Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

CCSBT-ESC/0609/08

7. Data Exchange

Purpose

To prepare the data exchange requirements for 2007.

A set of draft data exchange requirements for 2007 is provided in Attachment A. These requirements are based on the 2006 data exchange requirements. Changes have been made to the requirements for 2007 where these were considered appropriate.

Attachments B and C specify the catch effort and catch at size information that should be provided.

Prepared by the Secretariat

Attachment A

Draft Data Exchange Requirements for 2007

The following table shows the data that is to be provided during 2007 and the dates and responsibilities for the data provision. The changes from the 2006 requirements (excluding incrementing the year) are tracked. Comments and explanations of changes are highlighted.

Catch effort and size data should be provided in the identical format as it was provided in 2006. If the format of the data provided by a member is changed, then the new format and some test data in that format must be provided to the Secretariat by 31 January 2007 to allow development of the necessary data loading routines.

Data listed in the following table should be provided for the complete 2006 calendar year plus any other year for which the data has changed. If changes to historic data are more than a routine update of the 2005 data or very minor corrections to older data, then the changed data will not be used until discussed at the next SAG/SC meeting (unless there was specific agreement to the contrary). Changes to past data (apart from a routine update of 2005 data) must be accompanied by a detailed description of the changes.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
~~Cohort slicing algorithms~~	~~Australia Japan~~	~~31 Oct 05~~	~~The cohort slicing algorithms for cohort slicing are to be provided to the Secretariat for the Secretariat to use when it conducts cohort slicing for the MP. These algorithms will also be used by the Secretariat when producing the CPUE inputs file that is used to calculate the CPUE series. Explanations and assistance will also be provided to the Secretariat as is required.~~
~~Recommendation on split of Taiwan's fishery into LL1 and LL2 based on size selectivity~~ **~~for MP/OM~~**	~~Taiwan~~	~~31 Dec 05~~	~~The MP data inputs working group at SC10 recommended that Taiwan's data be split between LL1 and LL2 based on size selectivity instead of targeting criteria. Taiwan's recommendation will be subject to intersessional discussion and agreement prior to providing the revised data for the data exchange.~~
CCSBT Data CD	Secretariat	31 Jan 07	An update of the data (catch effort, catch at size, raised catch and tag-recapture) on the data CD to incorporate data provided in the 2006 data exchange and any additional data (e.g. tag/recapture) received since that time. *The Secretariat will provided additional updates of the tag-recapture data during 2007 on request from individual members.*
Total catch by Fleet	all members and cooperating non-members	30 Apr 07	Raised total catch (weight and number) and number of boats fishing by fleet and gear. These data need to be provided for both the calendar year and the quota year.
SBT import statistics	Japan	30 Apr 07	Weight of SBT imported into Japan by country, fresh/frozen and month. These import statistics are used in estimating the catches of non-member countries.
Mortality allowance (RMA and SRP) usage	all members (& Secretariat)	30 Apr 07	The mortality allowance (kilograms) that was used in the 2006 calendar year. Data is to be separated by RMA and SRP mortality allowance. If possible, data should also be separated by month and location.

[1] The text "**For MP/OM**" means that this data is used for both the Management Procedure and the Operating Model. If only one of these items appears (e.g. **For OM**), then the data is only required for the specified item.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
~~CPUE data preparation documentation **for MP**~~	~~Australia Japan New Zealand~~	~~30 April 06~~	~~Documentation specifying the data preparation process from the raw catch and effort logbook data to the final data which are used as inputs for the CPUE calculations.~~
~~Complete documentation on the method for calculating the 5 CPUE series **for MP**~~	~~Australia Japan~~	~~30 Apr 06~~	~~o A description of the specific input data for each specific CPUE series;~~ ~~o Complete details of the method used to calculate the CPUE series;~~ o ~~Description of the software used to calculate the CPUE series, including the code used for those calculations. Depending on the nature of the code provided, a navigation document may need to be provided which describes how to run the code or where to find different components of the code.~~
Catch and Effort	all members (& Secretariat)	23 Apr 07 (New Zealand)[2] 30 Apr 07 (other members, South Africa & Secretariat)	Catch (in numbers and weight) and effort data is to be provided as either shot by shot or as aggregated data (New Zealand provides fine scale shot by shot data which is aggregated and distributed by the Secretariat). The maximum level of aggregation is by year, month, fleet, gear, and 5x5 degree (longline fishery) or 1x1 degree for surface fishery. A template showing the required information is provided in Attachment B of CCSBT-ESC/0609/08.
Non-retained catches	All members	30 Apr 07	The following data concerning non retained catches will be provided by year, month, and 5*5 degree for each fishery: • Number of SBT reported (or observed) as being non-retained; • Raised number of non-retained SBT taking into consideration vessels and periods in which there was no reporting of non-retained SBT; • Estimated size frequency of non-retained SBT after raising; • Details of the fate and/or life status of non-retained fish. ~~An historic time series of these data should be provided in addition to the data for 2005.~~ These data were provided for the first time in 2006. It would be appropriate to discuss the data that was provided in 2006 (including differences in what different members provided) prior to setting requirements for 2007. Discussion should also be held regarding the inclusion (or not) of mortalities associated with these non-retained catches for stock assessments and in the global catch table.
Research and 'other' mortalities	All members	30 Apr 07	Research mortalities prior to 2001 and any other forms of mortalities up to 2006 that have not been provided as part of the data exchange. Data should be provided at 5*5 by month resolution if available, but otherwise at the best available resolution. Research mortalities are reported in the global catch table back to 2001, but these figures are not used in assessments or included in the global catch because mortalities for earlier years have not yet been provided. This item has been added by the Secretariat. Members may or may not wish to include this item.

[2] The earlier date specified for New Zealand is so that the Secretariat will be able to process the fine scale New Zealand data in time to provide aggregated and raised data to members by 30 April.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
RTMP catch and effort data	Japan	30 Apr 07	The catch and effort data from the real time monitoring program should be provided in the same format as the standard logbook data is provided.
NZ joint venture catch and effort data at 1*1 spatial resolution	Secretariat	30 Apr 07	Aggregated New Zealand catch and effort data, to 1*1 degrees of resolution instead of 5*5 degrees. The Secretariat will produce and provide these data to Japan only for use in the $W_{0.5}$ and $W_{0.8}$ CPUE indices produced by Japan. *Other members may request approval from New Zealand to be provided with access to these data for necessary analyses.*
Raised catch data for AU, NZ and KR catches	Australia, Secretariat, Korea,	30 Apr 07	Aggregated raised catch data should be provided at a similar resolution as the catch and effort data. Japan and Taiwan do not need to provide anything here because they provide raised catch and effort data. New Zealand does not need to provide anything here because the Secretariat produces New Zealand's raised catch data from the fine scale data provided by New Zealand. In 2006, the Secretariat provided the raised catch data for Korea. If the raising for Korea is to be done again by the Secretariat, it should be specified in this table of requirements.
Observer length frequency data	New Zealand	30 Apr 07	Raw observer length frequency data as provided in previous years.
Raised Length Data	Australia, Taiwan, Japan, New Zealand	30 Apr 07 (Australia, Taiwan, Japan) 7 May 07 (New Zealand)[3]	Raised length composition data should be provided[4] at an aggregation of year, month, fleet, gear, and 5x5 degree for longline and 1x1 degree for other fisheries. Data should be provided in the finest possible size classes (1 cm). A template showing the required information is provided in Attachment C of CCSBT-ESC/0609/08. ~~New Zealand will be providing a revised historic time series which will have very minor differences form the time series it provided in 2005. It was agreed that this changed historic data can be used prior to SAG7 without the need further agreement.~~
RTMP Length data	Japan	30 Apr 07	The length data from the real time monitoring program should be provided in the same format as the standard length data is provided.
Raw Size Data	Korea	30 Apr 07	Raw length/weight measurement data should be provided by Korea instead of raised length data because Korea does not yet have a suitable sample size to produce raised length data. *However, Korea is encouraged to improve its sample sizes of length frequency data in the future.*

[3] The additional week provided for New Zealand is because New Zealand requires the raised catch data that the Secretariat is scheduled to provide on 30 April.

[4] The data should be prepared using the agreed CCSBT substitution principles where practicable. It is important that the complete method used for preparing the raised length data be fully documented.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Indonesian LL SBT age and size composition	Australia	30 Apr 07	Estimates of both the age and size composition (in percent) is to be generated for the spawning season July 2005 to June 2006. Length frequency for ~~and~~ the 2006 calendar year and age frequency for the~~.~~ 2005 calendar year is also to be provided.~~ age frequency also needs to be provided~~.
Direct ageing data	All members	30 Apr 07	Updated direct age estimates (and in some cases revised series due to a need to re-interpret the otoliths) from otolith collections. Data must be provided for at least the 2004 calendar year (see paragraph 95 of the 2003 ESC report). The format for each otolith is: Flag, Year, Month, Gear Code, Lat, Long, Location Resolution Code[5], Stat Area, Length, Otolith ID, Age estimate, Age Readability Code[6], Sex Code, Comments. ~~It was agreed that any revised series provided in 2006 due to re-interpretation of otoliths can be used prior to SAG7 without the need further agreement.~~
Tag return summary data	Secretariat	30 Apr 07	Updated summary of the number tagged and recaptured per month and season.
Catch at age data	Australia, Taiwan, Japan, ~~New Zealand~~ Secretariat	14 May 07	Catch at age (from catch at size) data by fleet, 5*5 degree, and month to be provided by each member for their longline fisheries. The Secretariat will produce the catch at age for New Zealand using the same routines it uses for the CPUE input data and the catch at age for the MP. It may be worth considering whether the Secretariat should also produce the catch at age for all the longline fisheries. ~~New Zealand will be providing a revised historic time series which will have very minor differences form the time series it provided in 2005. It was agreed that this changed historic data can be used prior to SAG7 without the need further agreement.~~
Total Indonesian catch by month and % of Indonesian LL catch that is SBT	IOTC/ Secretariat	~~30 Apr 07~~ 15 May 07	The Secretariat is to liaise with the IOTC to obtain the required data for 2006. The date has been put back 15 days because the IOTC have been unable to provide figures at 30 April.

[5] M1=1 minute, D1=1 degree, D5=5 degree.
[6] Scales (0-5) of readability and confidence for otolith sections as defined in the CCSBT age determination manual.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Global SBT catch by flag and by gear	Secretariat	~~14 May 06~~ 22 May 07	Global SBT catch by flag and gear as provided in recent reports of the Scientific Committee. The date has been put back one week because the necessary figures are not usually available by 14 May.
~~Split of Taiwanese catch into LL1 and LL2~~ **~~For MP/OM~~**	~~Taiwan~~	~~24 May 06~~[7]	~~Provide the split of the Taiwanese catch (in numbers and weight) into the LL1 and LL2 fisheries based on size selectivity criteria. In addition to data for 2005, a revised time series of data should be provided that uses the size selectivity criteria.~~ ~~It was agreed that this changed historic data can be used prior to SAG7 without the need further agreement.~~ With the new splitting method, Taiwan does not need to provide this information, because the necessary information for the split is in the raised catch effort data provided by Taiwan.
~~Raised Catch-at-length (2 cm bins) for Taiwan split into LL1 and LL2~~ **~~For OM~~**	~~Taiwan~~	~~24 May 06~~[8]	~~Provide the raised catch-at-length data split into the LL1 and LL2 fisheries. In addition to data for 2005, a revised time series of data should be provided that uses the size selectivity criteria~~ ~~It was agreed that this changed historic data can be used prior to SAG7 without the need further agreement.~~ With the new splitting method, Taiwan does not need to provide this information, because the necessary information for the split is in the raised length data provided by Taiwan.
Raised catch-at-age (ages 0 – 30) for Australia surface and Indonesia spawning ground fisheries. **For OM**	Australia	24 May 07[9]	These data will be provided ~~to~~ for July 2005 to June 2006 in the same format as previously provided. ~~The Indonesian catch at age should be updated for all years (except 2003 and 2004 – which were updated in the 2005 data exchange) because of small changes to direct aging data in earlier seasons.~~
Total catch per fishery each year from 1952 to 2004. **For MP/OM**	Secretariat	31 May 07	The Secretariat will use the various data sets provided above together with previously agreed calculation methods to produce the necessary total catch by fishery data required by both the Management Procedure and the Operating Model.
Catch-at-length (2 cm bins) and catch-at-age proportions **for OM**	Secretariat	31 May 07	The Secretariat will use the various catch at length and catch at age data sets provided above to produce the necessary length and age proportion data required by the operating model (for LL1, LL2, LL3, LL4 – separated by Japan and Indonesia, and the surface fishery). The Secretariat will also provide these catch at length data subdivided by sub fishery (e.g. the fisheries within LL1).

[7] The date is set 1 week before 31 May to provide sufficient time for the Secretariat to process this data and produce the data required by the MP/OM on 31 May.
[8] The date is set 1 week before 31 May to provide sufficient time for the Secretariat to process this data and produce the data required by the OM on 31 May.
[9] The date is set 1 week before 31 May to provide sufficient time for the Secretariat to incorporate these data in the data set it provides for the OM on 31 May.

Type of Data to provide[1]	Data Provider(s)	Due Date	Description of data to provide
Catch at Age **for MP**	Secretariat	31 May 07	Cohort slicing by month of the 5*5 raised length data provided by members. The data used ~~would be~~is the data for LL1 fisheries only. For LL1 fisheries where raised length data are not available (i.e. Korea, Philippines, Miscellaneous), the Secretariat will use Japanese length frequency data as a substitute in the same manner as conducted when producing the length frequency inputs for the operating model
Global catch at age	Secretariat	31 May 07	Calculate the total catch-at-age in 2006 according to Attachment 7 of the MPWS4 report except that catch-at-age for Japan in areas 1 & 2 (LL4 and LL3) is to be prepared by fishing season instead of calendar year to better match the inputs to the operating model. At present, this calculation uses catch at age data provided by members. Would it be better to use the catch at age data calculated by the Secretariat (which is the catch at age data used for both the MP (above) and for the CPUE input data (below))?
CPUE input data	Secretariat	31 May 07	Catch (number of SBT and number of SBT in each age class from 0-20+ using proportional aging) and effort (sets and hooks) data[10] by year, month, and 5*5 lat/long for use in CPUE analysis. ~~This will be the first time that the Secretariat has generated the CPUE input data. Australia and Japan will provide any advice and assistance requested by the Secretariat in a timely manner.~~ ~~Minor historical differences in the historic CPUE input data are expected due to the revised New Zealand data and once the discrepancies between the Australian and Japanese calculation methods have been resolved.~~ ~~It was agreed that the revised series produced by the Secretariat be used prior to SAG7, but that members would conduct some quality control checks on the revised series before using the revisions.~~
Tag releases / recoveries and reporting rates. **For OM**	Australia	31 May 07	The RMP tag/recapture data for the period 1991-1997 will be updated for any changed/new data in the database.
Acoustic index of age 1 SBT off Western Australia	Japan	31 May 07	Estimates from the 2006/07 season sampling.
CPUE series. **For OM**	Australia / Japan	15 Jun 07	5 CPUE series are to be provided for ages 4+, as specified below: • Nominal (Australia) • Laslett Core Area (Australia) • B-Ratio proxy (W0.5) (Japan) • Geostat proxy (W0.8) (Japan) • ST Windows (Japan) The operating model uses the median of these series.
Aerial survey index	Australia	31 Jul 07	Estimates from the 2006/07 fishing season.

[10] Data restricted to months April to September, SBT statistical areas 4-9, and the Japanese, Australian joint venture and New Zealand joint venture fleets.

Attachment B

Template for Aggregated catch and effort data.

Notes: **(1)** **This information should be recorded for all commercial fishing that targeted SBT, or that caught SBT while targeting other species**
(2) Contact the Secretariat for details of the required codes
(3) You can provide catch data for multiple species by placing the catch of each species on a separate line and duplicating the "effort" information (the gray shaded columns) for each line. Alternatively, you may wish to add the catch of extra species as extra columns across this spreadsheet. If you choose this option, you will need to duplicate the last 6 columns (shaded in blue) for each species you add.
(4) If aggregating DATE to the month, you should enter the first day of the month as the date (e.g. enter Jan-02 as 01-Jan-02)
(5) If you do not record the SBT STAT_AREA_CODE, but are providing latitude and longitude, then you can leave the statistical area blank because the Secretariat can easily calculate this.
(6) The LATITUDE should be in decimal degrees with S<0 and N>0. The position you supply should be the northern border of the grid
(7) The LONGITUDE should be in decimal degrees with W<0 and E>0. The position you supply should be the western border of the grid
(8) The field "N_DAYS_SEARCHED" should be considered optional until we agree on a standard method for estimating this.
(9) Certain fields are only required for certain gear types. When a field is only required for a few gear types, the codes of the required gear types are listed in **red**
(10) GEAR_LENGTH should be provided in metres, as total length of net set for PS and GILL, and as total length of line for LL.
(11) GEAR_DEPTH should be provided in metres, as net depth for PS and GILL, and line depth for LL. However, this should only be provided if all shots used the same depth. In this case, provide the single depth of the net/line, NOT the sum of the depths for all shots.
(12) SPOTTER_TYPE_CODE should only be provided if a single code applied to all shots in the record.
(13) ***Important***: If fishing was conducted in the aggregated strata, but nothing was caught (or if no "relevant" species were caught), then you must record the fishing effort information, and specify the CATCH_SPECIES as "NIL". In this case, all the other catch fields would be left empty.
(14) WEIGHT_RETAINED is the whole weight of fish (of the relevant species) retained in kilograms.
(15) CONVERSION_FACTOR is the value by which processed weights were multipled to estimate the whole weight.
(16) SCALING_FACTOR is the amount by which a sample weight was multiplied to calculate the weight retained. This is "1" if no scaling was required.

																		Details of the catch of a species					
DATE	COUNTRY_ CODE	FLEET_ CODE	GEAR_ CODE	TARGET_ SPECIES	STAT_ AREA_ CODE	LATITUDE	LONGITUDE	N_ BOATS	N_DAYS_ SEARCHED **Optional - see point "8"**	N_DAYS_ FISHED	N_SETS_ SHOTS (GILL,LL, MWT,PS, TRAP)	N_ HOOKS (LL,TROL, HAND)	N_ BASKETS (LL)	N_ HOURS (TROL & desirable for all methods)	GEAR_ LENGTH **see point "10"** (PS,GILL, optional for LL)	GEAR_ DEPTH **see point "11"** (PS,GILL, optional for LL)	SPOTTER_ TYPE_ CODE (PS,BB)	NUMBER_ OF_POLES (BB)	CATCH_ SPECIES	WEIGHT_ RETAINED	CONVERSION_ FACTOR	SCALING_ FACTOR	NUMBER_ RETAINED	NUMBER_ DISCARDED

Template for Shot by Shot catch and effort data.

Notes: **(1)** **This information should be recorded for all commercial fishing that targeted SBT, or that caught SBT while targeting other species**
(2) Contact the Secretariat for details of the required codes
(3) You can provide catch data for multiple species by placing the catch of each species on a separate line and duplicating the "effort" information (the gray shaded columns) for each line. Alternatively, you may wish to add the catch of extra species as extra columns across this spreadsheet. If you choose this option, you will need to duplicate the last 6 columns (shaded in blue) for each species you add.
(4) For DATETIME, provide either the date & time at the start of the shot, or just the date. The date/time should be provided in the format DD-MON-YY:HH:MI (e.g 15-Jan-01:16:05)
(5) If you do not record the SBT STAT_AREA_CODE, but are providing latitude and longitude, then you can leave the statistical area blank because the Secretariat can easily calculate this.
(6) The LATITUDE can be noon position, start of shot, end position, and should be in decimal degrees with S<0 and N>0. The position you supply should be the northern border of the grid
(7) The LONGITUDE can be noon position, start of shot, end position, and should be in decimal degrees with W<0 and E>0. The position you supply should be the western border of the grid
(8) The field "N_DAYS_SEARCHED" should be considered optional until we agree on a standard method for estimating this.
(9) VESSEL_ID should be a unique identifier for the vessel. This can be a registration number, or a unique vessel key that hides the true identity of the vessel etc..
(10) Certain fields are only required for certain gear types. When a field is only required for a few gear types, the codes of the required gear types are listed in **red**
(11) GEAR_LENGTH should be provided in metres, as total length of net set for PS and GILL, and as total length of line for LL.
(12) GEAR_DEPTH should be provided in metres, as net depth for PS and GILL, and line depth for LL.
(13) ***Important***: If fishing was conducted, but nothing was caught (or if no "relevant" species were caught), then you must record the fishing effort information, and specify the CATCH_SPECIES as "NIL". In this case, all the other catch fields would be left empty.
(14) WEIGHT_RETAINED is the whole weight of fish (of the relevant species) retained in kilograms.
(15) CONVERSION_FACTOR is the value by which processed weights were multipled to estimate the whole weight.
(16) SCALING_FACTOR is the amount by which a sample weight was multiplied to calculate the weight retained. This is "1" if no scaling was required.

																	Details of the catch of a species					
DATETIME	COUNTRY_ CODE	FLEET_ CODE	GEAR_ CODE	TARGET_ SPECIES	STAT_ AREA_ CODE	LATITUDE	LONGITUDE	N_DAYS_ SEARCHED **Optional - see point "8"**	VESSEL_ ID	N_ HOOKS (LL,TROL,HAND)	N_ BASKETS (LL)	N_ HOURS (TROL & desirable for all methods)	GEAR_ LENGTH **see point "11"** (PS,GILL, optional for LL)	GEAR_ DEPTH **see point "12"** (PS,GILL, optional for LL)	SPOTTER_ TYPE_ CODE (PS,BB)	NUMBER_ OF_POLES (BB)	CATCH_ SPECIES	WEIGHT_ RETAINED	CONVERSION_ FACTOR	SCALING_ FACTOR	NUMBER_ RETAINED	NUMBER_ DISCARDED

Attachment C

Template for Catch at Size data.

Notes: **(1)** **You should provide adjusted (raised and substituted according to agreed CCSBT protocols) catch at size data. If you are not able to adjust your raw data, then you should provide the raw (individual) length (and weight) data.** **Notes below in blue relate specifically to the provision of raw measurement data.**

(2) Contact the Secretariat for details of the required codes

(3) If aggregating CAPTURE_DATE to the month, you should enter the first day of the month as the date (e.g. enter Jan-02 as 01-Jan-02). If aggregating to the half month, you should enter the first half month with a day of "1" and the second half month with a day of "16".

(4) If you do not record the SBT STAT_AREA_CODE, but are providing latitude and longitude, then you can leave the statistical area blank because the Secretariat can easily calculate this.

(5) The field "OTHER_AREA_CODE" should be completed where appropriate (e.g. Australia should record the State where these fish were captured)

(6) The LATITUDE should be in decimal degrees with S<0 and N>0. The position you supply should be the northern border of the grid

(7) The LONGITUDE should be in decimal degrees with W<0 and E>0. The position you supply should be the western border of the grid

(8) LENGTH_CLASS is the lower end of the length class in centimetres. For raw measurement data, simply record the length of the particular fish.

(9) WEIGHT is only relevant when raw (individual measurements) size data is provided, in which case, it is the weight of the fish in kilograms. When length frequency data is provided, the weight should be left empty.

(9) CLASS_PRECISION is the size of the length class in millimetres. This is not relevant (so leave empty) for raw measurement data.

(10) FREQUENCY_RAW. For raw measurement data, this should be "1". Otherwise, this is the number of SBT in this length class that were actually measured including any SBT that were measured in other units (e.g. weight) and placed in this length class after a conversion to length (i.e. this includes numbers reported in the next field).

(11) FREQUENCY_RAW_CONVERTED. In most cases, this will be zero. It is the number of SBT that have been placed in this length class after a conversion from different units (such as weight).

(12) FREQUENCY_ADJUSTED is the actual adjusted (raised and substituted) number of SBT in this length class. Because this is a calculated value, often involving small fractions of fish, this should be reported as a real number with up to six decimal places. Naturaly, this field should be left empty for raw measurement data.

CAPTURE_ DATE	COUNTRY_ CODE	FLEET_ CODE	GEAR_ CODE	STAT_ AREA_ CODE	OTHER_ AREA_ CODE	LATITUDE	LONGITUDE	LENGTH_ CLASS	WEIGHT	CLASS_ PRECISION (=class size)	FREQUENCY_ RAW	FREQUENCY_ RAW_ CONVERTED	FREQUENCY_ ADJUSTED