SCIENTIFIC COMMITTEE
TENTH REGULAR SESSION

Majuro, Republic of the Marshall Islands
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Project 35: Bigeye tuna age and reproductive biology progress report

WCPFC-SC10-2014/SA-IP-15

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Executive Summary

Key Points for SC10

1. Project 35 is progressing to schedule. However SC10 should note that the number of samples from the central Pacific is lower than intended for this stage of project implementation and encourage National and sub-regional observer programs to assist with increasing sampling from this area.
2. Web-based tool for WCPFC CCMs and external parties to monitor the collection of biological samples for the WCPO have been developed.
3. Procedures for granting access to the WCPFC tissue bank by third parties have been drafted and are ready to be reviewed, revised and adopted by the Scientific Committee.
4. SC10 should commence planning for the analyses of samples. This could commence as early as 2015.
5. USD75,000 has been allocated to Project 35 in the 2015 budget and this will be required to achieve sampling targets.

Introduction

SC7 reviewed the outputs from Project 35 (P35), identifying its expansion to a region-wide sampling program as one of 5 high priority projects. The aim of P35 is to gain a better understanding of bigeye age and maturity for application in the estimation of depletion based reference points. SC7 prioritized research in region 4 of the bigeye stock assessment where less information has been gathered to date.

The continuance of P35 is a multi-year project. Years 2012 – 2014 are devoted to sampling and 2015 will focus on subsequent analysis on the assumption that adequate samples have been collected. The indicative project budget and targets for 2012-2015 are as follows:

Year	2012	2013	2014	2015
Amount	USD 55,000	USD 70,000	USD 75,000	USD75,000
Sampling target	500 otoliths 150 gonads	1000 otoliths 150 gonads	1000 otoliths	Supplementary samples
Analyses				Gonad Histology Otolith sectioning

The European Union provided an additional Euro100,000 in 2014 to expand the collection of biological samples to include yellowfin, skipjack and other billfish. The objective of this European Union component is the establishment of a tissue bank of biological samples for the WCPFC. This was proposed in recognition of the 3 to 5 year time period is often takes to establish a collection of samples that are sufficient for stock wide analyses and efficiency gained by collecting across multiple species rather than being single species focussed.

Progress

Biological Sampling Equipment .

1. Equipment has been purchased for biological sampling including consumables for 3000 samples.

Sampling

2. Samples are being collected by national "at sea" and "port" observers throughout the WCPO.

3. Supplementary sampling has been organised by the Government of Chinese Taipei and the Luen Thai Fishing Venture (LTFV) to be undertaken by vessel crew for the fleet operating from Palau.
4. Opportunistic sampling on scientific cruises has been undertaken and will continue.
5. Otolith sampling arrangements have been organized for sashimi fish sent fresh to Japan. Japanese agents for LTFV, Sea Quest, Solander, Fiji Fish are collaborating with the National Research Institute of Far Seas Fisheries and Sasama Consulting in Japan to allow sampling of these fish after sale.
6. The number of bigeye, yellowfin and skipjack samples entered and appropriately stored in the WCPFC tissue bank is currently 1019, 1217,432 respectively.
7. Additional samples have been collected by observers which are waiting cataloguing. Delays between sample collection and cataloguing can be up to 6 months.
8. The acquisition of samples from PNG and the central Pacific has been slower than anticipated.
9. Web-based tools have been developed to allow the WCPFC to track the collection of samples with online tools to query the description of the samples in the tissue bank.
10. Procedures for granting access to the WCPFC tissue bank by third parties have been drafted and are ready to be reviewed, revised and adopted by the Scientific Committee.

Budgeting

An itemized budget, totalling USD75000, for 2015 is provided.

PROJECT CONTRIBUTORS

Contributor	Organisation
S.Clarke	Sasama Consulting, Japan
H.Ashida, M.Ogura	National Research Institute of Far Seas Fisheries, Japan
R.Wu	Overseas Fisheries Development Council, Chinese Taipei
S.Chou, E.Ng	Luen Thai Fishing Venture, China
E.Clodumar	Nauru Fisheries and Marine Resources Authority
N.Tavaga	Ministry for Fisheries and Forest, Fiji
C.Golu	Ministry of Fisheries & Marine Resources, Solomon Islands
K.Sisior	Ministry of Natural Resources, Environment and Tourism, Palau
H.Gossuin	Service de la Marine Marchande et des Pêches Maritimes, Nouvelle Caledonie
A.Jones	Ministry of Marine Resources, Cook Islands
T.Usu, B.Kumasi	National Fisheries Authority, Papua New Guinea
B.Phillips, R.Narruhn	National Oceanic Resource Management Authority, Federated States of Micronesia
T.Taleo	Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity, Vanuatu
M.Afeleti	Ministry of Fisheries Marine Resource Development, Kiribati
T.Raoulx	Direction des Resources Marinés, Marine Resources Authority, Polynesie Francais
B.Muller, B.Fuibala	Marshall Islands Marine Resources Authority, Marshall Islands
J.Farley	CSIRO, Australia
K.Weng	University of Hawaii, United States of America
C.Sanchez, F.Roupsard, S.Nicol	Oceanic Fisheries Programme, Secretariat of the Pacific Community
T.Costello, T.Park, A. Orianihaa	Forum Fisheries Agency

BACKGROUND

The WCPFC Scientific Committee established Project 35 to collect and analyse samples to provide biological ageing, growth and maturity data in support of improved regional bigeye stock assessments and the development of depletion based reference points. A pilot of this study was completed in 2011 and presented to Seventh Regular Session of the Scientific Committee (SC7). After review SC7 recommended that a pacific-wide study on growth would provide primary data to facilitate understanding of the biological processes that result in spatial variation in growth, benefitting future model structures for bigeye tuna.

SC7 (Para 133) provided the following guidance for the P35 project design:

- that there should be an emphasis on the central equatorial region (150W – 170 W) for future sampling, but that sampling across the WCPO should be undertaken;
- for this central equatorial region, there may be some value in collecting additional samples for maturity studies, and up to 300 samples might be needed;
- consideration be given to a simulation-based approach to get a better understanding of the potential impact of regional patterns in growth and implications for stock status; and
- the importance of providing training to fishery observers on the collection of biological samples; and a detailed breakdown of the proposed budget should be given to allow the cost of particular activities and sampling in particular areas.

SC7 approved the continuance of P35 as a multi-year project with 2012 – 2014 devoted to sample collection and 2015 to focus on sample analyses. The indicative project budget and sampling targets for 2012-2015 were as follows:

Year	**2012**	**2013**	**2014**	**2015**
Amount	USD 55,000	USD 70,000	USD 75,000	USD75,000
Sampling target	500 otoliths 150 gonads	1000 otoliths 150 gonads	1000 otoliths	Supplementary samples
Analyses				Gonad Histology Otolith sectioning

The budget in each year was primarily designed for payment to observers/data technicians and biological sampling coordinators for sample collection and for costs associated with the longer term storage and transport of samples. Where required the budget will also be used to train observers and technicians in biological sampling (including fees and expenses for trainers).

The European Union provided an additional Euro100,000 in 2014 to expand the collection of biological samples to include yellowfin, skipjack and other billfish. The objective of this European Union component is the establishment of a tissue bank of biological samples for the WCPFC. This was proposed in recognition of the 3 to 5 year time period is often takes to establish a collection of samples that are sufficient for stock wide analyses and efficiency gained by collecting across multiple species rather than being single species focussed.

Outputs and Deliverables for 2014

Activity	**Progress**
Biological Sampling Equipment	Observer sampling kits have been assembled and distributed to the National Observer Programs operating within the WCPO. These include Palau, Papua New Guinea, Solomon Islands, Federated States of Micronesia, Marshall Islands, New Caledonia, Vanuatu, Fiji, Cook Islands, Kiribati and French Polynesia. Biological sampling kits contain data sheets, pencils, knives, saws, cutters, cable tags, sample jars and bags, and instructions (Appendix 1, Appendix 2). Sufficient equipment has been purchased for biological sampling including consumables for 3000 samples.
Observer Training	Training modules and standards have been developed and implemented within the Pacific Island Regional Fisheries Observer programmes, providing the capacity for observer-based collection of biological samples across all fisheries in the WCPO (Appendix 3). Since SC9 additional training in the Marshall Islands, Fiji, Solomon Islands, Papua New Guinea, Federated States of Micronesia and Kiribati has been completed.
Sampling	Samples are being collected by national “at sea” and “port” observers across the WCPO. Observers are collecting to a strategy that minimizes the number of samples per set and maximizes sampling across sets and trips to avoid confounding of samples. The Government of Chinese Taipei and the Luen Thai Fishing Venture (LTFV) have organized additional sampling by vessel crew for the fleet operating from Palau. Opportunistic sampling on scientific cruises has also been undertaken.

Otolith sampling arrangements have been organized for sashimi fish sent fresh to Japan. Japanese agents for LTFV, Sea Quest, Solander, Fiji Fish are collaborating with the National Research Institute of Far Seas Fisheries and Sasama Consulting in Japan to allow sampling of these fish after sale. The notification posters for these fish are provided in Appendix 4.

The number of bigeye, yellowfin and skipjack samples entered and stored in the WCPFC tissue bank is currently 1019, 1217, and 432 respectively. The distribution of these samples is provided in Figure 1. These figures do not include samples waiting cataloguing. The quantity and details of these samples has not yet been verified due to the extended length of some observer trips or their requirement to complete consecutive trips and the biological sampling information not yet submitted by the observer. The spatial distribution of these un-catalogued samples is consistent with the distribution of samples in Figure 1. The lower rate of sampling of bigeye from the PNG and FSM area (Figure 2) has been due to a delay in financial arrangements being operationalised to compensate observers for the collection of biological samples. The low number of samples from the central Pacific region (Figure 2) has been largely due to the absence of a coordinator in Pago Pago to facilitate the collection of samples from purse-seine vessels. For long line vessels there has been an absence of vessels operating out of Pago Pago in that last 12 months and vessels willing to allow observers to extract otoliths.

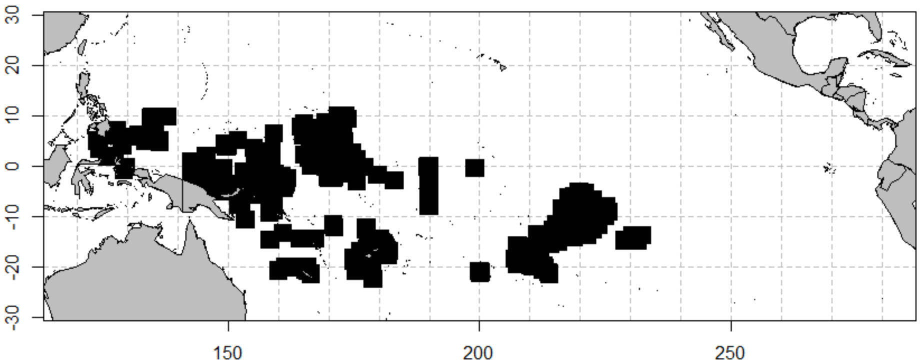

Figure 1. Distribution of catalogued biological samples for bigeye, yellowfin and skipjack collected for Project 35.

An FFA appointed observer coordinator is now placed in Pago Pago which should aid the placement of observers on purse-seine vessels who care able to collect biological samples. Similarly the observer coordinator for the USA program has reported increased activity of long line vessels based out of Pago Pago. The developing El Nino conditions in 2014 should also facilitate increased sampling from the central Pacific region as more vessels operate in this region during these conditions.

The distribution of the bigeye samples catalogued is shown in Figure 2 along with the distribution of samples from past studies indicates that if samples can be collected from the central Pacific and PNG/FSM over the next 6 months then the spatial coverage across the entire equatorial Pacific should be sufficient for examination of spatial variation in age at length and reproductive biology using a combination of new analyses and comparison with past studies.

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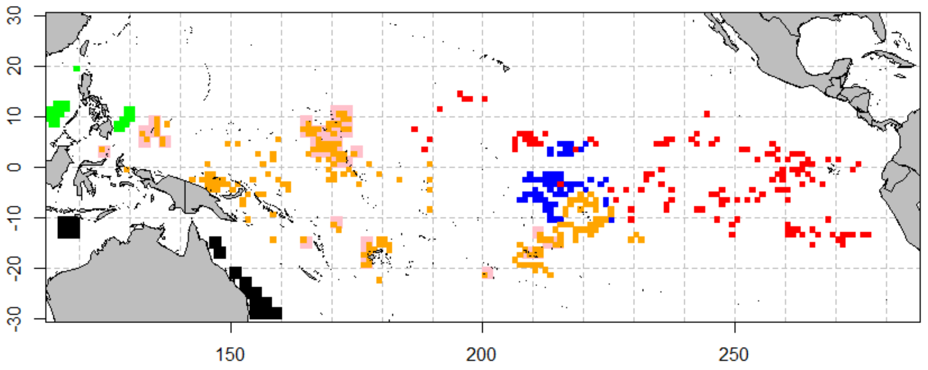
<tr><td></td><td>

Figure 2. The spatial distribution of bigeye samples. Orange squares are those collected for Project 35 by observers and set location information has been confirmed and is represented at 1x1 degree resolution. Pink squares are samples collected for Project 35 by port samplers. For these samples location is restricted to trip location which is represented by 2x2 degree resolution. Green (Sun et al. 2014), black (Farley et al. 2006), blue (Zhu et al. 2010) and red (Schaefer et al. 2005 and Schaefer and Fuller 2006) squares represent the sampling areas of previous published studies.</td></tr>
<tr><td>Tissue Bank</td><td>Sample storage has been arranged for ports of arrival and for longer term storage of samples at SPC and CSIRO. Transport arrangements have been organized to ship samples from ports of arrival to the long term storage facilities. Any guidance by SC10 on additional permanent locations for sample storage is requested. SC10 is advised that in the longer term a cost associated with storage, cataloguing, managing the biological samples beyond the current expected duration of Project 35 will be incurred. SC10 should commence the planning for this expense.

A relational database has been established to store all information on the samples. Web-based tools have also been drafted to allow WCPFC members to track the collection of samples. These include interactive maps where the user can obtain information on the number, type, species and length classes of samples collected from particular EEZ and high seas areas. An on-line query system is also included to allow more detailed information on each sample to be viewed (e.g. date and location of sample and types of samples taken from the individual, sample quality).

To fast track the analyses of these samples making them available to third party organisations for analyses maybe an option that the Scientific Committee pursues. To ensure that WCPFC obtains maximum benefit from third party involvement procedures for accessing the tissue bank are required. A draft of these procedures is provided for consideration by SC10.</td></tr>
<tr><td>Draft WCPFC Biological Samples Access Procedures</td><td>Background

1. The WCPFC has established a tissue bank of biological samples collected from pelagic species in the WCPO for the purposes of life history studies to advance fisheries management in the WCPO. The bank contains otoliths, spines, gonads, liver, muscle, stomach and blood from tuna, billfish and other pelagic species.
2. The purpose of this document is to specify the rules for scientific</td></tr>
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	researchers to access these samples for the purpose of scientific study. Rules and Procedures 3. Applications to access samples from the tissue bank must include: a. Project Name and Objectives b. WCPFC Scientific Committee Project Number or recommendation if these exist c. Specification of the samples to be withdrawn from the bank (number, type, species, any location/sex/date limits, etc.) d. The methods for processing and analyses e. Past contributions to the tissue bank by researcher or CCM f. Intended collaborations g. Timelines and intended outcomes and reporting 4. It will be a requirement of the researcher or CCM to provide an annual report to WCPFC's Scientific Committee on progress of the study. This must include documentation of raw and analysed results, however this does not imply a requirement for this data to be publicly available. The report must follow WCPFC standards and must include method description and meta data. All data will become publicly available 5 years after WCPFC Secretariat determines the project analyses are complete or at WCPFC's discretion. 5. Where sample size is small for particular spatial or temporal sectors, consideration may be given to the sequencing of analyses such that those which involve the samples being destroyed or modified are undertaken last. For example otolith weight and morphometric analyses may be prioritised before sectioning, which may be prioritised before chemical analyses. 6. Where the analyses involves the preparation of secondary products such as sectioned otoliths and histological slides these products are to be provided to the WCPFC at the completion of the study for future comparative reference and study. 7. Researchers or CCM's must acknowledge the WCPFC tissue bank in any publication of results from the study undertaken. 8. The selection and approval of projects will be determined by a "Biological Sampling" sub-committee of the WCPFC Scientific Committee. Membership of this committee will include: WCPFC Science Manager (or delegate), WCPFC Scientific Services Provider, WCPFC SC Stock Status Convener (or delegate), WCPFC SC Ecosystems and Bycatch Mitigation Convener (or delegate), WCPFC SC Research Committee Chair (or delegate). This committee may meet within the margins of WCPFC meetings or electronically. This sub-committee will prepare and submit a summary of their decision on each project proposal to the WCFPC Executive Director. The project approval process will consider, inter alia, the following: a. Preferential access to the tissue bank will be given to researchers or WCPFC CCM's who have contributed samples to the collection.

	b. Preferential access to the tissue bank will be given to collaborative projects with priority to those where the collaboration includes several WCPFC CCMs. c. Priority will be given to request that are part of the WCPFC Scientific Committee's research and work plan and those projects whose spatial scale is regional in preference to local. d. Past participation with those who acknowledge the source of the samples and provide interim products as required above given priority. 9. Once approval for access to samples from the tissue bank has been provided by the "Biological Sampling" sub-committee the researcher/CCM will enter into a formal agreement with the Secretariat of the WCPFC that will specify access requirements, reporting and any data confidentiality that the WCPFC may require. 10. A reasonable fee may be charged for the cost associated with preparing the samples for shipping and cost recovery for freight or transport agent fees.

Outcomes and Lessons Learned

Outcomes

The project has developed the capacity within the National and sub-regional observer programs to implement the biological sampling needs of the Scientific Committee.

The existing collaborative links between CCMs have been strengthened.

Lesson Learned

The existing infrastructure of the National and sub-regional observer programs is providing sufficient capacity to coordinate the placement of observers the resources. The timeframe needed for National and sub-regional observer programs to fully participate in biological sampling activities can take between 12-18 months.

Additional resources are required to assist with coordinating the transfer of samples from the observer to storage facilities.

Evaluation

The success of the project will be determined by the achievement of the sampling target at project end.

Risks and Challenges

Sampling within the central Pacific region has proven challenging due to the lower number of observer programmes operating in this area. To overcome this challenge increased effort is being placed in Kiribati, American Samoa and French Polynesia to place trained observers to undertake biological sampling.

Proposed Budget for 2015

	Budget (USD)
Activity	**2015**
Sampling Co-ordination	27,000
Observer Fees	27,000
Travel/Transport	10,000
SPC Management Fees	11,250
Total	**75,250**

Next steps and recommendations

- The collection of biological samples to continue for the remainder of 2014 and throughout 2015.
- The Science Service Provider to work with CMMs to plan for sample analyses to commence in 2015. SC10 should consider the priority and future financial support for analyses of bigeye growth and maturity parameters. The timeframe to complete analyses for inclusion of revised parameters and data in the next bigeye stock assessment would be 1.5 to 2 years. A commitment of USD100,00 per year by WCPFC would provide sufficient resources for WCPFC Scientific Services Provider or CCMs to lever the resources necessary to complete the analyses.
- SC10 recommend project continuance in 2015 with a budget of USD75,000.

Appendix 1. Biological sampling equipment

Appendix 2. Sampling Instructions

How to collect biological samples on longline vessels ?

STEP 1 Place the cable tie with labels around the mouth of the fish, once it is attached gently pull on it to make sure it will hold.

STEP 2 When the fish is gilled and gutted put aside the guts. Cut 4-5 cm of the liver, about the size of a finger.

STEP 3 Place the liver +1 label inside a small plastic bag.

STEP 4 Cut the stomach away from the digestive system.

STEP 5 Cut the oesophagus as close as possible to the gills.

STEP 6 Place the stomach +1 label inside the big plastic bag.

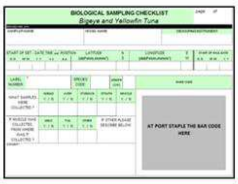
STEP 7 Find the gonads of the fish, if it is not with the guts, it is inside the belly of the fish towards the backbone.

STEP 8 Remove slowly the gonads. Check inside the fish again to be sure that you collected the entire gonad.

STEP 9 Place the 2 gonads +1 label inside a plastic bag.

STEP 10 Roll up together all the samples coming from a fish. Store rapidly the samples in a freezer.

STEP 11 Fill-in the biological sampling form. Use comment section if necessary.



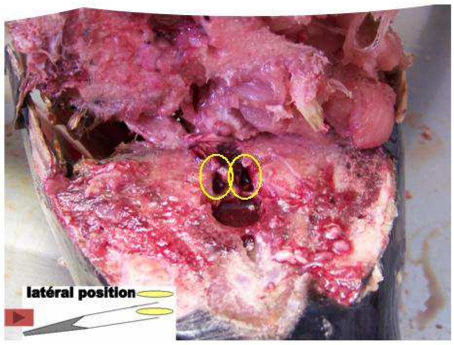
Caution: 1 fish has 1 tag, all the samples coming from a fish have the same label number

How to collect biological samples on purse seine vessels ?

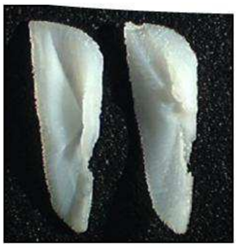
STEP 1 Place the cable tie with labels around the mouth of the fish, once it is attached gently pull on it to make sure it will hold.

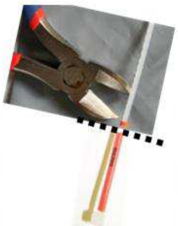
STEP 2 Remove the top of the head using a saw or a knife. If needed remove the head of the fish from the rest of the body. Stabilized the head on the floor. Cut straight down on top of the eye.

STEP 3 Place the head towards you. Remove the brain with the back end of the tweezers. Do not forget to use the tweezers in a lateral position.



STEP 4 Remove the membrane around the otoliths, clean and dry them. Place them in a vial with the cable label (no need of water, or alcool).

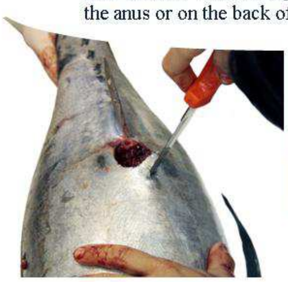




If you cannot remove at least 1 otolith, do not continue to collect other samples. Stop and sample another fish. Remove the cable tie label.

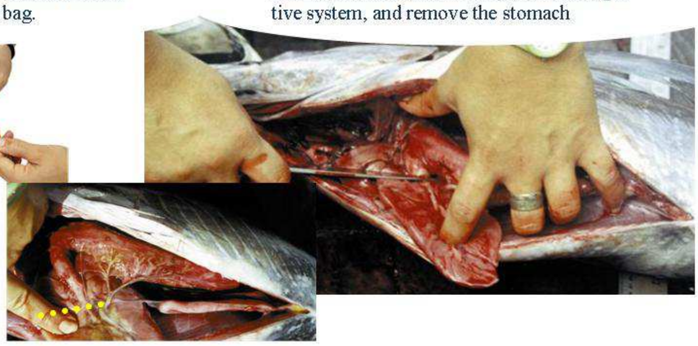
STEP 5 Open the fish's body carefully with the tip of the knife to avoid cutting internal organs.

STEP 6 Cut a 4-5 cm sample of muscles near the anus or on the back of the fish.



STEP 7 Remove the skin and place the muscle +1 label inside a small plastic bag.

STEP 8 Cut the intestine away from the digestive system, and remove the stomach

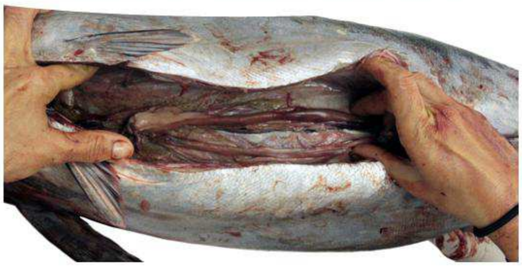


STEP 9 Cut the oesophagus as near as possible from the gills.

STEP 10 Place the stomach +1 label inside the big plastic bag.

STEP 11 Cut a 4-5cm sample of liver, place the liver +1 label inside a small plastic bag.

STEP 12 Find the gonads of the fish, if it is not with the guts, it is inside the belly of the fish towards the backbone.



STEP 13 Place the all gonads +1 label inside a plastic bag. If the gonads are broken put all the pieces together.

STEP 14 Fill-in the biological sampling form. Note in the comment section if the fish was alive at arrival on deck.

STEP 15 Roll up together all the samples coming from a fish. Store rapidly the samples in a freezer. Keep the otoliths in your cabin with other vials.

Caution: 1 fish has 1 tag, all the samples coming from a fish have the same label number

Appendix 3. Training modules and standards

Part A. Module

PIRFO Draft Competency Standards

NEW PIRFO 3-6.05	**Carry out biological catch sampling in accordance with a pre-determined sampling protocol**

Prerequisites:

Descriptor

This module requires candidates to understand the protocols of a biological sampling program, correctly identify anatomical parts of a fish, and participate in a pre-determined biological sampling program through accurately collecting and recording samples as required by the sampling protocol

Learning Outcome	Assessment Criteria
1. Demonstrate knowledge of established sampling programs employed in regional Pacific tuna fisheries	1.1 The main sampling programs used in regional tuna fisheries are outlined 1.2 The use of information obtained from sampling programs is summarised
2. Show awareness of fisheries observer roles and tasks in relation to regional sampling programs	2.1 Roles and tasks in sampling programs are summarised and include: • fish tag reporting and recording • stomach contents collection • otilith and other hard part identification and removal • tissue sampling 2.2 Demonstrate knowledge of the importance of compliance with sampling program protocols and record keeping standards
3. Awareness of fisheries observer roles in tagging programs	3.1 Fisheries Observer roles in relation to marine and fish species tagging programs are understood
4. Identify key internal organs and fish body parts commonly collected in sampling programs	4.1 Internal fish anatomy is correctly described 4.2 Key internal organs are identified and located 4.3 Methods for determining fish sex are described
5. Demonstrate practical biological fish sampling skills	5.1 Demonstrate safe use of the tools that are used to carry out biological sampling of fish 5.2 Selected organs or body parts are removed from fish samples, and stored and recorded in accordance with specified procedures

PIRFO 3 - 6.05 Evidence and Assessment Guide

Context and Method of assessment Assessment is to be conducted at the workplace or in a simulated workplace environment. The following assessment methods are suggested: • practical exercises • written or oral short answer testing • observation of practical demonstration. Resources for assessment may include: • fish samples • sampling protocols specified by the Regional Observer Program
Underpinning knowledge Candidates are required to demonstrate general knowledge of sampling programs in place regionally in Pacific fisheries and the roles of fisheries observers in relation to these sampling programs. Candidates need to be able to correctly identify the internal organs of fish species that are the target of these sampling programs

Learning Outcome	Evidence Guide
1. Demonstrate knowledge of established sampling programs employed in regional Pacific tuna fisheries	Candidates should be ware of port sampling initiatives and the type of information collected in such programs. They should also be aware of regional tagging programs and the ways in which information from tagging programs is used
2. Show awareness of fisheries observer roles and tasks in relation to regional sampling programs	Candidates should be familiar with the roles of fisheries observers in relation to sampling programs. This includes: • the requirements for fish tag reporting and recording • sampling programs for stomach contents collection • otilith and other hard part identification and removal • tissue sampling. Candidates should also demonstrate an understanding of the importance of sampling program protocols and accurate record keeping.
3. Awareness of fisheries observer roles in tagging programs	Candidates should know how to record and report the landing of a tagged fish, bird or marine mammal.
4. Identify key internal organs and fish body part commonly collected in sampling programs	Candidates should be able to identify and locate the main internal organs and otiliths in selected fish species Candidates to know the established methods for determining sex in selected fish species
5. Demonstrate practical biological fish sampling skills	This element requires candidates to carry out practical dissection demonstration using correct techniques to cut fish, identify and remove selected organs or hard parts. Candidates should also demonstrate correct methodology for labeling and recording samples.

Practical skills The essential skills a person needs to perform work to the required standard include: · The ability to correctly dissect selected species and remove selected body parts · The ability to record data and store samples in accordance with agreed protocols Literacy skills used for: · Interpretation of information about sampling programs · Collection of data and information · Accurate completion of forms Numeracy skills used for: · Recording data
Critical aspects of evidence Assessment must confirm an ability to: • Record the information required for a tagging or sampling program • Correctly identify the sex of selected species of fish • Dissect a fish to identify and remove key organs Assessment must confirm awareness of: • The main sampling and tagging programs of Pacific fisheries • How sampling and tagging information is used and why it is important • Characteristics of key internal body parts of selected species

Part B. Training Module

Training Guidelines for Delivering:

Biological sampling, Tag Recovery and Tag Seeding Competency Units

Pacific Island Regional Fisheries Observer

SPC CPS

SECRETARIAT OF THE PACIFIC COMMUNITY
SECRÉTARIAT GÉNÉRAL DE LA COMMUNAUTÉ DU PACIFIQUE

The Biological Sampling, Tag Recovery and Tag Seeding are competency units part of the

Pacific Island Regional Fisheries Observer Certification and Training Standards

Secretariat of the Pacific Community

Oceanic Fisheries Programme

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Web sites:

www.spc.int/oceanfish

http://www.spc.int/oceanfish/en/ofpsection/fisheries-monitoring/observers

Contents

Introduction

The purpose of these guidelines is to provide advice and a training plan to deliver the biological sampling and tagging project modules to Pacific Islands Regional Fisheries Observers (PIRFOs) during national, regional and sub-regional training workshops. This document is your guide to:

i. training PIRFOs in theoretical and practical techniques: (1) collecting biological samples from tuna and bycatch species, (2) reporting tag recoveries and (3) secretly deploying seeded-tags.
ii. scheduling training according to the modules available and the projects undertaken by the Secretariat of the Pacific Community.
iii. assessing the trainees' understanding and ability to carry out these tasks with a view to award a certificate of competency.

Training preparation

The biological sampling and tagging training is part of the overall observer course run by the lead trainer, as a team you need to discuss the schedule for delivery with him or her. You should inform the lead trainer that your schedule is based on the maximum number of fish being available. This part of the preparation needs to be done at least a few weeks in advance of the training.

The training schedule starts with the classroom sessions and then moves on to the practical work. For each activity on the schedule, refer to the relevant module in this guide for information.

You need to organise the teaching documents needed. These include the PowerPoint presentations, the printed biological sampling and tagging guides, the forms, the scenarios and the assessments. You will need to check where the most practical place to print these documents is, or who could do it for you.

The preparation for practical training, including obtaining fish heads and whole fish, securing a place to work and having the right tools, is described below. This is important and you should be prepared well in advance.

The materials needed for both theory and practical sessions are listed in the equipment check list below. It is very important that you uses this check list (print it) to make sure that nothing is forgotten (particularly in terms of transporting and organising materials).

Theory teaching

Make sure that a laptop computer with MS Office is available to deliver the PowerPoint presentations. Generally, if you don't have a personal laptop, one of the other trainers might have one that you could borrow. Check in advance that the laptop will not be wanted at the same time as you want it.

Before starting a presentation:

- load the presentation onto the computer and make sure it works properly;
- make sure that the computer can be plugged into the video projector and that it works (focus and size);
- check that the videos work properly (that you have the right player) with the presentations and that slides' animations run smoothly.
- have the folder containing the videos ready so you can play the appropriate video when the slide "video" comes up. Make sure the videos illustrating the sampling techniques can be played on the computer being used.

Practical teaching

The practical teaching is dependent on the number of fish heads and whole fish which can be obtained. One of your responsibilities is to organise with the issues relevant to the practical well in advance.

- Finding a training area for the practical which:
    - is sheltered from the sun and rain;
    - has a power plug;
    - has a water supply, drains, access to a hose and can be easily cleaned;
    - is located so the work does not cause any inconvenience to others.
    - has a quiet environment to facilitate teaching guidance

- Organising the collection of enough fish heads and whole fish.
    - Make contact with fishing companies and staff of local fisheries authorities at least 1 month ahead of time.
    - In some countries it is difficult to find fish for the training; you may need to pay for the heads and/or fish. If this is the case, you should ask for receipts and file a reimbursement claim after the training.
    - Organise a freezing facility to store the fish heads and whole fish. Freezers are available with fisheries contacts at:

      NORMA (Pohnpei); MIMRA (Majuro); Koror (Palau); Suva (Fiji) ; FTC Tarawa (Kiribati) and NFC Kavieng (PNG)
    - The number of **heads** you need depends on how many trainees attend the training. **Always try to get more heads than you need to allow the trainees to get plenty of practice.**

      You will need a minimum of one head per trainee for each of the three methods for otolith extraction plus one for yourself. For example: if you have 12 trainees you will need 13 small heads, 13 medium heads and 13 large heads = 39 heads. Try to get 60 !
        - The drilling method requires large tuna heads
        - The cutters method requires medium heads

- The saw method requires small heads

Table showing the head size required to train for each method. Note that the saw method can be used on any size head really, but the bigger ones should always be kept for practicing the cutters and drilling methods.

Head size for (extraction method)	Head Length		UF Length	
	Min	Max	Min	Max
Large (Drill)	30 cm	40 cm	96 cm	128 cm
Medium (Cutters)	25 cm	35 cm	80 cm	112 cm
Small (Saw)	20 cm	25 cm	64 cm	80 cm

IMPORTANT!
There are a few ways to obtain fish heads and whole fish, either from a purse seiner, a long liner or from a processing plant.

- If the head is obtained from a whole fish given by a purse seiner then time should be allocated to remove the heads and gill them so they ready to be used for practice. Trainees are not expected to do this preparatory work, especially if there is a lot of fish. If you can't to do it yourself or don't have the time, you can ask or even contract someone to do it.

- When getting your fish heads from a processing plant, ensure that they are cut correctly so that the otic capsules are not damaged. To ensure this, at leasr the first three vertebrae (back bones) must be included with the head. **You must make absolutely sure that this message is understood.** You could give pictures to the people who are providing the heads so that they are aware of what you need. If you are not collecting the heads yourself, make sure that you check the heads that are collected in good time to resolve any problems or, if you cannot be there yourself, get somebody who knows what is required to check.

- One **whole fish** per trainee is sufficient. When asking for whole fish, tell the provider that the fish **MUST NOT BE** gilled and gutted.

- Allow time before the practical for the heads/fish to defrost. On the day before the practical, take them out of the freezer and leave them to defrost overnight.

- Use some large rice bags to place the fish/heads in so that there are not too many flies around. Make sure the bags are placed somewhere where dogs cannot reach them.

- When in contact with local fisheries staff, never assume everything is going to be all right. Even if someone tells you: *No problems; we can do it,* keep reminding them until you can see for yourself that the heads and fish have been placed in a freezer or that there is a vessel scheduled to unload heads/fish that can be used for the training.

    - If necessary, ask your contacts to think about getting fish from the market, or you can do so when on site if no heads/fish are stored in advance.
- Organise extraction tools
    - Carry your own biological sampling training kit (and keep it clean and in working order).
    - If you do not have a drill of your own, arrange for one to be lent to you in the country you will be travelling to. Organise this in advance.
    - Make an inventory of your tools after every training session to make sure they are all there and in working order.
    - When you arrive in the country, buy a can of spraying lubricant, such as WD40, to spray the tools after each practical. Note: You will not be allowed to transport these aerosol cans on the plane for security reasons.

- You also need to plan when the practical will take place. Once you know this, let the trainees know and advise them to wear old clothes that day as they will probably get dirty.

Equipment Check list

The check list allows you to make sure you have all the equipment needed for delivering the theory and practical sessions. Print a copy of this list and write OK when you have gathered the equipment or organised it. The list is based on 15 trainees attending, which is generally the maximum. If there are more than 15 trainees, increase the number of items. If there are fewer than 15 trainees, bring back any items you did not use for the next training.

Items	**Quantities for 15 trainees**	**Check OK**
Extracting equipment		
Knife	3	
Saw	3	
Nail removers	3	
Side cutters/pliers	3	
Tweezers	3	
Power drill	1	
Drill tightner (if not provided with drill)	1	
Drill hole saw 38 mm	1	
Drill hole saw 44 mm	1	
Extension cord	1	
Power adaptor	1	
Sampling equipment		
Cable-tie labels (with 5 labels)	50	
Small bags	20	
Medium bags	40	
Large bags	20	
Vials	16	
absorbent paper	1 roll	
Water container	1	
Tagging equipment		
Seeding tags	25	
Tag seeding applicator	1	
Conventional tag	16	
Conventional tag applicator	1	
Teaching equipment		
General biological sampling presentation	1	
Trophic dynamics presentation	1	
YFT/BET reproductive biology presentation	1	
Tagging project presentation	1	
Tag seeding presentation	1	
Tagging project review	1	
Biological sampling review	1	
Biological sampling guide (printed)	16	
Biological sampling forms (printed)(scenario and practical)	32	
Biological sampling teaching cards (paper fish)	18	
Tag recovery manual (printed)	16	
Tag seeding guide (printed)	16	
Tag recovery scenarios (printed)-3 scenarios	16	

Tag recovery scenarios #1 correction	16	
Tag recovery scenarios #2 correction	18	
Tag recovery scenarios #3 correction	18	
Tag recovery forms (for scenario) (printed)	50	
Tag seeding scenarios (printed)-2 scenarios	35	
Tag seeding scenarios (printed)-corrections	3	
Tag seeding logsheet (printed)	35	
Tag recovery envelopes	20	
Tagging posters-English	20	
Assessment equipment		
Biological sampling assessment # 1 (printed)	18	
Biological sampling assessment # 2 (printed)	10	
Biological sampling assessment corrections #1 (printed)	3	
Biological sampling assessment corrections #2 (Printed)	3	
Assessment equipment		
Tagging project assessment # 1 (printed)	18	
Tagging project assessment # 2 (printed)	10	
Tagging project assessment corrections #1 (printed)	3	
Tagging project assessment corrections #2 (printed)	3	
Hardware equipment		
USB stick	1	
Stationery		
Red pen for correcting	1	
Large black permanent marker	1	
Highlighter pens	1	
Notebook for report	1	
plastic sleeves for attaching document on esky (if samples)	2	
Transport equipment		
Gel packs	10	
Duct tape	2	
Esky/cooler	1	
Permits for samples collection		
AQIS import permit	3	
NC import permit	3	
CSIRO letter	3	
SPC letter (certificate of origin)	3	
Keep frozen sign	3	

A. Theory Component

1. PowerPoint presentations

The PowerPoint presentations are the main tools used to deliver the information about established scientific programmes. There is a general presentation, which provides knowledge of the techniques used in biological sampling. Tow presentations illustrate the tagging projects. Finally, two review presentations are used as refresher before the final assessments.

Some presentations are linked to videos.

Equipment shown in the PowerPoint slides can be passed around for the trainees to look at (e.g. cable-ties, tags, forms).

To ensure you have the attention of the trainees throughout the session, give them a break at some stage. Judge their level of attention to decide when a break is appropriate.

Before the start of each presentation as well as during the presentation, encourage trainees to ask questions.

1.A General biological sampling

This presentation is an overview of biological sampling standards. It will take about one and a half hours to present.

The general biological sampling presentation shows why biological samples are needed and how they are used. Most importantly, this presentation describes how the samples are collected and how the data are recorded.

Some of the slides in this presentation are animated so that trainees are taken step by step through various protocols.

The videos linked to this presentation are:

- otolith sampling
  - saw technique
  - cutters technique
  - drilling technique
- dorsal spine sampling
- removal of the first dorsal spine.

1.B Tagging projects

Before the presentation, distribute the tag recovery forms and the tagging posters to the trainees.

This presentation shows SPC's tagging projects.

It covers the background of the tagging projects, the type of tags used and the recovery forms. Pay particular attention to the recovery form and be sure that all the data fields are explained step by step. It is recommended that you refer to *Tag recovery manual for fishing vessels /carriers* and to the page related to each subject. While the trainees listen to the presentation they can match the information with the manual.

This presentation will take about one and a half hours.

There is only one video linked to this presentation. It shows tagging action on a pole and line vessel.

1.C Tag seeding project

This presentation is about SPC's tag seeding project. It will take about one hour to present.

The presentation describes the tag seeding experience and explains its implication for the tagging project. Information is provided on the deployment of tags on board purse seiners and how to fill in the tag seeding log form.

2. Training in filling in forms

The trainees will practise filling in the various forms used to record data associated with biological sampling and tagging by means of scenarios, both in class and during practical sessions.

Tell the trainees that they should make sure to fill in the forms correctly, as you will assess them and then hand them back to the trainees with feedback on how well the forms were completed. Remind the trainees that the information needs to be written clearly.

For the tagging scenarios, if a white board is not provided for the training you can project the correct version of the forms with the video projector.

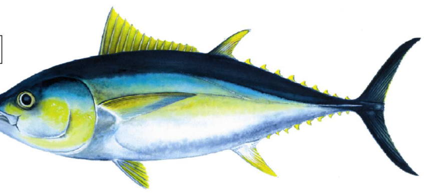
2.A Biological sampling form scenarios

This scenario is done as a group and is interactive. The objective is to familiarise trainees with filling in the biological sampling form (BS form).

This scenario is done after the general biological sampling presentation and should take about 25 minutes.

Refer to the instructions below for a detailed delivery and assessment method.

1



Bigeye tuna; caught at 13h03; label # B1001; length 110 cm UF; Male. Samples needed for reproductive biology studies.

Instructions:

1. Briefly mention the samples needed for the two projects: trophic dynamics (stomach, muscle and liver) and the reproductive biology studies (gonads, otoliths and spines).
2. Remind the trainees about the abbreviation for sex (Male–M, Female–F, Inderterminate–I and Unknown–U).
3. After showing the trainees how to fill in the BS form, randomly distribute the 'paper fishes' and one BS form to each trainee.
4. Open the animated slide where details of each fish will appear.
5. The generic information for this sampling is:
    - Observer name: The name of the trainee
    - trip #: JSM 11 00
    - Vessel name: Pacific Sunrise
    - Gear type: Longline
    - Start of trip date: 12/03/11
    - End of trip date: 25/03/11;
    - page 1 of 1.
6. In turn, ask each trainee to call out the details of each paper fish he/she has.
   For example: *It is a BET caught at 01.03 pm, the label number is B1001, it measures 110 cm UF, and it is a male. Samples taken were: stomach, muscle, liver. The muscle sample was taken from the anal region.*
   Note: All muscle samples should be taken from the anus, unless the fish is kept for consumption by the crew.
   For the sake of this scenario, all the otoliths are sampled in port.
7. While the trainee is calling out the details of his/her fish, the other trainees fill in the information across one row.
8. Then everyone has to fill the samples that need to be collected on the BSF (muscle, liver…)
9. The trainee gives his answer.
10. Click on the slide and the details will appear.
11. Ask all the trainees to check their data and correct any mistakes.

NB: If the fish is not retained for crew consumption, then muscle should be taken from the anus region.

Emphasise that the form needs to be completed in full.

12. At the end of this training exercise, collect all the forms and assess them.
    - Check that all the information has been filled in and is correct.
    - Circle anything that is incorrect in pencil.
13. The next day or in the afternoon of the same day (depending on when the training was done) hand back the forms to the trainees and point out their mistakes.

2.B Tag recovery form scenarios

There are three tag recovery form scenarios that are done individually but corrected as a group.

The objective is to give the trainees practice in filling in a recovery form when a tag is found on board a vessel. There are three scenarios with different levels of information and different situations on board fishing vessels.

The trainees read the scenarios and look for all the details that can be used to fill in the tag recovery form. Some scenarios have more information than others. This reflects the reality in the field, where sometimes there is no information at all.

This session will take about one and a half hours. Allow 15 to 20 minutes for trainees to read and complete each scenario and ten minutes to review the answers together.

Distribute the three tag recovery scenarios (printed on one back to back page) along with three tag recovery forms which include a map (printed on three back to back pages).

Instruct the trainees to read one scenario at a time and complete one tag recovery form at a time. When they have finished the first scenario, ask them to wait for the correction before working on the next scenario. While the trainees are completing the forms, you can assist some of them individually if you think they need help.

Once they have finished entering the information for the first scenario, ask a volunteer to give his answer, write the answers on a white board, correct them if necessary and explain each answer. Do the same with the two other scenarios.

2.C Tag seeding log release form scenarios

There are two tag seeding scenarios which are done individually but corrected as a group.

The objective of this session is show the trainee how to fill a tag seeding log form when an observer is assigned to deploy tags onboard a purse seiner.

The idea is that the trainees read through the scenarios and look for all the details which can be used to fill in the tag seeding log form.

This will take about 45 minutes. Allow 15 minutes for trainees to read and complete each scenario and five to ten minutes to review the answers together.

Distribute the scenarios and the two tag seeding log forms.

Tell the trainees to read the first scenario and fill in the form. Then ask a volunteer to give his/her answers, write them on the white board, correct them if necessary and explain each answer. The trainees can then work on the second scenario and this will be reviewed in the same way.

3. Review

Two presentations are used for reviewing the theoretical component of the training.

- Biological sampling review presentation
- Tagging project review presentation

These two presentations allow the trainees to refresh their skills in order to be ready for the assessment. The review should be presented either a few hours before or the day before each assessment. Encourage the trainees to take notes where appropriate and advise them to read their guides as well.

B. Practical component

The following sections provide advice on how to organise the practical teaching. It starts with sessions on labelling, storing and packing samples. Then you will demonstrate the techniques involved in taking samples from a fish and how to do tag seeding. The trainees practise the techniques on the fish, following your step by step instructions.

Tell trainees how they will be assessed. When they finish one set of instructions, they should show you what they have done so you can assess it using the assessment checklist (see section 11. Not scored assessment) and give feedback.

The practical sessions are really useful for trainees to get a feel for biological sampling. These sessions should be interactive. You can ask questions to motivate the group and stimulate interaction.

Once you have seen that the trainees are able to deploy seeded tags, they are ready to start taking samples from a whole fish. Tell them to tag seed the fish before they start gilling and gutting it, and to let you know when they have done this before proceeding to the next step. You can thus assess each trainee on their ability to deploy a seeded tag (see assessment details).

Tell the trainees that after they have collected the samples, they are to remove the conventional and/or seeded tag from their fish. You will assess them on their ability to do this correctly.

After collecting samples from three or four fish, the trainees should place the rolled up samples in the freezer, or on a bucket of ice, or in the shade. This should be done as soon as possible so that the samples are not damaged by the heat.

The biological sampling form

Hand out one biological sampling form to each trainee. Explain that they will use the same form to write the details of each fish during each practical session. Tell them how to fill it in correctly: their name, a trip number (e.g. TUNA 11 05), the gear type from which the fish for the practical came, the start date of the practical (beginning of week) and end date of the practical (end of the week).

At the first practical session, write the date and time, and let them know the position of the training place (estimate or make one up if necessary).

Then, for each fish, they write down the label number, the species code, the length, the sex and write Y or N in the boxes for the types of samples collected.

At the start of each practical, they, write a new date and time and the new details for the different fish. Repeat for as many practicals or fish.

Ask the trainees to use the Comments column as much as possible, e.g. broken otoliths, only one gonad, broken gonads, tag number. Remind them that if they are onboard a longliner, they must note the tag number on the LL4.

Collect the biological sampling forms at the end of each practical. Check them and give them back at the start of the next practical session with your feedback.

4. Labelling and storing fish and samples

This section provides a guide to demonstrating the use of appropriate storing bags and vials for each kind of sample.

Remind the trainees that each fish is identified by a unique identification number. This means that every sample from the same fish has the same label number.

It is very important that all the samples have a label and that the labelling is done correctly to ensure there is no confusion.

4.A Cable-tie labelling

Demonstrate how to place the cable-tie around the mouth of the fish and make sure it will hold by gently pulling on it. Once the cable-tie is placed, the tear-off labels can then be used to label each sample collected. The tear-off labels are removed one at a time when a sample is placed inside a bag and needs to be labelled.

Explain why the cable-tie is placed around the mouth of the fish — when fish are landed on board and selected for sampling, placing a cable-tie around the mouth of each fish allows us to identify them. Also, otoliths cannot always be collected on board at the same time as the organs. The cable-tie will allow port samplers to identify fish that have been sampled on board from which the otoliths still need to be extracted.

The cable tie is only removed at the end, when all the internal organs have been sampled and labeled and the otoliths have been extracted and cleaned and placed inside the vial. Then the stem of the cable tie can be cut off and placed inside the vial to label the otoliths.

4.B Storing stomach, muscles, liver, gonads and dorsal spine

Demonstrate which bags are used for each kind of sample. Tell the trainees that they will need to adapt to the situation. For example, if the gonads are very big, they will need to use a large bag.

Demonstrate how to place the label inside the sampling bag at the top so that the sample does not cover the label. This allows us to read the label number when inventorying the samples later on, especially when they are frozen and bloody.

When the samples have been placed in their bags, place the largest bag on the bottom and stack the other ones on top of it. Then roll all the bags up into one package. Insist on the rule that the sample bags should not be placed inside each other.

Packaging and storing samples is an important aspect of this work, as the samples are no use if they become damaged. Also, when samples are received for analysis, it is much easier to do an inventory if they are well packed. As with the correct way of labelling, all these steps will ensure efficient processing of the samples and, in turn, faster payment or reward.

What happens on an actual fishing trip is that, at the end of the trip, all samples are placed in a large solid plastic bag (or a rice bag) and the observer needs to inform the observer coordinator or the debriefer that there are some samples that must be stored in a freezer.

Once the observer gets back to shore, it is his/her responsibility to make sure the samples are stored in the right place and to make sure the data are attached with the samples and to make copies of or scan the data. The coordinator or the debriefer will be there to assist, but it is not their principal task.

If the observer follows all these steps, then the samples will be shipped to the place of analysis rapidly and payment will follow soon after.)

4.C Storing otoliths

Once the otoliths have been removed, clean and dry them, and place them in a vial. The vials are kept separate and do not need to be frozen. (When they go on a fishing trip, the trainees can keep the vials in a large plastic bag and keep this bag with them. At the end of the trip, the bag can be handed to the observer coordinator who will organise shipment.)

Demonstrate how to place the otoliths inside a vial and how to cut the stem of the cable-tie that is around the mouth of the fish and place it inside the vial. It has the same identification number as the other samples. Use the side cutters or a knife. Also explain how the stem can be cut to fit into a smaller vial.

Tell the trainees that this is done only after all the other internal organ samples have been collected and labelled.

5. Extraction of stomach, muscle, liver, gonads and dorsal spine for sampling

5.A Gilling and gutting techniques

First, remind the trainees what was presented during the general biological sampling PowerPoint presentation; that there are two ways of gilling and gutting tuna:

- on a purse seiner: the internal organs of the fish can be accessed by cutting the ventral surface of the fish. This must be done carefully so as not to damage the organs. Explain how to use the tip of the knife to do this. As the sampled fish will generally not be placed back inside the well, this technique can be used and performed by the observer on board.

- on a long line: the crew will generally gill and gut the fish in such a way that all internal organs are removed in one block attached to the gills. This method allows them to keep the ventral surface closed and the fish remains in good shape for marketing.

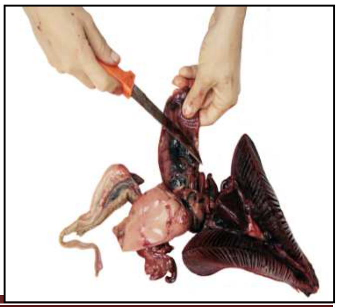
After explaining this, you have two options, depending on how many fish you have for demonstration.

If you have two fish, you can demonstrate the two techniques, one on each fish. First demonstrate the ventral surface cutting method to the trainees. This will allow them to see how the internal organs are positioned. This information is useful as they will later be examined on a picture showing the internal arrangement. Also when they sample the internal organs during the practical, the trainees will be using this method. Second, demonstrate how to gill and gut a fish as it would be done on a long liner. This will allow trainees to visualise how the internal organs are positioned using this technique

If you have only one fish, first demonstrate how to gill and gut a fish using the ventral surface cutting technique (as it would be done by an observer on board a purse seiner), then cut the gills from the mouth and remove the whole lot and place everything on the table or floor, which illustrates the long liner gill and gutting technique.

5.B Stomach sampling

Demonstrate how to identify the stomach and how to detach it from the digestive system and the oesophagus (as close as possible to the gills) using a knife. Explain that sometimes prey might fall out of the stomach and that it should be picked up and placed inside the sampling bag. In such a situation, a comment should also be provided on the form.



5.C Liver sampling

Demonstrate how to identify the liver and how to cut a sample of it (2 cm by 2 cm).

5.D Muscle sampling

On a long liner: the muscle sample can be taken around the anus area. Cut a piece of muscle next to the hole that was made during the gilling and gutting of the fish.

On a purse seiner: if the fish is going to be eaten by the crew or discarded, the observer can ask the fishing master or the captain for permission to take a sample of muscle from the back of the fish. Samples taken from this site are better as there are fewer nerves and tendons, which allows for better analysis. The same could be done for fish with a similar fate on a long liner. However, reiterate that permission from the captain or the fishing master should always be gained before taking samples from the back.

Demonstrate how to cut a sample of muscle from the back and from the anus (2 cm by 2 cm). Demonstrate how to remove the skin from the samples.

5.E Gonads sampling

The gonads are sometimes stuck inside the body cavity near the backbone when the fish is gilled and gutted.The observer therefore needs to place his hand inside to remove them gently.

Demonstrate how to identify the gonads of a fish and how to remove them without damaging them.

5.F Dorsal spine sampling

Demonstrate how to identify the first dorsal spine of the fish and how to remove it. This technique is very easy and minimum harm is done to the fish. Once the dorsal spine has been removed, it is placed inside the bag with the gonads. Emphasise that the spine should placed carefully so it does not pierce the bag.

6. Sex determination

Demonstrate how to visually determine the sex of a fish by looking at the gonads. Ovaries (female–F) are orange in appearance and grainy if cut. Testes (male–M) are whitish in appearance and tubular if cut.

Demonstrate how to perform the rolling test to determine the sex. Place one gonad between the index finger and thumb and try to roll it. If it rolls, it is a female. Male gonads do not roll; they may even break.

If the sex of the fish cannot be determined either by looking or feeling, the sex is said to be indeterminate, noted with an ‘I’ on the data form. This can happen when the gonads are small and immature.

If the gonads are simply not seen (perhaps thrown away before you could access them) then the sex is noted as unknown, 'U'.

7. Extraction of otoliths

The extraction of otoliths is an important part of the practical teaching as the technique takes practice. There are three techniques, depending on the type vessel and the species — its size and whether it needs to be kept in good condition or not. Different sized fish are used for this training. Once the otoliths have been extracted, the trainees need to remove the membrane surrounding the otoliths, clean the otoliths using some water and dry them using a piece of cloth. The otoliths are then placed inside the vial with the stem of the cable-tie.

7.A Saw method

The saw method consist of removing the top of the head to directly access the otic capsules.

Demonstrate how to use this technique using a medium size fish first. Later on (depending on the availability of fish) small and large size fish can also be used.

This is a destructive technique and is generally used only when the fish is loined in a factory or if it is going to be eaten by the crew or discarded.

7.B Cutters method

The cutters method is a non-destructive technique and consists of accessing the otic capsule by removing bones pieces at the base of the brain, between the brain and the start of the vertebral column.

Demonstrate how to use this technique using a medium size fish. Emphasise that it is important to place the tweezers in a lateral position to reach the otoliths to avoid pushing them inside the otic capsule.

7.C Drilling method

The drilling method is also non-destructive and can be used on large fish. As this method involves the use of a power tool, explain to the trainees that they should be careful when using the drill as well as when plugging in the power cord (especially in places where there is water).

Demonstrate how to use this technique on large and medium size fishes. Once the cores have been extracted from the fish, insist on the fact that the drill must be unplugged before removing the cores from the saw.

8. Tagging

Before the trainees' whole fish sampling practical, secretly tag some fish with conventional tags (approximately five fish out of fifteen) so that the trainees are made familiar with tags when they start the sampling.

Ask them not to remove the tag until the fish has been completely sampled.

8.A Conventional tagging

Show the trainees where a conventional tag is found on a tuna (behind the second dorsal fin on an angle).

Observers on board fishing vessels are not involved in conventional tagging, so there is no need to demonstrate how to deploy these tags. The trainees just need to know where a conventional tag can be found.

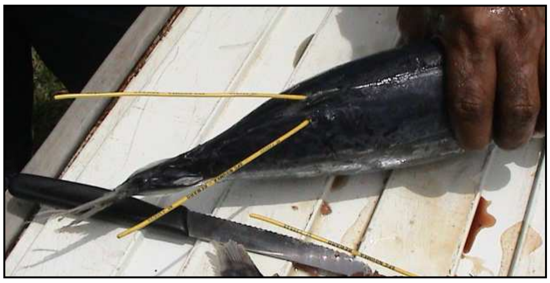
In a real case situation, if a tag is found on a fish and the fish is to be sampled, remind the trainees that they must complete the tag recovery form, and also write the tag number on the biological sampling form and on the LL-4 form if on board a longliner.

8.B Tag seeding deployment

Demonstrate to the trainees where a seeded tag is deployed on a tuna (behind the second dorsal fin on an angle). Also show them how to double tag a fish.

If you have done tag seeding previously, share your experience with the trainees. Tell them where the best place to do it is, the best time, how you reacted when a crew member saw you, and how you dealt with a seeded tag that had been found the same day or during the same trip by the crew.

Remind them about the tag seeding log form.



8.C Tag removal technique

Demonstrate how to remove a conventional tag as well as a seeded tag. Insist on the fact that the anchor must also be removed completely. Also, the fish should not be damaged during this process.

Mention that while removing the tag it may break. If this happens, it is very important is to remove the whole tag, including the anchor, and to give all the pieces to the tag recovery officer or make a note on the tag recovery form.

9. Callipers

If the use of callipers has not been demonstrated yet, demonstrate how to use them to measure a fish If it is a tuna, UF measurement should be demonstrated. If it is a sword fish or shark, other measurements should be demonstrated (LF and TL).

Tell the trainees to round down to the nearest centimetre when recording measurements. Ask them to show you how they measure a fish and assess them on this task.

10. Tools maintenance

Tool maintenance is important. Make sure the tools are washed and dried after each use. A spraying lubricant can be used to prevent rust formation. Tools are to be used for the sampling only and should not be used for any other purpose. If an observer is asked to do some sampling, he or she will be provided with a kit which must be returned afterwards.

C. Skills assessment modules

Assessing the trainees' skills is done in two ways:

- Not scored, ongoing assessment,
  During the practical, the trainees' abilities to fill in forms and to carry out various methods of sampling are assessed (not scored) while they are working, using a checklist. This allows you to give the trainees instant feedback.

  The checklist should be printed according to the schedule of the biological sampling training. During each practical, use the checklist to formally assess the trainees. Each skill required during each practical is listed. During the practical the trainer should check on each trainee or group of trainees (they can work in pairs during the practical sessions) and check all the assessment criteria. Use the notation 'A' for 'able' and 'U' for 'unable'. You will see that some skills are repeated in the checklist. This allows you to check each time a practical is performed that the abilities are formally assessed. In some practicals, identical protocols need to be followed by the trainees; the check list allows you to assess the trainee's consistency in fulfilling the tasks.

- Final assessment
  There are two final assessments, one for the biological sampling and one for the tagging project. These scored assessments should be planned in advance so the trainees have enough time to prepare. They are closed book assessments. For trainees who fail to reach 75% during the first assessment, a second assessment is available and can be provided.

11. Not scored assessment

Use the assessing checklist table (second tab in the BS_and_tagging_training_schedule final excel file) to assess the trainees during the scenarios and the practical sessions.

11.A Biological sampling assessment

Cable-tie label

The trainer must check that each cable-tie label placed by the trainee is not going to fall off by pulling on the cable.

This is checked before the trainee starts to take samples.

> **Able**: the cable-tie label is placed in the appropriate area and the label is firmly attached to the fish.
> **Unable**: the cable-tie label is inappropriately placed and/or the label is not firmly attached to the fish.

Labelling and storing and samples

Stomach, muscle, liver, gonads and dorsal spine samples

Able: Each sample from the same fish has the same identification number; the samples have been placed in the appropriate bag with the label; the labels are placed at the top of the bag and the number can be clearly read; once sampling is finished, the bags are sealed, placed on top of each other and rolled into a neat package.

Unable: Possible errors: Some samples have not been placed in the appropriate bag; some bags have no labels; the labels have different numbers; the labels are covered by the samples and the numbers cannot be read; the bags are placed inside each other; the bags are not sealed; the bags are stacked randomly in an untidy fashion.

Otoliths IMPORTANT: ***(Remove the otoliths from the vial to check their quality)***

Able: the membrane is removed from the otoliths and is rinsed in water or in the mouth; no remaining blood or membrane is seen on the otoliths; the otoliths are dried before being stored in a vial; the label has been collected from the stem of the cable-tie around the mouth of the fish; if other biological samples have been collected, the label number is the same as that of the other samples.

Unable: fails to demonstrate any or all of the steps above.

Gilling and gutting techniques

Assess trainees' ability to correctly gut the fish and identify the organs without extracting the samples.

Able: fish is gutted without damaging the internal organ; organs are identified correctly

Unable: internal organs have been damaged by the knife; mistakes are made in identification

Stomach, muscle, liver, gonads and dorsal spine sampling

Assess trainees' ability to correctly sample the five organs.

Able: Trainee has correctly identified each organ; used the appropriate removal techniques; sampled in appropriate quantities:

- removing the stomach as close as possible to the gills (and picking up prey if some has fallen out – the comments section should be filled in)
- removing a small muscle sample around 2 x 2 cm (4–5cm^2) and removing the skin
- removing a small piece of liver around 2 x 2 cm (4-5cm^2)
- removing both gonads (if they are broken, it should be noted in the comments section)
- removing the first dorsal spine without damaging the fish muscles

Unable: Trainee fails to demonstrate any or all of the above.

Sex determination

Assess trainees' ability to correctly identify the sex of a fish.

Able: Trainee correctly identifies the sex of the fish visually or by using the Rolling test Trainee demonstrates understanding of what to write if sex cannot be determined (I).
Unable: Trainee fails to identify the sex or writes an inappropriate letter if sex cannot be determined (I).

Otoliths extraction

Assess trainees' ability to correctly extract otoliths from a fish using the following methods.

Saw method

Able: cut above the eye is straight, not too deep or too shallow; the otic capsule is exposed and the otoliths are extracted.
Unable: cut is not straight, too deep or too shallow; the otic capsule is either not exposed enough or damaged; the otoliths are not extracted.

Cutters method

Able: bone material is removed appropriately with the cutters to expose the otic capsule; tweezers are used in a parallel way; the otoliths are extracted.
Unable: the bone material is removed too fast or too deep and the otic capsule is destroyed; wrong use of cutters; wrong use of tweezers; the otoliths are not extracted.

Drilling method

Able: safety precautions are taken; angle and depth of drilling is correct; the otoliths are extracted.
Unable: safety precautions are not taken; angle and depth of drilling is inappropriate; the otoliths are not extracted.

Data recording

Each trainee is provided with a biological sampling form and is asked to write all details of the fish and samples for each practical and for each scenario during the theory teaching. At the end of the practical the trainer collects the form to assess the trainees' abilities.

Assess trainees' ability to correctly record data.

Able: all fields of the biological sampling form are filled in correctly; use of comments where appropriate; writing is readable; the label number included with the samples (including inside the vial) is the same as the one written on the BS form.
Unable: one or more fields of the biological sampling form are not filled in correctly; no use of comments where appropriate; writing is unreadable; the label number included with the samples (including inside the vial) is not the same as the one written on the BS form.

11.B Tagging project assessment

Tag implementation

The trainer must check that the anchorage of the tag is properly done by gently pulling on the tag.

Assess trainees' ability to correctly deploy seeded tags:

Able: seeded tag is inserted behind the second dorsal fin with the appropriate angle and at the right depth for anchorage.
Unable: tag is placed elsewhere than behind the second dorsal fin and the deployment angle and depth are not appropriate for anchorage.

Tag removal

Assess trainees' ability to correctly remove tags:

Able: tags are completely removed (including anchor) and the fish is not too damaged in the process.
Unable: tag is broken or the anchor remains inside flesh or the fish is damaged during removal.

Biological sampling form

This assessment is done during the practical where fish were secretly tagged and trainees are meant to notice the tags and record the tag number in the comments column of the biological sampling form.

Assess trainees' ability to record tag number:

Able: tag number is recorder in the comments column with the word 'tag' in front of it.
Unable: tag number is not recorded or the word 'tag' is not placed in front of the number.

Tag recovery form

At the end of the scenario practical the trainer collects the forms to formally assess the trainees' abilities. Formal assessment is done to check that the trainees follow the instructions and corrections given by the trainer:

Able: all fields of the form are filled in correctly: use of comments where appropriate; writing is readable.

Unable: one or more fields of the tag recovery form are not filled in correctly; no use of comments where appropriate; writing is unreadable.

Using calipers to measure a fish

Assess the trainees' ability to use the callipers to record the length of a fish.

Able: the callipers are used appropriately (for tuna, UF measurement is taken) and measurement is correct (rounded down to the nearest centimetre).
Unable: the callipers are not used correctly (e.g. the total length is measured for tuna) and/or the measurement is incorrect (e.g. rounded up and/or simply incorrect).

12. Final assessment

The final assessments are closed book assessments and you should keep an eye on the trainees. Do not staple the pages together, and ask the trainees to write their name at the top of each page. Tell them to spend more time on the questions that carry more marks. When the trainees hand in their assessments, staple the pages together and verify that the trainee's name is written on all the pages.

12. A The biological sampling assessment

BS_assessment_number1_final
Print this document double-sided and in colour. Do not staple the assessment as the trainees will need to work on the biological sampling form and the LL-4 form example.

The biological sampling assessment has three major parts.

1. Questions to evaluate the trainees' understanding of the scientific projects and the required biological samples
2. Tuna anatomy pictures to evaluate their understanding of the internal anatomy of a tuna
3. A scenario to evaluate their ability to record data efficiently.

The trainer should explain to the trainees how the assessment is set up. Rapidly go through the questions (e.g. this question relates to the type of samples needed) and explain that, for the pictures, the trainees must write the name of the organ at the base of the arrow pointing towards it. For the scenario, go through the basic idea with them. Remind them to read all the questions with care as some of the answers are provided in the questions. It should take the trainer about five minutes to explain how the assessment is set out.

The time needed to complete the assessment is around **1 hour and 15 minutes - Maximum 1 hour and 20 minutes.**

12.B Tagging project assessment

The final tagging project assessment is a closed book assessment and you should keep an eye on the trainees.

Observer_Training_Assessment#1_Tagging project
Print this document, double-sided and in black and white. Do not staple the assessment as the trainees will need to work on the tag recovery form and the tag seeding form while they read the instructions on the first page of the assessment.

The tagging project assessment biological sampling assessment has three major parts.

1. Questions to evaluate the trainees' understanding of the tagging project and the tag seeding project
2. A tag recovery scenario to evaluate their ability to record data efficiently on the tag recovery form
3. A tag seeding scenario to evaluate their ability to record data efficiently on the tag seeding log form.

Rapidly go through the questions and, for the scenario, go through the basic idea with them. Remind them to read all the questions with care as some of the answers are provided in the questions.

The time needed to complete the assessment is around **1 hour - Maximum 1 hour and 15 minutes.**

13. Reassessment

For trainees who failed to reach 75% during the first assessment, there is a second assessment which is slightly different from the first one.

13.A Biological sampling assessment

BS_assessment_number2_final
Print this document double-sided and in colour. Do not staple the assessment as the trainees will need to work on the biological sampling form and the LL-4 form example.

13.B Tagging project assessment

Observer_Training_Assessment#2_Tagging project
Print this document double-sided and in black and white.

14. Marking assessments

It takes at least eight minutes to mark one assessment, so it is up to you to figure out how much time is needed to correct all assessments. During the first tagging assessment, you can start correcting the first biological sampling assessment. The same can be done for the re-assessment.

All the correct answers have been written on separate documents for both tagging and biological sampling. Print these documents and use them as support while marking the trainees' assessments.

Use a red pen for corrections.

If the answer is correct, place a tick next to it and write the score obtained in the box next to the question.

If the answer is incorrect, place a cross next to the answer and, in a few words, provide the correct answer or circle the correct choice.

The final score is obtained by adding all the marks and converting them to a percentage. If some trainees undertake the second assessment, the final score will the higher of the two scores obtained for each assessment.

After you have corrected both assessments, use the **BS and Tagging project Assessments scores table** Excel spreadsheet to enter the final marks the trainees have received.

The first two lines of the table have examples. Delete those examples when you have understood how to fill in the results.

Write the location of where the training took place as well as the training dates (eg. Pohnpei, April 4^{th} to April 8^{th} 2011).

The table is divided into several parts.

1. The names of the trainees appear on the left (first name and family name).
2. The scores obtained for the biological sampling assessment are divided as follows.
    a. Scores obtained for question 1 to 15 (number of marks)
    b. Scores obtained for the biological sampling scenario (number of marks)
    c. Final score (as a percentage)

If some trainees failed to reach 75% in the first assessment, they need to take the second assessment and the scores obtained are also reported on the table.

3. The scores obtained for the tagging project assessment are divided as follows.
    a. Scores obtained for question 1 to 4 and 6 to 8 (number of marks)
    b. Scores obtained for the tag recovery scenario (number of marks)
    c. Scores obtained for the tag seeding scenario (number of marks)
    d. Final score (as a percentage)

If some trainees failed to reach 75% during the first assessment, they need to take the second assessment and the scores obtained are also reported on the table.

For each trainee and assessment, in the columns headed **Final Scores (%),** highlight in green the scores above 75% and in red the ones below 75%.

14. A Biological sampling assessments

Questions 1 to 15 can earn the trainee up to 74 marks. The biological sampling scenario can earn him or her up to 286 marks.
Add up all the marks to get a TOTAL mark out of 357 marks.
Convert the TOTAL score to a percentage. E.g. a trainee scored 285 marks in total. Multiply 285 x 100 = 28500 and divide this result by 357: 28500/357 = 79.8%. This is the FINAL score.
The pass mark is 75%.

For correcting the biological sampling assessment, refer to the following document:
BS_Assessment_1_corrections_final.

14.B Tagging project assessments

Questions 1 to 4 and 6 to 8 can earn the trainee up to 35 marks. The tag recovery scenario can earn him or her up to 52 marks, and the tag seeding scenario up to 26 marks. Add up all the trainee's marks to get a TOTAL mark out of 113 marks.
Convert the TOTAL score to a percentage. E.g. a trainee scored 103 marks in total. Multiply 103 x 100 = 10300 and divide this result by 113: 10300/113 = 91.16%. This is the FINAL score.

The pass mark is 75%.

For correcting the tagging project assessment, refer to the following document:
Observer_Training_Assessment#1_Tagging project correction.

14. C Revision of assessment results

Once you have corrected all the assessments, give the trainees their test papers back and spend some time on pointing out the major mistakes made by trainees. This is a good time for them to ask questions and for you to answer them.

Present the correct answers using the video projector; each correct answer should be read and explained by the trainer.

15. Training Feedback to SPC

After training is finished, the trainers must provide detailed feedback on how the training was undertaken to Caroline Sanchez and Malo Hosken.

The aim of the feedback is:

- to keep a record of which trainees are more capable than others to perform biological sampling and tag seeding (for future reference if biological sampling and tag seeding need to be undertaken by the observers);
- to be able to improve the delivery of biological sampling and tagging modules;
- to provide you with advice and recommendations if needed.

15. A Writing a report

At the end of each day, take the time to write a 200 word narrative. This includes:

- difficulties that you may have encountered (e.g. difficulty in obtaining fish or a place to work, difficulty in demonstrating some of the techniques, difficulty in keeping to the schedule, difficulty in correcting the assessment, difficulty with some trainees.).
- Initiatives you have taken and believe have allowed to improve the delivery of the practical or the in class theory teaching.
- Relevant comments such as trainees' attendance (trainees which did not attend, etc).

15. B Training schedule

BS_and_tagging_training_schedule.xlsx

The training schedule is a list of the modules you will teach, in an appropriate order. Each module has a number that corresponds to a section in this guideline. Before the training starts, print the table and use it as a reference during the theory teaching and practical training. Before doing each activity in the schedule, refer to the module in this guide to remind yourself what needs to be done.

For each module, you need to note the date when you covered it. Fill in the **Date Done** column in the schedule.

You can enter the information into the electronic file or, if you write it on the paper version, scan all the pages and send them.

15.C Assessments

Scan and send the checklist table used for assessing the trainees' ability to perform each task.

Complete the electronic version of the score table, the one specific to the BS and tagging assessments. If no computer is available, ask someone to lend you theirs and send it by email.

NOTES:

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These guidelines were compiled by Malo Hosken and Caroline Sanchez

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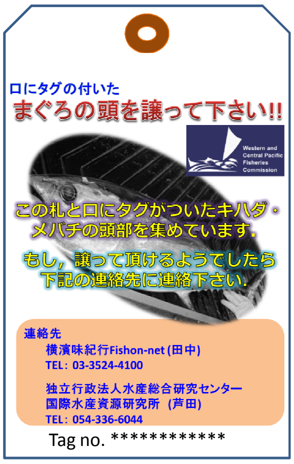
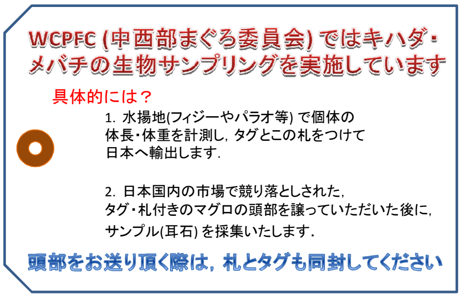
Appendix 4. Sampling tags for sashimi fish sent to Japan

A. Additional notification placed on tuna lip with cable tag



・表面



・裏面

B. Notification placed on head of tuna