from the highest in 2003 to the lowest in 2011 (Figure 29). Potential range shift of individuals form the northern social cluster to the WL/SWL region would be further examined in Section 5.7.3 to investigate the reason behind the opposite trends of dolphin occurrence in 2011-15 among the two main regions of dolphin occurrence in Hong Kong.

Temporal change in encounter rate in relation to HZMB construction

In the past several monitoring periods, the examination of temporal changes in quarterly encounter rates of dolphins in NEL and NWL revealed that the noticeable drops in NEL coincided with the commencement of reclamation works of HKBCF and HKLR in association with HZMB construction commenced in 2012 (Hung 2014, 2015). For the present report, such temporal trends in each quarter of the five-year period of 2011-15 were once again examined independently.

In NEL, after experiencing noticeable drops in dolphin encounter rates in all four quarters from 2012-14, it dropped even further to zero during the first, third and fourth quarters of 2015, and was nearly zero during the second quarter of the year (Figure 30). On the other hand, steady decline in dolphin encounter rates also occurred in NWL during all four quarters in the past five years, with exceptionally low encounter rates recorded during the first and second quarters of 2015. Notably, after a noticeable drop from 2013 to 2014 during the fourth quarter in NWL, the dolphin encounter rate in 2015 remained fairly similar to the one in 2014. It is apparent that the dramatic declines in quarterly dolphin occurrence has been expanded from NEL to the entire North Lantau region, with consistent declines in dolphin encounter rates throughout all four quarters in North Lantau waters during the past five years (Figure 30).

It should be noted that in the NEL region, both HKBCF and HKLR03 reclamation works commenced in the second and fourth quarters of 2012 respectively, while the reclamation works of TMCLKL northern landfall and bored piling works of TMCLKL southern viaduct commenced in the fourth quarter of 2013 and first quarter of 2014 respectively. The commencement of these construction works all coincided with a further drop in dolphin encounter rates in the respective quarter in NEL waters

(Figure 30). The commencement of HKLR09 piling works at the juncture of NWL and WL survey areas in the second quarter of 2013 also corresponded to a decline in dolphin encounter rate in NWL during the same period (Figure 30). Such drop was even more evident in 2015, where dolphin encounter rate reached zero in the first, third and fourth quarters in NEL, while it remained at the same level as in 2014 during the second quarter in the same area (Figure 30). For NWL, the encounter rate also dropped to the lowest level since the HZMB-related works has commenced, indicating that the construction impacts may have extended to the entire North Lantau region.

It is uncertain whether the impact of a single project commencement or the cumulative impacts of several concurrent projects have resulted in continuous drop in dolphin encounter rates in North Lantau waters. Nevertheless, it is evident that the HZMB-related construction works have played a pivotal role in the marked decline in dolphin usage of North Lantau region in the past several years, which have also resulted in a complete abandonment of their important habitat around the Brothers Islands, and dramatically reduced usage of North Lantau waters as a whole. In the previous monitoring period in 2014, it was shown that several EM&A studies have indicated the various impacts of construction activities associated with HZMB works on the dolphins, which included the increase in vessel movement and acoustic disturbance during construction works (Hung 2015). Even though the various construction works and the associated number of work vessels have been progressively reduced in 2015, there was still no sign of turnaround on the continuous decline in dolphin usage in North Lantau waters. Therefore, such trend should be continuously monitored and critically examined in order to determine whether there is any sign of recovery of dolphin usage once the construction works have halted and the Brothers Marine Park is established by the end of 2016.

5.5.2. Encounter rates of finless porpoises

Encounter rates of finless porpoises were calculated using data collected in Beaufort 0-2 conditions, since the porpoise encounter rate was consistently much lower in Beaufort 3-5 conditions than in Beaufort 0-2 conditions (Hung 2014, 2015). In 2015-16, the combined encounter rate of SWL, SEL, LM and PT was 3.79 porpoise sightings per 100 km of survey effort, which was lower than the ones in the previous four monitoring periods, but higher than the ones in earlier years. Among the five survey areas, the porpoise encounter rates in LM (6.39), SEL (5.32) and PT (5.15) were all higher than the overall encounter rate, while the ones in SWL (2.25) and NP (1.61) were both lower.

The temporal trend of annual porpoise encounter rates indicated that porpoise usage of Hong Kong waters fluctuated across different years since 2002, but was relatively stable (within the range of 5.3-6.4 porpoises per 100 km of survey effort) in the past four years of 2012-15 (Figure 31a). Among the four survey areas, the inconsistency in porpoise usage was even more evident, with no apparent long-term trend in any of these four areas (Figure 32). However, there appeared to be a noticeable downward trend in both SWL and SEL survey areas between 2013 and 2015.

To account for the potential frequent movements across SEL, SWL and LM in winter and spring months, the data from these three areas were pooled to calculate the annual porpoise encounter rate in southern waters of Hong Kong collectively for examination of such temporal trend in the past decade. In 2015, porpoise usage in the southern waters of Hong Kong was noticeably lower than the previous three years, during which the porpoise encounter rates were at relatively high level since 2002 (Figure 31b). The recent decline in porpoise usage in southern waters of Hong Kong should be continuously monitored in the upcoming years to determine whether such decline is persistent in a longer term. This is especially important as several pending infrastructure projects (e.g. reclamation for Integrated Waste Management Facilities at Shek Kwu Chau, artificial islands in central waters of Hong Kong) as well as the on-going threat of high-speed ferry traffic in South Lantau region may affect the porpoise usage in these waters.

5.6. Density and Abundance

5.6.1. Estimates of dolphin density and abundance in 2015

The density and abundance of Chinese White Dolphins were estimated in 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 (e.g. Hung 2014, 2015). The annual estimates in 2015 can be used to assess the long-term temporal trend in dolphin occurrence in Hong Kong since 2003 (see Section 5.6.2). Only effort and sighting data collected from the four areas under Beaufort 0-3 conditions were used in the analysis, which included 7,264.2 km of survey effort and 338 dolphin groups for the density and abundance estimation in 2015.

Among the four survey areas, WL recorded the highest dolphin density in 2015, with 111.05 individuals/100 km^2. This was considerably lower than the ones in 2014 as well as the earlier years from 2003-10. SWL recorded the second highest dolphin density among the four areas, with 37.05 individuals/100 km^2. Such annual estimate in SWL was similar to the previous high in 2014 (39.58), and was higher than the ones recorded in 2010-13 (17.33-28.54). Moreover, NWL recorded the lowest estimate of dolphin density since 2001, with only 11.53 individuals/100 km^2 respectively. Estimating dolphin density and abundance for NEL in 2015 was not feasible, as there was only one dolphin sighted throughout the entire year, which is not sufficient to estimate a mean and variance for cluster size measurement, or compute the estimate of f(0) by the DISTANCE program.

In 2015, the abundance estimates of Chinese White Dolphins were 31, 24 and 10 dolphins respectively in WL, SWL and NWL survey areas (and virtually zero in NEL survey area with only one dolphin sighted in 1791.6 km of survey effort), with a combined estimate of 65 dolphins from the four areas (Figure 33a). In recent years, the temporal trend of the combined total from the four areas indicated a decline from 88 dolphins in 2011 to only 73 dolphins in 2013, followed by a slight rebound to 87 dolphins in 2014, and then there was another noticeable drop to the lowest in 2015 with only 65 dolphins (Figure 33a). It should be noted that the coefficient of variations (CVs) remained fairly low for the 2015 estimates in WL (15%), SWL (24%) and NWL (24%), and therefore the resulted estimates should be reliable.

On the other hand, for the three areas of NWL, NEL and WL where the long-term temporal trend of their combined dolphin estimates has been assessed in the past monitoring periods (note: SWL was not included in this examination as the estimates in earlier years resulted in high CVs), the combined dolphin abundance was only 41 in 2015, which was the lowest since 2003, and was much lower than the ones in recent years of 2012-14 (within the range of 61-62 dolphins) (Figure 33b).

5.6.2. Temporal trend in dolphin abundance

Temporal trends of annual dolphin abundance in NWL and NEL (2001-15) as well as WL (2003-15) were further examined for each survey area, where consistent amount of survey effort (at least 500 km of annual survey effort) has been conducted in these three areas of major dolphin occurrence.

In WL, individual abundance has steadily decreased from 54 dolphins in 2007 to only 17 dolphins in 2012 (Figure 34). Since then, the abundance estimate has rebounded to 23 dolphins in 2013 and 36 dolphins in 2014, followed by another slight drop in 2015 with 31 dolphins (Figure 34). Notably, both 2014 and 2015 estimates were still considerably lower than the abundance estimates from the earlier years of

2003-09.

On the other hand, dolphin abundance showed noticeable declining trends in both NWL and NEL (Figure 34). In NWL, dolphin abundance steadily dropped from the highest in 2003 (84 dolphins) to the lowest in 2015 (10 dolphins), with an 88% decline in 13 years. Such decline has intensified during the past few years, dropping form 40 dolphins in 2012 to only 10 dolphins in 2015, with a 75% decline within three years. More notably, the drop in dolphin numbers between 2014 (24 dolphins) and 2015 (10 dolphins) was the most alarming in the past decade, with a 58% decline just within a year.

In NEL, the decline was even more appalling, dropping from the highest in 2001 (20 dolphins) to the lowest in 2014 (one dolphin), and then virtually zero in 2015 (Figure 34). The most noticeable decline occurred between 2011 and 2014, with a 91% drop in just three years. When combining NEL and NWL estimates to examine the trend in dolphin abundance for the entire North Lantau region, it has been on a rapid decline from 102 dolphins in 2003 to only 10 dolphins in 2015, with a 90% drop during 2003-15, or 80% drop during 2011-15.

Using the linear regression model, the test statistics for hypotheses $H_0{:}b=0$ vs. $H_1{:}b<0$ in the respective three areas were found to be as follow:

- WL (2003-15): the test statistic for the hypotheses was -6.4807 whose p-value was 0.0000 <5%. Therefore, the hypothesis H_0 is rejected at 5% level of significance and the abundance data of dolphin in WL was concluded to possess a significant downward sloping trend.

- NWL (2001-15): the test statistic for the hypotheses was -9.9096 whose p-value was ≈ 0.0000 <5%. Therefore, the hypothesis H_0 is rejected at 5% level of significance and the abundance data of dolphin in NWL was concluded to possess a significant downward sloping trend.

- NEL (2001-15): the test statistic for they hypotheses was -6.4807 whose p-value was ≈ 0.0000 <5%. Therefore, the hypothesis H_0 is rejected at 5% level of significance and the abundance data of dolphin in NEL was also concluded to possess a significant downward sloping trend.

- Combined estimates from WL, NWL and NEL (2003-15): the test statistic for the hypotheses was -9.8486 whose p-value was ≈ 0.0000 <5%. Therefore, the hypothesis H_0 is rejected at 5% level of significance and the combined abundance data of dolphin from WL, NWL and NEL was concluded to possess a significant downward sloping trend.

Temporal trend of annual dolphin abundance estimates in SWL was also examined only during recent years (2010-15) but not for a longer period, as consistent survey effort (500+km of survey effort each year) was not collected annually before 2010. In order to examine the temporal trend in SWL for a longer study period including the earlier years, biennial estimates were deduced instead for 2004-2015 to examine the overall temporal trend in dolphin abundance in SWL in the past decade.

Firstly, the temporal trend in biennial abundance estimates showed a marked decline from 21 dolphins in 2004/05 to only six dolphins in 2006/07 (Figure 35a). In the three subsequent biennial periods (2008/09, 2010/11 and 2012/13), the dolphin numbers have remained at a lower level of 11-12 dolphins, then it has significantly rebounded to a higher level of 25 dolphins in 2014/15 (Figure 35a). It should be noted that the CVs of the six biennial periods were in the range of 16-40% with considerable survey effort per period (at least 1,200 km each), and therefore the biennial abundance estimates and the associated trend should be quite reliable.

On the other hand, for the annual abundance estimates in SWL during 2010-15, the numbers fluctuated at a low level during the first four years, but have significantly increased to 26 dolphins in 2014 and 24 dolphins in 2015 (Figure 35b). Notably, the CVs were fairly high in 2010 (67%) and 2012 (54%), while the estimates should be more reliable for the years of 2011 (CV=40%), 2013 (29%), 2014 (28%) and 2015 (24%).

In summary, significant declines in dolphin abundance were detected across all three survey areas in NEL, NWL and WL in the past decade, while there was a marked increase in dolphin numbers in SWL just in the past two years. Even when the abundance estimates of SWL were considered together with the other three areas, there was still a marked decline in dolphin abundance to the lowest point in 2015, which was largely attributed by the dramatic decline in dolphin numbers in the North Lantau region in recent years. To elucidate the reasons behind the dramatic decline in dolphin abundance in Hong Kong waters in the past decade, the occurrence of individual dolphins including their temporal changes in range use among different survey areas in recent years will also be closely examined in Section 5.7, and a number of recommendations will be made in Section 5.8 to address this critical issue.

5.7. Range Use, Residency and Movement Pattern

5.7.1. Individual range use and residency pattern

In order to examine individual range use of Chinese White Dolphins, the 95% kernel range of 153 individuals that occurred in 2015 through photo-identification works were deduced using the fixed kernel method, and their ranging patterns are shown in Appendix V. In addition, 155 individual dolphins that were sighted ≥15 times and occurred in the past two years were further examined for their range use and residency patterns (Table 1). Among these individuals, almost all of them have occurred in WL (97.4%) in the past, while the majority of individuals also have occurred in NWL (78.7%) and SWL (54.8%), and to a smaller extent in NEL (31.0%) and DB (20.0%). On the contrary, only a handful of individual dolphins have been sighted in EL or SEL survey areas as part of their historical range. Moreover, 40.6% of these 155 individuals occupied range that spanned from Hong Kong across the border to Mainland waters, indicating the frequent cross-boundary movements of individual dolphins identified in Hong Kong waters.

The residency patterns of 147 individuals were assessed by examining their annual and monthly occurrences in Hong Kong. The other eight individuals were identified and re-sighted only in the past few years, and therefore their annual occurrence could not be properly and reliably assessed. Almost all examined individuals (92.3%) were considered residents in Hong Kong, as they have been sighted consistently in the past decade, or at least five years in a row. However, the proportion of visitors that utilized Hong Kong waters could be seriously underestimated, as these visitors would have infrequently utilized Hong Kong waters, and it will be harder for them to reach the minimum requirement on the number of re-sightings required for this analysis. Based on the monthly occurrences of these 147 individuals, 40.0% of these examined individuals only occurred in Hong Kong during certain months of the year, while the rest occurred here year-round (Table 1). Overall, 85 and 58 individuals were identified as year-round and seasonal residents respectively, while four individuals (NL247, NL280, WL132 and WL171) were identified as seasonal visitors.

In addition to their residency patterns, the 155 individuals were classified 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 56 individuals (36.1%) and 88 individuals (56.8%) belonged to the northern and western social clusters respectively, while another eleven individuals spanned their range use evenly across North and West Lantau waters with frequent occurrences in both waters (Table 1).

5.7.2. Individual movement pattern

By combining all photo-identification data collected through the present monitoring study and other studies, movement patterns of individual dolphins within Hong Kong territorial waters in 2015-16 were broadly examined. During the 12-month period, 210 individuals were re-sighted a total of 1214 times, with 175 individuals being sighted more than once (i.e. occurred at more than one location).

By examining their movement patterns between re-sightings, it was observed that 113 individuals moved extensively across different survey areas around Lantau in 2015-16. For example, 87 individuals were re-sighted in both SWL and WL survey areas, while 35 individuals occurred across NWL and WL survey areas. Nine individuals occurred in NWL, WL and SWL survey areas, covering extensive range during the 12-month monitoring period. As there was only one individual (NL285) sighted in NEL during the 12-month study period, this represented the only case for individual movement across NEL, NWL and WL survey areas.

Notably, despite the extensive amount of photo-identification data being collected in 2015-16, a significant portion of individual dolphins were sighted repeatedly within just a single survey area only, but did not range into neighbouring areas. For example, 44 individuals occurred exclusively in WL survey area, while another 15 individuals were only re-sighted in NWL waters during the 12-month study period. Undoubtedly, some of these animals would have ventured across the territorial border and utilized the Mainland waters as part of their range (see Section 5.7.4), but their restricted movements within Hong Kong waters could still be a concern, as this could be related to potential obstruction of movements across different survey areas as a result of human activities (e.g. high-speed ferry traffic) or infrastructure project (e.g. reclamation, bridge construction).

As in the previous monitoring period in 2014-15, the temporal trend in individual movement patterns across different survey areas was examined to provide insight on whether their intensity of movements has changed due to various anthropogenic factors. In the past, dolphins moved regularly and frequently between NEL and NWL by utilizing the Sha Chau and Lung Kwu Chau Marine Park as well as the Brothers Islands as their core areas (see Hung 2008, 2012). However, such movements have greatly diminished in the five monitoring periods, with 50 individual dolphins engaged in such movement in 2011-12 down to only one dolphin (NL285) in 2015-16 (Figure 36). Such astonishing decline coincided with the dramatic decline in dolphin abundance and overall usage in North Lantau waters during the same period (see Sections 5.3.1 and 5.6.2). As such movements between the two areas was facilitated by an important traveling corridor to the north of the airport based on results from focal follow study and theodolite tracking works (Hung 2014), these movements have likely been disrupted by the increased amount of vessel traffic originated from the Sky Pier (see Section 5.8 also), as well as the commencement of HKBCF reclamation works since spring 2012 with significant amount of habitat loss and increased number of construction boats to the northeast of the airport platform. Such situation has certainly worsened progressively in the past three monitoring periods as shown with the very low level of movement between the two survey areas (Figure 36).

Moreover, after a slight rebound in movements between NWL and WL survey areas from 2012-14 to 2014-15, there was a marked decline in number of individuals that moved between these two areas in 2015-16 (Figure 36). The changes in level of such movements have important implications, as individual movements between NWL and WL are facilitated by an important traveling corridor to the west of the airport and near Sham Wat based on previous focal follow study and shore-based theodolite tracking works (Hung 2014). In fact, the reduced movements between the two areas could partly explain why the dolphin numbers have dropped significantly in NWL waters, as dolphins often moved from WL to NWL in the past but not in recent years, while some individual dolphins have shifted their range use from North Lantau waters to WL and SWL waters as examined in Section 5.7.3.

There has been grave concern that the north-south movement between the two areas of NWL and WL would be hampered by the HKLR09 construction works as part of the HZMB construction, which may affect the interaction of the two social clusters of dolphins in Hong Kong (Dungan et al. 2012). In fact, dolphins have avoided the alignment in the past few years since works commenced in early 2013 (see Section 5.2.1), and individual movements across the alignment were apparently less intense during that period. The somewhat restricted movement could be related to the increasing amount of work vessels in the areas, the acoustic disturbance from the associated bored piling works (see Hung 2015), and the progressively reduced spacing because of bridge piers. With such marked reduction of dolphin movements between NWL and WL survey areas in 2015-16, which is also the lowest level of movements in recent years, the potential restriction of movements should be critically examined through shored-based theodolite tracking at Sham Wat Station. Continued monitoring of the intensity of individual movements across NWL and WL waters would also be needed in order to shed light on whether the impacts of bridge construction in high dolphin density areas would result in temporary restriction or more permanent impacts by restricting movements between bridge piers along the HKLR alignment.

Another notable trend is the emerging intensity of movements between WL and SWL survey areas in the past six monitoring periods (Figure 36). During the 2010-11 monitoring period, there were only 14 individual dolphins moving across these two areas. Since then, the intensity of such movements have increased significantly to the highest in 2015-16 period involving 87 dolphins, with a six-fold increase (Figure 36). The frequent movements of individuals between these two areas in the past two monitoring periods corresponded well with the significant increase in dolphin occurrence in SWL waters in 2014 and 2015 (see Sections 5.2.1 and 5.5.1). From the examination of individual range shifts (see Section 5.7.3), it is apparent that many individuals have continued to expand or extend their range use in SWL waters in recent years, while some individuals have even spent increasingly more time in SWL waters than in WL waters. Such trend should be continuously monitored, as it would shed light on whether it is related to the response to anthropogenic impacts by some individual dolphins. More importantly, it should be examined whether such increased utilization of SWL waters would increase the chance of these individuals of getting hit by a high-speed ferry within the South Lantau Vessel Fairway.

5.7.3. Temporal changes in range use of individual dolphins

In the previous monitoring period, the apparent shifts in range use of some individuals in the past few years have been linked to the decline in dolphin abundance in North Lantau waters and increase in WL and SWL waters based on the examination of 36 individuals that have regularly occurred around the Brothers Islands. In the present study, such examination of temporal changes in range use by individual dolphins is expanded to 114 individuals that have regularly occurred in Hong Kong waters among the four periods of 2011-12 (the start of the HZMB construction), 2013, 2014 and 2015, in order to further shed light on the reasons behind the trends in dolphin abundance in different parts of Lantau waters as examined in Section 5.6.2.

Among these 114 individuals, 59 and 55 of them were members of the northern and western social clusters respectively. As the individual range use patterns from the two social clusters can differ significantly (Dungan et al. 2012), with the northern ones focused their range use primarily around the Brothers Islands as well as the Sha Chau and Lung Kwu Chau Marine Park, while the western ones primarily along the west coast of Lantau, their changes in range use among the four time periods were examined independently. Several parameters were examined for such temporal changes in individual range use, which included the changes in level of utilization, changes in range use including expansion, shrinkage and shifts (either partial or complete shift to a nearby area), and how such shifts have occurred from one area to another. For the western social cluster's individuals, further examination would also be made to determine whether the individuals have shifted away from the HKLR alignment to the west of the airport.

For the 59 individuals from the northern social cluster, about two-thirds of them (38 individuals) have utilized Lantau waters progressively less since 2011 (see NL296 as an example in Figure 37), while 44 of them (75%) have started to utilize WL waters more, with a proportion of these (10 individuals) even starting to utilize SWL waters more in 2015 (see NL98 as an example in Figure 38). On the other hand, the less frequent use of Lantau waters also resulted in range shrinkage for 56% of these individuals, in contrast to a range expansion by 19% of these individuals.

The increased utilization of WL and SWL waters have also resulted in range shifts by many individual dolphins from the northern social cluster. In total, 48 of the 59 northern cluster individuals have shifted their range since 2011, and the majority of them (40 individuals) have shifted their range away from NEL waters (see NL136 as an example in Figure 39) which they have utilized extensively in the past, resulting in a virtual absence of dolphin occurrence in NEL waters in 2015 as examined in Sections 5.2.1, 5.3.1 and 5.6.1. Besides the range shifts away from NEL waters, 31 individuals have shifted part or all of their range from North Lantau waters to WL waters (see NL242 as an example in Figure 40), and eight of them even shifted their range use to include SWL waters (see NL120 as an example in Figure 41). Notably, among the 59 individuals, three of them have started to disappear from Hong Kong waters in 2014, and that number has increased to eight in 2015, which included some of the most frequently-sighted individuals in the photo-ID catalogue (e.g. NL24, NL139, NL191).

The above results implied that since the construction of HZMB commenced in 2012, individual dolphins have dramatically reduced their usage in NEL waters by shifting their range to avoid this area, while some of them also started to extend their range use to WL and even SWL waters and at the same time reduced their range use in NWL water in the past few years. This has also resulted in a dramatic decline in dolphin abundance in both NEL and NWL waters since 2011 as examined in Section 5.6.2. Apparently, the range shifts of individuals is only one of the scenarios behind the decline in dolphin abundance in North Lantau waters, as a good number of individuals have also disappeared from Hong Kong waters at the same time, possibly moving to Mainland waters temporarily or permanently (see Section 5.7.4). Some individuals could also have died as a result of the existing and additional threats. Moreover, a number of individuals have confined their range use in NWL (see Section 5.7.2, and NL202 as an example in Figure 42), and these individuals may have also ventured into Mainland waters more frequently with reduced usage of North Lantau waters. In summary, from the perspective of individual range use, the reduction in dolphin abundance in North Lantau waters is partly related to the essentially-complete exodus of individuals away from NEL and reduced usage of NWL waters with range of individuals shifting and extending into WL and SWL waters as well as likely into Mainland waters.

On the other hand, for the 55 individuals from the western social cluster, seven individuals have progressively reduced their utilization of their range in Lantau waters since 2011 (see WL50 as an example in Figure 43), while six dolphins have increased their usage of Hong Kong waters at the same time (see WL173 as an example in Figure 44). During the same period, approximately the same proportions of individuals have either expanded (34%) or shrunk (31%) their range in Hong Kong waters, while seven individuals (12%) did not show any apparent change in range use since 2011. Moreover, 13 of these western social cluster individuals whose range extended to the Lung Kwu Chau area in NWL previously have not been sighted in this area in recent years (see WL124 as an example in Figure 45). At the same time, 22 of the 55 individuals have shown clear avoidance of the HKLR alignment in the past few years by their range shifts to further south of the bridge alignment (see WL131 as an example in Figure 46), while nine individuals did not show such avoidance behaviour and still ranged across the bridge alignment recently.

Notably, nearly half of these individuals from the western social cluster (47.5%) have utilized SWL progressively more in recent years, and eight individuals have actually shown clear range shifts from WL to SWL waters as a result of increased utilization of SWL waters (see WL91 as an example in Figure 47). However, it is unclear whether such range shifts are related to the avoidance of the bridge alignment.

Another notable observation is that seven individuals, which have been frequently sighted in the past (e.g. NL128, SL35, WL25), disappeared from WL waters in 2015.

From the above results, it is apparent that there were fewer changes in range use among the western social cluster individuals than their counterpart from the northern social cluster in recent years, with most individuals continuing to utilize WL waters at a high level as before the bridge construction. Nevertheless, these individuals have ventured less frequently into North Lantau waters across the HKLR alignment, while spending progressively more time in SWL waters, with some individuals even shifting their range use there. It is likely that individuals from the western social cluster have been more affected by the HKLR construction with the presence of the physical structures of the bridge piers. The partial obstruction by the bridge alignment for western social cluster individuals to move between WL and NWL waters would further reduce the number of dolphins utilizing NWL waters, which coincided with the dramatic decline in dolphin numbers there. It is also possible that as more individual dolphins from the northern social cluster increased their usage in WL waters, this may result in some level of competition between individuals from the two social clusters, thereby forcing the individuals from the western social cluster to move further south to SWL waters with less competition. With the additional individuals from both social clusters starting to utilize SWL waters more, this would also explain why there has been a strong surge in dolphin numbers in SWL in 2014 and 2015 as discussed in Section 5.6.2.

To further understand the correlation between the extent of range shifts by individual dolphins in Hong Kong and the trends in dolphin abundance among different survey areas, the level of utilization among different areas were broadly examined quantitatively for individuals that have occurred regularly in Lantau waters during the past decade. The candidates for such examination included 80 individuals that were re-sighted at least 30 times during on-effort surveys since 2003, which included 48 members from the northern social cluster and 32 members from the western social cluster. Notably, only individual re-sightings made during on-effort survey effort were included in this analysis, as such re-sightings can be further normalized by the amount of survey effort collected in the respective year and survey area, since disproportionate amounts of survey effort across years and areas could affect the probability of individuals being re-sighted through photo-identification works during on-effort surveys.

To calculate the individual re-sighting rate, the number of on-effort re-sightings of each individual was counted for each year of 2007-2015 among each of the four main survey areas (i.e. NEL, NWL, WL and SWL). Then these numbers of all 80 individuals included in the analysis were summed up for a total of re-sightings for each area per year, which were then further divided by the amount of survey effort for the corresponding area and year. The combined individual re-sighting rate, or the total number of re-sightings per 1,000 km of survey effort, can then be compared across different survey areas for each year, and across different years for the same survey area to examine any temporal changes in individual usage among different areas of Lantau waters.

For the 80 individuals, the combined individual re-sighting rate in NEL remained at a lower level of 20-50 (or 9-20% of the combined total from all four areas) in 2007-10, but such value increased markedly to 133 in 2011 (Figure 48). Since then, there was a dramatic decline in the re-sighting rate from 133 (or 23% of combined total) in 2011 to only 1 (or nearly 0%) in 2015. For individual occurrence in NWL, there was a declining trend of individual re-sighting rate from 102 (49%) in 2007 to 64 (or 29%) in 2010 (Figure 48). Then a noticeable increase to the highest re-sighting rate of 263 (or 46%) also occurred in 2011, followed by another continuous decline to 146 (or 34%) in 2015.

In contrast, individual occurrence in WL started with an increasing trend from the re-sighting rate of 59 (or 28% of the combined total) in 2007 to a high level in 2010 (or 53%), followed by a slight decline in 2011-13 (25-32%). Then in 2014 and 15, the proportion of re-sightings increased once again in WL waters (Figure 48). Finally, there was a steady increase in individual re-sighting rate in SWL waters, from 14 (or 6%) in 2008 to 93 (or 22%) in 2015. Notably, the margin of individual re-sighting rates in NWL: SWL also narrowed dramatically from 49%:7% in 2007 to 34%:22% in 2015, signaling an increase of usage in SWL but a decline in usage in NWL by individual dolphins during this period (Figure 48). Coincidentally, the above trends of individual occurrence among NEL, NWL, WL and SWL largely resembled the trends in dolphin abundance as examined in Section 5.6.2, indicating that the examination of re-sighting rates of individual dolphins among different areas in different years would be insightful to understand the changes in dolphin abundance over time among different survey areas.

Since the primary range use of members from the northern social cluster centered around NEL and NWL in the past, while the ones from the western social cluster centered in WL and SWL waters (Dungan et al. 2012), it would also be useful to examine the temporal trends in individual re-sighting rates among different survey areas independently for the two social clusters, with an attempt to understand the opposite trends in dolphin abundance in NEL/NWL and WL/SWL as observed in Section 5.6.2, and range shifts of individuals as observed in the first part of this section.

For the 48 individuals from the northern social cluster, the proportion of combined individual re-sighting rates in NWL remained relatively stable (53%-77% of the total from the four areas) in the past nine years of 2007-15 (Figure 49). However, there was a gradual increase in individual sighting rate in NEL from 23% in 2007 to the 32% in 2011, followed by a rapid decline to nearly 0% in 2015 (Figure 49). The greatly diminished occurrence of northern cluster individuals in NEL in recent years was opposite to the trend in WL, where the proportion of individual re-sightings rates has increased evidently from 6% in 2007 and 2009 to 34% in 2015 (Figure 49). At the same time, the proportion in SWL always remained at 0% in 2007-12 until it increased considerably to 6% in 2015. Such opposite trends implied that many individuals from the northern social cluster diminished their usage in NEL and started to utilize WL waters (or even SWL waters to some extent) considerably more in the past two years. This corresponded well with the results from the examination of temporal range shifts of northern social cluster individuals as assessed above, with increasing numbers of individuals shifting their range away from NEL with some individuals starting to utilize WL and SWL waters more in recent years.

For the 32 individuals from the western social cluster, the proportion of individual re-sightings rates in WL and SWL remained fairly consistent from 2007-14 with a much larger proportion of utilization taking place in WL waters (Figure 50). However, the margin of utilization between of WL and SWL waters narrowed considerably in 2015, with a much higher proportion of the western social cluster individuals utilizing SWL waters. Notably, there was a higher proportion of re-sightings in NWL for these western social cluster individuals at the peak of the HZMB construction in both Mainland and Hong Kong waters during 2010-13, but this proportion dropped considerably to a very low level in 2014-15.

It should be acknowledged that the limitation of this analysis was still restricted to 80 individuals that frequently occurred in Hong Kong waters, and may not reflect fully the overall usage of the 150-200 individuals that occurred in Hong Kong annually at various degrees. However, this analysis would still provide some quantitative measurements on the overall level of range utilization of individual dolphins and how that would affect the temporal trends in dolphin abundance across different survey areas. It could also examine whether the range utilization would differ between the two social clusters as a result of different levels of anthropogenic disturbance that they experienced in their respective range.

5.7.4. Cross-boundary movements beyond Hong Kong waters

As discussed above, in the past few years a number of individual dolphins have disappeared from Hong Kong waters, while many have progressively reduced their utilization of the waters around Lantau, possibly shifting or expanding their range use away from Hong Kong waters. Recently, a set of on-going large-scale surveys has been conducted in Lingding Bay (or the eastern section of the Pearl River Estuary, EPRE) by the South China Sea Fisheries Research Institute (SCSFRI), which is partly sponsored by the Hong Kong-Zhuhai-Macao Bridge Authority (HZMBA). The study mainly aims to examine any changes in dolphin distribution and abundance in relation to the HZMB construction works in Mainland waters. Being a collaborator of the dolphin photo-identification works, the survey data are available to HKCRP from SCSFRI researchers with the permission of the HZMBA, in order to match photographs of dolphins taken from their EPRE surveys to the catalogue of individual dolphins in Hong Kong waters. Notably, the last set of large-scale systematic line-transect surveys conducted in the EPRE was in 2010-11 before the HZMB construction in Mainland waters. Therefore, this new set of surveys would provide the first glimpse of any cross-boundary movements of individual dolphins from Hong Kong waters into Lingding Bay since 2011. Such supplementary information can certainly fill the critical information gap by providing further insights behind the dramatic decline in dolphin occurrence in North Lantau waters in the past few years.

Between August 2015 and March 2016, seven sets of surveys were conducted in Lingding Bay by SCSFRI researchers (note: four sets of surveys from September to January were sponsored by HZMBA), with a total of 124 groups of 575 dolphins sighted in North Lingding Bay (NLDB), Central Lingding Bay (SLDB), South Lingding Bay (SLDB) and Macau (MA) survey areas. Over 13,000 photographs were taken during the course of these surveys, and preliminary photo-identification analysis by HKCRP researchers identified at least 91 individual dolphins being sighted 119 times altogether. Among these 91 individuals, 15 of them have never or rarely occurred in Hong Kong waters, while the other 76 individuals have been frequently sighted in different survey areas around Lantau. A closer examination of the sighting locations of these 76 individuals revealed that nine of them occurred at the boundary of Hong Kong territorial waters, while another 17 individuals occurred adjacent to the western boundary of Hong Kong. As these 26 individuals were observed near or at the territorial boundary during the 2015-16 EPRE surveys, their occurrence should not be considered notable cross-boundary movements outside of Hong Kong waters. As a result, only the remaining 50 individuals were further examined for their occurrence and range use outside of Hong Kong waters as follow.

Among these individuals that showed cross-boundary movements during 2015-16, 23 and 25 individuals were respective members of the northern and western social clusters, while two individuals (NL224 and WL258) ranged evenly between North and West Lantau waters in the past and cannot be classified into either social cluster. Moreover, 33 of these 50 individuals were considered as residents (with 18 and 15 individuals as year-round and seasonal residents, respectively), showing their strong reliance of Hong Kong waters as the major portion of their home range. In contrast, eight individuals (CH84, NL247, NL249, NL281, WL66, WL168, WL200 and WL214) only visited Hong Kong waters periodically and possibly ranged much more frequently in Mainland waters in the past. In fact, most of these visitors occurred further away from their range occupied in Hong Kong waters when sighted during the 2015-16 EPRE surveys (see examples in Figure 51), and three of them actually disappeared from Hong Kong waters since September 2013 (for individuals NL281 and WL66) and July 2014 (NL249). Besides these visitors, another seasonal resident (NL12) and a recently identified individual (WL226) also disappeared from Hong Kong waters since July and August 2014 respectively, and both were sighted in Lingding Bay in 2015-16 very far from their occupied range in Hong Kong waters.

Another notable observation is that half of the 50 individuals were identified away from Hong Kong territorial waters for the first time during the 2015-16 EPRE surveys, even though the majority of them have been identified in Hong Kong waters regularly with a long sighting history (e.g. NL104, NL123, NL264, NL296; see Figure 52). If they were utilizing the Mainland waters to a certain extent in the past, they should have been sighted during the earlier surveys in 2005-07 and 2010-11 in Lingding Bay similar to many individuals that have shown some cross-boundary movements as well. Therefore, it is possible that these individuals have expanded their range use into Mainland waters only fairly recently.

In fact, 10 of these 50 individuals have diminished their utilization in Hong Kong water during 2015-16, and all except one individual (WL58) have appeared in Lingding Bay for the first time far from their normal range around Lantau (see examples in Figure 53). This implies that while they spent less time in Hong Kong waters, they appear to have expanded their range into Mainland waters. More importantly, these nine individuals (NL37, NL80, NL123, NL260, NL264, NL288, NL295, NL296 and NL301) are members of the northern social cluster that once spent significant amounts of time in North Lantau waters, and of these, seven (except NL80 and NL301) showed clear signs of range shifts away from NEL waters and toward WL and SWL waters as discussed in the previous section.

Besides these seven individual dolphins with diminished use of Hong Kong waters and with clear range shifts into Lingding Bay for the first time in 2015-16, eight other individuals have also shown clear range shifts around Lantau waters in recent years but still maintained their overall level of utilization in Hong Kong waters. For these eight individuals, five of them also occurred in Lingding Bay for the first time, and all except one (individual WL128) were classified as year-round residents of Hong Kong waters. Four of these individuals (NL104, NL145, NL224 and WL05) abandoned their range use in NEL waters in recent years, and four individuals (NL145, NL224, NL236 and NL287) shifted their range use from North Lantau waters to WL and SWL survey areas (see examples in Figure 54). Therefore, the results once again suggested that some year-round residents have diminished their range use in North Lantau waters in recent years, and at the same time they may be spending more time in Mainland waters and/or expand their range to WL and SWL waters.

It should be mentioned that among the 19 frequently sighted individuals that have disappeared from Hong Kong waters in 2015 (see Section 5.1.3), only two (NL12 and NL103) were found in Lingding Bay in early 2016. It is possible that the rest of these missing individuals may have moved permanently and further across the border to range in Mainland waters, but have not been encountered during the seven sets of EPRE surveys in 2015-16, or they may have suffered from mortality, which could not be easy to confirm without further monitoring works across the border. Therefore, it is crucial to continue these large-scale monitoring surveys throughout Lingding Bay to confirm the presence or absence of these individuals that were known to occur more regularly in Hong Kong waters.

The continuous systematic line-transect surveys in Lingding Bay would be highly recommended as the survey results would further provide information of any cross-boundary movement of individuals that may have shifted their range partly or entirely into Mainland waters from Hong Kong waters. Such information would certainly fill an important information gap for the evaluation of the long-term trends in dolphin occurrence in Hong Kong waters. In addition, as the previous dolphin abundance estimates in ERPE have not been updated since 2005-07 (Chen et al. 2010), the continuous systemic line-transect surveys in Lingding Bay would also provide an important opportunity to examine the changes in dolphin abundance and distribution for the eastern part of the Pearl River Estuary including Hong Kong waters, and to understand the impacts caused by the construction activities of the HZMB and other infrastructure projects across the estuary. Finally, the continued dolphin monitoring in Lingding Bay will also be important to shed light on any potential recovery in dolphin usage in Hong Kong waters after the HZMB construction works are completed, as dolphins may resume their previous level of utilization in Hong Kong waters (particularly important is North Lantau waters) once the disturbance from the construction activities is removed, and the Brothers Marine Park is established in late 2016.

5.8. Synopsis on the Latest Status of Dolphin Occurrence in Hong Kong

From the long-term monitoring results presented above, it is quite apparent that the Chinese White Dolphins residing in Hong Kong waters have been undergoing considerable changes in their distribution, habitat use, abundance and individual range use in recent years. For example, dolphins have largely vacated the waters of Northeast Lantau in the past two years, and there has been a dramatic decline in their usage of Northwest Lantau waters with very limited occurrence around Lung Kwu Chau in 2015. At the same time, dolphin abundance in North Lantau waters dropped to a historical low in 2015 of only 10 dolphins, with the most rapid rate of decline in the past five years. On the other hand, dolphin utilization of West Lantau waters rebounded slightly in recent years, but still remained at a level that was lower than before the bridge construction works started in 2012-13. In contrast, there has been a surge in dolphin occurrence in Southwest Lantau waters with higher numbers of dolphin utilizing this area in 2014 and 2015.

At the individual level, a good number of year-round residents occurred only occasionally in Hong Kong waters with progressively diminishing usage in the past few years, and some have even disappeared from Hong Kong waters altogether. Evidently, many individuals from the northern social cluster have shifted their range use away from the North Lantau region (especially from Northeast Lantau waters) to West Lantau and even Southwest Lantau waters in recent years, which coincided with the marked decline in dolphin numbers in North Lantau waters. On the other hand, some individuals from the western social cluster appear to have avoided the HKLR alignment so access to North Lantau waters may have been obstructed, while some expanded their range into Southwest Lantau waters, resulting in a noticeable increase in dolphin numbers there as well. Concurrently, a recent set of surveys across the border revealed that many individuals that were first identified in Hong Kong waters have expanded their range into Mainland waters with some cross-boundary movements, which may partly explain why some year-round residents have diminished their use of North Lantau waters and this move out of Hong Kong's waters may even be permanent. Unfortunately, a number of individuals that once used Hong Kong waters regularly have disappeared and have not yet been encountered across the border either.

In the past two decades, various research studies on Chinese White Dolphins residing in Hong Kong waters have revealed that they have suffered from the lack of prey resources, entanglement in fishing gears, high levels of environmental contaminants, increased volume of vessel traffic (especially high-speed ferries) and intense acoustic disturbances, some of which originate from the high-speed ferries (Hung 2008, 2014, 2015; Jefferson et al. 2006, 2009, Marcotte et al. 2015; Piwetz et al. 2012; Sims et al. 2012). In recent years, it has become evident that the dolphins have also been affected by the construction activities of the HZMB, which have resulted in habitat loss from land reclamation as well as increased acoustic disturbance from bored piling works and intense traffic of construction-related boats (see Hung 2014, 2015). The changes in the dolphins' distribution, habitat use, abundance and individual range use in recent years are certainly the consequences stemming from the combination of existing threats and the additional threats from coastal development. It is troubling to observe that the situation of dolphin occurrence has continued to worsen in 2015, even when the intensity of HZMB construction works has already passed the peak, with most marine works being completed. Possibly there are some lingering effects from the bridge construction-related disturbance, and impacts such as the permanent structures of the bridge piers of HKLR may continue to affect the dolphins into the near future.

Besides the on-going bridge construction works, there have been some additional threats to the dolphins in 2015. For example, while the high-speed ferry traffic within dolphin habitats to the north and south of Lantau Island remained at a high level, the Airport Authority Hong Kong (AAHK) has recently reported to the Legislative Council that the volume of high-speed ferry traffic from their Sky Pier has increased from 83-84 trips per day in 2012-14 to 94 trips per day in 2015, although the increased figure in 2015 was still lower than the peak level of 99 trips per day in 2010. As discussed in previous monitoring reports, the high-speed ferry traffic in North Lantau waters has contributed to the decline in dolphin abundance in the past decade (see Hung 2012, 2013, 2015; and also Marcotte et al. 2015). Such increase of high-speed ferries from the Sky Pier at the time of significant decline in dolphin numbers in North Lantau during the bridge construction works may have further compounded the problems for the dolphins in 2015. In addition, there have been some preparation works in relation to the third runway expansion to the north of the airport, and dredging and dumping works have been initiated at the contaminated mud pits at the northeast corner of the airport in 2015. These works may have also posed additional disturbance to the dolphins, and affected their usage of the North Lantau waters.

Looking ahead to 2016, there are some additional anthropogenic disturbances that would pose further threats to the dolphins and affect their usage of North Lantau waters while the marine works of HZMB wind down and the piling works of HKLR09 have been completed. For example, a new route diversion of the high-speed ferry traffic from the Sky Pier was implemented in late December 2015 by AAHK as one of their major mitigation measures for the third runway expansion (see AAHK 2014). This route diversion will undoubtedly bring more marine traffic to the east and north of Lung Kwu Chau, an area that had less high-speed ferry traffic in the past. As shown in previous sections on dolphin distribution and habitat use patterns, the waters to the north of Lung Kwu Chau were the only remaining area where dolphins were regularly found in the entire North Lantau region in 2015. Therefore, such routing may pose additional disturbance to the dolphins in this important habitat, even with the imposed speed limit of 15 knots for Sky Pier ferries when transiting this area. The route diversion may also affect the viability of the Sha Chau and Lung Kwu Chau Marine Park, which has already shown a noticeable decline in dolphin usage in the past few years (see Section 5.3.1).

Moreover, a new high-speed ferry traffic route was introduced in January 2016 between Tuen Mun and Macau, and the traffic volume increased to 14 trips per day in March 2016. The additional high-speed ferry traffic will definitely pose further risks to the dolphins inhabiting the North Lantau waters. Last but not least, the construction works of the third runway expansion project, which would involve massive land reclamation of 650 hectares at the important dolphin habitat to the north of the airport, is scheduled to commence in 2016. This would bring a tremendous amount of new pressure onto the dolphin utilization of North Lantau waters. The project itself would also affect the viability of the soon-to-be established Brothers Marine Park as well as the existing Sha Chau and Lung Kwu Chau Marine Park due to the close proximity of the reclamation footprint to both marine parks in North

Lantau waters.

To ensure a recovery of dolphin utilization in North Lantau waters and achieve the overall long-term goal of the Chinese White Dolphin Conservation Plan adopted by the Hong Kong SAR Government (AFCD 2000), it is recommended that the authority should take a more proactive approach to lessen the various anthropogenic impacts to the dolphins. For example, as suggested in previous monitoring reports, a presumption against further reclamation around Lantau waters would be urgently needed, such that only fully-justified reclamation proposals with over-riding public interests should be considered. The presumption against reclamation should only be relaxed when the declining trend of dolphin usage in North Lantau waters has been reversed, or reviewed when research effort has managed to establish the threshold of development pressure and other on-going threats that the local dolphin population can sustain over the long-term.

In addition, since the negative impacts posed by the high-speed ferry traffic on the dolphins are well-proven (see AAHK 2014; Sims et al. 2012), it remains a high priority to properly manage such traffic in North Lantau waters to facilitate the continued utilization of these waters by the dolphins at the levels in the past. For example, the route diversion plan by AAHK should be reviewed and validated with monitoring data as soon as possible, and if this plan poses further risks to the dolphins (especially on their usage of Sha Chau and Lung Kwu Chau Marine Park), the diversion should be modified or revamped. Also, in view of the impacts of the high-speed ferry traffic from the Sky Pier, it is highly recommended that AAHK reduce the volume of such traffic and impose a speed limit within the vessel traffic route from the Sky Pier to Urmston Road. This would alleviate the restriction on dolphin movements between Northwest and Northeast Lantau waters through the traveling corridors to the north of the airport, and improve the long-term viability of the Brothers Marine Park. Further increase in the volume of high-speed ferries originating and departing from the Tuen Mun Pier should be closely monitored with a view to minimizing the amount of marine traffic traversing through the dolphin habitats in North Lantau waters.

In the long run, in light of the existing threats and proposed infrastructure projects in North Lantau waters, the authority should seriously consider establishing a large marine protected area connecting the Sha Chau and Lung Kwu Chau Marine Park, the soon-to-be established Southwest Lantau Marine Park as well as the Soko Islands Marine Park, to offer a large refuge for the dolphins and to safeguard them from existing and future threats. Such large marine protected area in the western waters of Hong Kong would cover most of the important and critical habitats for the dolphins as identified in Hung (2014), and thereby increase their overall capacity to cope with existing and future threats. This important conservation measure should be implemented as far as practicable, in order to ensure the continued utilization of Hong Kong waters by the Chinese White Dolphins as part of their range as stated in the government's conservation plan.

6. SCHOOL SEMINARS AND PUBLIC AWARENESS

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

For these school talks, a PowerPoint presentation was produced with up-to-date information on both dolphins and porpoises gained from the present long-term monitoring programme. The talks also included content such as the threats faced by local cetaceans, and conservation measures that AFCD has implemented to protect them in Hong Kong. Through this integrated approach of the long-term monitoring programme and publicity/education programme, the Hong Kong public can gain first-hand information from our HKCRP researchers. Their support will be vital to the long-term success in conservation of local cetaceans.

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Table 1. Range use (50%/25% UD core areas and sighting coverage) and residency pattern of 155 individuals with 15+ sightings and appeared in 2014-15.

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

	Last				Primary	Occurrence in Survey Areas								50% UD Core Area					25% UD Core Area				
ID#	Sighted	# STG	Gender	Residency	Range	DB	EL	NEL	NWL	WL	SWL	SEL	CH	LKC	BR	TO	PH	FL	LKC	BR	TO	PH	FL
CH12	15/12/15	62	F?	YR	WL					√	√		√				√	√				√	
CH34	09/12/15	129	F	YR	NL	√		√	√	√			√	√					√				
CH38	18/12/15	75	?	YR	WL					√	√		√				√	√				√	
CH98	29/04/14	68	?	YR	NL	√			√	√				√					√				
CH105	20/10/15	18	F	SR	WL				√	√			√			√					√		
CH108	30/12/15	82	F	YR	WL				√	√	√		√				√	√				√	√
CH113	08/09/15	33	F	SR	WL				√	√			√			√					√		
CH153	30/10/15	18		SR	WL				√	√			√			√					√		
EL01	18/08/15	119	M*	YR	NL		√	√	√	√	√				√					√			
NL12	09/07/14	26	F	SR	NL	√		√	√		√		√	√					√				
NL24	14/04/14	237	F	YR	NL			√	√	√			√	√	√				√	√			
NL33	09/12/15	130	F*	YR	NL			√	√	√					√					√			
NL37	02/06/15	66	?	SR	NL		√	√	√	√				√					√				
NL46	10/11/15	80	F*	YR	NL				√	√			√	√					√				
NL48	29/12/15	120	?	YR	NL	√		√	√	√				√					√				
NL49	03/12/15	58	F*	SR	NL			√	√	√				√					√				
NL80	10/09/15	30	F	SR	NL	√			√	√				√					√				
NL93	05/08/14	60	F	YR	NL			√	√	√				√					√				
NL98	24/11/15	156	F*	YR	NL			√	√	√	√		√	√	√				√	√			
NL103	08/10/14	53	?	SR	NL	√			√	√	√			√					√				
NL104	15/12/15	117	F	YR	NL	√		√	√	√			√	√					√				
NL105	12/06/15	28	?	SR	NL/WL				√	√			√	√		√			√		√		
NL120	14/12/15	116	F*	YR	NL			√	√	√	√				√					√			
NL123	02/11/15	143	F	YR	NL	√		√	√	√			√		√					√			
NL128	20/05/14	53	M*	SR	WL			√	√	√	√	√	√			√	√	√				√	√
NL136	29/12/15	113	F*	YR	NL	√		√	√	√				√					√				
NL139	04/07/14	134	F	YR	NL			√	√	√			√	√	√					√			
NL145	03/12/15	49	F	YR	NL			√	√	√				√					√				
NL150	24/11/15	41	F	SR	NL	√		√	√	√	√			√					√				
NL153	19/08/15	22	F	SR	NL	√			√				√	√					√				
NL156	20/10/15	46	?	SR	NL/WL				√	√	√			√		√	√				√	√	
NL165	24/11/15	87	?	SR	NL			√	√	√	√			√	√				√				
NL182	24/11/15	77	F	YR	NL	√		√	√	√				√					√				
NL188	06/07/15	84	F	YR	NL/WL			√	√	√	√			√		√	√		√				
NL191	24/06/14	67	?	YR	NL			√	√	√			√	√	√					√			
NL202	07/12/15	96	F	YR	NL	√		√	√	√				√					√				
NL206	10/09/15	50	F*	YR	WL				√	√	√						√	√				√	√
NL210	07/12/15	56	?	YR	NL			√	√	√				√					√				
NL212	30/12/15	32	F	YR	WL				√	√			√			√	√				√		
NL213	26/06/15	27	?	SR	NL	√			√	√				√					√				
NL214	21/12/15	39	F?	SR	NL	√			√	√				√					√				
NL220	19/12/14	77	F	YR	NL	√		√	√	√				√					√				
NL221	21/01/14	24	F	SR	NL				√	√			√	√					√				
NL224	24/11/15	58	?	YR	NL/WL	√		√	√	√	√		√	√		√			√				
NL226	14/12/15	60	?	YR	NL	√		√	√	√	√				√					√			
NL233	07/12/15	52	F	YR	NL	√		√	√	√				√					√				
NL236	24/11/15	36	?	YR	NL				√	√				√					√				
NL242	25/09/15	83	F*	YR	NL			√	√	√				√	√				√				
NL247	19/11/15	18	?	SV	WL				√	√						√	√					√	
NL256	21/08/15	15	?	SR	NL	√			√	√				√					√				
NL259	30/10/15	69	?	YR	NL			√	√	√				√					√				

Table 1. (cont'd)

ID#	Last Sighted	# 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	LKC	BR	TO	PH	FL
NL260	24/11/15	63	?	YR	NL			√	√	√				√	√	√			√	√			
NL261	15/12/15	80	M?	YR	NL	√		√	√	√				√	√					√			
NL262	18/12/15	48	?	YR	NL	√			√	√				√					√				
NL264	24/11/15	63	F	YR	NL			√	√	√				√					√				
NL269	09/12/15	27	?	SR	NL/WL				√	√			√	√		√	√				√	√	
NL272	15/12/15	66	?	YR	NL	√		√	√	√	√			√					√				
NL278	07/10/14	20	?	SR	NL/WL				√	√	√		√	√		√			√		√		
NL279	10/09/15	19	?	SR	WL				√	√			√			√					√		
NL280	07/12/15	20	?	SV	NL	√			√	√				√					√				
NL284	07/12/15	75	?	YR	NL			√	√	√				√	√				√	√			
NL285	29/12/15	74	?	YR	NL			√	√	√				√	√					√			
NL286	07/12/15	71	?	YR	NL	√		√	√					√					√				
NL287	18/12/15	39	?	YR	NL				√	√				√					√				
NL288	24/11/15	53	?	YR	NL			√	√	√				√					√				
NL293	19/11/15	26	?	SR	WL				√	√						√					√		
NL295	10/12/15	47	?	YR	NL			√	√	√				√	√				√				
NL296	31/10/15	58	F?	YR	NL			√	√	√				√					√				
NL299	10/09/15	23	?	SR	WL	√			√	√	√			√		√	√				√	√	
NL300	28/07/15	20	?	SR	NL			√	√	√				√		√			√				
NL301	10/09/15	20	?	SR	NL	√			√					√					√				
NL302	20/10/15	20	?	SR	NL	√			√	√				√		√			√				
NL307	20/10/15	15	?	N.D.	NL				√	√	√			√					√				
SL05	30/12/15	84	F	YR	WL					√	√						√	√					√
SL27	29/06/15	45	M	YR	WL				√	√	√					√		√			√		√
SL35	28/07/14	90	M	YR	WL				√	√	√	√	√			√	√	√				√	√
SL40	23/11/15	54	F	YR	WL					√	√		√				√	√					√
SL42	18/12/15	17	?	SR	NL/WL	√			√	√	√			√		√	√				√	√	
SL44	12/06/15	29	?	YR	WL					√	√					√	√					√	
SL47	13/10/15	28	?	SR	WL					√	√		√			√	√	√			√		√
SL50	18/12/15	16	?	SR	WL					√	√	√						√					√
WL04	30/12/15	52	F?	YR	NL/WL	√		√	√	√				√		√			√		√		
WL05	03/12/15	85	F?	YR	NL			√	√	√			√	√		√			√		√		
WL11	03/12/15	66	F*	YR	NL			√	√	√			√	√					√				
WL15	18/12/15	85	M*	YR	WL			√	√	√	√					√	√	√			√		√
WL17	17/09/15	32	?	SR	WL			√	√	√	√	√	√	√		√	√	√	√		√	√	√
WL21	10/09/15	61	F	SR	WL				√	√	√		√			√	√				√		
WL25	04/06/14	153	F	YR	WL				√	√	√		√			√	√	√			√	√	√
WL28	20/10/15	24	F	SR	WL				√	√			√			√	√				√		
WL29	11/12/15	37	F	SR	WL					√	√		√			√	√					√	
WL42	11/12/15	98	?	YR	WL				√	√	√		√				√	√				√	
WL44	14/12/15	39	?	YR	WL			√	√	√	√		√	√		√	√	√				√	
WL46	30/12/15	75	?	YR	NL/WL			√	√	√	√			√		√					√		
WL47	13/11/15	31	?	SR	WL	√			√	√	√	√	√			√	√	√				√	√
WL50	18/06/15	77	F*	YR	WL				√	√	√		√			√	√	√			√	√	√
WL58	20/10/15	15	?	SR	WL					√			√			√	√	√				√	√
WL61	14/12/15	77	?	YR	WL				√	√	√						√	√					√
WL62	14/12/15	70	F	YR	WL					√	√	√	√			√	√	√			√		√
WL68	23/11/15	41	F*	YR	WL					√	√						√	√				√	
WL69	31/10/15	75	F?	YR	WL					√	√	√	√				√	√					√
WL72	15/12/15	92	F	YR	WL				√	√	√					√	√	√				√	
WL73	08/10/14	41	?	SR	WL					√	√					√	√	√				√	√
WL74	23/11/15	39	?	YR	WL					√	√						√	√				√	√
WL79	13/10/15	41	?	SR	WL				√	√			√			√					√		
WL84	12/05/14	22	F	SR	WL					√	√					√	√	√				√	√
WL86	15/05/14	54	F	YR	WL					√	√							√					√
WL91	18/12/15	61	?	YR	WL					√	√		√				√	√				√	
WL92	23/11/15	28	?	SR	WL					√	√		√				√	√					√
WL93	25/11/14	39	?	YR	WL				√	√	√						√	√					√
WL94	09/11/15	48	F	YR	WL					√	√		√					√					√
WL98	07/10/15	26	F	SR	WL				√	√			√			√	√				√		
WL109	30/12/15	74	?	YR	WL				√	√	√		√			√	√					√	

Table 1. (cont'd)

ID#	Last Sighted	# 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	LKC	BR	TO	PH	FL
WL114	23/11/15	53	F?	YR	WL				√	√	√		√				√	√				√	√
WL116	30/10/15	62	?	YR	WL				√	√	√		√			√	√	√				√	
WL118	30/12/15	50	F	YR	WL					√	√						√	√				√	
WL120	07/05/15	28	?	SR	WL				√	√						√					√		
WL122	13/04/15	17	?	SR	WL				√	√	√		√			√					√		
WL123	30/12/15	79	F?	YR	WL				√	√	√		√				√	√					√
WL124	22/09/15	47	F	SR	WL				√	√	√					√	√				√		
WL128	23/11/15	36	?	SR	WL					√	√						√	√				√	√
WL129	11/12/15	18	F	SR	WL					√	√		√				√	√				√	
WL130	15/12/15	63	?	YR	WL				√	√	√						√	√					√
WL131	15/12/15	92	?	YR	WL				√	√	√					√	√	√				√	
WL132	24/11/14	36	F?	SV	WL					√	√	√	√			√	√	√				√	√
WL137	15/10/15	50	F	YR	WL				√	√	√		√				√					√	
WL142	23/11/15	53	?	YR	WL					√	√		√					√					√
WL144	13/06/15	21	?	SR	WL					√	√						√					√	
WL145	19/11/15	23	F	SR	WL				√	√						√					√		
WL152	15/12/15	54	?	YR	WL				√	√	√						√	√				√	
WL153	08/10/14	23	?	YR	WL				√	√			√			√	√				√		
WL159	04/07/14	22	F	SR	WL				√	√			√			√					√		
WL165	24/11/15	60	?	YR	WL					√	√						√	√					√
WL170	29/06/15	28	?	SR	WL				√	√	√		√					√					√
WL171	11/12/15	19	F	SV	WL					√	√						√	√				√	√
WL173	30/12/15	42	?	YR	WL					√	√						√	√				√	√
WL178	23/10/15	17	?	SR	WL				√	√	√	√	√			√	√				√		
WL179	10/12/15	23	F	SR	NL/WL				√	√				√			√	√	√			√	
WL180	20/10/15	55	F	YR	WL					√	√		√			√	√	√				√	√
WL189	06/07/15	15	?	SR	NL/WL				√	√						√					√		
WL191	10/12/15	24	?	YR	WL				√	√			√			√	√				√	√	
WL193	10/09/15	29	?	SR	WL				√	√						√					√		
WL199	30/12/15	30	?	SR	WL				√	√	√					√	√	√				√	
WL207	22/09/15	18	F	SR	WL				√	√						√					√		
WL208	30/12/15	25	?	SR	WL				√	√	√					√	√	√			√	√	
WL210	03/12/15	18	?	SR	WL					√	√		√			√	√	√				√	
WL211	23/11/15	16	F	YR	WL					√	√						√					√	
WL214	28/07/15	17	?	N.D.	WL				√	√						√	√				√		
WL215	15/10/15	34	?	YR	WL				√	√	√		√			√	√	√				√	√
WL216	25/09/15	16	?	SR	WL				√	√	√					√	√				√	√	
WL217	22/09/15	16	?	N.D.	WL				√	√	√					√	√				√		
WL220	15/12/15	26	?	N.D.	WL					√	√					√	√	√				√	√
WL221	18/12/15	33	?	N.D.	WL				√	√	√					√	√	√			√		
WL231	07/10/15	15	?	N.D.	WL				√	√	√					√	√				√	√	
WL232	18/12/15	16	?	N.D.	WL					√	√					√	√				√		
WL243	29/12/15	22	?	N.D.	WL				√	√	√	√				√		√			√		

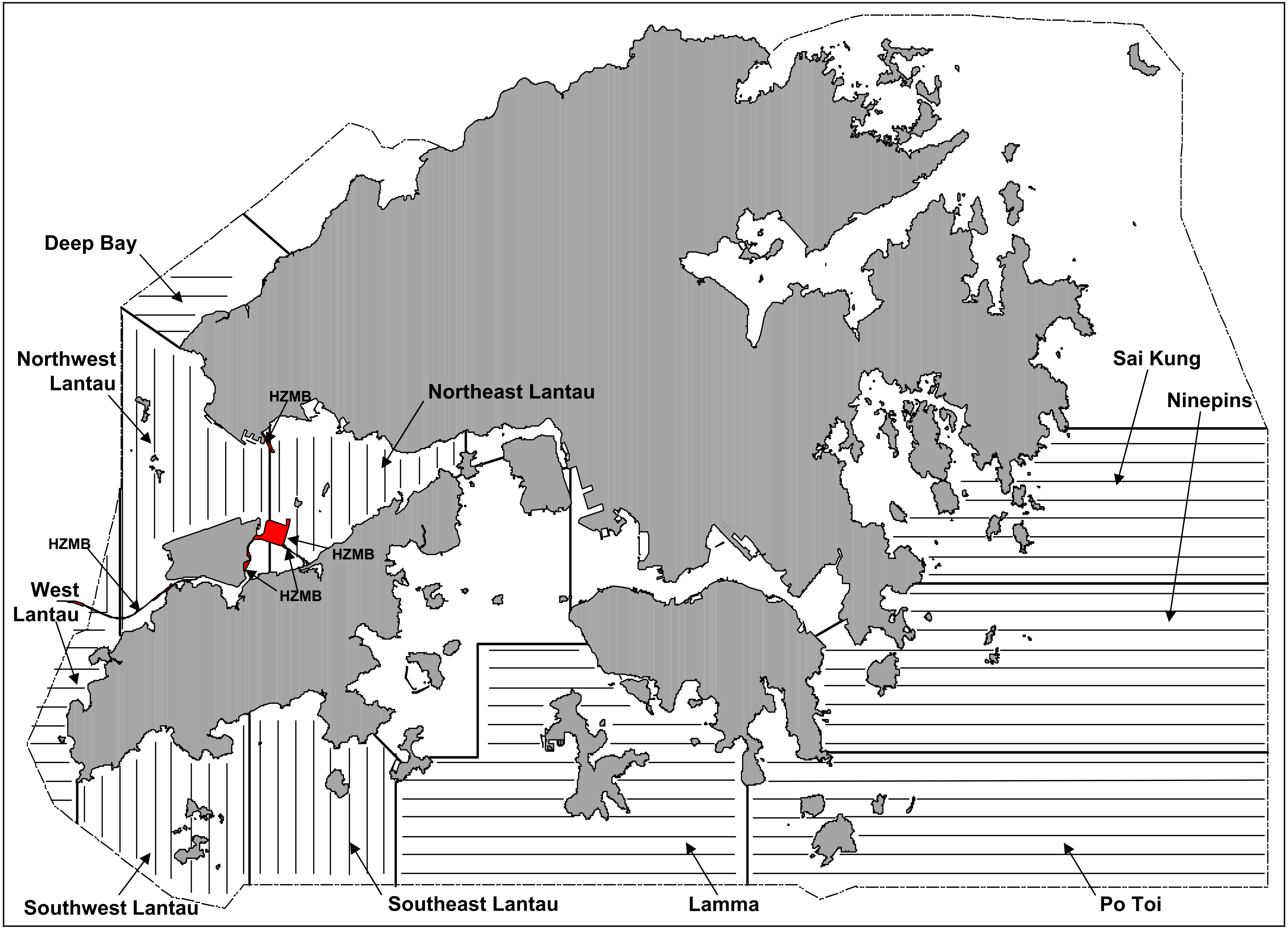


Figure 1. Ten Line-Transect Survey Areas within the Study Area chosen for the Present Monitoring Study (2015-16)

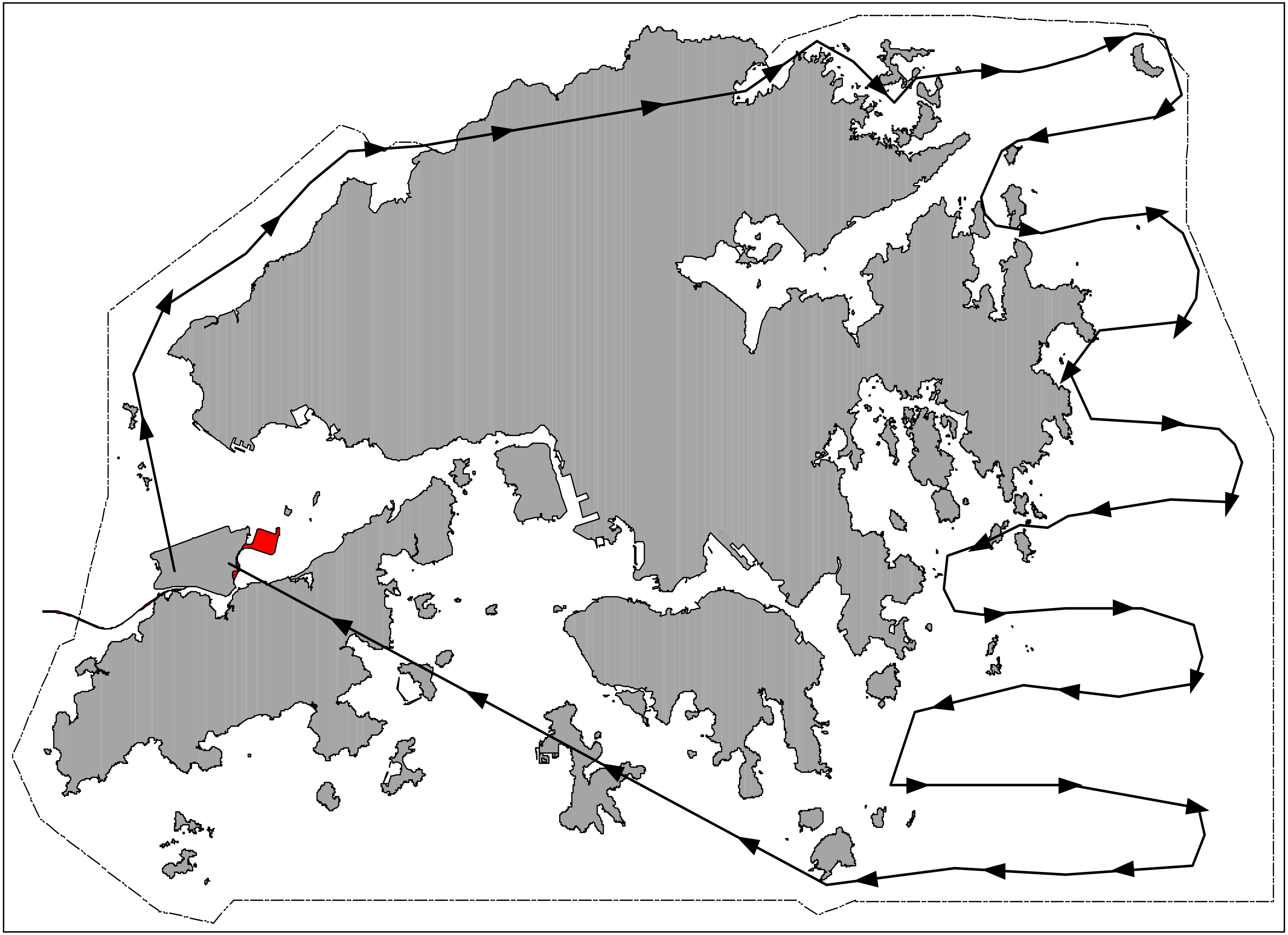


Figure 2. Survey Route for Helicopter Surveys in Eastern and Southern Waters of Hong Kong

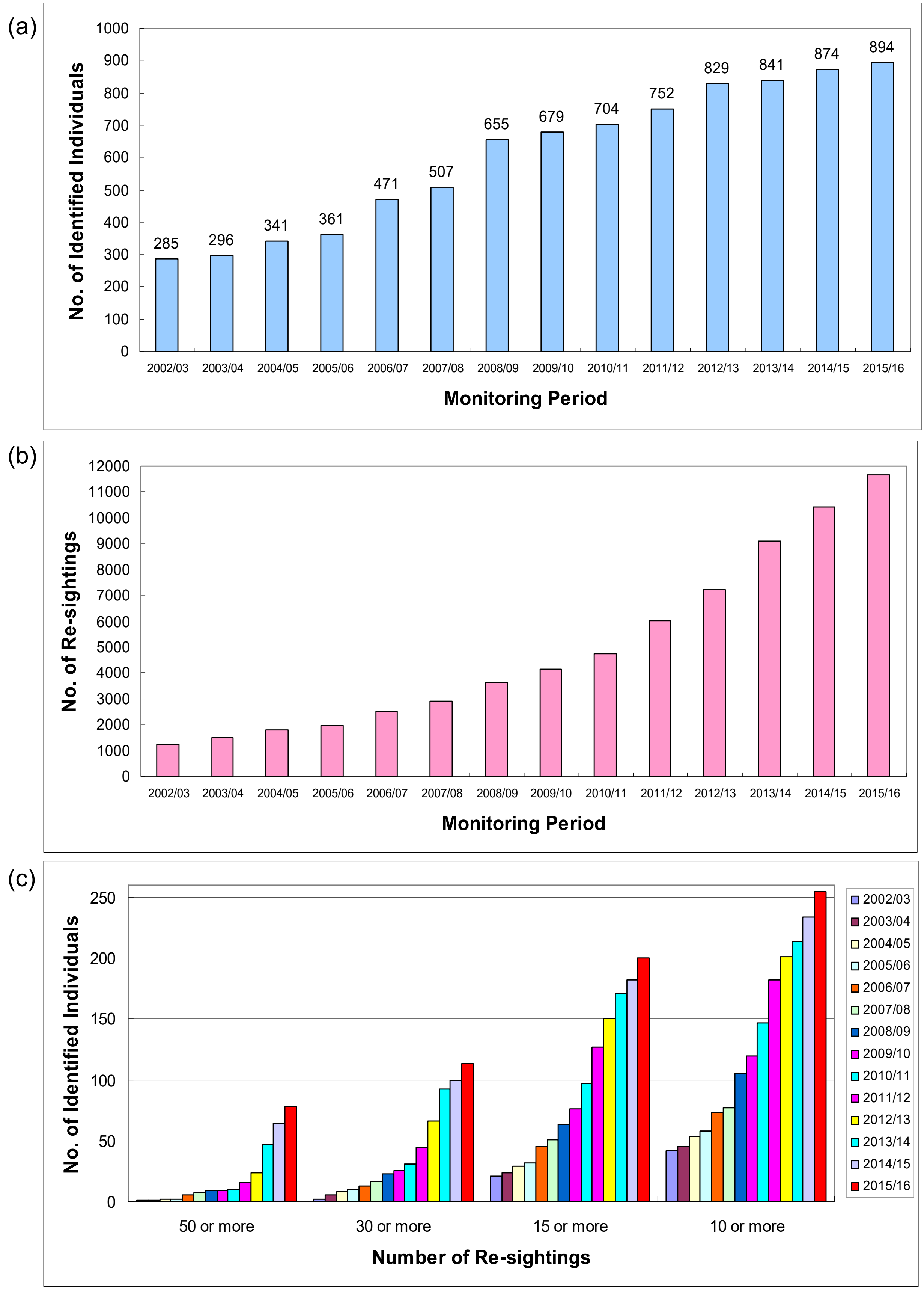


Figure 3. Temporal trends of (a) total number of identified individuals; (b) total number of re-sightings made; and (c) number of identified individuals within several categories of number of re-sightings in the past 14 monitoring periods since 2002

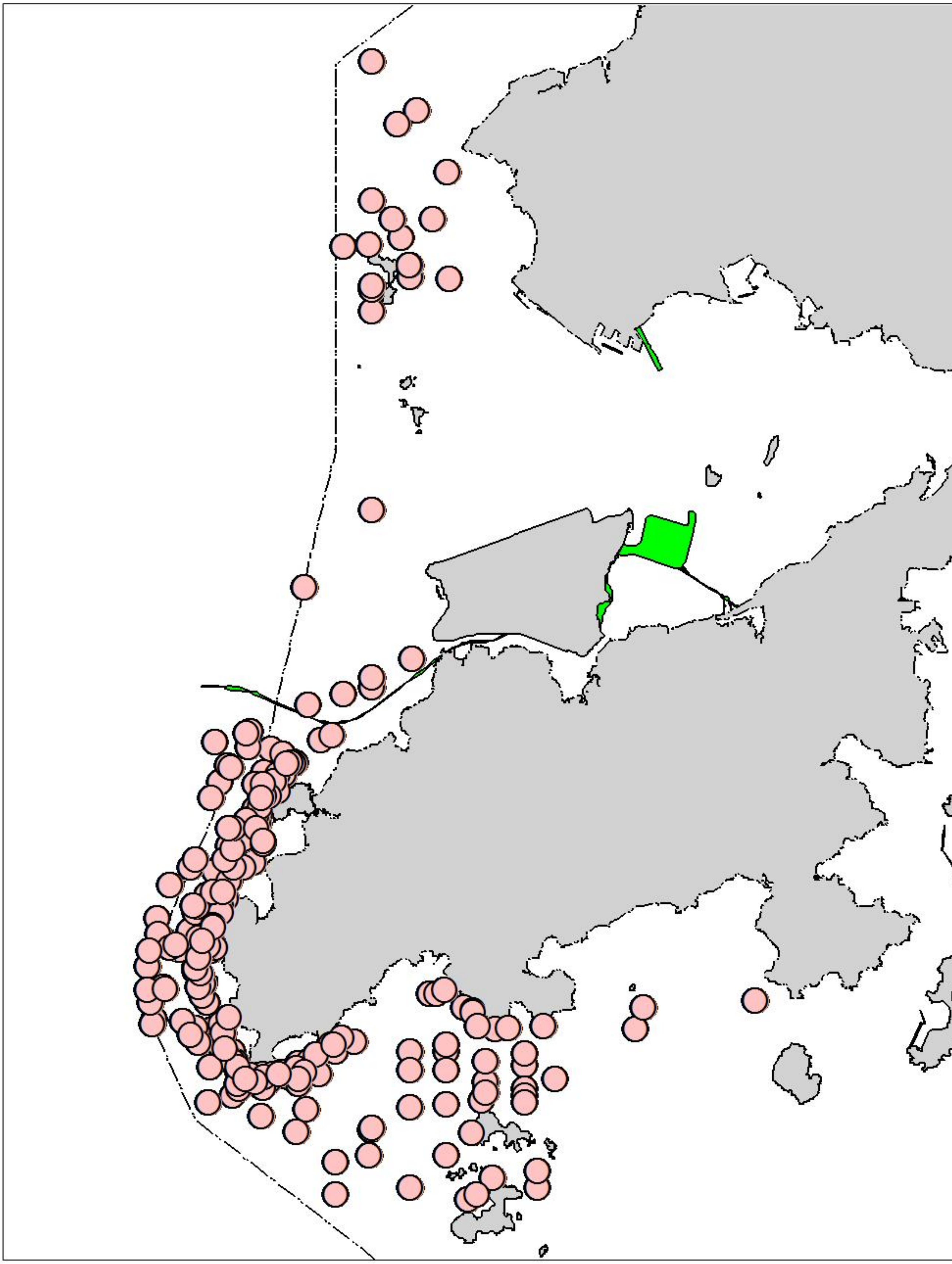


Figure 4. Distribution of CWD sightings in Hong Kong waters during AFCD monitoring surveys (April 2015 – March 2016)

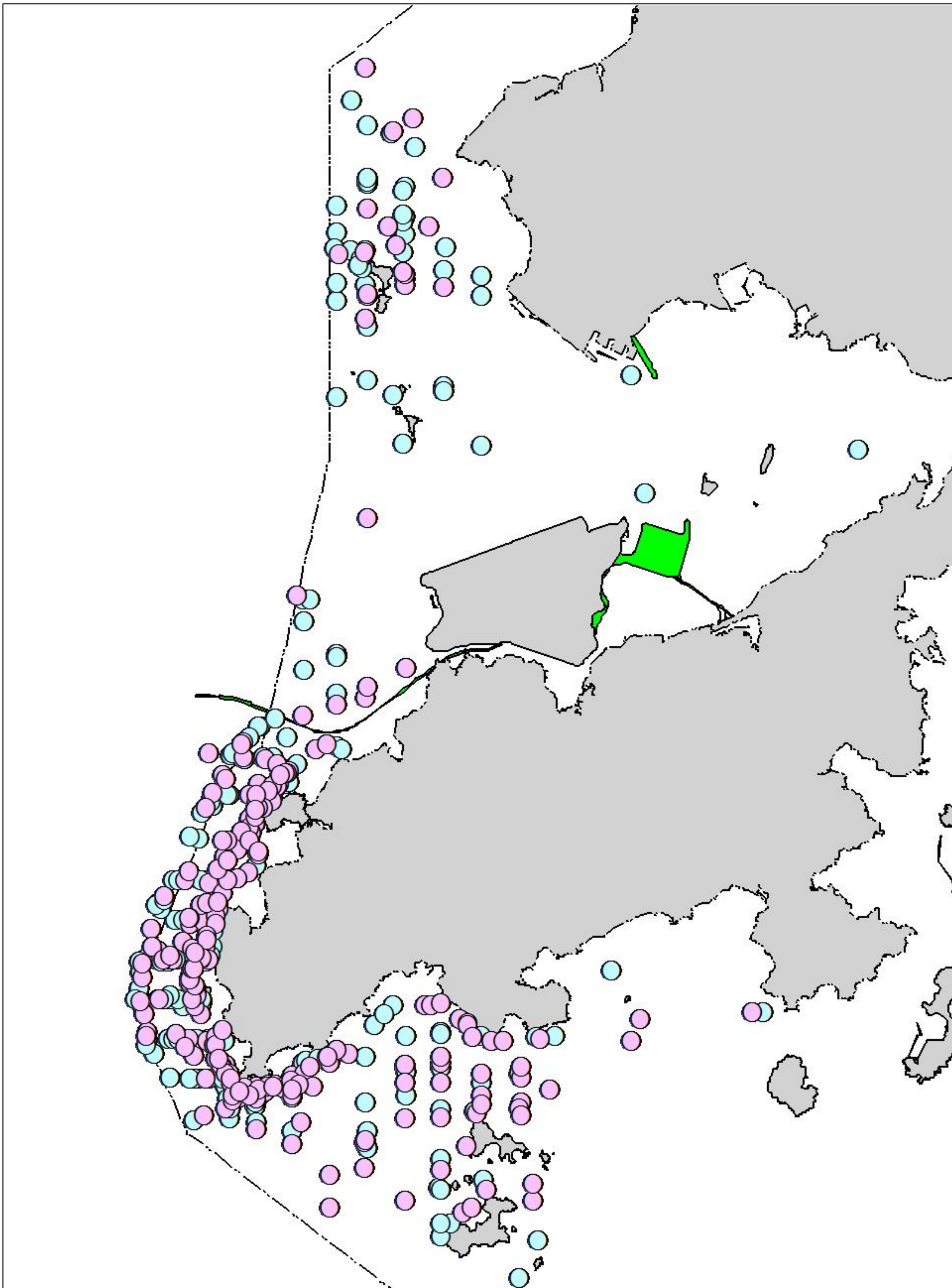


Figure 5. Distribution of all CWD sightings in Hong Kong waters in 2015-16
(purple dots: AFCD survey sightings; blue dots: HKLR survey sightings)

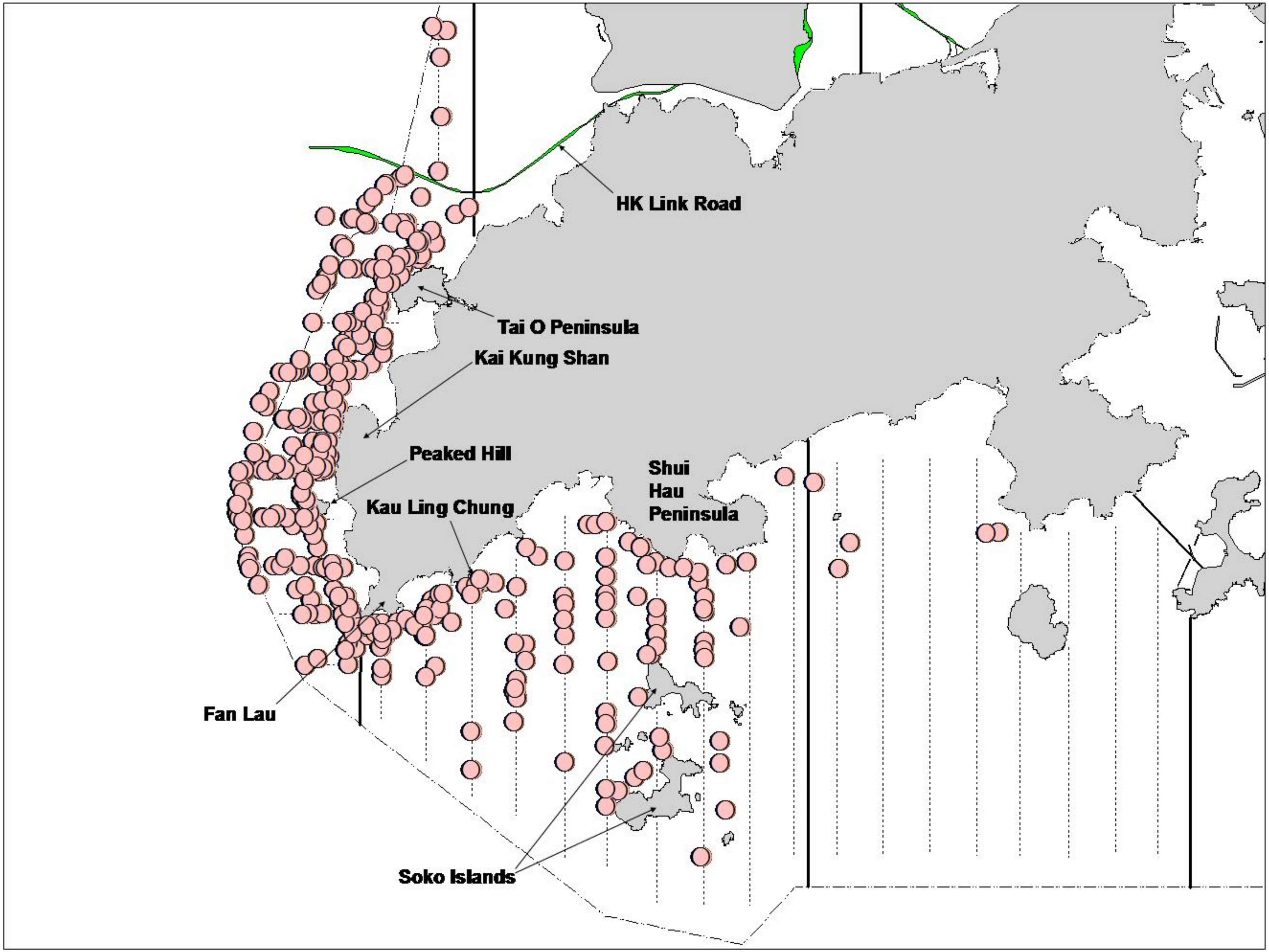


Figure 6. Distribution of Chinese white dolphin sightings in West and Southwest Lantau waters (2015)

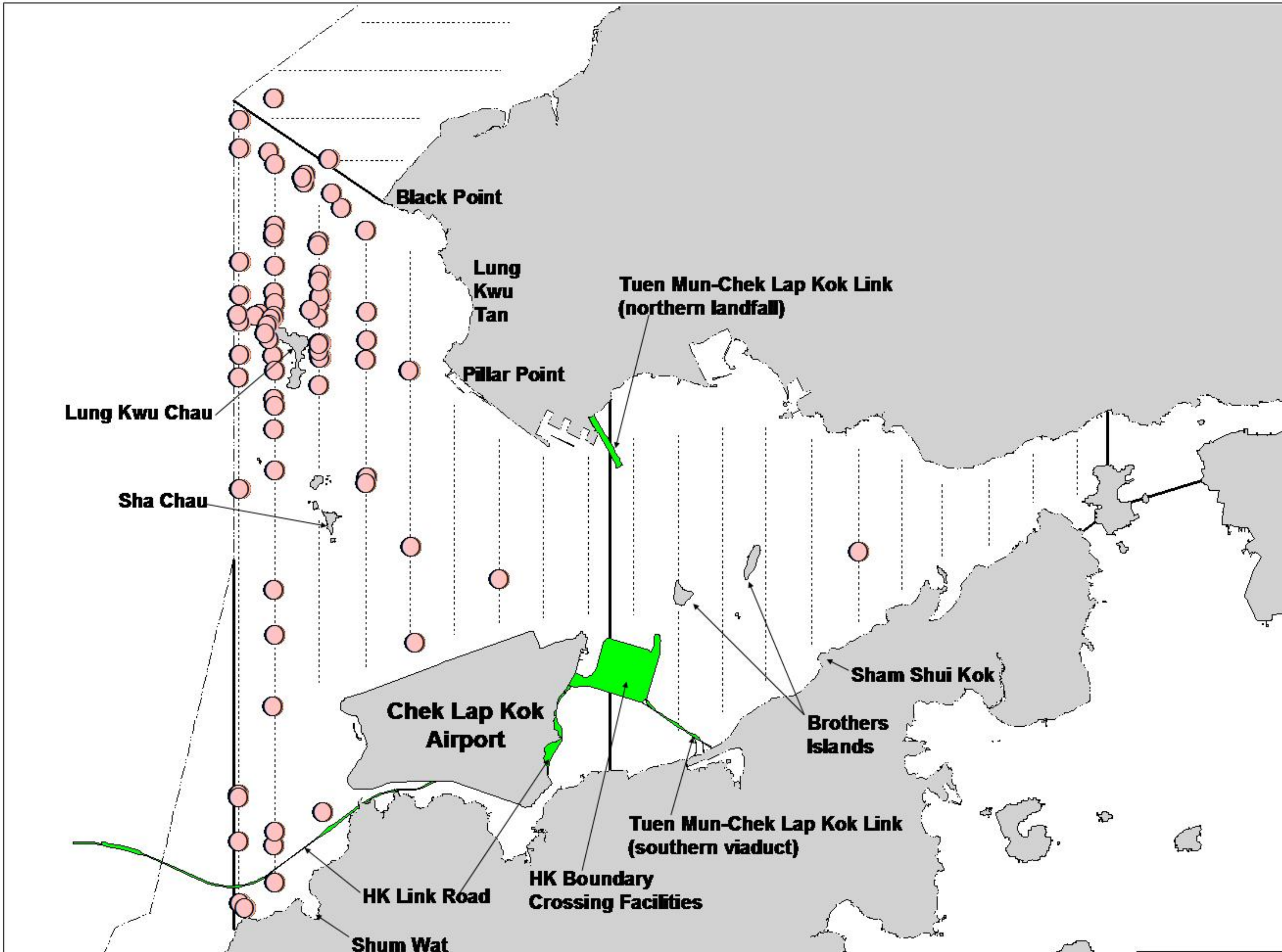


Figure 7. Distribution of Chinese white dolphin sightings in North Lantau and Deep Bay (2015)

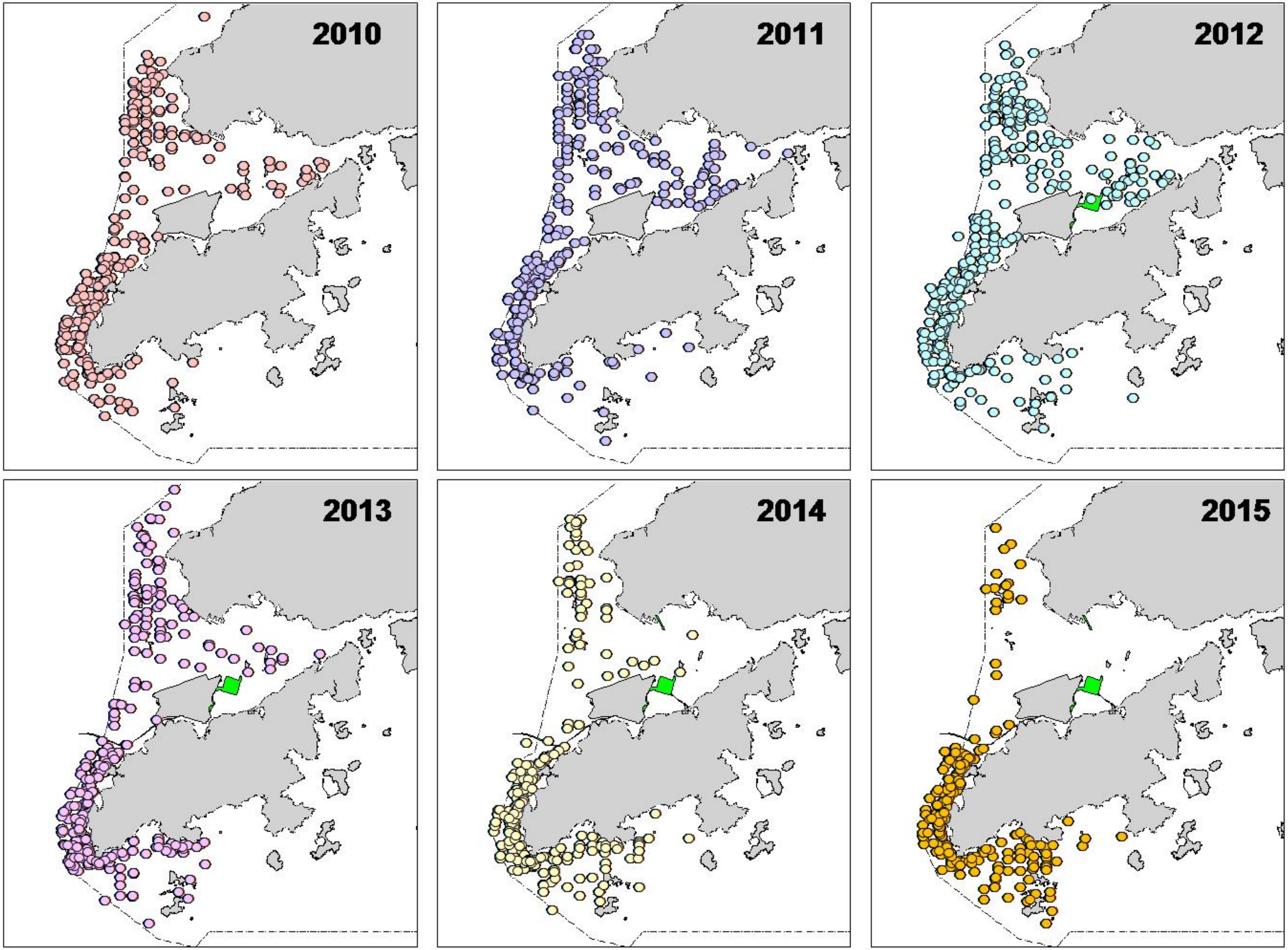


Figure 8. Comparison of dolphin distribution patterns from the past six years (2010-15)

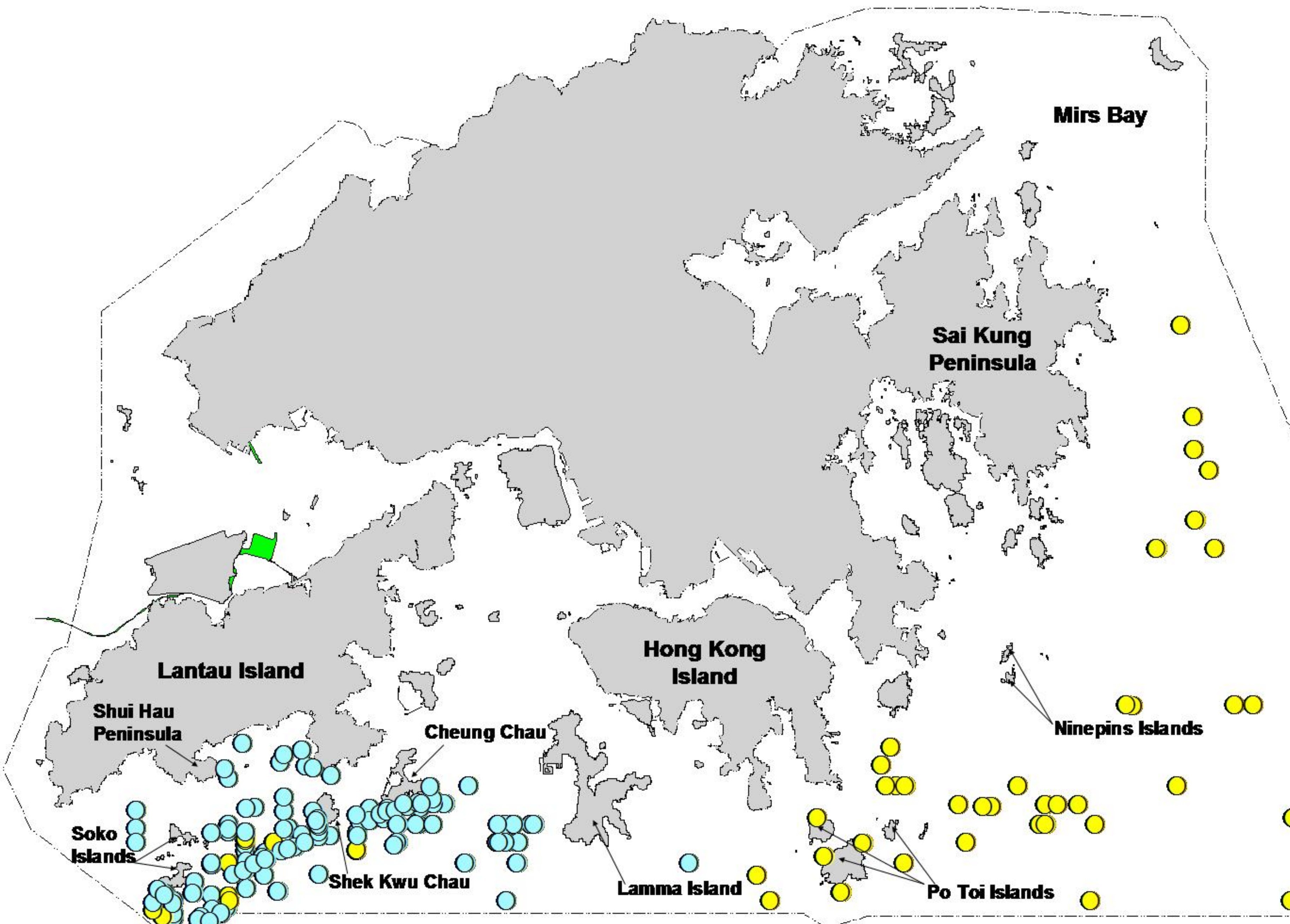


Figure 9. Distribution of finless porpoise sightings made during AFCD surveys (April 2015 – March 2016)
(yellow dots: sightings made during summer/autumn months)

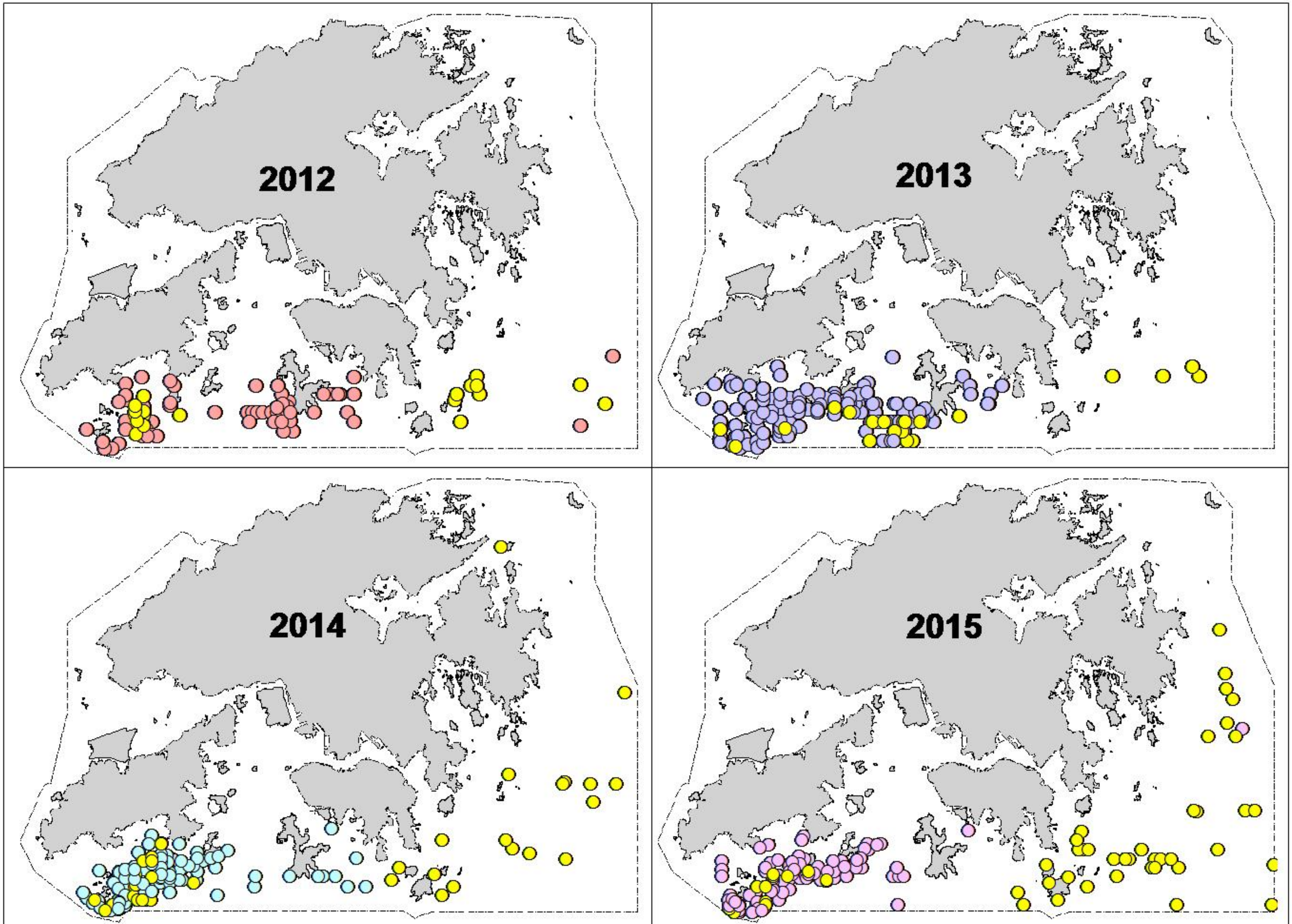


Figure 10. Comparison of annual porpoise distribution patterns from the past four years
(yellow dots: sightings made during summer/autumn months)

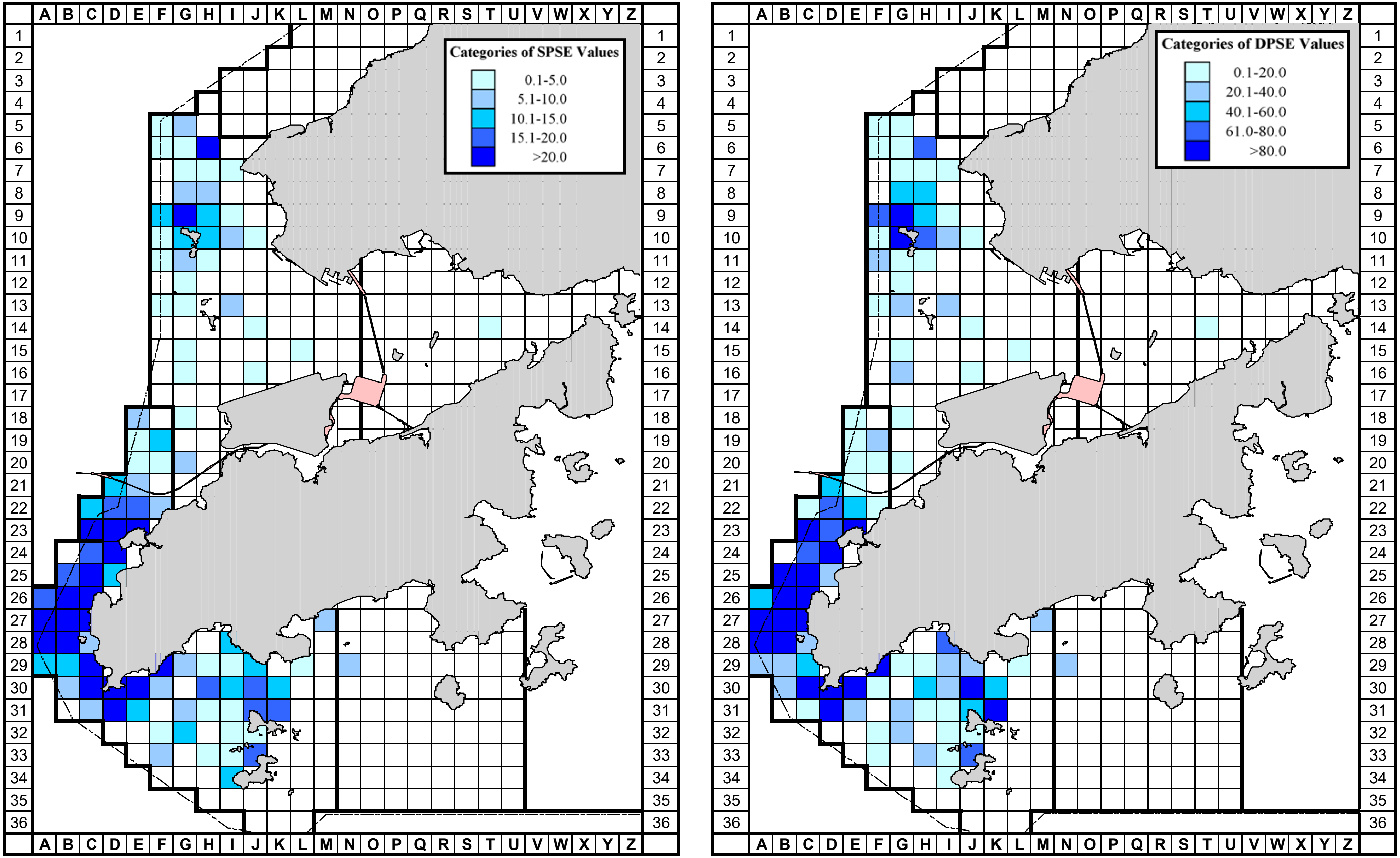


Figure 11. (left) Sighting density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island (number within grids represent "SPSE" = no. of on-effort dolphin sightings per 100 units of survey effort) (using data from January - December 2015)

(right) Density of Chinese white dolphins with corrected survey effort per km^2 in waters around Lantau Island (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort) (using data from January - December 2015)

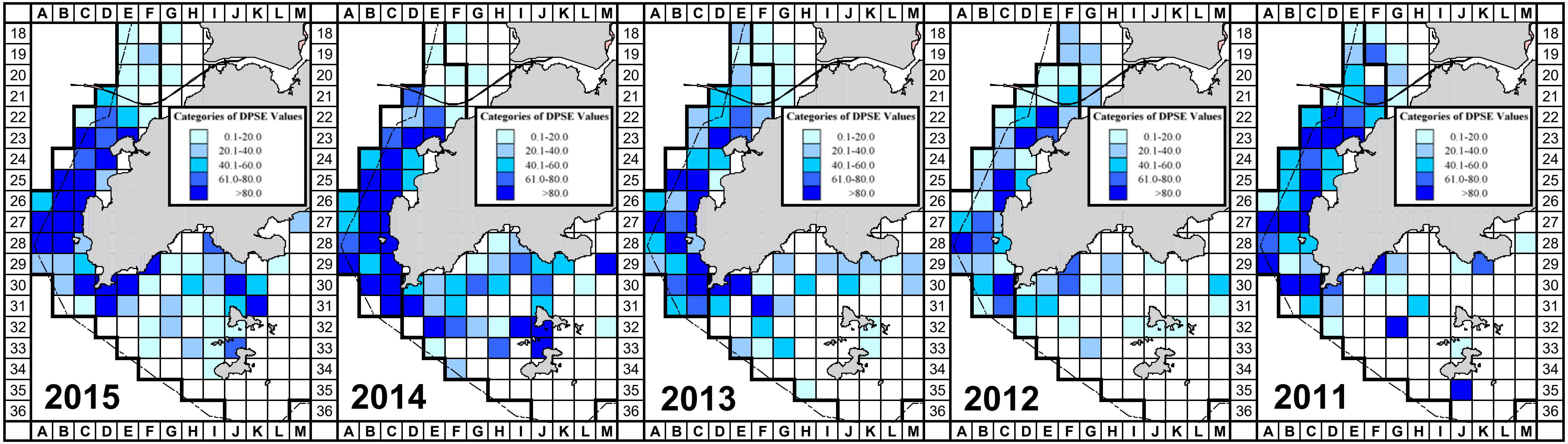


Figure 12. Comparison of Chinese white dolphin densities with corrected survey effort per km^2 in West Lantau Waters in 2011-15
(number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort)

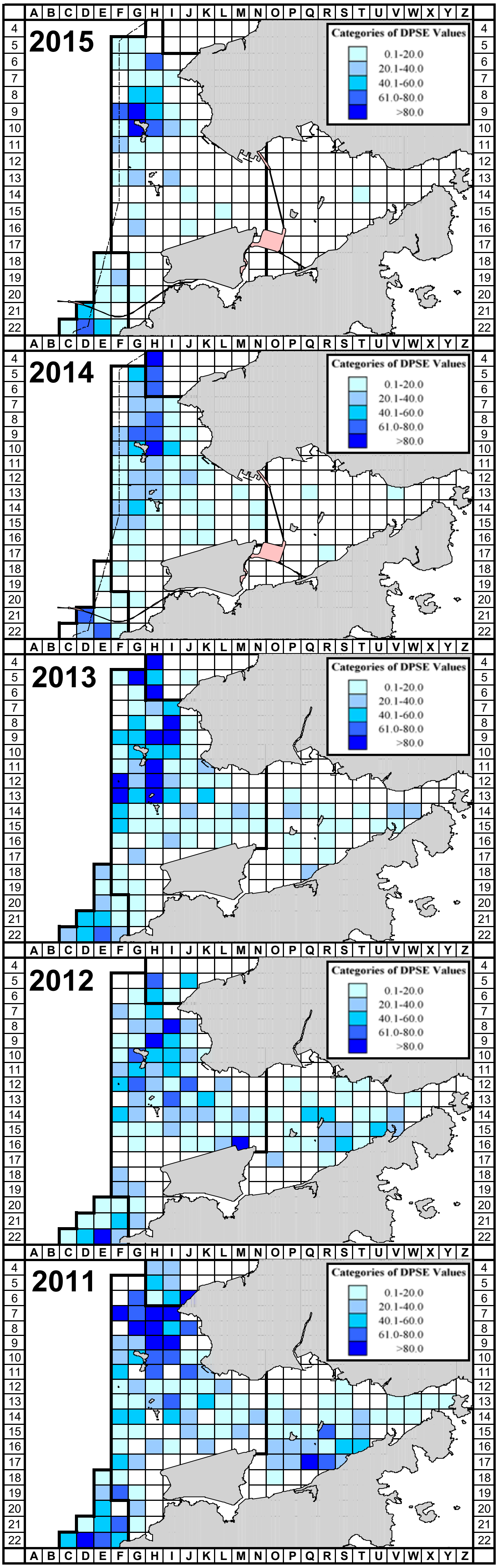


Figure 13. Comparison of dolphin densities with corrected survey effort per km^2 in North Lantau waters in 2011-15 (number within grids represent "DPSE" = no. of dolphins per 100 units of survey effort)

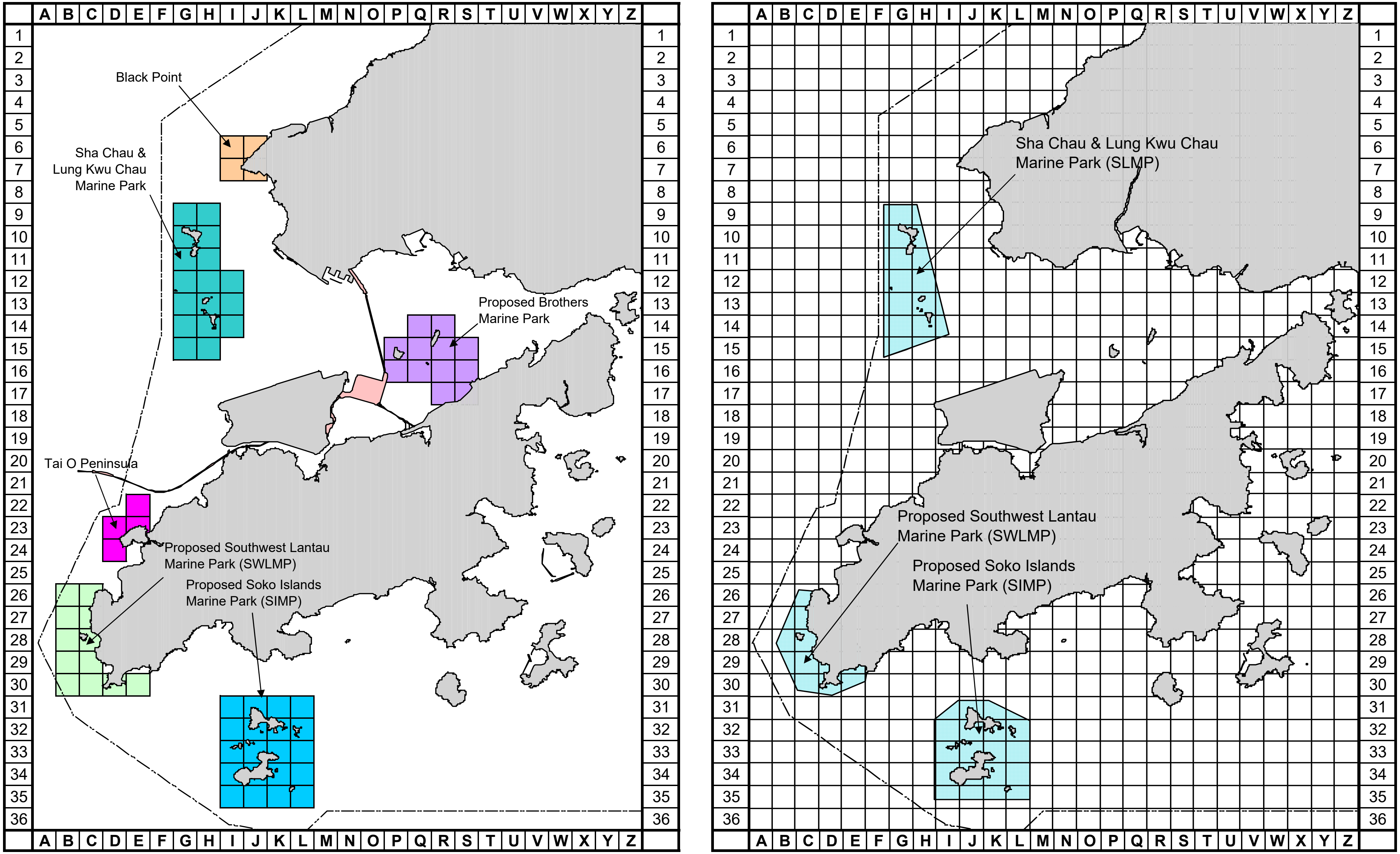


Figure 14. Grids of six key dolphin habitats that were examined for temporal trend in dolphin densities

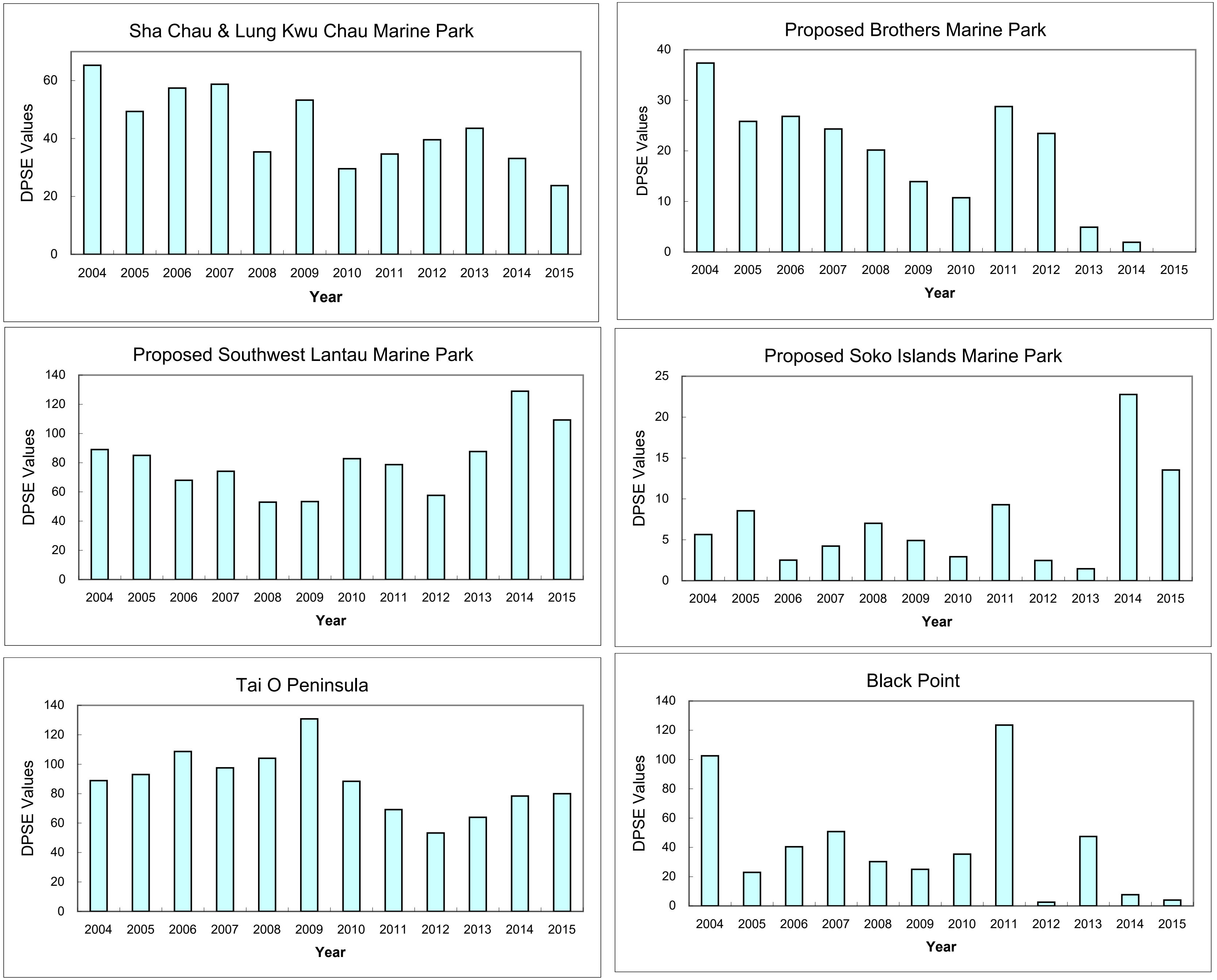


Figure 15. Temporal trend of dolphin densities (DPSE Values) at six key dolphin habitats in Lantau waters

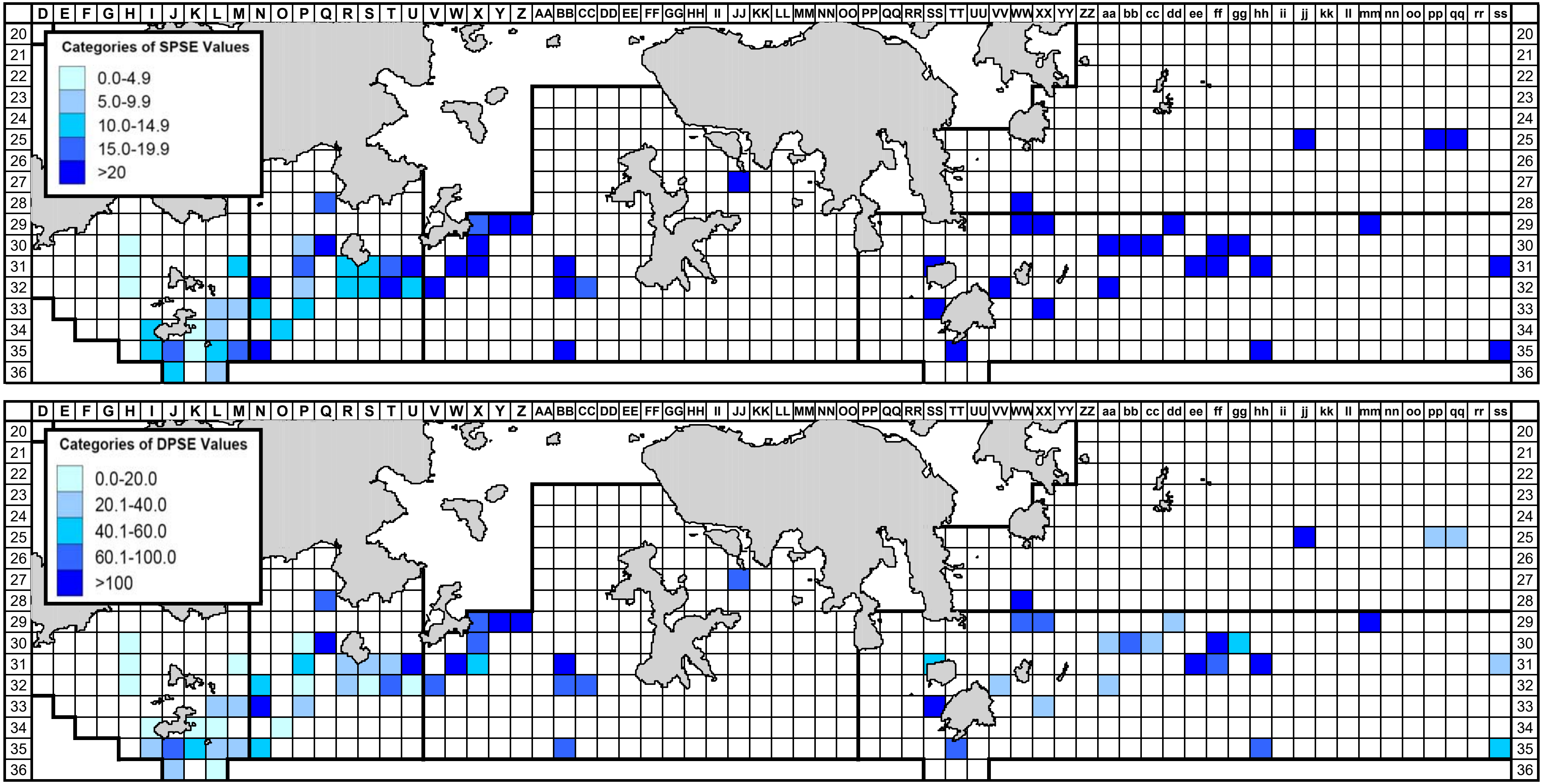


Figure 16. (top) Sighting density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong (number within grids represent "SPSE" = no. of on-effort porpoise sightings per 100 units of survey effort) (using data from January - December 2015)

(bottom) Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong (number within grids represents "DPSE" = no. of porpoises per 100 units of survey effort) (using data from January - December 2015)

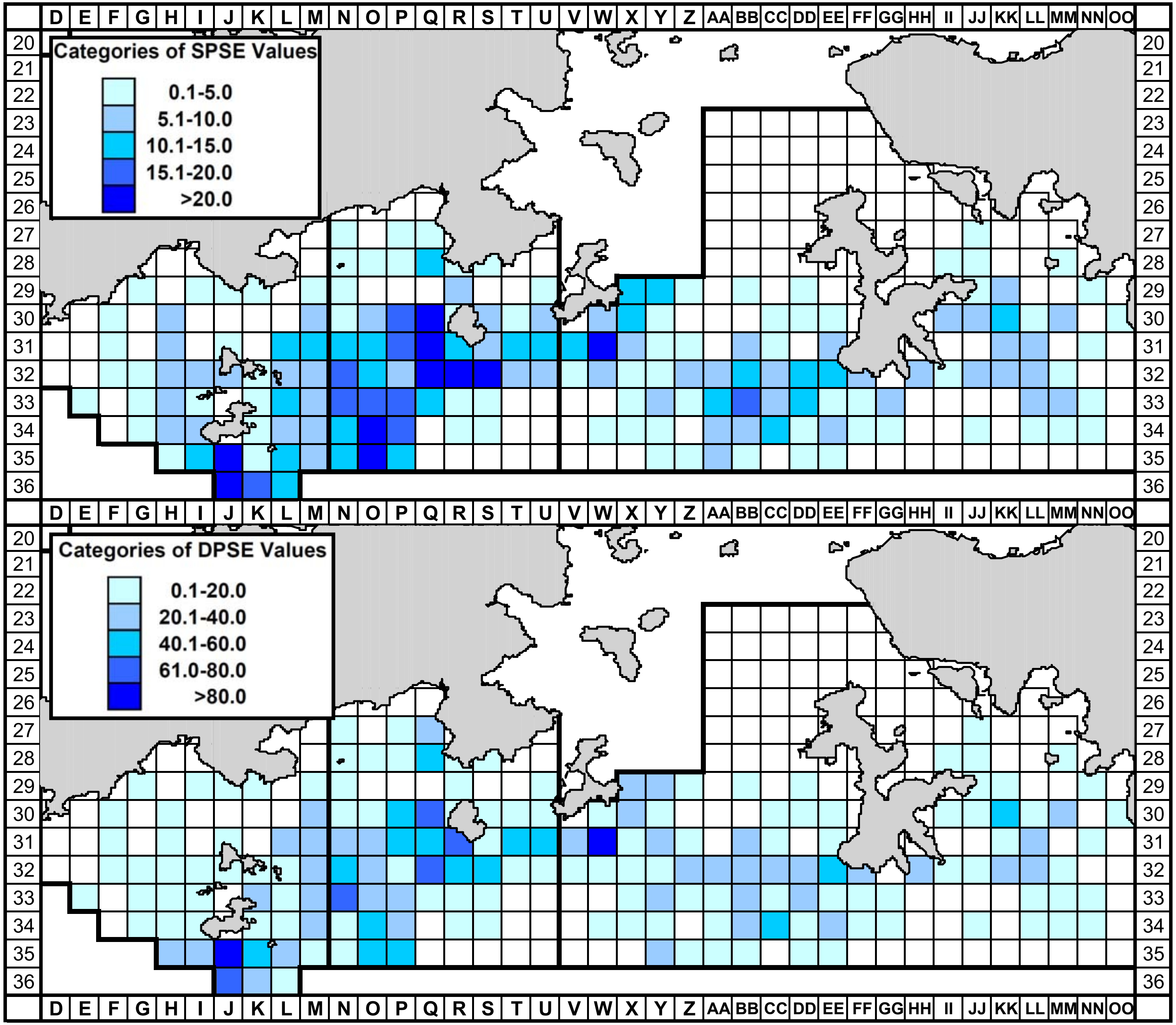


Figure 17. Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong during dry season (December to May), using data collected during 2006-15 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effor

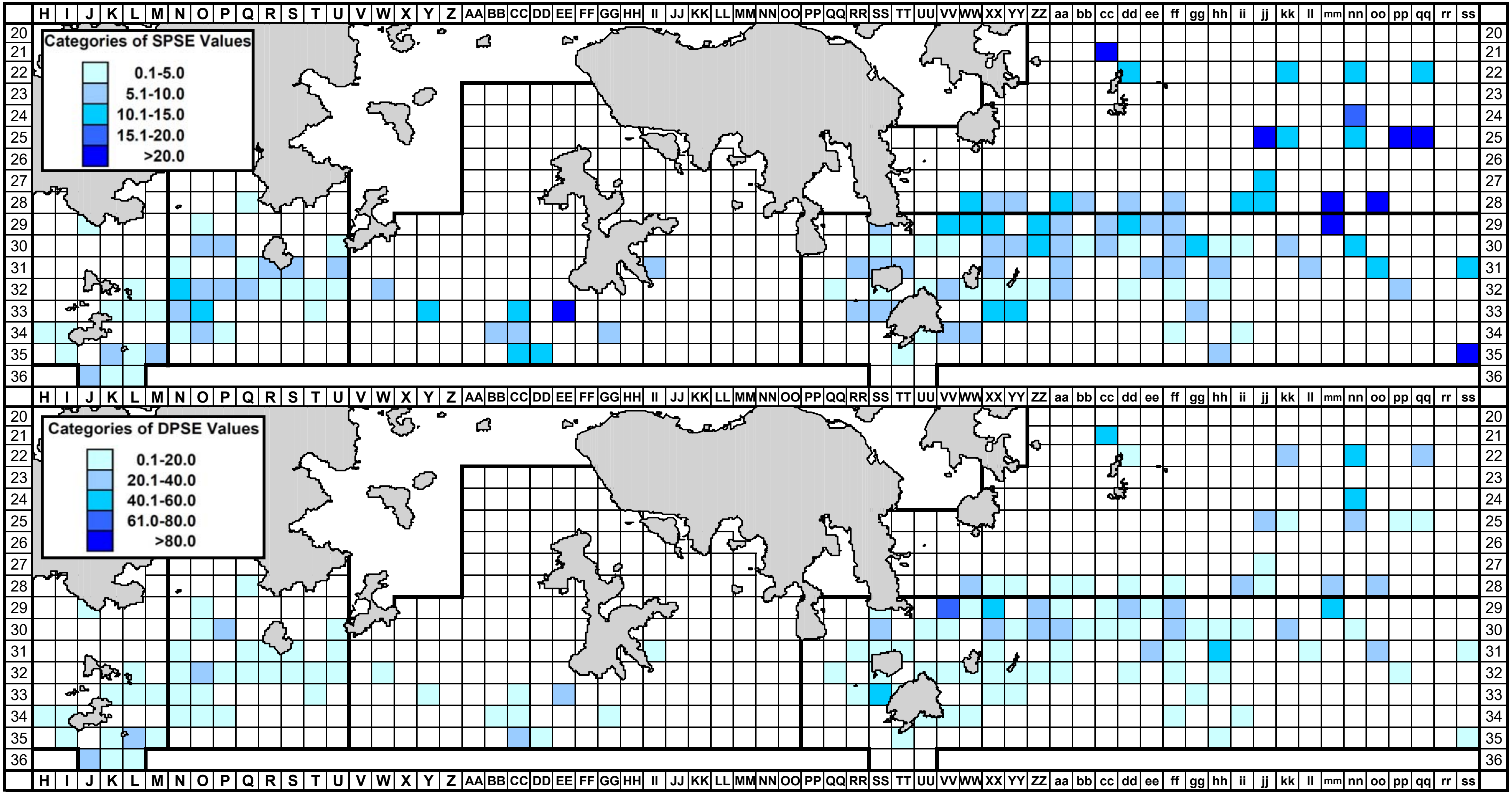


Figure 18. Density of finless porpoises with corrected survey effort per km^2 in southern waters of Hong Kong during wet season (June to November), using data collected during 2006-15 (SPSE = no. of on-effort porpoise sightings per 100 units of survey effort; DPSE = no. of porpoises per 100 units of survey effort

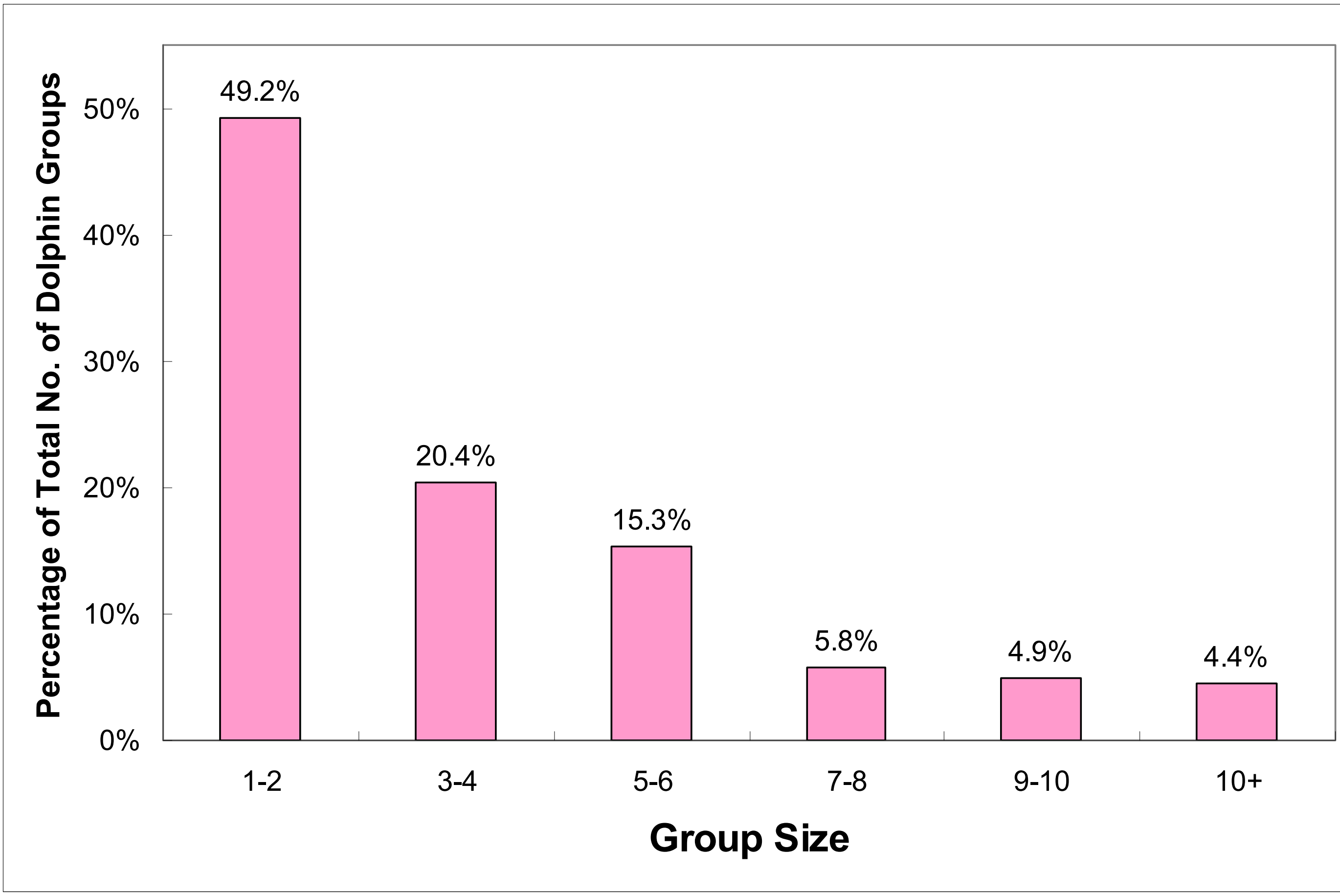


Figure 19. Percentages of different group sizes of Chinese white dolphins in Hong Kong during April 2015 to March 2016

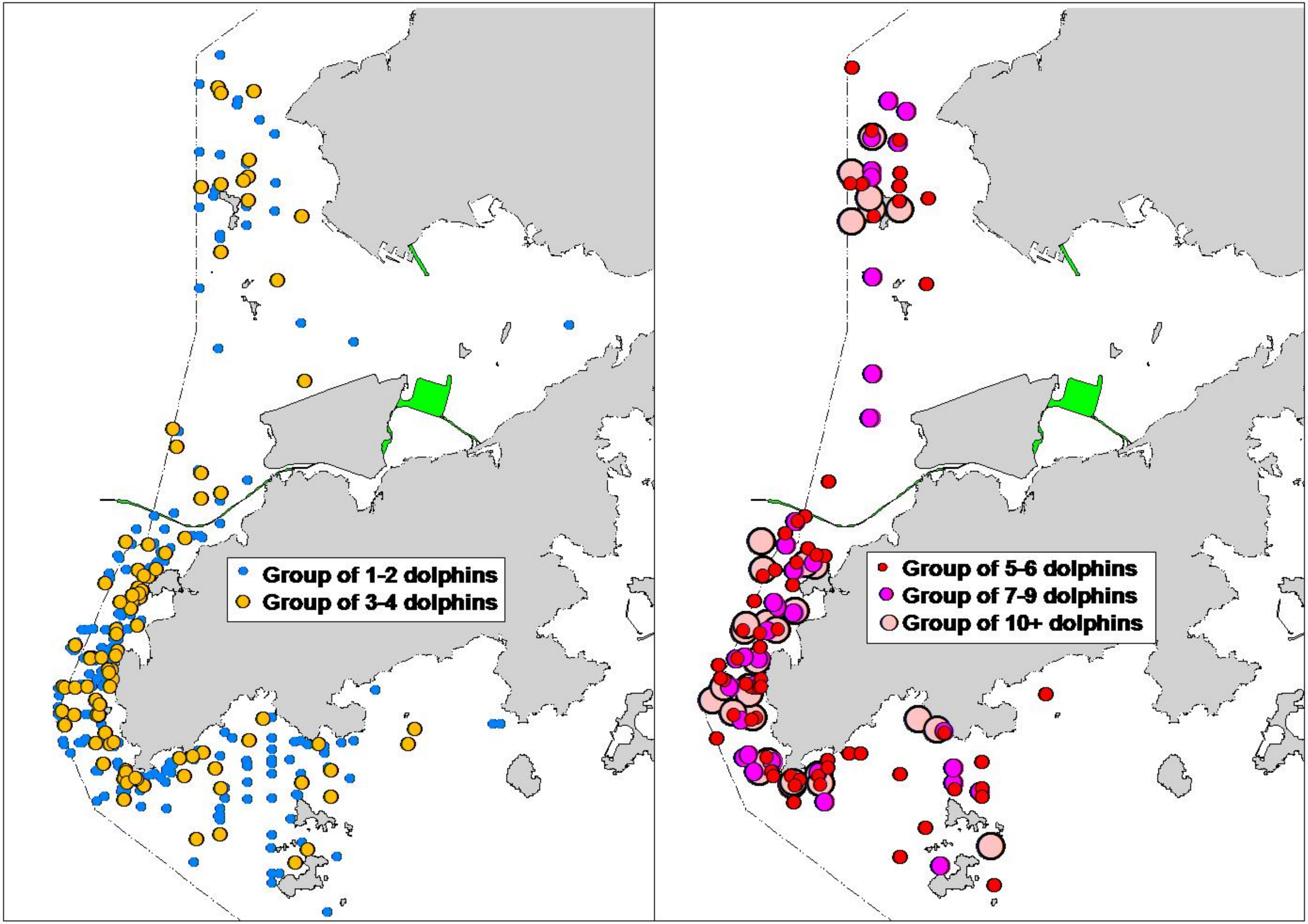


Figure 20. Distribution of Chinese white dolphins with different group sizes in 2015

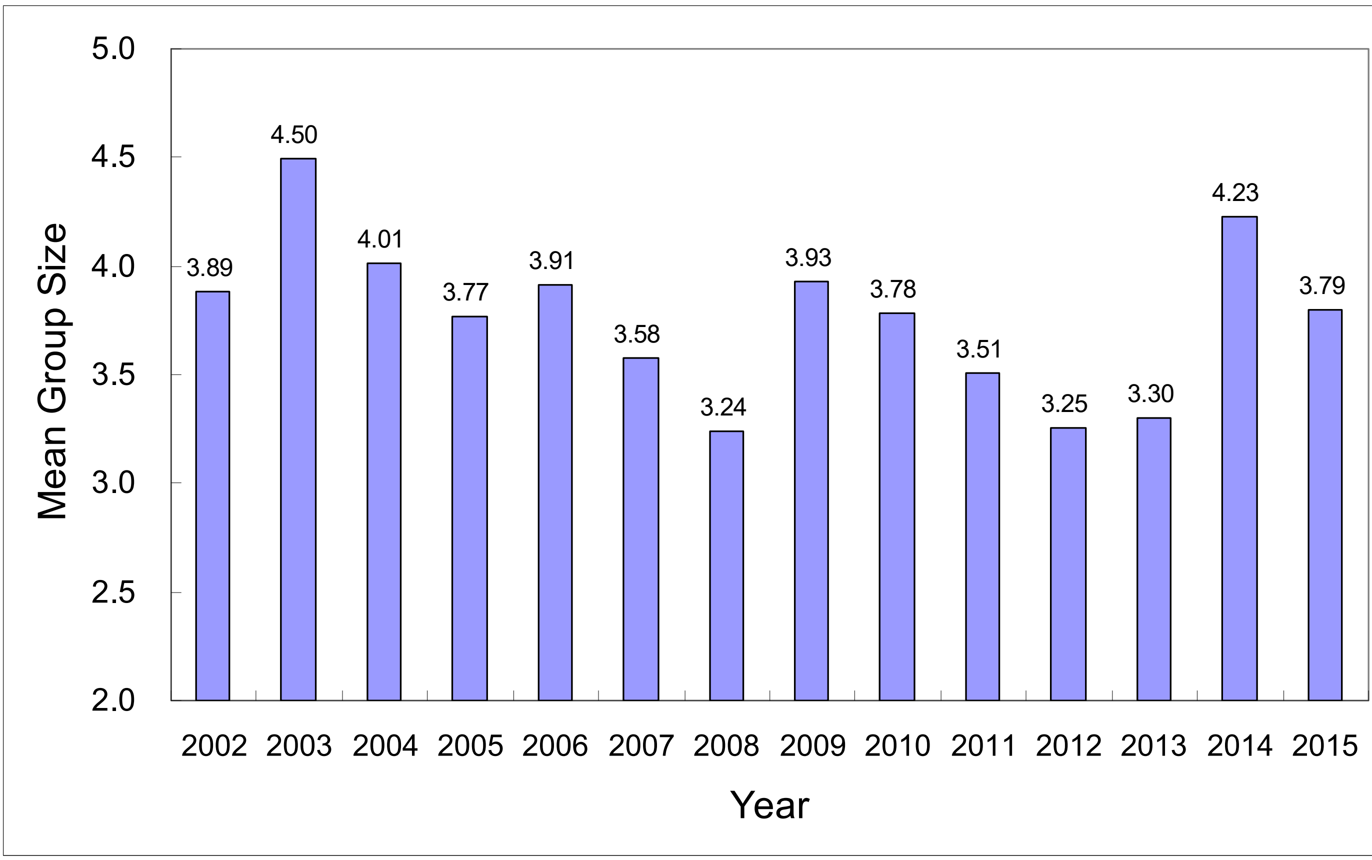


Figure 21. Temporal trend of mean dolphin group size in 2002-15

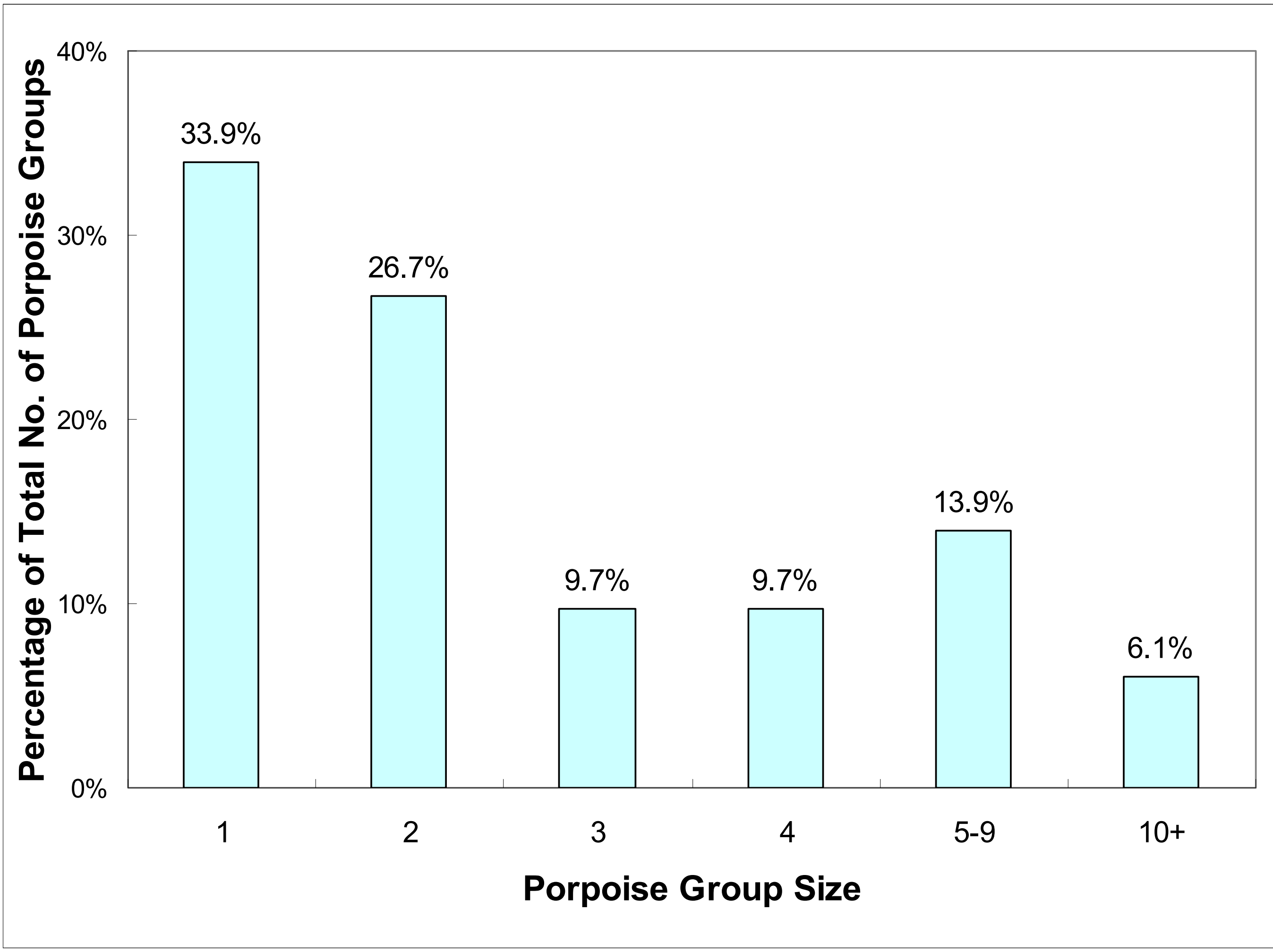


Figure 22. Percentages of different group sizes of finless porpoises in Hong Kong during April 2015 to March 2016

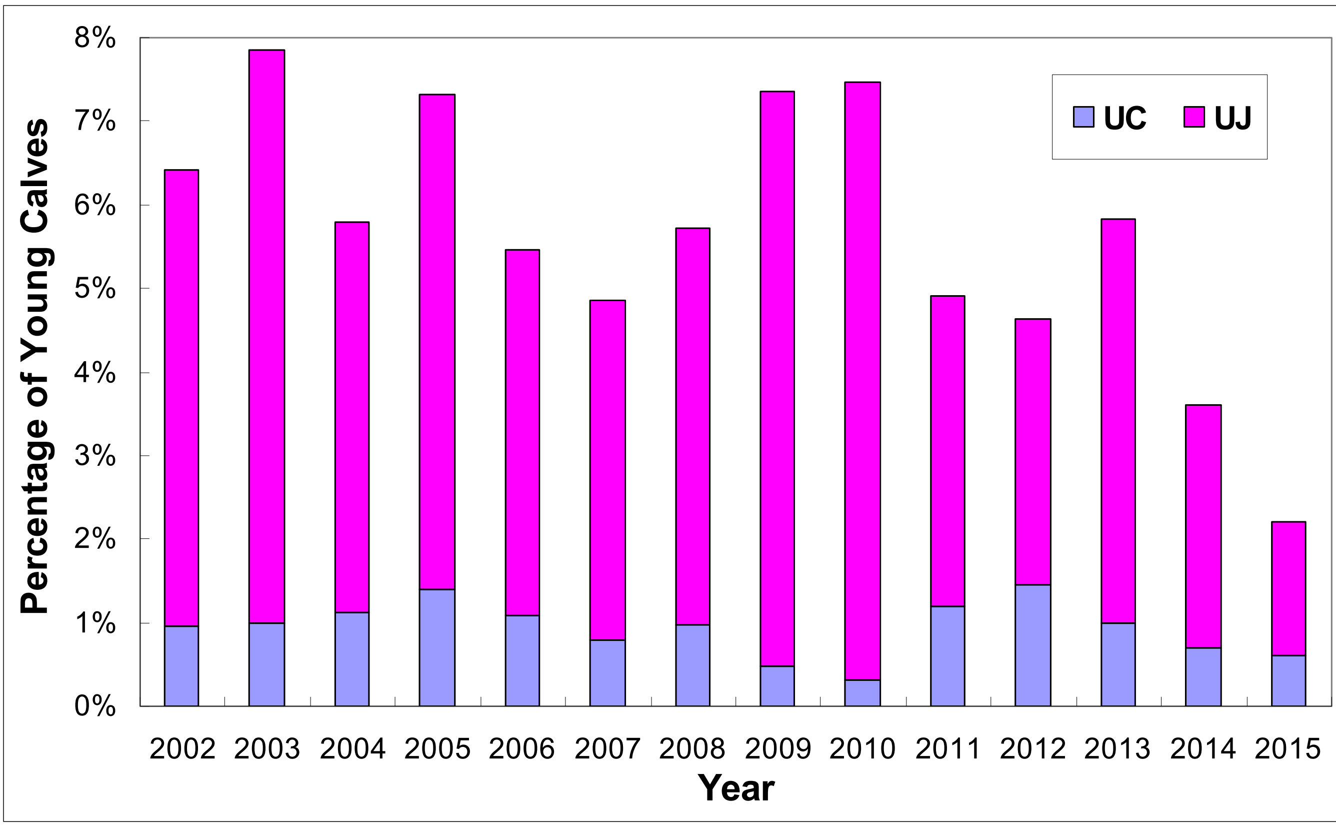


Figure 23. Percentages of young calves (i.e. Unspotted Calves (UC) and Unspotted Juveniles (UJ)) among all dolphin groups during 2002-15

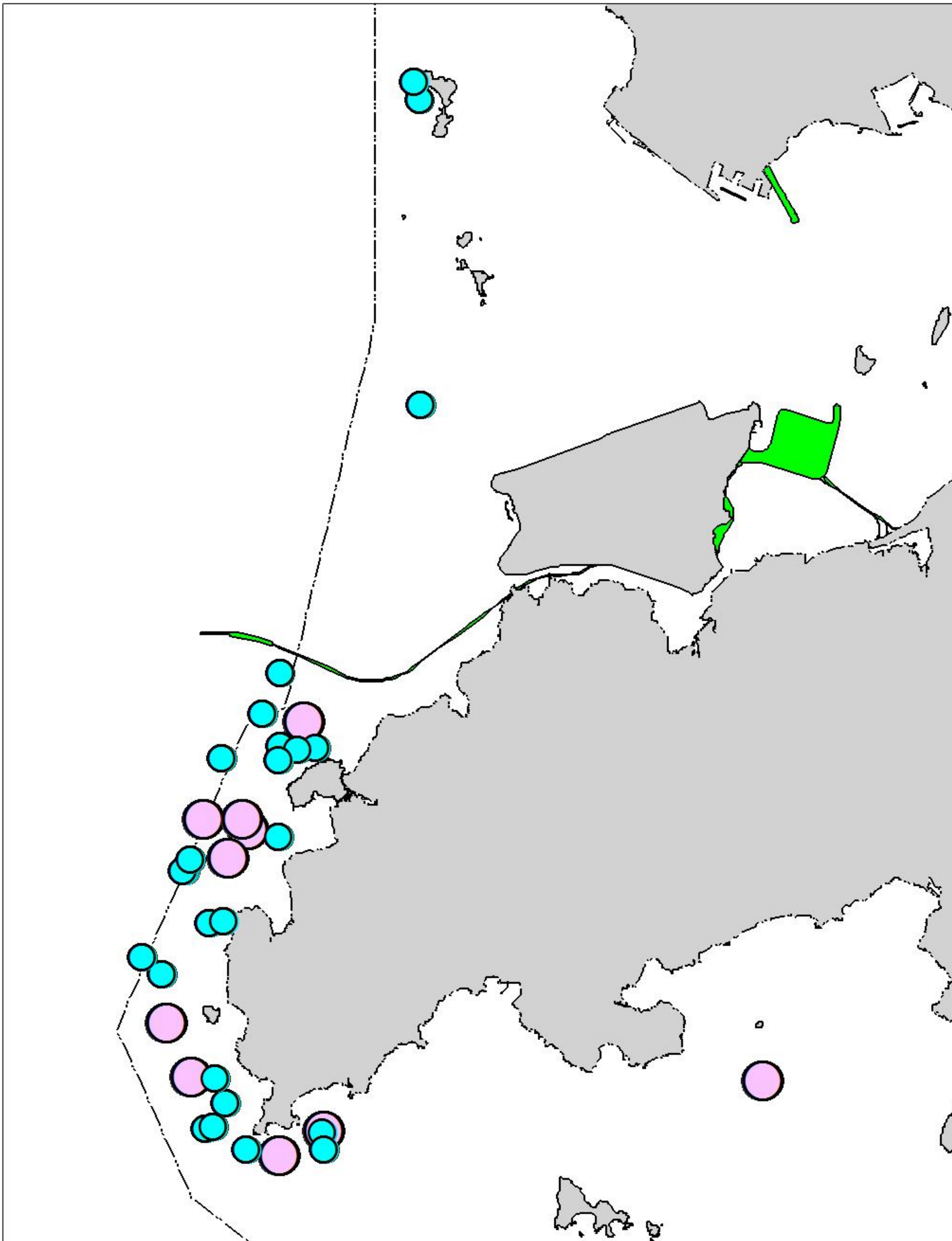


Figure 24. Distribution of Unspotted Calves (purple dots) & Unspotted Juveniles (blue dots) in 2015

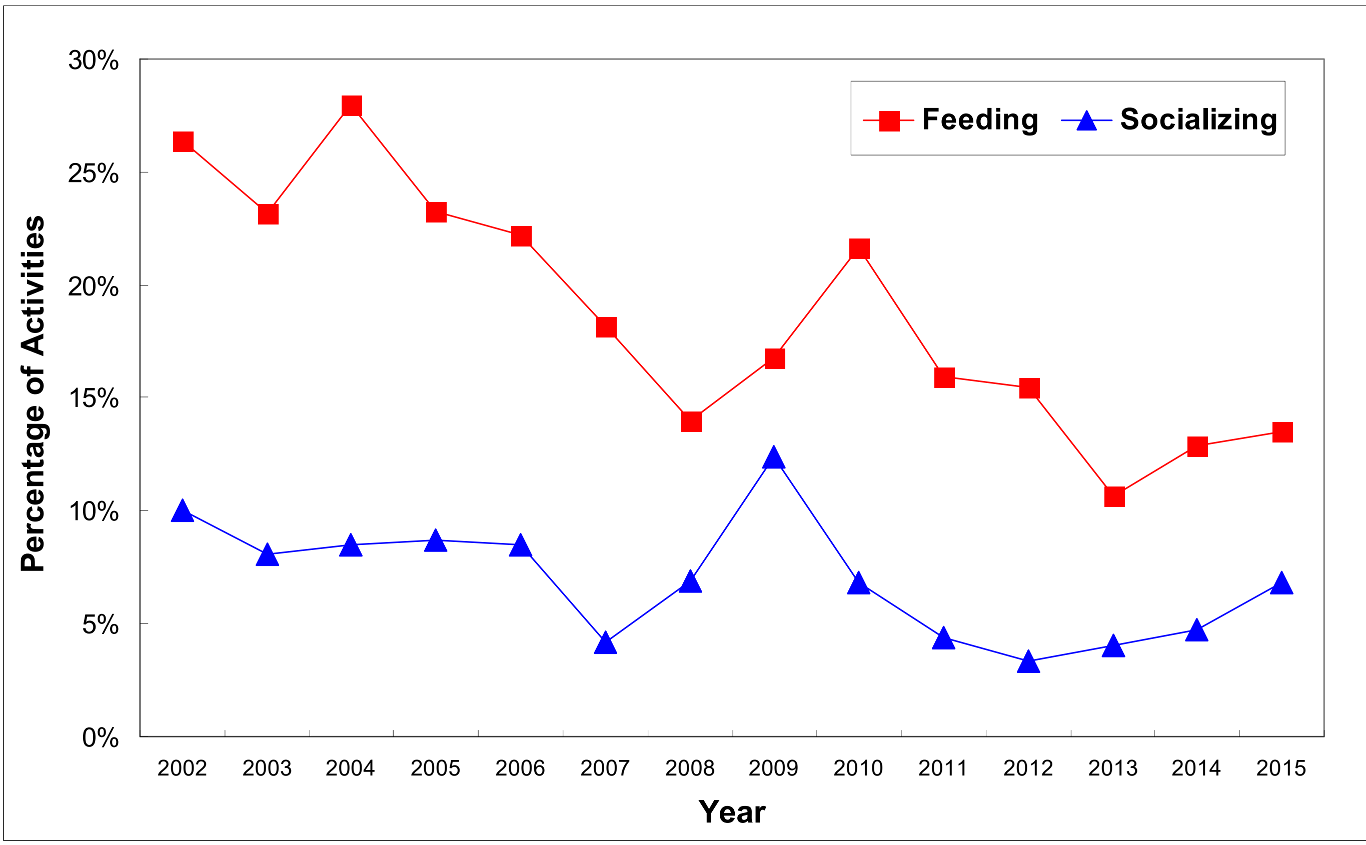


Figure 25. Percentages of feeding and socializing activities among all dolphin groups sighted in Hong Kong during 2002-15

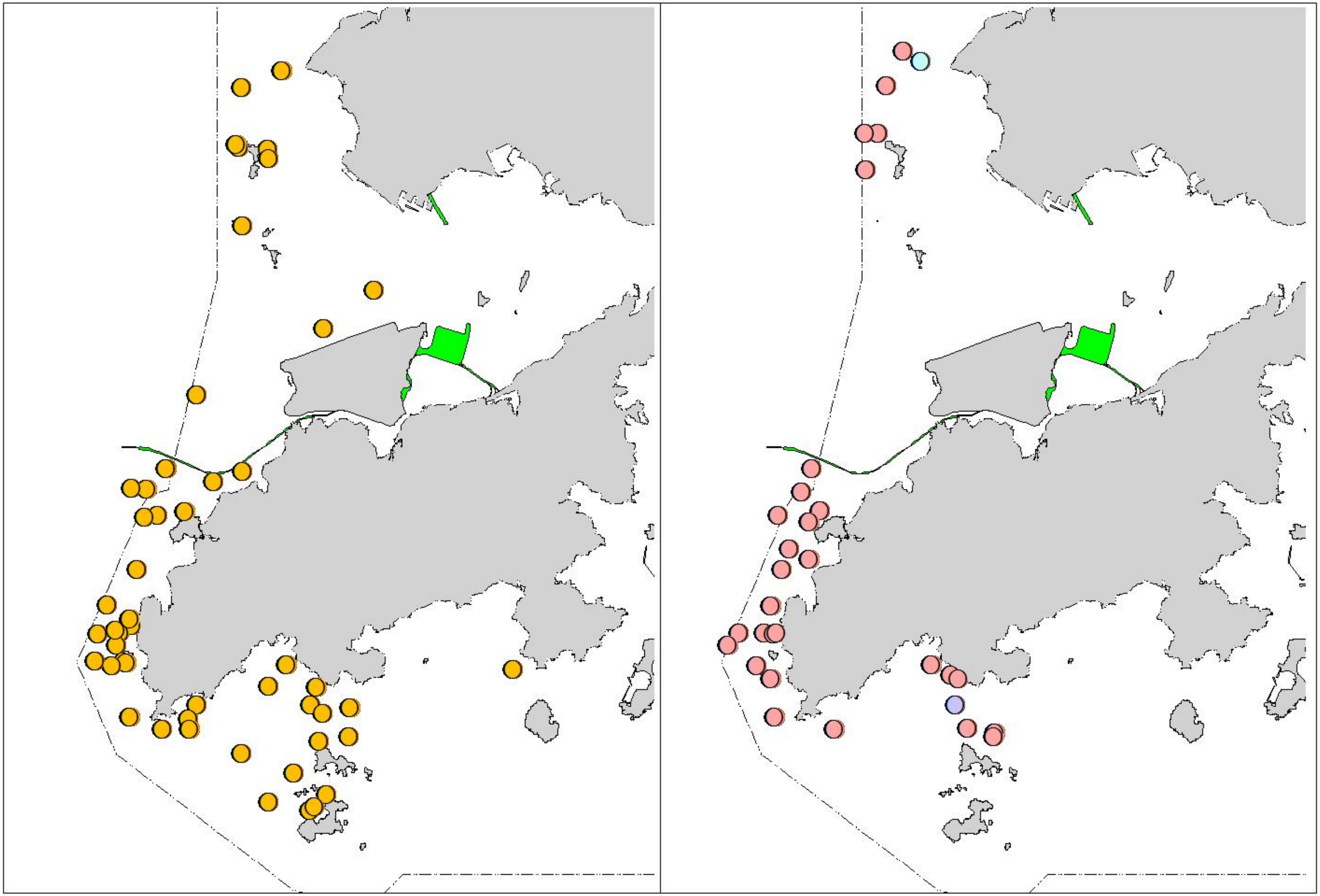


Figure 26. Distribution of Chinese white dolphins engaged in feeding (orange dots), socializing (pink dots), traveling (blue dots) and milling (purple dots) activities in 2015

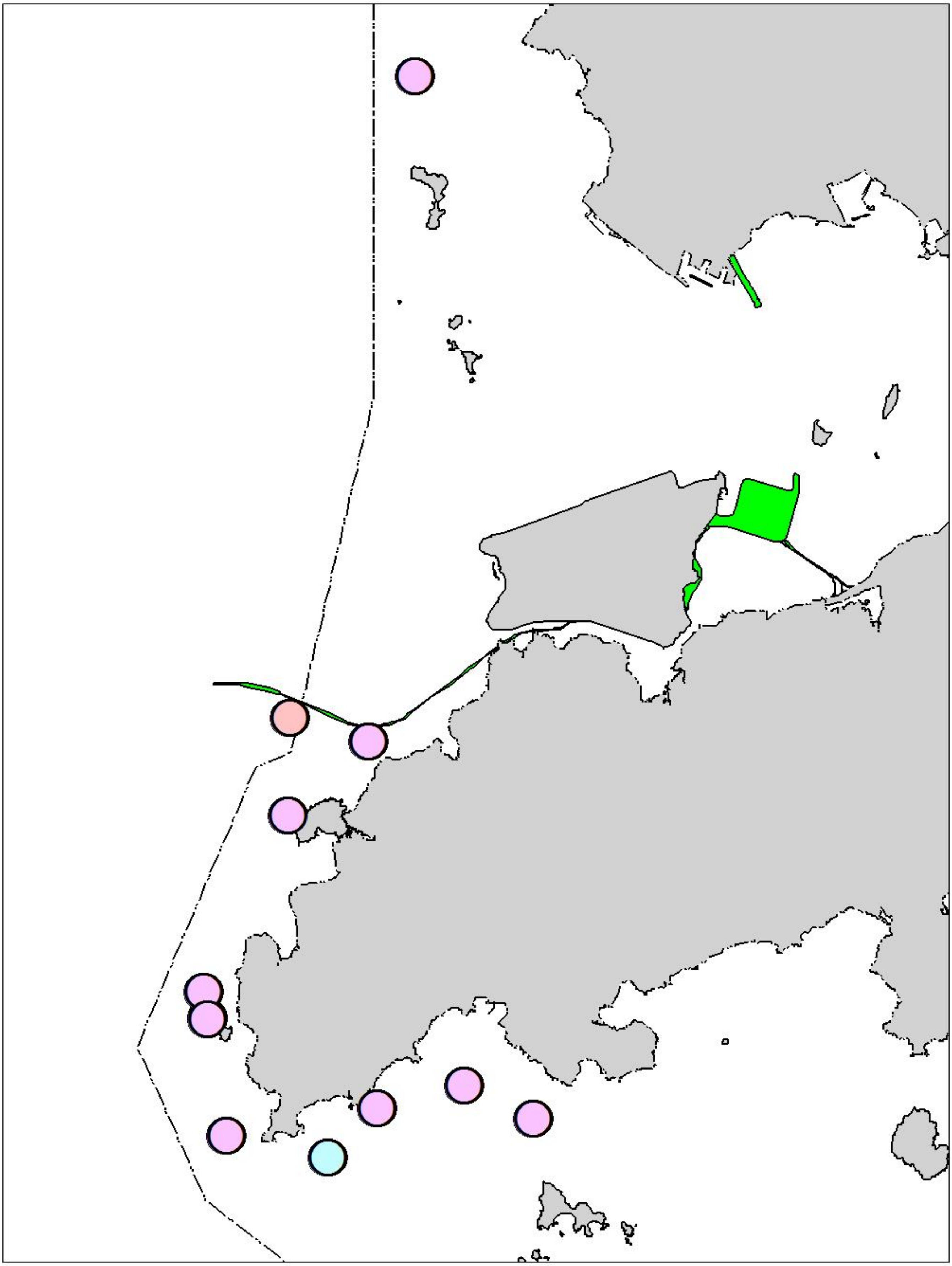


Figure 27. Distribution of dolphin sightings associated with fishing boats in 2015
(purple dots: with purse-seiners, blue dot: with gill-netter; pink dot: hang trawler)

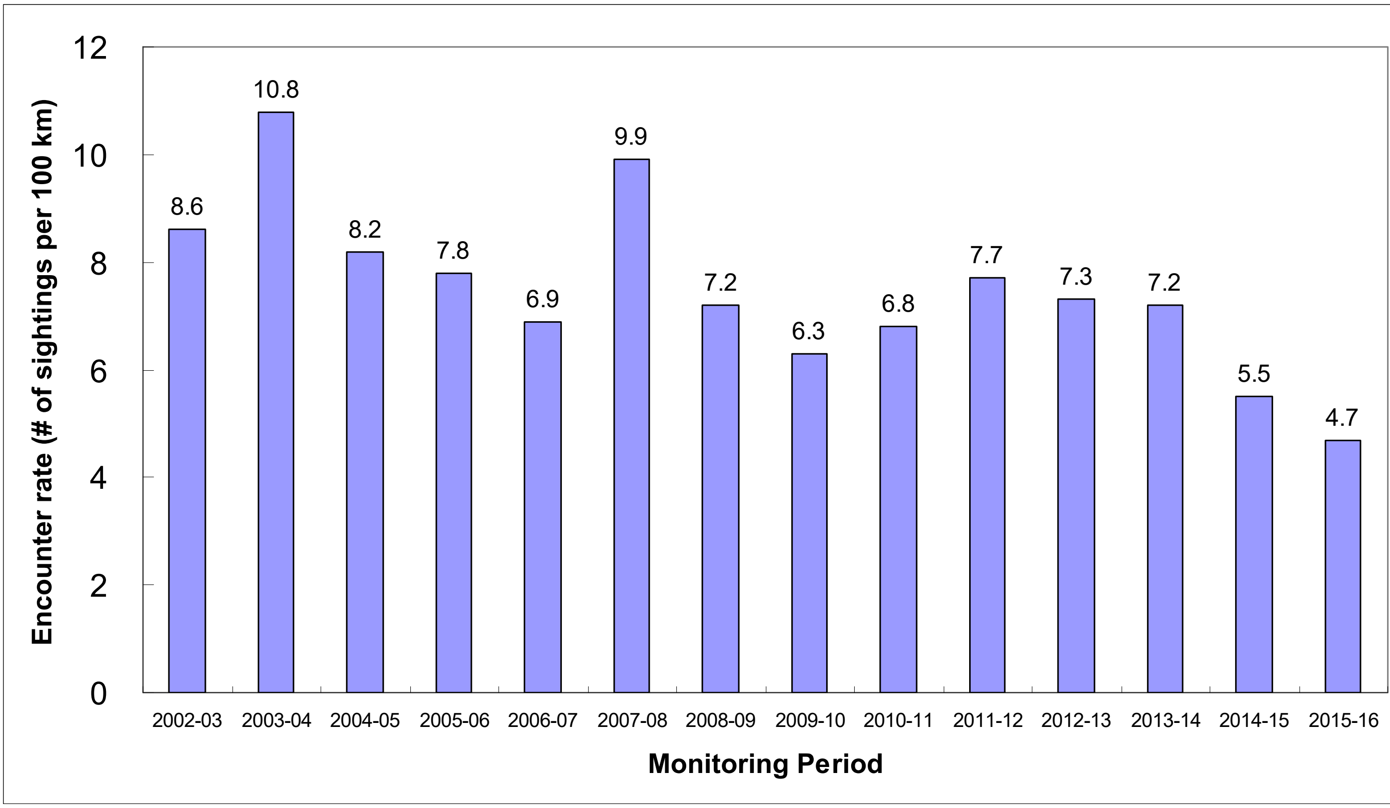


Figure 28. Temporal trend in encounter rates of Chinese white dolphins (combined from WL, NWL, NEL and SWL survey areas) in the past thirteen monitoring periods from 2002-16

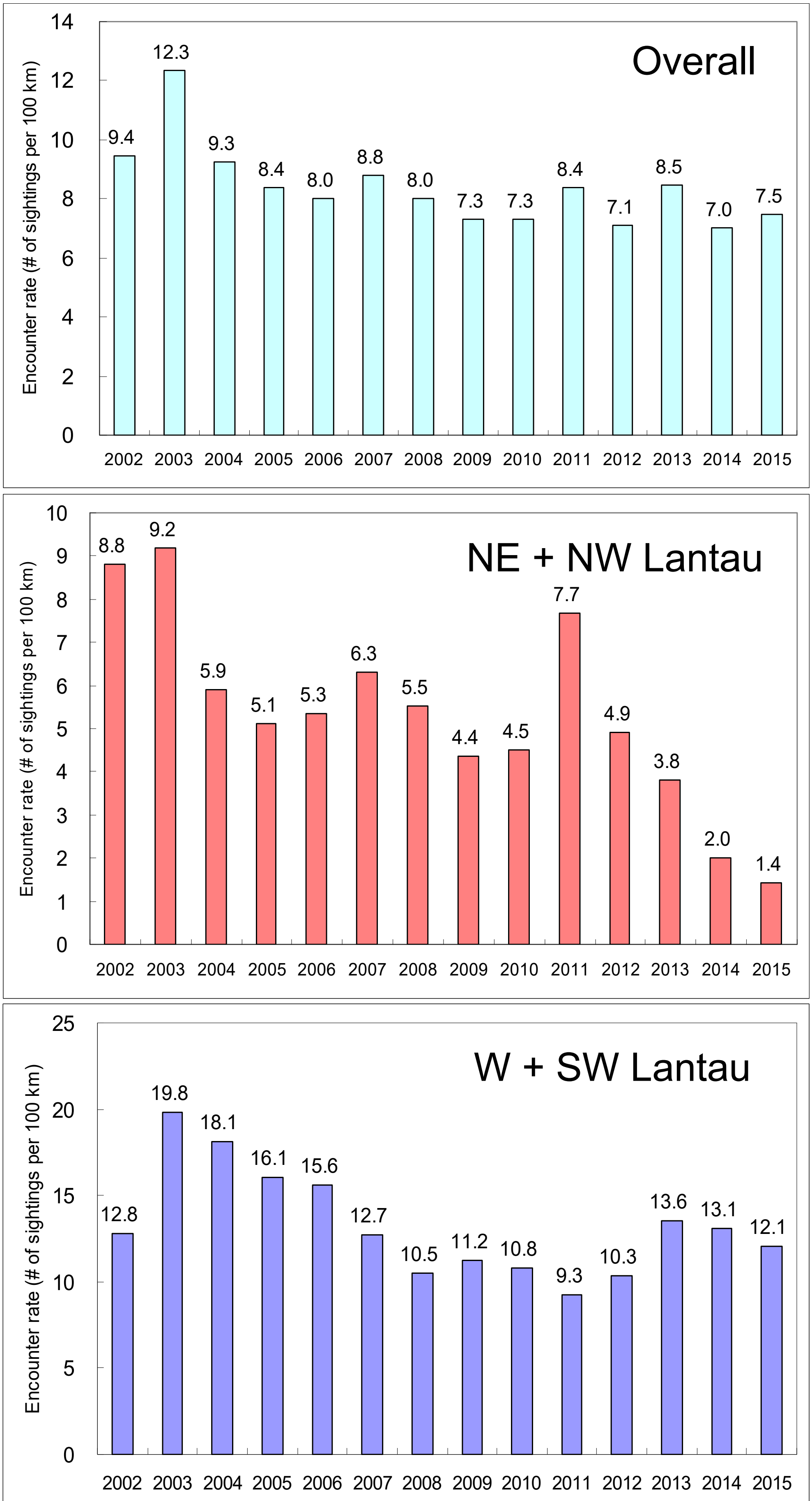


Figure 29. Long-term trends in annual dolphin encounter rates in different survey areas

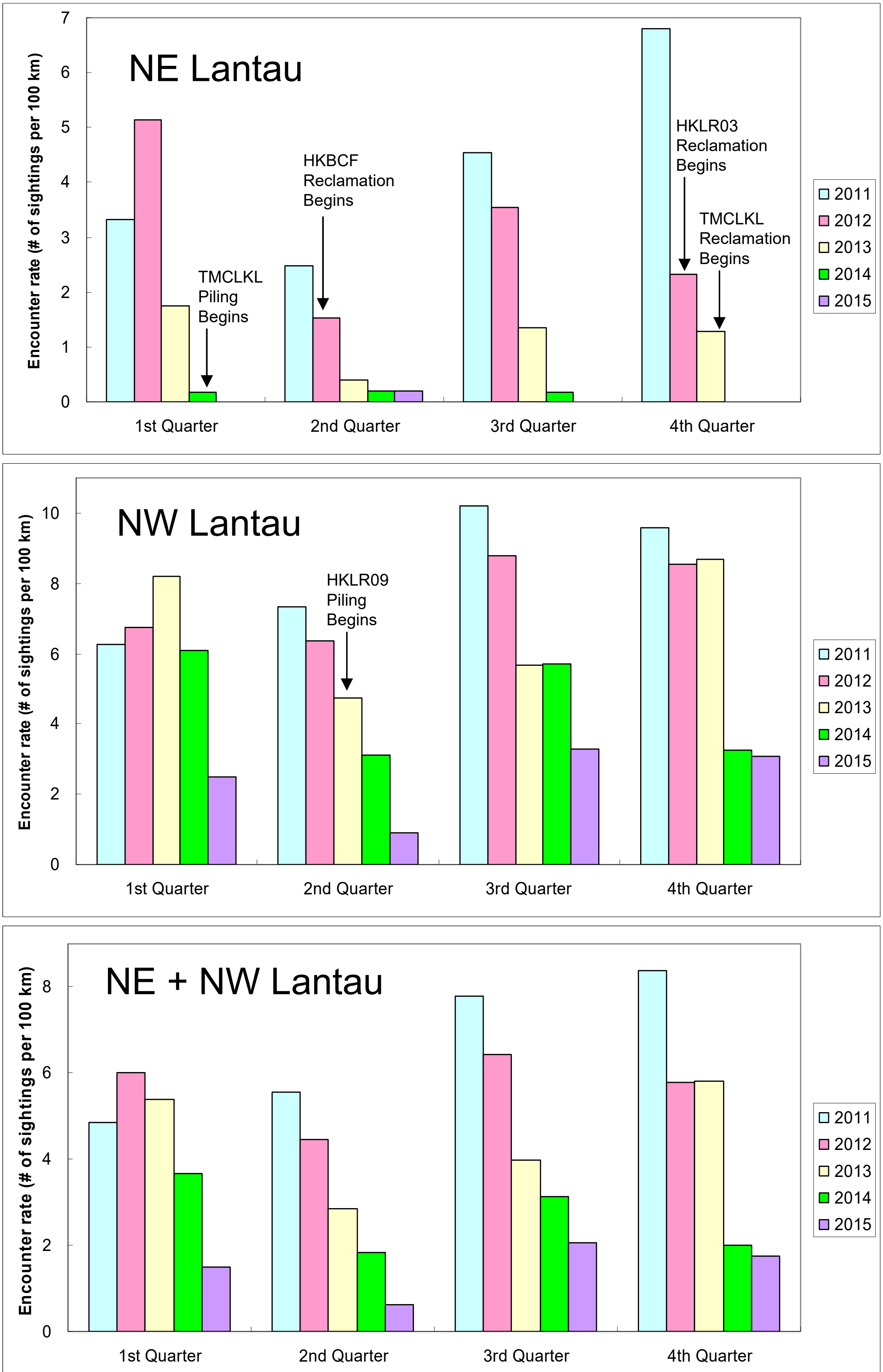


Figure 30. Temporal trends in quarterly dolphin encounter rates in North Lantau region from 2011-15 in association with schedules of HZMB works in NEL waters

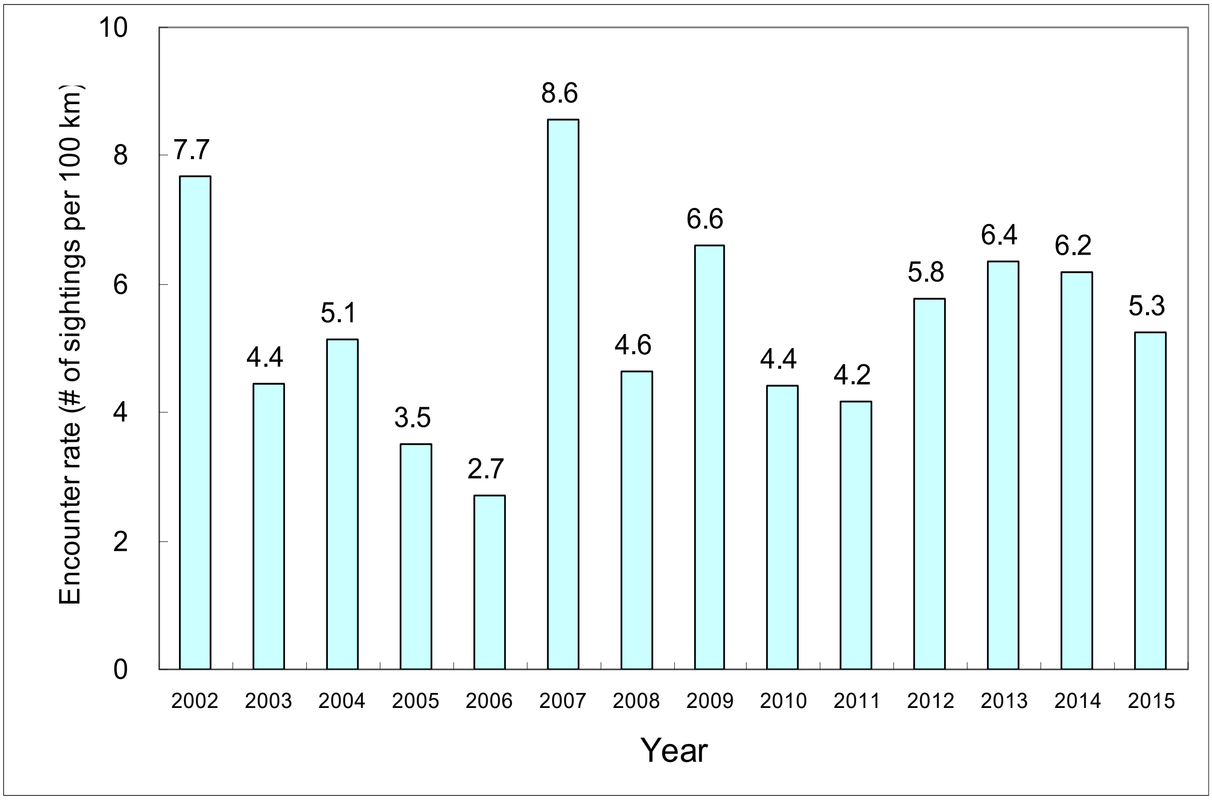


Figure 31a. Temporal trend of annual encounter rates of finless porpoises (combined from SWL, SEL, LM and PT survey areas) from 2002-15

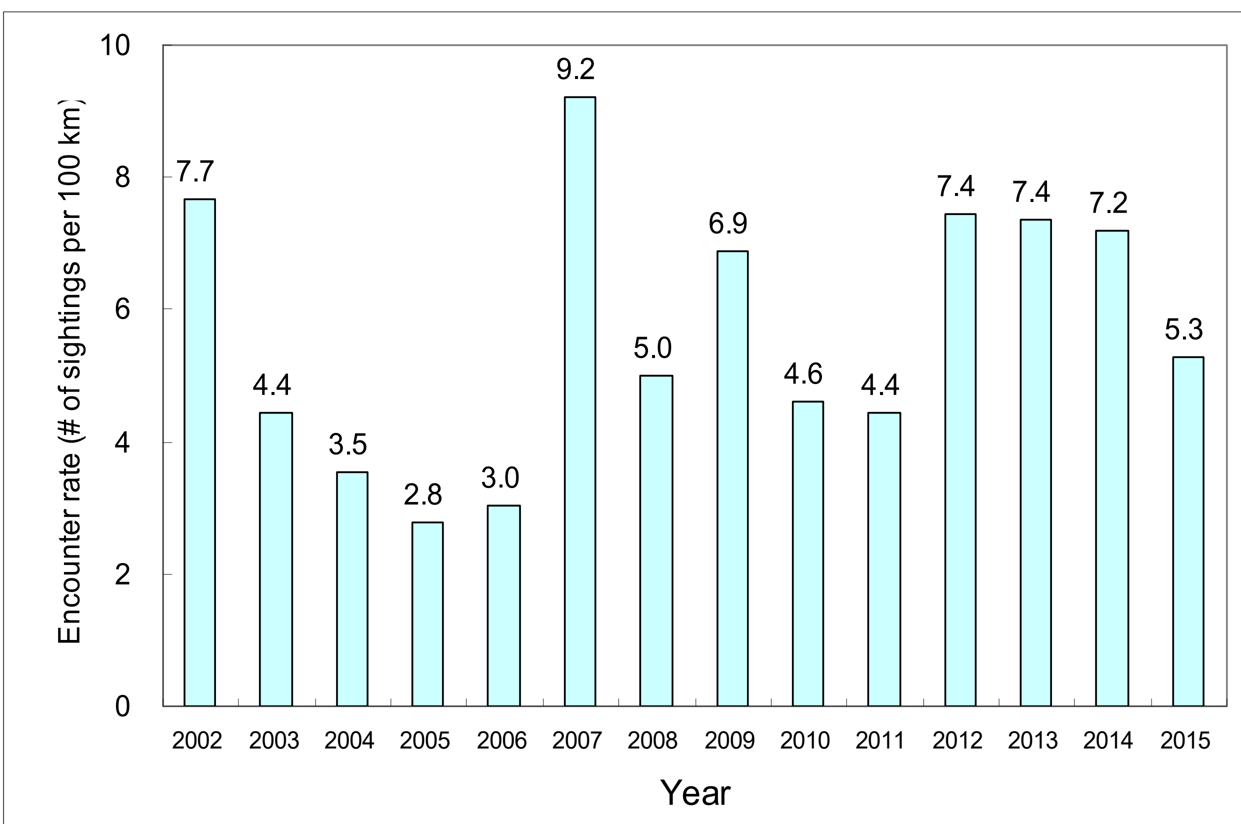


Figure 31b. Temporal trend of porpoise encounter rates in South Lantau and Lamma waters combined from winter/spring months of 2002-15

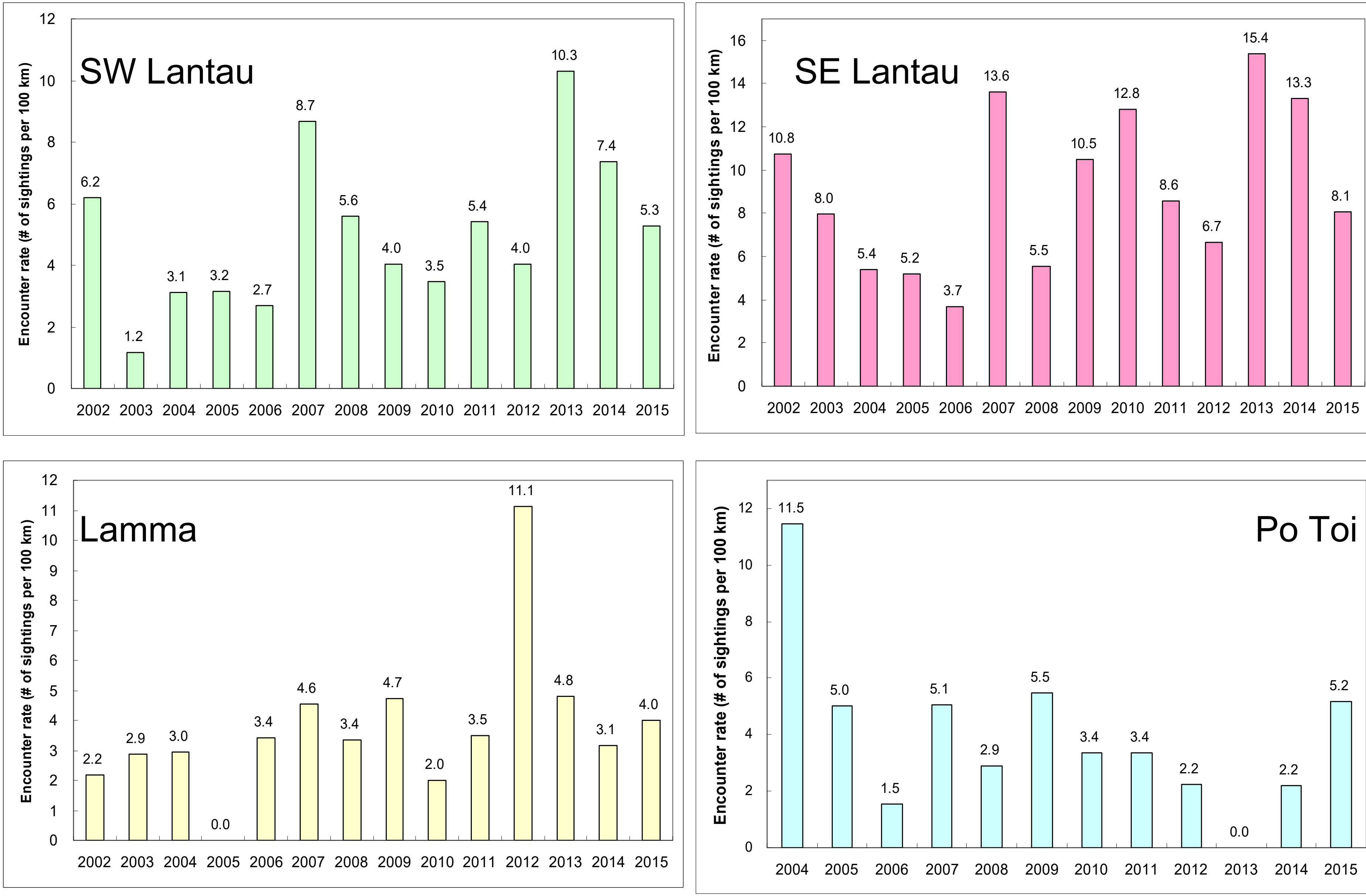


Figure 32. Temporal trends in annual encounter rates of finless porpoises among different survey areas

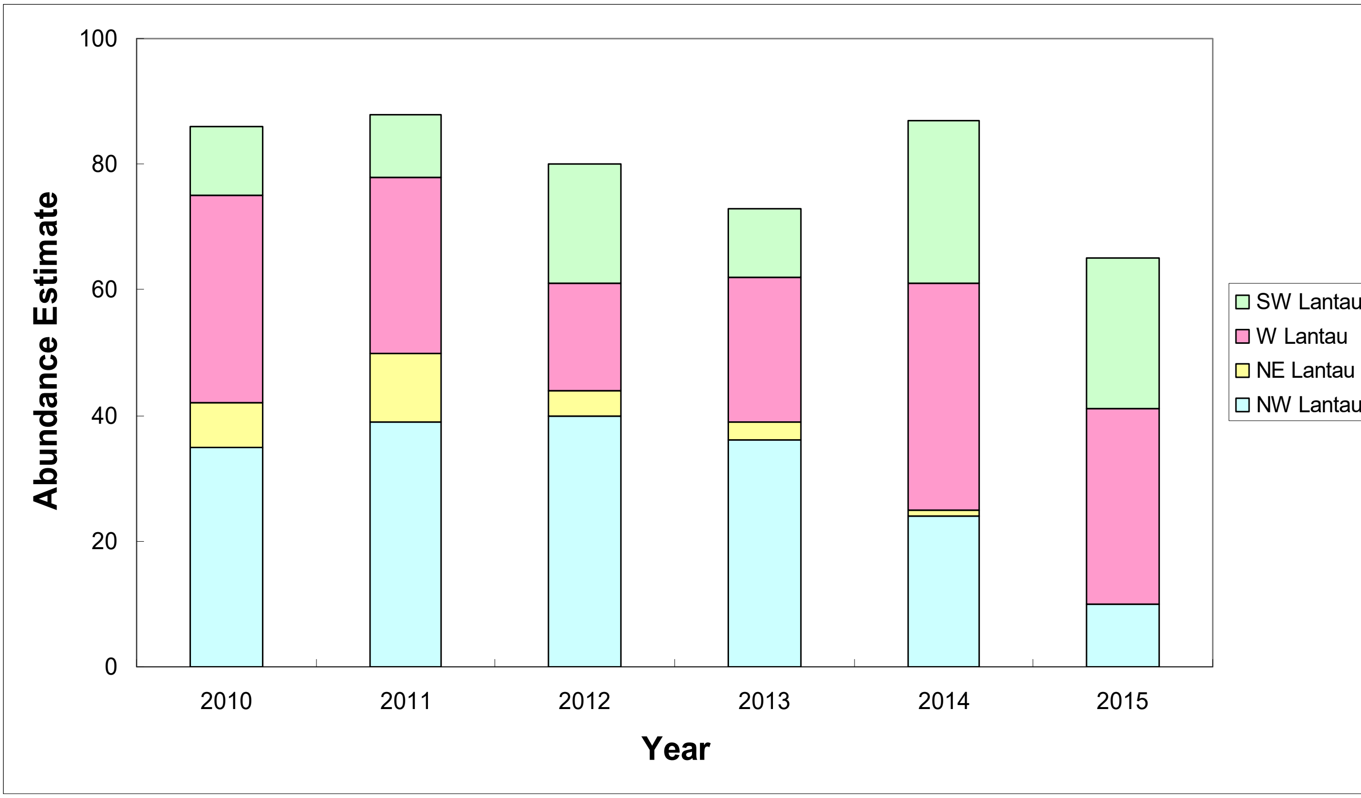


Figure 33a. Temporal trends in combined abundance estimates of Chinese white dolphins in Southwest, West, Northwest & Northeast Lantau from 2010-15

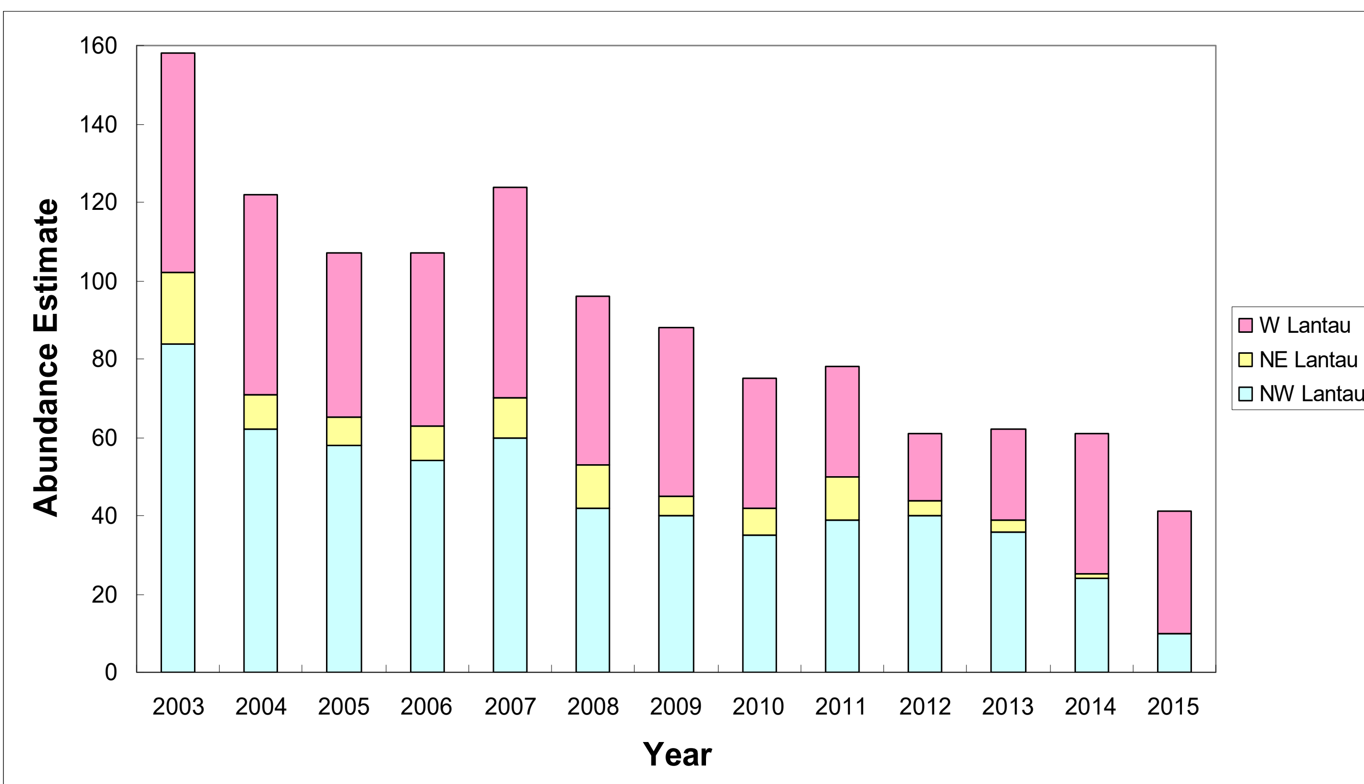


Figure 33b. Temporal trends in combined abundance estimates of Chinese white dolphins in West, Northwest & Northeast Lantau from 2003-15

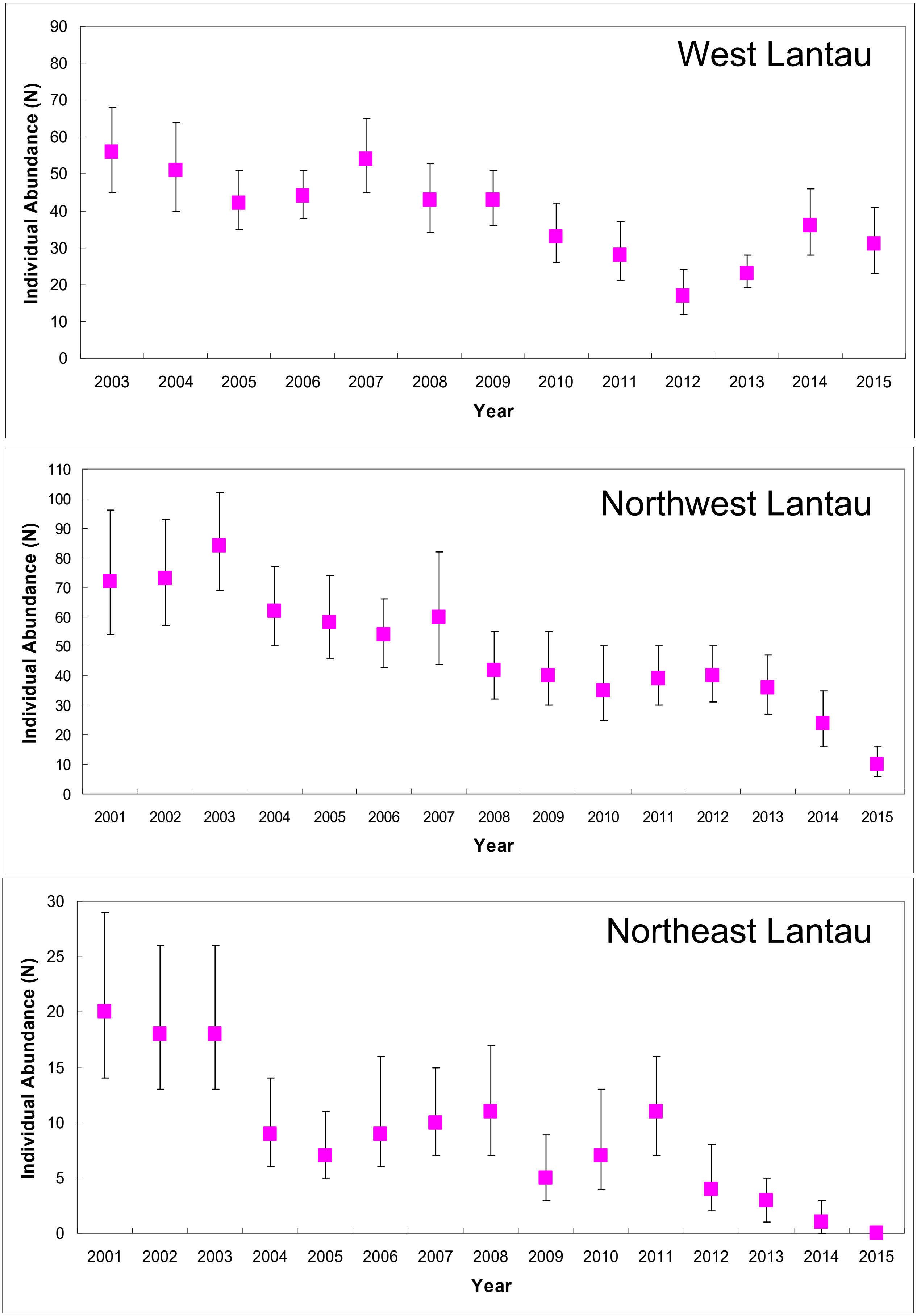


Figure 34. Temporal trends in abundance estimates of Chinese white dolphins in WL, NWL & NEL from 2001-15 (error bars: 95% confidence interval of abundance estimates)

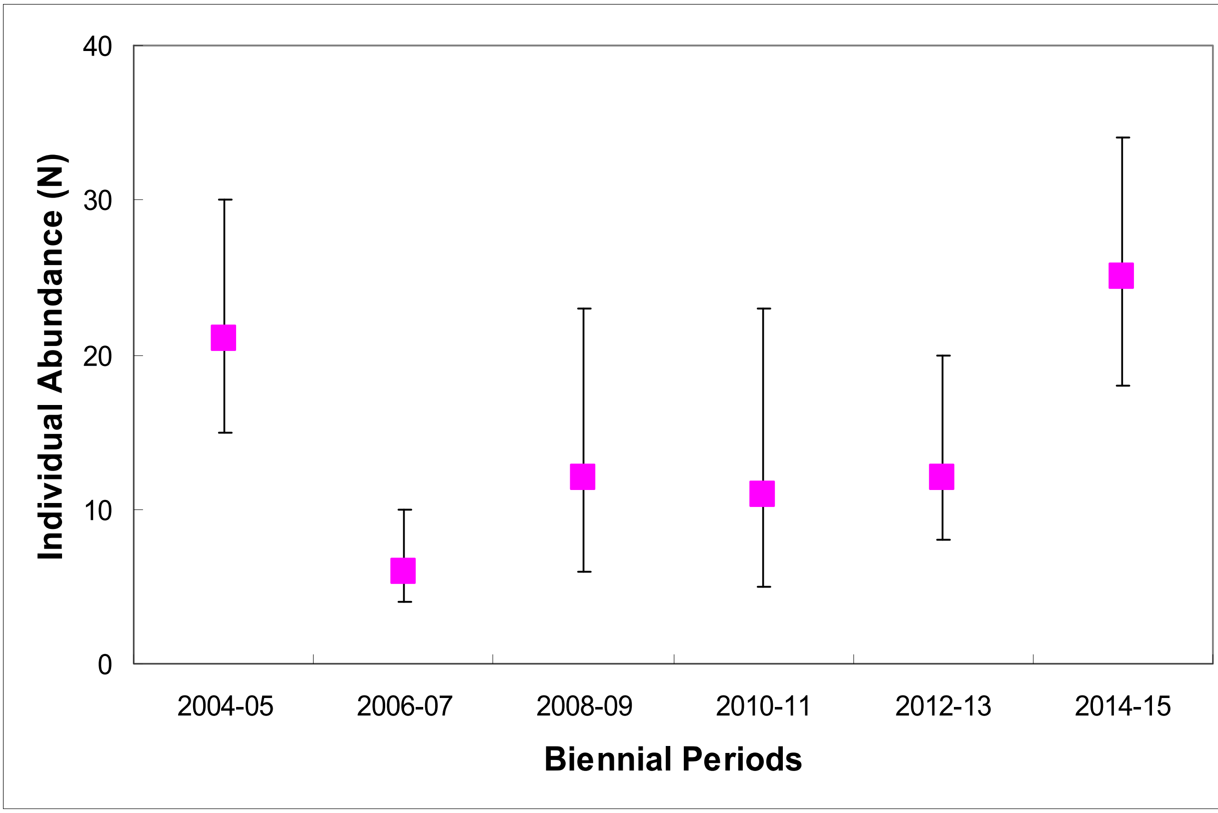


Figure 35a. Temporal trend in biennial abundance estimates of Chinese white dolphins in Southwest Lantau during 2004-15 (error bars: 95% confidence interval of abundance estimates)

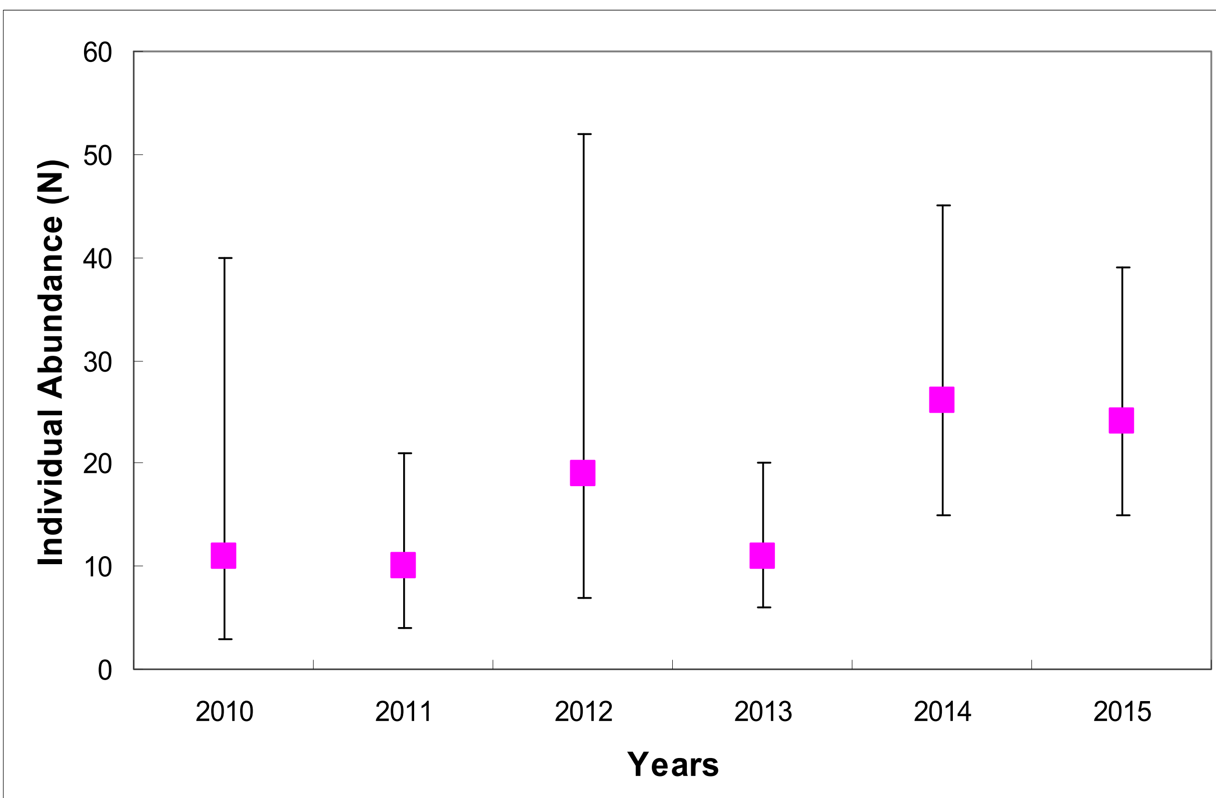


Figure 35b. Temporal trend in annual abundance estimates of Chinese white dolphins in Southwest Lantau from 2010-15 (error bars: 95% confidence interval of abundance estimates)

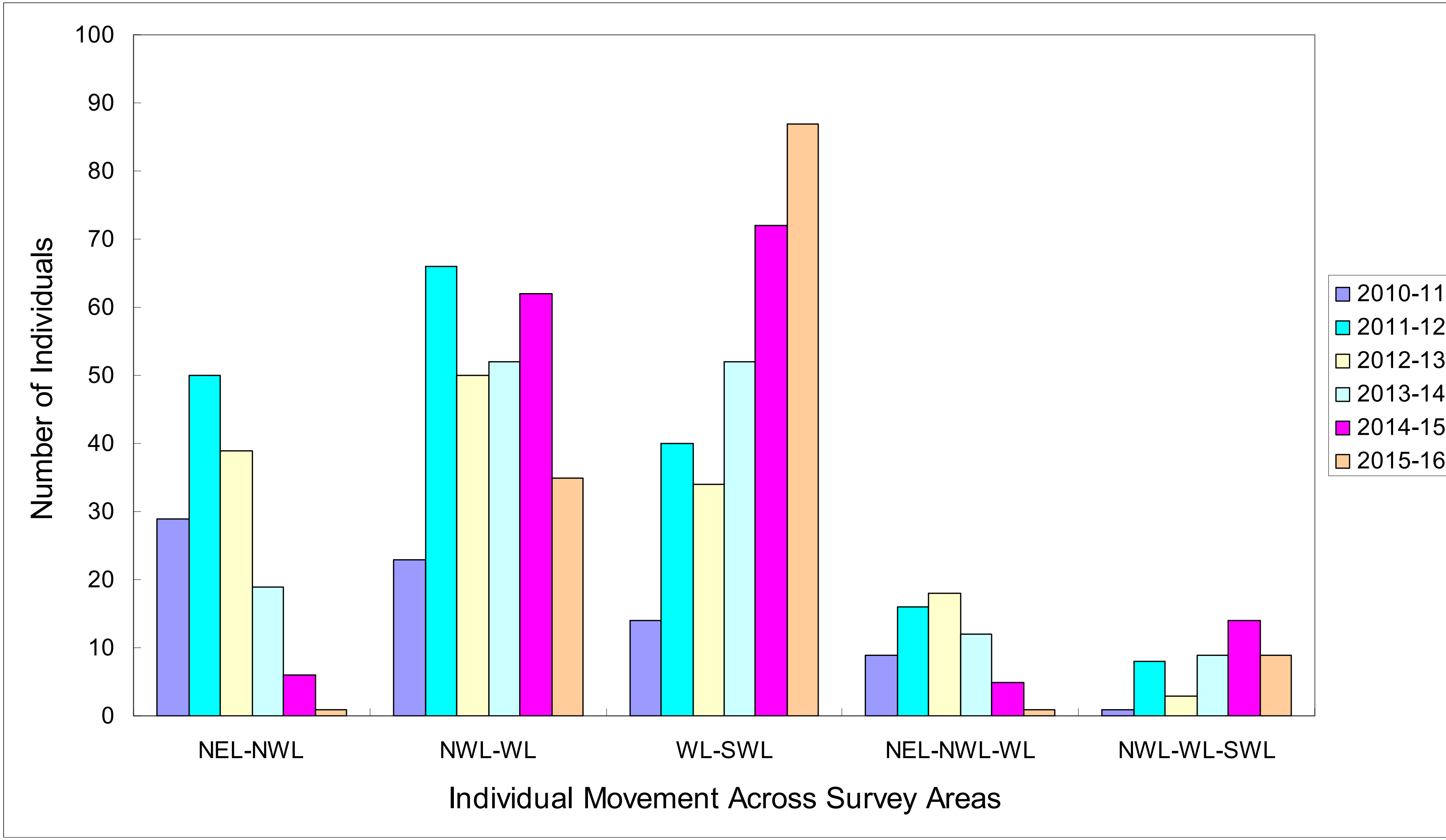


Figure 36. Temporal trends in number of individual dolphins involved in movements across different survey areas around Lantau in the past six monitoring periods

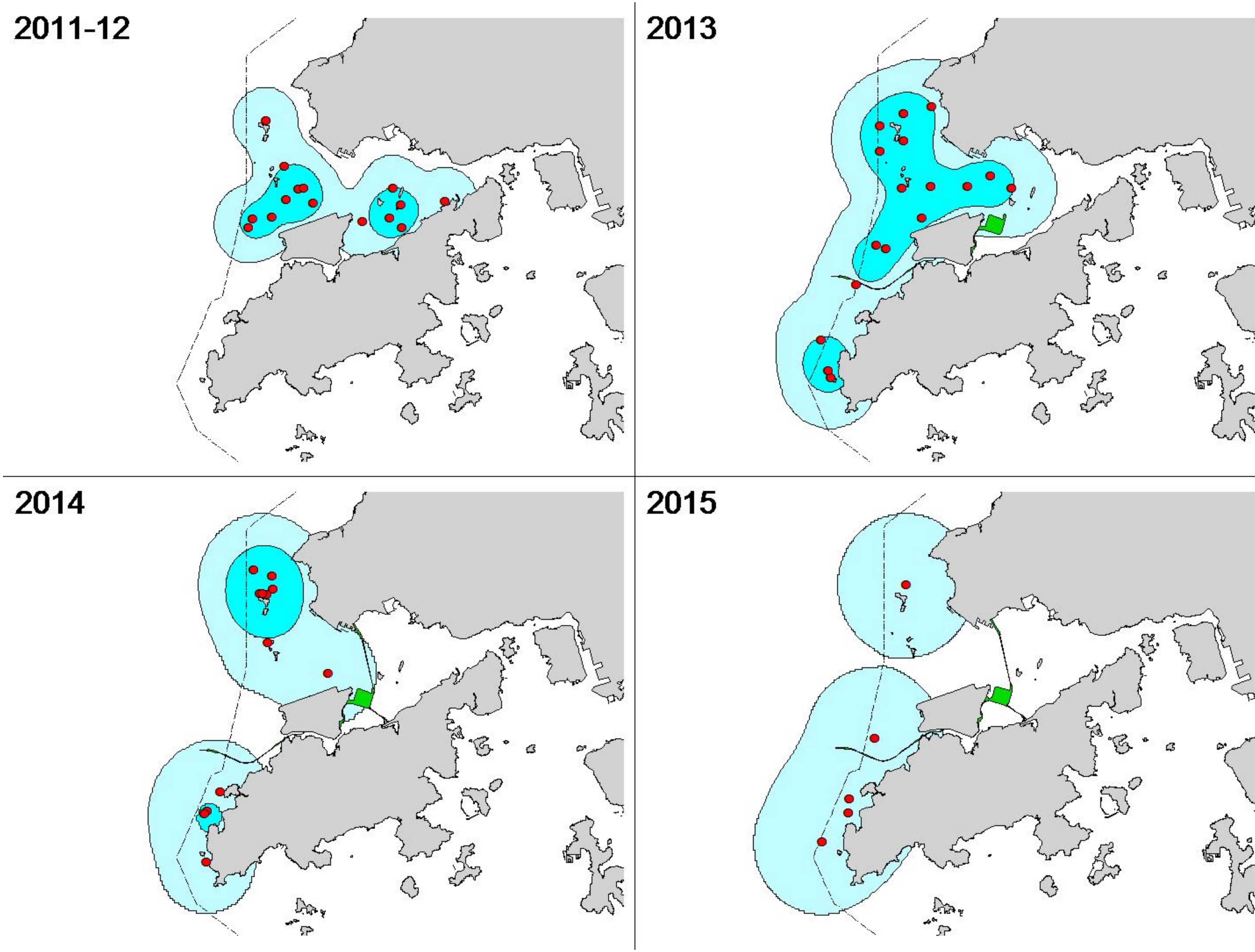


Figure 37. Temporal changes in range use of NL296 as an example of individuals from the northern social cluster which have utilized Lantau waters progressively less during 2011-15

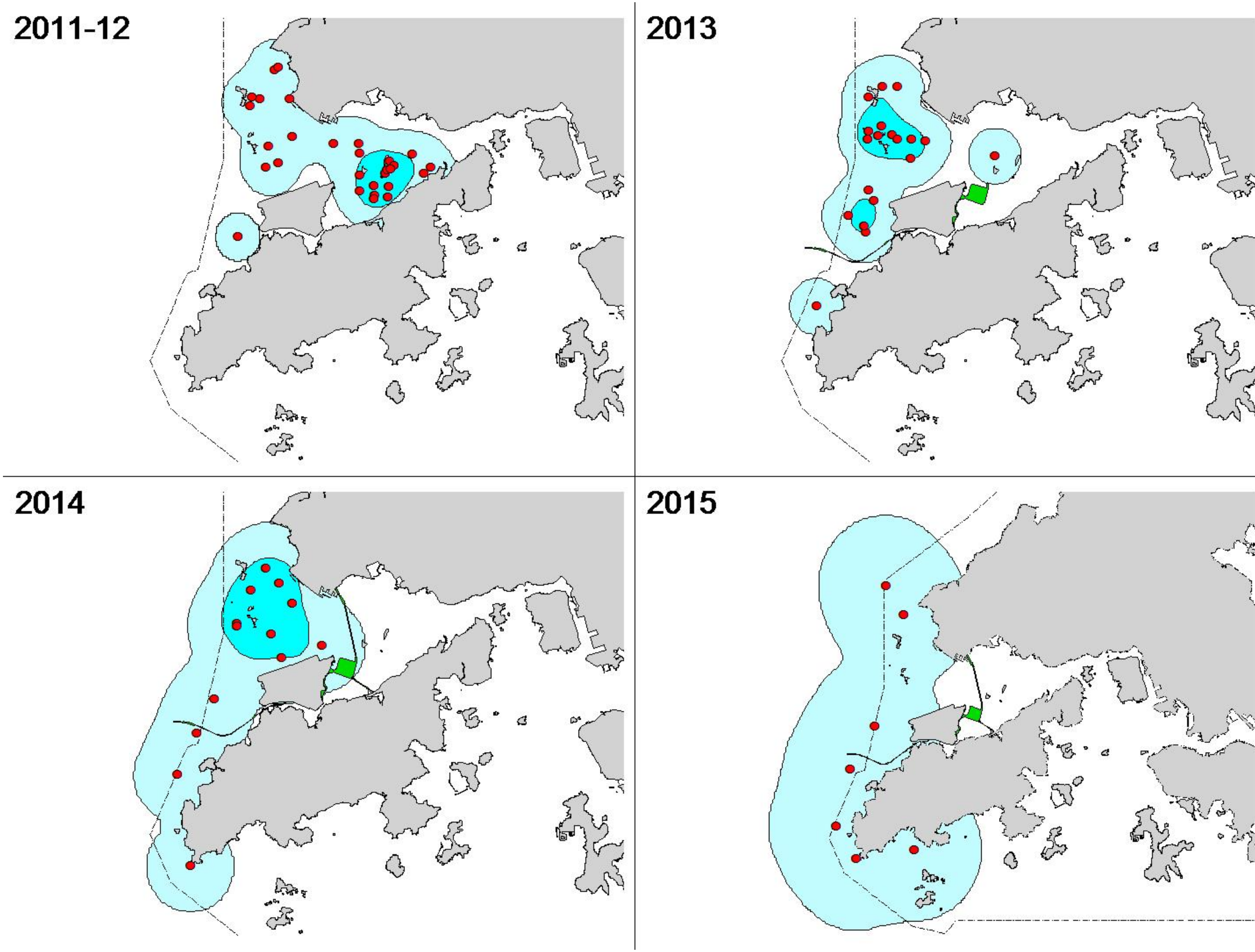


Figure 38. Temporal changes in range use of NL98 as an example of individuals from the northern social cluster which have utilized West and Southwest Lantau waters more during 2011-15

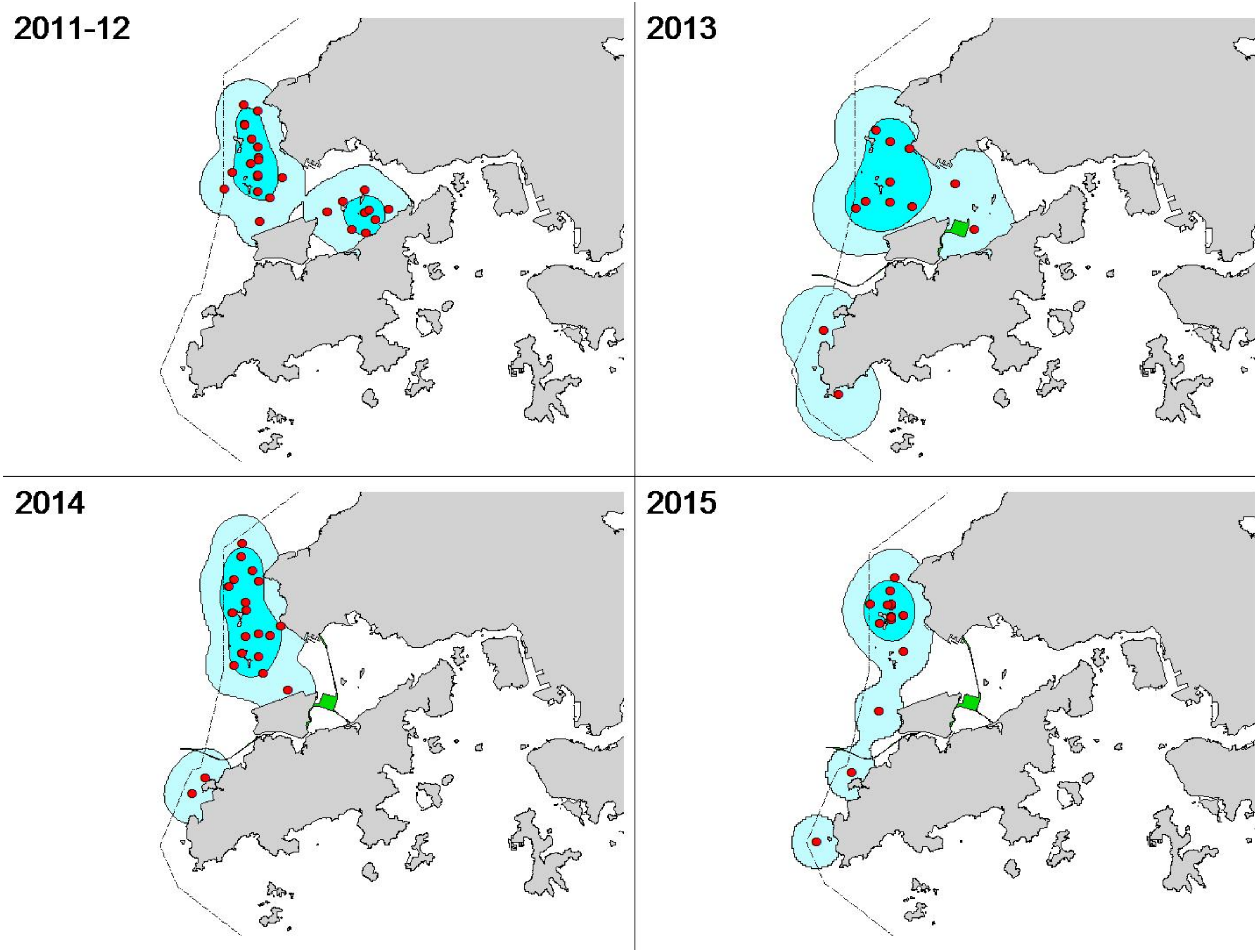


Figure 39. Temporal changes in range use of NL136 as an example of individuals from the northern social cluster which have shifted their ranges away from Northeast Lantau waters during 2011-15

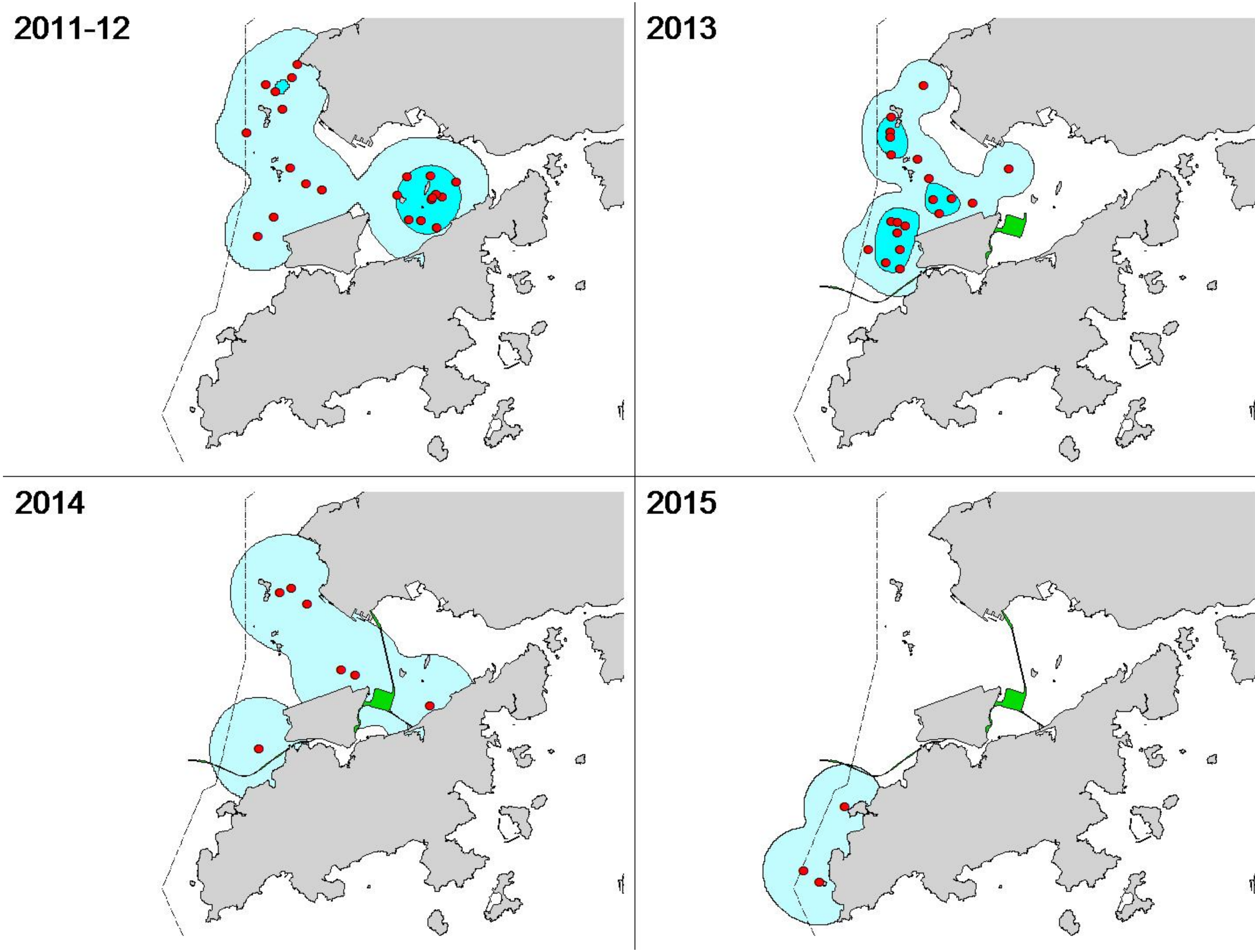


Figure 40. Temporal changes in range use of NL242 as an example of individuals which have partially or completely shifted their ranges from North Lantau waters to West Lantau waters during 2011-15

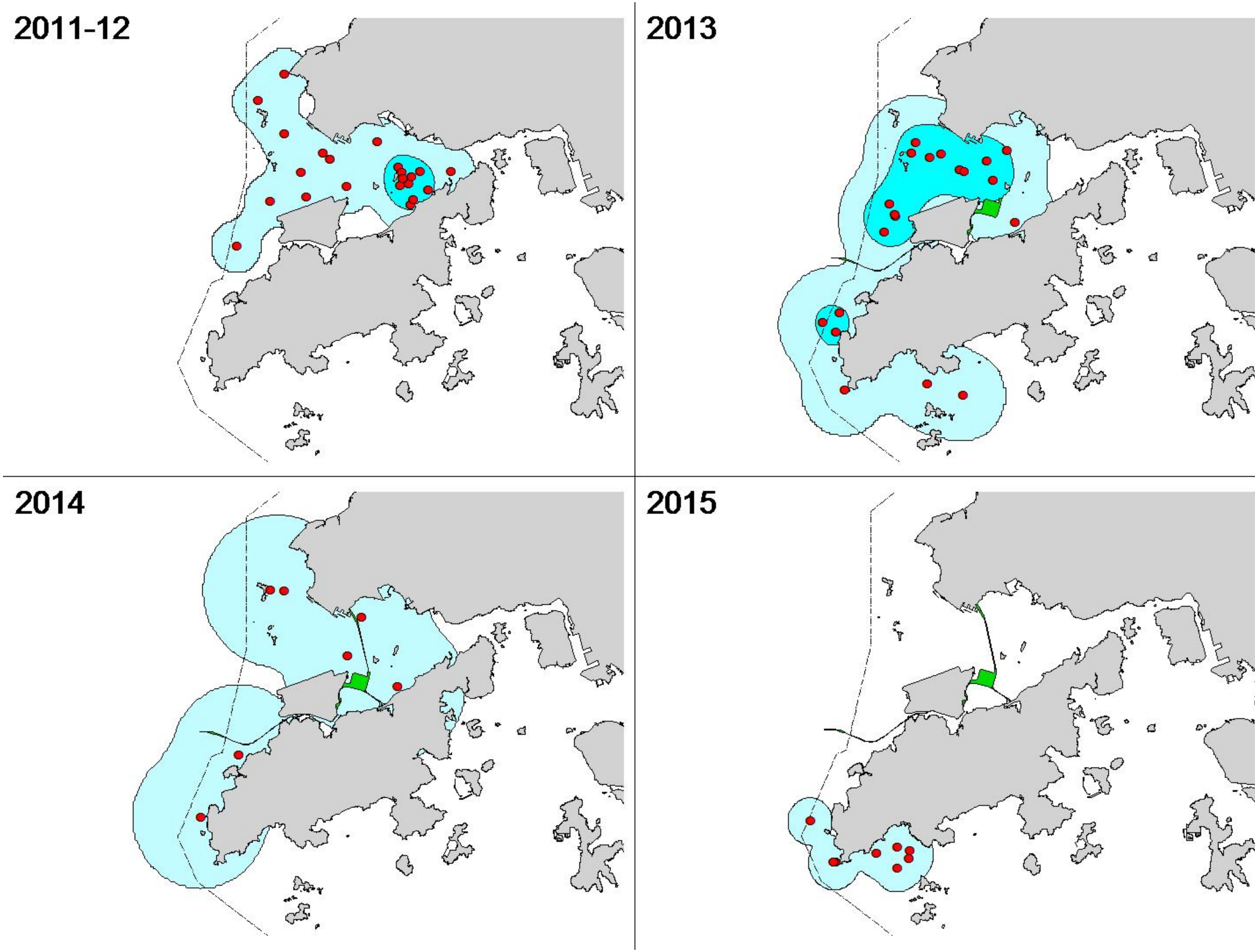


Figure 41. Temporal changes in range use of NL120 as an example of individuals which have shifted their ranges from North Lantau waters to Southwest Lantau waters during 2011-15

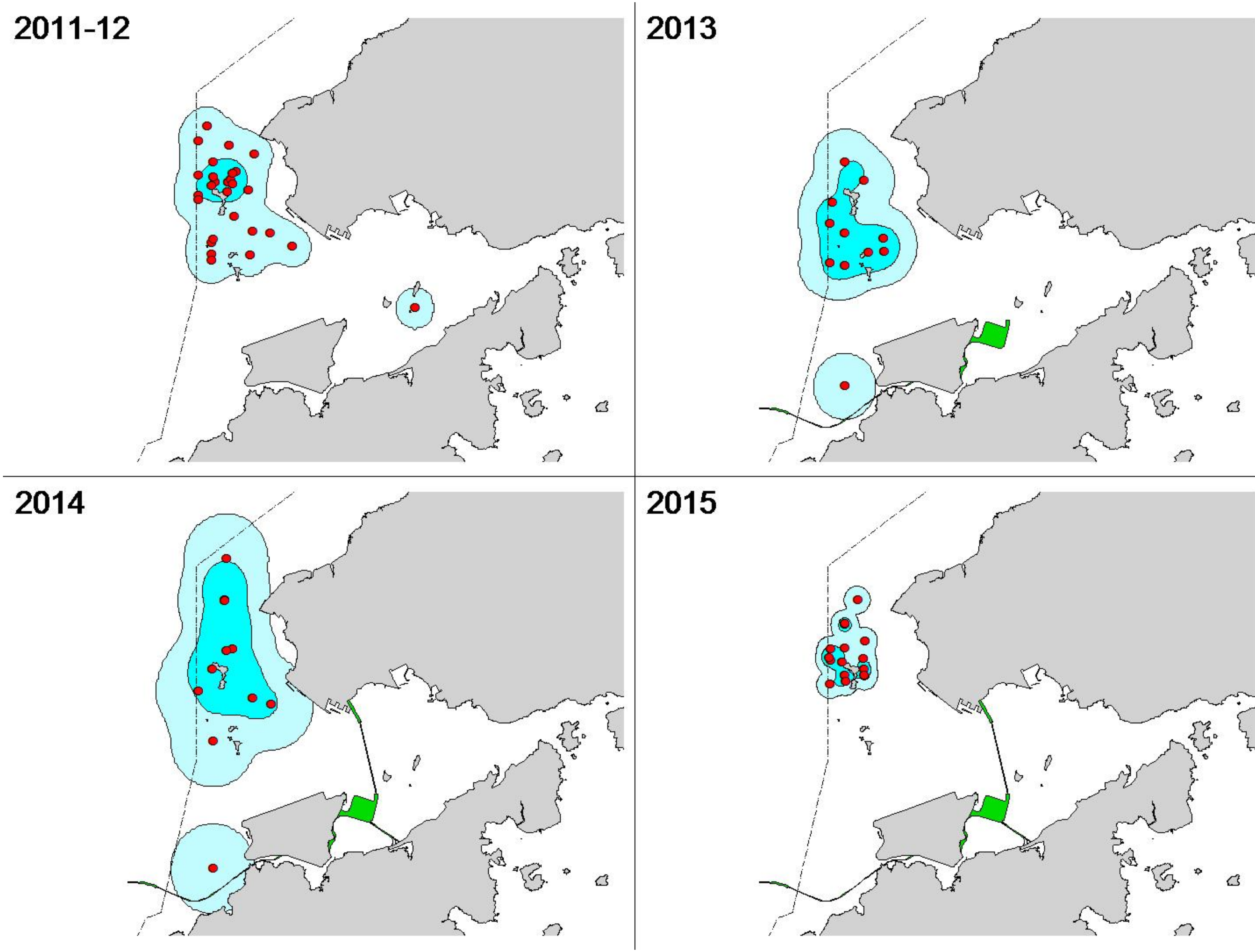


Figure 42. Temporal changes in range use of NL202 as an example of individuals which have confined their range use in Northwest Lantau waters and reduced their overall usage in North Lantau region during 2011-15

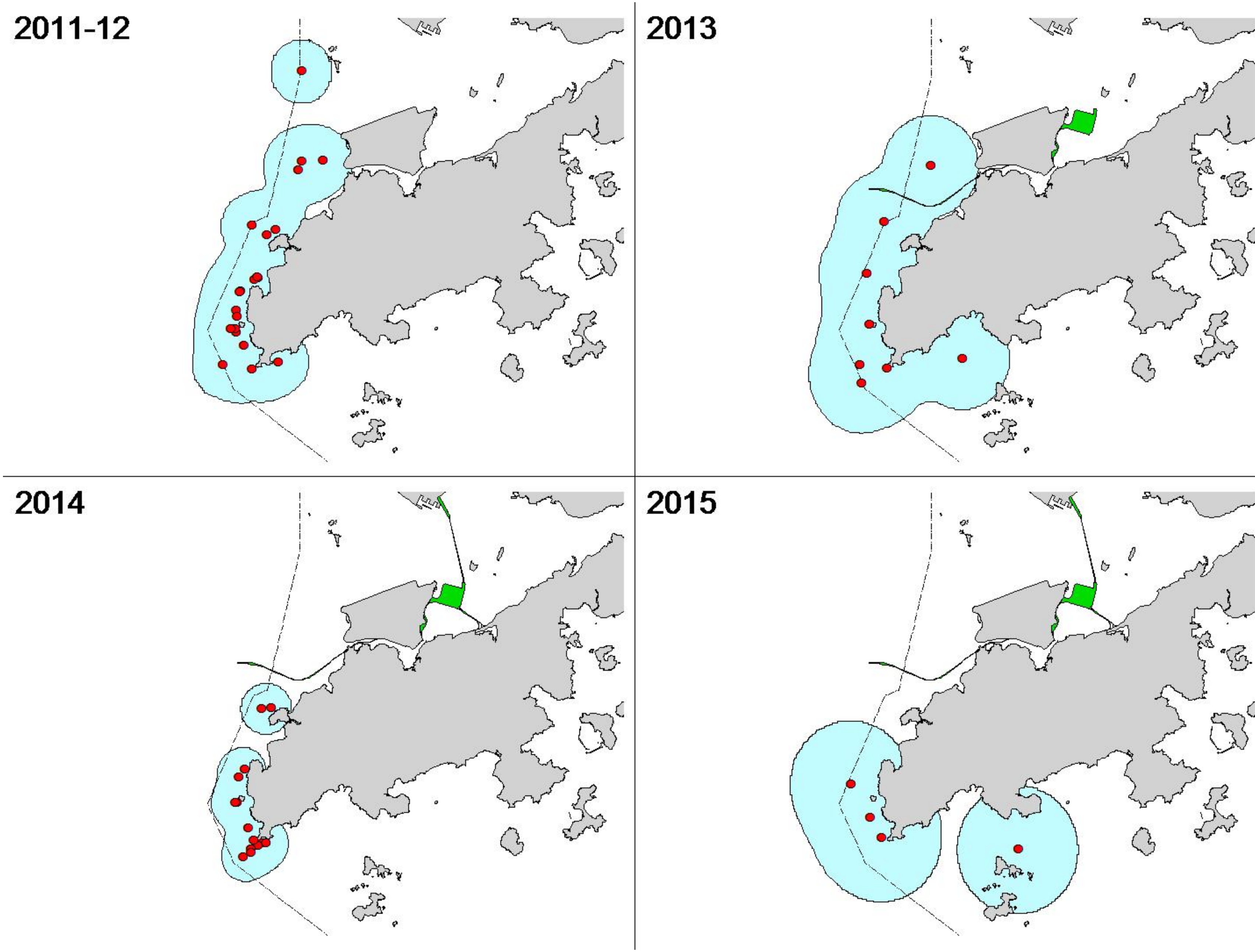


Figure 43. Temporal changes in range use of WL50 as an example of individuals from the western social cluster which have utilized Lantau waters progressively less during 2011-15

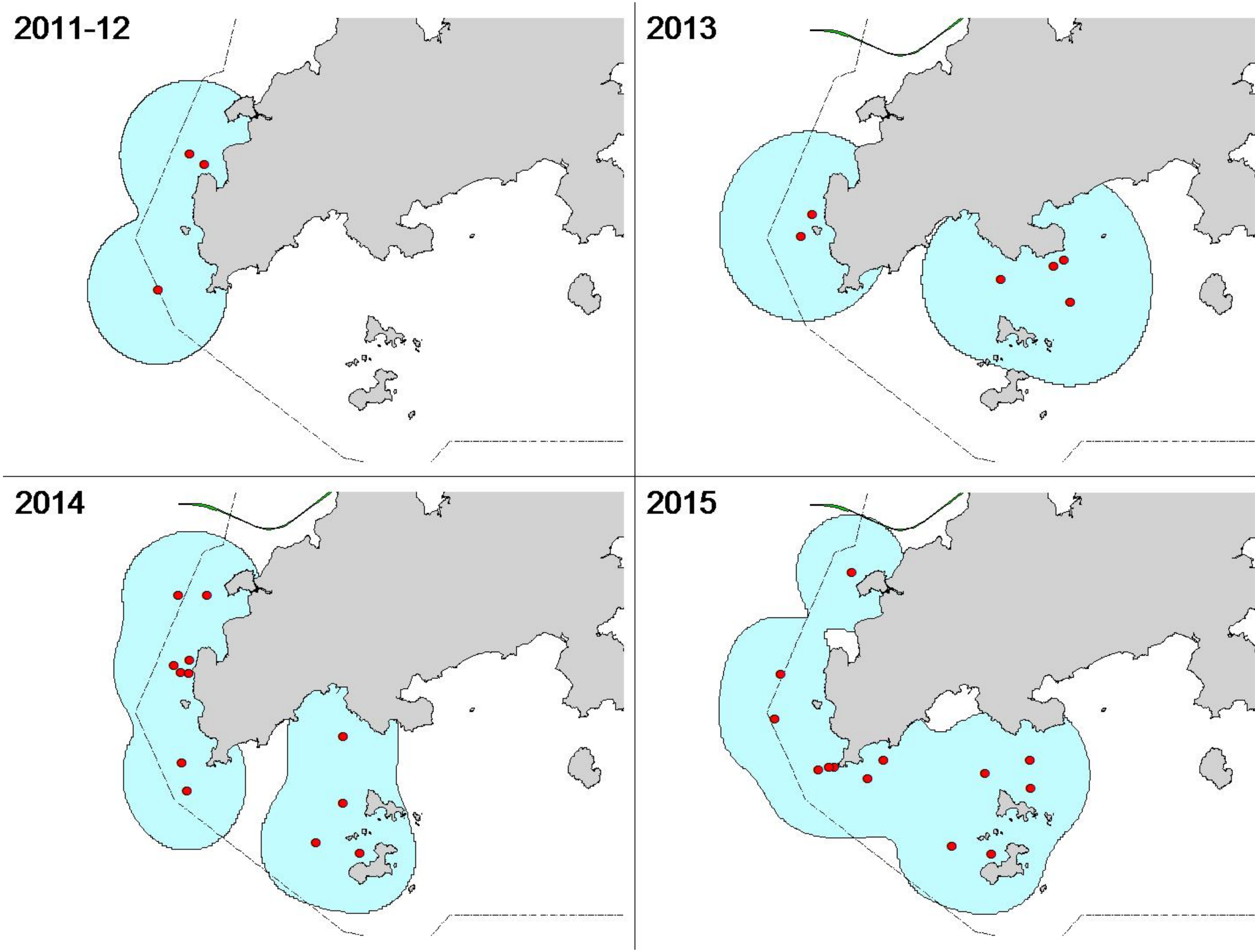


Figure 44. Temporal changes in range use of WL173 as an example of individuals from the western social cluster which have utilized Lantau waters progressively more during 2011-15

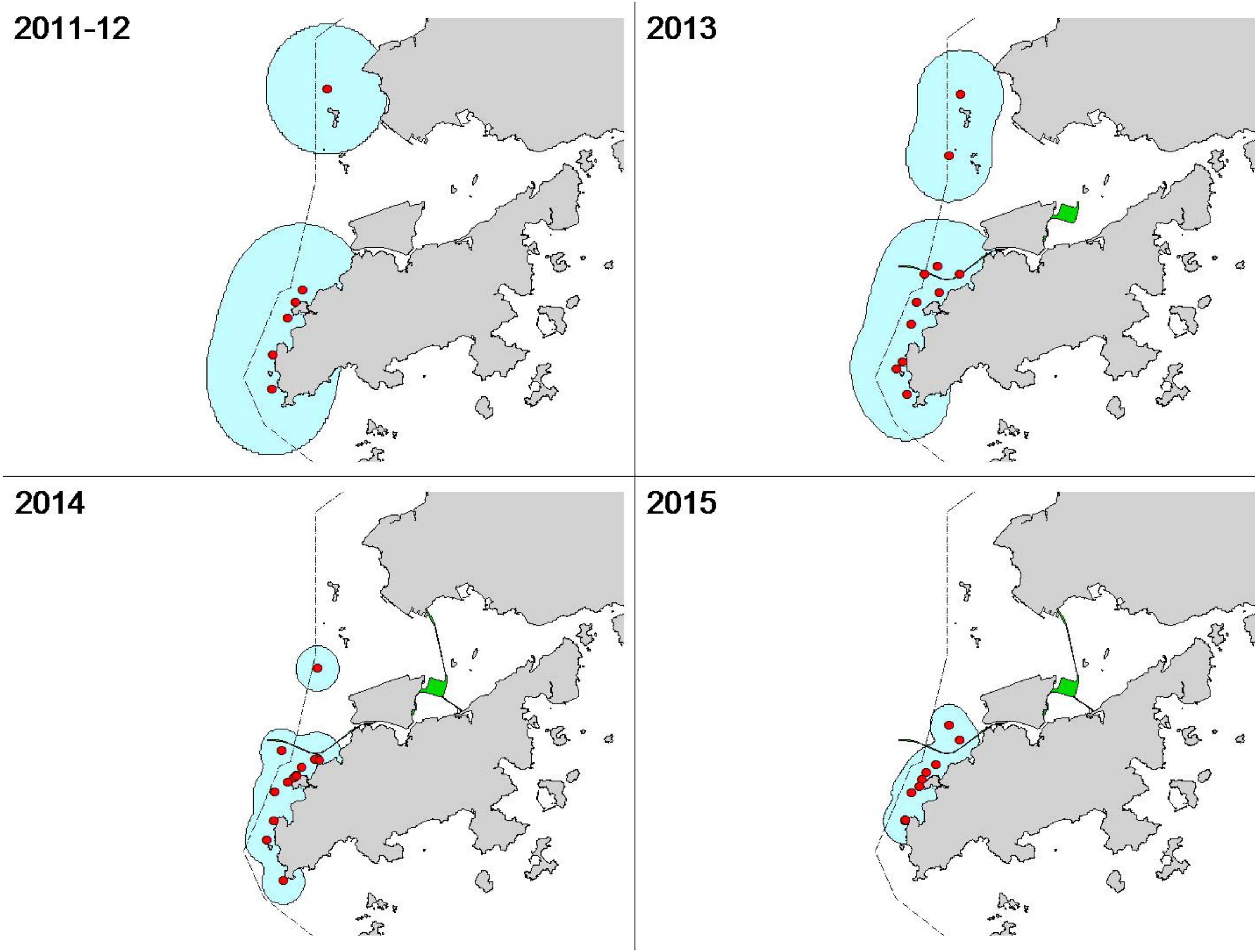


Figure 45. Temporal changes in range use of WL124 as an example of individuals from the western social cluster that have their ranges extended to Lung Kwu Chau area in the past but not in recent years

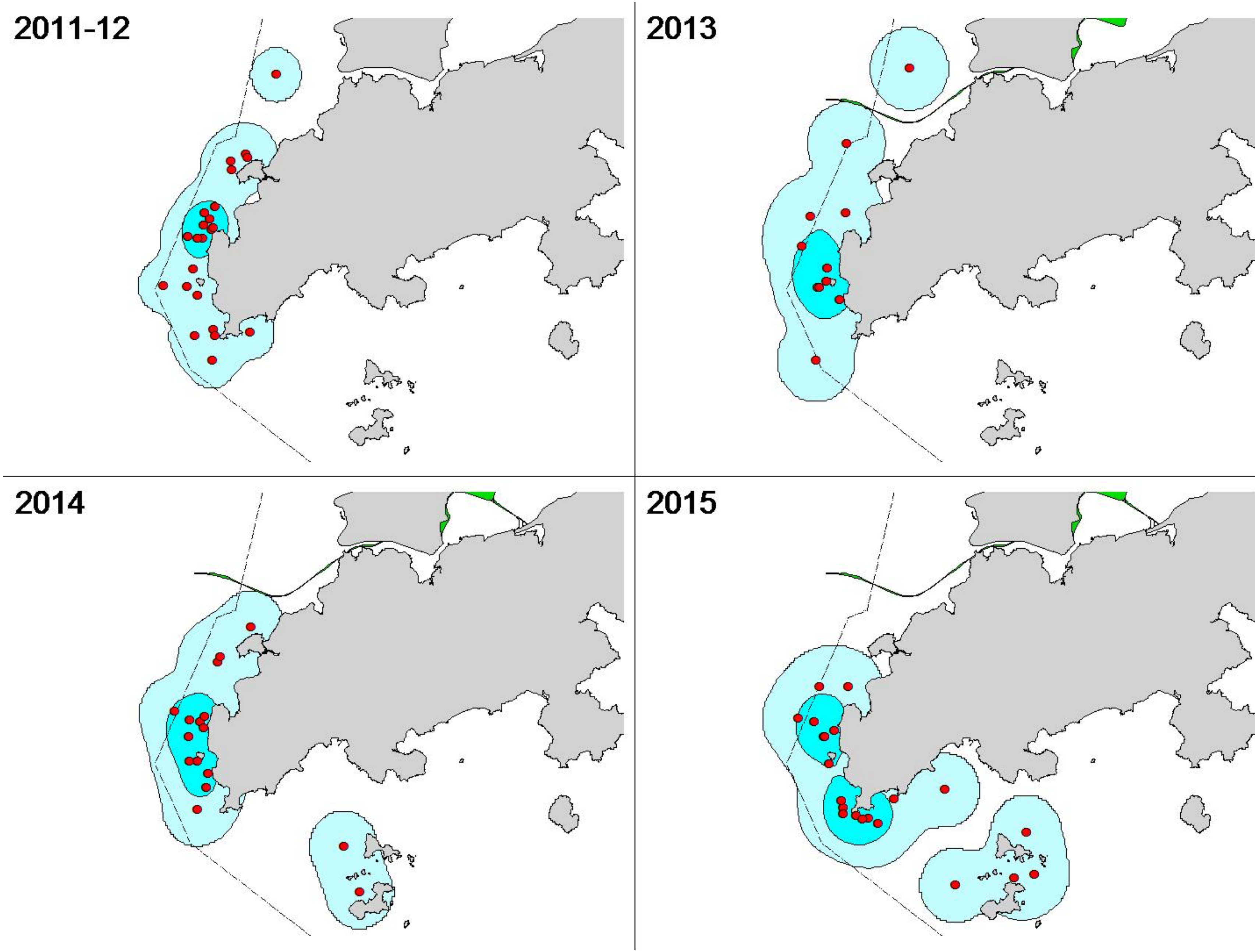


Figure 46. Temporal changes in range use of WL131 as an example of individuals from the western social cluster which have avoided the HKLR alignment in recent years and shifted their ranges further south

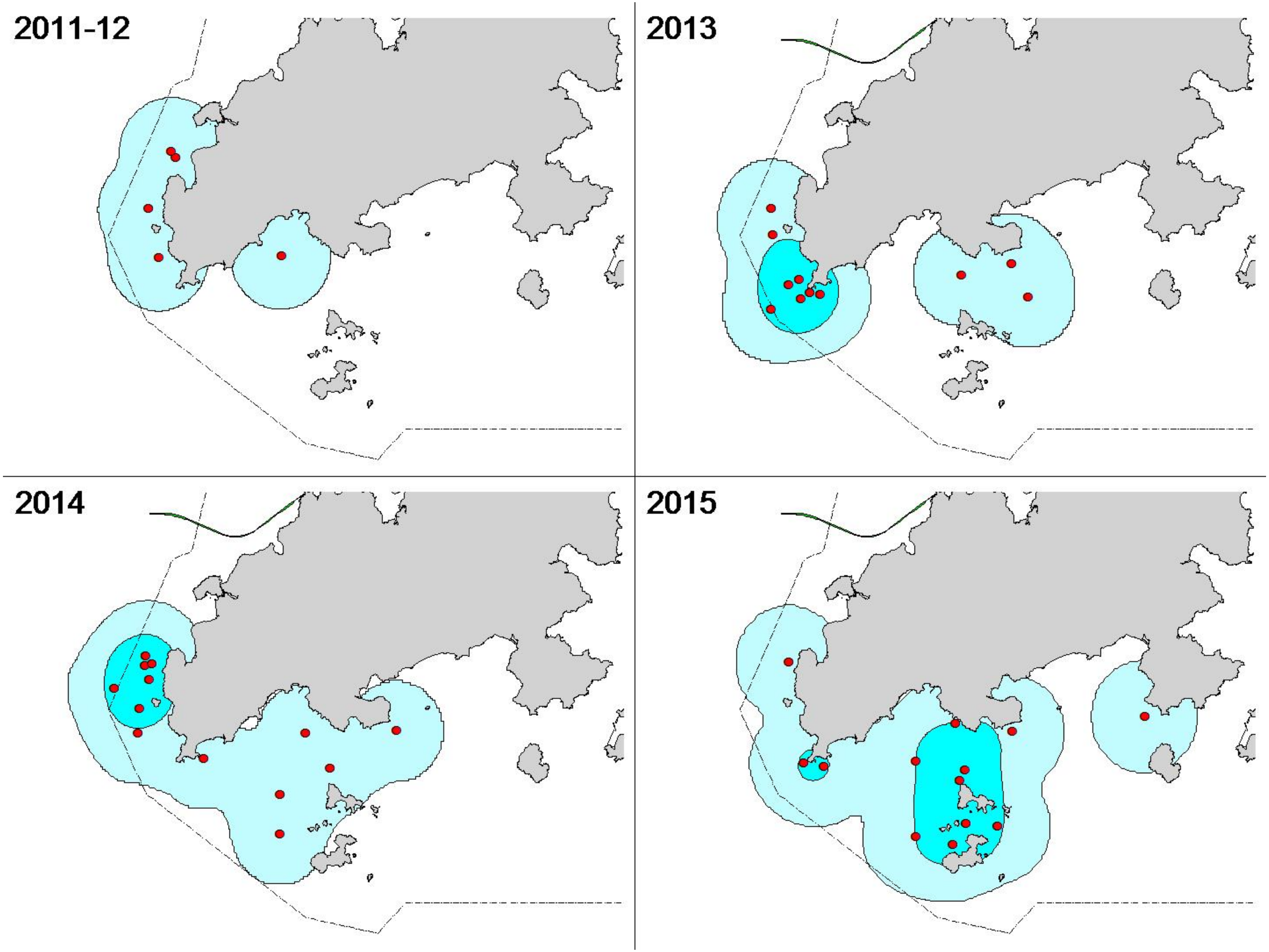


Figure 47. Temporal changes in range use of WL91 as an example of individuals from the western social cluster which have clearly shifted their range use from West Lantau to Southwest Lantau waters during 2011-15

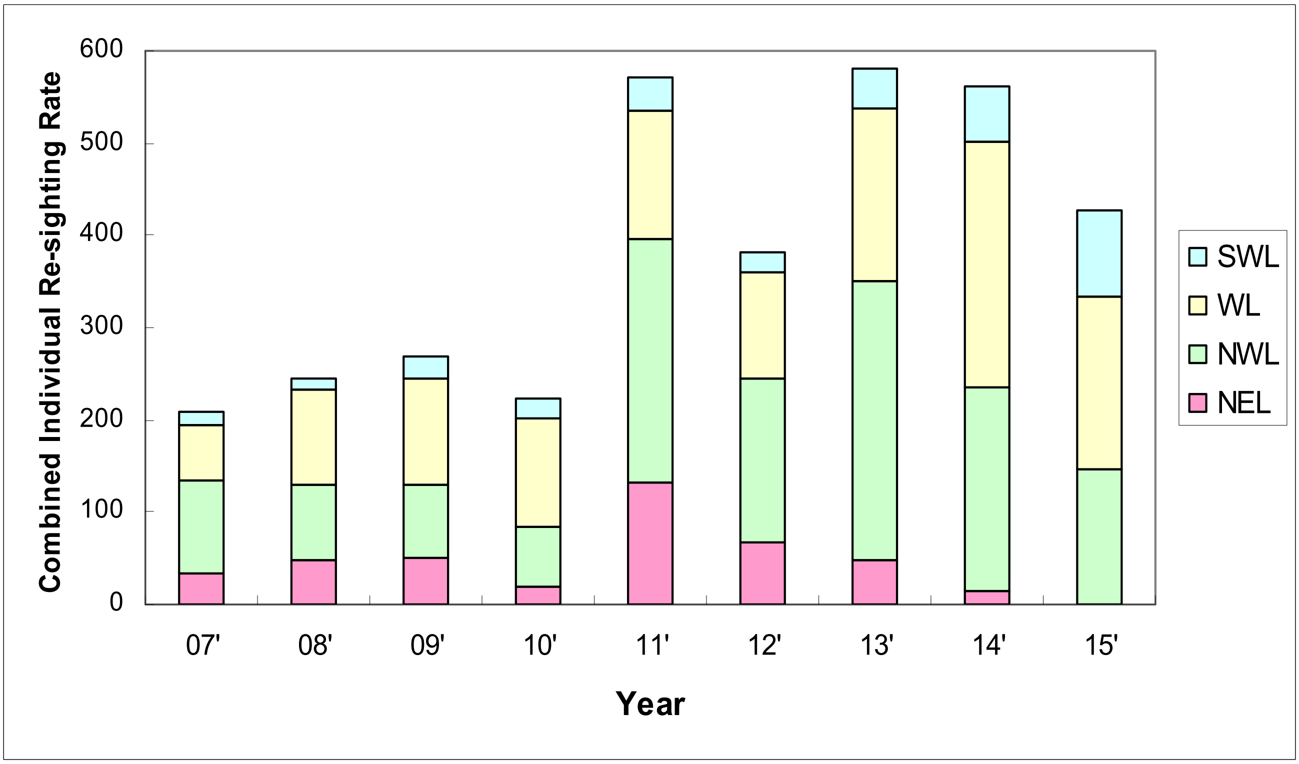


Figure 48a. Combined Individual Re-sighting Rate (total no. of individual re-sightings per 1,000 km of survey effort) of 80 individual dolphins (with 30+ re-sightings) among four survey areas during 2007-2015

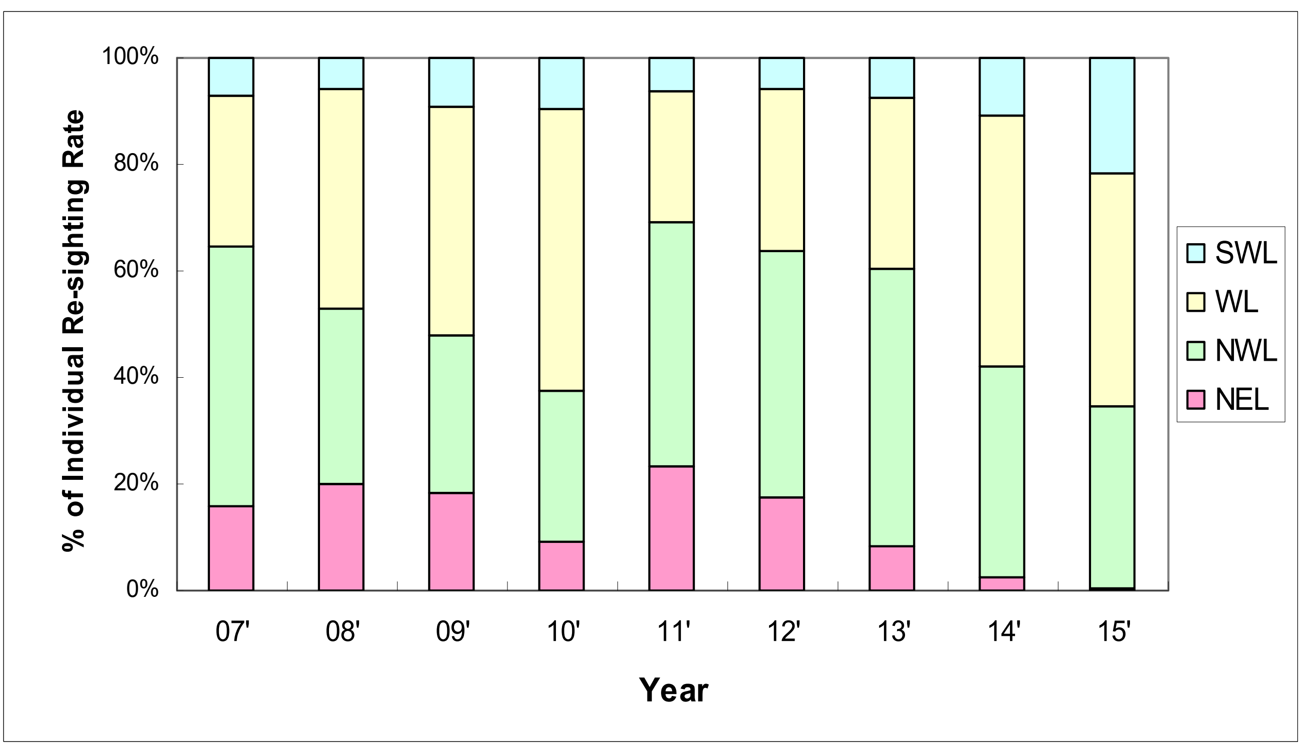


Figure 48b. Proportion of Combined Individual Re-sighting Rate of the total among four survey areas during 2007-2015 based on 80 individual dolphins with 30+ re-sightings

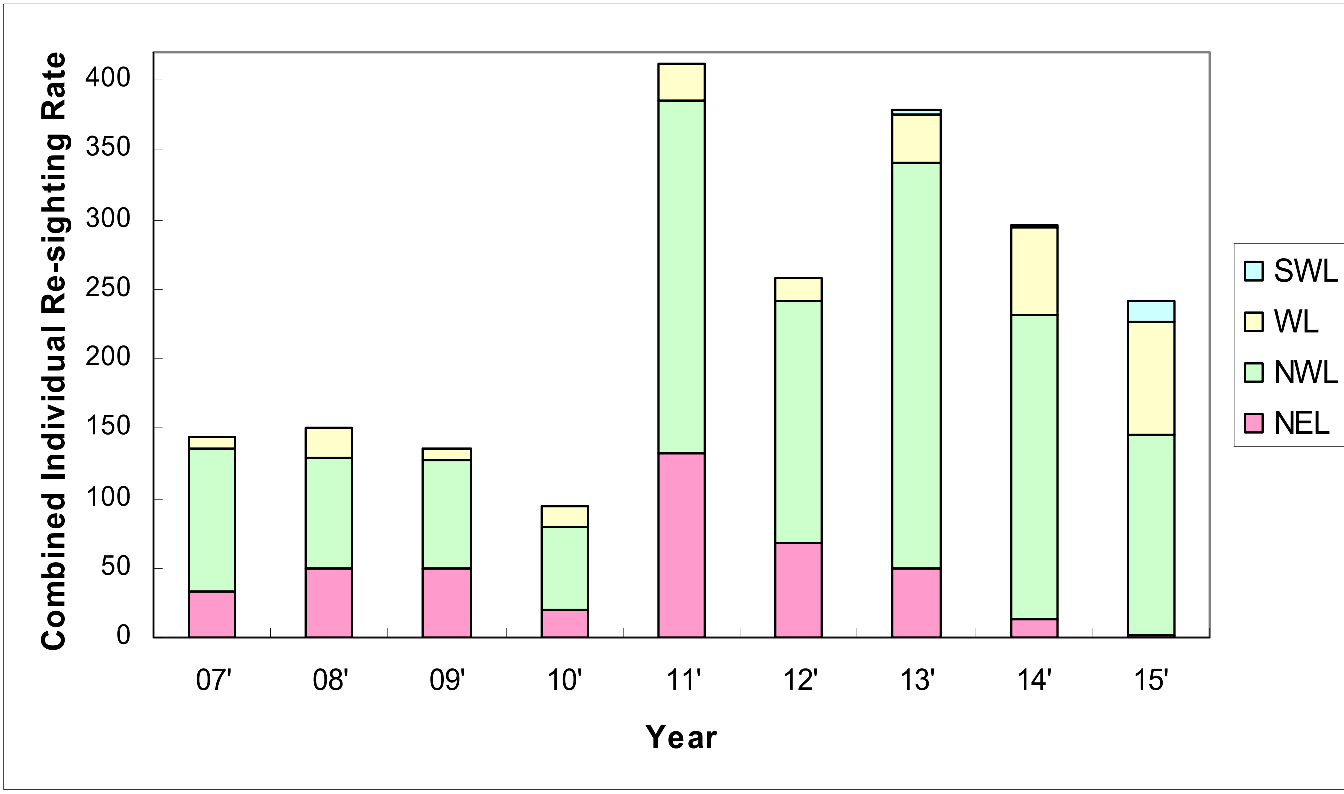


Figure 49a. Combined Individual Re-sighting Rate (total no. of individual re-sightings per 1,000 km of survey effort) of 48 individual dolphins (from northern social cluster) among four survey areas during 2007-2015

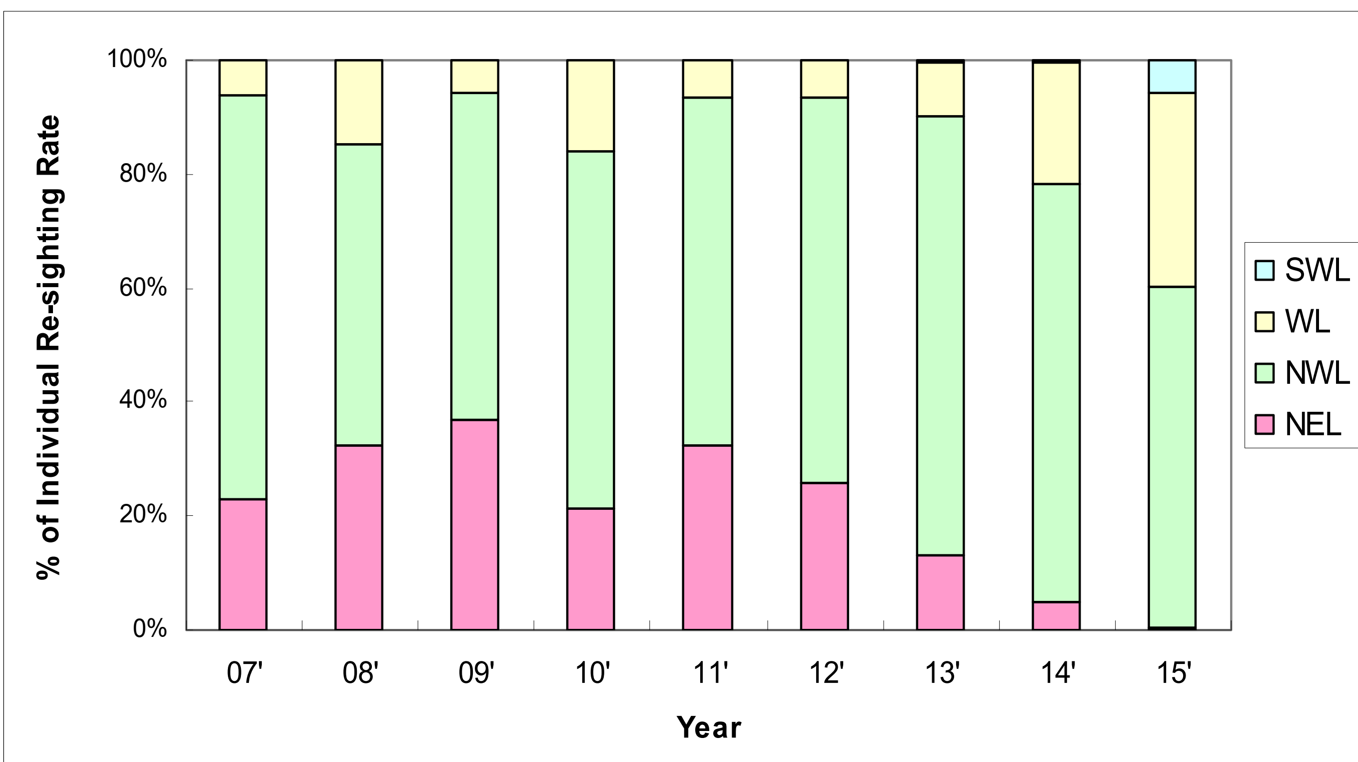


Figure 49b. Proportion of Combined Individual Re-sighting Rate of the total among four survey areas during 2007-2015 based on 48 individual dolphins from northern social cluster

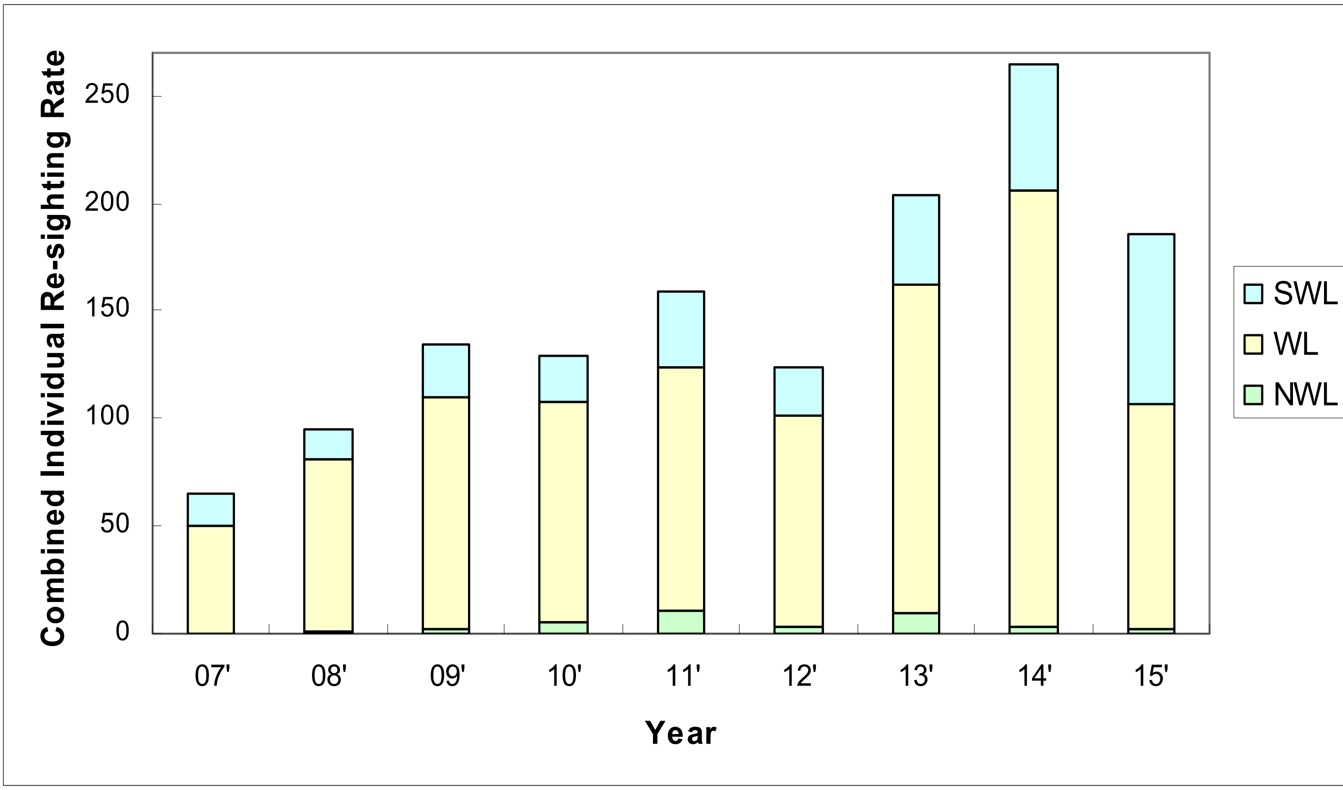


Figure 50a. Combined Individual Re-sighting Rate (total no. of individual re-sightings per 1,000 km of survey effort) of 32 individual dolphins (from western social cluster) among four survey areas during 2007-2015

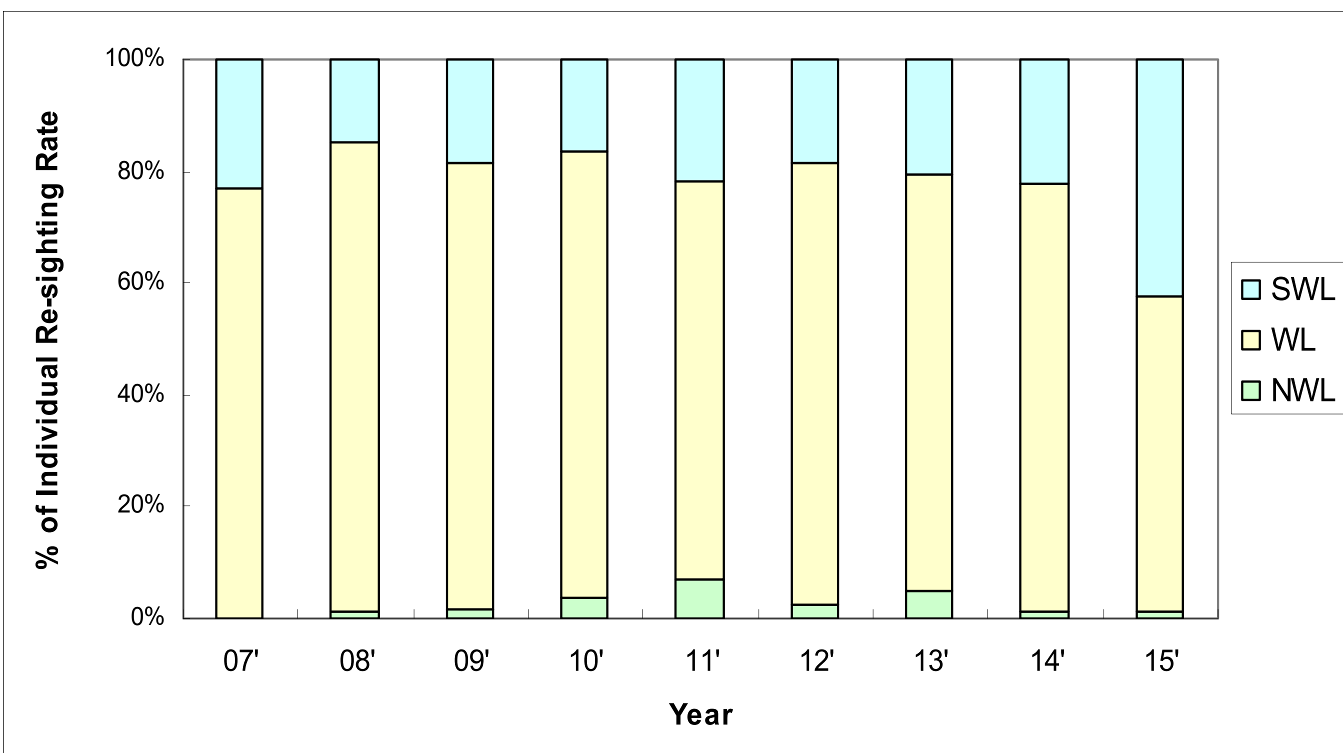


Figure 50b. Proportion of Combined Individual Re-sighting Rate of the total among four survey areas during 2007-2015 based on 32 individual dolphins from western social cluster

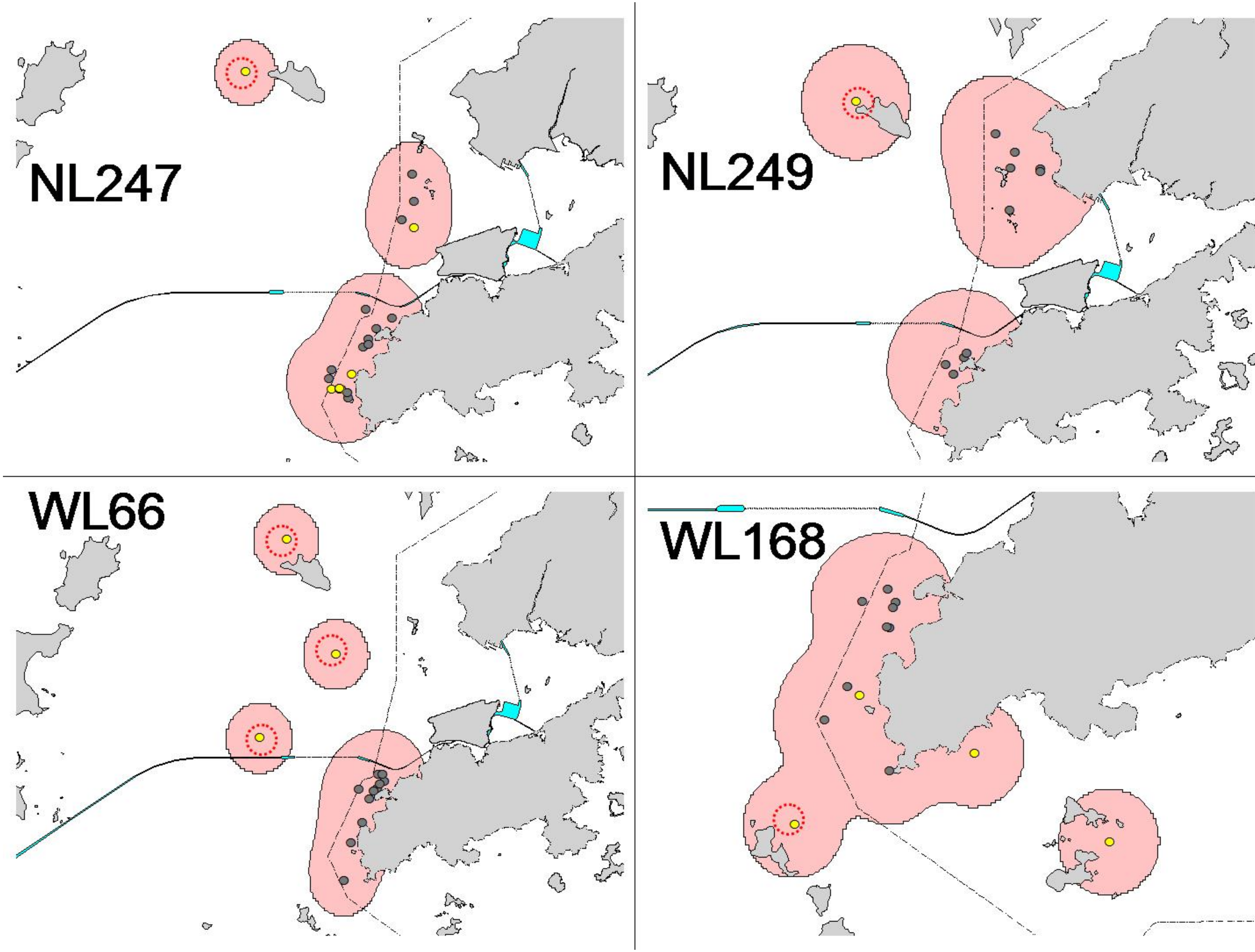


Figure 51. Four individuals sighted during the 2015-16 surveys in Lingding Bay that have only visited Hong Kong sporadically in the past and ranged further away from their ranges occupied in Hong Kong (yellow dots: sightings made in 2015-16; red circle: sightings made during 2015-16 surveys in Lingding Bay)

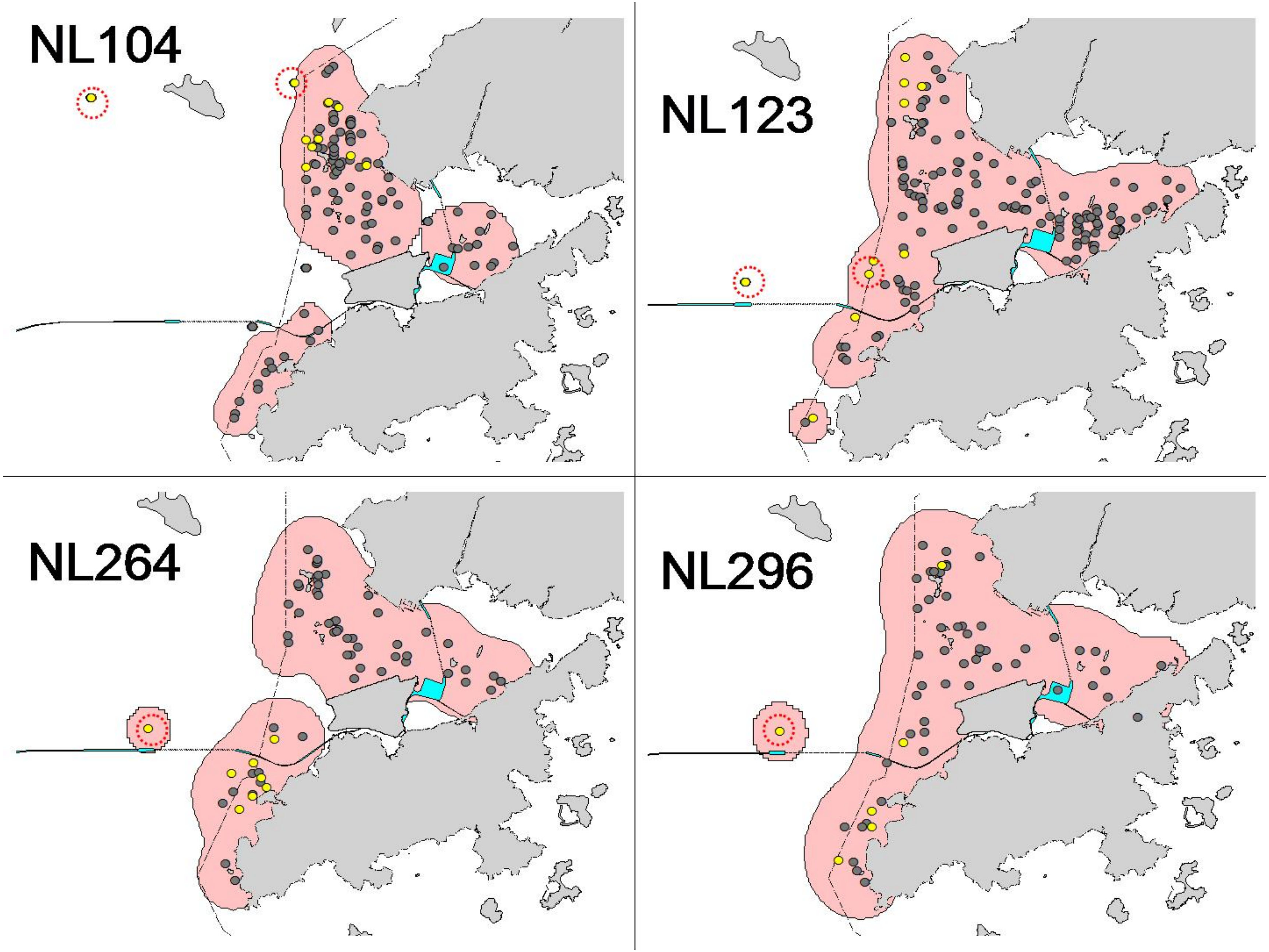


Figure 52. Four individuals that have been sighted frequently in Hong Kong waters in the past, and have shown up across the border for the first time during the 2015-16 surveys in Lingding Bay (yellow dots: sightings made in 2015-16; red circle: sightings made during 2015-16 surveys in Lingding Bay)

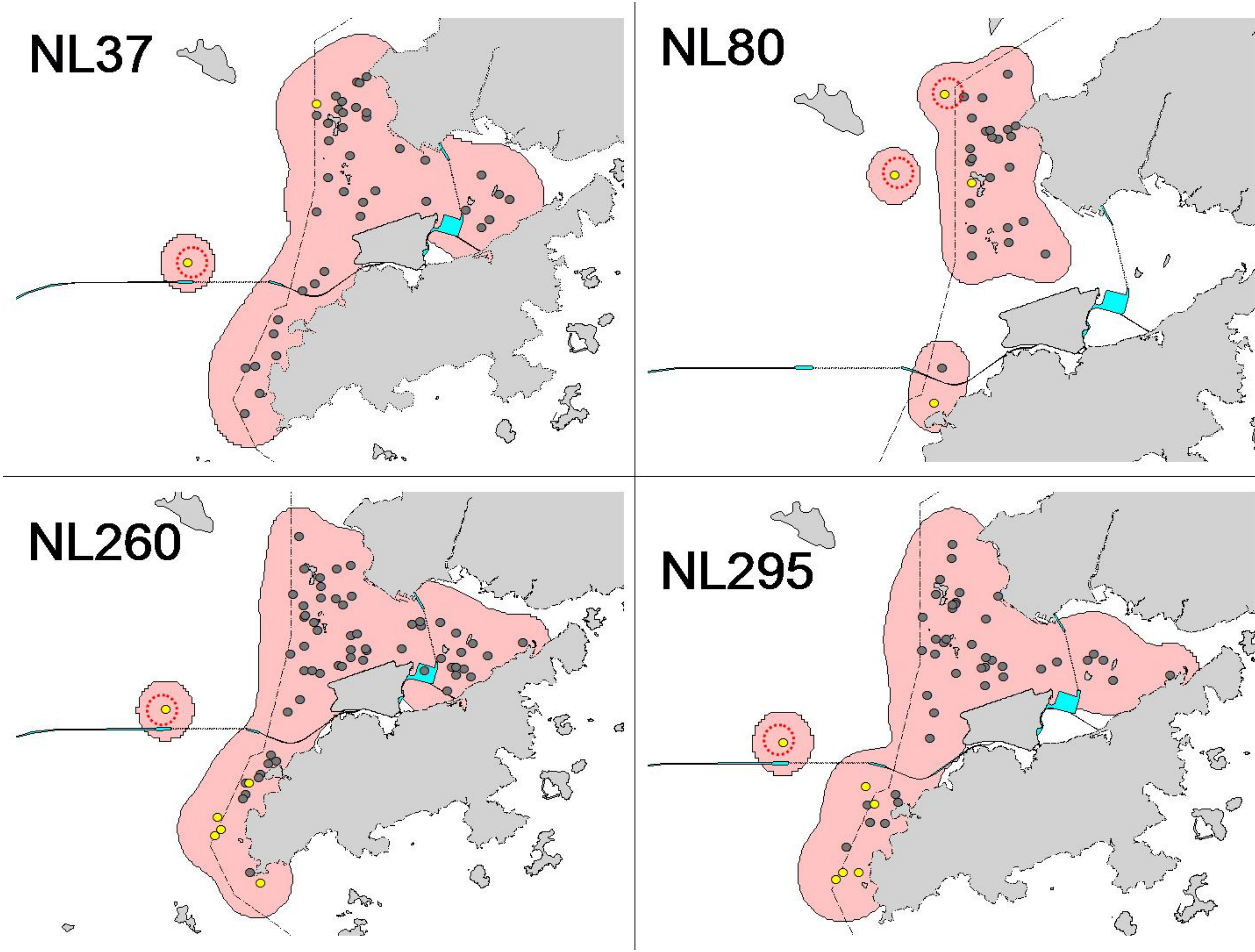


Figure 53. Four individuals that have spent less time in Hong Kong waters in recent years and at the same time have likely expanded their range use across the border during the 2015-16 surveys in Lingding Bay
(yellow dots: sightings made in 2015-16; red circle: sightings made during 2015-16 surveys in Lingding Bay)

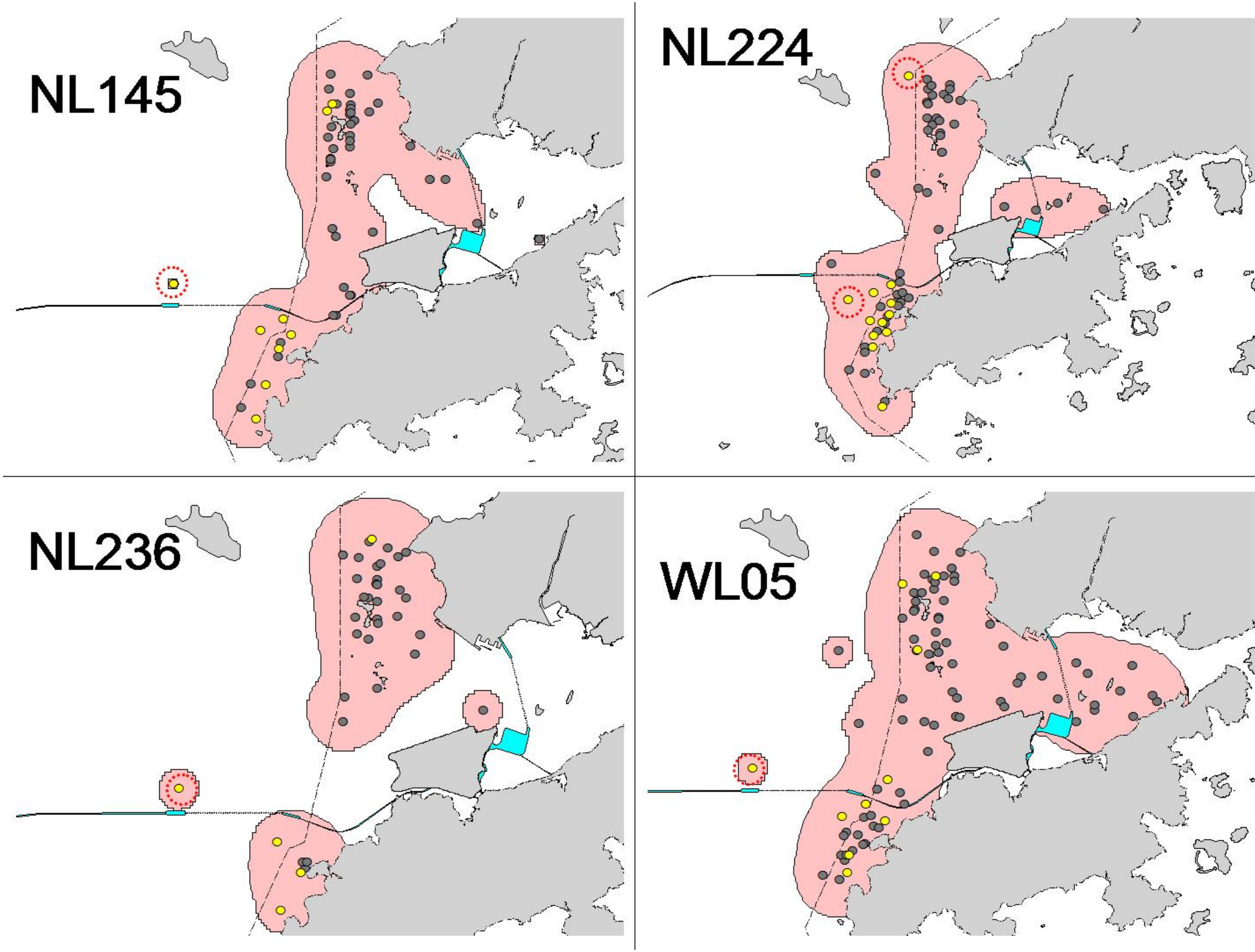


Figure 54. Four individuals that have shifted their range use away from North Lantau waters in recent years and at the same time have shown up across the border during the 2015-16 surveys in Lingding Bay (yellow dots: sightings made in 2015-16; red circle: sightings made during 2015-16 surveys in Lingding Bay)

Appendix I. HKCRP-AFCD Survey Effort Database (April 2015 - March 2016)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
1-Apr-15	NW LANTAU	2	2.13	SPRING	STANDARD31516	P
1-Apr-15	NW LANTAU	3	23.39	SPRING	STANDARD31516	P
1-Apr-15	NW LANTAU	4	0.56	SPRING	STANDARD31516	P
1-Apr-15	NW LANTAU	2	0.90	SPRING	STANDARD31516	S
1-Apr-15	NW LANTAU	3	7.52	SPRING	STANDARD31516	S
1-Apr-15	DEEP BAY	2	2.46	SPRING	STANDARD31516	P
1-Apr-15	DEEP BAY	3	8.73	SPRING	STANDARD31516	P
1-Apr-15	DEEP BAY	4	1.20	SPRING	STANDARD31516	P
1-Apr-15	DEEP BAY	2	0.61	SPRING	STANDARD31516	S
1-Apr-15	DEEP BAY	3	3.46	SPRING	STANDARD31516	S
1-Apr-15	DEEP BAY	4	1.30	SPRING	STANDARD31516	S
1-Apr-15	NE LANTAU	2	8.70	SPRING	STANDARD31516	P
1-Apr-15	NE LANTAU	3	13.15	SPRING	STANDARD31516	P
1-Apr-15	NE LANTAU	2	6.06	SPRING	STANDARD31516	S
1-Apr-15	NE LANTAU	3	3.79	SPRING	STANDARD31516	S
2-Apr-15	W LANTAU	2	1.53	SPRING	STANDARD31516	S
2-Apr-15	W LANTAU	3	9.38	SPRING	STANDARD31516	S
2-Apr-15	NW LANTAU	3	16.70	SPRING	STANDARD31516	P
2-Apr-15	NW LANTAU	4	9.10	SPRING	STANDARD31516	P
2-Apr-15	NW LANTAU	2	1.00	SPRING	STANDARD31516	S
2-Apr-15	NW LANTAU	3	5.40	SPRING	STANDARD31516	S
2-Apr-15	NW LANTAU	4	1.00	SPRING	STANDARD31516	S
9-Apr-15	W LANTAU	2	16.74	SPRING	STANDARD31516	P
9-Apr-15	W LANTAU	3	4.97	SPRING	STANDARD31516	P
9-Apr-15	W LANTAU	2	16.50	SPRING	STANDARD31516	S
9-Apr-15	W LANTAU	3	3.00	SPRING	STANDARD31516	S
9-Apr-15	NW LANTAU	2	20.39	SPRING	STANDARD31516	P
9-Apr-15	NW LANTAU	3	3.10	SPRING	STANDARD31516	P
9-Apr-15	NW LANTAU	2	5.91	SPRING	STANDARD31516	S
9-Apr-15	NW LANTAU	3	1.50	SPRING	STANDARD31516	S
13-Apr-15	SW LANTAU	2	2.90	SPRING	STANDARD31516	P
13-Apr-15	SW LANTAU	3	12.52	SPRING	STANDARD31516	P
13-Apr-15	SW LANTAU	4	4.96	SPRING	STANDARD31516	P
13-Apr-15	SW LANTAU	2	1.40	SPRING	STANDARD31516	S
13-Apr-15	SW LANTAU	3	5.85	SPRING	STANDARD31516	S
13-Apr-15	SW LANTAU	4	2.22	SPRING	STANDARD31516	S
15-Apr-15	W LANTAU	2	10.40	SPRING	STANDARD31516	S
16-Apr-15	LAMMA	1	11.03	SPRING	STANDARD31516	P
16-Apr-15	LAMMA	2	43.23	SPRING	STANDARD31516	P
16-Apr-15	LAMMA	3	17.50	SPRING	STANDARD31516	P
16-Apr-15	LAMMA	1	1.10	SPRING	STANDARD31516	S
16-Apr-15	LAMMA	2	16.89	SPRING	STANDARD31516	S
16-Apr-15	LAMMA	3	7.30	SPRING	STANDARD31516	S
21-Apr-15	W LANTAU	2	1.90	SPRING	STANDARD31516	P
21-Apr-15	W LANTAU	3	10.10	SPRING	STANDARD31516	P
21-Apr-15	W LANTAU	4	1.09	SPRING	STANDARD31516	P
21-Apr-15	W LANTAU	2	1.50	SPRING	STANDARD31516	S
21-Apr-15	W LANTAU	3	7.25	SPRING	STANDARD31516	S
21-Apr-15	SW LANTAU	1	2.99	SPRING	STANDARD31516	P
21-Apr-15	SW LANTAU	2	12.38	SPRING	STANDARD31516	P
21-Apr-15	SW LANTAU	3	1.15	SPRING	STANDARD31516	P
21-Apr-15	SW LANTAU	1	2.20	SPRING	STANDARD31516	S
21-Apr-15	SW LANTAU	2	9.70	SPRING	STANDARD31516	S
21-Apr-15	SW LANTAU	3	2.51	SPRING	STANDARD31516	S
27-Apr-15	SE LANTAU	2	12.81	SPRING	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
27-Apr-15	SE LANTAU	3	27.68	SPRING	STANDARD31516	P
27-Apr-15	SE LANTAU	2	1.04	SPRING	STANDARD31516	S
27-Apr-15	SE LANTAU	3	8.87	SPRING	STANDARD31516	S
27-Apr-15	SW LANTAU	3	13.85	SPRING	STANDARD31516	P
27-Apr-15	SW LANTAU	4	1.22	SPRING	STANDARD31516	P
27-Apr-15	SW LANTAU	3	1.22	SPRING	STANDARD31516	S
29-Apr-15	NW LANTAU	2	19.19	SPRING	STANDARD31516	P
29-Apr-15	NW LANTAU	3	8.22	SPRING	STANDARD31516	P
29-Apr-15	NW LANTAU	2	4.61	SPRING	STANDARD31516	S
29-Apr-15	NW LANTAU	3	1.98	SPRING	STANDARD31516	S
29-Apr-15	DEEP BAY	2	6.26	SPRING	STANDARD31516	P
29-Apr-15	DEEP BAY	3	6.69	SPRING	STANDARD31516	P
29-Apr-15	DEEP BAY	2	3.23	SPRING	STANDARD31516	S
29-Apr-15	NE LANTAU	1	3.80	SPRING	STANDARD31516	P
29-Apr-15	NE LANTAU	2	8.93	SPRING	STANDARD31516	P
29-Apr-15	NE LANTAU	3	3.42	SPRING	STANDARD31516	P
29-Apr-15	NE LANTAU	2	7.33	SPRING	STANDARD31516	S
29-Apr-15	NE LANTAU	3	1.22	SPRING	STANDARD31516	S
12-May-15	LAMMA	1	15.98	SPRING	STANDARD31516	P
12-May-15	LAMMA	2	28.37	SPRING	STANDARD31516	P
12-May-15	LAMMA	3	0.65	SPRING	STANDARD31516	P
12-May-15	LAMMA	2	6.53	SPRING	STANDARD31516	S
12-May-15	SE LANTAU	1	7.61	SPRING	STANDARD31516	P
12-May-15	SE LANTAU	2	10.90	SPRING	STANDARD31516	P
12-May-15	SE LANTAU	1	4.01	SPRING	STANDARD31516	S
12-May-15	SE LANTAU	2	5.19	SPRING	STANDARD31516	S
13-May-15	W LANTAU	2	6.23	SPRING	STANDARD31516	P
13-May-15	W LANTAU	3	10.58	SPRING	STANDARD31516	P
13-May-15	W LANTAU	4	5.01	SPRING	STANDARD31516	P
13-May-15	W LANTAU	2	5.42	SPRING	STANDARD31516	S
13-May-15	W LANTAU	3	12.05	SPRING	STANDARD31516	S
13-May-15	W LANTAU	4	3.75	SPRING	STANDARD31516	S
13-May-15	NW LANTAU	3	21.10	SPRING	STANDARD31516	P
13-May-15	NW LANTAU	2	1.70	SPRING	STANDARD31516	S
13-May-15	NW LANTAU	3	8.80	SPRING	STANDARD31516	S
19-May-15	NW LANTAU	2	9.27	SPRING	STANDARD31516	P
19-May-15	NW LANTAU	3	16.62	SPRING	STANDARD31516	P
19-May-15	NW LANTAU	3	6.08	SPRING	STANDARD31516	S
19-May-15	NW LANTAU	4	0.63	SPRING	STANDARD31516	S
19-May-15	DEEP BAY	3	6.80	SPRING	STANDARD31516	P
19-May-15	DEEP BAY	4	5.98	SPRING	STANDARD31516	P
19-May-15	DEEP BAY	3	2.03	SPRING	STANDARD31516	S
19-May-15	DEEP BAY	4	1.15	SPRING	STANDARD31516	S
19-May-15	NE LANTAU	2	13.03	SPRING	STANDARD31516	P
19-May-15	NE LANTAU	3	3.52	SPRING	STANDARD31516	P
19-May-15	NE LANTAU	2	4.53	SPRING	STANDARD31516	S
19-May-15	NE LANTAU	3	3.82	SPRING	STANDARD31516	S
22-May-15	W LANTAU	2	2.83	SPRING	STANDARD31516	P
22-May-15	W LANTAU	3	3.35	SPRING	STANDARD31516	P
22-May-15	W LANTAU	4	1.30	SPRING	STANDARD31516	P
22-May-15	W LANTAU	5	4.80	SPRING	STANDARD31516	P
22-May-15	W LANTAU	2	2.09	SPRING	STANDARD31516	S
22-May-15	W LANTAU	3	2.79	SPRING	STANDARD31516	S
22-May-15	W LANTAU	4	2.37	SPRING	STANDARD31516	S
22-May-15	W LANTAU	5	3.40	SPRING	STANDARD31516	S
22-May-15	NW LANTAU	2	0.38	SPRING	STANDARD31516	P
22-May-15	NW LANTAU	3	3.07	SPRING	STANDARD31516	P
22-May-15	NW LANTAU	4	7.83	SPRING	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
22-May-15	NW LANTAU	5	3.10	SPRING	STANDARD31516	P
22-May-15	NW LANTAU	2	1.89	SPRING	STANDARD31516	S
22-May-15	NW LANTAU	3	2.55	SPRING	STANDARD31516	S
22-May-15	NW LANTAU	4	5.58	SPRING	STANDARD31516	S
22-May-15	NE LANTAU	2	4.11	SPRING	STANDARD31516	P
22-May-15	NE LANTAU	3	19.95	SPRING	STANDARD31516	P
22-May-15	NE LANTAU	4	3.26	SPRING	STANDARD31516	P
22-May-15	NE LANTAU	2	2.17	SPRING	STANDARD31516	S
22-May-15	NE LANTAU	3	8.51	SPRING	STANDARD31516	S
26-May-15	SE LANTAU	2	12.61	SPRING	STANDARD31516	P
26-May-15	SE LANTAU	2	1.99	SPRING	STANDARD31516	S
26-May-15	SW LANTAU	1	4.46	SPRING	STANDARD31516	P
26-May-15	SW LANTAU	2	17.56	SPRING	STANDARD31516	P
26-May-15	SW LANTAU	2	4.58	SPRING	STANDARD31516	S
27-May-15	W LANTAU	3	9.77	SPRING	STANDARD31516	S
27-May-15	W LANTAU	4	0.83	SPRING	STANDARD31516	S
4-Jun-15	SE LANTAU	2	10.47	SUMMER	STANDARD31516	P
4-Jun-15	SE LANTAU	2	6.10	SUMMER	STANDARD31516	S
4-Jun-15	SW LANTAU	2	10.44	SUMMER	STANDARD31516	P
4-Jun-15	SW LANTAU	3	13.58	SUMMER	STANDARD31516	P
4-Jun-15	SW LANTAU	2	3.71	SUMMER	STANDARD31516	S
4-Jun-15	SW LANTAU	3	9.20	SUMMER	STANDARD31516	S
8-Jun-15	PO TOI	2	8.40	SUMMER	STANDARD31516	P
8-Jun-15	PO TOI	3	41.72	SUMMER	STANDARD31516	P
8-Jun-15	PO TOI	4	3.91	SUMMER	STANDARD31516	P
8-Jun-15	PO TOI	2	2.37	SUMMER	STANDARD31516	S
8-Jun-15	PO TOI	3	8.00	SUMMER	STANDARD31516	S
8-Jun-15	NINEPINS	2	8.37	SUMMER	STANDARD31516	P
8-Jun-15	NINEPINS	3	5.53	SUMMER	STANDARD31516	P
9-Jun-15	SW LANTAU	2	1.10	SUMMER	STANDARD31516	P
9-Jun-15	SW LANTAU	3	10.18	SUMMER	STANDARD31516	P
9-Jun-15	SW LANTAU	4	0.60	SUMMER	STANDARD31516	P
9-Jun-15	SW LANTAU	2	1.90	SUMMER	STANDARD31516	S
9-Jun-15	SW LANTAU	3	11.54	SUMMER	STANDARD31516	S
9-Jun-15	SW LANTAU	4	1.00	SUMMER	STANDARD31516	S
12-Jun-15	W LANTAU	2	2.32	SUMMER	STANDARD31516	S
12-Jun-15	W LANTAU	3	7.09	SUMMER	STANDARD31516	S
12-Jun-15	W LANTAU	4	1.19	SUMMER	STANDARD31516	S
12-Jun-15	SW LANTAU	2	13.37	SUMMER	STANDARD31516	P
12-Jun-15	SW LANTAU	3	5.14	SUMMER	STANDARD31516	P
12-Jun-15	SW LANTAU	1	0.67	SUMMER	STANDARD31516	S
12-Jun-15	SW LANTAU	2	5.28	SUMMER	STANDARD31516	S
12-Jun-15	SW LANTAU	3	4.81	SUMMER	STANDARD31516	S
12-Jun-15	SW LANTAU	4	0.60	SUMMER	STANDARD31516	S
12-Jun-15	SE LANTAU	3	8.37	SUMMER	STANDARD31516	P
12-Jun-15	SE LANTAU	2	1.72	SUMMER	STANDARD31516	S
12-Jun-15	SE LANTAU	3	4.21	SUMMER	STANDARD31516	S
12-Jun-15	SE LANTAU	4	0.60	SUMMER	STANDARD31516	S
15-Jun-15	W LANTAU	2	9.90	SUMMER	STANDARD31516	S
15-Jun-15	W LANTAU	3	0.50	SUMMER	STANDARD31516	S
16-Jun-15	PO TOI	1	36.53	SUMMER	STANDARD31516	P
16-Jun-15	PO TOI	2	12.09	SUMMER	STANDARD31516	P
16-Jun-15	PO TOI	1	1.71	SUMMER	STANDARD31516	S
16-Jun-15	PO TOI	2	5.44	SUMMER	STANDARD31516	S
16-Jun-15	NINEPINS	2	31.10	SUMMER	STANDARD31516	P
16-Jun-15	NINEPINS	3	5.59	SUMMER	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
16-Jun-15	NINEPINS	2	2.00	SUMMER	STANDARD31516	S
18-Jun-15	SW LANTAU	2	0.94	SUMMER	STANDARD31516	P
18-Jun-15	SW LANTAU	3	11.29	SUMMER	STANDARD31516	P
18-Jun-15	SW LANTAU	2	3.71	SUMMER	STANDARD31516	S
18-Jun-15	SW LANTAU	3	3.92	SUMMER	STANDARD31516	S
19-Jun-15	NW LANTAU	1	2.10	SUMMER	STANDARD31516	P
19-Jun-15	NW LANTAU	2	13.82	SUMMER	STANDARD31516	P
19-Jun-15	NW LANTAU	3	14.41	SUMMER	STANDARD31516	P
19-Jun-15	NW LANTAU	4	0.79	SUMMER	STANDARD31516	P
19-Jun-15	NW LANTAU	2	0.50	SUMMER	STANDARD31516	S
19-Jun-15	NW LANTAU	3	4.40	SUMMER	STANDARD31516	S
19-Jun-15	NE LANTAU	2	11.04	SUMMER	STANDARD31516	P
19-Jun-15	NE LANTAU	3	8.64	SUMMER	STANDARD31516	P
19-Jun-15	NE LANTAU	2	8.71	SUMMER	STANDARD31516	S
19-Jun-15	NE LANTAU	3	2.10	SUMMER	STANDARD31516	S
19-Jun-15	DEEP BAY	2	5.12	SUMMER	STANDARD31516	P
19-Jun-15	DEEP BAY	3	7.29	SUMMER	STANDARD31516	P
19-Jun-15	DEEP BAY	2	2.30	SUMMER	STANDARD31516	S
19-Jun-15	DEEP BAY	3	5.89	SUMMER	STANDARD31516	S
29-Jun-15	SE LANTAU	2	14.04	SUMMER	STANDARD31516	P
29-Jun-15	SE LANTAU	3	12.78	SUMMER	STANDARD31516	P
29-Jun-15	SE LANTAU	2	4.30	SUMMER	STANDARD31516	S
29-Jun-15	SE LANTAU	3	3.98	SUMMER	STANDARD31516	S
29-Jun-15	SW LANTAU	2	13.44	SUMMER	STANDARD31516	P
29-Jun-15	SW LANTAU	3	9.35	SUMMER	STANDARD31516	P
29-Jun-15	SW LANTAU	2	2.03	SUMMER	STANDARD31516	S
29-Jun-15	SW LANTAU	3	1.61	SUMMER	STANDARD31516	S
30-Jun-15	NW LANTAU	2	0.90	SUMMER	STANDARD31516	P
30-Jun-15	NW LANTAU	3	25.73	SUMMER	STANDARD31516	P
30-Jun-15	NW LANTAU	4	0.62	SUMMER	STANDARD31516	P
30-Jun-15	NW LANTAU	3	6.88	SUMMER	STANDARD31516	S
30-Jun-15	DEEP BAY	3	1.86	SUMMER	STANDARD31516	P
30-Jun-15	DEEP BAY	4	7.67	SUMMER	STANDARD31516	P
30-Jun-15	DEEP BAY	5	4.03	SUMMER	STANDARD31516	P
30-Jun-15	DEEP BAY	3	1.08	SUMMER	STANDARD31516	S
30-Jun-15	DEEP BAY	4	3.86	SUMMER	STANDARD31516	S
30-Jun-15	DEEP BAY	5	1.50	SUMMER	STANDARD31516	S
30-Jun-15	NE LANTAU	2	10.13	SUMMER	STANDARD31516	P
30-Jun-15	NE LANTAU	3	3.30	SUMMER	STANDARD31516	P
30-Jun-15	NE LANTAU	2	6.97	SUMMER	STANDARD31516	S
30-Jun-15	NE LANTAU	3	1.90	SUMMER	STANDARD31516	S
6-Jul-15	SW LANTAU	2	10.55	SUMMER	STANDARD31516	P
6-Jul-15	SW LANTAU	2	7.73	SUMMER	STANDARD31516	S
6-Jul-15	SW LANTAU	3	2.30	SUMMER	STANDARD31516	S
8-Jul-15	W LANTAU	2	1.32	SUMMER	STANDARD31516	S
8-Jul-15	W LANTAU	3	7.86	SUMMER	STANDARD31516	S
8-Jul-15	W LANTAU	4	1.22	SUMMER	STANDARD31516	S
13-Jul-15	PO TOI	1	3.20	SUMMER	STANDARD31516	P
13-Jul-15	PO TOI	2	71.20	SUMMER	STANDARD31516	P
13-Jul-15	PO TOI	2	17.20	SUMMER	STANDARD31516	S
28-Jul-15	SW LANTAU	2	9.10	SUMMER	STANDARD31516	P
28-Jul-15	SW LANTAU	3	3.03	SUMMER	STANDARD31516	P
28-Jul-15	SW LANTAU	2	6.50	SUMMER	STANDARD31516	S
28-Jul-15	SW LANTAU	3	4.31	SUMMER	STANDARD31516	S
30-Jul-15	NW LANTAU	2	3.28	SUMMER	STANDARD31516	P
30-Jul-15	NW LANTAU	3	13.53	SUMMER	STANDARD31516	P
30-Jul-15	NW LANTAU	4	4.60	SUMMER	STANDARD31516	P
30-Jul-15	NW LANTAU	5	1.23	SUMMER	STANDARD31516	P
30-Jul-15	NW LANTAU	3	0.94	SUMMER	STANDARD31516	S
30-Jul-15	DEEP BAY	2	3.60	SUMMER	STANDARD31516	P
30-Jul-15	DEEP BAY	3	7.87	SUMMER	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
30-Jul-15	DEEP BAY	4	1.62	SUMMER	STANDARD31516	P
30-Jul-15	DEEP BAY	2	2.98	SUMMER	STANDARD31516	S
30-Jul-15	DEEP BAY	3	4.20	SUMMER	STANDARD31516	S
30-Jul-15	DEEP BAY	4	0.63	SUMMER	STANDARD31516	S
30-Jul-15	W LANTAU	2	4.23	SUMMER	STANDARD31516	P
30-Jul-15	W LANTAU	3	6.06	SUMMER	STANDARD31516	P
30-Jul-15	W LANTAU	4	0.70	SUMMER	STANDARD31516	P
30-Jul-15	W LANTAU	2	9.69	SUMMER	STANDARD31516	S
30-Jul-15	W LANTAU	3	7.25	SUMMER	STANDARD31516	S
31-Jul-15	SE LANTAU	2	10.33	SUMMER	STANDARD31516	P
31-Jul-15	SE LANTAU	3	7.88	SUMMER	STANDARD31516	P
31-Jul-15	SE LANTAU	2	9.28	SUMMER	STANDARD31516	S
31-Jul-15	SE LANTAU	3	3.11	SUMMER	STANDARD31516	S
31-Jul-15	SW LANTAU	2	9.63	SUMMER	STANDARD31516	P
31-Jul-15	SW LANTAU	3	11.98	SUMMER	STANDARD31516	P
31-Jul-15	SW LANTAU	2	3.01	SUMMER	STANDARD31516	S
31-Jul-15	SW LANTAU	3	1.31	SUMMER	STANDARD31516	S
31-Jul-15	SW LANTAU	4	1.80	SUMMER	STANDARD31516	S
3-Aug-15	SAI KUNG	1	21.37	SUMMER	STANDARD31516	P
3-Aug-15	SAI KUNG	2	20.97	SUMMER	STANDARD31516	P
3-Aug-15	SAI KUNG	1	2.73	SUMMER	STANDARD31516	S
3-Aug-15	SAI KUNG	2	3.23	SUMMER	STANDARD31516	S
3-Aug-15	NINEPINS	2	22.36	SUMMER	STANDARD31516	P
3-Aug-15	NINEPINS	2	3.64	SUMMER	STANDARD31516	S
4-Aug-15	NINEPINS	0	16.97	SUMMER	STANDARD31516	P
4-Aug-15	NINEPINS	1	24.18	SUMMER	STANDARD31516	P
4-Aug-15	NINEPINS	2	1.36	SUMMER	STANDARD31516	P
4-Aug-15	NINEPINS	0	1.96	SUMMER	STANDARD31516	S
4-Aug-15	NINEPINS	1	2.46	SUMMER	STANDARD31516	S
4-Aug-15	PO TOI	1	11.74	SUMMER	STANDARD31516	P
4-Aug-15	PO TOI	2	23.88	SUMMER	STANDARD31516	P
4-Aug-15	PO TOI	2	4.28	SUMMER	STANDARD31516	S
6-Aug-15	PO TOI	0	11.61	SUMMER	STANDARD31516	P
6-Aug-15	PO TOI	1	36.06	SUMMER	STANDARD31516	P
6-Aug-15	PO TOI	2	19.36	SUMMER	STANDARD31516	P
6-Aug-15	PO TOI	1	4.71	SUMMER	STANDARD31516	S
6-Aug-15	PO TOI	2	11.11	SUMMER	STANDARD31516	S
7-Aug-15	W LANTAU	2	10.40	SUMMER	STANDARD31516	S
11-Aug-15	SE LANTAU	0	0.70	SUMMER	STANDARD31516	P
11-Aug-15	SE LANTAU	1	15.01	SUMMER	STANDARD31516	P
11-Aug-15	SE LANTAU	2	4.51	SUMMER	STANDARD31516	P
11-Aug-15	SE LANTAU	1	6.10	SUMMER	STANDARD31516	S
11-Aug-15	SW LANTAU	1	10.58	SUMMER	STANDARD31516	P
11-Aug-15	SW LANTAU	2	6.01	SUMMER	STANDARD31516	P
11-Aug-15	SW LANTAU	1	5.56	SUMMER	STANDARD31516	S
11-Aug-15	SW LANTAU	2	4.48	SUMMER	STANDARD31516	S
12-Aug-15	W LANTAU	2	12.48	SUMMER	STANDARD31516	P
12-Aug-15	W LANTAU	3	2.78	SUMMER	STANDARD31516	P
12-Aug-15	W LANTAU	1	0.90	SUMMER	STANDARD31516	S
12-Aug-15	W LANTAU	2	5.54	SUMMER	STANDARD31516	S
12-Aug-15	W LANTAU	3	1.17	SUMMER	STANDARD31516	S
12-Aug-15	SW LANTAU	2	20.96	SUMMER	STANDARD31516	P
12-Aug-15	SW LANTAU	3	0.46	SUMMER	STANDARD31516	P
12-Aug-15	SW LANTAU	2	10.38	SUMMER	STANDARD31516	S
18-Aug-15	SW LANTAU	2	8.63	SUMMER	STANDARD31516	P
18-Aug-15	SW LANTAU	1	1.91	SUMMER	STANDARD31516	S
18-Aug-15	SW LANTAU	2	8.64	SUMMER	STANDARD31516	S
18-Aug-15	SW LANTAU	3	1.20	SUMMER	STANDARD31516	S
20-Aug-15	PO TOI	0	2.34	SUMMER	STANDARD31516	P
20-Aug-15	PO TOI	1	3.32	SUMMER	STANDARD31516	P
20-Aug-15	PO TOI	2	27.43	SUMMER	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
20-Aug-15	PO TOI	3	12.90	SUMMER	STANDARD31516	P
20-Aug-15	PO TOI	1	1.96	SUMMER	STANDARD31516	S
20-Aug-15	PO TOI	2	1.23	SUMMER	STANDARD31516	S
20-Aug-15	PO TOI	3	1.90	SUMMER	STANDARD31516	S
20-Aug-15	NINEPINS	1	19.54	SUMMER	STANDARD31516	P
20-Aug-15	NINEPINS	2	11.16	SUMMER	STANDARD31516	P
20-Aug-15	NINEPINS	1	2.10	SUMMER	STANDARD31516	S
25-Aug-15	SAI KUNG	2	41.80	SUMMER	STANDARD31516	P
25-Aug-15	SAI KUNG	3	4.84	SUMMER	STANDARD31516	P
25-Aug-15	SAI KUNG	2	6.10	SUMMER	STANDARD31516	S
26-Aug-15	SW LANTAU	2	10.10	SUMMER	STANDARD31516	S
27-Aug-15	NW LANTAU	1	5.53	SUMMER	STANDARD31516	P
27-Aug-15	NW LANTAU	2	21.35	SUMMER	STANDARD31516	P
27-Aug-15	NW LANTAU	1	2.71	SUMMER	STANDARD31516	S
27-Aug-15	NW LANTAU	2	4.05	SUMMER	STANDARD31516	S
27-Aug-15	DEEP BAY	2	7.02	SUMMER	STANDARD31516	P
27-Aug-15	DEEP BAY	3	6.07	SUMMER	STANDARD31516	P
27-Aug-15	DEEP BAY	2	2.02	SUMMER	STANDARD31516	S
27-Aug-15	DEEP BAY	3	4.09	SUMMER	STANDARD31516	S
27-Aug-15	NE LANTAU	1	2.10	SUMMER	STANDARD31516	P
27-Aug-15	NE LANTAU	2	7.88	SUMMER	STANDARD31516	P
27-Aug-15	NE LANTAU	3	4.95	SUMMER	STANDARD31516	P
27-Aug-15	NE LANTAU	1	0.30	SUMMER	STANDARD31516	S
27-Aug-15	NE LANTAU	2	8.67	SUMMER	STANDARD31516	S
27-Aug-15	NE LANTAU	3	1.30	SUMMER	STANDARD31516	S
7-Sep-15	SW LANTAU	1	1.60	AUTUMN	STANDARD31516	P
7-Sep-15	SW LANTAU	2	6.87	AUTUMN	STANDARD31516	P
7-Sep-15	SW LANTAU	1	2.40	AUTUMN	STANDARD31516	S
7-Sep-15	SW LANTAU	2	4.73	AUTUMN	STANDARD31516	S
7-Sep-15	SW LANTAU	3	0.17	AUTUMN	STANDARD31516	S
8-Sep-15	NW LANTAU	2	10.82	AUTUMN	STANDARD31516	P
8-Sep-15	NW LANTAU	3	12.98	AUTUMN	STANDARD31516	P
8-Sep-15	NW LANTAU	2	3.30	AUTUMN	STANDARD31516	S
8-Sep-15	W LANTAU	2	3.03	AUTUMN	STANDARD31516	P
8-Sep-15	W LANTAU	3	13.79	AUTUMN	STANDARD31516	P
8-Sep-15	W LANTAU	4	1.25	AUTUMN	STANDARD31516	P
8-Sep-15	W LANTAU	2	5.61	AUTUMN	STANDARD31516	S
8-Sep-15	W LANTAU	3	12.14	AUTUMN	STANDARD31516	S
8-Sep-15	W LANTAU	4	2.16	AUTUMN	STANDARD31516	S
10-Sep-15	W LANTAU	2	8.03	AUTUMN	STANDARD31516	S
10-Sep-15	W LANTAU	3	1.71	AUTUMN	STANDARD31516	S
18-Sep-15	SE LANTAU	2	8.73	AUTUMN	STANDARD31516	P
18-Sep-15	SE LANTAU	3	10.17	AUTUMN	STANDARD31516	P
18-Sep-15	SE LANTAU	2	3.50	AUTUMN	STANDARD31516	S
18-Sep-15	SE LANTAU	3	5.10	AUTUMN	STANDARD31516	S
18-Sep-15	SW LANTAU	3	18.77	AUTUMN	STANDARD31516	P
18-Sep-15	SW LANTAU	4	1.50	AUTUMN	STANDARD31516	P
18-Sep-15	SW LANTAU	2	3.60	AUTUMN	STANDARD31516	S
18-Sep-15	SW LANTAU	3	6.23	AUTUMN	STANDARD31516	S
18-Sep-15	SW LANTAU	4	1.80	AUTUMN	STANDARD31516	S
21-Sep-15	W LANTAU	2	4.65	AUTUMN	STANDARD31516	S
21-Sep-15	W LANTAU	3	4.22	AUTUMN	STANDARD31516	S
22-Sep-15	W LANTAU	2	7.94	AUTUMN	STANDARD31516	P
22-Sep-15	W LANTAU	3	2.55	AUTUMN	STANDARD31516	P
22-Sep-15	W LANTAU	2	3.03	AUTUMN	STANDARD31516	S
22-Sep-15	W LANTAU	3	3.22	AUTUMN	STANDARD31516	S
22-Sep-15	NW LANTAU	2	6.42	AUTUMN	STANDARD31516	P
22-Sep-15	NW LANTAU	3	7.02	AUTUMN	STANDARD31516	P
22-Sep-15	NW LANTAU	2	0.61	AUTUMN	STANDARD31516	S
22-Sep-15	DEEP BAY	2	10.32	AUTUMN	STANDARD31516	P
22-Sep-15	DEEP BAY	3	3.09	AUTUMN	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
22-Sep-15	DEEP BAY	2	5.23	AUTUMN	STANDARD31516	S
22-Sep-15	DEEP BAY	3	2.16	AUTUMN	STANDARD31516	S
24-Sep-15	PO TOI	2	17.64	AUTUMN	STANDARD31516	P
24-Sep-15	PO TOI	3	23.30	AUTUMN	STANDARD31516	P
24-Sep-15	PO TOI	4	1.00	AUTUMN	STANDARD31516	P
24-Sep-15	PO TOI	2	7.09	AUTUMN	STANDARD31516	S
24-Sep-15	PO TOI	3	2.90	AUTUMN	STANDARD31516	S
24-Sep-15	NINEPINS	2	1.14	AUTUMN	STANDARD31516	P
24-Sep-15	NINEPINS	3	16.01	AUTUMN	STANDARD31516	P
24-Sep-15	NINEPINS	4	2.60	AUTUMN	STANDARD31516	P
24-Sep-15	NINEPINS	2	3.12	AUTUMN	STANDARD31516	S
24-Sep-15	NINEPINS	3	3.80	AUTUMN	STANDARD31516	S
24-Sep-15	NINEPINS	4	0.70	AUTUMN	STANDARD31516	S
25-Sep-15	W LANTAU	2	1.29	AUTUMN	STANDARD31516	S
25-Sep-15	W LANTAU	3	6.86	AUTUMN	STANDARD31516	S
25-Sep-15	SW LANTAU	2	19.31	AUTUMN	STANDARD31516	P
25-Sep-15	SW LANTAU	3	2.23	AUTUMN	STANDARD31516	P
25-Sep-15	SW LANTAU	1	1.16	AUTUMN	STANDARD31516	S
25-Sep-15	SW LANTAU	2	7.34	AUTUMN	STANDARD31516	S
25-Sep-15	SW LANTAU	3	0.75	AUTUMN	STANDARD31516	S
25-Sep-15	SE LANTAU	2	10.28	AUTUMN	STANDARD31516	P
25-Sep-15	SE LANTAU	2	5.31	AUTUMN	STANDARD31516	S
8-Oct-15	PO TOI	2	54.10	AUTUMN	STANDARD31516	P
8-Oct-15	PO TOI	3	17.40	AUTUMN	STANDARD31516	P
8-Oct-15	PO TOI	4	0.80	AUTUMN	STANDARD31516	P
8-Oct-15	PO TOI	2	6.10	AUTUMN	STANDARD31516	S
8-Oct-15	PO TOI	3	6.20	AUTUMN	STANDARD31516	S
8-Oct-15	PO TOI	4	3.70	AUTUMN	STANDARD31516	S
15-Oct-15	SE LANTAU	2	14.98	AUTUMN	STANDARD31516	P
15-Oct-15	SE LANTAU	2	6.22	AUTUMN	STANDARD31516	S
16-Oct-15	W LANTAU	2	9.84	AUTUMN	STANDARD31516	S
20-Oct-15	W LANTAU	2	1.91	AUTUMN	STANDARD31516	P
20-Oct-15	W LANTAU	3	7.45	AUTUMN	STANDARD31516	P
20-Oct-15	W LANTAU	4	1.46	AUTUMN	STANDARD31516	P
20-Oct-15	W LANTAU	2	1.61	AUTUMN	STANDARD31516	S
20-Oct-15	W LANTAU	3	6.18	AUTUMN	STANDARD31516	S
20-Oct-15	SW LANTAU	2	8.56	AUTUMN	STANDARD31516	P
20-Oct-15	SW LANTAU	3	8.37	AUTUMN	STANDARD31516	P
20-Oct-15	SW LANTAU	2	9.56	AUTUMN	STANDARD31516	S
20-Oct-15	SW LANTAU	3	2.01	AUTUMN	STANDARD31516	S
22-Oct-15	NW LANTAU	2	16.87	AUTUMN	STANDARD31516	P
22-Oct-15	NW LANTAU	3	9.98	AUTUMN	STANDARD31516	P
22-Oct-15	NW LANTAU	2	3.35	AUTUMN	STANDARD31516	S
22-Oct-15	NW LANTAU	3	3.38	AUTUMN	STANDARD31516	S
22-Oct-15	DEEP BAY	2	9.86	AUTUMN	STANDARD31516	P
22-Oct-15	DEEP BAY	3	3.60	AUTUMN	STANDARD31516	P
22-Oct-15	DEEP BAY	2	4.94	AUTUMN	STANDARD31516	S
22-Oct-15	DEEP BAY	3	2.60	AUTUMN	STANDARD31516	S
22-Oct-15	NE LANTAU	2	14.16	AUTUMN	STANDARD31516	P
22-Oct-15	NE LANTAU	2	7.44	AUTUMN	STANDARD31516	S
23-Oct-15	SE LANTAU	2	14.04	AUTUMN	STANDARD31516	P
23-Oct-15	SE LANTAU	2	6.46	AUTUMN	STANDARD31516	S
23-Oct-15	SW LANTAU	2	23.03	AUTUMN	STANDARD31516	P
23-Oct-15	SW LANTAU	3	7.50	AUTUMN	STANDARD31516	P
23-Oct-15	SW LANTAU	2	7.87	AUTUMN	STANDARD31516	S
23-Oct-15	SW LANTAU	3	2.20	AUTUMN	STANDARD31516	S
27-Oct-15	PO TOI	2	19.29	AUTUMN	STANDARD31516	P
27-Oct-15	PO TOI	3	17.07	AUTUMN	STANDARD31516	P
27-Oct-15	PO TOI	2	5.45	AUTUMN	STANDARD31516	S
27-Oct-15	PO TOI	3	1.99	AUTUMN	STANDARD31516	S
27-Oct-15	NINEPINS	2	32.90	AUTUMN	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
27-Oct-15	NINEPINS	2	2.10	AUTUMN	STANDARD31516	S
30-Oct-15	W LANTAU	1	3.26	AUTUMN	STANDARD31516	P
30-Oct-15	W LANTAU	2	18.28	AUTUMN	STANDARD31516	P
30-Oct-15	W LANTAU	1	3.56	AUTUMN	STANDARD31516	S
30-Oct-15	W LANTAU	2	15.63	AUTUMN	STANDARD31516	S
30-Oct-15	NW LANTAU	2	19.77	AUTUMN	STANDARD31516	P
30-Oct-15	NW LANTAU	2	3.94	AUTUMN	STANDARD31516	S
5-Nov-15	SE LANTAU	2	9.58	AUTUMN	STANDARD31516	P
5-Nov-15	SE LANTAU	3	5.58	AUTUMN	STANDARD31516	P
5-Nov-15	SE LANTAU	4	2.90	AUTUMN	STANDARD31516	P
5-Nov-15	SE LANTAU	2	0.60	AUTUMN	STANDARD31516	S
5-Nov-15	SE LANTAU	3	4.10	AUTUMN	STANDARD31516	S
5-Nov-15	SE LANTAU	4	3.14	AUTUMN	STANDARD31516	S
5-Nov-15	SW LANTAU	2	3.43	AUTUMN	STANDARD31516	P
5-Nov-15	SW LANTAU	3	18.31	AUTUMN	STANDARD31516	P
5-Nov-15	SW LANTAU	4	1.21	AUTUMN	STANDARD31516	P
5-Nov-15	SW LANTAU	2	1.20	AUTUMN	STANDARD31516	S
5-Nov-15	SW LANTAU	3	4.18	AUTUMN	STANDARD31516	S
5-Nov-15	SW LANTAU	4	2.94	AUTUMN	STANDARD31516	S
5-Nov-15	W LANTAU	1	5.36	AUTUMN	STANDARD31516	S
5-Nov-15	W LANTAU	2	2.45	AUTUMN	STANDARD31516	S
5-Nov-15	W LANTAU	3	3.04	AUTUMN	STANDARD31516	S
9-Nov-15	W LANTAU	1	3.51	AUTUMN	STANDARD31516	S
9-Nov-15	W LANTAU	2	6.69	AUTUMN	STANDARD31516	S
13-Nov-15	W LANTAU	2	1.80	AUTUMN	STANDARD31516	S
13-Nov-15	W LANTAU	3	2.97	AUTUMN	STANDARD31516	S
13-Nov-15	W LANTAU	4	5.99	AUTUMN	STANDARD31516	S
17-Nov-15	NW LANTAU	2	20.33	AUTUMN	STANDARD31516	P
17-Nov-15	NW LANTAU	3	2.97	AUTUMN	STANDARD31516	P
17-Nov-15	NW LANTAU	2	4.01	AUTUMN	STANDARD31516	S
17-Nov-15	NW LANTAU	3	1.30	AUTUMN	STANDARD31516	S
17-Nov-15	DEEP BAY	2	12.22	AUTUMN	STANDARD31516	P
17-Nov-15	DEEP BAY	3	1.06	AUTUMN	STANDARD31516	P
17-Nov-15	DEEP BAY	2	7.62	AUTUMN	STANDARD31516	S
17-Nov-15	NE LANTAU	2	8.00	AUTUMN	STANDARD31516	P
17-Nov-15	NE LANTAU	3	12.36	AUTUMN	STANDARD31516	P
17-Nov-15	NE LANTAU	2	8.60	AUTUMN	STANDARD31516	S
17-Nov-15	NE LANTAU	3	2.04	AUTUMN	STANDARD31516	S
18-Nov-15	SE LANTAU	2	17.38	AUTUMN	STANDARD31516	P
18-Nov-15	SE LANTAU	3	7.59	AUTUMN	STANDARD31516	P
18-Nov-15	SE LANTAU	2	6.40	AUTUMN	STANDARD31516	S
18-Nov-15	SE LANTAU	3	2.10	AUTUMN	STANDARD31516	S
18-Nov-15	SW LANTAU	2	14.52	AUTUMN	STANDARD31516	P
18-Nov-15	SW LANTAU	2	9.48	AUTUMN	STANDARD31516	S
19-Nov-15	W LANTAU	2	9.97	AUTUMN	STANDARD31516	S
19-Nov-15	NW LANTAU	2	10.17	AUTUMN	STANDARD31516	P
19-Nov-15	NW LANTAU	3	3.61	AUTUMN	STANDARD31516	P
19-Nov-15	NW LANTAU	2	2.82	AUTUMN	STANDARD31516	S
19-Nov-15	NW LANTAU	3	0.46	AUTUMN	STANDARD31516	S
23-Nov-15	W LANTAU	2	6.28	AUTUMN	STANDARD31516	S
23-Nov-15	W LANTAU	3	0.96	AUTUMN	STANDARD31516	S
23-Nov-15	SW LANTAU	1	4.08	AUTUMN	STANDARD31516	P
23-Nov-15	SW LANTAU	2	25.47	AUTUMN	STANDARD31516	P
23-Nov-15	SW LANTAU	3	0.99	AUTUMN	STANDARD31516	P
23-Nov-15	SW LANTAU	2	8.80	AUTUMN	STANDARD31516	S
23-Nov-15	SW LANTAU	3	2.19	AUTUMN	STANDARD31516	S
23-Nov-15	SE LANTAU	2	7.45	AUTUMN	STANDARD31516	P
23-Nov-15	SE LANTAU	2	5.05	AUTUMN	STANDARD31516	S
24-Nov-15	W LANTAU	2	12.74	AUTUMN	STANDARD31516	P
24-Nov-15	W LANTAU	3	3.72	AUTUMN	STANDARD31516	P
24-Nov-15	W LANTAU	4	2.76	AUTUMN	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
24-Nov-15	W LANTAU	2	9.68	AUTUMN	STANDARD31516	S
24-Nov-15	W LANTAU	3	8.56	AUTUMN	STANDARD31516	S
24-Nov-15	NE LANTAU	2	15.85	AUTUMN	STANDARD31516	P
24-Nov-15	NE LANTAU	2	10.25	AUTUMN	STANDARD31516	S
3-Dec-15	SW LANTAU	2	16.37	WINTER	STANDARD31516	P
3-Dec-15	SW LANTAU	3	0.88	WINTER	STANDARD31516	P
3-Dec-15	SW LANTAU	2	4.24	WINTER	STANDARD31516	S
3-Dec-15	SW LANTAU	3	3.29	WINTER	STANDARD31516	S
10-Dec-15	NW LANTAU	2	11.90	WINTER	STANDARD31516	P
10-Dec-15	NW LANTAU	3	8.92	WINTER	STANDARD31516	P
10-Dec-15	NW LANTAU	4	0.98	WINTER	STANDARD31516	P
10-Dec-15	NW LANTAU	2	2.82	WINTER	STANDARD31516	S
10-Dec-15	NW LANTAU	3	7.78	WINTER	STANDARD31516	S
10-Dec-15	W LANTAU	2	7.94	WINTER	STANDARD31516	S
10-Dec-15	W LANTAU	3	2.58	WINTER	STANDARD31516	S
11-Dec-15	W LANTAU	2	0.98	WINTER	STANDARD31516	S
11-Dec-15	W LANTAU	3	18.79	WINTER	STANDARD31516	S
11-Dec-15	NE LANTAU	2	33.30	WINTER	STANDARD31516	P
11-Dec-15	NE LANTAU	2	10.49	WINTER	STANDARD31516	S
14-Dec-15	W LANTAU	3	7.56	WINTER	STANDARD31516	S
14-Dec-15	W LANTAU	4	3.04	WINTER	STANDARD31516	S
18-Dec-15	SE LANTAU	2	9.27	WINTER	STANDARD31516	P
18-Dec-15	SE LANTAU	3	15.15	WINTER	STANDARD31516	P
18-Dec-15	SE LANTAU	2	3.70	WINTER	STANDARD31516	S
18-Dec-15	SE LANTAU	3	4.88	WINTER	STANDARD31516	S
18-Dec-15	SW LANTAU	2	14.40	WINTER	STANDARD31516	P
18-Dec-15	SW LANTAU	3	6.59	WINTER	STANDARD31516	P
18-Dec-15	SW LANTAU	2	6.92	WINTER	STANDARD31516	S
18-Dec-15	SW LANTAU	3	4.54	WINTER	STANDARD31516	S
21-Dec-15	NW LANTAU	2	23.14	WINTER	STANDARD31516	P
21-Dec-15	NW LANTAU	3	8.23	WINTER	STANDARD31516	P
21-Dec-15	NW LANTAU	2	4.49	WINTER	STANDARD31516	S
21-Dec-15	NW LANTAU	3	0.70	WINTER	STANDARD31516	S
21-Dec-15	DEEP BAY	2	12.90	WINTER	STANDARD31516	P
21-Dec-15	DEEP BAY	2	7.40	WINTER	STANDARD31516	S
21-Dec-15	NE LANTAU	1	1.00	WINTER	STANDARD31516	P
21-Dec-15	NE LANTAU	2	18.81	WINTER	STANDARD31516	P
21-Dec-15	NE LANTAU	2	10.69	WINTER	STANDARD31516	S
29-Dec-15	NW LANTAU	2	18.21	WINTER	STANDARD31516	P
29-Dec-15	NW LANTAU	3	10.69	WINTER	STANDARD31516	P
29-Dec-15	NW LANTAU	2	7.54	WINTER	STANDARD31516	S
29-Dec-15	DEEP BAY	2	1.23	WINTER	STANDARD31516	P
29-Dec-15	DEEP BAY	3	11.67	WINTER	STANDARD31516	P
29-Dec-15	DEEP BAY	2	2.60	WINTER	STANDARD31516	S
29-Dec-15	DEEP BAY	3	5.10	WINTER	STANDARD31516	S
29-Dec-15	NE LANTAU	1	6.63	WINTER	STANDARD31516	P
29-Dec-15	NE LANTAU	2	7.59	WINTER	STANDARD31516	P
29-Dec-15	NE LANTAU	1	4.36	WINTER	STANDARD31516	S
29-Dec-15	NE LANTAU	2	1.42	WINTER	STANDARD31516	S
30-Dec-15	W LANTAU	2	1.06	WINTER	STANDARD31516	P
30-Dec-15	W LANTAU	3	11.92	WINTER	STANDARD31516	P
30-Dec-15	W LANTAU	2	3.64	WINTER	STANDARD31516	S
30-Dec-15	W LANTAU	3	7.16	WINTER	STANDARD31516	S
30-Dec-15	SW LANTAU	1	2.10	WINTER	STANDARD31516	P
30-Dec-15	SW LANTAU	2	20.56	WINTER	STANDARD31516	P
30-Dec-15	SW LANTAU	2	10.26	WINTER	STANDARD31516	S
30-Dec-15	SW LANTAU	3	1.38	WINTER	STANDARD31516	S
4-Jan-16	LAMMA	1	6.40	WINTER	STANDARD31516	P
4-Jan-16	LAMMA	2	45.90	WINTER	STANDARD31516	P
4-Jan-16	LAMMA	3	19.20	WINTER	STANDARD31516	P
4-Jan-16	LAMMA	1	2.00	WINTER	STANDARD31516	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
4-Jan-16	LAMMA	2	18.00	WINTER	STANDARD31516	S
4-Jan-16	LAMMA	3	5.60	WINTER	STANDARD31516	S
5-Jan-16	SE LANTAU	2	8.16	WINTER	STANDARD31516	P
5-Jan-16	SE LANTAU	3	18.88	WINTER	STANDARD31516	P
5-Jan-16	SE LANTAU	2	3.00	WINTER	STANDARD31516	S
5-Jan-16	SE LANTAU	3	4.96	WINTER	STANDARD31516	S
5-Jan-16	SW LANTAU	2	15.16	WINTER	STANDARD31516	P
5-Jan-16	SW LANTAU	3	5.70	WINTER	STANDARD31516	S
6-Jan-16	W LANTAU	2	7.06	WINTER	STANDARD31516	S
6-Jan-16	W LANTAU	2	3.43	WINTER	STANDARD31516	S
6-Jan-16	NW LANTAU	2	4.42	WINTER	STANDARD31516	P
6-Jan-16	NW LANTAU	3	4.20	WINTER	STANDARD31516	P
6-Jan-16	NW LANTAU	2	0.35	WINTER	STANDARD31516	S
15-Jan-16	NW LANTAU	2	0.77	WINTER	STANDARD31516	P
15-Jan-16	NW LANTAU	3	3.74	WINTER	STANDARD31516	P
15-Jan-16	DEEP BAY	2	4.73	WINTER	STANDARD31516	P
15-Jan-16	DEEP BAY	3	7.64	WINTER	STANDARD31516	P
15-Jan-16	DEEP BAY	4	0.88	WINTER	STANDARD31516	P
15-Jan-16	DEEP BAY	2	2.25	WINTER	STANDARD31516	S
15-Jan-16	DEEP BAY	3	3.90	WINTER	STANDARD31516	S
15-Jan-16	W LANTAU	3	2.72	WINTER	STANDARD31516	P
15-Jan-16	W LANTAU	4	8.79	WINTER	STANDARD31516	P
15-Jan-16	W LANTAU	2	0.50	WINTER	STANDARD31516	S
15-Jan-16	W LANTAU	3	9.37	WINTER	STANDARD31516	S
15-Jan-16	W LANTAU	4	1.62	WINTER	STANDARD31516	S
18-Jan-16	W LANTAU	3	7.99	WINTER	STANDARD31516	S
18-Jan-16	W LANTAU	4	2.17	WINTER	STANDARD31516	S
21-Jan-16	NE LANTAU	1	0.38	WINTER	STANDARD31516	P
21-Jan-16	NE LANTAU	2	12.05	WINTER	STANDARD31516	P
21-Jan-16	NE LANTAU	1	1.65	WINTER	STANDARD31516	S
21-Jan-16	NE LANTAU	2	8.62	WINTER	STANDARD31516	S
21-Jan-16	SW LANTAU	2	8.47	WINTER	STANDARD31516	S
26-Jan-16	W LANTAU	2	6.71	WINTER	STANDARD31516	S
26-Jan-16	W LANTAU	3	2.80	WINTER	STANDARD31516	S
26-Jan-16	SW LANTAU	2	6.24	WINTER	STANDARD31516	P
26-Jan-16	SW LANTAU	3	15.68	WINTER	STANDARD31516	P
26-Jan-16	SW LANTAU	2	1.97	WINTER	STANDARD31516	S
26-Jan-16	SW LANTAU	3	12.21	WINTER	STANDARD31516	S
26-Jan-16	SE LANTAU	2	2.88	WINTER	STANDARD31516	P
26-Jan-16	SE LANTAU	3	9.58	WINTER	STANDARD31516	P
26-Jan-16	SE LANTAU	3	2.62	WINTER	STANDARD31516	S
4-Feb-16	SW LANTAU	1	3.20	WINTER	STANDARD31516	P
4-Feb-16	SW LANTAU	2	6.30	WINTER	STANDARD31516	P
4-Feb-16	SW LANTAU	3	2.52	WINTER	STANDARD31516	P
4-Feb-16	SW LANTAU	1	1.10	WINTER	STANDARD31516	S
4-Feb-16	SW LANTAU	2	3.48	WINTER	STANDARD31516	S
4-Feb-16	SW LANTAU	3	4.77	WINTER	STANDARD31516	S
17-Feb-16	W LANTAU	2	10.20	WINTER	STANDARD31516	S
17-Feb-16	W LANTAU	3	0.50	WINTER	STANDARD31516	S
18-Feb-16	LAMMA	1	19.55	WINTER	STANDARD31516	P
18-Feb-16	LAMMA	2	43.20	WINTER	STANDARD31516	P
18-Feb-16	LAMMA	3	17.94	WINTER	STANDARD31516	P
18-Feb-16	LAMMA	1	1.00	WINTER	STANDARD31516	S
18-Feb-16	LAMMA	2	8.76	WINTER	STANDARD31516	S
18-Feb-16	LAMMA	3	2.70	WINTER	STANDARD31516	S
19-Feb-16	SW LANTAU	2	7.00	WINTER	STANDARD31516	P
19-Feb-16	SW LANTAU	3	8.67	WINTER	STANDARD31516	P
19-Feb-16	SW LANTAU	2	7.30	WINTER	STANDARD31516	S
19-Feb-16	SW LANTAU	3	2.33	WINTER	STANDARD31516	S
23-Feb-16	SE LANTAU	1	10.91	WINTER	STANDARD31516	P
23-Feb-16	SE LANTAU	2	14.29	WINTER	STANDARD31516	P

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
23-Feb-16	SE LANTAU	1	4.03	WINTER	STANDARD31516	S
23-Feb-16	SE LANTAU	2	5.01	WINTER	STANDARD31516	S
23-Feb-16	SW LANTAU	1	6.58	WINTER	STANDARD31516	P
23-Feb-16	SW LANTAU	3	1.10	WINTER	STANDARD31516	P
23-Feb-16	SW LANTAU	4	5.10	WINTER	STANDARD31516	P
23-Feb-16	SW LANTAU	2	2.05	WINTER	STANDARD31516	S
23-Feb-16	SW LANTAU	3	4.73	WINTER	STANDARD31516	S
23-Feb-16	SW LANTAU	4	3.00	WINTER	STANDARD31516	S
25-Feb-16	NW LANTAU	2	16.38	WINTER	STANDARD31516	P
25-Feb-16	NW LANTAU	3	11.96	WINTER	STANDARD31516	P
25-Feb-16	NW LANTAU	2	4.66	WINTER	STANDARD31516	S
25-Feb-16	NW LANTAU	3	2.08	WINTER	STANDARD31516	S
25-Feb-16	DEEP BAY	2	9.07	WINTER	STANDARD31516	P
25-Feb-16	DEEP BAY	3	2.80	WINTER	STANDARD31516	P
25-Feb-16	DEEP BAY	2	5.67	WINTER	STANDARD31516	S
25-Feb-16	DEEP BAY	3	2.06	WINTER	STANDARD31516	S
25-Feb-16	NE LANTAU	1	1.30	WINTER	STANDARD31516	P
25-Feb-16	NE LANTAU	2	15.66	WINTER	STANDARD31516	P
25-Feb-16	NE LANTAU	2	9.58	WINTER	STANDARD31516	S
25-Feb-16	NE LANTAU	3	0.66	WINTER	STANDARD31516	S
29-Feb-16	W LANTAU	2	6.16	WINTER	STANDARD31516	P
29-Feb-16	W LANTAU	3	11.62	WINTER	STANDARD31516	P
29-Feb-16	W LANTAU	4	1.20	WINTER	STANDARD31516	P
29-Feb-16	W LANTAU	2	3.09	WINTER	STANDARD31516	S
29-Feb-16	W LANTAU	3	6.11	WINTER	STANDARD31516	S
29-Feb-16	SE LANTAU	2	14.44	WINTER	STANDARD31516	P
29-Feb-16	SE LANTAU	3	2.46	WINTER	STANDARD31516	P
29-Feb-16	SE LANTAU	4	3.23	WINTER	STANDARD31516	P
29-Feb-16	SE LANTAU	2	6.73	WINTER	STANDARD31516	S
29-Feb-16	SE LANTAU	3	1.63	WINTER	STANDARD31516	S
29-Feb-16	SE LANTAU	4	0.42	WINTER	STANDARD31516	S
1-Mar-16	NE LANTAU	2	5.59	SPRING	STANDARD31516	P
1-Mar-16	NE LANTAU	3	13.58	SPRING	STANDARD31516	P
1-Mar-16	NE LANTAU	4	0.80	SPRING	STANDARD31516	P
1-Mar-16	NE LANTAU	2	7.23	SPRING	STANDARD31516	S
1-Mar-16	NE LANTAU	3	3.60	SPRING	STANDARD31516	S
1-Mar-16	NW LANTAU	1	2.63	SPRING	STANDARD31516	P
1-Mar-16	NW LANTAU	2	12.25	SPRING	STANDARD31516	P
1-Mar-16	NW LANTAU	3	15.72	SPRING	STANDARD31516	P
1-Mar-16	NW LANTAU	2	3.04	SPRING	STANDARD31516	S
1-Mar-16	NW LANTAU	3	2.30	SPRING	STANDARD31516	S
1-Mar-16	DEEP BAY	2	4.78	SPRING	STANDARD31516	P
1-Mar-16	DEEP BAY	3	7.68	SPRING	STANDARD31516	P
1-Mar-16	DEEP BAY	4	0.78	SPRING	STANDARD31516	P
1-Mar-16	DEEP BAY	2	1.15	SPRING	STANDARD31516	S
1-Mar-16	DEEP BAY	3	4.81	SPRING	STANDARD31516	S
3-Mar-16	LAMMA	1	7.80	SPRING	STANDARD31516	P
3-Mar-16	LAMMA	2	43.03	SPRING	STANDARD31516	P
3-Mar-16	LAMMA	3	35.25	SPRING	STANDARD31516	P
3-Mar-16	LAMMA	4	3.90	SPRING	STANDARD31516	P
3-Mar-16	LAMMA	1	2.00	SPRING	STANDARD31516	S
3-Mar-16	LAMMA	2	9.44	SPRING	STANDARD31516	S
3-Mar-16	LAMMA	3	9.28	SPRING	STANDARD31516	S
4-Mar-16	SW LANTAU	1	7.68	SPRING	STANDARD31516	P
4-Mar-16	SW LANTAU	2	9.45	SPRING	STANDARD31516	P
4-Mar-16	SW LANTAU	1	0.33	SPRING	STANDARD31516	S
4-Mar-16	SW LANTAU	2	7.87	SPRING	STANDARD31516	S
8-Mar-16	W LANTAU	2	2.31	SPRING	STANDARD31516	S
8-Mar-16	W LANTAU	3	6.10	SPRING	STANDARD31516	S
8-Mar-16	W LANTAU	4	1.99	SPRING	STANDARD31516	S

Appendix I. (cont'd.)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	P/S
9-Mar-16	LAMMA	2	30.82	SPRING	STANDARD31516	P
9-Mar-16	LAMMA	3	15.02	SPRING	STANDARD31516	P
9-Mar-16	LAMMA	2	4.53	SPRING	STANDARD31516	S
9-Mar-16	SE LANTAU	1	2.29	SPRING	STANDARD31516	P
9-Mar-16	SE LANTAU	2	17.35	SPRING	STANDARD31516	P
9-Mar-16	SE LANTAU	1	1.73	SPRING	STANDARD31516	S
9-Mar-16	SE LANTAU	2	3.01	SPRING	STANDARD31516	S
9-Mar-16	SE LANTAU	3	1.00	SPRING	STANDARD31516	S
14-Mar-16	SW LANTAU	2	8.31	SPRING	STANDARD31516	P
14-Mar-16	SW LANTAU	3	4.00	SPRING	STANDARD31516	P
14-Mar-16	SW LANTAU	2	6.20	SPRING	STANDARD31516	S
14-Mar-16	SW LANTAU	3	3.08	SPRING	STANDARD31516	S
17-Mar-16	W LANTAU	3	3.15	SPRING	STANDARD31516	S
17-Mar-16	W LANTAU	4	1.38	SPRING	STANDARD31516	S
17-Mar-16	W LANTAU	5	6.43	SPRING	STANDARD31516	S
17-Mar-16	SW LANTAU	2	1.57	SPRING	STANDARD31516	P
17-Mar-16	SW LANTAU	3	22.78	SPRING	STANDARD31516	P
17-Mar-16	SW LANTAU	4	4.80	SPRING	STANDARD31516	P
17-Mar-16	SW LANTAU	2	5.00	SPRING	STANDARD31516	S
17-Mar-16	SW LANTAU	3	2.80	SPRING	STANDARD31516	S
17-Mar-16	SW LANTAU	4	4.30	SPRING	STANDARD31516	S
17-Mar-16	SE LANTAU	2	10.19	SPRING	STANDARD31516	P
17-Mar-16	SE LANTAU	3	7.86	SPRING	STANDARD31516	P
17-Mar-16	SE LANTAU	2	4.27	SPRING	STANDARD31516	S
17-Mar-16	SE LANTAU	3	3.18	SPRING	STANDARD31516	S
18-Mar-16	NW LANTAU	1	11.01	SPRING	STANDARD31516	P
18-Mar-16	NW LANTAU	2	24.51	SPRING	STANDARD31516	P
18-Mar-16	NW LANTAU	3	5.44	SPRING	STANDARD31516	P
18-Mar-16	NW LANTAU	1	4.70	SPRING	STANDARD31516	S
18-Mar-16	NW LANTAU	2	5.94	SPRING	STANDARD31516	S
18-Mar-16	DEEP BAY	1	4.60	SPRING	STANDARD31516	P
18-Mar-16	DEEP BAY	2	8.75	SPRING	STANDARD31516	P
18-Mar-16	DEEP BAY	1	2.50	SPRING	STANDARD31516	S
18-Mar-16	DEEP BAY	2	4.95	SPRING	STANDARD31516	S
18-Mar-16	NE LANTAU	2	5.16	SPRING	STANDARD31516	P
18-Mar-16	NE LANTAU	3	4.74	SPRING	STANDARD31516	P
18-Mar-16	NE LANTAU	2	10.20	SPRING	STANDARD31516	S
23-Mar-16	NE LANTAU	2	16.06	SPRING	STANDARD31516	P
23-Mar-16	NE LANTAU	3	1.59	SPRING	STANDARD31516	P
23-Mar-16	NE LANTAU	1	1.30	SPRING	STANDARD31516	S
23-Mar-16	NE LANTAU	2	4.95	SPRING	STANDARD31516	S
29-Mar-16	W LANTAU	1	3.35	SPRING	STANDARD31516	P
29-Mar-16	W LANTAU	2	13.06	SPRING	STANDARD31516	P
29-Mar-16	W LANTAU	3	0.48	SPRING	STANDARD31516	P
29-Mar-16	W LANTAU	1	4.16	SPRING	STANDARD31516	S
29-Mar-16	W LANTAU	2	6.24	SPRING	STANDARD31516	S
29-Mar-16	W LANTAU	3	1.29	SPRING	STANDARD31516	S
29-Mar-16	SW LANTAU	2	5.86	SPRING	STANDARD31516	P
29-Mar-16	SW LANTAU	3	5.60	SPRING	STANDARD31516	P
29-Mar-16	SW LANTAU	2	7.04	SPRING	STANDARD31516	S
29-Mar-16	SW LANTAU	3	3.10	SPRING	STANDARD31516	S
29-Mar-16	SW LANTAU	4	0.50	SPRING	STANDARD31516	S
31-Mar-16	LAMMA	0	5.07	SPRING	STANDARD31516	P
31-Mar-16	LAMMA	1	27.70	SPRING	STANDARD31516	P
31-Mar-16	LAMMA	2	40.96	SPRING	STANDARD31516	P
31-Mar-16	LAMMA	0	1.20	SPRING	STANDARD31516	S
31-Mar-16	LAMMA	1	2.48	SPRING	STANDARD31516	S
31-Mar-16	LAMMA	2	11.09	SPRING	STANDARD31516	S

Appendix II. HKCRP-AFCD Chinese White Dolphin Sighting Database (April 2015 - March 2016)

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

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
1-Apr-15	1	1133	3	DEEP BAY	2	287	ON	HKCRP	830537	806690	SPRING	NONE	P
2-Apr-15	1	1040	2	W LANTAU	3	106	ON	HKCRP	809897	800577	SPRING	NONE	S
9-Apr-15	1	1112	2	W LANTAU	2	408	ON	HKCRP	812452	801831	SPRING	NONE	P
9-Apr-15	2	1159	6	W LANTAU	2	91	ON	HKCRP	809375	801184	SPRING	NONE	S
9-Apr-15	3	1242	1	W LANTAU	2	12	ON	HKCRP	806628	801684	SPRING	NONE	S
9-Apr-15	4	1335	6	W LANTAU	3	57	ON	HKCRP	809677	799896	SPRING	NONE	S
9-Apr-15	5	1351	2	W LANTAU	2	1088	ON	HKCRP	810362	800764	SPRING	NONE	S
9-Apr-15	6	1544	2	NW LANTAU	3	283	ON	HKCRP	830206	806144	SPRING	NONE	S
13-Apr-15	1	1315	1	SW LANTAU	3	46	ON	HKCRP	806183	802518	SPRING	NONE	S
15-Apr-15	1	1025	4	W LANTAU	2	117	ON	HKCRP	812927	802347	SPRING	NONE	S
15-Apr-15	2	1035	1	W LANTAU	2	32	ON	HKCRP	810737	801280	SPRING	NONE	S
15-Apr-15	3	1042	3	W LANTAU	2	56	ON	HKCRP	808978	800761	SPRING	PURSE-SEINE	S
15-Apr-15	4	1050	5	W LANTAU	2	141	ON	HKCRP	806950	801457	SPRING	NONE	S
15-Apr-15	5	1055	4	W LANTAU	2	ND	OFF	HKCRP	806173	802157	SPRING	NONE	
21-Apr-15	1	1114	3	W LANTAU	3	37	ON	HKCRP	810703	801559	SPRING	NONE	S
21-Apr-15	2	1138	3	W LANTAU	2	182	ON	HKCRP	809431	801288	SPRING	NONE	S
21-Apr-15	3	1222	2	W LANTAU	3	508	ON	HKCRP	807415	801232	SPRING	NONE	P
21-Apr-15	4	1237	8	W LANTAU	3	33	ON	HKCRP	806816	801725	SPRING	NONE	S
13-May-15	1	1053	3	W LANTAU	3	490	ON	HKCRP	811599	802303	SPRING	NONE	S
13-May-15	2	1120	13	W LANTAU	3	176	ON	HKCRP	810416	801125	SPRING	NONE	P
13-May-15	3	1319	1	W LANTAU	3	71	ON	HKCRP	811445	801643	SPRING	NONE	P
15-May-15	3	1133	3	SW LANTAU	1	ND	OFF	HKCRP	803668	808670	SPRING	NONE	
15-May-15	4	1210	1	SW LANTAU	3	ND	OFF	HKCRP	804859	805413	SPRING	NONE	
15-May-15	5	1224	8	SW LANTAU	2	ND	OFF	HKCRP	805372	803702	SPRING	NONE	
19-May-15	1	1220	1	DEEP BAY	4	55	ON	HKCRP	831802	805457	SPRING	NONE	S
22-May-15	1	1023	3	W LANTAU	3	94	ON	HKCRP	814488	802753	SPRING	NONE	P
27-May-15	1	1026	1	W LANTAU	3	406	ON	HKCRP	814188	803267	SPRING	NONE	S
27-May-15	2	1038	2	W LANTAU	4	256	ON	HKCRP	811589	801633	SPRING	NONE	S
27-May-15	3	1053	1	W LANTAU	3	378	ON	HKCRP	808091	801048	SPRING	NONE	S
27-May-15	4	1101	3	W LANTAU	3	58	ON	HKCRP	806395	801869	SPRING	NONE	S
4-Jun-15	3	1319	3	SW LANTAU	3	140	ON	HKCRP	808289	807028	SUMMER	NONE	S
4-Jun-15	4	1454	2	SW LANTAU	3	91	ON	HKCRP	806546	803498	SUMMER	NONE	S
4-Jun-15	5	1511	1	SW LANTAU	3	29	ON	HKCRP	806261	802539	SUMMER	NONE	S

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
4-Jun-15	6	1520	1	SW LANTAU	3	ND	OFF	HKCRP	805187	802526	SUMMER	NONE	
4-Jun-15	7	1553	2	SW LANTAU	2	ND	OFF	HKCRP	806168	810355	SUMMER	NONE	
9-Jun-15	1	1349	1	SW LANTAU	3	228	ON	HKCRP	806293	802869	SUMMER	NONE	S
9-Jun-15	2	1518	1	SW LANTAU	2	40	ON	HKCRP	805607	808405	SUMMER	NONE	S
12-Jun-15	1	1029	5	W LANTAU	4	341	ON	HKCRP	811368	801261	SUMMER	NONE	S
12-Jun-15	2	1031	2	W LANTAU	3	79	ON	HKCRP	810782	801033	SUMMER	NONE	S
12-Jun-15	3	1102	2	W LANTAU	3	99	ON	HKCRP	806173	802023	SUMMER	NONE	S
12-Jun-15	4	1110	2	SW LANTAU	2	ND	OFF	HKCRP	806150	802353	SUMMER	NONE	
12-Jun-15	5	1221	2	SW LANTAU	2	83	ON	HKCRP	806828	806479	SUMMER	NONE	P
12-Jun-15	6	1241	10	SW LANTAU	1	66	ON	HKCRP	808289	807173	SUMMER	NONE	S
12-Jun-15	7	1331	4	SW LANTAU	3	65	ON	HKCRP	806049	808499	SUMMER	NONE	P
15-Jun-15	1	1029	4	W LANTAU	2	87	ON	HKCRP	814143	803391	SUMMER	NONE	S
15-Jun-15	2	1038	1	W LANTAU	2	126	ON	HKCRP	812131	801799	SUMMER	NONE	S
15-Jun-15	3	1051	1	W LANTAU	2	873	ON	HKCRP	808856	800771	SUMMER	NONE	S
15-Jun-15	4	1052	2	W LANTAU	2	9	ON	HKCRP	808468	800852	SUMMER	NONE	S
15-Jun-15	5	1058	2	W LANTAU	3	16	ON	HKCRP	806750	801612	SUMMER	NONE	S
18-Jun-15	1	1329	3	SW LANTAU	2	74	ON	HKCRP	805940	802538	SUMMER	NONE	S
18-Jun-15	2	1332	2	SW LANTAU	2	246	ON	HKCRP	806337	803044	SUMMER	NONE	S
18-Jun-15	3	1339	3	SW LANTAU	2	262	ON	HKCRP	807010	804376	SUMMER	NONE	S
18-Jun-15	4	1432	1	SW LANTAU	3	66	ON	HKCRP	805487	807446	SUMMER	NONE	P
18-Jun-15	5	1455	10	SW LANTAU	3	105	ON	HKCRP	807955	807915	SUMMER	NONE	S
18-Jun-15	6	1510	2	SW LANTAU	3	29	ON	HKCRP	807411	808790	SUMMER	NONE	S
18-Jun-15	7	1519	3	SW LANTAU	3	680	ON	HKCRP	806491	809562	SUMMER	NONE	P
18-Jun-15	8	1532	5	SW LANTAU	2	680	ON	HKCRP	805881	809561	SUMMER	NONE	P
18-Jun-15	9	1558	1	SW LANTAU	2	ND	OFF	HKCRP	803400	809897	SUMMER	NONE	
19-Jun-15	1	1257	2	NW LANTAU	3	402	ON	HKCRP	829007	807501	SUMMER	NONE	P
29-Jun-15	1	1406	9	SW LANTAU	2	574	ON	HKCRP	805726	809540	SUMMER	NONE	P
29-Jun-15	2	1445	7	SW LANTAU	2	ND	OFF	HKCRP	807855	808172	SUMMER	NONE	
29-Jun-15	3	1507	2	SW LANTAU	2	497	ON	HKCRP	806838	807438	SUMMER	NONE	P
30-Jun-15	1	1008	2	NW LANTAU	3	137	ON	HKCRP	816010	805456	SUMMER	NONE	P
30-Jun-15	2	1030	3	NW LANTAU	3	169	ON	HKCRP	816287	805467	SUMMER	NONE	P
6-Jul-15	1	1411	1	W LANTAU	2	ND	OFF	HKCRP	805731	801733	SUMMER	NONE	
6-Jul-15	2	1414	10	SW LANTAU	2	208	ON	HKCRP	805984	802486	SUMMER	NONE	S
6-Jul-15	3	1436	1	SW LANTAU	2	102	ON	HKCRP	806424	803663	SUMMER	NONE	S

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
6-Jul-15	4	1439	5	SW LANTAU	2	39	ON	HKCRP	807065	804582	SUMMER	PURSE-SEINE	S
8-Jul-15	1	1029	2	W LANTAU	3	37	ON	HKCRP	813834	803122	SUMMER	NONE	S
8-Jul-15	2	1055	1	W LANTAU	4	ND	OFF	HKCRP	808800	800884	SUMMER	NONE	S
8-Jul-15	3	1056	2	W LANTAU	4	95	ON	HKCRP	808634	800935	SUMMER	NONE	S
8-Jul-15	4	1102	2	W LANTAU	3	77	ON	HKCRP	807315	801427	SUMMER	NONE	S
28-Jul-15	1	1411	2	SW LANTAU	2	274	ON	HKCRP	806855	804479	SUMMER	NONE	P
28-Jul-15	2	1449	1	SW LANTAU	3	614	ON	HKCRP	805433	806497	SUMMER	NONE	P
28-Jul-15	3	1507	1	SW LANTAU	2	262	ON	HKCRP	808366	807420	SUMMER	NONE	S
28-Jul-15	4	1523	5	SW LANTAU	2	127	ON	HKCRP	805795	808519	SUMMER	NONE	P
30-Jul-15	1	1016	8	NW LANTAU	2	353	ON	HKCRP	820484	805486	SUMMER	NONE	P
30-Jul-15	2	1507	2	W LANTAU	4	87	ON	HKCRP	811466	802024	SUMMER	NONE	P
30-Jul-15	3	1524	4	W LANTAU	3	102	ON	HKCRP	810515	801455	SUMMER	NONE	S
30-Jul-15	4	1600	6	W LANTAU	3	96	ON	HKCRP	807651	799623	SUMMER	NONE	S
30-Jul-15	5	1649	3	W LANTAU	2	44	ON	HKCRP	812827	802481	SUMMER	NONE	S
31-Jul-15	1	1258	5	SW LANTAU	2	776	ON	HKCRP	805560	809560	SUMMER	NONE	P
31-Jul-15	2	1306	5	SW LANTAU	2	105	ON	HKCRP	806789	809562	SUMMER	NONE	P
31-Jul-15	3	1428	4	SW LANTAU	3	573	ON	HKCRP	804239	805401	SUMMER	NONE	P
31-Jul-15	4	1512	3	SW LANTAU	2	ND	OFF	HKCRP	807421	809110	SUMMER	NONE	
31-Jul-15	5	1516	1	SW LANTAU	2	ND	OFF	HKCRP	807464	810059	SUMMER	NONE	
31-Jul-15	6	1527	3	SE LANTAU	2	ND	OFF	HKCRP	807394	812502	SUMMER	NONE	
5-Aug-15	2	1622	1	SW LANTAU	2	ND	OFF	HELI	801463	809502	SUMMER	NONE	
5-Aug-15	3	1627	6	SW LANTAU	2	ND	OFF	HELI	802415	810019	SUMMER	NONE	
7-Aug-15	1	1028	1	W LANTAU	2	212	ON	HKCRP	812972	802347	SUMMER	NONE	S
7-Aug-15	2	1029	4	W LANTAU	2	148	ON	HKCRP	812695	802244	SUMMER	NONE	S
7-Aug-15	3	1035	1	W LANTAU	2	90	ON	HKCRP	811135	801642	SUMMER	NONE	S
7-Aug-15	4	1040	1	W LANTAU	2	31	ON	HKCRP	809774	801165	SUMMER	NONE	S
7-Aug-15	5	1042	7	W LANTAU	2	40	ON	HKCRP	809475	801040	SUMMER	NONE	S
7-Aug-15	6	1044	4	W LANTAU	2	70	ON	HKCRP	808789	800864	SUMMER	NONE	S
11-Aug-15	2	1319	7	SW LANTAU	1	480	ON	HKCRP	806592	808521	SUMMER	NONE	P
11-Aug-15	4	1446	5	SW LANTAU	2	283	ON	HKCRP	803407	806503	SUMMER	NONE	P
12-Aug-15	1	1038	6	W LANTAU	2	279	ON	HKCRP	814899	802197	SUMMER	NONE	S
12-Aug-15	2	1137	1	W LANTAU	2	ND	OFF	HKCRP	810360	801434	SUMMER	NONE	
12-Aug-15	3	1143	6	W LANTAU	2	186	ON	HKCRP	809442	801267	SUMMER	NONE	S
12-Aug-15	4	1226	3	W LANTAU	2	9	ON	HKCRP	806041	801899	SUMMER	NONE	S

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
12-Aug-15	5	1348	1	SW LANTAU	2	94	ON	HKCRP	806373	807427	SUMMER	NONE	P
12-Aug-15	6	1402	1	SW LANTAU	2	ND	OFF	HKCRP	804202	807423	SUMMER	NONE	
18-Aug-15	1	1525	9	SW LANTAU	3	25	ON	HKCRP	803105	808040	SUMMER	NONE	S
26-Aug-15	1	1509	1	SW LANTAU	2	ND	OFF	HKCRP	806084	802394	SUMMER	NONE	
27-Aug-15	1	1112	10	NW LANTAU	1	7	ON	HKCRP	826340	806486	SUMMER	NONE	P
7-Sep-15	1	1339	6	SW LANTAU	3	11	ON	HKCRP	806127	802745	AUTUMN	NONE	S
7-Sep-15	2	1404	6	SW LANTAU	2	ND	OFF	HKCRP	806270	803405	AUTUMN	NONE	
7-Sep-15	3	1425	5	SW LANTAU	2	482	ON	HKCRP	806568	803797	AUTUMN	NONE	S
7-Sep-15	4	1442	6	SW LANTAU	2	117	ON	HKCRP	807097	804984	AUTUMN	NONE	S
8-Sep-15	1	1258	6	W LANTAU	3	375	ON	HKCRP	814354	803061	AUTUMN	NONE	S
8-Sep-15	2	1319	5	W LANTAU	2	ND	OFF	HKCRP	813857	802597	AUTUMN	NONE	
8-Sep-15	3	1335	3	W LANTAU	2	316	ON	HKCRP	813559	802349	AUTUMN	NONE	P
8-Sep-15	4	1435	2	W LANTAU	4	1079	ON	HKCRP	807519	799592	AUTUMN	NONE	S
8-Sep-15	5	1444	3	W LANTAU	4	358	ON	HKCRP	807438	800737	AUTUMN	NONE	P
8-Sep-15	6	1556	2	W LANTAU	3	281	ON	HKCRP	810473	800785	AUTUMN	NONE	P
8-Sep-15	7	1620	4	W LANTAU	3	191	ON	HKCRP	812595	802408	AUTUMN	NONE	S
10-Sep-15	1	1011	6	W LANTAU	2	367	ON	HKCRP	814099	803360	AUTUMN	NONE	S
10-Sep-15	2	1036	8	W LANTAU	2	1014	ON	HKCRP	812242	801913	AUTUMN	NONE	S
10-Sep-15	3	1107	6	W LANTAU	2	411	ON	HKCRP	810848	801229	AUTUMN	NONE	S
10-Sep-15	4	1127	6	W LANTAU	2	229	ON	HKCRP	808269	800924	AUTUMN	NONE	S
10-Sep-15	5	1145	4	W LANTAU	3	128	ON	HKCRP	807503	801438	AUTUMN	NONE	S
10-Sep-15	6	1159	4	SW LANTAU	2	ND	OFF	HKCRP	806228	802219	AUTUMN	NONE	
21-Sep-15	1	1030	2	W LANTAU	2	176	ON	HKCRP	813812	803091	AUTUMN	NONE	S
21-Sep-15	2	1032	2	W LANTAU	2	94	ON	HKCRP	813558	802802	AUTUMN	NONE	S
21-Sep-15	3	1036	1	W LANTAU	2	117	ON	HKCRP	812618	802274	AUTUMN	NONE	S
21-Sep-15	4	1039	3	W LANTAU	2	122	ON	HKCRP	812197	802047	AUTUMN	NONE	S
21-Sep-15	5	1045	1	W LANTAU	3	74	ON	HKCRP	810881	801477	AUTUMN	NONE	S
21-Sep-15	6	1052	1	W LANTAU	3	4	ON	HKCRP	809431	801061	AUTUMN	NONE	S
21-Sep-15	7	1056	1	W LANTAU	3	84	ON	HKCRP	808534	800966	AUTUMN	NONE	S
22-Sep-15	1	1018	12	W LANTAU	2	ND	OFF	HKCRP	813812	802947	AUTUMN	NONE	
22-Sep-15	2	1053	1	W LANTAU	2	362	ON	HKCRP	809422	800339	AUTUMN	NONE	P
22-Sep-15	3	1108	6	W LANTAU	3	42	ON	HKCRP	810198	799722	AUTUMN	NONE	S
22-Sep-15	4	1115	2	W LANTAU	2	72	ON	HKCRP	811028	800075	AUTUMN	NONE	S
22-Sep-15	5	1146	2	W LANTAU	3	113	ON	HKCRP	811456	801777	AUTUMN	NONE	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
22-Sep-15	6	1200	8	W LANTAU	2	416	ON	HKCRP	812085	802562	AUTUMN	NONE	S
22-Sep-15	7	1221	3	W LANTAU	2	9	ON	HKCRP	812761	802367	AUTUMN	NONE	S
22-Sep-15	8	1230	1	W LANTAU	2	186	ON	HKCRP	813413	802936	AUTUMN	NONE	S
22-Sep-15	9	1255	2	W LANTAU	2	247	ON	HKCRP	815571	803755	AUTUMN	NONE	P
22-Sep-15	10	1343	2	NW LANTAU	3	706	ON	HKCRP	825468	805455	AUTUMN	NONE	P
22-Sep-15	11	1401	1	NW LANTAU	2	18	ON	HKCRP	827162	805386	AUTUMN	NONE	S
25-Sep-15	1	1018	4	W LANTAU	2	17	ON	HKCRP	814695	804114	AUTUMN	NONE	S
25-Sep-15	2	1026	2	W LANTAU	2	ND	OFF	HKCRP	814132	803298	AUTUMN	NONE	
25-Sep-15	3	1035	5	W LANTAU	2	42	ON	HKCRP	813005	802471	AUTUMN	NONE	S
25-Sep-15	4	1056	4	W LANTAU	3	1068	ON	HKCRP	810018	801217	AUTUMN	NONE	S
25-Sep-15	5	1100	4	W LANTAU	3	13	ON	HKCRP	808745	800884	AUTUMN	NONE	S
25-Sep-15	6	1141	1	SW LANTAU	2	865	ON	HKCRP	804926	805454	AUTUMN	NONE	P
25-Sep-15	7	1209	4	SW LANTAU	2	1058	ON	HKCRP	803226	808236	AUTUMN	NONE	P
25-Sep-15	8	1257	6	SW LANTAU	2	82	ON	HKCRP	807811	808172	AUTUMN	NONE	S
25-Sep-15	9	1320	4	SW LANTAU	2	181	ON	HKCRP	805560	809560	AUTUMN	NONE	P
25-Sep-15	10	1331	14	SW LANTAU	2	ND	OFF	HKCRP	803832	809898	AUTUMN	NONE	
25-Sep-15	11	1451	3	SE LANTAU	2	125	ON	HKCRP	807936	812730	AUTUMN	NONE	S
7-Oct-15	1	1428	4	SW LANTAU	3	ND	OFF	HKCRP	806280	804044	AUTUMN	NONE	
15-Oct-15	1	1400	1	W LANTAU	2	ND	OFF	HKCRP	805533	801114	AUTUMN	NONE	
15-Oct-15	2	1410	2	SW LANTAU	2	ND	OFF	HKCRP	806204	803229	AUTUMN	NONE	
15-Oct-15	3	1430	1	SW LANTAU	2	ND	OFF	HKCRP	807478	808306	AUTUMN	NONE	
16-Oct-15	1	1040	1	W LANTAU	2	785	ON	HKCRP	809497	801102	AUTUMN	NONE	S
16-Oct-15	2	1049	2	W LANTAU	2	374	ON	HKCRP	807326	801469	AUTUMN	NONE	S
16-Oct-15	3	1052	1	W LANTAU	2	113	ON	HKCRP	806583	801828	AUTUMN	NONE	S
20-Oct-15	1	1030	10	W LANTAU	2	39	ON	HKCRP	813627	801380	AUTUMN	NONE	S
20-Oct-15	2	1139	18	W LANTAU	3	218	ON	HKCRP	808981	799482	AUTUMN	NONE	S
20-Oct-15	3	1254	5	SW LANTAU	3	ND	OFF	HKCRP	805940	802538	AUTUMN	NONE	
22-Oct-15	1	1104	6	NW LANTAU	2	117	ON	HKCRP	826639	806487	AUTUMN	NONE	P
23-Oct-15	1	1550	2	SE LANTAU	2	ND	OFF	HKCRP	808109	815731	AUTUMN	NONE	
28-Oct-15	1	1734	5	W LANTAU	4	ND	OFF	HELI	809532	800700	AUTUMN	PURSE-SEINE	
30-Oct-15	1	1030	2	W LANTAU	2	91	ON	HKCRP	814500	802165	AUTUMN	NONE	P
30-Oct-15	2	1123	6	W LANTAU	2	284	ON	HKCRP	809777	799763	AUTUMN	NONE	S
30-Oct-15	3	1140	1	W LANTAU	2	778	ON	HKCRP	808448	799904	AUTUMN	NONE	P
30-Oct-15	4	1144	3	W LANTAU	2	176	ON	HKCRP	808446	800821	AUTUMN	NONE	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
30-Oct-15	5	1249	3	W LANTAU	1	367	ON	HKCRP	808095	799542	AUTUMN	NONE	S
30-Oct-15	6	1257	2	W LANTAU	1	422	ON	HKCRP	808383	799471	AUTUMN	NONE	S
30-Oct-15	7	1309	2	W LANTAU	2	1105	ON	HKCRP	809433	800050	AUTUMN	NONE	P
30-Oct-15	8	1337	14	W LANTAU	1	119	ON	HKCRP	811459	800633	AUTUMN	NONE	P
30-Oct-15	9	1438	4	W LANTAU	2	439	ON	HKCRP	818561	803648	AUTUMN	NONE	P
30-Oct-15	10	1536	4	NW LANTAU	2	325	ON	HKCRP	827108	804696	AUTUMN	NONE	P
5-Nov-15	1	1410	2	SW LANTAU	3	68	ON	HKCRP	807164	804675	AUTUMN	NONE	S
5-Nov-15	2	1511	3	W LANTAU	2	28	ON	HKCRP	808811	800884	AUTUMN	NONE	S
9-Nov-15	1	1020	1	W LANTAU	2	167	ON	HKCRP	813646	802844	AUTUMN	NONE	S
9-Nov-15	2	1037	1	W LANTAU	1	ND	OFF	HKCRP	809719	800835	AUTUMN	NONE	
9-Nov-15	3	1040	1	W LANTAU	1	132	ON	HKCRP	808956	800771	AUTUMN	PURSE-SEINE	S
9-Nov-15	4	1048	10	W LANTAU	1	12	ON	HKCRP	806816	801581	AUTUMN	NONE	S
13-Nov-15	1	1014	2	W LANTAU	2	121	ON	HKCRP	814817	804413	AUTUMN	PURSE-SEINE	S
17-Nov-15	1	1048	6	NW LANTAU	2	151	ON	HKCRP	826065	805487	AUTUMN	NONE	P
17-Nov-15	2	1334	2	NW LANTAU	2	260	ON	HKCRP	826283	807516	AUTUMN	NONE	P
19-Nov-15	1	1024	3	W LANTAU	2	58	ON	HKCRP	812662	802109	AUTUMN	NONE	S
19-Nov-15	2	1042	2	W LANTAU	2	ND	OFF	HKCRP	812032	801665	AUTUMN	NONE	
19-Nov-15	3	1044	13	W LANTAU	2	134	ON	HKCRP	811700	801509	AUTUMN	NONE	S
19-Nov-15	4	1601	3	NW LANTAU	3	209	ON	HKCRP	827348	806262	AUTUMN	NONE	S
23-Nov-15	1	1023	4	W LANTAU	3	116	ON	HKCRP	813370	802554	AUTUMN	NONE	S
23-Nov-15	2	1034	2	W LANTAU	2	1616	ON	HKCRP	811943	801757	AUTUMN	NONE	S
23-Nov-15	3	1046	10	W LANTAU	2	462	ON	HKCRP	809210	800823	AUTUMN	NONE	S
23-Nov-15	4	1100	1	W LANTAU	2	83	ON	HKCRP	807594	800417	AUTUMN	NONE	S
23-Nov-15	5	1104	8	W LANTAU	2	90	ON	HKCRP	807051	800849	AUTUMN	NONE	S
23-Nov-15	6	1131	12	SW LANTAU	1	160	ON	HKCRP	806026	803487	AUTUMN	NONE	P
24-Nov-15	1	1027	1	W LANTAU	2	1188	ON	HKCRP	813240	801193	AUTUMN	NONE	S
24-Nov-15	2	1036	7	W LANTAU	2	ND	OFF	HKCRP	812453	801769	AUTUMN	NONE	
24-Nov-15	3	1050	4	W LANTAU	2	177	ON	HKCRP	812453	801645	AUTUMN	NONE	P
24-Nov-15	4	1110	1	W LANTAU	2	676	ON	HKCRP	812440	802367	AUTUMN	NONE	P
24-Nov-15	5	1126	7	W LANTAU	2	184	ON	HKCRP	810506	800703	AUTUMN	NONE	P
24-Nov-15	6	1154	3	W LANTAU	2	34	ON	HKCRP	808426	799945	AUTUMN	NONE	P
24-Nov-15	7	1346	1	W LANTAU	2	171	ON	HKCRP	814059	801628	AUTUMN	NONE	S
24-Nov-15	8	1354	13	W LANTAU	2	ND	OFF	HKCRP	814624	801279	AUTUMN	NONE	
3-Dec-15	1	1326	8	SW LANTAU	2	361	ON	HKCRP	806414	803467	WINTER	NONE	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
10-Dec-15	1	1607	4	W LANTAU	3	11	ON	HKCRP	809951	801227	WINTER	NONE	S
10-Dec-15	2	1628	2	W LANTAU	2	820	ON	HKCRP	813259	802729	WINTER	NONE	S
11-Dec-15	1	1024	1	W LANTAU	3	ND	OFF	HKCRP	813259	802585	WINTER	PURSE-SEINE	
11-Dec-15	2	1121	1	W LANTAU	3	155	ON	HKCRP	809522	800236	WINTER	NONE	S
11-Dec-15	3	1140	10	W LANTAU	3	661	ON	HKCRP	811669	800746	WINTER	NONE	S
18-Dec-15	2	1352	1	SW LANTAU	2	138	ON	HKCRP	804766	808136	WINTER	NONE	S
18-Dec-15	3	1431	5	SW LANTAU	3	112	ON	HKCRP	806352	806499	WINTER	NONE	P
18-Dec-15	4	1525	2	SW LANTAU	2	263	ON	HKCRP	803244	804481	WINTER	NONE	P
18-Dec-15	5	1536	4	SW LANTAU	2	207	ON	HKCRP	804042	804483	WINTER	NONE	P
21-Dec-15	1	1108	2	NW LANTAU	2	55	ON	HKCRP	828269	805481	WINTER	NONE	P
29-Dec-15	1	959	1	NW LANTAU	3	ND	OFF	HKCRP	816728	806540	WINTER	NONE	
29-Dec-15	2	1121	5	NW LANTAU	3	ND	OFF	HKCRP	826628	806477	WINTER	NONE	
30-Dec-15	1	1047	1	W LANTAU	2	1181	ON	HKCRP	813992	801700	WINTER	NONE	S
30-Dec-15	2	1055	9	W LANTAU	3	14	ON	HKCRP	813569	802555	WINTER	NONE	P
30-Dec-15	3	1131	12	W LANTAU	2	494	ON	HKCRP	812152	802562	WINTER	NONE	S
5-Jan-16	5	1518	3	SW LANTAU	2	135	ON	HKCRP	807004	807428	WINTER	NONE	P
6-Jan-16	1	1047	15	W LANTAU	3	194	ON	HKCRP	807273	800613	WINTER	NONE	S
6-Jan-16	2	1155	7	SW LANTAU	2	ND	OFF	HKCRP	806271	802796	WINTER	GILLNET	
6-Jan-16	3	1606	3	NW LANTAU	2	162	ON	HKCRP	827792	806036	WINTER	NONE	S
18-Jan-16	1	1051	1	W LANTAU	3	129	ON	HKCRP	806595	801725	WINTER	NONE	S
21-Jan-16	1	1527	10	SW LANTAU	2	ND	OFF	HKCRP	806018	802095	WINTER	NONE	
26-Jan-16	1	1025	1	W LANTAU	2	46	ON	HKCRP	814077	803185	WINTER	NONE	S
26-Jan-16	2	1059	3	W LANTAU	2	137	ON	HKCRP	809210	800844	WINTER	NONE	S
26-Jan-16	3	1118	1	W LANTAU	3	ND	OFF	HKCRP	806373	801869	WINTER	NONE	
26-Jan-16	4	1122	5	SW LANTAU	3	305	ON	HKCRP	806194	802590	WINTER	NONE	S
4-Feb-16	1	1323	14	W LANTAU	4	ND	OFF	HKCRP	805897	801909	WINTER	NONE	
4-Feb-16	2	1342	6	W LANTAU	4	ND	OFF	HKCRP	806041	801888	WINTER	NONE	
4-Feb-16	3	1354	1	SW LANTAU	2	173	ON	HKCRP	806756	803963	WINTER	NONE	S
4-Feb-16	4	1357	2	SW LANTAU	2	212	ON	HKCRP	807010	804458	WINTER	GILLNET	S
17-Feb-16	1	1037	2	W LANTAU	2	ND	OFF	HKCRP	809609	800927	WINTER	NONE	
25-Feb-16	1	1051	3	NW LANTAU	3	104	ON	HKCRP	826650	806456	WINTER	NONE	P
29-Feb-16	1	1009	2	W LANTAU	3	ND	OFF	HKCRP	815846	804683	WINTER	NONE	
29-Feb-16	2	1204	2	W LANTAU	2	99	ON	HKCRP	807691	801645	WINTER	NONE	S
29-Feb-16	3	1233	3	W LANTAU	3	129	ON	HKCRP	806463	801157	WINTER	NONE	P

Appendix II. (cont'd.)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
29-Feb-16	4	1242	1	W LANTAU	3	46	ON	HKCRP	806461	801848	WINTER	NONE	P
29-Feb-16	5	1315	2	SW LANTAU	2	ND	OFF	HKCRP	806325	803663	WINTER	NONE	
1-Mar-16	1	1326	1	NW LANTAU	3	471	ON	HKCRP	827823	807097	SPRING	NONE	P
1-Mar-16	2	1541	1	NW LANTAU	2	100	ON	HKCRP	826121	805466	SPRING	NONE	P
4-Mar-16	1	1313	1	SW LANTAU	1	167	ON	HKCRP	806159	803477	SPRING	NONE	P
4-Mar-16	2	1329	1	SW LANTAU	1	421	ON	HKCRP	804808	803474	SPRING	NONE	P
8-Mar-16	1	1055	1	W LANTAU	4	175	ON	HKCRP	806927	801530	SPRING	NONE	S
14-Mar-16	1	1340	6	SW LANTAU	2	331	ON	HKCRP	806062	802353	SPRING	NONE	S
14-Mar-16	2	1353	2	SW LANTAU	2	136	ON	HKCRP	806260	802982	SPRING	NONE	S
17-Mar-16	1	1027	6	W LANTAU	3	410	ON	HKCRP	813226	802492	SPRING	NONE	S
17-Mar-16	2	1115	1	W LANTAU	5	ND	OFF	HKCRP	806151	802074	SPRING	NONE	
29-Mar-16	1	1102	3	W LANTAU	2	1236	ON	HKCRP	814833	802125	SPRING	NONE	S
29-Mar-16	2	1204	10	W LANTAU	1	226	ON	HKCRP	809346	799504	SPRING	NONE	S

Appendix III. HKCRP-AFCD Finless Porpoise Sighting Database (April 2015 - March 2016)

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

DATE	STG #	TIME	HRD SZ	NORTHING	EASTING	AREA	BEAU	PSD	EFFORT	SEASON	P/S
13-Apr-15	2	1545	2	803993	813539	SE LANTAU	2	ND	OFF	SPRING	
13-Apr-15	3	1603	2	804885	817026	SE LANTAU	2	ND	OFF	SPRING	
16-Apr-15	1	1236	1	801476	826636	LAMMA	2	176	ON	SPRING	P
16-Apr-15	2	1322	2	804504	820707	LAMMA	2	68	ON	SPRING	P
21-Apr-15	5	1410	2	806164	806498	SW LANTAU	1	120	ON	SPRING	P
21-Apr-15	6	1416	2	805234	806497	SW LANTAU	1	241	ON	SPRING	P
21-Apr-15	7	1421	3	804547	806495	SW LANTAU	2	364	ON	SPRING	P
21-Apr-15	8	1447	4	800856	808520	SW LANTAU	2	22	ON	SPRING	P
21-Apr-15	9	1455	1	801876	808037	SW LANTAU	2	189	ON	SPRING	S
27-Apr-15	1	1212	1	802841	813455	SE LANTAU	3	227	ON	SPRING	P
27-Apr-15	2	1308	1	805435	811509	SW LANTAU	3	246	ON	SPRING	P
27-Apr-15	3	1440	3	804083	812435	SE LANTAU	2	204	ON	SPRING	P
27-Apr-15	4	1450	11	803131	812434	SE LANTAU	3	71	ON	SPRING	P
12-May-15	1	1101	1	804522	826132	LAMMA	1	487	ON	SPRING	P
12-May-15	2	1107	5	804521	826762	LAMMA	1	166	ON	SPRING	P
12-May-15	3	1114	4	804532	827277	LAMMA	1	183	ON	SPRING	P
12-May-15	4	1143	7	805451	826597	LAMMA	1	139	ON	SPRING	P
12-May-15	5	1207	8	805455	821905	LAMMA	1	57	ON	SPRING	P
12-May-15	6	1349	2	806232	820214	SE LANTAU	1	ND	OFF	SPRING	
12-May-15	7	1353	1	806244	819162	SE LANTAU	1	ND	OFF	SPRING	
12-May-15	8	1401	2	805082	818511	SE LANTAU	2	370	ON	SPRING	P
12-May-15	9	1408	4	804064	818500	SE LANTAU	2	26	ON	SPRING	P
12-May-15	10	1440	3	804775	816448	SE LANTAU	1	13	ON	SPRING	P
12-May-15	11	1502	2	808430	815700	SE LANTAU	1	487	ON	SPRING	S
12-May-15	12	1519	2	806095	814522	SE LANTAU	2	25	ON	SPRING	P
12-May-15	13	1527	2	804766	814509	SE LANTAU	2	165	ON	SPRING	P
15-May-15	1	1051	4	805286	814747	SE LANTAU	2	ND	OFF	SPRING	
15-May-15	2	1109	10	804404	812395	SE LANTAU	3	ND	OFF	SPRING	
26-May-15	1	1408	2	801074	810615	SW LANTAU	2	28	ON	SPRING	S
26-May-15	2	1414	3	800698	810037	SW LANTAU	2	2	ON	SPRING	S
26-May-15	3	1549	3	802854	812186	SE LANTAU	2	ND	OFF	SPRING	
26-May-15	4	1628	2	805612	820523	LAMMA	2	ND	OFF	SPRING	
26-May-15	5	1631	5	806297	821937	LAMMA	2	ND	OFF	SPRING	
4-Jun-15	1	1040	3	805041	816459	SE LANTAU	2	68	ON	SUMMER	P
4-Jun-15	2	1128	1	804614	812436	SE LANTAU	2	97	ON	SUMMER	P
8-Jun-15	1	1408	1	806452	851316	PO TOI	2	5	ON	SUMMER	P
15-Jun-15	1	1514	2	826379	864079	SAI KUNG	2	ND	OFF	SUMMER	
15-Jun-15	2	1523	1	821075	864191	SAI KUNG	2	ND	OFF	SUMMER	
16-Jun-15	1	1206	3	807420	863225	PO TOI	2	284	ON	SUMMER	P
16-Jun-15	2	1327	2	807412	847933	PO TOI	2	82	ON	SUMMER	P
16-Jun-15	3	1334	1	807445	847345	PO TOI	2	223	ON	SUMMER	P
16-Jun-15	4	1533	1	811556	866291	NINEPINS	2	64	ON	SUMMER	P
16-Jun-15	5	1605	3	811535	860744	NINEPINS	3	338	ON	SUMMER	P
16-Jun-15	6	1712	1	809383	847612	NINEPINS	2	ND	OFF	SUMMER	
13-Jul-15	1	946	4	802846	840304	PO TOI	1	ND	OFF	SUMMER	
13-Jul-15	2	953	2	801485	840985	PO TOI	2	ND	OFF	SUMMER	
13-Jul-15	3	1102	2	801521	858490	PO TOI	2	101	ON	SUMMER	P
3-Aug-15	1	1309	1	819615	865265	SAI KUNG	1	ND	OFF	SUMMER	
3-Aug-15	2	1323	1	819621	862102	SAI KUNG	2	153	ON	SUMMER	P
3-Aug-15	3	1501	1	823612	864908	SAI KUNG	1	ND	OFF	SUMMER	
4-Aug-15	1	1059	1	811579	860425	NINEPINS	1	92	ON	SUMMER	P
4-Aug-15	2	1129	1	811580	867373	NINEPINS	0	42	ON	SUMMER	P
4-Aug-15	3	1408	3	806412	856039	PO TOI	2	ND	OFF	SUMMER	
4-Aug-15	4	1411	6	806435	856679	PO TOI	2	190	ON	SUMMER	P
6-Aug-15	1	1025	4	807435	848377	PO TOI	1	51	ON	SUMMER	P
6-Aug-15	2	1057	1	807441	854522	PO TOI	1	77	ON	SUMMER	P
6-Aug-15	3	1300	5	805442	858722	PO TOI	0	194	ON	SUMMER	P
6-Aug-15	4	1308	5	805438	855721	PO TOI	0	52	ON	SUMMER	P

Appendix III. (cont'd)

DATE	STG #	TIME	HRD SZ	NORTHING	EASTING	AREA	BEAU	PSD	EFFORT	SEASON	P/S
6-Aug-15	5	1319	2	805438	856041	PO TOI	0	221	ON	SUMMER	P
6-Aug-15	6	1421	2	805760	843603	PO TOI	1	111	ON	SUMMER	P
6-Aug-15	7	1505	7	803822	843955	PO TOI	2	158	ON	SUMMER	P
6-Aug-15	8	1517	1	804454	846069	PO TOI	2	93	ON	SUMMER	P
6-Aug-15	9	1533	1	803481	848338	PO TOI	2	154	ON	SUMMER	P
5-Aug-15	1	1531	2	831074	863422	SAI KUNG	3	ND	OFF	SUMMER	
11-Aug-15	1	1209	1	804703	812436	SE LANTAU	1	133	ON	SUMMER	P
11-Aug-15	3	1421	1	800724	807953	SW LANTAU	2	13	ON	SUMMER	S
20-Aug-15	1	1039	1	804503	851648	PO TOI	2	164	ON	SUMMER	P
20-Aug-15	2	1321	1	806398	853070	PO TOI	2	291	ON	SUMMER	P
20-Aug-15	3	1325	2	806398	852595	PO TOI	2	74	ON	SUMMER	P
25-Aug-15	1	1337	1	824663	864102	SAI KUNG	2	413	ON	SUMMER	P
18-Sep-15	1	1344	1	801013	807396	SW LANTAU	4	302	ON	AUTUMN	S
24-Sep-15	1	1010	2	801929	844863	PO TOI	2	223	ON	AUTUMN	S
24-Sep-15	2	1415	3	808475	847035	NINEPINS	3	283	ON	AUTUMN	P
8-Oct-15	1	1152	1	801496	869373	PO TOI	2	96	ON	AUTUMN	P
27-Oct-15	1	1216	1	805782	869509	PO TOI	2	62	ON	AUTUMN	S
27-Oct-15	2	1313	2	806459	857782	PO TOI	2	57	ON	AUTUMN	P
18-Nov-15	1	1038	1	804152	818500	SE LANTAU	2	203	ON	AUTUMN	P
18-Nov-15	2	1518	4	804557	813973	SE LANTAU	2	ND	OFF	AUTUMN	
23-Nov-15	7	1443	6	803486	811506	SW LANTAU	2	167	ON	AUTUMN	P
23-Nov-15	8	1506	1	801482	811554	SW LANTAU	2	120	ON	AUTUMN	P
3-Dec-15	2	1450	4	801434	807428	SW LANTAU	2	278	ON	WINTER	P
3-Dec-15	3	1501	2	801399	808439	SW LANTAU	2	421	ON	WINTER	S
18-Dec-15	1	1331	8	801831	808017	SW LANTAU	2	269	ON	WINTER	S
30-Dec-15	4	1542	2	806308	812903	SE LANTAU	2	ND	OFF	WINTER	
5-Jan-16	1	1153	1	804931	815489	SE LANTAU	3	111	ON	WINTER	P
5-Jan-16	2	1357	4	805170	811498	SW LANTAU	2	100	ON	WINTER	P
5-Jan-16	3	1426	1	800555	809840	SW LANTAU	2	224	ON	WINTER	S
5-Jan-16	4	1436	2	801884	809554	SW LANTAU	2	70	ON	WINTER	P
21-Jan-16	2	1644	1	807941	817071	SE LANTAU	1	ND	OFF	WINTER	
26-Jan-16	5	1455	1	803551	812445	SE LANTAU	3	84	ON	WINTER	P
26-Jan-16	6	1512	3	802032	814165	SE LANTAU	3	25	ON	WINTER	S
4-Feb-16	5	1544	1	803738	813311	SE LANTAU	1	ND	OFF	WINTER	
4-Feb-16	6	1550	2	804058	814364	SE LANTAU	1	ND	OFF	WINTER	
4-Feb-16	7	1554	2	804300	815086	SE LANTAU	1	ND	OFF	WINTER	
4-Feb-16	8	1556	5	804510	815613	SE LANTAU	1	ND	OFF	WINTER	
17-Feb-16	4	1546	1	800885	811069	SW LANTAU	1	249	ON	WINTER	S
18-Feb-16	1	1141	3	806484	823267	LAMMA	2	419	ON	WINTER	P
18-Feb-16	2	1146	5	806495	822700	LAMMA	2	86	ON	WINTER	P
18-Feb-16	3	1213	12	805478	821668	LAMMA	1	113	ON	WINTER	P
18-Feb-16	4	1248	2	805451	827969	LAMMA	1	246	ON	WINTER	P
18-Feb-16	5	1318	3	804521	826576	LAMMA	1	171	ON	WINTER	P
18-Feb-16	6	1410	1	803482	824409	LAMMA	2	78	ON	WINTER	P
19-Feb-16	1	1604	2	805492	818667	SE LANTAU	2	ND	OFF	WINTER	
19-Feb-16	2	1606	1	805668	819182	SE LANTAU	2	ND	OFF	WINTER	
19-Feb-16	3	1610	1	805723	819977	SE LANTAU	2	ND	OFF	WINTER	
19-Feb-16	4	1613	1	805523	820647	SE LANTAU	2	ND	OFF	WINTER	
23-Feb-16	1	1100	2	802870	816456	SE LANTAU	1	23	ON	WINTER	P
23-Feb-16	2	1114	20	805041	816459	SE LANTAU	1	152	ON	WINTER	P
23-Feb-16	3	1140	5	806126	816079	SE LANTAU	1	12	ON	WINTER	S
23-Feb-16	4	1219	3	806837	814512	SE LANTAU	1	366	ON	WINTER	P
23-Feb-16	5	1228	5	805220	814520	SE LANTAU	1	30	ON	WINTER	P
23-Feb-16	6	1254	1	802178	812453	SE LANTAU	1	ND	OFF	WINTER	
23-Feb-16	7	1306	4	805057	812437	SE LANTAU	2	118	ON	WINTER	P
23-Feb-16	8	1314	5	806275	812449	SE LANTAU	2	49	ON	WINTER	P
23-Feb-16	9	1330	2	809576	812279	SE LANTAU	1	ND	OFF	WINTER	
23-Feb-16	10	1338	3	808304	811266	SW LANTAU	1	ND	OFF	WINTER	
23-Feb-16	11	1353	14	804972	810560	SW LANTAU	1	167	ON	WINTER	P
23-Feb-16	12	1403	2	803355	810536	SW LANTAU	1	39	ON	WINTER	P
23-Feb-16	13	1418	2	800465	810521	SW LANTAU	2	ND	OFF	WINTER	
29-Feb-16	6	1530	3	805328	816459	SE LANTAU	2	297	ON	WINTER	P

Appendix III. (cont'd)

DATE	STG #	TIME	HRD SZ	NORTHING	EASTING	AREA	BEAU	PSD	EFFORT	SEASON	P/S
3-Mar-16	1	1229	1	804405	820480	LAMMA	3	ND	OFF	SPRING	
4-Mar-16	3	1547	1	805428	816367	SE LANTAU	1	ND	OFF	SPRING	
4-Mar-16	4	1605	4	806011	819802	SE LANTAU	2	ND	OFF	SPRING	
4-Mar-16	5	1613	1	806132	820142	SE LANTAU	1	ND	OFF	SPRING	
4-Mar-16	6	1614	2	806210	820555	SE LANTAU	1	ND	OFF	SPRING	
4-Mar-16	7	1617	1	806397	821256	SE LANTAU	1	ND	OFF	SPRING	
4-Mar-16	8	1620	8	806574	821823	LAMMA	2	ND	OFF	SPRING	
4-Mar-16	9	1631	1	806761	822597	LAMMA	2	ND	OFF	SPRING	
8-Mar-16	2	1632	2	808631	814350	SE LANTAU	2	ND	OFF	SPRING	
9-Mar-16	1	1036	1	807370	822463	LAMMA	2	12	ON	SPRING	P
9-Mar-16	2	1047	1	806486	821070	LAMMA	2	122	ON	SPRING	P
9-Mar-16	3	1406	6	804828	818521	LAMMA	2	190	ON	SPRING	P
9-Mar-16	4	1415	10	805891	818492	LAMMA	2	110	ON	SPRING	P
9-Mar-16	5	1452	2	805749	816346	LAMMA	2	163	ON	SPRING	S
9-Mar-16	6	1549	2	809041	814505	LAMMA	1	84	ON	SPRING	P
9-Mar-16	7	1603	5	808330	816102	LAMMA	2	ND	OFF	SPRING	
14-Mar-16	3	1540	1	802866	811763	SW LANTAU	1	ND	OFF	SPRING	
14-Mar-16	4	1546	2	803097	812310	SE LANTAU	1	ND	OFF	SPRING	
14-Mar-16	5	1550	2	803407	812888	SE LANTAU	1	ND	OFF	SPRING	
14-Mar-16	6	1555	5	803671	813549	SE LANTAU	1	ND	OFF	SPRING	
14-Mar-16	7	1604	1	804201	814694	SE LANTAU	2	ND	OFF	SPRING	
17-Mar-16	3	1345	4	803488	810547	SW LANTAU	4	40	ON	SPRING	P
17-Mar-16	4	1534	5	809283	815516	SE LANTAU	2	92	ON	SPRING	P
29-Mar-16	3	1534	1	805628	816264	SE LANTAU	3	ND	OFF	SPRING	
31-Mar-16	1	1130	2	803477	836601	LAMMA	0	347	ON	SPRING	P
31-Mar-16	2	1215	10	803480	827215	LAMMA	2	145	ON	SPRING	P
31-Mar-16	3	1318	10	804510	826256	LAMMA	2	39	ON	SPRING	P
31-Mar-16	4	1350	7	805428	828185	LAMMA	2	149	ON	SPRING	P
31-Mar-16	5	1358	10	805484	827020	LAMMA	1	82	ON	SPRING	P
31-Mar-16	6	1405	4	805452	826205	LAMMA	1	119	ON	SPRING	P
31-Mar-16	7	1430	4	805466	822606	LAMMA	2	31	ON	SPRING	P
31-Mar-16	8	1440	1	805467	820739	LAMMA	1	51	ON	SPRING	P
31-Mar-16	9	1453	6	806507	821999	LAMMA	1	2	ON	SPRING	P
31-Mar-16	10	1600	1	807424	824588	LAMMA	2	72	ON	SPRING	P

Appendix IV. Individual dolphins identified during AFCD surveys (April 2015 to March 2016)

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

DOLPHIN ID	DATE	STG#	AREA
CH12	25/09/15	5	WL
	30/10/15	8	WL
	23/11/15	5	WL
	21/01/16	1	SWL
CH34	01/04/15	1	DB
	30/07/15	4	WL
	27/08/15	1	NWL
	17/11/15	1	NWL
	19/11/15	4	NWL
CH38	07/09/15	4	SWL
	25/09/15	7	SWL
	25/09/15	10	SWL
	23/11/15	6	SWL
	18/12/15	5	SWL
	06/01/16	1	WL
	21/01/16	1	SWL
	04/02/16	1	WL
CH105	20/10/15	1	WL
CH108	21/04/15	2	WL
	22/09/15	1	WL
	24/11/15	5	WL
	30/12/15	3	WL
	06/01/16	1	WL
	29/03/16	2	WL
CH113	13/05/15	2	WL
	30/07/15	1	NWL
	08/09/15	2	WL
CH153	30/10/15	8	WL
CH181	20/10/15	2	WL
	09/11/15	4	WL
	19/11/15	3	WL
EL01	18/08/15	1	SWL
NL33	10/09/15	2	WL
	06/01/16	2	SWL
	04/02/16	2	WL
NL48	27/08/15	1	NWL
	22/10/15	1	NWL
	30/10/15	10	NWL
	21/12/15	1	NWL
	29/12/15	2	NWL
	01/03/16	1	NWL
NL49	07/08/15	5	WL
	23/11/15	3	WL
	24/11/15	3	WL
NL80	10/09/15	1	WL
NL98	30/10/15	9	WL
	24/11/15	8	WL
NL105	12/06/15	1	WL
NL120	07/09/15	4	SWL
	04/02/16	2	WL
NL123	30/10/15	9	WL
NL136	27/08/15	1	NWL
	22/10/15	1	NWL
	17/11/15	1	NWL
	29/12/15	2	NWL
NL145	07/08/15	5	WL
	08/09/15	1	WL
	08/09/15	3	WL
	24/11/15	8	WL
NL150	22/09/15	1	WL
	24/11/15	8	WL
NL156	20/10/15	2	WL
NL165	24/11/15	3	WL
	24/11/15	8	WL
NL182	08/09/15	7	WL
	19/11/15	4	NWL
	24/11/15	8	WL
	17/03/16	1	WL

DOLPHIN ID	DATE	STG#	AREA
NL188	09/04/15	1	WL
	21/04/15	1	WL
	12/06/15	5	SWL
NL202	27/08/15	1	NWL
	30/10/15	10	NWL
	17/11/15	1	NWL
	25/02/16	1	NWL
NL206	06/07/15	2	SWL
	10/09/15	4	WL
	06/01/16	1	WL
NL210	10/09/15	2	WL
	22/09/15	1	WL
NL212	15/04/15	1	WL
	22/09/15	1	WL
	25/09/15	1	WL
	24/11/15	5	WL
	30/12/15	3	WL
NL214	08/09/15	7	WL
	21/12/15	1	NWL
NL220	17/11/15	1	NWL
	19/11/15	4	NWL
	29/12/15	2	NWL
NL224	13/05/15	1	WL
	12/06/15	1	WL
	08/09/15	2	WL
	25/09/15	3	WL
	24/11/15	8	WL
	04/02/16	1	WL
NL226	04/06/15	3	SWL
	31/07/15	2	SWL
	04/02/16	2	WL
NL236	25/09/15	3	WL
	24/11/15	8	WL
NL242	25/09/15	5	WL
NL247	30/07/15	1	NWL
NL256	07/08/15	1	WL
NL259	30/10/15	9	WL
NL260	22/09/15	3	WL
	20/10/15	2	WL
	24/11/15	2	WL
NL261	22/09/15	5	WL
	22/09/15	6	WL
NL262	11/08/15	2	SWL
	30/10/15	1	WL
	01/03/16	2	NWL
NL264	08/09/15	1	WL
	24/11/15	2	WL
	24/11/15	8	WL
NL269	10/09/15	4	WL
NL272	22/10/15	1	NWL
NL279	08/09/15	2	WL
	10/09/15	3	WL
NL280	24/11/15	8	WL
NL282	19/11/15	3	WL
NL284	22/10/15	1	NWL
NL285	22/09/15	1	WL
	20/10/15	2	WL
	29/12/15	2	NWL
NL286	27/08/15	1	NWL
	17/11/15	1	NWL
	25/02/16	1	NWL
NL287	11/08/15	2	SWL
	20/10/15	2	WL
	30/10/15	1	WL
NL288	08/09/15	1	WL
	24/11/15	2	WL
	24/11/15	8	WL
NL293	25/09/15	3	WL

DOLPHIN ID	DATE	STG#	AREA
NL295	20/10/15	2	WL
	24/11/15	8	WL
NL299	12/06/15	1	WL
	08/09/15	2	WL
	10/09/15	2	WL
NL300	13/05/15	2	WL
NL301	10/09/15	2	WL
NL302	30/06/15	2	NWL
	27/08/15	1	NWL
	20/10/15	2	WL
NL307	20/10/15	2	WL
NL309	20/10/15	1	WL
	30/12/15	3	WL
NL311	04/06/15	4	SWL
	24/11/15	5	WL
NL316	30/07/15	1	NWL
NL320	***22/10/15***	***1***	***NWL***
	30/10/15	***10***	***NWL***
NL322	***10/09/15***	***2***	***WL***
	06/01/16	***2***	***SWL***
	04/02/16	***2***	***WL***
NL324	***22/09/15***	***11***	***NWL***
SL05	09/04/15	3	WL
	18/06/15	5	SWL
	28/07/15	4	SWL
	09/11/15	4	WL
	23/11/15	6	SWL
	03/12/15	1	SWL
	30/12/15	3	WL
	26/01/16	2	WL
SL27	15/05/15	3	SWL
	12/06/15	6	SWL
	29/06/15	1	SWL
SL40	12/06/15	7	SWL
	06/07/15	4	SWL
	28/07/15	4	SWL
	25/09/15	10	SWL
	23/11/15	6	SWL
SL42	19/11/15	1	WL
	19/11/15	3	WL
SL44	12/06/15	7	SWL
SL47	12/06/15	6	SWL
	31/07/15	2	SWL
SL50	11/08/15	2	SWL
	25/09/15	8	SWL
	30/10/15	4	WL
	30/10/15	6	WL
	18/12/15	4	SWL
	05/01/16	5	SWL
SL51	25/09/15	11	SEL
	06/01/16	1	WL
SL54	12/06/15	6	SWL
	18/06/15	5	SWL
	06/07/15	4	SWL
	11/08/15	2	SWL
	25/09/15	8	SWL
	23/11/15	1	WL
SL55	29/06/15	2	SWL
	06/07/15	2	SWL
	31/07/15	1	SWL
	31/07/15	2	SWL
	03/12/15	1	SWL
SL56	11/08/15	4	SWL
	12/08/15	1	WL
SL57	***09/04/15***	***2***	***WL***
	09/04/15	***4***	***WL***
	21/04/15	***4***	***WL***

Appendix IV. (cont'd)

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

DOLPHIN ID	DATE	STG#	AREA
SL58	***18/06/15***	***7***	***SWL***
	24/11/15	***2***	***WL***
SL59	***31/07/15***	***3***	***SWL***
	12/08/15	***3***	***WL***
	07/09/15	***2***	***SWL***
	30/12/15	***3***	***WL***
	06/01/16	***1***	***WL***
	26/01/16	***2***	***WL***
SL60	***07/09/15***	***1***	***SWL***
	30/10/15	***4***	***WL***
WL04	30/12/15	2	WL
WL05	24/11/15	3	WL
	24/11/15	8	WL
WL11	25/09/15	5	WL
	23/11/15	3	WL
WL15	11/08/15	2	SWL
	07/09/15	1	SWL
	25/09/15	7	SWL
	30/10/15	4	WL
	30/10/15	6	WL
	05/11/15	2	WL
	05/01/16	5	SWL
	21/01/16	1	SWL
WL21	07/08/15	6	WL
WL28	20/10/15	1	WL
WL29	20/10/15	2	WL
	03/12/15	1	SWL
	11/12/15	3	WL
WL42	12/06/15	3	WL
	18/08/15	1	SWL
	07/09/15	3	SWL
	20/10/15	2	WL
	23/11/15	3	WL
	11/12/15	3	WL
	21/01/16	1	SWL
	04/02/16	1	WL
	17/03/16	1	WL
WL44	18/06/15	8	SWL
	24/11/15	5	WL
	11/12/15	3	WL
	04/02/16	1	WL
WL46	13/05/15	2	WL
	10/09/15	5	WL
	22/09/15	6	WL
	22/09/15	7	WL
	20/10/15	2	WL
	09/11/15	4	WL
	30/12/15	2	WL
WL47	13/11/15	1	WL
WL50	18/06/15	8	SWL
WL58	20/10/15	2	WL
WL61	31/07/15	2	SWL
	25/09/15	10	SWL
	30/10/15	2	WL
	30/10/15	5	WL
	05/11/15	1	SWL
	09/11/15	4	WL
	23/11/15	6	SWL
	11/12/15	1	WL
	11/12/15	2	WL
WL62	21/04/15	4	WL
	29/06/15	2	SWL
	25/09/15	11	SEL
	13/11/15	1	WL
	04/02/16	1	WL
	17/03/16	2	WL

DOLPHIN ID	DATE	STG#	AREA
WL68	07/09/15	4	SWL
	23/11/15	3	WL
	04/02/16	4	SWL
WL69	12/06/15	7	SWL
	29/06/15	2	SWL
	06/07/15	2	SWL
	28/07/15	4	SWL
	31/07/15	1	SWL
	31/07/15	2	SWL
	25/09/15	11	SEL
	06/01/16	2	SWL
	26/01/16	2	WL
WL72	18/06/15	6	SWL
	25/09/15	9	SWL
	25/09/15	10	SWL
	09/11/15	4	WL
	29/03/16	2	WL
WL74	09/11/15	4	WL
	23/11/15	6	SWL
	14/03/16	1	SWL
WL76	20/10/15	2	WL
WL79	13/05/15	3	WL
	12/06/15	1	WL
	12/08/15	1	WL
	22/09/15	1	WL
	22/09/15	6	WL
	25/09/15	1	WL
	25/02/16	1	NWL
WL91	29/06/15	2	SWL
	11/08/15	4	SWL
	18/08/15	1	SWL
	25/09/15	10	SWL
	18/12/15	3	SWL
WL92	18/08/15	1	SWL
	25/09/15	7	SWL
	23/11/15	6	SWL
WL94	02/04/15	1	WL
	09/04/15	2	WL
	15/05/15	5	SWL
	06/07/15	2	SWL
	06/01/16	1	WL
	04/02/16	1	WL
WL97	12/06/15	4	WL
WL98	31/07/15	3	SWL
WL109	30/10/15	8	WL
	30/12/15	3	WL
	06/01/16	1	WL
	29/03/16	2	WL
WL114	18/06/15	8	SWL
	06/07/15	2	SWL
	11/08/15	4	SWL
	18/08/15	1	SWL
	23/11/15	6	SWL
	06/01/16	1	WL
WL116	15/04/15	4	WL
	06/07/15	2	SWL
	10/09/15	6	SWL
	30/10/15	2	WL
	30/10/15	5	WL
	06/01/16	1	WL
WL118	21/04/15	3	WL
	13/05/15	2	WL
	12/08/15	4	WL
	10/09/15	4	WL
	22/09/15	4	WL
	30/12/15	3	WL
WL120	21/04/15	1	WL

DOLPHIN ID	DATE	STG#	AREA
WL123	18/06/15	8	SWL
	07/09/15	1	SWL
	25/09/15	10	SWL
	30/12/15	2	WL
	21/01/16	1	SWL
	04/02/16	2	WL
WL124	30/06/15	1	NWL
	30/07/15	3	WL
	30/07/15	5	WL
	22/09/15	1	WL
WL128	15/05/15	5	SWL
	18/06/15	8	SWL
	06/07/15	2	SWL
	23/11/15	6	SWL
	06/01/16	1	WL
	29/03/16	2	WL
WL129	08/09/15	1	WL
	08/09/15	5	WL
	03/12/15	1	SWL
	11/12/15	3	WL
	04/02/16	1	WL
WL130	15/04/15	3	WL
	18/06/15	3	SWL
	11/12/15	3	WL
	26/01/16	4	SWL
	14/03/16	1	SWL
WL131	11/08/15	4	SWL
	07/09/15	1	SWL
	10/09/15	6	SWL
	22/09/15	3	WL
	25/09/15	9	SWL
	25/09/15	10	SWL
	30/10/15	8	WL
	09/11/15	4	WL
	29/02/16	3	WL
WL137	12/08/15	1	WL
	04/02/16	1	WL
	17/03/16	1	WL
WL142	06/07/15	2	SWL
	18/08/15	1	SWL
	23/11/15	6	SWL
	29/03/16	2	WL
WL144	04/06/15	4	SWL
	06/01/16	1	WL
	29/03/16	2	WL
WL145	19/11/15	3	WL
WL152	30/10/15	8	WL
	23/11/15	3	WL
WL160	31/07/15	2	SWL
WL163	24/11/15	6	WL
WL165	21/04/15	4	WL
	18/06/15	4	SWL
	07/09/15	4	SWL
	30/10/15	2	WL
	23/11/15	3	WL
	24/11/15	2	WL
	06/01/16	2	SWL
	29/02/16	4	WL
WL166	13/05/15	2	WL
	24/11/15	2	WL
WL167	24/11/15	8	WL
	30/12/15	2	WL
WL168	07/09/15	4	SWL
	25/09/15	10	SWL
	23/11/15	3	WL
WL170	15/05/15	3	SWL
	29/06/15	1	SWL

Appendix IV. (cont'd)

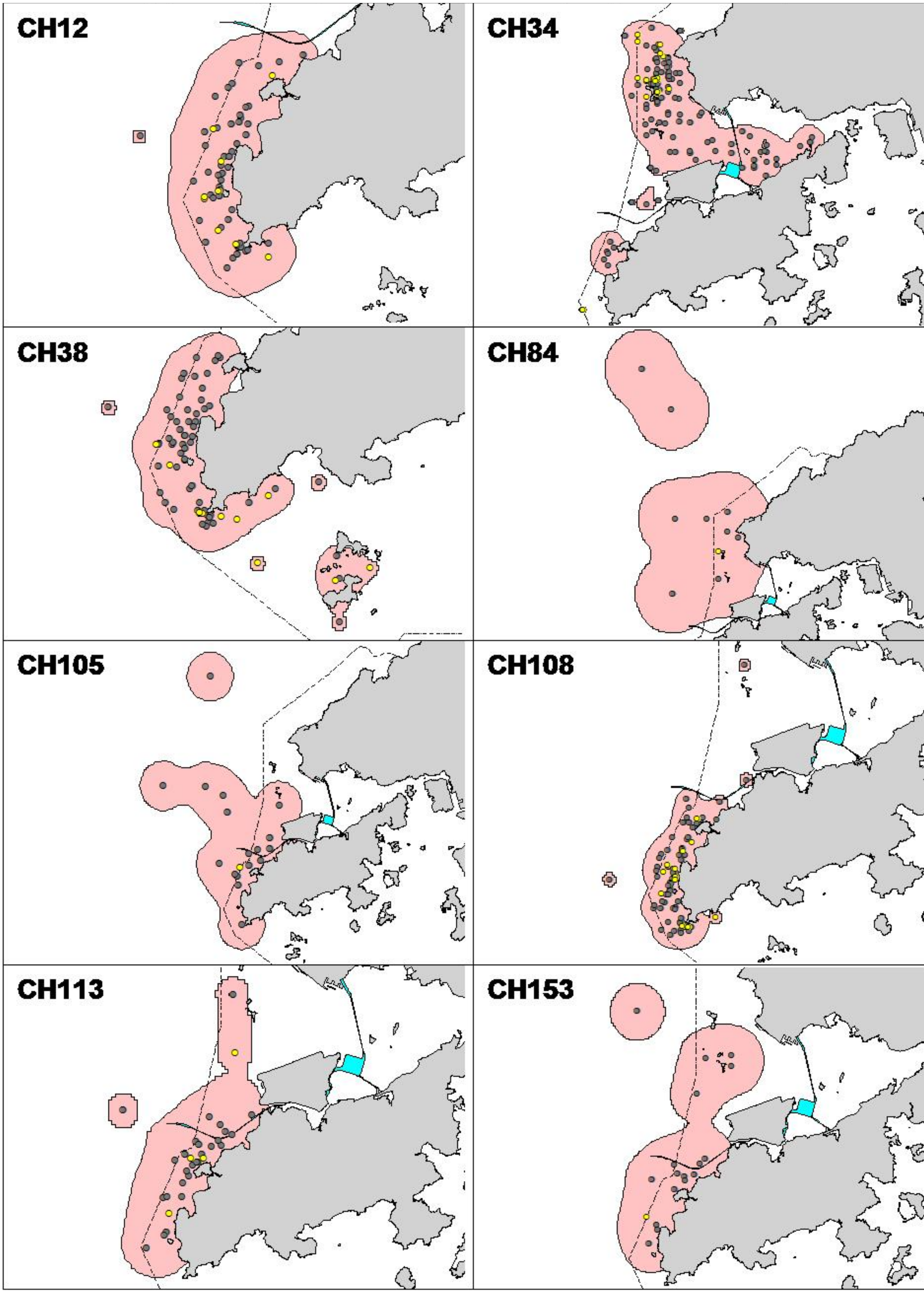
(***in bold & italics: new individuals***)

DOLPHIN ID	DATE	STG#	AREA
WL171	20/10/15	2	WL
	23/11/15	5	WL
	11/12/15	3	WL
WL173	11/08/15	4	SWL
	18/08/15	1	SWL
	07/09/15	3	SWL
	25/09/15	9	SWL
	30/10/15	2	WL
	30/10/15	5	WL
	30/12/15	2	WL
	21/01/16	1	SWL
WL178	23/10/15	1	SEL
WL179	20/10/15	1	WL
	10/12/15	1	WL
WL180	18/06/15	5	SWL
	07/09/15	1	SWL
	07/09/15	2	SWL
	25/09/15	10	SWL
	20/10/15	3	SWL
	06/01/16	1	WL
WL186	29/06/15	2	SWL
	06/07/15	2	SWL
	28/07/15	1	SWL
	31/07/15	1	SWL
WL190	12/08/15	3	WL
	07/09/15	3	SWL
	25/09/15	8	SWL
	30/10/15	8	WL
WL191	20/10/15	1	WL
	19/11/15	3	WL
WL193	10/09/15	1	WL
	29/03/16	2	WL
WL199	13/05/15	2	WL
	25/09/15	1	WL
	24/11/15	5	WL
	30/12/15	3	WL
WL200	26/01/16	4	SWL
WL207	13/05/15	2	WL
	30/07/15	3	WL
	10/09/15	5	WL
	22/09/15	6	WL
WL208	13/05/15	2	WL
	25/09/15	2	WL
	24/11/15	2	WL
	30/12/15	2	WL
	06/01/16	2	SWL
	29/02/16	2	WL
	29/02/16	5	SWL
	14/03/16	1	SWL
WL209	23/11/15	3	WL
WL210	03/12/15	1	SWL
WL211	07/09/15	4	SWL
	23/11/15	5	WL
WL213	19/11/15	3	WL
WL215	29/06/15	1	SWL
	12/08/15	1	WL
	04/02/16	1	WL
	17/03/16	1	WL
WL216	25/09/15	1	WL
	14/03/16	1	SWL
	29/03/16	2	WL
WL217	13/05/15	2	WL
	29/06/15	1	SWL
	12/08/15	3	WL
	10/09/15	3	WL
	22/09/15	1	WL
	22/09/15	6	WL

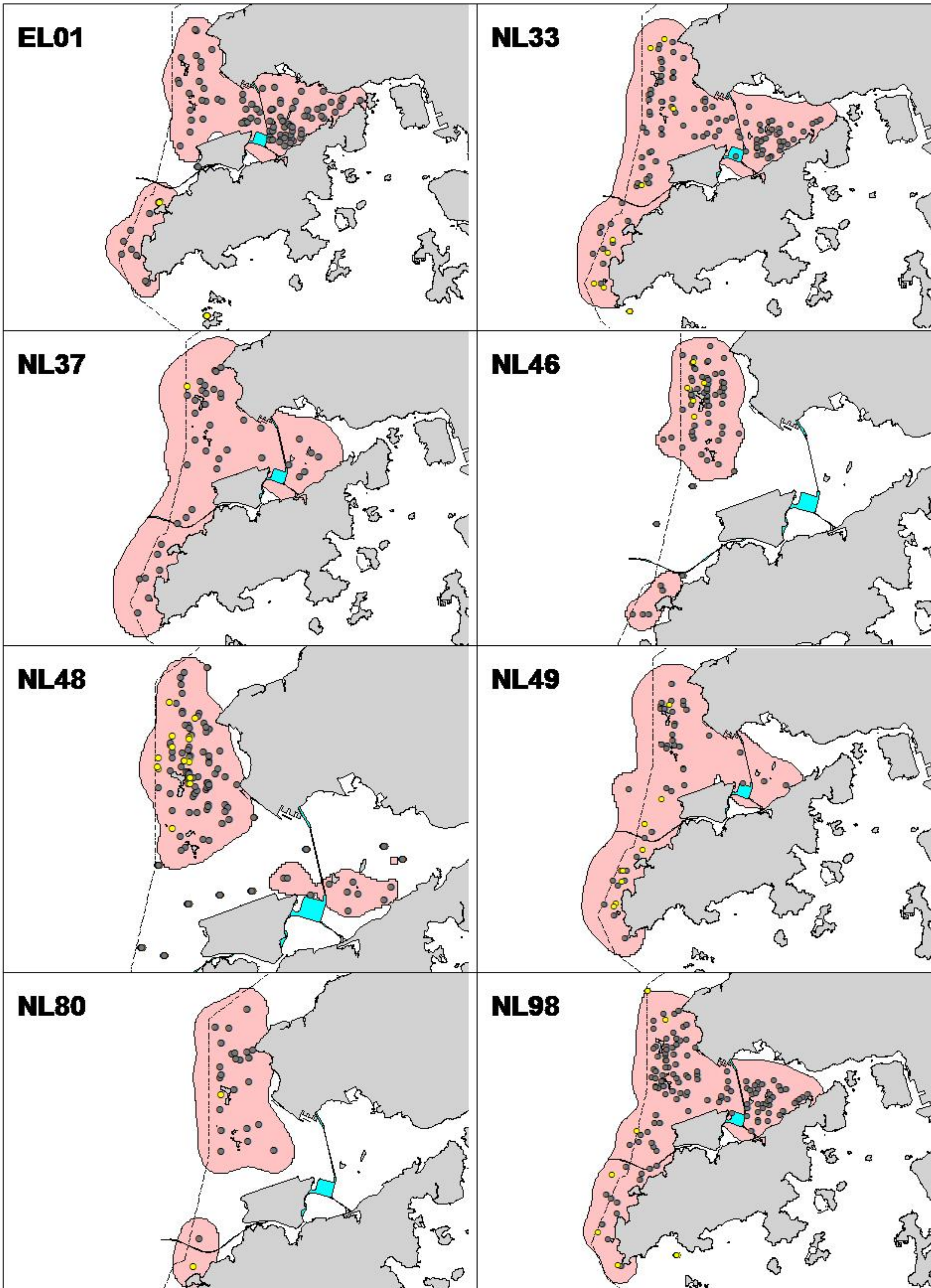
DOLPHIN ID	DATE	STG#	AREA
WL218	30/07/15	4	WL
	22/09/15	1	WL
WL220	30/10/15	8	WL
	23/11/15	3	WL
	06/01/16	1	WL
	26/01/16	1	WL
WL221	21/04/15	4	WL
	29/06/15	1	SWL
	15/10/15	3	SWL
WL227	22/05/15	1	WL
WL229	07/09/15	1	SWL
	30/12/15	3	WL
WL230	22/09/15	3	WL
	20/10/15	2	WL
WL231	12/06/15	6	SWL
	18/06/15	5	SWL
	12/08/15	3	WL
	10/09/15	1	WL
	22/09/15	1	WL
	22/09/15	6	WL
WL232	12/06/15	6	SWL
	18/06/15	5	SWL
	29/06/15	1	SWL
	06/07/15	4	SWL
	23/11/15	1	WL
	10/12/15	1	WL
	05/01/16	5	SWL
	17/03/16	1	WL
WL233	30/12/15	3	WL
WL234	12/06/15	6	SWL
	06/07/15	4	SWL
	12/08/15	1	WL
	10/12/15	1	WL
WL235	12/06/15	6	SWL
	11/08/15	2	SWL
	23/11/15	1	WL
	18/12/15	3	SWL
	06/01/16	2	SWL
	04/02/16	1	WL
WL237	23/11/15	5	WL
WL240	28/07/15	4	SWL
	23/11/15	3	WL
WL241	06/07/15	4	SWL
	19/11/15	1	WL
WL243	09/06/15	2	SWL
	18/06/15	5	SWL
	29/06/15	1	SWL
	06/07/15	4	SWL
	31/07/15	6	SEL
	23/10/15	1	SEL
	29/12/15	1	NWL
WL246	19/11/15	3	WL
WL249	22/09/15	3	WL
	20/10/15	2	WL
WL250	12/06/15	6	SWL
	29/06/15	2	SWL
	31/07/15	6	SEL
	20/10/15	3	SWL
	30/10/15	2	WL
	23/11/15	6	SWL
WL251	13/05/15	2	WL
WL253	30/10/15	8	WL
WL254	06/01/16	1	WL
	29/03/16	2	WL
WL255	***17/11/15***	***1***	***NWL***
WL257	***25/09/15***	***2***	***WL***
	06/01/16	***2***	***SWL***

DOLPHIN ID	DATE	STG#	AREA
WL259	***20/10/15***	***1***	***WL***
WL260	***02/04/15***	***1***	***WL***
	09/04/15	***2***	***WL***
	15/05/15	***5***	***SWL***
	06/01/16	***1***	***WL***
	04/02/16	***1***	***WL***
WL262	***15/05/15***	***3***	***SWL***
	29/06/15	***1***	***SWL***
	25/09/15	***8***	***SWL***
	18/12/15	***4***	***SWL***
	06/01/16	***2***	***SWL***
WL263	***18/08/15***	***1***	***SWL***
	07/09/15	***2***	***SWL***
	23/11/15	***6***	***SWL***
	06/01/16	***2***	***SWL***
	14/03/16	***1***	***SWL***
WL264	***10/09/15***	***3***	***WL***
WL265	***20/10/15***	***2***	***WL***
	30/12/15	***2***	***WL***
	26/01/16	***4***	***SWL***
WL266	***07/09/15***	***2***	***SWL***
	22/09/15	***3***	***WL***
	23/11/15	***3***	***WL***
WL267	***07/09/15***	***3***	***SWL***
	30/10/15	***8***	***WL***
WL268	***10/09/15***	***3***	***WL***
	19/11/15	***1***	***WL***
	19/11/15	***3***	***WL***
	30/12/15	***2***	***WL***

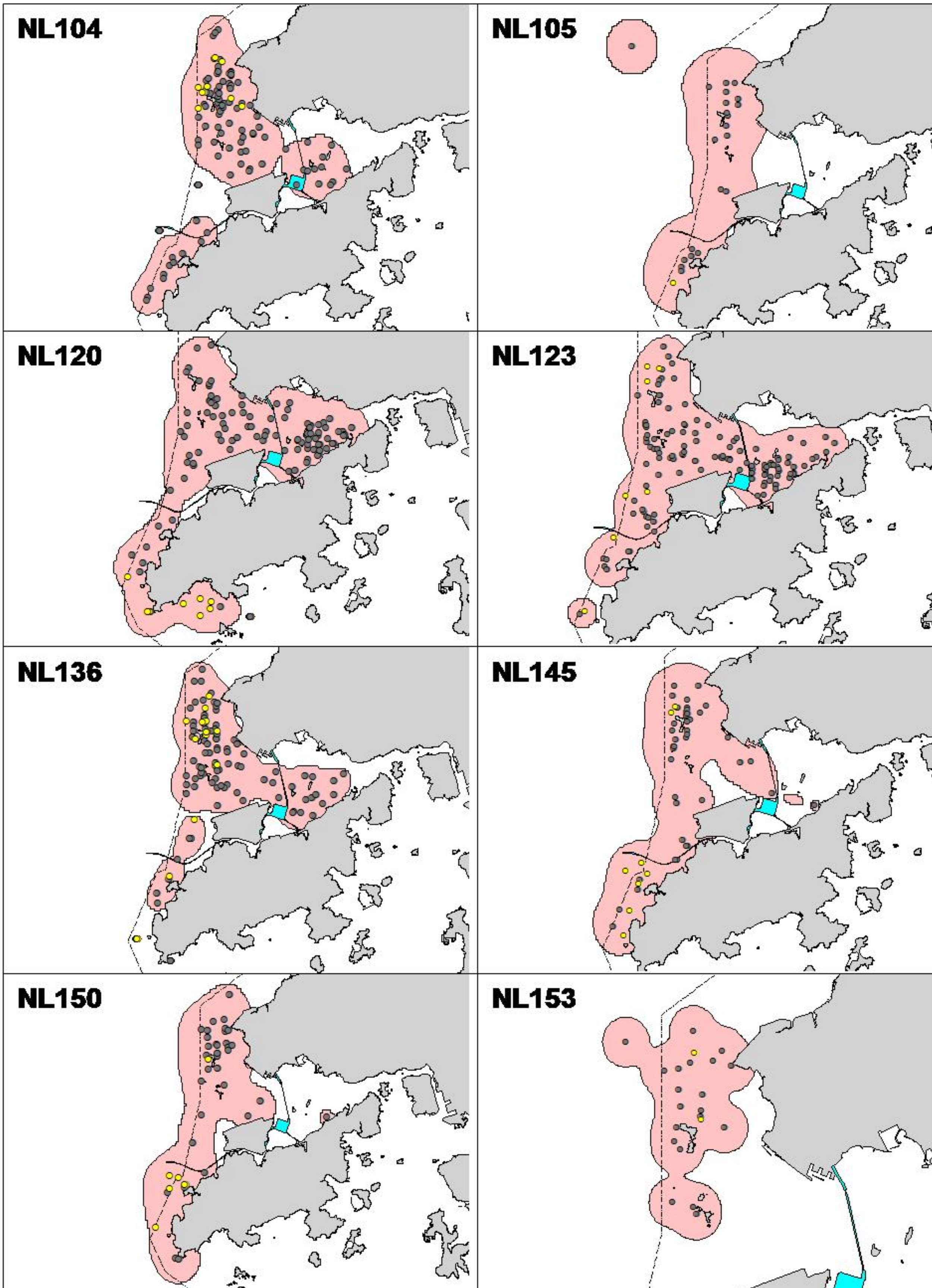
Appendix V. Ranging patterns (95% kernel ranges) of 153 individual dolphins with 10+ re-sightings that were sighted during 2015 (note: yellow dots indicates sightings made in 2015)



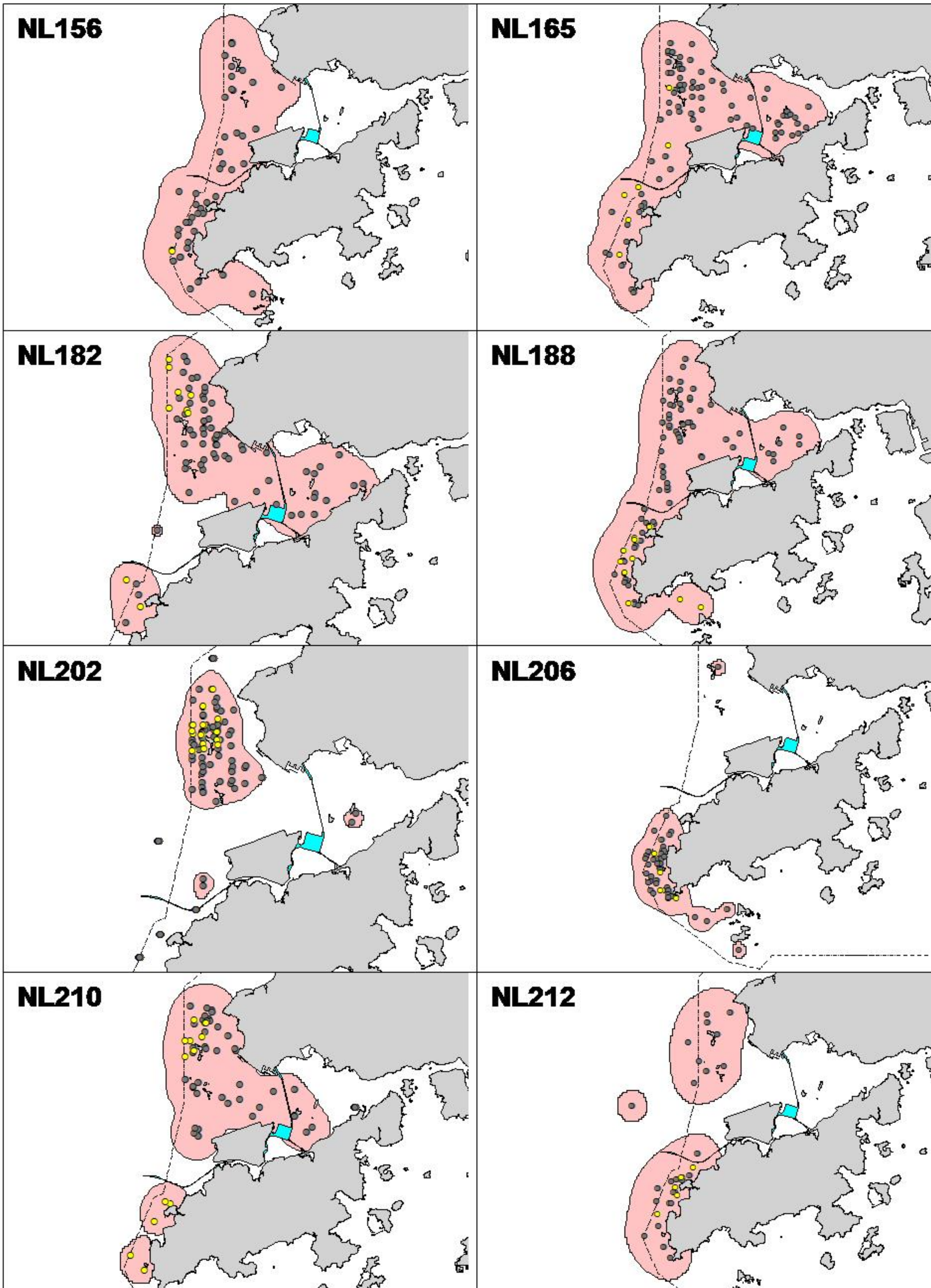
Appendix V (cont'd).



Appendix V (cont'd).



Appendix V (cont'd).



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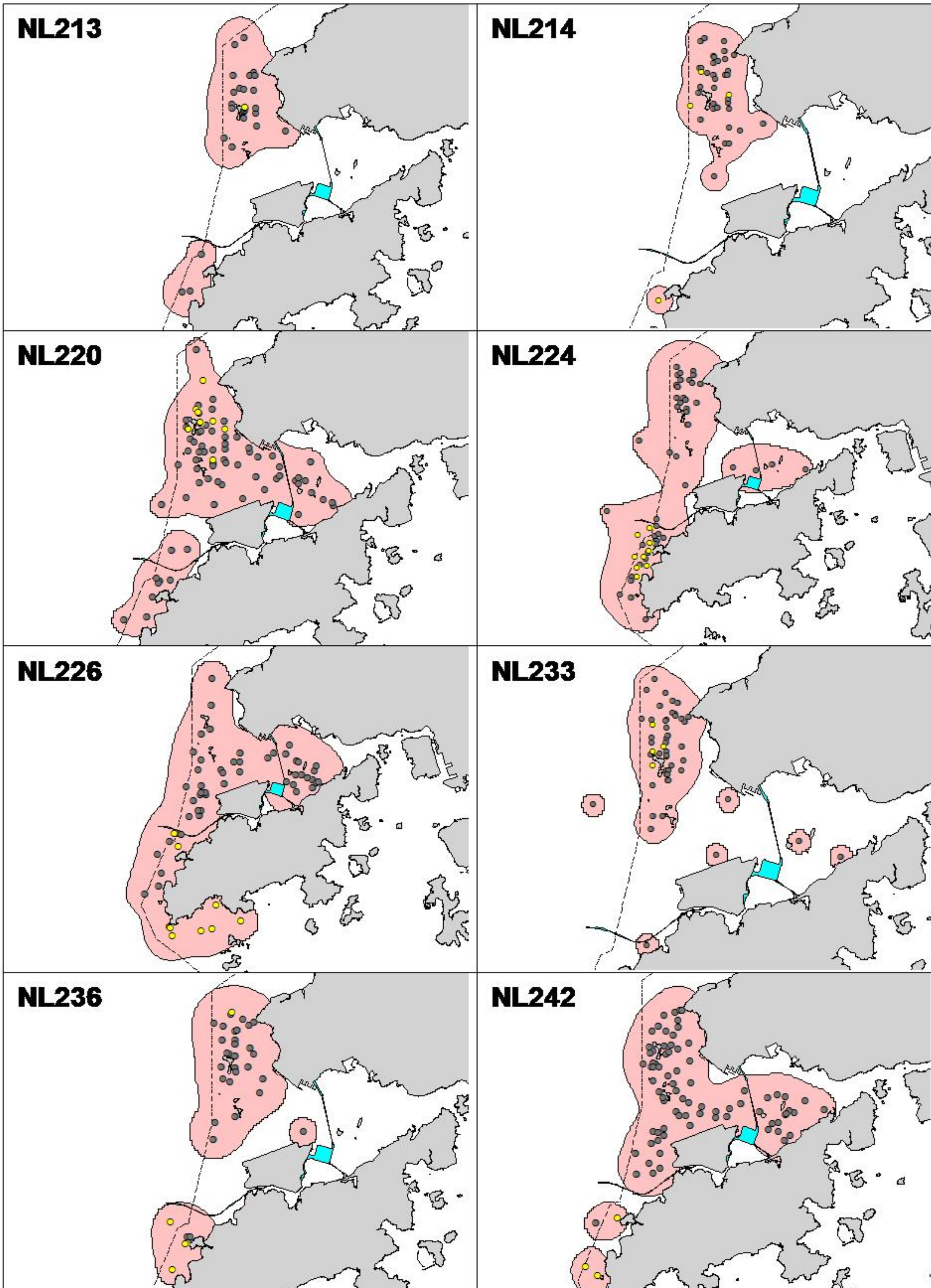

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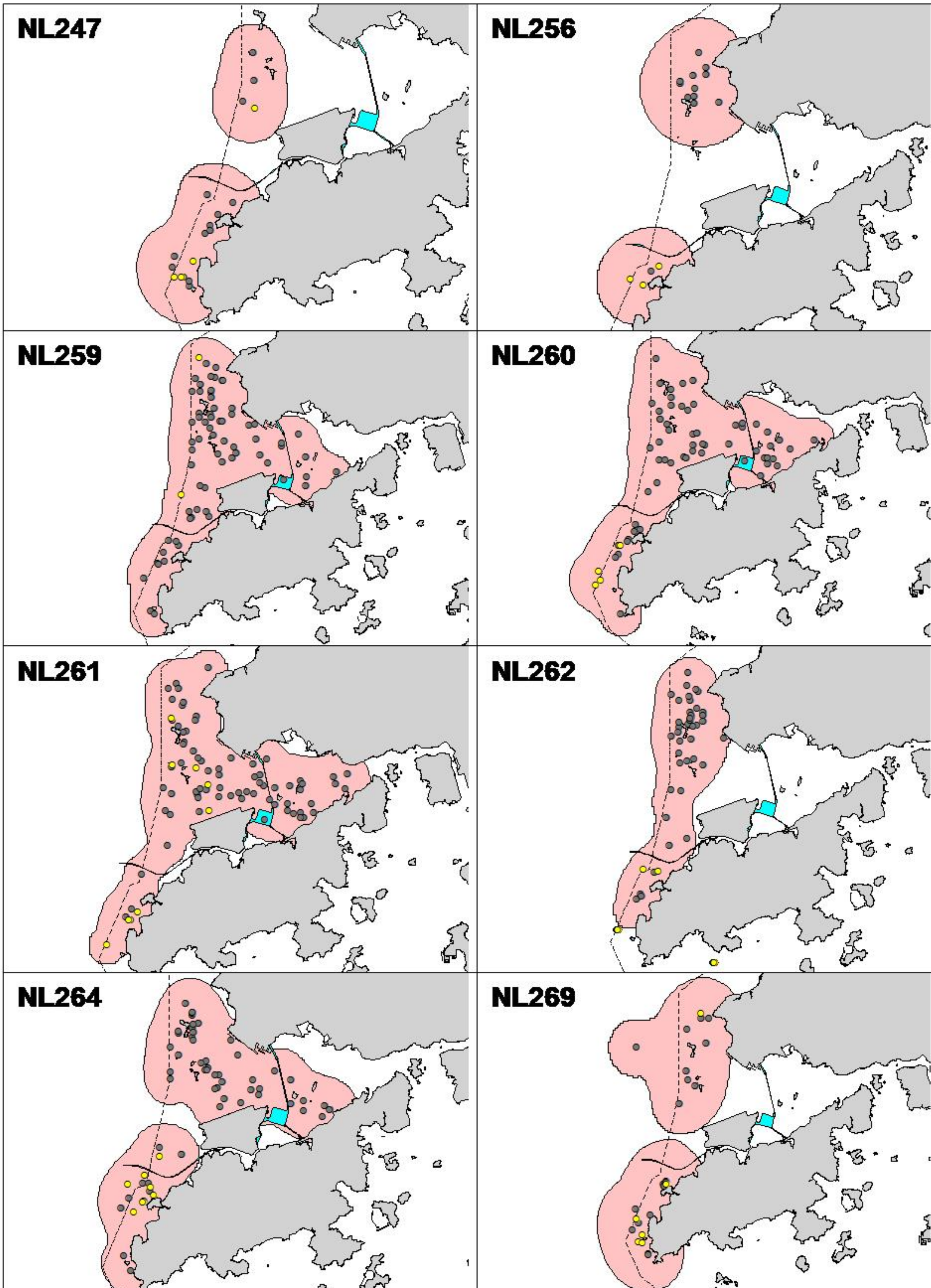

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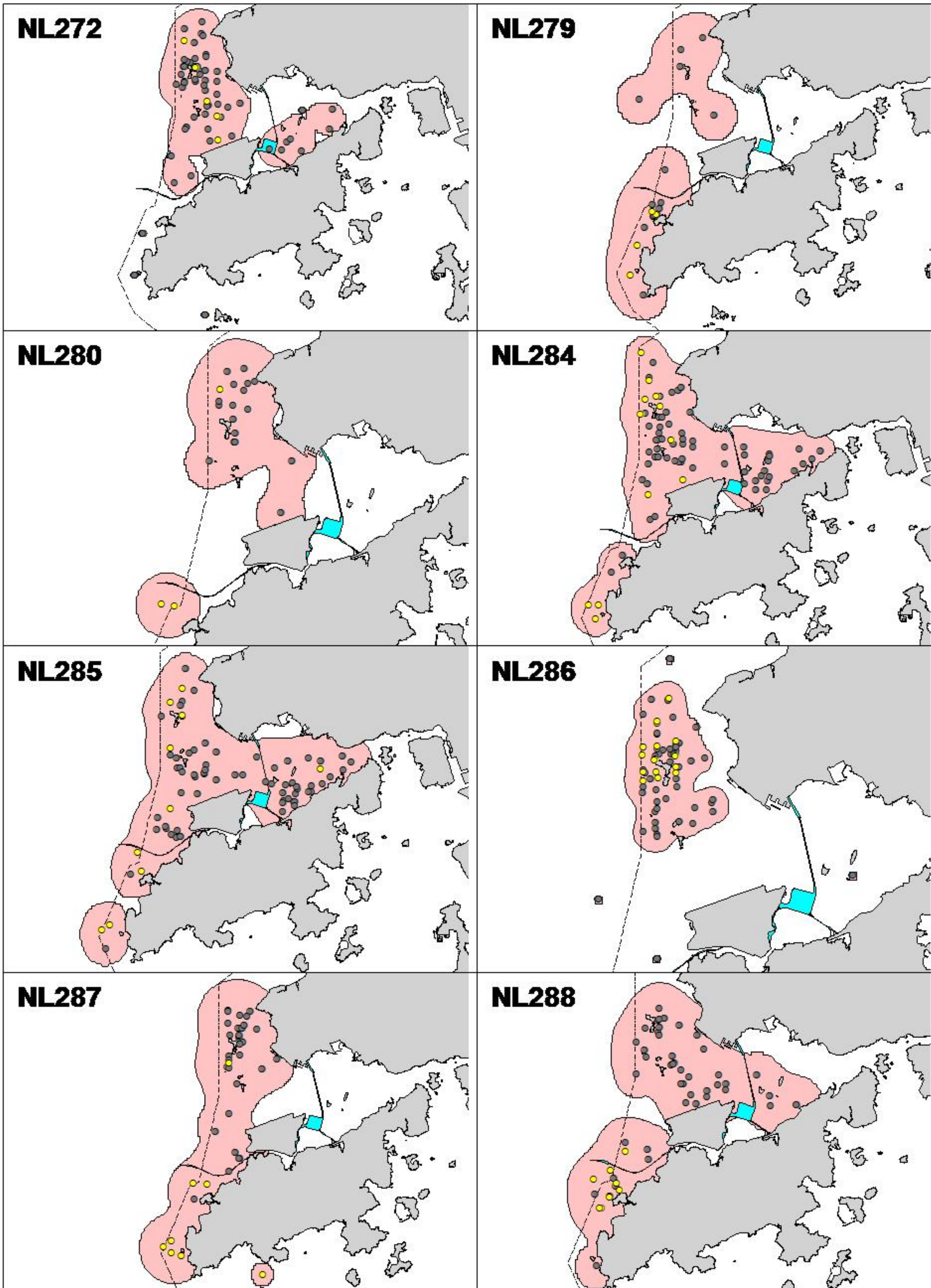

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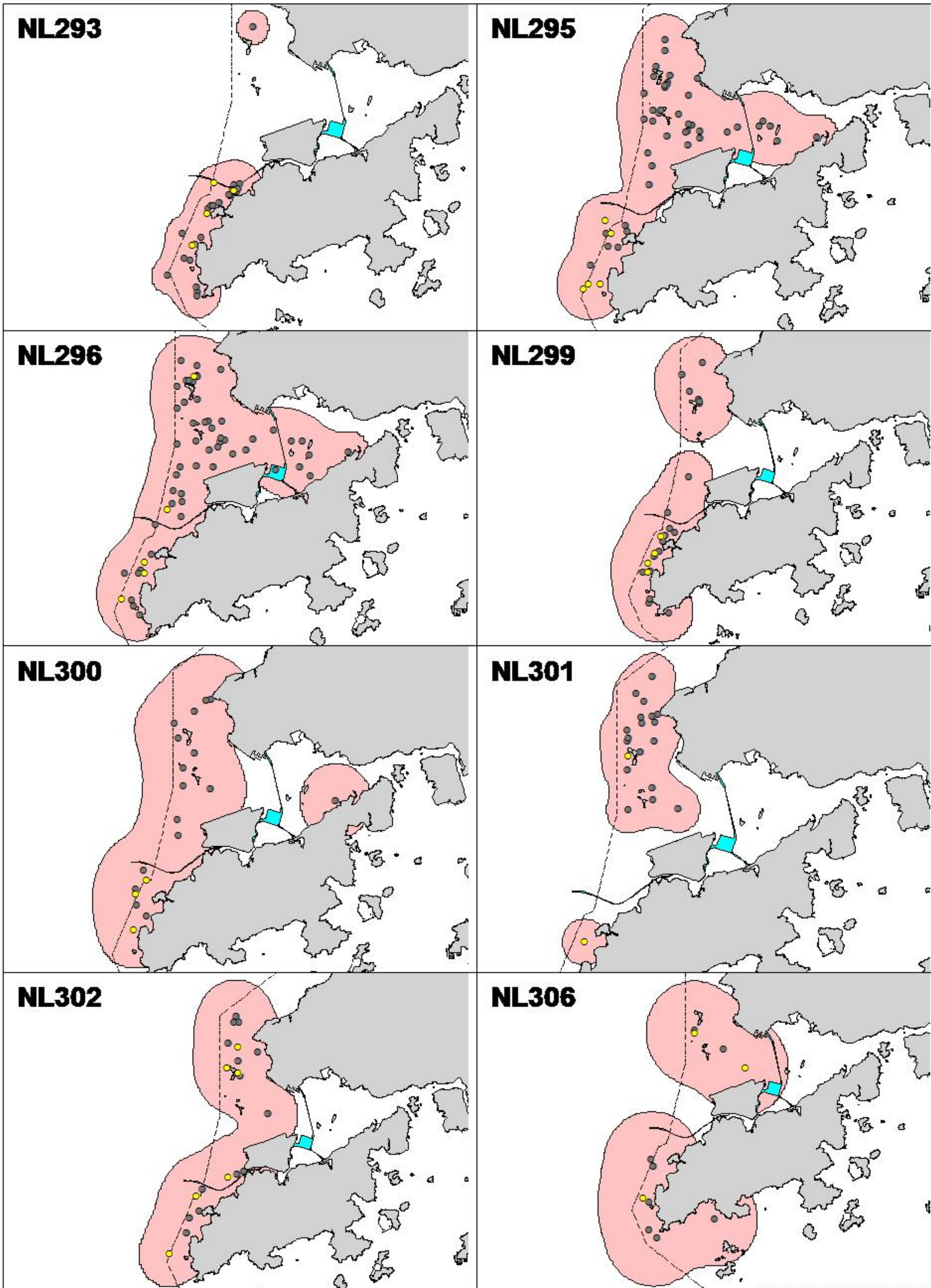

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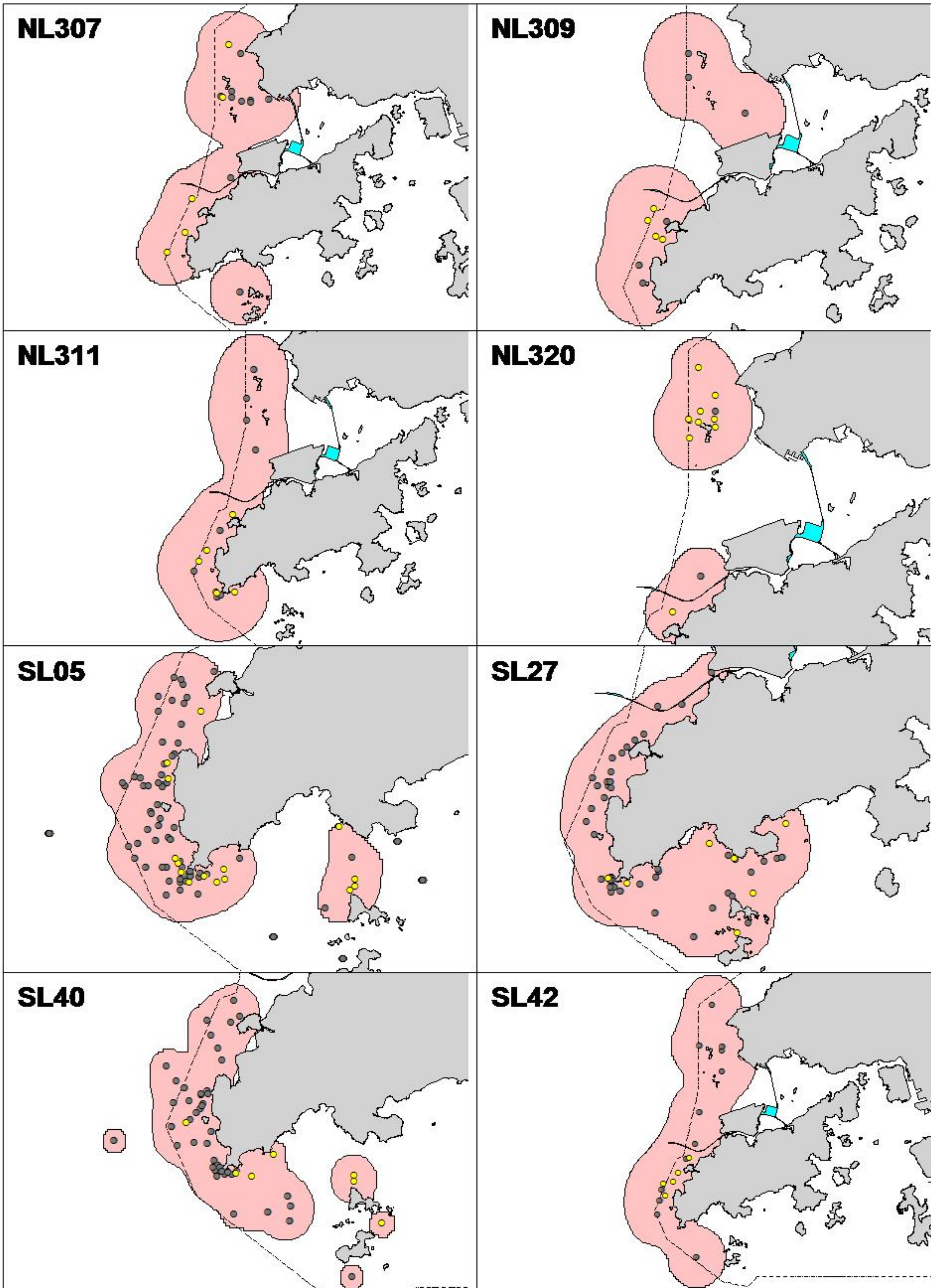

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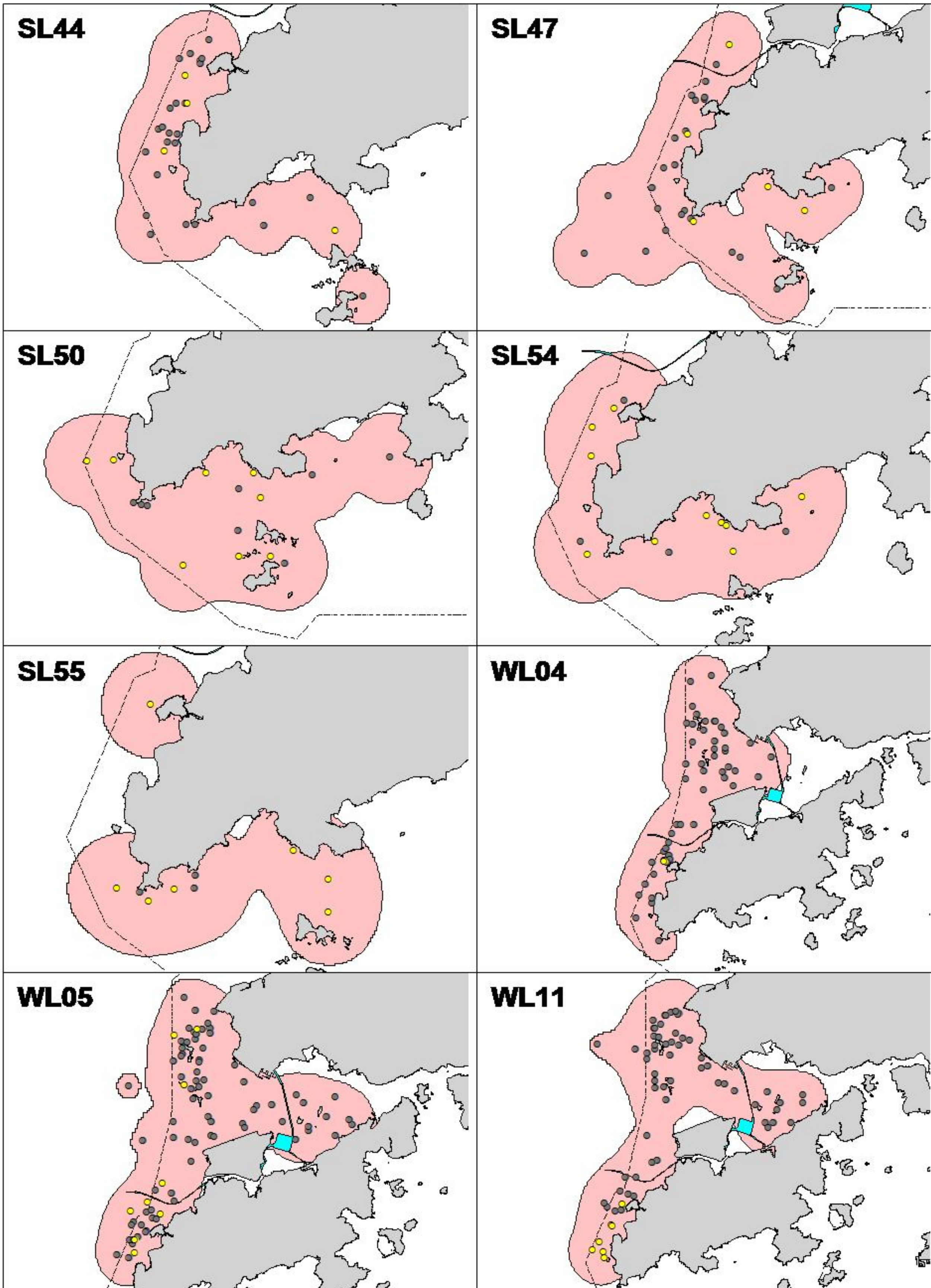

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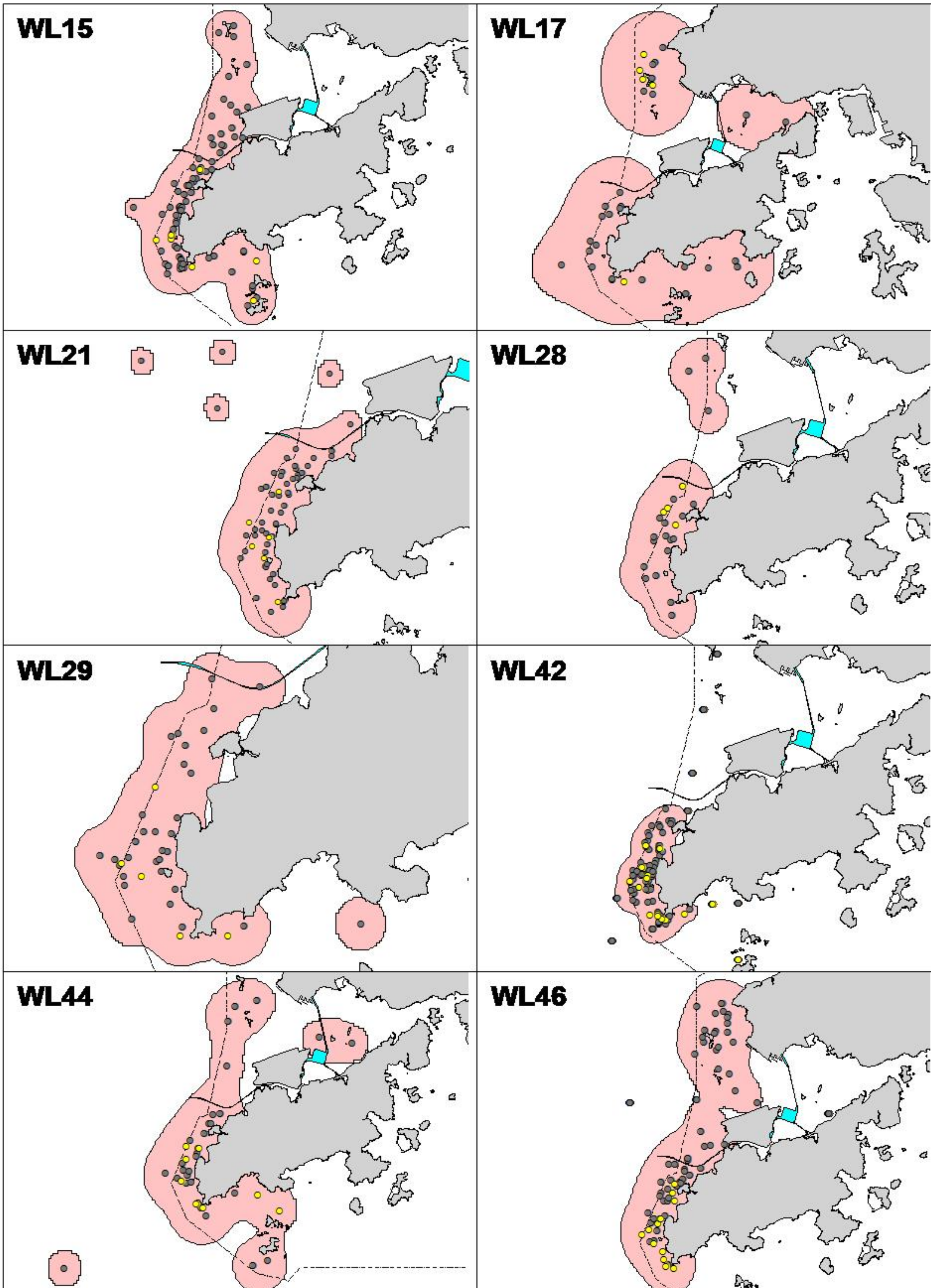

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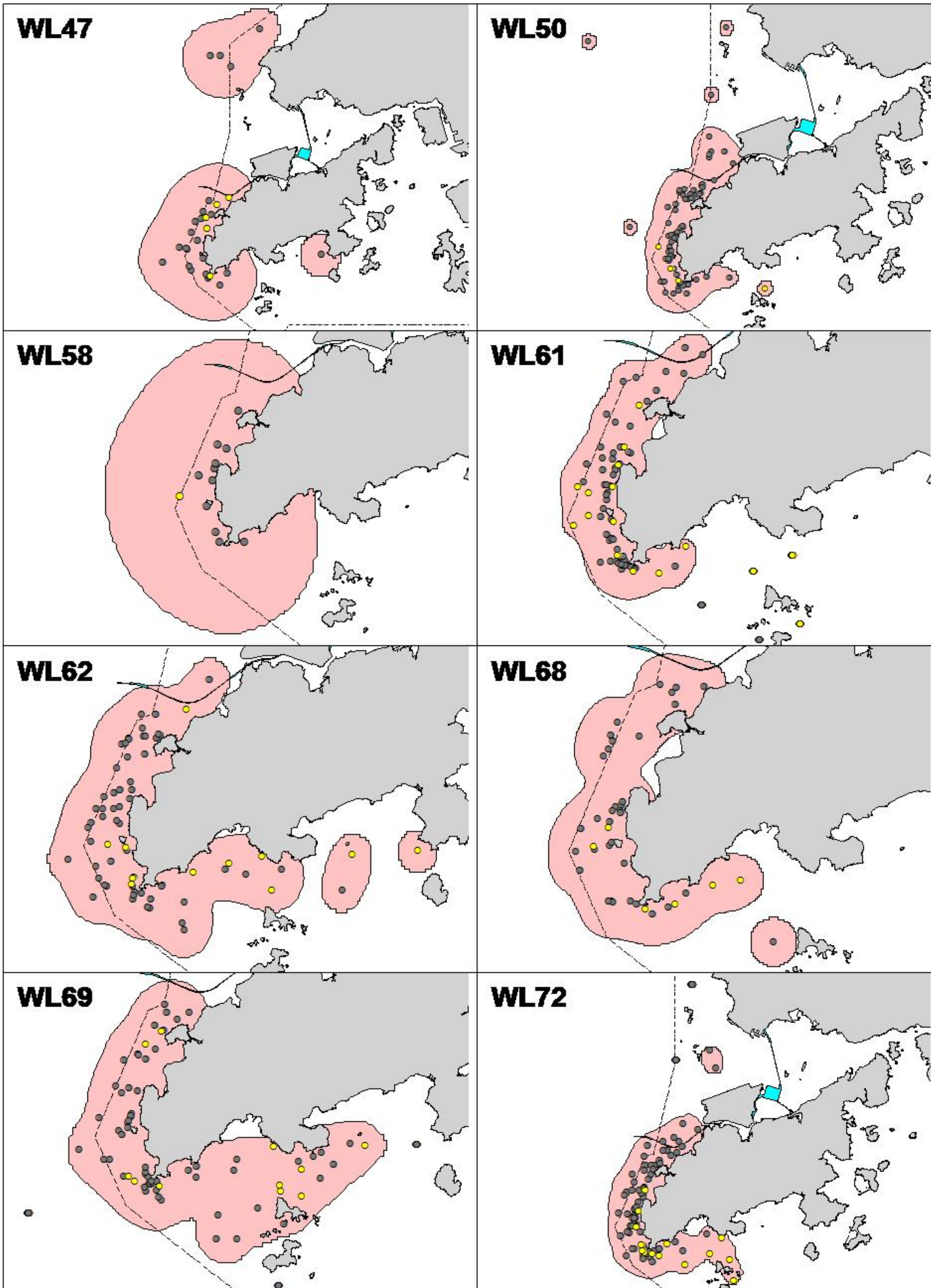

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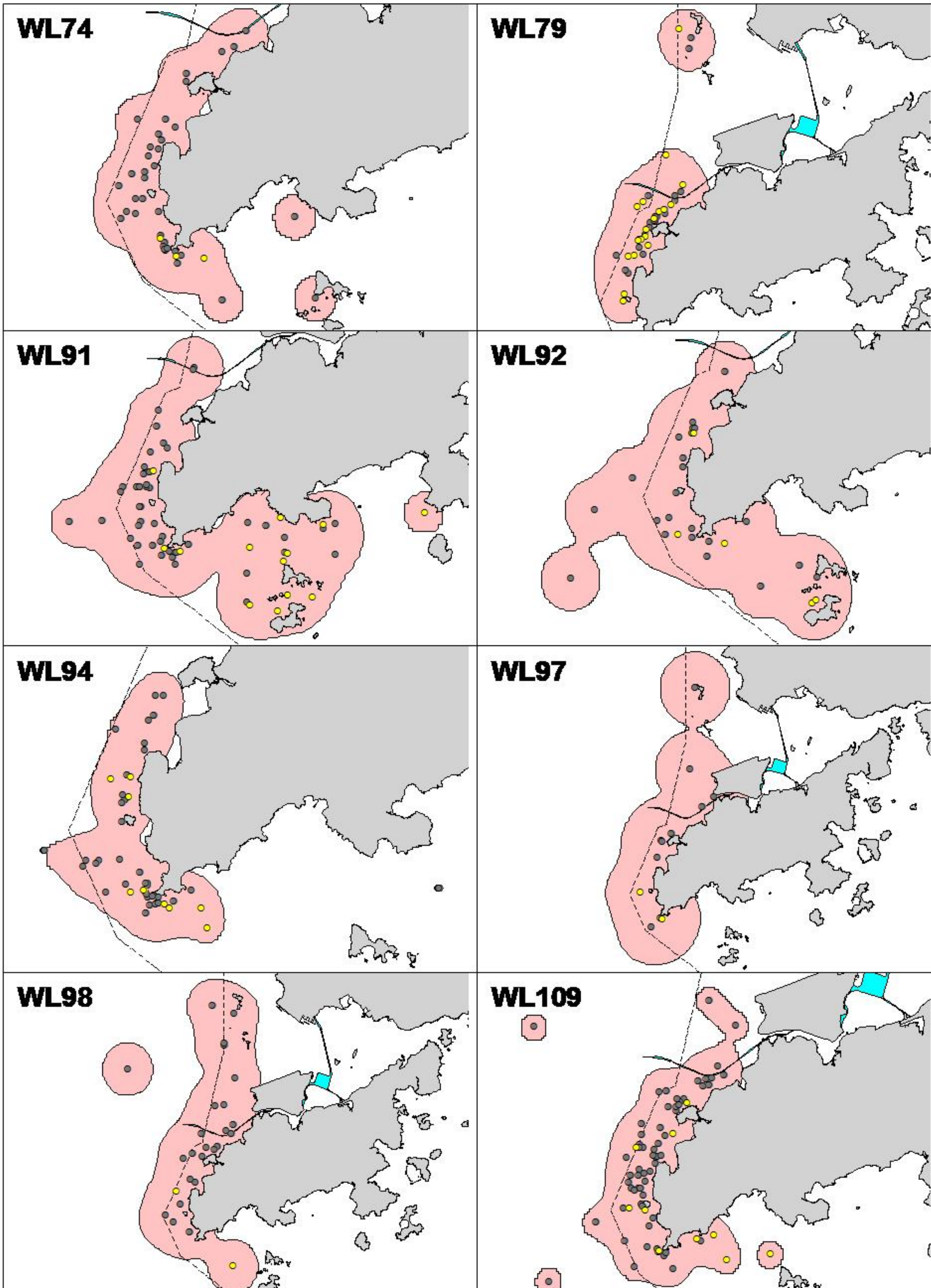

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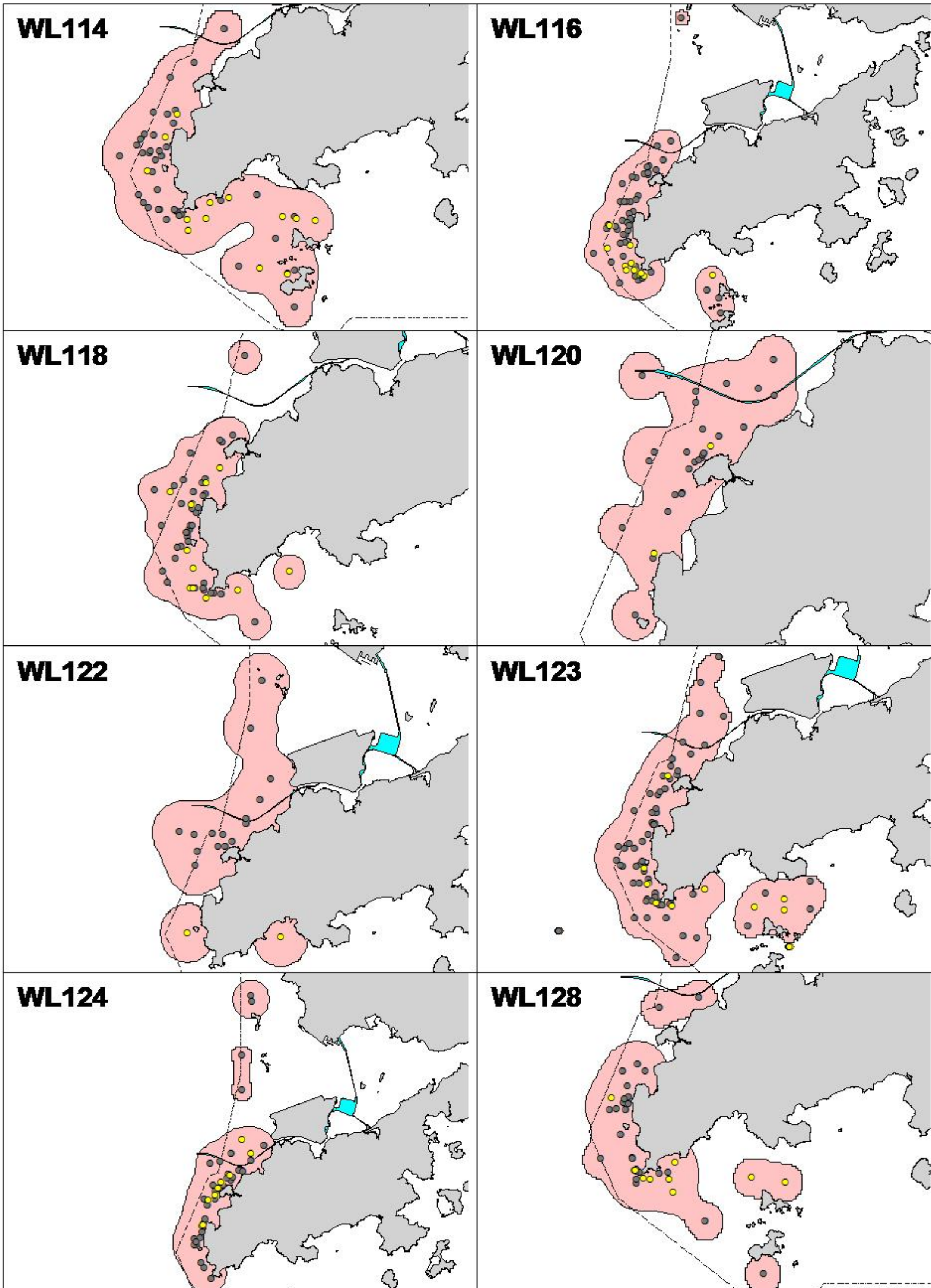

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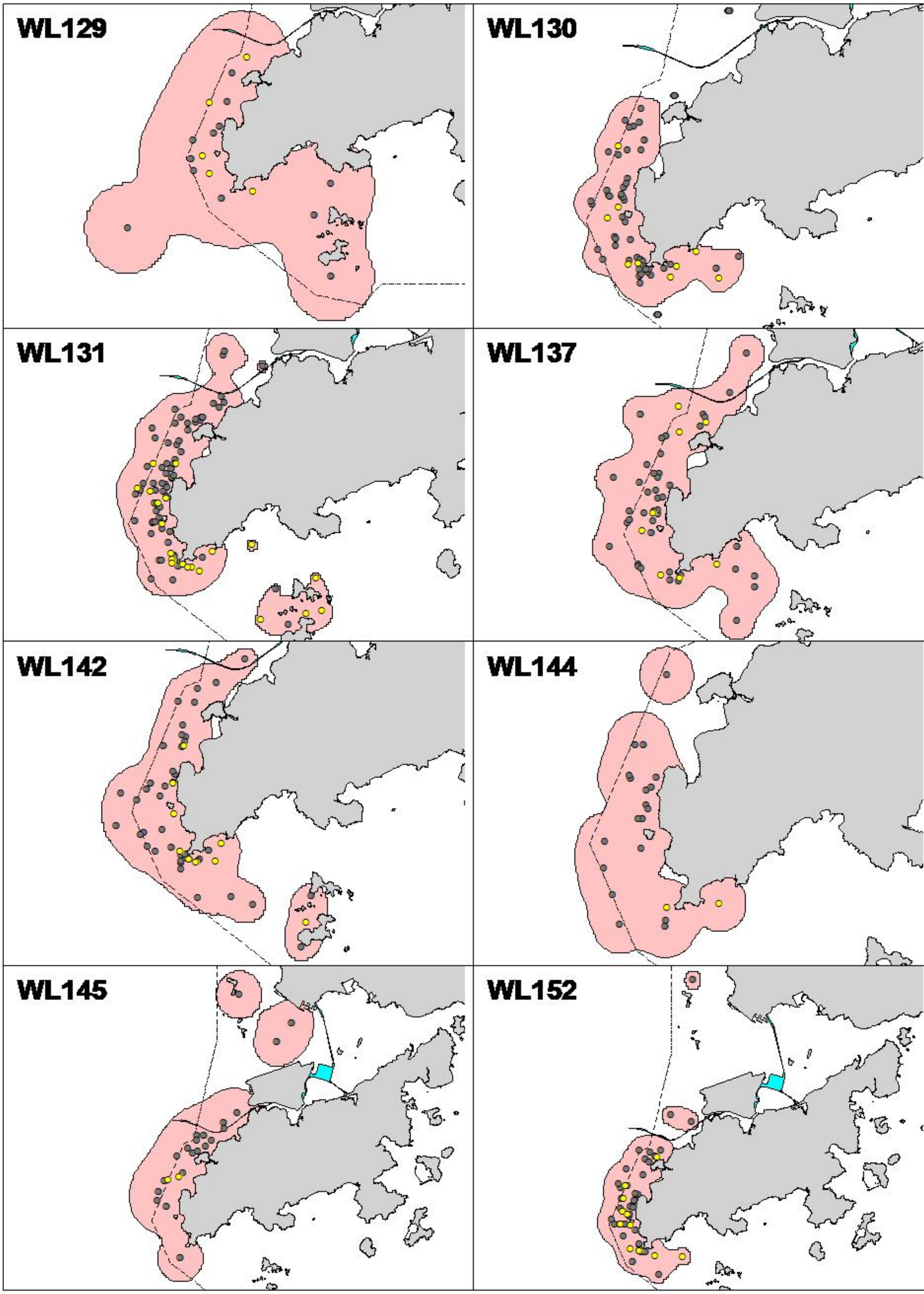

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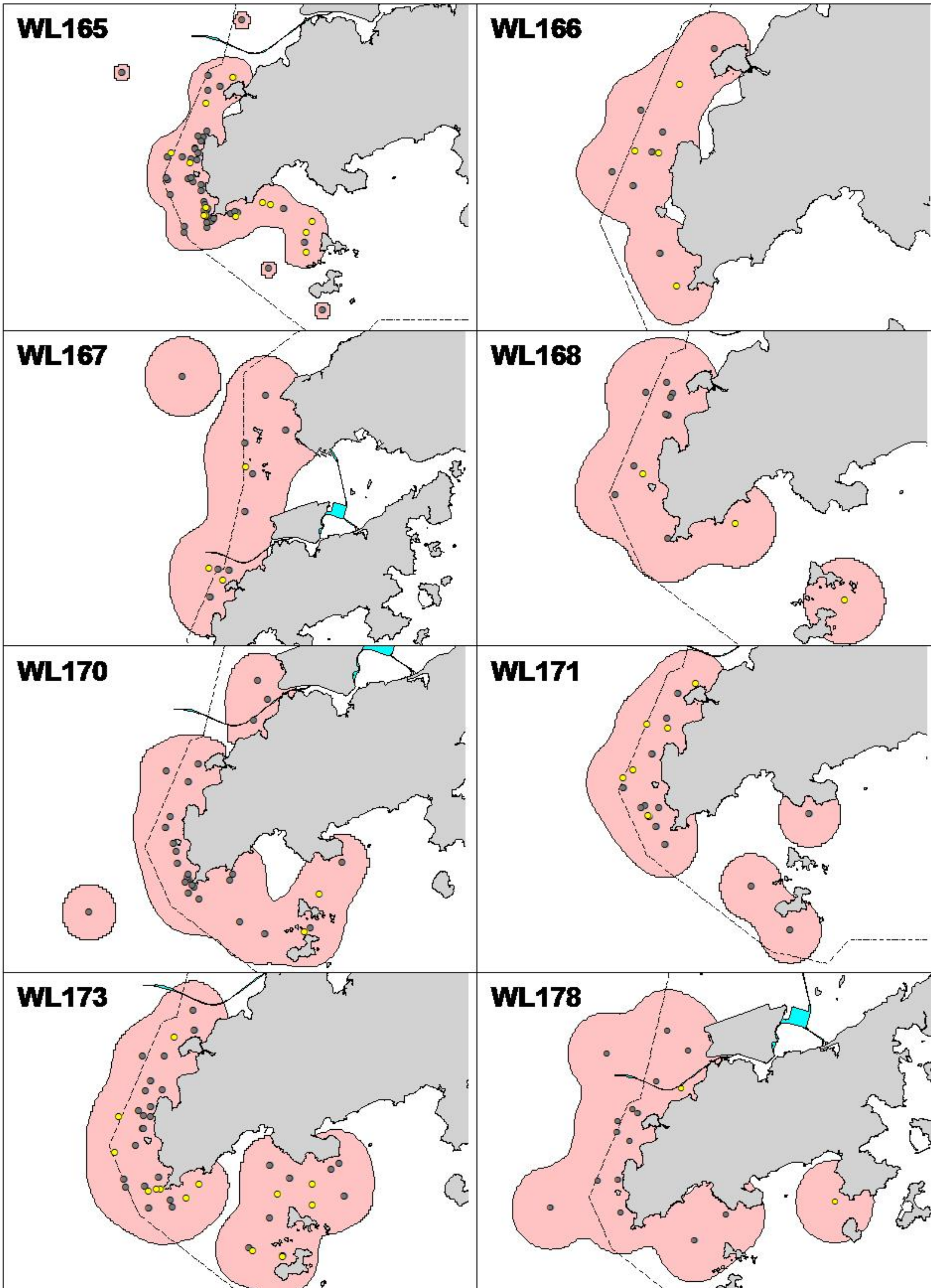

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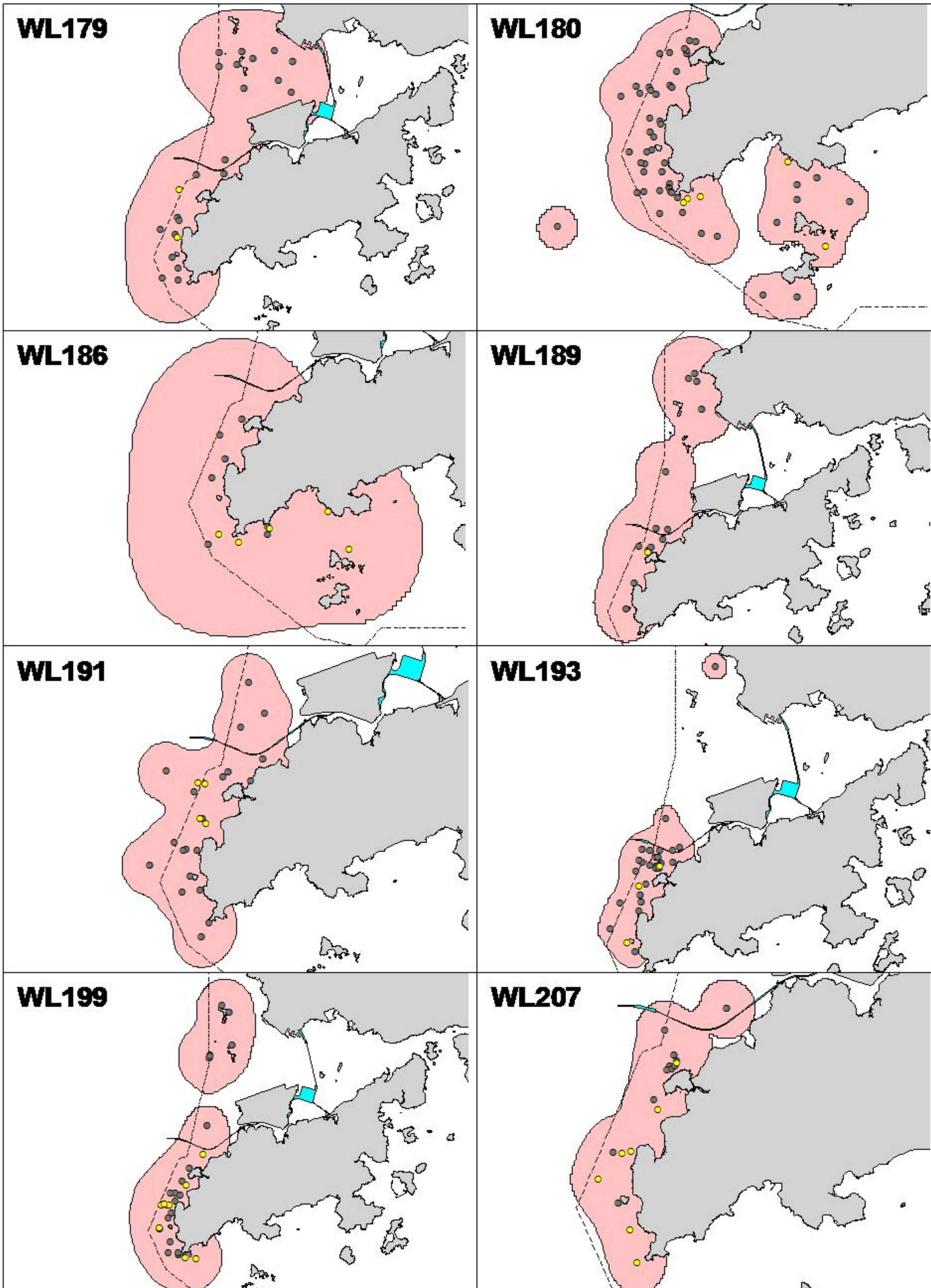

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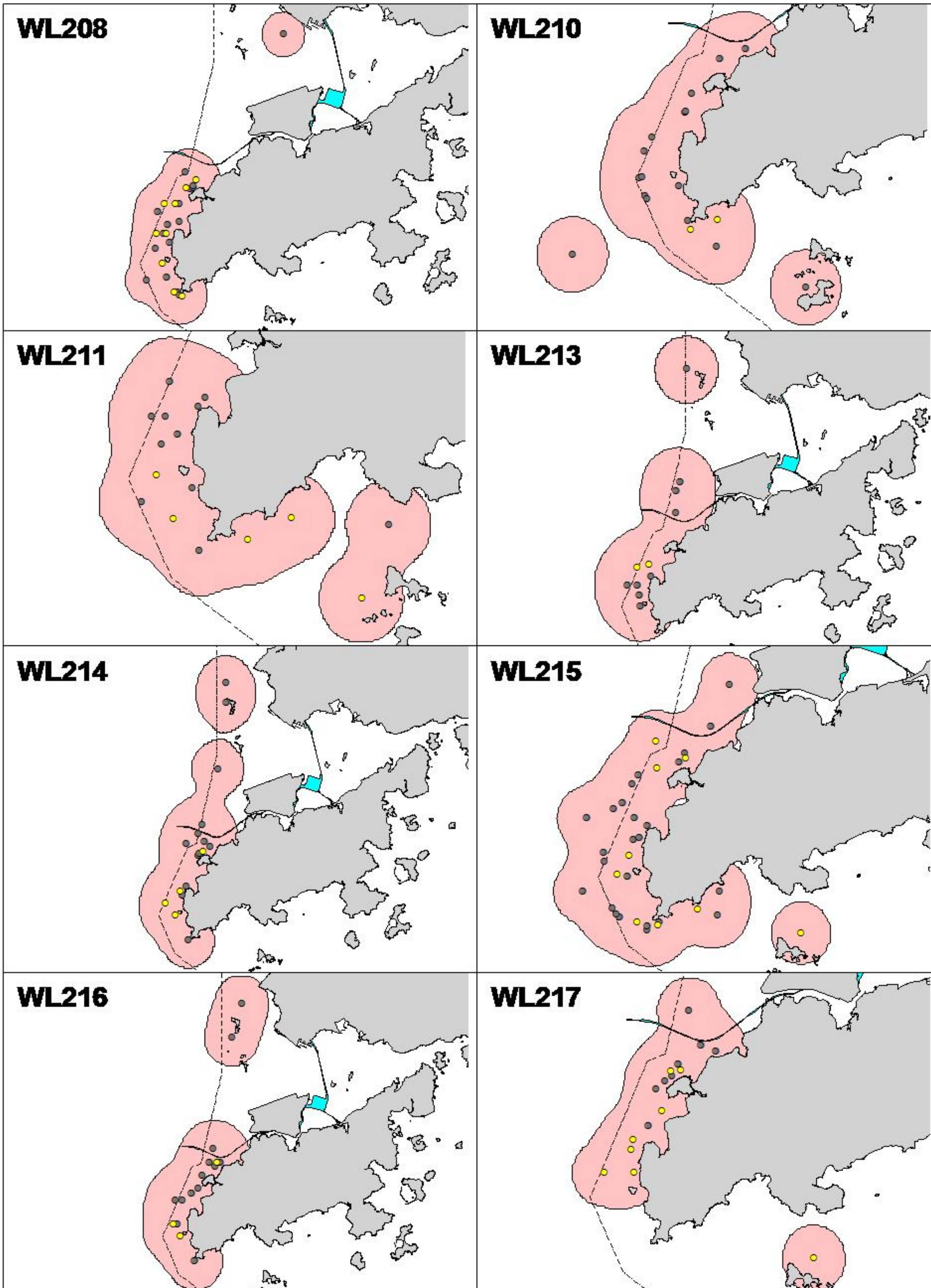

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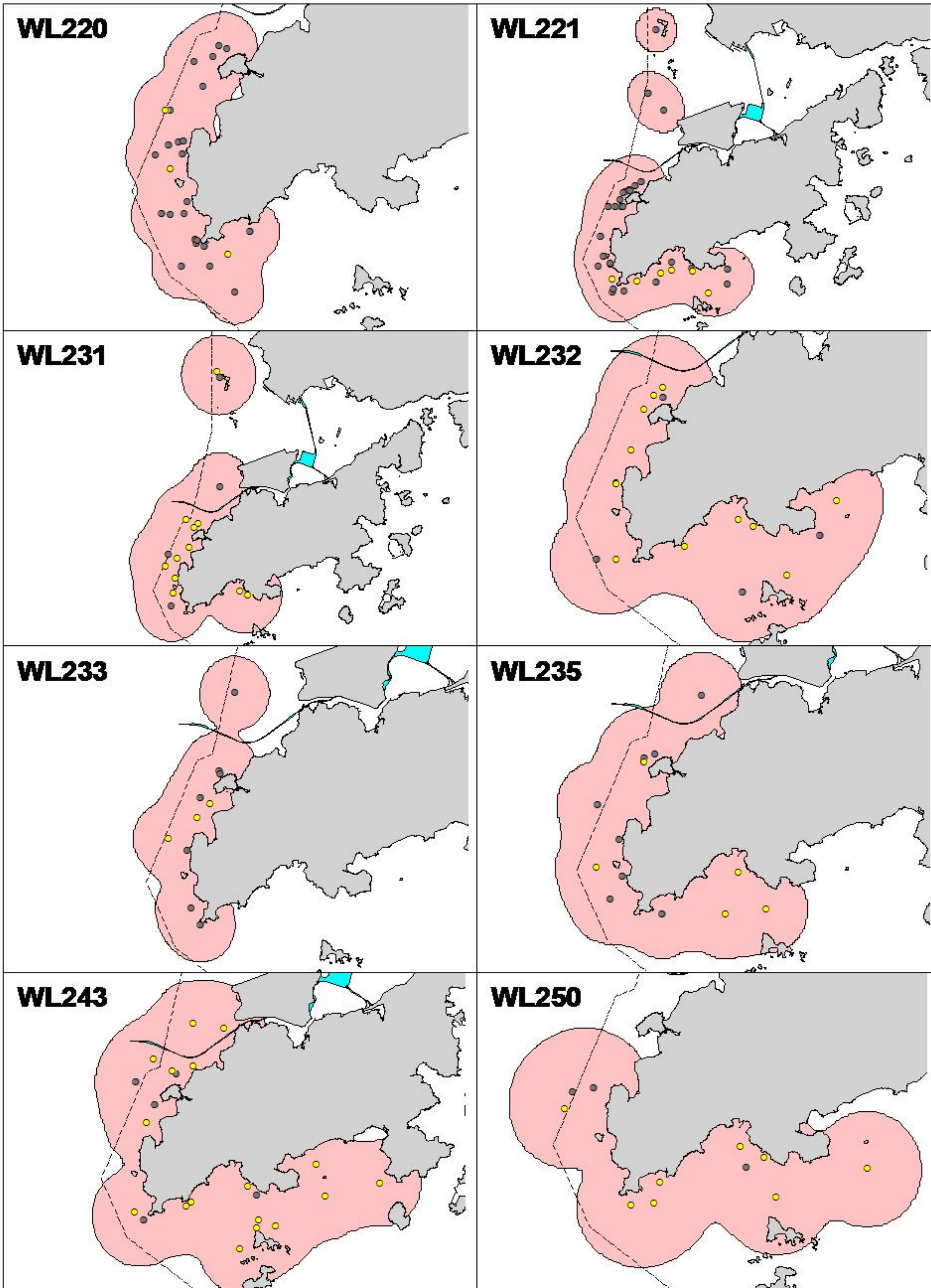

Appendix V (cont'd).