The NSW Commercial Fisheries Port Monitoring Program

Data summary report for 2018/19

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More information

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Introduction

NSW DPI-Fisheries relies upon fishery dependent sources of information to assess the status of exploited fish stocks. These assessments underpin management decisions and determination of quota allocations and fulfil Departmental obligations as part of the national Status of Australian Fish Stocks (SAFS) reports.. Monitoring of the commercial fishery is the primary source of data for Departmental stock assessment and includes catch and effort data as reported in mandatory logbooks, as well as information on the sizes, ages and species composition in landed catches. Port monitoring of the landed catch has been an important component of fisheries assessments for more than 70 years, and the time series of data generated provide considerable insight into the dynamics of the stocks and the fisheries that exploit them, far beyond what is achievable through simple logbook catch and effort data. For example, age and size composition samples are used to calculate indicators such as mean age, mortality rates or the fraction of fish smaller than a threshold length. These indicators are used, along with indicators of relative abundance such as catch rates, to make inferences about current levels of fishing pressure and relative biomass – the 2 requirements for the SAFS exploitation status assessments. Monitoring the size and age composition of the commercial catch is also a cost-effective option to insure against the deficiencies of commercial catch per unit effort data.

The Port Monitoring Program is completed within the 'Sustainable Fish Harvest Program' as detailed in the 'Fisheries NSW Strategic Research Plan 2014-2018'. It has been determined as an ongoing project in that plan. The project is nested beneath the 'Commercial Fisheries Monitoring' research theme but is the major data source for several listed Key Areas including 'Collection and integration of biological and fishery-based information', 'Assessment of quota managed species', and 'Stock structure and status determinations'.

The Port Monitoring Program contributes to:

- Stock status assessments in terms of changes to size and age compositions in landings
- Validation of the commercial logbook records
- Information on species compositions in species complexes (e.g. the trawl whitings, Bugs, Unspecified catch categories)
- Baseline data on biology (e.g. morphometric relationships such as length/weight and fork length/total length, reproductive biology, age and growth, diet etc.)
- Assessment of recovery programs (e.g. mulloway bycatch allowances)
- Analyses of the impacts of management changes (e.g. changes to minimum legal lengths)
- Stakeholder engagement – DPI staff at co-operatives liaise with commercial fishers and co-op staff and are at the front line of communications
- Various externally funded projects with commitments to provide data on commercial landings
- Unplanned events – e.g. the 2015/16 Perfluorooctane sulfonate (PFOS) contamination sampling, prawn white-spot monitoring
- Assisting the commercial fishing industry to maintain a social licence to operate through transparency in operations and co-operation with government

This data summary report is designed to be reviewed by the Fisheries Resource Assessment scientists responsible for stock assessment, as well as fisheries managers and industry. Review of the performance of the program is essential to maintain confidence in the data collected and provides opportunity for the designated scientific leads for each species to refine the sampling protocols if needed. The report also proves transparency around expenditure from the Commercial Trust.

This version of the data report has had the reported commercial catch data by month and sampling strata removed from the Tables for reasons of confidentiality.

Methods

The NSW commercial fisheries port monitoring program utilizes a spatially and temporally stratified sampling design in order to generate representative estimates of the landed commercial catch. The base units of sampling are generally monthly and commercial fishing reporting zone; however, these may vary depending on advice from the species' leads. Sampling protocols are established for each species to optimize the likelihood that representative samples of the landed catch are obtained from a port (fishing reporting zone) on each day sampled. The number of days sampled each month and area may differ between species and are based upon advice from each species' lead within the Resource Assessment Unit, as well as the dynamics of the fishery and the capacity of the program.

The relative importance of landings from each month/fishing zone are dependent upon the reported commercial landings provided by the commercial fishing logbooks. These data are used to reweight and combine the sampled length frequency data in each base unit of sampling (e.g. month/fishing zone) in order to provide estimates that are representative of the entire fishing fleet in NSW. The Department has developed extremely efficient computing applications to automate these processes. The project has also moved largely to electronic data collection. Custom-made electronic measuring boards have made data available in real time and removed the need for paper-based records and the associated data entry expense and potential data entry errors.

Process for selection of species to monitor

Species to be included in the port monitoring program are selected each year through a rigorous process involving all assessment scientists. The process utilizes the Species Priority List (SPL) for Resource Assessment (see Appendix B) to rank species of relative importance, followed by the Data and Monitoring Plan (DMP) to rank species for which port monitoring has been identified as being important for assessment purposes. Within the DMP the requirements of a port monitoring program for each species needs under a base case scenario required to inform a reliable assessment are also identified and ranked. These requirements being potentially biology, length composition and/or age composition. Following the identification and ranking of species requiring port monitoring the list is sent to all relevant assessment scientists who are designated 'leads' for each species for their recommendations. This is an important step in the process as the SPL was not designed specifically to be used for Port Monitoring, and under an environment limited by resources it may not be suitable to rely on the SPL as being totally prescriptive. Species leads may also be

aware of other programs collecting similar data, therefore allowing the group to make more balanced and practical decisions on allocation of port monitoring resources to species.

Generally, between 10-15 species are monitored for length compositions each year, with the numbers being dictated by sampling designs, sampling logistics and the resources available. In addition, a few (generally between 3 and 5) species are sampled for age composition. Port monitoring staff assess the feasibility of successfully sampling each identified species based on the temporal and spatial distribution of the fishery, the operations of the fleet and how they land catches, and the resourcing of the program. Once a final list of proposed species to monitor for lengths and ages has been compiled it is sent for endorsement by the relevant scientists.

Fish assessed for age are purchased directly from either the Fishermen's co-operative or the Sydney Fish Markets. Where it is considered cost-effective (e.g. the Wallis Lake co-operative and for high value species such as large Snapper and Mulloway), the fish have their otoliths removed and are resold to recoup costs.

Details of the prioritisation and justification, sampling aims, reported landings and sampling data for 2018/19 are presented below for each species separately. A brief commentary on how well the sampling met the aims is provided for each species.

Blue Swimmer Crab

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	South Eastern Australia	EGF, EPTF, OTF	Sustainable	Catch, effort, CPUE, size composition

EGF Estuary General Fishery (NSW)
EPTF Estuary Prawn Trawl Fishery (NSW)
OTF Ocean Trawl Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: ***30***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **18**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **18**

Rank for ages – **not required**

Species lead commentary

Size-limit changes and quota managed. Length frequency data needed to quantify changes in targeting behaviour (i.e. large crabs).

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data representative of the commercial landed catch from the Wallis Lake area.

Sampling design

Five estuaries account for 95% of the commercial catch, with Wallis Lake the most important (EG Region 4). All sampling was done at Wallis Lake Fishermen's co-operative.

As Estuary Prawn Trawl and Ocean Fish Trawl catches are incidental, sampling was focused on the Estuary General Fishery. Blue Swimmer Crab were measured as carapace length (CL) to the nearest whole mm, rounding down, and when possible all crabs on the floor on the day of sampling were measured unless the catch exceeded 50 individuals in which case sub-sampling was done. A separate length frequency was recorded for each sex, maturity and quality grade (A, B or C).

Sampling is based on month and estuary region strata for data expansion using reported commercial landings for each month and estuary region. These expansions are done using the PISCES software.

Sampling graded catches

Blue Swimmer Crab catches are graded according to their size and density. All grades are sampled and recorded separately. If sub-sampling is needed, approximately 10 times the number of size classes per grade are measured. These sub-samples are weighed and the total weight of each grade recorded and the sample scaled up accordingly, using the PISCES software.

Results

Table 1. Reported landings heat map of Blue Swimmer Crab by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													76848

Legend
Percent of Max Value
100%
75%
50%
25%

Table 2. The number of days sampled for Blue Swimmer Crab by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5	2												2
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	3	1			3	2	4	3	2	1			19
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	5	1	0	0	3	2	4	3	2	1	0	0	21
Total	5	1	0	0	3	2	4	3	2	1	0	0	21

Table 3. The number of catches sampled for Blue Swimmer Crab by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5	2												2
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	4	1			4	8	11	5	5	3			41
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	6	1	0	0	4	8	11	5	5	3	0	0	43
Total	6	1	0	0	4	8	11	5	5	3	0	0	43

Table 4. The number of Blue Swimmer Crabs sampled by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5	137												137
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	137	93			492	310	437	415	329	163			2376
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	274	93	0	0	492	310	437	415	329	163	0	0	2513
Total	274	93	0	0	492	310	437	415	329	163	0	0	2513

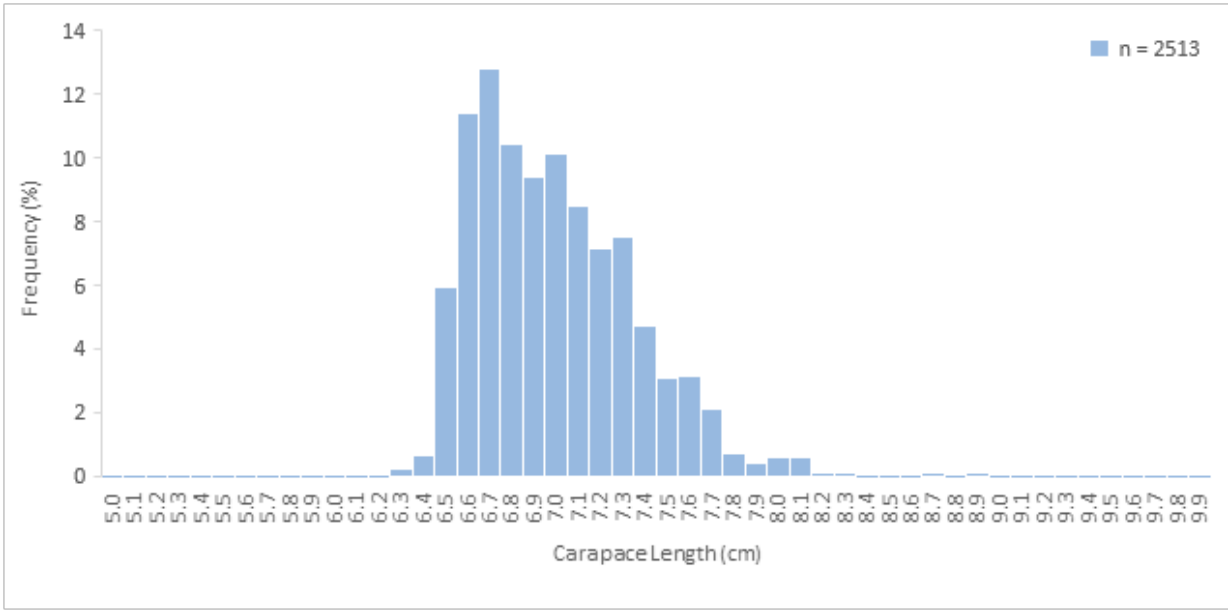

Figure 1. Length composition of Blue Swimmer Crab landed by the commercial fishery for 2018/19. Crabs were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

The distribution of sampling, for the most part, approximated the fishery landings for 2018/19. No catches were sampled during September and October 2018; however relatively low (< 1 t per month) landings occurred during those months.

Difficulties in accessing catch from the Wallis Lake Co-op resulted in a shift in sampling effort to the newly formed Great Lakes Fisheries fish processing factory; however, sampling was further impacted by the development of a live crab market and the pooling of catches across multiple fishers. A scoping study into the potential to representatively sample Blue Swimmer Crabs from the Wallis Lake area at the Sydney Fish Markets could be done in future if ongoing monitoring of the landed catch is considered necessary.

Bluespotted Flathead

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Eastern Australia	OTF	Sustainable	Catch, catch rates, length and age compositions, biomass depletion and harvest rate estimates

OTF Ocean Trawl Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: **1**

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring: **1**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **1**

Rank for ages – **1**

Species lead commentary

Data and Monitoring Plan indicates lengths and ages are required for the stock assessment. Monitoring Fish Trawl ocean zones 5, 6 and 7 only. Mainly Sydney Fish Market work. Collect 10 otolith pairs per month from Sydney fish trawl.

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial fish trawl fishery in ocean zones 5-7. Collect otoliths from the Sydney trawl fleet's landings to add to those being collected by the prawn trawl observer program in northern ocean zones.

Sampling design

Length Frequency data from the Fish Trawl Fishery, for primarily ocean zones 5, 6 and 7, were collected through Nelson Bay and Newcastle Fishermen's co-operatives and the Sydney Fish Markets. For each location, all catches from the Fish Trawl Fishery that were on the floor on the day of sampling were sampled. Bluespotted Flathead were measured from the tip of the nose to total length (nearest cm rounding down).

Bluespotted Flathead sampling is based on month and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

A sample of 10 fish from the Sydney Fish Market was also purchased each month for ageing. Fish were selected from each grade in the approximate ratio of each grade in the total catch by weight.

Sampling graded catches

Almost all Bluespotted Flathead catches are graded, generally into XL, L, M, S or U. All grades are sampled. Approximately 10 times the number of size classes per grade are measured (as tallied by the electronic measuring board software). These sub-samples are weighed and the total weight of each grade recorded and the sample scaled up accordingly, using the PISCES software.

Results

Table 1. Reported landings heat map of Bluespotted Flathead by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													113110

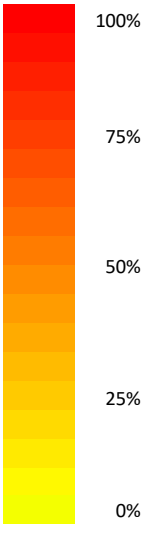

Table 2. The number of days sampled for Bluespotted Flathead by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	1												1
Zone 3													
Zone 4									1				1
Zone 5	3	3	5	3		2	3	3					22
Zone 6			1		3	4	3	1	1			1	14
Zone 7	1				1	1	1	1	2	1	1	1	10
Zone 8								1					1
Zone 9										1	1		2
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4				1									1
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	5	3	6	4	4	7	7	6	4	2	2	2	52
Total	6	3	6	4	4	7	7	6	4	2	2	3	54

Table 3. The number of catches sampled for Bluespotted Flathead by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	3												3
Zone 3													
Zone 4									1				1
Zone 5	4	3	5	3		2	3	3					23
Zone 6			1		4	8	3	1	1			1	19
Zone 7	2				1	1	1	1	2	1	1	1	11
Zone 8								1					1
Zone 9										1	1		2
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4				1									1
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	9	3	6	4	5	11	7	6	4	2	2	2	61
Total	10	3	6	4	5	11	7	6	4	2	2	3	63

Table 4. The number of fish sampled for Bluespotted Flathead by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	200												200
Zone 3													
Zone 4									97				97
Zone 5	433	707	695	489		491	465	861					4141
Zone 6			87		516	1247	180	121	44			46	2241
Zone 7	167				100	105	56	94	108	70	56	110	866
Zone 8								170					170
Zone 9										26	46		72
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4				65									65
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	800	707	782	554	616	1843	701	1246	249	96	102	156	7852
Total	898	707	782	554	616	1843	701	1246	249	96	102	345	8139

Table 5. The number of fish sampled for ageing Bluespotted Flathead by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 2	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 3	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 4	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 5	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 6	10	0	10	10	10	9	10	10	0	0	0	10	79
Zone 7	0	0	0	0	0	0	0	0	10	10	10	0	30
Zone 8	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 9	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 10	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 1	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 2	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 3	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 4	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 5	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 6	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 7	0	0	0	0	0	0	0	0	0	0	0	0	

Total (area known)	10	0	10	10	10	9	10	10	10	10	10	10	109
Total	10	0	10	10	10	9	10	10	10	10	10	10	109

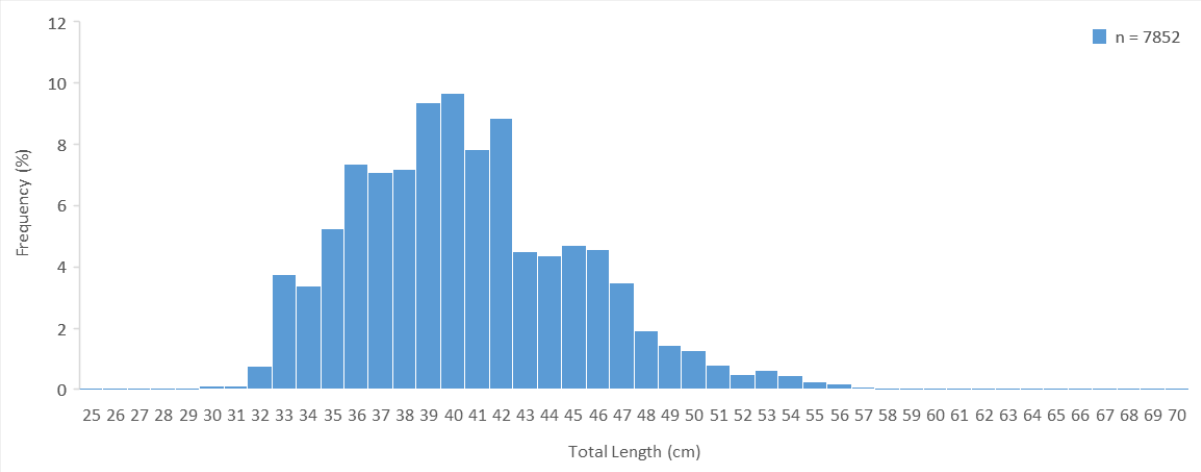

Figure 1. Length composition of Bluespotted Flathead landed by the commercial fishery mainly in ocean zones 5, 6 and 7 during 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Sampling across ocean zones 5, 6 and 7 was deemed to be representative of those zones. The single catch sampled from an unknown area is due to overdue catch returns or having been caught in commonwealth waters and will be rectified when catch records are up to date. This single catch is unlikely to have affected the overall length composition.

Eastern School Whiting

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	South Eastern Australia	OTF	Sustainable	Spawning stock biomass

OTF Ocean Trawl Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: **2**

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring: **2**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **2**

Rank for ages – **2**

Species lead commentary

Data Monitoring Plan requires a length and age-based assessment. Port monitoring to include continued export box sampling of species composition, lengths and otoliths at Iluka Fishermen's co-operative as well as length data from the Fish Trawl Fishery in ocean zones 4-6. Very small amounts south of Sydney but sample when possible. Collection of 10 otoliths per month from Sydney trawl catches, the rest from export boxes at Iluka and Newcastle.

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial fish trawl fishery in ocean zones 4-6 and whiting for export from Iluka.

Sampling design

Export box sampling was undertaken at Iluka Fishermen's co-operative, where length frequencies were recorded along with the species split of Eastern School Whiting: Stout Whiting. Length frequency data from the Fish Trawl Fishery for ocean zones 4-9 were collected through Newcastle Fishermen's co-operative and the Sydney Fish Markets. For each location, all catches from the Fish Trawl Fishery that were on the floor on the day of sampling were sampled. Eastern School Whiting were measured from the tip of the nose to fork length (nearest cm rounding down).

Eastern School Whiting sampling is based on month and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

A sample of 10 fish from the Sydney Fish Trawl catches at Sydney Fish Market was also purchased each month for ageing. Fish were selected from each grade in the approximate ratio of each grade in the total catch by weight.

Sampling graded catches

Almost all Eastern School Whiting catches are graded, generally into XL, L, M, S or U. All grades are sampled. Approximately 10 times the number of size classes per grade are measured (as tallied by the electronic measuring board software). These sub-samples are weighed and the total weight of each grade recorded and the sample scaled up accordingly, using the PISCES software.

Results

Table 1. Reported landings heat map of Eastern School Whiting by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													1194976

Legend
Percent of Max Value
100%
75%
50%
25%

Table 2. The number of days sampled for Eastern School Whiting by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2		2	3	3	1	4	3	1	1	1	4	1	24
Zone 3									1				1
Zone 4									1				1
Zone 5										1	1		2
Zone 6	1	1	1	2	3	5	3	2	1	3	1	1	24
Zone 7	2	1	1	2	2	4	4	2	3	2	1	1	25
Zone 8	1							2	2	1	2		8
Zone 9						2			1	1			4
Zone 10					1								1
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	4	4	5	7	7	15	10	7	10	9	9	3	90
Total	5	4	5	7	7	15	10	8	10	9	9	4	93

Table 3. The number of catches sampled for Eastern School Whiting by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2		2	3	3	1	4	3	1	1	1	5	1	25
Zone 3									1				1
Zone 4									1				1
Zone 5										1	2		3
Zone 6	2	1	1	2	4	9	3	3	2	4	2	1	34
Zone 7	3	1	1	2	3	4	4	2	3	2	1	1	27
Zone 8	1							2	2	1	2		8
Zone 9						2			1	1			4
Zone 10					1								1
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	6	4	5	7	9	19	10	8	11	10	12	3	104
Total	7	4	5	7	9	19	10	9	11	10	12	4	107

Table 4. The number of fish sampled for Eastern School Whiting by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2		337	452	562	123	400	376	125	13	93	298	60	2839
Zone 3									73				73
Zone 4									220				220
Zone 5										382	164		546
Zone 6	246	155	72	353	571	1284	545	463	231	665	280	227	5092
Zone 7	187	100	70	220	270	405	600	414	571	263	89	121	3310
Zone 8	60							276	265	102	220		923
Zone 9						278			70	154			502
Zone 10					70								70
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	493	592	594	1135	1034	2367	1521	1278	1443	1659	1051	408	13575
Total	563	592	594	1135	1034	2367	1521	1471	1443	1659	1051	549	13979

Table 5. The number of fish sampled for ageing Eastern School Whiting by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 2	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 3	0	0	0	0	0	0	0	0	30	30	30	30	120
Zone 4	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 5	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 6	0	0	0	10	10	0	10	10	0	10	0	10	60
Zone 7	10	10	10	0	0	10	0	0	10	0	10	0	60
Zone 8	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 9	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 10	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 1	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 2	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 3	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 4	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 5	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 6	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 7	0	0	0	0	0	0	0	0	0	0	0	0	
Total (area known)	10	10	10	10	10	10	10	10	40	40	40	40	240
Total	10	10	10	10	10	10	10	10	40	40	40	40	240

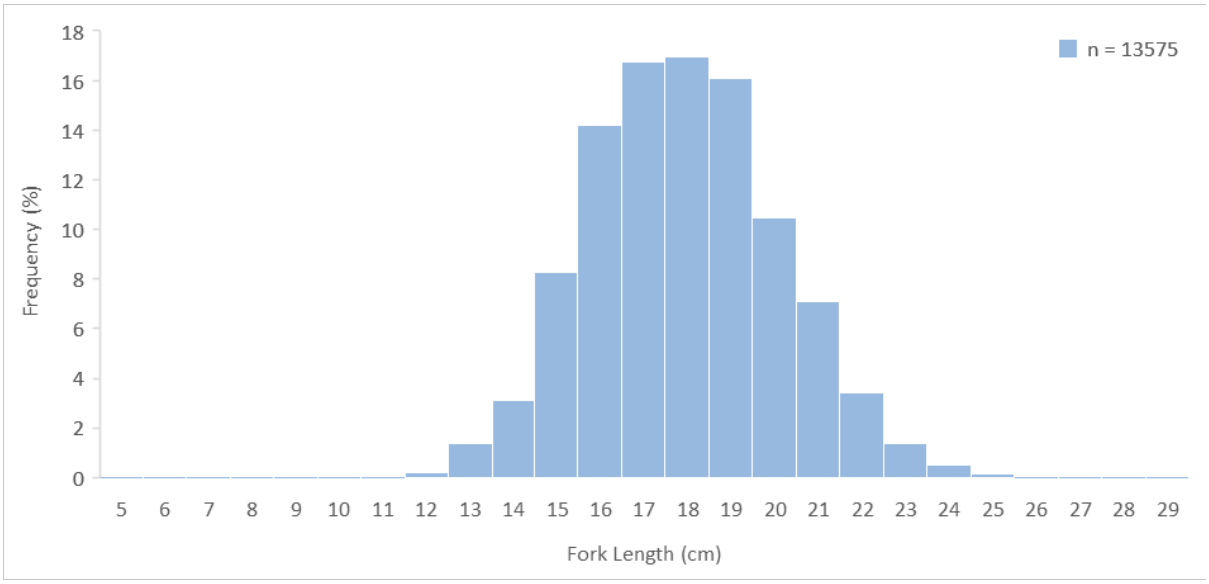

Figure 1. Length composition of Eastern School Whiting landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

The majority of the Eastern School Whiting caught in ocean zone 5 comes through Newcastle co-operative, where it is immediately boxed up for shipping and not able to be accessed. Therefore, very little length data and no otoliths were collected from ocean zone 5 which represents the largest landings in the state.

The three catches sampled with unknown area may be due to overdue catch returns or having been caught in Commonwealth waters and will be rectified when catch records are up to date.

Eastern Sea Garfish

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Eastern Australia	EGF, OHF	Sustainable	Spawning stock biomass, fishing mortality rate, age composition, catch, effort

EGF Estuary General Fishery (NSW)

OHF Ocean Hauling Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: ***29***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **17**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **17**

Rank for ages – **11**

Species lead commentary

Data and Monitoring Plan required length and age-based assessment. Previously (2002/03 to 2012/13) the stock was overfished and is still well below any nominal target reference level. TAC setting will likely require an age-based assessment based on recent analyses by Broadhurst et al., 2018.

Aim of the Port Monitoring sampling for 2018/19

Collect size and age composition data that are representative of the commercial landed catch for NSW.

Sampling design

Most sampling is done at the Sydney Fish Markets; however, some is done at regional Fishermen's co-operatives and instructions are sent to staff (see below). Sea Garfish sampling is based on the standard port monitoring design that is based on monthly and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

Sea Garfish are measured from the lower jaw to fork length to the nearest cm rounding down.

Both the Ocean Hauling and Estuary General Fisheries are monitored.

Twenty fish per catch are generally purchased for ageing. Fish are selected from each grade in the approximate ratio of each grade in the total catch by weight.

Sampling graded catches

Almost all Sea Garfish catches are graded, generally into XL, L, M, S or U. All grades are sampled. Approximately 10 times the number of size classes per grade are measured (as tallied by the electronic measuring board software). These sub-samples are weighed and the total weight of each grade recorded and the sample scaled up accordingly using the PISCES software.

Sea garfish *(Hyporhamphus australis)*

Sample days

- **Nelson Bay only -** January 2017 to June 2018
- Opportunistically up to 4 days per month

Lengths required

- Sea garfish are almost always graded by size. Sample from **each grade 80-100 fish** (approx. 3-10kgs depending on size). Make sure you weigh the sub-sample taken from each grade. If whole catch is ungraded then only need to do one sample of 80-100 length measurements
- Measure catches as fork length (FL - from the tip of the top jaw to the fork in the tail – see figure below) to the nearest whole cm below true length.
- You will need to record the total catch weight, total weight of each size grade and the total weight of the fish measured from each size grade.
- Try and measure from as many different fishermen as time allows.

Otoliths required

- 20 otoliths per catch taken proportionately from each grade. Two samples per month= 40 otoliths total. Field code **NB-Ha 1**

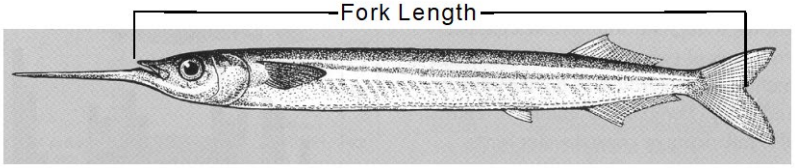

Figure 1. Sea Garfish sampling instructions for Nelson Bay

Results:

Table 1. Reported landings heat map of Eastern Sea Garfish by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													32601.8

Legend
Percent of Max Value
100%
75%
50%
25%
0%

Table 2. The number of days sampled for Eastern Sea Garfish by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5								2	6	4			12
Zone 6										1	1		2
Zone 7							4	4	1				9
Zone 8							4	3	1	2	2	2	14
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4									1	1			2
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	0	0	0	0	0	0	8	9	9	8	3	2	39
Total	0	0	0	0	0	0	8	9	9	9	3	2	40

Table 3. The number of catches sampled for Eastern Sea Garfish by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5								2	8	4			14
Zone 6										1	1		2
Zone 7							4	4	1				9
Zone 8							4	3	1	2	2	2	14
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4									1	1			2
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	0	0	0	0	0	0	8	9	11	8	3	2	41
Total	0	0	0	0	0	0	8	9	11	9	3	2	42

Table 4. The number of fish sampled for Eastern Sea Garfish by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5								843	1405	687			2935
Zone 6										204	192		396
Zone 7							879	844	160				1883
Zone 8							509	362	130	381	405	194	1981
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4									78	151			229
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	0	0	0	0	0	0	1388	2049	1773	1423	597	194	7424
Total	0	0	0	0	0	0	1388	2049	1773	1529	597	194	7530

Table 5. The number of fish sampled for ageing Eastern Sea Garfish by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 2	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 3	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 4	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 5	0	0	20	0	0	0	0	19	110	151	0	0	300
Zone 6	0	0	0	0	0	0	0	0	0	20	19	0	39
Zone 7	0	0	0	0	0	0	80	52	20	0	0	0	152
Zone 8	0	0	0	0	0	0	40	80	0	40	40	20	220
Zone 9	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 10	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 1	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 2	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 3	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 4	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 5	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 6	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 7	0	0	0	0	0	0	0	0	0	0	0	0	

Total (area known)	0	0	20	0	0	0	120	151	130	211	59	20	711

Total	0	0	20	0	0	0	120	151	130	211	59	20	711

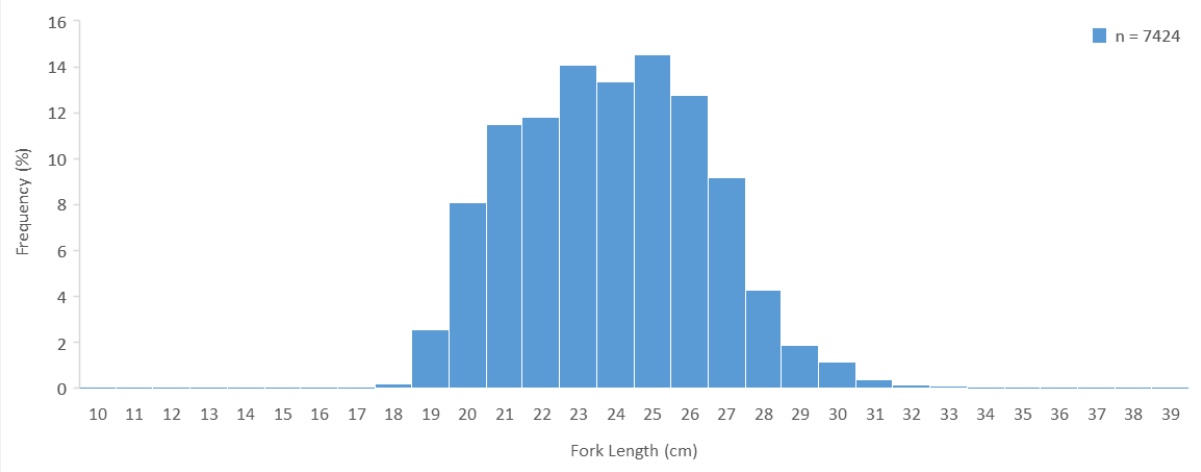

Figure 2. Length composition of Eastern Sea Garfish landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

The distribution of sampling approximated the fishery landings. A significant number of catches were sampled at a fisher's personal processing shed in ocean zone 5. Samples of genetic material were also collected from approximately 420 fish, with an aim to assist industry and management in determining whether the Southern Sea Garfish is mixed with Eastern Sea Garfish landings.

Literature cited:

Broadhurst, M. K., Kienzle, M. and Stewart J. 2018. Natural and fishing mortalities affecting eastern sea garfish, *Hyporhamphus australis* inferred from age-frequency data using hazard functions. Fisheries Research 198: 43-49.

Giant Mud Crab

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Estuary General Fishery	EGF	Undefined	Catch

EGF Estuary General Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: ***6***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **4**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **4**

Rank for ages – **not required**

Species lead commentary

Data and Monitoring Plan required a length-based assessment. Length frequency data required to investigate/determine if quota management results in changes in harvesting strategies (sizes and sexes). Need extra casual staff located at Wallis Lake's second factory. Port monitoring data sheet continue to include quality grade (A, B, C etc.).

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial landed catch from the Clarence River, Coffs Harbour, Wallis Lake and Newcastle areas.

Sampling design

Length Frequency data from the Estuary General Fishery were collected through the Clarence River Fishermen's co-operative, Coffs Harbour Fishermen's co-operative, Wallis Lake Fishermen's co-operative and Newcastle Fishermen's co-operative. Giant Mud Crab were measured as carapace length (CL) to the nearest mm, rounding down, and all crabs on the floor on the day of sampling were measured unless the catch exceeded 50 individuals in which case sub-sampling was done. A separate length frequency was recorded for each sex and maturity. The breakdown of quality grade (A, B or C) by weight was also recorded for each catch sampled.

Sampling is based on month and estuary region strata for data expansion using reported commercial landings for each month and estuary region. These expansions are done using the PISCES software.

Sampling graded catches

Giant Mud Crab catches are graded according to their size and density. All grades are sampled.

Results

Table 1. Reported landings heat map of Giant Mud Crab by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													1
Zone 2													1
Zone 3		1											1
Zone 4													1
Zone 5	1	1									1		1
Zone 6					1		1	1					1
Zone 7													1
Zone 8													1
Zone 9													1
Zone 10													1
EG Region 1	1	1	1	1	1	1	1	1	1	1	1	1	1
EG Region 2	1	1	1	1	1	1	1	1	1	1	1	1	1
EG Region 3	1	1	1	1	1	1	1	1	1	1	1	1	1
EG Region 4	1	1	1	1	1	1	1	1	1	1	1	1	1
EG Region 5	1		1	1	1	1	1	1	1	1	1	1	1
EG Region 6	1	1	1	1	1	1	1	1	1	1	1	1	1
EG Region 7	1					1		1	1	1	1	1	1
Total	1	1	1	1	1	1	1	1	1	1	1	1	116098

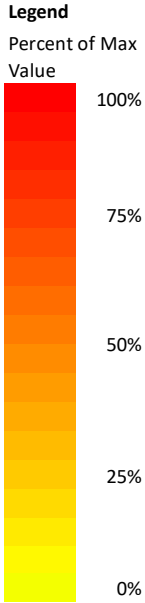

Table 2. The number of days sampled for Giant Mud Crab by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3						1							1
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	2	2	2	3	3	3	2	2	2	1	4	2	28
EG Region 3	7	5	5	4	3	5	4	6	7	4	4	7	61
EG Region 4					1								1
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	9	7	7	7	7	9	6	8	9	5	8	9	91
Total	9	7	7	7	7	9	6	8	9	5	8	9	91

Table 3. The number of catches sampled for Giant Mud Crab by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3						1							1
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	3	5	6	6	8	4	7	6	6	1	5	3	60
EG Region 3	10	6	7	4	6	8	7	8	7	5	5	9	82
EG Region 4					1								1
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	13	11	13	10	15	13	14	14	13	6	10	12	144
Total	13	11	13	10	15	13	14	14	13	6	10	12	144

Table 4. The number of Giant Mud Crabs sampled by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3						9							9
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	65	128	220	122	186	179	364	204	309	57	155	233	2222
EG Region 3	290	120	263	83	146	362	426	462	481	287	348	264	3532
EG Region 4					18								18
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	355	248	483	205	350	550	790	666	790	344	503	497	5781

Total	355	248	483	205	350	550	790	666	790	344	503	497	5781

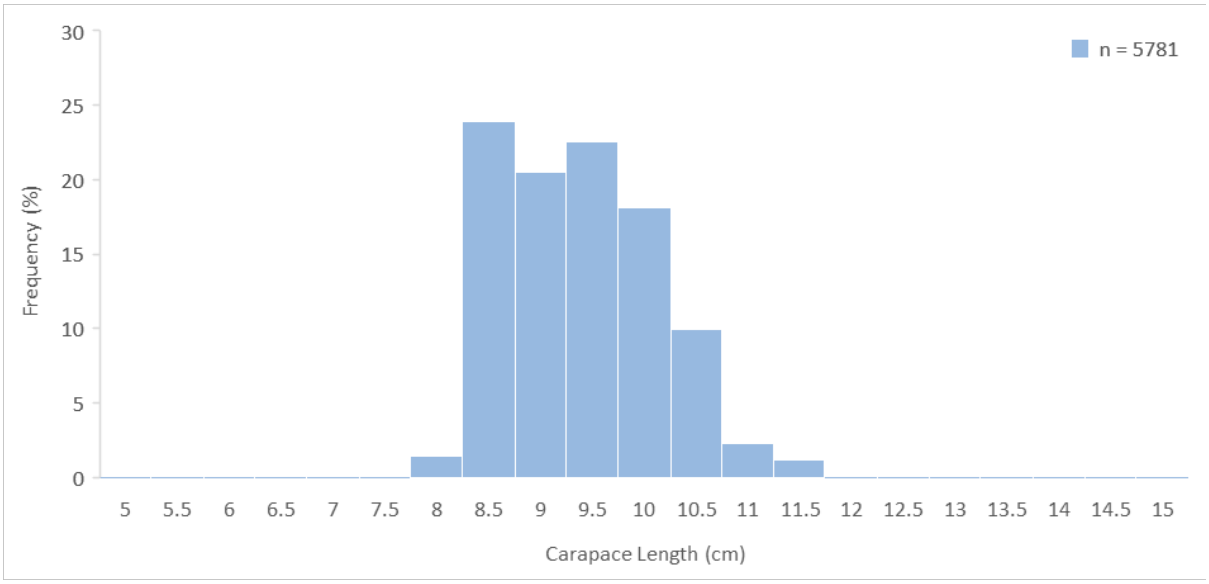

Figure 1. Length composition of Giant Mud Crab landed by the commercial fishery for 2018/19. Crabs were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES

Commentary

The distribution of sampling, for the most part, approximated the fishery landings. Difficulties in accessing catch particularly in EG region 4 have resulted in an under representation of catch from this zone.

Grey Morwong

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Eastern Australia	OTF, OTLF	**Depleted**	Catch, Catch rates, size structure, age structure, fishing mortality

OTF Ocean Trawl Fishery (NSW)
OTLF Ocean Trap and Line Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: ***11***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **8**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **8**

Rank for ages – **5**

Species lead commentary

Data and Monitoring Plan required length-based assessment. Following discussions with other jurisdictions, there is a need for age data to be collected across the whole stock (including Commonwealth waters) concurrently. Length frequency sampling on Ocean Trap and Line Fishery only as state Fish Trawl catch is < 1t.

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial landed catch for NSW.

Sampling design

Length frequency data from the Ocean Trap and Line Fishery were collected for all ocean zones through Iluka/Maclean Fishermen's co-operative, Coffs Harbour Fishermen's co-operative, Wallis Lake Fishermen's co-operative, Newcastle/Nelson Bay Fishermen's co-operative and the Sydney Fish Markets. For each location, all catches from the Ocean Trap and Line Fishery that were on the floor on the day of sampling were attempted to be sampled. Grey Morwong were measured from the tip of the nose to fork length (nearest cm rounding down).

Grey Morwong sampling is based on month and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

Sampling graded catches

Almost all Grey Morwong catches are graded, generally into XL, L, M, S or U. All grades are sampled and because catches are relatively small, all fish in each catch are usually measured.

Results

Table 1. Reported landings heat map of Grey Morwong by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													19589.5

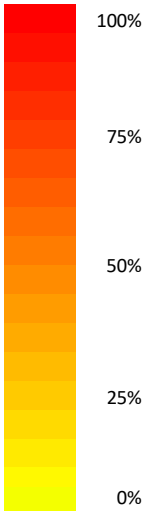

Table 2. The number of days sampled for Grey Morwong by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	3	4	3	6	1	4	2	4	5	5	1	1	39
Zone 3	3	2	4	8	3	5	2	2	3	3	3	4	42
Zone 4													
Zone 5		2	2	2		1		1		1			9
Zone 6	2	4	2	3	4	5	3		1	1		1	26
Zone 7							1						1
Zone 8													
Zone 9	1					2	1				1	1	6
Zone 10	1				1		1	1		1	1		6
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	10	12	11	19	9	17	10	8	9	11	6	7	129

Total	10	12	11	19	9	17	10	8	9	11	6	7	129

Table 3. The number of catches sampled for Grey Morwong by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	3	4	3	6	1	4	2	4	5	5	1	1	39
Zone 3	3	2	5	9	3	6	2	2	3	3	3	4	45
Zone 4													
Zone 5		2	2	2		2		1		2			11
Zone 6	4	9	4	7	7	13	3		1	1		1	50
Zone 7							1						1
Zone 8													
Zone 9	1					2	1				1	1	6
Zone 10	1				1		1	1		1	1		6
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	12	17	14	24	12	27	10	8	9	12	6	7	158

Total	12	17	14	24	12	27	10	8	9	12	6	7	158

Table 4. The number of fish sampled for Grey Morwong by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	24	26	56	115	43	33	16	90	119	72	11	28	633
Zone 3	15	14	106	214	68	46	35	29	49	42	43	77	738
Zone 4													
Zone 5		33	13	21		22		59		17			165
Zone 6	132	338	88	243	138	605	169		49	19		12	1793
Zone 7							13						13
Zone 8													
Zone 9	30					83	19				17	73	222
Zone 10	21				28		9	26		20	19		123
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	222	411	263	593	277	789	261	204	217	170	90	190	3687
Total	222	411	263	593	277	789	261	204	217	170	90	190	3687

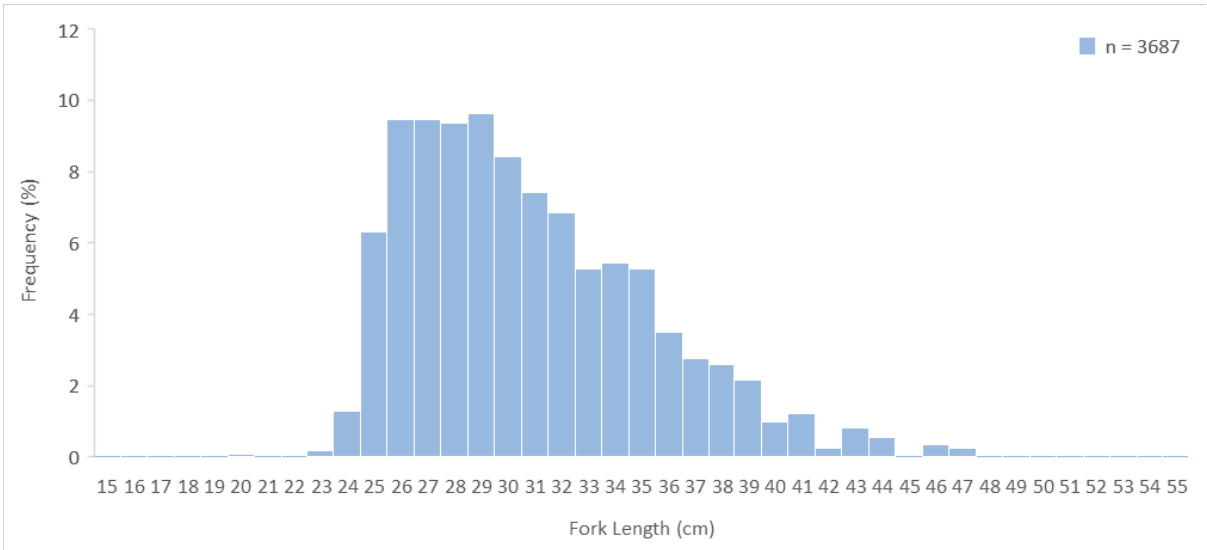

Figure 1. Length composition of Grey Morwong landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Landings of Grey Morwong from ocean zones 9 and 10 are becoming relatively more important. Fish from these zones are sampled at the Sydney Fish Markets; however greater sampling may require additional staff resources allocated to sample fish in those zones. Otherwise sampling was reasonably representative of the distribution of landings.

Luderick

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Eastern Australia	EGF, OHF	Sustainable	Catch, effort, fishing mortality, size composition

EGF Estuary General Fishery (NSW)
OHF Ocean Hauling Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: **31**

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring: **not required**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **19**

Rank for ages – **13**

Species lead commentary

Data and Monitoring Plan required length and age-based assessment, with these being identified as 'Data needed' due to age of most recent data.

Aim of the Port Monitoring sampling for 2018/19

To collect size and age composition data that are representative of the commercial landed catch for NSW.

Sampling design

Length Frequency data from the Estuary General Fishery were collected through the Iluka/Maclean, Wallis Lake and Nelson Bay Fishermen's co-operatives, as well as the Sydney Fish Markets. Sampling primarily focused on the Clarence River, Wallis Lake, Port Stephens and Tuggerah Lakes. For each location, all catches from the Estuary General Fishery that were on the floor on the day of sampling were attempted to be sampled. Luderick were measured from the tip of the nose to fork length (nearest cm rounding down).

Luderick sampling is based on month and estuary region strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

A sample of 20 fish from each estuary were also purchased each month for ageing. Fish were selected from each grade in the approximate ratio of each grade in the total catch by weight.

Sampling graded catches

Luderick catches are often graded, generally into XL, L, M, S or U. All grades are sampled. Approximately 10 times the number of size classes per grade are measured (as tallied by the electronic measuring board software). These sub-samples are weighed and the total weight of each grade recorded and the sample scaled up accordingly, using the PISCES software.

Results

Table 1. Reported landings heat map of Luderick by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													257485

Legend
Percent of Max Value
100%
75%
50%
25%
0%

Table 2. The number of days sampled for Luderick by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	4	5	5	7	7	3	5	3	3	3	7	5	57
EG Region 3													
EG Region 4	9	8	8	7	7	11	8	5	7	4	5	2	81
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	13	13	13	14	14	14	13	8	10	7	12	7	138

Total	13	13	13	14	14	14	13	8	10	7	12	7	138

Table 3. The number of catches sampled for Luderick by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2		1	1								1		3
Zone 3													
Zone 4													
Zone 5			1										1
Zone 6							1						1
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	14	16	10	16	8	5	6	4	7	6	15	14	121
EG Region 3													
EG Region 4	13	17	11	9	9	16	21	8	11	6	11	6	138
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	27	34	23	25	17	21	28	12	18	12	27	20	264

Total	27	34	23	25	17	21	28	12	18	12	27	20	264

Table 4. The number of fish sampled for Luderick by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2		13	1								5		19
Zone 3													
Zone 4													
Zone 5			34										34
Zone 6							23						23
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	556	388	142	455	105	73	74	32	57	73	501	286	2742
EG Region 3													
EG Region 4	1063	1282	1128	475	381	1231	1309	666	544	402	813	490	9784
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	1619	1683	1305	930	486	1304	1406	698	601	475	1319	776	12602
Total	1619	1683	1305	930	486	1304	1406	698	601	475	1319	776	12602

Table 5. The number of fish sampled for ageing Luderick by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 2	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 3	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 4	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 5	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 6	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 7	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 8	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 9	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 10	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 1	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 2	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 3	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 4	41	40	95	30	10	60	40	60	40	30	20	20	486
EG Region 5	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 6	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 7	0	0	0	0	0	0	0	0	0	0	0	0	

Total (area known)	41	40	95	30	10	60	40	60	40	30	20	20	486
Total	41	40	95	30	10	60	40	60	40	30	20	20	486

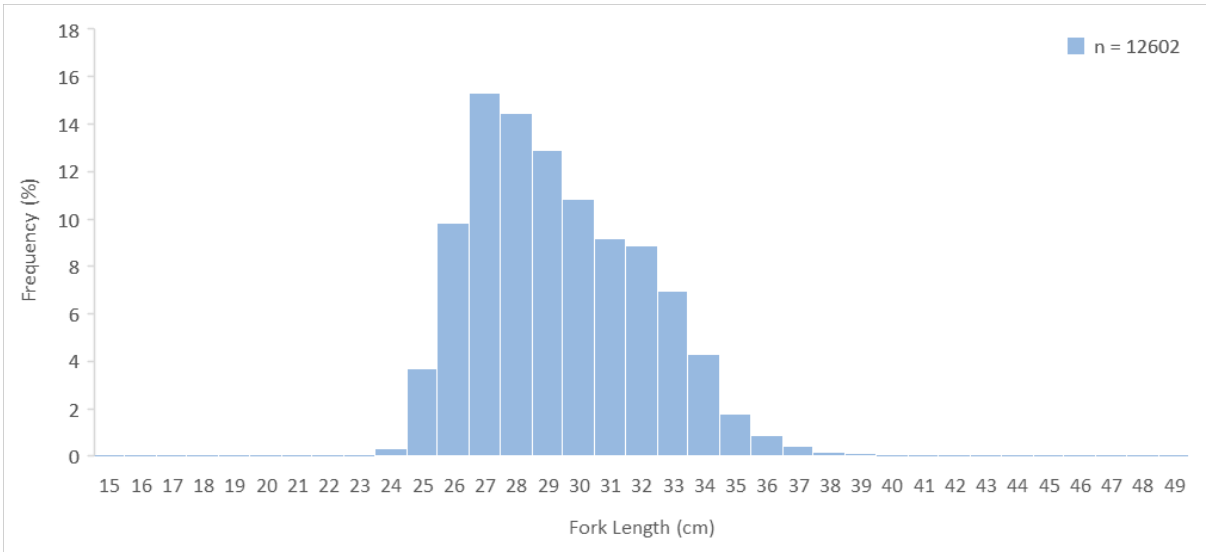

Figure 1. Length composition of Luderick landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Adequate sampling was completed for the major estuaries during 2018/19. The majority (240) of otoliths were collected from Tuggerah Lakes, with 160+ from Wallis Lake likely being sufficient to construct an age composition for each of those estuaries.

Mulloway

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	New South Wales	EGF, OHF, OTF, OTLF	Depleted	Catch, CPUE, length/age composition, yield-per-recruit, mortality rates, spawning potential ratio

EGF Estuary General Fishery (NSW)
OHF Ocean Hauling Fishery (NSW)
OTF Ocean Trawl Fishery (NSW)
OTLF Ocean Trap and Line Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: ***17***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **9**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **9**

Rank for ages – **6**

Species lead commentary

A 'Depleted' species, with the Data and Monitoring Plan requiring an age-based assessment. However, just length data needs to be collected through the Port Monitoring project until a revised plan for collecting otoliths has been developed.

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial landed catch for NSW.

Sampling design

Length Frequency data were collected through Iluka/Maclean Fishermen's co-operative, Coffs Harbour Fishermen's co-operative, Wallis Lake Fishermen's co-operative, Newcastle/Nelson Bay Fishermen's co-operative and the Sydney Fish Markets. Sampling primarily focused on the Clarence River, Manning River, Wallis Lake, Hawkesbury River and Shoalhaven River, as well as any ocean catches from these areas. Opportunistic sampling of the Ocean Haul fishery was also done. For each location, all catches from either the Estuary General Fishery or Ocean Trap and Line Fishery that were on the floor on the day of sampling, were attempted to be sampled. Mulloway were measured from the tip of the nose to total length (nearest cm rounding down).

Mulloway sampling is based on month, estuary region and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

Sampling graded catches

Mulloway catches are often graded, generally into XL, L, M, S or U. All grades are sampled and because catches are relatively small, all fish in each catch are usually measured.

Results

Table 1. Reported landings heat map of Mulloway by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													46146.9

Legend
Percent of Max Value
100%
75%
50%
25%
0%

Table 2. The number of days sampled for Mulloway by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	2		1	2			1					1	7
Zone 3	2				1	1	1	1		1			7
Zone 4													
Zone 5													
Zone 6							1	2		2	3		8
Zone 7								1			1		2
Zone 8	1												1
Zone 9													
Zone 10													
EG Region 1	1												1
EG Region 2	4	5	1	1	2			2	2		2	3	22
EG Region 3				2								2	4
EG Region 4	5	1	1	2		1	2	4	4	1	4	4	29
EG Region 5	1					1		1			1		4
EG Region 6			1			1					2		4
EG Region 7													
Total (area known)	16	6	4	7	3	4	5	11	6	4	13	10	89
Total	16	6	4	7	3	4	5	12	6	5	13	10	91

Table 3. The number of catches sampled for Mulloway by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	2		1	2			1					1	7
Zone 3	2				1	1	1	1		1			7
Zone 4													
Zone 5													
Zone 6							1	2		2	3		8
Zone 7								1			1		2
Zone 8	1												1
Zone 9													
Zone 10													
EG Region 1	1												1
EG Region 2	11	7	2	1	2			2	2		3	6	36
EG Region 3				3								3	6
EG Region 4	6	1	1	4		1	2	4	4	1	4	4	32
EG Region 5	2					1		1			1		5
EG Region 6			1			1					2		4
EG Region 7													
Total (area known)	25	8	5	10	3	4	5	11	6	4	14	14	109
Total	25	8	5	10	3	4	5	12	6	5	14	14	111

Table 4. The number of fish sampled for Mulloway by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	3		4	2			14					1	24
Zone 3	28				1	12	5	9		8			63
Zone 4													
Zone 5													
Zone 6							2	3		6	5		16
Zone 7								1			1		2
Zone 8	21												21
Zone 9													
Zone 10													
EG Region 1	17												17
EG Region 2	44	36	2	1	2			2	4		10	37	138
EG Region 3				3								44	47
EG Region 4	25	5	5	35		1	3	25	10	1	13	78	201
EG Region 5	12					1		10			2		25
EG Region 6			1			2					9		12
EG Region 7													
Total (area known)	150	41	12	41	3	16	24	50	14	15	40	160	566
Total	150	41	12	41	3	16	24	51	14	16	40	160	568

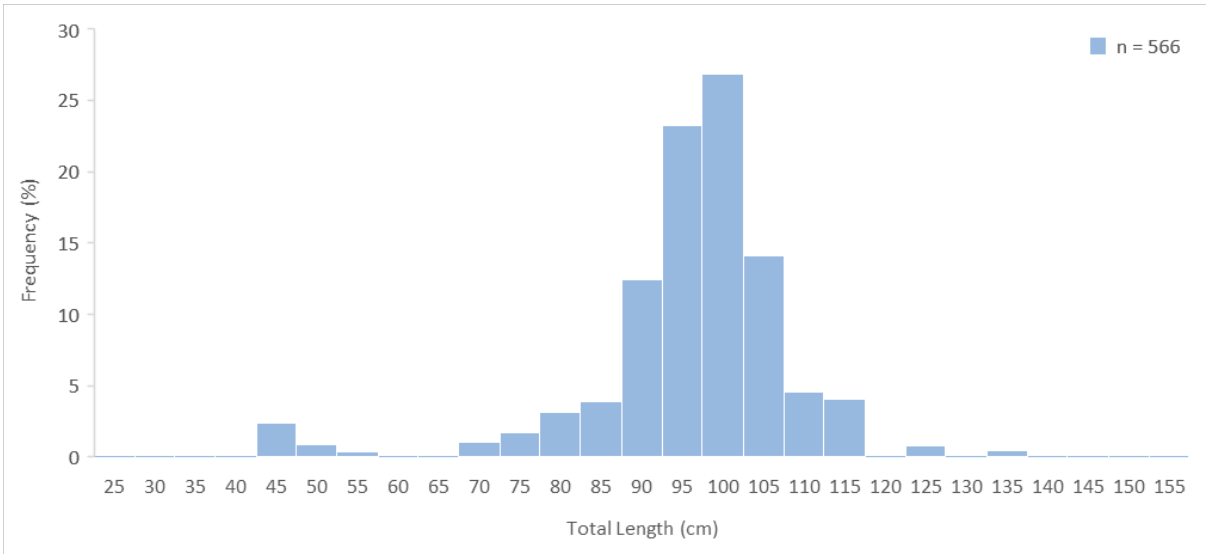

Figure 1. Length composition of Mulloway landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

A change in management in September 2018 removing the concession for Estuary General mesh net fishers to retain up to 10 Mulloway between 45 and 70 cm and reduced access to some co-ops impacted monitoring. Despite a reduction in coverage sampling was done adequately across the major catch strata. The majority of sampling reflected the distribution of landings between estuaries and ocean, with relatively few ocean catches. The 2 catches sampled with unknown areas are due to overdue catch returns and will be updated when catch records are up to date.

Pearl Perch

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Eastern Australia	OTF, OTLF	Depleted	Biomass, Standardised Catch Rate, Fishery-Dependent Length and Age Frequency, Estimates of Total Mortality Rate, Catch and Effort

OTF Ocean Trawl Fishery (NSW)
OTLF Ocean Trap and Line Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: **39**

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring: **22**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **22**

Rank for ages – **14**

Species lead commentary

Data and Monitoring Plan required length-based assessment. Low level monitoring for lengths to assist jurisdictional assessments. Mainly Coffs Harbour. Also, Clarence and Wallis co-ops with no SFM monitoring required. Insufficient resources for ageing in 2018/19.

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial landed catch for NSW.

Sampling design

Length Frequency data from the Ocean Trap and Line Fishery were collected for ocean zones through Iluka/Maclean, Coffs Harbour and Wallis Lake Fishermen's co-operatives. For each location, all catches from the Ocean Trap and Line Fishery that were on the floor on the day of sampling were attempted to be sampled. Pearl Perch were measured from the tip of the nose to fork length (nearest cm rounding down).

Pearl Perch sampling is based on month and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

Sampling graded catches

Almost all Pearl Perch catches are ungraded, however, where there was more than one grade, all grades were sampled. Because there are so few numbers of fish in each catch, subsampling is rarely needed.

Results

Table 1. Reported landings heat map of Pearl Perch by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													8325.29

Legend
Percent of Max Value
100%
75%
50%
25%
0%

Table 2. The number of days sampled for Pearl Perch by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	2	2	2	3	1	1	1	4	3	6	2	1	28
Zone 3	2	2	3	2		3	1	3	2	3	4	2	27
Zone 4													
Zone 5	3	1							1				5
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	7	5	5	5	1	4	2	7	6	9	6	3	60

Total	7	5	5	5	1	4	2	7	6	9	6	3	60

Table 3. The number of catches sampled for Pearl Perch by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	2	2	2	3	1	1	1	4	3	6	2	1	28
Zone 3	2	2	4	3		3	1	3	2	4	4	2	30
Zone 4													
Zone 5	3	1							1				5
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	7	5	6	6	1	4	2	7	6	10	6	3	63

Total	7	5	6	6	1	4	2	7	6	10	6	3	63

Table 4. The number of fish sampled for Pearl Perch by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	19	9	27	109	6	14	5	46	23	117	20	30	425
Zone 3	9	14	51	16		29	11	31	16	34	42	39	292
Zone 4													
Zone 5	5	7							66				78
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	33	30	78	125	6	43	16	77	105	151	62	69	795
Total	33	30	78	125	6	43	16	77	105	151	62	69	795

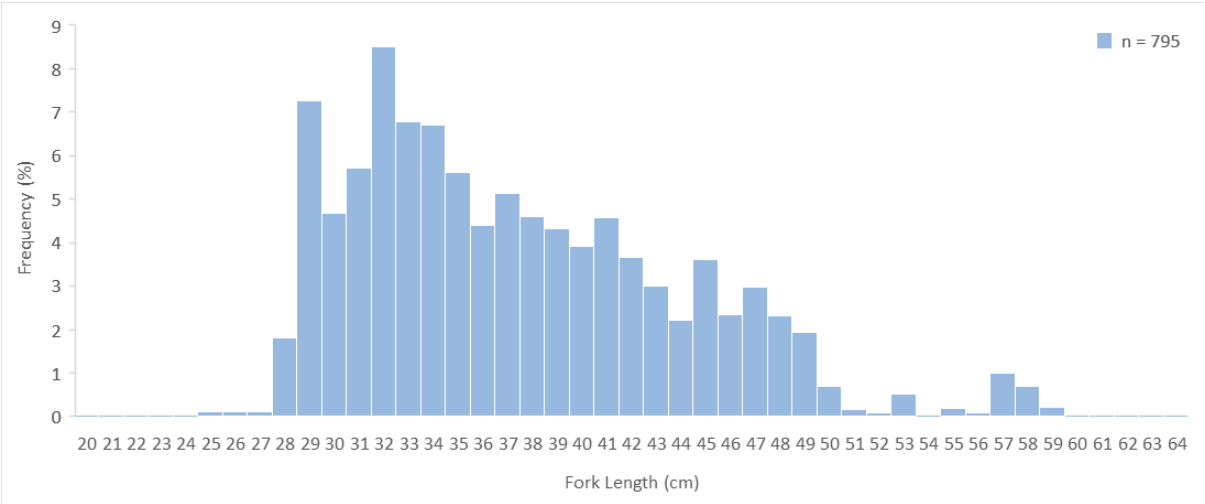

Figure 1. Length composition of Pearl Perch landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Commercial landings of Pearl Perch are relatively small at around 8 t p.a. and confined to northern NSW. Therefore, sampling of 63 catches and 795 individuals was considered sufficient during 2018/19.

Red Sea Urchin

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	**New South Wales**	NSW Sea Urchin and Turban Shell	Undefined	Catch, Effort, CPUE

Prioritization and justification

Species Priority Ranking for 2018/19: ***23***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **13**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **13**

Rank for ages – **not required**

Species lead commentary

Data and Monitoring Plan required a length-based assessment. Red Sea Urchins are a quota managed species in NSW, with current management concerns related to sustainability with a proposal by industry to introduce a MLL of 120 mm. Sampling is probably not feasible given observations from the first half of 2018 but continue the pilot during the 2nd half of 2018 to capture a full 12 months.

Aim of the Port Monitoring sampling for 2018/19

To sample at Sydney Fish Market and Newcastle Fishermen's co-ops for sizes from January to June 2018 as a pilot/feasibility study to assist in the development of a future sampling program.

Sampling design

Opportunistic length frequency data to be collected from Newcastle Fishermen's co-op and the Sydney Fish Markets. Red Sea Urchins to be measured as test diameter to the nearest millimeter (mm), rounding down.

Sampling graded catches

Red Sea Urchin catches are generally ungraded; however, if grading occurs then all grades are sampled.

Results

Table 1. Reported landings heat map of Red Sea Urchin by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													39404.4

Legend
Percent of Max Value
100%
75%
50%
25%
0%

Table 2. The number of days sampled for Red Sea Urchin by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5			1										1
Zone 6													
Zone 7		1		1	1						1		4
Zone 8		1			1								2
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	0	2	1	1	2	0	0	0	0	0	1	0	7
Total	0	2	1	1	2	0	0	0	0	0	1	0	7

Table 3. The number of catches sampled for Red Sea Urchin by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5			1										1
Zone 6													
Zone 7		1		1	1						1		4
Zone 8		1			1								2
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	0	2	1	1	2	0	0	0	0	0	1	0	7
Total	0	2	1	1	2	0	0	0	0	0	1	0	7

Table 4. The number of fish sampled for Red Sea Urchin by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5			53										53
Zone 6													
Zone 7		57		63	88						70		278
Zone 8		68			35								103
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	0	125	53	63	123	0	0	0	0	0	70	0	434
Total	0	125	53	63	123	0	0	0	0	0	70	0	434

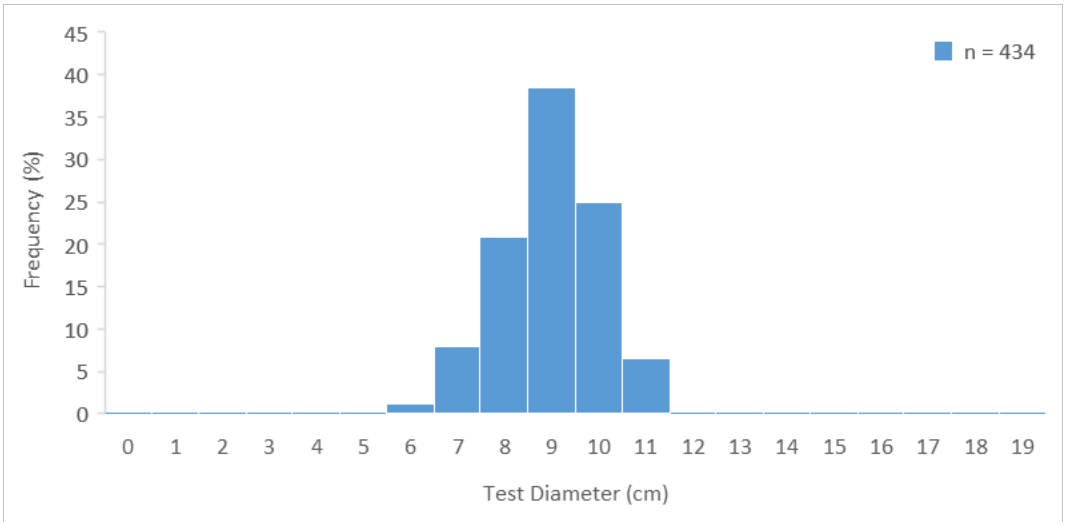

Figure 1. Length composition of Red Sea Urchin sampled through the Port Monitoring program during 2018/19. Urchins were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Very few catches of Red Sea Urchin were observed on the Sydney Fish Market floor during the sampling period. No data on variation in sizes between catches on a day are available due to limited availability of landings. Occasionally sealed boxes of Sea Urchins consigned for direct sale were observed, which may explain why Sea Urchins are seen on the market reports but not seen on the auction floor. A review of the appropriateness of the NSW Port Monitoring Program for gaining representative samples of Red Sea Urchins is recommended, including a detailed analysis of where landings are sent for sale.

Sea Mullet

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Eastern Australia	EGF, OHF	Sustainable	Catch, CPUE, length and age frequencies

EGF Estuary General Fishery (NSW)
OHF Ocean Hauling Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: ***19***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **11**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **11**

Rank for ages – **8**

Species lead commentary

Data Monitoring Plan required length and age-based assessment. Long-term size and age-based assessment used. Ocean Haul Fishery spawning run monitoring only.

Aim of the Port Monitoring sampling for 2018/19

To collect size and age composition data that are representative of the commercial landed catch during the spawn-run fishery for NSW.

Sampling design

All sampling was done during a 2-week period through Markwell Fisheries in Chinderah. For each catch sampled, length frequency data from an ungraded subsample of approximately 120kg was collected. A separate length frequency was recorded for each sex. Sea Mullet were measured from the tip of the nose to fork length (nearest cm rounding down).

Sea Mullet sampling is based on monthly and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

For each catch, 15 randomly selected males and females were processed for ageing.

Results

Table 1. Reported landings heat map of Sea Mullet by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													2522869

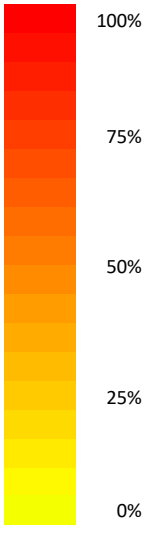

Table 2. The number of days sampled for Sea Mullet by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													2
Zone 1											2		2
Zone 2													
Zone 3											2		2
Zone 4											5		5
Zone 5											7		7
Zone 6											2		2
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5											1		1
EG Region 6													
EG Region 7													
Total (area known)	0	0	0	0	0	0	0	0	0	0	19	0	19
Total	0	0	0	0	0	0	0	0	0	0	19	0	19

Table 3. The number of catches sampled for Sea Mullet by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1											2		2
Zone 2													
Zone 3											2		2
Zone 4											5		5
Zone 5											11		11
Zone 6											2		2
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5											1		1
EG Region 6													
EG Region 7													
Total (area known)	0	0	0	0	0	0	0	0	0	0	23	0	23
Total	0	0	0	0	0	0	0	0	0	0	23	0	23

Table 4. The number of fish sampled for Sea Mullet by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1											289		289
Zone 2													
Zone 3											301		301
Zone 4											870		870
Zone 5											1696		1696
Zone 6											293		293
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5											117		117
EG Region 6													
EG Region 7													
Total (area known)	0	0	0	0	0	0	0	0	0	0	3566	0	3566
Total	0	0	0	0	0	0	0	0	0	0	3566	0	3566

Table 5. The number of fish sampled for ageing Sea Mullet by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1	0	0	0	0	0	0	0	0	0	0	60	0	60
Zone 2	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 3	0	0	0	0	0	0	0	0	0	0	60	0	60
Zone 4	0	0	0	0	0	0	0	0	0	0	150	0	150
Zone 5	0	0	0	0	0	0	0	0	0	0	330	0	330
Zone 6	0	0	0	0	0	0	0	0	0	0	90	0	90
Zone 7	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 8	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 9	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 10	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 1	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 2	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 3	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 4	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 5	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 6	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 7	0	0	0	0	0	0	0	0	0	0	0	0	
Total (area known)	0	0	0	0	0	0	0	0	0	0	690	0	690
Total	0	0	0	0	0	0	0	0	0	0	690	0	690

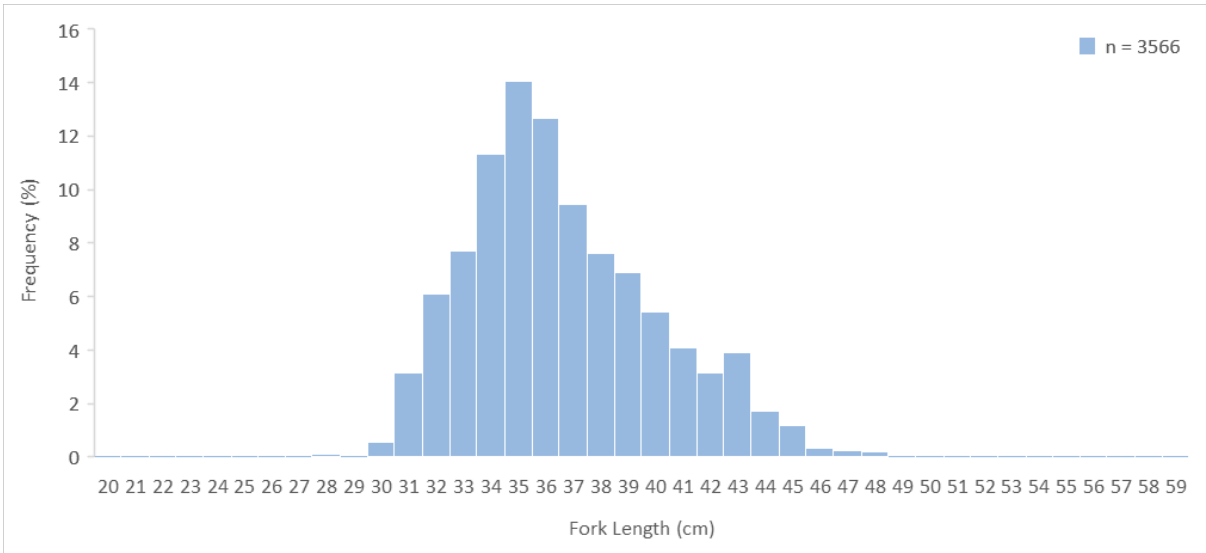

Figure 1. Length composition of Sea Mullet landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Sea Mullet landings are highly subject to weather patterns from year to year during the spawning run; however, this year a reasonable spread of samples were taken from as far south as Patonga (Ocean Zone 6) up to Kingscliff beach (Ocean Zone 1). Sampling reflected fishery landings, with ocean zone 5 reporting the highest landings and being sampled the most.

Silver Trevally

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	New South Wales	EGF, OHF, OTF, OTLF	Depleting	Catch, CPUE, length and age structures

EGF Estuary General Fishery (NSW)
OHF Ocean Hauling Fishery (NSW)
OTF Ocean Trawl Fishery (NSW)
OTLF Ocean Trap and Line Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: ***4***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **3**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **3**

Rank for ages – **3**

Species lead commentary

Data and Monitoring Plan required a length-based assessment. However, there is a need for updated age data given uncertainties around the assessment method and the transition of most of the fishery to the Commonwealth in 2019.

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial landed catch for NSW. No otoliths were to be collected as considerable length and age data are yet to be analysed and the species lead will assess existing data before further collections for ageing.

Sampling design

Length Frequency data from the Ocean Trap and Line Fishery were collected for ocean zones 6-10 through the Sydney Fish Markets. When catches could be traced to state waters, the Fish Trawl Fishery was also sampled. Both the Ocean Trap and Line Fishery and the Fish Trawl Fishery were sampled opportunistically through Newcastle and Nelson Bay Fishermen's co-operatives. For each location, all catches that were on the floor on the day of sampling were attempted to be sampled. Silver Trevally were measured from the tip of the nose to fork length (nearest cm rounding down).

Silver Trevally sampling is based on month and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

Sampling graded catches

Silver Trevally catches are generally graded into XL, L, M, S or U. All grades are sampled. Approximately 10 times the number of size classes per grade are measured (as tallied by the electronic measuring board software). These sub-samples are weighed and the total weight of each grade recorded and the sample scaled up accordingly, using the PISCES software. Because catches are relatively small, all fish in each catch are usually measured.

Results

Table 1. Reported landings heat map of Silver Trevally by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													39957.6

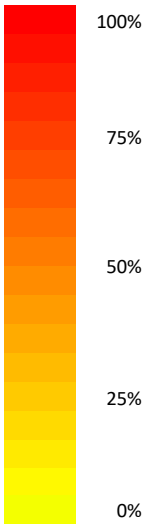

Table 2. The number of days sampled for Silver Trevally by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	3	1	2	1		1							8
Zone 3	3	1	2	2	2	2				1	1	1	15
Zone 4		1											1
Zone 5			1					1					2
Zone 6	3	3	1	3	3	2	2	1		3	4	4	29
Zone 7						1	3	1	2	1			8
Zone 8						1					1		2
Zone 9				1		1			1				3
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4			1										1
EG Region 5				1	1								2
EG Region 6				1						1	2		4
EG Region 7				1	1								2
Total (area known)	9	6	7	10	7	8	5	3	3	6	8	5	77
Total	9	6	7	10	7	8	5	3	3	6	8	5	77

Table 3. The number of catches sampled for Silver Trevally by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	3	1	2	1		1							8
Zone 3	4	1	2	2	2	2				1	1	1	16
Zone 4		1											1
Zone 5			1					1					2
Zone 6	6	6	1	8	6	3	2	2		3	5	6	48
Zone 7						1	3	1	2	1			8
Zone 8						1					1		2
Zone 9				1		1			1				3
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4			1										1
EG Region 5				1	2								3
EG Region 6				1						1	2		4
EG Region 7				2	1								3

Total (area known)	13	9	7	16	11	9	5	4	3	6	9	7	99

Total	13	9	7	16	11	9	5	4	3	6	9	7	99

Table 4. The number of fish sampled for Silver Trevally by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	109	2	21	12		7							151
Zone 3	54	2	50	31	49	68				21	15	24	314
Zone 4		8											8
Zone 5			6					8					14
Zone 6	211	275	20	227	176	132	170	122		87	274	222	1916
Zone 7						127	119	55	98	18			417
Zone 8						8					73		81
Zone 9				13		99			7				119
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4			9										9
EG Region 5				136	109								245
EG Region 6				23						20	135		178
EG Region 7				47	37								84

Total (area known)	374	287	106	489	371	441	289	185	105	146	497	246	3536

Total	374	287	106	489	371	441	289	185	105	146	497	246	3536

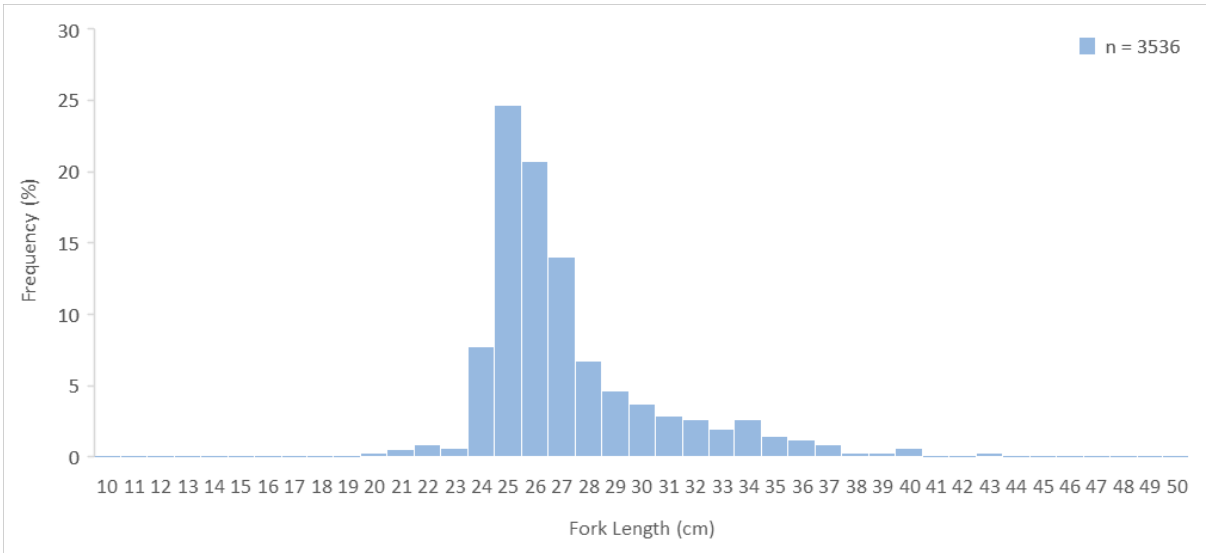

Figure 1. Length composition of Silver Trevally landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Commercial landings of Silver Trevally during 2018/19 were relatively small; however, the port monitoring sampling was reasonably comprehensive. Two very large purse-seine catches reported from ocean zone 9 during July and October 2018 were not sampled as we were unaware of them at the time.

Snapper

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	New South Wales	OTLF	Sustainable	Estimated biomass, catch, effort, size and age composition

OTLF Ocean Trap and Line Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: **24**

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring: **14**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **2**

Rank for lengths - **14**

Rank for ages – **9**

Species lead commentary

Data and Monitoring Plan required length and age-based assessment.

Aim of the Port Monitoring sampling for 2018/19

To collect size and age composition data that are representative of the commercial landed catch for NSW.

Sampling design

Length Frequency data from the Ocean Trap and Line Fishery were collected for all ocean zones through Iluka/Maclean, Coffs Harbour, Wallis Lake, Nelson Bay and Newcastle Fishermen's co-operatives and the Sydney Fish Markets. For each location, all catches from the Ocean Trap and Line Fishery that were on the floor on the day of sampling were attempted to be sampled. Snapper were measured from the tip of the nose to fork length (nearest cm rounding down).

Snapper sampling is based on month and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

Fish were also purchased each month from Maclean and Coffs Harbour Fishermen's co-operatives and the Sydney Fish market (central and south coast) for ageing. Fish were selected from each grade in the approximate ratio of each grade in the total catch by weight.

Sampling graded catches

Almost all Snapper catches are graded, generally into XL, L, M, S or U. All grades are sampled. Approximately 10 times the number of size classes per grade are measured (as tallied by the electronic measuring board software). These sub-samples are weighed and the total weight of each grade recorded and the sample scaled up accordingly, using the PISCES software.

Results

Table 1. Reported landings heat map of Snapper by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													159195

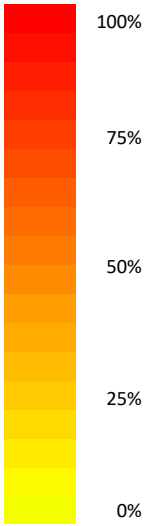

Table 2. The number of days sampled for Snapper by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													2
Zone 1							2						2
Zone 2	3	5	5	10	6	7	8	6	5	6	6	2	69
Zone 3	12	6	6	8	5	7	7	5	7	7	8	4	82
Zone 4													
Zone 5	2	2	3			1	3	1	1	2			15
Zone 6	3	4	3	4	4	3	1	2	3	3	4	3	37
Zone 7							1		2				3
Zone 8								1			1		2
Zone 9												1	1
Zone 10							1			2			3
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	1												1
EG Region 5						2	1		1				4
EG Region 6													
EG Region 7				1							1		2

Total (area known)	21	17	17	23	15	20	24	15	19	20	20	10	221

Total	21	17	17	23	15	20	24	15	19	20	20	10	221

Table 3. The number of catches sampled for Snapper by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1							2						2
Zone 2	4	9	7	11	6	9	8	7	5	6	7	2	81
Zone 3	19	12	9	13	7	12	18	7	11	10	10	6	134
Zone 4													
Zone 5	2	2	4			1	5	1	1	2			18
Zone 6	6	12	8	9	9	11	1	4	6	4	6	4	80
Zone 7							1		2				3
Zone 8								1			1		2
Zone 9												1	1
Zone 10							1			2			3
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	1												1
EG Region 5						3	1		1				5
EG Region 6													
EG Region 7				1							1		2

Total (area known)	32	35	28	34	22	36	37	20	26	24	25	13	332

Total	32	35	28	34	22	36	37	20	26	24	25	13	332

Table 4. The number of fish sampled for Snapper by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1							159						159
Zone 2	226	193	574	618	194	380	286	256	305	361	415	153	3961
Zone 3	638	759	492	260	385	516	390	145	185	243	292	540	4845
Zone 4													
Zone 5	159	62	194			15	59	37	54	51			631
Zone 6	532	749	392	513	491	624	11	224	391	285	615	264	5091
Zone 7							76		121				197
Zone 8								18			17		35
Zone 9												85	85
Zone 10							20			81			101
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	105												105
EG Region 5						61	28		30				119
EG Region 6													
EG Region 7				37							71		108
Total (area known)	1660	1763	1652	1428	1070	1596	1029	680	1086	1021	1410	1042	15437
Total	1660	1763	1652	1428	1070	1596	1029	680	1086	1021	1410	1042	15437

Table 5. The number of fish sampled for ageing Snapper by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 2	10	10	0	20	2	15	0	0	10	0	20	34	121
Zone 3	20	20	20	0	40	20	20	20	0	20	0	60	240
Zone 4	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 5	0	0	10	7	43	0	0	0	0	0	0	0	60
Zone 6	20	20	20	20	20	20	0	20	20	20	20	22	222
Zone 7	0	0	0	0	0	0	10	0	10	0	0	0	20
Zone 8	0	0	0	0	0	0	0	0	0	0	0	0	
Zone 9	0	0	0	0	0	0	0	0	0	0	0	10	10
Zone 10	0	0	0	0	0	0	0	0	0	10	0	0	10
EG Region 1	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 2	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 3	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 4	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 5	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 6	0	0	0	0	0	0	0	0	0	0	0	0	
EG Region 7	0	0	0	10	0	0	0	0	0	0	10	0	20
Total (area known)	50	50	50	57	105	55	30	40	40	50	50	126	703
Total	50	50	50	57	105	55	30	40	40	50	50	126	703

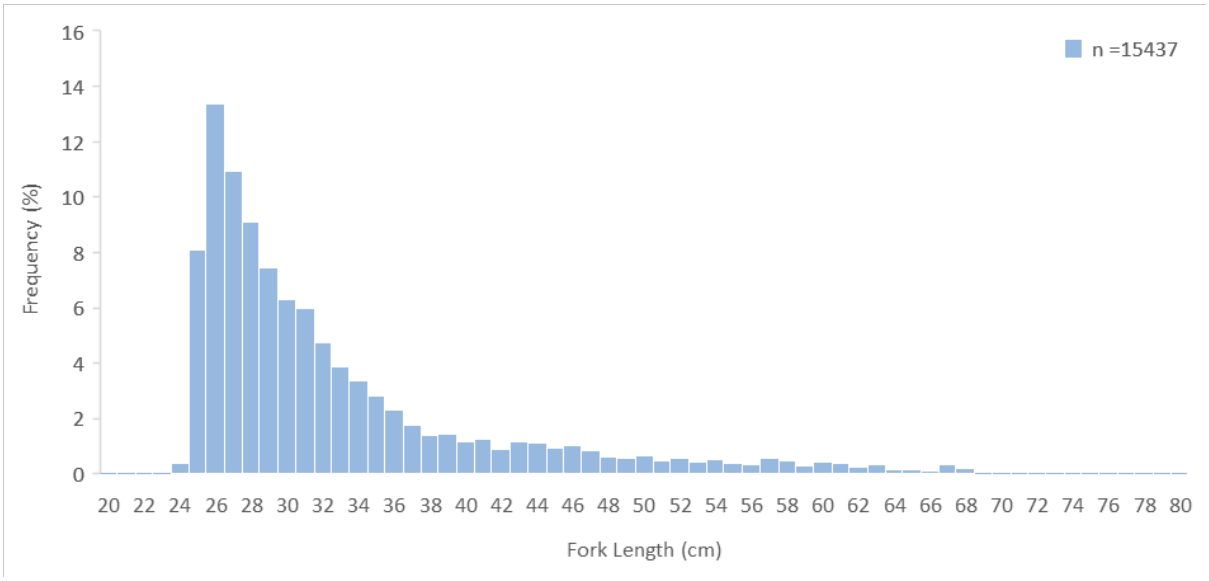

Figure 1. Length composition of Snapper landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Port monitoring for Snapper during 2018/19 was reflective of the distribution of landings, with most coming from ocean zones 3 and 6. In addition to the extraction of otoliths for stock assessment, samples of genetic tissue were also collected for an ARC linkage grant investigating Snapper genomics.

Stout Whiting

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Eastern Australia	OTF	Sustainable	Standardised CPUE, age composition

OTF Ocean Trawl Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: ***10***

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring **7**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **1**

Rank for lengths - **7**

Rank for ages – **4**

Species lead commentary

Data and Monitoring Plan required length and age-based assessment. Port monitoring to include continued export box sampling of lengths and species composition at Iluka and Newcastle fishermen's co-operatives. Also, collection of 10 otoliths per month from each location.

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial landed catch through the Iluka co-op. These data are to supplement those being collected via observer programs.

Sampling design

Export box sampling was done at the Iluka Fishermen's co-operative, where length frequencies were recorded along with the species split of Stout Whiting: Eastern School Whiting. Stout Whiting were measured from the tip of the nose to fork length (nearest cm rounding down).

Results

Table 1. Reported landings heat map of Stout Whiting by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													241766

Legend
Percent of Max Value
100%
75%
50%
25%
0%

Table 2. The number of days sampled for Stout Whiting by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2		2	3	2	1	3	4	1	3	1	4	1	25
Zone 3								1					1
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	0	2	3	2	1	3	4	2	3	1	4	1	26

Total	0	2	3	2	1	3	4	2	3	1	4	1	26

Table 3. The number of catches sampled for Stout Whiting by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2		2	3	2	1	3	4	1	2	1	5	1	25
Zone 3								1					1
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2									1				1
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	0	2	3	2	1	3	4	2	3	1	5	1	27

Total	0	2	3	2	1	3	4	2	3	1	5	1	27

Table 4. The number of fish sampled for Stout Whiting by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2		66	74	66	39	133	302	282	315	64	562	124	2027
Zone 3								66					66
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2									161				161
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	0	66	74	66	39	133	302	348	476	64	562	124	2254

Total	0	66	74	66	39	133	302	348	476	64	562	124	2254

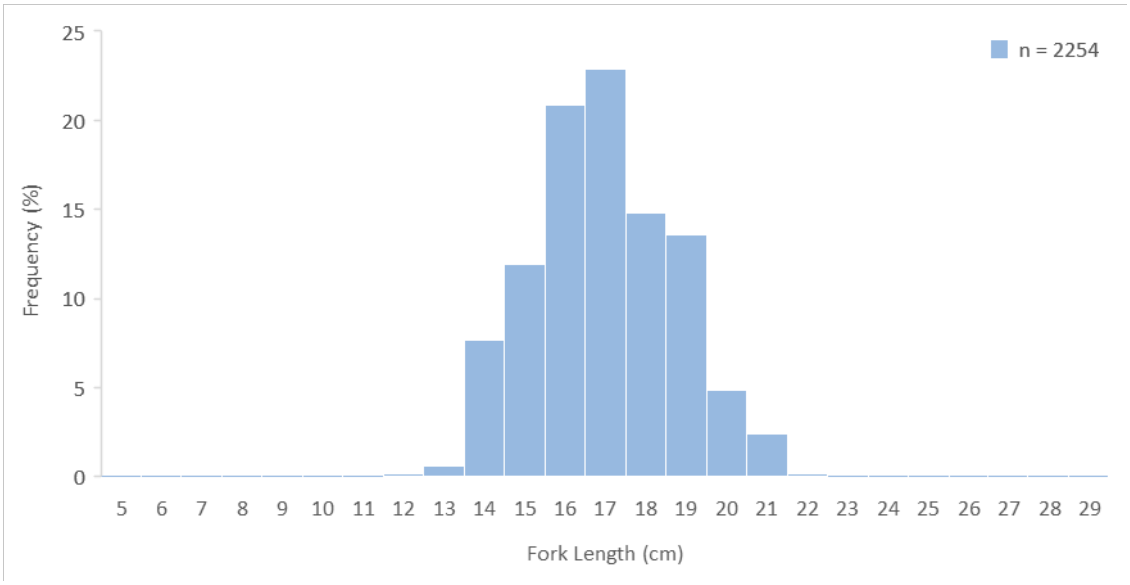

Figure 1. Length composition of Stout Whiting landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

While sampling was undertaken according to the catch breakdown, only export boxes were sampled at Iluka Fishermen's Co-operative. On their own, these boxes do not provide representative sampling and would require additional sampling of ungraded product landed on the floor. However, these port-monitoring data were collected to supplement species composition and length frequency data collected during the prawn trawl observer program and combined, these will provide representative sampling.

Yellowtail Kingfish

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	Eastern Australia	OTLF	**Undefined**	Catch, CPUE, size composition, fishing mortality, yield per recruit analysis, spawning potential ratio

OTLF Ocean Trap and Line Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2018/19: **26**

Data and Monitoring Plan for 2018/19

Ranking for Port Monitoring: **15**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **15**

Rank for ages – **not required**

Species lead commentary

Data and Monitoring Plan required length-based assessment with commercial otoliths collected on an ad hoc basis.

Aim of the Port Monitoring sampling for 2018/19

To collect size composition data that are representative of the commercial landed catch for NSW.

Sampling design

All sampling from ocean zones 4 to 10 was done at the Sydney Fish Markets, with sampling from Coffs Harbour co-operative covering ocean zones 2 and 3. All catches that were on the floor on the day of sampling from a particular area/month strata were attempted to be sampled. Yellowtail Kingfish were measured from the tip of the nose to fork length (nearest cm rounding down).

Yellowtail Kingfish sampling is based on monthly and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. These expansions are done using the PISCES software.

Sampling graded catches

Almost all Yellowtail Kingfish catches are ungraded; however, where there were more than 1 grade, all grades were sampled. Because there is so few numbers of fish in each catch, subsampling is rarely needed. When this does occur, sub-samples are weighed and the total weight of each grade recorded and the sample scaled up accordingly using the PISCES software.

Results

Table 1. Reported landings heat map of Yellowtail Kingfish by month and area during 2018/19.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2													
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total													75249

Legend
Percent of Max Value
100%
75%
50%
25%
0%

Table 2. The number of days sampled for Yellowtail Kingfish by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	1							1		1			3
Zone 3	6	7	3	6	3	4	4	1	1	4	8	5	52
Zone 4											1		1
Zone 5													
Zone 6	2	2	4	1	2		1		1	2	1		16
Zone 7	1								2	1	4	2	10
Zone 8								1					1
Zone 9												1	1
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	10	9	7	7	5	4	5	3	4	8	14	8	84
Total	11	9	7	7	5	4	5	3	4	8	14	8	85

Table 3. The number of catches sampled for Yellowtail Kingfish by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	1							1		1			3
Zone 3	8	8	3	9	4	4	4	1	1	5	10	6	63
Zone 4											1		1
Zone 5													
Zone 6	2	3	6	1	4		1		1	3	1		22
Zone 7	1								2	1	5	2	11
Zone 8								1					1
Zone 9												1	1
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	12	11	9	10	8	4	5	3	4	10	17	9	102
Total	13	11	9	10	8	4	5	3	4	10	17	9	103

Table 4. The number of fish sampled for Yellowtail Kingfish by month and area during 2018/19. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	21							2		18			41
Zone 3	185	302	32	282	52	65	32	7	9	82	457	217	1722
Zone 4											21		21
Zone 5													
Zone 6	108	115	123	5	36		6		3	5	1		402
Zone 7	62								43	34	168	86	393
Zone 8								24					24
Zone 9												32	32
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	376	417	155	287	88	65	38	33	55	139	647	335	2635
Total	418	417	155	287	88	65	38	33	55	139	647	335	2677

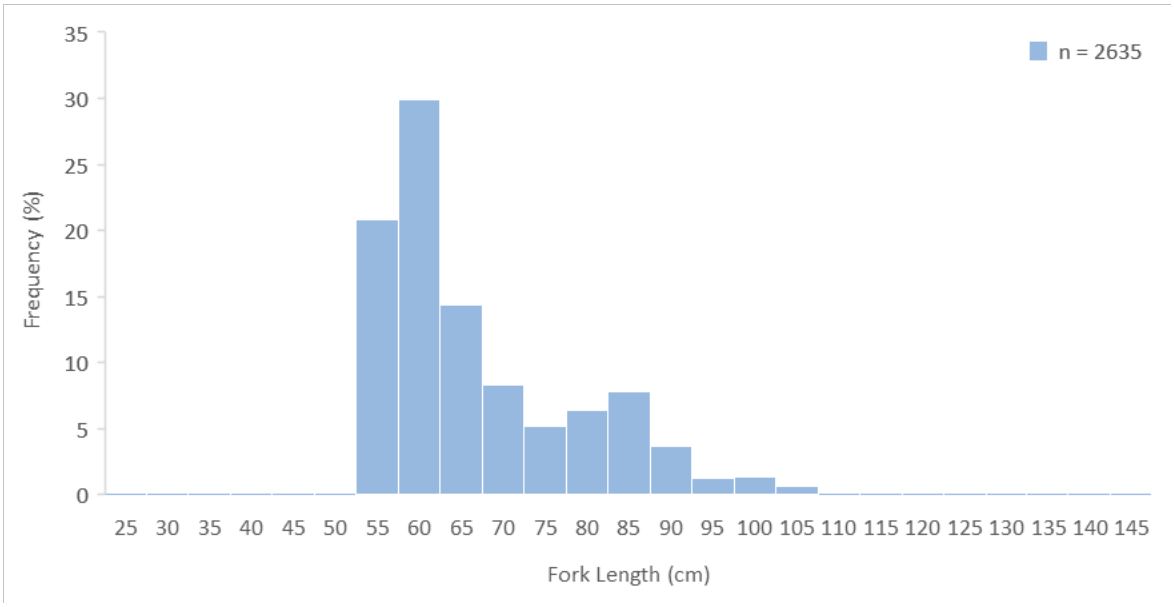

Figure 1. Length composition of Yellowtail Kingfish landed by the commercial fishery for 2018/19. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Sampling during 2018/19 reflected the distribution of commercial landings, with the majority of landings coming from ocean zone 3. Sampling of fish from the far south coast was limited as they were not regularly sighted at the Sydney Fish Markets. The single catch sampled with an unknown area is due to overdue catch returns and will be rectified when catch records are up to date.

Appendices

Appendix A -Staff

Core funded

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Anne-Marie Hegarty
Caitlin Young
Alice Pidd
Antony Gould

Commercial Trust funded

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Glenn Campbell
Isabelle Thiebaud
Angela Russell
Chantelle Clain
Holly Gunton
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Sandra Howarth

Appendix B - Species Priority List 2018/19

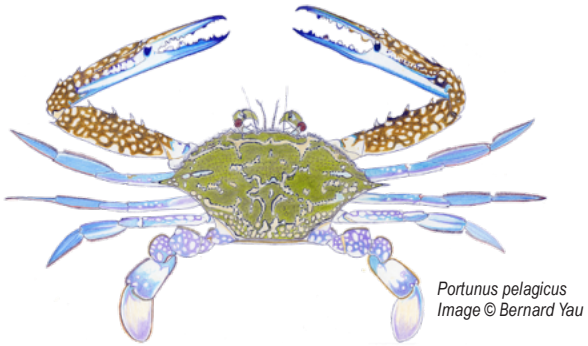
Species priority list for research for 2018/19, ranked highest to lowest. The multi-criteria decision analysis (MCDA) was based on commercial and recreational management weightings. Species selected for port monitoring in 2018/19 are highlighted.

MCDA score	Common Name	MCDA score	Common Name	MCDA score	Common Name
11.063	Bluespotted Flathead	3.708	Spanish Mackerel	1.255	Eastern Blue Groper
10.689	Eastern School Whiting	3.417	Loligo Squid	1.254	Mako Sharks
10.266	Gemfish	3.344	Cockles	1.252	Longtail Tuna
9.686	Silver Trevally	3.312	Bass Groper	1.251	Cunjevoi
9.598	Blacklip Abalone	3.308	Hapuku	1.250	Mangrove Jack
9.374	Giant Mud Crab	3.194	Tailor	1.250	Estuary Perch
9.301	Eastern King Prawn	3.134	Australian Bonito	1.198	Australian Herring
9.162	Pipi	3.060	Bugs	1.154	Freshwater Shrimp
8.307	Yellowtail Scad	3.001	Crimsonband Wrasse	1.100	Black Bream
8.285	Eastern Rock Lobster	2.965	Spotted Mackerel	1.073	Catfish
8.059	Stout Whiting	2.757	Royal Red Prawn	1.048	Australian Bass
7.917	Tiger Flathead	2.754	Common Jack Mackerel	1.021	Golden Perch
7.874	Pink Ling	2.740	John Dory	0.976	Maori Octopus
7.860	Grey Morwong	2.719	Mirror Dory	0.952	Pale Octopus
7.826	Spanner Crab	2.580	Trawl Octopus	0.950	Southern Bluefin Tuna
7.744	Dusky Flathead	2.462	Shovelnose Rays	0.943	Angel Sharks
7.675	Mulloway	2.382	Estuary Cobbler	0.914	Eastern Pigfish
7.672	Blue-eye Trevalla	2.360	Gloomy Octopus	0.337	Wobbegong Sharks
7.340	Sea Mullet	2.346	Mahi	0.335	Greentail Prawn
7.299	Redfish	2.307	Turban Shells	0.327	Red Gurnard and Latchets
7.106	Blue Mackerel	2.263	Dart	0.322	Mackerel Tuna
7.076	School Prawn	2.232	Leatherjackets-other	0.320	Brown Tiger Prawn
7.020	Snapper	2.167	Octopus	0.309	Red Morwong
6.960	Red Sea Urchin (group data)	2.120	Sawsharks	0.309	Frigate Mackerel
6.819	Australian Sardine	2.094	Yabbies (freshwater)	0.307	Diamondfish
6.651	Yellowtail Kingfish	2.083	Murray Cod	0.306	Striped Perch
6.625	Yellowfin Bream	2.082	Whaler Sharks	0.305	Bigeyes
6.308	School Shark	2.021	Common Blacktip Sharks	0.304	Hammerhead Sharks
6.193	Eastern Sea Garfish	2.006	Sandbar Shark	0.303	Tiger Shark
6.034	Blue Swimmer Crab	2.005	Dusky Whaler	0.303	Tilefish
5.727	Ocean Perch	1.966	Goulds (Arrow) Squid	0.302	Boarfish
5.675	Luderick	1.956	Jackass Morwong	0.301	Blue Shark
5.464	Sand Whiting	1.942	Purple Sea Urchin	0.300	Mantis Shrimps
5.258	Dogfish	1.877	Rock Blackfish	0.300	Ghostsharks
5.094	Eastern Australian Salmon	1.859	Yellowfin Tuna	0.300	Banded Morwong
5.067	Trumpeter Whiting	1.850	Striped Marlin	0.022	Forktail Catfish
5.029	Pearl Perch	1.437	Red Mullet	0.004	Bastard Trumpeter
4.965	Ghost Nipper	1.436	Flounders	0.003	Ribaldo
4.943	Silver Sweep	1.411	Soles	0.001	Bluethroat Wrasse
4.667	Gummy Shark	1.386	Whitebait - Sandy Sprat	0.001	Blue Warehou
4.667	Ocean Jackets	1.348	Sand Mullet	0.000	Spangled Emperor
4.481	Beachworms	1.346	Cuttlefish	0.000	Elephantfish
4.450	Balmain Bugs	1.336	Eastern Red Scorpionfish	0.000	School Mackerel
4.199	River Eels	1.310	River Garfish	0.000	Snook
4.118	Common Silverbiddy	1.285	Banded Rockcod	0.000	Silver Warehou
4.026	Goldspot Mullet	1.268	Hairtail		
4.017	Tarwhine	1.265	Whaler Sharks - other		
4.013	Teraglin	1.265	Southern Maori Wrasse		
3.950	Green Sea Urchin	1.258	Australian Anchovy		
3.947	Southern Calamari	1.256	Cobia		

NSW GOVERNMENT Primary Industries

Appendix C – Blue swimmer Crab

Fisheries NSW- port monitoring fact sheet



Portunus pelagicus
Image © Bernard Yau

EXPLOITATION STATUS	SUSTAINABLE

Stock Indicators:

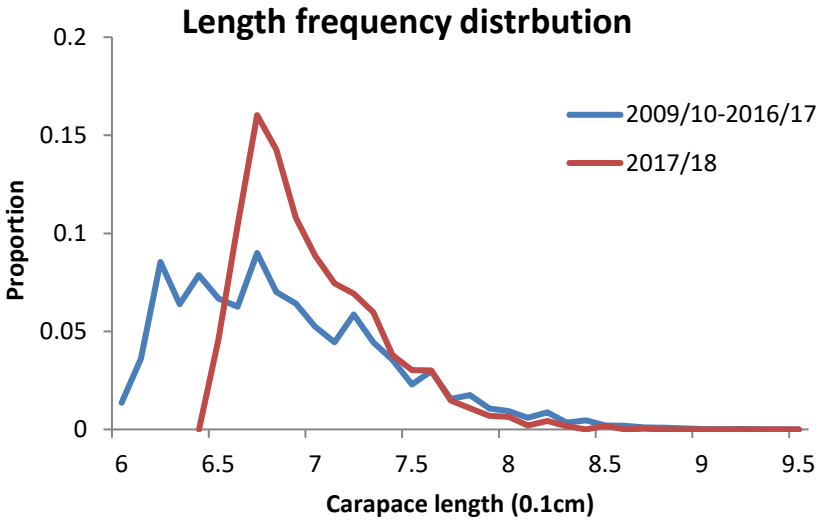
Catch ✓ **Effort** ✓ **Catch rate** ✓ **Size composition** ✓

Data collection aim:

To continue the long-term monitoring (>10 yrs) for stock status assessment in NSW. Data being collected are the size composition and sex ratios in the landed catch.

Ports being monitored during 2018/19:

Wallis Lake



The length distribution of Blue Swimmer Crabs in commercial landings from Wallis Lake ranged between 6 and 10 cm carapace length (CL), and remained relatively stable between 2009/10 and 2016/17. The minimum legal length of Blue Swimmer Crabs in NSW prior to 2017/18 was 6 cm CL and in 2017/18 the minimum legal length changed to 6.5 cm CL.

Further information on the stock status of Blue Swimmer Crabs in NSW and nationally can be found on the Status of Australian Fish Stocks webpage http://fish.gov.au/

Appendix D - Review of sampling – how many fish to measure from each sample, and how many days to sample

As part of the approval process for the 'NSW Commercial Fisheries Port Monitoring Program', it was reviewed by the Senior Scientists Group (SSG) in 2017. That group acknowledged the need for the program and fully supported its continuation; however did recommend that a review of the sampling design be done, potentially by existing program staff, to consider whether current levels of sampling produced acceptable levels of accuracy and precision. To facilitate approval of the program for 2017/18, a pre-proposal was submitted into ZUME (110393 - Sampling designs for collection of fishery dependent data) which was in part designed to secure biometrics support if required.

The review presented here is in response to the recommendation by the SSG, the work described in ZUME (110393) and to assist the various species leads within the FRA Unit, who are largely relatively inexperienced in terms of Port Monitoring sampling design, in their responsibilities to develop sampling protocols for their species.

How many fish to measure from each sample?

The first objective of sampling during the NSW Commercial Fisheries Port Monitoring Program is to representatively sample each individual catch. The logistics of the program mean that fish to be sampled for length data are generally only available following sorting for sale, and as such are often sorted into size grades. This size-grading means that each size grade must be sampled for length composition. The resulting length distributions from each size grade are then combined by the relative catch weights of each size grade to produce a representative length distribution for that catch. It is important to note that information on the dynamics of the fishery and the post-harvest operations can also be obtained through data on the size compositions within a particular size grade. The result of this sampling requirement is that time spent measuring fish from every grade from within a catch can be considerable, and potentially at the expense of time spent measuring other catches, species etc. Therefore it is important that the time spent measuring each size grade of fish is optimized in terms of efficiency and adequate precision. Generally, the number of fish available will exceed the number that can be measured at a reasonable cost, and so a subsample needs to be taken. Historically, sub-sampling was done until a 'reasonable' and 'stable' looking distribution was obvious on the wooden measuring boards (and more recently via the electronic measuring board and sampling application). A more formal approach, and perhaps one that reduces the risk of measuring excessive numbers of fish, is to consider an acceptable level of precision around the mean length.

The precision of the number of observations in a sample (e.g. a size grade of fish from a single catch) can be estimated by assuming a multinomial distribution (Smith and Maguire, 1983). If the precision in each sample is expressed in the form of a coefficient of variation (CV), an overall measure of precision can be obtained by weighting each CV by the number of fish in each size grade. This mean weighted CV (MWCV) provides a description of the precision over the entire range of size classes in a length frequency distribution. Gerritsen and Mcgrath, (2007), using data from a trawl survey, showed that the MWCV of subsamples followed an exponential decline with increasing numbers of fish measured per size class bin (Fig. 1). The MWCV declined rapidly until around 10 times the number of size class bins in the sample, after which relatively little decreases from a MWCV of around 0.25 were achieved even with substantial increases in the numbers of fish measured.

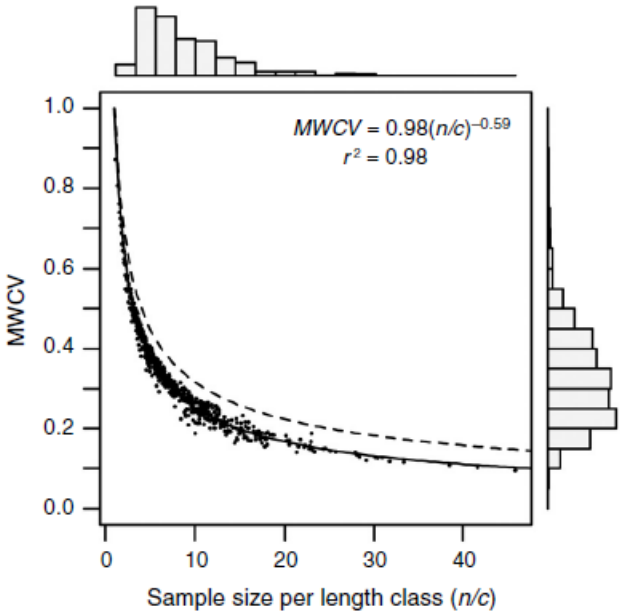


Figure 1

The mean weighted coefficient of variation (MWCV) for 596 subsamples was closely related to the sample size (n) divided by the number of per length classes in the sample (c). A good fit was obtained for the power function indicated by the solid line; its parameters are given at the top of the plot. The dashed line indicates the theoretical maximum MWCV (Eq. 4.). The histograms show the distribution of the samples on both axes.

Figure 1. From Gerritsen and McGrath (2007) showing the decline in MWCV with increasing numbers of fish measured per length class bin.

The number of length classes for species in the Gerritsen and McGrath paper (generally 5 to 20) are similar to most NSW species monitored, with the exception of the larger species like Mulloway and Yellowtail Kingfish that span a lot more size classes (depending on the size class bins used). It is therefore appropriate to apply the rule of thumb to measure 10 times the number of size classes in a sample to achieve an acceptable level of precision. However to validate this assumption, analyses were done using data from sampling Snapper through the Port Monitoring Program in previous years. The observed decline in MWCV for NSW Snapper was very similar to that shown in the Gerritsen and McGrath paper, with relatively little decrease in MWC after 10 times the number of size classes, and with a similar MWCV of around 0.25.

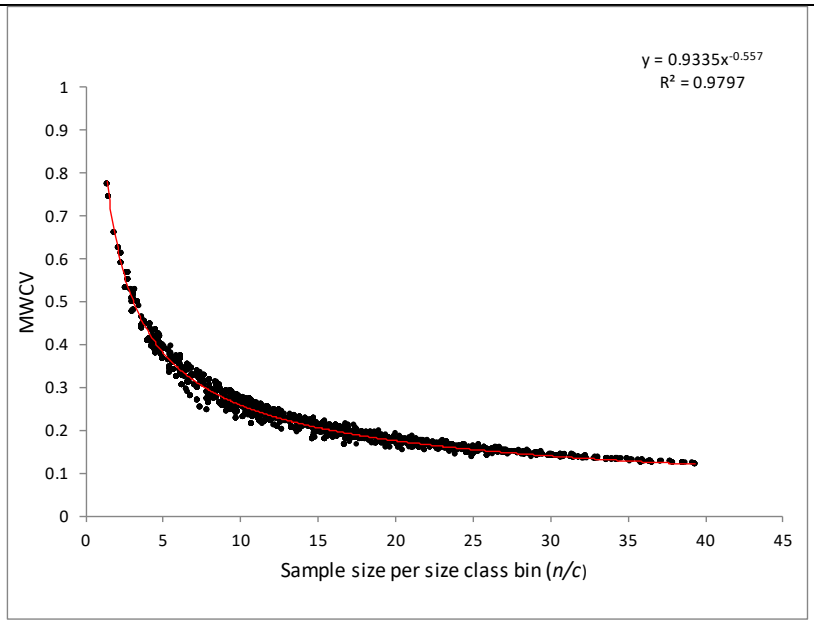


Figure 2. The MWCV for sub-sampling Snapper catches against increasing numbers of fish measured per size-class bin.

Based on these findings it is recommended that the NSW Port Monitoring Program adopts the rule of thumb that, where possible, sub-samples of fish measured should be at least 10 times the number of size classes. The electronic measuring board application, displayed on a tablet, makes this very easy to keep track of when measuring catches.

How many days a month are required to be sampled?

The Port Monitoring sampling design works on the assumption that the lengths of fish measured on any day are representative of all fish landed on that day from that region. This is achieved through agreed sampling protocols; however generally an attempt is made to measure all available catches on a day from a sampled region.

The default sampling design for the Port Monitoring program works on sampling a target of 4 days each month. It is not known how this target was derived; however the assumption is that by sampling 4 days each month that when combined the length distributions from those 4 days will adequately represent the length distribution of all landed fish during that month/region.

To examine whether this assumption is reasonable, we used the same dataset of Snapper measurements as used above. Two methods were used to examine the cost-benefit of varying sample days within a month: (i) the increasing precision associated with increasing sampling days using the MWCV as above, and; (ii) estimating the probability that length distributions resulting from combining varying numbers of sample days would differ significantly from the overall observed length distribution using KS-tests.

Data were analysed based on defining an individual length sample as a catch of snapper caught: (1) by a fisher; (2) using one fishing method, and; (3) on a day. The dataset was subdivided into months, and for each month the following was calculated:

The MWCV was calculated using lengths from all samples collected on all days in the month. Then 1 day (from all days sampled in that month) was selected at random and all length samples collected on that day were combined to create a subset of that month's data. This was repeated until 100, 1-day subsets of length data were created. This process was repeated, but this time 2 days were selected at random from the month creating 100 2-day subsets. Then 100 3-day subsets, 100 4-day subsets etc. were created, until the number of days in the subsets equalled the number of days sampled in that month minus 1. The above was repeated for each month of the year and the MWCV was calculated for all subsets of the length frequency data.

The MWCV was plotted against the number of days sampled in a month, all months combined, to examine the increased precision against increasing sample days in a month.

Kolmogorov-Smirnoff tests were also done to compare whether length frequency distributions from varying numbers of sample days in a month differed significantly from a 'known' length frequency distribution that comprised the maximum number of sample days a month in the dataset, being 8 days In January 2017. Sample days within a month were randomly selected for each number of days to be examined (1 through 8) and the resulting length distributions compared to the overall length known frequency distribution. This was done 100 times for each number of days, and the probability of those distributions differing from the 'known' distribution calculated.

The results showed that the MWCV and its variability both decreased with increasing numbers of days sampled per month (Fig. 3). The mean MWCV for 3 sample days a month was 0.23, decreasing to 0.215 for 4 days and only minor improvements in precision thereafter. The mean MWCV for only 2 days sampled a month was reasonable at 0.28; however the likelihood of relatively imprecise results substantially greater than for more sample days.

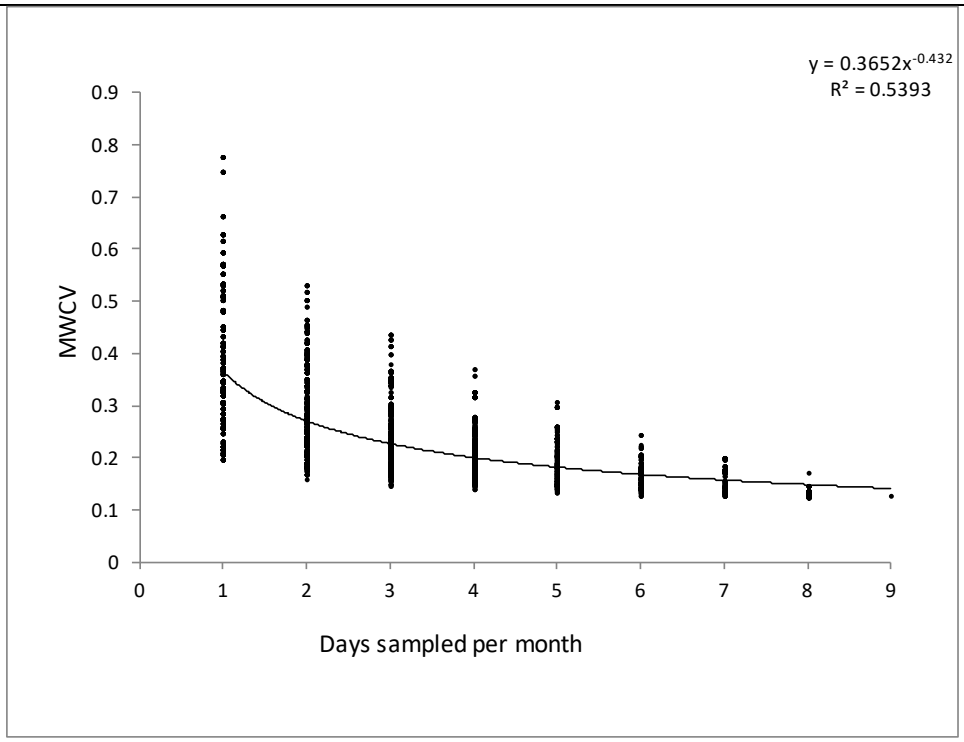


Figure 3. The MWCV for sampling Snapper catches against increasing numbers of days sampled in a month, all months combined.

The conclusion that 3 Days a month provides adequate precision is based on the assumption that variation between days is similar for all months. Plots of the MWCV against days sampled by month indicated some variation between months; however MWCVs were generally below 0.3 for 3 sample days.

The KS-tests indicated that the probability of a monthly length frequency distribution of a randomly selected monthly sample being significantly different from the 'known' monthly length frequency distribution (the one generated from the full 8 days sampling) decreased rapidly as the number of sample days used to make up a monthly sample was increased Fig. 4. For 3 sample days a month the probability of getting a significantly different length distribution was around 7%, whereas after 4 sample days it was around 4%.

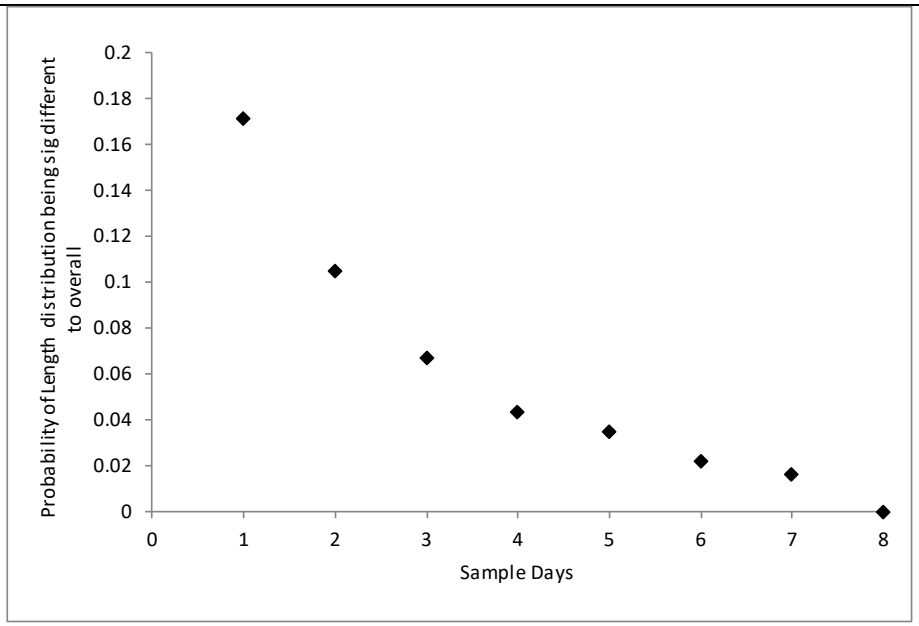


Figure 4. The probability of the monthly length frequency distribution (January 2017) being significantly different from the 'known' monthly length frequency distribution versus the number of sample days in the month.

Conclusion

These analyses have resulted in the Port Monitoring Program adopting the rule of thumb that, where possible, sub-samples of fish measured should be at least 10 times the number of size classes. The application which records the output from the electronic measuring boards has been modified to display these metrics.

The sampling protocol target for Snapper (and the default for all species unless modified following species leads recommendation) of sampling catches on 4 days a month in order to generate representative length frequency distributions of the entire landed catch for that month appears reasonable; however these analyses using the MWCV and KS tests for a single month suggest that adequate distributions for Snapper from Coffs Harbour may be obtained from just 3 sample days a month.

It is important to note that these results pertain only to Snapper from the Coffs Harbour co-operative and may not necessarily pertain to other species.

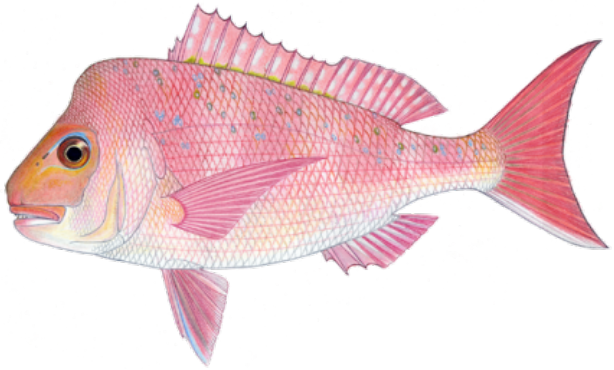
Further analyses to examine whether the protocol of measuring all available catches on a sample day is necessary to adequately represent the lengths of all catches on that day could potentially be done for Snapper, and other species for which comprehensive data are available. This between catch variability on a day is an important consideration when developing sampling protocols, however from a practical view the current default methodology is working well. It is also the responsibility of each species lead to be aware of the dynamics of the fishing fleet from relevant ports when developing sampling protocols.

References

Gerritsen, H.D. and McGrath, D., 2007. Precision estimates and suggested sample sizes for length-frequency data. *Fishery Bulletin*, *105*(1), pp.116-120.

Appendix E - Ballina co-op sampling Procedures July 2018 – June 2019

Snapper (Chrysophrys auratus)



Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.
- Minimum sampling is one box of small fish (20kg).
- Sub sample for catches over 200kg (see sub sampling procedure below)

Pearl Perch (Glaucosoma scapulare)

Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.
- Sample opportunistically if John lands pearl perch at the same time as landing snapper.

EQUIPMENT & PROCEDURES

Contact details

For sending log sheets, datasheets, otoliths or if any equipment needs to be replaced, please contact us via the following details:

Anne-Marie Hegarty/Antony Gould

NSW Fisheries

Sydney Institute of Marine Science

Bldg 19 Chowder Bay Road, Mosman, 2088, NSW

Ph. (02) 9435 4681

Anne-Marie: 0416 289 042 and Antony: 0421 656 455

Fax (02) 9527 8459

Email: anne-marie.hegarty@dpi.nsw.gov.au or antony.gould@dpi.nsw.gov.au

Or John Stewart on 9435 4668

Sampling Procedures – General

- If sub-sampling is required be careful to sample from each size grade (unless specified otherwise in species protocol). If any size grade is unable to be sampled (e.g. if a buyer takes all boxes from one of the grades during the time you are sampling) discontinue sampling this catch or **do not sample this catch** at all i.e. **all grades need to be sampled.** If all grades are not sampled the data is unusable unless there is a component of the catch that is ungraded. If this is the case then measure all of the ungraded portion of the catch and indicate on the data sheet that the other size grades existed.

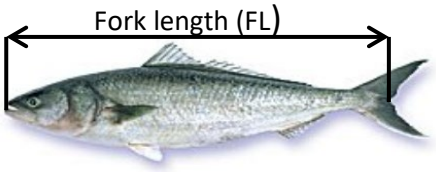
- When sub-sampling, each grade must be recorded separately on datasheets. The weight of the fish sampled and the total weight of the grade need to be recorded ('sampled' and "out of" respectively). Don't use the total catch weight – this may be written in the notes area as extra information

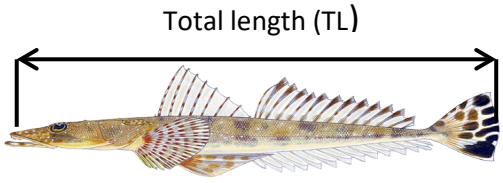
- Samples can be taken from single or multiple catches depending on the quantity available.

- If the entire sample is taken from a single catch then try to sample a different fisher during the next sample period to reduce bias (although not essential).

- If multiple catches of a species is sampled then the data from each fisher is to be kept separate.

- All fish are to be measured to the nearest 1 cm below actual fork length (FL) or (TL) if the species has no fork length, e.g. If the FL = 40.8cm it should be recorded as 40cm.





- Use a pencil to scribe length marks on the measuring board, using any method you find easiest to interpret later.

- Ensure datasheet (completed in pencil) is correctly labelled/completed.

- Transcribe data from the measuring board(s) to the datasheet(s) as early as possible to minimise any mistakes or confusion in regards to markings.

- After measuring, return the fish/invertebrate to the box with care. If the box was packed in a certain way then it must be re-packed exactly the same.

Otolith sampling procedures

- All data for these fish are collected separate from length frequency data.

- If the fish are whole then they must be purchased before removing the otoliths – see 'Purchasing fish samples' and 'Resale of fish' below for further details. When purchasing fish from multiple catches, complete each transaction separately. Don't mix fish from different catches.

- If the fish are gilled and gutted the otoliths can be removed without purchasing. Approval must be given by Co-op staff to do this. Once otoliths are removed make sure that all sharp parts such as bone fragments are removed from the fish and that the fish does not appear damaged in any way. If all is in order, return the fish to the box and to the floor/cool room.

- Fish set aside need their FL or TL (if no fork) re-measured prior to otoliths being removed (to the nearest 0.1cm – not the nearest whole cm) and recorded on the measuring board (or Biological Data Sheet). Otoliths should be placed in an ice-tray for storage prior to cleaning.

- Otolith condition:
  - Whole otoliths are required for the next stage of processing.
  - If you have badly broken both otoliths for a fish, record this on the envelope and datasheet and place in envelope as normal. Please then take otoliths from an additional fish e.g. you will then have 11 otolith samples instead of 10 (spare blank envelopes are provided for extra monthly otolith samples).
  - If only one otolith is present, please note on the envelope.
  - Otoliths MUST be sent as soon as collected so that they can be checked by NSW DPI staff and if necessary extra fish can be sampled for that month as replacements.

- If practical, remove gill and guts of fish for resale (dispose of in an appropriate manner).

- Fish not for resale need to be disposed of in an appropriate manner such as disposal at the Co-op – see staff for procedure and location of bin.

- Before transferring otoliths to envelopes write any information including the date to prevent breakage.

- After all otoliths have been removed, clean with water and store in labelled envelopes (don't seal it down) Label the otolith envelopes with the species field code on the bottom left hand corner of each envelope. Record the corresponding field code in the notes column on the biological datasheet.

Data Sheets

Length Frequency Data Sheet (for finfish species)

The items underlined MUST be completed.

- Species
- Biological samples taken? Y / N – Yes, if fish put aside for otolith sample. No, if otolith sample is not taken from this sample.
- Date caught
- Location - where the fish were caught including whether caught in an estuary or ocean.
- Fisher – name of fisher who caught the fish
- Method used to catch the species (see Method list at the end of this document).
- Process - write any process here such as whole, frozen, etc (see SFM process list at the end of this document).
- Disposal – the location that the sample was processed (eg. Ballina Fishermen's Coop).
- Processed by – the individual processing the sample.
- Notes – any comments.
- Sample weight (kg) – weight of all fish measured.
- Out of - Total catch (or grade) weight (kg) – total weight of the catch the sample was taken from if the catch was of one grade only or ungraded OR total weight of the grade sampled.
- Size grade – eg. ungraded, small, medium, large or x-large (see SFM Size Codes list at the end of this document).

Crab-specific length frequency datasheet

- The catch information on this data sheet is the same as that on the Length Frequency Data Sheet (for finfish species).
- Record a length frequency for each sex and maturity (i.e. immature and mature for both males and females) – there are heading fields allocated for this information.

Biological Data Sheet

- The catch information needed on the Biological Data Sheet is the same as that on the Length Frequency Data Sheet.
- The biological information required is species specific. Refer to individual specie protocols.

  - MetricID – leave blank.
  - Fish # – this is a number to identify each fish – Each monthly sample should start at 1 and increase by 1.
  - Grade – this is the size grading of the fish – X-small, small, medium, large, X-large, or ungraded – see SFM size codes at the end of this document for abbreviations/codes.
  - Sex – from examining gonad – male (M), female (F), juvenile (J), juvenile/male (JM), juvenile/female (JF), hermaphrodite (H) or unknown (U). **Leave blank unless specified in species protocol.**
  - Length - FL – fork length in cm (to the nearest 0.1cm).
  - Length - TL – Leave blank unless specified in species protocol.
  - Body weight (g) – whole weight in grams (to the nearest 0.1g if have electronic scales – leave blank unless specified in species protocol).
  - Gonad weight (g) – leave blank unless specified in protocol.
  - Gonad stage – leave blank unless specified in protocol.
  - EnvelopeID – **leave blank**.
  - Notes – Field code and comments.

Occupational Health & Safety Guidelines

Fisheries staff or volunteers required to work at Fishermen's Co-operatives as part of their duties should at all times follow the procedures outlined below.

- Always comply with the policies issued by the SFM/Fish Co-op/business for personnel visiting or working, including any instructions given by their staff.

- Staff should have with them at all times the appropriate equipment to fulfil the OH&S requirements of NSW DPI and the Food Safe guidelines.

When on these premises the following must be worn:

- Protective clothing
- Protective footwear with non-slip soles
- Head covering i.e. Cap
- Clothing suitable for the cold temperatures
- When handling product – gloves

A first aid kit must be available at all times when working.

- At all times be aware of your surroundings, minimise risks to your health and safety as well as those people around you – at no time place market, co-operative staff, fishers or other personnel at risk with your operations.

If a staff member feels at any time that the work they are doing is compromising their health and safety they must cease those duties and notify their supervisor immediately. Duty of care is the responsibility of the individual and the manager.

Safe Food Handling Guidelines

Persons should be fully aware that the product held at fish receivers is for public consumption and therefore safe food handling vigilance is required at all times when entering or working on these premises. The following guidelines should be adhered to:

Personal hygiene

- Wash and dry hands thoroughly before handling product (even if using gloves).
- Do not enter premises if suffering from any illness with symptoms of fever, vomiting, diarrhoea or advised by GP not to handle food.
- Extra precautions must be taken if have any infections/cuts on hands, arms or face, or have discharge from nose, eyes or ears, including sufficient coverings (e.g. bandages, mask) to prevent contamination or taking medications to minimise symptoms. If possible do not work when in this condition.

Contamination prevention

- All contact surfaces (bench, measuring boards, gloves, stationary items etc) must be cleaned prior to touching product and regularly during task.
- Only food-safe cleaning products to be used and items rinsed thoroughly to remove any residue.
- At no time should hazardous substances or contaminated equipment come in contact with product, this includes being used in areas where product may move through.

Temperature control

- Product must be kept cold at all times
  - Leave in cold storage until needed
  - Ice workbench under product
  - Return ice to fish boxes and top-up if not sufficient
- Minimise handling times.

Remember that product being handled is sold for human consumption and must be treated safely to prevent any risk to health.

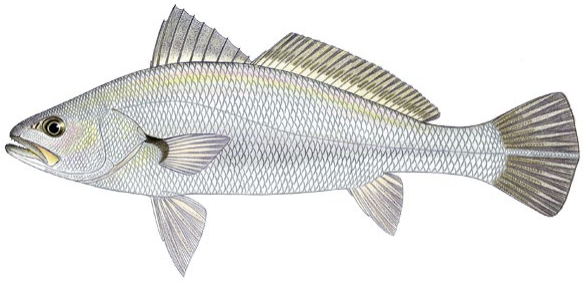
Appendix F - Clarence River co-op sampling Procedures July 2018 – June 2019

Sampling schedule

2018/19	Sample days	Otoliths
Giant mud crab	4 days/month	
Grey morwong	4 days/month	
Luderick	Opportunistic	
Mulloway	4 days/month	
Pearl perch	Opportunistic	
Silver trevally	Opportunistic	
Snapper	4 days/month	10 per month

SAMPLING PROTOCOLS

Mulloway (Argyrosomus japonicus)



Sample days

- 4 days/month

Lengths required

- Measure all the catches of mulloway on the floor on the day of sampling.
- Measure catches as total length (TL) to the nearest whole cm below true length.

Otoliths required

- Any otoliths that are required for Angela and DJ's project

Snapper (Chrysophrys auratus)

Sample days

- Opportunistically up to 4 days per month

Otoliths required

- 10 otoliths per month taken from either one or two catches. Take fish proportionately from each grade if catches are graded
- Collect fork length (0.1 cm), body weight (0.1g), sex, gonad stage, gonad weight (0.1g) and otoliths (start field code **CR-Pa 1**)
- It is fine to collect samples from gilled and gutted samples and only collect the fork length and otoliths.
- Be sure to collect samples from both trap AND handline catches.

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Silver trevally (Pseudocaranx georgianus)

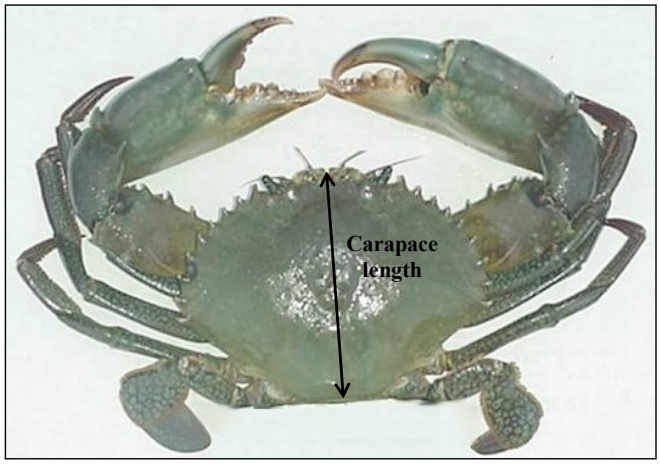
Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure from both fish trawl and ocean trap and line catches only (don't measure estuary general landings).
- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Mud crab (Scylla serrata)



Sample days

- 4 days per month

Lengths required

- Measure all crabs on the floor on the day of sampling.
- Measure as carapace length (CL) to the nearest whole millimetre below true length with calipers (see diagram below for CL measurement).
- A separate length frequency needs to be recorded for each sex and maturity
- Please record total weights by GRADE of individual catches in the notes section of the crab-specific datasheet

Pearl Perch (Glaucosoma scapulare)

Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Grey morwong (Nemadactylus douglasii)

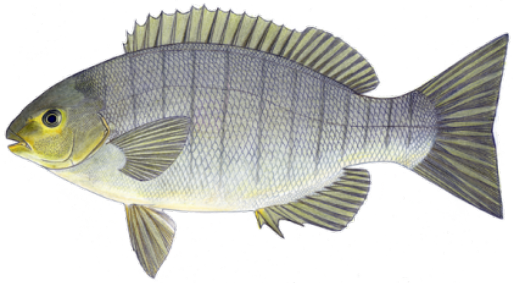
Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Luderick (Girella tricuspidata)



Sample days

- 4 days/month

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

EQUIPMENT & PROCEDURES

Contact details

For sending log sheets, datasheets, otoliths or if any equipment needs to be replaced, please contact us via the following details:

Anne-Marie Hegarty/Antony Gould

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Or John Stewart on 9435 4668

Sampling Procedures – General

- If sub-sampling is required be careful to sample from each size grade (unless specified otherwise in species protocol). If any size grade is unable to be sampled (e.g. if a buyer takes all boxes from one of the grades during the time you are sampling) discontinue sampling this catch or **do not sample this catch** at all i.e. **all grades need to be sampled.** If all grades are not sampled the data is unusable unless there is a component of the catch that is ungraded. If this is the case then measure all of the ungraded portion of the catch and indicate on the data sheet that the other size grades existed.

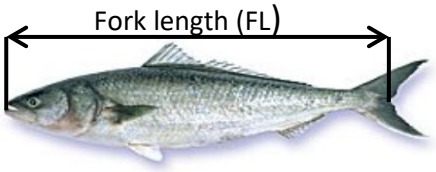
- When sub-sampling, each grade must be recorded separately on datasheets. The weight of the fish sampled and the total weight of the grade need to be recorded ('sampled' and "out of" respectively). Don't use the total catch weight – this may be written in the notes area as extra information

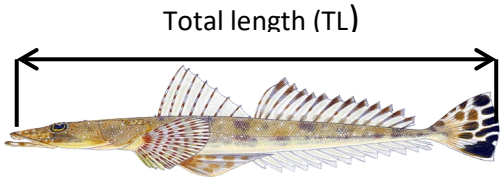
- Samples can be taken from single or multiple catches depending on the quantity available.

- If the entire sample is taken from a single catch then try to sample a different fisher during the next sample period to reduce bias (although not essential).

- If multiple catches of a species is sampled then the data from each fisher is to be kept separate.

- All fish are to be measured to the nearest 1 cm below actual fork length (FL) or (TL) if the species has no fork length, e.g. If the FL = 40.8cm it should be recorded as 40cm.





- Use a pencil to scribe length marks on the measuring board, using any method you find easiest to interpret later.

- Ensure datasheet (completed in pencil) is correctly labelled/completed.

- Transcribe data from the measuring board(s) to the datasheet(s) as early as possible to minimise any mistakes or confusion in regard to markings.

- After measuring, return the fish/invertebrate to the box with care. If the box was packed in a certain way then it must be re-packed exactly the same.

Otolith sampling procedures

- All data for these fish is collected separate from length frequency data.

- If the fish are whole then they must be purchased before removing the otoliths – see 'Purchasing fish samples' and 'Resale of fish' below for further details. When purchasing fish from multiple catches, complete each transaction separately. Don't mix fish from different catches.

- If the fish are gilled and gutted the otoliths can be removed without purchasing. Approval must be given by Co-op staff to do this. Once otoliths are removed make sure that all sharp parts such as bone fragments are removed from the fish and that the fish does not appear damaged in any way. If all is in order, return the fish to the box and to the floor/cool room.

- Fish set aside need their FL or TL (if no fork) re-measured prior to otoliths being removed (to the nearest 0.1cm – not the nearest whole cm) and recorded on the measuring board (or Biological Data Sheet). Otoliths should be placed in an ice-tray for storage prior to cleaning.

- Otolith condition:
  - Whole otoliths are required for the next stage of processing.
  - If you have badly broken both otoliths for a fish, record this on the envelope and datasheet and place in envelope as normal. Please then take otoliths from an additional fish e.g. you will then have 11 otolith samples instead of 10 (spare blank envelopes are provided for extra monthly otolith samples).
  - If only one otolith is present, please note on the envelope.
  - Otoliths MUST be sent as soon as collected so that they can be checked by NSW DPI staff and if necessary extra fish can be sampled for that month as replacements.

- If practical, remove gill and guts of fish for resale (dispose of in an appropriate manner).

- Fish not for resale need to be disposed of in an appropriate manner such as disposal at the Co-op – see staff for procedure and location of bin.

- Before transferring otoliths to envelopes write any information including the date to prevent breakage.

- After all otoliths have been removed, clean with water and store in labelled envelopes (don't seal it down) Label the otolith envelopes with the species field code on the bottom left hand corner of each envelope. Record the corresponding field code in the notes column on the biological datasheet.

Data Sheets

Length Frequency Data Sheet (for finfish species)

The items underlined MUST be completed.

- Species
- Biological samples taken? Y / N – Yes, if fish put aside for otolith sample. No, if otolith sample is not taken from this sample.
- Date caught
- Location - where the fish were caught including whether caught in an estuary or ocean.
- Fisher – name of fisher who caught the fish
- Method used to catch the species (see Method list at the end of this document).
- Process - write any process here such as whole, frozen, etc (see SFM process list at the end of this document).
- Disposal – the location that the sample was processed (eg. Ballina Fishermen's Coop).
- Processed by – the individual processing the sample.
- Notes – any comments.
- Sample weight (kg) – weight of all fish measured.
- Out of - Total catch (or grade) weight (kg) – total weight of the catch the sample was taken from if the catch was of one grade only or ungraded OR total weight of the grade sampled.
- Size grade – eg. ungraded, small, medium, large or x-large (see SFM Size Codes list at the end of this document).

Crab-specific length frequency datasheet

- The catch information on this data sheet is the same as that on the Length Frequency Data Sheet (for finfish species).
- Record a length frequency for each sex and maturity (i.e. immature and mature for both males and females) – there are heading fields allocated for this information.

Biological Data Sheet

- The catch information needed on the Biological Data Sheet is the same as that on the Length Frequency Data Sheet.
- The biological information required is species specific. Refer to individual specie protocols.

  - MetricID – leave blank.
  - Fish # – this is a number to identify each fish – Each monthly sample should start at 1 and increase by 1.
  - Grade – this is the size grading of the fish – X-small, small, medium, large, X-large, or ungraded – see SFM size codes at the end of this document for abbreviations/codes.
  - Sex – from examining gonad – male (M), female (F), juvenile (J), juvenile/male (JM), juvenile/female (JF), hermaphrodite (H) or unknown (U). **Leave blank unless specified in species protocol.**
  - Length - FL – fork length in cm (to the nearest 0.1cm).
  - Length - TL – Leave blank unless specified in species protocol.
  - Body weight (g) – whole weight in grams (to the nearest 0.1g if have electronic scales – leave blank unless specified in species protocol).
  - Gonad weight (g) – leave blank unless specified in protocol.
  - Gonad stage – leave blank unless specified in protocol.
  - EnvelopeID – **leave blank**.
  - Notes – Field code and comments.

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When on these premises the following must be worn:

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- Protective footwear with non-slip soles
- Head covering i.e. Cap
- Clothing suitable for the cold temperatures
- When handling product – gloves

A first aid kit must be available at all times when working.

- At all times be aware of your surroundings, minimise risks to your health and safety as well as those people around you – at no time place market, co-operative staff, fishers or other personnel at risk with your operations.

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- Extra precautions must be taken if have any infections/cuts on hands, arms or face, or have discharge from nose, eyes or ears, including sufficient coverings (e.g. bandages, mask) to prevent contamination or taking medications to minimise symptoms. If possible do not work when in this condition.

Contamination prevention

- All contact surfaces (bench, measuring boards, gloves, stationary items etc) must be cleaned prior to touching product and regularly during task.
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- At no time should hazardous substances or contaminated equipment come in contact with product, this includes being used in areas where product may move through.

Temperature control

- Product must be kept cold at all times
  - Leave in cold storage until needed
  - Ice workbench under product
  - Return ice to fish boxes and top-up if not sufficient
- Minimise handling times.

Remember that product being handled is sold for human consumption and must be treated safely to prevent any risk to health.

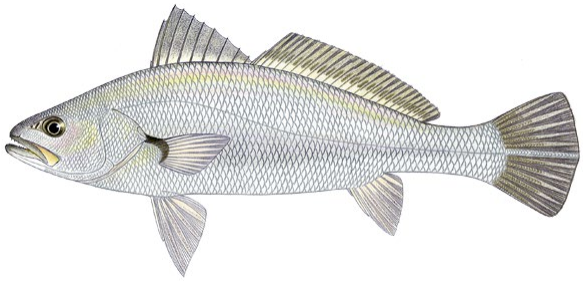
Appendix G - Coffs Harbour co-op sampling procedures July 2018 – June 2019

Sampling schedule

2018/19	Sample days	Otoliths
Giant mud crab	4 days/month	
Grey morwong	Opportunistic up to 4 days/month	
Mulloway	4 days/month	
Pearl perch	Opportunistic up to 4 days/month	
Silver trevally	Opportunistic up to 4 days/month	
Snapper	4 days/month	20 per month
Yellowtail kingfish	4 days/month	

SAMPLING PROTOCOLS

Mulloway (Argyrosomus japonicus)



Sample days

- 4 days per month

Lengths required

- Measure all the catches of mulloway on the floor on the day of sampling.
- Measure catches as total length (TL) to the nearest whole cm below true length.

Otoliths required

- Any otoliths that are required for Angela and DJ's project

Snapper (Chrysophrys auratus)

Sample days

- 4 days per month

Otoliths required

- 20 otoliths per month taken from either one or two catches. Take fish proportionately from each grade if catches are graded
- Collect fork length (0.1 cm), body weight (0.1g), sex, gonad stage, gonad weight (0.1g) and otoliths (start field code **CH-Pa 1**)
- It is fine to collect samples from gilled and gutted samples and only collect the fork length and otoliths.
- Be sure to collect samples from both trap AND handline catches.

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Silver trevally (Pseudocaranx georgianus)

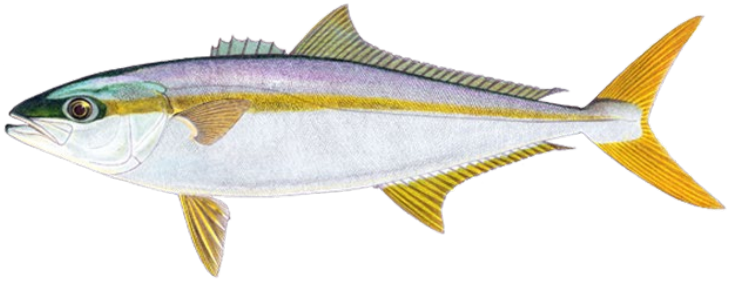
Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure from both fish trawl and ocean trap and line catches only (don't measure estuary general landings).
- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Yellowtail kingfish (Seriola lalandi)



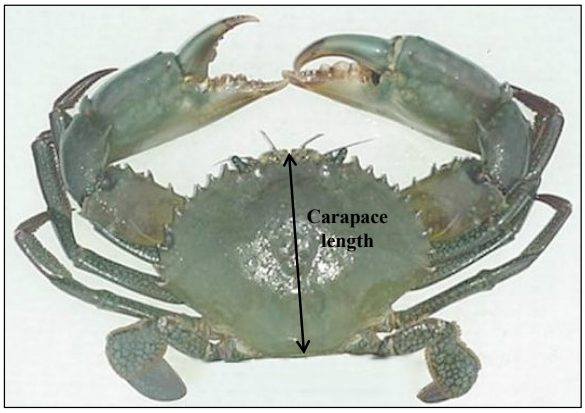
Sample days

- 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.
- Use of a tape measure is recommended for extra large fish and should be done whilst the fish are in the box on the market floor.

Mud crab (Scylla serrata)



Sample days

- 4 days per month

Lengths required

- Measure all crabs on the floor on the day of sampling.
- Measure as carapace length (CL) to the nearest whole millimetre below true length with calipers (see diagram below for CL measurement).
- A separate length frequency needs to be recorded for each sex and maturity
- Please record total weights by GRADE of individual catches in the notes section of the crab-specific datasheet

Pearl Perch (Glaucosoma scapulare)

Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Grey morwong (Nemadactylus douglasii)

Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

EQUIPMENT & PROCEDURES

Contact details

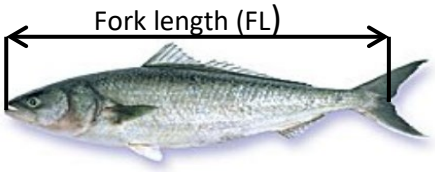
For sending log sheets, datasheets, otoliths or if any equipment needs to be replaced, please contact us via the following details:

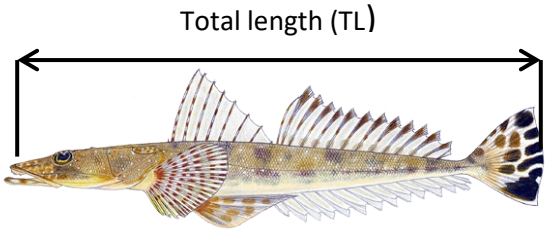
Anne-Marie Hegarty/Cailtin Young
NSW Fisheries
Sydney Institute of Marine Science
Bldg 19 Chowder Bay Road, Mosman, 2088, NSW
Ph. (02) 9435 468
Anne-Marie: 0416289042 (A-M) and Caitlin: 0439 497 924
Fax (02) 9527 8459
Email: anne-marie.hegarty@dpi.nsw.gov.au or caitlin.young@dpi.nsw.gov.au

Or John Stewart on 9435 4668

Sampling Procedures – General

- Catches sampled should be ungraded (or graded as one size only) to reduce any bias.
- If sub-sampling is required be careful to sample from each size grade (unless specified otherwise in species protocol). If any size grade is unable to be sampled (e.g. if a buyer takes all boxes from one of the grades during the time you are sampling) discontinue sampling this catch or **do not sample this catch** at all i.e. **all grades need to be sampled.** If all grades are not sampled the data is unusable unless there is a component of the catch that is ungraded. If this is the case then measure all of the ungraded portion of the catch and indicate on the data sheet that the other size grades existed.
- When sub-sampling, each grade must be recorded separately on datasheets. The weight of the fish sampled and the total weight of the grade need to be recorded ('sampled' and "out of" respectively). Don't use the total catch weight – this may be written in the notes area as extra information
- Samples can be taken from single or multiple catches depending on the quantity available.
- If the entire sample is taken from a single catch then try to sample a different fisher during the next sample period to reduce bias (although not essential).
- If multiple catches of a species is sampled then the data from each fisher is to be kept separate.
- All fish are to be measured to the nearest 1 cm below actual fork length (FL) or (TL) if the species has no fork length, e.g. If the FL = 40.8cm it should be recorded as 40cm.





- Use a pencil to scribe length marks on the measuring board, using any method you find easiest to interpret later.
- Ensure datasheet (completed in pencil) is correctly labelled/completed.
- Transcribe data from the measuring board(s) to the datasheet(s) as early as possible to minimise any mistakes or confusion in regards to markings.
- After measuring, return the fish/invertebrate to the box with care. If the box was packed in a certain way then it must be re-packed exactly the same.

Otolith sampling procedures

- All data for these fish are collected separate from length frequency data.

- If the fish are whole then they must be purchased before removing the otoliths – see 'Purchasing fish samples' and 'Resale of fish' below for further details. When purchasing fish from multiple catches, complete each transaction separately. Don't mix fish from different catches.

- If the fish are gilled and gutted the otoliths can be removed without purchasing. Approval must be given by Co-op staff to do this. Once otoliths are removed make sure that all sharp parts such as bone fragments are removed from the fish and that the fish does not appear damaged in any way. If all is in order, return the fish to the box and to the floor/cool room.

- If, for example, 20 otoliths are required each month then take 10 otoliths from two different catches/sample days. If measuring approx. 100 fish, set every 10th fish aside (after measuring to the nearest whole cm below true length and recording on length frequency datasheet).

- Fish set aside need their FL or TL (if no fork) re-measured prior to otoliths being removed (to the nearest 0.1cm – not the nearest whole cm) and recorded on the measuring board (or Biological Data Sheet). Otoliths should be placed in an ice-tray for storage prior to cleaning.

- Otolith condition:
  - Whole otoliths are required for the next stage of processing.
  - If you have badly broken both otoliths for a fish, record this on the envelope and datasheet and place in envelope as normal. Please then take otoliths from an additional fish e.g. you will then have 11 otolith samples instead of 10 (spare blank envelopes are provided for extra monthly otolith samples).
  - If only one otolith is present, please note on the envelope.
  - Otoliths MUST be sent as soon as collected so that they can be checked by NSW DPI staff and if necessary extra fish can be sampled for that month as replacements.

- If practical, remove gill and guts of fish for resale (dispose of in an appropriate manner).

- Fish not for resale need to be disposed of in an appropriate manner such as disposal at the Co-op – see staff for procedure and location of bin.

- Before transferring otoliths to envelopes write any information including the date to prevent breakage.

- After all otoliths have been removed, clean with water and store in labelled envelopes (don't seal it down) Label the otolith envelopes with the species field code on the bottom left hand corner of each envelope. Record the corresponding field code in the notes column on the biological datasheet.

Data Sheets

Length Frequency Data Sheet (for finfish species)

The items underlined MUST be completed.

- Species
- Biological samples taken? Y / N – Yes, if fish put aside for otolith sample. No, if otolith sample is not taken from this sample.
- Date caught
- Location - where the fish were caught including whether caught in an estuary or ocean.
- Fisher – name of fisher who caught the fish
- Method used to catch the species (see Method list at the end of this document).
- Process - write any process here such as whole, frozen, etc. (see SFM process list at the end of this document).
- Disposal – the location that the sample was processed (e.g. Ballina Fishermen's Coop).
- Processed by – the individual processing the sample.
- Notes – any comments.
- Sample weight (kg) – weight of all fish measured.
- Out of - Total catch (or grade) weight (kg) – total weight of the catch the sample was taken from if the catch was of one grade only or ungraded OR total weight of the grade sampled.
- Size grade – e.g. ungraded, small, medium, large or x-large (see SFM Size Codes list at the end of this document).

Crab-specific length frequency datasheet

- The catch information on this data sheet is the same as that on the Length Frequency Data Sheet (for finfish species).
- Record a length frequency for each sex and maturity (i.e. immature and mature for both males and females) – there are heading fields allocated for this information.

Biological Data Sheet

- The catch information needed on the Biological Data Sheet is the same as that on the Length Frequency Data Sheet.
- The biological information required is species specific. Refer to individual specie protocols.

  - MetricID – leave blank.
  - Fish # – this is a number to identify each fish – Each monthly sample should start at 1 and increase by 1.
  - Grade – this is the size grading of the fish – X-small, small, medium, large, X-large, or ungraded – see SFM size codes at the end of this document for abbreviations/codes.
  - Sex – from examining gonad – male (M), female (F), juvenile (J), juvenile/male (JM), juvenile/female (JF), hermaphrodite (H) or unknown (U). **Leave blank unless specified in species protocol.**
  - Length - FL – fork length in cm (to the nearest 0.1cm).
  - Length - TL – Leave blank unless specified in species protocol.
  - Body weight (g) – whole weight in grams (to the nearest 0.1g if have electronic scales – leave blank unless specified in species protocol).
  - Gonad weight (g) – leave blank unless specified in protocol.
  - Gonad stage – leave blank unless specified in protocol.
  - EnvelopeID – **leave blank**.
  - Notes – Field code and comments.

Occupational Health & Safety Guidelines

Fisheries staff or volunteers required to work at Fishermen's Co-operatives as part of their duties should at all times follow the procedures outlined below.

- Always comply with the policies issued by the SFM/Fish Co-op/business for personnel visiting or working, including any instructions given by their staff.

- Staff should have with them at all times the appropriate equipment to fulfil the OH&S requirements of NSW DPI and the Food Safe guidelines.

When on these premises the following must be worn:

- Protective clothing
- Protective footwear with non-slip soles
- Head covering i.e. Cap
- Clothing suitable for the cold temperatures
- When handling product – gloves

A first aid kit must be available at all times when working.

- At all times be aware of your surroundings, minimise risks to your health and safety as well as those people around you – at no time place market, co-operative staff, fishers or other personnel at risk with your operations.

If a staff member feels at any time that the work they are doing is compromising their health and safety they must cease those duties and notify their supervisor immediately. Duty of care is the responsibility of the individual and the manager.

Safe Food Handling Guidelines

Persons should be fully aware that the product held at fish receivers is for public consumption and therefore safe food handling vigilance is required at all times when entering or working on these premises. The following guidelines should be adhered to:

Personal hygiene

- Wash and dry hands thoroughly before handling product (even if using gloves).
- Do not enter premises if suffering from any illness with symptoms of fever, vomiting, diarrhoea or advised by GP not to handle food.
- Extra precautions must be taken if have any infections/cuts on hands, arms or face, or have discharge from nose, eyes or ears, including sufficient coverings (e.g. bandages, mask) to prevent contamination or taking medications to minimise symptoms. If possible do not work when in this condition.

Contamination prevention

- All contact surfaces (bench, measuring boards, gloves, stationary items etc.) must be cleaned prior to touching product and regularly during task.
- Only food-safe cleaning products to be used and items rinsed thoroughly to remove any residue.
- At no time should hazardous substances or contaminated equipment come in contact with product, this includes being used in areas where product may move through.

Temperature control

- Product must be kept cold at all times
  - Leave in cold storage until needed
  - Ice workbench under product
  - Return ice to fish boxes and top-up if not sufficient
- Minimise handling times.

Remember that product being handled is sold for human consumption and must be treated safely to prevent any risk to health.

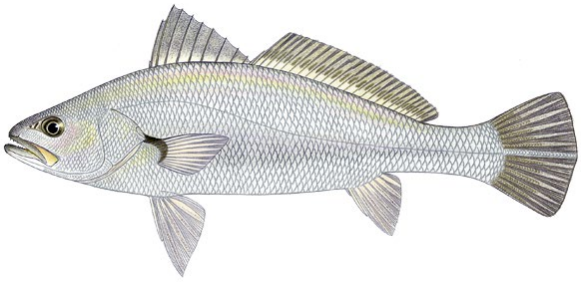
Appendix H - Wallis Lake/Great Lakes co-op sampling procedures July 2018 – June 2019

Sampling schedule

2018/19	Sample days	Otoliths
Bluespotted flathead	Opportunistic	
Blue swimmer crab	4 days/month	
Garfish	Opportunistic	20/sample
Giant mud crab	4 days/month	
Grey morwong	Opportunistic	
Luderick	4 days/month	20/month
Mulloway	4 days/month	
Snapper	Opportunistic	
Pearl perch	Opportunistic	

SAMPLING PROTOCOLS

Mulloway (Argyrosomus japonicus)



Sample days

- 4 days/month

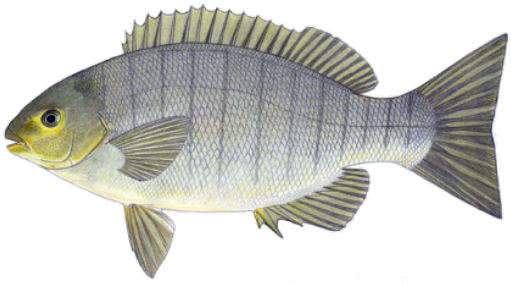
Lengths required

- Measure all the catches of mulloway on the floor on the day of sampling.
- Measure catches as total length (TL) to the nearest whole cm below true length.

Otoliths required

- Any otoliths that are required for Angela and DJ's project

Luderick (Girella tricuspidata)



Sample days

- 4 days/month

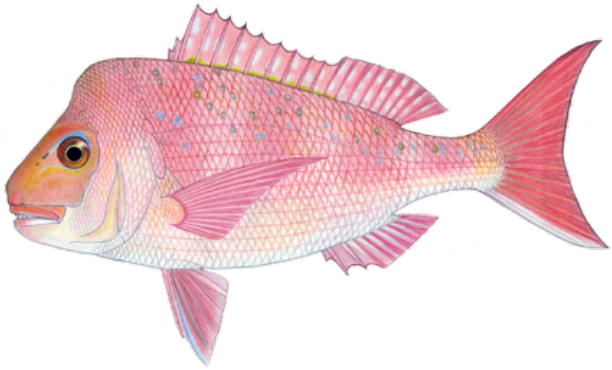
Otoliths required

- 20 otoliths per month taken from either one or two catches. Take fish proportionately from each grade if catches are graded
- Collect fork length (0.1 cm), body weight (0.1g), sex, gonad stage, gonad weight (0.1g) and otoliths (start field code **WL-Gt 1**)

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Snapper (Chrysophrys auratus)



Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Bluespotted flathead (Platycephalus caeruleopunctatus)

Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as total length (TL) to the nearest whole cm below true length.

Blue swimmer crab (*Portunus pelagicus*)

Sample days

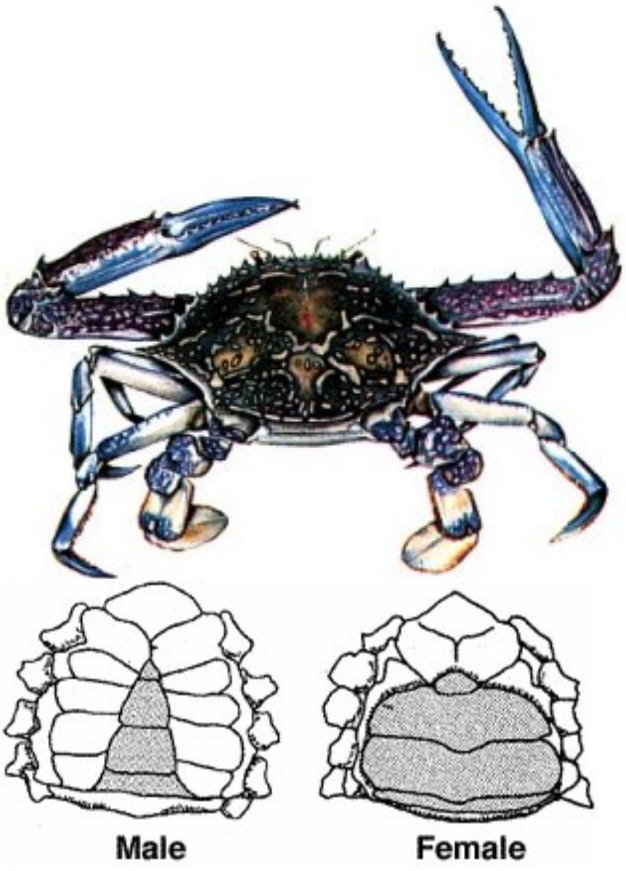
- 4 days/month

Lengths required

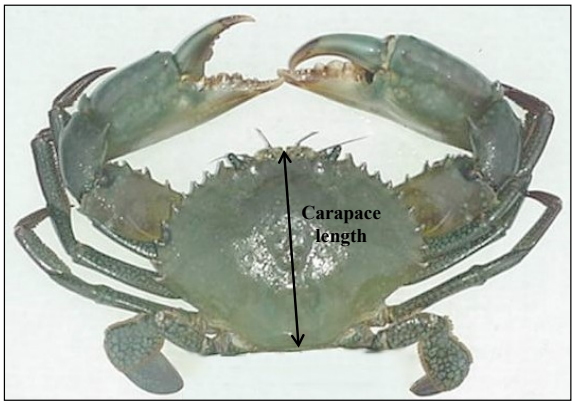
- Measure all crabs on the floor on the day of sampling unless the catch exceeds 50 individuals. Aim for 100 lengths in total each month.

- Measure as carapace length (CL) to the nearest millimetre with callipers (as per CL measurement for mud crabs).

- Please sex each crab and record a separate length frequency for each sex on the crab-specific length frequency data sheet (refer to section on data sheets in this document).



Mud crab (Scylla serrata)



Sample days

- 4 days per month

Lengths required

- Measure all crabs on the floor on the day of sampling.
- Measure as carapace length (CL) to the nearest whole millimetre below true length with callipers (see diagram below for CL measurement).
- A separate length frequency needs to be recorded for each sex, maturity AND grade (A, B or C).
- Please use the crab-specific data sheet for mud crabs

Pearl Perch (Glaucosoma scapulare)

Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Grey morwong (Nemadactylus douglasii)

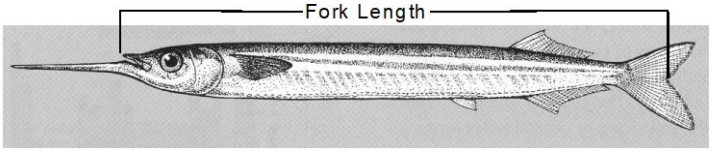
Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Sea garfish (Hyporhamphus australis)



Sample days

- Opportunistically up to 4 days per month

Lengths required

- Sea garfish are almost always graded by size. Sample from **each grade 80-100 fish** (approx. 3-10kgs depending on size). Make sure you weigh the sub-sample taken from each grade. If whole catch is ungraded then only need to do one sample of 80-100 length measurements
- Measure catches as fork length (FL - from the tip of the top jaw to the fork in the tail – see figure below) to the nearest whole cm below true length.
- You will need to record the total catch weight, total weight of each size grade and the total weight of the fish measured from each size grade.
- Try and measure from as many different fishermen as time allows.

Otoliths required

20 otoliths per catch taken proportionately from each grade. Field code **WL-Ha 1**

EQUIPMENT & PROCEDURES

Contact details

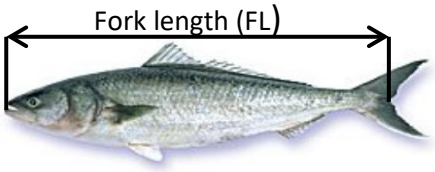
For sending log sheets, datasheets, otoliths or if any equipment needs to be replaced, please contact us via the following details:

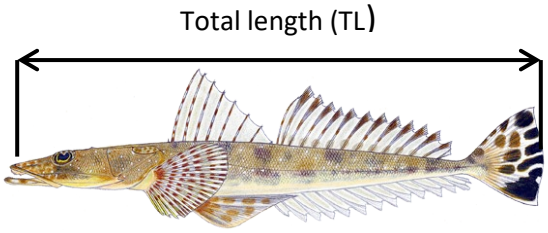
Anne-Marie Hegarty/Cailtin Young
NSW Fisheries
Sydney Institute of Marine Science
Bldg 19 Chowder Bay Road, Mosman, 2088, NSW
Ph. (02) 9435 468
Anne-Marie: 0416 289 042 and Caitlin: 0439 497 924
Fax (02) 9527 8459
Email: anne-marie.hegarty@dpi.nsw.gov.au or caitlin.young@dpi.nsw.gov.au

Or John Stewart on 9435 4668

Sampling Procedures – General

- Catches sampled should be ungraded (or graded as one size only) to reduce any bias.
- If sub-sampling is required be careful to sample from each size grade (unless specified otherwise in species protocol). If any size grade is unable to be sampled (e.g. if a buyer takes all boxes from one of the grades during the time you are sampling) discontinue sampling this catch or **do not sample this catch** at all i.e. **all grades need to be sampled.** If all grades are not sampled the data is unusable unless there is a component of the catch that is ungraded. If this is the case then measure all of the ungraded portion of the catch and indicate on the data sheet that the other size grades existed.
- When sub-sampling, each grade must be recorded separately on datasheets. The weight of the fish sampled and the total weight of the grade need to be recorded ('sampled' and "out of" respectively). Don't use the total catch weight – this may be written in the notes area as extra information
- Samples can be taken from single or multiple catches depending on the quantity available.
- If the entire sample is taken from a single catch then try to sample a different fisher during the next sample period to reduce bias (although not essential).
- If multiple catches of a species is sampled then the data from each fisher is to be kept separate.
- All fish are to be measured to the nearest 1 cm below actual fork length (FL) or (TL) if the species has no fork length, e.g. If the FL = 40.8cm it should be recorded as 40cm.





- Use a pencil to scribe length marks on the measuring board, using any method you find easiest to interpret later.
- Ensure datasheet (completed in pencil) is correctly labelled/completed.
- Transcribe data from the measuring board(s) to the datasheet(s) as early as possible to minimise any mistakes or confusion in regards to markings.
- After measuring, return the fish/invertebrate to the box with care. If the box was packed in a certain way then it must be re-packed exactly the same.

Otolith sampling procedures

- All data for these fish are collected separate from length frequency data.

- If the fish are whole then they must be purchased before removing the otoliths – see 'Purchasing fish samples' and 'Resale of fish' below for further details. When purchasing fish from multiple catches, complete each transaction separately. Don't mix fish from different catches.

- If the fish are gilled and gutted the otoliths can be removed without purchasing. Approval must be given by Co-op staff to do this. Once otoliths are removed make sure that all sharp parts such as bone fragments are removed from the fish and that the fish does not appear damaged in any way. If all is in order, return the fish to the box and to the floor/cool room.

- If, for example, 20 otoliths are required each month then take 10 otoliths from two different catches/sample days. If measuring approx. 100 fish, set every 10th fish aside (after measuring to the nearest whole cm below true length and recording on length frequency datasheet).

- Fish set aside need their FL or TL (if no fork) re-measured prior to otoliths being removed (to the nearest 0.1cm – not the nearest whole cm) and recorded on the measuring board (or Biological Data Sheet). Otoliths should be placed in an ice-tray for storage prior to cleaning.

- Otolith condition:
  - Whole otoliths are required for the next stage of processing.
  - If you have badly broken both otoliths for a fish, record this on the envelope and datasheet and place in envelope as normal. Please then take otoliths from an additional fish e.g. you will then have 11 otolith samples instead of 10 (spare blank envelopes are provided for extra monthly otolith samples).
  - If only one otolith is present, please note on the envelope.
  - Otoliths MUST be sent as soon as collected so that they can be checked by NSW DPI staff and if necessary extra fish can be sampled for that month as replacements.

- If practical, remove gill and guts of fish for resale (dispose of in an appropriate manner).

- Fish not for resale need to be disposed of in an appropriate manner such as disposal at the Co-op – see staff for procedure and location of bin.

- Before transferring otoliths to envelopes write any information including the date to prevent breakage.

- After all otoliths have been removed, clean with water and store in labelled envelopes (don't seal it down) Label the otolith envelopes with the species field code on the bottom left hand corner of each envelope. Record the corresponding field code in the notes column on the biological datasheet.

Data Sheets

Length Frequency Data Sheet (for finfish species)

The items underlined MUST be completed.

- Species
- Biological samples taken? Y / N – Yes, if fish put aside for otolith sample. No, if otolith sample is not taken from this sample.
- Date caught
- Location - where the fish were caught including whether caught in an estuary or ocean.
- Fisher – name of fisher who caught the fish
- Method used to catch the species (see Method list at the end of this document).
- Process - write any process here such as whole, frozen, etc. (see SFM process list at the end of this document).
- Disposal – the location that the sample was processed (e.g. Ballina Fishermen's Coop).
- Processed by – the individual processing the sample.
- Notes – any comments.
- Sample weight (kg) – weight of all fish measured.
- Out of - Total catch (or grade) weight (kg) – total weight of the catch the sample was taken from if the catch was of one grade only or ungraded OR total weight of the grade sampled.
- Size grade – e.g. ungraded, small, medium, large or x-large (see SFM Size Codes list at the end of this document).

Crab-specific length frequency datasheet

- The catch information on this data sheet is the same as that on the Length Frequency Data Sheet (for finfish species).
- Record a length frequency for each sex and maturity (i.e. immature and mature for both males and females) – there are heading fields allocated for this information.

Biological Data Sheet

- The catch information needed on the Biological Data Sheet is the same as that on the Length Frequency Data Sheet.
- The biological information required is species specific. Refer to individual specie protocols.

  - MetricID – leave blank.
  - Fish # – this is a number to identify each fish – Each monthly sample should start at 1 and increase by 1.
  - Grade – this is the size grading of the fish – X-small, small, medium, large, X-large, or ungraded – see SFM size codes at the end of this document for abbreviations/codes.
  - Sex – from examining gonad – male (M), female (F), juvenile (J), juvenile/male (JM), juvenile/female (JF), hermaphrodite (H) or unknown (U). **Leave blank unless specified in species protocol.**
  - Length - FL – fork length in cm (to the nearest 0.1cm).
  - Length - TL – Leave blank unless specified in species protocol.
  - Body weight (g) – whole weight in grams (to the nearest 0.1g if have electronic scales – leave blank unless specified in species protocol).
  - Gonad weight (g) – leave blank unless specified in protocol.
  - Gonad stage – leave blank unless specified in protocol.
  - EnvelopeID – **leave blank**.
  - Notes – Field code and comments.

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Fisheries staff or volunteers required to work at Fishermen's Co-operatives as part of their duties should at all times follow the procedures outlined below.

- Always comply with the policies issued by the SFM/Fish Co-op/business for personnel visiting or working, including any instructions given by their staff.

- Staff should have with them at all times the appropriate equipment to fulfil the OH&S requirements of NSW DPI and the Food Safe guidelines.

When on these premises the following must be worn:

- Protective clothing
- Protective footwear with non-slip soles
- Head covering i.e. Cap
- Clothing suitable for the cold temperatures
- When handling product – gloves

A first aid kit must be available at all times when working.

- At all times be aware of your surroundings, minimise risks to your health and safety as well as those people around you – at no time place market, co-operative staff, fishers or other personnel at risk with your operations.

If a staff member feels at any time that the work they are doing is compromising their health and safety they must cease those duties and notify their supervisor immediately. Duty of care is the responsibility of the individual and the manager.

Safe Food Handling Guidelines

Persons should be fully aware that the product held at fish receivers is for public consumption and therefore safe food handling vigilance is required at all times when entering or working on these premises. The following guidelines should be adhered to:

Personal hygiene

- Wash and dry hands thoroughly before handling product (even if using gloves).
- Do not enter premises if suffering from any illness with symptoms of fever, vomiting, diarrhoea or advised by GP not to handle food.
- Extra precautions must be taken if have any infections/cuts on hands, arms or face, or have discharge from nose, eyes or ears, including sufficient coverings (e.g. bandages, mask) to prevent contamination or taking medications to minimise symptoms. If possible do not work when in this condition.

Contamination prevention

- All contact surfaces (bench, measuring boards, gloves, stationary items etc) must be cleaned prior to touching product and regularly during task.
- Only food-safe cleaning products to be used and items rinsed thoroughly to remove any residue.
- At no time should hazardous substances or contaminated equipment come in contact with product, this includes being used in areas where product may move through.

Temperature control

- Product must be kept cold at all times
  - Leave in cold storage until needed
  - Ice workbench under product
  - Return ice to fish boxes and top-up if not sufficient
- Minimise handling times.

Remember that product being handled is sold for human consumption and must be treated safely to prevent any risk to health.

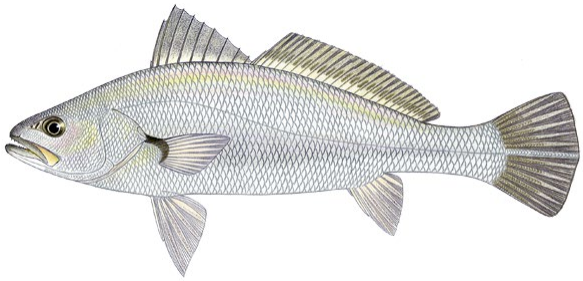
Appendix I - Newcastle and Nelson Bay co-op sampling procedures July 2018 – June 2019

Sampling schedule

2018/19	Nelson Bay	Newcastle
Bluespotted flathead	4 days/month	4 days/month
Eastern School Whiting		2 days month
Eastern Sea Garfish	Opportunistic 20 otos per catch	
Giant Mud Crab		4 days/month
Grey Morwong	4 days/month	Opportunistic
Mulloway	Opportunistic	4 days/month
Snapper	Opportunistic	Opportunistic
Silver Trevally	Opportunistic	4 days/month
Luderick	4 days/month 20 otos/month	

SAMPLING PROTOCOLS

Mulloway (Argyrosomus japonicus)



Sample days

- 4 days/month

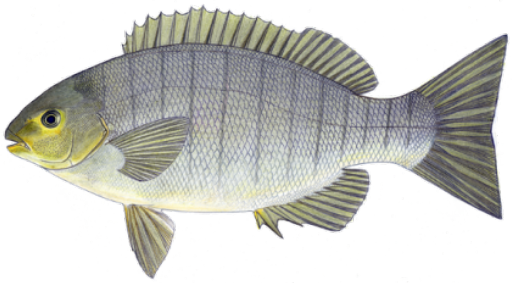
Lengths required

- Measure all the catches of mulloway on the floor on the day of sampling.
- Measure catches as total length (TL) to the nearest whole cm below true length.

Otoliths required

- Any otoliths that are required for Angela and DJ's project

Luderick (Girella tricuspidata)



Sample days

- 4 days/month

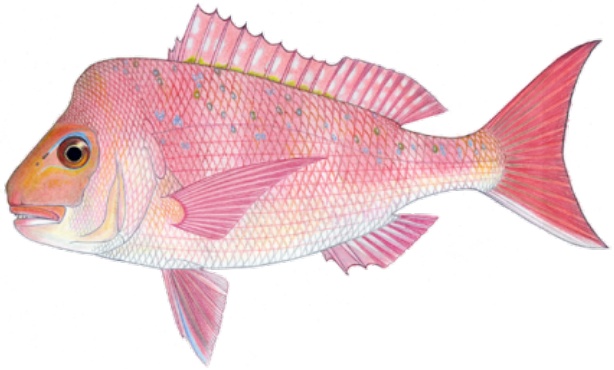
Otoliths required

- **NELSON BAY -** 20 otoliths per month taken from either one or two catches. Take fish proportionately from each grade if catches are graded
- Collect fork length (0.1 cm), body weight (0.1g), sex, gonad stage, gonad weight (0.1g) and otoliths (start field code **NB-Gt 1**)

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Snapper (Chrysophrys auratus)



Sample days

- 4 days/month

Lengths required

- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Bluespotted flathead (Platycephalus caeruleopunctatus)

Sample days

- 4 days/month

Lengths required

- Measure FISH TRAWL catches only
- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as total length (TL) to the nearest whole cm below true length.

Silver trevally (Pseudocaranx georgianus)

Sample days

- 4 days/month

Lengths required

- Measure from both fish trawl and ocean trap and line catches
- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Grey morwong (Nemadactylus douglasii)

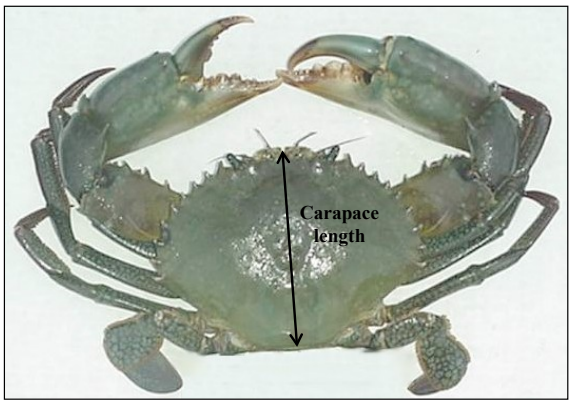
Sample days

- Opportunistically up to 4 days per month

Lengths required

- Measure from both fish trawl and ocean trap and line catches
- Measure all the catches on the floor on the day and time of sampling.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Mud crab (Scylla serrata)



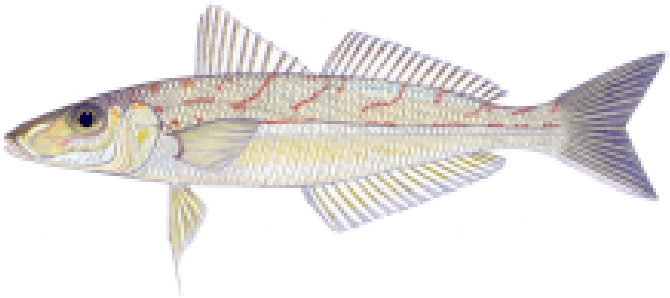
Sample days

- 4 days per month

Lengths required

- Measure all crabs on the floor on the day of sampling.
- Measure as carapace length (CL) to the nearest whole millimetre below true length with callipers (see diagram below for CL measurement).
- A separate length frequency needs to be recorded for each sex and maturity
- Please record total weights by GRADE of individual catches in the notes section of the crab-specific datasheet

Eastern School Whiting (Sillago flindersi)



Sample days

- 2 days per month

Lengths required

- Measure from ocean trawl catches on the floor. Try and measure from as many different fishermen as time allows.
- Sub-sampling will be required for large catches. Aim for 80-100 fish per grade (if catches are graded). Make sure to weigh the sub-sample of fish measured.
- Aim to sample export catches when the Danish seiner is fishing
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Sea garfish (Hyporhamphus australis)

Sample days

- Opportunistically up to 4 days per month between December 2018 to April 2019.

Lengths required

- Sea garfish are almost always graded by size. Sample from **each grade 80-100 fish** (approx. 3-10kgs depending on size). Make sure you weigh the sub-sample taken from each grade. If whole catch is ungraded then only need to do one sample of 80-100 length measurements

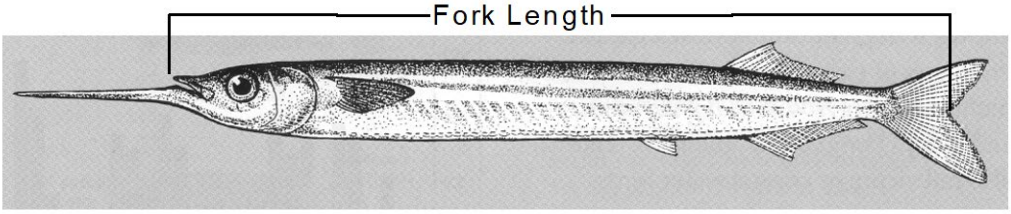
- Measure catches as fork length (FL - from the tip of the top jaw to the fork in the tail – see figure below) to the nearest whole cm below true length.

- You will need to record the total catch weight, total weight of each size grade and the total weight of the fish measured from each size grade.

- Try and measure from as many different fishermen as time allows.

Otoliths required

20 otoliths per catch taken proportionately from each grade. Field code **WL**



EQUIPMENT & PROCEDURES

Contact details

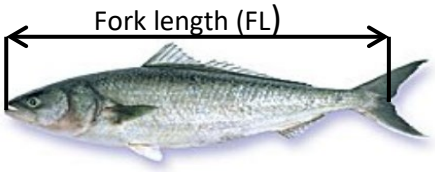
For sending log sheets, datasheets, otoliths or if any equipment needs to be replaced, please contact us via the following details:

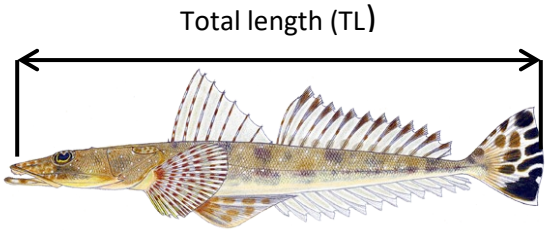
Anne-Marie Hegarty/Cailtin Young
NSW Fisheries
Sydney Institute of Marine Science
Bldg 19 Chowder Bay Road, Mosman, 2088, NSW
Ph. (02) 9435 468
Anne-Marie: 0416 289 042 and Caitlin: 0439 497 924
Fax (02) 9527 8459
Email: anne-marie.hegarty@dpi.nsw.gov.au or caitlin.young@dpi.nsw.gov.au

Or John Stewart on 9435 4668

Sampling Procedures – General

- Catches sampled should be ungraded (or graded as one size only) to reduce any bias.
- If sub-sampling is required be careful to sample from each size grade (unless specified otherwise in species protocol). If any size grade is unable to be sampled (e.g. if a buyer takes all boxes from one of the grades during the time you are sampling) discontinue sampling this catch or **do not sample this catch** at all i.e. **all grades need to be sampled.** If all grades are not sampled the data is unusable unless there is a component of the catch that is ungraded. If this is the case then measure all of the ungraded portion of the catch and indicate on the data sheet that the other size grades existed.
- When sub-sampling, each grade must be recorded separately on datasheets. The weight of the fish sampled and the total weight of the grade need to be recorded ('sampled' and "out of" respectively). Don't use the total catch weight – this may be written in the notes area as extra information
- Samples can be taken from single or multiple catches depending on the quantity available.
- If the entire sample is taken from a single catch then try to sample a different fisher during the next sample period to reduce bias (although not essential).
- If multiple catches of a species is sampled then the data from each fisher is to be kept separate.
- All fish are to be measured to the nearest 1 cm below actual fork length (FL) or (TL) if the species has no fork length, e.g. If the FL = 40.8cm it should be recorded as 40cm.





- Use a pencil to scribe length marks on the measuring board, using any method you find easiest to interpret later.
- Ensure datasheet (completed in pencil) is correctly labelled/completed.
- Transcribe data from the measuring board(s) to the datasheet(s) as early as possible to minimise any mistakes or confusion in regards to markings.
- After measuring, return the fish/invertebrate to the box with care. If the box was packed in a certain way then it must be re-packed exactly the same.

Otolith sampling procedures

- All data for these fish are collected separate from length frequency data.

- If the fish are whole then they must be purchased before removing the otoliths – see 'Purchasing fish samples' and 'Resale of fish' below for further details. When purchasing fish from multiple catches, complete each transaction separately. Don't mix fish from different catches.

- If the fish are gilled and gutted the otoliths can be removed without purchasing. Approval must be given by Co-op staff to do this. Once otoliths are removed make sure that all sharp parts such as bone fragments are removed from the fish and that the fish does not appear damaged in any way. If all is in order, return the fish to the box and to the floor/cool room.

- If, for example, 20 otoliths are required each month then take 10 otoliths from two different catches/sample days. If measuring approx. 100 fish, set every 10th fish aside (after measuring to the nearest whole cm below true length and recording on length frequency datasheet).

- Fish set aside need their FL or TL (if no fork) re-measured prior to otoliths being removed (to the nearest 0.1cm – not the nearest whole cm) and recorded on the measuring board (or Biological Data Sheet). Otoliths should be placed in an ice-tray for storage prior to cleaning.

- Otolith condition:
  - Whole otoliths are required for the next stage of processing.
  - If you have badly broken both otoliths for a fish, record this on the envelope and datasheet and place in envelope as normal. Please then take otoliths from an additional fish e.g. you will then have 11 otolith samples instead of 10 (spare blank envelopes are provided for extra monthly otolith samples).
  - If only one otolith is present, please note on the envelope.
  - Otoliths MUST be sent as soon as collected so that they can be checked by NSW DPI staff and if necessary extra fish can be sampled for that month as replacements.

- If practical, remove gill and guts of fish for resale (dispose of in an appropriate manner).

- Fish not for resale need to be disposed of in an appropriate manner such as disposal at the Co-op – see staff for procedure and location of bin.

- Before transferring otoliths to envelopes write any information including the date to prevent breakage.

- After all otoliths have been removed, clean with water and store in labelled envelopes (don't seal it down) Label the otolith envelopes with the species field code on the bottom left hand corner of each envelope. Record the corresponding field code in the notes column on the biological datasheet.

Data Sheets

Length Frequency Data Sheet (for finfish species)

The items underlined MUST be completed.

- Species
- Biological samples taken? Y / N – Yes, if fish put aside for otolith sample. No, if otolith sample is not taken from this sample.
- Date caught
- Location - where the fish were caught including whether caught in an estuary or ocean.
- Fisher – name of fisher who caught the fish
- Method used to catch the species (see Method list at the end of this document).
- Process - write any process here such as whole, frozen, etc. (see SFM process list at the end of this document).
- Disposal – the location that the sample was processed (e.g. Ballina Fishermen's Coop).
- Processed by – the individual processing the sample.
- Notes – any comments.
- Sample weight (kg) – weight of all fish measured.
- Out of - Total catch (or grade) weight (kg) – total weight of the catch the sample was taken from if the catch was of one grade only or ungraded OR total weight of the grade sampled.
- Size grade – e.g. ungraded, small, medium, large or x-large (see SFM Size Codes list at the end of this document).

Crab-specific length frequency datasheet

- The catch information on this data sheet is the same as that on the Length Frequency Data Sheet (for finfish species).
- Record a length frequency for each sex and maturity (i.e. immature and mature for both males and females) – there are heading fields allocated for this information.

Biological Data Sheet

- The catch information needed on the Biological Data Sheet is the same as that on the Length Frequency Data Sheet.
- The biological information required is species specific. Refer to individual specie protocols.

  - MetricID – leave blank.
  - Fish # – this is a number to identify each fish – Each monthly sample should start at 1 and increase by 1.
  - Grade – this is the size grading of the fish – X-small, small, medium, large, X-large, or ungraded – see SFM size codes at the end of this document for abbreviations/codes.
  - Sex – from examining gonad – male (M), female (F), juvenile (J), juvenile/male (JM), juvenile/female (JF), hermaphrodite (H) or unknown (U). **Leave blank unless specified in species protocol.**
  - Length - FL – fork length in cm (to the nearest 0.1cm).
  - Length - TL – Leave blank unless specified in species protocol.
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  - Gonad weight (g) – leave blank unless specified in protocol.
  - Gonad stage – leave blank unless specified in protocol.
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