Appendix G

Impact Dolphin Monitoring Survey Result

CONTRACT NO. HY/2012/07
Hong Kong-Zhuhai-Macao Bridge Tuen Mun – Chek Lap Kok Link (Southern Connection Viaduct Section)
Chinese White Dolphin Monitoring

Fifth Annual Progress Report (November 2017 - October 2018)
submitted to Gammon Construction Limited

Submitted by
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1. Introduction

1.1. The Tuen Mun-Chek Lap Kok Link (TM-CLKL) comprises a 1.6 km long dual 2-lane viaduct section between the Hong Kong Boundary Crossing Facilities (HKBCF) and the North Lantau Highway and associated roads at Tai Ho. Gammon Construction Limited (hereinafter called the "Contractor") was awarded as the main contractor of "Contract No. HY/2012/07 – Hong Kong-Zhuhai-Macao Bridge Tuen Mun-Chek Lap Kok Link – Southern Connection Viaduct Section".

1.2. According to the updated Environmental Monitoring and Audit (EM&A) Manual (for TM-CLKL), monthly line-transect vessel surveys for Chinese White Dolphin should be conducted to cover the Northwest (NWL) and Northeast Lantau (NEL) survey areas as in AFCD annual marine mammal monitoring programme. However, as such surveys have been undertaken by the HKLR03 and HKBCF projects in the same areas (i.e. NWL and NEL), a combined monitoring approach is recommended by the Highways Department, that the TM-CLKL EM&A project can utilize the monitoring data collected by HKLR03 or HKBCF project to avoid any redundancy in monitoring effort. Such exemption for the dolphin monitoring will end upon the completion of the dolphin monitoring carried out by HKLR03 contract as well as the TM-CLKL Northern Connection Sub-Sea Tunnel Section (HY/2012/08).

1.3. In November 2013, the Director of Hong Kong Cetacean Research Project (HKCRP), Dr. Samuel Hung, has been appointed by Gammon Construction Limited as their dolphin specialist for the TM-CLKL Southern Viaduct Section EM&A project. He is responsible for the dolphin monitoring study, including the data collection on Chinese White Dolphins during the construction phase (i.e. impact period) of the TM-CLKL project in Northwest Lantau (NWL) and Northeast Lantau (NEL) survey areas.

1.4. During the construction period of HKLR, the dolphin specialist would be in charge of

reviewing and collating information collected by HKLR03 dolphin monitoring programme to examine any potential impacts of TM-CLKL construction works on the dolphins. 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 fifth annual progress report under the TM-CLKL construction phase dolphin monitoring programme submitted to the Gammon Construction Limited, summarizing the results of the surveys findings during the period of November 2017 to October 2018, utilizing the survey data collected by HKLR03 project.

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 1) twice per month throughout the entire construction period of HZMB. The co-ordinates of all transect lines conducted during the HKLR03 dolphin monitoring surveys are shown in Table 1.

Table 1 Co-ordinates of transect lines conducted by HKLR03 project

Line No.		Easting	Northing		Line No.		Easting	Northing
1	Start Point	804671	815456		13	Start Point	1	Start Point
1	End Point	804671	831404		13	End Point	1	End Point
2	Start Point	805476	820800		14	Start Point	2	Start Point
2	End Point	805476	826654		14	End Point	2	End Point
3	Start Point	806464	821150		15	Start Point	3	Start Point
3	End Point	806464	822911		15	End Point	3	End Point
4	Start Point	807518	821500		16	Start Point	4	Start Point
4	End Point	807518	829230		16	End Point	4	End Point
5	Start Point	808504	821850		17	Start Point	5	Start Point
5	End Point	808504	828602		17	End Point	5	End Point
6	Start Point	809490	822150		18	Start Point	6	Start Point
6	End Point	809490	825352		18	End Point	6	End Point

7	Start Point	810499	822000		19	Start Point	7	Start Point
7	End Point	810499	824613		19	End Point	7	End Point
8	Start Point	811508	821123		20	Start Point	8	Start Point
8	End Point	811508	824254		20	End Point	8	End Point
9	Start Point	812516	821303		21	Start Point	9	Start Point
9	End Point	812516	824254		21	End Point	9	End Point
10	Start Point	813525	821176		22	Start Point	10	Start Point
10	End Point	813525	824657		22	End Point	10	End Point
11	Start Point	814556	818853		23	Start Point	11	Start Point
11	End Point	814556	820992		23	End Point	11	End Point
12	Start Point	815542	818807		24	Start Point	12	Start Point
12	End Point	815542	824882		24	End Point	12	End Point

2.1.2. The HKLR03 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 20 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2018). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars.

2.1.4. 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.

2.1.5. During on-effort survey periods, the survey team recorded effort data including time, positions (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.

2.1.6. Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.

2.1.7. 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.

2.1.8. 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. 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 HKLR03 survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.

2.2.2. A professional digital camera (*Canon* EOS 7D or 60D model), equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.

2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995.

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. The following analyses were performed utilizing the HKLR03 dolphin monitoring data collected under the present impact phase (the fifth year of TMCLKL construction; i.e. November 2017 to October 2018). In addition, these analyses were also conducted for the one-year baseline phase (one year before any HZMB construction works have commenced; i.e. February 2011 to January 2012); the one-year transitional phase (one year after the HZMB construction works (HKBCF and HKLR works) have commenced, but before the commencement of TMCLKL construction works; i.e. November 2012 to October 2013); and the first, second, third, fourth and fifth years of TMCLKL construction (i.e. November 2013 to October 2014, November 2014 to October 2015, November 2015 to October 2016; November 2016 to October 2017; November 2017 to October 2018).

2.3.2. Along with the analyzed results from the baseline and transitional as well as the first four years of impact phase, results from the fifth year of impact phase can then be interpreted from the examination of any temporal changes before and during the construction activities of TMCLKL on dolphin usage in North Lantau waters. For the baseline phase, both baseline monitoring data collected under HZMB contract as well as the AFCD long-term dolphin monitoring data were included to increase the sample size in order to match the similar amount of survey effort in transitional and impact phases, both of which only HKLR03 monitoring data were included for the various analyses.

Distribution analysis

2.3.3. 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.

Encounter rate analysis

2.3.4. 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. Only data collected under Beaufort 3 or below condition would be used for the encounter rate analyses. Dolphin encounter rates during the impact phase were calculated in two ways for comparisons with the HZMB baseline and transitional period monitoring results as well as to the AFCD long-term marine mammal monitoring results.

2.3.5. Firstly, for the comparison with the HZMB monitoring results, the encounter rates were calculated using primary survey effort alone. The average encounter rate of sightings (STG) and average encounter rate of dolphins (ANI) were deduced based on the encounter rates from the 24 events during the present 12-month study period (i.e. 24 sets of line-transect surveys in North Lantau), which was also compared with the ones

deduced from the events during the first four years of impact period as well as the transitional period and baseline period.

2.3.6. Secondly, the encounter rates were also calculated using both primary and secondary survey effort as in AFCD long-term monitoring study. The encounter rate of sightings and dolphins were deduced by diving the total number of on-effort sightings (STG) and total number of dolphins (ANI) by the amount of survey effort for the present 12-month study period.

Quantitative grid analysis on habitat use

2.3.7. 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.

2.3.8. 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).

2.3.9. 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

Behavioural analysis

2.3.10. When dolphins were sighted during vessel surveys, their behaviour was observed. Different activities were categorized (i.e. feeding, socializing, traveling, and milling/resting) 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. Sighting distribution 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.

Ranging pattern analysis

2.3.11. Location data of individual dolphins that occurred during the present 12-month impact phase monitoring period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, was loaded as an extension with ArcView© 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD level.

3. Monitoring Results

3.1. Summary of survey effort and dolphin sightings

3.1.1. During the fifth year of TMCLKL impact phase monitoring (i.e. November 2017 to October 2018), a total of 24 sets of systematic line-transect vessel surveys were conducted under the HKLR03 monitoring works to cover all transect lines in NWL and NEL survey areas twice per month.

3.1.2. From these HKLR03 surveys, a total of 3,152.08 km of survey effort was collected, with 93.6% 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, 1,160.48 km and 1,991.60 km of survey effort were conducted in NEL and NWL survey areas respectively.

3.1.3. The total survey effort conducted on primary lines was 2,300.78 km, while the effort on secondary lines was 851.30 km. The 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.

3.1.4. From the 24 sets of HKLR03 monitoring surveys from November 2017 to October 2018, a total of 42 groups of 131 Chinese White Dolphins were sighted. All except two dolphin groups were sighted during on-effort search. Among the 40 on-effort sightings, 33 of them were made on primary lines, while the other seven dolphin sightings were made on secondary lines.

3.1.5. During this 12-month period, all dolphin sightings were made in NWL, and while none of them were made in NEL. A summary table of the dolphin sightings is shown in Appendix II.

3.2. Distribution

3.2.1. Distribution of dolphin sightings made during the HKLR03 monitoring surveys in November 2017 to October 2018 is shown in Figure 1.

3.2.2. The majority of dolphin sightings made during the fifth year of impact phase were concentrated at the northwestern portion of the North Lantau region, mainly in the waters around Lung Kwu Chau (Figure 1). Several dolphin sightings were also made near Black Point, Pillar Point and Sha Chau, while some were sighted near the juncture of Northwest and West Lantau survey areas, or just to the north and south of the HKLR09 alignment (Figure 1).

3.2.3. Notably, none of the dolphin groups were sighted in the vicinity of the entire alignment of TMCLKL or the reclamation sites of HKLR03 and HKBCF (Figure 1). As mentioned above, several sightings were made adjacent to the HKLR09 alignment near Shum Wat (Figure 1). In general, dolphins appeared to have mostly avoided the construction areas of HZMB works during the present impact phase monitoring period, which was consistent with the dolphin distribution during the first four years of impact phase.

3.2.4. Dolphin sighting distribution of the present impact phase monitoring period (November 2017 to October 2018) was compared to the ones during the baseline phase (February 2011 to January 2012), the transitional phase (November 2012 to October 2013) and the first four years of impact phase (November 2013 to October 2017) (Figure 2).

3.2.5. During the present impact phase period in 2017-18, dolphin distribution was quite similar to the previous three impact phase periods in 2014-15, 2015-16 and 2016-17, with dolphins being largely vacated from the eastern and central portions of the North Lantau region (Figure 2). This was in stark contrast to their very frequent occurrence around the Brothers Islands, Shum Shui Kok, the waters between Pillar Point and airport platform, and the vicinity of HZMB-associated work sites during the baseline period (Figure 2). Even in the transitional phase, dolphins still utilized these waters in a moderate extent, but such usage has progressively diminished during the five periods of impact phase of TMCLKL construction (Figure 2).

3.2.6. The only area where dolphin occurrence was consistently high across the seven periods was around the Lung Kwu Chau area, but even so such occurrence there was progressively diminishing in past four monitoring periods (Figure 2).

3.3. Encounter rate

3.3.1. During the present 12-month impact phase monitoring period, the average daily encounter rates of Chinese White Dolphins were deduced in NEL and NWL survey areas, and compared to the ones deduced from the baseline, transitional and first four years of impact phases (Table 2).

3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter rates were also calculated for the present 12-month study period using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 2.17 sightings and 7.06 dolphins per 100 km of survey effort respectively, while the encounter rates of sightings (STG) and dolphins (ANI) in NEL were both nil with no on-effort sighting being made there in 2017-18.

Table 2. Comparison of average daily dolphin encounter rates from the first five years of impact phase, transitional phase and baseline phase monitoring periods (Note: encounter rates deduced from the five periods were calculated based on survey and on-effort sighting data made along the primary transect lines under favourable conditions; ± denotes the standard deviation of the average encounter rates).

	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)	
	Northeast Lantau	**Northwest Lantau**	**Northeast Lantau**	**Northwest Lantau**
Impact Phase (2017-18)	0.00	2.68 ± 3.04	0.00	9.02 ± 14.63
Impact Phase (2016-17)	0.00	2.35 ± 2.62	0.00	8.57 ± 11.05
Impact Phase (2015-16)	0.00	2.10 ± 1.83	0.00	8.54 ± 8.53
Impact Phase (2014-15)	0.11 ± 0.54	2.54 ± 2.49	0.11 ± 0.54	11.64 ± 14.04
Impact Phase (2013-14)	0.22 ± 0.74	6.93 ± 4.08	0.76 ± 2.59	26.31 ± 17.56
Transitional Phase (2012-13)	1.70 ± 2.26	7.68 ± 4.36	4.75 ± 7.61	27.51 ± 18.06
Baseline Phase (2011-12)	6.05 ± 5.04	7.75 ± 5.69	19.91 ± 21.30	29.57 ± 26.96

3.3.3. In NEL, the dolphin encounter rates (both STG and ANI) in the fifth year of TMCLKL impact monitoring period were nil as in the previous two periods in 2015-16 and 2016-17, which was in stark contrast to the averages during the baseline phase and transitional phase (Table 2). Such progressive decline has actually existed in this area since the transitional phase (i.e. well before the TMCLKL construction works commenced), with the averages in the transitional phase being much lower than the ones in the baseline phase (reductions of 71.9% for STG and 76.1% respectively). Since then, dolphin occurrence has further diminished to an extremely low level during the first and second monitoring periods of TMCLKL construction works, and then to complete absence in the third, fourth and fifth monitoring periods.

3.3.4. In NWL, the average dolphin encounter rates (STG and ANI) during the present impact phase monitoring period were much lower (reductions of 65.4% and 69.5% respectively) than the ones recorded in the baseline period, indicating a dramatic decline in dolphin usage of this survey area during the fifth year of TMCLKL impact phase monitoring period (Table 2). Moreover, those encounter rates consistently remained at a low level in the four consecutive monitoring periods between 2014-18.

3.3.5. Notably, the encounter rates in NWL during the first year of impact phase (2013-14) were only slightly lower than the baseline period, but such decline has quickly escalated during the following monitoring periods during the impact phase. This signaled a further widespread of declining usage by the dolphins throughout the entire North Lantau region with no sign of recovery, even though most of the marine works of HZMB construction has been completed.

3.3.6. A two-way ANOVA with repeated measures of variance and unequal sample size was conducted to examine whether there were any significant differences in the average encounter rates between the baseline, transitional and the five impact phase periods. The two variables that were examined included the different periods and the two locations (i.e. NEL and NWL).

3.3.7. For the comparison between the different monitoring periods, the p-value for the differences in average dolphin encounter rates of STG and ANI were both 0.000000 and 0.00000 respectively. Even if the alpha value is set at 0.00001, significant differences were detected among the different periods in both dolphin encounter rates of STG and ANI.

3.4. Group size

3.4.1. Group size of Chinese White Dolphins ranged from one to 12 individuals per group in North Lantau region during November 2017 – October 2018. The average dolphin group sizes from the 12-month impact phase monitoring period were compared with the ones deduced from baseline, transitional and first four years of impact phases, as shown in Table 3.

Table 3. Comparison of average dolphin group sizes from the first five years of impact phase, transitional phase and baseline phase monitoring periods (± denotes the standard deviation of the average encounter rates)

	Average Dolphin Group Size		
	Overall	**Northeast Lantau**	**Northwest Lantau**
Impact Phase (2017-18)	3.12 ± 2.86 (n = 42)	0.00	3.12 ± 2.86 (n = 42)
Impact Phase (2016-17)	3.51 ± 2.68 (n = 43)	0.00	3.51 ± 2.68 (n = 43)
Impact Phase (2015-16)	3.73 ± 3.14 (n = 45)	1.00 (n = 1)	3.80 ± 3.14 (n = 44)
Impact Phase (2014-15)	4.24 ± 3.15 (n = 54)	1.00 (n = 1)	4.30 ± 3.15 (n = 53)
Impact Phase (2013-14)	3.76 ± 2.57 (n = 136)	5.00 ± 2.71 (n = 4)	3.73 ± 2.57 (n = 132)
Transitional Phase (2012-13)	3.37 ± 2.98 (n = 186)	2.64 ± 2.38 (n = 22)	3.47 ± 3.05 (n = 164)
Baseline Phase (2011-12)	3.32 ± 2.86 (n = 288)	2.80 ± 2.35 (n = 79)	3.52 ± 3.01 (n = 209)

3.4.2. The average dolphin group sizes in NWL waters (and also the entire North Lantau region) during the present impact phase monitoring period were the lowest among all five impact phase monitoring periods as well as the baseline and transitional phases (Table 3).

3.4.3. Among the 42 dolphin groups sighted during the impact phase, 33 of them were

composed of 1-4 individuals only, while there were nine groups with more than 5 animals and only two groups with more than 10 individuals (Appendix II).

3.4.4. Distribution of dolphins with larger group sizes (i.e. five individuals or more per group) during the present impact phase is shown in Figure 3, with comparison to the ones in the first four years of impact phase, transitional phase and baseline phase. During the impact phase in 2017-18, distribution of the larger dolphin groups were mainly concentrated around and to the north of Lung Kwu Chau, while the two very large groups with 12 animals each were sighted at the mouth of Deep Bay and between Sha Chau and Lung Kwu Chau respectively (Figure 3).

3.4.5. Throughout the five impact phases, distribution of these larger groups has been largely confined to the northwestern portion of North Lantau region. Such limited distribution was drastically different from the baseline phase, when the larger dolphin groups were distributed more evenly in NWL waters with many of them also sighted in NEL waters (Figure 3).

3.5. Habitat use

3.5.1. During the present impact phase monitoring period in 2017-18, the most heavily utilized habitats by Chinese White Dolphins were only found to the northeast of Lung Kwu Chau (Figures 4a and 4b). For the rest of North Lantau region, only a handful of grids between Sha Chau and Lugn Kwu Chau, near Pillar Point, Black Point, at the mouth of Deep Bay, and adjacent to the HKLR09 alignment have recorded low to moderately low dolphin densities (Figures 4a and 4b). Moreover, all grids near the HKLR03 and HKBCF reclamation sites as well as the entire alignment of TMCLKL did not record any presence of dolphins in the present 12-month impact monitoring period in 2017-18 (Figures 4a and 4b).

3.5.2. When compared with the habitat use patterns during the baseline phase, dolphin usage in NEL has progressively diminished during the transitional phase and the four periods of impact phases (Figure 5). During the baseline period, a number of grids between Siu Mo To and Shum Shui Kok recorded moderately high to high dolphin densities, and most grids in NEL recorded dolphin usage. This was in stark contrast to the complete absence of dolphin in this area during the present and previous two impact phase periods (Figure 5).

3.5.3. Moreover, dolphin usage of NWL waters has also declined dramatically during the recent monitoring periods (including the present one in 2017-18), with the only higher densities occurred near Lung Kwu Chau. This is in contrast to a more evenly spread usage in NWL during the baseline phase, transitional phase and the first year of impact phase monitoring (Figure 5). Apparently, there has been a more widespread decline of dolphin usage throughout the North Lantau waters in the past four years of the impact monitoring periods.

3.6. Mother-calf pairs

3.6.1. During the present 12-month impact phase monitoring period, no young calf was sighted at all in North Lantau waters. Notably, the extremely low occurrence of young calves

have been persistent in recent monitoring periods between 2014-18, ranging from 0% in 2015-16 and 2017-18 to 1.3% in 2014-15, when compared to the higher percentages during the impact phase period of 2013-14 (5.7%), transitional phase (6.7%) and baseline phase (4.5%).

3.6.2. The near absence of young calves in North Lantau region during recent monitoring periods was drastically different from the distribution patterns during the baseline and transitional phases when the young calves were sighted throughout NWL waters (Figure 6).

3.7. Activities and associations with fishing boats

3.7.1. Only three dolphin sightings were associated with feeding activities during the 12-month impact phase monitoring period. The percentage of sightings associated with feeding activities during the present impact phase (7.1%) was much lower than the impact phase periods in 2016-17 (18.6%), 2015-16 (11.1%), 2014-15 (18.5%), transitional phase (8.6%) and baseline phase (12.8%), but was slightly higher than the one during 2013-14 period (5.9%).

3.7.2. Moreover, two sightings were also associated with socializing activities in 2017-18, and the percentage of such sightings (4.8%) was lower than the previous impact monitoring periods in 2015-16 (8.9%), 2014-15 (5.5%) and 2013-14 (5.9%) as well as the transitional period (6.4%), but higher than the baseline period (3.8%) and the previous monitoring period in 2016-17 (0%). On the contrary, none of the 42 dolphin group was engaged in traveling or resting/milling activities in 2017-18.

3.7.3. Distribution of dolphins engaged in feeding and socializing activities during the present impact phase monitoring period is shown in Figure 7. Two of the three groups engaged in feeding activities were located near Lung Kwu Chau, while another group was found near HKLR09 alignment (Figure 7). On the other hand, the two groups engaged in socializing activities were found near Lung Kwu Chau and at the mouth of Deep Bay (Figure 7).

3.7.4. The comparison in distribution of dolphins engaged in different activities during different monitoring phases revealed that feeding activities were frequently sighted during the baseline and transitional periods along the Urmston Road, within the Sha Chau and Lung Kwu Chau Marine Park, to the west of the airport platform and around the Brothers Islands, while the socializing activities were more scattered throughout the North Lantau region in the same period (Figure 7). It is apparent that the “hotspots” where dolphins engaged in different activities were considerably different between the baseline, transitional and impact phases.

3.7.5. Notably, only one of the 42 dolphin groups sighted during the impact phase monitoring period in 2017-18 were found to be associated with an operating purse-seiner. The rare events of fishing boat associations by the dolphins during the five periods of impact phase as well as the transitional phase was quite different from the baseline period with 14 of 288 dolphin groups associated with fishing boats.

3.8. Summary of photo-identification works

3.8.1. During the 12-month impact phase monitoring period in 2017-18, a total of 44 individuals sighted 96 times altogether were identified (see Appendix III). All of these re-sightings were made in NWL.

3.8.2. More than two-thirds of the 44 identified individuals were sighted only once or twice, while the other 13 individuals were sighted more frequently during the 12-month period. For example, CH34 and NL286 were sighted 5-6 times, while NL136 and NL182 were sighted seven and nine times respectively in 2017-18. Their frequent occurrences during the fifth year of impact phase monitoring indicated strong reliance of NWL waters as their home ranges.

3.8.3. Notably, a total of six well-recognized females (i.e. NL33, NL202, NL233, WL28, WL145, WL179) were accompanied with their calves during their re-sightings, and most of these calves are older and already in their juvenile stage.

3.9. Individual range use

3.9.1. Ranging patterns of the 44 individuals identified during the 12-month impact phase monitoring period in 2017-18 were determined by fixed kernel method, and are shown in Appendix IV.

3.9.2. The majority of identified dolphins sighted within this 12-month period were utilizing their ranges primarily in NWL, with the exception of NL311, NL327, WL28, WL62, WL124, WL145, WL179, WL188, WL251, WL273 and WL288 that primarily utilized WL waters (Appendix IV). Moreover, 28 of the 44 individuals have occurred in both North and West Lantau waters based on the HKLR09 monitoring data collected concurrently during the same 12-month period in 2017-18 (Appendix IV). On the contrary, all identified dolphins have avoided the NEL waters (Appendix IV), the area where many of them have utilized as their core areas of activities before the HZMB construction.

3.9.3. Temporal changes in range use of 13 individual dolphins that have consistently occurred in baseline phase, transitional phase and all five periods of impact phases were examined in details (Appendix V). It is apparent that seven of them (e.g. CH34, NL33, NL136, NL182) have gradually shifted their range use away from their previously important habitat in NEL since 2013-14, and have been completely absent from there in the recent impact phase periods (Appendix V).

3.9.4. Moreover, some individual dolphins have gradually diminished their utilization of NWL waters during the TMCLKL impact phases, and at the same time nine of them (e.g. NL98, NL123, NL210) have increased their utilization of WL waters (Appendix V). Three individuals (NL33, NL120 and NL269) have even expanded their range use to Southwest Lantau waters as well during the past several impact phase monitoring periods (Appendix V). However, it should also be noted that such range expansion or shift has been reversed for a number of individuals (e.g. NL120, NL82) in 2016-17 and 2017-18, as they have once again utilized NWL waters primarily for their range use (Appendix V).

3.9.5. On the contrary, three individuals (NL46, NL202 and NL286) have no changes in their range use throughout the different monitoring periods. Moreover, five individuals (e.g. NL104, NL210) have utilized Lantau waters less in recent years (Appendix V).

3.9.6. The abovementioned temporal changes in individual range use should be continuously monitored for the rest of the TMCLKL construction period, to determine whether such range shifts are temporary or permanent, and whether the dolphins would continue the North Lantau waters once the HZMB-related construction works have completed.

4. Conclusion

4.1. During the fifth year of TMCLKL impact phase monitoring of Chinese white dolphins, no adverse impact from the activities of the TMCLKL construction project on the dolphins was noticeable from general observations.

4.2. Although the dolphins infrequently occurred along the alignment of TMCLKL southern connection viaduct in the past and during the baseline monitoring period, it is apparent that dolphin usage has been drastically reduced in the entire North Lantau region, and many individuals have shifted away from the important habitats around the Brothers Islands and the rest of North Lantau waters.

4.3. It is critical to monitor the dolphin usage in North Lantau region for the rest of the impact phase monitoring period, to determine whether the dolphins are continuously affected by the various construction activities in relation to the HZMB-related works, and whether suitable mitigation measure can be applied to revert the situation.

5. References

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- Hung, S. K. 2018. Monitoring of marine mammals in Hong Kong waters: final report (2017-18). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 174 pp.

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

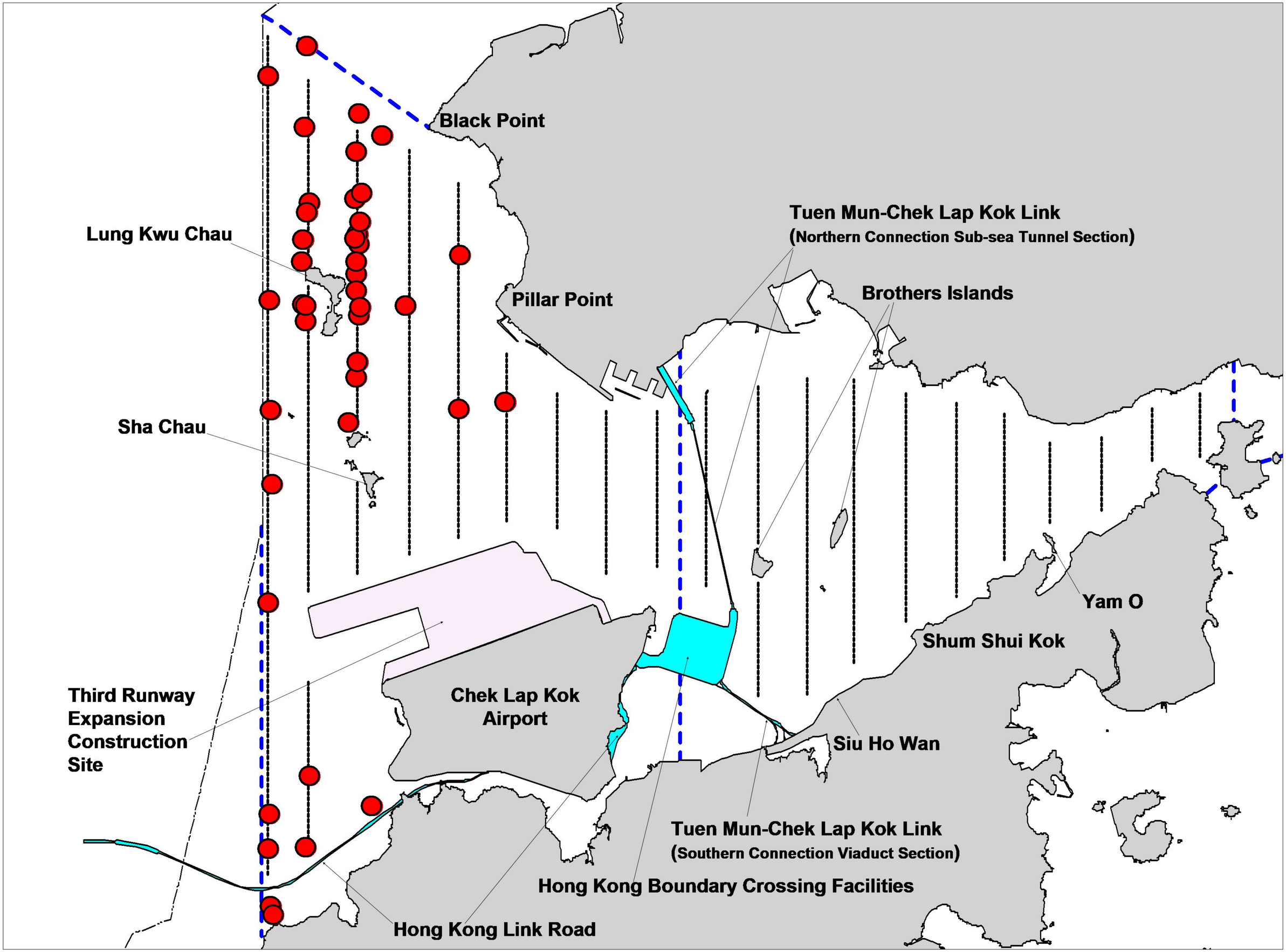


Figure 1. Distribution of Chinese white dolphin sightings in North Lantau region during the fifth year of TMCLKL construction works (November 2017 to October 2018), utilizing the HKLR03 monitoring data

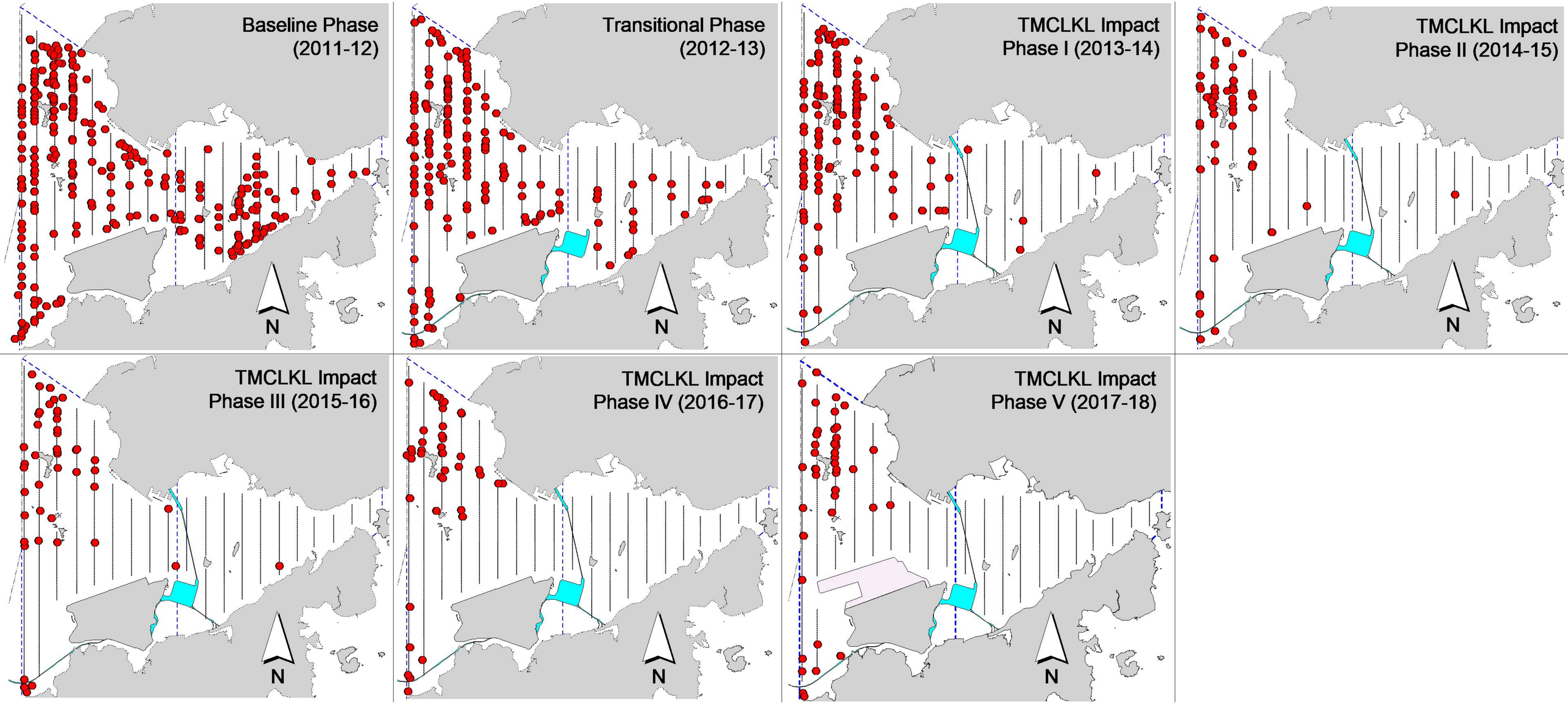


Figure 2. A comparison on distribution of Chinese white dolphin sightings in North Lantau region during the baseline (2011-12), transitional (2012-13) and five impact phases (2013-14, 2014-15, 2015-16, 2016-17 & 2017-18) of TMCLKL construction works

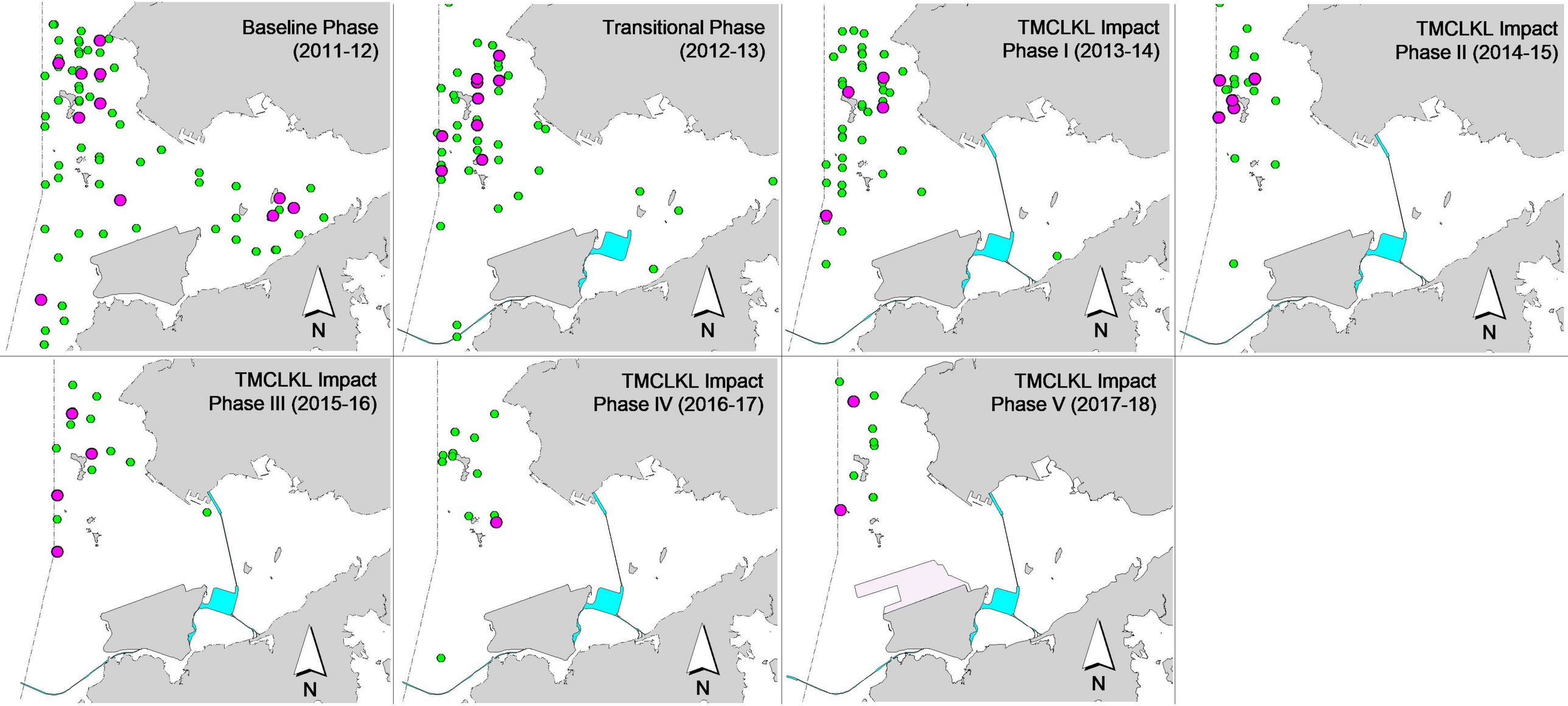


Figure 3. Distribution of dolphins with larger group sizes during different phases of TMCLKL construction works (green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

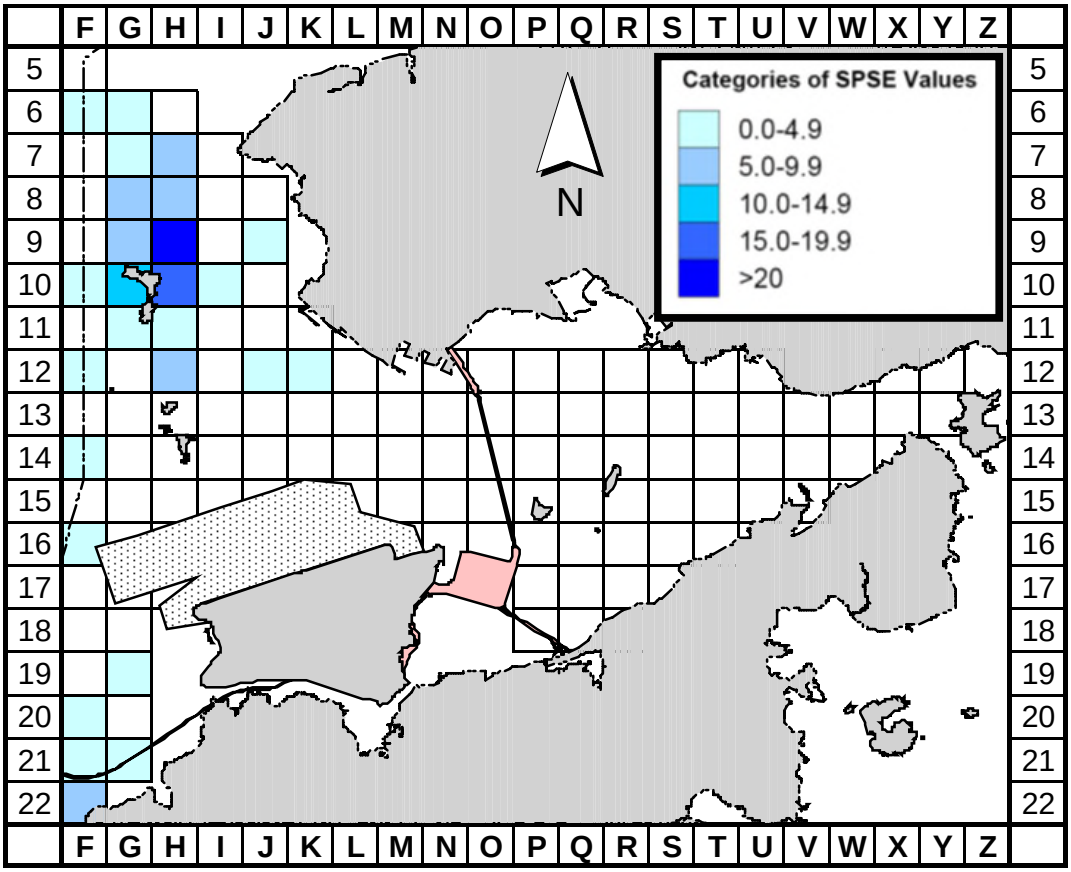


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period monitoring period (Nov17 - Oct18) (SPSE = no. of on-effort sightings per 100 units of survey effort)

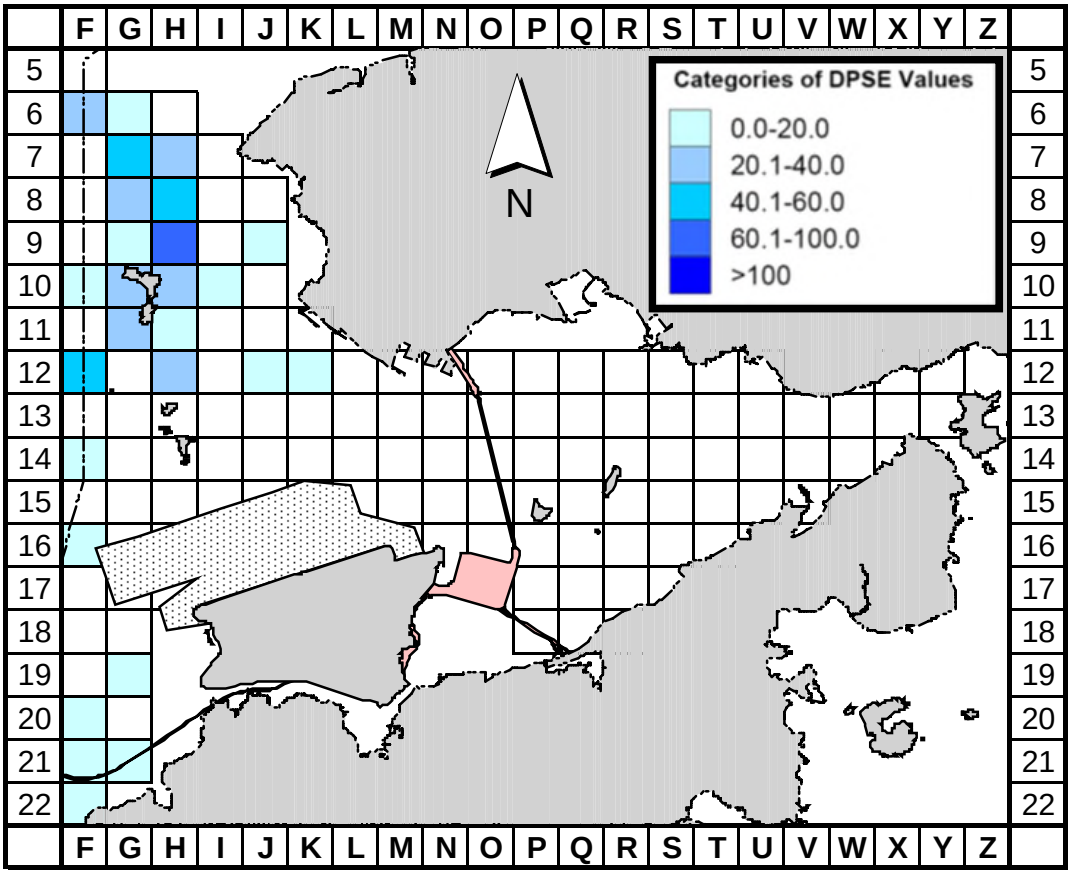


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Nov17 -Oct18) (DPSE = no. of dolphins per 100 units of survey effort)

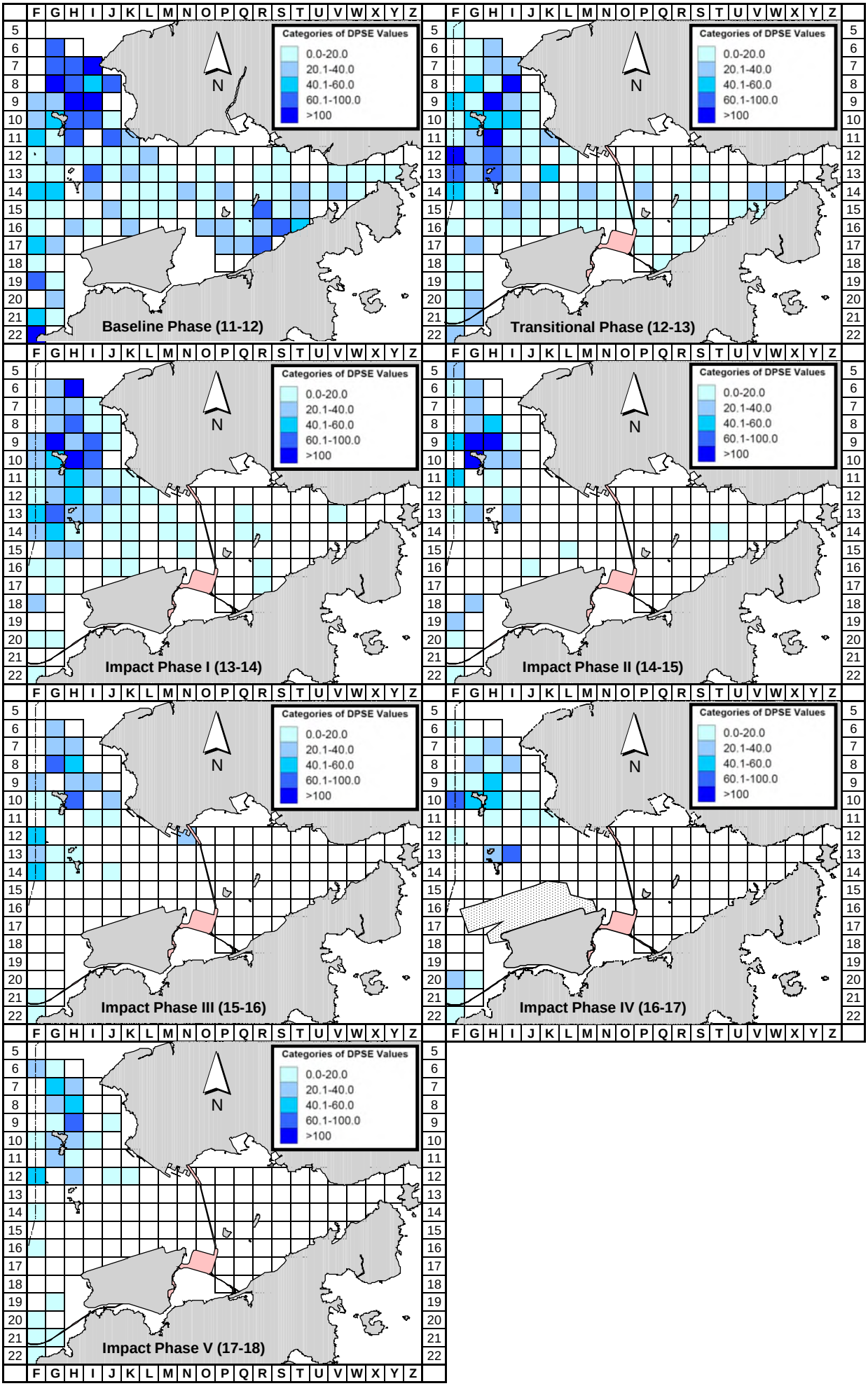


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km^2 in NWL and NEL survey areas between the five impact phases (2013-14, 2014-15, 2015-16, 2016-17 & 2017-18), transitional phase (2012-13) and baseline phase (Feb11-Jan12) monitoring periods (DPSE = no. of dolphins per 100 units of survey effort)

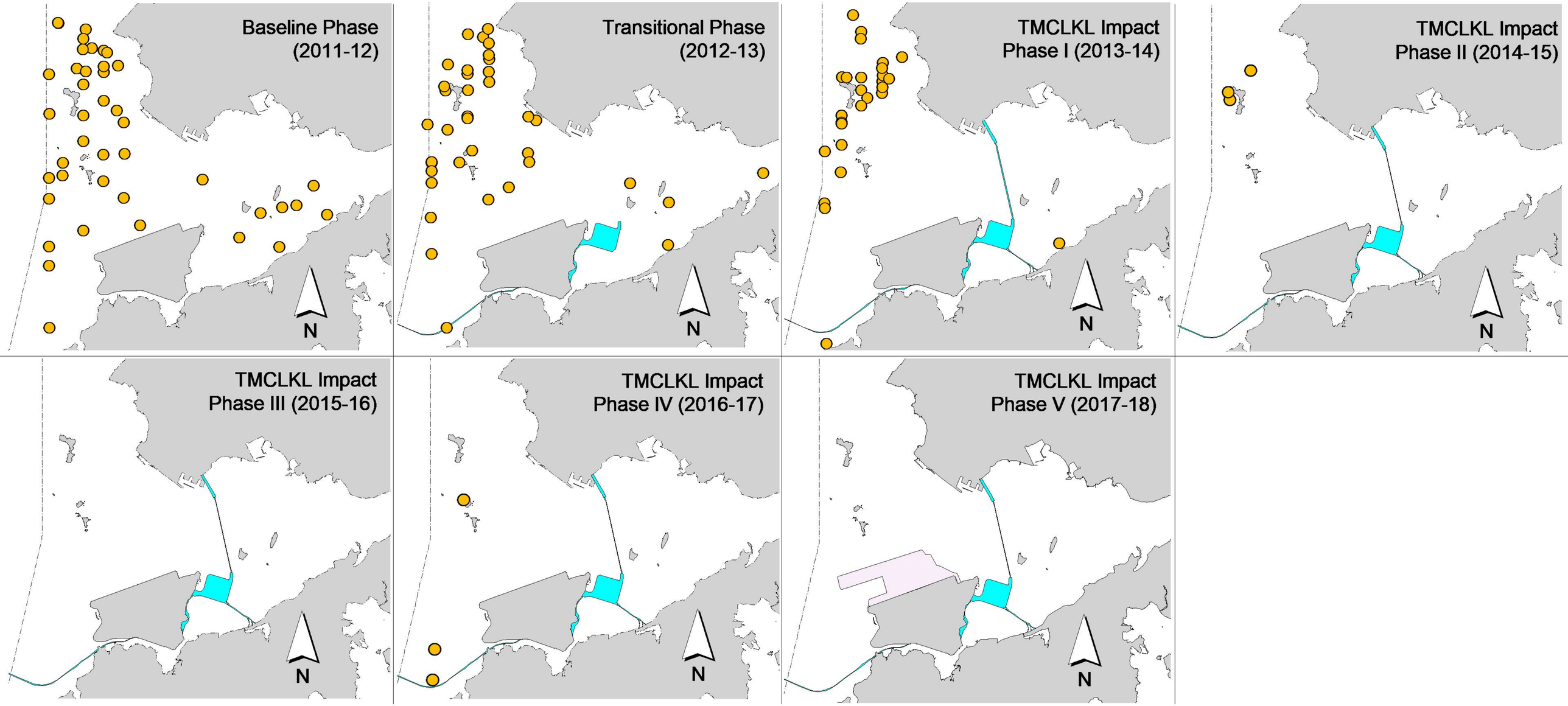


Figure 6. Distribution of young calves of Chinese white dolphins during different phases of TMCLKL construction works

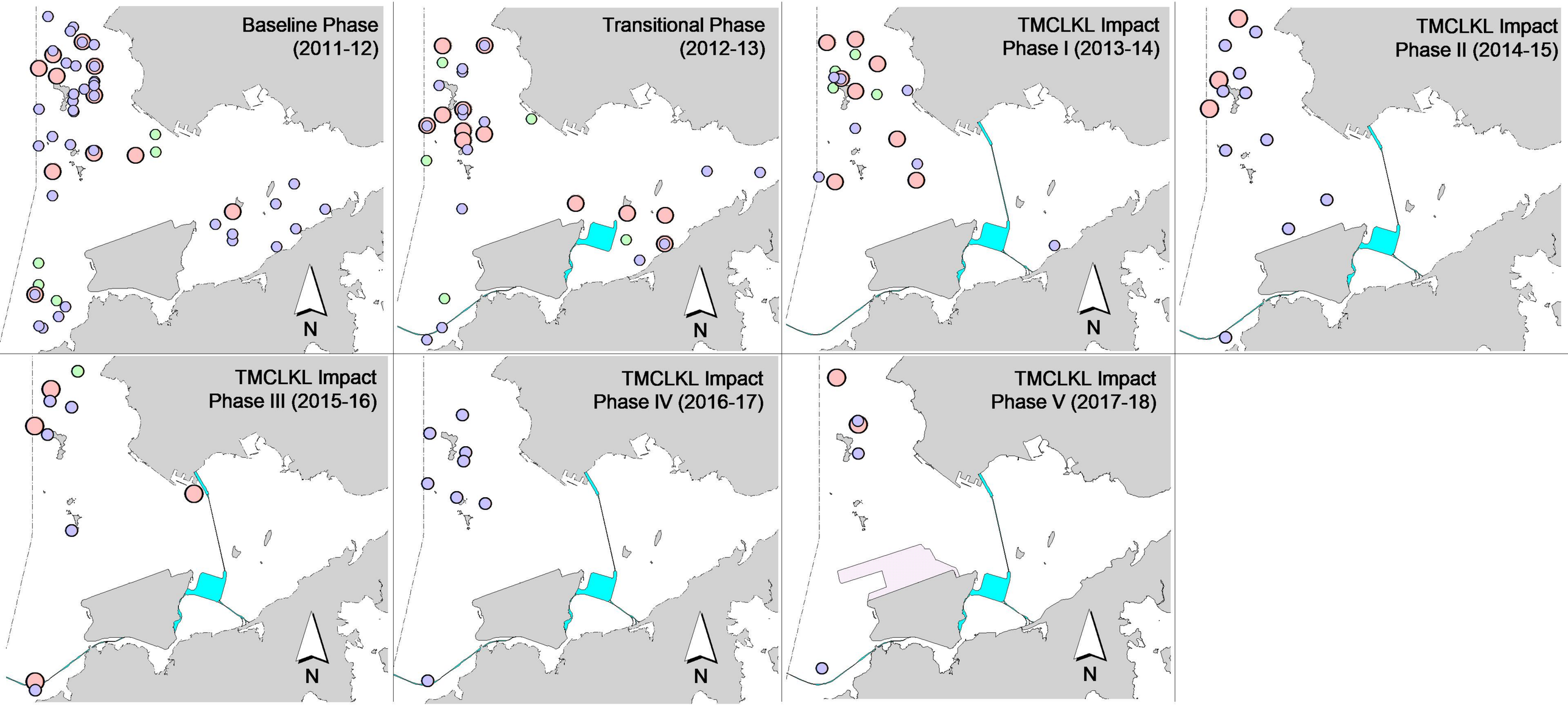


Figure 7. Distribution of dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during different phases of TMCLKL construction works

Appendix I. HKLR03 Survey Effort Database (November 2017 - October 2018)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
1-Nov-17	NW LANTAU	2	17.00	AUTUMN	STANDARD36826	HKLR	P
1-Nov-17	NW LANTAU	3	15.32	AUTUMN	STANDARD36826	HKLR	P
1-Nov-17	NW LANTAU	2	8.38	AUTUMN	STANDARD36826	HKLR	S
1-Nov-17	NW LANTAU	3	2.53	AUTUMN	STANDARD36826	HKLR	S
1-Nov-17	NE LANTAU	2	29.72	AUTUMN	STANDARD36826	HKLR	P
1-Nov-17	NE LANTAU	3	5.10	AUTUMN	STANDARD36826	HKLR	P
1-Nov-17	NE LANTAU	2	10.07	AUTUMN	STANDARD36826	HKLR	S
1-Nov-17	NE LANTAU	3	2.41	AUTUMN	STANDARD36826	HKLR	S
8-Nov-17	NW LANTAU	2	13.77	AUTUMN	STANDARD36826	HKLR	P
8-Nov-17	NW LANTAU	3	14.05	AUTUMN	STANDARD36826	HKLR	P
8-Nov-17	NW LANTAU	2	10.58	AUTUMN	STANDARD36826	HKLR	S
8-Nov-17	NW LANTAU	3	1.80	AUTUMN	STANDARD36826	HKLR	S
17-Nov-17	NW LANTAU	2	8.53	AUTUMN	STANDARD36826	HKLR	P
17-Nov-17	NW LANTAU	3	18.98	AUTUMN	STANDARD36826	HKLR	P
17-Nov-17	NW LANTAU	2	9.37	AUTUMN	STANDARD36826	HKLR	S
17-Nov-17	NW LANTAU	3	3.55	AUTUMN	STANDARD36826	HKLR	S
24-Nov-17	NW LANTAU	2	3.81	AUTUMN	STANDARD36826	HKLR	P
24-Nov-17	NW LANTAU	3	28.72	AUTUMN	STANDARD36826	HKLR	P
24-Nov-17	NW LANTAU	2	4.40	AUTUMN	STANDARD36826	HKLR	S
24-Nov-17	NW LANTAU	3	6.27	AUTUMN	STANDARD36826	HKLR	S
24-Nov-17	NE LANTAU	2	30.83	AUTUMN	STANDARD36826	HKLR	P
24-Nov-17	NE LANTAU	3	4.97	AUTUMN	STANDARD36826	HKLR	P
24-Nov-17	NE LANTAU	1	1.20	AUTUMN	STANDARD36826	HKLR	S
24-Nov-17	NE LANTAU	2	10.10	AUTUMN	STANDARD36826	HKLR	S
5-Dec-17	NW LANTAU	2	17.27	WINTER	STANDARD36826	HKLR	P
5-Dec-17	NW LANTAU	3	15.02	WINTER	STANDARD36826	HKLR	P
5-Dec-17	NW LANTAU	2	7.80	WINTER	STANDARD36826	HKLR	S
5-Dec-17	NW LANTAU	3	3.81	WINTER	STANDARD36826	HKLR	S
5-Dec-17	NE LANTAU	2	33.41	WINTER	STANDARD36826	HKLR	P
5-Dec-17	NE LANTAU	3	2.11	WINTER	STANDARD36826	HKLR	P
5-Dec-17	NE LANTAU	2	13.18	WINTER	STANDARD36826	HKLR	S
5-Dec-17	NE LANTAU	3	0.60	WINTER	STANDARD36826	HKLR	S
12-Dec-17	NW LANTAU	2	24.51	WINTER	STANDARD36826	HKLR	P
12-Dec-17	NW LANTAU	3	3.30	WINTER	STANDARD36826	HKLR	P
12-Dec-17	NW LANTAU	2	11.89	WINTER	STANDARD36826	HKLR	S
12-Dec-17	NW LANTAU	3	0.90	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NW LANTAU	1	3.85	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NW LANTAU	2	21.86	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NW LANTAU	3	2.68	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NW LANTAU	1	2.79	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NW LANTAU	2	6.92	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NW LANTAU	3	2.43	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NE LANTAU	1	11.59	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NE LANTAU	2	21.70	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NE LANTAU	3	4.60	WINTER	STANDARD36826	HKLR	P
15-Dec-17	NE LANTAU	1	3.31	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NE LANTAU	2	6.80	WINTER	STANDARD36826	HKLR	S
15-Dec-17	NE LANTAU	3	1.90	WINTER	STANDARD36826	HKLR	S
20-Dec-17	NW LANTAU	2	1.39	WINTER	STANDARD36826	HKLR	P
20-Dec-17	NW LANTAU	3	5.99	WINTER	STANDARD36826	HKLR	P
20-Dec-17	NW LANTAU	4	25.69	WINTER	STANDARD36826	HKLR	P
20-Dec-17	NW LANTAU	3	5.43	WINTER	STANDARD36826	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
20-Dec-17	NW LANTAU	4	5.50	WINTER	STANDARD36826	HKLR	S
2-Jan-18	NW LANTAU	2	27.79	WINTER	STANDARD36826	HKLR	P
2-Jan-18	NW LANTAU	3	3.97	WINTER	STANDARD36826	HKLR	P
2-Jan-18	NW LANTAU	2	10.12	WINTER	STANDARD36826	HKLR	S
2-Jan-18	NW LANTAU	3	0.60	WINTER	STANDARD36826	HKLR	S
8-Jan-18	NW LANTAU	3	3.47	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NW LANTAU	4	9.99	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NW LANTAU	5	14.91	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NW LANTAU	4	6.80	WINTER	STANDARD36826	HKLR	S
8-Jan-18	NW LANTAU	5	3.73	WINTER	STANDARD36826	HKLR	S
8-Jan-18	NE LANTAU	2	6.71	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NE LANTAU	3	29.79	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NE LANTAU	4	0.64	WINTER	STANDARD36826	HKLR	P
8-Jan-18	NE LANTAU	2	5.70	WINTER	STANDARD36826	HKLR	S
8-Jan-18	NE LANTAU	3	7.36	WINTER	STANDARD36826	HKLR	S
16-Jan-18	NW LANTAU	2	27.70	WINTER	STANDARD36826	HKLR	P
16-Jan-18	NW LANTAU	3	5.45	WINTER	STANDARD36826	HKLR	P
16-Jan-18	NW LANTAU	2	8.15	WINTER	STANDARD36826	HKLR	S
16-Jan-18	NW LANTAU	3	2.70	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NE LANTAU	2	17.96	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NE LANTAU	3	18.90	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NE LANTAU	2	7.54	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NE LANTAU	3	4.20	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NE LANTAU	4	1.40	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NW LANTAU	2	7.23	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NW LANTAU	3	17.92	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NW LANTAU	4	2.72	WINTER	STANDARD36826	HKLR	P
25-Jan-18	NW LANTAU	2	4.02	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NW LANTAU	3	6.52	WINTER	STANDARD36826	HKLR	S
25-Jan-18	NW LANTAU	4	1.95	WINTER	STANDARD36826	HKLR	S
2-Feb-18	NW LANTAU	2	2.34	WINTER	STANDARD36826	HKLR	P
2-Feb-18	NW LANTAU	3	16.30	WINTER	STANDARD36826	HKLR	P
2-Feb-18	NW LANTAU	4	15.00	WINTER	STANDARD36826	HKLR	P
2-Feb-18	NW LANTAU	2	2.86	WINTER	STANDARD36826	HKLR	S
2-Feb-18	NW LANTAU	3	6.78	WINTER	STANDARD36826	HKLR	S
2-Feb-18	NW LANTAU	4	1.12	WINTER	STANDARD36826	HKLR	S
9-Feb-18	NE LANTAU	1	4.00	WINTER	STANDARD36826	HKLR	P
9-Feb-18	NE LANTAU	2	30.78	WINTER	STANDARD36826	HKLR	P
9-Feb-18	NE LANTAU	1	1.00	WINTER	STANDARD36826	HKLR	S
9-Feb-18	NE LANTAU	2	12.02	WINTER	STANDARD36826	HKLR	S
9-Feb-18	NW LANTAU	1	5.87	WINTER	STANDARD36826	HKLR	P
9-Feb-18	NW LANTAU	2	21.20	WINTER	STANDARD36826	HKLR	P
9-Feb-18	NW LANTAU	1	2.32	WINTER	STANDARD36826	HKLR	S
9-Feb-18	NW LANTAU	2	8.91	WINTER	STANDARD36826	HKLR	S
14-Feb-18	NW LANTAU	1	2.80	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NW LANTAU	2	24.71	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NW LANTAU	2	12.25	WINTER	STANDARD36826	HKLR	S
14-Feb-18	NE LANTAU	1	3.84	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NE LANTAU	2	22.25	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NE LANTAU	3	10.09	WINTER	STANDARD36826	HKLR	P
14-Feb-18	NE LANTAU	2	12.04	WINTER	STANDARD36826	HKLR	S
14-Feb-18	NE LANTAU	3	1.28	WINTER	STANDARD36826	HKLR	S
22-Feb-18	NW LANTAU	2	11.27	WINTER	STANDARD36826	HKLR	P
22-Feb-18	NW LANTAU	3	21.56	WINTER	STANDARD36826	HKLR	P

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
22-Feb-18	NW LANTAU	2	5.32	WINTER	STANDARD36826	HKLR	S
22-Feb-18	NW LANTAU	3	5.45	WINTER	STANDARD36826	HKLR	S
8-Mar-18	NE LANTAU	2	21.56	SPRING	STANDARD36826	HKLR	P
8-Mar-18	NE LANTAU	3	13.44	SPRING	STANDARD36826	HKLR	P
8-Mar-18	NE LANTAU	2	6.79	SPRING	STANDARD36826	HKLR	S
8-Mar-18	NE LANTAU	3	4.71	SPRING	STANDARD36826	HKLR	S
8-Mar-18	NW LANTAU	2	5.20	SPRING	STANDARD36826	HKLR	P
8-Mar-18	NW LANTAU	3	17.08	SPRING	STANDARD36826	HKLR	P
8-Mar-18	NW LANTAU	4	2.40	SPRING	STANDARD36826	HKLR	P
8-Mar-18	NW LANTAU	2	3.42	SPRING	STANDARD36826	HKLR	S
8-Mar-18	NW LANTAU	3	1.60	SPRING	STANDARD36826	HKLR	S
8-Mar-18	NW LANTAU	4	5.60	SPRING	STANDARD36826	HKLR	S
12-Mar-18	NW LANTAU	1	4.88	SPRING	STANDARD36826	HKLR	P
12-Mar-18	NW LANTAU	2	30.68	SPRING	STANDARD36826	HKLR	P
12-Mar-18	NW LANTAU	1	1.00	SPRING	STANDARD36826	HKLR	S
12-Mar-18	NW LANTAU	2	12.34	SPRING	STANDARD36826	HKLR	S
20-Mar-18	NE LANTAU	2	7.92	SPRING	STANDARD36826	HKLR	P
20-Mar-18	NE LANTAU	3	26.28	SPRING	STANDARD36826	HKLR	P
20-Mar-18	NE LANTAU	4	3.00	SPRING	STANDARD36826	HKLR	P
20-Mar-18	NE LANTAU	2	4.82	SPRING	STANDARD36826	HKLR	S
20-Mar-18	NE LANTAU	3	8.18	SPRING	STANDARD36826	HKLR	S
20-Mar-18	NE LANTAU	4	1.30	SPRING	STANDARD36826	HKLR	S
20-Mar-18	NW LANTAU	2	0.77	SPRING	STANDARD36826	HKLR	P
20-Mar-18	NW LANTAU	3	6.09	SPRING	STANDARD36826	HKLR	P
20-Mar-18	NW LANTAU	4	17.10	SPRING	STANDARD36826	HKLR	P
20-Mar-18	NW LANTAU	5	2.10	SPRING	STANDARD36826	HKLR	P
20-Mar-18	NW LANTAU	3	3.40	SPRING	STANDARD36826	HKLR	S
20-Mar-18	NW LANTAU	4	4.54	SPRING	STANDARD36826	HKLR	S
20-Mar-18	NW LANTAU	5	2.60	SPRING	STANDARD36826	HKLR	S
23-Mar-18	NW LANTAU	1	4.22	SPRING	STANDARD36826	HKLR	P
23-Mar-18	NW LANTAU	2	19.38	SPRING	STANDARD36826	HKLR	P
23-Mar-18	NW LANTAU	3	10.11	SPRING	STANDARD36826	HKLR	P
23-Mar-18	NW LANTAU	2	9.28	SPRING	STANDARD36826	HKLR	S
23-Mar-18	NW LANTAU	3	1.55	SPRING	STANDARD36826	HKLR	S
10-Apr-18	NW LANTAU	2	23.74	SPRING	STANDARD36826	HKLR	P
10-Apr-18	NW LANTAU	3	1.23	SPRING	STANDARD36826	HKLR	P
10-Apr-18	NW LANTAU	2	11.73	SPRING	STANDARD36826	HKLR	S
17-Apr-18	NW LANTAU	1	2.20	SPRING	STANDARD36826	HKLR	P
17-Apr-18	NW LANTAU	2	33.50	SPRING	STANDARD36826	HKLR	P
17-Apr-18	NW LANTAU	2	14.10	SPRING	STANDARD36826	HKLR	S
17-Apr-18	NE LANTAU	1	1.20	SPRING	STANDARD36826	HKLR	P
17-Apr-18	NE LANTAU	2	34.52	SPRING	STANDARD36826	HKLR	P
17-Apr-18	NE LANTAU	1	1.10	SPRING	STANDARD36826	HKLR	S
17-Apr-18	NE LANTAU	2	12.58	SPRING	STANDARD36826	HKLR	S
19-Apr-18	NW LANTAU	1	3.85	SPRING	STANDARD36826	HKLR	P
19-Apr-18	NW LANTAU	2	8.59	SPRING	STANDARD36826	HKLR	P
19-Apr-18	NW LANTAU	3	20.48	SPRING	STANDARD36826	HKLR	P
19-Apr-18	NW LANTAU	1	2.26	SPRING	STANDARD36826	HKLR	S
19-Apr-18	NW LANTAU	2	8.21	SPRING	STANDARD36826	HKLR	S
25-Apr-18	NW LANTAU	1	10.61	SPRING	STANDARD36826	HKLR	P
25-Apr-18	NW LANTAU	2	18.13	SPRING	STANDARD36826	HKLR	P
25-Apr-18	NW LANTAU	1	1.60	SPRING	STANDARD36826	HKLR	S
25-Apr-18	NW LANTAU	2	9.66	SPRING	STANDARD36826	HKLR	S
25-Apr-18	NE LANTAU	2	36.91	SPRING	STANDARD36826	HKLR	P

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
25-Apr-18	NE LANTAU	2	10.89	SPRING	STANDARD36826	HKLR	S
7-May-18	NW LANTAU	3	18.59	SPRING	STANDARD36826	HKLR	P
7-May-18	NW LANTAU	4	5.80	SPRING	STANDARD36826	HKLR	P
7-May-18	NW LANTAU	3	9.41	SPRING	STANDARD36826	HKLR	S
7-May-18	NE LANTAU	2	22.70	SPRING	STANDARD36826	HKLR	P
7-May-18	NE LANTAU	3	11.82	SPRING	STANDARD36826	HKLR	P
7-May-18	NE LANTAU	2	7.15	SPRING	STANDARD36826	HKLR	S
7-May-18	NE LANTAU	3	5.23	SPRING	STANDARD36826	HKLR	S
10-May-18	NW LANTAU	3	13.41	SPRING	STANDARD36826	HKLR	P
10-May-18	NW LANTAU	4	21.03	SPRING	STANDARD36826	HKLR	P
10-May-18	NW LANTAU	3	6.20	SPRING	STANDARD36826	HKLR	S
10-May-18	NW LANTAU	4	6.66	SPRING	STANDARD36826	HKLR	S
16-May-18	NE LANTAU	2	19.20	SPRING	STANDARD36826	HKLR	P
16-May-18	NE LANTAU	3	17.50	SPRING	STANDARD36826	HKLR	P
16-May-18	NE LANTAU	2	11.20	SPRING	STANDARD36826	HKLR	S
16-May-18	NE LANTAU	3	0.90	SPRING	STANDARD36826	HKLR	S
16-May-18	NW LANTAU	2	4.80	SPRING	STANDARD36826	HKLR	P
16-May-18	NW LANTAU	3	27.00	SPRING	STANDARD36826	HKLR	P
16-May-18	NW LANTAU	2	4.50	SPRING	STANDARD36826	HKLR	S
16-May-18	NW LANTAU	3	6.50	SPRING	STANDARD36826	HKLR	S
30-May-18	NW LANTAU	2	2.60	SPRING	STANDARD36826	HKLR	P
30-May-18	NW LANTAU	3	18.99	SPRING	STANDARD36826	HKLR	P
30-May-18	NW LANTAU	4	6.00	SPRING	STANDARD36826	HKLR	P
30-May-18	NW LANTAU	2	4.90	SPRING	STANDARD36826	HKLR	S
30-May-18	NW LANTAU	3	6.81	SPRING	STANDARD36826	HKLR	S
30-May-18	NW LANTAU	4	2.50	SPRING	STANDARD36826	HKLR	S
5-Jun-18	NW LANTAU	2	3.73	SUMMER	STANDARD36826	HKLR	P
5-Jun-18	NW LANTAU	3	28.14	SUMMER	STANDARD36826	HKLR	P
5-Jun-18	NW LANTAU	2	3.46	SUMMER	STANDARD36826	HKLR	S
5-Jun-18	NW LANTAU	3	6.03	SUMMER	STANDARD36826	HKLR	S
5-Jun-18	NE LANTAU	2	10.32	SUMMER	STANDARD36826	HKLR	P
5-Jun-18	NE LANTAU	3	25.47	SUMMER	STANDARD36826	HKLR	P
5-Jun-18	NE LANTAU	2	6.68	SUMMER	STANDARD36826	HKLR	S
5-Jun-18	NE LANTAU	3	3.77	SUMMER	STANDARD36826	HKLR	S
13-Jun-18	NW LANTAU	2	23.63	SUMMER	STANDARD36826	HKLR	P
13-Jun-18	NW LANTAU	3	3.34	SUMMER	STANDARD36826	HKLR	P
13-Jun-18	NW LANTAU	2	8.49	SUMMER	STANDARD36826	HKLR	S
13-Jun-18	NW LANTAU	3	2.64	SUMMER	STANDARD36826	HKLR	S
19-Jun-18	NW LANTAU	3	23.85	SUMMER	STANDARD36826	HKLR	P
19-Jun-18	NW LANTAU	4	3.40	SUMMER	STANDARD36826	HKLR	P
19-Jun-18	NW LANTAU	3	7.85	SUMMER	STANDARD36826	HKLR	S
19-Jun-18	NW LANTAU	4	3.20	SUMMER	STANDARD36826	HKLR	S
19-Jun-18	NE LANTAU	2	24.33	SUMMER	STANDARD36826	HKLR	P
19-Jun-18	NE LANTAU	3	11.62	SUMMER	STANDARD36826	HKLR	P
19-Jun-18	NE LANTAU	2	9.72	SUMMER	STANDARD36826	HKLR	S
19-Jun-18	NE LANTAU	3	1.87	SUMMER	STANDARD36826	HKLR	S
27-Jun-18	NW LANTAU	2	16.07	SUMMER	STANDARD36826	HKLR	P
27-Jun-18	NW LANTAU	3	12.56	SUMMER	STANDARD36826	HKLR	P
27-Jun-18	NW LANTAU	4	4.20	SUMMER	STANDARD36826	HKLR	P
27-Jun-18	NW LANTAU	2	10.57	SUMMER	STANDARD36826	HKLR	S
3-Jul-18	NW LANTAU	3	24.91	SUMMER	STANDARD36826	HKLR	P
3-Jul-18	NW LANTAU	4	10.69	SUMMER	STANDARD36826	HKLR	P
3-Jul-18	NW LANTAU	3	12.89	SUMMER	STANDARD36826	HKLR	S
3-Jul-18	NW LANTAU	4	0.81	SUMMER	STANDARD36826	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
3-Jul-18	NE LANTAU	2	28.85	SUMMER	STANDARD36826	HKLR	P
3-Jul-18	NE LANTAU	3	7.29	SUMMER	STANDARD36826	HKLR	P
3-Jul-18	NE LANTAU	2	13.36	SUMMER	STANDARD36826	HKLR	S
3-Jul-18	NE LANTAU	3	0.80	SUMMER	STANDARD36826	HKLR	S
9-Jul-18	NW LANTAU	2	4.62	SUMMER	STANDARD36826	HKLR	P
9-Jul-18	NW LANTAU	3	17.99	SUMMER	STANDARD36826	HKLR	P
9-Jul-18	NW LANTAU	4	0.98	SUMMER	STANDARD36826	HKLR	P
9-Jul-18	NW LANTAU	2	0.90	SUMMER	STANDARD36826	HKLR	S
9-Jul-18	NW LANTAU	3	7.21	SUMMER	STANDARD36826	HKLR	S
12-Jul-18	NW LANTAU	2	19.42	SUMMER	STANDARD36826	HKLR	P
12-Jul-18	NW LANTAU	3	15.11	SUMMER	STANDARD36826	HKLR	P
12-Jul-18	NW LANTAU	2	3.70	SUMMER	STANDARD36826	HKLR	S
12-Jul-18	NW LANTAU	3	7.80	SUMMER	STANDARD36826	HKLR	S
12-Jul-18	NW LANTAU	4	1.30	SUMMER	STANDARD36826	HKLR	S
12-Jul-18	NE LANTAU	2	15.65	SUMMER	STANDARD36826	HKLR	P
12-Jul-18	NE LANTAU	3	18.42	SUMMER	STANDARD36826	HKLR	P
12-Jul-18	NE LANTAU	2	10.66	SUMMER	STANDARD36826	HKLR	S
12-Jul-18	NE LANTAU	3	2.77	SUMMER	STANDARD36826	HKLR	S
20-Jul-18	NW LANTAU	1	1.50	SUMMER	STANDARD36826	HKLR	P
20-Jul-18	NW LANTAU	2	18.66	SUMMER	STANDARD36826	HKLR	P
20-Jul-18	NW LANTAU	3	4.88	SUMMER	STANDARD36826	HKLR	P
20-Jul-18	NW LANTAU	1	0.90	SUMMER	STANDARD36826	HKLR	S
20-Jul-18	NW LANTAU	2	2.82	SUMMER	STANDARD36826	HKLR	S
20-Jul-18	NW LANTAU	3	4.14	SUMMER	STANDARD36826	HKLR	S
1-Aug-18	NW LANTAU	2	28.28	SUMMER	STANDARD36826	HKLR	P
1-Aug-18	NW LANTAU	3	5.46	SUMMER	STANDARD36826	HKLR	P
1-Aug-18	NW LANTAU	2	7.13	SUMMER	STANDARD36826	HKLR	S
1-Aug-18	NW LANTAU	3	5.60	SUMMER	STANDARD36826	HKLR	S
1-Aug-18	NE LANTAU	2	34.52	SUMMER	STANDARD36826	HKLR	P
1-Aug-18	NE LANTAU	1	0.70	SUMMER	STANDARD36826	HKLR	S
1-Aug-18	NE LANTAU	2	11.98	SUMMER	STANDARD36826	HKLR	S
8-Aug-18	NW LANTAU	1	3.60	SUMMER	STANDARD36826	HKLR	P
8-Aug-18	NW LANTAU	2	14.70	SUMMER	STANDARD36826	HKLR	P
8-Aug-18	NW LANTAU	3	7.46	SUMMER	STANDARD36826	HKLR	P
8-Aug-18	NW LANTAU	2	5.34	SUMMER	STANDARD36826	HKLR	S
8-Aug-18	NW LANTAU	3	2.30	SUMMER	STANDARD36826	HKLR	S
21-Aug-18	NW LANTAU	1	1.50	SUMMER	STANDARD36826	HKLR	P
21-Aug-18	NW LANTAU	2	33.50	SUMMER	STANDARD36826	HKLR	P
21-Aug-18	NW LANTAU	2	13.30	SUMMER	STANDARD36826	HKLR	S
21-Aug-18	NE LANTAU	1	4.50	SUMMER	STANDARD36826	HKLR	P
21-Aug-18	NE LANTAU	2	27.89	SUMMER	STANDARD36826	HKLR	P
21-Aug-18	NE LANTAU	3	2.50	SUMMER	STANDARD36826	HKLR	P
21-Aug-18	NE LANTAU	1	1.10	SUMMER	STANDARD36826	HKLR	S
21-Aug-18	NE LANTAU	2	12.41	SUMMER	STANDARD36826	HKLR	S
28-Aug-18	NW LANTAU	2	21.50	SUMMER	STANDARD36826	HKLR	P
28-Aug-18	NW LANTAU	3	2.69	SUMMER	STANDARD36826	HKLR	P
28-Aug-18	NW LANTAU	2	7.60	SUMMER	STANDARD36826	HKLR	S
28-Aug-18	NW LANTAU	3	2.45	SUMMER	STANDARD36826	HKLR	S
4-Sep-18	NW LANTAU	1	7.70	AUTUMN	STANDARD36826	HKLR	P
4-Sep-18	NW LANTAU	2	24.60	AUTUMN	STANDARD36826	HKLR	P
4-Sep-18	NW LANTAU	3	3.00	AUTUMN	STANDARD36826	HKLR	P
4-Sep-18	NW LANTAU	1	4.20	AUTUMN	STANDARD36826	HKLR	S
4-Sep-18	NW LANTAU	2	7.80	AUTUMN	STANDARD36826	HKLR	S
4-Sep-18	NW LANTAU	3	1.30	AUTUMN	STANDARD36826	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
18-Sep-18	NE LANTAU	3	34.10	AUTUMN	STANDARD36826	HKLR	P
18-Sep-18	NE LANTAU	4	1.10	AUTUMN	STANDARD36826	HKLR	P
18-Sep-18	NE LANTAU	2	2.50	AUTUMN	STANDARD36826	HKLR	S
18-Sep-18	NE LANTAU	3	13.40	AUTUMN	STANDARD36826	HKLR	S
18-Sep-18	NW LANTAU	2	3.50	AUTUMN	STANDARD36826	HKLR	P
18-Sep-18	NW LANTAU	3	17.73	AUTUMN	STANDARD36826	HKLR	P
18-Sep-18	NW LANTAU	4	3.97	AUTUMN	STANDARD36826	HKLR	P
18-Sep-18	NW LANTAU	2	4.10	AUTUMN	STANDARD36826	HKLR	S
18-Sep-18	NW LANTAU	3	5.90	AUTUMN	STANDARD36826	HKLR	S
20-Sep-18	NW LANTAU	2	21.14	AUTUMN	STANDARD36826	HKLR	P
20-Sep-18	NW LANTAU	3	6.75	AUTUMN	STANDARD36826	HKLR	P
20-Sep-18	NW LANTAU	2	7.28	AUTUMN	STANDARD36826	HKLR	S
20-Sep-18	NW LANTAU	3	2.01	AUTUMN	STANDARD36826	HKLR	S
26-Sep-18	NE LANTAU	2	33.45	AUTUMN	STANDARD138716	HKLR	P
26-Sep-18	NE LANTAU	3	11.25	AUTUMN	STANDARD138716	HKLR	S
26-Sep-18	NW LANTAU	2	13.12	AUTUMN	STANDARD138716	HKLR	P
26-Sep-18	NW LANTAU	3	20.65	AUTUMN	STANDARD138716	HKLR	P
26-Sep-18	NW LANTAU	2	10.51	AUTUMN	STANDARD138716	HKLR	S
26-Sep-18	NW LANTAU	3	2.62	AUTUMN	STANDARD138716	HKLR	S
4-Oct-18	NW LANTAU	2	19.20	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NW LANTAU	3	12.68	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NW LANTAU	4	0.62	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NW LANTAU	2	6.10	AUTUMN	STANDARD36826	HKLR	S
4-Oct-18	NW LANTAU	3	5.60	AUTUMN	STANDARD36826	HKLR	S
4-Oct-18	NE LANTAU	2	19.33	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NE LANTAU	3	15.44	AUTUMN	STANDARD36826	HKLR	P
4-Oct-18	NE LANTAU	2	8.06	AUTUMN	STANDARD36826	HKLR	S
4-Oct-18	NE LANTAU	3	5.07	AUTUMN	STANDARD36826	HKLR	S
11-Oct-18	NW LANTAU	2	15.31	AUTUMN	STANDARD36826	HKLR	P
11-Oct-18	NW LANTAU	3	12.41	AUTUMN	STANDARD36826	HKLR	P
11-Oct-18	NW LANTAU	2	4.07	AUTUMN	STANDARD36826	HKLR	S
11-Oct-18	NW LANTAU	3	9.41	AUTUMN	STANDARD36826	HKLR	S
16-Oct-18	NW LANTAU	2	23.58	AUTUMN	STANDARD36826	HKLR	P
16-Oct-18	NW LANTAU	3	5.15	AUTUMN	STANDARD36826	HKLR	P
16-Oct-18	NW LANTAU	2	10.36	AUTUMN	STANDARD36826	HKLR	S
16-Oct-18	NW LANTAU	3	2.11	AUTUMN	STANDARD36826	HKLR	S
18-Oct-18	NW LANTAU	2	32.45	AUTUMN	STANDARD36826	HKLR	P
18-Oct-18	NW LANTAU	2	11.05	AUTUMN	STANDARD36826	HKLR	S
18-Oct-18	NE LANTAU	2	34.26	AUTUMN	STANDARD36826	HKLR	P
18-Oct-18	NE LANTAU	3	2.27	AUTUMN	STANDARD36826	HKLR	P
18-Oct-18	NE LANTAU	2	11.07	AUTUMN	STANDARD36826	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (November 2017 - October 2018)

(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-Nov-17	1	1126	6	NW LANTAU	3	371	ON	HKLR	830641	804652	AUTUMN	NONE	P
1-Nov-17	2	1152	8	NW LANTAU	2	529	ON	HKLR	827437	806499	AUTUMN	NONE	P
8-Nov-17	1	1129	2	NW LANTAU	2	317	ON	HKLR	826272	807434	AUTUMN	NONE	P
17-Nov-17	1	1155	12	NW LANTAU	2	627	ON	HKLR	829665	805381	AUTUMN	NONE	S
24-Nov-17	1	1023	2	NW LANTAU	3	21	ON	HKLR	816588	804674	AUTUMN	NONE	P
24-Nov-17	2	1155	1	NW LANTAU	3	0	ON	HKLR	826850	806436	AUTUMN	NONE	P
5-Dec-17	1	1150	5	NW LANTAU	3	155	ON	HKLR	824890	806432	WINTER	NONE	P
15-Dec-17	1	1011	1	NW LANTAU	2	7	ON	HKLR	815955	805415	WINTER	NONE	P
15-Dec-17	2	1106	6	NW LANTAU	2	151	ON	HKLR	825966	805414	WINTER	NONE	P
15-Dec-17	3	1242	1	NW LANTAU	1	176	ON	HKLR	824441	809449	WINTER	NONE	P
2-Jan-18	1	1141	8	NW LANTAU	2	93	ON	HKLR	827614	806458	WINTER	PURSE-SEINE	P
2-Jan-18	2	1204	8	NW LANTAU	2	285	ON	HKLR	828301	806418	WINTER	NONE	P
8-Jan-18	1	1105	2	NW LANTAU	5	42	ON	HKLR	827107	805345	WINTER	NONE	P
16-Jan-18	1	1137	1	NW LANTAU	2	309	ON	HKLR	825178	806453	WINTER	NONE	P
25-Jan-18	1	1440	1	NW LANTAU	3	237	ON	HKLR	827516	805356	WINTER	NONE	P
2-Feb-18	1	1134	1	NW LANTAU	3	33	ON	HKLR	824048	806286	WINTER	NONE	S
9-Feb-18	1	956	1	NW LANTAU	1	ND	OFF	HKLR	816739	806756	WINTER	NONE	
9-Feb-18	2	1013	1	NW LANTAU	1	99	ON	HKLR	817306	805490	WINTER	NONE	P
9-Feb-18	3	1031	2	NW LANTAU	2	687	ON	HKLR	820619	804662	WINTER	NONE	P
9-Feb-18	4	1116	2	NW LANTAU	1	387	ON	HKLR	828225	805491	WINTER	NONE	S
14-Feb-18	1	1052	1	NW LANTAU	2	55	ON	HKLR	826276	805353	WINTER	NONE	P
14-Feb-18	2	1107	3	NW LANTAU	2	1047	ON	HKLR	828037	805429	WINTER	NONE	P
22-Feb-18	1	1040	1	NW LANTAU	3	137	ON	HKLR	827222	808537	WINTER	NONE	P
12-Mar-18	1	1207	3	NW LANTAU	1	149	ON	HKLR	827547	806417	SPRING	NONE	P
23-Mar-18	1	1046	4	NW LANTAU	3	705	ON	HKLR	822867	804739	SPRING	NONE	P
23-Mar-18	2	1055	12	NW LANTAU	2	96	ON	HKLR	824284	804721	SPRING	NONE	P
23-Mar-18	3	1122	2	NW LANTAU	2	251	ON	HKLR	826377	804684	SPRING	NONE	P
23-Mar-18	4	1322	2	NW LANTAU	1	515	ON	HKLR	828400	806542	SPRING	NONE	P
23-Mar-18	5	1328	3	NW LANTAU	2	486	ON	HKLR	827846	806510	SPRING	NONE	P
10-Apr-18	1	1125	1	NW LANTAU	2	24	ON	HKLR	829507	806966	SPRING	NONE	S
19-Apr-18	1	1133	2	NW LANTAU	3	363	ON	HKLR	826075	806486	SPRING	NONE	P
19-Apr-18	2	1146	1	NW LANTAU	3	208	ON	HKLR	827093	806426	SPRING	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
13-Jun-18	1	1123	5	NW LANTAU	2	83	ON	HKLR	829917	806493	SUMMER	NONE	S
27-Jun-18	1	1144	2	NW LANTAU	2	73	ON	HKLR	826551	806435	SUMMER	NONE	P
12-Jul-18	1	1125	4	NW LANTAU	3	156	ON	HKLR	829186	806430	SUMMER	NONE	P
1-Aug-18	1	1009	1	NW LANTAU	2	55	ON	HKLR	814838	804712	SUMMER	NONE	P
1-Aug-18	2	1015	3	NW LANTAU	2	234	ON	HKLR	815923	804662	SUMMER	NONE	P
1-Aug-18	3	1131	1	NW LANTAU	2	79	ON	HKLR	831204	805435	SUMMER	NONE	S
21-Aug-18	1	1012	1	NW LANTAU	1	ND	OFF	HKLR	814661	804753	SUMMER	NONE	
26-Sep-18	1	1433	2	NW LANTAU	2	258	ON	HKLR	826241	806517	AUTUMN	NONE	P
11-Oct-18	1	1222	4	NW LANTAU	3	362	ON	HKLR	826265	805415	AUTUMN	NONE	S
18-Oct-18	1	1232	2	NW LANTAU	2	145	ON	HKLR	824310	808501	AUTUMN	NONE	P

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in November 2017-October 2018

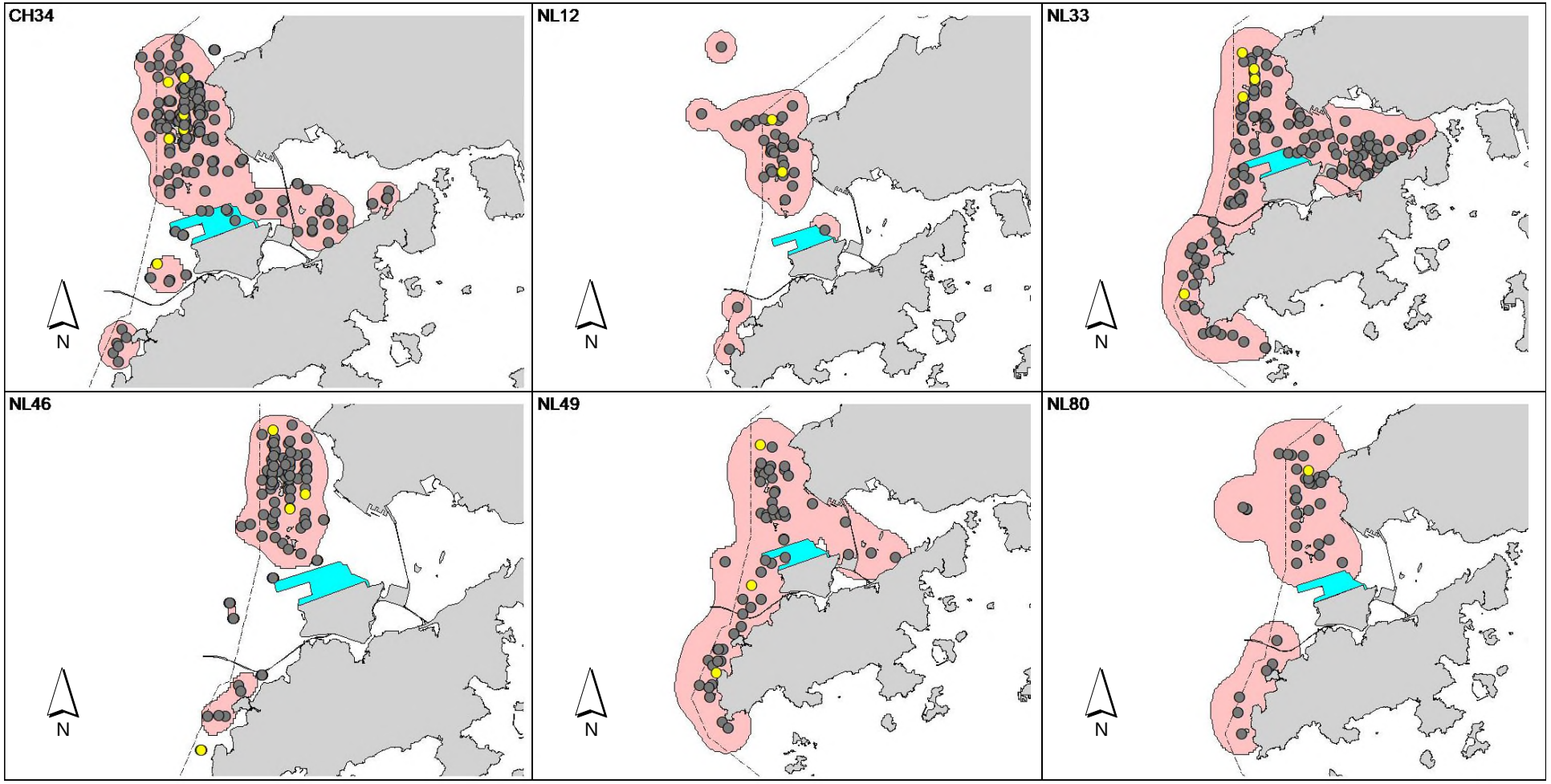
ID#	DATE	STG#	AREA
CH34	01/11/17	2	NW LANTAU
	17/11/17	1	NW LANTAU
	15/12/17	2	NW LANTAU
	12/03/18	1	NW LANTAU
	13/06/18	1	NW LANTAU
	27/06/18	1	NW LANTAU
NL12	27/06/18	1	NW LANTAU
	01/08/18	3	NW LANTAU
NL33	01/11/17	2	NW LANTAU
	17/11/17	1	NW LANTAU
	15/12/17	2	NW LANTAU
	02/01/18	2	NW LANTAU
NL46	17/11/17	1	NW LANTAU
	05/12/17	1	NW LANTAU
NL49	17/11/17	1	NW LANTAU
NL80	13/06/18	1	NW LANTAU
NL98	02/01/18	1	NW LANTAU
	23/03/18	2	NW LANTAU
NL104	01/08/18	2	NW LANTAU
NL120	23/03/18	2	NW LANTAU
NL123	02/01/18	2	NW LANTAU
	25/01/18	1	NW LANTAU
NL136	01/11/17	2	NW LANTAU
	08/11/17	1	NW LANTAU
	15/12/17	2	NW LANTAU
	02/01/18	1	NW LANTAU
	12/03/18	1	NW LANTAU
	11/10/18	1	NW LANTAU
	18/10/18	1	NW LANTAU
NL145	17/11/17	1	NW LANTAU
	01/08/18	1	NW LANTAU
	21/08/18	1	NW LANTAU

ID#	DATE	STG#	AREA
NL182	01/11/17	2	NW LANTAU
	24/11/17	2	NW LANTAU
	15/12/17	2	NW LANTAU
	02/01/18	1	NW LANTAU
	22/02/18	1	NW LANTAU
	12/03/18	1	NW LANTAU
	19/04/18	2	NW LANTAU
	26/09/18	1	NW LANTAU
	11/10/18	1	NW LANTAU
NL202	01/11/17	2	NW LANTAU
	09/02/18	4	NW LANTAU
	13/06/18	1	NW LANTAU
NL210	01/11/17	2	NW LANTAU
NL226	02/01/18	1	NW LANTAU
	23/03/18	2	NW LANTAU
	19/04/18	1	NW LANTAU
NL233	12/07/18	1	NW LANTAU
NL242	05/12/17	1	NW LANTAU
NL261	17/11/17	1	NW LANTAU
	15/12/17	2	NW LANTAU
	19/04/18	1	NW LANTAU
	11/10/18	1	NW LANTAU
NL269	05/12/17	1	NW LANTAU
	02/01/18	1	NW LANTAU
	23/03/18	2	NW LANTAU
NL272	17/11/17	1	NW LANTAU
	02/01/18	1	NW LANTAU
	16/01/18	1	NW LANTAU
	11/10/18	1	NW LANTAU
NL286	01/11/17	2	NW LANTAU
	17/11/17	1	NW LANTAU
	02/01/18	2	NW LANTAU
	09/02/18	4	NW LANTAU
	10/04/18	1	NW LANTAU

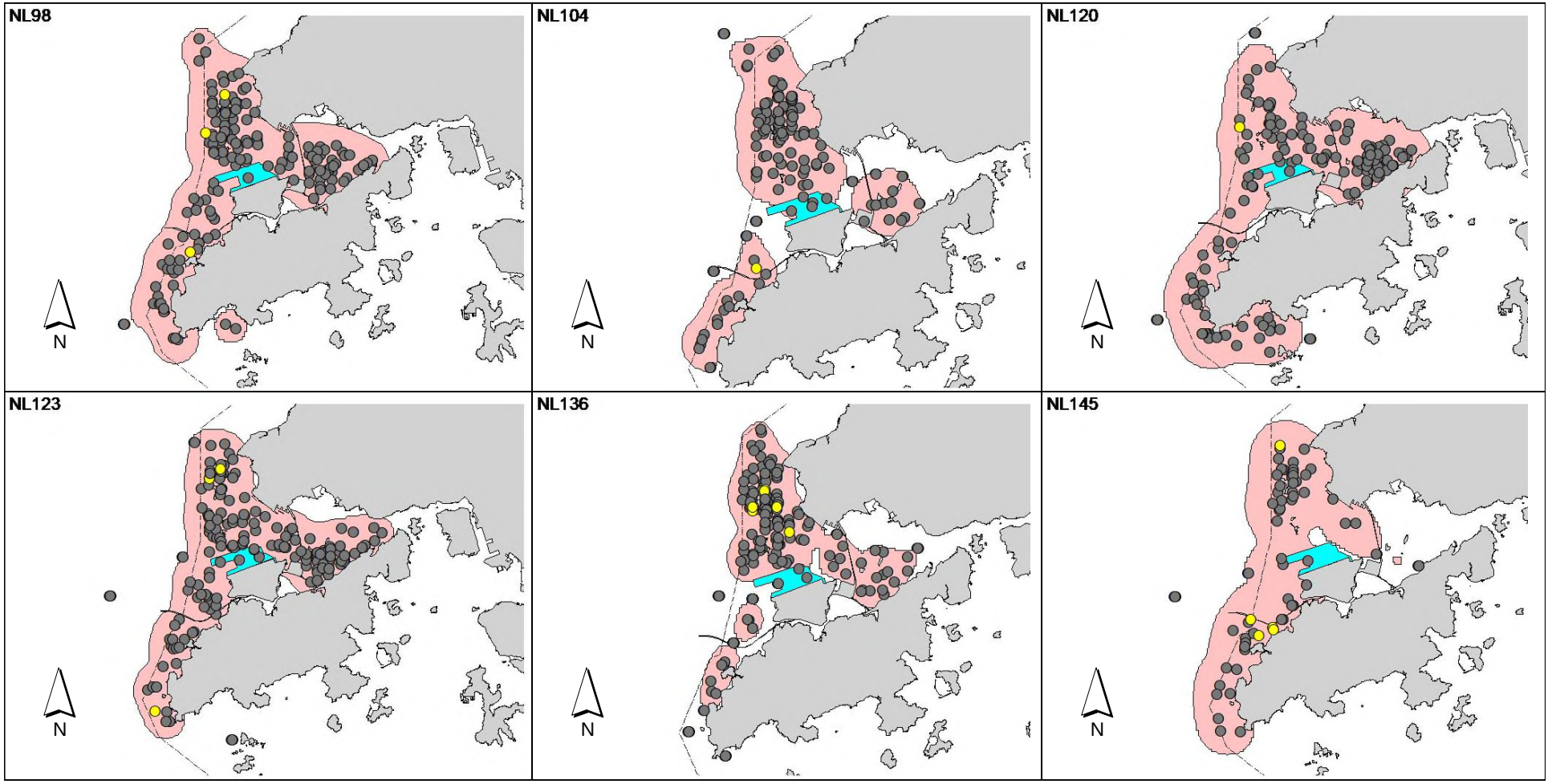
Appendix III. (cont'd)

ID#	DATE	STG#	AREA
NL296	05/12/17	1	NW LANTAU
NL301	13/06/18	1	NW LANTAU
NL302	01/08/18	2	NW LANTAU
NL311	02/01/18	1	NW LANTAU
NL317	12/07/18	1	NW LANTAU
NL320	01/11/17	2	NW LANTAU
	17/11/17	1	NW LANTAU
NL322	01/11/17	2	NW LANTAU
	17/11/17	1	NW LANTAU
	15/12/17	2	NW LANTAU
	02/01/18	2	NW LANTAU
NL327	01/08/18	2	NW LANTAU
NL328	08/11/17	1	NW LANTAU
	17/11/17	1	NW LANTAU
	18/10/18	1	NW LANTAU
NL329	23/03/18	2	NW LANTAU
	12/07/18	1	NW LANTAU
WL05	17/11/17	1	NW LANTAU
WL11	14/02/18	1	NW LANTAU
WL28	09/02/18	3	NW LANTAU
WL62	15/12/17	3	NW LANTAU
WL124	23/03/18	2	NW LANTAU
WL145	24/11/17	1	NW LANTAU
	23/03/18	2	NW LANTAU
WL179	23/03/18	2	NW LANTAU
WL188	12/07/18	1	NW LANTAU
WL251	02/01/18	2	NW LANTAU
WL273	05/12/17	1	NW LANTAU
WL276	23/03/18	2	NW LANTAU
WL288	09/02/18	3	NW LANTAU

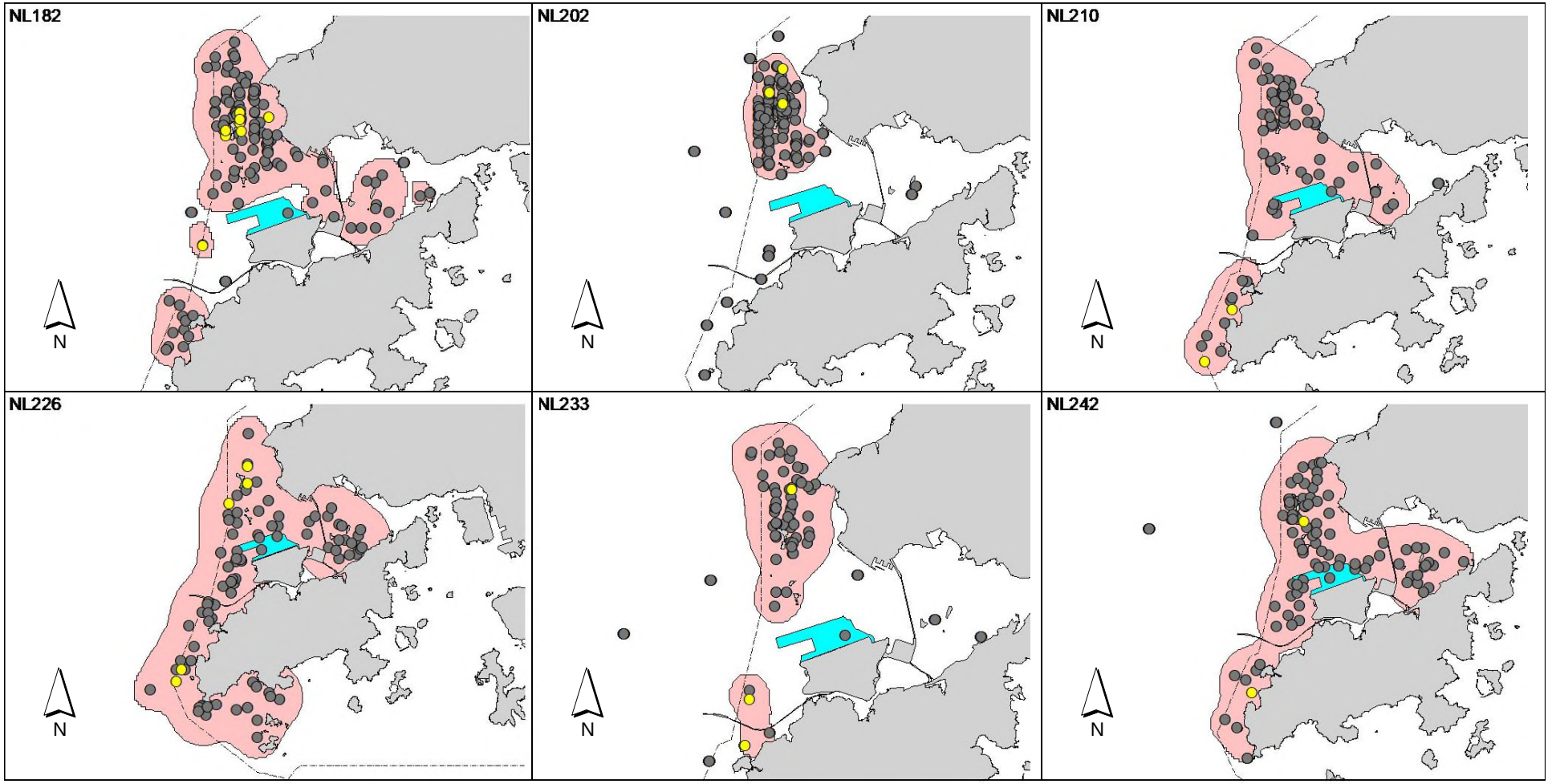
Appendix IV. Ranging patterns (95% kernel ranges) of 44 individual dolphins that were sighted during the fourth year of TMCLKL construction works, utilizing the HKLR03 monitoring data with supplement of HKLR09 monitoring data in West Lantau (note: yellow dots indicates sightings made in November 2017 to October 2018)



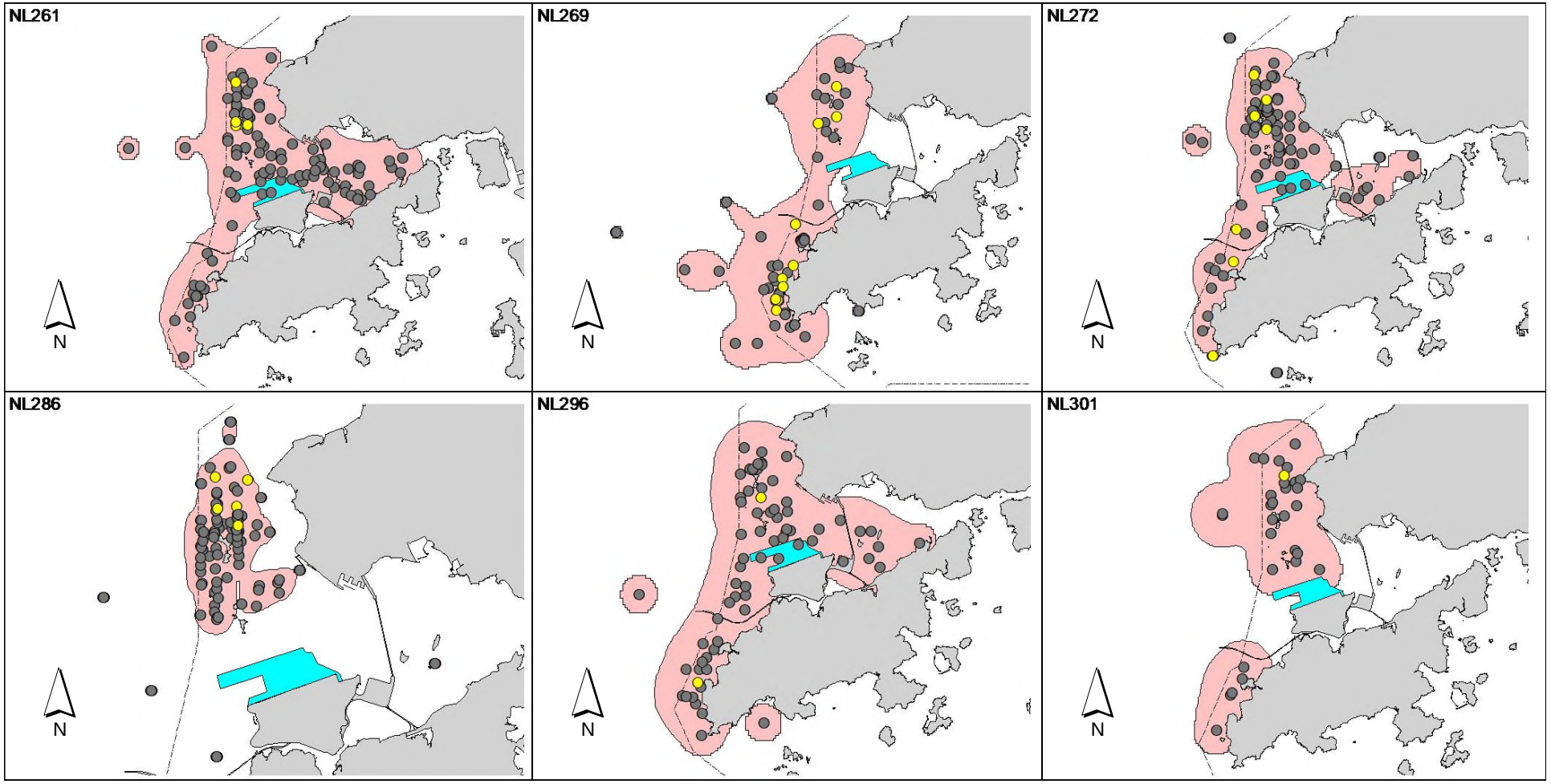
Appendix IV. (cont'd)



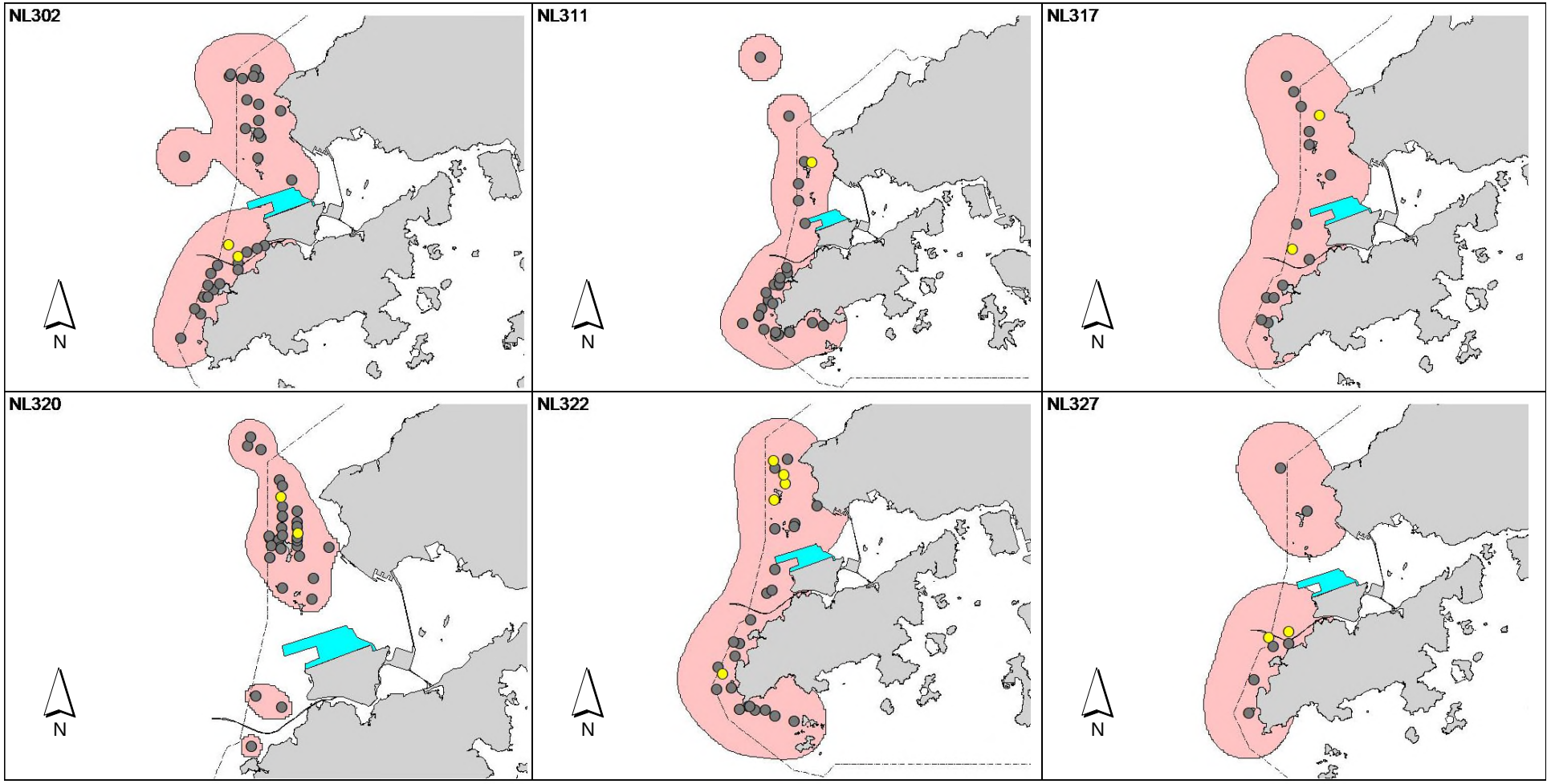
Appendix IV. (cont'd)



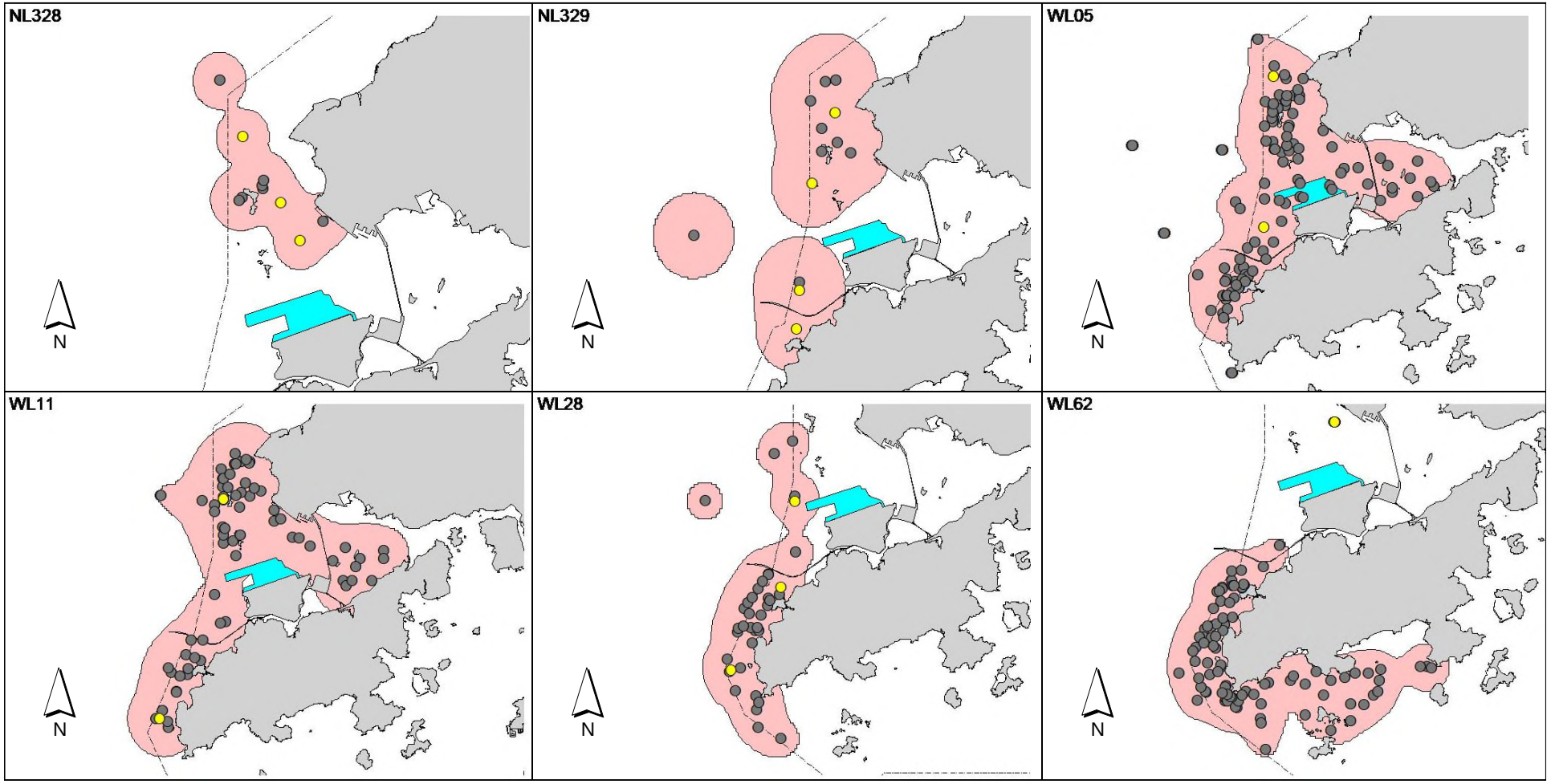
Appendix IV. (cont'd)



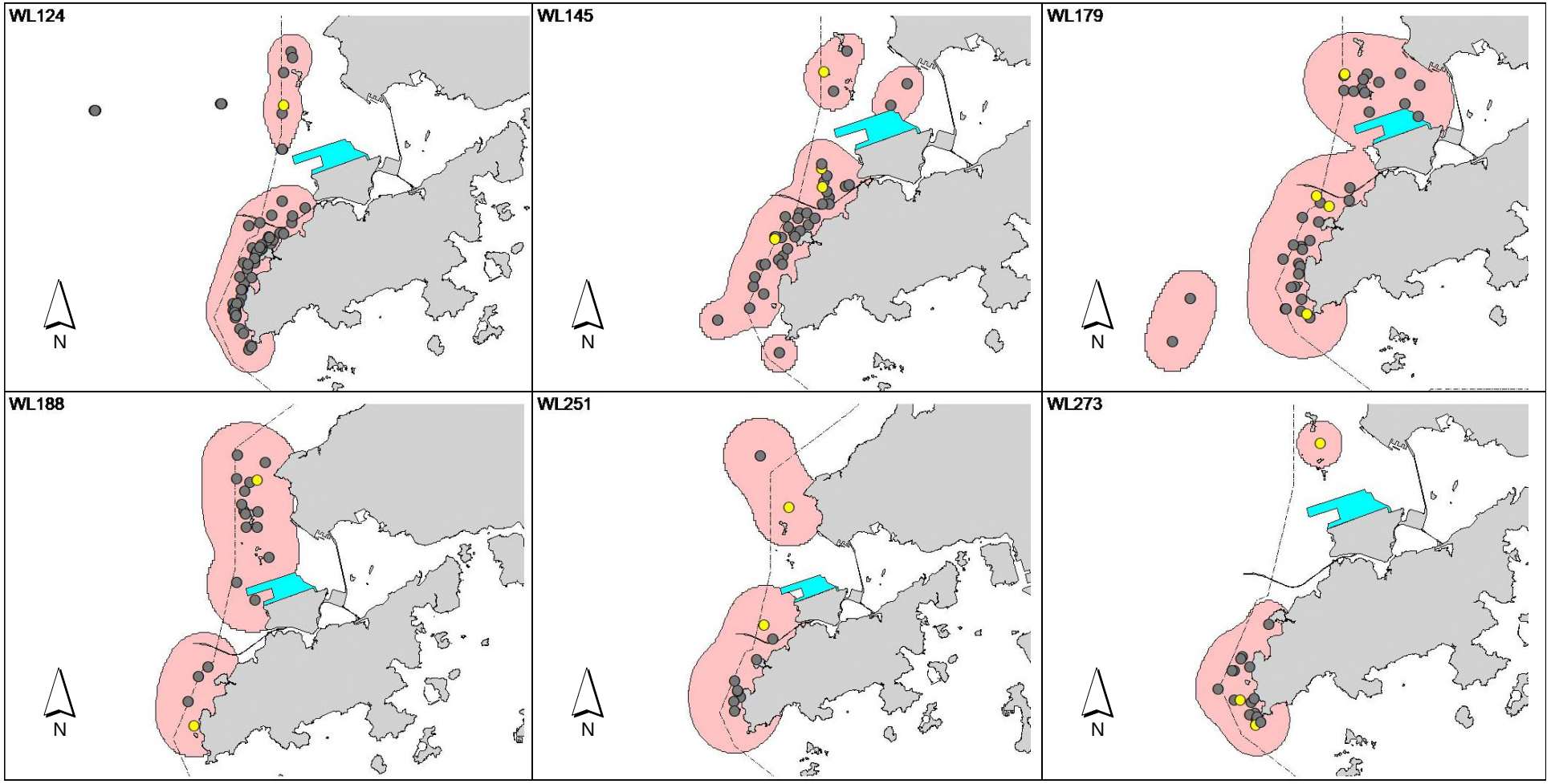
Appendix IV. (cont'd)



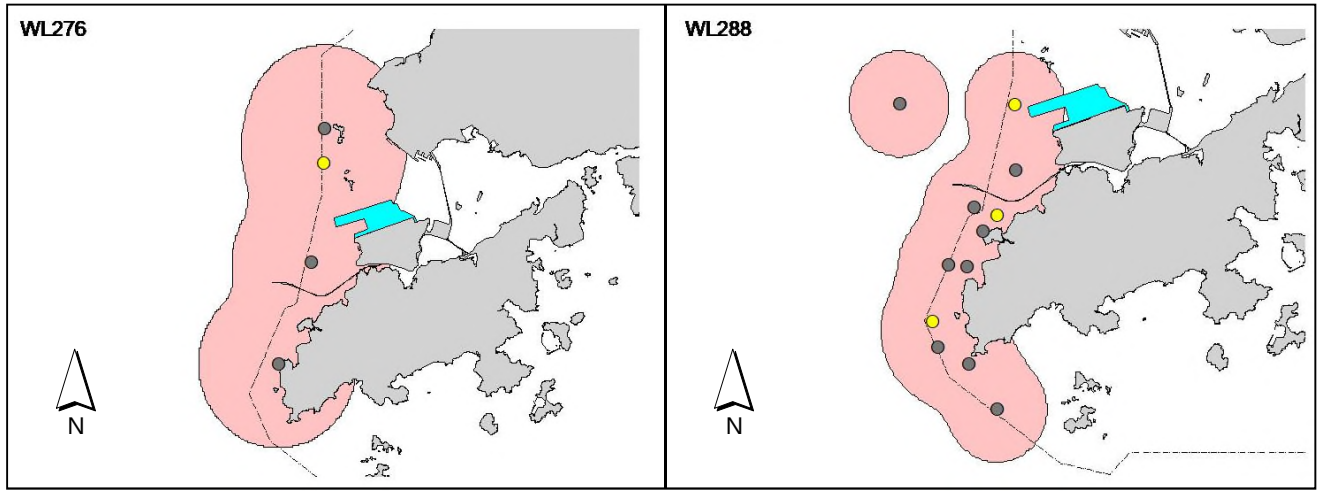
Appendix IV. (cont'd)

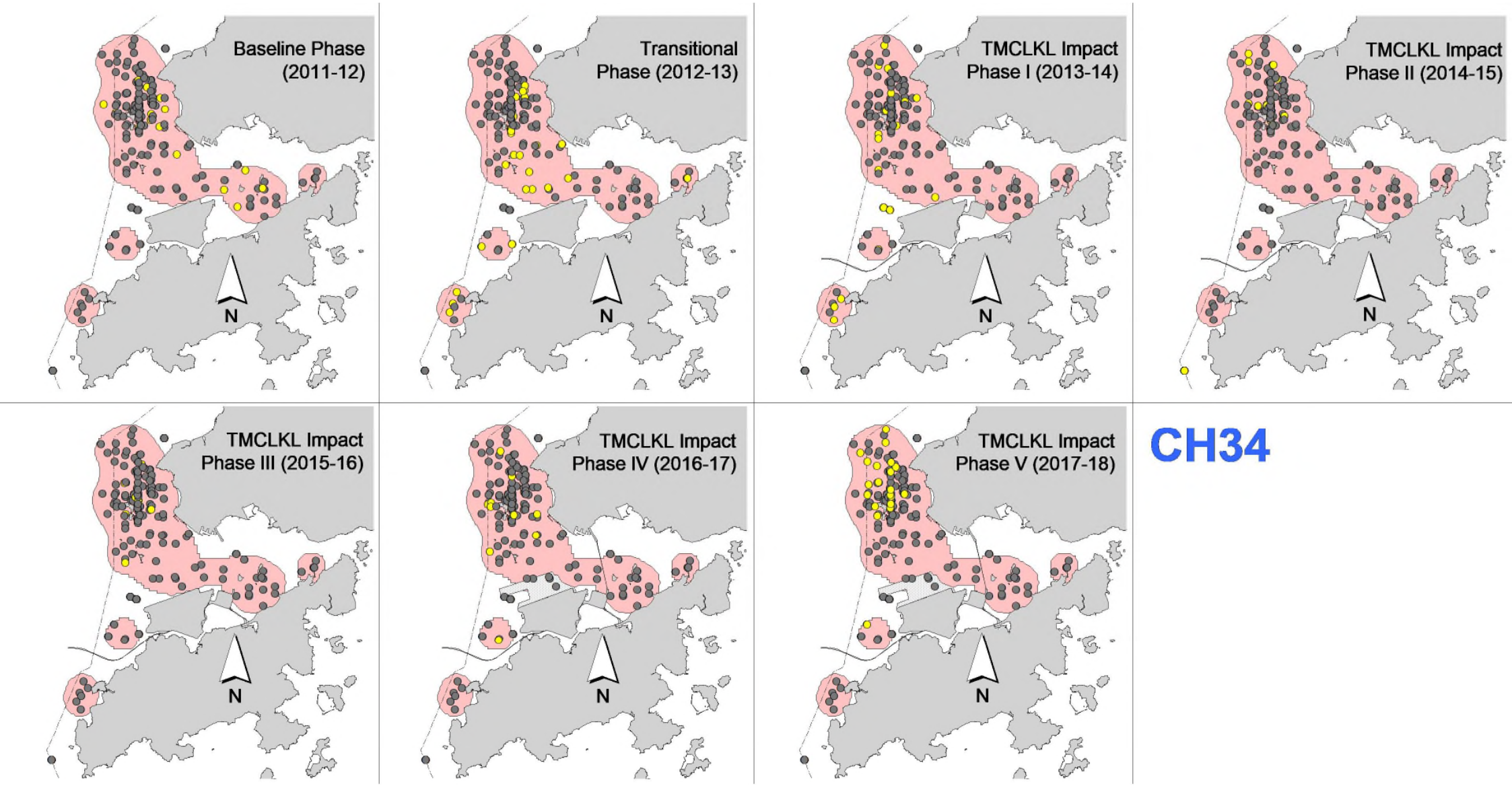


Appendix IV. (cont'd)

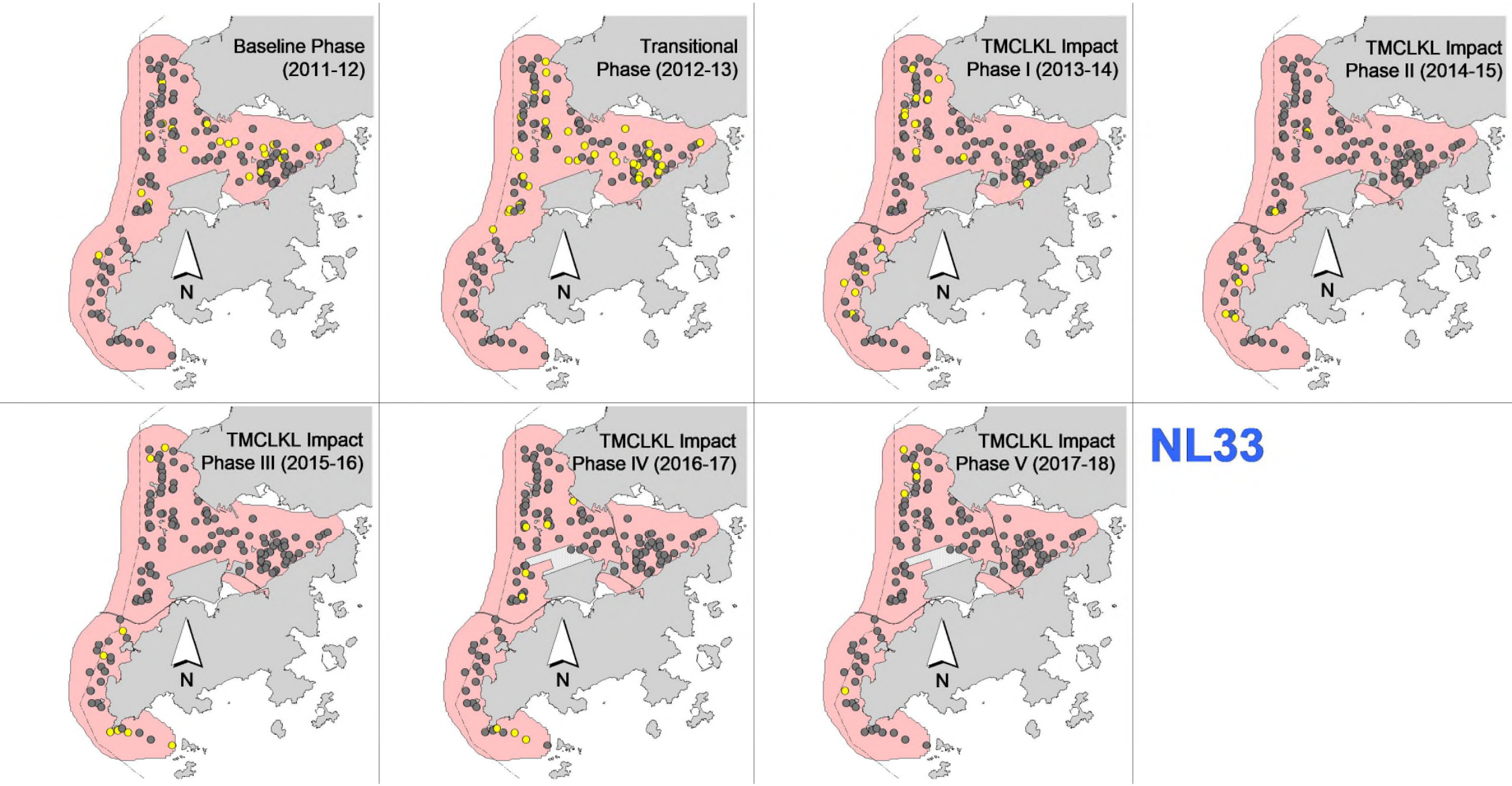


Appendix IV. (cont'd)

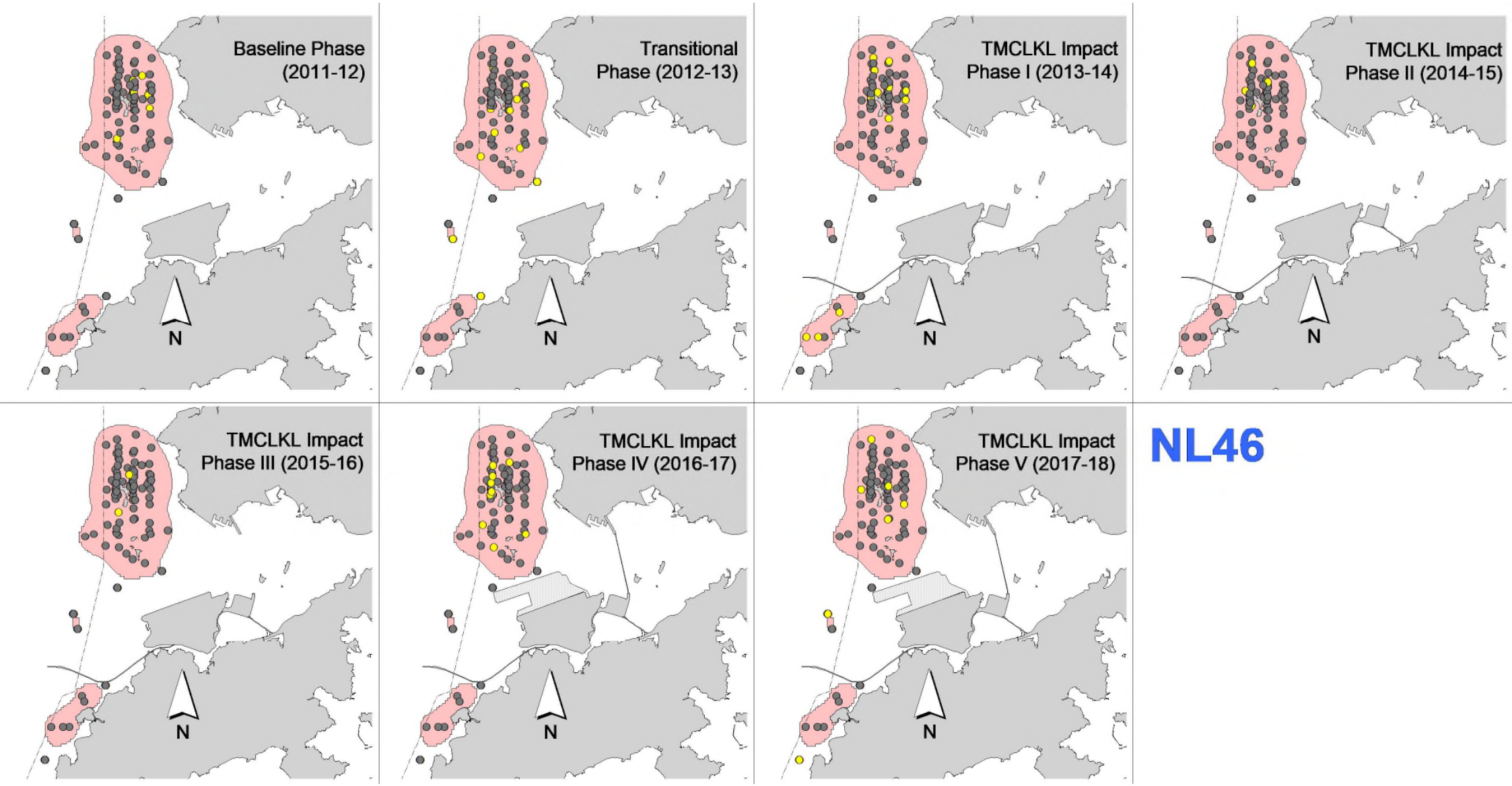




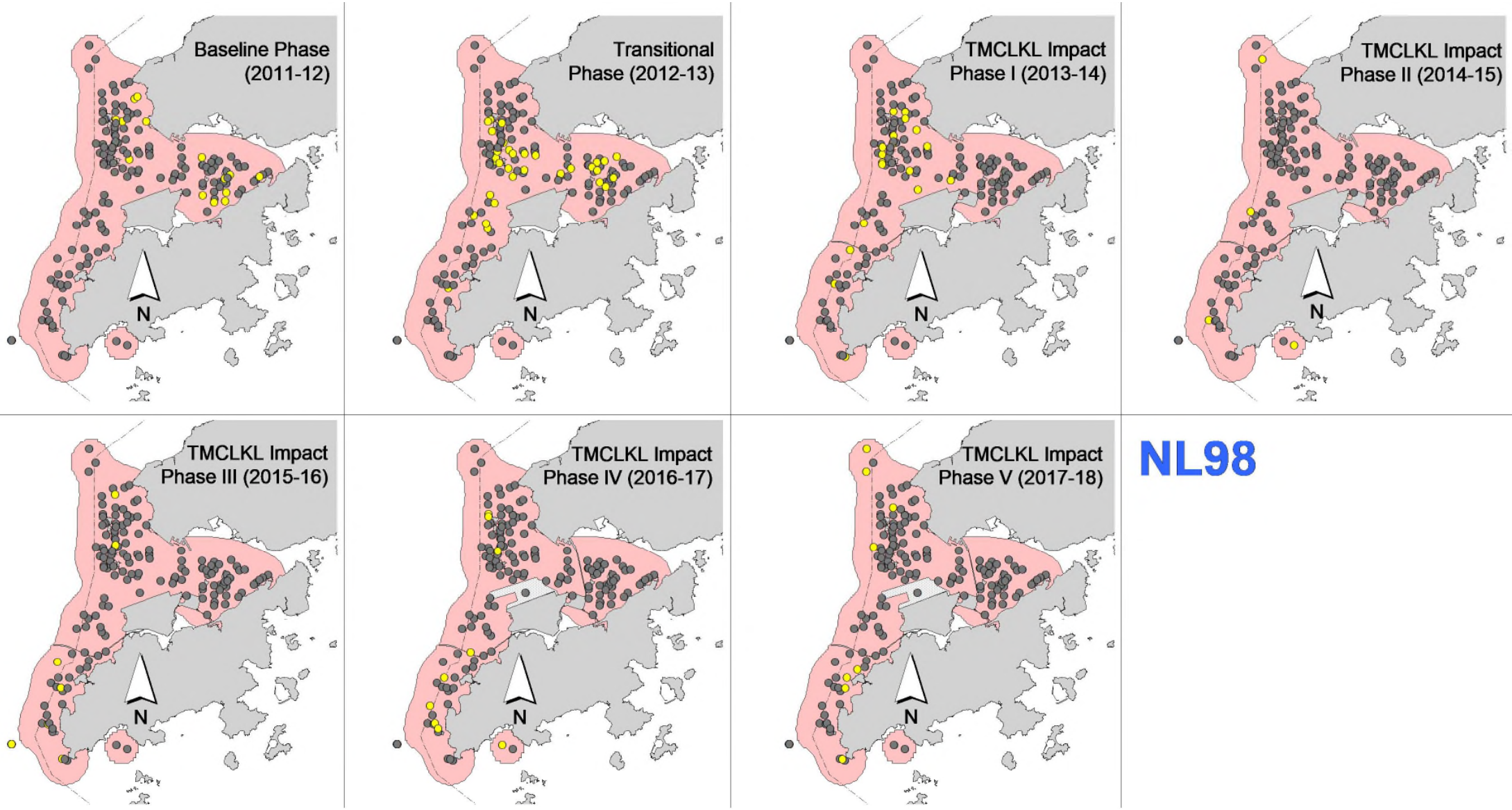
Appendix V. Temporal changes in range use patterns of 13 individual dolphins during baseline, transitional & five impact phases of TMCLKL construction (note: yellow dots indicates sightings made in corresponding period)



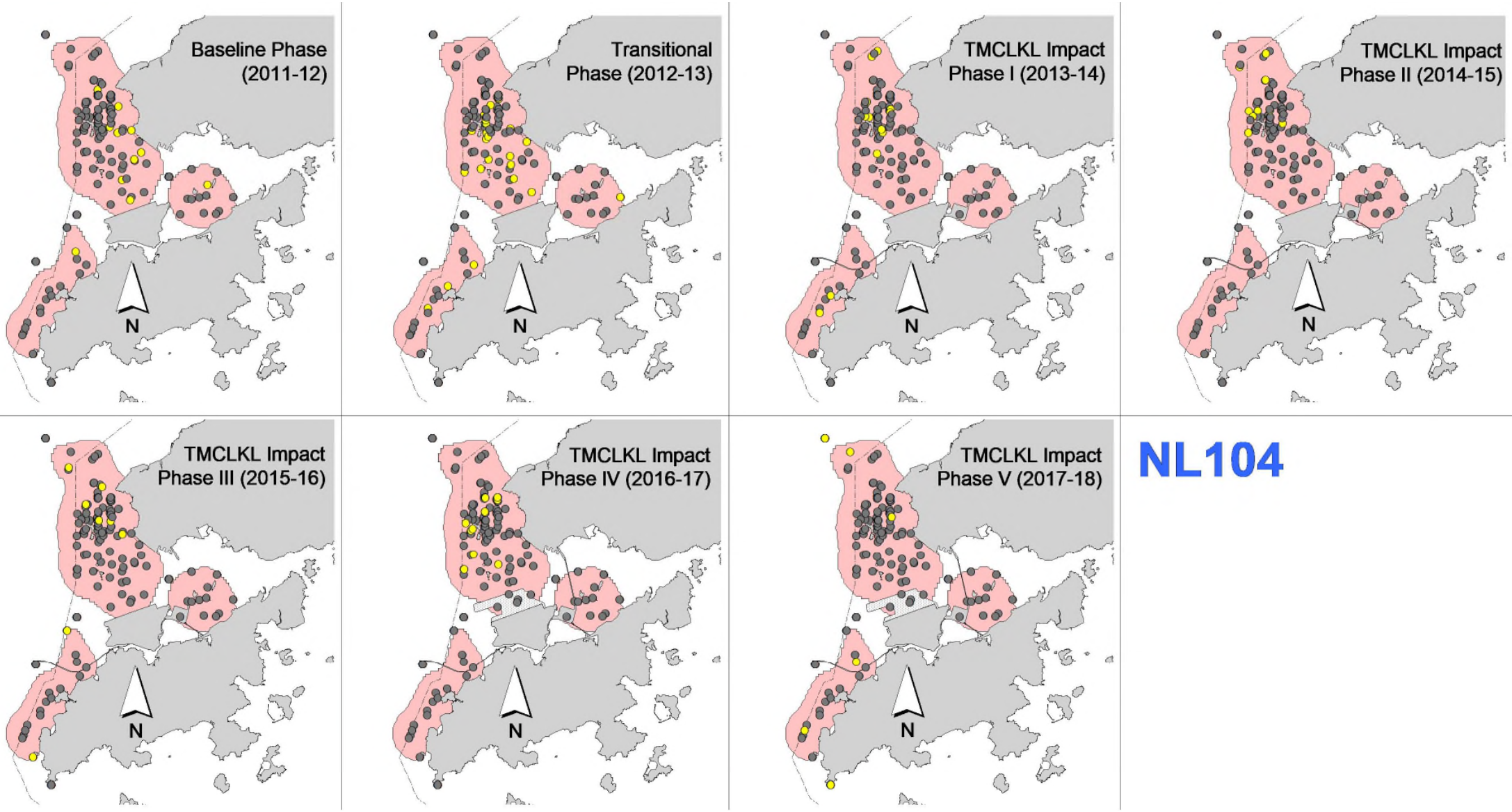
Appendix V. (cont'd)



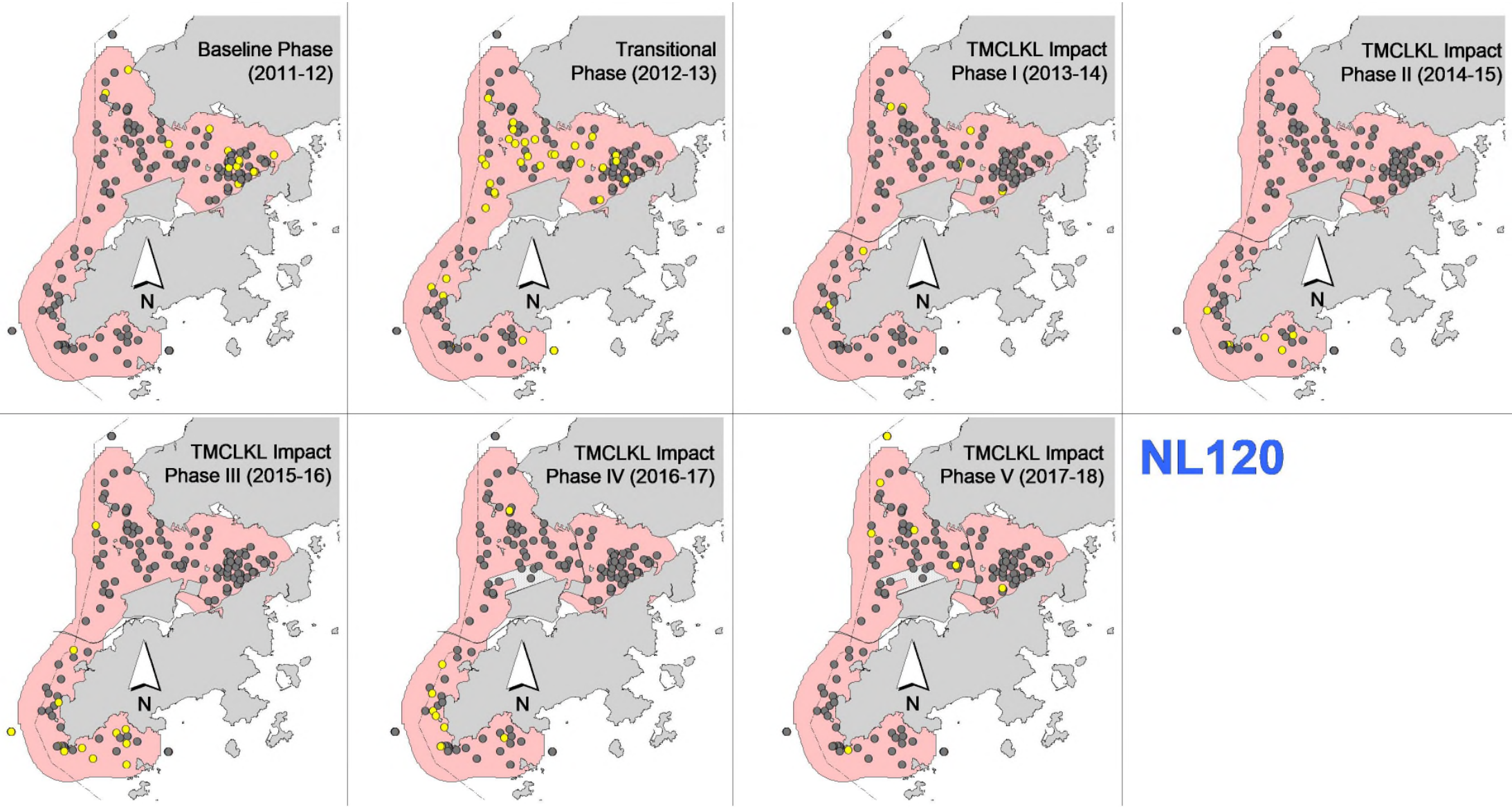
Appendix V. (cont'd)



Appendix V. (cont'd)



Appendix V. (cont'd)



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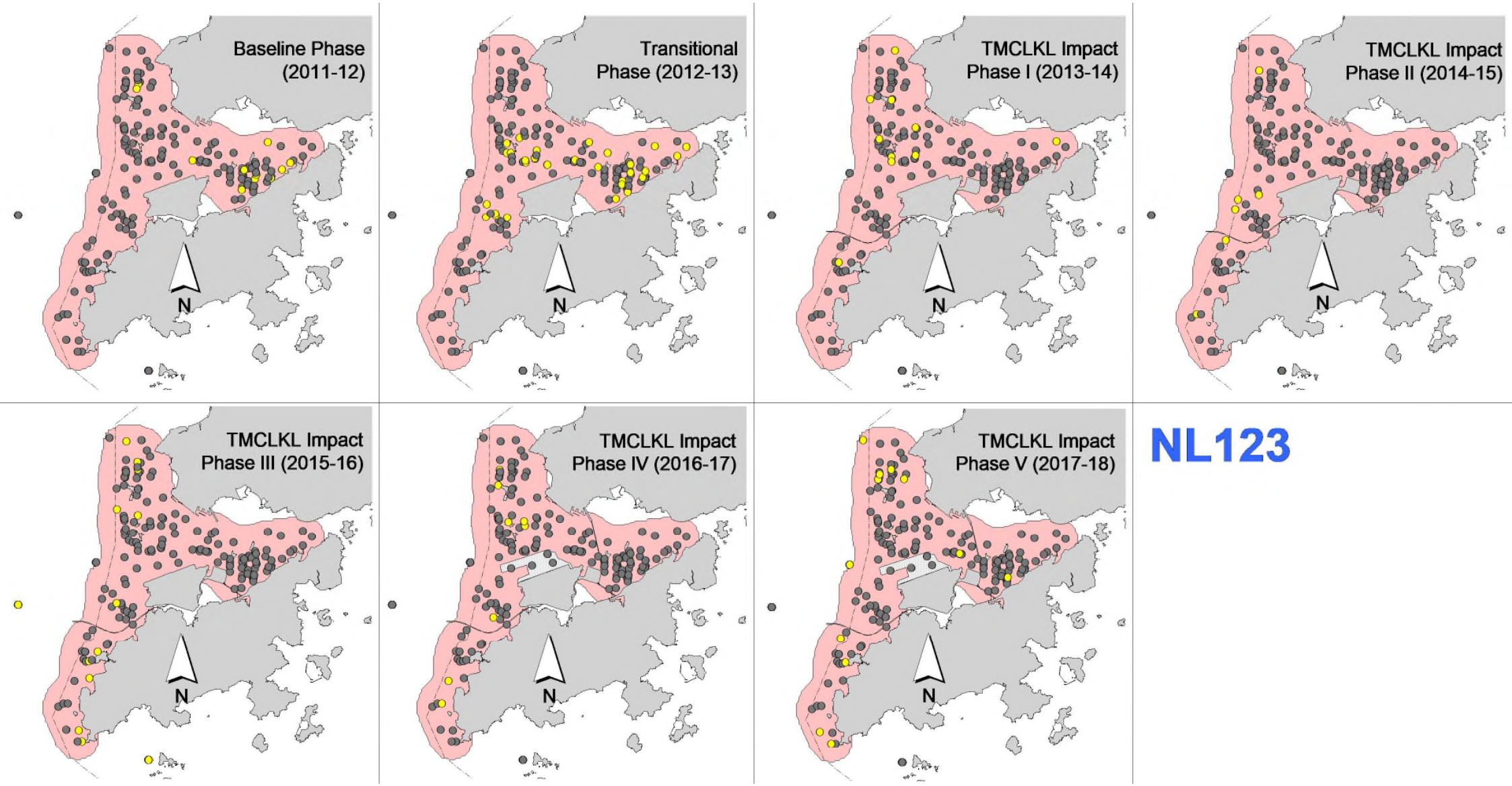

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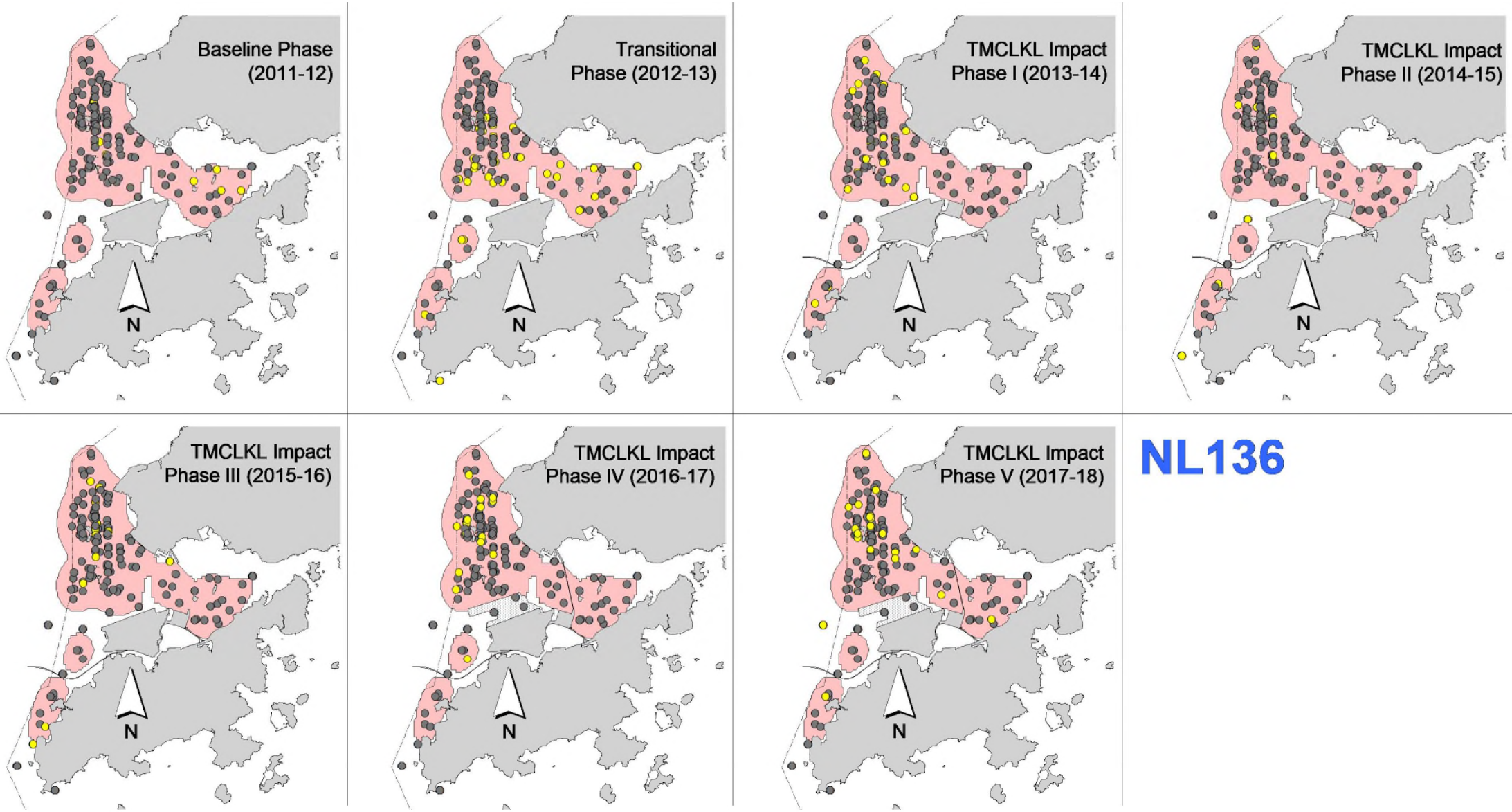

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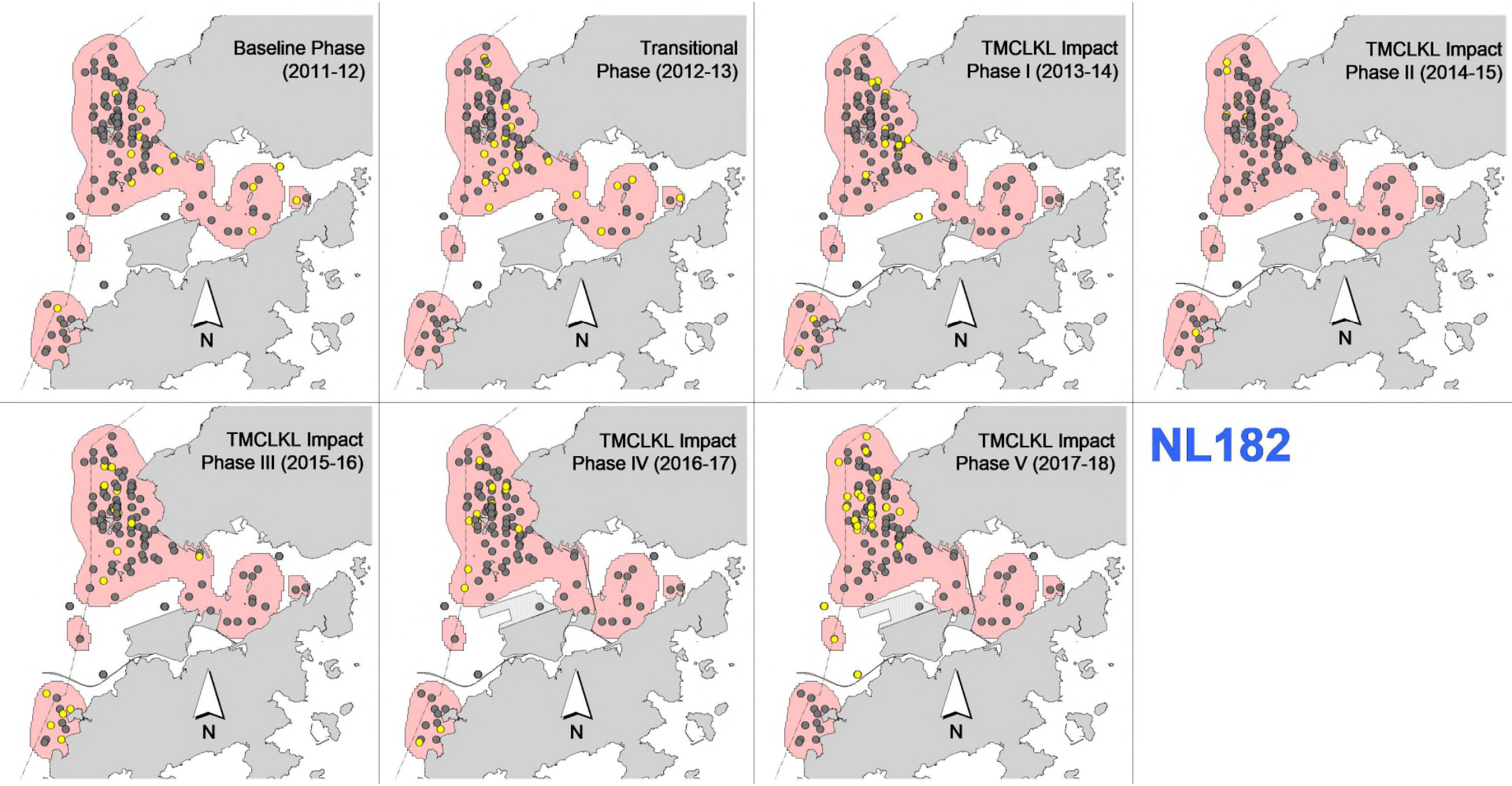
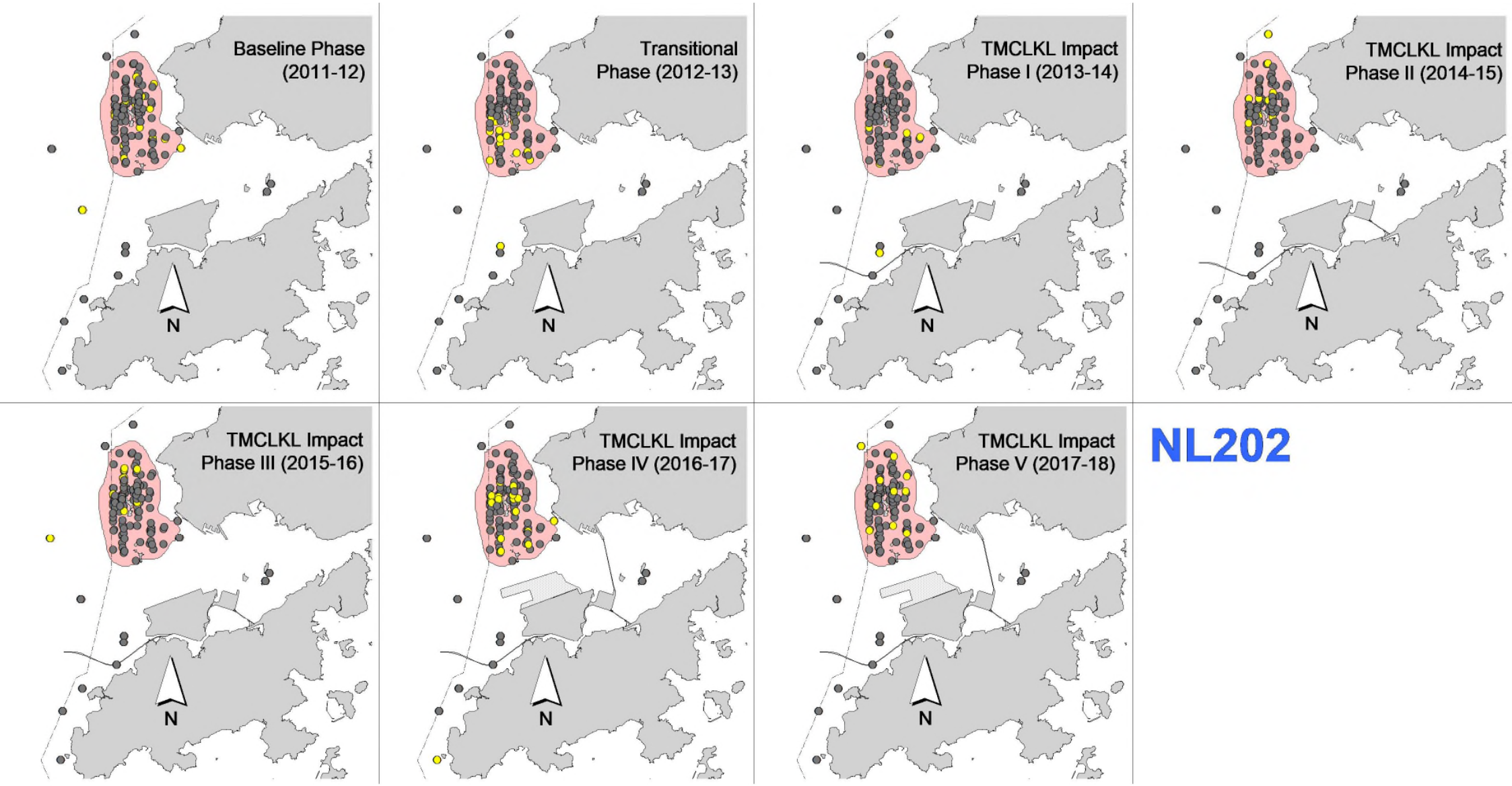
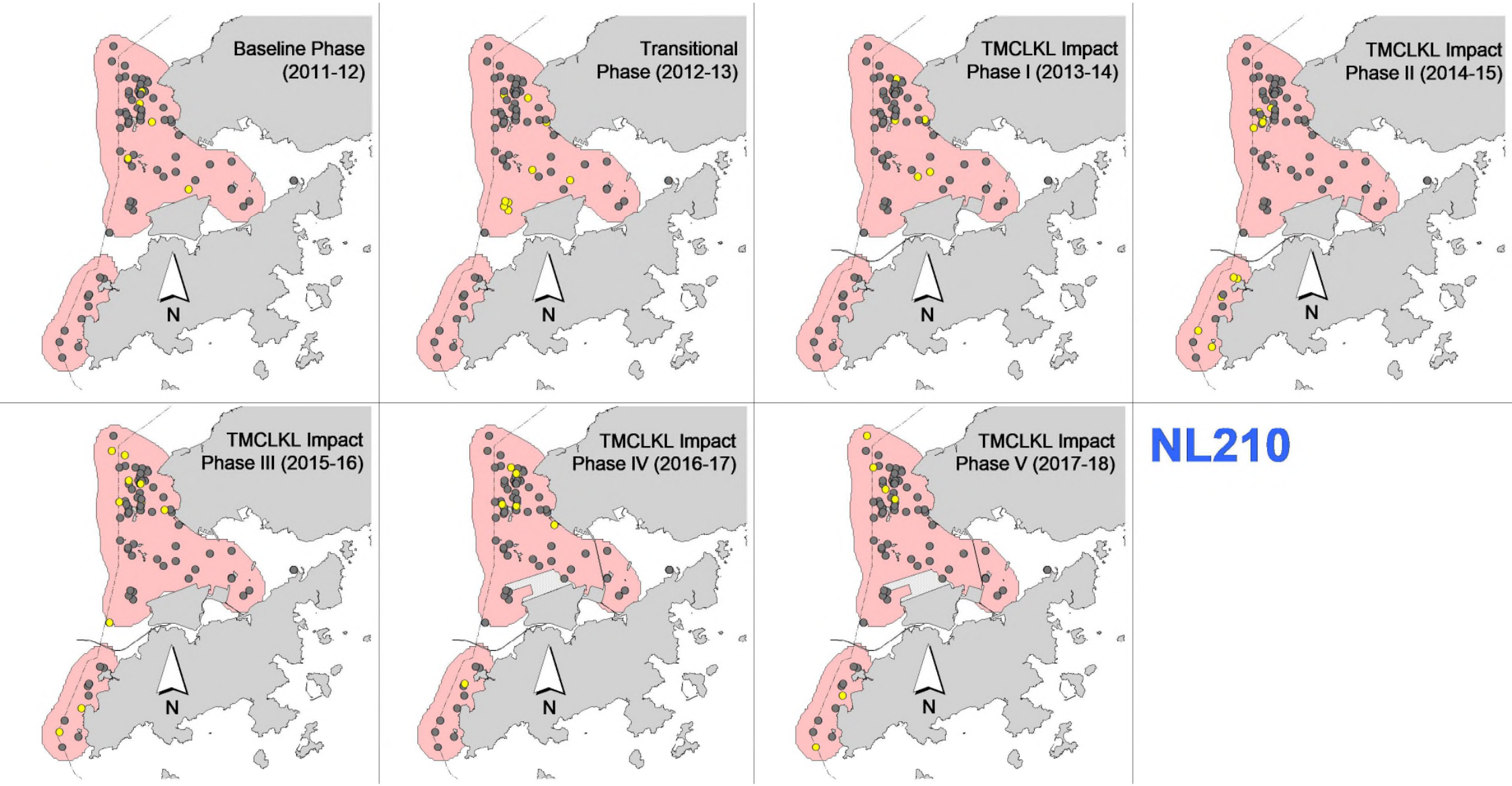


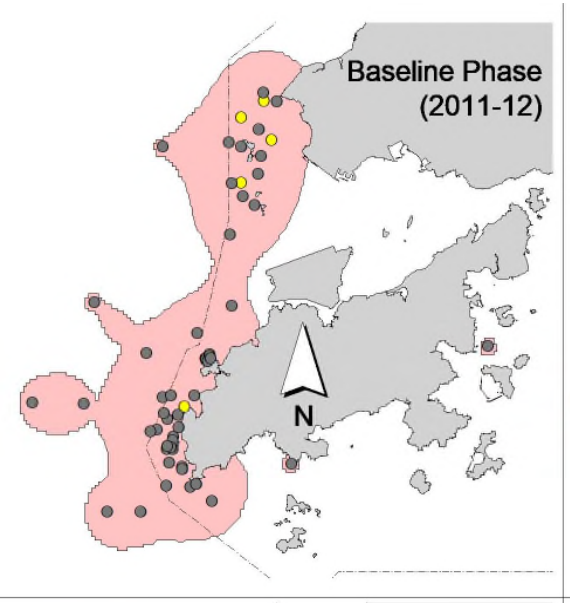
Appendix V. (cont'd)

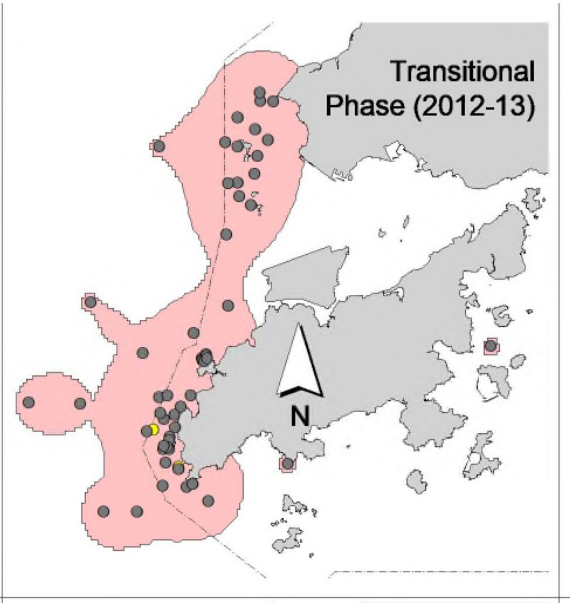


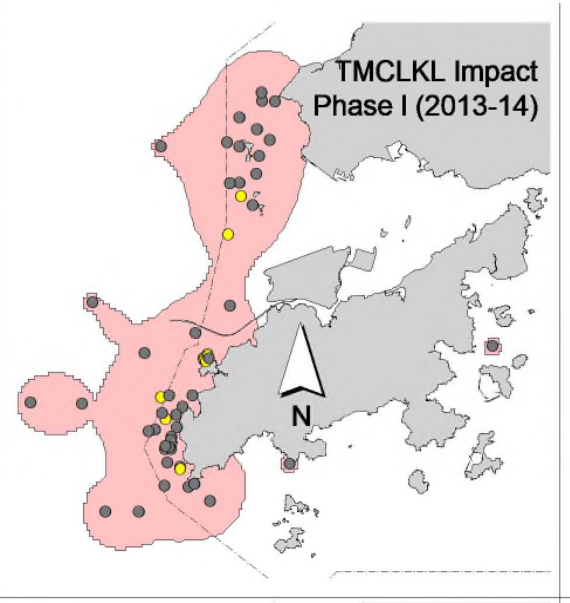
Appendix V. (cont'd)

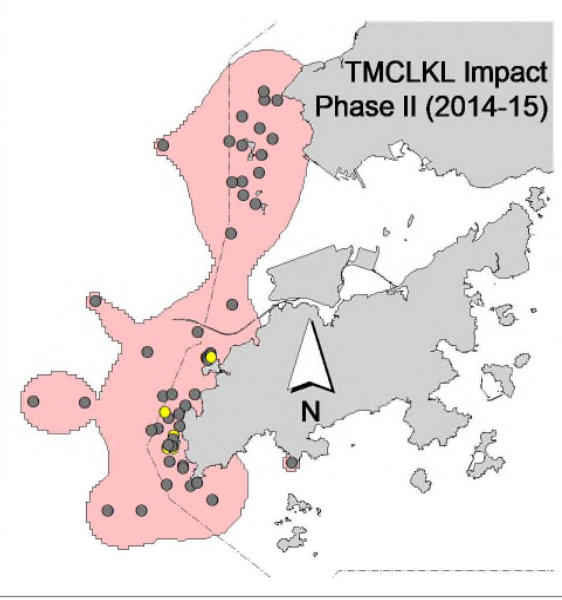


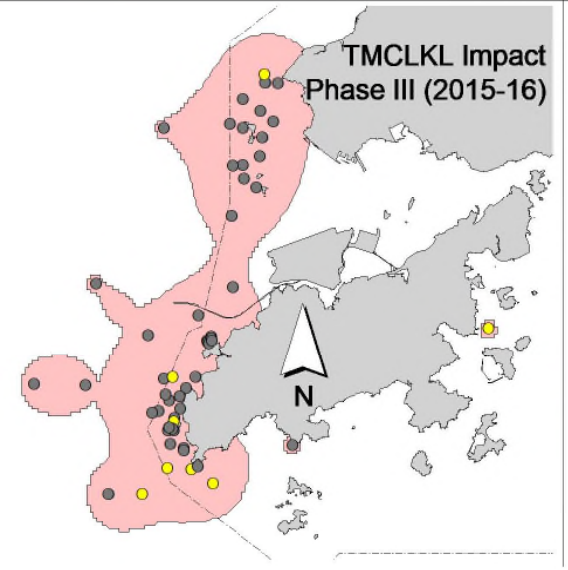
Appendix V. (cont'd)

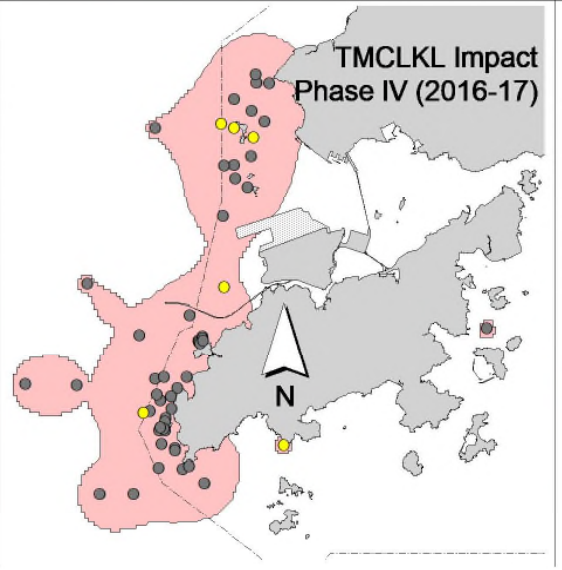


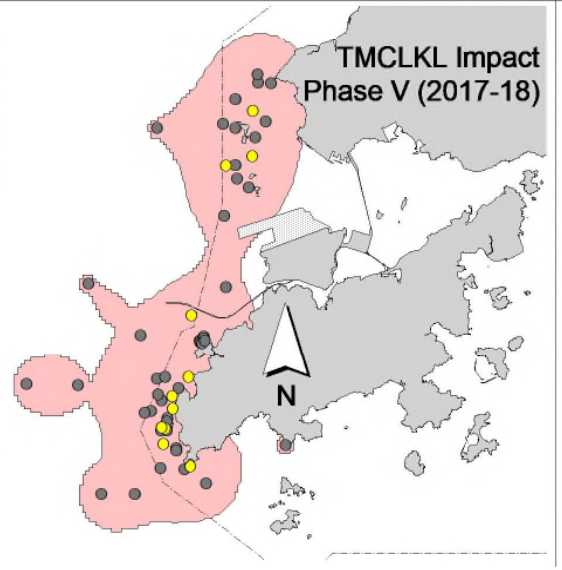












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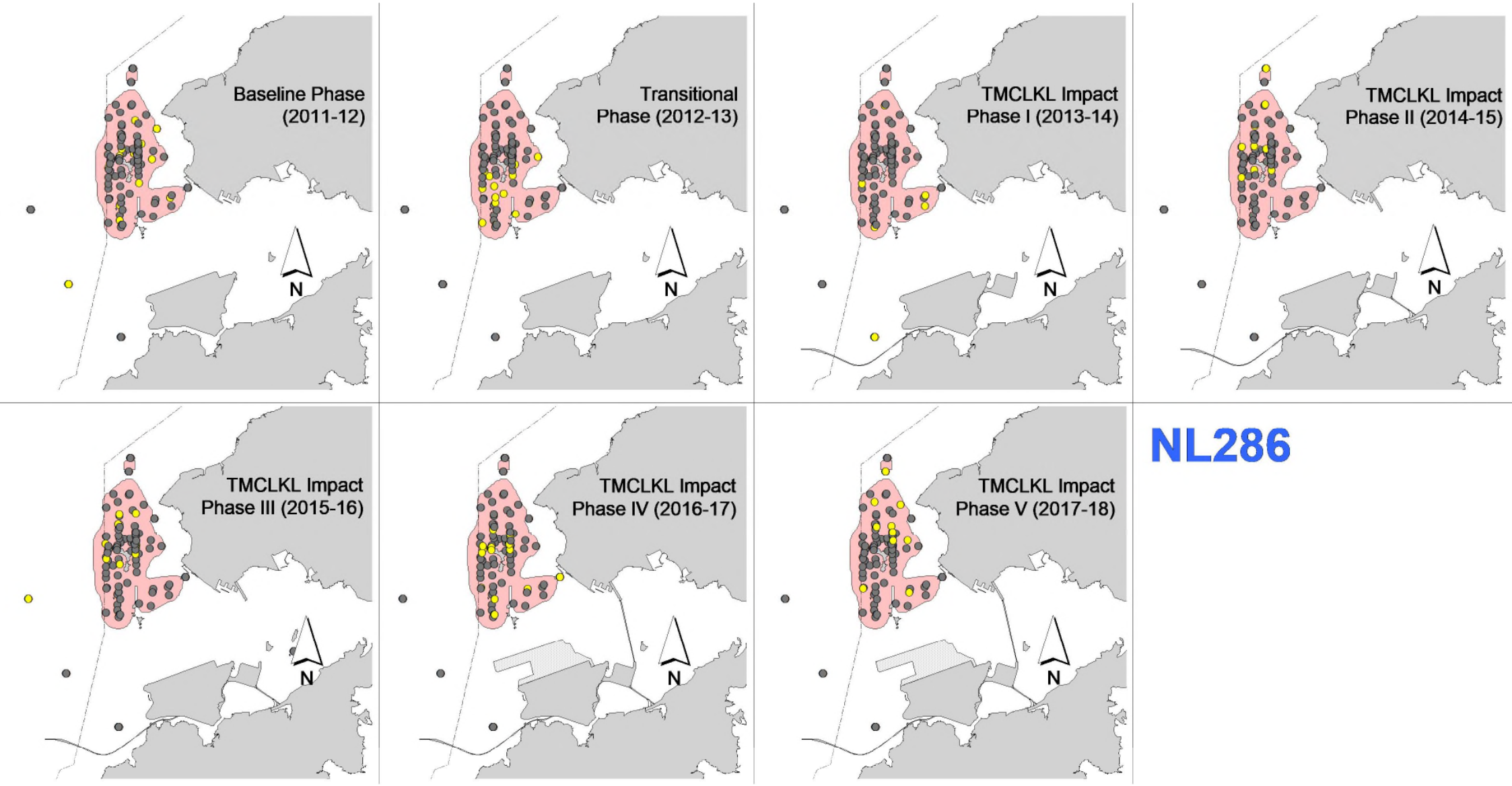
Appendix V. (cont'd)



Appendix V. (cont'd)