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## Final Report on Dolphin Conservation along the Coastline of the Thai and Cambodian Border

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**Photo Captions:** Irrawaddy dolphin *Orcaella brevirostris* leaping near the edge of the mangrove forest in the Peam Krasop Wildlife Sanctuary (top left), Indo-Pacific humpback dolphin *Sousa chinensis* spy hopping while preying on fish falling out of a gillnet while it is being pulled up at the mouth of the Old Peam Krasop Channel (top right); Fishers pulling up a fine-mesh gillnet set to catch mackerel with a group of Irrawaddy dolphin foraging nearby (bottom left), bottom trawling vessel operating illegally within one km offshore of the Peam Krasop Wildlife Sanctuary (bottom right).

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## Executive Summary

Between January 2015 and June 2016, with financial support from the Swedish Postcode Lottery, IUCN implemented an 18-month transboundary dolphin conservation project along the coastline of Thailand and Cambodia. The aim of this project was to enhance the protection of the remaining populations of dolphins in their marine habitat along the Thai-Cambodian border. The following research and conservation outcomes were achieved during the project period:

- 1) A Transboundary Marine Mammal Management Committee and a technical working group were established in Koh Kong, Cambodia (see List of Committee members in Appendix 4). These have been functioning beyond the lifetime of the project. A less formal working group was established in Trat Province, Thailand. It will be integrated with the newly formed Provincial Committee on Coastal and Marine Resources Management under the new Marine and Coastal Resources Management Act (2015).
- 2) Eight joint patrols, involving the Peam Krasop Commune Chief, the Peam Krasop Wildlife Sanctuary (PKWS) Director, members of the provincial Fisheries Administration Cantonment (FIAC), Community Fisheries (CFi), local police force, community representatives and IUCN staff, were conducted in Koh Kong, Cambodia, to inform community members about and enforce fishery regulations.
- 3) The Peam Krasop Wildlife Sanctuary (PKWS) Management Plan in Koh Kong, which includes measures on dolphin and habitat conservation, was finalised and forwarded for official adoption by the Cambodia Ministry of Environment.
- 4) Significant progress was made towards establishing Marine Spatial Planning and developing marine protected areas (MPAs) in Trat, Thailand, in synergy with other initiatives that will be continued over the next several years.
- 5) Local dolphin conservation networks were strengthened and expanded on both sides of the border.
- 6) Research was conducted on the status of the dolphins and threats they face with the results shared between the two countries. These results included new information about the status of the dolphins and the threats they face as well as movements of individual across the Cambodia/Thailand border. It also fostered transboundary collaboration between the two countries.
- 7) The technical capacity of stakeholders on both sides of the border and an already existing stranding network was strengthened in Trat, Thailand, through trainings on emergency response for stranded dolphins and conducting dolphin necropsies;
- 8) Awareness was raised on both sides of the border through community meetings and outreach activities. Communication materials were produced and disseminated to communities, government agencies, and NGOs/International Organizations in both countries, in particular a video on the activities of the dolphin project in Cambodia, as well as a dolphin map and stranding posters in both Thai and Khmer languages.
- 9) Best practices for dolphin watching ecotourism were developed and training was given on dolphin watching guidelines to boat drivers and tour operators in Koh Kong, Cambodia, and the Mairoot Sub-district in Trat, Thailand.

## **ACKNOWLEDGMENTS**

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## 1. Background

Between January 2015 and June 2016, with financial support from the Swedish Postcode Lottery, IUCN implemented an 18-month transboundary dolphin conservation project along the coastline of Thailand and Cambodia. The aim of this project was to enhance the protection of the remaining populations of dolphins in their marine habitat along the Thai-Cambodian border. The project targeted the main threats to dolphin populations by working to improve fishing practices and knowledge about dolphin populations and to strengthen local dolphin conservation networks. This report presents the results of the dolphin surveys conducted under this project in Koh Kong Province, Cambodia and Trat Province, Thailand.

An earlier project for *Building Resilience to Climate Change Impacts: Koh Kong Province, Cambodia*, implemented by the IUCN Asia Regional Office, conducted an intensive training course on 23-26 October 2013 for a team of 12 local researchers and natural resource managers on dolphin survey techniques. This training was followed up by two dolphin surveys in the inland channels of the Peam Krasop Wildlife Sanctuary and adjacent coastal waters of Koh Kong Province. The first survey was conducted on 27 October – 7 November 2013. During this survey the team searched along 408 km of systematic trackline. They made six sightings of Irrawaddy dolphins (*Orcaella brevirostris*) with a mean group size of 4.8 individuals and a single sighting of finless porpoises (*Neophocaena phocaenoides*) with a group size of 8-10 individuals. The first survey also searched along 194 km of non-systematic trackline and recorded 13 sightings of Irrawaddy dolphins with a mean group size of 10.7 individuals. During the second survey conducted during 10-16 February 2014, the team covered 332 km of systematic trackline and recorded three sightings of Irrawaddy dolphins with group sizes of one, two, and 10 individuals. They also searched along 150 km of non-systematic trackline and recorded six sightings of Irrawaddy dolphins with a mean group size of 5.5 as well as a single sighting of seven humpback dolphins (*Sousa chinensis*).

During both surveys Irrawaddy dolphins were found most often just offshore the Prek Bak Khlong, Old Peam Krasop, and Lam Dam channel mouths as well as along the northwest coast of Koh Kong Island in waters affected by freshwater outflow from the Trapeang Rong and Tatai Rivers. Although the overall number of Irrawaddy dolphin sightings was low, group sizes were large ranging up to 19 individuals. Group sizes were almost double and sightings much more frequent while following non-systematic tracklines versus systematic tracklines. This can be explained by the fact that the non-systematic searching paths took the survey team more often through the main channels linking inland waters and open seas which are the preferred habitat of Irrawaddy dolphins.

About 3,200 photographs of Irrawaddy and humpback dolphins were taken during these surveys. Fifteen Irrawaddy dolphins were identified from distinctive marks on their dorsal fins. Seven of these individuals were re-identified on one or two occasions. A minimum abundance estimate of 36 Irrawaddy dolphins (95% CI=24-48) was generated from the number of identified individuals plus the estimated number of unmarked individuals. Only two humpback dolphin individuals were identified from dorsal fin marks during a single sighting of the species made during the second survey.

These surveys indicated that the clumped distribution of the dolphins in the mouths of channels leading in and out of the mangrove forest offers key opportunities for conservation management in terms of taking a zoning approach to fisheries that threaten the dolphins due to accidental entanglements and for developing ecotourism which includes a strong component on dolphin watching. One of the

recommendations that emerged from the surveys was that additional photo-identification effort be conducted and that a photo-catalogue of Irrawaddy and humpback dolphins be compiled to estimate abundance and movements of individuals identified in the Koh Kong Province, Cambodia, and that this catalogue should be compared with a photo catalogues compiled by researchers from the Department of Marine and Coastal Resources along coast of the Trat Province in Thailand.

As part of the present project for *Dolphin Conservation along the Coastline of Thai and Cambodian Border* the IUCN Asia Regional Office, with technical support from cetacean expert Brian D. Smith from the Wildlife Conservation Society (WCS), conducted an additional training workshop and survey focused on:

- (1) Further developing the photo-catalogue mentioned above;
- (2) Obtaining additional information on the fine-scale distribution of coastal dolphins to identify priority areas for establishing dolphin management zones for focused protection from entanglement in fishing gears; and
- (3) Assessing the potential for integrating dolphin watching into an ecotourism programme that supports dolphin conservation and the livelihoods of local fishermen whose activities may be affected by the establishment of dolphin management zones.
- (4) Monitoring stranded dolphins and providing recommendations to further investigate the causes of death and ensure effect interventions to protect populations.

## **2. Training**

On 10 November 2015, IUCN conducted a training programme for 12 local Cambodian researchers and natural resource managers on population assessment techniques for coastal dolphin populations and on integrating ecotourism into dolphin conservation (Appendix 1). Several of the participants in this training programme also participated in the training programme convened by IUCN in October 2013. The emphasis of the dolphin assessment component of the training was to review the methods used and results obtained during the earlier dolphin surveys conducted in Koh Kong during October-November 2013 and February 2014, and to learn about photo-identification techniques for Irrawaddy and humpback dolphins for use during the present study. On 11 November 2015, the team conducted a practice survey which recorded four sightings of Irrawaddy dolphins and took a total of 11,312 photographs.

In close collaboration with a veterinarian team from the Department of Marine and Coastal Resources (DMCR), Thailand, the project also supported four stranding network trainings in Trat and Koh Kong from July to September 2015 to improve data collection and strengthen responses to reports of dolphin mortalities. Marine mammal rescue guidelines developed by DMCR were translated to Khmer and distributed among the local community in Koh Kong.

Training on the use of a GPS and simple data collection on dolphins was given to local communities members in the Trat Bay area. These community members then participated in a transboundary survey on 6-8 October 2015. The project also supported three DMCR veterinarians from Eastern Research Centre to participate in dolphin a necropsy training led by Dr. Frances Gulland of the Marine Mammal Center in San Francisco, USA, which was organized by WWF Cambodia in Kratie Province, Cambodia from 14-16 March 2016.



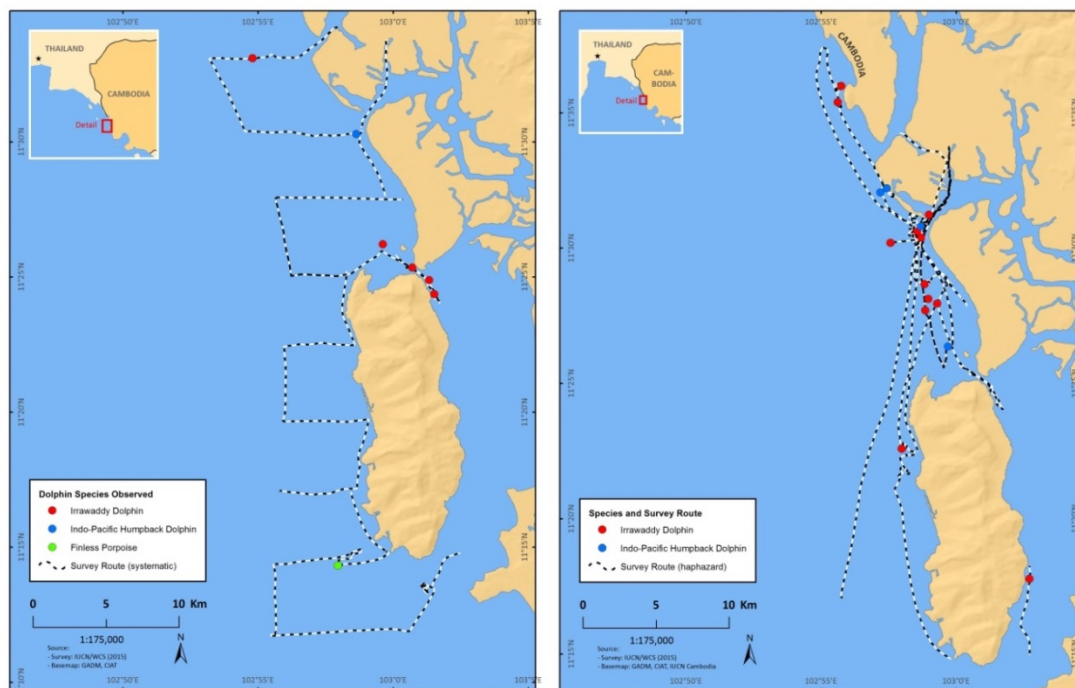
### 3. Research

#### Dolphin survey in Koh Kong, Cambodia

##### *Searching effort and dolphin sightings*

During 12-16 November 2015, the survey team searched along 150.4 km of systematic trackline extending 5-9 kilometres from the shore and to a maximum depth of 30.9 m (mean=15.8; standard deviation=7.5). Sighting conditions were generally good with an average Beaufort sea state of 1.6 (SD=1.0, range=0-4). While following systematic tracklines that provided representative coverage of the coastal waters of Koh Kong Province offshore the Peam Krasop Wildlife Sanctuary, the team made five sightings of Irrawaddy dolphins with a mean group size of 6.7 (SD=7.8, range=1-19), one sighting of Indo-Pacific humpback dolphins with an estimated group size of 6-7 individuals, and one sighting of finless porpoises with an estimated group size of nine individuals (Figure 1).

The team also searched along 226 km of non-systematic search effort while travelling to and from the tracklines and searching where the team thought they were most likely to encounter dolphins. During non-systematic search effort the team made nine sightings of Irrawaddy dolphins with a mean group size of 7.0 dolphins (SD=4.4, range=1-13) and four sightings of Indo-Pacific humpback dolphins with a mean group size of 7.5 individuals (SD=4.8, range=3-13). Similar to the results of the 2013/2014 surveys summarized above, Irrawaddy dolphins sightings were concentrated near channel mouths. A similar situation was documented during this survey for Indo-Pacific humpback dolphins (Figure 1).



**Figure 1.** Map of systematic (left) and non-systematic (right) tracklines and sightings of Irrawaddy dolphins (red), Indo-Pacific humpback dolphins (blue) and finless porpoises (green).

### *Environmental conditions*

Environmental conditions including depth, temperature and salinity were recorded during each sighting. For all 14 sightings of Irrawaddy dolphins the mean temperature was 30.1°C (SD=0.6, range=29.4-30.9); mean depth was 7.5m (SD=2.4, range=3.7-11.4); and mean salinity was 27.9 ppt (SD=2.7, range=23.0-31.0). For all five sightings of Indo-Pacific humpback dolphins the mean temperature was 30.0°C (SD=0.7, range=29.3-31.0); mean depth was 3.4 m (SD=1.2, range=2.3-4.9); and mean salinity was 27.4 ppt (SD=0.9, range=26.0-28.0). For the single sighting of finless porpoises temperature was 30.1°C, depth was 21.1m, and salinity was 28 ppt.

### Photo-identification and minimum abundance estimates

#### *General procedures*

Each photograph that contained one or more dorsal fin images was evaluated according to quality. Quality was considered poor if the image of the dorsal fin was insufficiently clear for identifiable marks to be discerned. These photographs were removed from the photo-database. Sharpness/focus, contrast/lighting and angle of the fin in relation to the camera were considerations that were used for deciding on the quality of the picture. A careful record was kept of the total number of good quality photographs with marks on the dorsal fin that would allow the dolphin to be identified and the total number of good quality photographs without marks on the dorsal fin. The proportion of marked fin images compared with number of the unmarked fin images were then used to estimate the proportion of unmarked individuals in the population.

Cropped images of each identifiable dorsal fin were then extracted. After photo-editing we ended up with Windows folders containing the dorsal fin images for each sighting. Individuals were identified according to marks on their dorsal classified according to type and their location (Table 1). These categories were assigned to each individual in the data base using the ACDSee software.

**Table 1.** Criteria used to categorize dorsal fins of Irrawaddy and humpback dolphins according to mark types and their location.

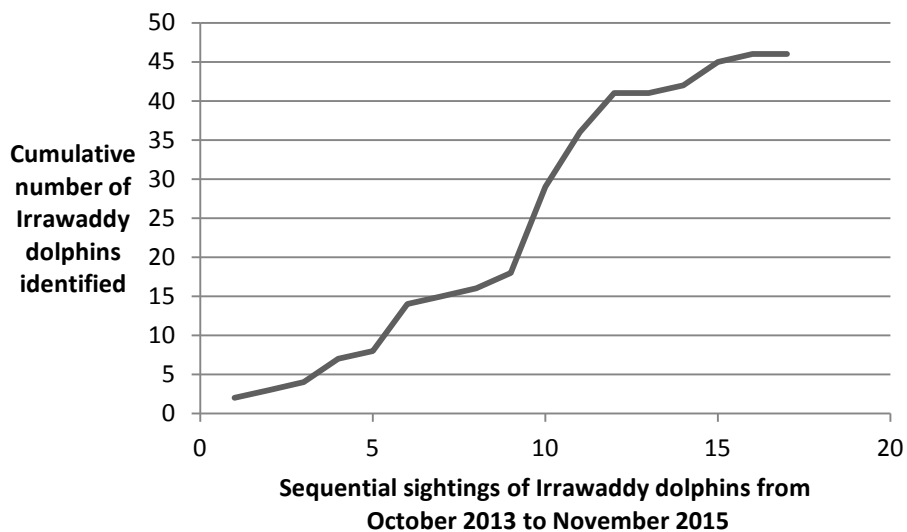
<b>Mark Type</b>	<b>Location on dorsal fin or body</b>
Nicks (mark whose opening is 1/10 <sup>th</sup> or smaller of the straight fin height)	Trailing edge top third, middle third, bottom third, tip or leading edge for humpback dolphins; and trailing edge top half, bottom half, tip or leading edge
Notches (mark whose opening is greater than 1/10 <sup>th</sup> to 1/5 <sup>th</sup> of the total straight fin height)	Ibid
Gouge (mark whose opening is greater than 1/5 <sup>th</sup> to 1/3 <sup>rd</sup> of the total straight fin height)	Ibid
Large fin wound (opening that covered more than 1/3 <sup>rd</sup> the total straight fin height)	Trailing edge or leading edge
Dorsal fin bend	Dorsal fin tip
Body wound	Anterior of dorsal fin tip or posterior of dorsal fin
Suspected shark bite	Dorsal fin, anterior of dorsal fin tip, posterior of dorsal fin
Parasite	Ibid

### *Koh Kong Province, Cambodia*

During 10 sightings of Irrawaddy dolphins and five sightings of Indo-Pacific humpback dolphins in Koh Kong Province, Cambodia, the survey team took 5,980 and 5,254 photographs of each species, respectively. These photographs were processed and analysed to add to the photo-id catalogues of 15 Irrawaddy dolphin and two Indo-Pacific humpback dolphin individuals identified during surveys conducted in October and November 2013 and February 2014.<sup>1</sup>

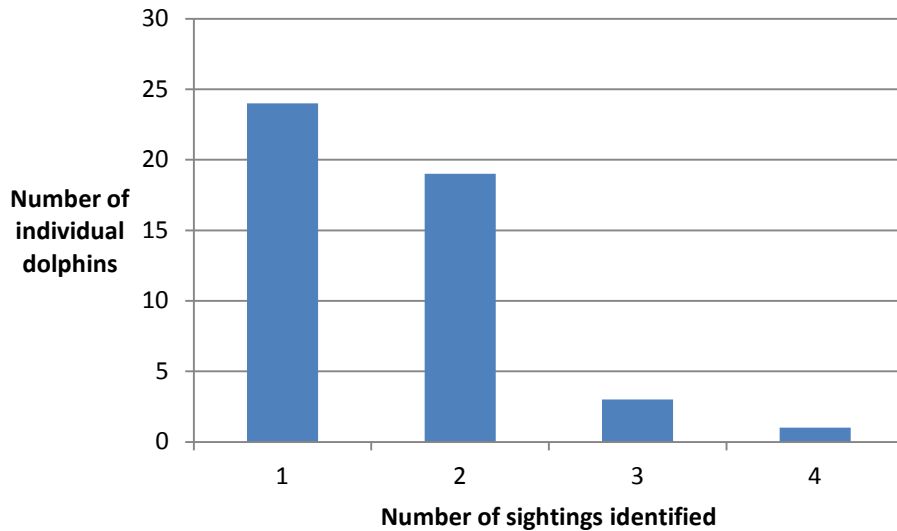
Of the total number of dorsal fin photographs of Irrawaddy dolphins taken during 17 sightings made between 27 October 2013 to 16 November 2015, 256 were considered as good quality (i.e., image clear enough so that distinguishing marks could be discerned). From the good quality photographs, 46.9% had no marks that could be used to reliably identify individuals. Using the remaining 136 good quality photographs of dorsal fins with marks, 47 individuals were identified.

During the study, only 17% of photo-identified individuals were identified during both years; 17% were identified only in year one (October 2013 to February 2014 – 2 sightings); and 66% were identified only in year two (November 2015 – 10 sightings). The increasing trend in a discovery curve of the cumulative number of identified individuals (Figure 2) and the low number of re-identifications (51.1% were identified only during a single sighting, 40.4% during two sightings, 6.4% during three sightings, 2.1% during four sightings, and 0% during more than 4 sightings – Figure 3) indicates that the actual size of the Irrawaddy dolphin population is larger than the 47 individuals identified.



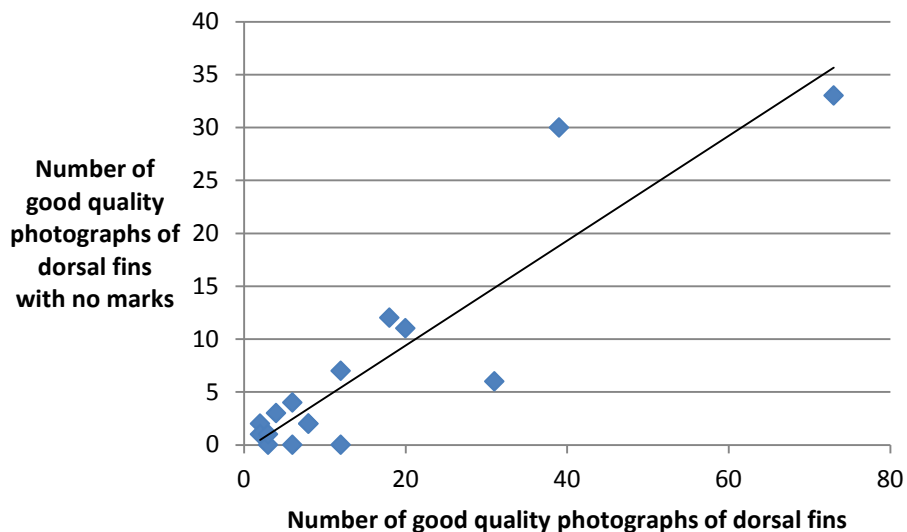
**Figure 2.** Discovery curve of newly identified Irrawaddy dolphins during 17 sightings in the near shore waters of Koh Kong, Cambodia.

<sup>1</sup> Smith, B.D., Kong, S. and Saroeun, L. 2014. *Conservation status and the use of Irrawaddy dolphins as a flagship species for climate adaptation in the Peam Krasop Wildlife Sanctuary, Cambodia. Report to the European Union Project for Building Coastal Resilience to Climate Change Impacts in Southeast Asia.*



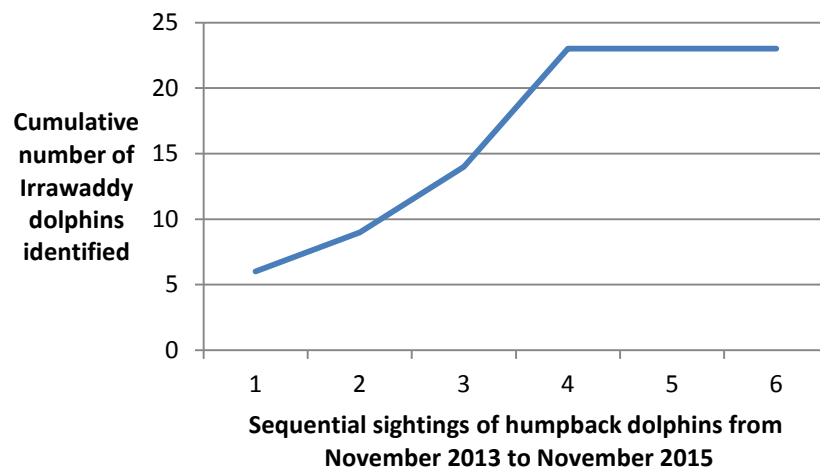
**Figure 3.** Frequency distribution of the number of sightings that Irrawaddy dolphin individuals were identified in the near shore waters of Koh Kong, Cambodia.

Re-identification rates were too low to generate an estimate of abundance using a mark-recapture or mark-resight model. However, an estimate of minimum population size was calculated according to the number of identified individuals (47) corrected for the proportion of unmarked individuals (46.9% or 0.469). This resulted in a corrected estimate of 69 individuals with a 95% confidence interval (CI) of (53-85). The 95% CI was calculated according to the standard error of a linear regression (8.14) of unmarked good quality images of dorsal fins versus the total number of dorsal fin images recorded during each sighting ( $R=0.907$ ,  $P<0.001$ ) (Figure 4).

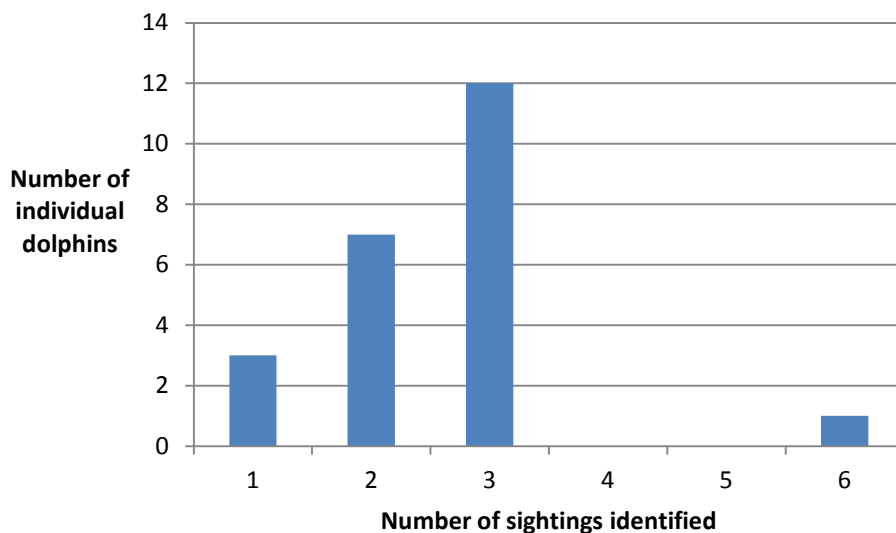


**Figure 4.** Linear regression of the number of good quality photographs of Irrawaddy dolphin dorsal fins and the number of good quality photographs of Irrawaddy dolphin dorsal fins with no marks in Koh Kong, Cambodia.

Of the total number of dorsal fin photographs of humpback dolphins taken during six sightings made between 12 February 2014 to 16 November 2015, 306 were considered good quality and 25.5% of these had no marks that could be used to reliably identify individuals. From the remaining 228 dorsal fin photographs with marks, 23 individuals were identified. Of the total number of photo-identified individuals, 21.7% were identified during both years of the study. Only a single individual was identified only in year one (1 sighting) while 73.9% were identified only in year two (5 sightings). The increasing trend in a discovery curve of the cumulative number of identified individuals (Figure 5) and the low number of re-identifications (Figure 6) indicate that the actual size of the humpback dolphin population in Koh Kong is greater than the 23 identified individuals. It should be noted the apparent flattening out of the discovery curve in sightings 4-6 can be explained by the fact that all three sightings occurred during different times of the same day.

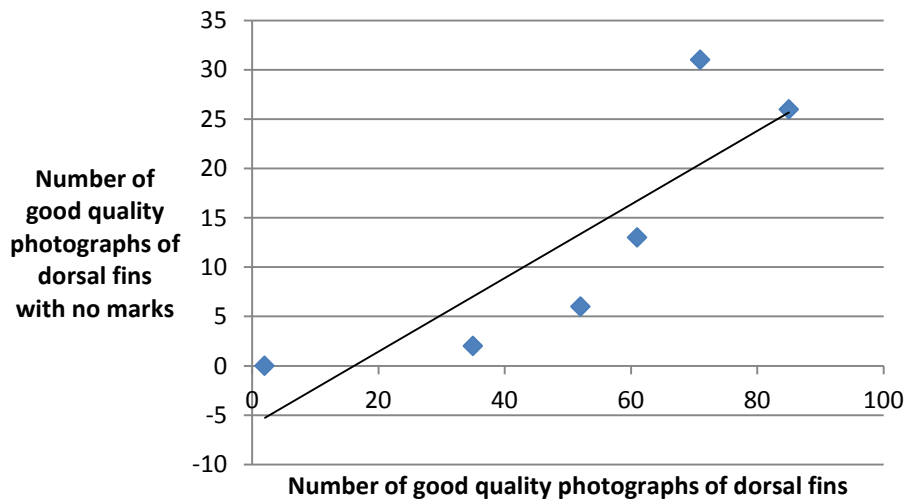


**Figure 5.** Discovery curve of newly identified humpback dolphins during six sightings in the near shore waters of Koh Kong, Cambodia.



**Figure 6.** Frequency distribution of the number of sightings of humpback individuals were identified in the near shore waters of Koh Kong, Cambodia.

Similar to the Irrawaddy dolphin population, re-identification rates were too low to generate a credible estimate of abundance for humpback dolphins. However, using the same technique described above for Irrawaddy dolphins, a minimum abundance estimate of 29 humpback dolphins (95% CI = 29-57) was calculated according to the standard error (17.4) of a linear regression ( $R=0.849$ ,  $P=0.033$  – Figure 7) of unmarked good quality images of dorsal fins versus the total number of dorsal fin images recorded during each sighting.



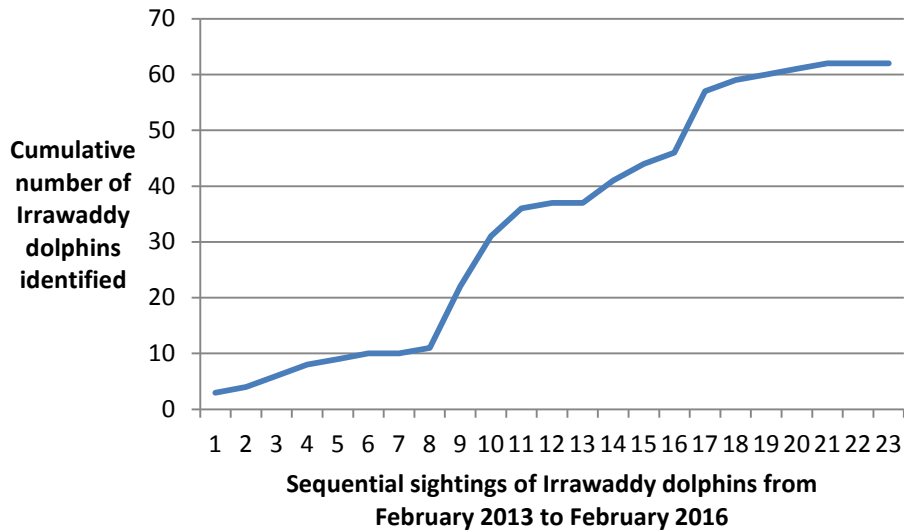
**Figure 7.** Linear regression of the number of good quality photographs of humpback dolphin dorsal fins and the number of good quality photographs of humpback dorsal fins with no marks in coastal waters of Koh Kong, Cambodia.

#### *Trat Province, Thailand*

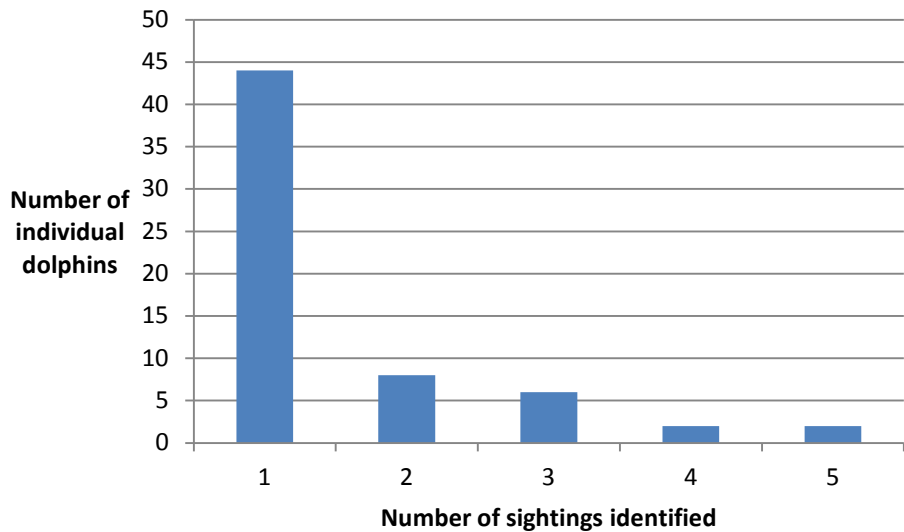
In addition to conducting dedicated surveys in Koh Kong, Cambodia, we provided technical support for compiling a photo-identification catalogue and conducting a preliminary analysis of Irrawaddy and humpback dolphin photographs taken by Thailand’s Department of Marine and Coastal Resources (DMCR) in coastal waters of Trat Province, Thailand, which is contiguous with the Koh Kong study area.

Of the total number of dorsal fin photographs of Irrawaddy dolphins taken in the Trat Province during 21 sightings made between 14 February 2013 and 19 February 2016, 1,253 were considered good quality with 50.0% exhibiting no marks that could be used to reliably identify individuals. From the remaining 627 dorsal fin photographs with marks, 62 individuals were identified. Only two dolphins or 3.2% were identified in more than one year and only 32.3% were identified during more than one sighting. Similar to the situation in Koh Kong, an increasing trend in the discovery curve of the cumulative number of identified individuals (Figure 8) and the low number of re-identifications (Figure 9) in Trat indicate that the actual size of Irrawaddy dolphins is larger than the 62 individuals identified.



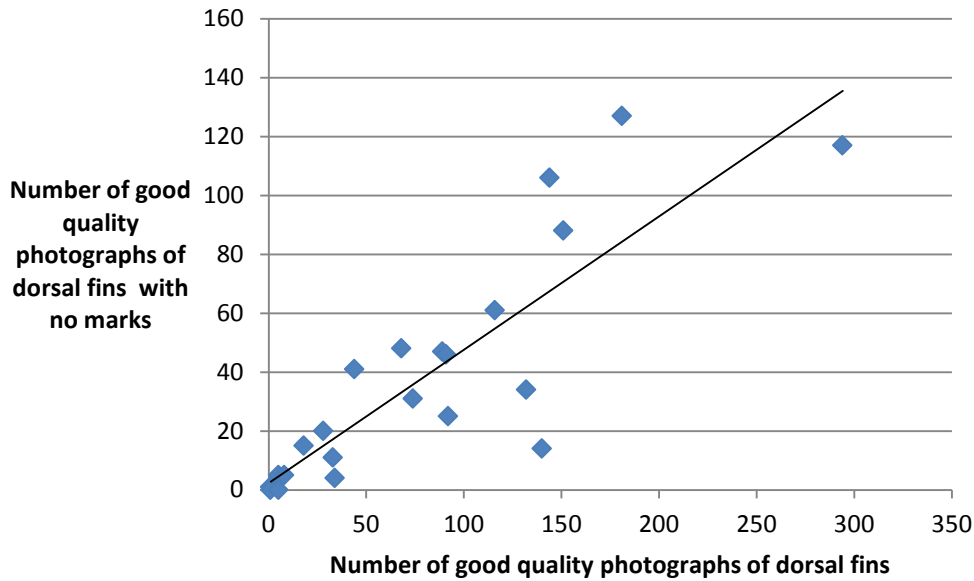


**Figure 8.** Discovery curve of newly identified Irrawaddy dolphins during 23 sightings in the near shore waters of Trat Province in Thailand.



**Figure 9.** Frequency distribution of the number of sightings of humpback dolphin individuals that were identified in the near shore waters of the Trat Province, Thailand.

Also similar to the situation in Koh Kong, re-identification rates were too low to generate a credible estimate of abundance using a mark-recapture (or mark-resight) model. However, a minimum estimate of 88 Irrawaddy dolphins (95% CI = 59-164 calculated according to the standard error (38.7) of a linear regression ( $R=0.859$ ,  $P<0.001$  – Figure 10) of unmarked good quality images of dorsal fins versus the total number of dorsal fin images recorded during each sighting) was generated for the population occupying the near shore waters of Trat during the study period.

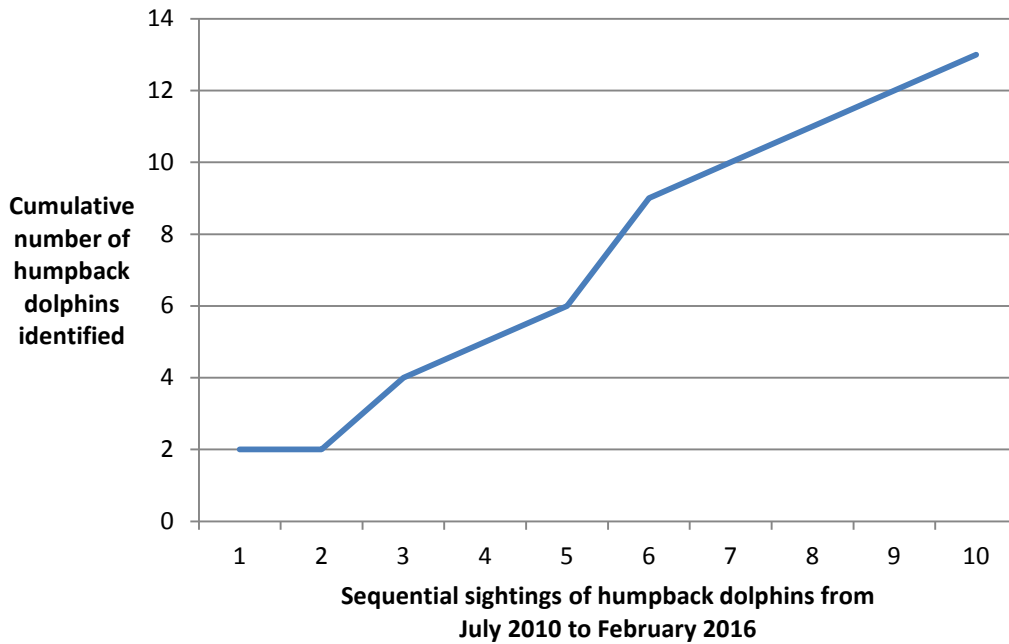


**Figure 10.** Linear regression of the number of good quality photographs of Irrawaddy dolphin dorsal fins and the number of good quality photographs of Irrawaddy dolphin dorsal fins with no marks in coastal waters of the Trat Province, Thailand.

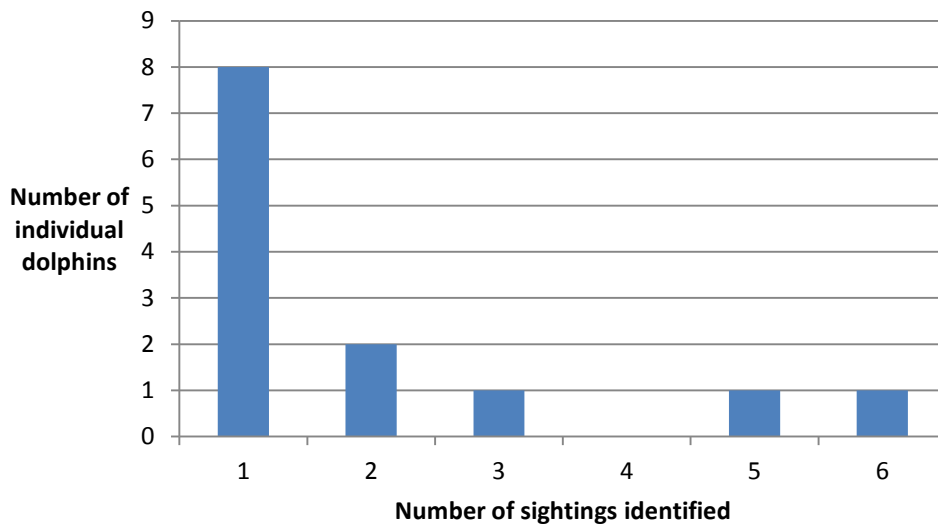
Of the total number of dorsal fin photographs of humpback dolphin taken during surveys in Trat, during 10 sightings made between 29 July 2010 and 18 February 2016, 1,030 were considered as good quality and 5.1% of these had no marks that could be used to reliably identify individuals. From the remaining 978 dorsal fin photographs with marks, 13 individuals were identified. Of the total number of photo-identified individuals, none were identified during all five years that humpback dolphins were sighted (2010 – three sightings, 2011 – one sighting, 2014 – two sightings, 2015 – three sightings, and 2016 – one sighting), 15.4% were identified during four and three years, respectively, 30.8% were identified during two years and the remaining 38.5% were identified only during a single year.

Again, similar to the situation in Koh Kong, an increasing trend in the discovery curve of the cumulative number of identified humpback dolphin individuals (Figure 11) the low number of re-identifications (61.5% during only a single sighting, 15.4% during two sightings, a single individual identified during three sightings, five and six sightings, and no individuals during four and more than 6 sightings – Figure 12), indicate that the actual size of the humpback dolphin population is larger than the 13 identified individuals.

Similar to Irrawaddy dolphins, re-identification rates were too low for a credible estimate of abundance to be generated using a mark-recapture or mark-resight model. However, according to the photo-identification catalogue there are at least 13 individuals in the population. No correction was made for the proportion of unmarked individuals due to the low proportion of unmarked photographs of dorsal fins in the data set (5%).



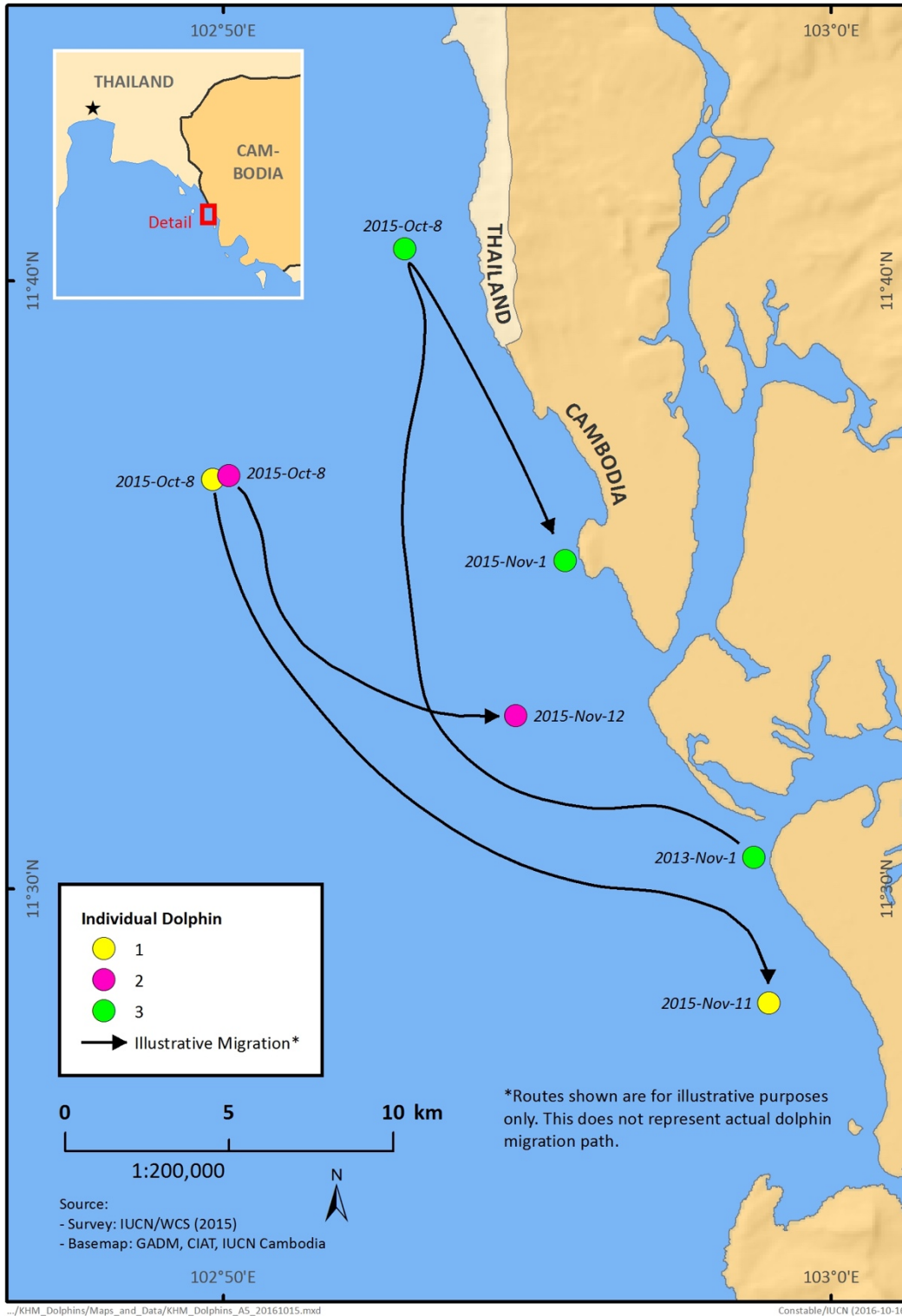
**Figure 11.** Discovery curve of newly identified humpback dolphins during 10 sightings in the nearshore waters of the Trat Province, Thailand.



**Figure 12.** Frequency distribution of the number of sightings of individual humpback dolphins that were identified in the nearshore waters in the Trat Province, Thailand.

*Comparison between photo-catalogues from Koh Kong and Trat*

From photo-identification catalogues for Koh Kong and Trat, three matches were made of Irrawaddy dolphins occurring on both sides the Cambodian and Thai sides of the border. The distances and time between sightings on both sides of the border were 35 days and 10.0 km, 34 days and 22.9 km, 39 days and 10.7 km for the dolphins shown on the top, middle, and bottom in Figure 14, respectively. No matches were made between photo-id catalogues for humpback dolphins in Koh Kong and Trat.



**Figure 13.** Map of sightings of three Irrawaddy dolphin individuals that were found on both sides of the border in Koh Kong, Cambodia and Trat, Thailand

### Cambodia

OB27 – 12 Nov 2015  
N11.55162, E102.91346



### Thailand

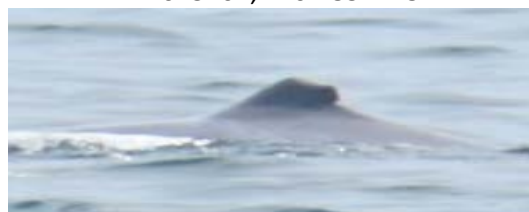
OB21 – 8 Oct 2015  
N11.613162, E102.834778



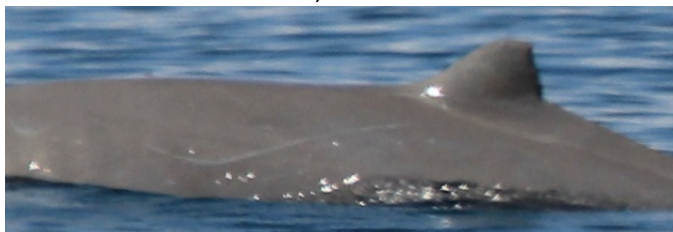
OB05 – 11 Nov 2015  
N11.46869, E102.98291



OB19 – 8 Oct 2015  
N11.613162, E102.834778



OB35 – 16 Nov 2015  
N11.58981, E102.92703



OB16 – 8 Oct 2015  
N11.6752, E102.883063



**Figure 14.** Photographs of the dorsal fins of three Irrawaddy dolphin individuals that were found on both sides of the border in Koh Kong, Cambodia (left) and Trat, Thailand (right) with information on their individual identification numbers in their respective photo-identification catalogue and the geographic positions where the photographs were obtained.

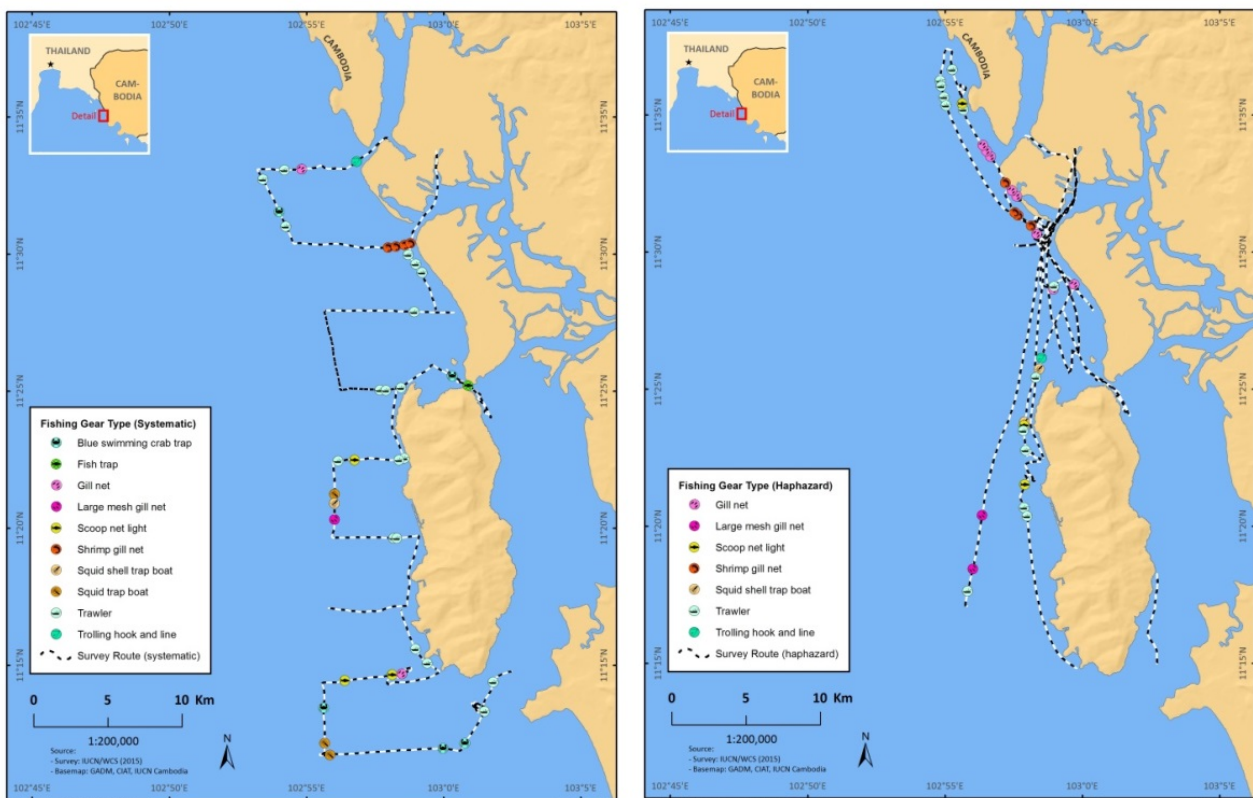
#### 4. Fishing vessels and gears

During systematic and haphazard searching effort for dolphins the survey team kept a detailed record of fishing vessel and gear sightings (Figure 15). Fishing gears and vessels were identified with the help of a local fisherman who was a member of our survey team.

The most commonly encountered fishing gear recorded during 40 sightings of 54 fishing vessels while following systematic transect lines was trawlers (48.5%) followed by scoop net light, shrimp gill net and squid shell trap comprising 9.1% each of the total fishing vessel and gear encounters. All gill nets together, including shrimp gill nets, gill nets of unidentified mesh size and large-mesh gill nets, which present the greatest risk of entanglement to coastal dolphins, comprised 15.1% of encounters. The small sample size of gears recorded during a single survey does not allow for a rigorous inference to be made on distribution patterns. However, the occurrence of all three types of gillnets at channel mouths, which is the preferred habitat of both Irrawaddy and humpback dolphins, is reason for concern. The large proportion of trawlers

may also be cause for concern in terms of the potential for overfishing and habitat degradation especially if they are setting their nets on the bottom. According to the total number of gears (19,441) the majority of those recorded were blue swimming crab traps (74.3%) followed by squid shell trap (24.3%). These gears are of lesser concern for coastal dolphins although if set in particularly high densities in areas of primary dolphin occurrence (e.g., river mouths) could displace the animals from their priority habitat. Also, the death of an Irrawaddy dolphin attributed to entanglement in a squid shell trap means that at least in some circumstances dolphins can be killed by these gears.

Similar to the systematic transect lines the most commonly encountered fishing gear recorded during 33 sightings of 74 fishing vessels while following haphazard or non-systematic transect lines was trawlers (39.4%). However, gill nets of underdetermined mesh size comprised 24.2% of all encounters and all gill net types combined totalled 42.4% encounters. This can almost certainly be explained by the positively biased survey coverage in river mouths while travelling to and from the beginning and end points of the systematic transect lines. This reinforces concern about the potential for dolphin entanglements in these nets along the coast of Koh Kong. According to the total number of gears (12,040) the vast majority of those recorded (99.7%) were squid shell traps. As mentioned above these gears are of lesser concern for coastal dolphins although if set in particularly high densities could displace the animals from their priority habitat and at least one entanglement in this gear type has recorded.

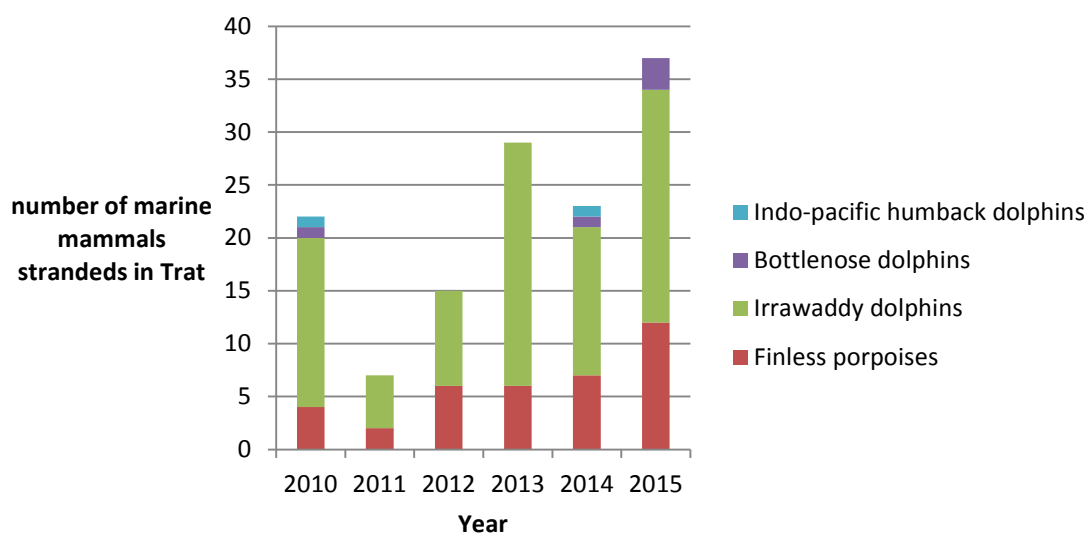


**Figure 15.** Maps of systematic transect lines (left) and haphazard transect lines (right) followed during dolphin survey of the coastal waters of Koh Kong with the locations of fishing vessels and gears observed during the survey classified according to type.



## 5. Dolphin mortality

From an examination of 112 dolphins found stranded in Trat Bay, Thailand from February 2010 to March 2015 (Figure 16), 86.6% were in advanced stages of decomposition. The remaining 15 carcasses (11 Irrawaddy dolphins, 3 finless porpoises, and one bottlenose dolphin) were necropsied by DMCR. The cause of death was reported to be entanglement in fishing gears (40.0% – surrounding net, gill net and squid trap). An additional four Irrawaddy dolphins were found dead with a rope wrapped around their flukes, which may indicate possible fishery interactions. This would increase the percentage of entanglement in fishing gears to 66.7%. Two finless porpoises and one bottlenose dolphin died from unidentified sickness (20.1%); one finless porpoise died from ingestion of garbage (6.3%); and one Irrawaddy dolphin (whose cause of death was unknown) was found carved into pieces (DMCR 2015). As mentioned above, training and technical support was given by IUCN to the DMCR-led dolphin stranding network and necropsy program. This supported data collection and strengthened capacity of the dolphin stranding network in 2015 and 2016.



**Figure 16.** Number of stranded marine mammals in Trat province, Thailand during February 2010 – December 2015 (data from DMCR)

## 6. Dolphin watching tourism

The emphasis of the ecotourism component was to review approaches for incorporating well-managed dolphin watching into ecotourism so that that the animals and environment are not harmed by the activity and so that it benefits local livelihoods and builds constituencies for dolphin conservation. IUCN with Wild Encounter Thailand, a leading tourism operator who specializes in responsible wildlife tourism, organized a whale/dolphin-watching ecotourism development workshop from 19-21 October 2015. The workshop included 18 participants from Trat and six participants from Cambodia. It included general background on marine mammal tourism and best practices for community-based ecotourism development and directed discussions on tailoring approaches that have worked well elsewhere around the globe to the situation of dolphins in Trat. As part of the workshop, participants discussed action points to further develop community-based ecotourism activities in Trat and Koh Kong.

## 7. Transboundary cooperation

The ultimate goal of the transboundary dolphin project is to bring Thailand and Cambodia together in a partnership to develop transboundary Marine Protected Areas (MPAs) for dolphin conservation. Transboundary cooperation was emphasized from the beginning with a Transboundary Multi-Stakeholder Meeting for Dolphin Conservation on 29 July 2015 in Trat involving all key organizations in Thailand and Cambodia with a total of 66 participants and chaired by the Governor of Trat (see List of Participants in Appendix 2). Knowledge sharing was organized during field visits, collaborative community forums, and a joint dolphin training and survey from September 2015 to March 2016. Transboundary cooperation was further formalized with the First Transboundary Marine Mammal Meeting in Trat, 31 March – 1 April 2016. The concept of transboundary MPAs for marine mammals was introduced to 67 participants including 23 from Cambodia. Transboundary cooperation on MPAs, fisheries and ecotourism development were discussed to determine important next steps.

The project also supported the first transboundary dolphin day on 24 June 2016 at Mairoot Sub-district to promote transboundary collaboration. Vice-governor of Koh Kong led 12 Cambodian participants in joining about 300 local participants in Trat including local students. The meeting also led to multi-stakeholders agreeing to share data and it established a collaborative platform for discussing marine spatial planning in coastal waters of the Trat Province in Thailand and Koh Kong Province in Cambodia. The stakeholders included DMCR, IUCN, Mangroves for the Future (MFF), the United National Development Programme (UNDP), the Southeast Asian Fisheries Development Center (SEAFDEC), the Sustainable Development Foundation (SDF), the Department of Fisheries, Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), the Coordinating Body on the Seas of East Asia (COBSEA), and Burapha University. Support was given by multi-stakeholders for developing a marine spatial plan focussed on dolphins and sustainable fisheries as a way to foster cooperation for marine conservation more widely across Thailand and Cambodia (Table 2, Figure 17).

**Table 2.** Summary of action points generated from discussions on research and monitoring for MPA management, sustainable fisheries management, and dolphin watching tourism during the Transboundary Multi-Stakeholder Meeting on 31 March -1 April, 2016.

Research and Monitoring for MPA Management	Sustainable Fisheries Management	Dolphin Watching Tourism
<ul style="list-style-type: none"> <li>• Identifying critical habitat</li> <li>• Monitoring fishing activity</li> <li>• Mapping marine resources and small scale fishing gear</li> </ul>	<ul style="list-style-type: none"> <li>• Need sharing of database in terms of fishing boats, gears, and legal framework</li> <li>• Clear zoning and gear regulations or seasonal closures</li> <li>• More awareness raising for communities on sustainable fisheries</li> </ul>	<ul style="list-style-type: none"> <li>• Need good public relations (PR) for eco-tourism, well trained staff, and correct guidelines</li> <li>• Need sharing data of dolphin location</li> </ul>



**Figure 17.** Diagram summarizing group discussions on MPA, fisheries, and tourism during the Transboundary Multi-Stakeholder Meeting on 31 March -1 April 2016.

## 8. Dolphin conservation measures

Under the *Dolphin Conservation along the Coastline of Thai and Cambodian Border Project*, relevant stakeholders in Koh Kong, including the Fisheries Administration Cantonment (FiAC), agreed to establish three ‘Dolphin Protection Zones’ in Koh Kong. Two of these zones covering a total of more than 3,000 ha are already Community Fishery Areas where some gear restrictions already apply. These include a ban on blue swimming crab and shrimp gill nets, squid shell traps, scope shrimp past net, trolling hook and line and long line with many hooks. Another Dolphin Protection Zone, which would be the largest of the three at more than 2,600 ha, is proposed to the east of Koh Kong Island (Figure 18).

Within each of these Dolphin Protection Zones, a more restrictive ‘Dolphin Conservation Zone’ has been newly defined, where all fishing activities are prohibited. However, the small size of these areas (10-15 ha) means that they should be considered as a starting point that will need to be expanded upon to at least the size of the much larger Dolphin Protection Zones for them to make a meaningful difference in protecting coastal dolphins and their habitat.

- Location 1: This 2,274 ha dolphin protection zone coincides with the existing Peam Krasop Community Fishery (CFi) area, which had been approved and recognized by the Minister of Agriculture, Forestry and Fisheries (MAFF) on 14 July 2014. Within this area, a more restrictive dolphin conservation zone of 10 ha has been proposed by the project stakeholders.
- Location 2: This 1,103 ha dolphin protection zone coincides with the existing Chrouy Bras CFi, which had been approved and recognized by MAFF on 10 September 2010. Within this area, a more restrictive dolphin conservation zone of 10 ha has been proposed by the project stakeholders.

- Location 3: This 2,603 ha dolphin protection zone is a newly proposed area. It includes a more restrictive dolphin conservation zone of 15 ha.

For the Dolphin Protection Zones in location 1 and 2 (existing CFI areas) it was discussed among stakeholders that enforcement of existing rules and regulations needs to be strengthened. This has been achieved partly by the project through the establishment of joint patrols involving the Peam Krasop Commune Chief, the Peam Krasop Wildlife Sanctuary (PKWS) Director, members of the provincial Fisheries Administration Cantonment (FiAC), Community Fisheries (CFI), local police force, community representatives and IUCN staff. However, government budget is limited. The Fisheries Administration and the Transboundary Marine Mammal Management Committee are requesting additional budget for this activity. For the smaller, more restrictive Dolphin Conservation Zones, the project stakeholders agreed that all fishing activities should be banned. An official amendment to the CFI will require more time and follow-up action by IUCN and partners.

The Dolphin Protection Zone and Dolphin Conservation Zone in location 3, were identified by the project stakeholders. However, the necessary steps for their official protection and the establishment of rules and regulations still need to be taken as a follow-up action to this project. It has not been discussed yet whether this would be a CFI area, with similar rules to the ones mentioned above.

## **9. Discussion and conclusions**

The results of these surveys confirm that the transborder coastal waters of Cambodia and Thailand are particularly important habitat for globally threatened Irrawaddy and Indo-Pacific humpback dolphins. Based on line transect surveys conducted in 2008-9 and 2012-14, an average of 423 Irrawaddy dolphins were estimated to occur in the coastal waters of the Trat (Hines et al. 2015). Adding the numbers of Irrawaddy dolphins now known to occur along the coast of Koh Kong, Cambodia results in a minimum population estimate of almost 500 individuals. This makes the Cambodia/Thailand transborder population the second largest known of the species. Despite its relatively large size there is strong concern about high mortality in this Irrawaddy dolphin population due to entanglements in fishing gear particularly gillnets.

Much less is known about the status of humpback dolphins along the coastline of Koh Kong and Trat. However, the results of surveys on both sides of the Cambodia and Thailand border indicate that humpback dolphins occur in much lower numbers compared to Irrawaddy dolphins. For instance, the combined encounter rate while searching along 890 km systematic tracklines during all three surveys conducted in 2013-2015 (see Background and Searching effort and dolphin sightings sections above) was 1.6 groups/100 km (14 sightings) for Irrawaddy dolphins and 0.1 groups/100 km (1 sighting) for humpback dolphins. Meanwhile, the group sizes were similar with a mean of about seven individuals for both species. However, it appears that the transborder coast of Koh Kong and Trat is also important for this species because records of their occurrence along the coast of Southeast Asia are sparse bounded by much larger populations in China to the east and Bangladesh to the west (see Jefferson and Smith 2015).

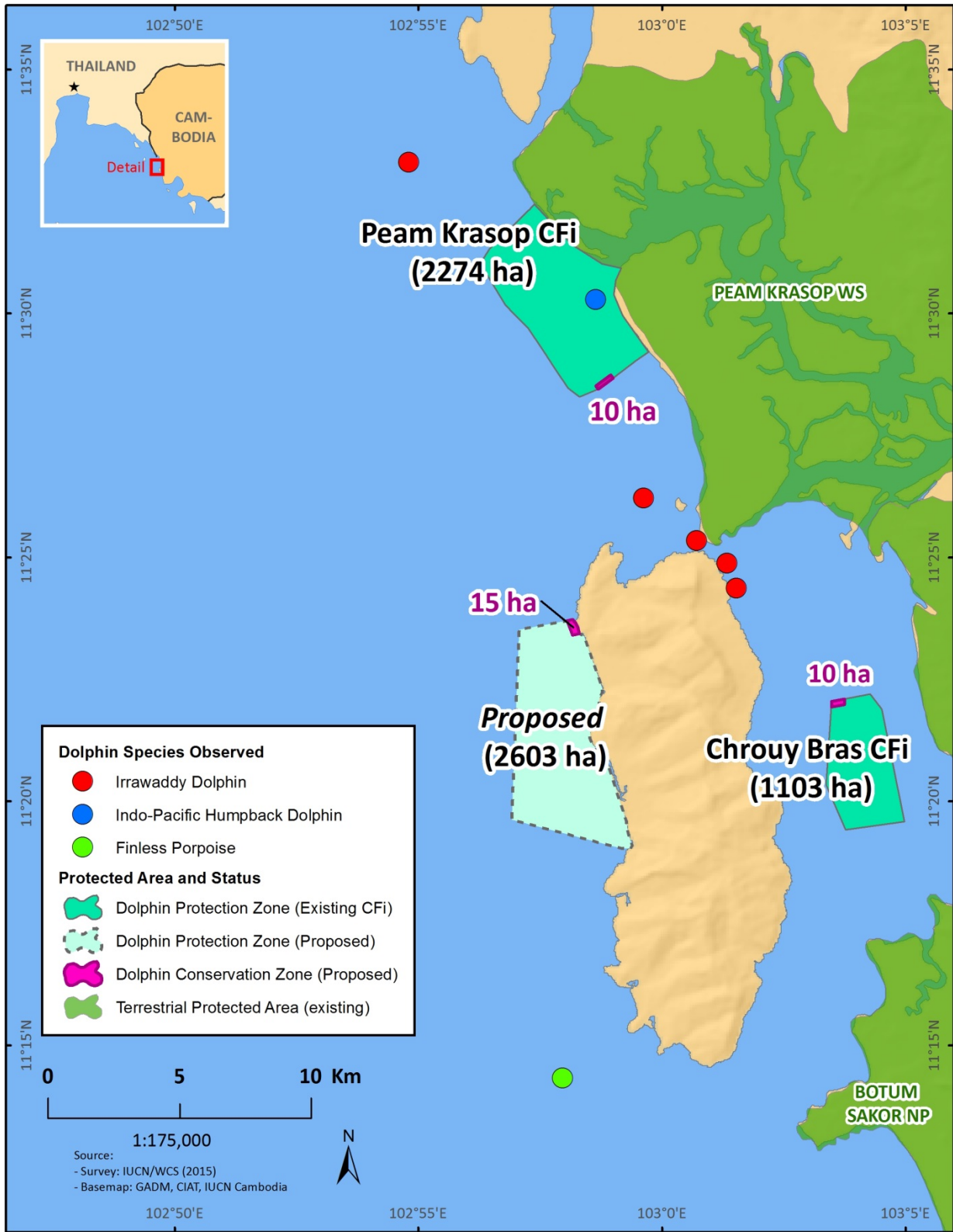


Figure 18. Map of dolphin protection zones established by relevant stakeholders in Koh Kong.

Photo-id catalogues for coastal dolphins in Koh Kong were significantly strengthened by this project with an increase from 15 to 47 Irrawaddy dolphin individuals and 2 to 23 humpback dolphin individuals from previous surveys summarized in the background above. New photo-id catalogues were also started for the Trat coast in Thailand that included 59 Irrawaddy dolphin individuals and 13 humpback dolphin individuals. Information from photo-catalogues in both Koh Kong and Trat was used to generate minimum abundance estimates, discovery curves and frequency distributions of resightings of both species on both sides of the Cambodia/Thailand border. The discovery curves and frequency distributions indicated that the actual population sizes of Irrawaddy and humpback dolphins are higher than the combined minimum abundance estimates for Koh Kong and Trat: 157 and 42 individuals, respectively. They also confirm that at least some Irrawaddy dolphins move back and forth across the Cambodian/Thailand border.

Vital information was also gained on the fine-scale distribution of Irrawaddy dolphins. This information is consistent with the results of earlier surveys conducted in October 2013 and February 2014. Sighting data confirmed that Irrawaddy dolphins are generally found in the Prek Bak Khlong, Old Peam Krasop, and Lam Dam channel mouths and along the northwest coast of Koh Kong Island in waters affected by freshwater outflow from the Trapeang Rong and Tatai Rivers. Information from field studies also confirm that these areas should be prioritized for establishing dolphin management zones for focused protection from entanglement in fishing gears.

The identification of priority dolphin habitat also indicates a strong potential for integrating dolphin watching into an ecotourism programme because if tourists are brought to these areas they will have a high probability of seeing dolphins. This particularly applies to the coastal waters of Koh Kong where the distribution of both species appears to be more clumped compared to Trat. This can almost certainly be explained by greater availability of freshwater from channels entering and leaving the Peam Krasop mangrove forest.

Well-managed ecotourism offers a potential opportunity for strengthening dolphin research and conservation as well as improving the livelihoods of local fishermen whose activities may be affected by the establishment of dolphin management zones. Tourists could be encouraged to contribute photographs to the developing photo-id catalogues for both Irrawaddy and humpback dolphins. Dolphin watching operators could be incorporated into a dolphin and threat monitoring programme using a Spatial Monitoring and Reporting Tool (SMART) which is an effective way to measure, evaluate and improve the effectiveness of protected area management (<http://www.smartconservationsoftware.org>). Both Thailand and Cambodia have been at the forefront of using SMART to conserve wildlife in their terrestrial protected areas and marine park rangers were recently trained in Thailand to use a SMART monitoring approach for patrols in marine protected areas. Although normally used by government agencies, a SMART monitoring approach could be easily adapted for use by tourism operators and even local communities. Data can be collected on a SMART phone with easily understood icons used to record observations. Livelihood opportunities could be developed for local fishermen for things such as dolphin spotters and guides, catering picnics on scenic beaches adjacent to the dolphin management zones, and producing handicrafts with dolphin themes to sell to tourists.



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Jefferson, T. A., & Smith, B. D. (2016). Chapter One-Re-assessment of the Conservation Status of the Indo-Pacific Humpback Dolphin (*Sousa chinensis*) Using the IUCN Red List Criteria. *Advances in marine biology*, 73, 1-26.

Junchompoo, C., Monanunsap, S., & Penpein, C. (2014). Population and Conservation Status of Irrawaddy Dolphins (*Orcaella brevirostris*) in Trat Bay, Trat Province, Thailand.

Smith, B., Kong, S., & Saroeun, L. (2014). *Conservation status and the use of Irrawaddy dolphins as a flagship species for climate adaptation in the Peam Krasop Wildlife Sanctuary, Cambodia*. Thailand: IUCN. 80pp.

**Appendix 1.** List of participants for dolphin training course and survey in Koh Kong, Cambodia, 10 – 16 November 2015.

<b>Participants' name</b>	<b>Position and Affiliation</b>
Mr. Lieng Saroeun	Vice Chief of Conservation and Crocodile Industrial Division of Fisheries Administration (FiA)
Mr. Nou Ngoy	Deputy Chief of Fisheries Administration Division of Peam Krasop, FiAC Koh Kong Province
Mr. Hun Marady	Deputy Director of Department of Environment, Koh Kong Province
Mr. Youn Tean	Deputy Chief of Department of Tourism, Koh Kong Province
Mr. Oul Rann	Director of Peam Krasop Wildlife Sanctuary, Koh Kong Province
Mr. Thiv Keanthav	Office Chief of Public communication and International Cooperation, Koh Kong Provincial Hall (attended training only)
Mr. Yem Yann	Peam Krasop Commune Chief
Mr. Vong Dara	Deputy Chief of Village II of Peam Krasop Commune and Community Protected Area Management Committee Member
Mr. Heng Suy	Representative of Koh Kapik Community Protected Area
Mr. Tith Rith	Chief of Peam Krasop Community Fishery
Mr. Veth Sonim	Dolphin Project Field Coordinator, IUCN
Mr. Noiy Beum	Boat Driver

**Appendix 2.** List of participants for transboundary dolphin stakeholder meeting in Trat, Thailand, 29 July 2015.

<b>Participant's Name</b>	<b>Position and Affiliation</b>
Mr. Wuttichai Jenkan	Deputy Director General of Department of Marine and Coastal Resources (DMCR)
Mr. Suchat Sawangareeruk	Marine Biologist of DMCR
Mr. Narong Chanteerarangkool	Trat Provincial Governor
Mr. Pisan Thanapermpun	Director of Trat Natural Resources and Environment Office
Mr. Winai Saowalit	Chief of Trat Marine and Coastal Resources Conservation Unit (DMCR)
Mrs. Jarupa Siri	Department of Fishery (DOF), Trat office
Mr. Winai Boonlorm	Chief of Mangrove station in Trat (DMCR)
Mr. Somchai Mananatasap	Director of Marine and Coastal Resources Research and Development Center of the Lower Gulf of Thailand (DMCR)
Mr. Bamroonsak Chatanantawej	Director of Marine and Coastal Protected Area Conservation Unit (DMCR)
Mrs. Chanokphon Chantarakantee	DMCR Officer
Ms. Orapa Suwatno	DMCR Officer
Ms. Suthira Younglit	DMCR Officer
Mr. Supawat Kanadireklap	Director of Marine and Coastal Resources Research and Development Center of the Eastern Gulf of Thailand (DMCR)
Mrs. Chalathip Junchompoo	Marine and Coastal Resources Research and Development Center of the Eastern Gulf of Thailand (DMCR)
Mr. Nunthapon Suksamran	Fishery expert from Eastern Gulf of Thailand Marine Research and Development Center: EMDEC (DOF)
Mr. Surasak Intaraprasert	President of Mairoot Subdistrict Administration Organization
Mr. Kittipas Srisaengkachon	Vice president of Mairoot Subdistrict Administration Organization
Ms. Chanya Sinal	Member of Laemklad Subdistrict Administration Organization
Mr. Pradit Kumchon	President of Laemklad Subdistrict Administration Organization
Mr. Channarong Rungsri	Laemklad local representative
Mr. Kalong Had-an	Taprik Subdistrict Conservation Network
Mrs. Nualnapa Sornpradit	Nongkunsong Subdistrict Conservation network
Mr. Somchai Sornprasert	Nongkunsong Subdistrict Conservation network

Mr. Preecha Sawanghasap	President of Trat Natural Resource and Environment Volunteer Network
Mrs. Junpen Prasansin	Trat Natural Resource and Environment Volunteer Network
Ms. Ravadee Prasertchaloernsuk	Sustainable Development Foundation (SDF)
Ms. Waraphon ketjinda	SDF staff
Ms. Munthana Bunnak	SDF staff
Mr. Rakkiet Pansri	SEAFDEC Training Department
Mr. Jirayu Ekkul	CEO of Whale Watching Tourism (Wild Encounter Thailand)
Ms. Suvalack Sathumanaspan	Assoc Prof. Environment and Resource Study Faculty, Mahidol University
Ms. Laongdow Tunnuch	DMCR officer
Ms. Patcharaphon Kaewmong	Vet, Marine and Coastal Resources Research and Development Center of the Andaman (Phuket) (DMCR)
Mr. Poommate Chumchat	Vet, Marine and Coastal Resources Research and Development Center of the Eastern Gulf of Thailand (DMCR)
Ms. Jittima Chareonphol	Conservation Group, Laemklad
Mr. Thiti Tawonthanon	President of Conservation Group, Laemklad
Ms. Sonthaya Jongpantanimitr	Deputy Director of Thailand Radio Station (Trat Office)
Mr. Watchara Kerdsom	Head of Village Moo 1, Laemklad
Ms. Narakorn Samawanthana	Fishery Expert from EMDEC: DOF
Ms. Suppaluck Ruaylap	Fishery Expert from EMDEC, DOF
Mr. Jakkrit Waewkaihong	Press
Mrs. Yanee Waewkaihong	Press
Mr. Chawalit Kocharuk	Press
Mr. Soun Norn	Interpreter
Mr. Sonim Veth	IUCN
Mr. Lieng Saroeun	Vice Chief of Conservation and Crocodile Industrial Division
Mr Lang Kiry	Fishery Administration Cantonment Chief of Koh Kong
Mr. Oul Rann	PKWS director
Mr. Vong Dara	Peam Krasob Community Protected Area Committee
Ms. Angela Joehl Cadena	IUCN

Mr. Petch Manopawitr	IUCN
Mrs. Orathai Pongraktham	IUCN
Ms. Supranee Kampongsun	IUCN
Ms. Siriporn Kulapatthanasuwan	IUCN
Ms. Rawiwan Boonchai	IUCN
Ms. Waraphon Kanthasiri	IUCN

**Appendix 3.** List of participants for transboundary dolphin conservation planning workshop in Trat, Thailand, 31 March – 1 April 2016.

<b>Name of Thai participants</b>	<b>Position and Affiliation</b>
<b>Central DMCR</b>	
Dr. Pinsak Surasawaddee	Director of DMCR Research Institute
Mr. Bamroongsak Chatananhawej	Experts in DMCR Research Institute
Ms. Kanchanaporn Wuttiworawong	Experts in DMCR Research Institute
Ms. Pattarawadee Konpien	DMCR Research Institute
Ms. Chanokporn Chantarakhunti	DMCR Research Institute
<b>Eastern Gulf of Thailand DMCR</b>	
DR. Supphawat Kanadireklap	Director of DMCR Research Institute (Rayong Station)
Mrs. Suthida Kanadileklap	Experts in DMCR Research Institute (Rayong station)
Ms. Chalathip Junchompoo	Experts in DMCR Research Institute (Rayong station)
Mr. Poommate Chomchat	Veterinarian, DMCR Research Institute (Rayong Station)
Mr. Weerapong Laowejprasit	Veterinarian, DMCR Research Institute (Rayong Station)
Mr. Chatchai Penpien	DMCR Research Institute (Rayong station)
Mr. Sakda Inganu	DMCR Research Institute (Rayong station)
Ms. Chatsuda Siangsano	DMCR Research Institute (Rayong station)
Ms. Supatsara Jitseng	DMCR Research Institute (Rayong station)
<b>Trat Provincial Office</b>	
Mr. Paisan Thanapermpun	Director of Trat Naural Resources and Environment Office
Mrs. Jarupa Siri	Expert in Trat Fisheries Office
Ms. Tharinee Wongnakorn	Trat Provincial adminstration Office
<b>DMCR Provincial Committee</b>	
Mr. Sansern Serirak	Director of Trat Fisiheries Office
Mr. Niramitr Thammasaro	Director of Trat Forestry Office
Mr. Wanchai Kaewchaiya	Repreentative Trat Police Station
Mr. Wichaya Piriryawat	Representative Royal Thai Navy (Trat Station)
Mr. Rojthanin Mora	Representative Trat Provincial Public Works and Town Planning
Mr. Teeratat Kaewpiyasawadi	Representative Trat Provincial Administration Office
Mrs. Patcharin Phonkaj	Expert in Tourism
Mr. Thiti tawonthanon	Expert in Fisheries
Mr. Pisan Sawaddee	Expert in Fisheries
Mr. Surasak Indraprasert	Expert in Fisheries
Mr. Umporn Patsart	Expert in Coastal Erosion
Mr. Paiwan Si-in	Expert in Coastal and Marine Resources Management
Mr. Apidech Boonlom	Expert in Environment
Mr. Withon Chantuma	Expert in Ecosystem (mangrove)
<b>Burapha University</b>	
Mr. Wirote La-ongmanee	Lecturer
Mrs. Penchan La-ongmanee	Lecturer
Mr. Bancha Nilkerd	Lecturer
Ms. Aksorn Saibua	Research Assistant

<b>Related organizations and NGO</b>	
Mr. Brian Smith	WCS
Ms. Ylva Mattsson	SEAFDEC
Mr. Jirayu Ekkul	Wild Encounter Thailand
Ms. Kesinee Kaewcharoen	Sustainable Development Foundation
<b>Press</b>	
Mr. Athiti Kanjanaphairoj	Thai PBS
Mr. Abdulgoiyum Taleh	Thai PBS
<b>IUCN staff</b>	
Mr. Petch Manopawitra	Deputy South East Asia Group
Ms. Angela Joehl Cadena	Senior Programme Officer
Ms. Rawiwan Boonchai	Field Coordinator

<b>Name of Cambodian participants</b>	<b>Position and Affiliation</b>
<b>National FiA</b>	
H.E Srun Limsong	DDG-FiA
Mr. Ouk Vibol	Director of Department of Fisheries Conservation
Mr. Lieng Saroeun	Vice Chief of Conservation and Crocodile Industrial Division
<b>Provincial</b>	
Mr. Lim Savann	Vice chief of administration of Kohn Kong Provincial Hall
Mr. Sous Mao	Kohn Kong Provincial Hall Staff
<b>FiA</b>	
Mr. Nou Ngoy	Kohn Kong Fisheries Administration Cantonment Staff
<b>DoME</b>	
Mr. Pich Syun	Director of Department of Mine and Energy
<b>DoE</b>	
Mr. Hun Marady	Vice chief of Department of Environment
<b>DoT</b>	
Mr. Youn Tean	Vice chief of Department of Tourism
<b>Koh Kong District</b>	
Mr. Som Sothyr	Koh Kong District Governor
<b>Mondol Seima District</b>	
Mr. Hak Leng	Mondolseima District Governor
<b>Soldier</b>	
Mr. Ek SamAn	Deputy Commander of the Front Headquarters, Maritime Security Committee
<b>Marine</b>	
Mr. Sin Daro	Police Commander of the Water Border Protection Unit
<b>PKWS</b>	
Mr. Oul Rann	PKWS Director
<b>Chief of commune</b>	
Mr. Yem Yan	Chief of Peam Krasob commune
Mr. Khun Vanna	Chief of Koh Kapik commune

Mr. Kroch Peng	Chief of Chrouy Bros commune
<b>Cfi</b>	
Mr. Tith Rith	Chief of Cfi Peam Krasob
Mr. Say Chhean	Chief of Cfi Chrouy Bros
<b>IUCN</b>	
Mr. Veth Sonim	Project Coordinator
Mrs. Yim Sothea	Admin and Accountant
Mr. Steve Bernacki	Volunteer
<b>Interpreter</b>	
Mr. Thiv Keanthav	Freelance



#### Appendix 4. List of transboundary marine mammal management committee (Cambodia)

##### Transboundary Marine Mammal Committee

Name	Position	Composition	Location of institute
H.E. Bun Leut	Koh Kong Provincial Governor	Chief	Koh Kong
H.E Phithon Phlamkesan	Koh Kong Provincial Deputy Governor	N/A	Koh Kong
H.E. Srun Limsong	Deputy Director General of FiA	Vice Chief	Phnom Penh
Mr. Ouk Vibol	Director of Department of Fisheries Conservation of FiA	Vice chief	Phnom Penh
Mr. Lim Savann	Vice Chief of Administration of Koh Kong Provincial Hall	Vice chief	Koh Kong
Mr. Sao Sinthoun	Vice Chief of Administration of Koh Kong Provincial Hall	N/A	Koh Kong
Mr. Thiv Keanthav	Office Chief of Public communication and International Cooperation, Koh Kong Provincial Hall	N/A	Koh Kong
Mr. Lang Kiry	Chief of Koh Kong FiAC	member	Koh Kong
Mr. Pich Syun	Chief of Department of Mine and Energy	member	Koh Kong
Mr. Hun Marady	Vice Chief of Department of Environment	member	Koh Kong
Mr. YounTean	Vice Chief of Department of Tourism	member	Koh Kong
Mr. Lou Vanny	Representative of IUCN Cambodia	member	Phnom Penh
Mr. Sam Sothyr	Koh Kong District Governor	member	Koh Kong
Mr. Hak Leng	Mondolseiyma District Governor	member	Koh Kong
Mr. Ek SamAn	Deputy Commander of the Front Headquarters, Maritime Security Committee	member	Koh Kong
Mr. Sin Daro	Police Commander of the Water Border Protection Unit	member	Koh Kong

##### Transboundary Marine Mammal Working Group

Name	Position	Composition	Location of institute
Mr. Lang Kiry	Chief of Koh Kong FiAC	Chief	Koh Kong
Mr. Hun Marady	Vice Chief of DoE	Vice Chief	Koh Kong
Mr. Lieng Saroeun	Vice Chief of Conservation and Crocodile Industrial Division of FiA	Vice Chief	Phnom Penh
Mr. Veth Sonim	IUCN staff based in Koh Kong	secretary	Koh Kong
Mr. Oul Rann	Director of Peam Krasop Wildlife Sanctuary	member	Koh Kong
Mr. Youn Tean	Vice Chief of Department of Tourism	member	Koh Kong
Mr. Yem Yann	Peam Krasop Commune Chief	member	Koh Kong
Mr. Khut Vanna	Koh Kapik Commune Chief	member	Koh Kong
Mr. Krouch Peng	Chrouy Bros Commune Chief	member	Koh Kong
Mr. Tith Rith	Peam Krasop Community Fishery Chief	member	Koh Kong
Mr. Say Chhean	Chrouy Bros Community Fishery Chief	member	Koh Kong