Contract No. HY/2011/03
Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road – Section between Scenic Hill and Hong Kong Boundary Crossing Facilities Dolphin Monitoring

Quarterly Progress Report (December 2012 – February 2013) submitted to China State Construction Engineering (HK) Ltd.

Submitted by
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1. Introduction

1.1. The Hong Kong Link Road (HKLR) serves to connect the Hong Kong-Zhuhai-Macao Bridge (HZMB) Main Bridge at the Hong Kong Special Administrative Region (HKSAR) Boundary and the HZMB Hong Kong Boundary Crossing Facilities (HKBCF) located at the northeastern waters of the Hong Kong International Airport. The construction of HKLR is separated into two sections, with the construction for the section between Scenic Hill and Hong Kong Boundary Crossing Facilities being commenced in October 2012.

1.2. According to the updated Environmental Monitoring and Audit (EM&A) Manual (for HKLR), monthly line-transect vessel surveys for Chinese White Dolphin should be conducted to cover the Northwest and Northeast Lantau survey areas as in AFCD annual marine mammal monitoring programme.

1.3. In October 2012, Hong Kong Cetacean Research Project (HKCRP) has been commissioned to conduct this 54-month dolphin monitoring study in order to collect data on Chinese White Dolphins during the construction phase (i.e. impact period) of the HKLR03 project in Northwest Lantau (NWL) and Northeast Lantau (NEL) survey areas, and to analyze the collected survey data to monitor distribution, encounter rate, activities and occurrence of dolphin calves. Photo-identification will also be collected from individual Chinese White Dolphins to examine their individual range patterns.

1.4. From the monitoring results, any changes in dolphin occurrence within the study area will be examined for possible causes, and appropriate actions and additional mitigation measures will be recommended as necessary.

1.5. This report is the first quarterly progress report under the HKLR03 construction phase dolphin monitoring programme submitted to the China State Construction Engineering (HK) Limited, summarizing the results of the surveys findings during the period of December 2012 to February 2013.

2. Monitoring Methodology

2.1. Vessel-based Line-transect Survey

2.1.1. According to the requirement of the updated EM&A manual, dolphin monitoring programme should cover all transect lines in NEL and NWL survey areas (see Figure 2.2 of the Quarterly EM&A Report) twice per month throughout the entire construction period. The co-ordinates of all transect lines are shown in Table 1.

Table 1. Co-ordinates of transect lines

Line No.		Easting	Northing		Line No.		Easting	Northing
1	Start Point	804671	814577		13	Start Point	816506	819480
1	End Point	804671	831404		13	End Point	816506	824859
2	Start Point	805475	815457		14	Start Point	817537	820220
2	End Point	805477	826654		14	End Point	817537	824613
3	Start Point	806464	819435		15	Start Point	818568	820735
3	End Point	806464	822911		15	End Point	818568	824433
4	Start Point	807518	819771		16	Start Point	819532	821420
4	End Point	807518	829230		16	End Point	819532	824209
5	Start Point	808504	820220		17	Start Point	820451	822125
5	End Point	808504	828602		17	End Point	820451	823671
6	Start Point	809490	820466		18	Start Point	821504	822371

6	End Point	809490	825352		18	End Point	821504	823761
7	Start Point	810499	820690		19	Start Point	822513	823268
7	End Point	810499	824613		19	End Point	822513	824321
8	Start Point	811508	820847		20	Start Point	823477	823402
8	End Point	811508	824254		20	End Point	823477	824613
9	Start Point	812516	820892		21	Start Point	805476	827081
9	End Point	812516	824254		21	End Point	805476	830562
10	Start Point	813525	820872		22	Start Point	806464	824033
10	End Point	813525	824657		22	End Point	806464	829598
11	Start Point	814556	818449		23	Start Point	814559	821739
11	End Point	814556	820992		23	End Point	814559	824768
12	Start Point	815542	818807					
12	End Point	815542	824882					

2.1.2. The 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 16 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2012). For each monitoring vessel survey, a 15-m inboard vessel (*Standard* 31516) with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

2.1.3. 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 *Steiner* 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 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 2.2 of the Quarterly EM&A Report) was labeled as "primary" survey effort, while the survey effort conducted along the connecting lines between parallel lines was labeled as "secondary" survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese white dolphins deduced from effort and sighting data collected along primary and secondary lines were similar in NEL and NWL survey areas. Therefore, 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. Two professional digital cameras (*Canon* EOS 7D and 60D models), each equipped with long telephoto lenses (100-400 mm zoom), were available on

board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.

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.

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, and total number of dolphins sighted on-effort per 100 km of survey effort) were calculated in NEL and NWL survey areas in relation to the amount of survey effort conducted during each month of monitoring survey. Dolphin encounter rates were calculated in two ways for comparisons with the HZMB baseline monitoring results as well as to AFCD long-term marine mammal monitoring results. Firstly, for the comaprison with the HZMB baseline monitoring results, the encounter rates were

calculated using primary survey effort alone, and only data collected under Beaufort 3 or below condition would be used for encounter rate analysis. The average encounter rate of sightings (STG) and average encounter rate of dolphins (ANI) were deduced based on the encounter rates from six events during the present quarter (i.e. six sets of line-transect surveys in North Lantau), which was also compared with the one deduced from the six events during the baseline period (i.e. six sets of line-transect surveys in North Lantau). Secondly, the encounter rates were calculated using both primary and secondary survey effort collected under Beaufort 3 or below condition as in AFCD long-term monitoring study. The encoutner rate of sightings and dolphins were dedcued by deducting the total number of on-effort sightings (STG) and total number of dolphins (ANI) by the amount of survey effort for the entire quarterly period (December 2012 – February 2013).

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-km^2 grids among NWL and NEL survey areas on GIS. Sighting densities (number of on-effort sightings per km^2) and dolphin densities (total number of dolphins 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 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 **s**ightings **p**er 100 units of **s**urvey **e**ffort. In addition, the derived unit for actual dolphin 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) x 100) / SA%
DPSE = ((D / E) x 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 3-month baseline 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 level.

3. Monitoring Results

3.1. Summary of survey effort and dolphin sightings

3.1.1. During the period of December 2012 to February 2013, six sets of systematic line-transect vessel surveys were conducted to cover all transect lines in NWL and NEL survey areas twice per month.

3.1.2. From these surveys, a total of 900.45 km of survey effort was collected, with 95.0% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility). Among the two areas, 345.69 km and 544.76 km of survey effort were conducted in NEL and NWL survey areas respectively. In addition, the total survey effort conducted on primary lines was 660.41 km, while the effort on secondary lines

was 240.04 km. Survey effort conducted on primary and secondary lines were both considered as on-effort survey data. Summary table of the survey effort is shown in Appendix I.

3.1.3. During the six sets of monitoring surveys in December 2012 to February 2013, a total of 48 groups of 187 Chinese White Dolphins were sighted. All except two sightings were made during on-effort search. Forty on-effort sightings were made on primary lines, while another six on-effort sightings were made on secondary lines. Among the two survey areas, 8 groups of 21 dolphins were sighted in NEL, while the other 40 groups of 166 dolphins were sighted in NWL. Summary table of the dolphin sightings is shown in Appendix II.

3.2. Distribution

3.2.1. Distribution of dolphin sightings made during monitoring surveys in December 2012 to February 2013 is shown in Figure 1. The majority of the dolphin sightings were made around Lung Kwu Chau, while other sightings were scattered to the northeast of the airport platform as well as near the Brothers Islands during the three-month study period.

3.2.2. No dolphin was sighted in the vicinity of the HKLR03 reclamation site, but a sighting was made near the adjacent HKBCF reclamation site during the three-month study period (Figure 1). One dolphin sighting was also made along the alignment of the HKLR09 section to the west of the airport.

3.2.3. When compared with the sighting distribution of dolphins during baseline monitoring surveys in September to November 2011, it appears that more sightings were made around Lung Kwu Chau and near the western border adjacent to the Sha Chau and Lung Kwu Chau marine park in the present quarter (Figure 1). In addition, more sightings were made near the northeast corner of the airport platform, while fewer sightings were made near Pillar Point, the HKBCF reclamation site and around the Brothers Islands during the present three-month period than the baseline period (Figure 1).

3.3. Encounter rate

3.3.1. During the present three-month study period, 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 each of the survey areas are shown in Table 2. The average encounter rates deduced from the six sets of surveys were also compared with the ones deduced from the baseline monitoring period (September – November 2011) (Table 3).

Table 2. Dolphin Encounter Rates (Sightings Per 100 km of Survey Effort) During there Reporting Period (Dec 2012 – Feb 2013)

Survey Area	**Dolphin Monitoring**	**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	**Primary Lines Only**
Northeast Lantau	Set 1 (4 & 6 Dec 2012)	5.42	10.84
	Set 2 (11 & 13 Dec 2012)	0.00	0.00
	Set 3 (2 & 4 Jan 2013)	2.65	2.65
	Set 4 (8 & 10 Jan 2013)	8.24	21.98
	Set 5 (1 & 6 Feb 2013)	2.54	2.54
	Set 6 (18 & 20 Feb 2013)	0.00	0.00
Northwest Lantau	Set 1 (4 & 6 Dec 2012)	5.60	21.01
	Set 2 (11 & 13 Dec 2012)	13.73	60.78
	Set 3 (2 & 4 Jan 2013)	5.57	43.14
	Set 4 (8 & 10 Jan 2013)	3.08	12.33
	Set 5 (1 & 6 Feb 2013)	15.54	63.56
	Set 6 (18 & 20 Feb 2013)	6.62	14.57

	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)	
	December 2012 – February 2013	**September-November 2011**	**December 2012 – February 2013**	**September-November 2011**
Northeast Lantau	3.14 ± 3.21	6.00 ± 5.05	6.33 ± 8.64	22.19 ± 26.81
Northwest Lantau	8.36 ± 5.03	9.85 ± 5.85	35.90 ± 23.10	44.66 ± 29.85

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (December 2012 – February 2013) and baseline monitoring period (September-November 2011) (Note: the encounter rates deduced from the baselie monitroing period have been recalculated based only on the survey effort and on-effort sighting data made along the primary transect lines under favourable conditions)

3.3.2. In NEL, the average dolphin encounter rates (both STG and ANI) in the present three-month study period were 50% and 72% lower than the ones recorded in the 3-month baseline period, indicating a much lower dolphin usage during this impact phase monitoring period in this survey area. On the other hand, the average dolphin encounter rate (both STG and ANI) in NWL during the present impact phase monitoring period was only slightly lower (reductions of 15 and 20% respectively) than the ones recorded in the 3-month baseline period.

3.3.3. A two-way ANOVA with repeated measures and unequal sample size was conducted to examine whether there were any significant differences in the average encounter rates between the baseline and impact monitoring periods. The two variables that were examined included the two periods (baseline and impact phases) and two locations (NEL and NWL). For the comparison between the baseline period and the present quarter (second quarter of the impact phase), the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.2810 and 0.3011 respectively. On the other hand, for the comparison between the baseline period and the cumulative quarters in impact phase (i.e. first and second quarters of the impact phase), the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.0529 and 0.1917 respectively.

3.3.4. For this statistical comparison, the alpha value is set at 0.1 due to the small sample size for each quarter that would likely not be enough to give a higher statistical power in this analysis. With the alpha value at 0.1, no significant difference is detected between the baseline period and the present quarter. However, the comparison between the baseline period and the cumulative quarters in the impact phase indicates that a significant difference is detected in the average dolphin encounter rate of STG (i.e. between the two periods and the locations), but not in the average dolphin encounter rate of ANI (i.e. the difference occurred only between the two locations but not the two periods).

3.3.5. Notably, the sample size of each quarter was fairly small that the statistical power is reduced for comparison between two quarters (i.e. baseline phase vs. present quarter in impact phase). Even though a decline between the baseline phase and present quarter is obvious, more data would be needed to detect a statistical difference. Therefore the comparison between the baseline period

and the cumulative quarters in the impact phase should also be performed throughout the impact phase monitoring period.

3.3.6. To facilitate the comparison with the AFCD long-term monitoring results, the encounte rates were also calculated for the present quarter using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 7.46 sightings and 31.2 dolphins per 100 km of survey effort respectively, while the encounter rates of sightings (STG) and dolphins (ANI) in NEL were 2.31 sightings and 6.07 dolphins per 100 km of survey effort respectively.

3.4. Group size

3.4.1. Group size of Chinese White Dolphins ranged from 1-7 individuals per group in NEL and 1-17 individuals per group in NWL during December 2012 to February 2013. The average dolphin group sizes from these three months were compared with the one deduced from the baseline period in September to November 2011, as shown in Table 4.

Table 4. Comparison of average dolphin group sizes from impact monitoring period (December 2012 – February 2013) and baseline monitoring period (September-November 2011)

	Average Dolphin Group Size	
	December 2012 – February 2013	**September-November 2011**
Overall	3.90 ± 3.53 (n = 48)	3.72 ± 3.13 (n = 66)
Northeast Lantau	2.63 ± 2.13 (n = 8)	3.18 ± 2.16 (n = 17)
Northwest Lantau	4.15 ± 3.71 (n = 40)	3.92 ± 3.40 (n = 49)

3.4.2. The average dolphin group sizes in the entire North Lantau region during December 2012 – February 2013 was slightly higher than the ones recorded in the 3-month baseline period (Table 3). Among the two areas, the average dolphin group size in NEL during the impact phase monitoring period was slightly lower than the baseline period, while the one in NWL was slightly higher (Table 3).

3.4.3. Distribution of dolphins with larger group sizes during December 2012 – February 2013 is shown in Figure 2. These groups were mostly concentrated around the Lung Kwu Chau area, which included four large dolphin groups with more than 10 animals in each group. However, only one group of seven animals was sighted in NEL during the impact phase monitoring period while

the rest of the dolphin groups sighted composed of a few individual.

3.5. Habitat use

3.5.1. From December 2012 to February 2013, the most heavily utilized habitats by Chinese White Dolphins mainly concentrated around Lung Kwu Chau and Sha Chau in NWL, as well as near Siu Ho Wan in NEL (Figures 3a and 3b).

3.5.2. It should be noted that the amount of survey effort collected in each grid during the three-month period was still fairly low (6-12 units of survey effort for most grids), and therefore the habitat use pattern derived from the three-month dataset should be treated with caution. 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.

3.5.3. Notably, one grid near HKBCF (P17) recorded moderately high SPSE/DPSE values, but none of the grids along the alignment of HKLR recorded any dolphin densities. This was different from the baseline period when several grids along the HKLR alignment of HKLR (Grids F21 and G20) recorded moderate to high dolphin densities.

3.6. Mother-calf pairs

3.6.1. During the three-month study period, a total of one unspotted calf (UC) and 10 unspotted juveniles (UJ) were sighted in NEL and NWL survey areas. These young calves comprised 6.4% of all animals sighted, which was very similar to the percentage recorded during the baseline monitoring period (6.8%).

3.6.2. These young calves mainly occurred within the Sha Chau and Lung Kwu Chau Marine Park, while some calves were also sighted near Black Point and Siu Ho Wan (Figure 4). Notably, no young calves were found in the vicinity of the HKLR or HKBCF work sites in December 2012 to February 2013.

3.7. Activities and associations with fishing boats

3.7.1. A total of 14 dolphin sightings were associated with feeding and socializing activities during the three-month study period, comprising of 16.7% and 12.5% of the total number of dolphin sightings. Both percentages were higher than the percentages recorded during the baseline period (feeding activity: 11.6%; socializing activity: 5.4%). Only a lone dolphin was engaged in traveling activity near the HKBCF site in NEL (Figure 5).

3.7.2. Distribution of dolphins engaged in different activities during the three-month study period is shown in Figure 5. Most of the feeding and socializing activities occurred between Sha Chau and Lung Kwu Chau, while some were

also made near Siu Ho Wan (Figure 5). Moreover, one group of four dolphins was engaged in traveling activity to the east of the HKBCF site. It is uncertain whether the dolphins were disturbed by the construction activities and were traveling quickly through the area.

3.7.3. During the three-month period, only one dolphin group were found to be associated with an operating shrimp trawler, comprising of 2.1% of all dolphin groups, which was much lower than the percentage recorded in baseline period (5.4%). The low percentage of fishing boat association was likely related to the recent trawl ban being implemented in 2013 in Hong Kong waters.

3.8. Photo-identification and individual range use

3.8.1. From December 2012 to February 2013, over 3,000 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.

3.8.2. In total, 57 individuals sighted 103 times altogether were identified (see summary table in Appendix III). The number of re-sightings made in NEL and NWL were 13.6% and 86.4% of the total respectively. Notably, a very high percentage of dolphins sighted in NEL (14 out of 21 dolphins) were identified as known individuals, and these are all considered to be year-round residents (e.g. EL01, NL18, NL33, NL123) that regularly occur in North Lantau waters.

3.8.3. Most identified individuals were sighted only once or twice during the three-month period, with the exception of 13 individuals being sighted thrice (e.g. NL93, NL139, NL165), and one individual being sighted four times (NL260).

3.8.4. Ranging patterns of the 57 individuals identified during the three-month study period were determined by fixed kernel method, and are shown in Appendix IV. Notably, many of these individuals being sighted a few times ranged extensively across NEL and NWL.

3.8.5. A number of individuals were sighted in both NEL and NWL survey areas (e.g. EL01, NL123, NL136, NL179, NL285), indicating that the on-going HZMB construction works have not seriously affected their movement between the two areas.

3.8.6. However, a number of year-round residents (e.g. CH34, NL118, NL191, NL284) that used to utilize the Brothers Islands as their core areas have not been seen there during this quarter and the previous quarter. Their range use should be continuously monitored in the upcoming quarters to determine whether their movement into NEL has been affected by the reclamation works of HKLR03 or HKBCF.

3.8.7. It should be noted that only a very few individuals have their ranges overlapped with the HKLR03 construction works (Appendix IV), and their movement will likely not be affected by the reclamation works of the present project. Nevertheless, the range use of individual dolphins will be continuously monitored throughout the construction period to examine whether any shift in ranging pattern has occurred as a result of the HZMB construction activities.

4. Conclusion

4.1. During this quarter of dolphin monitoring, no adverse impact from the activities of this construction project on Chinese White Dolphins was noticeable from general observations, as the dolphin occurrence in the HKLR03 work sites remained rare as in the baseline period.

4.2. Although the average dolphin encounter rates and group sizes in the present three-month study period were lower than the ones in the three-month baseline monitoring period, the dolphins do not appear to be affected by the HKLR03 reclamation works, as they rarely occurred in this area in the past (see Hung 2012), during the baseline monitoring period and the impact phase monitoring period.

4.3. Nevertheless, dolphin usage in NEL and NWL will be continuously monitored, to examine whether it will be affected by the on-going construction activities in relation to the HZMB works.

5. 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. 2012. Monitoring of marine mammals in Hong Kong waters – data collection: final report (2011-12). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 120 pp.

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

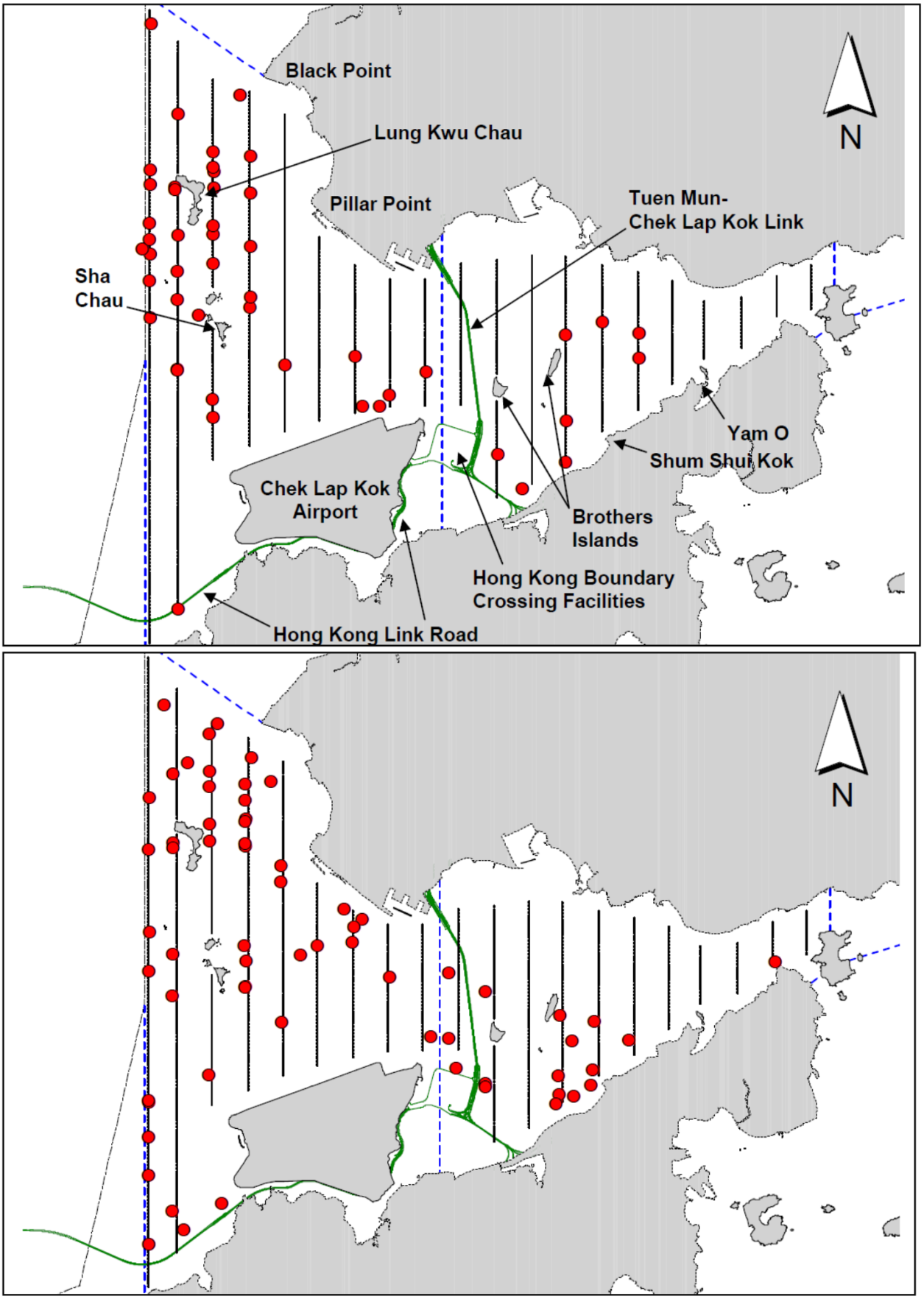


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top: December 2012 – February 2013) and baseline monitoring surveys (below: September – November 2011)

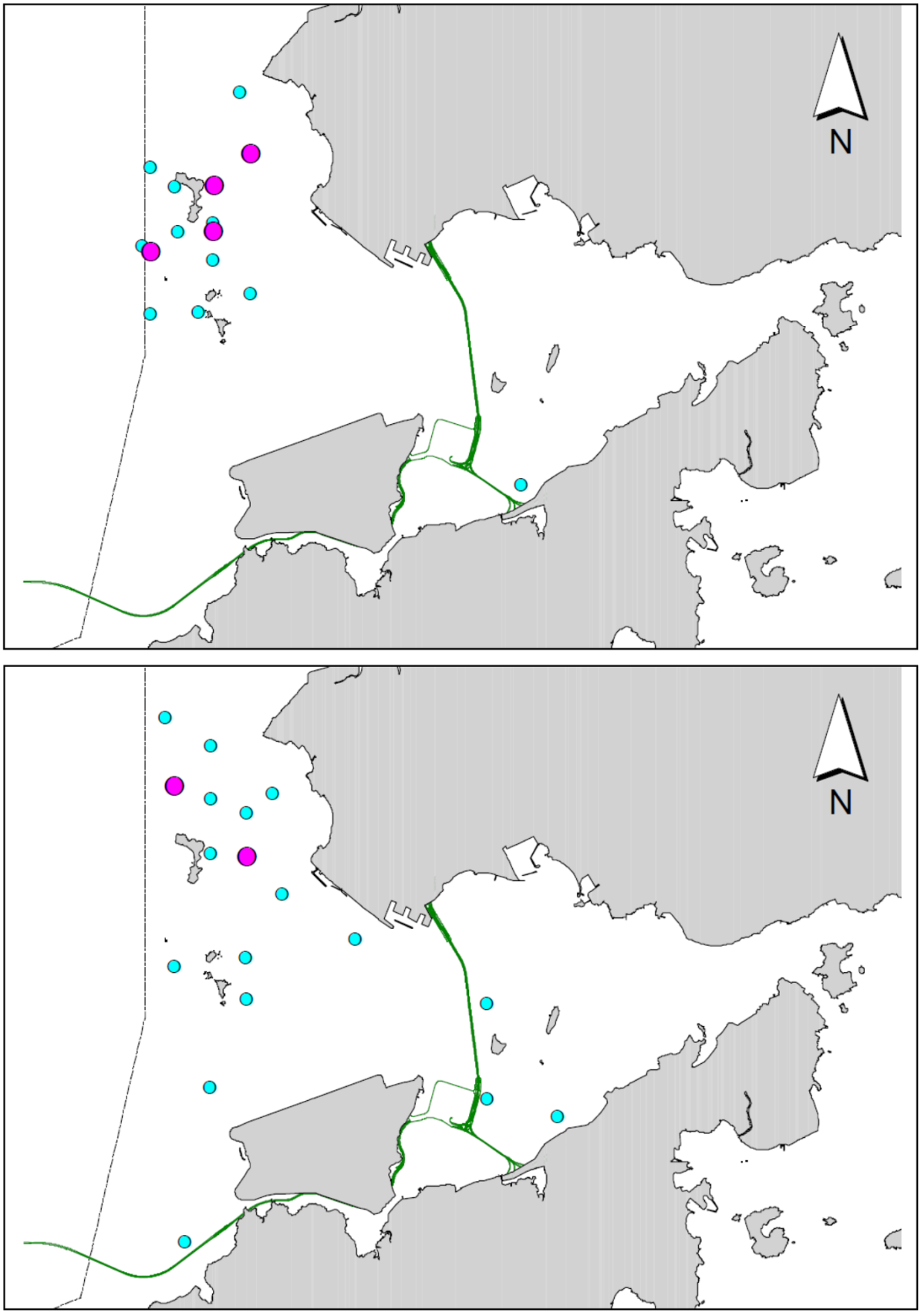


Figure 2. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top: Dec 2012 – February 2013) and baseline monitoring surveys (below: September – November 2011) (blue dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

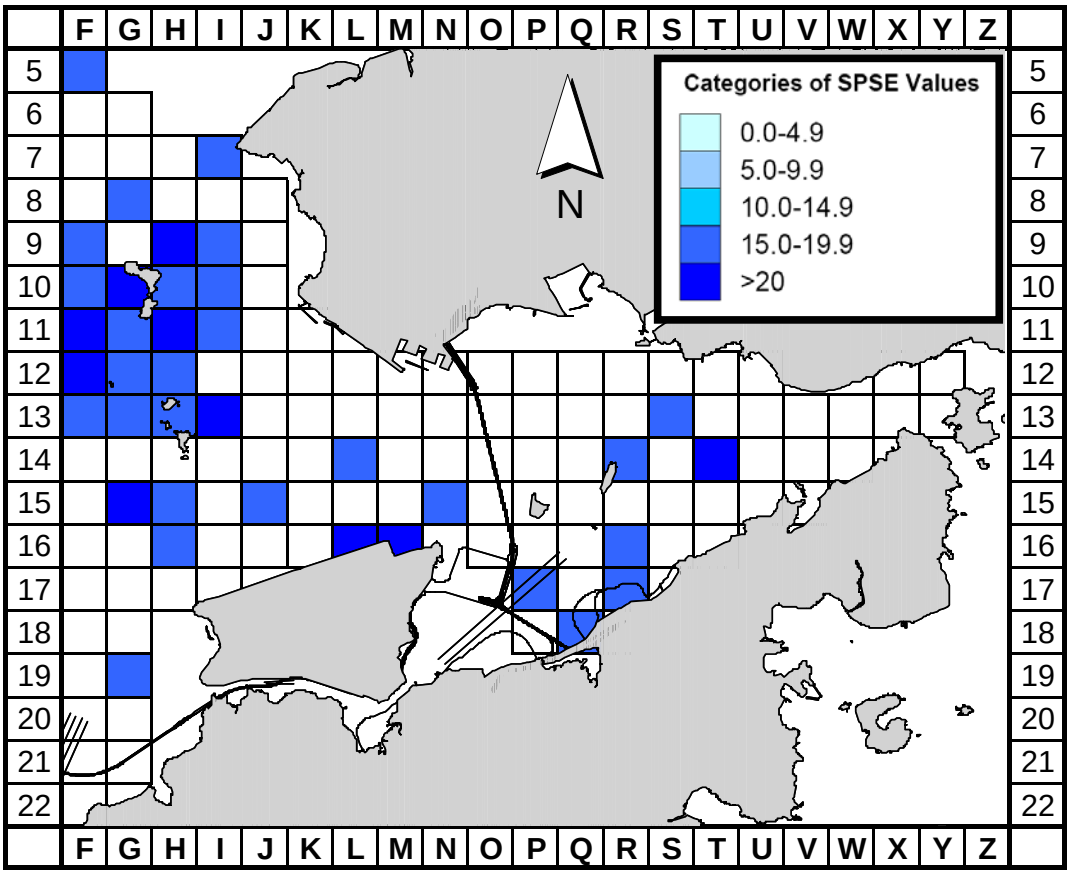


Figure 3a. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period monitoring period (Dec 12-Feb 13) (SPSE = no. of on-effort sightings per 100 units of survey effort)

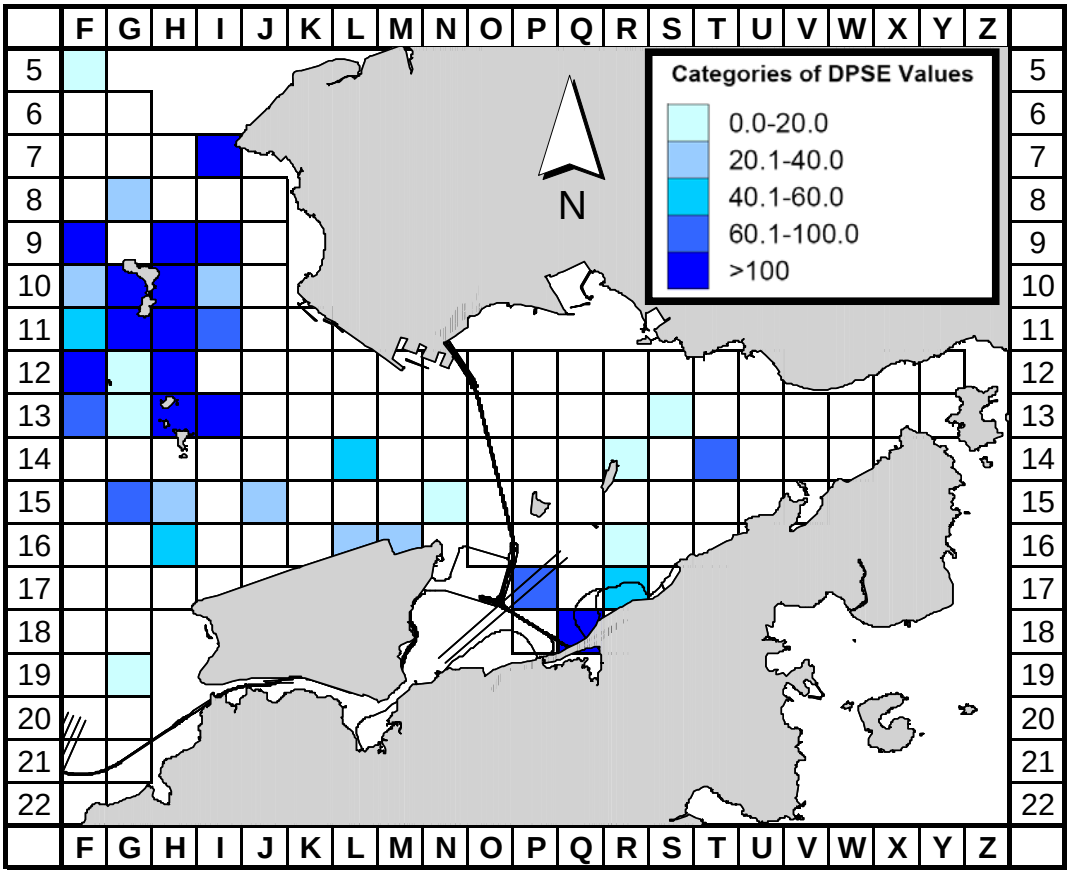


Figure 3b. Density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Dec 12-Feb 13) (DPSE = no. of dolphins per 100 units of survey effort)

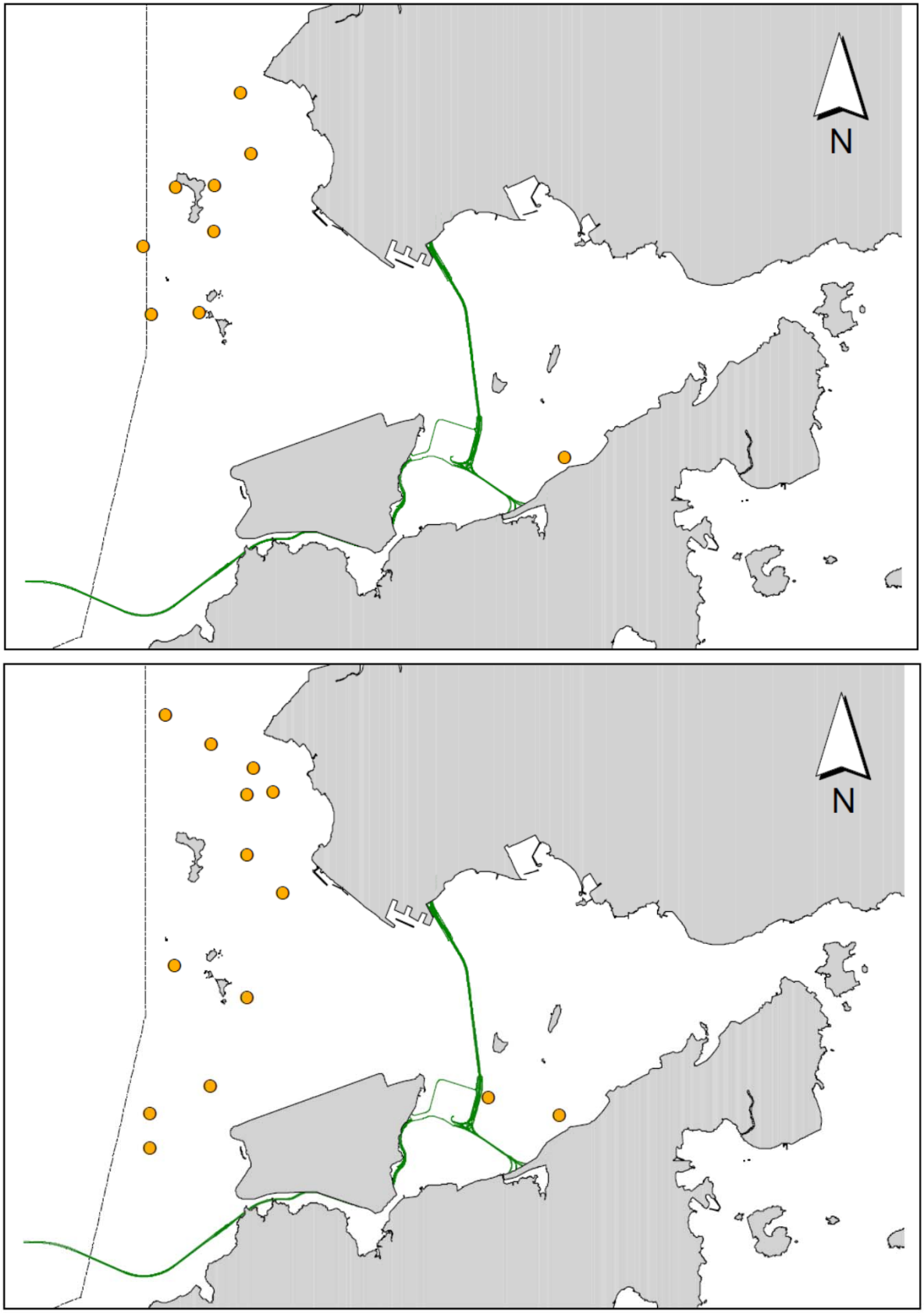


Figure 4. Distribution of young calves of Chinese white dolphins during HKLR03 impact phase (top: December 2012 – February 2013) and baseline monitoring surveys (below: September – November 2011)

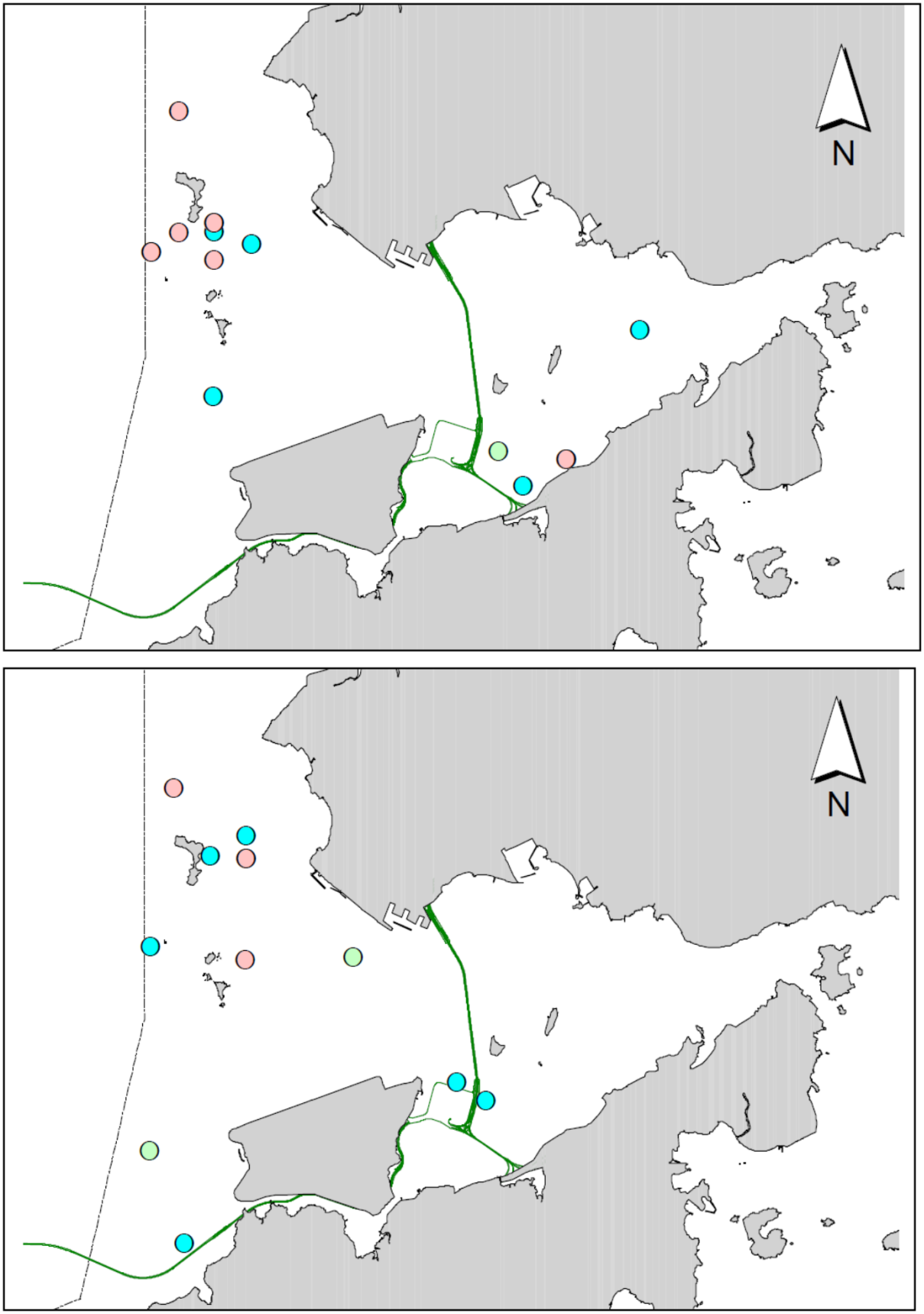


Figure 5. Distribution of Chinese white dolphins engaged in feeding (blue dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top: December 2012 – February 2013) and baseline monitoring surveys (below: September – November 2011)

Appendix I. HKLR03 Survey Effort Database (Dec 2012-Feb 2013)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
6-Dec-12	NE LANTAU	1	1.30	WINTER	STANDARD31516	HKLR	P
6-Dec-12	NE LANTAU	2	16.20	WINTER	STANDARD31516	HKLR	P
6-Dec-12	NE LANTAU	3	2.00	WINTER	STANDARD31516	HKLR	P
6-Dec-12	NE LANTAU	2	10.80	WINTER	STANDARD31516	HKLR	S
6-Dec-12	NW LANTAU	1	1.10	WINTER	STANDARD31516	HKLR	P
6-Dec-12	NW LANTAU	2	11.00	WINTER	STANDARD31516	HKLR	P
6-Dec-12	NW LANTAU	3	18.80	WINTER	STANDARD31516	HKLR	P
6-Dec-12	NW LANTAU	2	7.20	WINTER	STANDARD31516	HKLR	S
7-Dec-12	NW LANTAU	2	23.20	WINTER	STANDARD31516	HKLR	P
7-Dec-12	NW LANTAU	3	17.30	WINTER	STANDARD31516	HKLR	P
7-Dec-12	NW LANTAU	2	13.30	WINTER	STANDARD31516	HKLR	S
7-Dec-12	NE LANTAU	1	6.10	WINTER	STANDARD31516	HKLR	P
7-Dec-12	NE LANTAU	2	11.30	WINTER	STANDARD31516	HKLR	P
7-Dec-12	NE LANTAU	1	2.20	WINTER	STANDARD31516	HKLR	S
7-Dec-12	NE LANTAU	2	7.70	WINTER	STANDARD31516	HKLR	S
11-Dec-12	NE LANTAU	1	1.00	WINTER	STANDARD31516	HKLR	P
11-Dec-12	NE LANTAU	2	12.70	WINTER	STANDARD31516	HKLR	P
11-Dec-12	NE LANTAU	3	2.20	WINTER	STANDARD31516	HKLR	P
11-Dec-12	NE LANTAU	1	1.70	WINTER	STANDARD31516	HKLR	S
11-Dec-12	NE LANTAU	2	8.10	WINTER	STANDARD31516	HKLR	S
11-Dec-12	NW LANTAU	2	18.10	WINTER	STANDARD31516	HKLR	P
11-Dec-12	NW LANTAU	3	19.80	WINTER	STANDARD31516	HKLR	P
11-Dec-12	NW LANTAU	4	3.40	WINTER	STANDARD31516	HKLR	P
11-Dec-12	NW LANTAU	2	9.20	WINTER	STANDARD31516	HKLR	S
11-Dec-12	NW LANTAU	3	0.50	WINTER	STANDARD31516	HKLR	S
11-Dec-12	NW LANTAU	4	3.50	WINTER	STANDARD31516	HKLR	S
13-Dec-12	NW LANTAU	2	0.90	WINTER	STANDARD31516	HKLR	P
13-Dec-12	NW LANTAU	3	12.20	WINTER	STANDARD31516	HKLR	P
13-Dec-12	NW LANTAU	4	18.10	WINTER	STANDARD31516	HKLR	P
13-Dec-12	NW LANTAU	4	6.80	WINTER	STANDARD31516	HKLR	S
13-Dec-12	NE LANTAU	2	3.50	WINTER	STANDARD31516	HKLR	P
13-Dec-12	NE LANTAU	3	17.00	WINTER	STANDARD31516	HKLR	P
13-Dec-12	NE LANTAU	2	4.30	WINTER	STANDARD31516	HKLR	S
13-Dec-12	NE LANTAU	3	6.40	WINTER	STANDARD31516	HKLR	S
2-Jan-13	NE LANTAU	1	2.60	WINTER	STANDARD31516	HKLR	P
2-Jan-13	NE LANTAU	2	15.02	WINTER	STANDARD31516	HKLR	P
2-Jan-13	NE LANTAU	1	0.45	WINTER	STANDARD31516	HKLR	S
2-Jan-13	NE LANTAU	2	9.33	WINTER	STANDARD31516	HKLR	S
2-Jan-13	NW LANTAU	1	1.50	WINTER	STANDARD31516	HKLR	P
2-Jan-13	NW LANTAU	2	17.57	WINTER	STANDARD31516	HKLR	P
2-Jan-13	NW LANTAU	3	21.39	WINTER	STANDARD31516	HKLR	P
2-Jan-13	NW LANTAU	1	1.96	WINTER	STANDARD31516	HKLR	S
2-Jan-13	NW LANTAU	2	3.11	WINTER	STANDARD31516	HKLR	S
2-Jan-13	NW LANTAU	3	7.90	WINTER	STANDARD31516	HKLR	S
4-Jan-13	NW LANTAU	2	16.80	WINTER	STANDARD31516	HKLR	P
4-Jan-13	NW LANTAU	3	14.60	WINTER	STANDARD31516	HKLR	P
4-Jan-13	NW LANTAU	2	4.20	WINTER	STANDARD31516	HKLR	S
4-Jan-13	NW LANTAU	3	3.50	WINTER	STANDARD31516	HKLR	S
4-Jan-13	NE LANTAU	2	15.46	WINTER	STANDARD31516	HKLR	P
4-Jan-13	NE LANTAU	3	4.70	WINTER	STANDARD31516	HKLR	P
4-Jan-13	NE LANTAU	2	6.72	WINTER	STANDARD31516	HKLR	S

Appendix I. (cont'd)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
4-Jan-13	NE LANTAU	3	4.20	WINTER	STANDARD31516	HKLR	S
8-Jan-13	NE LANTAU	1	4.02	WINTER	STANDARD31516	HKLR	P
8-Jan-13	NE LANTAU	2	12.06	WINTER	STANDARD31516	HKLR	P
8-Jan-13	NE LANTAU	1	1.94	WINTER	STANDARD31516	HKLR	S
8-Jan-13	NE LANTAU	2	5.98	WINTER	STANDARD31516	HKLR	S
8-Jan-13	NW LANTAU	2	5.31	WINTER	STANDARD31516	HKLR	P
8-Jan-13	NW LANTAU	3	27.89	WINTER	STANDARD31516	HKLR	P
8-Jan-13	NW LANTAU	4	7.80	WINTER	STANDARD31516	HKLR	P
8-Jan-13	NW LANTAU	3	7.32	WINTER	STANDARD31516	HKLR	S
8-Jan-13	NW LANTAU	4	5.58	WINTER	STANDARD31516	HKLR	S
10-Jan-13	NW LANTAU	2	19.29	WINTER	STANDARD31516	HKLR	P
10-Jan-13	NW LANTAU	3	12.40	WINTER	STANDARD31516	HKLR	P
10-Jan-13	NW LANTAU	2	5.81	WINTER	STANDARD31516	HKLR	S
10-Jan-13	NW LANTAU	3	1.60	WINTER	STANDARD31516	HKLR	S
10-Jan-13	NE LANTAU	1	8.71	WINTER	STANDARD31516	HKLR	P
10-Jan-13	NE LANTAU	2	11.62	WINTER	STANDARD31516	HKLR	P
10-Jan-13	NE LANTAU	1	4.40	WINTER	STANDARD31516	HKLR	S
10-Jan-13	NE LANTAU	2	6.27	WINTER	STANDARD31516	HKLR	S
1-Feb-13	NW LANTAU	1	6.20	WINTER	STANDARD31516	HKLR	P
1-Feb-13	NW LANTAU	2	29.70	WINTER	STANDARD31516	HKLR	P
1-Feb-13	NW LANTAU	3	3.70	WINTER	STANDARD31516	HKLR	P
1-Feb-13	NW LANTAU	2	12.80	WINTER	STANDARD31516	HKLR	S
1-Feb-13	NE LANTAU	1	9.10	WINTER	STANDARD31516	HKLR	P
1-Feb-13	NE LANTAU	2	9.50	WINTER	STANDARD31516	HKLR	P
1-Feb-13	NE LANTAU	1	3.40	WINTER	STANDARD31516	HKLR	S
1-Feb-13	NE LANTAU	2	5.40	WINTER	STANDARD31516	HKLR	S
6-Feb-13	NE LANTAU	1	10.90	WINTER	STANDARD31516	HKLR	P
6-Feb-13	NE LANTAU	2	9.90	WINTER	STANDARD31516	HKLR	P
6-Feb-13	NE LANTAU	1	5.50	WINTER	STANDARD31516	HKLR	S
6-Feb-13	NE LANTAU	2	5.10	WINTER	STANDARD31516	HKLR	S
6-Feb-13	NW LANTAU	1	3.30	WINTER	STANDARD31516	HKLR	P
6-Feb-13	NW LANTAU	2	17.90	WINTER	STANDARD31516	HKLR	P
6-Feb-13	NW LANTAU	3	10.10	WINTER	STANDARD31516	HKLR	P
6-Feb-13	NW LANTAU	1	1.80	WINTER	STANDARD31516	HKLR	S
6-Feb-13	NW LANTAU	2	4.30	WINTER	STANDARD31516	HKLR	S
18-Feb-13	NE LANTAU	1	11.59	WINTER	STANDARD31516	HKLR	P
18-Feb-13	NE LANTAU	2	4.74	WINTER	STANDARD31516	HKLR	P
18-Feb-13	NE LANTAU	3	1.70	WINTER	STANDARD31516	HKLR	P
18-Feb-13	NE LANTAU	1	8.67	WINTER	STANDARD31516	HKLR	S
18-Feb-13	NE LANTAU	2	1.10	WINTER	STANDARD31516	HKLR	S
18-Feb-13	NW LANTAU	1	1.30	WINTER	STANDARD31516	HKLR	P
18-Feb-13	NW LANTAU	2	40.13	WINTER	STANDARD31516	HKLR	P
18-Feb-13	NW LANTAU	1	2.50	WINTER	STANDARD31516	HKLR	S
18-Feb-13	NW LANTAU	2	10.45	WINTER	STANDARD31516	HKLR	S
20-Feb-13	NW LANTAU	2	23.95	WINTER	STANDARD31516	HKLR	P
20-Feb-13	NW LANTAU	3	10.12	WINTER	STANDARD31516	HKLR	P
20-Feb-13	NW LANTAU	2	6.74	WINTER	STANDARD31516	HKLR	S
20-Feb-13	NE LANTAU	1	3.91	WINTER	STANDARD31516	HKLR	P
20-Feb-13	NE LANTAU	2	16.82	WINTER	STANDARD31516	HKLR	P
20-Feb-13	NE LANTAU	1	1.87	WINTER	STANDARD31516	HKLR	S
20-Feb-13	NE LANTAU	2	8.50	WINTER	STANDARD31516	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (December 2012 - February 2013)

(Abberviations: 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
6-Dec-12	1	1052	1	NE LANTAU	2	141	ON	HKLR	823122	817544	WINTER	NONE	P
6-Dec-12	2	1220	1	NW LANTAU	2	ND	OFF	HKLR	821171	811473	WINTER	NONE	
6-Dec-12	3	1339	3	NW LANTAU	3	58	ON	HKLR	823492	807511	WINTER	NONE	P
6-Dec-12	4	1400	4	NW LANTAU	3	32	ON	HKLR	825109	807524	WINTER	NONE	P
6-Dec-12	5	1513	1	NW LANTAU	2	154	ON	HKLR	826697	805364	WINTER	NONE	S
6-Dec-12	6	1525	6	NW LANTAU	2	196	ON	HKLR	825423	805465	WINTER	NONE	P
7-Dec-12	1	1158	2	NW LANTAU	2	112	ON	HKLR	821047	806435	WINTER	SHRIMP	P
7-Dec-12	2	1555	3	NE LANTAU	2	116	ON	HKLR	822811	818573	WINTER	NONE	P
11-Dec-12	1	1237	1	NW LANTAU	2	173	ON	HKLR	820862	810720	WINTER	NONE	S
11-Dec-12	2	1452	12	NW LANTAU	3	257	ON	HKLR	826661	806477	WINTER	NONE	P
11-Dec-12	3	1614	1	NW LANTAU	3	300	ON	HKLR	825746	804662	WINTER	NONE	P
13-Dec-12	1	1006	1	NW LANTAU	2	110	ON	HKLR	815479	805465	WINTER	NONE	P
13-Dec-12	2	1042	1	NW LANTAU	3	203	ON	HKLR	821835	805447	WINTER	NONE	P
13-Dec-12	3	1054	1	NW LANTAU	3	141	ON	HKLR	823707	805451	WINTER	NONE	P
13-Dec-12	4	1111	5	NW LANTAU	3	74	ON	HKLR	826630	805364	WINTER	NONE	P
13-Dec-12	5	1158	10	NW LANTAU	3	90	ON	HKLR	827534	807529	WINTER	NONE	P
2-Jan-13	1	1046	1	NE LANTAU	2	389	ON	HKLR	822769	816492	WINTER	NONE	P
2-Jan-13	2	1409	17	NW LANTAU	3	81	ON	HKLR	825432	806464	WINTER	NONE	P
2-Jan-13	3	1453	1	NW LANTAU	3	721	ON	HKLR	827104	806478	WINTER	NONE	P
2-Jan-13	4	1540	2	NW LANTAU	3	315	ON	HKLR	826754	804675	WINTER	NONE	P
2-Jan-13	5	1553	11	NW LANTAU	3	453	ON	HKLR	824915	804681	WINTER	NONE	P
8-Jan-13	1	1114	1	NE LANTAU	1	321	ON	HKLR	820466	816510	WINTER	NONE	P
8-Jan-13	2	1127	3	NE LANTAU	1	268	ON	HKLR	819392	816478	WINTER	NONE	P
8-Jan-13	3	1143	7	NE LANTAU	1	278	ON	HKLR	818652	815251	WINTER	NONE	S
8-Jan-13	4	1208	4	NE LANTAU	1	23	ON	HKLR	819594	814561	WINTER	NONE	P
8-Jan-13	5	1300	1	NW LANTAU	2	518	ON	HKLR	821767	812514	WINTER	NONE	P
8-Jan-13	6	1559	7	NW LANTAU	3	55	ON	HKLR	827163	804675	WINTER	NONE	P
10-Jan-13	1	1135	9	NW LANTAU	3	368	ON	HKLR	829163	807223	WINTER	NONE	S
1-Feb-13	1	1049	3	NW LANTAU	2	148	ON	HKLR	824207	804659	WINTER	NONE	P
1-Feb-13	2	1057	6	NW LANTAU	2	ND	OFF	HKLR	825038	804455	WINTER	NONE	
1-Feb-13	3	1159	4	NW LANTAU	2	368	ON	HKLR	827647	806458	WINTER	NONE	P
1-Feb-13	4	1222	4	NW LANTAU	2	273	ON	HKLR	827215	806457	WINTER	NONE	P

Appendix II. (cont'd)

(Abberviations: 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
1-Feb-13	5	1241	7	NW LANTAU	2	626	ON	HKLR	825676	806464	WINTER	NONE	P
1-Feb-13	6	1258	9	NW LANTAU	2	318	ON	HKLR	824679	806473	WINTER	NONE	P
1-Feb-13	7	1322	6	NW LANTAU	2	95	ON	HKLR	823274	806048	WINTER	NONE	S
1-Feb-13	8	1337	3	NW LANTAU	1	502	ON	HKLR	820560	806465	WINTER	NONE	P
1-Feb-13	9	1401	2	NW LANTAU	2	603	ON	HKLR	821962	808507	WINTER	NONE	P
1-Feb-13	10	1503	3	NW LANTAU	2	153	ON	HKLR	822180	810506	WINTER	NONE	P
1-Feb-13	11	1700	1	NE LANTAU	1	98	ON	HKLR	822147	818573	WINTER	NONE	P
6-Feb-13	1	1334	5	NW LANTAU	2	21	ON	HKLR	823769	807522	WINTER	NONE	P
6-Feb-13	2	1353	2	NW LANTAU	2	467	ON	HKLR	826527	807537	WINTER	NONE	P
6-Feb-13	3	1508	3	NW LANTAU	3	32	ON	HKLR	821813	805437	WINTER	NONE	P
18-Feb-13	1	1213	1	NW LANTAU	2	53	ON	HKLR	820861	811194	WINTER	NONE	S
18-Feb-13	2	1445	1	NW LANTAU	2	14	ON	HKLR	831028	804694	WINTER	NONE	P
18-Feb-13	3	1514	2	NW LANTAU	2	63	ON	HKLR	825296	804661	WINTER	NONE	P
18-Feb-13	4	1525	5	NW LANTAU	2	133	ON	HKLR	823243	804667	WINTER	NONE	P
20-Feb-13	1	1052	1	NW LANTAU	3	193	ON	HKLR	824471	805453	WINTER	NONE	P
20-Feb-13	2	1122	2	NW LANTAU	2	182	ON	HKLR	828646	805461	WINTER	NONE	P

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in December 2012 - February 2013

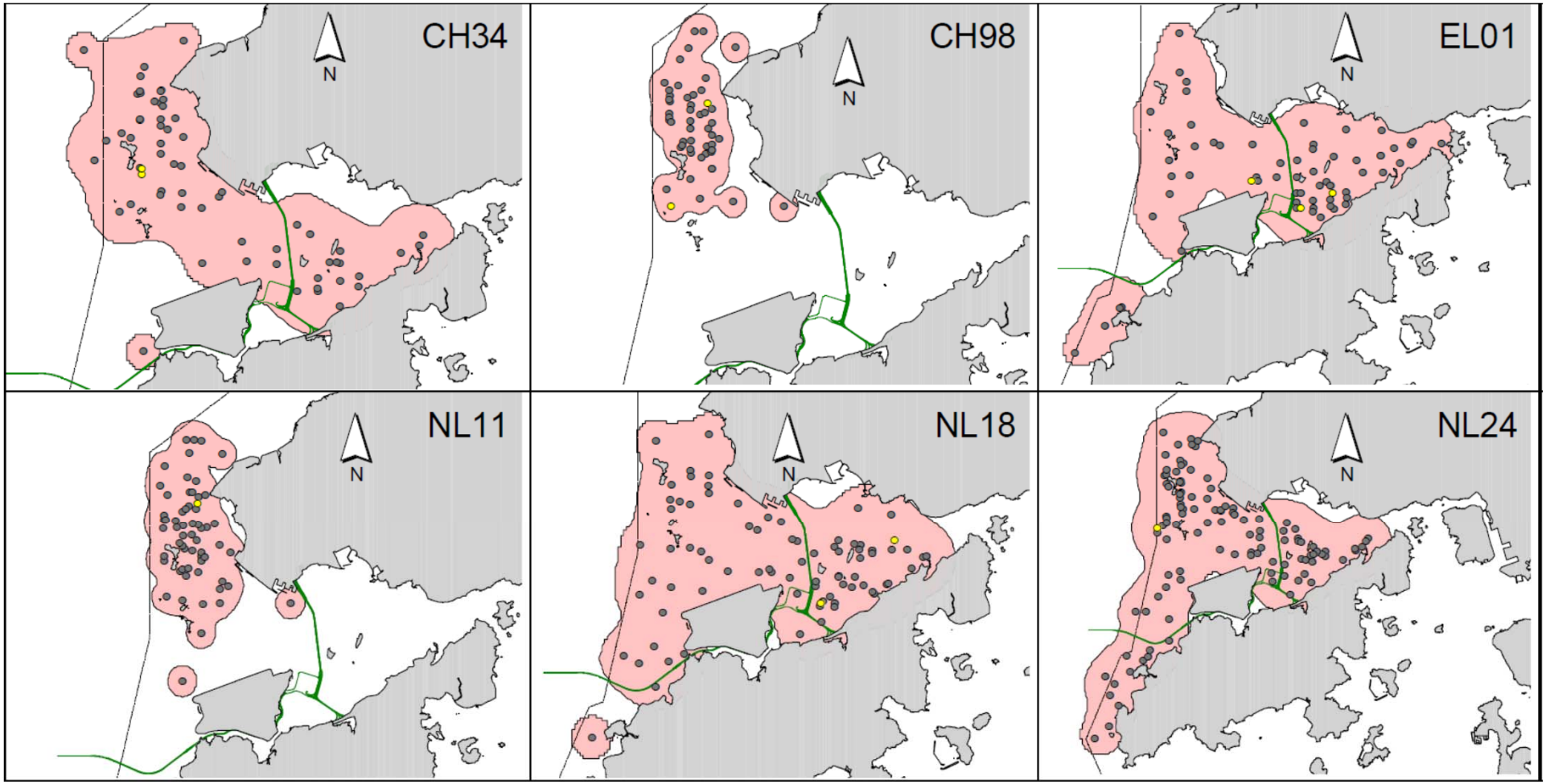
ID#	DATE	STG#	AREA
CH34	2013-01-02	2	NW LANTAU
	2013-02-01	5	NW LANTAU
CH98	2013-01-10	1	NW LANTAU
	2013-02-20	1	NW LANTAU
EL01	2012-12-06	2	NW LANTAU
	2013-01-08	1	NE LANTAU
	2013-01-08	4	NE LANTAU
NL11	2013-01-10	1	NW LANTAU
NL18	2012-12-07	2	NE LANTAU
	2013-01-08	4	NE LANTAU
NL24	2013-02-18	4	NW LANTAU
NL33	2013-01-08	2	NE LANTAU
NL46	2012-12-13	5	NW LANTAU
NL48	2012-12-13	5	NW LANTAU
NL49	2012-12-13	5	NW LANTAU
NL93	2012-12-06	3	NW LANTAU
	2012-12-11	2	NW LANTAU
	2013-01-02	5	NW LANTAU
NL103	2012-12-06	6	NW LANTAU
NL104	2012-12-11	2	NW LANTAU
	2013-01-02	2	NW LANTAU
	2013-02-18	4	NW LANTAU
NL112	2013-02-18	2	NW LANTAU
NL118	2012-12-07	1	NW LANTAU
	2013-02-01	4	NW LANTAU
NL120	2012-12-06	4	NW LANTAU
	2013-01-08	3	NE LANTAU
NL123	2012-12-07	2	NE LANTAU
	2013-01-08	3	NE LANTAU
	2013-02-06	1	NW LANTAU
NL136	2012-12-06	4	NW LANTAU
	2013-01-08	4	NE LANTAU
	2013-02-06	3	NW LANTAU
NL139	2012-12-06	4	NW LANTAU
	2013-01-08	3	NE LANTAU
	2013-02-06	3	NW LANTAU
NL150	2012-12-13	5	NW LANTAU
	2013-01-02	2	NW LANTAU
NL156	2013-01-08	6	NW LANTAU
	2013-02-18	4	NW LANTAU
NL165	2012-12-11	2	NW LANTAU
	2013-02-01	5	NW LANTAU
	2013-02-06	3	NW LANTAU

ID#	DATE	STG#	AREA
NL179	2013-01-08	3	NE LANTAU
	2013-02-01	5	NW LANTAU
NL182	2012-12-13	5	NW LANTAU
	2013-01-08	4	NE LANTAU
	2013-02-06	1	NW LANTAU
NL188	2012-12-13	4	NW LANTAU
NL191	2013-02-20	2	NW LANTAU
NL202	2013-02-18	3	NW LANTAU
NL210	2013-02-20	2	NW LANTAU
NL212	2013-02-01	1	NW LANTAU
NL220	2012-12-06	3	NW LANTAU
	2013-02-18	4	NW LANTAU
NL224	2013-01-02	2	NW LANTAU
NL226	2013-02-18	4	NW LANTAU
NL233	2013-01-02	2	NW LANTAU
NL246	2012-12-11	2	NW LANTAU
	2013-02-01	5	NW LANTAU
NL259	2013-01-02	2	NW LANTAU
	2013-01-02	5	NW LANTAU
	2013-02-18	4	NW LANTAU
NL260	2012-12-13	4	NW LANTAU
	2013-01-02	2	NW LANTAU
	2013-01-02	5	NW LANTAU
	2013-02-01	6	NW LANTAU
NL262	2012-12-06	6	NW LANTAU
	2012-12-13	5	NW LANTAU
NL264	2012-12-11	2	NW LANTAU
	2013-01-02	2	NW LANTAU
	2013-01-02	5	NW LANTAU
NL272	2012-12-06	6	NW LANTAU
	2013-01-02	2	NW LANTAU
NL278	2013-02-01	6	NW LANTAU
	2013-02-01	7	NW LANTAU
NL280	2013-01-02	2	NW LANTAU
NL284	2013-02-06	1	NW LANTAU
NL285	2012-12-07	2	NE LANTAU
	2013-01-08	3	NE LANTAU
	2013-02-06	1	NW LANTAU
NL286	2013-02-01	3	NW LANTAU
	2013-02-18	3	NW LANTAU
NL287	2012-12-06	6	NW LANTAU
NL288	2012-12-11	2	NW LANTAU
	2013-01-02	2	NW LANTAU
	2013-01-02	5	NW LANTAU

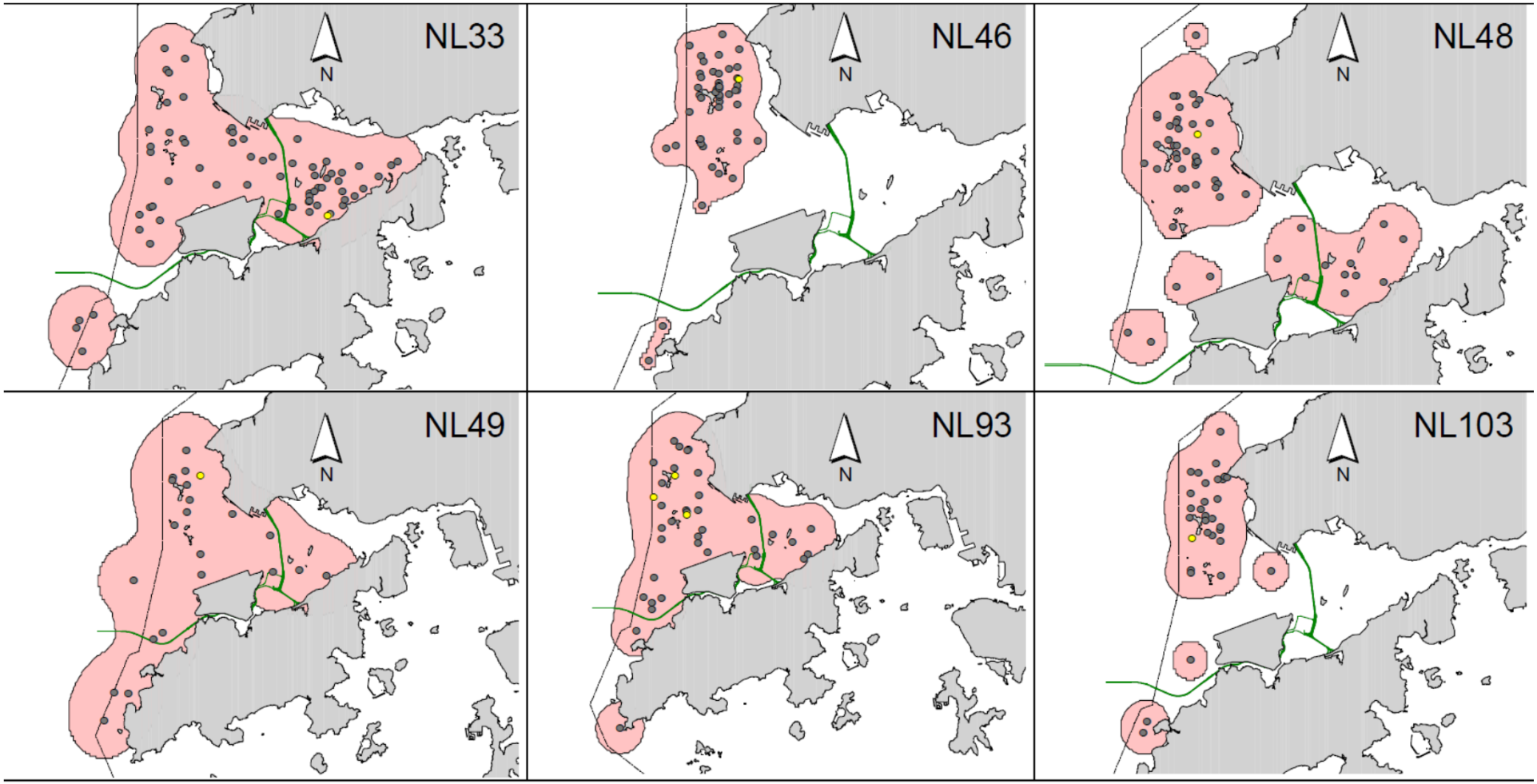
Appendix III. (cont'd)

ID#	DATE	STG#	AREA
NL291	2012-12-07	1	NW LANTAU
	2013-01-10	1	NW LANTAU
NL295	2013-01-02	2	NW LANTAU
	2013-01-02	5	NW LANTAU
NL296	2013-01-02	4	NW LANTAU
	2013-01-02	5	NW LANTAU
	2013-02-01	6	NW LANTAU
SL42	2013-01-08	6	NW LANTAU
SL43	2013-01-08	6	NW LANTAU
WL28	2013-02-01	2	NW LANTAU
WL46	2013-01-02	2	NW LANTAU
	2013-02-01	2	NW LANTAU
WL61	2012-12-13	1	NW LANTAU
WL179	2013-02-01	1	NW LANTAU
WL188	2013-01-02	2	NW LANTAU
WL198	2013-01-08	6	NW LANTAU

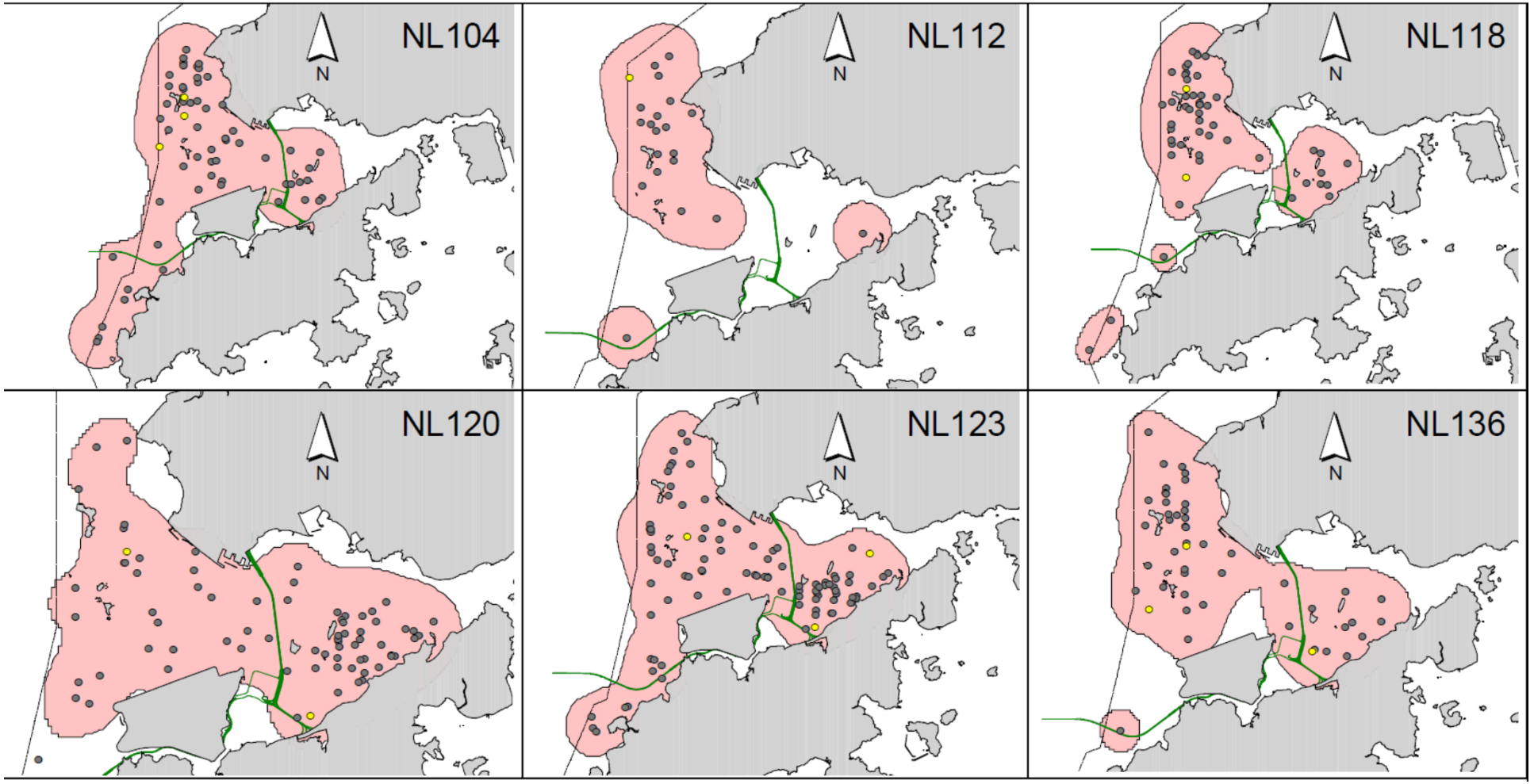
Appendix IV. Ranging patterns (95% kernel ranges) of 57 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicates sightings made in December 2012 – February 2013)



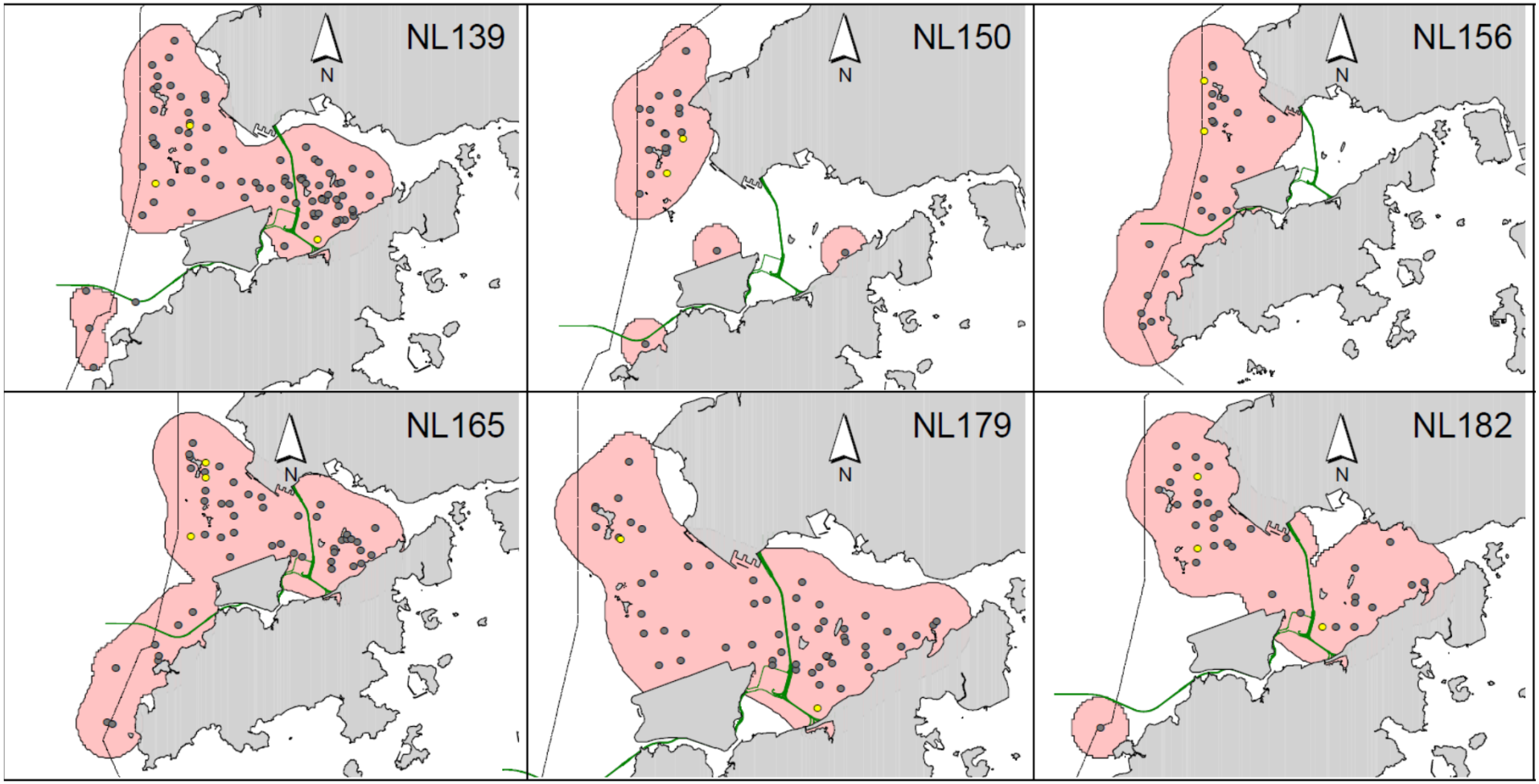
Appendix IV. (cont'd)



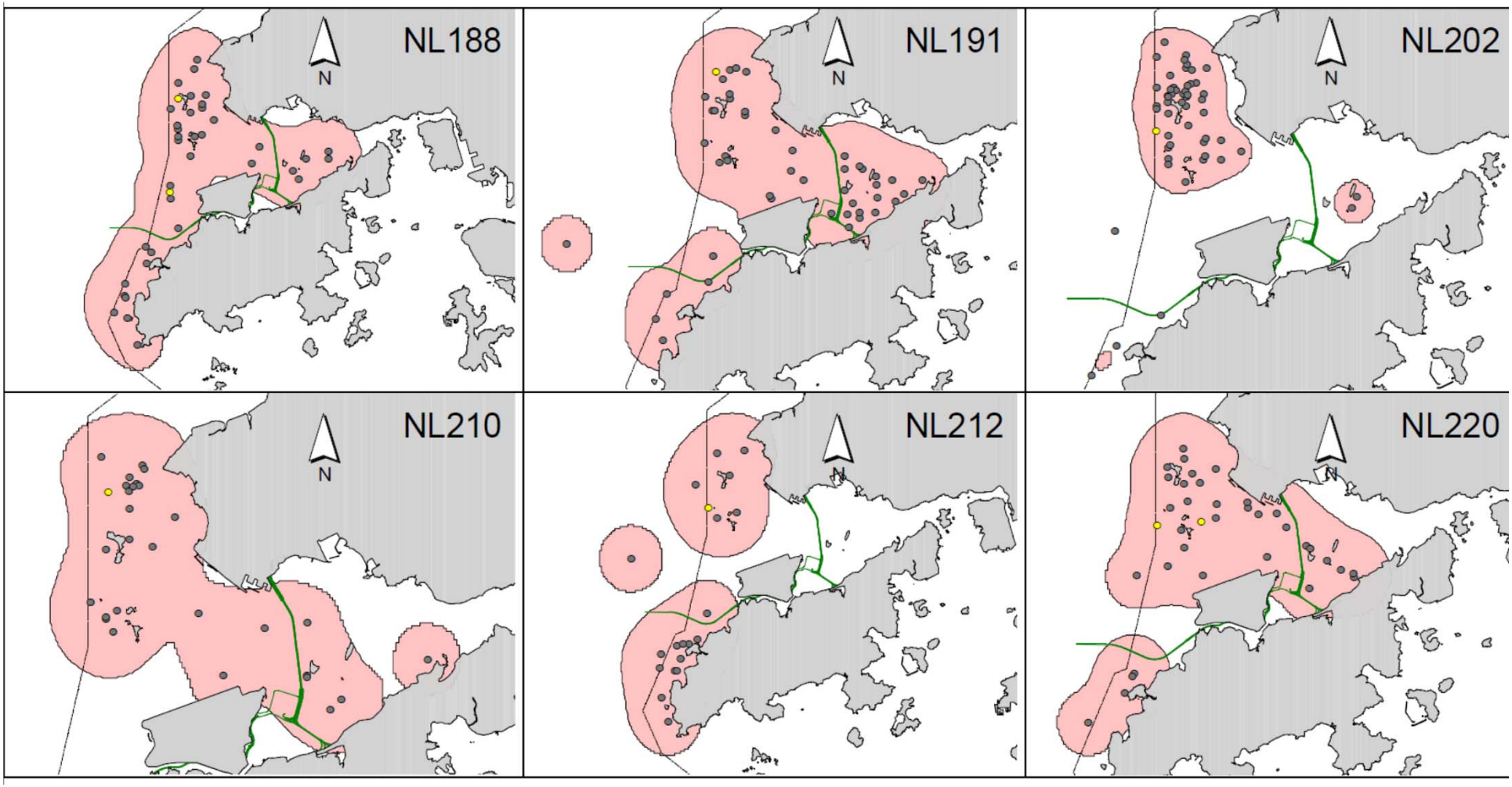
Appendix IV. (cont'd)



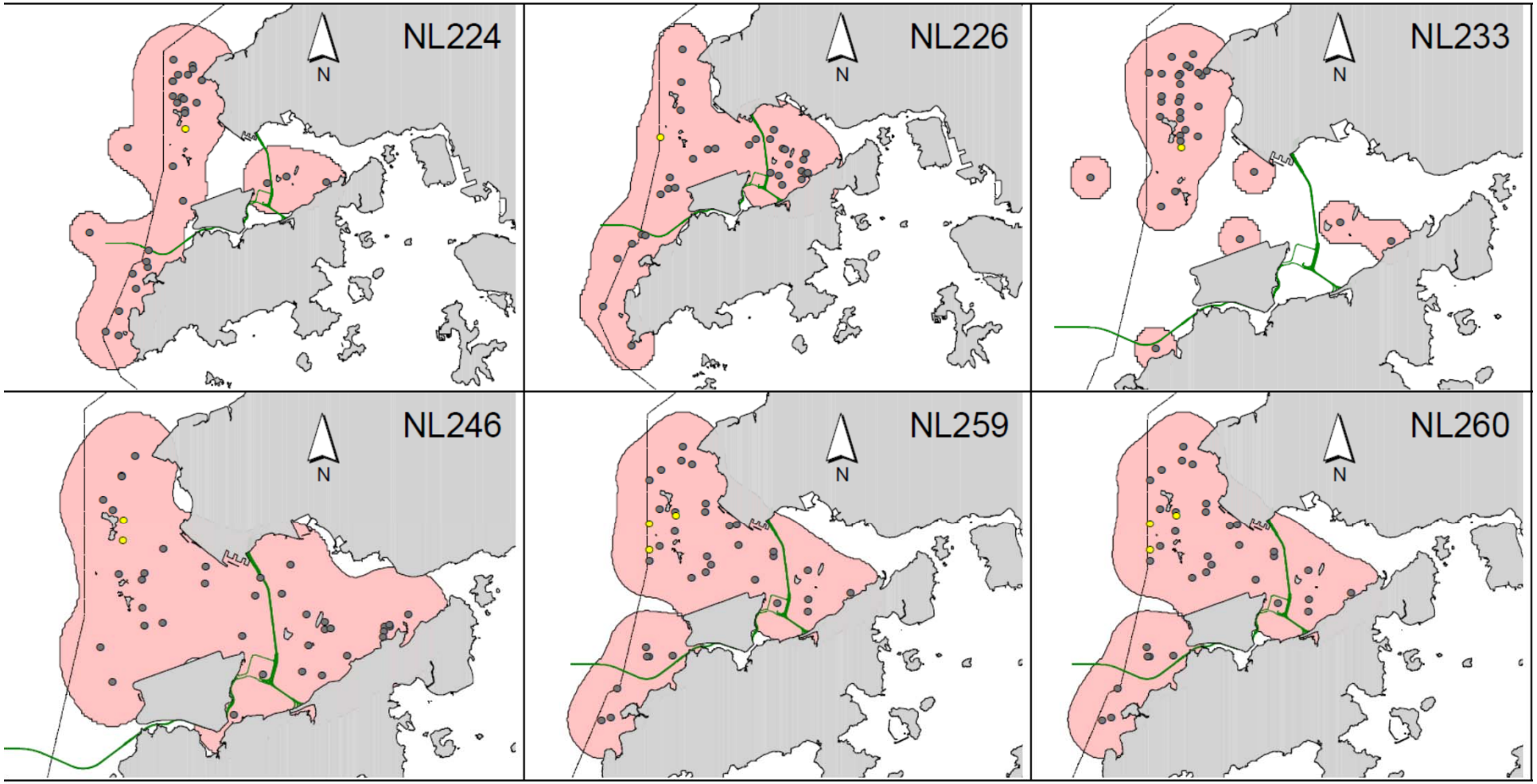
Appendix IV. (cont'd)



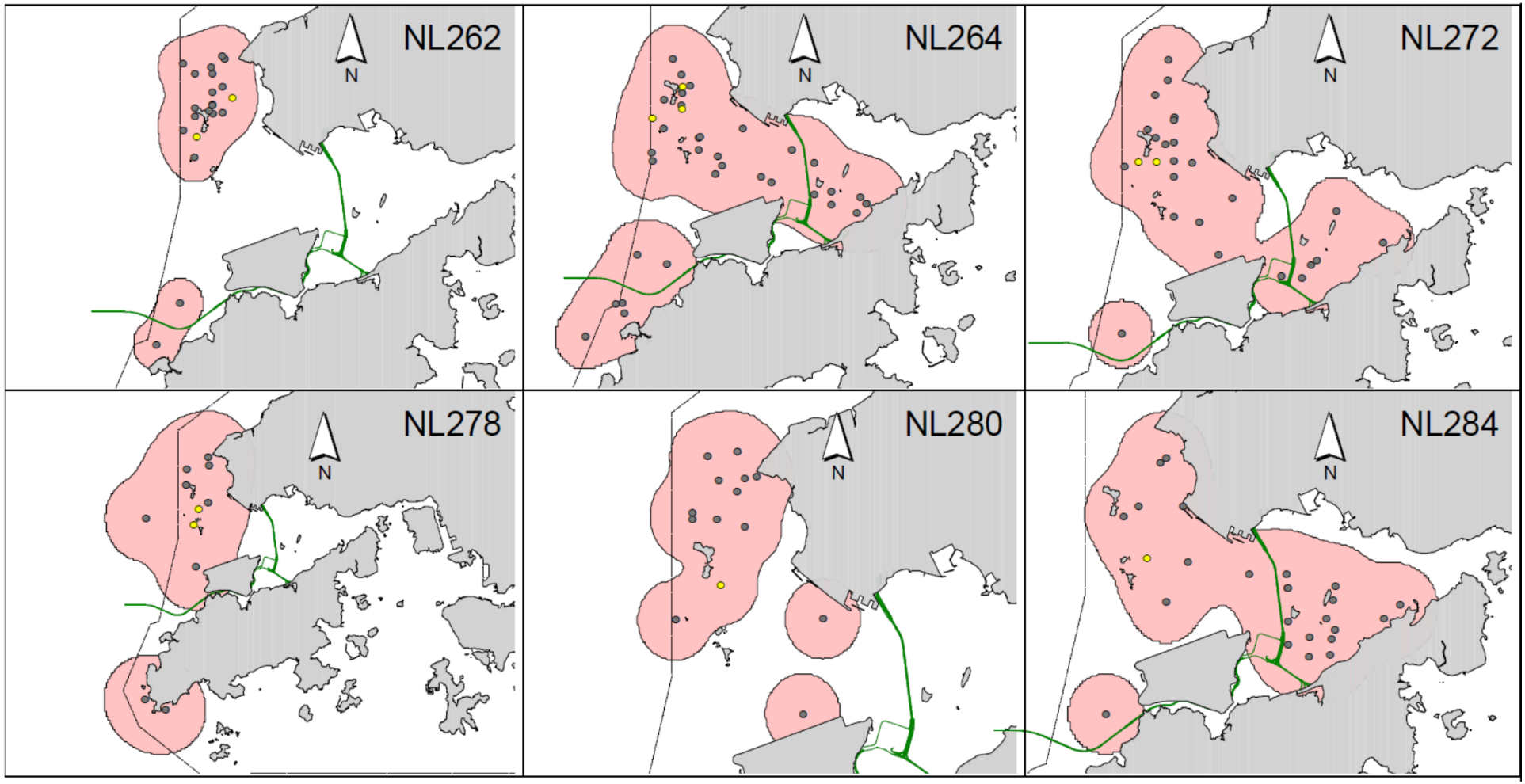
Appendix IV. (cont'd)



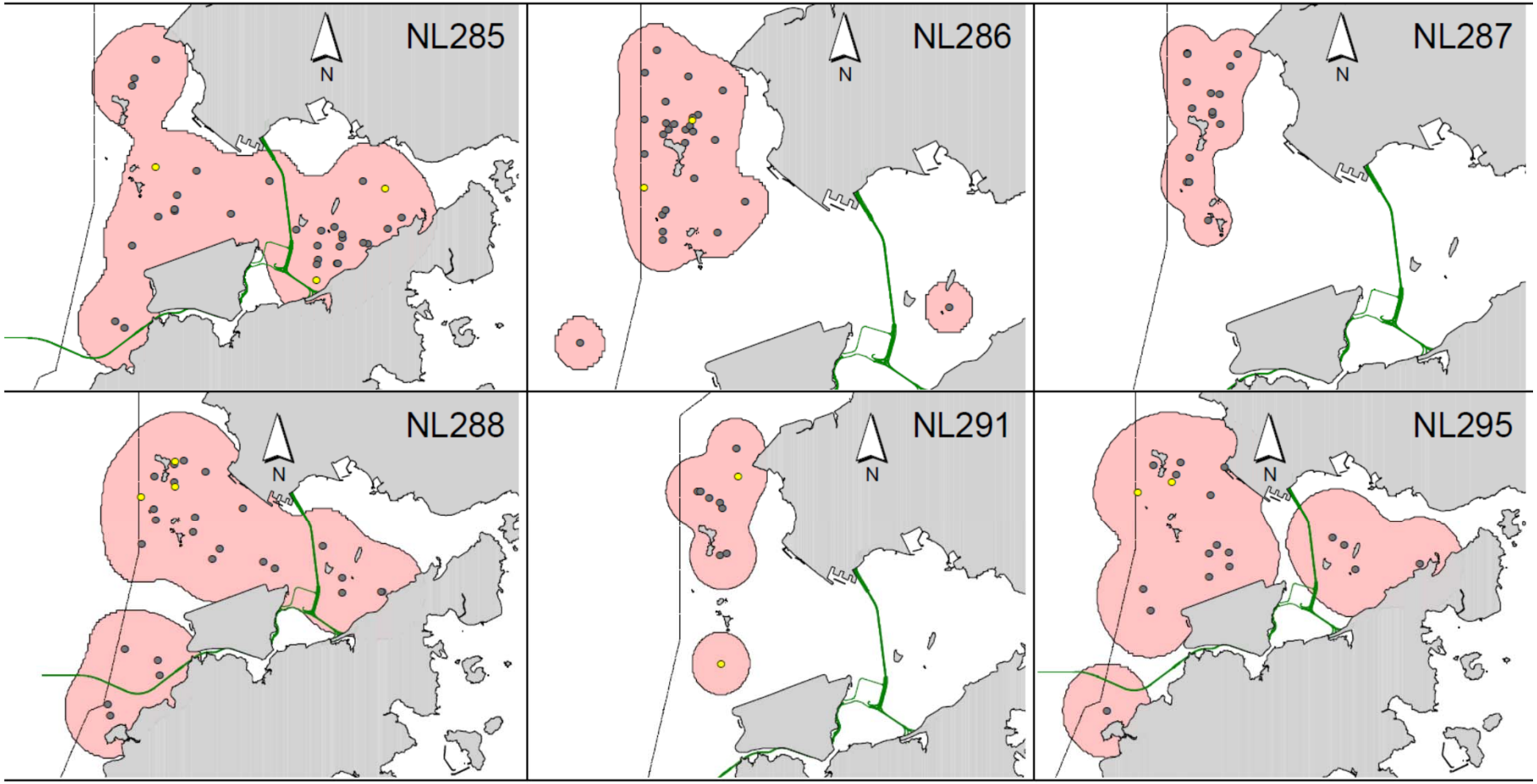
Appendix IV. (cont'd)



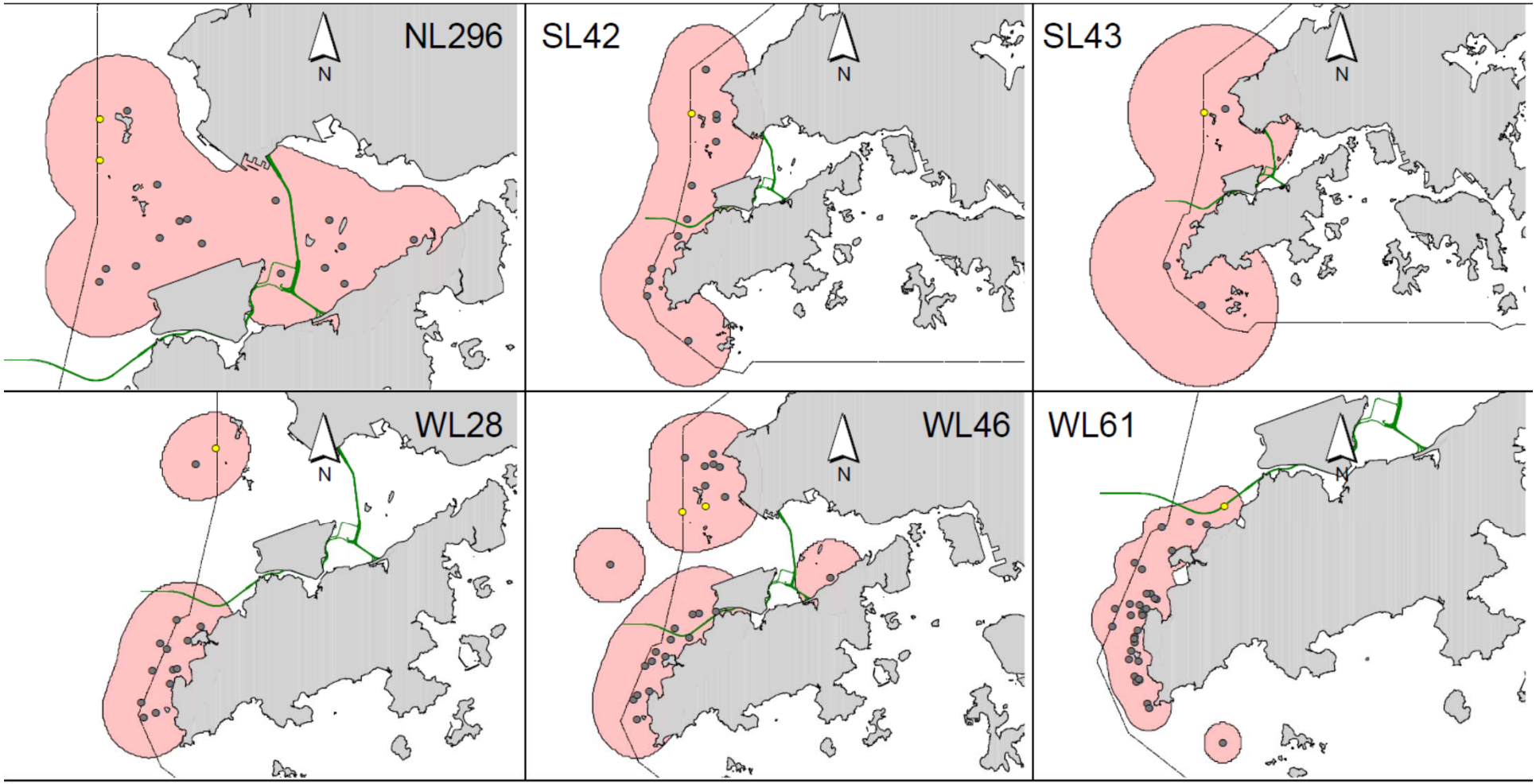
Appendix IV. (cont'd)



Appendix IV. (cont'd)



Appendix IV. (cont'd)



Appendix IV. (cont'd)