Hong Kong-Zhuhai-Macao Bridge
Hong Kong Boundary Crossing Facilities-Reclamation Works

June– August 2012
Quarterly Report

Dolphin Impact Monitoring

TABLE OF CONTENTS

Figures

ANNEXES

1. Introduction

In March 2012, construction for the Hong Kong-Zhuhai-Macao Bridge (HZMB) began in Hong Kong territorial waters. In Hong Kong, the HZMB comprises three projects; the Hong Kong Boundary Crossing Facilities (HKBCF) Project; the Hong Kong Link Road (HKLR) Project and; the Tuen Mun-Chek Lap Kok Link (TM-CLKL) Project. The HKBCF, the first of the HZMB projects to commence in Hong Kong, requires the total reclamation of approximately 149 hectares (ha); which consists of 130 ha for the HKBCF artificial island and 19 ha for the TM-CLKL southern landfall (Fig. 1).

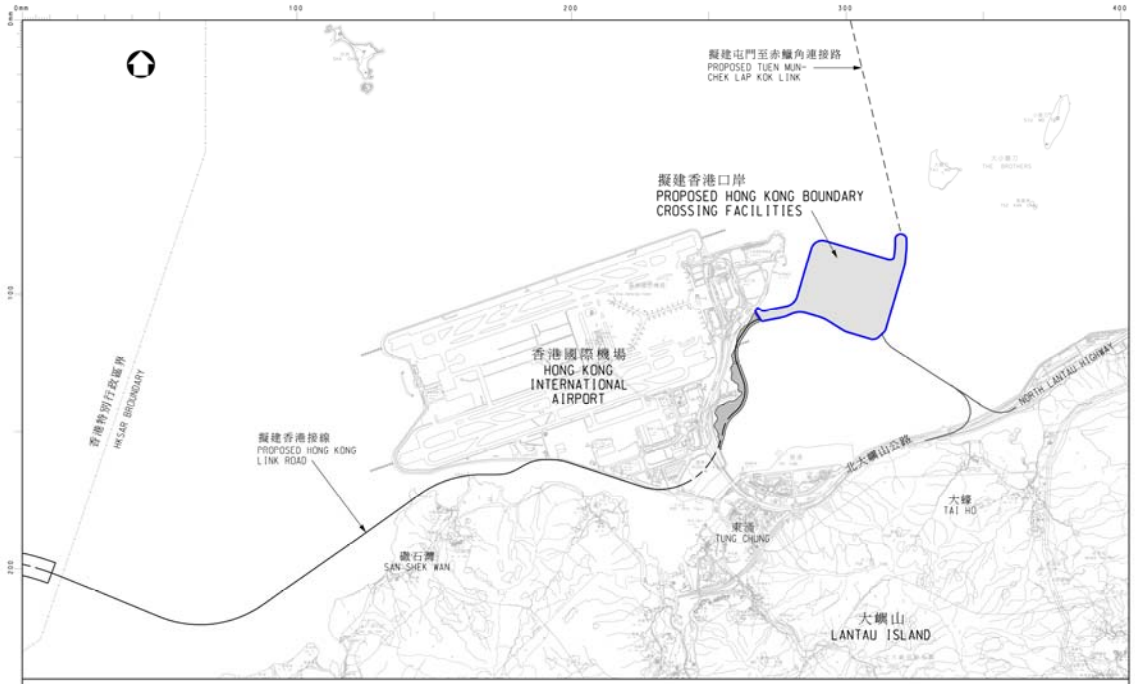


Figure 1. The Hong Kong Boundary Crossing (HKBCF) Reclamation Sites, North Lantau, Hong Kong (www.hzmb.hk/eng/img/overview/about_overview03_p01l.jpg)

The EM&A Manuals and Environmental Permits (EP) associated with all three projects have special provision for Chinese white dolphins (CWD) as they occur regularly in the waters which will be affected by the HZMB development. This report comprises the second three months (June–August 2012) data associated with the impact monitoring conducted for contract HY/2010/02, HKBCF-Reclamation Works. The format of this report follows as closely as possible the outline provided for the Baseline Monitoring Report and the first quarterly report (Mar-May 2012) to ease comparison. Data from AFCD Annual Monitoring reports have also been incorporated[1]

[1]www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi

2. OBJECTIVES AND METHODOLOGY

2.1. Objectives of the Present Study

The EM&A Manual for HZMB states that "A dolphin monitoring programme at North Lantau and West Lantau waters, in particular the dolphin sighting hotspots (e.g. Brothers Islands) and areas where juveniles have been sighted (e.g. West Lantau waters), should be set up to verify the predictions of impacts and to ensure that there are no unforeseen impacts on the dolphin population during construction phase". For HKBCF the study area known as West Lantau was not included in the site specific EM&A Manual for construction phase survey work. As such, for HKBCF vessel based dolphin surveys are conducted in the areas known as Northeast Lantau (NEL) and Northwest Lantau (NWL) to monitor impact. These surveys are conducted twice monthly and for the duration of the construction phase of HKBCF. Following the single baseline study which was conducted for HZMB in its entirety, the data gathered from these surveys are intended to monitor impacts by;

1) providing ongoing assessment of the spatial and temporal distribution patterns and habitat use of CWD during the construction phase of the HKBCF project.

2) identifying individual CWD by their natural marks, coloration and scars for comparison with the baseline data and to assess individual distribution patterns and habitat use.

3) comparing impact survey data to that gathered during the baseline data period so that any changes deemed to be of a significant nature can be assessed and mitigated appropriately.

The baseline monitoring report includes distribution analysis, encounter rate analysis, behavioural analysis, quantitative grid analysis and ranging pattern analysis. Protocols for data interpretation and analyses methods were provided in the baseline monitoring report.

2.2. Line-transect Vessel Surveys

The co-ordinates for the transect lines and layout map are provided by AFCD (Table 1; Figure 2). The study area incorporates 23 transects which are surveyed twice per month by boat. When the start of a transect line is reached, "on effort" survey begins. When the vessel is travelling between transect lines and travelling to and from the study area it is defined as "off effort". The transect line is surveyed at a speed of 7-8 knots (13-15 km/hr). During some periods, tide and current flow in the study site exceeds 7 knots and thus the vessel travels at the same speed as the current during these periods. A minimum of four marine mammal observers (MMOs) are present on each survey, rotating through four positions; observers (2), data recorder (1) and rest (1). Rotations occur every 30 minutes or at the end of dolphin sightings. The data recorder enters vessel effort, observer effort, weather and sightings information directly onto the programme Logger and is not part of the observer team. Logger is purpose built software which automatically collects and stores GPS data and contains a user configurable interface for the manual entry of the data required for line transect and other cetacean research studies (Gillespie *et al* 2010).

When the boat is travelling along the transect line ("on effort"), observers search the area in front of the boat between 90° and 270° abeam (bow being 0°). When a group of dolphins is sighted, position, bearing and distance data are recorded immediately onto Logger and, after a short observation, an estimate is made of group size. This is an "on effort" sighting. These input parameters are linked to the time-GPS-ships data which are automatically stored in the programme Logger throughout the survey period. In this manner, information on heading, position, speed, weather, effort

and sightings are stored in an interlinked database which can be subsequently used in a variety of analytical software packages.

Once the vessel leaves the transect line, it is deemed to be “off-effort”. The dolphins are approached with the purpose of taking high resolution images. Then the vessel returns to the transect line at the point of departure and is again “on effort”. If another group of dolphins is seen while travelling back to the transect line, or when with the first group of dolphins, the sightings are considered as “opportunistic” and noted accordingly. Group size is defined as an aggregation of dolphins within 100m of each other involved in similar behaviour (Connor *et al* 1998).

Table 1. The Dolphin Monitoring Transect Co-Ordinates for HKBCF Monthly Monitoring

ID	x	y	Long	Lat	ID	x	y	Long	Lat
1	804671	814577	113.870308	22.269741	12	815542	824882	113.975647	22.362962
1	804671	831404	113.869975	22.421696	13	816506	819480	113.985072	22.314192
2	805475	815457	113.878087	22.277704	13	816506	824859	113.985005	22.362771
2	805477	826654	113.877896	22.378814	14	817537	820220	113.995070	22.320883
3	806464	819435	113.887615	22.313643	14	817537	824613	113.995018	22.360556
3	806464	822911	113.887550	22.345030	15	818568	820735	114.005071	22.325550
4	807518	819771	113.897833	22.316697	15	818568	824433	114.005030	22.358947
4	807518	829230	113.897663	22.402113	16	819532	821420	114.014420	22.331747
5	808504	820220	113.907397	22.320761	16	819532	824209	114.014390	22.356933
5	808504	828602	113.907252	22.396462	17	820451	822125	114.023333	22.338117
6	809490	820466	113.916965	22.323003	17	820451	823671	114.023317	22.352084
6	809490	825352	113.916884	22.367128	18	821504	822371	114.033556	22.340353
7	810499	820690	113.926752	22.325043	18	821504	823761	114.033544	22.352903
7	810499	824613	113.926688	22.360464	19	822513	823268	114.043340	22.348458
8	811508	820847	113.936539	22.326475	19	822513	824321	114.043331	22.357971
8	811508	824254	113.936486	22.357241	20	823477	823402	114.052695	22.349680
9	812516	820892	113.946329	22.326894	20	823477	824613	114.052686	22.360610
9	812516	824254	113.946279	22.357255	21	805476	827081	113.877878	22.382668
10	813525	818270	113.956156	22.303225	21	805476	830562	113.877811	22.414103
10*	813525	824657	113.956065	22.360912	22	806464	824033	113.887520	22.355164
11	814556	818449	113.966160	22.304858	22	806464	829598	113.887416	22.405423
11	814556	820992	113.966125	22.327820	23	814559	821739	113.966142	22.334574
12	815542	818807	113.975726	22.308109	23	814559	824768	113.966101	22.361920

*Transect 10 is now 3.6km in length due to the HKBCF construction site. The total transect length for both NEL and NWL combined is 111km

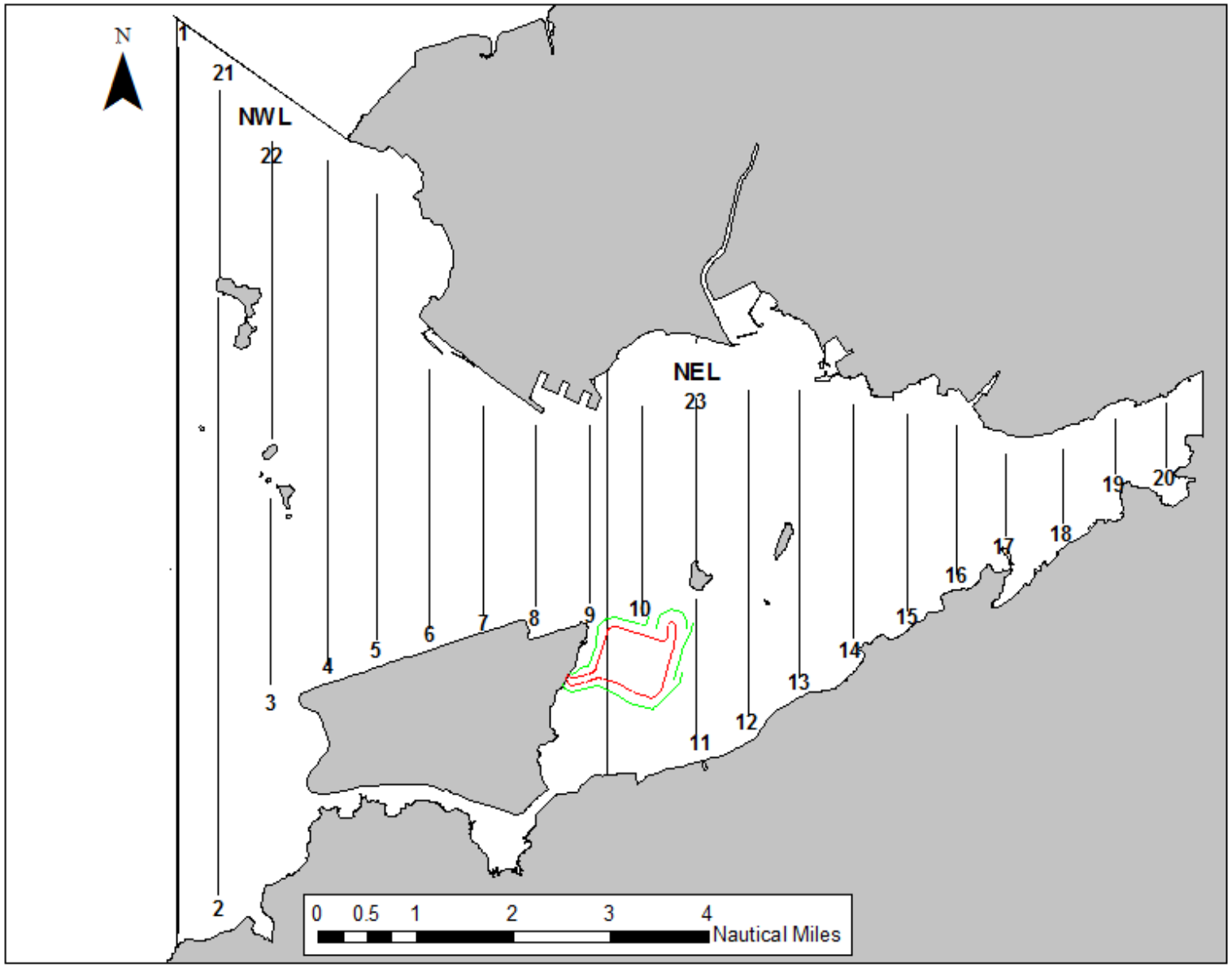


Figure 2. Location of the Transect Lines for Impact Monitoring during HKBCF (modified from baseline layout as HKBCF *in situ*)

2.3. Photo-identification

When a dolphin(s) is sighted, the vessel leaves the transect line and slowly approaches the group or individual. Attempts are made to photograph every individual sighted although close approaches to mother and calf pairs are not attempted. A digital SLR camera (Nikon D90) using long lenses (Nikor 80-200mm and fixed length 300mm) are used to obtain high resolution images. Effort is made to ensure consistency of image taking, e.g., no shadow and at an angle perpendicular to the dorsal fin. Polarising filters are used to minimise glare. In this manner, the best image clarity is achieved and image sorting and matching is more consistent. Images are sorted according to clarity and presence/absence of identifying features (nicks/cuts/deformities/pigmentation). Only images deemed to be of suitable quality and as containing sufficient markings for unambiguous identification are included in the photo ID catalogue.

2.4. Data Analyses

2.4.1. Distribution pattern analysis

Dolphin sightings data are mapped in the Geographic Information System (GIS) ArcView© 10.1.

2.4.2. Encounter rate analysis

Encounter rate is calculated using the number of "on-effort" sightings per 100 km of survey effort. This is the method of encounter rate calculation in both the baseline monitoring and AFCD long term monitoring reports and allows for temporal and spatial comparisons across studies.

2.4.3. Quantitative grid analysis of habitat use

Quantitative grid analysis is performed by mapping both sighting and dolphin densities plotted onto 1kmx1km grid squares. These densities are standardised by effort by calculating survey coverage in each line transect survey to determine the number of times the grid has been surveyed. Densities are calculated using the following formulae;

SPSE and DPSE:

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

Where;

S= total number "on effort" sightings
D = total number dolphins from "on effort" sightings
E = total number units survey effort
SA% = percentage of sea area

2.4.4. Behavioural analysis

When dolphins are sighted during vessel surveys, their behaviour is observed. Different activities are categorised (i.e. feeding, traveling, socialising, surface active, associated with boats, unknown) and recorded in the sighting data form of Logger. The sightings form is integrated with survey effort and positional data and can be subsequently mapped to examine distribution and behavioural trends.

2.4.5. Ranging pattern analysis

Home ranges for individual dolphins can be calculated using a variety of software (Worton 1989). In the baseline monitoring report, the program Animal Movement Analyst Extension, created by the Alaska Biological Science Centre, USGS was used in conjunction with ArcView© 3.1 and Spatial Analyst 2.0. Using the fixed kernel method, kernel density estimates and kernel density plots are created using all sightings. In the baseline monitoring, data from other studies and from outside the baseline monitoring period were used to map individual ranges. It is important to maximize the number of sightings used as kernel analyses cannot be conducted unless more than 20 independent sightings are made for an individual although it is recommended that a minimum of 70 resightings are used before kernel analyses has any accuracy (Wauters *et al* 2007; Kauhala and Auttila 2010). AFCD Annual Reports use a minimum of 15 resightings for kernel analyses (AFCD 2012). To date, too few data on individual dolphins exist from impact monitoring, i.e., 15 or more independent resightings for an individual, it is not possible to map utilisation densities for individual dolphins using the fixed kernel method. As sufficient data is gathered throughout the impact monitoring phase, other approaches to home range and habitat use analyses will be tried which may be more appropriate for small, short term datasets (Parra 2006).

3. RESULTS AND DISCUSSIONS

3.1. Summary of survey effort and dolphin sightings

From June to August 2012, 17 vessel surveys were conducted in NEL and NWL survey areas (Annex I). A total of 921.2km of on effort transect lines were conducted in NEL and NWL, of which 916.2km were under favourable conditions; i.e, Beaufort Sea State 3 or better with good (>5km) visibility. Therefore, 99% of vessel surveys were conducted under favorable conditions (Annex II). Only those periods of on-effort survey conducted under favourable conditions were included in quantitative analyses. During the impact monitoring period (June-August), 62 groups of dolphins, numbering 180 (min 172: max 218[1]) individuals, were sighted from the vessel surveys. Of these, 47 groups were on effort and the remaining 15 opportunistic (Annex III).

Of all sightings, 42 groups were located in NWL and 20 in NEL. Data from the same period (June – August) in 2011 notes a total of 37 groups, 25 of which occurred in NWL and 12 in NEL. There is no difference in the distribution of sightings which occur between NEL and NWL when comparing the 2011 and 2012 summer seasons (June to August). There are relatively more groups of dolphins in NEL when compared to the baseline survey period (Sept – Nov 2011) and the June to August 2011 period (Table 2).This is further discussed in section 3.2. Maps depicting location of sightings which have not been corrected for effort or survey track length are included as Figs. 3;4;5;6.

Table 2. A Comparison of Total Sightings Recorded in NEL and NWL Areas Combined During Jun – Aug 2011, Sep – Nov 2011 and Jun – Aug 2012

Monitoring Period	Total Dolphin Sighting in NWL	Total Dolphin Sighting in NEL
	Number of Groups	Number of Groups
Jun – Aug 2011* (Advanced Monitoring)	25	12
Sep – Nov 2011** (Baseline Monitoring)	49	17
Jun – Aug 2012** (Impact Monitoring)	42	20

* Surveys conducted once per month

** Surveys conducted twice per month and three times in June and July as compensatory surveys

[1] During sightings a minimum, maximum and best estimate of group size is noted; the range stated represents the minimum and maximum numbers estimated)

To correct for effort, only sightings made while the boat is on effort are used. On effort sightings are those sightings made while the boat is on the transect line and observers are actively looking for dolphins. Sometimes additional dolphin groups are seen while with one group of dolphins and sometimes dolphins are seen between transect lines; these are recorded as opportunistic sightings. Using on effort sightings only, 30, 53 and 47 dolphins groups were sighted in June – August (2011), baseline monitoring (September – November 2011) and June – August 2012, respectively (Table 3).

Table 3. A Comparison of On-effort Sightings Recorded in NEL and NWL Areas Combined During Jun – Aug 2011, Sep – Nov 2011 and Jun to Aug 2012

Monitoring Period	Groups of Dolphin sighted in NEL and NWL
Jun - Aug 2011* (Advanced Monitoring)	30
Sep - Nov 2011** (Baseline Monitoring)	53
Jun – Aug 2012** (Impact Monitoring)	47

* Surveys conducted once per month

** Surveys conducted twice per month and three times in June and July as compensatory surveys

3.2. Distribution

In June to August 2012, approximately two thirds of all "on effort" dolphin sightings occurred in NWL (Table 4; Figure 6). This is similar to the distribution of on effort sightings in the same period 2011. For both years, areas of importance include the Shau Chau Lung Kwu Chau Marine Park (SCLKCMP) area and adjacent, eastern waters. Also, sightings frequently occur in the area to the northeast of the airport platform. The NEL waters adjacent to this also have frequent sightings. Also in NEL, dolphins often occur in the area to the south of the Brothers Islands and the coastal area from Sham Shui Kok to the Ma Wan Bridge (Fig. 6). Both baseline and AFCD long term monitoring data indicate that these areas; SCLKCMP, the northeast of the airport platform, the Brothers Islands and the near shore waters of north Lantau, are all consistently frequented by dolphins. Long term monitoring also shows that higher numbers of sightings are made in the summer months compared to other seasons in the NEL area.

Table 4. A Comparison of On-effort Sightings Recorded in NEL and NWL Areas During Jun – Aug 2011, Sep – Nov 2011 and Jun - Aug 2012

Monitoring Period	No. of Dolphin Groups sighted in NWL	No. of Dolphin Groups sighted in NEL
Jun – Aug 2011* (Advanced Monitoring)	19	11
Sep – Nov 2011** (Baseline Monitoring)	39	14
Jun – Aug 2012** (Impact Monitoring)	30	17

* Surveys conducted once per month

** Surveys conducted twice per month and three times in June and July as compensatory surveys

3.3. Encounter rate

As each survey period conducted different numbers of boat surveys, variation in sightings occurrence can be quantified by correcting for the different amount of effort (number and distance of transect lines surveyed, i.e., km spent on effort), to obtain an encounter rate. Only on effort sightings are included in rate calculation. During June – August 2011, a total of 331km of survey effort was conducted under favourable conditions in the NEL and NWL survey areas compared to 916.2km conducted in 2012. During the baseline, 743.9km of survey effort was conducted under favourable conditions in the NEL and NWL survey areas. Ideally, the effect of different survey lengths should be investigated to ensure that comparisons are corrected for effort. During June to August 2011 monitoring, 30 groups of dolphins were sighted on effort compared to 47 in the same period 2012. During baseline monitoring, 53 groups of dolphins were sighted on effort. For June – August 2011, the encounter rates for NEL and NWL are 7.0 and 11.0, respectively. For the same period in 2012, the encounter rates are 6.0 and 5.3 for NEL and NWL respectively. The baseline monitoring encounter rates are 5.4 and 9.3 for NEL and NWL respectively (Table 5).

Table 5. A Comparison of On-effort Sightings Recorded in NEL and NWL Areas During Jun – Aug 2011, Sept – Nov 2011 and Jun – Aug 2012.

Monitoring Period	Enc. Rate*** NEL	Enc. Rate NWL
Jun - Aug 2011* (Advanced Monitoring)	7.0	11.0
Sep - Nov 2011** (Baseline Monitoring)	5.4	9.3
Jun - Aug 2012** (Impact Monitoring)	6.0	5.3

* Surveys conducted once per month

** Surveys conducted twice per month and three times in June and July as compensatory surveys

***Encounter rate is the number of groups of dolphins encountered per 100km of "on effort" survey under favourable conditions. Encounter rates from advanced monitoring were calculated from data provided; encounter rates for baseline monitoring were sourced from the baseline report.

The AFCD Annual Reports describe variation in spatial distribution between areas and between seasons in NEL and NWL. For the last ten years, it is reported that overall **annual encounter rate** for NEL varies between 1.8 and 6.2 and the **annual encounter rate** for NWL varies between 5.8 and 17.0. There is both up and down movement between these limits but, the general trend in yearly encounter rate for dolphins throughout Hong Kong is declining (AFCD 2012). For the months June to August, graphic representation in AFCD annual trend graphs indicate that for NEL, encounter rates vary between 1 and 6 and for NWL, encounter rates vary between 5 and 12. There are considerable differences between these encounter rates which makes detecting any significant or unusual change problematic.

The NWL 2011 June to August encounter rate, at 11.0, is close to the highest encounter rate recorded for this period. And the NWL 2012 June to August encounter rate, at 5.3, is close to the lowest encounter rate. Both these values, however, are within the limits of previously reported rates (AFCD long term monitoring data).

For NEL, the encounter rate for June to August 2011 is 7.0 and for June to August 2012, it is 6.0. For this period, previously reported encounter rates vary between 1 and 6 so both 2011 and 2012 data are near the maximum encounter rates recorded for this period.

The small number of sightings recorded in NEL during the first quarter (Mar-May 2012) of impact monitoring for HKBCF did cause some concern although this area typically has fewer sightings recorded during the March to May period. It is clear that the number of sightings and the encounter rate has increased between the March to May and June to August 2012 periods and the current encounter rate is close to the upper range of encounter rates for NEL in summer months. The encounter rate for NWL is at the lower range of that typical for the area in the summer period. This could be partially explained by a shift in distribution from NWL to NEL, i.e., a low encounter rate in one area with a concomitant higher encounter rate in the adjacent area. It must be noted that NEL and NWL are arbitrary divisions within the habitat and do not represent biological units. Further, not all areas known to be within the range of individuals recorded in NEL and NWL are recorded. This makes population level distribution and encounter rates difficult to fully interpret.

3.4. Group size

During impact monitoring, group size varied from 1 to 11 individuals with an overall average of 3.2 ±2.4 (SD). In June to August 2011, the NEL average group size was 2.8 and, for the same period in 2012, it was 4.3. In June to August 2011, the NWL average group size was 4.3 and for the same period in 2012, it was 2.8. In summary, the average group size in NEL has increased since June 2011 but the average group size in NWL has decreased. This may be indicative of more dolphins using the NEL area compared to the same time periods in 2011 with a concomitant decrease in dolphins using the NWL area. A comparison between June to August 2011, 2012 and baseline monitoring group size is summarised below (Table 6). A map depicting group size distribution shows that larger groups occur in northeast SCLKCMP and the north lantau nearshore area (Fig. 7).

Table 6. A Comparison of On-effort Sightings Group Size Averages Recorded in NEL and NWL Areas During Jun – Aug 2011, Sep – Nov 2011 and Jun – Aug 2012.

Monitoring Period	Average Group Size (NWL)	Average Group Size (NEL)
June - August 2011* (Advanced Monitoring)	**4.3**	**2.8**
Sept – Nov 2011 (Baseline Monitoring)**	**4.4**	**3.4**
June - August 2012 (Impact Monitoring)**	**2.8**	**3.8**

* Surveys conducted once per month

** Surveys conducted twice per month and three times in June and July as compensatory surveys

As encounter rate and group size are both subject to variation, the use of other more powerful analyses may be more appropriate to discern differences over the shorter term. Alternative analyses have been developed and review of these is in progress to determine if they will be a useful tool for more detailed data interpretation for the shorter time periods considered during impact monitoring.

3.5. Habitat use

Quantitative grid analyses indicates that the most often frequented areas in NWL are SCLKCMP across to Black Point and the western edge of the Urmston Road shipping lane. The area to the northeast of the airport platform is also a popular habitat. In NEL, dolphins are regularly sighted in the area adjacent to the northeast edge of the airport platform and to the north of HKBCF. This area which straddles NEL and NWL has been a hotspot of dolphin activity during June to August 2012. Also in NEL, regular sightings are recorded at the Brothers Islands and the northern coast of Lantau (Figs. 8; 9). The grid analyses from this quarter shows a similar distribution to that published in AFCD long term monitoring reports and the baseline monitoring; there are several areas within

the NWL and NEL area which are used frequently throughout the year. These areas have been consistent in the long term.

3.6. Mother-calf pairs

Fifteen mother and calf pairs were sighted to the west of NWL, 9 groups and, in NEL, at the Brothers Islands and Sham Shui Kok, 6 groups. There were no mother and calf pairs in the area to the northeast of the airport platform (Fig. 10). Calves comprised 8.2% of all dolphins sighted. One dead calf was observed during impact monitoring to the east of Sha Chau (12/07/12).

3.6.1. Calf Mortality Incident

Referring to the monthly EM&A reports, stone column installation was the major construction activity between project commencement and 12 July 2012. According to the information from the Contractor, around 71 stone columns were installed in a localised area during the period 1 July 2012- 12 July 2012. It is noted that marine works of similar nature and scale had been conducted in the works area since project commencement in April 2012, therefore, no increase in activity occurred in July 2012. Furthermore, a passive acoustic monitoring (PAM) system is deployed every night at HKBCF. The HKBCF PAM system records underwater noise levels as well as dolphin vocal activity. Recording indicate that both stone column piling and vibration piling create low underwater noise as most of the activity occurs within the sediment rather than in the open water column. There is minimal transmission of sound at the solid-liquid interface of the sea bed. Any noise from the HKBCF stone column and vibration piling construction activities appears to be site specific and can be considered to be minimal. Moreover, mothers and young calves tend to stay in a localised area as the calf is developing and cannot swim long distances. A dolphin which likely was in the Sha Chau area between last sighting (10th) and time of carcass recovery (12th) is unlikely to be affected by localised construction noise which is some 5km distant. The deceased dolphin was located distant to the HKBCF site and it is therefore unlikely that underwater noise affected the mother-calf pair if they were located at the Sha Chau area. Considering the nature, scale and location of the works, it was reasonable to conclude that marine works at HKBCF did not contribute to this mortality incident.

3.7. Activities and associations with fishing boats

Of the 62 groups sighted (using all sightings), 29 (46.7%) were engaged in feeding activities or were associated with boats. This is similar to the feeding activities recorded for the period March – May 2012 (45%). Six groups (9.6%) were engaged in socialising (surface active) behaviours which is also similar (10%) to March – May 2012 records. Five groups (8.1%) were both feeding and socialising (multiple), again, this is similar to the period March – May 2012 (10%). Nine groups (14.5%) were travelling and seven groups (11%) were classified as “other”, e.g., this category is used to describe unusual events such as avoiding shipping traffic, epimeletic behaviour, etc. The behaviour of six groups (9.6%) was unknown. Month by month, feeding would appear to be the predominant activity during daylight hours (Fig. 11). For NWL, most feeding occurs to the north and the waters adjacent waters to SCLKCMP. For NEL, feeding occurs throughout the north Lantau coastal area (Fig. 12).

3.8. Photo-identification work

The photo ID catalogue is regularly updated and re-sightings of dolphins identified within the first quarter are beginning recorded. The project specific photo identification catalogue has been developed and is presented in Annex IV.

4. CONCLUSION

When compared to baseline monitoring (Sept to Nov 2011), the data from June to August 2012 show several consistencies. The data collected from June to August 2012 also has many consistencies with the general trends reported in AFCD long term monitoring. Habitat use, activity budgets, encounter rates, group size and behavioural trends all fall within those reported normally for the population. According to AFCD records, there has been no unusual mortality events during this period. The lower encounter rate for NWL, although within the range reported previously, is noted although the significance of this, if any, is as yet unknown. The existing long term data set shows that there is an inherent variation in all patterns and rates observed for the dolphin population, however, care should be exercised so that short term changes which may be of significance are not masked by the natural variability of population trends. Again, it is highlighted that the most recent AFCD Annual Report shows that the dolphin population is in decline and, as such, survey methodologies and analysis techniques should take this into account.

References

Agriculture, Fisheries and Conservation Department (AFCD) 2012. *Annual Marne Mammal Monitoring Programme April 2011-March 2012.)* The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

Connor, R. Mann, J., Tyack, P. and Whitehead, H. 1998. Social Evolution in Toothed Whales. *Trends in Ecology and Evolution* 13, 228-232

Gillespie, D., Leaper, R., Gordon, J. and Macleod, K. 2010. An integrated data collection system for line transect surveys. *J. Cetacean Res. Manage.* 11(3): 217–227.

Kauhala, K. & Auttila, M. 2010: Estimating habitat selection of badgers - a test between different methods. - *Folia Zoologica* 59: 16-25.

Parra, G. 2006. Resource partitioning in sympatric delphinids: space use and habitat preferences of Australian snubfin and Indo-Pacific humpback dolphins. *Journal of Animal Ecology* 75:862–74

Wauters, L., Preatoni, D., Molinari, A. and Tosi, G. 2007. Radio-tracking squirrels: Performance of home range density and linkage estimators with small range and sample size. Ecological Modelling 202(10):333-44

Worton, B. 1989. Kernel Methods for Estimating Utilization Distribution in Home Range Studies. *Ecology* 70(I):164-8

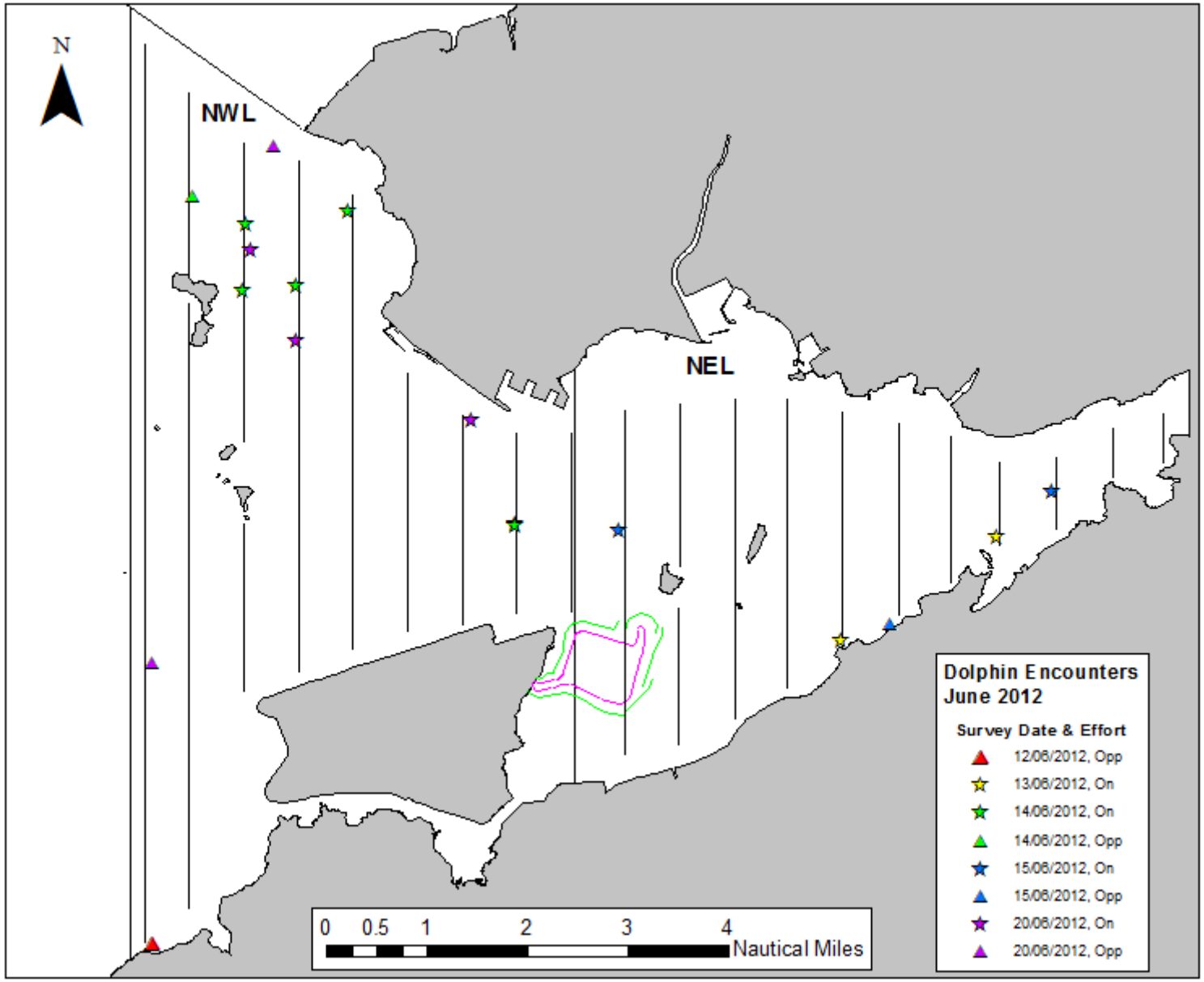


Figure 3 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (June 2012)

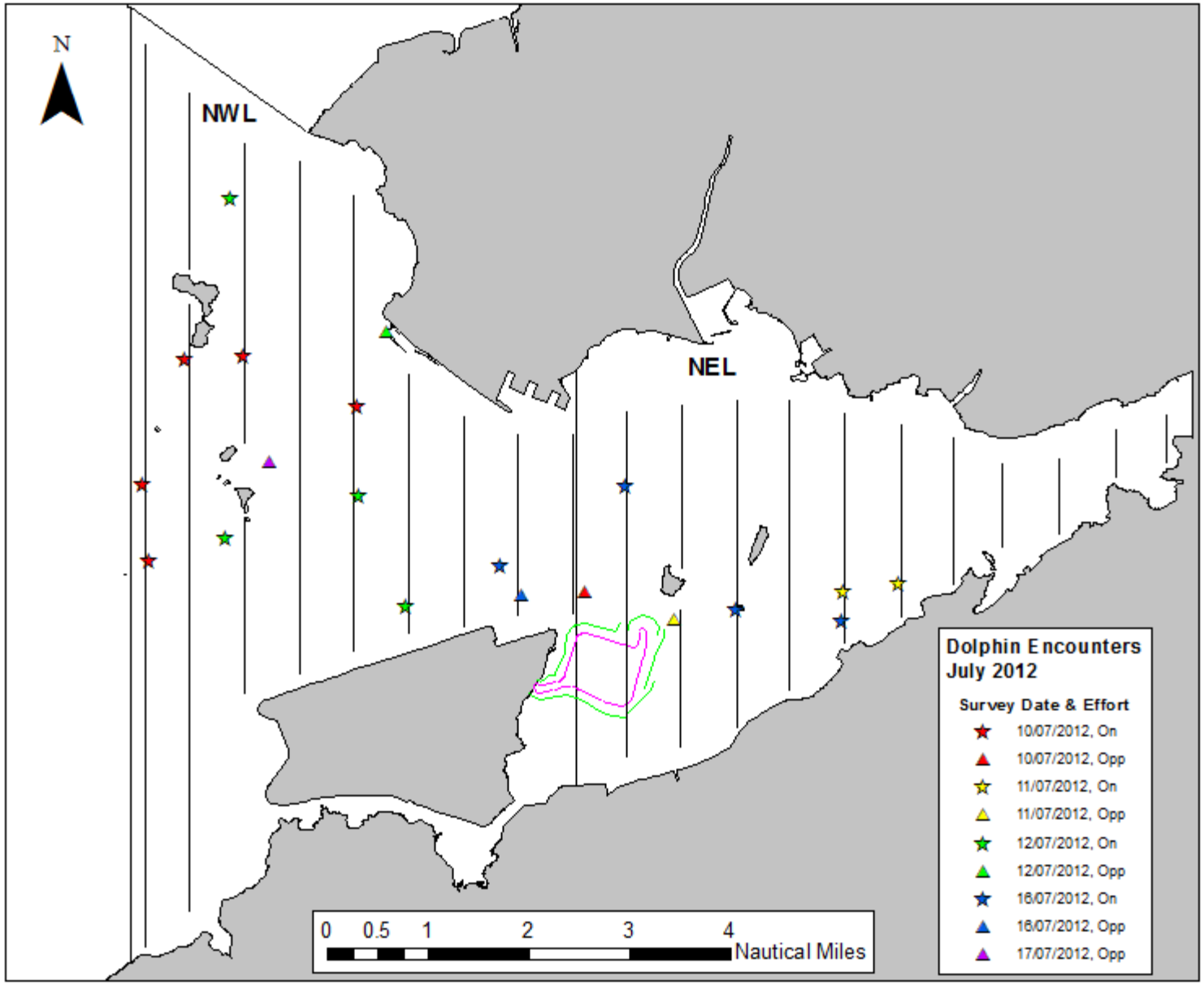


Figure 4 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (July 2012)

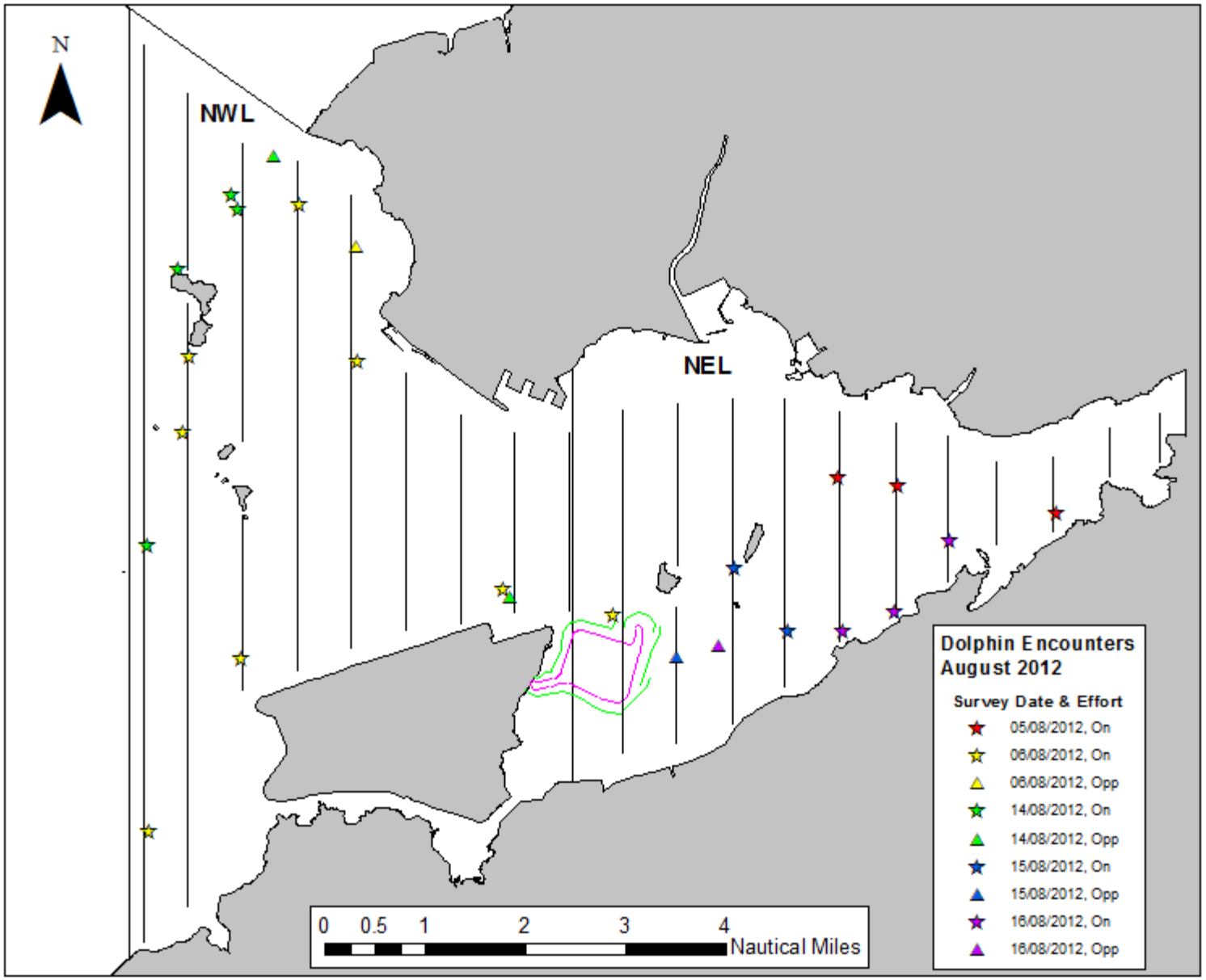


Figure 5 Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (August 2012)

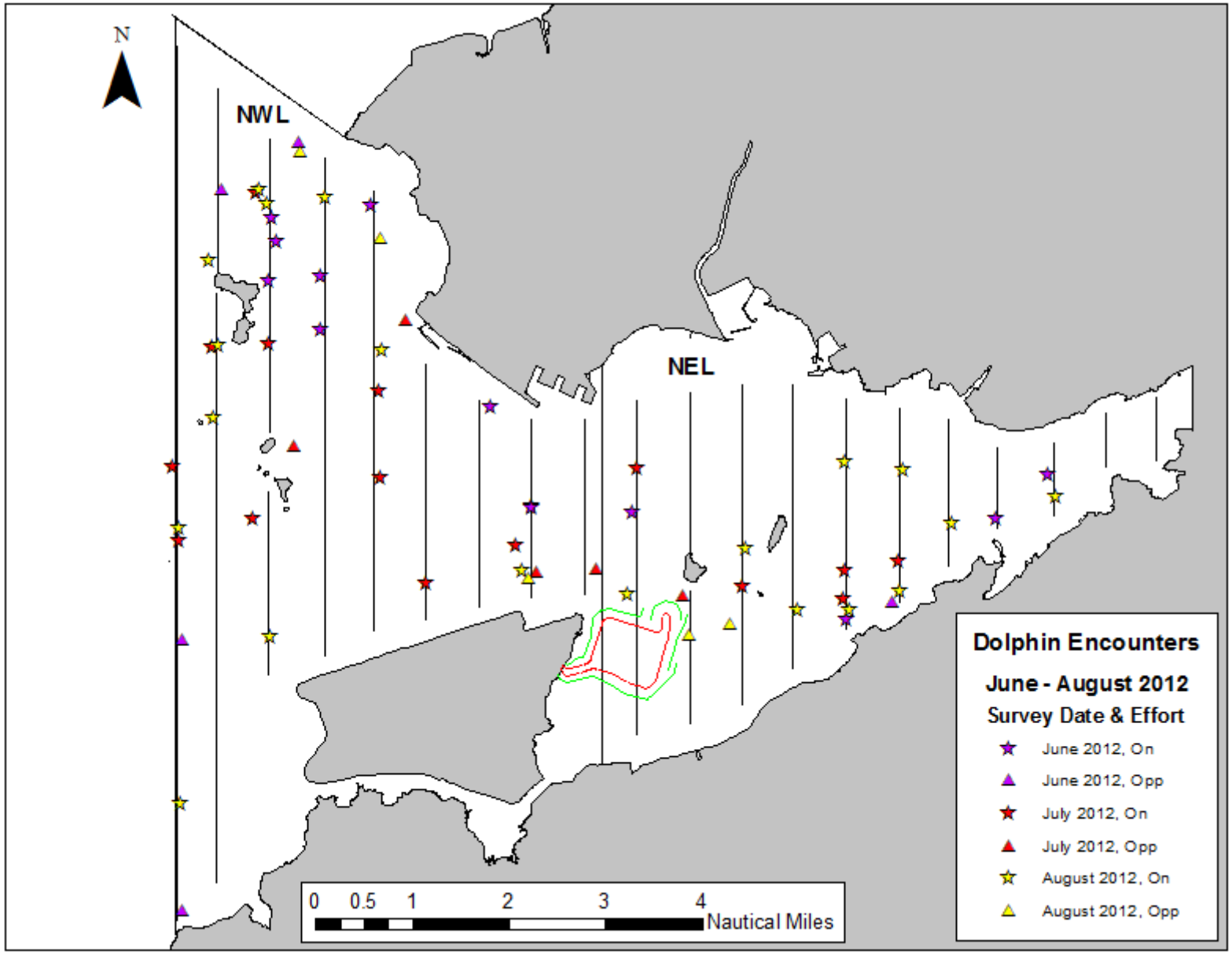


Figure 6. Distribution of Sightings Recorded During Impact Monitoring Surveys for HKBCF (June – August 2012)

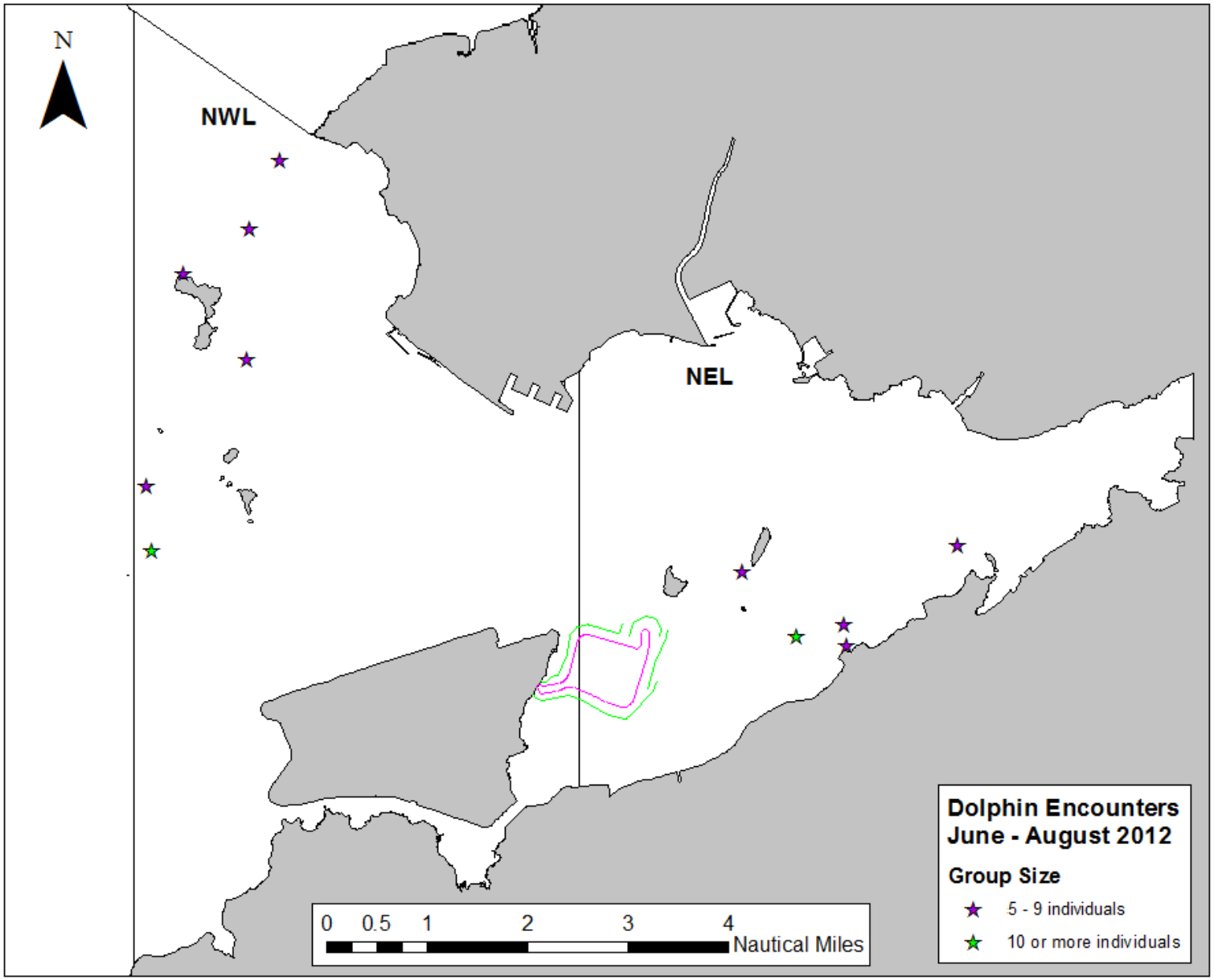


Figure 7. The Location of Dolphin Groups Numbering 5 and Above Individuals

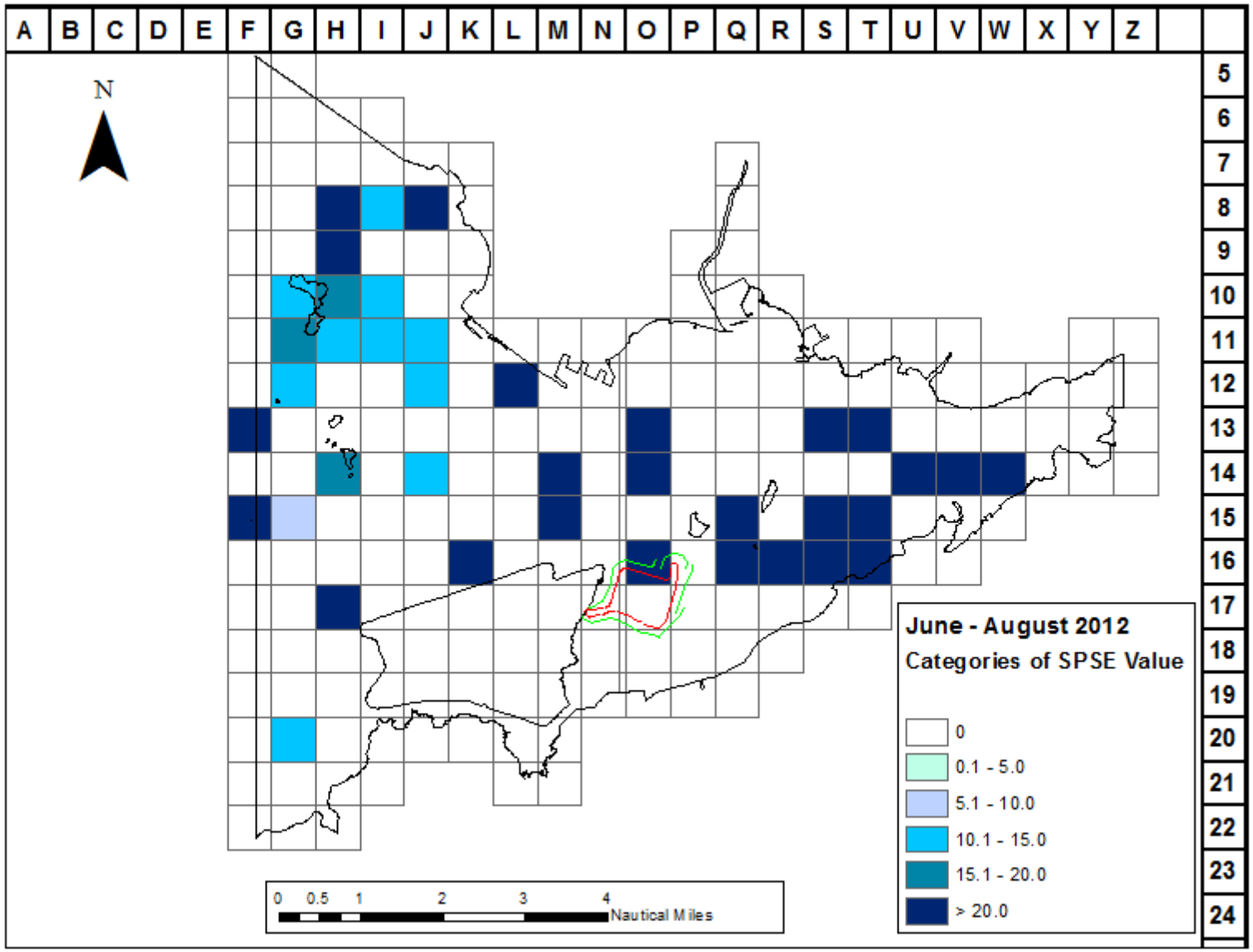


Figure 8. Sighting density SPSE (number of on-effort sightings per 100 units of survey effort) for June – August 2012.

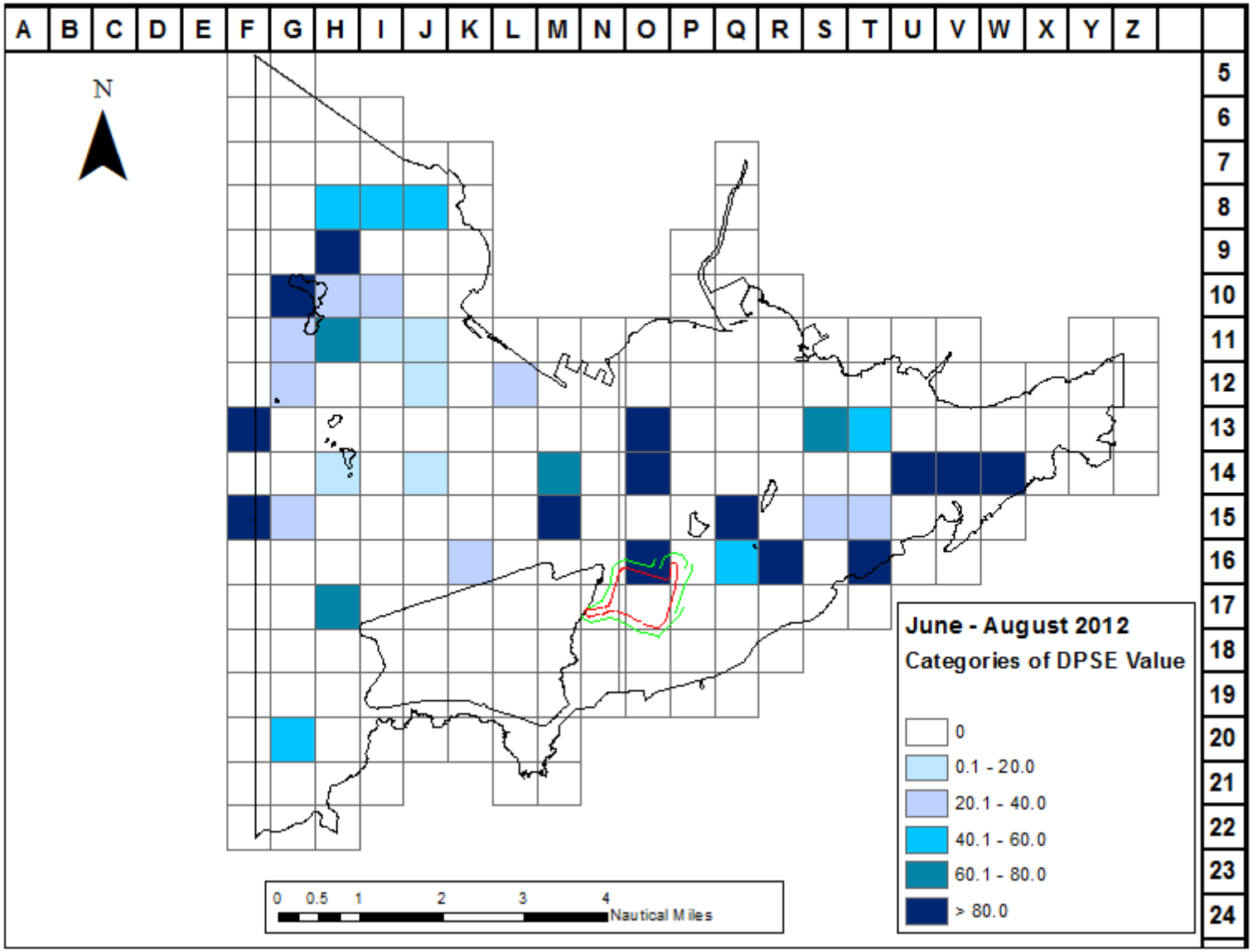


Figure 9. Dolphin density DPSE (number of dolphins per 100 units of survey effort) for June – August 2012.

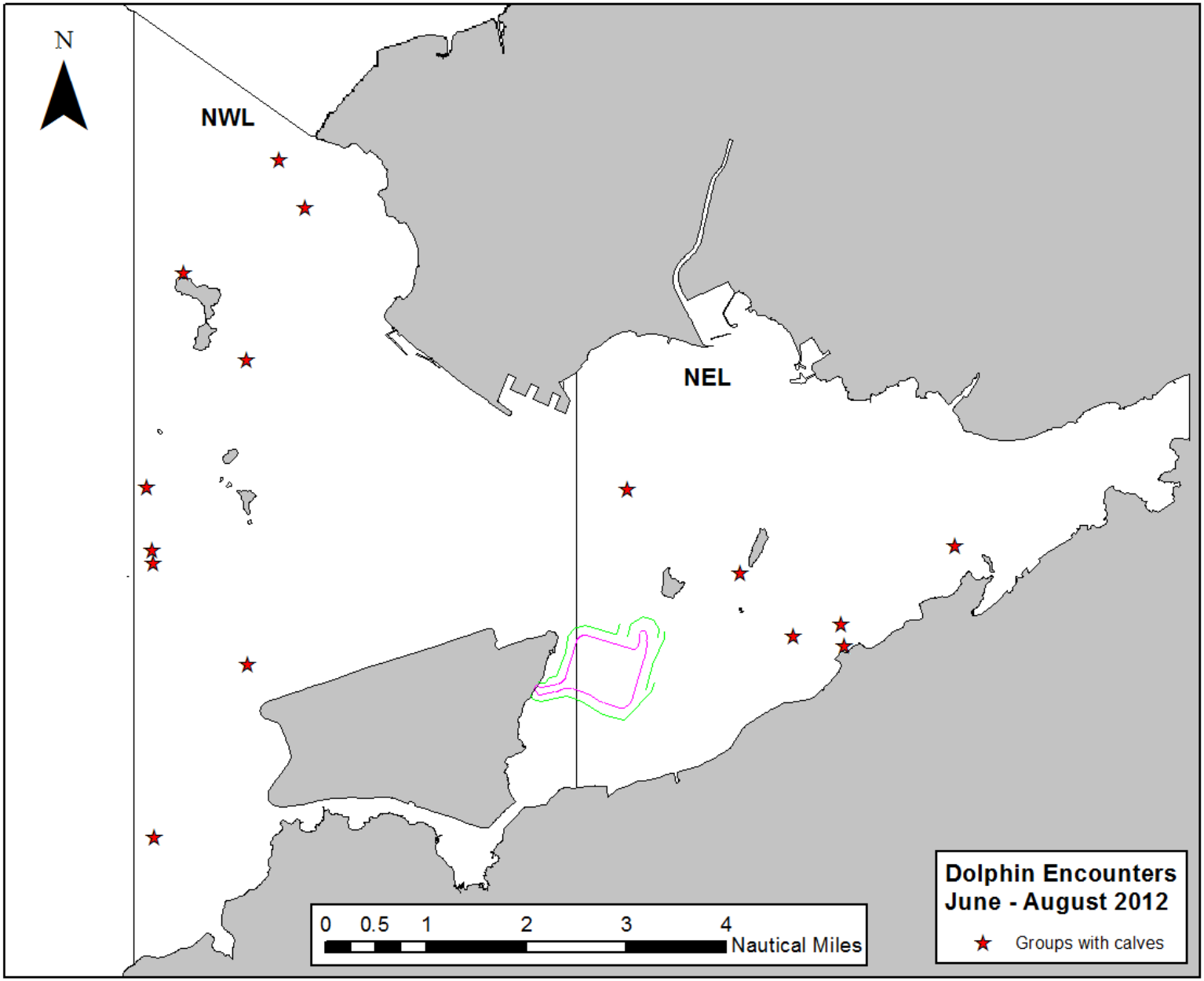


Figure 10. Location of groups containing mother and calf pairs during June to August 2012.

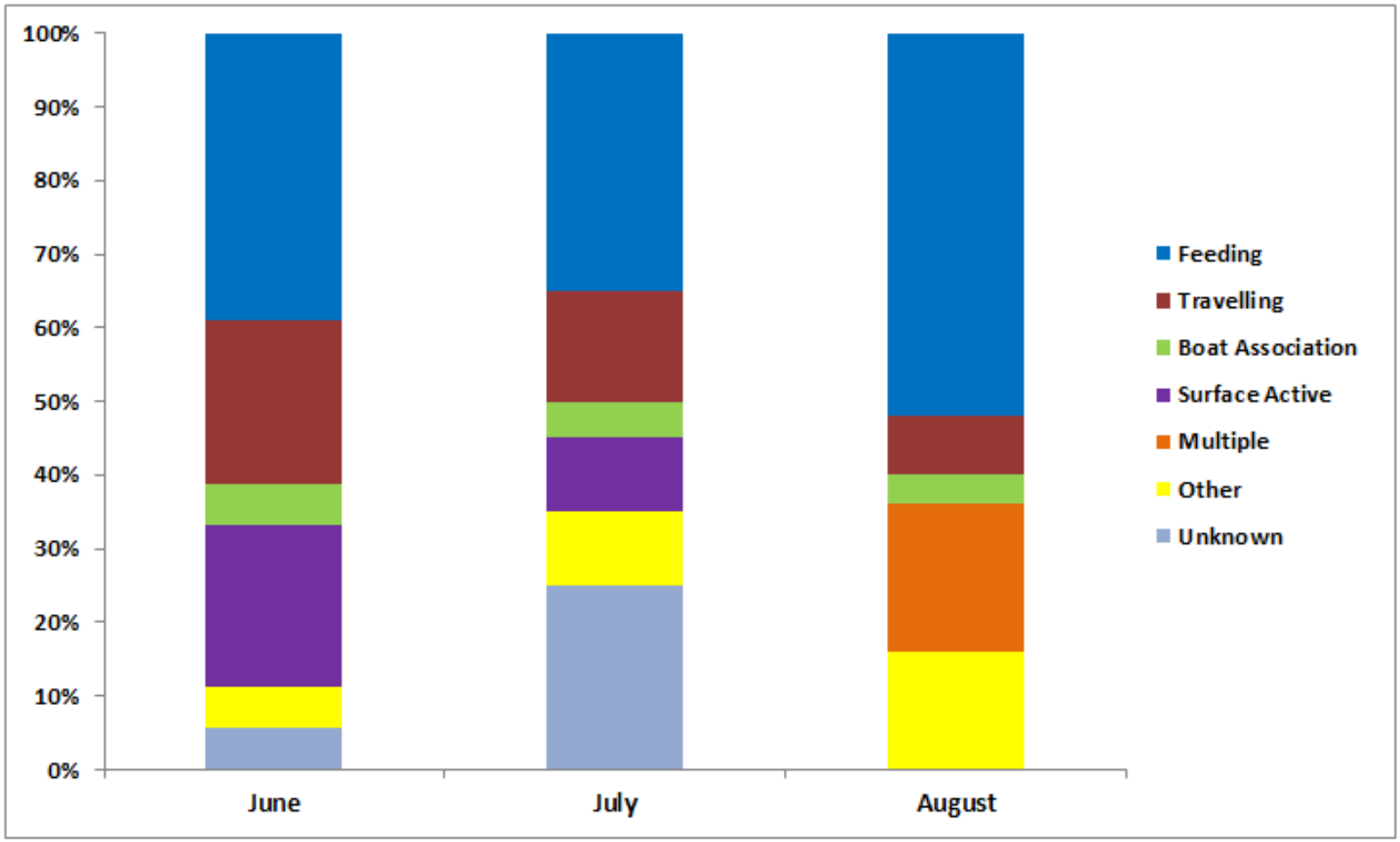


Figure 11. Activity Budget for Dolphin Behaviour June – August 2012

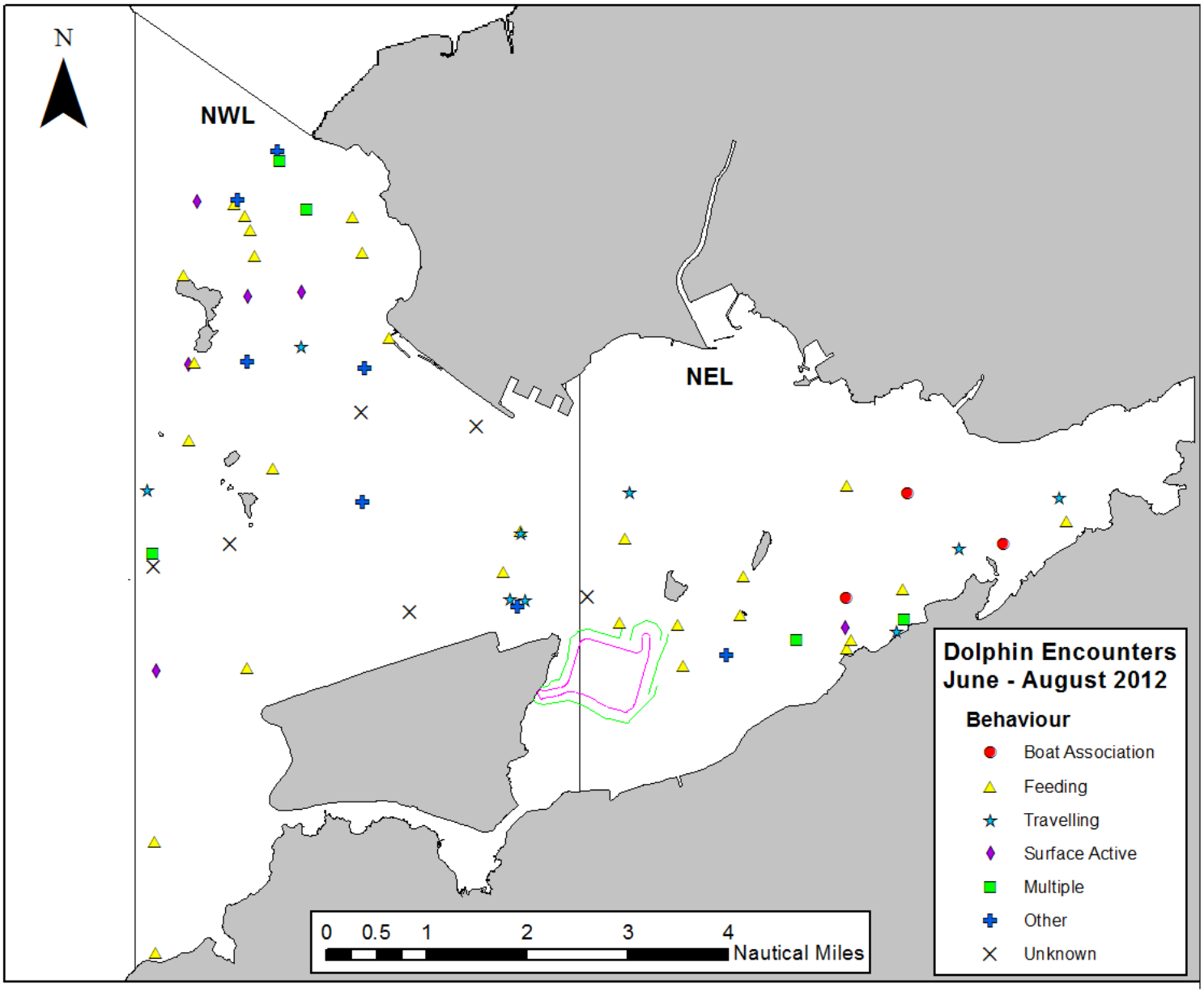


Figure 12. The Location of Different Behavioural Activities June - August 2012

Annex I. Impact Monitoring Survey Schedule and Details (June – August 2012)

Date	Location of Survey	No. Sightings ON	No. Sightings Opp	Total km ON EFFORT (favourable conditions)
12-06-12	NW Lantau	0	1	52.9
13-06-12	NW and NE Lantau	2	0	50.3
14-06-12	NW Lantau	6	1	82.4
15-06-12	NW and NE Lantau	2	1	58.9
20-06-12	NW Lantau	3	2	81.9
25-06-12	NW and NE Lantau	0	0	35.1
10-07-12	NW Lantau	5	1	61.1
11-07-12	NW and NE Lantau	2	1	50.8
12-07-12	NW Lantau	4	1	62.2
16-07-12	NW and NE Lantau	4	1	46.3
17-07-12	NW and NE Lantau	0	1	84.2
20-07-12	NE Lantau	0	0	33.4
05-08-12	NW and NE Lantau	3	0	38.1
06-08-12	NW Lantau	7	1	68.9
14-08-12	NW Lantau	4	2	62.6
15-08-12	NW and NE Lantau	2	1	25.7
16-08-12	NE Lantau	3	1	21.4

Annex II. Impact Monitoring Survey Effort Summary (June – August 2012)

Date	Area	Beaufort	Effort (km)	Season	Vessel	Type
12-06-12	NWL	0	20.5	SUMMER	HKDW	IMPACT
12-06-12	NWL	1	22.4	SUMMER	HKDW	IMPACT
12-06-12	NWL	2	7.2	SUMMER	HKDW	IMPACT
12-06-12	NWL	3	2.8	SUMMER	HKDW	IMPACT
13-06-12	NWL	0	3.2	SUMMER	HKDW	IMPACT
13-06-12	NWL	0	29.4	SUMMER	HKDW	IMPACT
13-06-12	NWL	1	17.7	SUMMER	HKDW	IMPACT
14-06-12	NWL	0	13.7	SUMMER	HKDW	IMPACT
14-06-12	NWL	1	28.1	SUMMER	HKDW	IMPACT
14-06-12	NWL	2	40.6	SUMMER	HKDW	IMPACT
15-06-12	NWL	2	3.2	SUMMER	HKDW	IMPACT
15-06-12	NWL	3	0.2	SUMMER	HKDW	IMPACT
15-06-12	NEL	1	19.1	SUMMER	HKDW	IMPACT
15-06-12	NEL	2	28.6	SUMMER	HKDW	IMPACT
15-06-12	NEL	3	7.8	SUMMER	HKDW	IMPACT
20-06-12	NWL	1	71.8	SUMMER	HKDW	IMPACT
20-06-12	NWL	2	10.1	SUMMER	HKDW	IMPACT
25-06-12	NWL	2	2.3	SUMMER	HKDW	IMPACT
25-06-12	NWL	3	0.3	SUMMER	HKDW	IMPACT
25-06-12	NEL	2	28.5	SUMMER	HKDW	IMPACT
25-06-12	NEL	3	4	SUMMER	HKDW	IMPACT
10-07-12	NWL	1	14.3	SUMMER	HKDW	IMPACT
10-07-12	NWL	2	25.4	SUMMER	HKDW	IMPACT
10-07-12	NWL	3	21.4	SUMMER	HKDW	IMPACT
11-07-12	NWL	2	3.8	SUMMER	HKDW	IMPACT
11-07-12	NEL	1	14.4	SUMMER	HKDW	IMPACT
11-07-12	NEL	2	28	SUMMER	HKDW	IMPACT
11-07-12	NEL	3	4.6	SUMMER	HKDW	IMPACT
12-07-12	NWL	2	29.2	SUMMER	HKDW	IMPACT
12-07-12	NWL	3	33	SUMMER	HKDW	IMPACT
16-07-12	NWL	1	6.1	SUMMER	HKDW	IMPACT
16-07-12	NWL	2	2.8	SUMMER	HKDW	IMPACT
16-07-12	NEL	1	6.5	SUMMER	HKDW	IMPACT
16-07-12	NEL	2	28.8	SUMMER	HKDW	IMPACT
16-07-12	NEL	3	2.1	SUMMER	HKDW	IMPACT
17-07-12	NWL	1	32.3	SUMMER	HKDW	IMPACT
17-07-12	NWL	2	17.6	SUMMER	HKDW	IMPACT
17-07-12	NWL	3	34.3	SUMMER	HKDW	IMPACT

Annex II (con). Impact Monitoring Survey Effort Summary (June – August 2012)

Date	Area		Effort (km)	Season	Vessel	Type
20-07-12	NEL	1	11.4	SUMMER	HKDW	IMPACT
20-07-12	NEL	2	19.6	SUMMER	HKDW	IMPACT
20-07-12	NEL	3	2.4	SUMMER	HKDW	IMPACT
05-08-12	NWL	2	3.4	SUMMER	HKDW	IMPACT
05-08-12	NEL	1	16.8	SUMMER	HKDW	IMPACT
05-08-12	NEL	2	11.6	SUMMER	HKDW	IMPACT
05-08-12	NEL	3	6.3	SUMMER	HKDW	IMPACT
06-08-12	NWL	1	33.6	SUMMER	HKDW	IMPACT
06-08-12	NWL	2	16.6	SUMMER	HKDW	IMPACT
06-08-12	NWL	3	18.7	SUMMER	HKDW	IMPACT
14-08-12	NWL	2	48.3	SUMMER	HKDW	IMPACT
14-08-12	NWL	3	14.3	SUMMER	HKDW	IMPACT
15-08-12	NWL	2	10.3	SUMMER	HKDW	IMPACT
15-08-12	NEL	1	8.3	SUMMER	HKDW	IMPACT
15-08-12	NEL	2	7.1	SUMMER	HKDW	IMPACT
16-08-12	NEL	1	3.4	SUMMER	HKDW	IMPACT
16-08-12	NEL	2	17.5	SUMMER	HKDW	IMPACT
16-08-12	NEL	3	0.5	SUMMER	HKDW	IMPACT

Annex III. Impact Monitoring Sighting Database (June – August 2012)

Date	Sighting	Time	Group Size	Area	Beaufort	PSD*	Effort**	Type	Latitude	Longitude	Season	Boat Association***
12-06-12	293	9:13	1	NWL	1		Opp	Impact	22.26961	113.8705	Summer	No
13-06-12	295	13:32	8	NEL	1	48	On	Impact	22.33502	114.0177	Summer	No
13-06-12	296	14:22	4	NEL	1	46	On	Impact	22.34095	114.0236	Summer	HT
14-06-12	298	10:51	2	NWL	2		Opp	Impact	22.38878	113.8792	Summer	No
14-06-12	299	13:14	2	NWL	2	45	On	Impact	22.38705	113.8783	Summer	No
14-06-12	300	13:43	5	NWL	1	6	On	Impact	22.38384	113.8880	Summer	No
14-06-12	301	14:17	2	NWL	2	29	On	Impact	22.37758	113.8998	Summer	No
14-06-12	302	15:32	1	NWL	2	45	On	Impact	22.39469	113.9073	Summer	No
14-06-12	303	16:55	1	NWL	2.5	19	On	Impact	22.34116	113.9368	Summer	No
14-06-12	304	17:15	4	NWL	2.5	179	On	Impact	22.33135	113.9431	Summer	No
15-06-12	306	14:10	4	NEL	2	72	On	Impact	22.34338	113.9596	Summer	No
15-06-12	307	16:30	2	NEL	1		Opp	Impact	22.32747	114.0040	Summer	No
15-06-12	308	17:30	2	NEL	2	25	On	Impact	22.34468	114.0367	Summer	No
20-06-12	317	9:28	3	NWL	1		Opp	Impact	22.31217	113.8682	Summer	No
20-06-12	320	13:23	3	NWL	1	443	On	Impact	22.38606	113.8818	Summer	No
20-06-12	321	13:54	3	NWL	1.5		Opp	Impact	22.40068	113.8947	Summer	No
20-06-12	322	14:14	1	NWL	1.5	55	On	Impact	22.36292	113.8994	Summer	No
20-06-12	323	16:30	1	NWL	1.5	81	On	Impact	22.35476	113.9341	Summer	No
10-07-12	329	9:48	3	NWL	1	96	On	IMPACT	22.33923	113.8673	Summer	No
10-07-12	330	10:54	8	NWL	1	125	On	IMPACT	22.36949	113.8862	Summer	No
10-07-12	332	12:15	2	NWL	2	200	On	IMPACT	22.36972	113.8789	Summer	No
10-07-12	333	14:16	5	NWL	2	0	On	IMPACT	22.37128	113.8887	Summer	No
10-07-12	334	15:53	1	NWL	3	57	On	IMPACT	22.36310	113.9099	Summer	No
10-07-12	335	16:55	2	NWL	2	NA	Opp	IMPACT	22.32832	113.9547	Summer	No
11-07-12	337	11:12	1	NEL	2	NA	Opp	IMPACT	22.33215	113.9625	Summer	No
11-07-12	338	12:48	1	NEL	2	125	On	IMPACT	22.33027	114.0042	Summer	Sh

Annex III (con). Impact Monitoring Sighting Database (June – August 2012)

Date	Sighting	Time	Group Size	Area	Beaufort	PSD*	Effort**	Type	Latitude	Longitude	Season	Boat Association***
11-07-12	339	13:11	1	NEL	2	300	On	IMPACT	22.33181	114.0090	Summer	No
12-07-12	341	12:00	1	NWL	3	0	On	IMPACT	22.34156	113.8848	Summer	No
12-07-12	343	12:33	1	NWL	2	300	On	IMPACT	22.39619	113.8852	Summer	No
12-07-12	344	14:11	3	NWL	3	192	On	IMPACT	22.34593	113.9092	Summer	No
12-07-12	345	15:01	2	NWL	3	NA	Opp	IMPACT	22.37128	113.9147	Summer	No
12-07-12	346	15:37	1	NWL	2	35	On	IMPACT	22.32699	113.9273	Summer	No
16-07-12	348	9:25	2	NWL	1	NA	Opp	IMPACT	22.33001	113.9359	Summer	No
16-07-12	350	10:31	4	NWL	2	132	On	IMPACT	22.33216	113.9373	Summer	No
16-07-12	351	11:12	4	NEL	1	17	On	IMPACT	22.34746	113.9670	Summer	No
16-07-12	352	12:51	2	NEL	3	51	On	IMPACT	22.32441	113.9786	Summer	No
16-07-12	353	14:09	6	NEL	2	26	On	IMPACT	22.32015	113.9941	Summer	No
17-07-12	359	12:39	3	NWL	1	NA	Opp	IMPACT	22.35541	113.8891	Summer	No
05-08-12	366	15:39	3	NEL	3	200	On	IMPACT	22.35959	113.9981	SUMMER	No
05-08-12	367	16:38	2	NEL	1	643	On	IMPACT	22.34985	114.0063	SUMMER	Sh
05-08-12	368	17:15	1	NEL	2	51	On	IMPACT	22.34270	114.0343	SUMMER	No
06-08-12	370	8:49	4	NWL	2	21	On	IMPACT	22.29030	113.8700	SUMMER	No
06-08-12	371	10:55	2	NWL	2	217	On	IMPACT	22.36673	113.8737	SUMMER	No
06-08-12	372	11:17	2	NWL	2	41	On	IMPACT	22.35758	113.8761	SUMMER	No
06-08-12	373	12:31	3	NWL	1	12	On	IMPACT	22.32930	113.8858	SUMMER	No
06-08-12	374	13:32	3	NWL	1	139	On	IMPACT	22.38779	113.8987	SUMMER	No
06-08-12	375	14:55	1	NWL	1	66	On	IMPACT	22.37762	113.9083	SUMMER	No
06-08-12	376	15:13	1	NWL	2	NA	Opp	IMPACT	22.38396	113.9092	SUMMER	No
06-08-12	377	16:19	2	NWL	1	44	On	IMPACT	22.33101	113.9431	SUMMER	No
14-08-12	382	9:22	11	NWL	2	264	On	IMPACT	22.34678	113.8680	SUMMER	No
14-08-12	383	10:58	6	NWL	2	106	On	IMPACT	22.37565	113.8679	SUMMER	No
14-08-12	386	13:36	1	NWL	2	207	On	IMPACT	22.39030	113.8847	SUMMER	No

Annex III (con). Impact Monitoring Sighting Database (June – August 2012)

Date	Sighting	Time	Group Size	Area	Beaufort	PSD*	Effort**	Type	Latitude	Longitude	Season	Boat Association***
14-08-12	387	13:54	1	NWL	2	47	On	IMPACT	22.39740	113.8863	SUMMER	No
14-08-12	388	14:08	5	NWL	3	NA	Opp	IMPACT	22.39688	113.8926	SUMMER	No
14-08-12	389	16:43	1	NWL	3	NA	Opp	IMPACT	22.33010	113.9384	SUMMER	No
15-08-12	391	14:57	1	NWL	2	NA	Opp	IMPACT	22.31504	113.9641	SUMMER	No
15-08 -12	392	16:02	5	NEL	1	9	On	IMPACT	22.32832	113.9788	SUMMER	No
15-08-12	393	16:46	10	NEL	1	81	On	IMPACT	22.32988	113.9773	SUMMER	No
16-08-12	395	13:07	1	NEL	2	NA	Opp	IMPACT	22.32215	113.9745	SUMMER	No
16-08-12	399	14:14	3	NEL	2	60	On	IMPACT	22.32099	113.9963	SUMMER	No
16-08-12	400	14:19	4	NEL	2	82	On	IMPACT	22.33090	114.0091	SUMMER	No
16-08-12	401	15:01	5	NEL	1	37	On	IMPACT	22.33817	114.0129	SUMMER	No

* **PSD** *Perpendicular Sighting Distance*
**** Opp** A sighting which occurred while not on the transect line **On** A sighting which occurred when on the transect line
***** Boat Association** **Sh** Shrimp Trawler **HT** Hang Trawler

Annex IV. Photo ID Images (June – August 2012)

Table 1. Sightings of Individually Identified Chinese White Dolphin (*Sousa chinensis*) in June – August 2012

Identification Number	Date (YYYY-MM-DD)	Sighting Number	Area Sighted
HZMB 024	2012-06-13	295	NEL
HZMB 025	2012-06-13	295	NEL
HZMB 026	2012-06-13	295	NEL
HZMB 014	2012-06-13 2012-08-06	295 373	NEL NWL
HZMB 027	2012-06-14	299	NWL
HZMB 015	2012-07-10	330	NWL
HZMB 016	2012-07-10	330	NWL
HZMB 017	2012-07-10	330	NWL
HZMB 018	2012-07-10	330	NWL
HZMB 019	2012-07-10	330	NWL
HZMB 020	2012-07-10	330	NWL
HZMB 021	2012-07-10	330	NWL
HZMB 022	2012-07-10	330	NWL
HZMB 023	2012-07-10	330	NWL
HZMB 028	2012-08-06	373	NWL

HZMB Code	HZMB001
AFCD Code	WL46 (FROM 19-05-11)
Name	Ropey
Sex	
Distinguishing features	Partial Removed Fin Spotted
Note	Assumed previously sighted with rope around body causing deep gauge into front dorsal fin – rope cut through fin and partially tore off
Match	RHS

HZMB Code	HZMB002
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	V nick trailing tip dorsal Raised notch mid dorsal darkly pigmented Spotted
Note	

HZMB Code	HZMB003
AFCD Code	NL179 (FROM 02-03-11)
Name	
Sex	
Distinguishing features	Notch near tip dark pigment Square notch Base Pad V nick Deep rakes forward edge Spotted
Note	CHECK LEFT-RIGHT TO CONFIRM WHEN IMAGES AVAILABLE

HZMB Code	HZMB004
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	2 V notch top dorsal Notch mid dorsal Deep rakes lateral Marbled
Note	

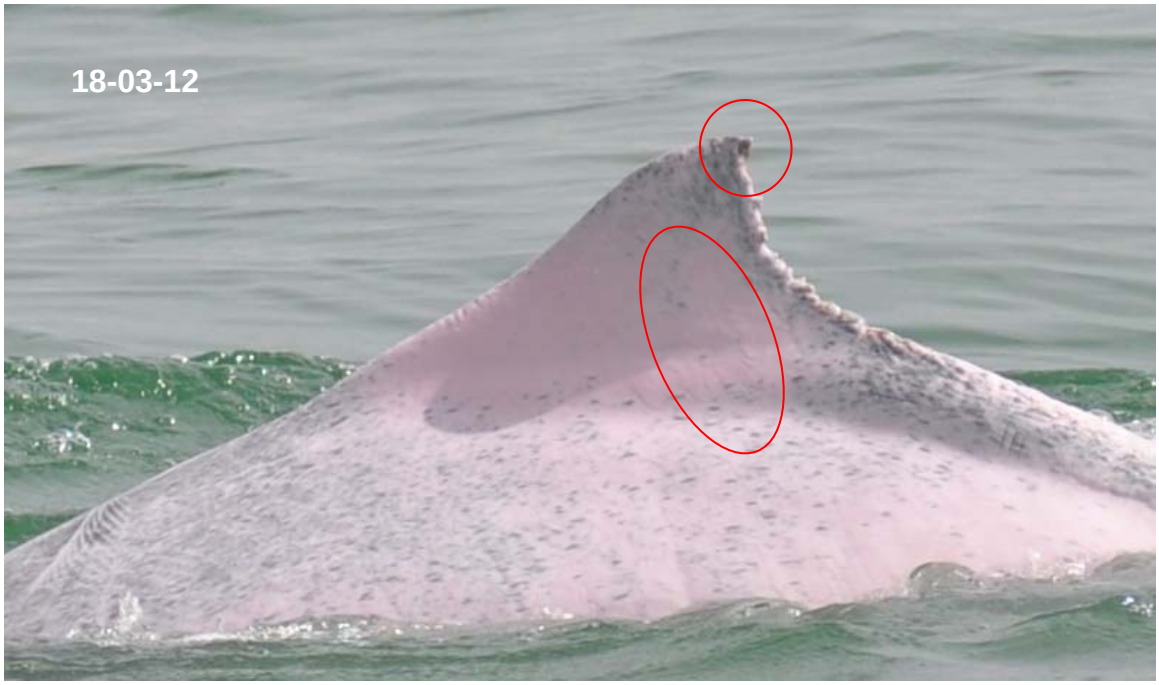
HZMB Code	HZMB005
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	Missing Top Dorsal 2 V nick Spotted
Note	Extensive body rakes
Match	Yes


RESIGHT 06/08/12

HZMB Code	HZMB006
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	2 V nick 1 Square nick 1 V nick Dark frame Spotted
Note	

HZMB Code	HZMB007
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	2 V nick tip dorsal 1 V base dorsal Marbled pink fin Superficial rakes leading edge
Note	

HZMB Code	HZMB008
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	Pigmentation primary: *Trailing edge base V pattern* Raised leading edge Angled Apex
Note	



HZMB Code	HZMB009
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	3 Notches, tip dark pigment V base fin Superficial rakes dorsal lateral Spotted 3 spots lateral line
Note	
Match	

HZMB Code	HZMB011
AFCD Code	EL01
Name	Fat Boab
Sex	
Distinguishing features	Extensive body rakes Dorsal fin raked entire Triangular Fin No Pigment Skin roughened
Note	NOT SIGHTED DURING SAME PERIOD 2011 IN AFCD DATA
Match	RHS

HZMB Code	HZMB 012
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	Rounded nick anterior tip dorsal Superficial rakes mid trailing Marbled grey Dark frame
Note	

HZMB Code	HZMB 013
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	5 Square notch (4 5 pigmented) 1 V nick base dorsal Marbled
Note	

HZMB Code	HZMB014
AFCD Code	NL176 (FROM 02-03-2011)
Name	
Sex	F
Distinguishing features	Nick 3 Notch 0 Scar Pigment spotted
Note	Calf 2012 Apex fin dent
Match	


RESIGHT 06-08-12

HZMB Code	HZMB015
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	Notch 1 (apex) Pigment spotted
Note	Scar (mid base dorsal) Rakes (apex)
Match	

HZMB Code	HZMB016
AFCD Code	CHECKED AGAINST AFCD RHS – NO MATCH
Name	
Sex	
Distinguishing features	Nicks 3 V top to mid Pigment spotted
Note	Rakes (mid to base dorsal)
Match	

HZMB Code	HZMB017
AFCD Code	CHECKED AGAINST AFCD RHS – NO MATCH
Name	
Sex	
Distinguishing features	Nick 2 top and mid dorsal ill defined Pigment spotted
Note	
Match	

HZMB Code	HZMB018
AFCD Code	CHECKED AGAINST AFCD RHS – NO MATCH
Name	
Sex	
Distinguishing features	Nick small ill defined Pigment spotted Dorsal apex rounded
Note	
Match	

HZMB Code	HZMB019
AFCD Code	CHECKED AGAINST AFCD RHS – NO MATCH
Name	
Sex	
Distinguishing features	2 square nicks (mid-dorsal) 2 v-shaped nick (top and mid-dorsal) 1 deep v-shaped nick (base dorsal) Notch mid-dorsal Marbled dorsal edge
Note	
Match	

HZMB Code	HZMB020
AFCD Code	CHECKED AGAINST AFCD RHS – NO MATCH
Name	
Sex	
Distinguishing features	1 square nicks (top dorsal) 4 v-shaped nick (mid- and base dorsal) Marbled dorsal apex
Note	
Match	

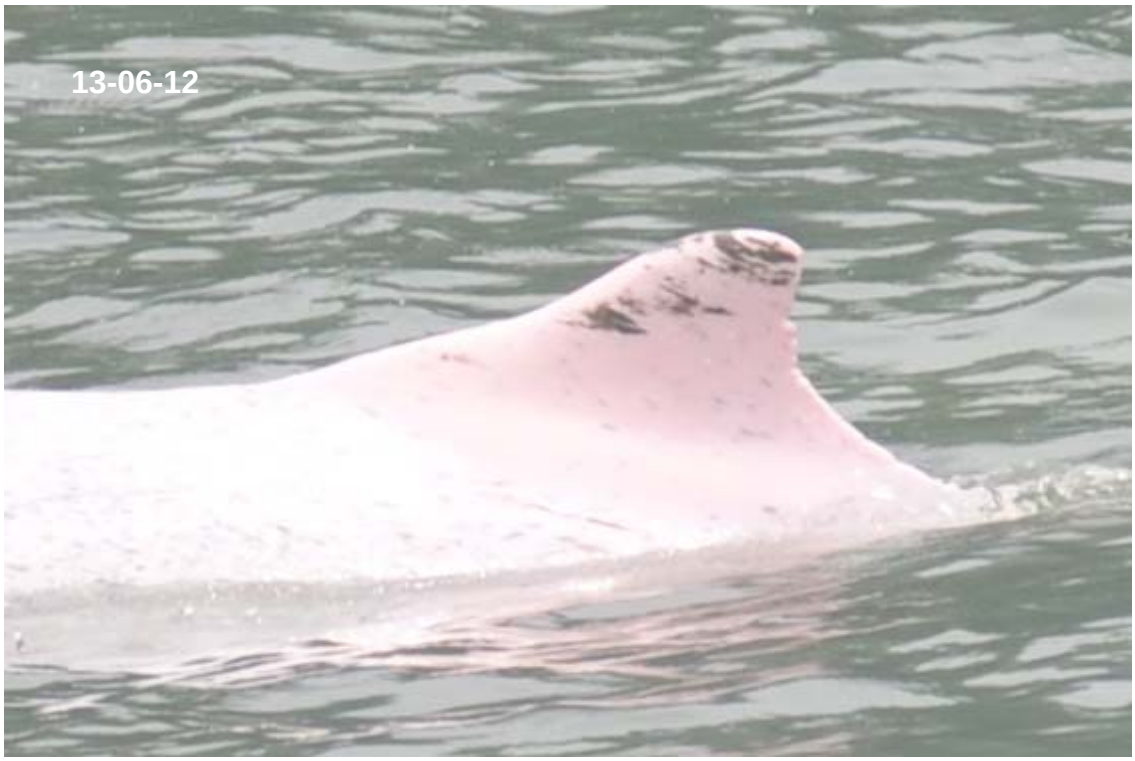
HZMB Code	HZMB021
AFCD Code	NL37 (FROM 02/03/2011)
Name	
Sex	
Distinguishing features	Deep square nick (mid-dorsal) 2 v-shaped nicks (apex) 1 rounded nick above square nick (mid-dorsal) 2 Notches (mid-dorsal above and below square nick) Pigment spotted
Note	
Match	

HZMB Code	HZMB022
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH (see note)
Name	
Sex	
Distinguishing features	Deep V-shaped nick fore dorsal Pigment spotted
Note	Fore Fin – clean slice prop damage or fishing line abrasion. As this visible both LHS and RHS, RHS images from AFCD also checked; no match
Match	

HZMB Code	HZMB023
AFCD Code	CHECKED AGAINST AFCD RHS – NO MATCH (see note)
Name	
Sex	
Distinguishing features	Dorsal fin apex missing Small, rounded nicks along dorsal
Note	Possible match NL202 but baseline image provided is not perpendicular and is out of focus so a positive match cannot be made. Appropriate quality image required
Match	

HZMB Code	HZMB024
AFCD Code	CHECKED AGAINST AFCD RHS and LHS – NO MATCH
Name	
Sex	
Distinguishing features	Nick 0 Notch 0 Scar RHS aft dorsal rakes Pigment spot on grey
Note	
Match	Yes

HZMB Code	HZMB025
AFCD Code	CHECKED AGAINST AFCD LHS – NO MATCH (see note)
Name	
Sex	
Distinguishing features	Nick rounded mid fin Notch Scar Pigment pink Dent fore dorsal fin
Note	This may be NL18 but the image provided in the baseline is not perpendicular and hence cannot be matched accurately. Appropriate image required
Match	



HZMB Code	HZMB026
AFCD Code	CHECK AGAINST AFCD LHS – NO MATCH
Name	
Sex	
Distinguishing features	Nick hald square mid dorsal Notch Scar Pigment spotted
Note	
Match	

HZMB Code	HZMB027
AFCD Code	CHECKED AGAINST AFCD RHS – NO MATCH (see note)
Name	
Sex	
Distinguishing features	Nick: flattened apex dorsal fin (flat cut) Notch: Scar: Pigment:
Note	Damage Possible match NL139 but baseline image provided not perpendicular, out of focus and low resolution. Appropriate quality image required.
Match	

HZMB Code	HZMB028
AFCD Code	CHECKED AGAINST AFCD – NO MATCH (see note)
Name	
Sex	
Distinguishing features	Nick Notch Scar notched trailing edge and spine Pigment spotted
Note	Very rounded apex Possible match NL210 however baseline image provided is in shadow, is out of focus and is low resolution. Appropriate image quality required for positive match
Match	Yes


06-08-12