

Monitoring of Chinese White Dolphins in Southwest Lantau Waters – First Quarterly Report (March-May 2015)

Submitted to Environmental Project Office for the HZMB, HKLR, HZMB HKBCF and
TM-CLKL – Investigation

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1. Introduction

- 1.1. In March 2015, Hong Kong Cetacean Research Project (HKCRP) was appointed by the Environmental Project Office for the HZMB Hong Kong Projects to undertake a monitoring study of Chinese White Dolphins in Southwest Lantau (SWL) waters.
- 1.2. The objectives of the monitoring study are to quantify the abundance and density of Chinese White Dolphins in SWL waters, to identify individuals during the monitoring surveys, and to analyze their range use and movement patterns in Hong Kong and the wider Pearl River Estuary waters.
- 1.3. The monitoring study will supplement the on-going EM&A monitoring results of the HZMB Hong Kong Projects in North and West Lantau waters, and provide a more complete picture of dolphin usage and movements between different survey areas in western Hong Kong waters.
- 1.4. The present report is the first quarterly progress report under this dolphin monitoring study submitted to the Environmental Project Office, summarizing the results of the survey findings during the quarterly period of March to May 2015.

2. Monitoring Methodology

- 2.1. *Vessel-based Line-transect Survey*
 - 2.1.1. According to the requirement of the technical proposal submitted to the Environmental Project Office, the present dolphin monitoring programme should cover all transect lines

in SWL survey area (see Figure 1) once per month upon instruction. The co-ordinates of all transect lines conducted during the dolphin monitoring survey are shown in Table 1.

Table 1. Co-ordinates of transect lines in SWL survey area (corresponding to transect line layout as shown in Figure 1)

Line #		Northing	Easting		Line #		Northing	Easting
SWL001	1	806180	802510		SWL007	13	807380	808520
	2	804250	802510			14	805600	808520
SWL002	3	806710	803480		15	804400	808520	
	4	803450	803480		16	803000	808520	
SWL003	5	807270	804500		17	802100	808520	
	6	802690	804500		18	800470	808520	
SWL004	7	807590	805450		SWL008	19	807380	809550
	8	802295	805450			20	805050	809550
SWL005	9	808490	806500			21	804400	809550
	10	801410	806500			22	800470	809550
SWL006	11	808500	807430		SWL009	23	807380	810550
	12	801250	807430			24	800470	810550
					SWL010	25	809410	811510
						26	801470	811510

2.1.2. The HKCRP survey team used standard line-transect methods (Buckland et al. 2001) to conduct the systematic vessel surveys, and followed the same technique of data collection that has been adopted over the last 18 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2014). For each monitoring 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.

2.1.3. Two experienced observers from HKCRP (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° and 90° (in relation to the bow, which is defined as 0°). One to two additional experienced observer was available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.

- 2.1.4. During on-effort survey periods, the survey team recorded effort data including time, position (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (*Garmin eTrex Legend*).
- 2.1.5. Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.
- 2.1.6. When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin 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 group to the transect line was later calculated from the initial sighting distance and angle.
- 2.1.7. Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines (as indicated in Figure 1) was labeled as “primary” survey effort, while the survey effort conducted along the connecting lines between parallel lines as well as the section around the Soko Islands was labeled as “secondary” survey effort. Both primary and secondary survey effort were presented as on-effort survey effort in this report.
- 2.2. *Photo-identification Work*
- 2.2.1. When a group of Chinese White Dolphins were sighted during the line-transect survey, the survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.
- 2.2.2. A professional digital camera (*Canon EOS 7D* model), 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.

- 2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995. For individual dolphins that are not readily identifiable from the catalogue but have distinct features on their bodies, they will be placed in a pool of “potential new individuals”, with decision being made at the end of each year on whether any of them should be incorporated into the photo-ID catalogue.
- 2.2.4. 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 2000).
- 2.2.5. 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.
- 2.3. *Data analysis*
- 2.3.1. Distribution Analysis – The line-transect survey data was integrated with the Geographic Information System (GIS) in order to visualize and interpret different spatial and temporal patterns of dolphin distribution using sighting positions. Location data of dolphin 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, young calves and activities.
- 2.3.2. Encounter rate analysis – Encounter rates of Chinese white dolphins (number of on-effort sightings per 100 km of survey effort (ER(STG)), and total number of dolphins sighted on-effort per 100 km of survey effort (ER(ANI))) were calculated in SWL survey area in relation to the amount of survey effort conducted during each month of monitoring survey. Only data collected under Beaufort 3 or below would be used for encounter rate analysis. Dolphin encounter rates were calculated in two ways: 1) using primary survey effort alone; and 2) using both primary and secondary survey effort collected.
- 2.3.3. Quantitative grid analysis on habitat use – To conduct quantitative grid analysis of habitat use, positions of on-effort sightings of Chinese White Dolphins collected during the

quarterly impact phase monitoring period were plotted onto 1-km² grids in SWL survey area on GIS. Sighting densities (number of on-effort sightings per km²) and dolphin densities (total number of dolphins from on-effort sightings per km²) were then calculated for each 1 km by 1 km grid with the aid of GIS. Sighting density grids and dolphin 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 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 sightings per 100 units of survey effort. In addition, the derived unit for actual dolphin density was termed DPSE, representing the number of dolphins per 100 units of survey effort. Among the 1-km² 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-km² 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 from on-effort sightings
E = total number of units of survey effort
SA% = percentage of sea area

2.3.4. Behavioural analysis – When dolphins were sighted during vessel surveys, their behaviour was observed. Different activities were categorized (i.e. feeding, milling/resting, traveling, socializing) and recorded on sighting datasheets. This data was then input into a separate database with sighting information, which can be used to determine the distribution of behavioural data with 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 of the dolphins.

2.3.5. Ranging pattern analysis – Location data of individual dolphins that occurred during the

three-month impact phase monitoring period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, 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. If the sample size (number of re-sightings of each individual within the study period) were adequate (i.e. a minimum of 15 re-sightings, Hung 2008), the core areas of individuals at two different levels (50% and 25% UD) were also examined to investigate their range use in greater details. To examine the movement pattern within individual ranges, the locations of re-sightings made in the present quarterly period were visually examined and compared to those made in recent years, in order to determine whether any apparent shift in range use occurs in the present quarterly period.

3. Monitoring Results

3.1. *Summary of survey effort and dolphin sightings*

- 3.1.1. During the period of March to May 2015, three sets of systematic line-transect vessel surveys were conducted to cover all transect lines in SWL survey area once per month. In addition, five line-transect surveys were also conducted under the AFCD long-term dolphin and porpoise monitoring programme in SWL survey area on March 27th, April 13th, April 21st, April 27th and May 26th (see Table 2). Such monitoring survey data were also incorporated into the present study for various analyses.
- 3.1.2. For the present study alone, a total of 209.18 km of survey effort was collected in SWL survey during this quarter (Table 2), with 100% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility) (Appendix I). The total survey effort conducted on primary and secondary lines were 161.29 km and 47.89 km respectively during the three sets of surveys. For the combined monitoring dataset from both the present study and AFCD monitoring study, a total of 336.95 km of survey effort was collected in SWL waters in March-May 2015.
- 3.1.3. During the present quarter, 13 groups of 31 Chinese White Dolphins were sighted from the present study's surveys and AFCD monitoring surveys conducted in SWL survey area (Table 2, Appendix II). Eight of the 13 dolphin sightings were made during on-effort search. Four on-effort sightings were made on primary lines, while the other on-effort sightings were made on secondary lines. None of these dolphin groups were associated

with any operating fishing vessels.

Table 2. Summary table of survey effort and dolphin sightings collected during the present quarter (i.e. March-May 2015)

Month	Date	Total Distance (km)	No. of Sighting	No. of Individual
<u>HYD</u>				
March 2015	March 30 th	71.17	1	1
April 2015	April 15 th	67.31	4	7
May 2015	May 27 th	70.70	3	8
	<i>Total</i>	<i>209.18</i>	<i>8</i>	<i>16</i>
<u>AFCD</u>				
March 2015	March 27 th	24.10	1	2
April 2015	April 13 th , 21 st , 27 th	77.07	1	1
May 2015	May 26 th	26.60	3	12
	<i>Total</i>	<i>127.77</i>	<i>5</i>	<i>15</i>

3.1.4. In addition, the Indo-Pacific finless porpoises were also sighted during the present quarter in SWL survey area, with a total of 17 groups of 45 animals (Appendix III).

3.2. *Distribution*

3.2.1. Distribution of dolphin sightings made during monitoring surveys in March to May 2015 is shown in Figure 1. Chinese White Dolphins mostly occurred toward the northwestern end of the survey area, while finless porpoises were mostly located on the southeastern end. The only overlapped region where both marine mammal species occurred was around the Soko Islands, where dolphins were spotted between the islands and the porpoises were sighted around the islands but mainly to the south of Tai A Chau (Figure 1). During the present quarter, dolphin occurrence was mainly concentrated between Fan Lau and Kau Ling Chung, while the dolphins generally avoided the offshore region and the Shui Hau Peninsula.

3.2.2. Sighting distribution of dolphins in the present quarter (i.e. spring 2015) was similar to the spring periods of 2013 and 2014, with sightings mainly concentrated around and near Fan Lau (Figure 2). However, it was quite different from the distribution pattern in spring 2012, when most dolphin groups occurred near Shui Hau Peninsula during that year.

3.3. *Encounter rate*

- 3.3.1. During the present three-month impact phase monitoring period (March – May 2015), the encounter rates of Chinese White Dolphins deduced from the survey effort and on-effort sighting data from the primary transect lines under favourable conditions (Beaufort 3 or below) from Southwest Lantau survey area are shown in Table 3. The quarterly rates were calculated by pooling the monthly survey effort and on-effort dolphin sightings from the three months during the present quarter, in order to compare to the historical data.
- 3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter rates were also calculated for the present quarter using both primary and secondary survey effort.
- 3.3.3. Both types of quarterly encounter rates (ER(STG) and ER(ANI)) deduced from the present quarter were also compared with the ones deduced from 2013 and 2014, while the quarterly encounter rates deduced using primary and secondary survey effort combined was compared with the ones deduced from all spring months in the past decade (2005-14) (Table 3).

Table 3. Overall dolphin encounter rates (sightings per 100 km of survey effort) from the present monitoring survey and combined database with AFCD monitoring survey conducted in March-May 2015 (i.e. spring 2015) (primary lines only, as well as both primary lines and secondary lines were used) in Southwest Lantau survey area in comparison to the ones deduced during spring months of 2013 and 2014, as well as the ones in the past decade (March-May 2005-14)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	Primary Lines Only	Both Primary and Secondary Lines	Primary Lines Only	Both Primary and Secondary Lines
Spring 2015	1.63	2.43	4.07	4.57
Spring 2014	2.35	3.40	2.35	8.26
Spring 2013	3.12	1.93	6.24	3.87
Spring of 2005-14		1.54		4.14

- 3.3.4. Dolphin encounter rates in the present quarter appeared to be higher than the overall period of 2005-14 as well as in spring 2013, but lower than the one in spring 2014. It

appeared that dolphin occurrence in Southwest Lantau during this quarter of the year has increased in recent years.

3.4. *Group size*

- 3.4.1. Group size of Chinese White Dolphins ranged from 1-8 individuals per group in SWL survey area between March-May 2015. The average dolphin group size for the three-month period was 2.38, which was lower than the one during the 2005-14 period (2.69).
- 3.4.2. Among the 13 dolphin groups sighted during this quarter, ten of them were composed of only 1-2 dolphins per group, while only two groups have moderate group sizes of five and eight animals respectively.
- 3.4.3. Distribution of dolphins with moderate group size of five animals or more is shown in Figure 3. Both groups were located near Fan Lau.

3.5. *Habitat use*

- 3.5.1. From March to May 2015, only five grids recorded dolphin presence in SWL survey area. Four of the five grids were located near Fan Lau and Kau Ling Chung, while another grid with dolphin occurrence was between the Soko Islands (Figure 4). These grids recorded moderate to high densities, but the results should be treated with cautions as the amount of survey effort collected in each grid during the three-month period was fairly low. A more complete picture of dolphin habitat use pattern will be presented when more survey effort for each grid will be collected throughout the impact phase monitoring programme.
- 3.5.2. When compared with the habitat use pattern recorded during the spring periods of 2012-14, dolphin usage of SWL were more evenly spread along the coastline from Fan Lau in the west to Shui Hau Peninsula in the east, but only the grids around Fan Lau recorded higher dolphin densities in 2012-14, where it was also used intensively used by dolphins in spring 2015 (Figure 5).

3.6. *Mother-calf pairs*

- 3.6.1. During the three-month monitoring period, no occurrence of dolphin calves was found in SWL waters.

3.7. *Activities and associations with fishing boats*

- 3.7.1. During the three-month monitoring period, only one dolphin sighting was associated with feeding activity between the Soko Islands (Figure 6). On the other hand, no sighting was associated with socializing activity at all in SWL waters during the present quarter.

3.7.2. In addition, none of the dolphin groups was associated with operating fishing boat during the present quarter.

3.8. *Summary of photo-identification works*

3.8.1. From March to May 2015, nearly 1,000 digital photographs of Chinese White Dolphins were taken during the SWL monitoring surveys for the photo-identification work.

3.8.2. In total, 10 individuals sighted 11 times altogether were identified (see the summary table in Appendix IV and photographs of identified individuals in Appendix V). Almost all identified individuals were sighted only once or twice during the three-month period, but one individual (SL50) were sighted twice.

3.9. *Individual range use*

3.9.1. Ranging patterns of the 10 individuals identified during the three-month study period were determined by fixed kernel method, and their 95% kernel home ranges including their re-sightings during each year of 2012-15 are shown in Appendix VI for examination of their changes in range use in recent years.

3.9.2. Nine of these 10 individuals were sighted in SWL survey area in the past, and their occurred locations were well within their past home ranges in SWL waters (Appendix VI). The only exception was WL238, which occurred in SWL waters near Fan Lau for the first time during the present quarter. But since it was first identified in January 2014, all of the re-sightings of this individual were within WL waters. Therefore, it was likely just extending its home range use further to the nearby SWL waters.

4. **References**

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

Hung, S. K. 2014. Monitoring of marine mammals in Hong Kong waters – data collection: final report (2013-14). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 231 pp.

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

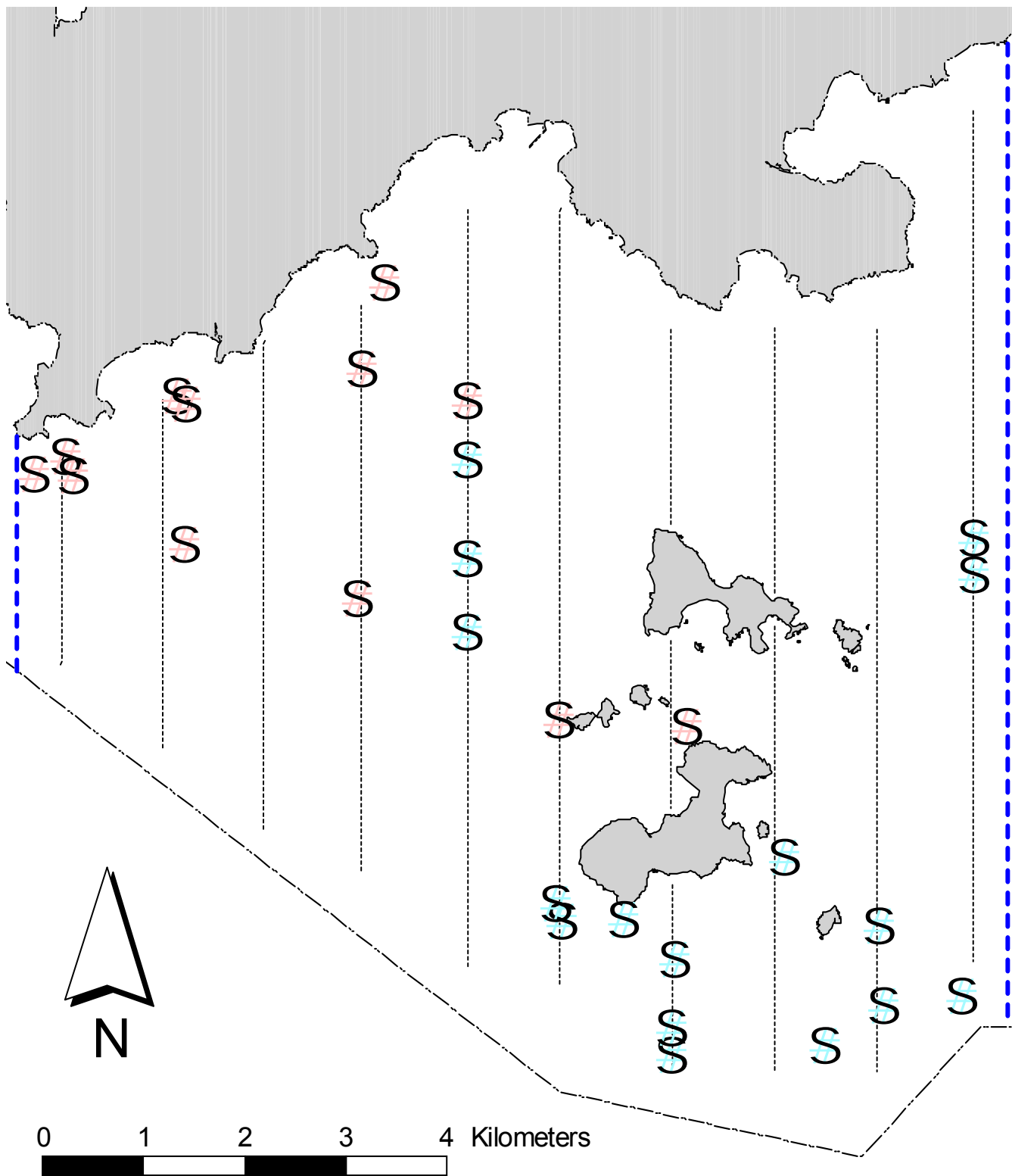


Figure 1. Distribution of marine mammal sightings (pink dots: Chinese White Dolphins; blue dots: Finless Porpoises) during monitoring surveys in Southwest Lantau survey area conducted in March-May 2015

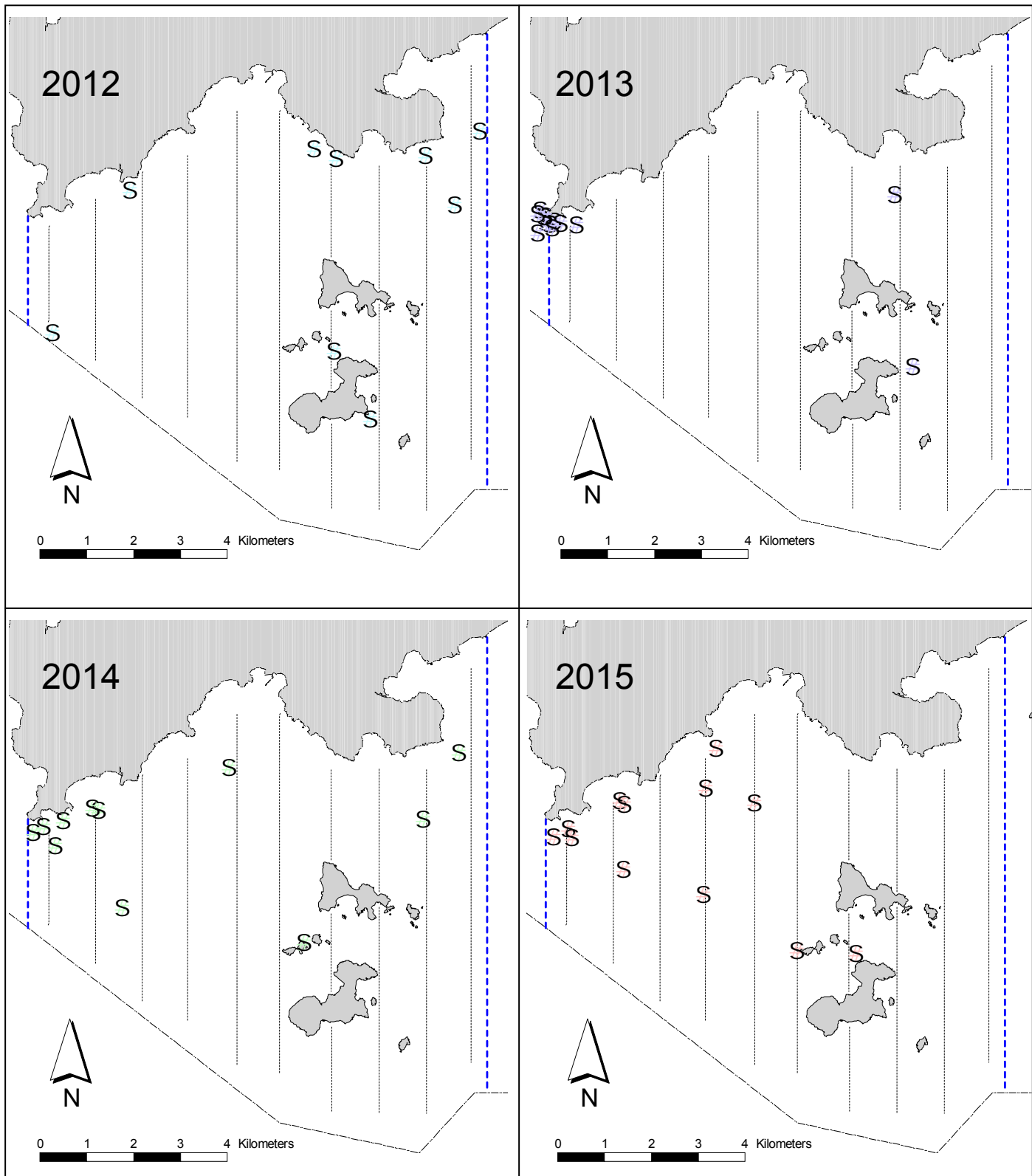


Figure 2. Comparisons on distribution of Chinese White Dolphin sightings in Southwest Lantau survey area during the spring months of 2012-2015

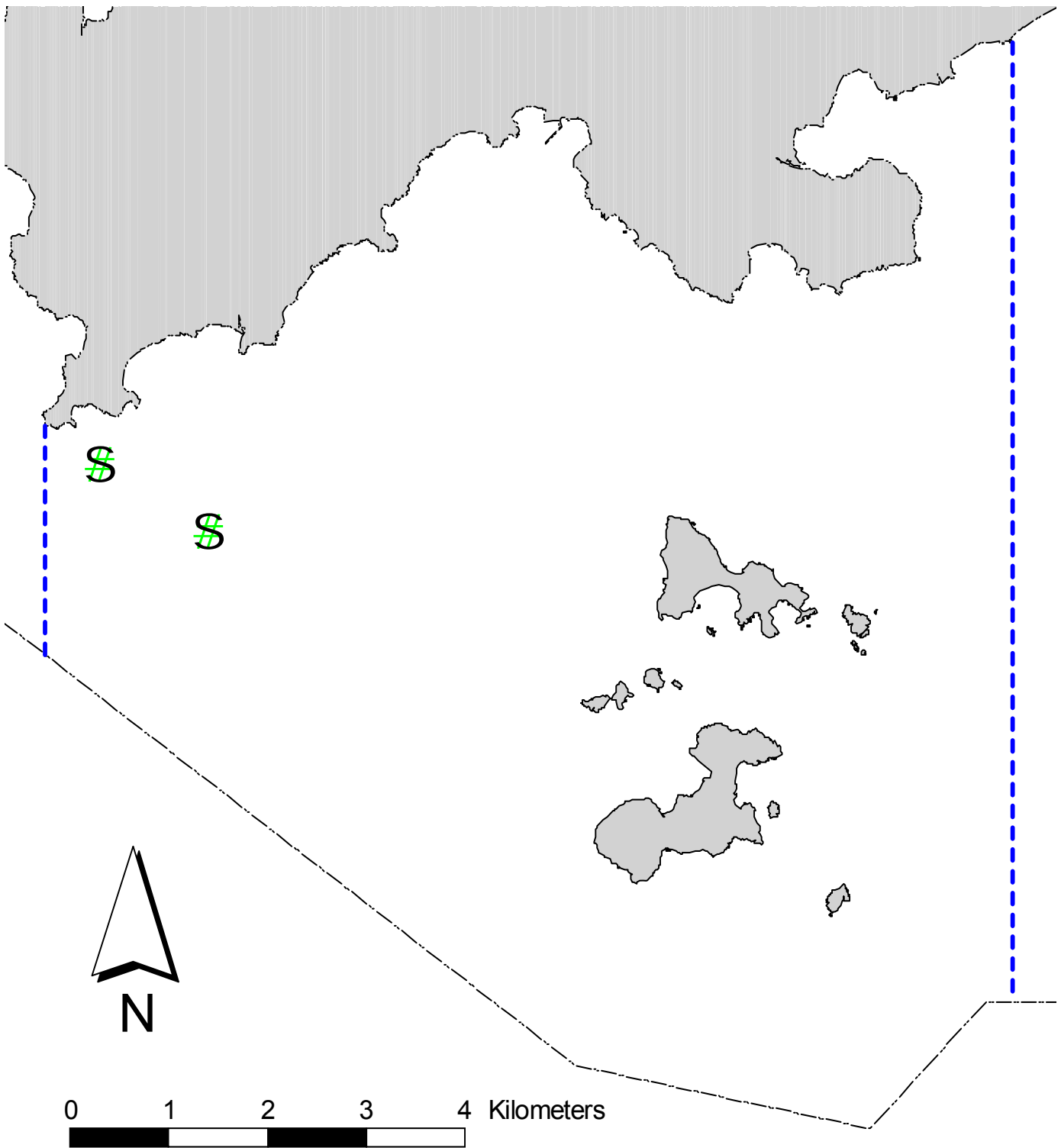


Figure 3. Distribution of Chinese White Dolphins with large group sizes of 5 or more during SWL monitoring surveys conducted in March-May 2015

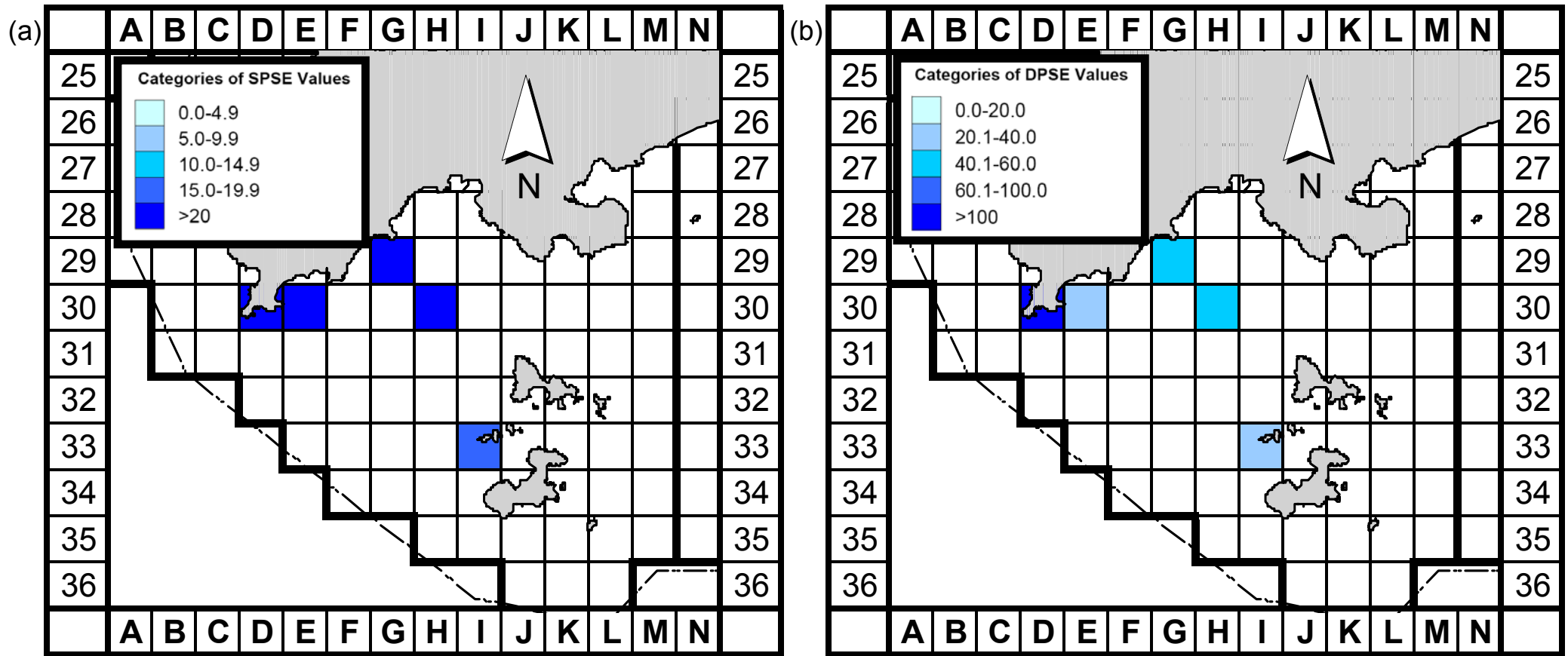


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km² in Southwest Lantau survey area during spring months (March-May) of 2015 (SPSE = no. of on-effort sightings per 100 units of survey effort)

Figure 4b. Density of Chinese white dolphins with corrected survey effort per km² in Southwest Lantau survey area during spring months (March-May) of 2015 (DPSE = no. of dolphins per 100 units of survey effort)

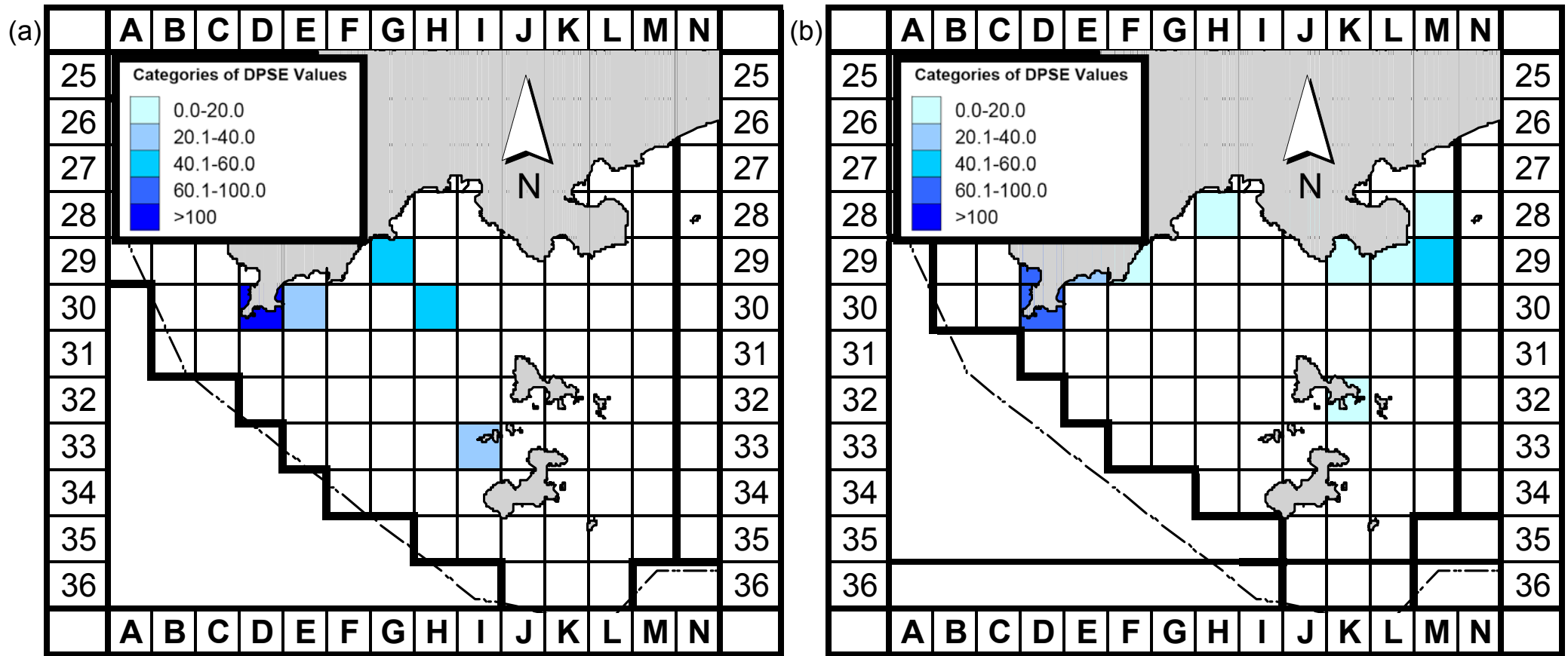


Figure 5a. Density of Chinese white dolphins with corrected survey effort per km² in Southwest Lantau survey area during spring months (March-May) of 2015 (DPSE = no. of dolphins per 100 units of survey effort)

Figure 5b. Density of Chinese white dolphins with corrected survey effort per km² in Southwest Lantau survey area during spring months (March-May) of 2012-2014 (DPSE = no. of dolphins per 100 units of survey effort)

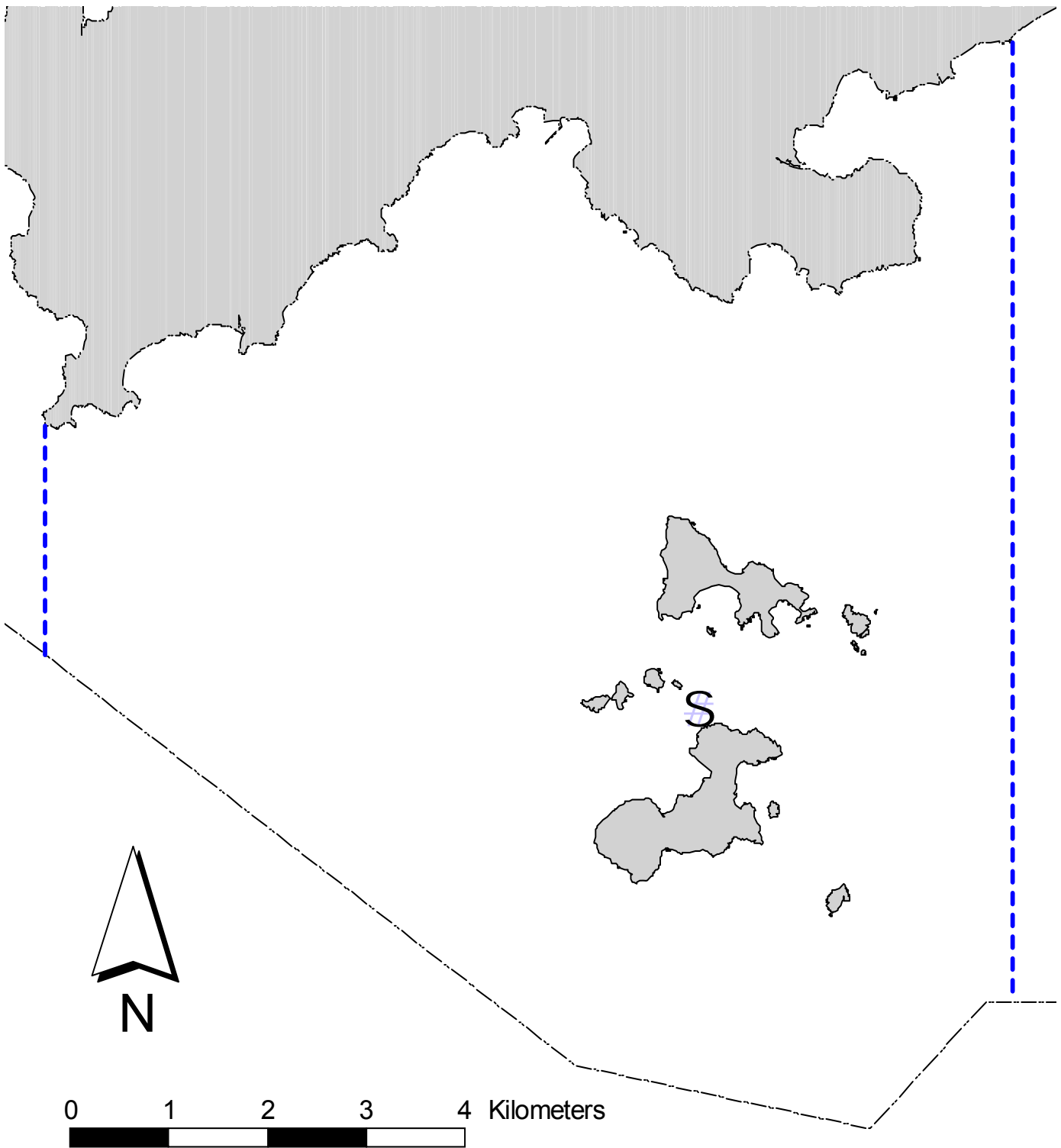


Figure 6. Distribution of Chinese White Dolphins engaged in feeding activity during SWL monitoring surveys conducted in March-May 2015

Appendix I. Survey Effort Database in SWL Survey Area (March-May 2015)

(Abbreviations: BEAU = Beaufort Sea State; P = Primary Line Effort; S = Secondary Line Effort)

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
27-Mar-15	SW LANTAU	1	13.28	SPRING	STANDARD31516	HKCRP	P
27-Mar-15	SW LANTAU	2	3.30	SPRING	STANDARD31516	HKCRP	P
27-Mar-15	SW LANTAU	1	3.07	SPRING	STANDARD31516	HKCRP	S
27-Mar-15	SW LANTAU	2	4.45	SPRING	STANDARD31516	HKCRP	S
30-Mar-15	SW LANTAU	2	30.55	SPRING	STANDARD31516	HYD-HZMB	P
30-Mar-15	SW LANTAU	3	23.99	SPRING	STANDARD31516	HYD-HZMB	P
30-Mar-15	SW LANTAU	2	9.13	SPRING	STANDARD31516	HYD-HZMB	S
30-Mar-15	SW LANTAU	3	7.50	SPRING	STANDARD31516	HYD-HZMB	S
13-Apr-15	SW LANTAU	2	2.90	SPRING	STANDARD31516	HKCRP	P
13-Apr-15	SW LANTAU	3	12.52	SPRING	STANDARD31516	HKCRP	P
13-Apr-15	SW LANTAU	4	4.96	SPRING	STANDARD31516	HKCRP	P
13-Apr-15	SW LANTAU	2	1.40	SPRING	STANDARD31516	HKCRP	S
13-Apr-15	SW LANTAU	3	5.85	SPRING	STANDARD31516	HKCRP	S
13-Apr-15	SW LANTAU	4	2.22	SPRING	STANDARD31516	HKCRP	S
15-Apr-15	SW LANTAU	1	2.67	SPRING	STANDARD31516	HYD-HZMB	P
15-Apr-15	SW LANTAU	2	49.88	SPRING	STANDARD31516	HYD-HZMB	P
15-Apr-15	SW LANTAU	1	0.60	SPRING	STANDARD31516	HYD-HZMB	S
15-Apr-15	SW LANTAU	2	14.16	SPRING	STANDARD31516	HYD-HZMB	S
21-Apr-15	SW LANTAU	1	2.99	SPRING	STANDARD31516	HKCRP	P
21-Apr-15	SW LANTAU	2	12.38	SPRING	STANDARD31516	HKCRP	P
21-Apr-15	SW LANTAU	3	1.15	SPRING	STANDARD31516	HKCRP	P
21-Apr-15	SW LANTAU	1	2.20	SPRING	STANDARD31516	HKCRP	S
21-Apr-15	SW LANTAU	2	9.70	SPRING	STANDARD31516	HKCRP	S
21-Apr-15	SW LANTAU	3	2.51	SPRING	STANDARD31516	HKCRP	S
27-Apr-15	SW LANTAU	3	13.85	SPRING	STANDARD31516	HKCRP	P
27-Apr-15	SW LANTAU	4	1.22	SPRING	STANDARD31516	HKCRP	P
27-Apr-15	SW LANTAU	3	1.22	SPRING	STANDARD31516	HKCRP	S
26-May-15	SW LANTAU	1	4.46	SPRING	STANDARD31516	HKCRP	P
26-May-15	SW LANTAU	2	17.56	SPRING	STANDARD31516	HKCRP	P
26-May-15	SW LANTAU	2	4.58	SPRING	STANDARD31516	HKCRP	S
27-May-15	SW LANTAU	2	44.92	SPRING	STANDARD31516	HYD-HZMB	P
27-May-15	SW LANTAU	3	9.28	SPRING	STANDARD31516	HYD-HZMB	P
27-May-15	SW LANTAU	2	8.82	SPRING	STANDARD31516	HYD-HZMB	S
27-May-15	SW LANTAU	3	7.68	SPRING	STANDARD31516	HYD-HZMB	S

Appendix II. Chinese White Dolphin Sighting Database in SWL Survey Area (March-May 2015)

(Abbreviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Lines)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
27-Mar-15	1	1333	2	SW LANTAU	2	ND	OFF	HKCRP	806018	802208	SPRING	NONE	
30-Mar-15	1	1133	1	SW LANTAU	3	7	ON	HYD-HZMB	806746	803622	SPRING	NONE	S
13-Apr-15	1	1315	1	SW LANTAU	3	46	ON	HKCRP	806183	802518	SPRING	NONE	S
15-Apr-15	1	1127	1	SW LANTAU	1	61	ON	HYD-HZMB	806679	803715	SPRING	NONE	S
15-Apr-15	2	1220	2	SW LANTAU	2	50	ON	HYD-HZMB	807804	805677	SPRING	NONE	S
15-Apr-15	3	1242	2	SW LANTAU	2	123	ON	HYD-HZMB	806707	806500	SPRING	NONE	P
15-Apr-15	4	1322	2	SW LANTAU	2	253	ON	HYD-HZMB	803726	807401	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	
27-May-15	1	1104	5	SW LANTAU	2	127	ON	HYD-HZMB	806006	802600	SPRING	NONE	P
27-May-15	2	1220	1	SW LANTAU	2	37	ON	HYD-HZMB	807008	805459	SPRING	NONE	P
27-May-15	3	1629	2	SE LANTAU	2	ND	OFF	HYD-HZMB	808131	815999	SPRING	NONE	

Appendix III. Finless Porpoise Sighting Database in SWL Survey Area (March-May 2015)

(Abbreviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Lines)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	P/S
27-Mar-15	2	1501	1	SW LANTAU	1	167	ON	HKCRP	801855	807429	SPRING	P
27-Mar-15	3	1535	4	SW LANTAU	1	ND	OFF	HKCRP	803142	812155	SPRING	
30-Mar-15	2	1315	2	SW LANTAU	2	48	ON	HYD-HZMB	802021	807367	SPRING	P
15-Apr-15	5	1426	10	SW LANTAU	2	453	ON	HYD-HZMB	801498	808553	SPRING	P
15-Apr-15	6	1434	4	SW LANTAU	2	22	ON	HYD-HZMB	800612	808520	SPRING	P
15-Apr-15	7	1448	1	SW LANTAU	2	185	ON	HYD-HZMB	802460	809627	SPRING	P
15-Apr-15	8	1536	2	SW LANTAU	2	70	ON	HYD-HZMB	801816	810565	SPRING	P
15-Apr-15	9	1547	2	SW LANTAU	2	47	ON	HYD-HZMB	801161	811389	SPRING	S
15-Apr-15	10	1602	1	SW LANTAU	2	61	ON	HYD-HZMB	805081	811509	SPRING	P
21-Apr-15	5	1410	2	SW LANTAU	1	120	ON	HKCRP	806164	806498	SPRING	P
21-Apr-15	6	1416	2	SW LANTAU	1	241	ON	HKCRP	805234	806497	SPRING	P
21-Apr-15	7	1421	3	SW LANTAU	2	364	ON	HKCRP	804547	806495	SPRING	P
21-Apr-15	8	1447	4	SW LANTAU	2	22	ON	HKCRP	800856	808520	SPRING	P
21-Apr-15	9	1455	1	SW LANTAU	2	189	ON	HKCRP	801876	808037	SPRING	S
27-Apr-15	2	1308	1	SW LANTAU	3	246	ON	HKCRP	805435	811509	SPRING	P
26-May-15	1	1408	2	SW LANTAU	2	28	ON	HKCRP	801074	810615	SPRING	S
26-May-15	2	1414	3	SW LANTAU	2	2	ON	HKCRP	800698	810037	SPRING	S

Appendix IV. Individual dolphins identified during SWL monitoring surveys in March-May 2015

ID#	DATE	STG#	TYPE
SL27	15/05/15	3	HKCRP
SL50	15/04/15	2	HYD-HZMB
	15/04/15	4	HYD-HZMB
WL62	27/05/15	3	HYD-HZMB
WL91	27/05/15	3	HYD-HZMB
WL94	15/05/15	5	HKCRP
WL128	15/05/15	5	HKCRP
WL165	27/05/15	2	HYD-HZMB
WL170	15/05/15	3	HKCRP
WL221	15/04/15	1	HYD-HZMB
WL238	27/05/15	1	HYD-HZMB

Appendix V. Ten individual dolphins that were identified in Southwest Lantau survey area during March-May 2015



Appendix V. (cont'd)

WL94



WL128



WL165



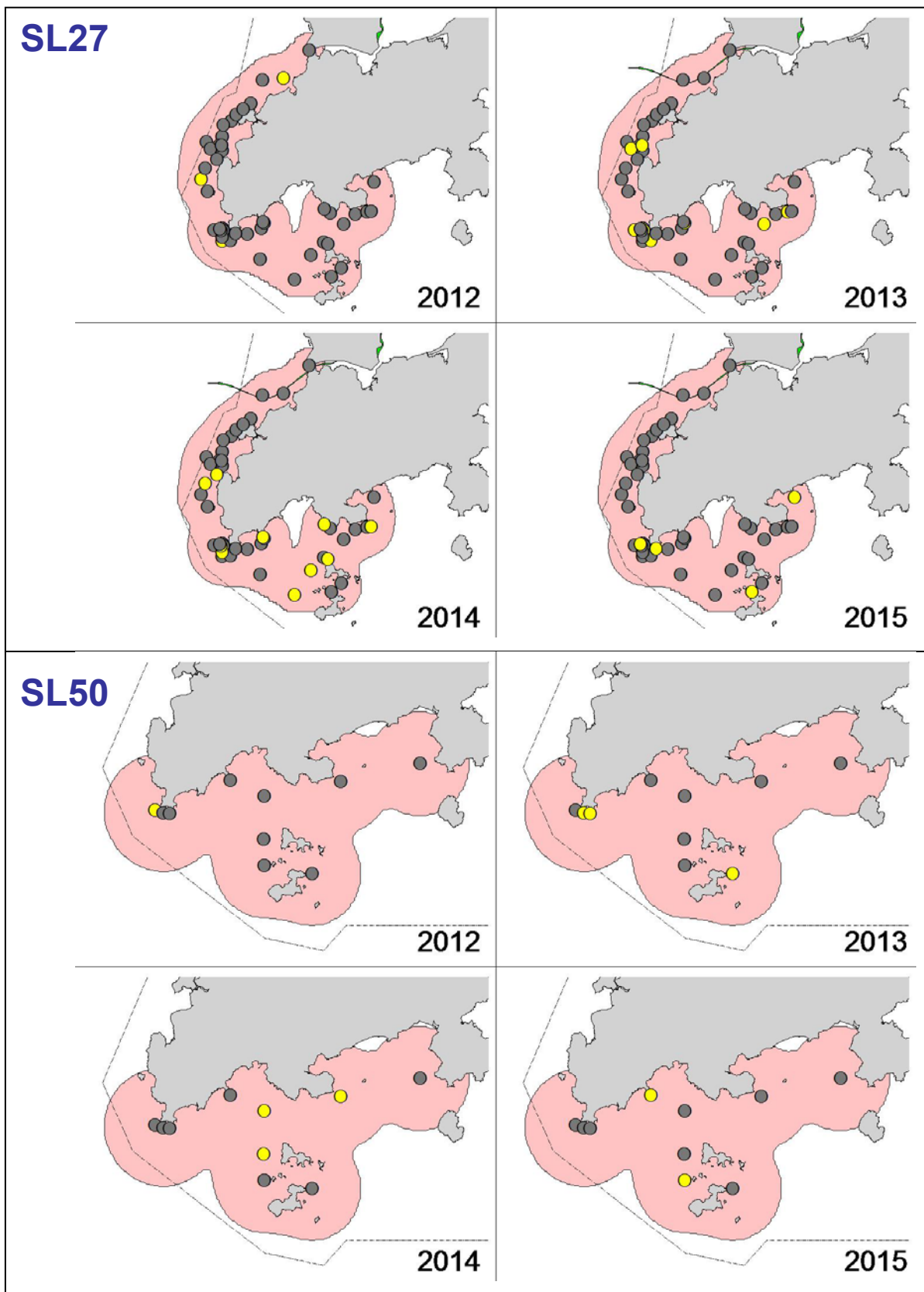
WL170



Appendix V. (cont'd)

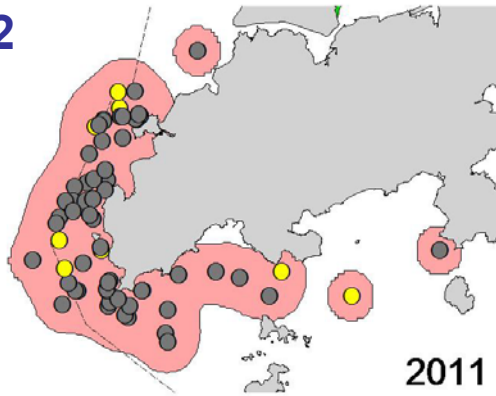


Appendix VI. Ranging patterns (95% kernel ranges) of 10 individual dolphins that were sighted in Southwest Lantau survey area during March-May 2015 (note: yellow dots indicates sightings made in the respective years of 2012-15)

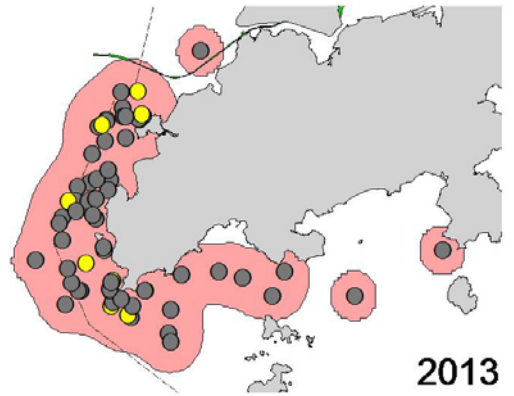


Appendix VI. (cont'd)

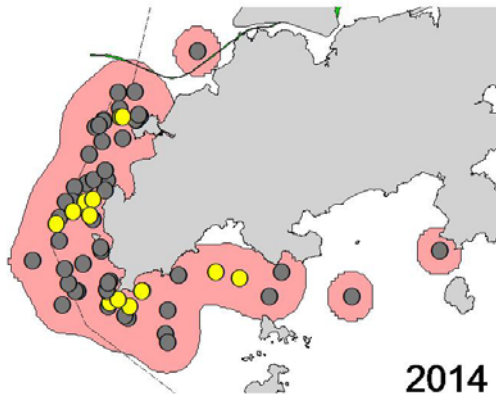
WL62



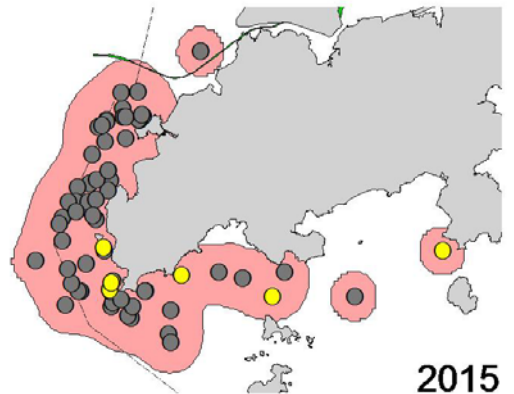
2011



2013

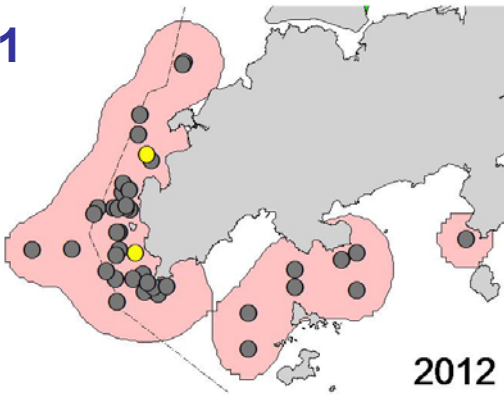


2014

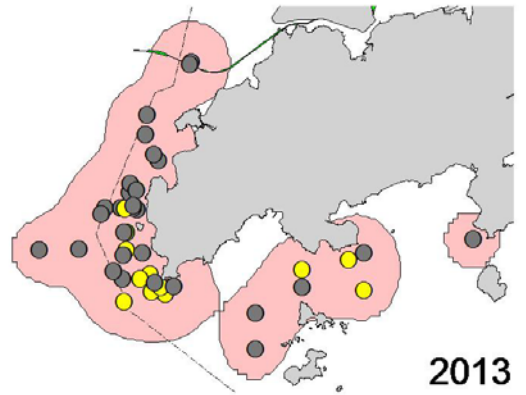


2015

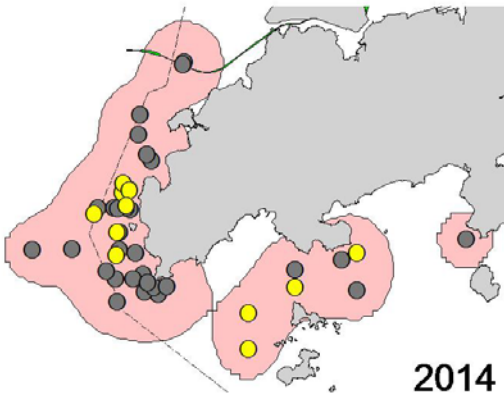
WL91



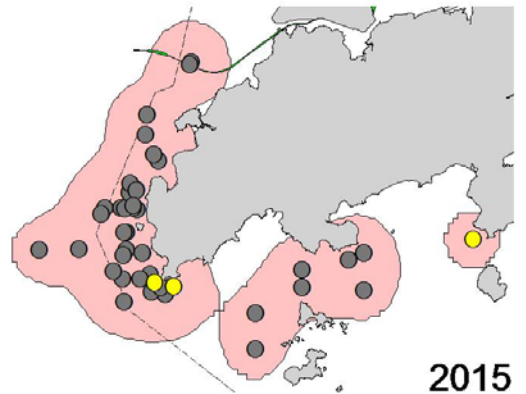
2012



2013



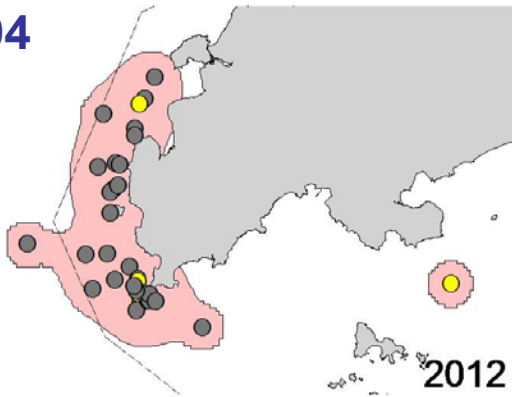
2014



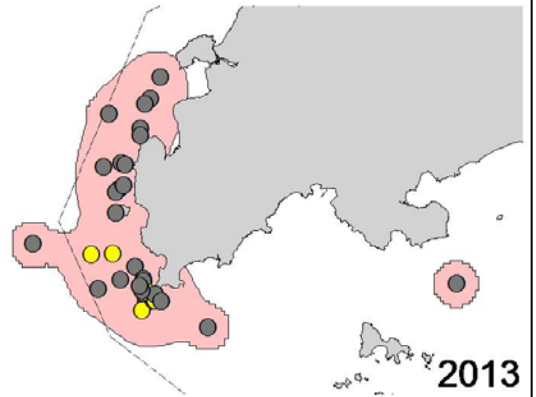
2015

Appendix VI. (cont'd)

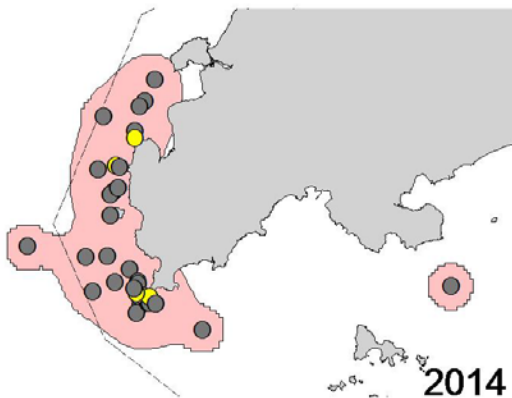
WL94



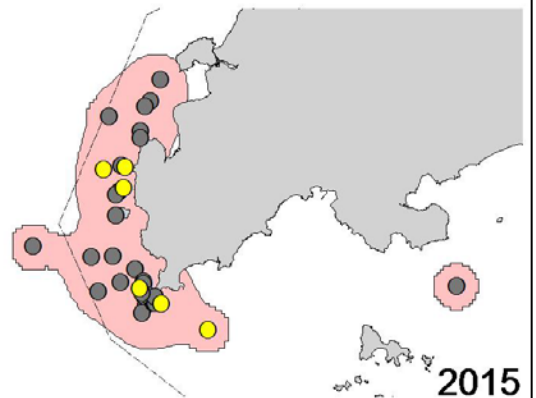
2012



2013

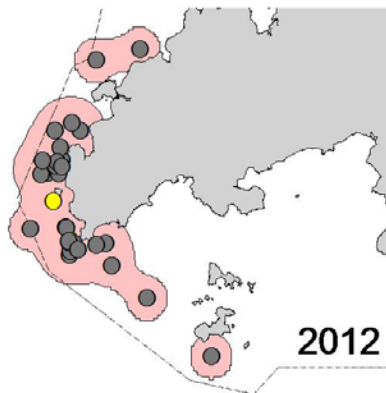


2014

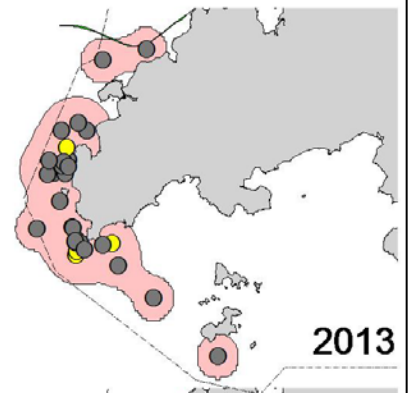


2015

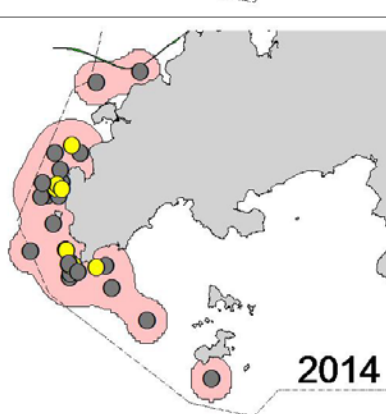
WL128



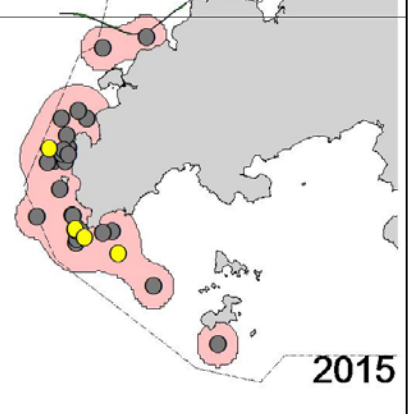
2012



2013



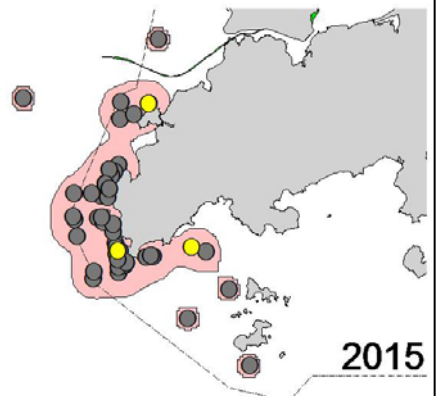
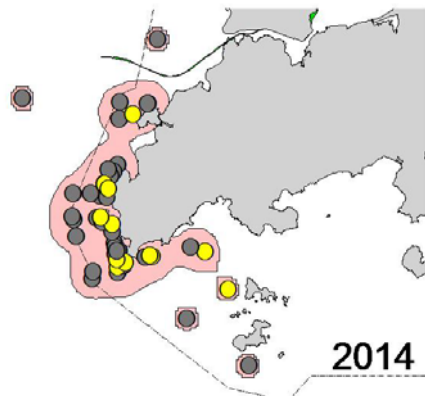
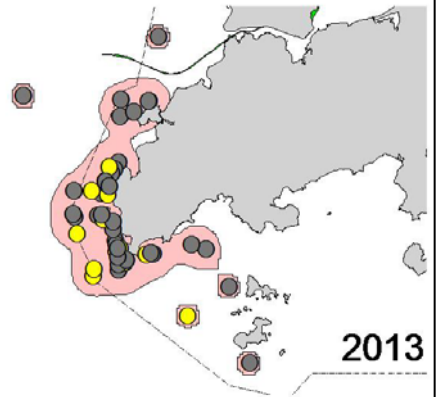
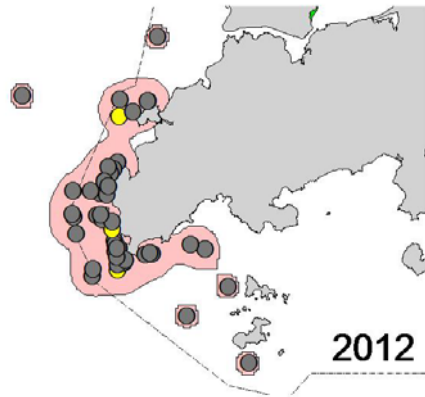
2014



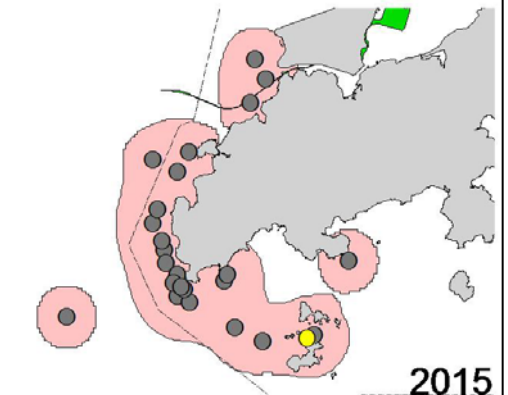
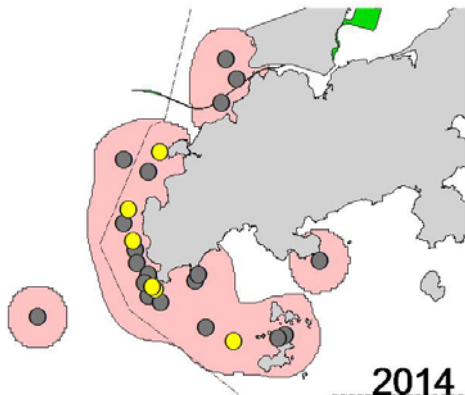
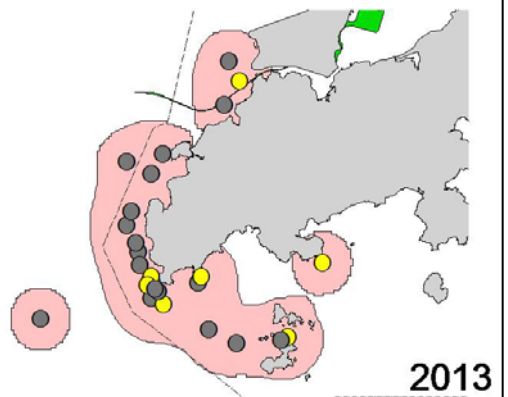
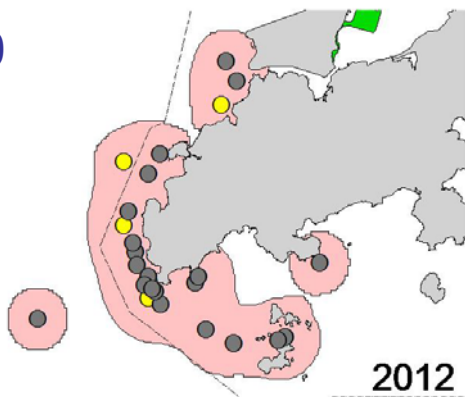
2015

Appendix VI. (cont'd)

WL165

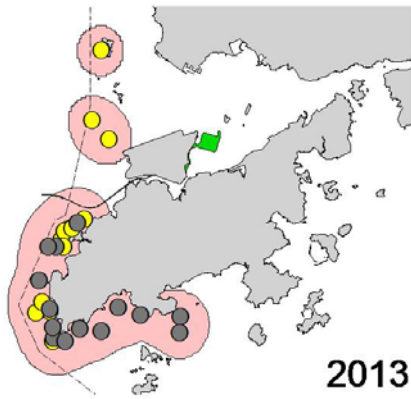


WL170

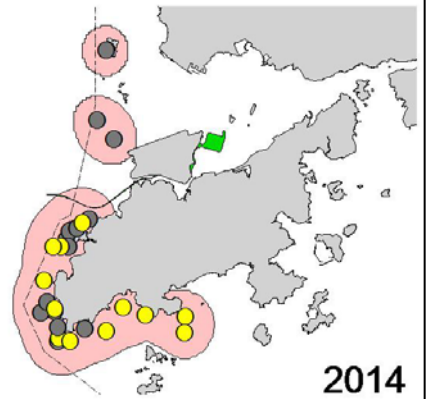


Appendix VI. (cont'd)

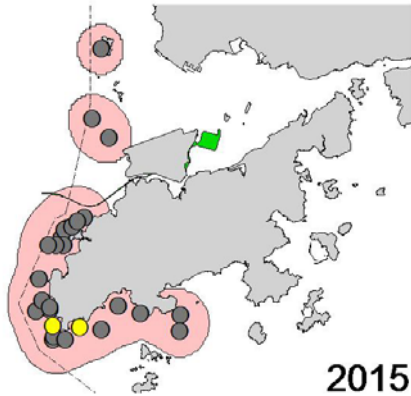
WL221



2013

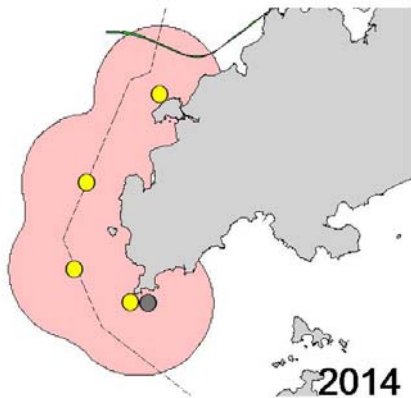


2014

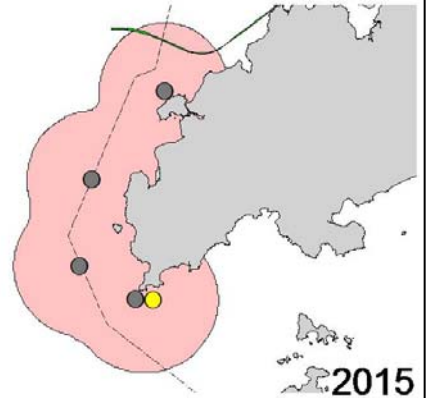


2015

WL238



2014



2015