CCSBT-CC/0810/18
CCSBT-EC/0810/BGD 20

Ministry of Fisheries
Te Tautiaki i nga tini a Tangaroa

New Zealand SBT tagging trials as part of a catch tracking system

1. Introduction

During July and August 2008 the New Zealand Ministry of Fisheries ran trials to investigate how a tagging system could operate in New Zealand fisheries as part of a catch tracking system for southern bluefin tuna (SBT). The aims of the trials were to qualitatively investigate the practicalities of different systems of tagging, measuring, and recording fish, including:

i) The tagging system, including the roles of fishers and fish processors;

ii) The application of tags, including type of tag used; and

iii) Collection of fish measurements, including form design and relationship to existing domestic reporting requirements

Trials involved the cooperation of both fishers and licensed fish receivers (to whom all commercially-caught fish must be landed). The work drew on existing discussions with the Commission for the Conservation of Southern Bluefin Tuna, and in particular the following papers:

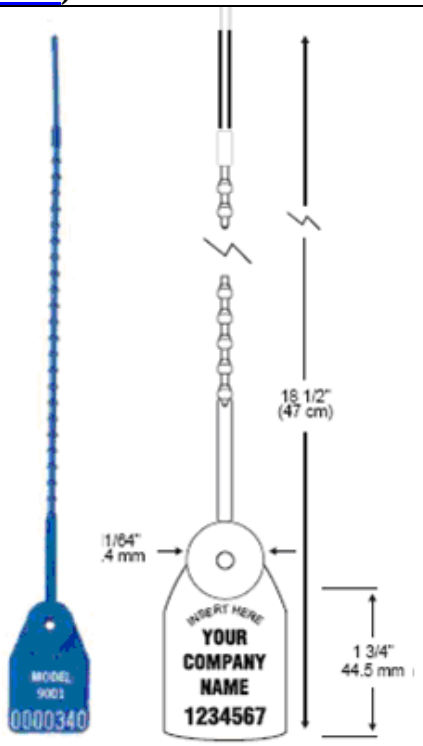
- Initial considerations by the Secretariat for the CCSBT CDS system
- CCSBT-CC/0704/04
- CCSBT-CC/0710/Info01
- CCSBT-CC/0710/07 / CCSBT-EC/0710/BGD02 (Australian proposal)
- CCSBT-CC/0710/22 / CCSBT-EC/0710/BGD17 (Japanese proposal)

The work also referred to catch tracking systems in development in other Regional Fisheries Management Organisations (RFMOs).

2. Choice of tags

2.1 Review of tags suggested in paper CCSBT-CC/0710/Info02

During its investigations of tag types and suitability, New Zealand looked at various tags suggested by the Secretariat and makes the following comments:

1. American Casting (www.americancasting.com)	
(i) "9001-16" The breaking strength of the 9001-16 is too low (22.7 kg) – it was possible to break this tag without using any tool which, in New Zealand's opinion, leaves open the possibility of tag breakages during transportation. The plastic also showed visible signs of stress (i.e. whitening at bends).	
(ii) "BT4LH" Model BT4LH is a cable tie similar to the model that was trialled. Further discussion occurs below on some problems that might arise with this style of tag. A further comment is that this model is quite thin (4.7mm), which may make it more difficult to readily check information like tag number.	

(iii) “PSW-97” The PSW-97 model involves a thin wire threaded through a small plastic ‘box’. The ‘box’ is only 2.67cm high. There would appear to be a high likelihood of fishers losing the wire or otherwise finding the system too fiddly and difficult to use. It is also unclear whether this type of tag could be printed with a logo, or only with numbers or text. Another potential problem is if the wire cuts into the flesh of the fish (might be a problem for fresh fish).	
2. Precision Dynamics Corporation (www.pdcorp.com)	
New Zealand did not source samples from this company, but did talk to various manufacturers of this style of tag. Some suppliers consider that these tags would not be tamper proof, because it would be possible to use a tool to un-do the fastening, then potentially re-use the tag. New Zealand considered this to be a serious problem with this style of tag, but would be interested in further discussions with members. Fisher confidence in the tag chosen is also an important consideration. These tags can stretch and delaminate (although nylon tags may be more successful). Once stretched, the ability of the tags to withstand transportation may be limited. Further, they probably do not provide fishers with the same level of confidence in their durability and likelihood of remaining attached.	
3. Harcor Security Seals (www.harcor.com.au)	
New Zealand did not get samples of the Harcor ‘rock lobster seal’ discussed by the Secretariat, but it is unclear to New Zealand how this tag could be used for tagging SBT. The tag appears to be too small to successfully tag an SBT, certainly a fresh one.	

2.2 Selection of tags for New Zealand trials

New Zealand chose to trial a type of tag commonly used in the New Zealand fishery (referred to in this paper as an applicator tag), along with a strip tag similar to those discussed above, as follows:

1. A strip tag of the sort used as a security seal. Once fastened, the tag cannot be removed except by cutting through it (which renders it unusable). For more information on this style of tag, see: http://www.americancasting.com/info-plastic-strap-seals-hs115.asp (Model HS115 heavy duty all plastic cargo seal)	
2. A tag applied with an applicator, of the sort commonly used in animal management (e.g. as a 'cow ear' tag). This tag can also only be used once. It has not yet been trialled in the New Zealand fishery, but a machine readable option would be available for this tag (http://www.zeetags.com/wa.asp?idWebPage=12160&idDetails=113). For more information on this style of tag, see: http://www.zeetags.com/ra.asp?url=/webfiles/ZeeTags/files/6489_Zeetags_ID_Brochure_LR.pdf	

2.3 Tag costs

Costs of the tags trialled were as follows:

- Strip tags: costs vary depending on the order size. Cost for an order of 1,000 tags is US$0.32 plus postage costs (which were US$92 for the trial order)
- Applicator tags: costs vary depending on size of tag and printing required. Costs for the trial were NZ$0.81 per two-part tag. Tags require use of an applicator, which costs NZ$35.75. Postage costs were minimal ($6).

3. Trial set-up

3.1 Tagging system

Trials were carried out between June and August 2008. Trials involved three fishing vessels and four licensed fish receivers. The trial occurred with domestic fishing vessels, which land fresh fish. Processing at sea is usually limited to a gilled and gutted state, and sometimes the tail is also removed.

With the exception of the larger freezer vessels that are chartered by New Zealand fishing companies, most of the vessels that catch SBT in New Zealand are 25m or less in length. Of the 46 vessels that recorded landing SBT in the 2006-07 fishing year, 28 vessels were less than 20 metres in overall length. Almost all vessels targeting SBT are therefore too small to accurately weigh and measure fish at sea. It was suggested that applying a tag and filling out the accompanying documentation might also be difficult in some circumstances on smaller vessels. Initial comments from fishers during trial development favoured application of tags upon landing rather than at sea.

It was decided that trials should cover both fishers applying tags on board their vessels and upon landing, as follows:

- Tagging to be done by the fisher on board the fishing vessel. All fish to be tagged before landing.
- Tagging to done by the licensed fish receiver upon landing.

Since discussions to date within the Secretariat have focussed on the application of tags at sea (or at the time of kill on farms), it was seen as important to trial the alternative situation. In particular, the trial could help assess whether applying the tag on land would allow the successful tracking of catches of SBT as required by a catch tracking scheme.

3.2 Application of tags

Two different types of tags were trialled. Each participant was provided with some of each type of tag to use during the trial. Each fish was tagged once, using one or other of the tag types.

Both sorts of tags were attached to the fish through the gill plate. The strip tag was looped between the gill arches if possible (otherwise through a slit in the gill plate made with a knife – see photo below from the trial). The applicator tag was applied directly through the gill plate using the applicator which is made for this purpose (see examples below of existing use in the New Zealand domestic fishery).

Figure 1: Strip style tag applied to an SBT

Figure 2a: Applicator tag applied to an SBT (I)

Figure 2b: Applicator tag applied to an SBT (II)

3.3 Collection of fish measurements

The current domestic system allows for fishers recording estimated catches at sea, followed by subsequent accurate measurement by licensed fish receivers (to whom landings must be made) upon landing. It was not considered feasible to alter this system as part of a catch tracking system. That is, it was not considered feasible to require fishers to provide accurate length and weight measurements at sea. On a small vessel, there is unlikely to be space for the required equipment, nor scope to use it (given the requirements of fishing operations). In particular, there would be a need for movement compensating scales. The smaller domestic vessels also have limited crew sizes, and fish need to be processed as they are caught, without additional delays caused by measuring unprocessed (greenweight) fish.

The two tagging systems (at sea or on land) trialled were associated with two different options for collecting length and weight measurements, as follows:

- Fishers to apply a tag and record initial information, including an estimated weight. The licensed fish receiver would then record measured weight, along with length measurements.
- All measurements occur at the licensed fish receivers, at the time at which the tag is applied. This system sometimes involved measurement of processed (tail-off) fish rather than whole fish.

Discussions to date within the Commission have assumed that a catch tracking scheme will involve collection of both length and weight measurements for individual fish. The collection of such information potentially has both compliance and science value, for example:

- Such information could help confirm the identity of tagged fish (i.e. length and weight information would be recorded alongside tag number, and could subsequently be checked at another point in the supply chain e.g. at import or

sale on the domestic market where the fish remained whole or largely whole, to verify that the fish is likely to be the one that is documented on the corresponding form). This information may therefore be useful for compliance purposes. It is also noted that typically length is less variable than weight during fish handling and processing (aside from processing in which length is altered e.g. through removal of the tail). That is, while length is likely to remain constant, weight may change as a result of water loss or through freezing.

- Such information would theoretically provide lengths and weights for almost all harvested SBT, which could potentially be a useful input into stock assessment.

It is noted that in the latter example, the quality of the information would be of great importance. Because of the relationship between weight and length, even small changes in assumed length can be critical. Therefore, a key aspect of the trials was to investigate whether or not accurate length information could be collected as part of a catch tracking system.

Most fish caught in the New Zealand fishery range between 150cm and 190cm. It is not common practice for either fishers or licensed fish receivers to measure fish lengths at present, although observers do make such measurements using callipers.

Different trial forms were associated with the two trial options (i.e. tagging by fishers or by licensed fish receivers) as follows:

- One form to be used if the tag is applied by a fisher on board the vessel. This form has an initial section for the fisher to fill in, as well as a section the licensed fish receiver fills in.
- One form to be used if the tag is applied at the licensed fish receiver. Only the licensed fish receiver needed to fill in this form.

Copies of these forms are provided in Annex One.

4. Trial outcomes

4.1 Tagging system

Both options trialled – tagging at sea and tagging on land – involved some adjustments to current practices, in particular in relation to the associated requirements for measurements and documentation. However, applying the tag itself was seen as fairly straightforward in either situation (see also the discussion below on tag types).

However, it was noted that weather conditions are likely to affect the success of tagging at sea, and in particular completion of associated documentation. There are likely to be some situations in which a tag could not be applied to the fish immediately, because of the conditions (particularly on small vessels). It is envisaged that any catch tracking scheme would need to make some limited provision for landing fish without a tag in such situations.

For example, one fisher commented that because of rough weather he was not able to fill in documentation immediately. This lead to potential confusion with associating the correct information (such as time of catch) with each tagged fish, particularly if tags were applied out of sequence. It was also noted that in rougher weather it became more likely that forms would get soiled (e.g. with water, fish blood), and thus require re-doing. These are problems fishers are familiar with from their other domestic reporting requirements.

Tag management is an important element of any catch tracking system. Those authorised to tag fish need to be able to account for all tags they have been issued (including both those applied to fish, and any losses or broken tags). One observation is that tag management may be easier for licensed fish receivers than for fishers, because of the facilities available to them. For example, one fisher noted that although he was organised at first, tags did subsequently get out of sequence and it was easy to lose track of them.

Trial participants did not consider there would be problems in returning unused tags at the end of the season if this were a requirement of a catch tracking scheme (although again this might be easier for licensed fish receivers who would have better storage facilities available).

Sometimes three or four boats may offload fish onto the same truck for transport to the licensed fish receiver. If tagging were to occur at the licensed fish receiver there may be potential for mixing up of fish from different vessels. The likelihood of this occurring was considered to be low, since fishers already have an obvious interest (and existing legal reporting and recordkeeping obligations that reinforce this interest) in ensuring their catch is easily distinguished from that of other fishers.

Overall, it was noted that the amount of effort required from the licensed fish receiver would be about the same whether the fisher or the fish receiver applies the tag. This is because the licensed fish receiver would still need to do additional measuring and recording even if the tag was already on the fish. At busy times (landing around 100 fish per day), one licensed fish receiver estimated they would need an extra person in order to do the tagging/documentation. The main part of the process that is time consuming is measuring the length.

One issue of importance is the potential for misidentification of species. Even if in general tagging is to occur on vessels, licensed fish receivers would need to be familiar with the system and able to apply tags to untagged fish if required. For example, the initial species identification might be incorrect (e.g. identifying an SBT as a juvenile Pacific bluefin tuna). Further, a catch tracking system would need to have a way of dealing with ‘false positives’ – that is, fish that were falsely identified as SBT and therefore tagged. For example, one bigeye tuna got tagged by mistake during trials. The error was identified by the licensed fish receiver and noted on the associated form, but a more formal way of dealing with this problem would be required.

4.2 Application of tags

Fishers and licensed fish receivers involved in the trial expressed a strong preference for the two piece tag applied with the applicator. This system was seen as straightforward and simple, and also reflects existing practices in the fishery.

While the strip style tag is considered likely be secure if applied correctly, it was not viewed as easy to use. Those applying the tag did not consider it secure enough to loop the tag through the gill cavity, because the neck can sometimes tear and the tag could be lost at this time. Therefore, as noted above, tags were applied either between the gill arches or through a hole in the gill plate. This process was seen as time consuming and sometimes awkward.

These comments contrast with assumptions made in discussions to date, and therefore require further consideration. The following excerpt is from the second discussion paper prepared by the Secretariat (**CCSBT-CC/0710/Info02**).

> At present, we are assuming that the tag will be ALWAYS fastened to the fish in the same location and general manner (i.e. looped through) that is done in the current Japanese tagging system as shown in the photo of a frozen SBT below. We would appreciate it if **Members** could investigate different types of tags and tagging methods. The Secretariat does not have sufficient practical experience of handling SBT to advise on what is practical for the range of handling practices that occur in the industry.

The New Zealand Ministry of Fisheries now considers a tagging system must make allowances for situations in which it is not possible to apply a tag in the way shown in this photograph. Applying a tag through the gill plate is considered to be more secure and less prone to tag loss during transportation, in comparison to looping a tag through the gut cavity. While this particularly applies to fresh tuna, it is also relevant to frozen fish.

Another observation was that the strip tags sometimes showed evidence of stress at the point where it bends (e.g. the plastic whitening at bends). However, no tags broke during the trial. The breaking strain of these tags is reported to be 61.2 kgs.

4.3 Collection of fish measurements

As noted, a key aspect of the trials was to investigate whether or not accurate length information could be collected.

New Zealand makes the following observations on the ability to accurately record individual fish lengths as an element of a catch tracking system:

- Small vessels have limited working space, and need to quickly process fresh fish (with minimal handling) to ensure its quality. These factors limit their ability to measure fish lengths, which would generally require the use of specialised equipment such as callipers for fish of the size caught in the New Zealand fishery.
- Some domestic vessels process fish in ways that alter the overall length of the fish (i.e. processing to gilled and gutted– tail off state). As such, accurate recording of processed state would be required. Such reporting is already required under domestic systems, and there are separate conversion factors for gilled and gutted – tail on; and gilled and gutted– tail off. However, further work may be required to ensure processing is done uniformly (i.e. tail removed at same place), and states are recorded consistently.
- In cases where processing occurs before landing, conversion factors for length measurements could be developed if required (such factors already exist for weight conversions). Observers on New Zealand vessels already record individual fish measurements that could be used as the basis for length conversion factors.
- The size of the fish can present a problem for accurate length measurements, particularly while fitting in with existing practices for processing fish. For example, one licensed fish receiver noted that the fish are too long to use a measuring board. However, it is difficult to use a tape measure because of the shape and curvature of the fish. One fish receiver used a measuring stick while the fish was suspended. Other methods could probably be developed but are not in current use.
- Any method currently used adds to the time required to process each fish, which has important implications for both quality of the fish product, and staffing requirements, particularly at busy times.
- Even small inaccuracies in measurements of length present potential problems if used for scientific purposes, because of the assumed relationship between length and weight. Weight can be accurately measured by licensed fish receivers.

Nonetheless, as noted above, length is considered likely to be less subject to change over time than is weight, which may change as a result of loss of moisture over time, and through changes of state (e.g. freezing).

The collection of length information may be disruptive to existing commercial practices. Further, careful consideration would be needed to ensure the information collected is of sufficient accuracy to be of value for science purposes. Nonetheless, the costs and benefits of collecting length information should be carefully considered as part of a catch tracking system.

The forms that were trialled were generally found to be easy to use. The form was sometimes difficult to fill in when weather is rough e.g. with wet hands, but as noted this is a problem common to all recording of information on board vessels (including domestic reporting requirements). Such problems could be addressed through form

design (e.g. use of strong paper for forms; limiting the information fishers are required to fill in at sea).

One comment was that it was unclear how to deal with fish from the same vessel that is to be included in different shipments. If the fisher is applying the tag and doing some of the associated documentation, the form becomes a per trip report, rather than a per shipment report, upon which the existing Trade Information Scheme is based. If the fish caught on a single trip go to several different destinations, a single tagging form could be associated with more than one 'catch tracking form' (i.e. the equivalent of the existing Trade Information Scheme form).

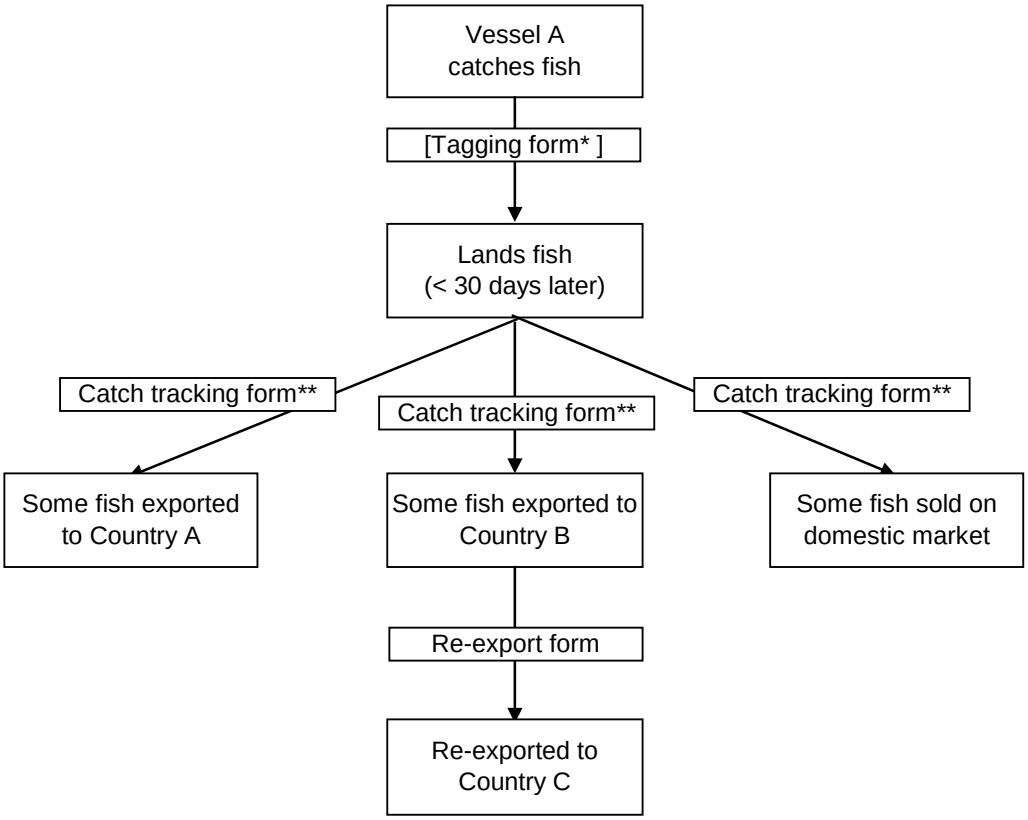
5. Discussion

In general, New Zealand considers that as part of a catch tracking system, tagging, measuring and recording should occur at the first available opportunity. For most of New Zealand's domestic vessels, the first available opportunity for tagging may well be on board the vessel. The first available opportunity for measuring and recording is considered more likely to be the licensed fish receiver.

However, where different fishing practices are in place, this situation may well be different. For example, New Zealand considers measuring and recording would need to occur on board the vessel in situations in which a long period of time elapses between the fish being caught and being landed (for example freezer vessels). Measuring and recording would need to occur at this stage to supply the time of catch and length and weight measurements before the fish is frozen. In any case, tagging and documentation would have to be completed before any transhipment occurred.

Another observation is that the current Trade Information Scheme is based on recording information by shipment. This trial has highlighted that basing a catch tracking system (involving tagging of individual fish) on a per vessel (or per farm) approach may require changes in the way in which information is collected. For example, in the New Zealand context it is relatively common for product from a single fishing vessel to be split into several different shipments (see scenario one outlined below).

Scenario 1 - small scale fishing boat



* If tagging (or catch tracking) form is filled out at this point, all fish from Vessel A would likely be included on a single form, but fish subsequently go in 3 different directions. Therefore parts of this information would have to be repeated on each of the 3 catch tracking forms, as well as the re-export form. Alternative is for tagging form to be filled out at licensed fish receiver to which fish are landed.

** Tagging form could also be filled out at this point.

Annex One: Trial catch tracking forms

Example tagging form (a) – fisher / licensed fish receiver form

Southern Bluefin Tuna Tagging Return

Ministry of Fisheries
Te Tautiaki i nga tini a Tangaroa

1. Complete separate returns for each fishing trip, start a new return if you change fishing method during a trip.

STN 1234567

2. To be completed by the fisher upon capture:

3. To be completed by the Licensed Fish Receiver

Date Fish was Taken (dd/mm/yy)	Processed Weight	Processed State	Tag Number	Length after Processing	Processed Weight
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg
/ /	.0kg			.0cm	.0kg

Fishing method

Registration number of vessel

Client number of permit holder

Signature of permit holder or authorised person

Licensed Fish Reciever Name

Licensed Fish Receiver number

Signature of authorised person

Southern Bluefin Tuna Tagging Return Explanatory Notes (June 2008)

You should complete a return if you take Southern Bluefin Tuna.

You should complete one row per fish taken.

You should complete a separate form for each trip.

The "blue" part of the form should be completed by the fisher who took the fish.

Date Fish was Taken: Write the date the fish was brought aboard the vessel, this should be the same as the "end of haul" date if using a tuna longlining catch effort return.

Processed Weight: Write an estimate of the weight of the fish after it has been processed.

Processed State: Write the principal landed state code that best describes the state of the fish after processing.

Tag Number: Write the number of the tag that you attached to this fish.

Fishing method: Write the method code that best describes how you caught the fish (For example, if Surface longlining write SLL).

Registration number of vessel: Write the registration number from the New Zealand certificate of registration. Write the callsign if the vessel does not have this certificate.

Client number of permit holder: Write the client number given to the permit holder by the Ministry of Fisheries or Fishserve.

Signature of permit holder or authorised person: The permit holder or a person authorised by the permit holder must sign the form.

The "grey" part of the form should be completed by the Licensed fish Receiver.

Length after Processing: Measure and record the length of the fish in centimetres rounded down to the nearest cm (for example for 125.8 cm record 125).
If the fish has an intact tail then you should record the length from tip of lower jaw (mouth closed) to the fork of the tail fin. If the tail has been removed you should record the total length of the fish after it has been processed.

Processed Weight: Write the weight of the fish in its processed state.

Licensed Fish Receiver Name: Write the full legal name for this Licensed Fish Receiver.

Licensed Fish Receiver Number: Write the client number for this Licensed Fish Receiver as assigned by the Ministry of Fisheries or Fishserve.

Signature of authorised person: The person signing the form must be specified as an authorised signatory for the Licensed Fish Receiver named on this form.

Forms should be completed and sent to the Ministry of Fisheries no later than 15 days after the last day of the calendar month in which the trip that took Southern Bluefin Tuna (STN) ended.

Example tagging form (b) – licensed fish receiver form

Southern Bluefin Tuna Tagging Return (LFR)

Ministry of Fisheries
Te Tautiaki i nga tini a Tangaroa

1. The Licensed Fish Receiver should complete a separate return for each shipment containing Southern bluefin tuna.
2. Complete a single row for each Southern bluefin tuna landed:

STN 1234567

Registration Number of Vessel	Date of Landing (dd/mm/yy)	Landed State	Length after Processing	Processed Weight	Tag Number
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	
	/ /		.0cm	.0kg	

Licensed Fish Receiver number

Signature of authorised person

Licensed Fish Receiver Name

Date of signature / /

Send completed returns to the Ministry of Fisheries, PO Box 1020 Wellingotn 6140

Southern Bluefin Tuna Tagging Return (LFR) Explanatory Notes (June 2008)

You should complete a return if you receive Southern Bluefin Tuna (STN).

You should complete one row per fish received.

You should complete a separate form for each shipment which contains STN.

Registration number of vessel: Write the registration number for each vessel from which you received STN. If the vessel does not have a New Zealand certificate of registration then write the callsign.

Date of Landing: Write the date that the STN was received by the LFR.

Landed State: Write the principal landed state code that best describes the state of the Southern Bluefin tuna after processing.

Length after Processing: Measure and record the length of the fish in centimetres rounded down to the nearest cm (for example for 125.8 cm record 125).
If the fish has an intact tail then you should record the length from tip of lower jaw (mouth closed) to the fork of the tail fin. If the tail has been removed you should record the total length of the fish after it has been processed.

Processed Weight: Write the weight of the fish in its processed state.

Tag Number: Write the number of the tag you attached to this fish.

Licensed Fish Receiver Number: Write the client number for this Licensed Fish Receiver as assigned by the Ministry of Fisheries or Fishserve.

Licensed Fish Receiver Name: Write the full legal name for this Licensed Fish Receiver.

Signature of authorised person: The person signing the form must be specified as an authorised signatory for the Licensed Fish Receiver named on this form.

Date of signature: Write the date the form was signed by the authorised person.

Forms should be completed and sent to the Ministry of Fisheries no later than 15 days after the last day of the calendar month in which the Southern Bluefin Tuna (STN) recorded on this form was shipped.