

Exploration and partnership research at the Gangkou National Sea Turtle Nature Reserve, Guangdong Province, People's Republic of China

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The Gangkou National Sea Turtle Nature Reserve (惠東港口海龜國家級自然保護區) (Map 1, thereafter named as “Gangkou Reserve”), established in 1985, is the first and only nature reserve for protection of sea turtles in the mainland China. The Reserve contains a primary and important nesting site of green turtles in southern China and covers the bay area where mating of green turtles are occasionally observed in April and May. The Reserve is renowned for its research and conservation of chelonians including sea turtles, e.g. head-starting programme of green turtle hatchlings, rescue and rehabilitation of sea turtles from by-catch or strandings, and public education with wonderful exhibits and facilities to promote sea turtle conservation. For more details of the Reserve, please visit its official website at <http://www.seaturtle.cn/index1.asp>.

Under the collaboration for sea turtles research between the Gangkou Reserve and the City University of Hong Kong, we paid visits to the Gangkou Reserve in February and June 2012. Thanks to the great devotion and efforts of the Reserve colleagues, tissue samples of 52 sea turtles (which include 48 green turtles and 4 loggerhead turtles) and their basic morphometrics, such as carapace length and weight, and health parameter in terms of hematocrit were collected at the Reserve for contaminant tests and genetic analysis. These turtles were generally in good physical conditions, which comprised green turtle yearlings from nesting turtles at the Reserve and juveniles to adults mostly from by catch. The by-caught turtles were from the coast along Guangdong Province and nearby waters, approximately spanning from Daya Bay to Shanwei and far to the Taiwan Straits. Some individuals were forfeited from fisheries enforcement. The sea turtle samples were subsequently transferred to the State Key Laboratory in Marine Pollution, City University of Hong Kong for genetics analysis and contaminant test. Some sub-samples were sent to Dr. Peter Dutton and his laboratory at Southwest Fisheries Science Centre (SWFSC) of National Oceanic and Atmospheric Administration (NOAA), for collaboration on genetic analysis.

In June 2012, we participated in the event of restocking of marine resources at Xunliao of Guangdong Province upon invitation by the Director of the Gangkou Reserve, Mr. He-Xiang GU (古河祥局長), one of the very few members of the Marine Turtle Specialist Group (MTSG) in East Asia Region, International Union for Conservation of Nature (IUCN). The theme of the event was to replenish marine resources and protected species, e.g. fish fry, shrimps, groupers, horseshoe crabs and sea turtles, during a fishing moratorium in the South China Sea. In the event, a total of 134 sea turtles (i.e. 133 green turtles and 1 loggerhead) were released, with the majority being juveniles to sub-adults. These turtles were reported to be by-catch along the coast of Guangdong Province, such as Nanao (南澳), which is believed to be a foraging ground of green turtles and captive-reared in a turtle farm at Zhanjiang (湛江) of Guangdong Province. Such release events bear deep traditional and cultural meaning in the Chinese society, yet also create innovative opportunities for scientific research, notably sample collection for genetic and contaminant analysis, satellite telemetry and tagging. Scute and blood samples were collected from 4 green turtles and 1 loggerhead turtle for genetic and contaminant analyses. The conservation context and cultural significance of the release event was also presented under the co-authorship with Director GU and Ms. Feiyan ZHANG at the 33rd International Sea Turtle Symposium (Annex 2).

To understand the movements and foraging grounds of sea turtles, we later sent satellite transmitters of the City University of Hong Kong to our partners of the Reserve. In July 2013, one adult-sized green turtle of curved carapace length 93.5 cm was attached with the satellite transmitter after rehabilitation as a by-catch turtle. The tagged turtle was then released. From the tracking result (Annex 1), the turtle travelled for about a month and arrived at presumably its foraging ground in Bangui Bay, the northern Philippines.

We are sincerely thankful for the hospitality and friendship of all the nice people we work with in the Gangkou Reserve and the town, especially Director He-Xiang GU (古河祥局長), Fei-Yan ZHANG (張飛燕), Zhong-Rong XIA (夏中榮), Ming-Bin YE (葉明彬), Ri-Jin LIN (林日錦), Jin-Xia DUAN (端金霞), and Simon CHAN (陳堅峰) for his kind introduction to the Reserve colleagues. The following images give views of the wonderful experiences we had.

There are more articles about scientific and cultural aspects of sea turtles in Guangdong and Taiwan. Please visit the links to these articles in Annex 2.

與中國廣東省惠東港口海龜國家級自然保護區合作探索之旅

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惠東港口海龜國家級自然保護區（圖一 ‘港口保護區’）成立於 1985 年，是中國大陸第一個，也是唯一一個為保護海龜而設立的保護區。港口保護區內有一個在中國南部主要及重要的綠海龜產卵沙灘，每逢 4 月及 5 月會偶爾觀察到綠海龜在海龜灣內及其附近交配。港口保護區聞名於其龜類(包括海龜)研究和保育，例如飼養小綠海龜、救援及復康誤捕或擱淺的海龜、及透過精彩的展品和設施促進海龜保育的公眾教育。有關港口保護區更詳盡的資料，請瀏覽其官方網站

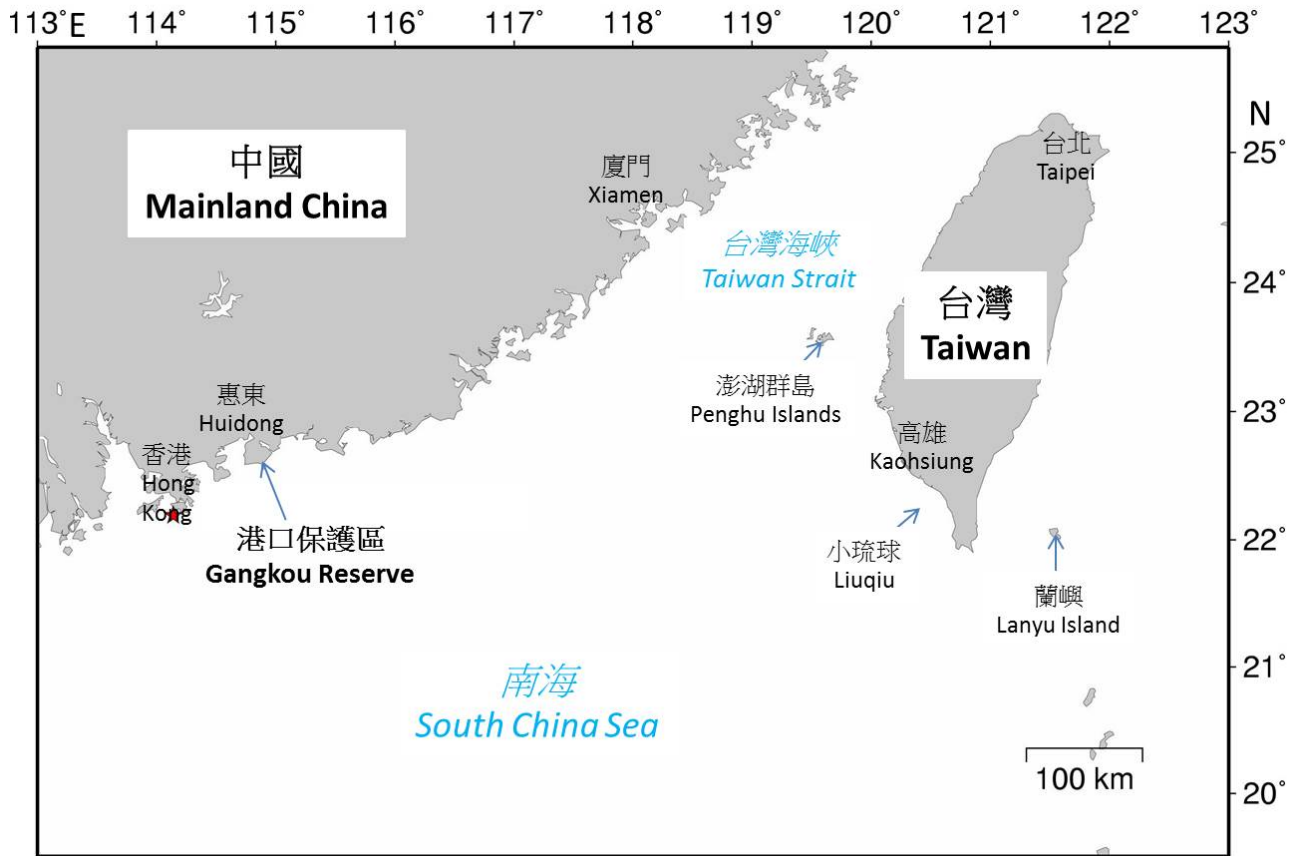
<http://www.seaturtle.cn/index1.asp>。

基於港口保護區和香港城市大學在海龜污染物及群體遺傳學的合作研究項目，我們於 2012 年 2 月和 6 月造訪港口保護區。在保護區人員的協助下，我們成功收集 52 隻海龜（包括 48 隻綠海龜和 4 隻赤蠟龜）的組織樣本、牠們的體形測量，如背甲的長度和重量，及健康參數如血細胞比容。這些海龜的狀態良好，當中包括在保護區母龜所生的小海龜及大多來自誤捕的未成年至成年海龜。這些誤捕海龜來自廣東省沿海及鄰近海域，從大亞灣至汕尾及遠到台灣海峽。另外有些是被漁政執法沒收的海龜。這些海龜組織樣本隨後被轉移到香港城市大學的海洋污染國家重點實驗室進行遺傳學分析和污染物測試。一些組織樣本隨即送到合作伙伴 Dr. Peter Dutton 的團隊 (SWFSC, NOAA) 進行基因分析。

在 2012 年 6 月，我們受港口保護區古河祥局長的邀請，參與在廣東省惠州巽寮舉辦的“南海生物資源增殖放流”活動。古局長是其中少數在東亞地區，國際自然保護聯盟的國際海龜專家小組的成員之一。此活動是在中國南海休漁期期間，藉放流經濟和保護物種，例如魚苗、蝦、石斑魚、馬蹄蟹及海龜，以補充增殖海洋資源。在活動中，放流共 134 個海龜（包括 133 綠海龜和 1 隻赤蠟龜），當中主要是青年至亞成年海龜。根稱，這些海龜是誤捕自廣東省沿海，如被認為是綠海龜覓食地的南澳，及從廣東省湛江人工圈養的海龜場。這種放流活動承載深厚的中國傳統和文化內涵，同時也創造科研的機會。我們為遺傳學和污染物測試，收集了 4 隻綠海龜和 1 隻赤蠟龜的組織樣本，保護人員亦為放流海龜安裝衛星追蹤器以了解牠們在海洋的活動動向。我們連同古局長及張飛燕女士在 2013 年第 33 屆國際海龜專題研討會上曾發表此放流活動的保育內容及文化價值 (附錄 2)。

為了解海龜的海洋動向及覓食地，我們把香港城市大學的海龜衛星追蹤器給港口保護區的合作夥伴用到當地海龜上。在 2013 年 7 月，保護區的研究人員把追蹤器安裝到一隻來自誤捕及在保護區復康的成年綠海龜 (背甲彎曲長度 93.5 厘米)，及後將其放流。根據追蹤結果 (附錄 1)，綠海龜在約一個月內從港口游到菲律賓北部的班吉灣 (Bangui Bay)，相信是其覓食地。

我們衷心感謝在港口保護區的各位及港口鎮遇到所有美好的人，尤其是保護區的古河祥局長、張飛燕、夏中榮、葉明彬及林日錦，和陳堅峰熱切向我們介紹認識保護區的各位。以下圖片記載我們在這旅程的所見所聞。請大家細心欣賞感受。另外，請大家到附錄 2 的連結，參閱其他關於在廣東及台灣海龜研究和文化的文章。



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Map 1 showing the location of Gangkou National Sea Turtle Nature Reserve

圖 1 顯示惠東港口海龜國家級自然保護區的位置

(Source 來源: SEATURTLE ORG Maptool. SEATURTLE.ORG,

Inc. <http://www.seaturtle.org/maptool/>)



Picture 1. Director He-Xiang GU (3rd left), George BALAZS (4th left), Fei-Yan ZHANG (3rd right),
Connie Ka-yan NG (2nd right) and ZHANG's family

圖 1. 古河祥局長(左三)、佐治柏樂滋(左四)、張飛燕(右三)、伍家恩(右二)及張的家人



Picture 2. Mazu Temple at Xunliao

圖 2. 位於惠州巽寮的天后宮



Picture 3. Plastic sea turtle decorations in local store at Gangkou

圖 3. 於港口商店內出售的塑膠製的海龜擺設



Picture 4. Local people fixing a fishing net at Gangkou

圖 4. 港口當地人在修補漁網



© Connie Ka-yan NG

Picture 5. Wet market at Gangkou
圖 5. 於港口的菜市場



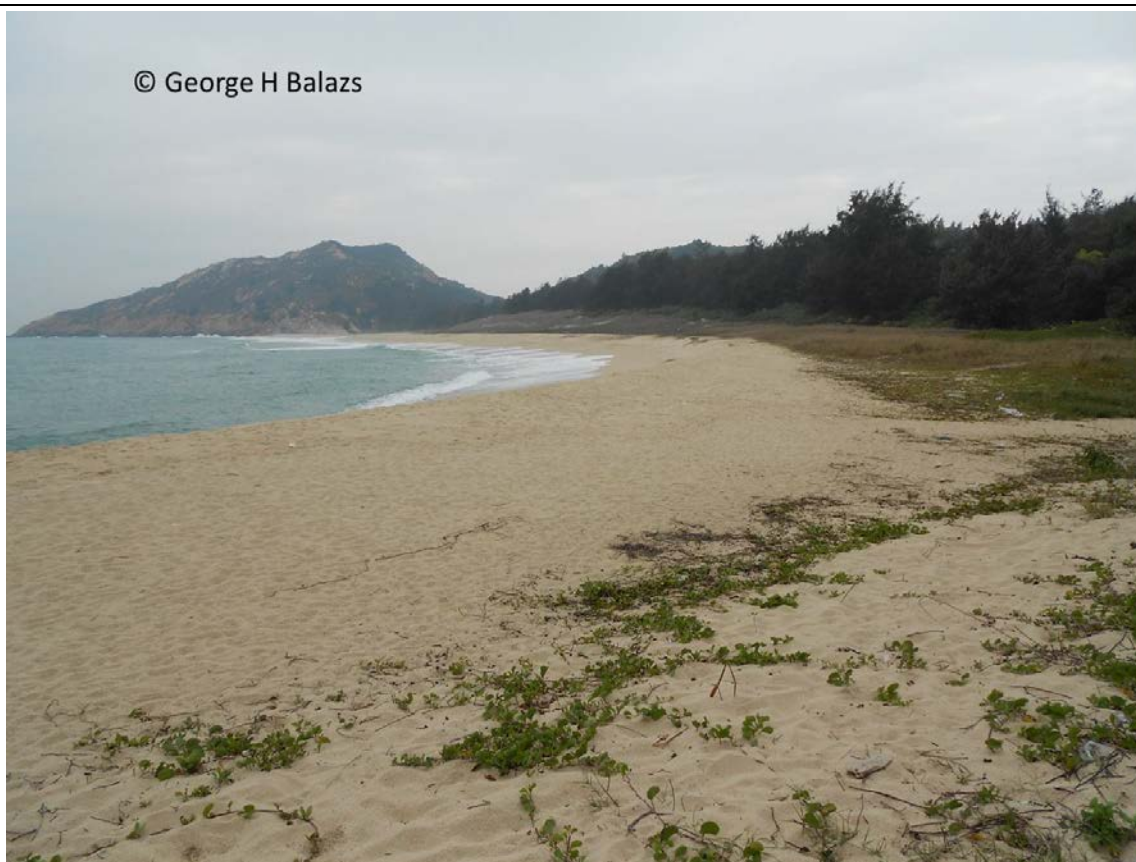
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Picture 6. Local child at Gangkou
圖 6. 港口當地的小朋友



Picture 7. Fei-Yan and George enjoying local food at Gangkou

圖 7. 飛燕及佐治正享受港口當地的小吃



© George H Balazs

Picture 8. Beautiful protected nesting beach of green turtle at Gangkou Reserve

圖 8. 位於港口保護區內優美的綠海龜產卵沙灘

© George H Balazs



Picture 9. Looking for historical remains of nesting green turtle at the nesting beach
圖 9. 在產卵沙灘找尋很久以前遺留下的綠海龜的身體部分

© Connie Ka-yan NG



Picture 10. Rehabilitated green turtles in captivity at Gangkou Reserve
圖 10. 在港口保護區復康中的綠海龜



Picture 11. Green turtle yearlings from the nesting turtles at Gangkou Reserve
圖 11. 在保護區母龜所生的小海龜



Picture 12. Rehabilitated loggerhead in captivity at Gangkou Reserve
圖 12. 在港口保護區復康中的赤蠟龜



Picture 13. Olive ridley turtle for public education at Gangkou Reserve
圖 13. 在港口保護區作公眾教育展示的太平洋麗龜



Picture 14. Hawksbill turtles for public education at Gangkou Reserve
圖 14. 在港口保護區作公眾教育展示的玳瑁



Picture 15. Measuring the carapace length of a juvenile green turtle

圖 15. 為未成年綠海龜量度背甲長度



Picture 16. Weighing a juvenile green turtle

圖 16. 為未成年綠海龜量度體重



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Picture 17. Taking record photo of the ventral side of a juvenile green turtle

圖 17. 拍照記錄未成年綠海龜的腹面



© Connie Ka-yan NG

Picture 18. Taking record photo of the lateral side of a juvenile green turtle

圖 18. 拍照記錄未成年綠海龜的側面



Picture 19. Taking record photo of the dorsal side of a juvenile green turtle (Clean area of posterior carapace is from harmless scraping of scutes for contaminants research)

圖 19. 拍照記錄未成年綠海龜的背面 (為環境污染學研究，經無創傷性的背甲角質層採樣，背甲末端看來較淡色)



Picture 20. Collecting scute scrapings of a juvenile green turtle

圖 20. 採集未成年綠海龜的背甲角質層



© Connie Ka-yan NG

Picture 21. Collecting blood sample of a sub-adult green turtle

圖 21. 採集亞成年綠海龜的血液



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Picture 22. Collecting blood sample of an adult-sized loggerhead turtle

圖 22. 採集成年赤蠟龜的血液



Picture 23. Collecting blood sample of a green turtle yearling
圖 23. 採集在保護區母龜所生的小海龜的血液



Picture 24. Jin-Xia DUAN and George at Gangkou Reserve
圖 24. 端金霞及佐治在保護區



Picture 25. Taking hematocrit reading of the sea turtle blood collected at Gangkou Reserve
圖 25. 讀取在保護區海龜血液的血細胞比容



Picture 26. Director GU, George, Fei-Yan and Ming-Bin YE (from left to right) having dinner at
Gangkou Reserve
圖 26. 古河祥局長、佐治、飛燕及葉明彬(從左至右)在保護區共進晚餐



© Ye

Picture 27. Director GU, Connie, George and Fei-Yan (from right to left) having dinner at Gangkou Reserve

圖 27. 古河祥局長、家恩、佐治及飛燕(從右至左)在保護區共進晚餐



© Connie Ka-yan NG

Picture 28. Restocking of marine resources at Xunliao of Guangdong
圖 28. 在廣東省惠州巽寮舉辦的”南海生物資源增殖放流”活動

© Connie Ka-yan NG



Picture 29. A loggerhead to be released at the restocking event
圖 29. 在”南海生物資源增殖放流”活動中放流的赤蠟龜



© Connie Ka-yan NG

Picture 30. Reserve colleagues tagging an adult-sized green turtle at the restocking event
圖 30. 保護區人員為活動中放流的綠海龜安裝衛星追蹤器



Picture 31. Green turtle to be released at the restocking event
圖 31. 在”南海生物資源增殖放流”活動中放流的綠海龜



Picture 32. Green turtle to be released at the restocking event
圖 32. 在”南海生物資源增殖放流”活動中放流的綠海龜



Picture 33. Reserve colleagues preparing at the restocking event
圖 33. 保護區人員準備”南海生物資源增殖放流”活動



Picture 34. Reserve colleagues preparing at the restocking event
圖 34. 保護區人員準備”南海生物資源增殖放流”活動

© Connie Ka-yan NG



Picture 35. A green turtle with satellite transmitter to be released at the restocking event

圖 35. 在活動中放流的綠海龜配備衛星追蹤器



© Connie Ka-yan NG

Picture 36. Participants releasing tagged green turtle at the restocking event

圖 36. 參與者在“南海生物資源增殖放流”活動放流配備衛星追蹤器的綠海龜



© Connie Ka-yan NG

Picture 37. Participants releasing tagged green turtle at the restocking event
圖 37. 參與者在“南海生物資源增殖放流”活動放流配備衛星追蹤器的綠海龜



© Connie Ka-yan NG

Picture 38. Participants releasing juvenile green turtles at the restocking event
圖 38. 參與者在“南海生物資源增殖放流”活動放流未成年綠海龜



© Connie Ka-yan NG

Picture 39. Participants releasing groupers at the restocking event
圖 39. 參與者在“南海生物資源增殖放流”活動放流石斑魚



© Connie Ka-yan NG

Picture 40. Participants releasing horseshoe crabs at the restocking event
圖 40. 參與者在“南海生物資源增殖放流”活動放流馬蹄蟹



Picture 41. Participants releasing horseshoe crabs at the restocking event

圖 41. 參與者在“南海生物資源增殖放流”活動放流馬蹄蟹

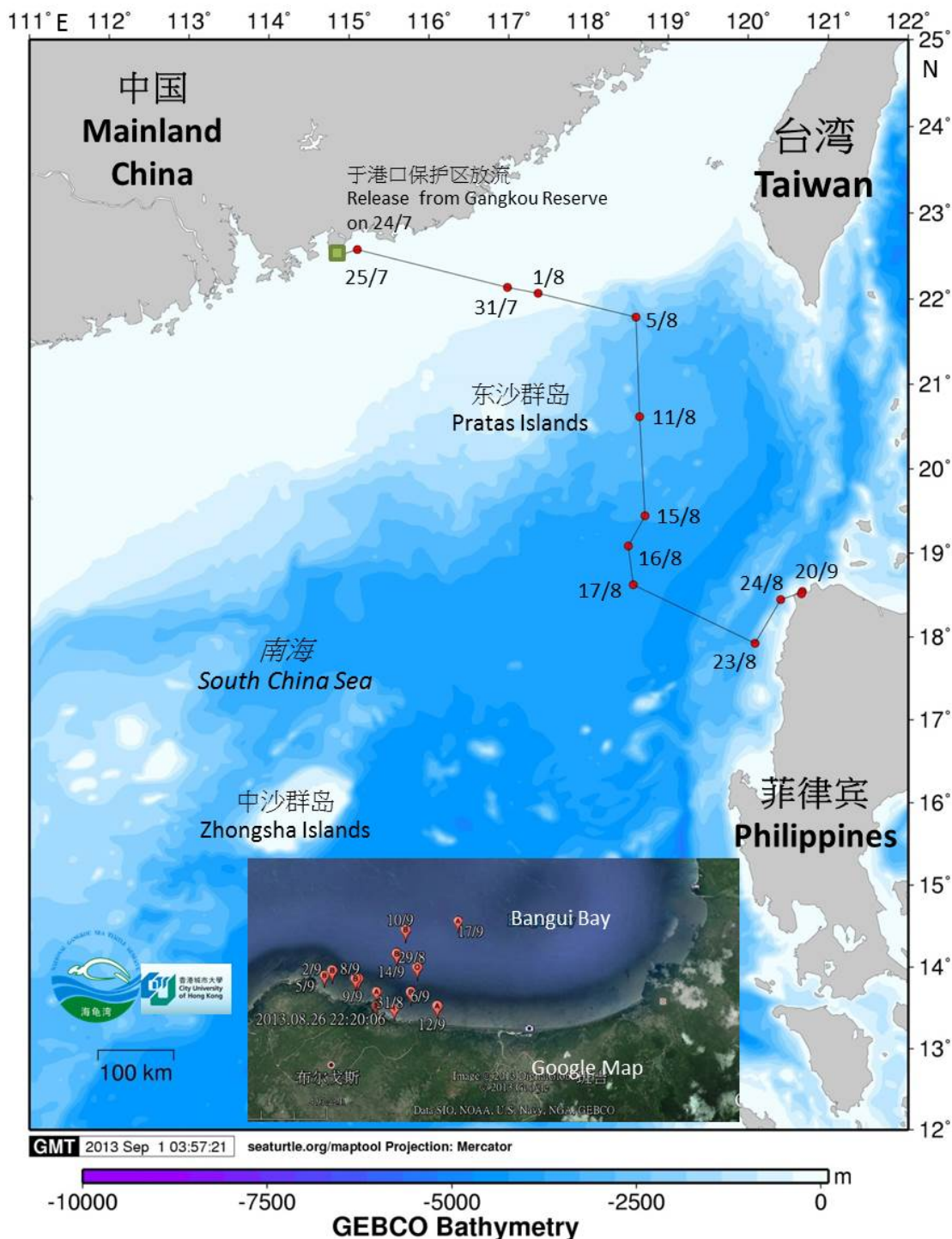


Picture 42. Participants releasing fish fries and shrimps at the restocking event

圖 42. 參與者在“南海生物資源增殖放流”活動放流魚苗及蝦

至 2013 年 9 月 20 日
 绿海龟 背甲曲线长: 93.5 cm 来源: 误捕
 TAM-2639 ID: 65417 首个信号: 2013 年 7 月 24 日 接收信号日数: 58

Update as of 20 September 2013
 Green Turtle CCL: 93.5 cm Source: By-catch
 TAM-2639 ID: 65417 First location: 24 July 2013 Days transmitting: 58



Tracking map of a by-catch green turtle released from Gangkou Reserve
 從港口保護區野放的誤捕綠海龜的衛星追蹤圖 (Source 来源: SEATURTLE ORG Maptool.
 SEATURTLE.ORG, Inc. <http://www.seaturtle.org/maptool/>)

Web-links to the three articles of sea turtles in Guangdong and Taiwan and citation of an abstract presented on 33rd International Sea Turtle Symposium

三篇關於在廣東及台灣海龜研究和文化的文章的連結及在第 33 屆國際海龜專題研討會發表的文章摘要:

Ng, K.Y., and G.H. BALAZS. 2013. Exciting observations of numerous green turtles foraging in coastal waters of Liuqiu Island, Taiwan. (in English and Chinese)

伍家恩及佐治柏樂滋。2013。在台灣小琉球沿岸觀賞綠海龜覓食。

<http://akepa.hpa.edu/~mrice/turtle/liuqiu.pdf>

http://www6.cityu.edu.hk/sklmp/sklmp_cn/dept_content_list.asp?type=list&btype=11&stype=48

Ng, K.Y., and G.H. BALAZS. 2013. From Traditional Culture to Science - Exploratory Trips for Sea Turtles in Taiwan. (in English and Chinese)

伍家恩及佐治柏樂滋。2013。從傳統文化到科學 - 探索台灣海龜之旅。

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Ng, K.Y., and G.H. BALAZS. 2013. Exploratory Trips for Sea Turtles in Guangdong Province, China – A Road to Conservation from Tradition, Culture and Science. (in English and Chinese)

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G. H. BALAZS, K.Y., NG, H.X. GU, and F.Y. ZHANG. 2013. The Xunlian Guangdong Province Experience: Releasing Sea Turtles For Restocking and Conservation Awareness in China. 33rd International Sea Turtle Symposium, Baltimore, U.S. (Abstract)