

聽，海龜的故事

台灣海保救援網與海龜收容中心

**Saving the Sea Turtle:
Turtle Shelters and the Marine Animal
Rescue Network**

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海龜收容中心為擱淺海龜提供暫時休息地

Sea turtle shelters provide a temporary refuge for stranded sea turtles



合適的海水溫度、豐富珊瑚礁資源，使得台灣周邊海域成為全球七種海龜中，綠蠟龜、玳瑁、欖蠟龜、赤蠟龜和革龜洄游與覓食的重要場域，也是綠蠟龜主要繁殖地，也讓台灣成為全球海龜保育不可或缺的一份子。

編號111-17的欖蠟龜鰭足不時划出水面，激起陣陣水花，使得前來農業部水產試驗所澎湖漁業生物研究中心進行年度海龜健康巡檢的獸醫師們，都因為牠「活潑」的反應而笑了出來。

但隔壁池的綠蠟龜，讓大家的眉頭反而皺了起來。如同年初在近海被發現一動也不動的反常模樣，113-04像片落葉，漂浮於水面，隨水流旋轉，待人類更加靠近時，生性敏感的牠才稍稍作動。

劃設保護區為小海龜留生路

作為大洋性洄游動物，海龜往返於棲地與產卵地之間，而台灣東北角、南部及澎湖周邊溫暖海域即是牠們常出沒的區域，偶有民眾能看到海龜探出水面換氣，或是在正午時漂於水面上享受溫暖陽光。

With moderate water temperatures and an abundance of coral reefs, the seas around Taiwan are an important habitat for the migration and feeding of the green sea turtle (*Chelonia mydas*), the hawksbill sea turtle (*Eretmochelys imbricata*), the olive ridley sea turtle (*Lepidochelys olivacea*), the loggerhead sea turtle (*Caretta caretta*), and the leatherback sea turtle (*Dermochelys coriacea*), as well as being a major breeding ground for the green sea turtle. This makes Taiwan an indispensable player in global sea turtle conservation.

The flipper of olive ridley sea turtle No. 111-17 occasionally breaks the surface of the water, throwing up splashes of liquid. The veterinarians who have come to the Penghu Fishery Research Center (PFRC) of the Ministry of Agriculture's Fisheries Research Institute for the annual sea turtle health inspection all smile on seeing how active it is.

In contrast, the green sea turtle in the next tank over has them furrowing their brows with worry. Discovered early this year in coastal waters, where it was showing no signs of movement, 113-04 simply floats on the surface like a fallen leaf, turning in circles with the flow of the water. It is only when people approach even closer that the sensitive turtle makes a very slight motion.

A conservation zone for hatchling survival

As pelagic migratory animals, sea turtles travel back and forth between their habitats and the places where they lay their eggs. They frequently appear in the warm sea waters off Northeastern Taiwan, Southern Taiwan, and the Penghu Islands.

Besides being a place where a number of sea turtle species find food, Taiwan is also a major egg-laying habitat for green sea turtles.

In 1995 the Penghu County Government designated the area around Wang'an Island as a wildlife conservation zone. It remains a safe place for female green sea turtles to lay their eggs to this day.

Since the PFRC's Penghu Sea Turtle Rescue Center (PSTRC) was set up in 1997 it has devoted itself to rescuing stranded turtles, and provided a shelter for physically weak late-hatched baby turtles.

Xu Zhonggang, an associate researcher at the PSTRC, says that over the last 27 years the center has sheltered

620 sea turtles, including hatchlings, of which 342 have been successfully released into the wild. The veterinarians who are there on the day of our visit are not only checking the status of rescued sick and injured turtles, but also confirming the condition of turtles which are due to be released back into the ocean.

The last mile before release

In another part of the PTSRC, turtle 113-04, which weighs several tens of kilograms, is being gently placed on a soft pad by veterinarians from the Taiwan Cetacean Society (TCS) so that they can carry out various health checks.



中華鯨豚協會獸醫團隊替113-04進行全身健康檢查，以了解其無法下潛的原因。

The veterinary team of the Taiwan Cetacean Society gives sea turtle 113-04 a complete physical to try to determine why it can't submerge.

Chen Yu-rong, a veterinarian with the TCS rescue team, relates that even before a turtle is removed from its tank, they observe all of its behaviors, including swimming postures and reactions when encountering humans, because each and every movement made by a sea turtle can be an important clue to its physical condition.

"You can imagine how you might react if one day when you weren't feeling well you were suddenly grabbed by an alien," she says.

Moreover, the observations made during routine daily care of each turtle are also important indicators for

除作為部分海龜族群的攝食區域，台灣同時也是綠蠟龜的重要產卵棲地之一。

澎湖縣政府1995年將望安島區域公告劃設為野生動物保護區，至今仍是母綠蠟龜穩定繁殖地。編號TW139的母龜，被記錄到連續28年至保護區網垵口沙灘上岸產卵，即是保育區成果的最好證明。

也因此，澎湖漁業生物研究中心的海龜救護收容工作站，自1997年設立以來，除致力救援因故擱淺海龜，也收容較晚孵化或身體虛弱的小海龜。

吃著水面上的細碎泡沫，或是將一對前鰭足收到背甲側邊，不同時期入住「膠囊旅館」的小海龜，如今狀況都相當穩定。澎湖漁業生物研究中心副研究員許鐘鋼表示，只要維持現在的健康狀態，成長約兩、三年後，體重達三公斤時，小海龜便能準備迎接回到大海的生活。

他指出，包含小海龜，工作站27年來總計收容620例個案，成功野放342隻海龜回到大海，採訪這一天的獸醫師巡檢，除了確認救傷海龜的現況，也是為野放前做最後確認。

野放前的最後一哩路

收容中心另一頭，重達數十公斤的113-04被中華鯨豚協會獸醫團隊以保定姿態，暫時安置在軟墊上，接著以都卜勒檢查脈搏，以及進行測量背甲和腹甲長度、檢查有無明顯外傷，還有抽血作業等健康檢查項目。

中華鯨豚協會野動救援組獸醫師陳毓蓉補充，尚未把海龜帶出水池前，他們也會觀察其游泳姿態、遇見人的反應等行為，因為海龜每個舉動都是判斷病情的重要依據。

「你可以想像今天你身體很不舒服時，突然有一個外星人把你抓起來，你的反應會是什麼。」她說，團隊曾遇過對於檢查沒有絲毫反應，但確認有生命徵象的個案，如此反常狀態被判其有很高機率處於病重狀態。

另外，平日照護的觀察也是判斷健康狀態的一項重要指標。許鐘鋼是工作站的靈魂人物，他與夥伴每天悉心餵食、清潔水池，並細膩觀察每隻海龜的活動力等，讓牠們從最初性命垂危，恢復至如今的健康模樣。



除澎湖望安鄉，小琉球沙灘也是母海龜選擇上岸產卵的重要棲地之一。（海保署提供）

In addition to the islands of Penghu's Wang'an Township, the beaches of Xiaoliuqi Island are another important habitat where female sea turtles come ashore to lay their eggs. (courtesy of OCA)

失去左前肢的112-40健康狀態良好，距離回到大海，只差最後一哩路。

Sea turtle 112-40, which has lost its left front flipper, is otherwise in good health and is at the final stage before being returned to the sea.



judging its health status. Xu Zhonggang is the heart and soul of the PSTRC, and every day he and his partners meticulously feed the turtles, clean the water in their tanks, and closely observe their energy levels.

“When it first came in, the muscle in its left front flipper had decomposed to the point where the bone was visible, which we treated by cleaning the wound and applying medication. Now you only need to look at its neck and you can see how well it has recovered.” Comparing Xu’s description of turtle 111-17’s condition when it first arrived with the well-fed creature we see today, they seem like two different animals.

Depending on their individual physical condition, post-care rehabilitation for sheltered sea turtles can take anything from a few months to several years, until ultimately they can return to the sea following careful evaluation by experts.

Xu cites the example of turtle 112-40, which has lost its left front flipper, and is currently still at the PSTRC. Experts note that there are sea turtles living in the wild that are missing one or more limbs, and therefore one cannot say categorically that a turtle with a missing limb cannot be released. Thus the team has increased the level of health checks on this animal and continues to reassess the feasibility of returning it to the open ocean. Conversely, says Xu: “Right now there are two sea turtles at the National Museum of Marine Biology and Aquarium in Pingtung which are unable to submerge and so have been assessed as not suitable for release.” He explains

that when sea turtles are brought into the shelter most have not ingested any food for a long time, and a long-term build-up of air inside their shells causes them to float. But after they begin eating again, they usually return to normal. On the other hand, turtles that cannot be nursed back to health after a long period of care very likely have irreversible illnesses or injuries, which reduces their chances of being released into the wild.

The Marine Animal Rescue Network

According to past research, the main reasons why sea turtles lose vitality and end up getting stranded include their being accidentally mixed up with fishing catch,

澎湖海龜救護收容工作站副研究員許鍾綱自開站以來致力救援擱淺海龜。圖中白色帆布製品為其自創的海龜專用擔架袋。

Xu Zhonggang, associate researcher at the Penghu Sea Turtle Rescue Center, has worked for many years to rescue stranded sea turtles. The white canvas object in the photo is a stretcher he created for carrying sea turtles.





海洋保育署海洋生物保育組科長柯慶麟指出，部分野放海龜會安裝衛星追蹤，為海龜研究提供更全面的資料。

Ko Ching-lin, section chief in the Marine Conservation Division of the Ocean Conservation Administration, fits satellite tracking devices to some sea turtles released into the wild to provide more comprehensive research data.

「牠進來的時候，左前肢肌肉腐爛都已經見骨，是清創、上藥才好的，你看牠的脖子就知道牠吃得有多好。」許鐘鋼描述的111-17彼時病況，與如今被照顧到連獸醫認證營養十分充足的牠，彷彿是兩隻不同的海龜。

視個體狀況不同，收容照護後的海龜康復期短則數月、長則數年，最後經專業人員縝密判斷後，才會迎接回家的最後一哩路。

許鐘鋼舉例，目前收容於工作站的112-40，是失去左前肢的案例，而專家表示野外也有斷肢生活的海龜，因此尚無定論斷肢個體無法野放，團隊持續加強檢查和判定其回到大海的可能性。「目前屏東海生館裡兩隻無法下潛的海龜，就被認為不適合野放。」他解釋，剛進收容中心的海龜通常因長時間無進食，身體累積空氣而長時間呈漂浮狀，但恢復進食後，通常會恢復正常狀態；反之，經長時間照護後仍未康復，則有極高可能患不可逆病情或傷勢，也影響未來野放的可能性。

集結官民學力量「海保救援網」

根據過往研究，使海龜活力下降以致擱淺的原因，包含漁業混獲、船隻撞擊、誤食海洋垃圾、幽靈漁網纏繞等。

根據海洋委員會海洋保育署（下稱「海保署」）統計資料顯示，海龜被發現擱淺時，兩至三成為活體個案，約七、八成則是已明顯死亡個體，根據遺體腐爛程度，有相對應處置方式。

為提高擱淺海龜目擊率及活體救援存活率，海保署於2019年建立海洋保育類野生動物救援組織網（下稱「海保救援網」），統整中央單位、地方政府及學術研究組織等，明確分工現場救援、照護收容、鑑識分析與教育宣導四大組別，為擱淺鯨豚與海龜爭取救援時間。

海保署海洋生物保育組科長柯慶麟表示，海保署延續農業部既有保育野生動物組織框架，擴大合作團隊範圍，並經過多次會議討論，才建置出如今的海保救援網，隨後每一年也都持續根據救援現場修改運行細節，不斷強化救援網。

柯慶麟指出，海保救援網的組織，以及科技的進步，讓通報更加順暢，也連帶讓更多民眾透過各縣市政府1999市民專線，及海巡署118專線，實際為保育盡一分心力。據統計，目擊海龜擱淺案件，2015年時僅50餘起，近年則大幅提高至一年300多起；113-04獲救關鍵，即是民眾警覺牠於傍晚時不正常漂流，撥出的那通電話。



除擱淺海岸，混獲也是導致海龜擱淺的其中一項原因。圖為海巡署人員協助安置遭誤捕海龜。（海保署提供）

Besides being stranded on beaches, becoming part of fishing boat bycatch is another reason why sea turtles need to be rescued. The photo shows Coast Guard personnel assisting a turtle that was accidentally caught by a fishing vessel. (courtesy of OCA)



(左) 每隻送到收容中心的海龜，皆需經過獸醫
縝密檢查。(國立海洋生物博物館提供)
(left) Every sea turtle brought into a shelter must receive
a thorough veterinary checkup. (courtesy of NMMBA)

(下) 海保署開設相關課程，教導海巡署、海洋
巡守員等一線人員，面對擱淺海龜時該如何應
對。(海保署提供)

(below) The Ocean Conservation Administration
offers classes to teach frontline personnel such as
coastguards and the OCA's own coastal patrol staff how
to deal with stranded sea turtles. (courtesy of OCA)

being struck by vessels, mistakenly eating marine trash, or getting snagged in abandoned fishing nets.

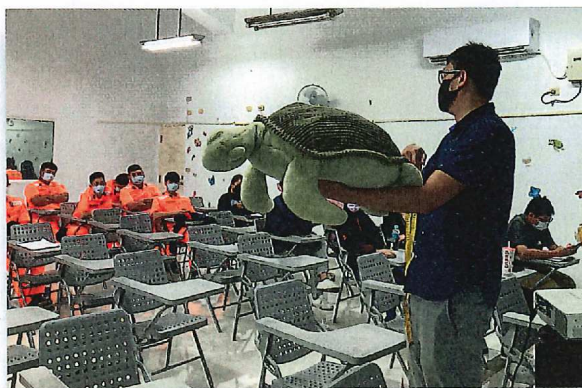
Statistics from the Ocean Conservation Administration (OCA) of the Ocean Affairs Council show that only some 20–30% of stranded sea turtles are still alive when found.

To improve the chances of stranded turtles being discovered while they are still alive and so increase the numbers that can be rescued and will survive, the OCA founded the Marine Animal Rescue Network (MARN) in 2019. This network brings together central government agencies, local governments, and academic institutions with a clearly defined four-way division of labor: on-site rescue; care and shelter; forensic analysis; and public education. The aim is to gain more time for the rescue of beached cetaceans and sea turtles.

Ko Ching-lin, section chief in the Marine Conservation Division of the OCA, notes that the creation of MARN and advances in technology have made reporting much easier. These factors enable more citizens to do their part for conservation by calling their 1999 local government hotlines or the Coast Guard Administration's 118 hotline. Turtle 113-04 was rescued because one evening citizens noticed it was floating abnormally and they called in to make a report.

Treating through eating

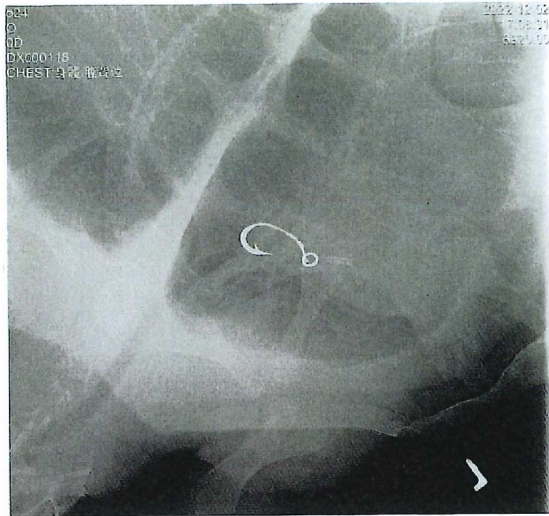
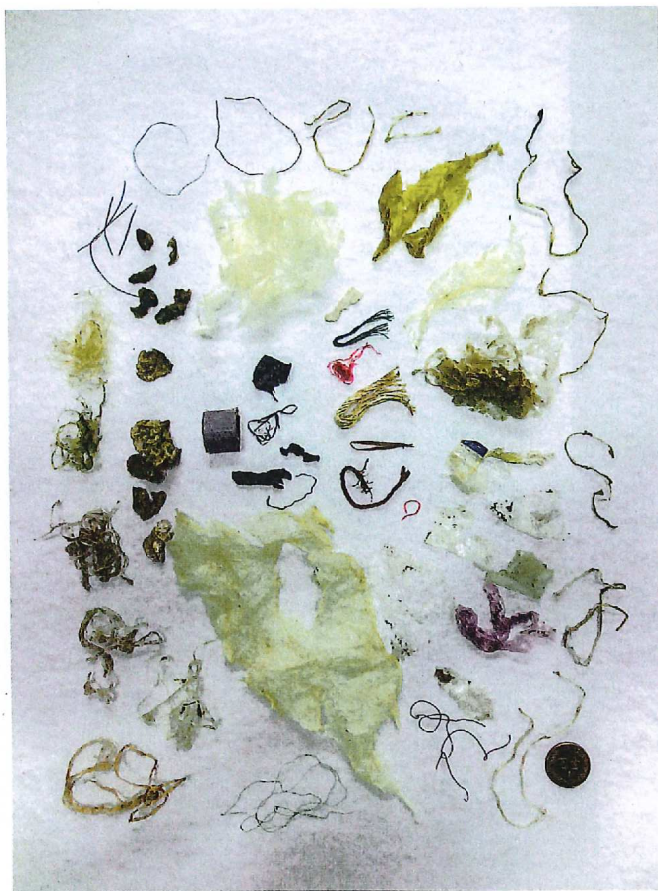
Taiwan has seven sea turtle rescue centers in total, and the shelter capacity of the one at the National Museum of Marine Biology and Aquarium (NMMBA) in Checheng, Pingtung County, is second only to that of the PFRC. As well as being a rescue center and shelter for injured sea turtles, it is a bastion of sea turtle research in Taiwan.



Squid, shrimp, crab, and oyster, carefully weighed out according to a chart, make up the “special diet” for sea turtles at the NMMBA shelter. Care staff take pills and capsules out of pill organizers and insert the medicines into this food. Looking carefully at the chart, one can see that there are even notes in red ink showing which of the patients are picky eaters.

Li Tsung-hsien, an assistant researcher in the Biology Department of the NMMBA, explains that the types and amounts of food fed to sea turtles at the shelter are individually tailored to each animal's physical condition, with customized medications and nutrition. For example, a seriously injured turtle will be given extra protein, and its diet will be further adjusted according to its state of health as it moves into later stages of treatment and rehabilitation.

Li notes that as turtles get closer to being ready for release, the research team will adjust their diets to feed



(上) 誤食的魚鉤因為處理不當而留於海龜體內，為其帶來嚴重傷害。(海保署提供)

(above) Improperly discarded fish hooks may be eaten by sea turtles, causing serious injury. (courtesy of OCA)

(左) 李宗賢觀察到，入住收容中心的海龜幾乎100%，都會在收容期間排出人造垃圾。(國立海洋生物博物館提供)

(left) Li Tsung-hsien notes that virtually all sea turtles placed in shelters excrete human-generated trash during their stays. (courtesy of NMBA)

救傷先譜「龜」食性

全台總計七座海龜救傷收容中心，收容量能僅次澎湖水試所，是位於本島的國立海洋生物博物館，不僅為海龜救傷收容中心，也是台灣海龜研究的重鎮。

對照表格，細心秤量小卷、白蝦、螃蟹和帶殼牡蠣，這是收容中心海龜們的「特製餐點」；照護人員接著打開一格格藥盒，把藥丸塞入其中，仔細看表格，還能看到紅色筆跡標注哪隻「病人」有挑剔的食性。

國立海洋生物博物館生物馴養組助理研究員李宗賢表示，收容中心海龜的攝食重量與品項，都會根據身體狀況調整，量身配置藥品及營養品。若是傷勢嚴重的個案，則會給予較多的蛋白質，進入康復中後期，會再根據個體狀況調整。

以主食為藻類的綠蠵龜為例，李宗賢指出牠為機會性主義者，有蛋白質可吃時，則以肉為先；接近野放時程，獸醫團隊便會調整飲食為其在大

海中較常攝取的鹿角菜、石蓴等藻類，為野放預先準備。

處理完食材，餵食作業也有眉角。把食物丟入池中各種深淺度，可以觀察海龜下潛狀況；只吃肉不吃藥的海龜，則需詳細記錄，再由獸醫更換藥品種類；觀察到挑食的海龜，也需特別留意，為其分配其他食物。諸多根據海龜安排的「客製化套餐」，皆是希望能讓受傷的牠們盡速返回大海。

李宗賢笑說，他初入收容中心團隊時，面對的第一隻個案，即是不願進食、終日漂於水面的成年海龜，靠著耐心逐項嘗試，才終於等到牠願意張口的那一天；願意進食後，康復狀況突飛猛進，隔年便被送回家——大海。

倘若是因病離水的個案，則會陷入無法進食、無法運動、極差新陳代謝、藥品吸收效力低的負面循環裡，何時能康復，連執業十多年的李宗賢也沒個把握。

them the kinds of algae that they commonly consume in the ocean, such as red seaweed and sea lettuce.

After the sea turtles' meals are prepared, there is also an art to feeding them. By putting food into a tank at different depths, researchers can observe how well the resident turtle is diving. Moreover, careful records must be kept of those turtles that only eat the meat without consuming the medications, so that veterinarians can change the types of medicine given. Records must also be kept of turtles who are picky eaters, so that they can be fed with alternative foods. Many "custom meal plans" are prepared for the turtles, all with the aim of enabling the sick and injured animals to return to the sea as soon as possible.

Li Tsung-hsien says with a smile that the first case he encountered when he started working at the shelter was an adult turtle that refused to eat and simply floated on the surface all day long. He had to patiently try out various alternatives before the day arrived when the turtle was finally willing to open its mouth and consume food. After that, it made rapid progress in recovering its health and the following year was returned home to the sea.



將藥丸塞入食物恰到好處的位置，才能讓每隻海龜都能順利吃下。

Caregivers administer medication to sea turtles by inserting pills into their food.

Stories of sea turtles

There is no universal treatment for sick or injured sea turtles, and for each fresh case the rescue team must get to know the newcomer from scratch. As they do this, they find they are turning the pages of stories that no one has seen before.



國立海洋生物博物館生物馴養組助理研究員李宗賢（右2）與團隊夥伴，全天候悉心照料受傷的海龜。

Li Tsung-hsien (second from right), assistant researcher in the Biology Department of the National Museum of Marine Biology and Aquarium, works with other team members to care for injured sea turtles.

台灣海龜保育的成果，透過海保署持續參與一年一度國際海龜研討會與他國交流，為全球海龜研究貢獻一份心力。(海保署提供)

Taiwan's achievements in sea turtle conservation are shared with other countries through the Ocean Conservation Administration's participation in the annual International Sea Turtle Symposium, making a contribution to global sea turtle studies. (courtesy of OCA)



說，海龜的故事

海龜救傷沒有萬靈丹，面對新收治的個案，團隊皆要從頭開始和牠們認識，同時也翻開一頁頁過往未曾看見的故事。

李宗賢說：「救傷收容過程中，總能看見海龜面對的威脅有哪些。」誤食的塑膠垃圾、魚鉤，說得是人類對海洋的破壞；效用變差的抗生素，透露抗藥性已經不再只是人類的事；衝出皮膚的纖維乳突瘤，目前被認為與海龜第五型疱疹病毒有關，至今仍是海龜未知成因的威脅來源之一。

「結合科學研究，便是希望能提供解決源頭的措施，不然收容中心的海龜永遠會收不完。」他說。

團隊藉由分析擱淺海龜解剖報告，為漁業活動造成海龜受傷提供具體且客觀證據，成為保育區劃設依據。李宗賢的博士論文，也以救傷個案數據為本，首創全球救援海龜存活預測指標，證明漂浮海龜在客觀數據上，有明顯高於一般海龜的死亡風險。

收容中心使我們看到更多海龜面臨的困境，也知曉牠們回家路的阻礙始於人類，惟有實際減塑、使用友善海龜漁網等，方能使海龜無憂地悠游於海洋中，牠的故事，也才會是幸福結局。□



Li says: "In the process of rescuing and sheltering turtles, we see the kinds of threats they face." Mistakenly ingested plastic garbage or fishing hooks tell of the damage that humankind is doing to the sea. Decreasingly effective antibiotics indicate that the development of resistance to medications is no longer limited to people. Fibropapillomatosis, a debilitating neoplastic disease whose cause is as yet uncertain but is currently thought to be associated with chelonid herpesvirus 5 (ChHV5), constitutes another threat to sea turtles.

"By accumulating scientific research, we hope to be able to offer measures that solve such problems at source. Otherwise, there will always be more sick turtles needing help than the shelter can cope with," he says.

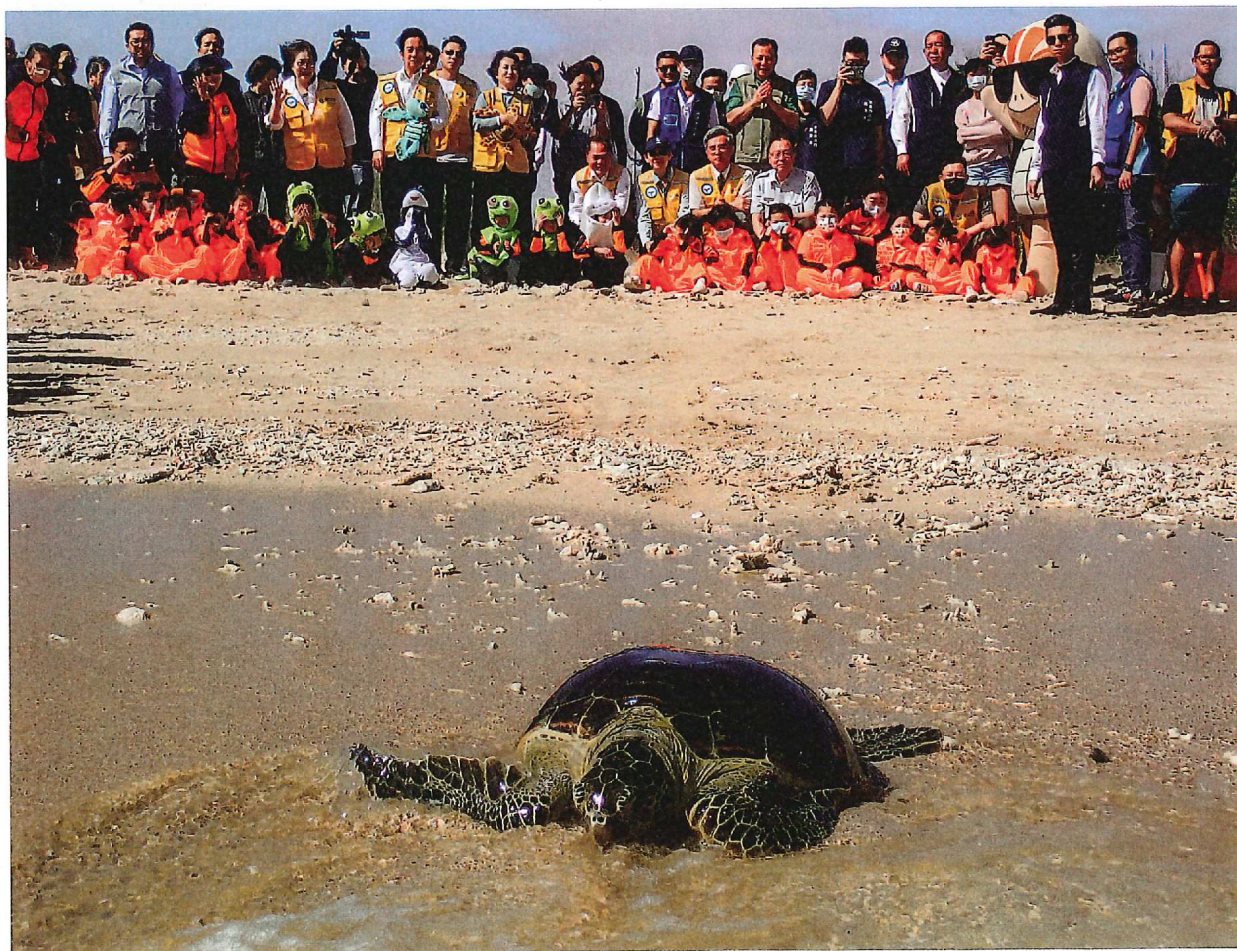
The team at the shelter uses autopsy reports on stranded turtles to provide concrete and objective evi-

dence about injuries caused to these creatures by fishing activities, thereby laying the foundation for the creation of conservation zones. Li's doctoral thesis, based on statistical data on rescued turtles, created the world's first indicators for predicting the survival of rescued sea turtles; it also proved that floating sea turtles are statistically at a much greater risk of dying than are other turtles.

Sea turtle rescue centers and shelters help us to see more of the threats facing these animals, and to understand that the obstacles to their returning to normal lives are created mainly by mankind. Only by taking practical actions like reducing plastic waste and using turtle-friendly fishing nets can we enable them to roam the seas without care, and only then will their story have a happy ending. □

*(Cindy Li/photos by Lin Min-hsuan/
tr. by Phil Newell)*

Taiwan President Lai Ching-te



在眾人守護下，海龜一步步爬回大海。(海保署提供)

Watched over by a crowd, this sea turtle makes its way back to the sea. (courtesy of OCA)