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 (March – May 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 third 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 March to May 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 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 1)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 (Hung 2013). 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 comparison 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 encounter rate of sightings and dolphins were deduced by dividing 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 (March-May 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:

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

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 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 March to May 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 887.74 km of survey effort was collected, with 89.5% 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, 340.62 km and 547.12 km of survey effort were conducted in NEL and NWL survey areas respectively. In addition, the total survey effort

conducted on primary lines was 660.79 km, while the effort on secondary lines was 226.95 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 Annex I.

3.1.3. During the six sets of monitoring surveys in March to May 2013, a total of 39 groups of 127 Chinese White Dolphins were sighted. All except two sightings were made during on-effort search. Thirty-two on-effort sightings were made on primary lines, while another five on-effort sightings were made on secondary lines. Among the two survey areas, only two groups of two dolphins were sighted in NEL, while the other 37 groups of 125 dolphins were sighted in NWL. Summary table of the dolphin sightings is shown in Annex II.

3.2. Distribution

3.2.1. Distribution of dolphin sightings made during monitoring surveys in March to May 2013 is shown in Figure 1. Most dolphins sightings were made in the northwest portion of North Lantau region, concentrating along the Urmston Road section between Black Point and Lung Kwu Chau. Other sightings were made around Sha Chau, between Pillar Point and the airport platform, as well as to the west of the airport platform. The two lone dolphins sighted in NEL were found near Tai Mo To and Yam O.

3.2.2. No dolphin was sighted in the vicinity of the HKLR03 reclamation site (Figure 1). The lone dolphin sighted near Tai Mo To was in the vicinity of the HKBCF reclamation site, but dolphins generally were absent from the surrounding waters of the reclamation area. On the other hand, a few dolphin sightings were made near the HKLR09 alignment to the west of the airport platform (Figure 1).

3.2.3. When compared with the sighting distribution of dolphins during baseline monitoring surveys in September to November 2011, dolphins very rarely occurred in NEL region during the present impact monitoring period, in contrast with their frequent occurrence around the Brothers Islands and HKBCF reclamation site during the baseline period (Figure 1). However, dolphin occurrence in the northwest portion of North Lantau region was similar between the two periods (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 (March – May 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 (6 & 11 Mar 2013)	0.00	0.00
	Set 2 (13 & 20 Mar 2013)	2.53	2.53
	Set 3 (2 & 3 Apr 2013)	0.00	0.00
	Set 4 (8 & 12 Apr 2013)	0.00	0.00
	Set 5 (8 & 13 May 2013)	0.00	0.00
	Set 6 (25 & 28 May 2013)	0.00	0.00
Northwest Lantau	Set 1 (6 & 11 Mar 2013)	9.57	33.49
	Set 2 (13 & 20 Mar 2013)	13.82	49.76
	Set 3 (2 & 3 Apr 2013)	4.38	10.94
	Set 4 (8 & 12 Apr 2013)	4.16	5.54
	Set 5 (8 & 13 May 2013)	9.88	36.24
	Set 6 (25 & 28 May 2013)	4.69	9.39

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

	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)	
	March - May 2013	**September - November 2011**	**March - May 2013**	**September - November 2011**
Northeast Lantau	0.42 ± 1.03	6.00 ± 5.05	0.42 ± 1.03	22.19 ± 26.81
Northwest Lantau	7.75 ± 3.96	9.85 ± 5.85	24.23 ± 18.05	44.66 ± 29.85

3.3.2. In NEL, the average dolphin encounter rates (both STG and ANI) in the present three-month study period were close to nil, which was much lower than the

ones recorded in the 3-month baseline period (Table 3). It should be noted that dolphin occurrence in NEL was generally lower in spring months (March-May), and hence it is noteworthy to determine whether the recorded occurrence of dolphins in the habitat of NEL during this impact phase monitoring period was due to seasonal fluctuation. For example, the encounter rates deduced from the advance HZMB monitoring data in spring 2011 were 5.4 (STG) and 11.8 (ANI) respectively. By pooling both HZMB and AFCD monitoring data, the encounter rates in spring 2011 were 3.8 (STG) and 13.3 (ANI) respectively.

3.3.3. In NWL, the average dolphin encounter rates (STG and ANI) during the present impact phase monitoring period were also noticeably lower (reductions of 21% and 46% respectively) than the ones recorded in the 3-month baseline period, indicating a reduced dolphin usage of this survey area.

3.3.4. 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).

3.3.5. For the comparison between the baseline period and the present quarter (third quarter of the impact phase), the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.0858 and 0.0931 respectively and therefore no significant difference is detected based on the alpha value of 0.05.

3.3.6. For the comparison between the baseline period and the cumulative quarters in impact phase (i.e. first three quarters of the impact phase), the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.1336 and 0.0507 respectively, and therefore no significant difference is detected based on the alpha value of 0.05.

3.3.7. 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. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 7.27 sightings and 26.00 dolphins per 100 km of survey effort respectively, while the encounter rates of sightings (STG) and dolphins (ANI) in NEL were 0.59 sightings and 0.59 dolphins per 100 km of survey effort respectively.

3.4. Group size

3.4.1. Group size of Chinese White Dolphins ranged from 1-20 individuals per group

in North Lantau region during March to May 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 (March-May 2013) and baseline monitoring period (September-November 2011)

	Average Dolphin Group Size	
	March to May 2013	**September-November 2011**
Overall	3.26 ± 3.89 (n = 39)	3.72 ± 3.13 (n = 66)
Northeast Lantau	1.00 ± 0.00 (n = 2)	3.18 ± 2.16 (n = 17)
Northwest Lantau	3.38 ± 3.96 (n = 37)	3.92 ± 3.40 (n = 49)

3.4.2. The average dolphin group sizes in the entire North Lantau region during March to May 2013 was slightly lower than the ones recorded in the 3-month baseline period (Table 3). Notably, the two sightings made in NEL during the present monitoring period were comprised of two lone dolphins, hence the average dolphin group size was much lower than the baseline period. On the other hand, the average dolphin group size in NWL during the present monitoring period was slightly lower than the baseline period (Table 3).

3.4.3. Distribution of dolphins with larger group sizes during March – May 2013 is shown in Figure 2. There were much fewer large dolphin groups recorded (four groups with more than 10 animals and one group with more than 5 animals) during the present monitoring period when compared with the baseline period (two groups with more than 10 animals and 16 groups with more than 5 animals). These five large dolphin groups were scattered within and around the Sha Chau and Lung Kwu Chau Marine Park (Figure 2).

3.5. Habitat use

3.5.1. From March-May 2013, the most heavily utilized habitats by Chinese White Dolphins mainly concentrated along the Urmston Road section between Lung Kwu Chau and Black Point as well as around Sha Chau (Figures 3a and 3b). Only two grids in NEL recorded the presence of dolphins in very low density based on two sightings of two lone dolphins. None of the grid around HKLR03 or HKBCF work site recorded the presence of dolphins.

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. When compared with the habitat use patterns during the baseline period, the usage of NEL was significantly less as well as overall number of grids with presence of dolphins were much fewer during the present impact monitoring period (Figure 4). Moreover, dolphins were generally absent from the habitat around the Brothers and near Shum Shui Kok in NEL that was identified during the baseline period. From the same comparison between the two quarterly periods, it appears that dolphins have been less found in the construction sites of HKLR03 in the present monitoring period (Figure 4) and it should be noted that construction site of HKLR03 situates in waters which has rarely been used by dolphins in the past. Hence there is no evidence showing that the sources of impact were directly related to the construction works of HKLR03 that may have affected the dolphins usage in the NEL region.

3.6. Mother-calf pairs

3.6.1. During the three-month study period, a total of six unspotted juveniles (UJ) were sighted in NEL and NWL survey areas, while no unspotted calves (UC) were sighted. These young calves comprised 4.7% of all animals sighted, which was lower than the percentage recorded during the baseline monitoring period (6.8%).

3.6.2. These young calves mainly occurred within and around the Sha Chau and Lung Kwu Chau Marine Park (Figure 5). Notably, no young calves were found in the vicinity of HZMB-related construction sites.

3.7. Activities and associations with fishing boats

3.7.1. A total of four dolphin sightings were associated with feeding and socializing activities during the three-month study period, comprising of 7.7% and 2.6% of the total number of dolphin sightings. Both percentages were lower than the percentages recorded during the baseline period (feeding activity: 11.6%; socializing activity: 5.4%). Only one group of dolphins was engaged in traveling activity.

3.7.2. Distribution of dolphins engaged in different activities during the three-month study period is shown in Figure 6. Most of the feeding and socializing activities occurred within and around the Sha Chau and Lung Kwu Chau Marine Park. Moreover, one group of ten dolphins was engaged in traveling activity to the west of Sha Chau close to the Hong Kong-Guangdong border.

All these activities were far away from the HZMB-related construction works.

3.7.3. During the three-month period, only one dolphin group were found to be associated with an operating purse-seiner, comprising of 2.6% 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. Summary of photo-identification works

3.8.1. From March to May 2013, over 2,000 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.

3.8.2. In total, 34 individuals sighted 58 times altogether were identified (see summary table in Annex III and photographs of identified individuals in Annex IV). Only one of these 58 re-sightings were made in NEL, which involved the individual NL18 that was also the most frequently sighted individuals in NEL during previous months of HKLR03 monitoring works. On the contrary, a number of year-round residents that occurred in NEL regularly before (e.g. EL01, NL123, NL285, NL179) have disappeared from this survey area during the present monitoring period.

3.8.3. Most identified individuals were sighted only once or twice during the three-month period, with the exception of two individuals being sighted thrice (NL93, NL244) and three individuals being sighted four times (NL104, NL202 and NL286).

3.8.4. Five well-recognized females, including NL33, NL46, NL93, NL104 and NL202, were accompanied with their calves during their re-sightings. These mother-calf pairs were frequently seen throughout the HKLR03 impact phase monitoring period.

3.9. Individual range use

3.9.1. Ranging patterns of the 34 individuals identified during the three-month study period were determined by fixed kernel method, and are shown in Annex V.

3.9.2. Only one individual (NL18) was sighted in the NEL survey area while other

individuals were mostly found in the NWL survey area during this quarterly period. In contrast to the extensive movements between NEL and NWL survey areas in previous two impact monitoring periods and the baseline period, most identified individuals have avoided NEL during March-May 2013, even though they were frequently sighted there before and their core areas were centered around the Brothers Islands (i.e. NL24, NL33, NL261) (Annex V).

3.9.3. Moreover, a number of year-round residents that used to utilize the Brothers Islands as their core areas have not been seen there during the past two quarters. This apparent shift in range use of many individual dolphins should be continuously monitored in the upcoming quarterly periods to determine whether this is related to the disturbance associated with the HZMB-related construction activities.

3.9.4. It should be noted that a number of individuals that focused their activities in West Lantau waters in the past were also sighted in NWL (e.g. WL44, WL46, WL50, WL98) (Annex V). The movement of these individuals between North and West Lantau waters should be continuously monitored to determine whether their range use will be affected by the HKLR09 construction works.

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 occurrence of Chinese white dolphins in NEL were much lower in the present three-month study period 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) and during the baseline monitoring period.

4.3. Nevertheless, dolphin usage in North Lantau region should be continuously monitored, as there are indications that their occurrence in NEL has been affected by the various construction activities in relation to the HZMB works.

5. References

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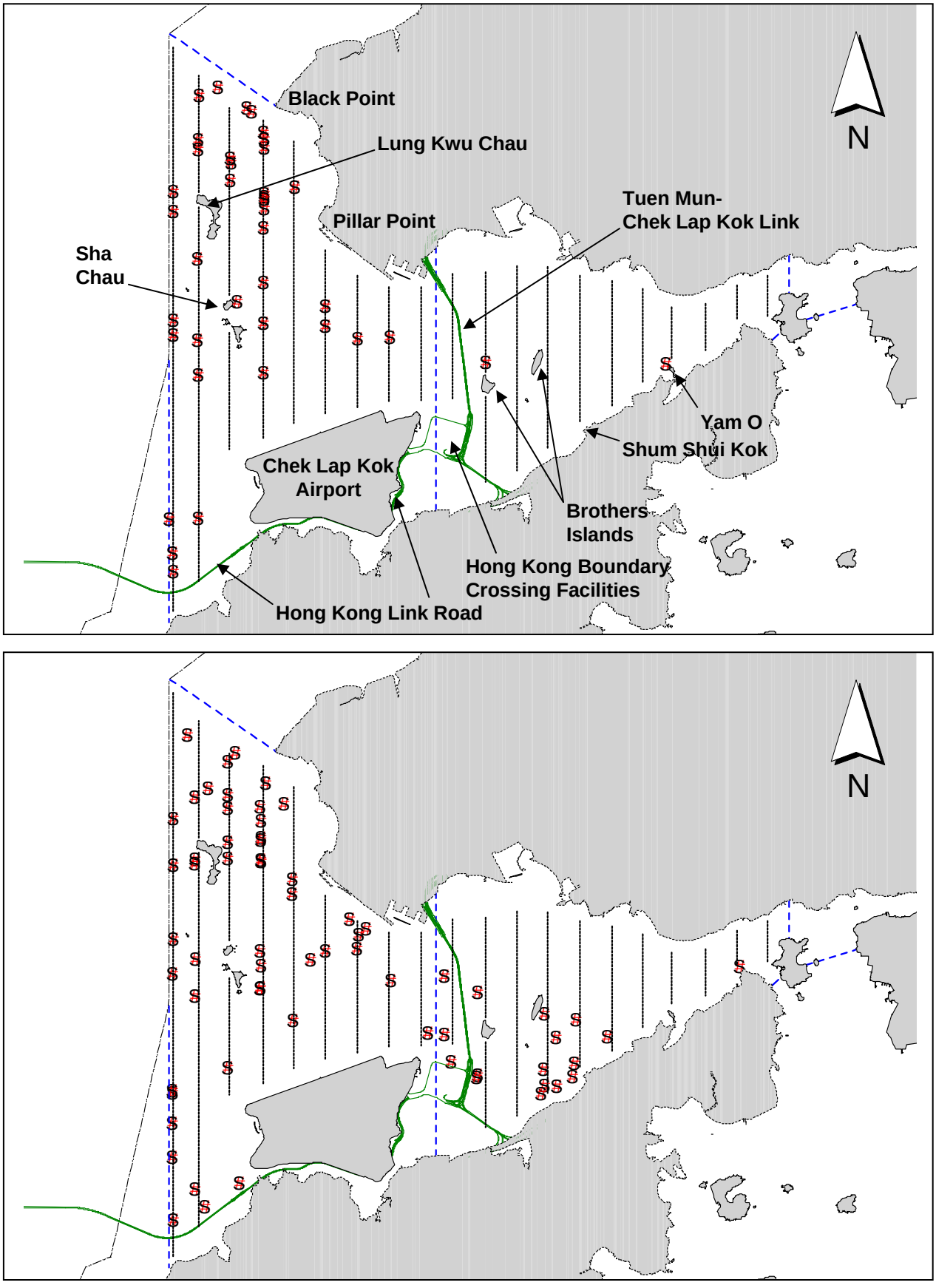


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top: March-May 2013) and baseline monitoring surveys (below: September-November 2011)

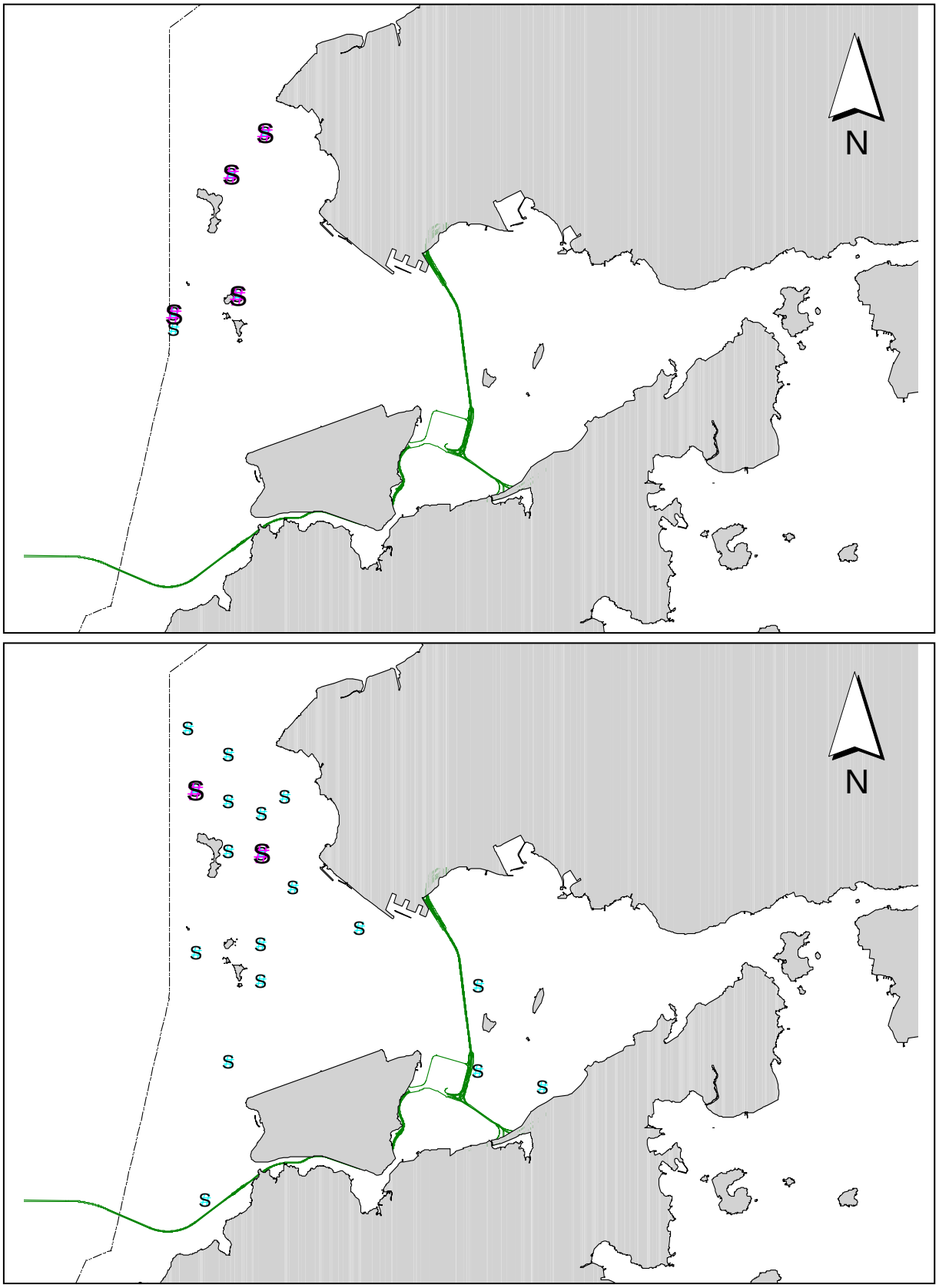


Figure 2. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top: March-May 2013) and baseline monitoring surveys (below: September-November 2011) (blue dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

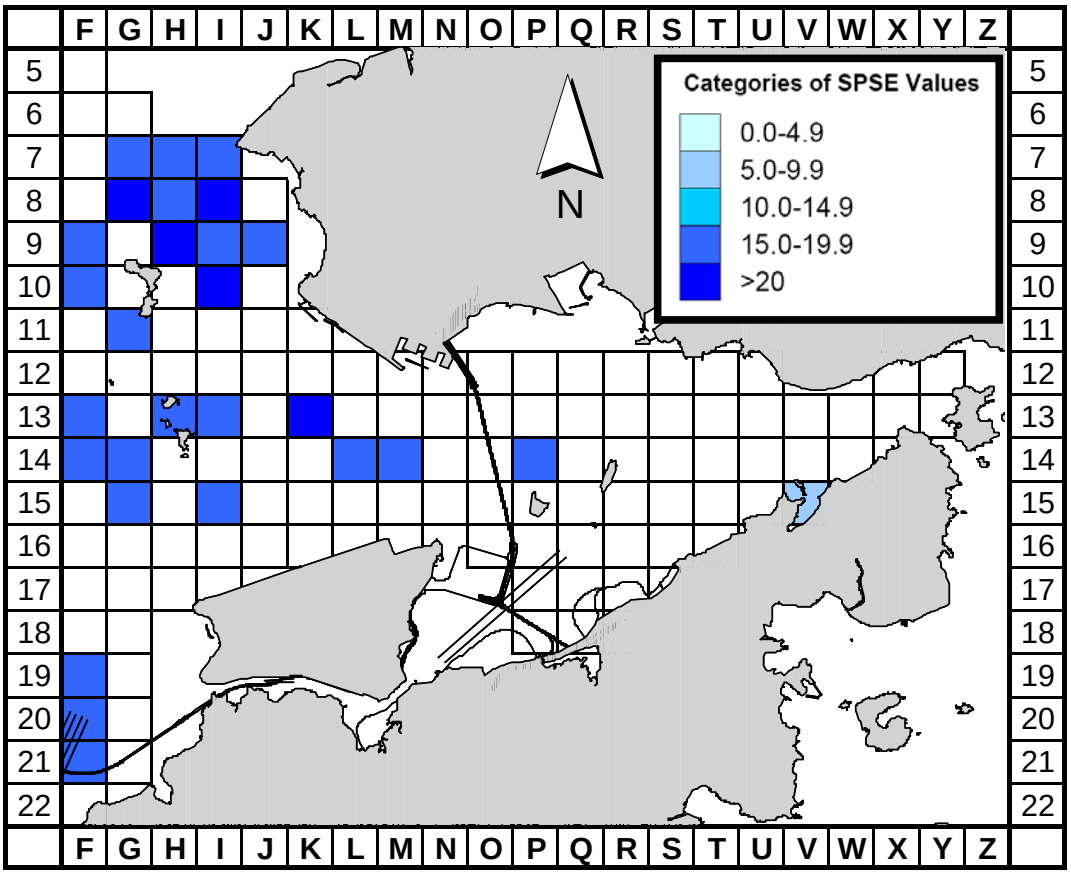


Figure 3a. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period monitoring period (Mar-May 13) (SPSE = no. of on-effort sightings per 100 units of survey effort)

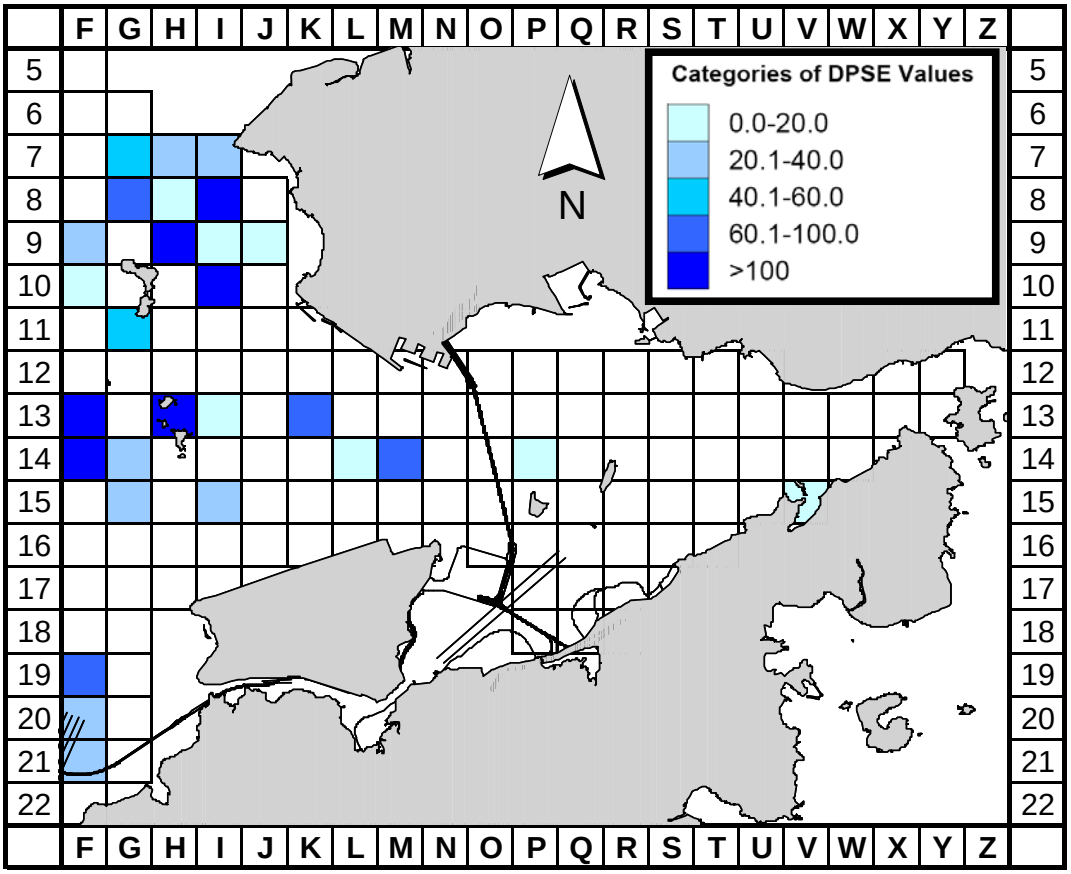


Figure 3b. Density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Mar-May 13) (DPSE = no. of dolphins per 100 units of survey effort)

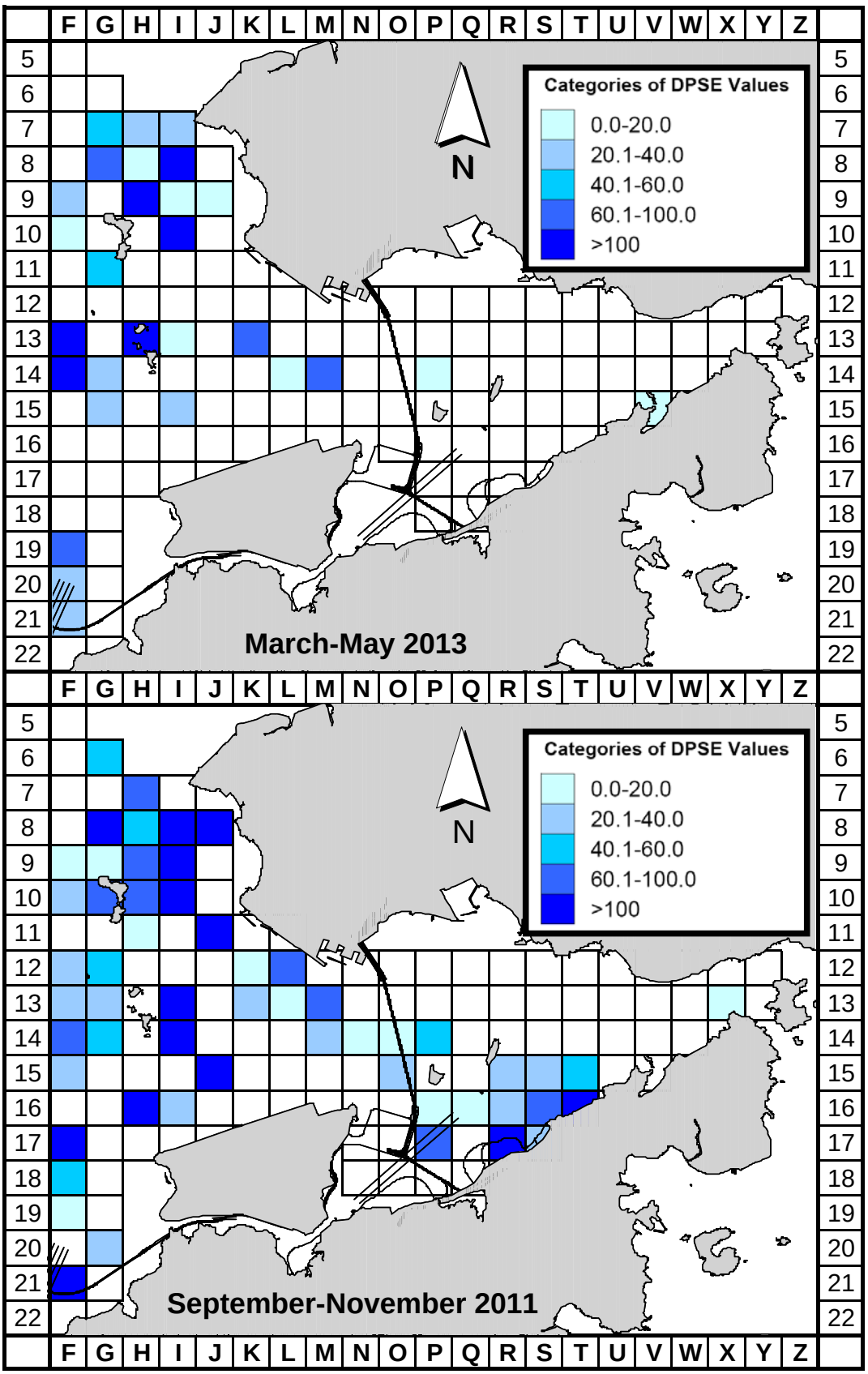


Figure 4. Comparison of density of Chinese white dolphins with corrected survey effort per km^2 in Northwest and Northeast Lantau survey area between the impact monitoring period (March-May 2013) and baseline monitoring period (September-November 2011)
(DPSE = no. of dolphins per 100 units of survey effort)

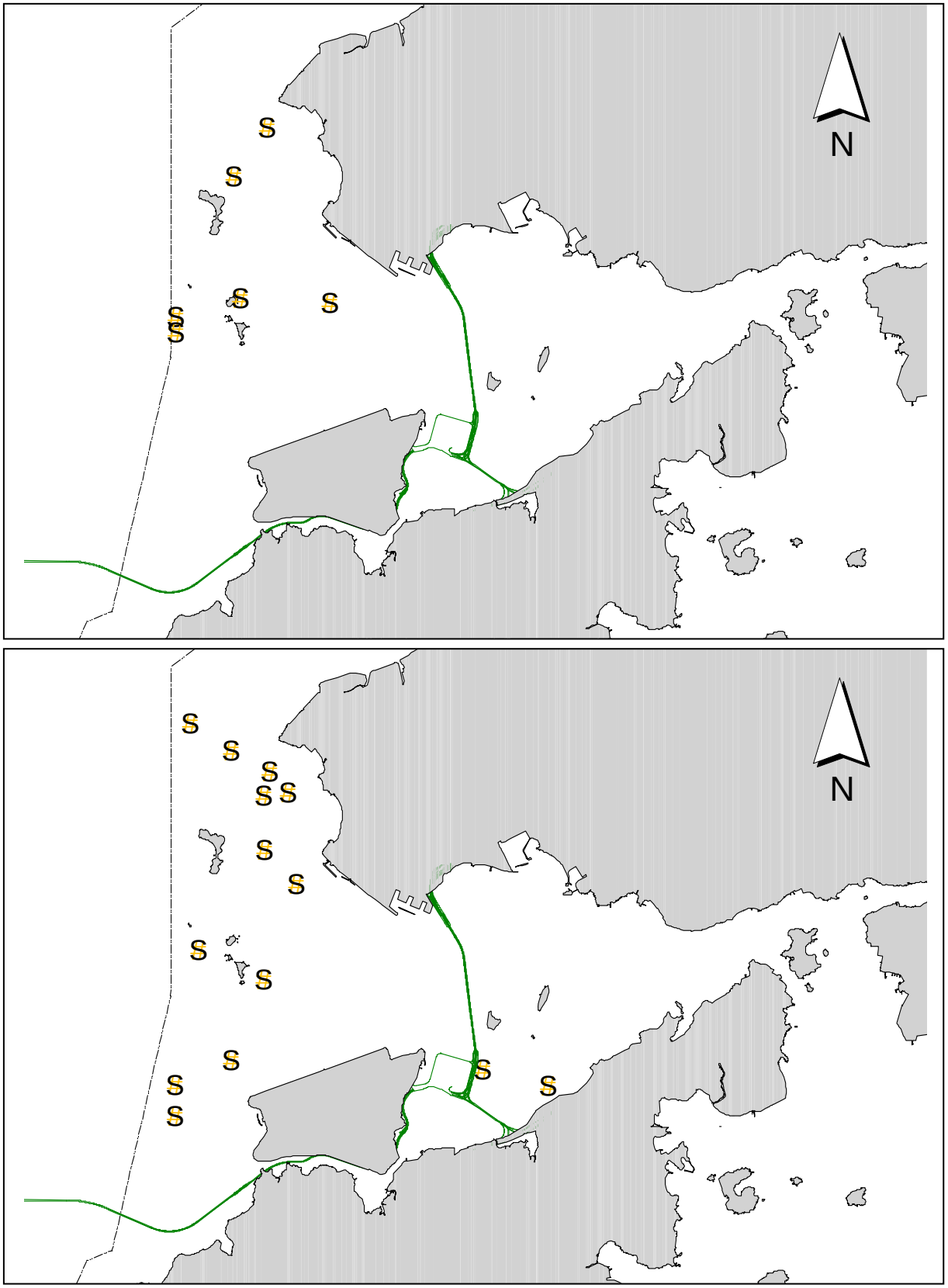


Figure 5. Distribution of young calves of Chinese white dolphins during HKLR03 impact phase (top: March-May 2013) and baseline monitoring surveys (below: September-November 2011)

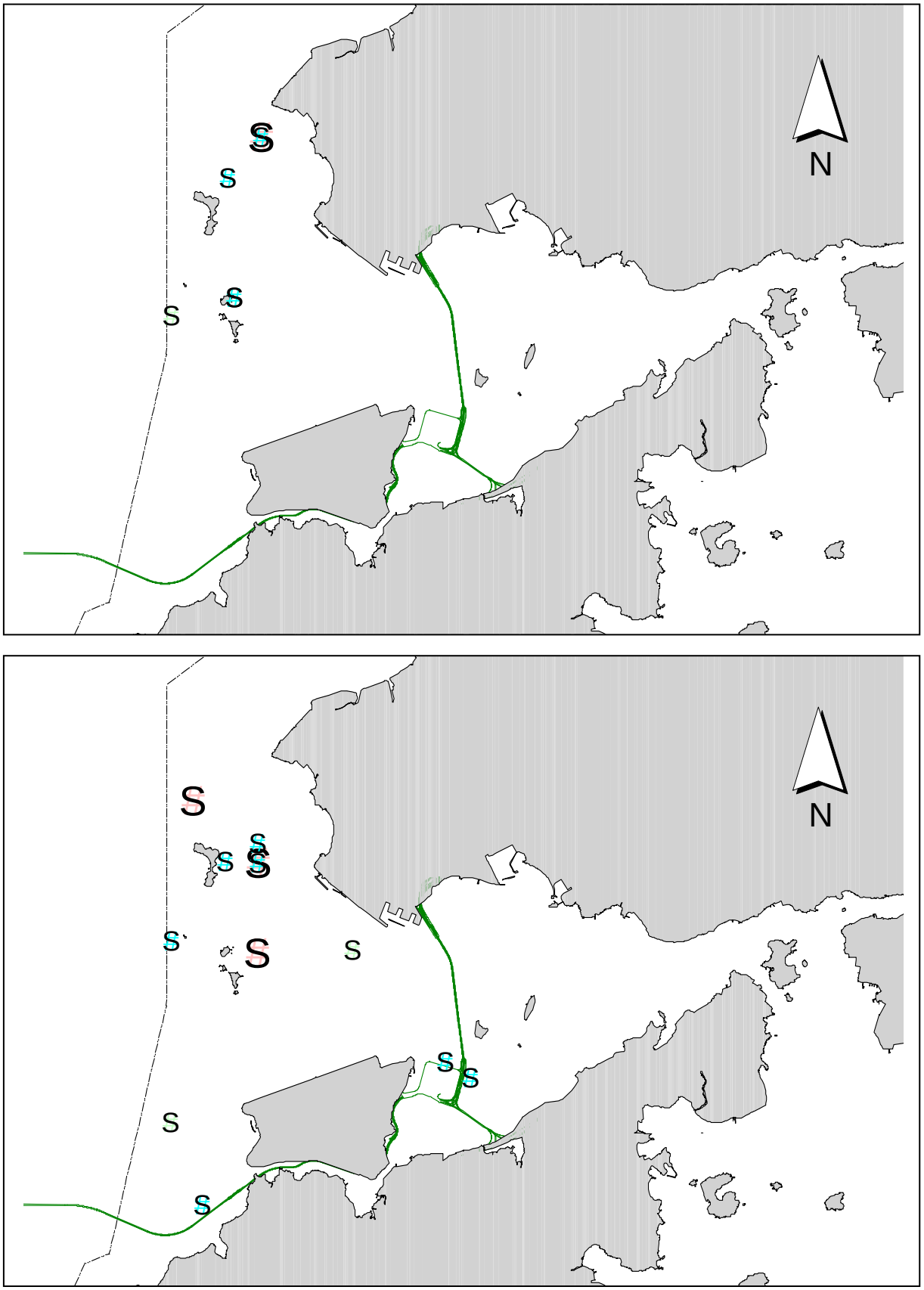


Figure 6. Distribution of Chinese white dolphins engaged in feeding (blue dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top: March-May 2013) and baseline monitoring surveys (below: September-November 2011)

Annex I. HKLR03 Survey Effort Database (March-May 2013)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
6-Mar-13	NE LANTAU	1	1.3	SPRING	STANDARD31516	HKLR	P
6-Mar-13	NE LANTAU	2	11.1	SPRING	STANDARD31516	HKLR	P
6-Mar-13	NE LANTAU	3	5.5	SPRING	STANDARD31516	HKLR	P
6-Mar-13	NE LANTAU	1	2.1	SPRING	STANDARD31516	HKLR	S
6-Mar-13	NE LANTAU	2	5.11	SPRING	STANDARD31516	HKLR	S
6-Mar-13	NE LANTAU	3	2.4	SPRING	STANDARD31516	HKLR	S
6-Mar-13	NW LANTAU	0	2.81	SPRING	STANDARD31516	HKLR	P
6-Mar-13	NW LANTAU	1	7.37	SPRING	STANDARD31516	HKLR	P
6-Mar-13	NW LANTAU	2	14.99	SPRING	STANDARD31516	HKLR	P
6-Mar-13	NW LANTAU	3	14.56	SPRING	STANDARD31516	HKLR	P
6-Mar-13	NW LANTAU	1	1.7	SPRING	STANDARD31516	HKLR	S
6-Mar-13	NW LANTAU	2	3.6	SPRING	STANDARD31516	HKLR	S
6-Mar-13	NW LANTAU	3	6.7	SPRING	STANDARD31516	HKLR	S
11-Mar-13	NE LANTAU	2	6.6	SPRING	STANDARD31516	HKLR	P
11-Mar-13	NE LANTAU	3	13.7	SPRING	STANDARD31516	HKLR	P
11-Mar-13	NE LANTAU	1	1.3	SPRING	STANDARD31516	HKLR	S
11-Mar-13	NE LANTAU	2	4.9	SPRING	STANDARD31516	HKLR	S
11-Mar-13	NE LANTAU	3	4.4	SPRING	STANDARD31516	HKLR	S
11-Mar-13	NW LANTAU	2	4.1	SPRING	STANDARD31516	HKLR	P
11-Mar-13	NW LANTAU	3	18.9	SPRING	STANDARD31516	HKLR	P
11-Mar-13	NW LANTAU	4	8.95	SPRING	STANDARD31516	HKLR	P
11-Mar-13	NW LANTAU	2	2.56	SPRING	STANDARD31516	HKLR	S
11-Mar-13	NW LANTAU	3	5.31	SPRING	STANDARD31516	HKLR	S
13-Mar-13	NW LANTAU	0	3.41	SPRING	STANDARD31516	HKLR	P
13-Mar-13	NW LANTAU	1	32.24	SPRING	STANDARD31516	HKLR	P
13-Mar-13	NW LANTAU	2	4.38	SPRING	STANDARD31516	HKLR	P
13-Mar-13	NW LANTAU	0	2.01	SPRING	STANDARD31516	HKLR	S
13-Mar-13	NW LANTAU	1	5.83	SPRING	STANDARD31516	HKLR	S
13-Mar-13	NW LANTAU	2	4.28	SPRING	STANDARD31516	HKLR	S
13-Mar-13	NE LANTAU	0	1.19	SPRING	STANDARD31516	HKLR	P
13-Mar-13	NE LANTAU	1	7.4	SPRING	STANDARD31516	HKLR	P
13-Mar-13	NE LANTAU	2	6.9	SPRING	STANDARD31516	HKLR	P
13-Mar-13	NE LANTAU	3	3.8	SPRING	STANDARD31516	HKLR	P
13-Mar-13	NE LANTAU	1	2.2	SPRING	STANDARD31516	HKLR	S
13-Mar-13	NE LANTAU	2	6.4	SPRING	STANDARD31516	HKLR	S
20-Mar-13	NE LANTAU	1	13.7	SPRING	STANDARD31516	HKLR	P
20-Mar-13	NE LANTAU	2	6.6	SPRING	STANDARD31516	HKLR	P
20-Mar-13	NE LANTAU	1	8.7	SPRING	STANDARD31516	HKLR	S
20-Mar-13	NE LANTAU	2	2	SPRING	STANDARD31516	HKLR	S
20-Mar-13	NW LANTAU	1	1.2	SPRING	STANDARD31516	HKLR	P
20-Mar-13	NW LANTAU	2	25.7	SPRING	STANDARD31516	HKLR	P
20-Mar-13	NW LANTAU	3	5.4	SPRING	STANDARD31516	HKLR	P
20-Mar-13	NW LANTAU	1	2.4	SPRING	STANDARD31516	HKLR	S
20-Mar-13	NW LANTAU	2	4.7	SPRING	STANDARD31516	HKLR	S
2-Apr-13	NE LANTAU	0	2.1	SPRING	STANDARD31516	HKLR	P
2-Apr-13	NE LANTAU	1	9.4	SPRING	STANDARD31516	HKLR	P
2-Apr-13	NE LANTAU	2	13.9	SPRING	STANDARD31516	HKLR	P
2-Apr-13	NE LANTAU	1	3.2	SPRING	STANDARD31516	HKLR	S
2-Apr-13	NE LANTAU	2	6.3	SPRING	STANDARD31516	HKLR	S
2-Apr-13	NW LANTAU	2	20.2	SPRING	STANDARD31516	HKLR	P
2-Apr-13	NW LANTAU	3	14.3	SPRING	STANDARD31516	HKLR	P

Annex 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
2-Apr-13	NW LANTAU	4	0.7	SPRING	STANDARD31516	HKLR	P
2-Apr-13	NW LANTAU	2	5.3	SPRING	STANDARD31516	HKLR	S
2-Apr-13	NW LANTAU	3	2.5	SPRING	STANDARD31516	HKLR	S
3-Apr-13	NW LANTAU	2	2.8	SPRING	STANDARD31516	HKLR	P
3-Apr-13	NW LANTAU	3	8.4	SPRING	STANDARD31516	HKLR	P
3-Apr-13	NW LANTAU	4	17.97	SPRING	STANDARD31516	HKLR	P
3-Apr-13	NW LANTAU	5	8.23	SPRING	STANDARD31516	HKLR	P
3-Apr-13	NW LANTAU	2	2.4	SPRING	STANDARD31516	HKLR	S
3-Apr-13	NW LANTAU	3	4.9	SPRING	STANDARD31516	HKLR	S
3-Apr-13	NW LANTAU	4	2.7	SPRING	STANDARD31516	HKLR	S
3-Apr-13	NW LANTAU	5	1	SPRING	STANDARD31516	HKLR	S
3-Apr-13	NE LANTAU	2	5.1	SPRING	STANDARD31516	HKLR	P
3-Apr-13	NE LANTAU	3	6.8	SPRING	STANDARD31516	HKLR	P
3-Apr-13	NE LANTAU	2	2.1	SPRING	STANDARD31516	HKLR	S
3-Apr-13	NE LANTAU	3	3.1	SPRING	STANDARD31516	HKLR	S
8-Apr-13	NE LANTAU	1	7.8	SPRING	STANDARD31516	HKLR	P
8-Apr-13	NE LANTAU	2	9.93	SPRING	STANDARD31516	HKLR	P
8-Apr-13	NE LANTAU	1	5.5	SPRING	STANDARD31516	HKLR	S
8-Apr-13	NE LANTAU	2	4.47	SPRING	STANDARD31516	HKLR	S
8-Apr-13	NW LANTAU	1	11.15	SPRING	STANDARD31516	HKLR	P
8-Apr-13	NW LANTAU	2	24.7	SPRING	STANDARD31516	HKLR	P
8-Apr-13	NW LANTAU	3	5	SPRING	STANDARD31516	HKLR	P
8-Apr-13	NW LANTAU	0	1.8	SPRING	STANDARD31516	HKLR	S
8-Apr-13	NW LANTAU	1	3	SPRING	STANDARD31516	HKLR	S
8-Apr-13	NW LANTAU	2	4.6	SPRING	STANDARD31516	HKLR	S
12-Apr-13	NW LANTAU	1	1.9	SPRING	STANDARD31516	HKLR	P
12-Apr-13	NW LANTAU	2	20	SPRING	STANDARD31516	HKLR	P
12-Apr-13	NW LANTAU	3	9.4	SPRING	STANDARD31516	HKLR	P
12-Apr-13	NW LANTAU	1	3.7	SPRING	STANDARD31516	HKLR	S
12-Apr-13	NW LANTAU	2	1.1	SPRING	STANDARD31516	HKLR	S
12-Apr-13	NW LANTAU	3	1.9	SPRING	STANDARD31516	HKLR	S
12-Apr-13	NE LANTAU	1	9.4	SPRING	STANDARD31516	HKLR	P
12-Apr-13	NE LANTAU	2	10.4	SPRING	STANDARD31516	HKLR	P
12-Apr-13	NE LANTAU	2	10.7	SPRING	STANDARD31516	HKLR	S
8-May-13	NE LANTAU	2	3.52	SPRING	STANDARD31516	HKLR	P
8-May-13	NE LANTAU	3	13.45	SPRING	STANDARD31516	HKLR	P
8-May-13	NE LANTAU	4	0.6	SPRING	STANDARD31516	HKLR	P
8-May-13	NE LANTAU	2	4.23	SPRING	STANDARD31516	HKLR	S
8-May-13	NE LANTAU	3	5.6	SPRING	STANDARD31516	HKLR	S
8-May-13	NW LANTAU	2	7.1	SPRING	STANDARD31516	HKLR	P
8-May-13	NW LANTAU	3	22.06	SPRING	STANDARD31516	HKLR	P
8-May-13	NW LANTAU	4	10.98	SPRING	STANDARD31516	HKLR	P
8-May-13	NW LANTAU	2	2.9	SPRING	STANDARD31516	HKLR	S
8-May-13	NW LANTAU	3	7.07	SPRING	STANDARD31516	HKLR	S
8-May-13	NW LANTAU	4	3.19	SPRING	STANDARD31516	HKLR	S
13-May-13	NW LANTAU	1	16.4	SPRING	STANDARD31516	HKLR	P
13-May-13	NW LANTAU	2	15.1	SPRING	STANDARD31516	HKLR	P
13-May-13	NW LANTAU	1	2.7	SPRING	STANDARD31516	HKLR	S
13-May-13	NW LANTAU	2	4.3	SPRING	STANDARD31516	HKLR	S
13-May-13	NE LANTAU	2	9.4	SPRING	STANDARD31516	HKLR	P
13-May-13	NE LANTAU	3	10.3	SPRING	STANDARD31516	HKLR	P
13-May-13	NE LANTAU	2	10.5	SPRING	STANDARD31516	HKLR	S
25-May-13	NW LANTAU	1	6.25	SPRING	STANDARD31516	HKLR	P
25-May-13	NW LANTAU	2	12.09	SPRING	STANDARD31516	HKLR	P

Annex 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
25-May-13	NW LANTAU	3	3.18	SPRING	STANDARD31516	HKLR	P
25-May-13	NW LANTAU	4	10.62	SPRING	STANDARD31516	HKLR	P
25-May-13	NW LANTAU	2	2.35	SPRING	STANDARD31516	HKLR	S
25-May-13	NW LANTAU	3	0.58	SPRING	STANDARD31516	HKLR	S
25-May-13	NW LANTAU	4	4.28	SPRING	STANDARD31516	HKLR	S
25-May-13	NE LANTAU	2	7.14	SPRING	STANDARD31516	HKLR	P
25-May-13	NE LANTAU	3	9.92	SPRING	STANDARD31516	HKLR	P
25-May-13	NE LANTAU	2	7.24	SPRING	STANDARD31516	HKLR	S
28-May-13	NE LANTAU	1	12.11	SPRING	STANDARD31516	HKLR	P
28-May-13	NE LANTAU	2	7.22	SPRING	STANDARD31516	HKLR	P
28-May-13	NE LANTAU	3	1.23	SPRING	STANDARD31516	HKLR	P
28-May-13	NE LANTAU	1	3.35	SPRING	STANDARD31516	HKLR	S
28-May-13	NE LANTAU	2	7.24	SPRING	STANDARD31516	HKLR	S
28-May-13	NW LANTAU	2	2.29	SPRING	STANDARD31516	HKLR	P
28-May-13	NW LANTAU	3	18.83	SPRING	STANDARD31516	HKLR	P
28-May-13	NW LANTAU	4	12.58	SPRING	STANDARD31516	HKLR	P
28-May-13	NW LANTAU	5	7	SPRING	STANDARD31516	HKLR	P
28-May-13	NW LANTAU	3	7.9	SPRING	STANDARD31516	HKLR	S
28-May-13	NW LANTAU	4	4.7	SPRING	STANDARD31516	HKLR	S

Annex II. HKLR03 Chinese White Dolphin Sighting Database (March-May 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-Mar-13	1	1401	20	NW LANTAU	3	294	ON	HKLR	823815	806677	SPRING	NONE	S
6-Mar-13	2	1532	10	NW LANTAU	2	132	ON	HKLR	823288	804667	SPRING	NONE	P
11-Mar-13	1	1309	2	NW LANTAU	3	105	ON	HKLR	821698	807518	SPRING	NONE	P
11-Mar-13	2	1356	2	NW LANTAU	2	75	ON	HKLR	828398	807530	SPRING	NONE	P
11-Mar-13	3	1421	3	NW LANTAU	2	39	ON	HKLR	829964	805464	SPRING	NONE	P
11-Mar-13	4	1434	2	NW LANTAU	2	296	ON	HKLR	828646	805451	SPRING	NONE	P
11-Mar-13	5	1452	3	NW LANTAU	4	96	ON	HKLR	825113	805433	SPRING	NONE	P
11-Mar-13	6	1510	2	NW LANTAU	4	58	ON	HKLR	822666	805428	SPRING	NONE	P
11-Mar-13	7	1517	2	NW LANTAU	3	32	ON	HKLR	821625	805437	SPRING	NONE	P
13-Mar-13	1	1019	2	NW LANTAU	1	262	ON	HKLR	815768	804652	SPRING	NONE	P
13-Mar-13	2	1026	2	NW LANTAU	2	74	ON	HKLR	816322	804643	SPRING	NONE	P
13-Mar-13	3	1035	4	NW LANTAU	1	735	ON	HKLR	817341	804531	SPRING	NONE	P
13-Mar-13	4	1103	8	NW LANTAU	1	349	ON	HKLR	822845	804666	SPRING	NONE	P
13-Mar-13	5	1125	1	NW LANTAU	1	858	ON	HKLR	826532	804664	SPRING	NONE	P
13-Mar-13	6	1129	2	NW LANTAU	1	24	ON	HKLR	827086	804665	SPRING	NONE	P
13-Mar-13	7	1213	13	NW LANTAU	2	242	ON	HKLR	827437	806458	SPRING	PURSE SEINE	P
13-Mar-13	8	1415	1	NW LANTAU	1	255	ON	HKLR	822723	810507	SPRING	NONE	P
13-Mar-13	9	1510	1	NE LANTAU	0	116	ON	HKLR	822030	814555	SPRING	NONE	P
20-Mar-13	1	1359	2	NW LANTAU	2	473	ON	HKLR	826604	807537	SPRING	NONE	P
20-Mar-13	2	1403	1	NW LANTAU	2	435	ON	HKLR	827036	807528	SPRING	NONE	P
20-Mar-13	3	1525	1	NW LANTAU	2	ND	OFF	HKLR	817373	805459	SPRING	NONE	N/A
2-Apr-13	1	1410	2	NW LANTAU	2	0	ON	HKLR	826028	807526	SPRING	NONE	P
2-Apr-13	2	1417	3	NW LANTAU	2	238	ON	HKLR	826936	807538	SPRING	NONE	P
8-Apr-13	1	1426	1	NW LANTAU	1	31	ON	HKLR	827957	806489	SPRING	NONE	P
8-Apr-13	2	1434	1	NW LANTAU	1	13	ON	HKLR	828090	806469	SPRING	NONE	P
12-Apr-13	1	1140	3	NW LANTAU	3	10	ON	HKLR	829573	806997	SPRING	NONE	S
12-Apr-13	2	1223	2	NW LANTAU	2	139	ON	HKLR	826881	807528	SPRING	NONE	P
12-Apr-13	3	1242	1	NW LANTAU	2	ND	OFF	HKLR	824400	807523	SPRING	NONE	N/A
13-May-13	1	1131	3	NW LANTAU	1	48	ON	HKLR	828874	807521	SPRING	NONE	P
13-May-13	2	1150	10	NW LANTAU	2	15	ON	HKLR	828675	807531	SPRING	NONE	P
13-May-13	3	1228	1	NW LANTAU	2	388	ON	HKLR	823182	807521	SPRING	NONE	P
13-May-13	4	1312	1	NW LANTAU	2	38	ON	HKLR	823101	809488	SPRING	NONE	P

Annex 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)

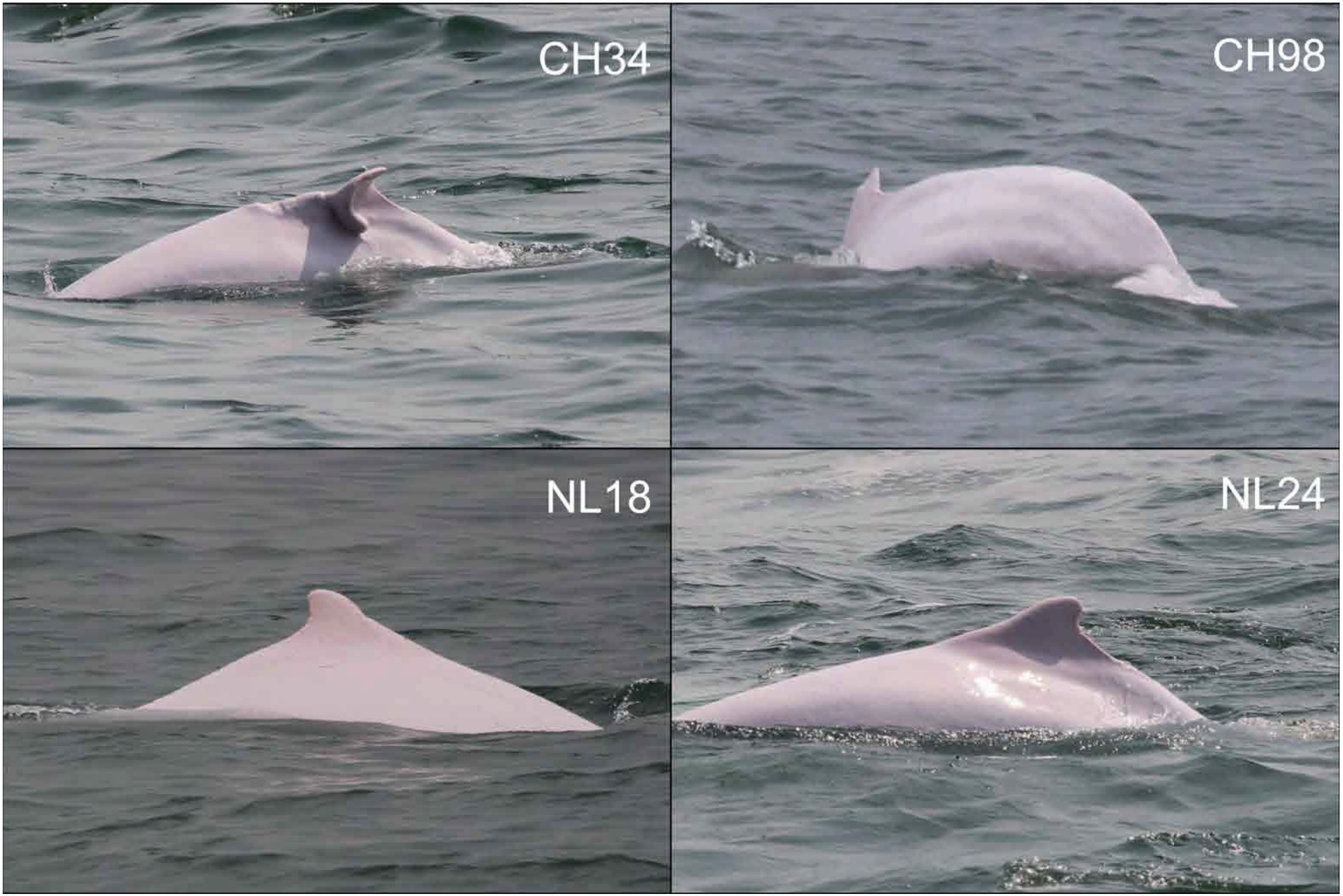
DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
13-May-13	5	1320	3	NW LANTAU	2	74	ON	HKLR	823688	809468	SPRING	NONE	P
13-May-13	6	1406	4	NW LANTAU	2	458	ON	HKLR	822766	811506	SPRING	NONE	P
25-May-13	1	1146	3	NW LANTAU	2	329	ON	HKLR	828358	805460	SPRING	NONE	P
25-May-13	2	1258	1	NW LANTAU	3	275	ON	HKLR	830206	806082	SPRING	NONE	S
25-May-13	3	1305	2	NW LANTAU	2	82	ON	HKLR	829462	807151	SPRING	NONE	S
25-May-13	4	1647	1	NE LANTAU	2	5	ON	HKLR	821968	820252	SPRING	NONE	S
28-May-13	1	1330	1	NW LANTAU	3	83	ON	HKLR	827222	808507	SPRING	NONE	P

Annex III. Individual dolphins identified during HKLR03 monitoring surveys in March-May 2013

ID#	DATE	STG#	AREA
CH34	2013-03-06	1	NW LANTAU
CH98	2013-05-13	1	NW LANTAU
NL18	2013-03-13	9	NE LANTAU
NL24	2013-03-06	1	NW LANTAU
NL33	2013-04-12	2	NW LANTAU
	2013-05-13	5	NW LANTAU
NL46	2013-03-06	2	NW LANTAU
	2013-03-13	7	NW LANTAU
NL49	2013-03-06	1	NW LANTAU
	2013-03-11	1	NW LANTAU
NL93	2013-03-06	1	NW LANTAU
	2013-03-13	7	NW LANTAU
	2013-05-13	2	NW LANTAU
NL104	2013-03-06	1	NW LANTAU
	2013-03-13	4	NW LANTAU
	2013-05-13	1	NW LANTAU
	2013-05-13	2	NW LANTAU
NL120	2013-05-13	5	NW LANTAU
NL145	2013-03-13	7	NW LANTAU
NL165	2013-03-06	1	NW LANTAU
NL179	2013-03-06	1	NW LANTAU
NL202	2013-03-06	1	NW LANTAU
	2013-03-06	2	NW LANTAU
	2013-03-13	7	NW LANTAU
	2013-05-25	1	NW LANTAU
NL210	2013-03-11	2	NW LANTAU
NL224	2013-04-12	1	NW LANTAU
NL233	2013-03-11	3	NW LANTAU
	2013-04-12	1	NW LANTAU
NL244	2013-03-06	1	NW LANTAU
	2013-03-11	6	NW LANTAU
	2013-03-13	4	NW LANTAU
NL259	2013-03-06	1	NW LANTAU
	2013-05-13	2	NW LANTAU

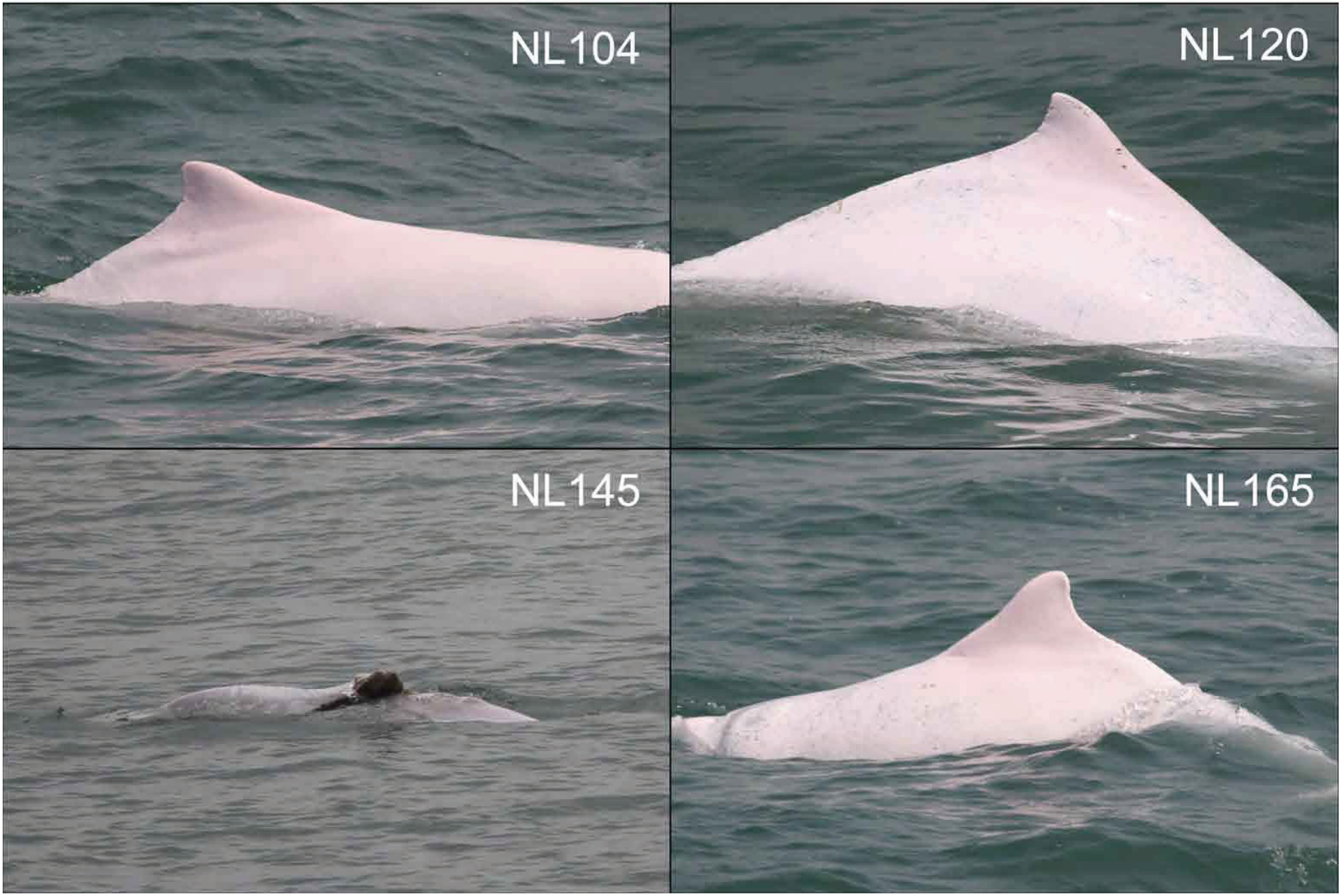
ID#	DATE	STG#	AREA
NL261	2013-03-11	7	NW LANTAU
NL262	2013-03-06	1	NW LANTAU
	2013-03-13	7	NW LANTAU
NL264	2013-03-13	7	NW LANTAU
NL272	2013-03-13	7	NW LANTAU
	2013-05-25	3	NW LANTAU
NL284	2013-03-06	1	NW LANTAU
	2013-03-11	7	NW LANTAU
NL286	2013-03-06	1	NW LANTAU
	2013-03-06	2	NW LANTAU
	2013-03-13	7	NW LANTAU
	2013-05-25	1	NW LANTAU
NL295	2013-03-11	6	NW LANTAU
	2013-03-13	4	NW LANTAU
WL05	2013-03-06	1	NW LANTAU
WL44	2013-03-13	4	NW LANTAU
WL46	2013-03-06	1	NW LANTAU
	2013-04-12	1	NW LANTAU
WL50	2013-03-13	3	NW LANTAU
WL61	2013-03-13	1	NW LANTAU
WL98	2013-03-13	4	NW LANTAU
WL131	2013-03-13	3	NW LANTAU
WL199	2013-03-06	1	NW LANTAU
	2013-03-13	4	NW LANTAU

Annex IV. Thirty-four individual dolphins that were identified during March-May 2013 under HKLR03 impact phase monitoring surveys

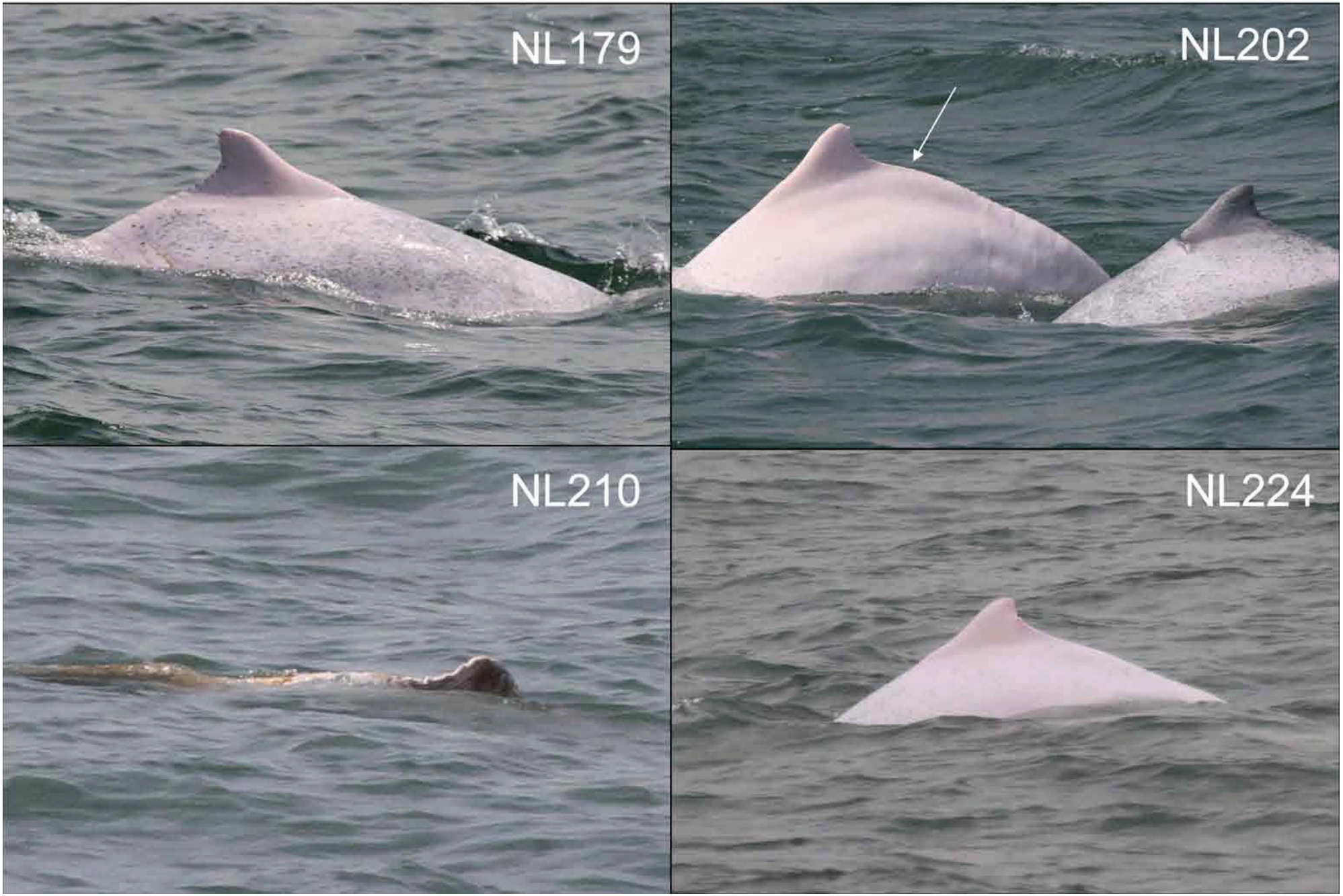


Annex IV. (cont'd)

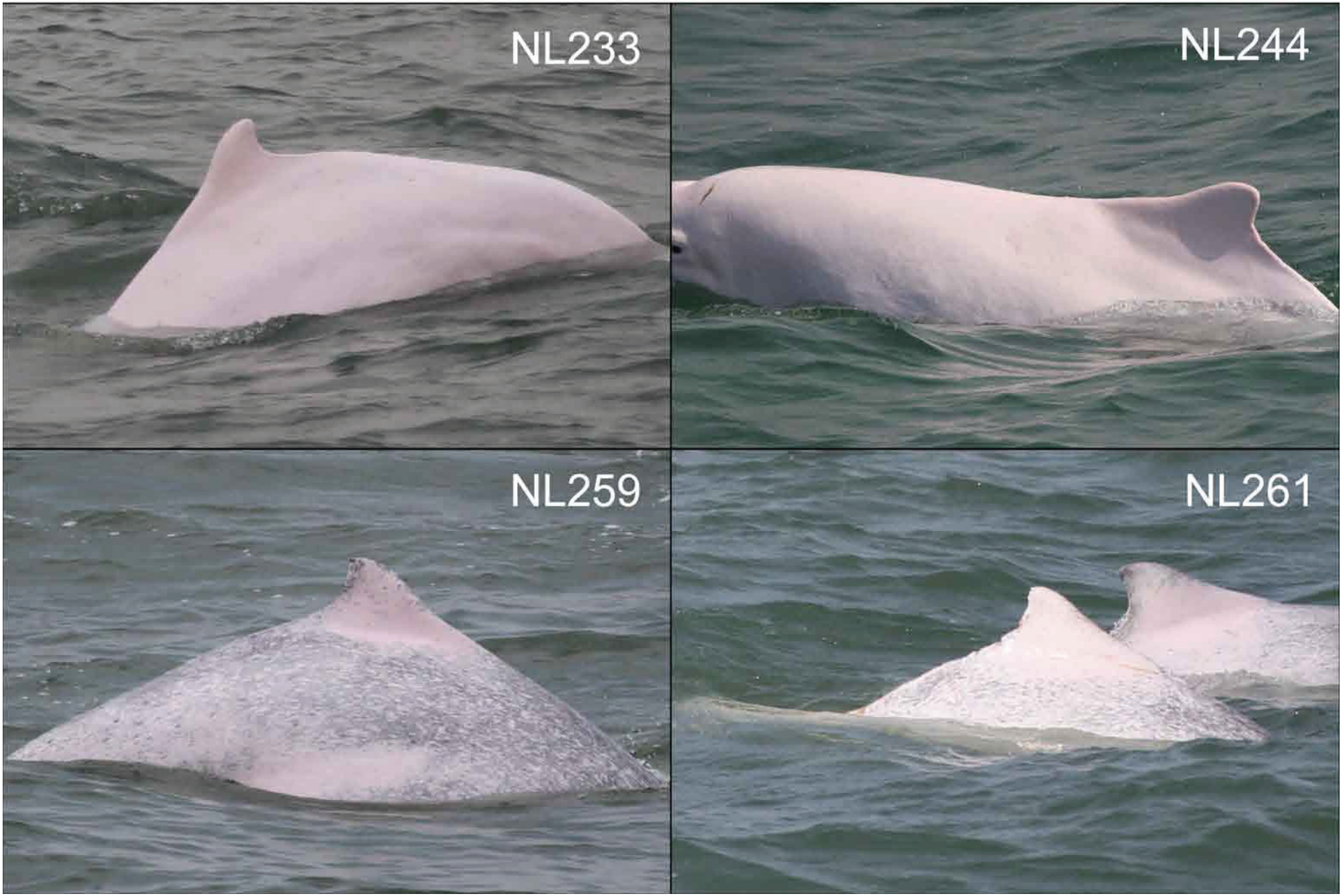
Annex IV. (cont'd)



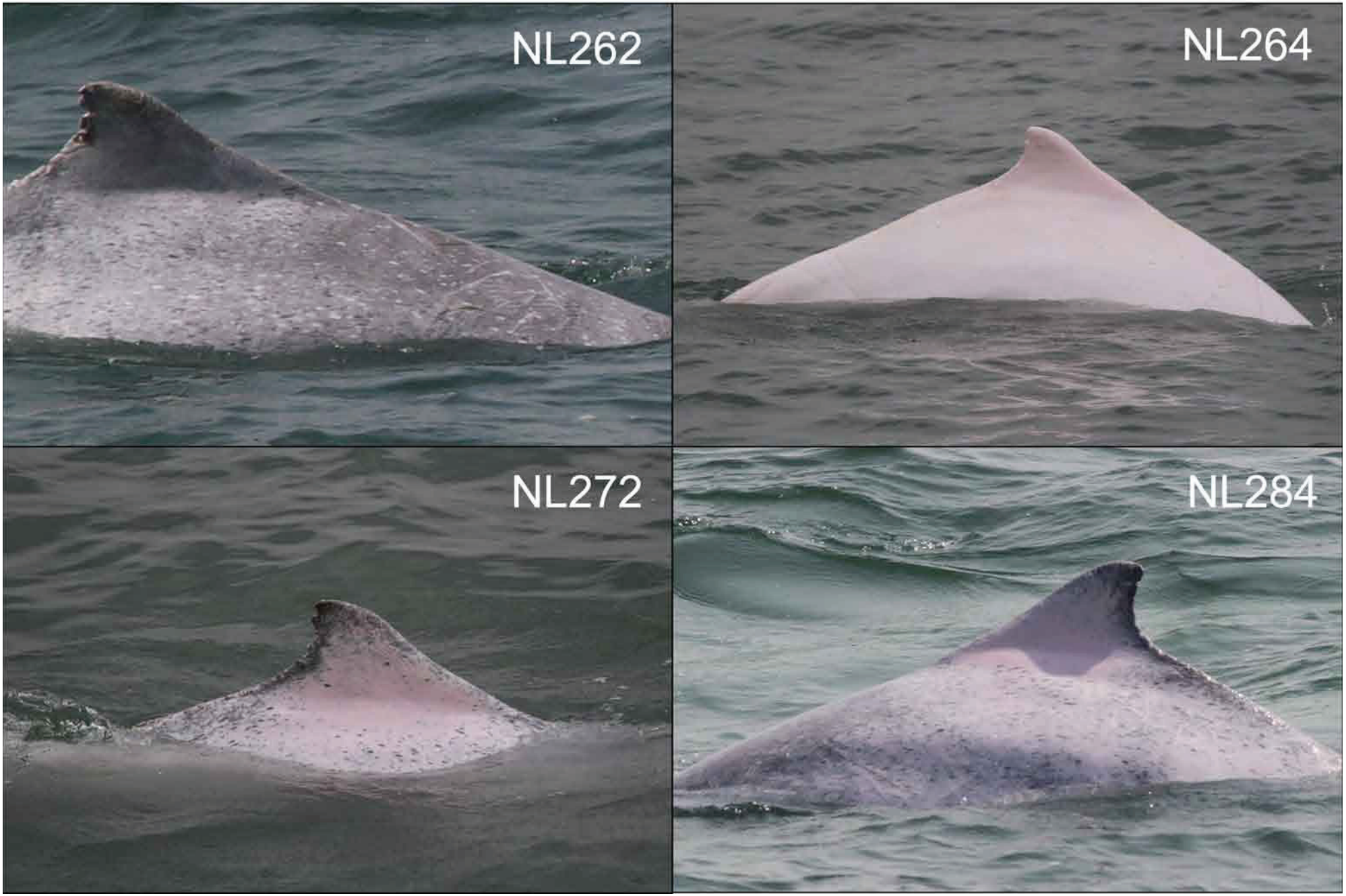
Annex IV. (cont'd)



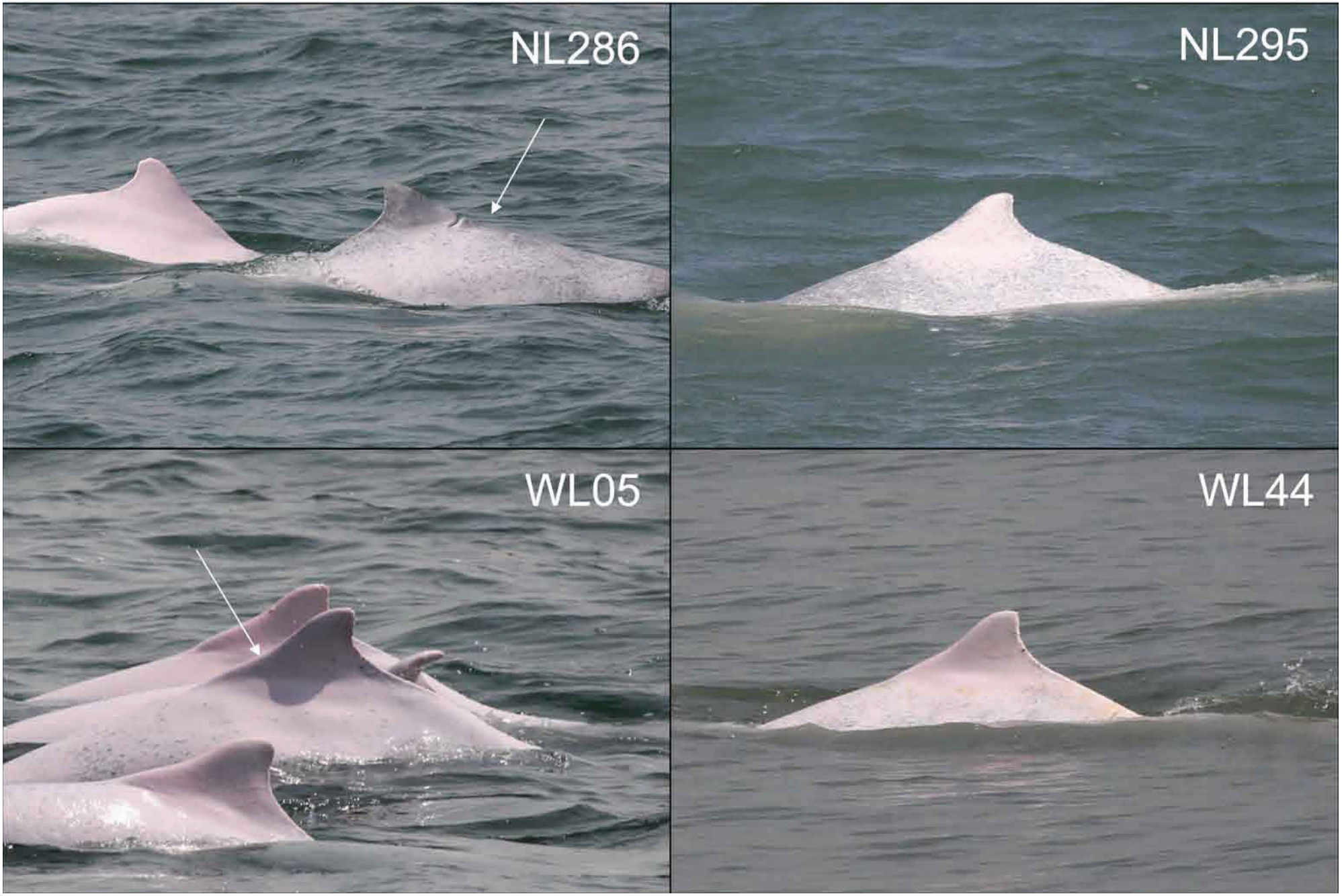
Annex IV. (cont'd)



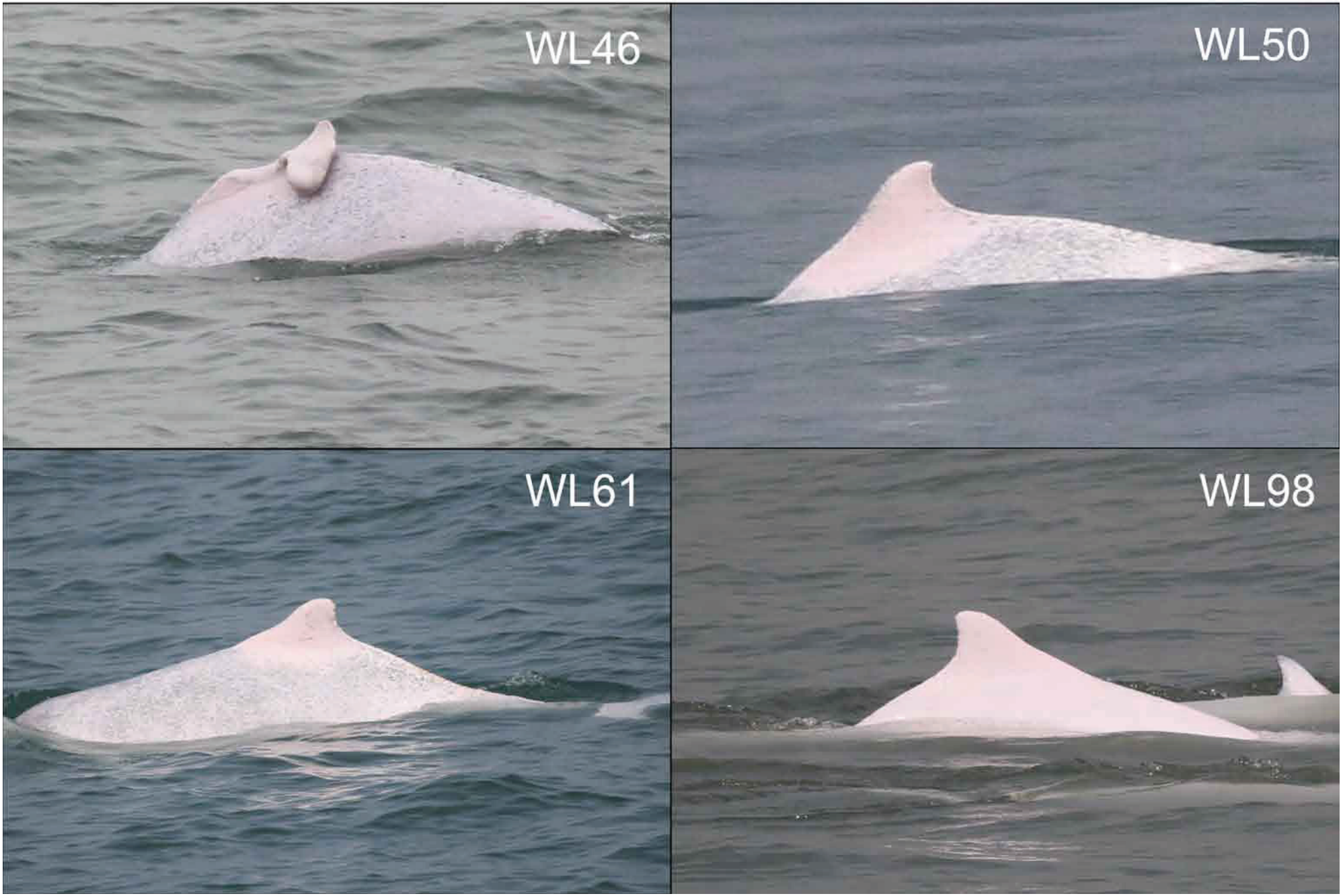
Annex IV. (cont'd)



Annex IV. (cont'd)

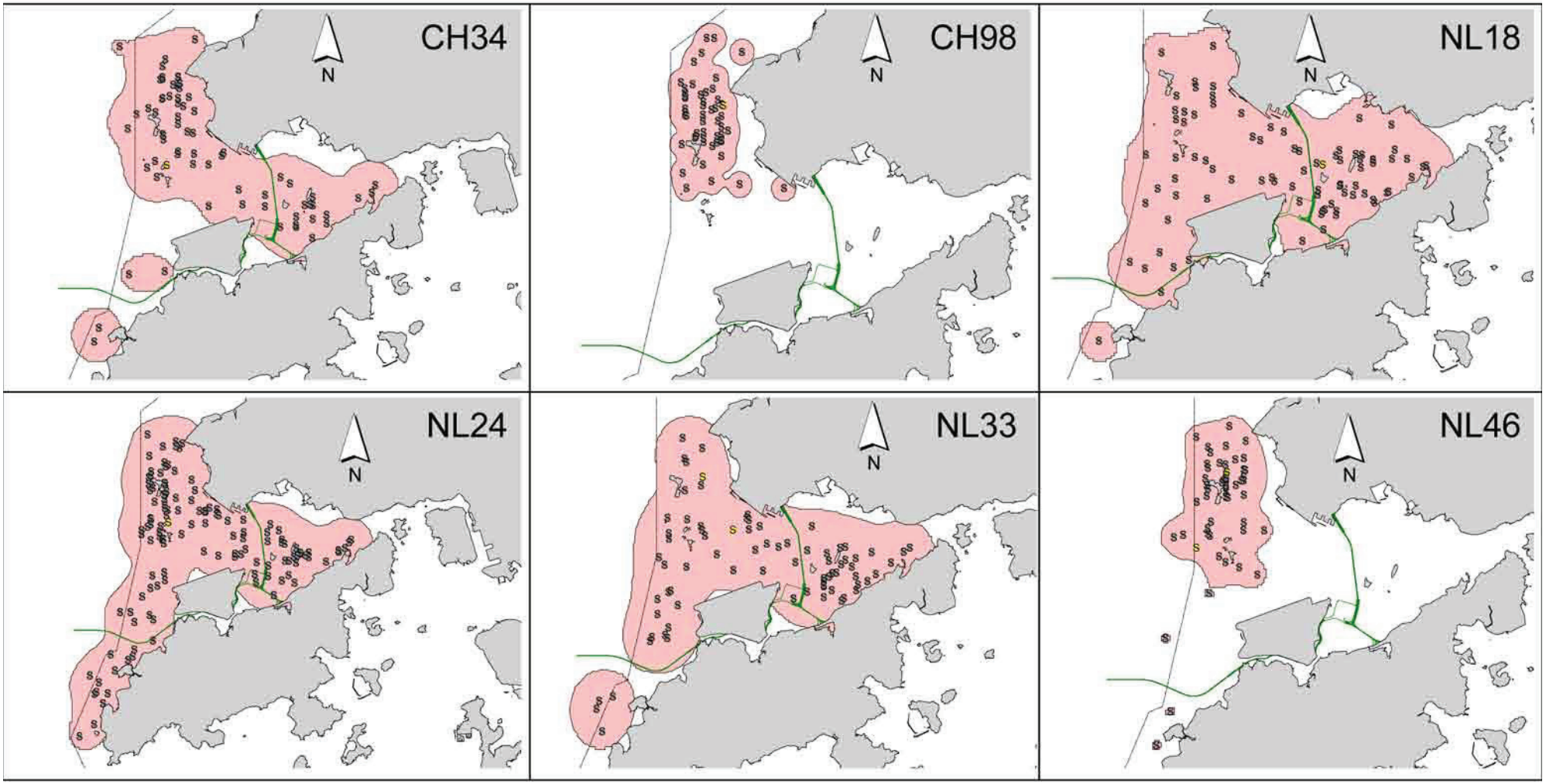


Annex IV. (cont'd)

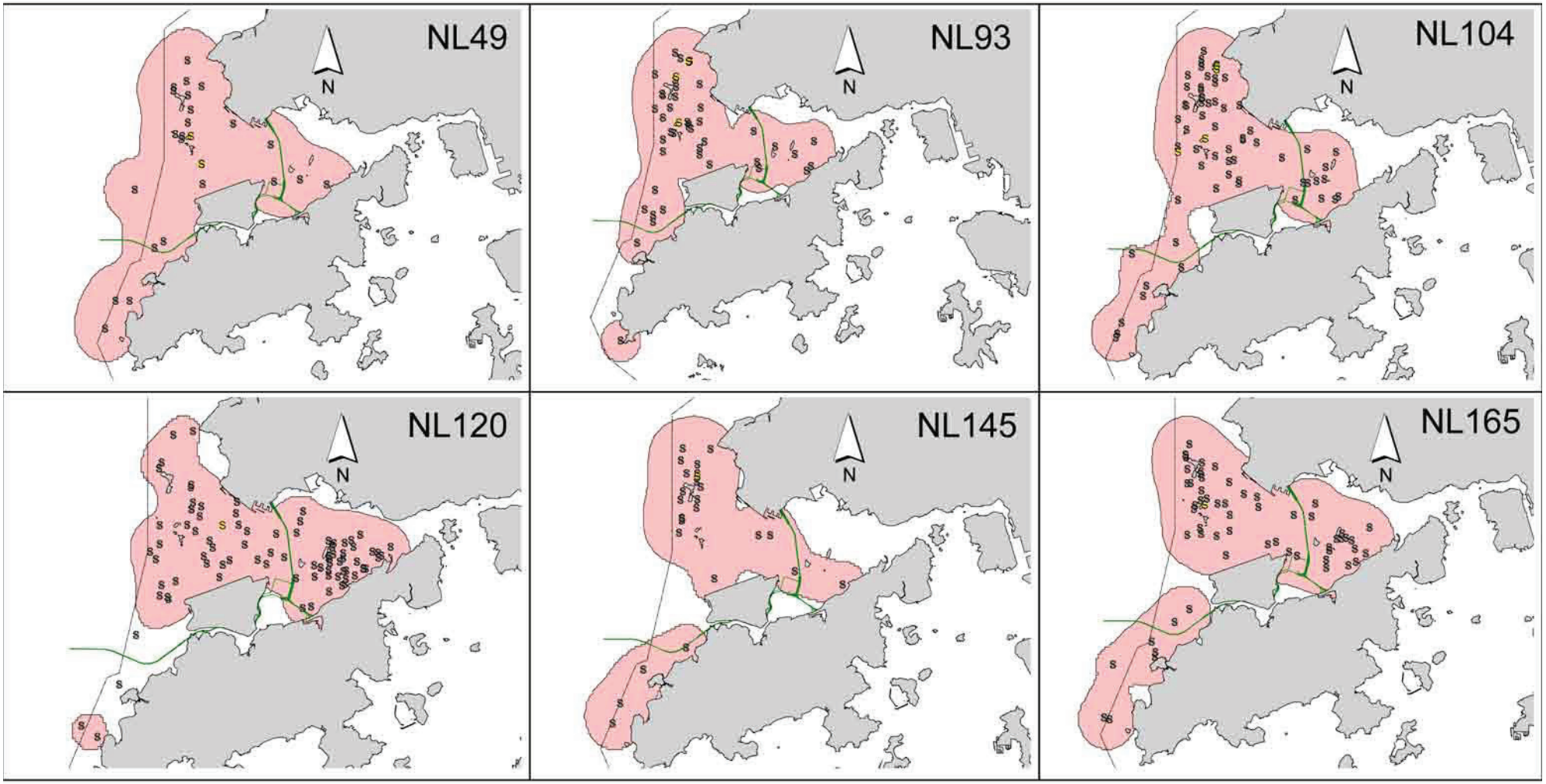


Annex IV. (cont'd)

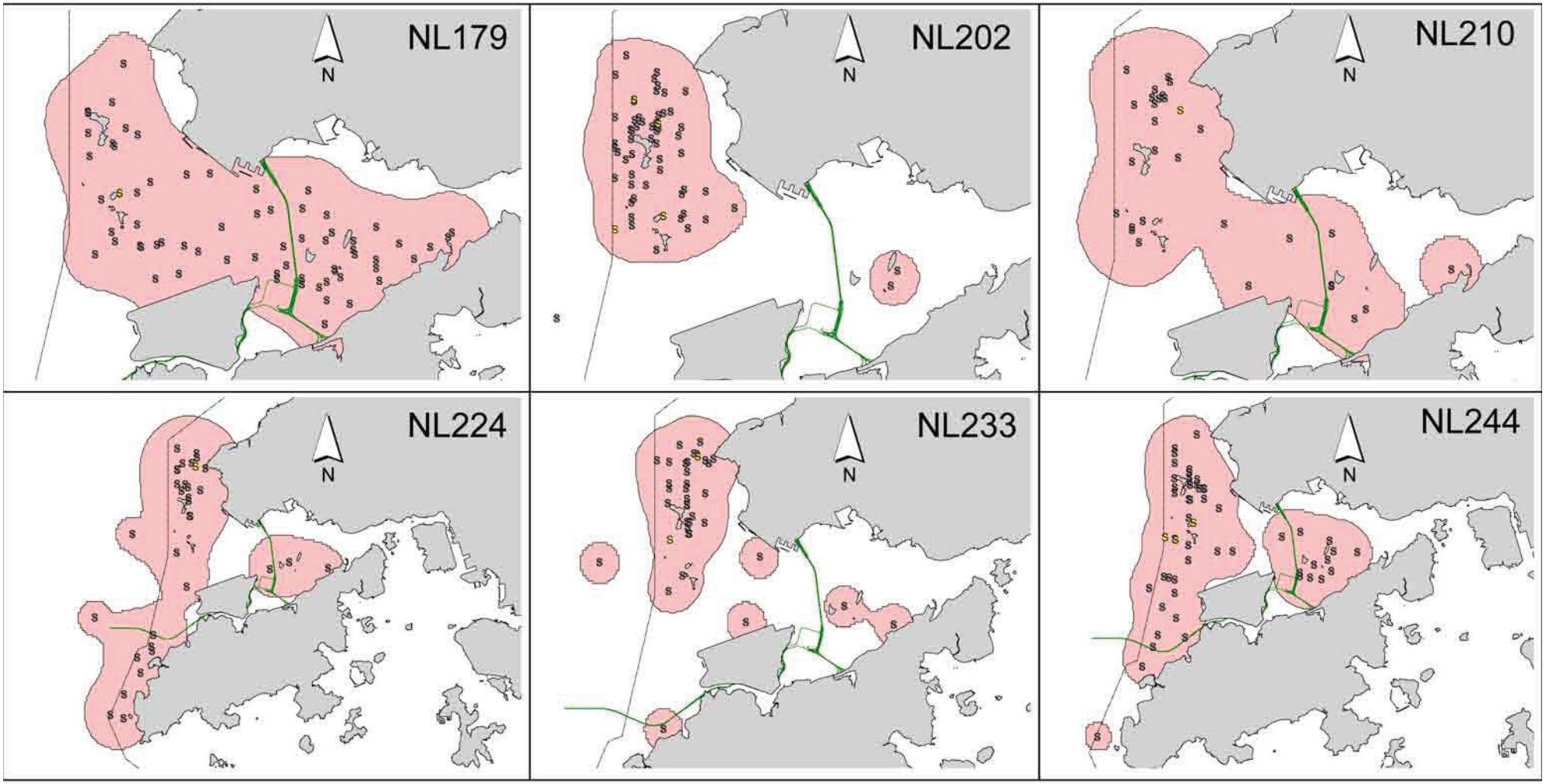
Annex V. Ranging patterns (95% kernel ranges) of 34 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicates sightings made in March – May 2013)



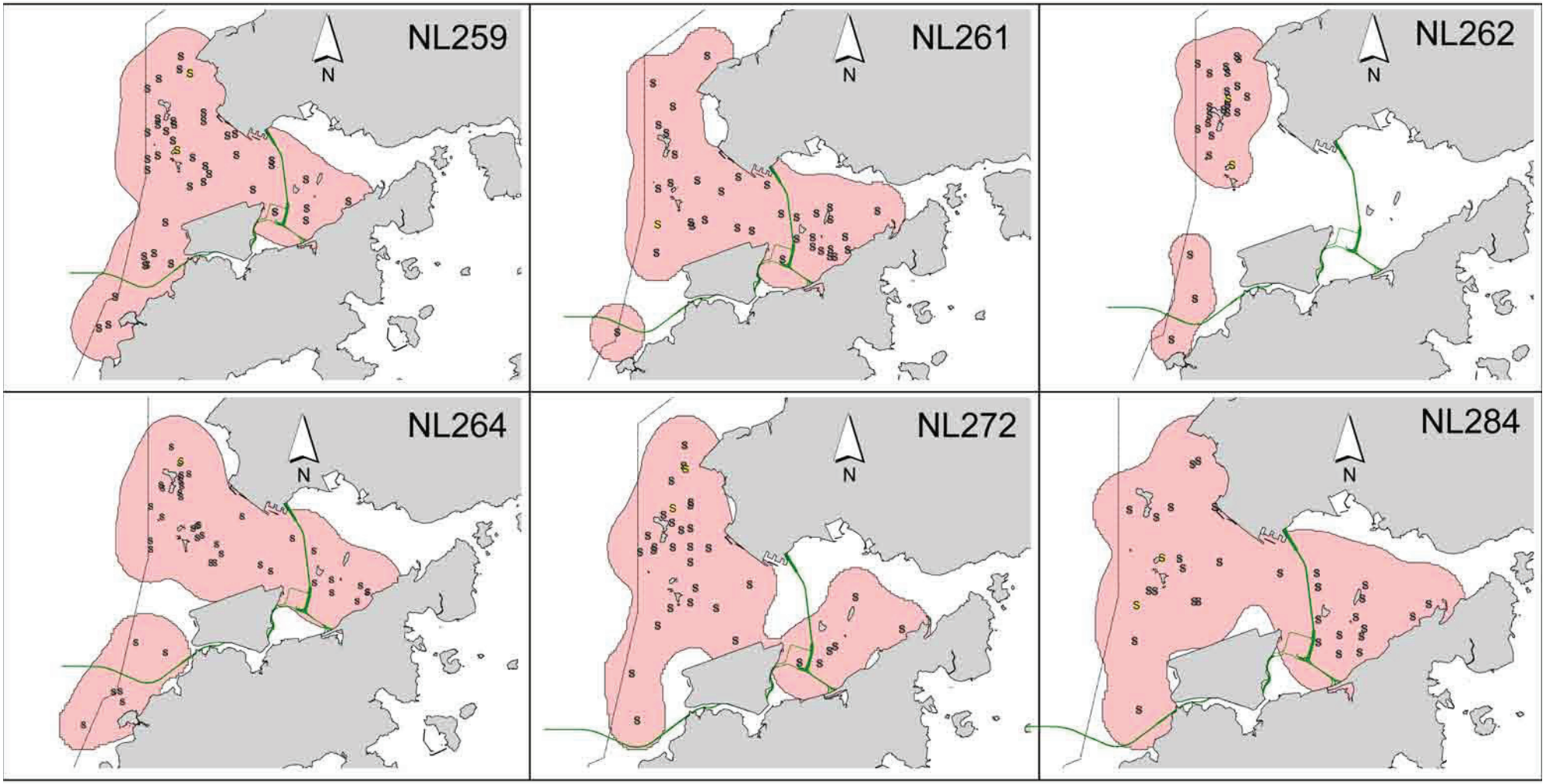
Annex V. (cont'd)



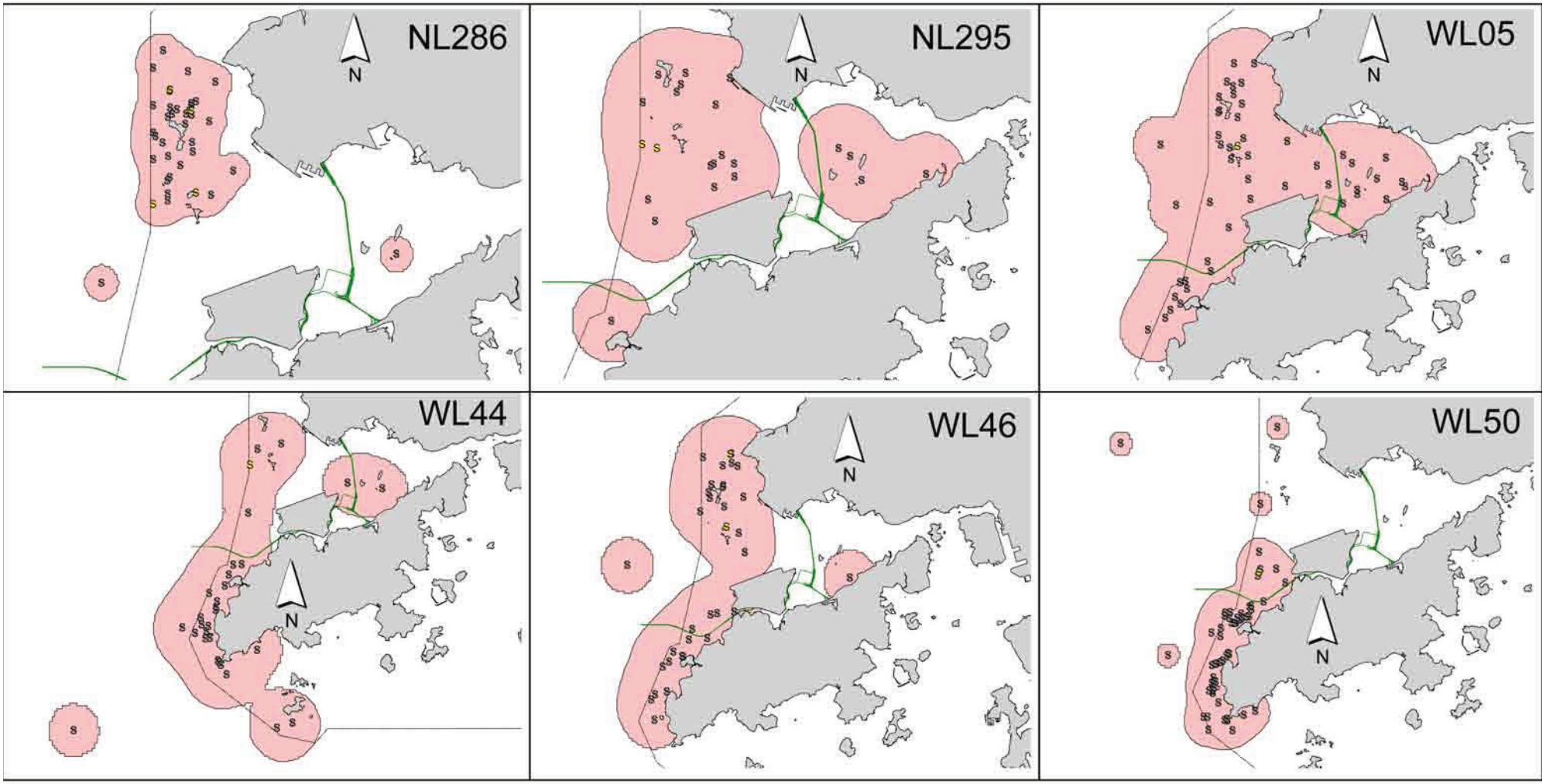
Annex V. (cont'd)



Annex V. (cont'd)



Annex V. (cont'd)



Annex V. (cont'd)