SCIENTIFIC COMMITTEE
EIGHTH REGULAR SESSION

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Project 35: Bigeye tuna age and reproductive biology progress report

WCPFC-SC8-2012/SA-WP-03

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Executive Summary

Introduction

SC7 reviewed these outputs from Project 35 (P35), identifying it's expansion to a region-wide sampling program as one of 5 high priority projects for 2012 and supported the continuation of sampling and analysis to gain a better understanding of bigeye ageing and maturity. It was noted that work on depletion based reference points requires more detailed information on spawning biomass and that simultaneous gonad and otolith sampling of bigeye could be funded prior to the next bigeye stock assessment, prioritizing research in region 4, where less information has been gathered to date.

The continuance of P35 is a multi-year project. Years 2012 – 2014 will be devoted to sampling and 2015 will focus on subsequent analysis on the assumption that adequate samples have been collected. The indicative project budget and sampling targets for each of the next 3years is as follows:

Year	2012	2013	2014
Amount	USD 55,000	USD 70,000	USD 75:000
Sampling target	500 otoliths 150 gonads	1000 otoliths 150 gonads	1000 otliths

Progress

Biological Sampling Equipment .

Equipment has been purchased for biological sampling including consumables for 1000 samples. Observer sampling kits assembled and distributed to Cook Islands, Marshall Islands, and Federated States of Micronesia.

Assembly of kits for French Polynesia, Kiribati, Fiji, Solomon Islands, Papua New Guinea, and Palau to be completed by 31 August 2012.

Observer Training

Biological sampling training provided to all PIRFO courses in 2012.

Sampling co-ordinators

Sampling co-ordination organized for Cook Islands, Marshall Islands, Federated States of Micronesia, French Polynesia, Kiribati, Fiji, Solomon Islands, Papua New Guinea, American Samoa and Palau.

Agreement for sampling with processing companies in Palau, Federated States of Micronesia, Marshall Islands, Fiji, and Solomon Islands has been completed.

Budgeting

An itemized budget for 2013 and an indicative budget for 2014 are provided for consideration by SC8.

Recommendation

SC8 note the progress of Project 35 and recommend its continuance in 2013 with a budget of USD70,000.

BACKGROUND

Bigeye tuna in the WCPO is considered to be experiencing overfishing and approaching a state of being overfished. Project P35, a pilot study that was extended and re-titled "A comprehensive review and proposed investigation of the age, growth and reproductive biology of bigeye tuna in the Pacific Ocean" was completed in 2011 and presented to Seventh Regular Session of the Scientific Committee (SC7). It was reported 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. The study collected 282 gonads and 313 otoliths. Matching gonads and otoliths were only collected for 120 individuals. The maturity ogive for females was estimated from 100 gonads. The estimated length at 50% maturity was 105.9 cm, which was consistent with other estimates of the female maturity ogive from the WCPO. The inclusion of the maturity ogive in the 2011 assessment model for bigeye altered the SBcurrent/SBMSY by 4% and the Fcurrent/FMSY by 2%. The results of the pilot study suggest that variation in the maturity ogive may have greater influence on a Pacific-wide assessment of bigeye than it has on the WCPO assessment. It was recommended that greater priority be given to understanding variation at the ocean basin scale rather than within the regions of the WCPO.

A comparison of daily and annual ageing techniques for bigeye tuna indicated that annual ageing methods are appropriate; however, additional validation of methods should be included in future studies. Variation in growth was detected between regions using growth curves derived from otoliths and MULTIFAN-CL. The inclusion of the growth curve in the 2011 assessment model for bigeye altered the SBcurrent/SBMSY by 38% and the Fcurrent/FMSY by 26%. The implementation of the age and growth component for the full Pacific-wide study was recommended as a higher priority than the reproductive biology component. To implement the Pacific-wide study on age and growth, a minimum sample size of approximately 2,500 otoliths is required to be collected from 8 strata of 32° longitude x 20° latitude (approx. 300 per strata).

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. Collection of otoliths from fresh-fish longline vessels is likely to be restricted to sampling at ports. Coordination between observers, vessels, agents and processing facilities allows otoliths to be matched with gonads, fishing and sample details of the individual.

SC7 reviewed these outputs from P35, identifying it's expansion to a region-wide sampling program as one of 5 high priority projects for 2012 and supported the continuation of sampling and analysis to gain a better understanding of bigeye ageing and maturity. It was noted that work on depletion based reference points requires more detailed information on spawning biomass and that simultaneous gonad and otolith sampling of bigeye could be funded prior to the next bigeye stock assessment, perhaps prioritizing research in region 4, where less information has been gathered to date.

The continuance of P35 is a multi-year project. Years 2012 – 2014 will be devoted to sampling and 2015 will focus on subsequent analysis on the assumption that adequate samples have been collected. The indicative project budget and sampling targets for each of the next 3years is as follows:

Year	**2012**	**2013**	**2014**
Amount	USD 55,000	USD 70,000	USD 75:000
Sampling target	500 otoliths 150 gonads	1000 otoliths 150 gonads	1000 otoliths

The budget in each year will be used for payment to observers/data technicians and biological sampling coordinators in key ports in the WCPO 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).

Objective

The overall objective of the project is to collect and analyse samples to provide biological aging, growth and maturity data in support of improved regional bigeye stock assessments and the development of depletion based reference points.

Scope

SC7 Para 133; ……the SC 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 (30N – 30S) should be done;
- for this central equatorial region, there may be some value in collecting additional samples for maturity studies, but that 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.

The sampling strategy involves collecting a minimum sample size of approximately 2500 otoliths from 8 strata of 32° longitude x 20° latitude (approx. 300 per strata). The target number of otoliths for collection in 2012 is 500. The maturity element of the project requires the collection of simultaneous bigeye otolith and gonad samples for subsequent analysis. Complete sampling of the equatorial region would required 300 matching gonads and otoliths in each of the following longitude strata (10°N-10°S, 124°E-156°E), (10°N-10°S, 156°E-172°W) and (172°W to 140°W) regions.

Outputs and Schedule for 2012

The principle outputs are:

- Submission of a project progress report by 22 July 2012,
- Presentation of the project progress report at SC8; and
- Submission of a final project report by 31 December 2012.

The contract between the secretariat of WCPFC and SPC to undertake Year 1 of P35 was signed on 15 May 2012.

Progress Report

Activity	Progress
Biological Sampling Equipment	20 Observer sampling kits assembled and distributed to Cook Islands, Marshall Islands, and Federated States of Micronesia. Equipment purchased to assemble kits for French Polynesia, Kiribati, Fiji, Solomon Islands, Papua New Guinea, and Palau. Observer sampling instruction provided in Appendix 1 of this report
Observer Training	Biological sampling training provided to all PIRFO courses in 2012
Sampling co-ordinators	Sampling co-ordination organized for Cook Islands, Marshall Islands, Federated States of Micronesia, French Polynesia, Kiribati, Fiji, Solomon Islands, Papua New Guinea, American Samoa and Palau. Agreement for sampling with processing companies in Palau, Federated States of Micronesia, Marshall Islands, Fiji, and Solomon Islands completed.
Progress Report	Completed
Year 2012 Final Report	To be completed in December 2012

Indicative Budget for 2013 and 2014

	Budget (USD)	
Activity	**2013**	**2014**
Sampling Co-ordination	25,000	27,000
Observer Training	15,000	17,000
Observers	10,000	11,000
Equipment	4,500	4,000
Travel/Transport	5,000	5,000
SPC Management Fees	10,500	11,250
Total	**70,000**	**75,250**

Appendix 1. Sampling Instruction Forms

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.

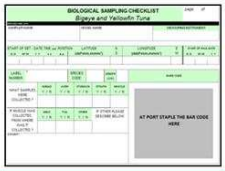
STEP 7 Find the gonads of the fish, if it is not with the guts, it is inside the belly of the fish towards the backbone.

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.



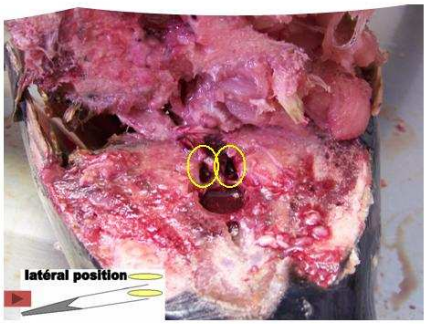
Caution: 1 fish has 1 tag, all the samples coming from a fish have the same label number

How to collect biological samples on purse seine vessels ?

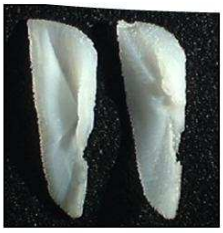
STEP 1 Place the cable tie with labels around the mouth of the fish, once it is attached gently pull on it to make sure it will hold.

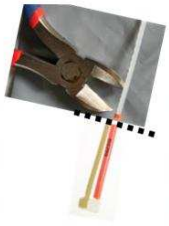
STEP 2 Remove the top of the head using a saw or a knife. If needed remove the head of the fish from the rest of the body. Stabilized the head on the floor. Cut straight down on top of the eye.

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).

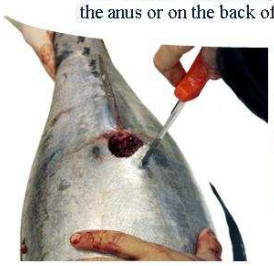




If you cannot remove at least 1 otolith, do not continue to collect other samples. Stop and sample another fish. Remove the cable tie label.

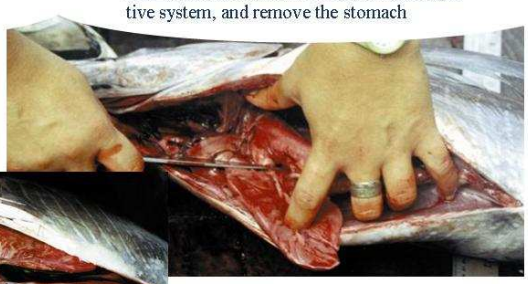
STEP 5 Open the fish's body carefully with the tip of the knife to avoid cutting internal organs.

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

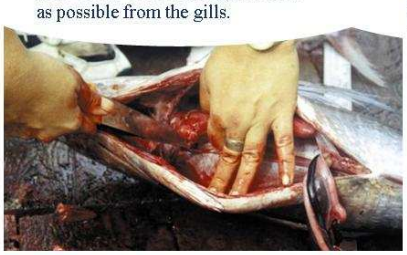


STEP 7 Remove the skin and place the muscle +1 label inside a small plastic bag.

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



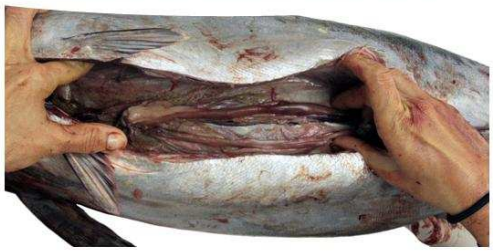
STEP 9 Cut the oesophagus as near as possible from the gills.



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