

FINAL REPORT

**AWARD NO. NA10NMF4540305
NOAA PACIFIC ISLANDS REGIONAL OFFICE**



**PROGRAMMATIC SUPPORT FOR INTRODUCING TURTLE
EXCLUDER DEVICES IN THE SHRIMP FISHERIES OF SABAH,
MALAYSIA**



**MARINE RESEARCH FOUNDATION
SABAH, MALAYSIA**

August 2012

Final Report

A. Project Title: Programmatic support for introducing turtle excluder devices in the shrimp fisheries of Sabah, Malaysia

B. Project Background and Principal Objectives

MRF has promoted the uptake of Turtle Excluder Devices (TEDs) in the Malaysian shrimp trawl fisheries since 2007. This bycatch reduction programme comes with the backing and support of both the Sabah Department of Fisheries and its Federal counterpart, the Department of Fisheries Malaysia of the Ministry of Agriculture and Agro-based Industry. Our project is aimed at reducing bycatch of endangered green and hawksbill turtles, which are taken at a rate of 1000-4000 a year in Sabah state alone (Pilcher et al. 2009). These turtles have been linked to Western Pacific US fisheries through satellite tracking and flipper tag returns (Pilcher 2010). Our project promotes the use of TEDs, which it alternatively introduces as Trash Excluder Devices, as, when fitted correctly in Malaysian trawl fishing nets, they can eject unwanted logs, coconuts, rocks, branches, and discarded tires (NRC 1990, Pilcher 2008). The market-based benefits to fishing communities of installing TEDs on fishing vessels are multiple, and include lower fuel costs, improved catch quality and thus higher revenue, lower gear loss and damage, improved ocean governance and co-management with State and Federal agencies.

Our proposal was developed to enable a site visit involving high-ranking fisheries department officers and technical experts to the United States in 2011, but which did not take place until 2012 due to logistical difficulties in securing the availability of all parties at the same time during a narrow window of opportunity when the NMFS Pascagoula lab was available each year to host the visit.

The objectives of the site visit were twofold: (1) to meet with senior officials at the Office of Marine Conservation, U.S. Department of State, in D.C. to discuss a framework and possible steps to develop a timeline for TED-compliance in Malaysian shrimp trawl fisheries, and (2) for the Malaysian Fishery officials to experience first-hand the applicability of TEDs to shrimp fisheries through a hands-on training programme with the NOAA National Marine Fisheries Service Pascagoula Gear Technology lab.

C. Project Accomplishments

Following substantial email, telephone and letter exchanges between MRF and the Federal Department of Fisheries, a suitable agreement for a date to conduct the site visit was reached by mid April 2012, and slated for the second-to-last week of May. It is virtually impossible to describe the logistical challenges of trying to dovetail the schedules of several government agencies separated by half the planet and language barriers, or the voluminous paperwork that went into communication to get this site visit off the ground. As with many well-designed plans, unfortunately some last minute changes in plans at both the Malaysian government side along with the NMFS Pascagoula lab meant the trip was delayed until June 09 through June 17, during which we were able to meet with both US State Department officials, NMFS technical staff and several other NMFS branches in Panama City, Florida, at the SEFSC, where we were graciously hosted by Centre's Director, Guy Davenport.

The Malaysian delegation consisted of the following participants:

1. Mr. Rosidi Ali, Director, Gear Technology Division, Kampung Aceh, Perak. Malaysian Department of Fisheries (Federal);
2. Mr. Sharum Yusof, Deputy Director, Gear Technology Division, Kampung Aceh, Perak. Malaysian Department of Fisheries (Federal);
3. Mr. Syed Abdullah Abdul Kadir, Director, Marine Turtle Conservation Programme, Turtle and Marine Ecosystem Center (TUMEC), Malaysian Department of Fisheries (Federal); and,
4. Mr. Godfery Kiskey, Deputy Director, Sabah Department of Fisheries (State), along with
5. Dr. Nicolas Pilcher, Executive Director, Marine Research Foundation, Sabah.



The trip also coincided with a collaborative working visit by the US Department of State official in charge of the TED certification program, Ms. Marlene Menard, which enabled the Malaysian delegation to understand the certification process, the opportunities available to Malaysia through partnership in the program, and the link between the US State Department and the NOAA NMFS technical team based at Pascagoula. Additionally, a senior representative from the Mexico enforcement agency (PROFEPA) also opportunistically participated in the cross-site visit, providing the Malaysian delegation with the opportunity to discuss with a TED partner country the pitfalls of establishing a TED programme from scratch.

Further, the trip coincided with the annual TED tests and trials undertaken by the NMFS Pascagoula lab, during which various TEDs and TED configurations are trialed and evaluated under controlled conditions. These trials are logistically and technically complex, involve many people and several NOAA agencies, and yet provided the optimum background for the Malaysian delegation to witness firsthand the efficacy of the devices (over hand-reared 100 turtles were used in the trials) and the impact of grid placement, deployment angle, and type. On any given day there were several staff from the Panama City SEFSC, at least ten to fifteen staff from the Pascagoula lab headed by John Mitchell, and two to three staff from the NOAA Galveston lab, headed by Ben Higgings. Over the years, the Galveston Lab has played an important role in the conservation and recovery of turtle species through ongoing research, head-starting experiments and support of international conservation efforts, and provides the head-started turtles used in the TED trials.

The Pascagoula lab research activities are carried out in response to resource management, environmental, and utilization needs, and are the lead agency in developing and testing TED technology for the US government. MRF has worked with the Pascagoula lab in the past, with their experts coming to Malaysia on two occasions to run workshops, and subsequently hosting a very successful site visit for Malaysian fishers in 2009. MRF will once again host the Pascagoula technical team in Malaysia in late 2012.

There was a full agenda of activities during the site visit, summarized as follows:

Day 1: Arrival. Settle into accommodation. Introductory briefing by John Mitchell.

Day 2: Technical presentations, including "Purpose of the Site Visit and MRF's role in TED Uptake in Malaysia" by Nicolas Pilcher, "Role and Activities of the Panama City SEFCS Research Lab" by Guy Davenport, "History and Development of TEDs in the US" by John Mitchell, "Turtle Research and Headstart Programme" by Ben Higgins, "TED Technical Specifications and Guidelines" by Jack Forrester, and "Malaysian Bycatch Reduction Programmes" by Rosidi Ali.

Day 3: Construction of TED from raw materials – this was a hands-on activity during which the Malaysian team constructed an entire TED extension, affixed the grid, cut the escape chute and sewed in the flaps. In the afternoon we visited various TED-equipped boats in Panama City.

Day 4: At-sea Trials. The at-sea trials involved the Malaysian delegation in deployment and retrieval of turtles and TED-equipped nets, participation in discussion and deliberation over TED performance, assisting the dive team and overall participation in the NOAA trials.

Day 5: At-sea Trials (continued). The Malaysian delegation continued their involvement in deployment and retrieval of turtles and TED-equipped nets, participation in discussion and deliberation over TED performance, and overall participation in the NOAA trials.

Day 6: Technical presentation from the US State Department by Marlene Menard and summary of lessons learnt. During the afternoon the Malaysian team developed a trip report of their own for the Malaysian Director of Fisheries.

Day 7: Cultural site visits.

Day 8: Packing and departure.

The trip provided the opportunities to build on past TED development work in Malaysia by MRF, and by all accounts from people on both sides of the ocean the trip was overwhelming success, with the US team impressed with the interest and non-stop involvement of the Malaysian delegation, and various commitments by the Malaysians to take the lessons home for implementation. Several discussions have already taken place about setting up a National Committee to drive the TED programme, with MRF involved in a technical capacity, and meetings have already been held with the Director General to discuss an immediate action plan for implementation. Since that time the Malaysian government has reached out to the US Department of State for copies of existing partnership arrangements in order to prepare a full briefing for Cabinet discussion.



A daily blog was written in a casual manner to keep track of the project activities, and this is appended in Annex I to provide a synthesis of activities, deliberations, and discussion topics. A paragraph from the final day summarises the importance of missions such as these:

“It is trips like this that catalyse these sorts of efforts, and everyone acknowledged that

the face to face meetings, the realisation that there are extensive trials that go behind the TED certification programme, and that people care and are committed to this in the long run, were the most outstanding parts of the visit. As Rosidi summed up the comments from the Malaysia delegation, he noted that ‘...how very impressed we have been with the way the visit was not only about some technical lectures, but about working alongside the US NMFS team to devise actual solutions, and how rewarding that has been’. It was evident the partnership was already a given, now all we need to do is build on this and work toward introducing TEDs bit by bit into our fisheries.”

Finally, each participant was asked to provide a short summary of their experiences, lessons learnt and thoughts on the future, which are provided in Annex II. There are some interesting insights and some very positive comments about the future of the TEDs programme in Malaysia in these short write-ups.

D. Relevance to NOAA Fisheries' Mission

This project directly addresses the spirit and intent of the NOAA Fisheries' Mission “Stewardship of living marine resources through science-based conservation and management and the promotion of healthy ecosystems” as it seeks solutions to the “management, conservation and protection of living marine resources which are directly impacted by US fishery fleets”, and which are of critical significance due to their listing under the U.S. Endangered Species Act. Recent genetic research (Jensen & Pilcher, in prep) and satellite tracking data (Kolinski et al. in prep., NOAA Fisheries, unpubl. data), link the Malaysia turtle populations to those of the Western Pacific (Fig. 1).

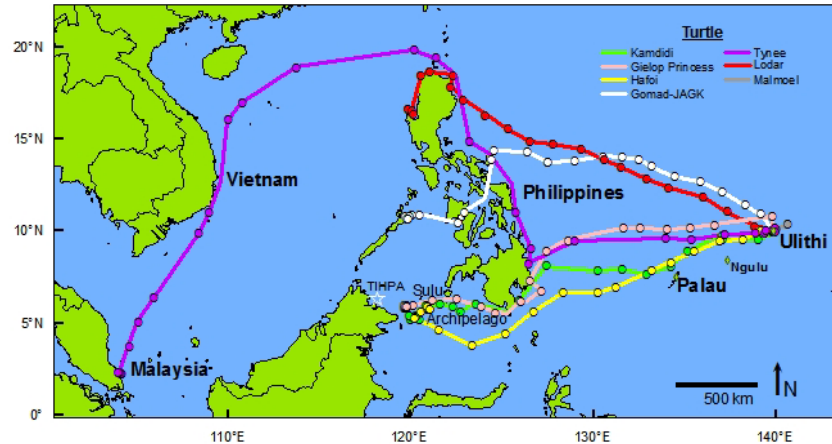


Fig. 1. Satellite tracks of post-nesting female turtles tracked from the western Pacific into the Sulu-Sulawesi Seas, and the coasts of Malaysia (Graphic courtesy of NOAA NMFS, unpublished data).

E. Relevance to the NOAA International Cooperation and Species Recovery Plans

Following the US requirements for compliance with P.L. 101-162 with regard to TEDs and shrimp trawling operations, Malaysia joined with three other countries and sued the US at the WTO citing breach of trade laws and unfair imposition of US laws on foreign countries. The WTO upheld the suit and the US was required to continue importing shrimp. The US subsequently appealed the ruling but lost the appeal, and turtle-unfriendly fisheries persisted. Eventually the US argued at the WTO that the purpose of the law was to protect sea turtles, not to detract from trade, which the WTO agreed to, and the four countries were given the opportunity to counter the new decision, which all declined to do. From that day on, these countries have been required to use TEDs or the equivalent if they wish to export shrimp to the US. This created substantial tension between governments, and in Malaysia between government and NGOs pushing for TED adoption. Since 2007 MRF has slowly built support within the Malaysian government to go back to evaluating the use of TEDs in such a manner as they do not conflict with fisher needs and income generation capacity. This is in keeping with the broad terms of reference for the US NOAA NMFS TEDs outreach program. We also facilitate the transfer of appropriate technology to from the US to Malaysia to promote qualification for certification.

Marine turtles impacted in the Sulu and Sulawesi seas (where the project is based) can originate from as far as Guam, Yap and other parts of the western Pacific, and down as far south as Australia (Fig. 2). The US Recovery Plan for the Pacific green turtle found that “outside of Hawaii, the green turtle populations have seriously declined and should probably be classified as Endangered” (NMFS USFWS 1998), and prescribes nine key measures need to aid in the recovery of Pacific green turtle stocks. This proposal directly addresses Action 3 of the US Recovery Plan, to “Reduce incidental harvest of green turtles by commercial and artisanal fisheries”, while at the same time meeting the objectives of Action 6, to “Support conservation and biologically viable management of green turtle populations in countries that share U.S. green turtle stocks.”

Finally, our work addresses regional efforts to implement an ecosystem-based approach to fisheries by addressing impacts on non-target species within ecologically meaningful boundaries (FAO 2003). Through this, we are assisting

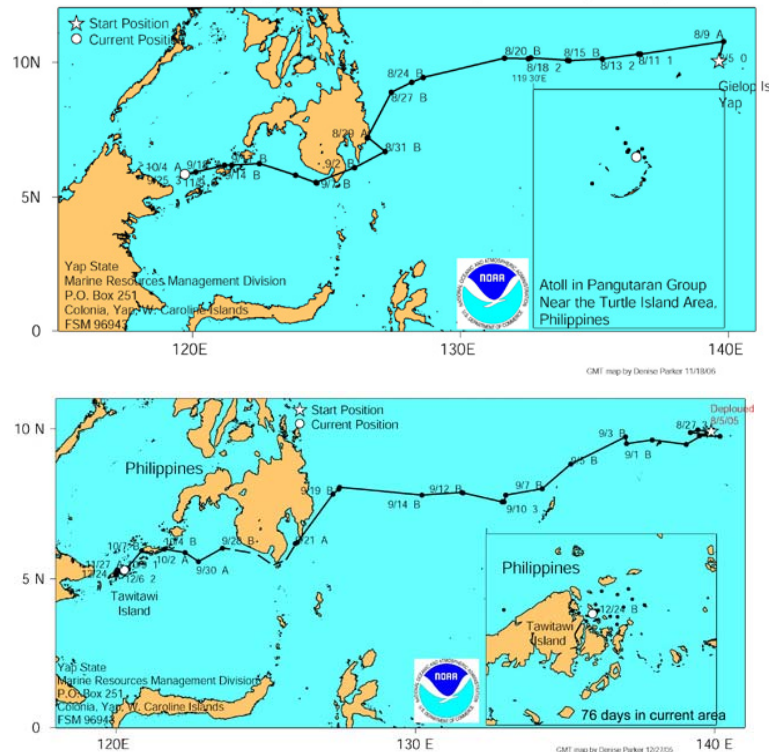


Fig. 2. Post nesting migrations of green turtles from the Gielop island, Yap, Federates States of Micronesia. Graphics courtesy of Steve Kolinski, Marine Resources Management Division, Yap. Tracking technology courtesy of the Marine Turtle Research Program, NOAA, National Marine Fisheries Service, Pacific Islands Fisheries Science Center.

F. Relevance to National and Regional Conservation Initiatives

MRF's bycatch reduction efforts address sea turtle conservation Objective 1 (to reduce direct and indirect causes of sea turtle mortality) of the Malaysia National Plan of Action (NPOA; DoF Malaysia 2008) through Objective 3.0 Research and Monitoring (Actions 1,2&3), Objective 5.0 Building Capacity for Conservation, Research and Management (Actions 1&2) and Objective 6.0 Integrated Management for Marine Turtles (Actions 1&3), and the recently adopted tri-partite Action Plan for the Conservation of Marine Turtles and their Habitats in the Sulu-Sulawesi Seascape (Pilcher 2009), along with Objective 1 of the Conservation and Management Plan of the IOSEA Memorandum of Understanding on Sea Turtle Conservation. The activities described in this proposal also directly address Goals 5 of the US-supported Regional Action Plan of the Coral Triangle Initiative (CTI), "addressing by-catch of threatened marine species", specifically under Regional Action 3 which deals with "incidental by-catch in fisheries, including legislative reform and practical modifications of fishing gear". This project also directly addresses Theme 5 of the Regional Action Plan of the Coral Triangle Initiative (CTI), specifically through "addressing bycatch in coastal fisheries".

G. Conclusions and Next Steps

MRF's Malaysia TED programme is multifaceted and recognises that fishery-wide TED compliance requires buy-in at all levels of society, from vessel crews to owners, and from government agencies to the wider general public. Since 2007 we have endeavoured to deal at all of these levels, and the project is far from over. However, site visits such as this one can play a major role in bringing about change. When MRF first started working, we dealt nearly entirely with fishers and crews in a 'bottom-up' approach and promoting voluntary adoption. But voluntary compliance is fraught with all kinds of issues and in the long run there is a need for government legislation which is enforceable, alongside widescale fishery buy-in. This recent trip enabled that capacity-building those government officers, in the 'top-down' side of the MRF approach, so that government policy can be moving along in tandem with our efforts at generating fisher buy-in. MRF will continue to work with the Department of Fisheries Malaysia and will continue to promote NOAA-Malaysia linkages as the backbone of the TED-adoption process. Ultimately we see our role as that of facilitating the development of capacity at a National level, and the provision of technical support to both fishers and the Department of Fisheries Malaysia, as Malaysia works towards fishery-wide TED compliance.

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Annex I - Daily Blog of Site Visit Experiences

Day 1:

The other side of the world is a long, long way away. Or so they say... But we found out yesterday and the day before (yes, it takes nearly two days...) as we travelled from Malaysia to Panama City Florida, to work with the US National Marine Fisheries Service as part of a learning exchange between Malaysia and the US. With me are four officers from the Malaysian Fisheries Department: Rosidi Ali and Sharum Yusof from the Fisheries Research Institute, in Kampong Aceh (Perak); Syed Abdullal Abdul Kader from the Terengganu Fisheries Department and in charge of turtle conservation in Malaysia, and Godfery Kiskey from Sabah Fisheries Department. And no trip is without it's little hiccups: I had to fly on a different aircraft from Kuala Lumpur to Seoul and arrived a few minutes earlier than the Malaysian team. Then in Seoul we had all kinds of fun making sure we all had boarding passes to Atlanta, and hoping we could also pick up our boarding passes down to Panama City – no go except for Sharum! Why him?... Then in Atlanta we had nail-biting moments making sure everyone made it through immigration, particularly Rosidi, as his visa was in an older passport. But all went smoothly, and we got our boarding passes, introduced the Malaysian team to the TSA's upgraded security measures – kind of funny watching them holding up their trousers after taking off their belts to go through the scanner! – and eventually made it on to our short 1 hour hop down to Florida. The four absolutely zonked guys passed out before we even got to take off □ Then in Panama City my luggage didn't arrive.... What a surprise.... But we made it, and John Mitchell from the NMFS Pascagoula lab was there to meet us, and right behind us on our same flight was Marlene Menard, from the US Department of State, also to be part of the week's expedition. We checked into our condo, and what a palace! Complete with all the comforts of home. But travel takes it's toll, so we settled for an early evening meal and then we were all off to bed, ready for a full day of meetings the following day.

Day 2:

We are working with the folk from the NMFS Pascagoula lab over in Mississippi, but each year around this time they are over in Panama City running TED trials, testing different configurations, different types, and different settings to get things to work just right. Many of the gears they test are designed by fishermen, so that the fishers themselves will buy into using them once they get tested and approved. Our long-time friends from Pascagoula include John Mitchell, who is head of the lab, and Jack Forrester and Nick Hopkins, old fishing hands now working for NMFS focussing on the gear technology aspect of things. Also with us are some folk from the Galveston lab, headed by Ben Higgings, who are in charge of rearing the turtles that are used in the NMFS trials, and of course we are being hosted by the Panama City NMFS lab, headed by Guy Davenport, who have made us all feel very welcome and at home. We are also benefitting from the presence of Marlene Menard from the US Department of State, who will be with us for the work sharing her thoughts and experiences, and the role of the US Dept. of State in the international aspects of the TED outreach and assistance programmes, and the eventual certification process. And to make things even better, our trip coincides with that from a senior officer from the Mexican fisheries agency, Rigoberto Garcia, who is here to learn as much as he can but also to share the experiences of the Mexican TED programme, which is an unexpected bonus for our

team, as we grapple with the complexities of getting something like this off the grounds, and sustaining it well into the future.

Day two was about setting the scene: After personal introductions all around, Guy gave a very comprehensive presentation on what the Panama City lab does and how it helps with the TED trials, and welcomed the team to Florida. The Malaysian delegation was then treated to a short history of the long TED development process in the US by John Mitchell, who elaborated on the programme's hiccups and trials and tribulations, and also its successes. It was good to get an overall historic account of how things had evolved with the programme, and to discuss what made things work. Of particular note, in response to a query from one of our guys, was how communication between NMFS and the fishers was really the key to having a programme up and running. And having Jack in the group, who was a shrimp fisherman when the TED was being introduced, allowed us all to hear the fishermen's side of the story too. The team also got to see actual video footage of TED trials and even real turtle exclusions, and received packages containing printed and video materials to bring back to Malaysia. We then were treated to a great presentation by Rigoberto on the introduction of TEDs, the certification with the US process, but also their decertification in 2010 following poor uptake and compliance by the Mexican fishers. But he also shared with us how the Mexican programme was turned around with a 'zero tolerance' policy which ensured Mexico got re-certified just ten months later. Rigoberto also highlighted how the Vessel Monitoring System (VMS) in Mexico was a key ally in the process, as they could track individual boats which were suspected of bypassing regulations. Of course, all this was done in Spanish with me translating, so there were a few chuckles about having an Englishman come from Malaysia to translate for a Mexican guy in the US... But it was all good stuff, and helped highlight how the programme is not without its challenges. Jack then gave us all a very detailed presentation on TED specifications and US regulations – but highlighted that these were US regulations only – and how these came together to provide the backbone of the TED programme, and the guidelines under which it was enforced in the US. At the end of that, I must admit we were all dropping. 12 hours of time difference and a day's worth of jet lag was taking its toll, and it was time to call it a day. Tomorrow we hope to be offshore if the weather holds, and we'll keep you updated on progress.

Day 3:

It's six am – I only managed to sleep until four am because of jet lag. Seems the older I get the harder this is to deal with... Anyway, it's six am and the rain is pounding against the window of my condo, trees outside are bent sideways, and the howling resembles a midnight train through the forest. And today we're supposed to be going out on the NOAA research vessel *Caretta* to trial TEDs with sea turtles... Hmm, I think there might be a change of plans. I turn on the TV and the weatherman says there's a 50% chance of rain. Only 50%? It's pouring outside!!! This is Florida. Middle of the summer. It's supposed to be sunny and blue and hot. It's not. It's rainy and windy and miserable. But at seven am we pull up at the NOAA facility to check in and find out about the plans for the day.

Sure enough, plans for the day have been shelved – 'blown-in' they call it, so we revert to Plan B: let's build a TED from scratch. We rummage around the stores and come up with reams of new net webbing, and a TED super-shooter grid, a few sewing needles, a knife or two, and loads of enthusiasm. The Malaysian delegation were all ready:

notepads out, cameras out, backpacks off and stored. And Jack Forrester was there ready to lead them through the entire process. First we need a long rectangle of net to make the extension into which the TED will be installed. Then this needs sewing down a long end to make a cylinder of webbing. Sharum takes the lead on this, but passes on to Syed, then Rosidi shows them all how it should be done. Takes a real gear guy and Rosidi knows his stuff... Now we hang the leading edge of the TED grid, measure back and hang the rear end, and hang the whole thing up to make sure the angle is just right. Now comes the interesting bit, sewing the webbing onto the grid all the way around to make sure it doesn't slip and a turtle doesn't get stuck. Everyone helps, with one team going left and the other round to the right. Even I help with this bit, as the rains hit once more and everyone takes shelter in the cabin. Ok, now things get interesting, because all the measurements and requirements the guys learnt yesterday come into play: How large can the opening be? How far from the sides? Ohhh the little details.... Ok, so now they are all hands-on: Sharum and Syed on the grid, knives out, turtle escape hole being crafted, while Godfery and Rosidi are cutting new webbing to make the flaps. Cutting net webbing in a straight line requires great skills, and the guys don't let anyone down. It's a veritable TED-making operation! Jack is gently guiding the team through step by step, and questions are flying back and forth. Not just the how, but also the why. So we're nearly at the end, the two flaps need sewing on so they overlap a but at the leading edge, but Rosidi's there counting meshes (knots) like he's done it all his life, while the gang get the flaps and sewing needles ready. Now they take turns sewing for another half an hour and there you have it: a brand new TED installed in a six-foot extension, ready to be installed and used in real fishing operations.

But it's now over yet. The NMFS guys had one last surprise up their sleeves, as they bring out Jeff Gearhart to inspect the new TED. Will it pass legal regulations? Will the Malaysia team pass on the first attempt? Hmmmmm. Tensions are high. Laughter all around tried to disguise the worry, but all in a good natured way. Let's measure the opening. Let's measure the flap extension beyond the escape hole. What about the angle? Anything else? And the guys pass! It's a winner, with the angle the way it was designed to hang, and the openings and overlaps and extension all looking perfect. First time. Score one for the Malaysian team.

So the weather 'blew us in' but the day was not wasted. We had planned to do this later in the week but just switched the days around, and by the time we were done it was just shy of six pm. A whole day of learning and sharing, with just about everyone on the team having the chance to chip in: Capt. Drew, and his many years of experience. Jeff, Warren, Nick, Dan, Dominy, John, Jack. You name them, they all came down to lend a hand. I don't know, for the life of me, how the Malaysian team ever understood some of them, with their southern American drawl and thick accents, but I must say that watching from the upper deck as they all laughed and joked the day away it was a memorable event. Another wonderful day in the Malaysian TED adventures over with the NMFS team in Florida!

Day 4:

Day four, and expectations are high. Will the day be a go? Will we get to see TEDs in operation? Will the weather cooperate? As we walked to the car we got some idea of what to expect. It was still. No wind. No clouds. The sun was shining. And oh was it shining! Not a breath of wind to cool us down, and by seven am on the dock things were a frantic beehive of activity: Small, two-year-old laboratory-reared turtles were being

loaded aboard the Caretta in readiness for at-sea trials. Ropes were being readied, plans for deployment trials made, and the well-oiled machinery was in high gear, clearly evident. These guys have done this before, and it was wonderful to see the coordination and cooperation to get a mammoth task underway.

Today we were deliberately 'shooting' turtles through a trawl net and measuring the effectiveness of the TED with regards to how quickly the turtles were able to get out. This is how the NMFS test and certify new TED designs – most designed by fishermen – so that they can be used legally in the US. Anything longer than five minutes and the team of divers would step in and help the turtle to the surface. This was a complex operation. Three boats. Twenty one staff. Twenty five turtles. Nine hours. Four dives. The basic idea goes something like this: 1) Deploy a normal shrimp trawl with a TED installed. 2) Put a shot line down from the boat to the trawl headrope so turtles can be sent down to divers below. 3) Send three divers down from a second 'dive boat' to look after matters underwater. 4) Deploy a recovery team in a third boat to recover the turtles once they have gone through the net and are sent back to the surface by the dive team. 5) Come back and discuss the results.

Sounds simple, huh? But there is nothing simple to this in the slightest: There are strict communication rules between the divers and the Caretta through the shot line. There are strict diving safety rules. One of the divers sends a signal to the boat. Three pulls. A turtle gets sent down in a web basket and the lead diver underwater collects it, clips a float to himself, and then clips the basket to the main net. Then he opens the basket, retrieves the turtle, and lets it go down into the trawl net. One other diver films the entire sequence. A third diver starts a stopwatch to time the escape. All three follow the turtle backwards towards the TED, and watch it make its escape. The moment it gets out of the TED the stopwatch is stopped; the float is clipped to the turtle and sent to the surface. Video stops. All three go back to the headrope, signal for a new turtle, and the process starts anew. On the surface a team is readying the turtles in their baskets. Another is recovering the turtles on the surface and relaying them back to the Caretta. The dive team signal with a yellow float that the dive is over and they are surfacing. Another team retrieves the main net between dives, while another team fills scuba tanks, others pass gear back and forth, and tend the boats. It is all a well-oiled machinery.

And the Malaysian delegation had some real fun and some real work. First up was Godfery: Dive assistant on the dive boat. Next dive, Rosidi goes out on the recovery boat – Godfery still is a fixture on the dive boat. Dive three, and Sharum's on the dive boat and Rosidi is dive assistant. Syed keeps a watchful eye on all from the upper deck, taking it all in. Dive four and its musical boats again as the team go out on dive and recovery boats. Throughout the day they were physically handling turtles, working with the dive teams, and participating in the discussion of the results. John Mitchell was a great host explaining the whole process up front, and answering pointed and objective questions by the team. I could not have hoped for better hosts. Or for a better and more hands-on Malaysian delegation. The wonderful thing was the way everyone worked together – it is evident the Malaysian guys are all used to being out on boats, and the US team were more than welcoming and appreciative. I think we not only learnt a great deal, but forged some wonderful new friendships. It was great to stand back and watch it happen, and I am confident this is going to translate into great working relationships and a superb TED programme once we all get back home to Malaysia. The incredible learning opportunities a site visit like this brings can not be overstated: this was the first time the Malaysia team had ever handled these turtles (loggerheads is a first for all!) but

also worked with TEDs and seen them in action. It would have taken me decades to provide this sort of experience back home, and we saw the results of thirty years of experience shine through in a single day. Simply amazing....

Day 5:

It's funny how things can just become so... routine. Incredibly, that's how things seemed today out on the water. The Malaysian delegation was today a part of the team, rather than outside observers. Syed was out on turtle recovery duty, once, twice, and ready for more. Rosidi, Sharum and Godfery took turns on the dive boat, before Syed claimed that spot too. But the wonderful thing was how it all felt like 'business as usual'. The guys were stuck into TEDs testing like they had been doing it all their lives. Quite amazing considering that for some it was the first time they'd seen and handled one. They also were right at home handling the turtles as they came off the trials and got moved around the boats. Day five was a continuation of the TED trials, checking to see what worked and what didn't. We ran all of the control trials yesterday, so today was all about using TEDs in the wrong configuration to see if they could eject a turtle within the stipulated timeframe. Normally a TED tows through the water at 45-50 degrees, an angle which is steep enough to keep the flap covers closed (and keep the catch), but not so steep that the turtles hit it and don't know up from down and can't get out. Most people have a mental picture of a TED in which the flaps fly open and a massive gap is waiting for the turtle to swim out (and that fish and shrimp are Nemo-clever and go 'Oh, look, a hole, let's go guys!') Nothing could be further from the truth though, one, the fish and shrimp aren't that clever and don't see an exit, and the flaps remain closed and are actually quite hard to push open against the water currents as the trawl moves forward. And when the TED angle is too steep, the flap can push against the grid and make escape even harder. So in the US a grid angle that is too steep and does not allow the turtle to escape is considered illegal, while an angle that is too shallow can result in lost catch which is not in the fishermen's best interests.

Today's trials were about making sure everything we thought we knew about TEDs still stood. We set the TED out with a 70 degree angle, where the flaps bunch up tightly against the grid and make sure no catch is lost, but we found that turtles can take more than five minutes to get out, especially if the opening is set to be a bottom-shooting TED. These experiences are like living gold, because it's not every day someone gets to go out and purposefully test TEDs in various configurations to make sure we are giving fishermen the very best advice, and giving managers the best technical information upon which to base rules and regulations, and the Malaysian team got to be part of the entire thing.

The team also got to sit with Dan Foster and discuss circle-hook trials that the NOAA folks have been conducting, and which coincide with the work Rosidi and Sharum have been doing over in Malaysia, so there are a number of unexpected ways in which this trip has been useful for all. I am convinced these site visits have an incredible impact on people who have the potential to take the message back home and influence the future of fishing operations.

Day 6:

We got rained-in again. By seven am it was already pouring with rain, a nice gale-force was a-blowin' east to west, as they say, and things were not looking good. Day six was

definitely not meant to start like this. But as always, the NOAA folks had Plan B up their sleeves, after some quiet consultation with the Malaysian delegation yesterday: If it rained, they had decided, today would be set aside to examine video and data results from the trials, and then see what the weather had in store for us later in the day. So it was that by nine we had all assembled at our place, and filled the living room with the NOAA team and the Malaysian team, while Dominy set up the video playback onto the large 50" display we have in our place □. Once everyone was set we managed to go through several days of video, looking at how one configuration differed from the other in terms of how the net behaved, and also in how turtles were able to escape. And the discussions were loud, numerous, and criss-crossed the room - often multiple conversations were going on at once, in several languages too, as the Malaysian team debated amongst themselves and also sought clarification from the varied NOAA folk. For me this was a sight to behold: In just a few days we have been forging relationships that emails and occasional encounters at international meetings could never promote.

For those of you with a penchant for the technical, here's the skinny on the trials themselves: Without a doubt a top-shooting TED (with the exit hole on the top) made things easier for the turtles – when the bottom-shooting TED was in place we could see how the turtles struggled to find their way out for a minute or two longer than the other way around. But the downside of the top shooting TED is that debris and coconuts and logs and tyres etc. take longer or do not get out at all. One thing is for a turtle to actively swim around looking for an opening. Another is for an inert piece of wood to be pushed upwards defying gravity So the jury is out on which might work best in Malaysia. Indeed, chances are in some places with little accumulated debris underwater a top-shooter would be the best option, but in the waters in front of the Kinabatangan river in Sabah there's so much wood, logs, coconuts etc. washed down from the interior that the TEDs would clog in minutes if we could not eject them downward.

For those of you wanting to know where things go from here, I can tell you I just could not be happier: By afternoon as the weather cleared and the boat crew decided it was all systems go. While I went on the boat, the Malaysian crew stayed back to get a head start on their report to the Director General of Fisheries in Malaysia. This is an auspicious start - when folk prefer to stay back to write a report rather than go on a boat you know things are moving forward! I stayed out on the boat while we tested another twenty turtles, and by the time I was back in the evening the guys had put the finishing touches on the report, which will be submitted on their return. Not surprisingly, they were telling me that they included so many of the things we had all been discussing all along: the need to work with the fishers from the very start, the need for a flexible approach and multiple options as far as excluder designs go given that each fishery is different, and importantly that the certification process would give our fishers the added leverage and negotiating power that they currently lack when selling overseas, and the need for a legal requirement of some sort for this to all work. They also commented on how the potential loss of shrimp would easily be offset by the increase in catch quality, something the Terengganu trials have already demonstrated. So it is onwards and upwards from here, and I remain confident that the ball is very much in motion, in the right direction.

Day 7:

Day seven and things today come to a close for our site visit. This has been a tremendous trip, a wonderful opportunity for me to really get to know the Malaysian team, for them to get to know me and understand the motivation behind my interest in

seeing Malaysia become TED-compliant, and for them also to get to know the US TED programme and the people behind it. It's a bit hard to say how incredible this has all been, and I am struggling to find the words to close out this blog and the trip. We had a wrap-up meeting at our condo this morning with Jack Forrester, Marlene Menard and John Mitchell, and when it came time to say goodbye we were all a bit awkward in finding the right words. The final meeting was a good opportunity for Marlene to explain how the US State Department is involved in the TED certification programme, and how it liaises closely with the NMFS folk at Pascagoula for the technical input. She also was very open in explaining how Malaysia had the opportunity to become a partner with the US in the efforts to save sea turtles from shrimp trawling, and how such a partnership could help provide technical advice, and funding even, to see a TED programme mature back home. I am very optimistic after hearing everyone's points of view today that TEDs are very likely going to be a permanent fixture in our fisheries back home. It is trips like this that catalyse these sorts of efforts, and everyone acknowledged that the face to face meetings, the realisation that there are extensive trials that go behind the TED certification programme, and that people care and are committed to this in the long run, were the most outstanding parts of the visit. As Rosidi summed up the comments from the Malaysia delegation, he noted that '...how very impressed we have been with the way the visit was not only about some technical lectures, but about working alongside the US NMFS team to devise actual solutions, and how rewarding that has been'. It was evident the partnership was already a given, now all we need to do is build on this and work toward introducing TEDs bit by bit into our fisheries.

This afternoon we had some down time, and went into town to do some shopping to bring home some small things for our families - our small bit to support the US economy! For me this was a wonderful personal moment, seeing the guys buying things for their wives and children at home, and all of us sharing stories of our own families and giving this trip a personal feel as well as a professional one. We also stopped for a blowout lunch at a great seafood place over in historical downtown Panama City, feasting on oysters, crab cakes, a few more oysters, grilled tuna and shrimp, more oysters, and, and, and.... I think we're all still reeling from the seafood intake, but it was nice to know we were all enjoying turtle-free shrimp!

Now everyone's back packing their things, getting ready for a five am departure from our hotel to the airport. It's a long way home, and I think everyone is looking forward to being back in Malaysia after this week of TED immersion. Me? I'm sitting back with a big smile on my face and a satisfied feeling in my heart, knowing this trip was all worth it. Every single second of it.

I trust you have enjoyed reading about our TED adventures and are as hopeful and optimistic as I am about the Malaysia TED programme. Please don't hesitate to follow MRF's Malaysia TEDs programme on our website at <http://www.mrf-asia.org>.

Annex II – Personal Reports from Participants

Report on the Technical Visit to Panama City, USA: 9 -17 June, 2012 Rosidi Ali (Malaysia)

The technical visit is very beneficial to me as a researcher in fishing gear and technology. It has given me an opportunity in understanding on several aspects regarding to the TEDs (Turtle Excluder Devices).

In the briefing and discussion session on the first day of our arrival, we had been presented with

- I. The roles and functions of the institutions involve and responsible in certification of TED in USA
- II. The designs and specification of some certified TED in USA
- III. Success experiences in implementing TED in USA and Mexico

We were very fortunate to have a chance to learn and practice the installation of TED supervised by experiences trainers from NOAA.

The most interesting experience was the opportunity to join and participate in two sea cruises to test and evaluate the performance of TED. It has exposed us on the methodology of certification of TED in USA.

The visits to the fishing ports has able us to observe several designs of TED onboard of local trawlers.

I very much appreciate the excellent arrangements for the visit made by the Marine Research Foundation (MRF). The knowledge, skills and exposure during this technical visit will assist us in planning and implementing a program to use TEDs in Malaysia. The visit will also serve as a bridge to enhance further corporation in the future regarding the use of TED in Malaysia.

I also would like to take this opportunity to acknowledge Dr. Nicolas J. Pilcher of MRF and experts, officers and staff of NOAA for their kind and warm hospitality extended to us during the visit.

**REPORT OF “TURTLE EXCLUDER DEVICE (TED)” WORKING VISIT,
TRAINING USE AND IT’S VALUE IN PANAMA CITY, FLORIDA, UNITED
STATES
BY THE SABAH DEPARTMENT OF FISHERIES OFFICER - MR GODFERY
KISSEY AT 7-19 JUN 2012**

1.0 Introduction

This report addresses the observations, experience gained and the overall discussions which took place during a cross site visit and training use and evaluation for "Turtle Excluder Devices (TEDs)" in Panama City, Florida, United States by Mr. Godfery Kissey, Fisheries Officer, Department of Fisheries.

2.0 About the Visit

2.1 The Mission

The delegation from Malaysia consisted of:

- (i) Mr Rosidi Ali - Fisheries Research Institute, Kampong Aceh (Silver), Department of Fisheries Malaysia.
- (ii) Mr. Sharum Yusof - Fisheries Research Institute, Kampong Aceh (Silver), Department of Fisheries Malaysia.
- (iii) Mr. Syed Abdul Kader Abdullal - Terengganu Fisheries Department (Head of Conservation Turtle, Malaysia) and;
- (iv) Mr Godfery Kissey - Department of Fisheries Sabah.

2.2 Date and Duration of Visit

Working visit and training in Panama City, Florida, was for nine days starting on Saturday, June 9 to Sunday, June 17, 2012. This includes day-to-day commuting and also travel expenses back to Sabah.

2.3 Places Visited

Working visits and training programs involved a TED organized briefing, TED construction, and testing at sea for trial and error by US-NMFS, Panama City, as follows:

Date	Places Visited	Record
9/6/2012 (Saturday)	KKIA, Kota Kinabalu	Travel to Panama City, Florida, America via Kuala Lumpur; Incheon, Seoul Korea; and Atlanta, America.
10/6/2012 (Sunday)	U.S. National Marine Fisheries Laboratory Service (US-NMFS) Panama City, Florida.	Briefing, history, success, program countries (Mexico) and discussions about TED

11/6/2012 (Monday)	U.S. National Marine Fisheries Laboratory Service (US-NMFS) Panama City, Florida, and on-board survey of fishing gear – R / V Caretta	Sewing Purse and TED Construction Equipment
12/6/2012 (Tuesday)	Gulf of Mexico	TED test could not be implemented due to weather conditions
13/6/2012 (Wednesday)	Gulf of Mexico	First and Second TED test
14/6/2012 (Thursday)	Gulf of Mexico	Third TED test
15/6/2012 (Friday)	Gulf of Mexico	Fourth TED test
16/6/2012 (Saturday)	U.S. National Marine Fisheries Laboratory Service (US-NMFS) Panama City, Florida	Discussion and closing, with the Officers of the Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS)
17/6/2012 (Sunday)	Airport, Panama City, Florida	Travel back to Sabah through Atlanta, Seoul and Kuala Lumpur.



Photo 1: Delegates from Malaysia with NOAA Officers, Panama City Laboratory



Photo 2: TED Presentation and Discussion with NOAA Officers, Panama City Laboratory



Photo 3: Construction of TED



Photo 4: Sewing TED flaps



Photo 5: TED testing in the Gulf of Mexico



Photo 6: After discussions with officers from Marine Research Foundation, Department of Commerce, USA and NOAA.

3.0 Observations and Comments

3.1 Presentation, Success and TED Talk

The use of shrimp trawlers was identified as one of the main causes of the extinction of turtles either in this country or other countries in the world. To reduce the effect of nets, the United States has set rules so that all countries wishing to export shrimp catch of sea into the country are required to use the Turtle Excluder Device (TED) in fishing nets used. Without using TEDs (the tool to remove turtles caught in nets) wild caught shrimp are prohibited for export to the United States. These rules are referred to 'the U. S. Shrimp Import Embargo "which took effect in 1996. Since the TED was introduced and used by fishermen in the United States, a series of research and development projects to improve the efficiency of TED have been implemented. With the help of video cameras, the divers and fishermen support, NOAA scientists have been able to implement the TED program which are effective and successful. Apart from that, several other countries participated, such as Mexico and it now has a positive impact on the overall turtle conservation in Mexico.

3.2 Analysis :

TED use can help avoid catching turtles in trawl nets. Besides that, other materials such as wood and garbage can also be avoided or removed without affecting the main catch of fish or shrimp. However, the installation angle specifications in TEDs are very important, and the equipment has to be installed properly for the TED trawl to work effectively.

3.3 Sewing netting and construction and testing of real TEDs at sea

The construction and sewing of TED nets was a very rewarding “hands on” experience. Several types of TED were introduced and are used throughout the United States. TED construction basically involves several stages and specifications and this is very important for TED equipment to function truly as an instrument that can release turtles while keeping the only target as shrimp. After the development of each new TED, it is tested at sea by using NOAA research vessels to ensure the successful development and also to test the installation angle of the main TED which can help fishermen continue to fish and not affect the turtles.

3.4 Analysis :

TED test work processes involve several turtle staff, particularly turtle science experts, construction experts and expert divers to take videos and analyze the behavior during the capture of turtles in the TED trawlers. If the angles on a TED are over 70 degrees is no longer suitable for the use of releasing turtles. Construction and testing performed on the TED can also help the Malaysian group learn the details more thoroughly.

4.0 Summary

The Fisheries Department has a plan to require all types of fishing trawlers in the state to install the "Turtle Excluder Device" (TED). This completion is subject to ongoing review with Marine Research Foundation (MRF), an NGO. The study involves four fisheries sectors from Kudat and Tawau. Both Kudat and Tawau town have more than 1,500 trawlers. This is also the second study, after a study in 2007-2008 was carried out in Sandakan. Currently the installation of TEDs on trawlers is voluntary, however the long-term goal will involve a change in legal fisheries and trawler operating conditions. The main obstacle, currently, is that the installation of TED also leads to a decline of fish where the fish will not be caught due to the TED that has been installed.

But the TED has an advantage; it can reduce fuel costs, increase product value, reduce the time taken and improve efficiency. TED is a device installed in trawl nets and may release non-target catch such as turtles, wood and rubbish. The majority of fishermen who do not use the TED will also release the turtle after the purse is raised. But because towing trawl nets last 1-2 hours, the turtles caught in the net would have already died. Turtles are a play a major role in marine ecosystems, which can also contribute to the tourism industry where many divers will come to see the turtles in the waters and islands in Sabah.

Thus, apart from complying with, and to overcome the 'U.S. Shrimp Import Embargo ', planning towards the management, conservation and effective development of aquatic resources should be centered on the Code of Conduct for Responsible Fisheries (Code Of Conduct For Responsible Fisheries, CCRF) as recommended by the Food and Agriculture Organization of the United Nations (FAO). A Code of Practice was introduced and adopted by consensus in 1995 when the world's fisheries could no longer afford

development, and exploitation of resources was rapid and uncontrolled. CCRF provides principles and standards for responsible practices affecting aspects of biological, technological, economical, social, environmental and commercial use. It can be applied to all sub-sectors of fisheries, including processing and trade in fish and fishery products, fishing operations, aquaculture, fisheries research and the integration of fisheries into coastal area management.

The Fisheries Department hopes that more fishermen in Malaysia including Sabah will start using the TED in order to prevent the extinction of the turtle species and direct marketing and export of crayfish has no restriction for the development of the local fishing industry.

Prepared by
Godfery Kiskey
Marine Development Branch
Department of Fisheries
22 June 2012

**Report of the
Technical Visit to Learn TED Technology
In Panama City, United States
9-20 June 2012**

1. Introduction

I thank the Marine Research Foundation (MRF) for funding the technical visit to learn TED technology in Panama City, United States. I would also like to thank the Department of Fisheries Malaysia for having chosen me, to participate in the visit. To be exact, three researchers from the Department of Fisheries Malaysia and an officer from the Department of Fisheries participated in the technical visit. My purposes for the visit are:

- (I) To determine the effectiveness of TED for the conservation of turtles.
- (II) To know the proper techniques for installing TED in trawl nets.
- (III) To gain experience in conducting research using trawl TED.

2. Experiences During the TED Technical Visit in Panama City, United States.

Main activities during this technical visit can be divided into three categories;

- a. Information/briefing on:
 - i. The role of NOAA (National Oceanic & Atmospheric Administration) and the agencies responsible in approving the design and specifications of TED in the United States.
 - ii. TED designs and specifications that have received approval in the United States.
 - iii. Examples of successful use of TEDs.
- b. Demonstrations, practical training, surveys:
 - i. Installation methods and inspection of TED.
 - ii. The methods of testing and validation of TED designs and specifications.
 - iii. Review of the use of TED on commercial vessels.
- c. Discussion on the status and planning the use of TED in Malaysia.

3. Benefits and Information Received During the TED Technical Tour.

During the stay in Panama City, participants from Malaysia had the opportunity to meet with officials from the Office of Marine Conservation, Washington DC, NOAA Fisheries Laboratory, Mississippi and the NOAA National Marine Fisheries Service, Panama City, all of which were present to conduct TED tests in the waters of Panama City.

The information/discussions during the technical visit are summarised here;

- i. There are more than 20 TED designs/specifications certified by the Office of Marine Conservation, Washington DC, to be used by shrimp trawlers in the

United States. Several TED design examples that have been certified are Georgia-Jumper, Hooped TED, Fix Angle, Super-Shooter, Weedless TED and Flounder TED.

ii. The Gulf of Mexico coast is the main habitat of Kemp's Ridley sea turtle nesting. The number of turtles that lay their eggs on the beach have undergone a drastic decline, which could ultimately lead to complete extinction of the species. TED use came into force in Texas, at the end of the 80's, and Mexico enforced the use of TEDs in 1995. The effect on Kemp Ridley sea turtle nesting is increasing in numbers, beginning in 2005 until present.

iii. TEDs must be installed properly to ensure that it works well. NOAA Fisheries Laboratory, Mississippi, is responsible for conducting TED technical training and proper installation techniques to fishermen. Technical training participants from Malaysia also had the opportunity to undergo practical training to install the "double cover Super Shooter" TED by NOAA Fisheries Laboratory Mississippi.

iv. The designs of a new TED device need to be certified and endorsed. TEDs must be tested and compared with a control or standard TED. Technical visit participants from Malaysia had the opportunity to participate in two trips to conduct these trials at sea.

v. The test required three boats: a boat to tow the TED installed net and to bring the turtle which is to be released, a boat carrying divers, and a boat to catch the turtle which arises on the surface (after being released by divers). A total of 25 loggerhead turtles aged two years were released one by one at the mouth of the trawl, which was going at a speed of 2.5 knots. If the turtles exited the TED in less than five minutes, it was categorised as having escaped safely. Only the devices that manage to release the turtles equal to or less than the TED control applications are approved and confirmed.

vii. During the discussions, participants from Malaysia reported that the TED activities program in Malaysia were conducted in 1984, 1997 and 2007. A project to pioneer the use of TED on monsoon trawl was initiated in 2011 and will continue until 2013.

4 Benefits gained

i. NOAA are prepared to provide technical services to Malaysia in the use of TEDs. Technical services are more easily transmitted if Malaysia is to "partner" with the United States in the TED program countries.

ii. This technical visit was very meaningful to the participants giving us the opportunity to gain the information and skills of TED directly, including TED installation and testing.

iii. Trawling fishing gear endangers the safety of turtles, and the use of TEDs can save turtles from being trapped in trawl nets, which in turn, can help rehabilitate/improve the population.

iv. TED installation will allow shrimp export from Malaysia to enter broader foreign markets.

5. Measures to be implemented after joining the TED technical visit

- iv. The use of TEDs must be introduced to fishing trawlers in Malaysia and systematic strategic points are to be admitted, including the support of stakeholders.
 - v. It is recommended that a Technical Working Committee is established, to plan and intensify the use of TED on trawlers in Malaysia.
 - vi. Cooperation with private NGOs such as MRF should be further intensified, and coordination with state governments in the TED program should also be strengthened.
 - vii. Also recommended to be made in respect of scientific research and political appropriateness of Malaysia as a partner in the TED program with the United States.
 - viii. A seminar for TED use in Malaysia will take place in September/October 2012.
 - ix. Studies on the use of TED on trawlers during the monsoon season in Kemaman will continue, and NOAA will assist in this study.
-

International Visit Report

Reference number approved by the Ministry of Agriculture & Agro-based Industries: KP/CP/320/8/5 Jld 47 (12) Dated: 1 August 2012

By Sharum Yusof

1. Seminar topics/conference/visit:
Technical Visit on TEDs Operation in Mississippi, USA.
2. Location: Panama City, Florida, United States of America.
3. Duration: 9 – 17 June 2012
4. Promoter: Marine Research Foundation (MRF)
5. Aim: Working visit to explore the use of Turtle Excluder Device (TED) in the United States.
6. Objective:
 - i. To gain direct exposure to the conditions and procedures for the installation of TEDs in the United States.
 - ii. To learn TED installation techniques.
 - iii. To understand TED testing methods.
7. The central issue under discussion:

The main activities during this technical visit can be divided into three categories;

- a. Information/briefing on:
 - i. NOAA (National Oceanic & Atmospheric Administration) and the role of other agencies responsible in approving the design and specifications of TEDs in the United States.
 - ii. Designs and specifications of TEDs that have been endorsed by the United States.
 - iii. Examples of successful use of TED.
 - b. Demonstrations, practical training, and review:
 - i. TED installation and inspection methods.
 - ii. The methods of testing the TED, and validation of designs and specifications
 - iii. Review of TEDs used on commercial vessels.
 - c. Discussion on status and planning the use of TEDs in Malaysia.
8. Decisions made:

During the stay in Panama City, the Malaysian participants had the opportunity to meet with officials from the Office of Marine Conservation, Washington, DC; NOAA Fisheries Mississippi Laboratory and the NOAA National Marine Fisheries Service, Panama City, who were present for testing the TED in the waters of Panama City.

Between information / technical decisions during the visit:

- I. All TEDs used by shrimp trawlers in the United States must obtain a certificate

from the Office of Marine Conservation, Washington, DC. Shrimp trawl operators will be given two options: namely: -

(i) TED designs already certified by the "Office of Marine Conservation, Washington, DC"; or

(ii) The TED is designed using the design which was approved by the "Office of Marine Conservation, Washington, DC".

NOAA Fisheries Mississippi Laboratory and the NOAA National Marine Fisheries Service, Panama City are responsible for the testing and monitoring of the TEDs used. Vessels found not complying with these conditions are penalized through cancellation / suspension of captain licenses / master of the vessel concerned.

ii. There are more than 20 design / specification TED certified by the "Office of Marine Conservation, Washington, DC" to be used by shrimp trawlers in the United States. TED design examples that have been certified are Georgia-Jumper, Hooped TED, Fix Angle, Super-Shooter, Weedless TED and Flounder TED.

iii. The Gulf of Mexico is the main habitat of sea turtle nesting "Kemp Ridley". The number of turtles nesting on the beach shows a drastic decline that could lead to the extinction of the population. TED use came into force in Texas, the United States at the beginning of the end of the 80's, and Mexico is responsible for enforcing the use of TED in 1995. The effect is Kemp Ridley sea turtle nesting has shown a significant increase beginning in 2005 until now.

iv. TED must be installed properly so that it works well. NOAA Fisheries Mississippi Laboratory responsible for conducting technical training to the fishermen TED proper installation techniques.

Technical training participants from Malaysia also had the opportunity to undergo practical training to install TED kind of "double cover Super Shooter" by NOAA Fisheries Mississippi Laboratory.

v. Design of a new device or TED specifications to be certified and endorsed its use must be tested and compared with the control or standard TED.

Technical visit participants from Malaysia had the opportunity to participate in two trips to undergo this test at sea.

The test requires three boats, a boat to tow nets are installed with a TED and bring the turtle to be released, a boat carrying divers, and a boat to catch a turtle that arise on the surface (after release by divers).

A total of 25 Loggerhead turtles, aged 2 years, are released one by one from the mouth of the trawler, which is travelling at a speed of 2.5 knots.

Three divers are required to perform several tasks in the sea. A diver to release the turtles in trawl mouth and then catch the turtles after they go through the TED, stick a float then release the turtle to allow it to rise to the surface. A diver records the time and fitness of the turtle, and another photographs the movement of the turtle.

Turtles that succeed in getting through and out of the TED in less than five minutes are considered to have been released safely. Only devices that have managed to release the turtles equal to or less than TED control applications are approved and confirmed.

vi. During the sessions, the participants from Malaysia presented a number of steps that have been taken for turtle conservation in Malaysia. Program to introduce TED in Malaysia was conducted in 1984, 1997 and 2007. A project to pioneer the use of TED on monsoon trawl was initiated in 2011 and is currently underway.

The main purpose of turtle conservation programs in Malaysia, including the use of TEDs, is to conserve turtles from extinction. Having the opportunity to market shrimp to the U.S. is just an additional benefit which arises from these programs.

vii. NOAA prepared to provide technical services to Malaysia in the use of TED. Technical services are more easily transmitted if Malaysia is to "partner" with the United States in the TED program countries.

9. Review Officer:

i. This technical visit is meaningful to the participants, for having the opportunity to directly get the information and skills on TED, the installation and testing.

ii. Sea turtles are part of marine ecosystems, so conservation of turtles help to stabilize the ecosystem.

iii. Trawling gear poses a threat to the safety of turtles, the use of TEDs can save the turtles from being trapped in the nets, and this method can help save and rehabilitate / improve the population of turtles worldwide.

iv. An increase in the turtle population after the TED program was successfully implemented in Malaysia can help enhance and boost the tourism industry.

v. TED installation will allow the export of shrimp from Malaysia into wider overseas markets.

vi. The use of the TED must be introduced to fishing trawlers in Malaysia and systematic strategic points to be admitted and the support of stakeholders gained.

vii. A Technical Working Committee must be established to plan and intensify the use of TED on trawlers in Malaysia.

viii. Cooperation with NGOs such as Huntsman and private MRF should be further intensified and coordination with state governments in the TED program should be strengthened.

ix. It is also recommended that Malaysia should be made a partner in the TED program, in respect of scientific research and political appropriateness, with the United States.