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OVERVIEW OF RTTP-IO RECOVERY PROCESS, DATA QUALITY CONTROL AND RELIABILITY

by

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I- INTRODUCTION

To achieve RTTP-IO's main objectives of reinforcing the knowledge about the size and distribution of Indian Ocean tropical tuna resources and the interactions between the fisheries that target them, it is essential to have:

(1) good estimation of shedding and reporting rates;
(2) good estimation of reference catches;
(3) precise time of tagging and recapture;
(4) reliable fish length data both at tagging and at recovery;
(5) accurate tagging and recovery positions

In order to meet data requirement at recovery, priority was given to recovery platforms with: (1) a high turnover of fish caught, unloaded, processed and/or transshipped; (2) good possibilities of estimating reporting rate through the implementation of tag seeding activities; (3) good fisheries statistics; (4) easy access (5) and good potential to collect high quality data. These being the recovery platforms unloading, transshipping and processing fish caught in the Indian Ocean by the purse-seine fleets.

In this paper we discussed the quality of the recovery data originating from the different recovery platforms based in the 1st priority countries such as the Seychelles, "At sea", Madagascar, Mauritius, Kenya and Thailand, who's recoveries make up to 95% of the total recoveries reported until the end of the 3rd Quarter of 2008 (figure 1).

This study has two parts: a first part regarding recovery data collection were its described the recovery systems implemented with purse-seine crews, stevedores and processing plants recovery platforms and a second part where it's discuss their particular evolution with time and its impact on tag recovery data quality are discussed.

The objective of this paper is inform the scientific community of methods used in the implementation of project tag recovery activities, data reliability, trends and limitations, that should be taken into account when selecting the data to use on the multiple studies to take place in the future. This paper aims to provide an insight into these problems and opens the way for a more detailed document that is in the process of being compiled.

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II – METHODS – Recovery systems and quality control methods implemented

RECOVERY SYSTEMS

Two main tag recovery systems are in place and holding good results with the tag recovery platforms based in the Seychelles, Madagascar, Mauritius, Kenya and Thailand. One targets the stevedore platforms and another, the canneries and cold stores workers. A third tag recovery system is in place with the crews of the EU, Seychelles and Thailand purse-seine fleets targeting what we call here the "at sea" recoveries.

In order to optimize recoveries and data quality, recovery process was adapted along time, according to the location and availability of local human resources.

Stevedores

Stevedores are the main tag recovery platform in all 1st priority countries, with the exception of Thailand where all the recoveries come from canneries and cold stores, making up to 67% of project total recoveries to the end of the 3rd quarter of 2008.

Implementation and optimization of the recovery system with this platform was directly related with the availability of human resources. Recovery system suffered up to three main changes along time that had a significant impact on the quality of the data recovered by each of these RS.

1st Phase

During the first year of activities project was limited to one recovery officer allocated to each stevedores Recovery System. Stevedores collected the large majority of the tag recovery data, including fish length, species and origin (FV name and well number). This system proved very quickly to be inadequate for all essential data because of the low level or total lack of associated data collected.

2nd Phase

To press stevedores into returning whole fish with the tag inside to the RO, the project implemented a system of preferential rewards. Most prized reward was only allocated to the stevedores who brought whole fish with the tag inside to the RO.

Preferential rewards system, quickly produced the expected results and had a significant impact in the quality of the data collected, specially fish species, length and weight. Information regarding fish origin (date of unloading, fishing vessel name and well No.) keep being supplied by stevedores and was proved to be still of a very poor quality through the analysis of the tag seeding data.

As the number of recoveries and the size of the fish recovered increased, removal of tagged fish from the fishing vessel became unpractical and unpopular with both Captains and Stevedores. Several Captains

stopped stevedores from removing the fish from the FV and several serious problems started to rise among stevedores, crew and the RTTP-IO due to the situation.

To avoid further problems that could put an end to the purse-seine cooperation and to avoid the increase of numbers of tag recoveries associated to no data it was deemed critical the recruitment /involvement of more people on the recovery process.

3rd Phase

A third and last recovery process involving a larger number of people was implemented in 2007, during which tagged fish was collected directly on board by project tag recovery officer and tag recovery assistants.

In Seychelles and in Madagascar this recovery process relies on professional samplers that conduct the work of Tag Recovery Assistants (TRA). In other countries such as Mauritius and Kenya, stevedores supervisors, were trained and incentivized (good quality data recoveries are rewarded up to the level of 20 % of the reward given) to perform the role of TRA.

Preferential reward system was adapted in such a way that recoverers have access to increasingly preferred rewards depending on the quantity and quality of the data associated to the recovery reported. This system proved efficient and is still in place today.

In the case of the Seychelles, tag recovery team also collects independent information on PS activities (PS and Reefers in port, tons unloaded and fish destination, wells unloaded, hatches loaded) in order to crosscheck stevedores information and to provide an independent traceability system for tags recovered in other recovery platforms .

Canneries and Cold-Stores

8% of the project total recoveries until the end of the 3rd quarter of 2008 are reported by canneries and cold-store companies based in the six 1st priority countries. Being the canneries and cold stores the last filter for the recovery and reporting of tag recoveries it was deemed vital to implement an efficient recovery scheme for this platform.

Implementation and optimization of the recovery process were done through the integration, training and incentivizing of cannery worker supervisors. Recovery process suffered several changes along time, from which the two main ones are described below. Changes implemented at different moments with each of the regarded countries and that had a significant impact on the quality of the data recovered are discussed on the second part of this document.

1st Phase

During the first year of activities project was limited to one Recovery Officer per company and company workers were collecting all recovery data, including fish length, species and origin. Since company workers could not leave or stop their work to collect recovery associated information, a very small

amount of data was being reported. It became quickly clear that this system wasn't working and that the project should try to involve company workers supervisors in the tag recovery process.

2nd Phase

Company workers supervisors were training in the collection of tag recovery information. The inclusion of supervisors in the recovery system was accompanied with the implementation of a supervisor incentive. Supervisors receive a % of the reward given for every good data quality recovery done under their supervision. Implementation of this recovery process allowed for the collection of the needed associated data.

At the moment a company worker finds a tagged fish it reports it immediately to its supervisor without having to leave its working place. Supervisors collect all needed information, fill the recovery form and pass recovery form to company RO. RO allocates rewards to recoverers and pass tag recoveries to the PTRO for revision and feedback on who to allocate supervisors incentive. This system proved to be efficient and is still in place today.

At sea

25% of the total project tag recoveries till the end of the 3rd quarter of 2008, were done directly at sea by the purse-seine fishing crews. Crew interest on tag recovery activities was identified at an early stage and was carefully nurtured through time due to its potential to provide highly reliable data, both at biological and fish origin level. However it takes more than a 1 ½ year before PS fishing crews realize that all recoveries made by purse seiners can bring them a lot of rewards. Therefore until the end of 2006, the percentage of recovery at sea remained below 14% for every quarter since the beginning of the tagging in May 2005.

1st Phase

To take advantage of this sudden interest and avoid the lost of associated information the project created a simplified recovery form that was given to every crew member that reported a tag and that taught them how to measure fish for curve and fork length. As fish captures reduce and recoveries increase, purse-seine crews redoubled their efforts on the search for the tagged tuna. Unfortunately this effort was not accompanied with an effort for the collection of reliable data, therefore a better recovery process had to be found and implemented to assure the collection of high quality data.

2nd Phase

By 2007 it was agreed with the large majority of the purse-seine fleet captains that tagged fish recovered at sea would be frozen on board and data and position would be collected by vessel officers. Upon arrival to the port of unloading, crew reported the presence of tagged fish to project local representative who took

charge of collecting fish biological data and fill in the recovery forms with the data supplied by the fishing vessel (date of catch, position and type of school).

Certain boats preferred to collect all information directly at sea. FV officers were trained in the collection of recovery information and allocated with the means to do it (calliper, recovery forms). A reward preferential system, similar to the one implemented with the stevedores was put in place to incentive the reporting of recoveries with the most complete data possible.

Tagged fish recovered "at sea" whose recovery information was collected by the crew is signalized in the data base as recovered "at sea", information collected by "crew', "captain".

DATA QUALITY CONTROL

Recoveries data quality control was done on a daily basis, trough the revision of tag recovery forms and on a monthly basis through the analysis on the reliability of the recovery biological data (length / Weight) and the analysis of tag seeding data (recovery rate, fish origin information).

Length, weight measurements were attributed to a level of reliability in the recovery data base in order to evaluate the quality of the data collected. Fish length is classified as good or bad, depending on the reliability of the measurement in relation to the tagging data, the type of measurement, the measuring tool used and to who measured the fish. Fish weight is classified as weighted or estimated also depending on the weighting tool and to who weighted the fish.

Tag seeding information was analyzed for the levels of recovery rates and the proportion of seeding recoveries associated to the correct fishing vessel name and corrected well number.

Analysis of the data allowed for the optimization of the recovery process in order to obtain more and better recovery data and for the identification and solving of problems at human, economical and material level.

III- RESULTS – Impact of the implementation and optimization of recovery systems in recovery data quality and reliability

In the process of finding and reporting tags, the potential for colleting recoveries associated to a most complete and high quality data is expected to be directly related with the proximity to the moment of capture and the efficiency of the recovery method in place. Therefore the efficiency of the tag recovery process itself and of any changes done to it should reflect on the proportion of tags recovered at each successive recovery platforms and on the quality of the data collected (Fig 2).

Seychelles being the largest port of unloading and transhipment for the purse-seine fleet in the Indian Ocean and the base of project PMU, has worked as an experimental field for the implementation, improving and optimizing of the tag recovery processes. Measures successfully implemented here were then implemented and adapted to other recovery platforms.

As an example of the recovery systems implemented within the different recovery platforms in all 5 priority countries and of its impact on the quality of the data collected, we will focus in this part of the document on the changes done with recovery processes implemented with the recovery platforms in the Seychelles, "At sea" and on two particular cases where implementation of the recovery system was highly successful or unsuccessful due to exceptional conditions.

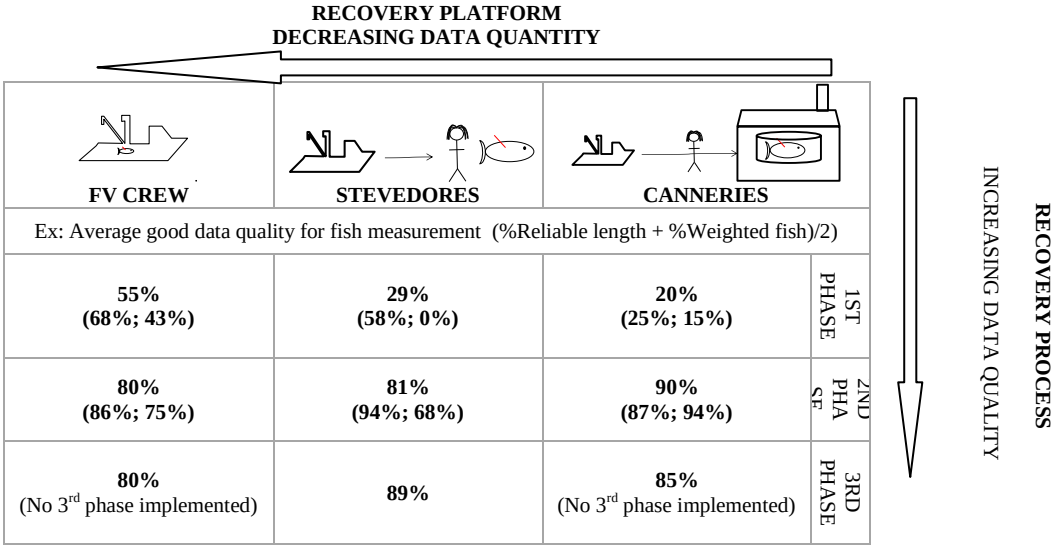

Figure 2 – Evolution of the length/weight measurements reliability along the three recovery platforms represented in the Seychelles and along the recovery processes implemented

Seychelles

Stevedores

Stevedores are the main tag recovery platform for the RTTP-IO, with 67% of the total tags recovered. Stevedores' recovery system (RS) in the Seychelles passed through 3 phases: a 1st phase that run from May 2005 till May 2006, a 2nd from June 2006 to March 2007 and a 3rd from April 2007 onwards.

1st phase – May 2005 to June 2006

As previously described during the first phase of the implementation of RS, a large majority of tag recovery associated data was collected by the stevedores and recorded by the freshly arrived TRO. Three main goals were achieved during this first phase:

(1) The increase of stevedore's level of awareness:
   a. Reporting rate increased from 40% in 2004 to 94% by June 2006. Values provided by the tag seeding exercise (Fig 3)

b. Reversion of Seychelles platforms (stevedores / cannery) recovery ratio, from 1/3 to 3/4 of country quarterly recoveries as seen in Fig 4

(2) The boost on length measurement reliability, from 48% during the 3rd quarter of 2005 to 84% for the 1st quarter of 2006 (Fig6).
(3) A slight increase on the proportion of fork length measurements (Fig 5)

Nevertheless recovery data related to the fish origin (date of recovery, FV name and well number), remained extremely unreliable, with data from the tag seeding exercise pointing to 45% the seeded tags being reported to a wrong well during this period.

2nd phase – July 2006 to February 2007

During this phase proportion of stevedore's recoveries continued to increase, mounting up to 96% of Seychelles quarterly recoveries for the 1st quarter of 2007 (Fig 4).

Second phase of the RS was characterized by the implementation of preferential rewards that pressed stevedores into reporting tagged fish with the tag inside to the TRO. Several measures were implemented during this period to try to reduce proportion of wrong vessels and wrong well numbers reported by the stevedores: well numbers were painted next to each well in the purse-seiners; stevedores were sent back to the FV to check well No and FV name, etc. Implementation of this measure resulted on:

(1) The increase of the proportion of fish measured for fork length, from 66% to 93% (Fig 5)
(2) The increase of length measurement reliability, from 55% in to 94% (Fig 6)
(3) The increase of the proportion of fish weighted, from 0% to 76% (Fig 6)
(4) No improvement on the FV/well No, 43%

Note: Proportion of fish weighted decreased from 76% to 63% during the 1st quarter of 2007 due to the lack of human resources to deal with the sudden influx of recoveries. (Fig 6)

3rd phase – March 2007 onwards

With the implementation of the 3rd phase of RS, the proportion of tags recovered by the stevedores stabilized on an average of 95% of Seychelles quarterly recoveries. The complete changing of recovery methodology and the drastic increase on the number of people incorporating the tag recovery team allowed for the stabilization of the recovery process by avoiding the decrease of recovery rate, maintaining the tag recovery at a high rate, and increasing the quality of data by decreasing the report of recoveries associated to no data and reducing the report of recoveries associated to no or the wrong FV and well number.

(1) Proportion of fish measured for fork length, increased from an average of 93% to 97% and stabilized at this rate. (Fig 5)
(2) Proportion of length measurement reliability stayed at a quarterly average of 94% (Fig 6)
(3) Proportion of fish weighted increased from 76% to 92% (fig6).
(4) Allocation of wrong vessel name decreased to less than 5%
(5) Allocation of a wrong well number reduced to 30%

Notes: Proportion of fish weighted decreased from 92% to 80% during 1st quarter of 2008 (Fig?), due to the lack of > 25kg scales to measure large YFT and BET unloaded during this quarter.

The presence of the tag recovery team on the FV helped to solve part of the problem regarding tagged fish origin, tagged fish is now associated to the correct FV of origin. However the allocation of correct well number to the recovery is still a problem, and a difficult one to solve, since it's directly related to the FV method of unloading. Often several wells are unloaded at the same time therefore if the tagged fish is not spotted when it comes out of the well it can be attributed a wrong well number.

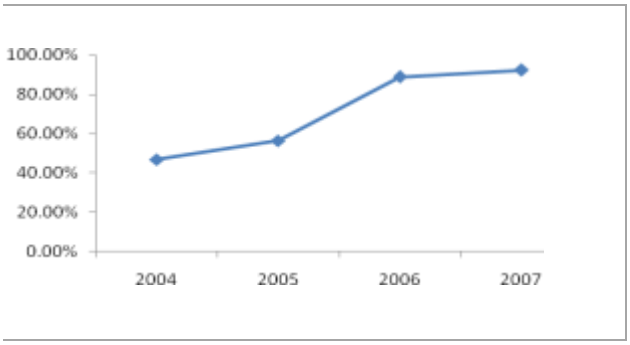

Figure 3 – Tag seeding reporting rates from 2004 to 2007

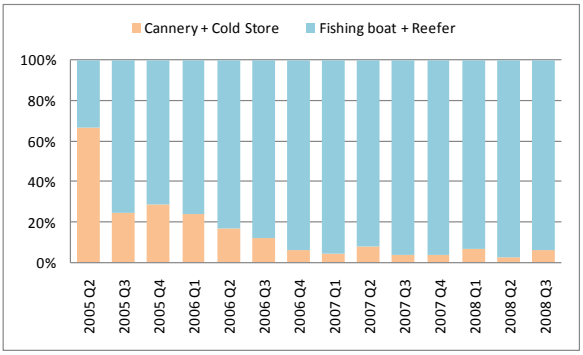

Figure 4- Proportion of quarterly recoveries with the two recovery platforms in the Seychelles

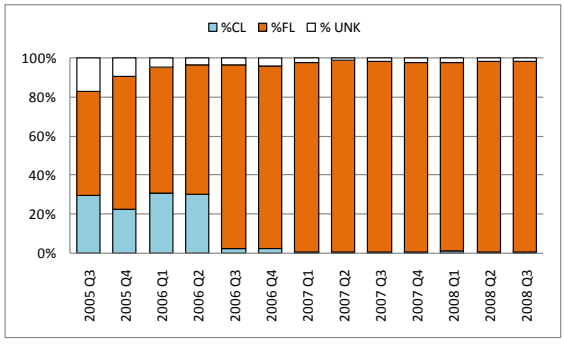

Figure 5- Proportion of quarterly recoveries by length measurement type in the Seychelles

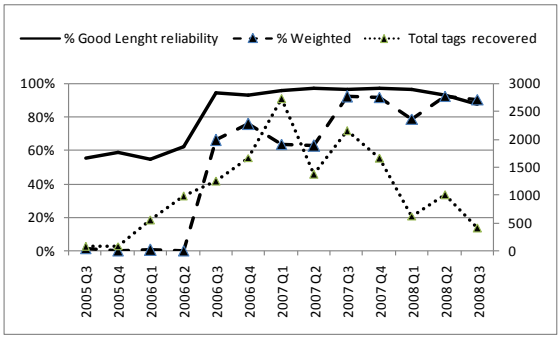

Figure 6- Seychelles stevedore's quarterly recoveries associated to good length / weight reliability

Cannery

Being the cannery the last filter for the recovery and reporting of tag recoveries it's of great importance to have an efficient recovery process in place within this platform. In the case of Seychelles, 7% of the total recoveries are reported by the local cannery (+ cold-store). The implementation of a recovery processes (RS) with the local cannery passed through 2 phases: a 1st phase implemented in July 2005 and a 2nd one that started in November 2005 and is still in place today.

1st phase – July to October 2005

In July 2005 the RTTP-IO started implementing publicity and recovery activities with the local processing plant. As previously described during this first phase, all recoveries were collected by the cannery / cold-store workers who passed the tag and associated information to the company TRO. One main goal was achieved during this first phase: the increase of the level of awareness with the processing plant workers reflected on the quality of length and weigh measurements with the proportion of length measurement reliability mounting to 52% and the number of fish weighted mounting to 48% (Fig 7),.

Even if the levels of awareness had increased, data reliability levels were still too low and the large majority of the recoveries missed fish origin information. Only 33% of the recoveries were associated to a FV well number.

2nd phase –October 2005 onwards

In November 2005 the PTRO conducted several workshops with processing plant supervisors in order to train them in the recovery of tagged fish and associated information including the collection of length and weight measurements and the filling of project recovery forms. By December 2005 the 2nd phase of the RS was implemented and resulted in highly significant changes in recovery rates and quality:

(1) Recoveries length measurement reliability mounted from 52% to 84%. Since then quarter length measurement reliability stabilized on an average value of 86% (Fig 7).
(2) Proportion of fish weighted mounted from 48% to 94%. Since then proportion of quarterly recoveries from which weigh was collected became stable on an average value of 92% (Fig 7).
(3) Proportion of recoveries associated to a well number passed from 33% to 98%

Data collected indicates that level of data reliability of recoveries found in the processing plant decrease according to the time the fish is captured and the following fish process'. With fish found by processing plant workers during transfer, unloading, sorting, ranking, butchering and cleaning providing less and less reliable data. As an example in figure 8 we present how the distance to the moment the fish was captured affects length measurement reliability.

In general, in canneries it is easier to take weights than lengths are scale (generally electronic) is at hands at different locations inside the canneries.

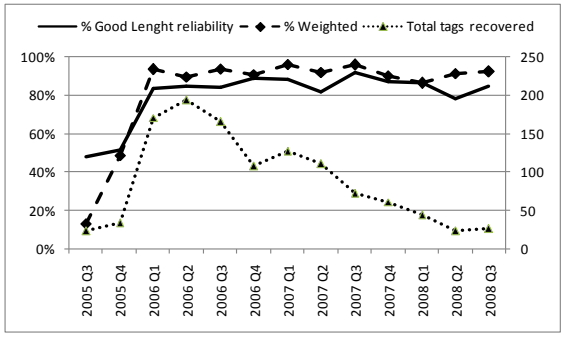

Figure 7- Seychelles cannery quarterly recoveries associated to good length weight reliability data

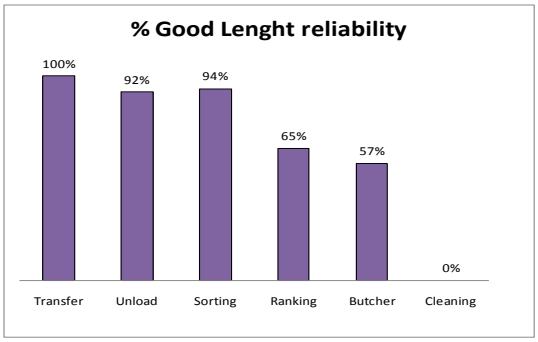

Figure 8- Proportion of recoveries associated to good length reliability data by processing area

Figure 10 A&B – Proportion of recoveries associated to good length and weight reliability data recovered by cannery workers during unloading and sorting activities

At sea

As recoveries activities were implemented with the stevedores and cannery workers, fishing vessel crews revealed an increasing interest on tag recovery activities and associated rewards. In order to take advantage of this interest a simplified recovery form was allocated to FV crews in order to allow them to recover tags and associated information directly at sea. As tuna captures declined in the beginning of 2007, FV crew begun to dedicate more time to the sorting of tuna captures at sea and started recovering

larger numbers of tagged fish. At this point RS with the FV crews entered in a 2nd phase that had for main objective the increase of the quality of the associated data.

1st phase – January to December 2006

The first RS implemented with the FV crews in the beginning of 2006 had the following results:

(1) The increase of "At sea" tag recoveries from 2% in 2005 with 7 tags recovered to 9% in 2006 with 1,002 tags recovered (Fig 11)
(2) The increase of the proportion of length measurement reliability, from 52% to 75%
(3) The increase of the proportion of fish weighted from 24% to 67% (Fig 12)
(4) The slight reduction on the proportion of recoveries associated to no geographical position, from 6% to 5%
(5) The slight reduction on the proportion of recoveries associated to no date of capture, from 7% to 5%

2nd phase – January 2007 onwards

The implementation of differentiated rewards that characterized the 2nd phase of the RS put in place with the FV crews in January 2007, pushed FV crews to bring the whole fish with the tag inside to land and to cooperate with FV officers in the collection of catch information. This measure contributed to stabilize relations inside fishing vessels and to sanction the collection of recoveries at sea. The following results were achieved:

(1) The increase of at sea tag recoveries to 31% of project total recoveries in 2007and 31% during the first three quarters of 2008 (Fig 11)
(2) The increase of the proportion of fork length measurements from 71% in 2006 to 91% in 2007, and 89% in 2008 (Fig 13).
(3) The increase of length measurement reliability to an average of 86% of at sea quarterly recoveries (Fig 12)
(4) The increase of the proportion of fish weighted to an average of 75% of at sea quarterly recoveries (Fig 12)
(5) The reduction of the proportion of recoveries associated to no geographical position to 4%
(6) The reduction of the proportion of recoveries associated to no date of capture to 2%

Note: Reduction on the proportion of fish weighted during the 1st quarter of 2007 and 2008, as seen in figure 11 and 14, is due to the low numbers of large YFT and BET sampled for weigh during these quarters (Chagos fishing season). As a matter of fact, a large % of large YFT and BET were not sampled for weight due to the lack of staff to go onboard to sample large YFT in 2007 and the absence of >10kg scales to weight large YFT/BET unloaded in 2008.

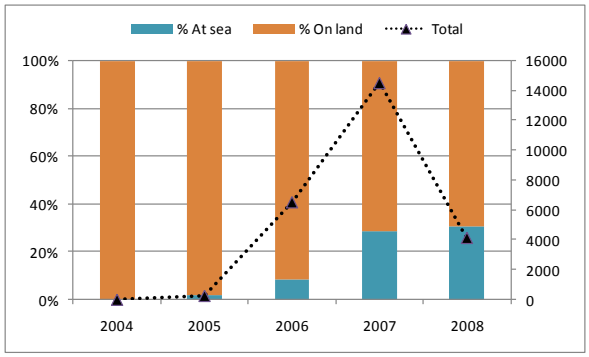

Figure 11- Proportion of "At sea" recoveries versus "on land" recoveries

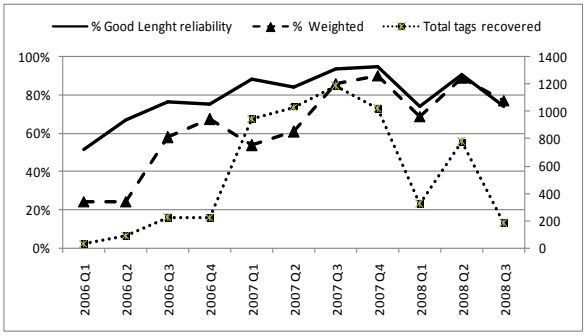

Figure 12- 'At sea' quarterly recoveries associated to good length / weight reliability

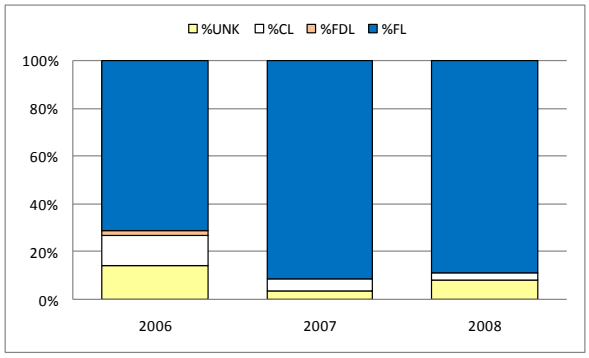

Figure 13- Proportion of length measurements collected "At sea" from 2006 to 2008

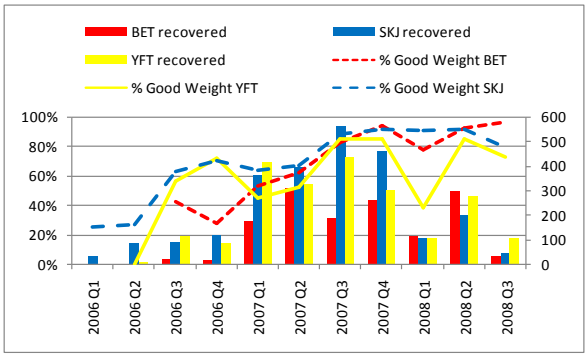

Figure 14- At sea' quarterly recoveries associated to good length / weight reliability per species

Two particular cases

Two particular cases are discussed bellow, one referring to the implementation of an extremely successful RS and the other to an extremely problematic RS. These two examples provide an insight into the level of variability and unpredictability of recovery platforms and its effect the quality of the data recovered according to countries specificities.

<u>Madagascar</u>

RS: Stevedores

Stevedores are the main tag recovery platform in Madagascar with 97% of the total tags recovered for this country. Implementation of recovery processes (RS) with this platform was done in January 2006, and significant changes were done to the RS since.

In Madagascar the RTTP-IO works in association with the USTA - Unité Statistique Thonière d'Antisranana (Tuna Statistique unit of Diego Suarez). USTA has a team of 6 samplers that sample tuna on board the FV and Reefers unloading on the port of Diego Suarez within the general framework of the EU fishery sampling under the supervision of IRD and IEO. Since 2006, USTA has collected and measured 1569 tagged fish.

Implementation of the publicity campaign and RS with stevedores in Madagascar produced immediate and spectacular results:

(1) The increase of recoveries from 5 in 2005 to 208 in 2006 and 976 in 2007 (Fig 15)
(2) 96% of total recoveries measured for fork length (Fig 16)
(3) An average length measurement reliability of 95%
(4) An average of 85% of total recoveries weighted (Fig 17)
(5) 100% of the recoveries are related to a FV name
(6) 95% of the recoveries are allocated to a well No.

This case clearly demonstrates the impact of the availability of human, technical and material resources have in the quick implementation and running of an efficient recovery system. The e existence of a team of professional samplers, directed by an extremelly responsable, interested and respected coordinator allowed and still allows for the collection of high quality data in a country of great importance to the project, due to levels of unloading and transhippemtns done here during the Mozambique Channel fishing season when a great part of the purse-seiners move south to fish in this area.

Notes:

Proportion of recoveries associated to reliable length decreased from 98% to 67% from the 1st quarter to the 3rd quarter of 2007 due to the sudden increase of recoveries and the halving of USTA recovery team. These conditions together with the lack of scales of more than 5 kg also brought a decrease of the recoveries weighted from 95% to 40%

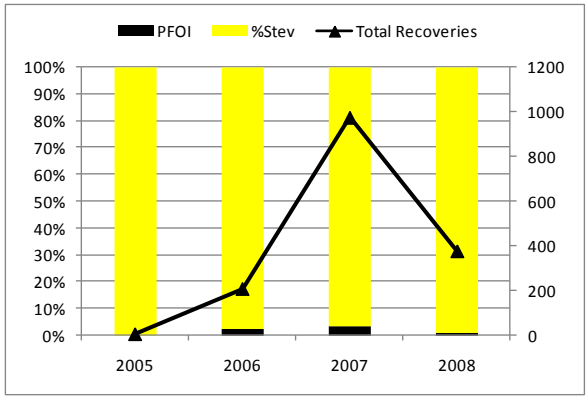

Figure 15- Proportion of stevedores versus cannery collected along time in Madagascar

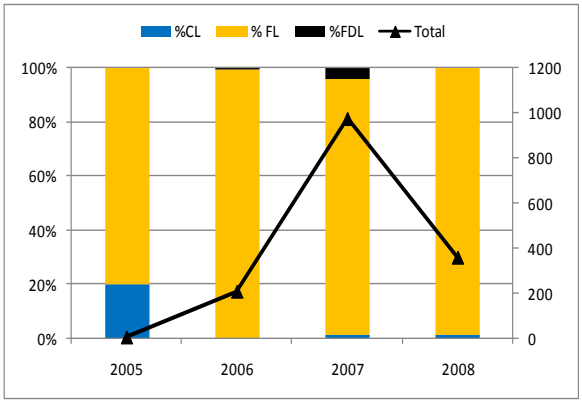

Figure 16- Proportion of different length measurements recoveries from 2005 to 2008

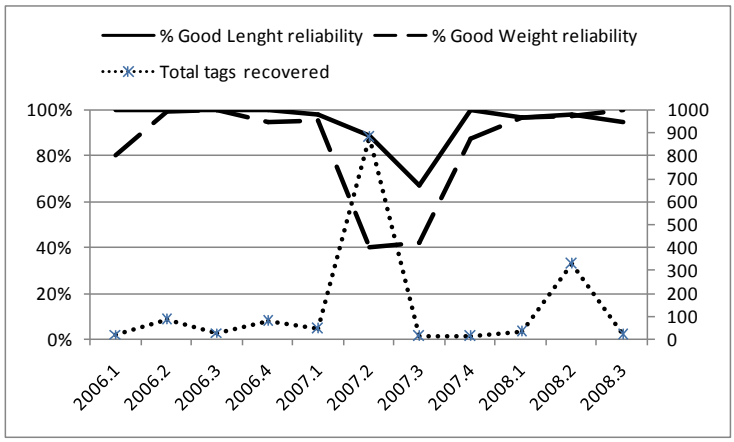

Figure 17- Stevedores quarterly recoveries associated to good length / weight reliability

Mauritius

RS: Stevedores at FDM

42% of Mauritius total recoveries are reported by two Mauritian stevedores companies MFD (8%) and FDM (34%; see figure 18 and 19) the rest being reported by canneries. Recovery process (RS) was first implemented with FDM, in February 2006, since then RS passed through three different phases on the attempt to increase recovery data quality.

1st phase – February 2006

A RS was implemented with FDM in February 2006. RS included the allocation of a company RO be responsible for the collection of tag recoveries and the integration of stevedore's supervisors who collect tagged fish and recover data. Implementation of the RS affected. :

(1) The number of recoveries reported by the company that increased from 5 in 2005, to 208 in 2006.
(2) The mounting of recoveries weighted to 89% (figure 21)

Nevertheless recovery length reliability stayed very low, 20% of company total recoveries for the 2nd quarter of 2006, and the proportion of recoveries provided with fish origin information, FV/Cargo; date of unloading, well/hatch No, being also very poor.

In late June 2006, company RO left the FDM. This unexpected event had a negative impact on the quantity of tags reported and the quality of the data collected during the 3rd quarter of 2006:

(1) Proportion of tags recovered by the company decreased while the overall numbers of recoveries increase for the project in general (Fig 19)

(2) Length measurement reliability decrease from 20% to 10% (Fig 21)
(3) Proportion of recoveries weighted decrease from 89% to 10% (Fig 21)

2nd phase – August 2006

By August 2006 a new recovery officer was in place and a supervisor incentive was implemented. By the beginning of the 4th quarter of 2006, RS had started to recover:

(1) Proportion of tags recovered by the company increasing (Fig 19)
(2) Length measurement reliability increasing from 10% to 51% (Fig 21)
(3) Proportion of recoveries weighted increasing from 10% to 77% (Fig 21)

3rd phase – May 2007

The absence of data and the decrease on the level of length reliability and the proportion of fish being weighted during the 1st quarter of 2007 (see figure 21) conducted to the implementation of two stand rewards, where recoverer is allocated with half of the reward upon the report of the tag recovery, while the second half of the reward is allocated after the recovery data being revised by the PTRO and in the condition that the recovery is associated to high quality data.

This measure assured a steady increase (even if slow) of the quality recovery data:

(1) Proportion of tags recovered by the company increased, mounting to 54% of country total recoveries for the year of 2007 and 56% for the year of 2008 (Fig 19)
(2) Length measurement reliability slowly increased from 60% to 80% (Fig 21)
(3) Proportion of recoveries weighted increased to 60% and decreased again to a level as low as 40% before remounting to 80% again from the 4th quarter of 2007 to the 1st quarter of 2008 (Fig 21)

The case of FDM in Mauritius not only demonstrates the importance of the availability of human, technical and material resources but also the influence that an interested Recovery Officer has in the recovery process and quality of the data. The unpredictable leaving of the first company recovery officer (CRO) put in stake all the recovery process implemented with this company and even after the allocation of a second CRO, the effects of the leaving of the first continued to be felt. The return to « normality» was only achieved through the implementation of extremelly tight measures, that finally managed to overcome, the natural inercia and lack of interest of the second CRO, and even bypass the tasks initially allocated to him.

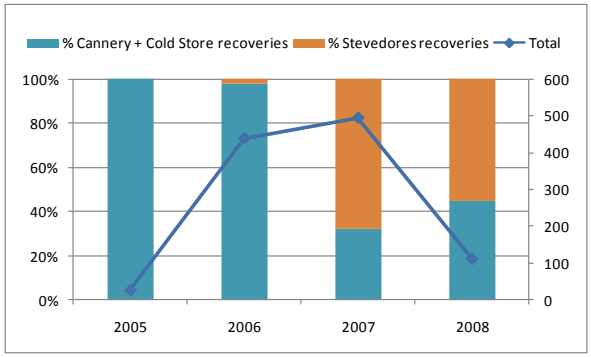

Figure 18- Proportion of tags recovered by the CA+CS and stevedores in Mauritius from 2005 to 2008

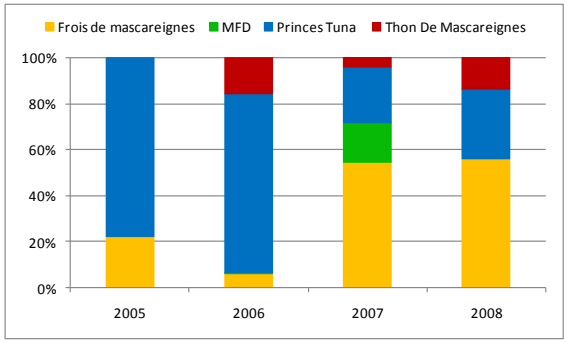

Figure 19- Proportion of recoveries collected by the 4 different recovery platforms in Mauritius

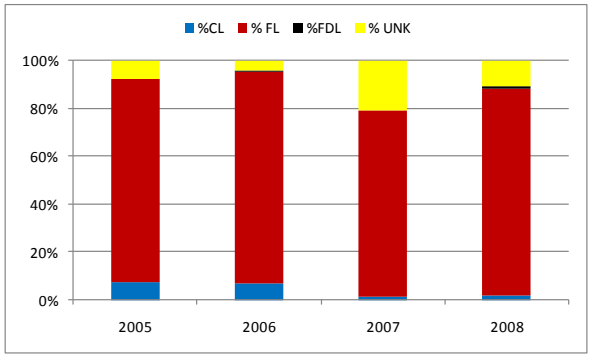

Figure 20- Proportion of recoveries measured for CL FL and FDL and UNK in Mauritius

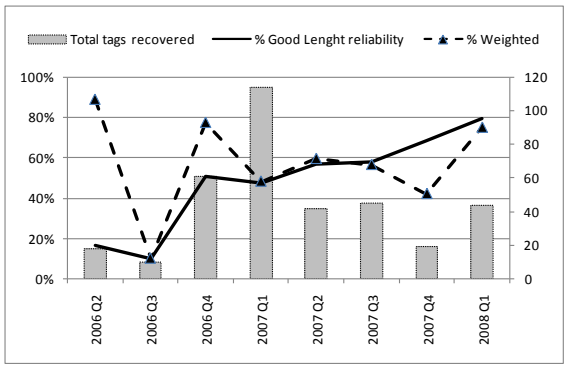

Figure 21- Proportion of recoveries associated to a reliable length and weight measurements in FDM

CONCLUSIONS

26,098 recoveries were reported up to date to the RTTP-IO by 25 different countries and multiple fleets. An average of 95% of tags were collected in countries where high levels of recoveries were already expected and where the project had identified and implemented recovery systems with the different recovery platforms.

Recovery schemes implemented with stevedores and canneries in Seychelles, Madagascar, Mauritius, Kenya and Thailand and with the Purse-seine crews were optimized according to several phases in order to collect the highest quality data possible. Recovery systems are still in place and running in all of these countries (details on each of the recovery platforms can be found in figure 22).

This paper provides an overview of the difficulties and variability in tags recoveries and associated data quality according to country specificities. It is also clear at this stage that data quality associated to each recovery platform varies with time and distance to the moment the fish tagged is captured. Against all odds, certain recovery platforms, such as the canneries in Mauritius, are providing the project with high

quality data, while others, such as the Stevedores from Froid de Mascareignes in Mauritius, are returning tag recoveries with an associated data of a quality well below the one initially expected. Variability associated to these trends and exceptional cases need to be taken into account to optimize the use of the data available.

On this paper we only talk about the Recovery Systems put in place with the purse-seine fleet, but one should also take into account that project also implemented RS with artisanal fleets in countries such as Kenya, Comoros, Tanzania and Maldives, Oman, Iran, Sri Lanka, India and with the longline fleets operating in the IO. Never the less a small number of recoveries is expected from these fleets, the value of the data associated to each of these recoveries will be of great importance since it will provide information on fishes that are not captured by PS, such as large YFT and BET that could provide reliable information on growth and fisheries interactions.

Proper running of the different TRS is never acquired as things can get wrong very easily. Therefore they have to be monitored closely in order to rectify quickly any downgrading.
Considering the complexity of the TRS together with its geographical extension, results achieved so far are very satisfactory and play their part in the overall success of the RTTP-IO.

FIGURES

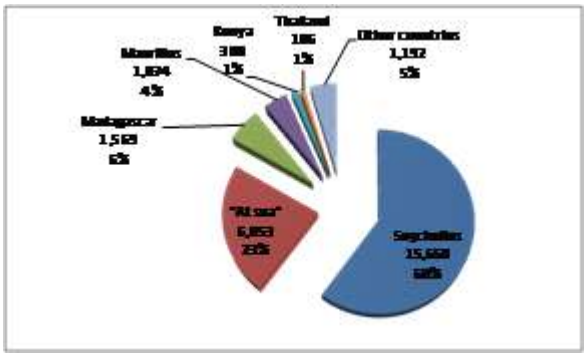

Figure1- Proportion of RTTP-IO total recoveries per country till the 3rd quarter of 2008 (N= 26,050)

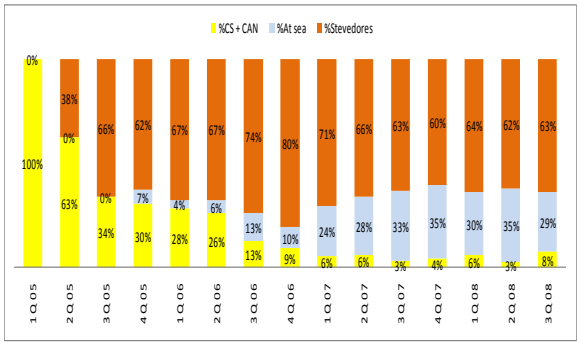

Figure 2- Time progression of the portion of recoveries with project 3 main recovery platforms

COUNTRY	Recovery process phase	FV CREW	STEVEDORES		CANNERIES	
		Fish measurements average good reliability (%Reliable length + %Weighted fish)/2)				
SEYCHELLES	1ST PHASE	n/a	29%		20%	
	2ND PHASE	n/a	81%		90%	
	3RD PHASE	n/a	89%		85%	
AT SEA	1ST PHASE	55%	n/a		n/a	
	2ND PHASE	80%	n/a		n/a	
MADAGASCAR	1ST PHASE	n/a	97.5%		84%	
KENYA	1ST PHASE	n/a	94%		92%	
MAURITIUS	3RD PHASE	n/a	FDM 53%	MFD 95%	PTM 90%	TDM 77%
	1ST PHASE	n/a	FDM 41%	n/a	n/a	TDM 91%
	2ND PHASE	n/a	FDM 62%	n/a	n/a	n/a
THAILAND	1ST PHASE	n/a	n/a		62%	

Figure 22 – Evolution of the length/weight measurements reliability along the different recovery platforms in the six priority countries and along the recovery processes implemented

Mauritius

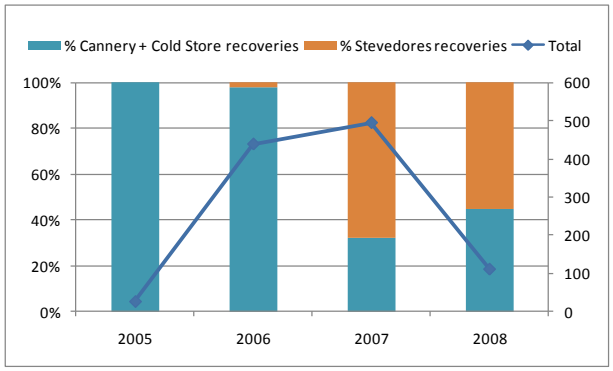

Figure 18- Proportion of tags recovered by the CA+CS and stevedores in Mauritius from 2005 to 2008

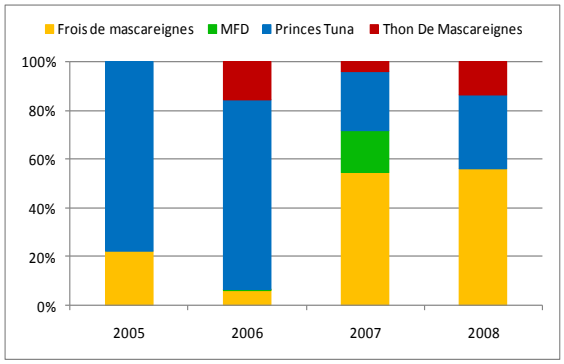

Figure 19- Proportion of recoveries collected by the 4 different recovery platforms in Mauritius

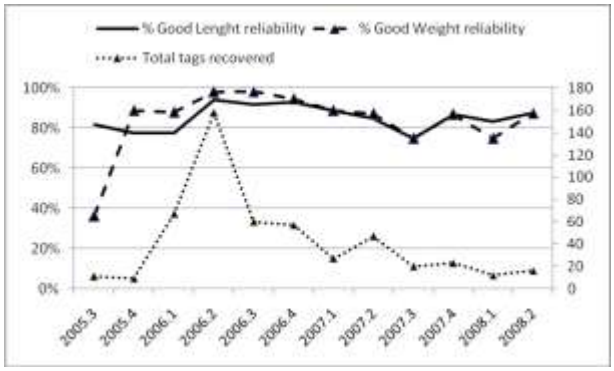

Figure 21- Proportion of recoveries associated to reliable length/weight measurements in PTM cannery

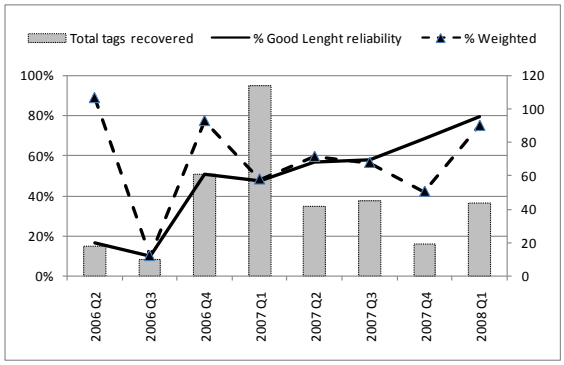

Figure 23- Proportion of recoveries associated to reliable length/weight measurements in FDM

Quarter	Good Length	Weighted	Total tags recovered	% Good Lenght	% Weighted
2nd Q 2007	27	30	30	90%	100%
3rd Q 2007	11	10	11	100%	91%
4th Q 2007	41	43	44	93%	98%
Total	52	53	55	95%	96%

Figure 24- Proportion of recoveries associated to reliable length/weigh measurements in MFD stevedores

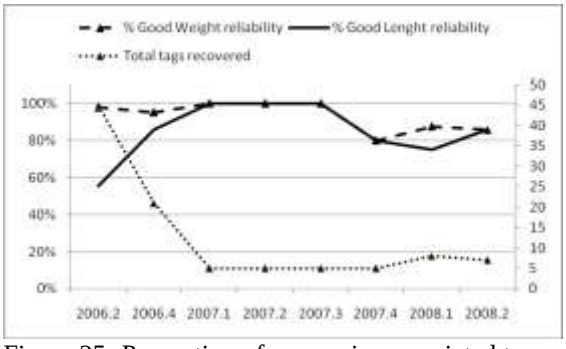

Figure 25- Proportion of recoveries associated to reliable length/weigh measurements in TDM

Kenya

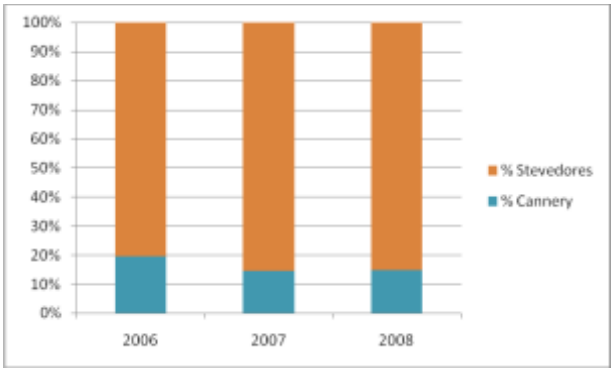

Figure 25 – Proportion of tags recovered by CA+CS collected along time in Kenya

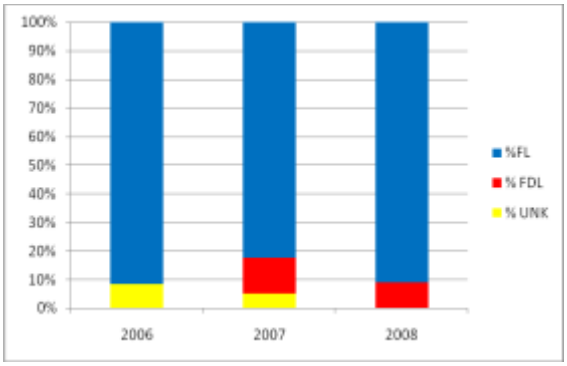

Figure 26- Proportion of length type measurements and stevedores in Kenya from 2005 to 2008

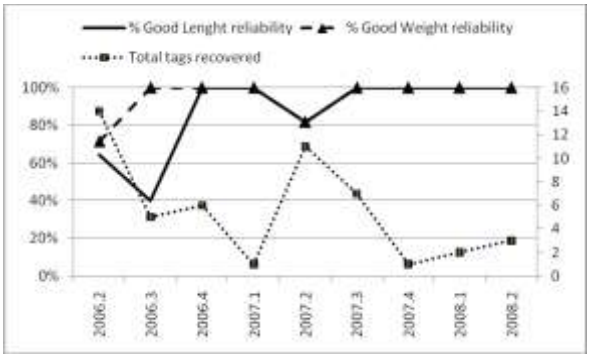

Figure 27 - Proportion of recoveries associated to reliable length/weight measurement for tags recovered at the cannery

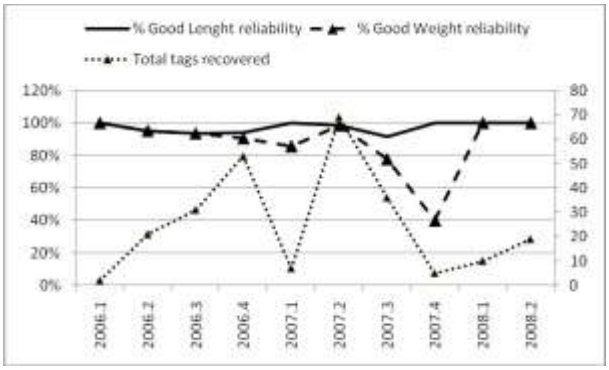

Figure 28 – Proportion of recoveries associated to reliable length/weight measurements for tags recovered by the stevedores

Thailand

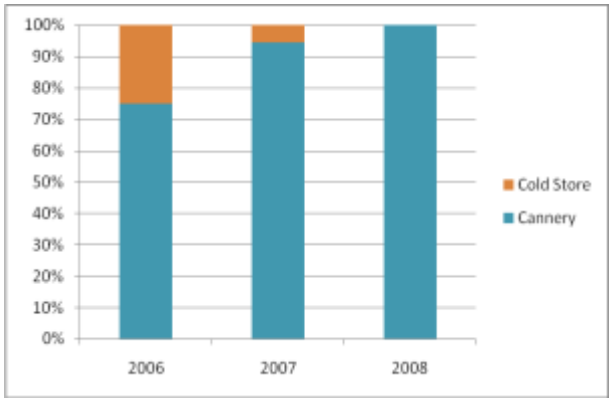

Figure 29 – Proportion of tags recovered by CA+CS time along time in Thailand

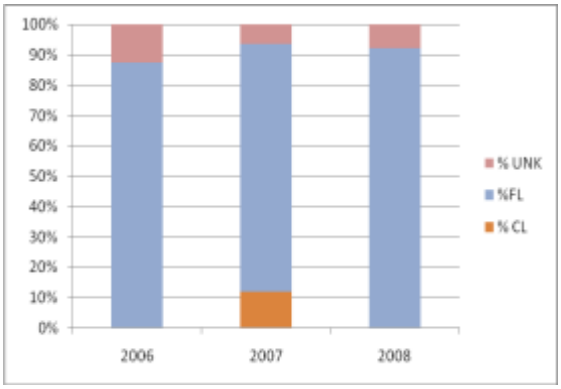

Figure 30- Proportion of length type measurements collected along time in Thailand

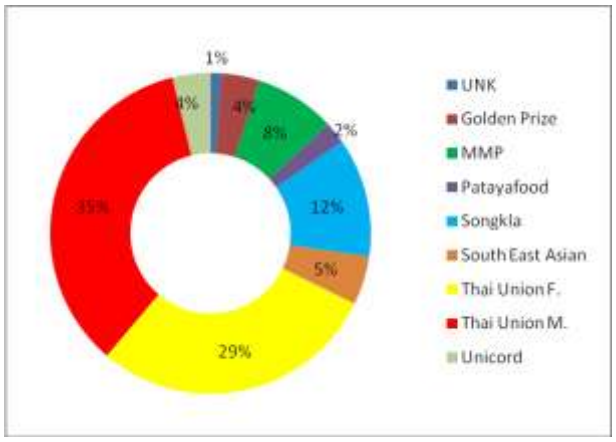

Figure 30 – Proportion of total tag recoveries in Thailand per cannery

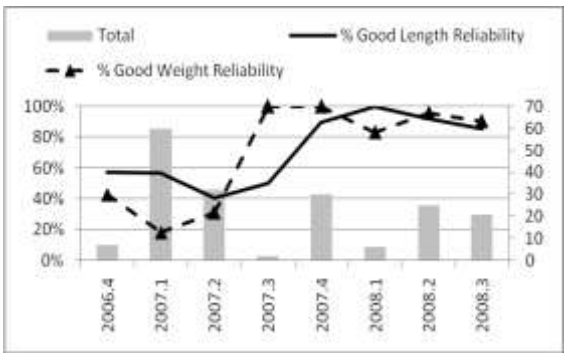

Figure 31- Proportion of recoveries associated to reliable length/weight measurements in Thailand