



Australian Government

Australian Fisheries Management Authority



Shark Resource Assessment Group (SharkRAG)

MEETING RECORD
2-3 OCTOBER 2013
DOCKLANDS, MELBOURNE

SHARK RESOURCE ASSESSMENT GROUP (SharkRAG)

Chair	Dr Brendan Kelaher
Date	2-3 October 2013
Location	Travel Lodge Docklands, Melbourne

1. Preliminaries

Attendance

Members and Permanent Observers

David Power	AFMA
Dr Colin Simpfendorfer	Scientific member
David Stone	Industry member
Dr Robin Thomson	Scientific member
Kyriakos Toumazos	Industry member

Observers

Dr Malcolm Haddon	CSIRO Marine Research
Erik Raudzens	AFMA, SharkRAG Executive Officer
Dr Miriana Sporcic	CSIRO Marine Research
Dr Dairmid Mather	AFMA
Dr Ian Knuckey	Fishwell Consulting (only attended item 6.1)

1.2 Apologies

Dr Jeremy Prince	Scientific member
Anissa Lawrence	Environment member

1.6 Declarations of interest

Declared conflicts of interest were noted. It was agreed that members could raise a particular conflict when each agenda item was discussed.

Dr Colin Simpfendorfer	Has a potential pecuniary interest in research noting research interests are unlikely in particular to this fishery. Currently undertaking work on the research plan for upper slope dogfish.
Dr Diarmid Mather	AFMA economist, no pecuniary interests.
David Stone	Executive Officer for Sustainable Shark Fishing industry. No pecuniary interests. Represents hook and gillnet industry interests.
Dr Brendan Kelaher	SESSFRAG member. Is currently conducting work on the management plan for upper slope dogfish species.
David Power	AFMA manager no pecuniary
Dr Miriana Sporcic	CSIRO currently undertaking stock assessment work for the fishery. No pecuniary interests
Dr Robin Thomson	Undertake CSIRO stock assessments. No pecuniary interests
Dr Malcolm Haddon	Potential scientific research interest. SlopeRAG and NPFrag member. Participant on other RAGs.
Kyriakos Toumazos	SA industry license holder, quota holder operating 4 vessels. Executive Officer of South Australian rock lobster industry.



Erik Raudzens	AFMA manager no pecuniary interests
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1.3 Adoption of Agenda

SharkRAG adopted the agenda noting the timing of agenda items may be changed if required.

1.4 Actions arising from previous meetings

Item	Progress/comment
1. RAG Executive Officer to formalise membership of Anissa Lawrence as conservation member of the RAG.	Complete
2. AFMA to report on agreed ISMP sampling regime and ensure appropriate amounts of sampling is being conducted for the hook fishing sector in future sampling projects	AFMA has allocated additional observer coverage to the shark hook sector. See action item 1.
3. CSIRO to provide RAG with a summary of results from the Gummy Shark RBC presentation given at November 2012 RAG.	See agenda item 3.2
4. Currently the ISMP is not capturing School Shark discards. AFMA to consider increasing the number of School Shark shots observed.	SESSFRAG considered this in July. AFMA observer section has been advised.
5. AFMA EO to invite principle investigator of the Close Kin CSIRO project Mark Bravington to attend the next SharkRAG meeting.	See agenda item 2.2.
6. AFMA to contact Russell Hudson regarding first shot survey investigation	CSIRO have undertaken analysis of historical first shot data for School Shark. Using this method reduces the likelihood of data being skewed. Members requested that AFMA ensures all data has been passed on to CSIRO
7. SharkRAG to set parameters (as per Action Item 2 of the School Shark Workshop) for desktop study using historic first shot catch data to determine whether CVs can be reduced to suitable levels.	Work currently being undertaken by CSIRO. CSIRO to update on progress.
8. SharkRAG to develop standardisation protocol and reference point for 'Tier 5' assessment for School Shark (to be developed later in the process; Malcolm Haddon to provide data set to SharkRAG).	CSIRO to be completed. Tier 5 project is just starting with objectives not yet formalised. Catch history to be completed at the end 2014. It was noted SharkRAG needs to ensure shark species are included in the process. Malcolm Haddon to include shark species and feedback provided to the RAG.



Action item 1: ISMP quarterly report to be updated for next SharkRAG meeting to incorporate hook fishing data.

Action item 2: Malcolm Haddon to include shark species in Tier 5 project and provide feedback to the RAG.

Summary of action items for SharkRAG 2 2013.

Item	Description	Responsibility
1	ISMP quarterly report to be updated for next SharkRAG meeting to incorporate hook fishing data.	AFMA
2	Malcolm Haddon to include shark species in Tier 5 project and provide feedback to the RAG.	Malcolm Haddon
3	Miriana Sporcic to define differences between data from CANDE and SESSF and propose a split in the CPUE series	Miriana Sporcic
4	Malcolm Haddon to prepare presentation on potential breakout rules and/or indicators of performance requiring review regarding a multiyear TAC for Sawshark and Elephant fish for next RAG meeting.	Malcolm Haddon
5	Kyriakos Toumazos to distribute School Shark length and discard data to CSIRO for hook caught School Shark.	Kyriakos Toumazos
6	AFMA observer section to collect dual total length - partial length measurements for all 4 shark quota species to improve conversion factors for CSIRO assessments. AFMA to look at obtaining port samples from Welshpool, Portland, Robe and San Remo. Additional dual fork length-total length measurements to be taken from a wider range of vessels / areas / months and sawshark to be included in the program of measurements.	AFMA
7	Fishwell Consulting to provide CSIRO with length measurements obtained from the auto-longline trial.	Fishwell Consulting
8	Fishwell Consulting to provide David Stone with seabird interaction data obtained from the auto-longline trial.	Fishwell Consulting
9	AFMA to seek further information on State catch details.	AFMA

2. Managers update.

The AFMA member updated the RAG on progress on research on an alternative index of abundance for School Shark. Three expressions of interest had been submitted to FRDC for funding. The FRDC decision will be delayed until additional work on the seven candidate data sources recommended by the School Shark working group are reviewed. The initial work, which will review the potential coefficients of variation of the alternate data sources, is being undertaken by CSIRO and Fishwell consulting. These results will be reviewed by an independent scientist.

Industry members expressed concerns regarding the independence of the review. AFMA stated the independent review will most likely be undertaken by a researcher



based overseas in order to avoid any potential conflicts of interests with researchers in the fishery.

The working group recommended that the candidates for the external review should not have been involved in any collaborative work with researchers involved in the EOI process for the past five years to prevent any conflict of interest.

The AFMA member noted the Marine Mammal Working Group (MMWG) met on 25 September 2013. The RAG was advised that it was able to task the (MMWG) with action items and provide recommendations for research on marine mammals.

The 25 September meeting heard a number of presentations including common dolphin and Australian Sea Lion population analysis and acoustic mitigation research for cetaceans. The MMWG recommended a subcommittee be formed to provide advice to industry on marine mammal mitigation strategies and potential research.

The AFMA manager informed the group that the Threat Abatement Plan for seabirds is currently under review and public submissions can be made to the Australian Antarctic Division. AFMA has provided advice to the reviewers regarding the need for a risk based approach to individual seabird species and boat level responses in mitigation strategies.

Industry Update

David Stone noted it had been an unusual year for fishing in regard to weather patterns. Most Gummy Shark were staying inside the 3 nautical mile limit He noted Danish seine vessel were catching large numbers of shark with very large catches on the 3 nautical mile limit. Fishers have noted the depth distribution has changed for shark reducing catch in waters adjacent to Victoria.

The fishing industry has concerns regarding Gippsland basin seismic surveys. Fishers have concerns Blue Warehouse have been affected by surveys conducted in the 1990s with fish stocks not recovering since surveys were undertaken. He suggested a five year decline after surveys and industry wanted to see research to investigate if such results are similar to research conducted in Norway and other fisheries overseas.

Kyriakos Toumazos updated the RAG on South Australian operations. He has had only one gillnet boat operating with variable catches. Hook boats have been doing well operating in gillnet closures. He raised concern over future management of the fishery stating the fishery cannot be only a hook fishery. He is a strong supporter of gillnet fishing and has concerns that managers have a false hope hook fishing is the solution for the fishery. He sees marine mammal management as crucial for the fishery.

He noted the continued increased cost for operators, such as the competitive market for labour, increased insurance costs and occupational health and safety requirements.

3 Research Update

Gummy Shark update CSIRO



Malcolm Haddon presented an update on catch and effort data for Gummy Shark, including Standardised Catch per unit Effort (CPUE). The key conclusions from the CPUE data include:

- catch rates in Bass Strait are stable with Standardised CPUE at or above the long term mean;
- there has been a decline in CPUE in South Australia, although Shark RAG did not believe this represented abundance due to significant management changes and impacts of spatial closures;
- catches in SA are 35% of what they were in 2009;
- catch rates in TAS have remained stable.

on the data used for the CPUE standardization have two sources – CANDE (historical data collected by MAFFRI) and Commonwealth logbook data from the GENLOG database data. Some of the earlier data represent aggregations of shots whereas GENLOG records shot-by-shot information. In addition, some of the GENLOG data that were compiled by MAFFRI differ from the GENLOG data compiled by CSIRO. It was suggested that the GENLOG data be compiled by CSIRO, and that CANDE be used only for data not included in GENLOG.

Action item 3: Miriana Sporic to define differences between data from CANDE and GENLOG and to propose a cut-off date for use of CANDE data.

Discussions on assumptions for the 2013 stock assessment were further discussed under agenda item 7.1.

Sawshark Research Update

CSIRO reviewed Sawshark catch rates for the 2007-12 period. 60% of catch was obtained by the gillnet sector and 40% from trawl. The RAG agreed that trawl data was likely to produce a better representation of catch rates and discards. Therefore, trawl data would provide a better index of abundance. This was due to avoidance issues in the gillnet sector.

It was noted there was downward trend in CPUE for gillnet and operators are actively avoiding. Trawl CPUE is also decreasing but is closer to the long term average. Changes in CPUE in both methods may be driven by market price and it is not clear for the trawl CPUE if it is an indication of abundance or whether discarding is occurring.

The RAG noted issues with the use of BMSY and BMEY due to the trawl fishery being a multi-species fishery.

Elephant fish Research Update

The RAG noted difficulties with the Elephant fish assessment with reported discards increasing substantially over the past fishing season. It was agreed that ongoing assessment will improve once a more accurate estimate of discards is incorporated in the next few years. Current catch data from the trawl sector was noted as producing a more accurate index of abundance as there was not an issue of avoidance.



Industry members agreed that current high discard rates are likely to be accurate due to the low market price for Elephant fish.

RAG members queried the process for moving Sawshark and Elephant Fish to a multiyear TAC. Malcolm Haddon agreed to present some options for indicators and break out rules for Sawshark and Elephant fish at the next RAG meeting.

Action item 4: Malcolm Haddon to prepare presentation on potential breakout rules and/or indicators of performance requiring review regarding a multiyear TAC for Sawshark and Elephant fish for next RAG meeting.

3.5 Research priorities

The RAG noted the current research process to develop an independent index of abundance for School Shark was a key priority for the fishery. Industry members suggested a timeframe for research targets was essential to provide certainty to operators. In addition consideration of on-going costs needs to be incorporated into the decision making process.

The RAG supported research to identify population size and trends for dolphins and Australian Sea Lions.

Industry noted it has been collecting length frequency data from hook caught School Shark in South Australia. The RAG agreed that such information should be passed on to CSIRO for consideration.

Action Item 5: Kyriakos Toumazos to distribute School Shark length and discard data to CSIRO for hook caught School Shark.

Industry members noted that Marine Mammal Working Group should promote and seek research on Australian Sea Lions from the Marine Mammal Research Centre.

4.2-4.5 Data Collection Issues

The RAG noted port sampling ISMP data collection has improved performance over the last two years. Industry noted concerns that some ports were not being assessed for hook caught shark species. It was noted that SESSFRAG annually reviews port and ISMP data requirements.

The RAG noted that work continues on processing and treatment of selected historical shark vertebrae sampled by Terry Walker. The remaining vertebrae, not selected for ageing, have been relocated to facilities at CSIRO in Hobart for storage.

CSIRO noted issues with partial length measurement - partial length measurements may vary across the fishery as a function of differing processing methods used.



Action item 6: AFMA observer section to collect partial length measurements to improve conversion factors for CSIRO assessments. AFMA to look at obtaining port samples from Welshpool, Portland, Robe and San Remo.

7.2 Species summary template

AFMA management advised the RAG that species summaries for all species would be made consistent for all SESSF fisheries. Members were invited to comment on the current format.

The RAG agreed the template should include a section on historical changes to management and interactions with other fisheries.

5.1 Auto longline trial update

Ian Knuckey of Fishwell Consulting updated the working group on draft results from the FRDC report *Trials of longlines to target Gummy Shark in SESSF waters off South Australia*.

- The trial had two components which included stratified scientific sampling and a trial of commercial fishing operations.
- The stratified scientific sampling component focused on length frequency and discard data collection while the trial of fishing operations focused on the economic viability of auto-longline methods to target Gummy Shark.
- Draft economic results from the three commercial vessels were presented.
- Size frequency of the autolongline catch was compared to the selectivity of 6 and 7 inch mesh gillnet and showed the bulk of the sharks caught were of similar size but there were smaller sharks and larger sharks present in the longline catch which have low selectivity in the gillnets.
- Gummy Shark, comprised between 56% and 88% (by weight) of the retained catch during the scientific trips and 60% of the total catch (retained and released) and 74% of the retained catch during normal operations.
- Snapper accounted for 12% of total catch during commercial trials of which about 75% were released.
- School Shark catches comprised 2–8% during scientific trips, and 10% to the total catch by weight for commercial trips (about 17% of the Gummy Shark catch).
- A number of seabirds were captured during the commercial trial. The trial was ceased after a large number of shearwater interactions were reported in December 2012. The authors of the report sought independent advice from Dr Nigel Brothers regarding potential causes of interactions.
- Lengths of >5000 Gummy Shark were measured throughout the trials.

Action item 7: Fishwell Consulting to provide CSIRO with length measurements obtained from the auto-longline trial.

Action item 8: Fishwell Consulting to provide David Stone with seabird interaction data obtained from the auto-longline trial.



Industry members noted concerns with some of the economic information provided in the draft document. Fishwell consulting noted that members could provide updated advice if they had concerns with economic information provided.

School Shark update:

The RAG noted there is no evidence of targeting of School Shark and catches in the Commonwealth sector remain dispersed. Gillnet catch rates in Bass Strait and Tasmania have remained flat and rates in South Australia have declined. Trawl catches have remained steady and hook catch has increased. There has been limited ability to provide an update on abundance since the 1997 assessment due to fisher avoidance.

Action item 9: AFMA to seek further information on State catch details.
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6.1 Temporary hook permit management measures

SharkRAG made the following recommendations regarding permit conditions for temporary hook permits including the use of auto-baiting machines:

- A 200 tonne Gummy Shark review point. If hook catches exceed 200 tonnes in waters adjacent to South Australia within 12 months of the start of permits being issued, SharkRAG will review catch rates and determine whether catches may affect the sustainability of the resource.
- School Shark catch limits. The GHAT hook sectors will be required to adhere to 20% ratio requirements currently in place for the gillnet sector.
- Seabird mitigation. Permit holders will be required to adhere to the Threat Abatement Plan (TAP) for Seabird requirements including remaining under seabird interaction rates and the use of seabird mitigation devices. Seabird mitigation for auto-line permits will include meeting a demonstrated gear sink rate, use of tori lines and no release of offal whilst setting.
- All vessels operating under temporary permits will be required to have AFMA approved Electronic Monitoring Systems installed.
- Temporary permits will be issued for two years. AFMA and SharkRAG will review the performance of the permits after 18 months in order to ensure a decision on more permanent arrangements can be made before permits expire.
- Performance criteria will include sustainability of Gummy Shark catch levels, ensuring incidental catch levels of School Shark allow for the rebuilding of the stock, meeting seabird TAP interaction requirements and ensuring bycatch catch levels do not exceed rates that threaten the sustainability of these species.

6.2 Review of input controls and spatial closures

The RAG reviewed recommendations made by the Future Directions Working group regarding input controls and spatial closures and made the following recommendations:



- Limit the permitted mesh depth on all GHAT gillnet concessions and permits to 20 meshes deep to minimise bycatch ;
- The 5 and 10 tonne trigger limits for School and Gummy shark in the auto-longline sector will remain. The requirement for AFMA to implement a Closure Direction to implement trip limits if the trigger limits are exceeded will be removed. SEMAC will review requirements to implement trip limits if triggers are exceeded.
- It was noted that during the 18 month review of the proposed temporary auto-line permits in SA, consideration will need to be given to the whether it is appropriate to maintain the 10 tonne trigger for Gummy Shark.
- Murat Bay, Seal Bay and Pages Island spatial closures are to be removed due to additional Australian Sea Lion closures providing protection for these areas
 - For Murat Bay closure review the extent of the ASL closures currently in place and ensure the radial closures extend around the colonies.
 - Shark RAG could not comment on the impacts of Murat bay closure on protecting snapper and Jewfish and advice will need to be sought from SA fisheries.
- The Victor Harbor to the Victorian border closure will remain in place as a precautionary measure due to uncertainty whether School Shark breeding areas exist within the closure area. SharkRAG noted there were no known Australian Sea Lion colonies within the closure area.

9.3 Update on Dolphin mitigation projects

The RAG was updated on proposed dolphin mitigation projects. AFMA had decided not to proceed with industry dolphin mitigation projects within the dolphin closure area due to high risks to dolphins and Australian Sea Lions. AFMA remains supportive of research outside of such areas and noted there are no regulations currently preventing the use of acoustic mitigations devices on gillnets.

It is expected that a dolphin management strategy will be introduced in the fishery by mid-2014. The management strategy will utilise an individual responsibility framework where vessels will be required to stay below an interaction rate for dolphin mortalities. There will be a two stage management response for vessels which exceed the rate. Vessels which are identified as having high interaction rates during the first stage of the strategy will be required to develop mitigation strategies. If vessels continue to have interactions they will incur a penalty which may exclude them from fishing in an area of the fishery for a period time.

It was noted that the Marine Mammal Working Group recommended the creation of subcommittee to investigate mitigation strategies for fishers. AFMA will form this group before the implementation of the dolphin management strategy.

9.1 High risk species



The RAG reviewed catches of species recognized as high risk from the ERA process. The RAG agreed lower catches for Boarfish, Broadnose shark, Bronze and Dusky Whaler were likely to be due to spatial closures in South Australia rather than lower catch rates. The RAG agreed catch reference limits for all species were appropriate.

7.1 Gummy shark assessment

The RAG discussed several decision points regarding the gummy shark stock assessment update for 2013.

Assumptions regarding future auto-longline catches

In South Australia it can be assumed up to 50% of the total SA catch may be from hook methods including auto-longline, if gillnets have access to the Coorong in the future.

To allow for sensitivity testing a range of scenarios will be considered in the assessment between proportions of hook and gillnet catches for Bass Strait, South Australia and Tasmania.

Model structure

The RAG agreed that the model will:

- Truncate the likelihood calculations for tag returns at 2005;
 - New length frequencies and the survey age frequency previously used will be incorporated;
 - An effort saturation parameter will be estimated and also sensitivity results for the no effort saturation case will be retained;
 - CPUE data will be investigated in more detail looking at period of “peak saturation” when the number of vessels in the fishery is large;
 - Full CPUE data up to 2012 will be included for Tasmania and Bass Strait and data up to 2010 for South Australia
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- The ‘reference case’ model b will be used as the sole base case model.

The use of discarding in the stock assessment model

The RAG agreed discard rates are low, and past rates are unknown. Therefore discarding will not be incorporated into the model.

The use of Stock Synthesis

The stock assessment package, Stock Synthesis 3 (SS3) now includes an new mortality-based stock-recruitment function designed for assessing species that have a strong relationship between number of mature females and number of pups (such as elasmobranchs). Moving Gummy Shark into this framework would bring it into line with ShelfRAG, SlopeRAG and GABRAG which exclusively use SS3 for Tier 1



assessments. This would standardize the communication of results, reduce user error and allow for succession.

Scientific members provided advice that we should move to stock synthesis as it allows standard reporting, is simpler to operate and allows others to review assessment work. Industry members raised concern over the potential cost and risk of changing to a new model. However, it was noted that investigating a move to SS3 did not mean committing to such a move.

The use of a single base case model

The previous gummy shark assessment (presented in 2010) was the first gummy shark update to use a suite of alternative models, each treating density dependence in a different way, instead of using a single base case model. This was done because there was no information on the form of density dependence in the population, and the form that is assumed can have a strong effect on results. The results from these models were combined by giving each model equal weight, even though some gave much lower likelihoods than others when fitted to the data.

Most other SESSF stock assessments select a base case model then present other possible model configurations as sensitivities. By integrating a range of possible models, the Gummy Shark stock assessment has been more difficult to report on. The RAG agreed to use a single base case model and sensitivity tests as a means of dealing with uncertainty. Of the suite of models used in 2010, the one that most closely resembles the base case models used prior to 2010 is named the “reference case”. It was decided to reinstate the “reference model” as the base case model.

Standardization of catch rates

The RAG agreed that a cut-off date of 1997 be used and the historical series standardized up to that date using Andre Punt’s method (previously agreed to by the RAG). Logbook data should be standardized separately and the best method for standardizing those data should be investigated. This decision is relevant to all 4 shark quota species. The Tier 4 method is not designed to cope with such a split, however, both of the Tier 4 shark species use data from only 1997 onwards.

The RAG noted a close re-examination of the Punt method is required in order to fully understand previous methodology. Catch rates from past surveys should also be re-examined and included in the assessment. This process would take time, and would benefit from presentation to and discussion by SharkRAG in the near future.

The use of recent catch rates from South Australia and Bass Strait

The RAG agreed the closure of historical fishing grounds to gillnets in South Australia have resulted in catch rates in that State which are unlikely to be comparable with historical catch rates. The first ASL closure was implemented in July 2010 and lead to an immediate drop in catches of Gummy Shark in South Australia. Therefore the model will use South Australian catch rates up the end of 2009.

It was noted that the impact of vessels moving from South Australia to Bass Strait was unlikely to have significant impact on catch rates and so the assessment would



include data from Bass Strait up to 2012. The assessment for Tasmania will also use data to 2012.

Future use of catch rates in South Australia

The RAG noted that due to increased availability of hook fishing, it is likely that after a period of transition, the fishery will settle into a new pattern in South Australia. If this new pattern includes a larger line sector a catch rate series from that sector will become available. Catch rates from the “settling” period for both gillnet and line sectors are unlikely to be reliable indices of abundance so that there is likely to be a gap of several years in the catch rate series, and the new “post-settlement” series will not be comparable with the old.

The relative stability and longevity of the Gummy Shark population suggests that provided catches do not change greatly during this time of change, the population should not to be greatly affected. Once the fishery has settled down, catch rates from the fishery will again become useable, providing information to future stock assessments.

Comparison of logbook catches with catch disposal records

The RAG agreed that average ratio over 2001-2013 period for logbook to CDR reported catches was 1.06 for non-trawl gears and 1.22 for trawl gears. As the vast majority of catches are made by gillnets, and the accuracy of these figures seems to be very good, inflation factors should not be applied to logbook data.

7.3 Methods for independently measuring School Shark abundance

The AFMA member advised that AFMA engaged CSIRO and Fishwell consulting to conduct a scientific review of the seven candidate methods identified at the School Shark Workshop for developing a School Shark index of abundance. The purpose of the review is to discuss the merits and viability of the seven methods. This review will assist AFMA and FRDC in supporting research to develop an ongoing index of abundance. This review will be subject to independent peer review to mitigate any perception of potential bias.

Industry members raised concerns over the potential for a conflict of interest in the review. The AFMA member noted that the reviewers had been chosen based on their expertise and association with Shark RAG and that strict criteria would be included to ensure independence in the peer review. The RAG agreed that peer review would be appropriate provided the reviewer was independent and had not had any direct research association with the CSIRO scientists or Fishwell consulting over the last 5 years. Dr Thomson (Principal investigator on the review project) told the group that she aims to conduct the review in a transparent manner by circulating relevant sections of the review amongst interested parties for their comment prior to completion of the report.

Presentation on close kin genetics

Mark Bravington was unable to attend the meeting, but Robin Thomson gave an update on work she had done with Dr Bravington on close kin genetics and its



potential suitability as a method for independently assessing the abundance of School shark.

Close kin genetics is methodologically a tag and return approach for deriving an absolute abundance measurement for a population using. It uses genetic markers to identify closely related individuals and these close relatives serve as tags and returns. At its simplest, a close kin project can be described in this way:

- If you start by getting the genetic profile from one animal you know it has two parents;
- The next step is to sample the population and use genetic analysis to see if you identify its mother or father;
- If you sample 50% of population you would expect to find 1 adult parent;
- Therefore you can statistically calculate the size of the population based on the number of parents detected relative to the number of juveniles and the sample size.

This technique has been used for Southern Bluefin Tuna (SBT) with adults sampled in their spawning area and juveniles in the Great Australian Bight. During the SBT survey a total of 45 parent offspring pairs were detected.

The same principle can be used for School shark but instead of parent-offspring pairs, half siblings will be used. Mitochondrial markers will be used to identifying half siblings that share a mother. This modification is necessary for School Shark because the gillnet fishery catches primarily juvenile fish.

In summary the key points about close kin genetics are that it:

- provides an absolute measure of abundance;
- estimates mortality rates;
- gives some indication of stock structure;
- can yield low CVs (aim for 15%) that relate directly to how precisely it measures abundance;
- needs a sample of 3000 individuals to give a one off estimate of abundance;
- is less expensive when repeated because vastly fewer samples are needed;
- Has a high upfront cost (of the order of \$600 000) but low ongoing cost (of the order of \$20 000). Note these are indicative costs;
- becomes cheaper with time because current genetic costs of \$20-30 per sample are steadily reducing;

It was noted by the scientific member that results from an initial survey could be available within 2-3 years and that ongoing surveys would only need to be conducted every 3-5 years to measure trends in abundance.

Industry members noted that the initial cost was very high and that they would not be able to pay for it out of levy funds but noted that the ongoing costs were low.

Presentation on first shot analysis



Miriana Sporcic (CSIRO) presented a quantitative analysis of first shot data from logbooks. The purpose of this analysis was to calculate CVs from existing logbook data to assess the suitability of a potential first shot survey as a measure of stock abundance. The variables considered were year, month, vessel, area, region, mesh size, depth (<20, 20-80, >80 m), gummy shark catch, region and month. All variables were significant except mesh size. The outcome of the analysis indicated that a first shot survey based on catch and effort reported in logbooks is not likely to be reliable index of abundance as the estimated overall mean CVs were too high ranging from 167-346% (across the years for each region).

8. School Shark Rebuilding strategy and biologically reasonable timeframe

The AFMA member noted that the School Shark rebuilding strategy needs to be reviewed and updated. The RAG noted that there is currently no reliable index of abundance available and that it is crucial that a new index of abundance be developed for School Shark.

The RAG supported the following points to update the existing rebuilding strategy:

- Objective: Limit catch of School Shark to a level that covers unavoidable bycatch whilst supporting recovery within three generation times (biologically reasonable timeframe);
- Ensure priority is given to the development of an independent index of abundance for School Shark so that the RAG can measure current abundance and rebuilding progress.
- The RAG noted that in order to comment on suitable timeframes for recovery, guidance is needed on the meaning of “suitable” ie. The RAG need to be provided with, or to select, specific objectives that need to be met by the rebuilding timeframe.
- The objectives of the rebuilding strategy including targets and timeframes will be reviewed again when a measure of abundance is available.

