The NSW Commercial Fisheries Port Monitoring Program

Data summary report for 2019/20

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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 whiting spp., 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
- 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 and/or management. 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. 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 2019/20 are presented below for each species separately. A brief commentary on how well the sampling met the aims is provided for each species.

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 2019/20: **1**

Data and Monitoring Plan for 2019/20

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

Although Bluespotted Flathead were scheduled for age and lengths in 2018/19 - sampling from the OPT observer program did not occur as planned, so the overall numbers of otoliths collected (n=119) were insufficient. An updated age-length key is required for age-structured population modelling to estimate an RBC for this species for TAF setting.

Aim of the Port Monitoring sampling for 2019/20

To collect size and age composition data that are representative of the NSW commercial fishery.

Sampling design

Length frequency data were collected through Maclean/Iluka, Nelson Bay and Newcastle Fishermen's co-operatives and the Sydney Fish Markets. For each location, all catches 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 ocean zone 2, 15 fish from zone 5 and 15 fish from the Sydney trawl fleet (zones 5, 6 and 7), with opportunistic samples from south coast were 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 2019/20.

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													81041.5

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

Table 2. The number of days sampled for Bluespotted Flathead by month and area during 2019/20. 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	4	6	4	4	3	3		3	4	4	3		38
Zone 3													
Zone 4			1										1
Zone 5	4	6	6	2	1	1	2	1	2	3	4	1	33
Zone 6	1	2	1	1	2	4	4			1	1	2	19
Zone 7					3						2		5
Zone 8							1			1	1	2	5
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)	9	15	12	7	9	8	7	4	6	9	11	5	102

Total	9	15	12	7	9	8	7	4	6	9	11	5	102

Table 3. The number of catches sampled for Bluespotted Flathead by month and area during 2019/20. 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	15	12	9	16	4	8		4	5	5	4		82
Zone 3													
Zone 4			1										1
Zone 5	6	8	9	2	1	1	2	1	4	3	4	1	42
Zone 6	1	2	3	2	2	4	4			2	1	3	24
Zone 7					3						2		5
Zone 8							1			1	1	2	5
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)	22	23	22	20	10	13	7	5	9	11	12	6	160

Total	22	23	22	20	10	13	7	5	9	11	12	6	160

Table 4. The number of fish sampled for Bluespotted Flathead by month and area during 2019/20. 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	748	301	846	750	131	127		78	87	151	93		3312
Zone 3													
Zone 4			112										112
Zone 5	1219	1032	1451	410	215	42	126	22	299	695	983	58	6552
Zone 6	210	455	339	457	371	696	355			232	183	230	3528
Zone 7					429						196		625
Zone 8							111			36	168	394	709
Zone 9		106											106
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)	2177	1894	2748	1617	1146	865	592	100	386	1114	1623	682	14944
Total	2177	1894	2748	1617	1146	865	592	100	386	1114	1623	682	14944

Table 5. The number of fish sampled for ageing Bluespotted Flathead by month and area during 2019/20. 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	10	10	10	10	10	10			10	10	10		90
Zone 3													
Zone 4													
Zone 5	15	15	15	15			20		45	20			145
Zone 6	15		13	15		15	30			15	15	19	137
Zone 7		15			14			15			20		64
Zone 8											14	17	31
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)	40	40	38	40	24	25	50	15	55	45	59	36	467
Total	40	40	38	40	24	25	50	15	55	45	59	36	467

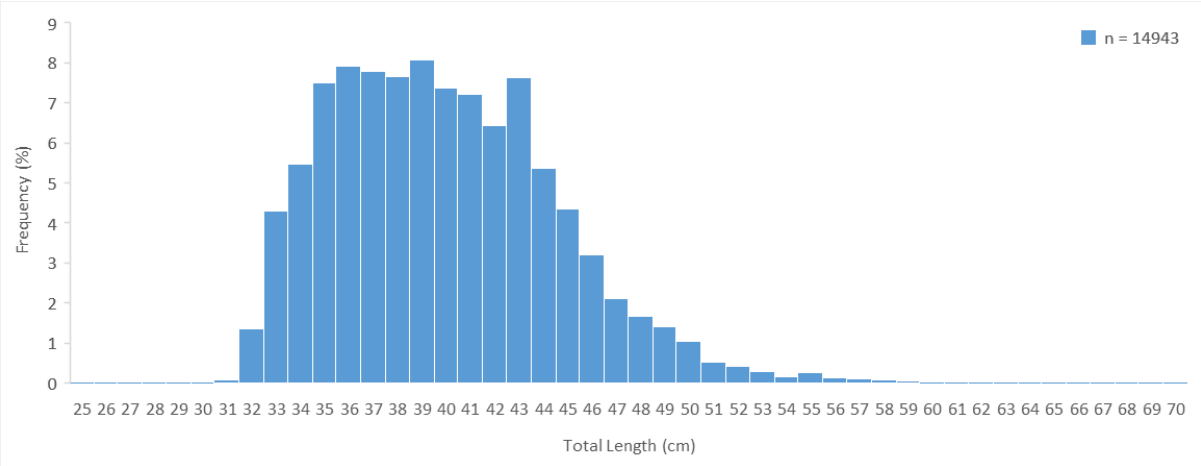

Figure 1. Length composition of Bluespotted Flathead landed by the commercial fishery during 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

Sampling across ocean zones was deemed to be representative of the NSW commercial fishery. The number of days and catches sampled per month were sometimes below the target as catches through Sydney Fish Market were at times sporadic.

Eastern King Prawn

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	New South Wales	OTF	Sustainable	Biomass; catch, effort and CPUE relative to MSY reference points; fishery-independent index of recruit abundance

OTF Ocean Trawl Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2019/20: **7**

Data and Monitoring Plan for 2019/20

Ranking for Port Monitoring **5**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **5**

Rank for ages – **not required**

Species lead commentary

Other sampling has concluded so Port Monitoring should re-commence.

Aim of the Port Monitoring sampling for 2019/20

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

Sampling design

Length Frequency data from the Ocean Prawn Trawl Fishery were collected through Ballina, Maclean/Iluka, Coffs Harbour and Newcastle Fishermen's Co-ops. For each location 2-3 catches per day of sampling were sampled. Eastern King Prawns were sexed and measured for carapace length: a straight line from the base of the eye socket to the centre of the posterior margin of the carapace (i.e. the back of the carapace) as shown in Figure 1. Carapace length is measured in millimeters (mm).

Eastern King Prawn 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

All Eastern King Prawn catches are graded, generally into Jumbo, XL, L, M, S/M or S. All grades are sampled; at least 50 prawns from each grade.

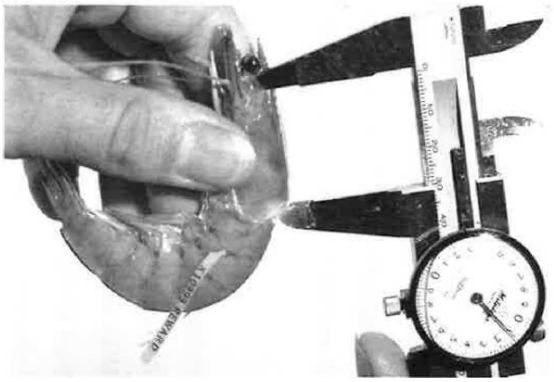

Figure 1. Carapace length of a prawn being measured using calipers. Note the locations of the caliper jaws at the back of the eye socket and back of the carapace.

Results

Table 1. Reported landings heat map of Eastern King Prawn by month and area during 2019/20.

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													707543

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

Table 2. The number of days sampled for Eastern King Prawn by month and area during 2019/20. 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	4	4	3	3	4	3	4	3	2	4		3	37
Zone 2	3	3	5	3	4	1	1	3	5	3	2		33
Zone 3	4	4	4	2	5	5	3	3	5	3	4	3	45
Zone 4													
Zone 5	2	1											3
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)	13	12	12	8	13	9	8	9	12	10	6	6	118
Total	13	12	12	8	13	9	8	9	12	10	6	6	118

Table 3. The number of catches sampled for Eastern King Prawn by month and area during 2019/20. 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	4	6	8	7	12	6	11	8	7	9		5	83
Zone 2	4	3	5	4	4	3	1	4	5	4	2		39
Zone 3	5	4	6	4	10	7	6	6	6	5	7	6	72
Zone 4													
Zone 5	2	1											3
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)	15	14	19	15	26	16	18	18	18	18	9	11	197

Total	15	14	19	15	26	16	18	18	18	18	9	11	197

Table 4. The number of individuals sampled for Eastern King Prawn by month and area during 2019/20. 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	209	500	788	869	1312	553	1238	991	503	953		559	8475
Zone 2	795	650	1050	769	825	498	150	650	800	600	300		7087
Zone 3	700	650	900	586	1497	1125	900	900	950	800	1050	900	10958
Zone 4													
Zone 5	204	101											305
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)	1908	1901	2738	2224	3634	2176	2288	2541	2253	2353	1350	1459	26825

Total	1908	1901	2738	2224	3634	2176	2288	2541	2253	2353	1350	1459	26825

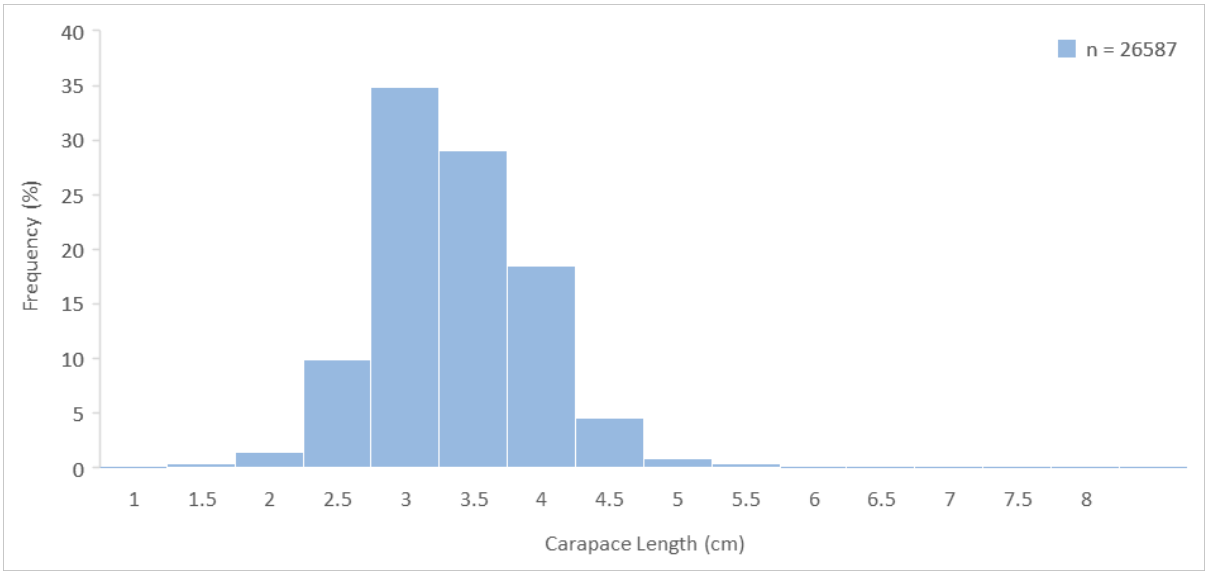

Figure 1. Length composition of Eastern King Prawn landed by the commercial fishery for 2019/20. Prawns were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

The target number of catches measured per sampling day proved to be unfeasible for most coops. Commonly catches had up to 5 or 6 different grades and needed to move quickly through the coop process for transport; this made sampling multiple catches per day difficult.

Eastern School Prawn

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	New South Wales	EGF, EPTF, OTF	Sustainable	Catch, CPUE, environmental models

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

Prioritization and justification

Species Priority Ranking for 2019/20: ***21***

Data and Monitoring Plan for 2019/20

Ranking for Port Monitoring **12**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **12**

Rank for ages – **not required**

Species lead commentary

Due to current issues surrounding prawn counts in Clarence River, it would be good to recommence the co-op sampling program for this species.

Aim of the Port Monitoring sampling for 2019/20

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

Sampling design

Length Frequency data from Estuary General Fishery, Estuarine Prawn Trawl Fishery and Ocean Trawl Fishery were collected through Clarence River Fishermen's Co-op and the Sydney Fish Markets. Sampling primarily focused on the Clarence River, Wallis Lake, Hunter River and Hawkesbury River. For each location, 2-3 catches per day of sampling were sampled. School Prawns were sexed and measured for carapace length: a straight line from the base of the eye socket to the centre of the posterior margin of the carapace (i.e. the back of the carapace) as shown in Figure 1. Carapace length is measured in millimeters (mm).

School Prawn 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

School Prawn catches are usually graded into XL, L or U. All grades are sampled; at least 50 prawns from each grade.

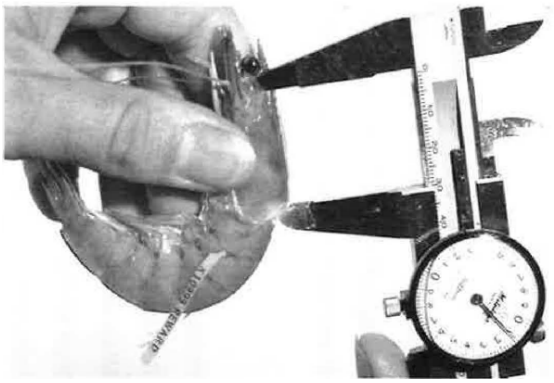

Figure 1. Carapace length of a prawn being measured using calipers. Note the locations of the caliper jaws at the back of the eye socket and back of the carapace.

Results

Table 1. Reported landings heat map of School Prawn by month and area during 2019/20.

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													701969

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

Table 2. The number of days sampled for School Prawn by month and area during 2019/20. 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													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1						1			1				2
EG Region 2				3	3	4	2	4	5	3	3	2	29
EG Region 3													
EG Region 4							4	2	1	1	1		9
EG Region 5				3	3	4	2	2	2	2	2	1	21
EG Region 6													
EG Region 7													
Total (area known)	0	0	0	6	6	9	8	8	9	7	6	3	62
Total	0	0	0	6	6	9	8	8	9	7	6	3	62

Table 3. The number of catches sampled for School Prawn by month and area during 2019/20. 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													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1						1			1				2
EG Region 2				7	5	5	3	8	6	6	6	6	52
EG Region 3													
EG Region 4							4	2	2	1	1		10
EG Region 5				4	4	5	3	4	3	4	3	1	31
EG Region 6													
EG Region 7													

Total (area known)	0	0	0	11	9	11	10	14	12	12	10	7	96

Total	0	0	0	11	9	11	10	14	12	12	10	7	96

Table 4. The number of School Prawn sampled by month and area during 2019/20. 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										48			48
Zone 3													
Zone 4													
Zone 5													
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1						130			161				291
EG Region 2				1100	669	582	260	1010	881	843	853	734	6932
EG Region 3													
EG Region 4							546	320	174	231	235		1506
EG Region 5				462	280	422	162	264	169	333	453	159	2704
EG Region 6													
EG Region 7													

Total (area known)	0	0	0	1562	949	1134	968	1594	1385	1455	1541	893	11481

Total	0	0	0	1562	949	1134	968	1594	1385	1455	1541	893	11481

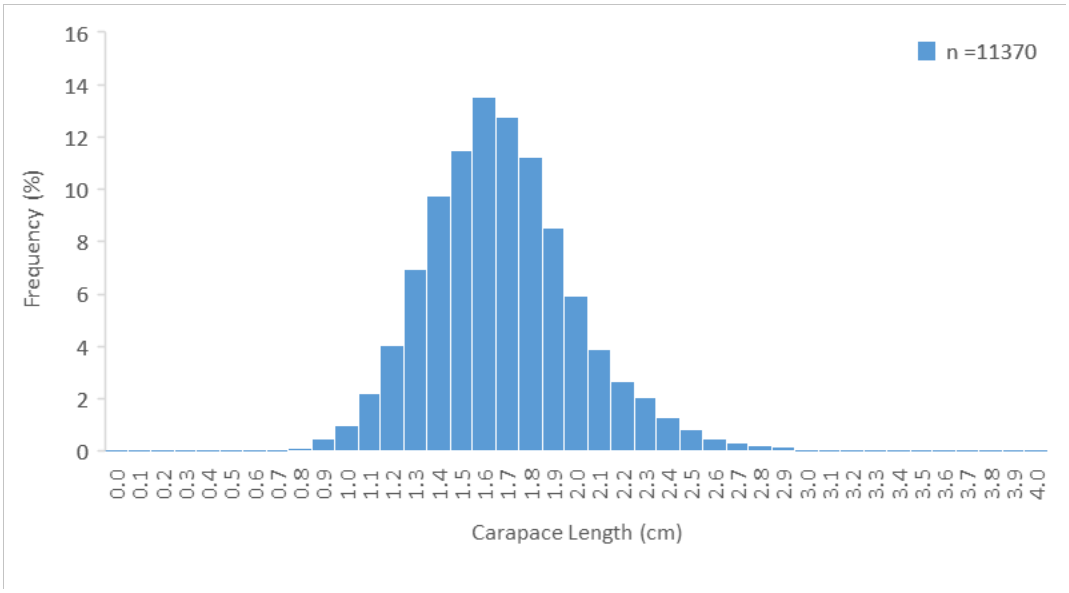

Figure 2. Length composition of School Prawn landed by the commercial fishery for 2019/20. Prawns were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

Catches sampled from Wallis Lake did not meet target numbers. This was due to the Wallis Lake co-op board preventing NSWDPI staff from monitoring landings in the co-op and a subsequent decision to sample prawns from Wallis Lake through the Sydney Fish Market. Inconsistent and late arrival times of the transport truck and limited resources resulted in a low interception rate with School Prawn consigned for sale. Nevertheless, excellent coverage of landings from the most productive area of the fishery resulted in a robust length sample.

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 2019/20: **2**

Data and Monitoring Plan for 2019/20

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

Although ESW were scheduled for age and lengths in 2018/19 - sampling from the OPT observer program did not occur as planned, so the overall numbers of otoliths collected (n=70) were insufficient. Updated age structure data from NSW waters is required to inform an update of the Commonwealth Tier 1 assessment in 2020/21.

Aim of the Port Monitoring sampling for 2019/20

To collect size composition data that are representative of the commercial trawl fishery. To collect fish for otolith sampling to support stock assessment.

Sampling design

Export box sampling was undertaken at Iluka and Coffs Harbour Fishermen's co-operatives, where length frequencies were recorded along with the species split of Eastern School Whiting: Stout Whiting. A small number of each species was also processed for ageing. Approximately one 5-8 kg export box was purchased per month from each location. 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 15 fish from ocean zones 5 and either 6 or 7 was also purchased at Sydney Fish Market 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 2019/20.

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													924006

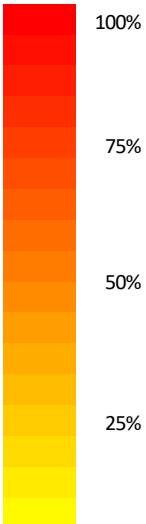

Table 2. The number of days sampled for Eastern School Whiting by month and area during 2019/20. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	5	2	2	2	1	2	1	1	1	1		1	19
Zone 3	1	1			1				1	1	1	1	7
Zone 4													
Zone 5	2	1	1	1	1	1		2	1	4	2	1	17
Zone 6	1	1			1		2			1	2	1	9
Zone 7	1		1	1	1		1		1			1	7
Zone 8						1		1	1	1	1		5
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)	10	5	4	4	5	4	4	4	5	8	6	5	64
Total	10	5	4	4	5	4	4	4	5	8	6	5	64

Table 3. The number of catches sampled for Eastern School Whiting by month and area during 2019/20. 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	6	4	4	3	2	4	2	1	2	2		2	32
Zone 3	2	2			2				2	2	2	2	14
Zone 4													
Zone 5	2	1	1	1	1	1		2	1	4	2	1	17
Zone 6	1	1			1		2			1	2	1	9
Zone 7	2		1	1	1		1		1			1	8
Zone 8						1		1	1	1	1		5
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)	13	8	6	5	7	6	5	4	7	10	7	7	85

Table 4. The number of fish sampled for Eastern School Whiting by month and area during 2019/20. 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	342	171	175	82	44	94	115	86	93	8		137	1347
Zone 3	261	42			50				72	48	48	222	743
Zone 4													
Zone 5	371	168	15	5	14	15		30	15	133	45	15	826
Zone 6	206	15			15		31			15	30	15	327
Zone 7	128		15	15	15		15		15			15	218
Zone 8						15		15	15	15	17		77
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)	1308	396	205	102	138	124	161	131	210	219	140	404	3538
Total	1308	396	205	102	138	124	161	131	210	219	140	404	3538

Table 5. The number of fish sampled for ageing Eastern School Whiting by month and area during 2019/20. 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	46	51	48	48	22	41	22		22	4		23	327
Zone 3		21			25				36	24	24	22	152
Zone 4													
Zone 5	20		15	5	14	15		30	15	47	38	15	214
Zone 6		15			15		31			15	30	15	121
Zone 7	15		15	15	15		15		15			15	105
Zone 8						15		15	15	15	17		77
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)	81	87	78	68	91	71	68	45	103	105	109	90	996
Total	81	87	78	68	91	71	68	45	103	105	109	90	996

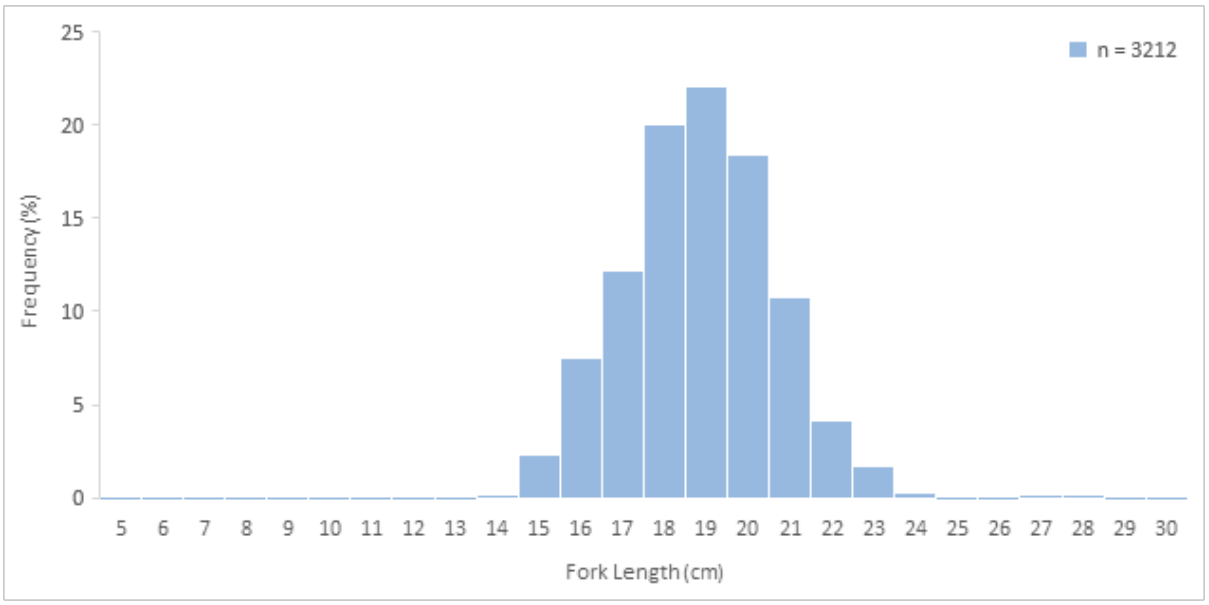

Figure 1. Length composition of Eastern School Whiting landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

Extra samples from the Maclean and Coffs Harbour coop floor, as well as the Sydney Fish Market, were taken throughout the month of July before protocols were finalised.

Given that the largest landings in this fishery are not available for port monitoring, as they are transported directly from the Newcastle port to processing facilities, a review of the likely representativeness of existing port monitoring via the co-ops and Sydney Fish Markets is recommended. Noting that these very large landings are from the largest trawl vessel and the only Danish Seiner in the fishery that is likely to have differing selectivity to smaller trawl vessels.

Ongoing issues at the Sydney Fish Markets with partial catches being sold prior to auction and not available for sampling are also making the utility of ongoing port monitoring for Eastern School Whiting questionable.

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 2019/20: ***29***

Data and Monitoring Plan for 2019/20

Ranking for Port Monitoring **16**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **16**

Rank for ages – **11**

Species lead commentary

Data and Monitoring Plan required length and age-based assessment. Previously the stock was overfished and is still under pressure. Length and Age monitoring required.

Aim of the Port Monitoring sampling for 2019/20

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

- 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. Collect ototliths from 2 catches per month; 40 otoliths in total per month.

Field code **NB-Ha 1**

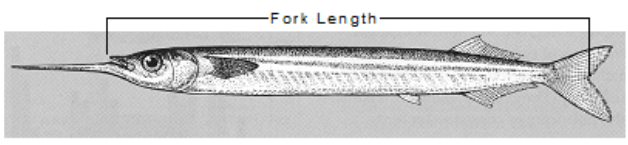

Figure 1. Sea Garfish sampling instructions for Nelson Bay

Results:

Table 1. Reported landings heat map of Eastern Sea Garfish by month and area during 2019/20.

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													33899.9

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 2019/20. 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	9	9	3		23
Zone 6													
Zone 7							4			1	1		6
Zone 8						1							1
Zone 9													
Zone 10	1										1		2
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	1	1						5	4	2			13
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	2	1	0	0	0	1	4	7	13	12	5	0	45
Total	2	1	0	0	0	1	4	7	13	12	5	0	45

Table 3. The number of catches sampled for Eastern Sea Garfish by month and area during 2019/20. 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	10	10	3		25
Zone 6													
Zone 7							4			1	1		6
Zone 8						1							1
Zone 9													
Zone 10	1										1		2
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	1	1						5	4	2			13
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	2	1	0	0	0	1	4	7	14	13	5	0	47
Total	2	1	0	0	0	1	4	7	14	13	5	0	47

Table 4. The number of fish sampled for Eastern Sea Garfish by month and area during 2019/20. 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								191	1147	1071	391		2800
Zone 6													
Zone 7							1001			257	204		1462
Zone 8						146							146
Zone 9													
Zone 10	180										130		310
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4	149	65						704	600	285			1803
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	329	65	0	0	0	146	1001	895	1747	1613	725	0	6521
Total	329	65	0	0	0	146	1001	895	1747	1613	725	0	6521

Table 5. The number of fish sampled for ageing Eastern Sea Garfish by month and area during 2019/20. 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								40	179	160	39	20	438
Zone 6													
Zone 7							60			20	18		98
Zone 8						20							20
Zone 9													
Zone 10	10												10
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4								60	40	20			120
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	10	0	0	0	0	20	60	100	219	200	57	20	686
Total	10	0	0	0	0	20	60	100	219	200	57	20	686

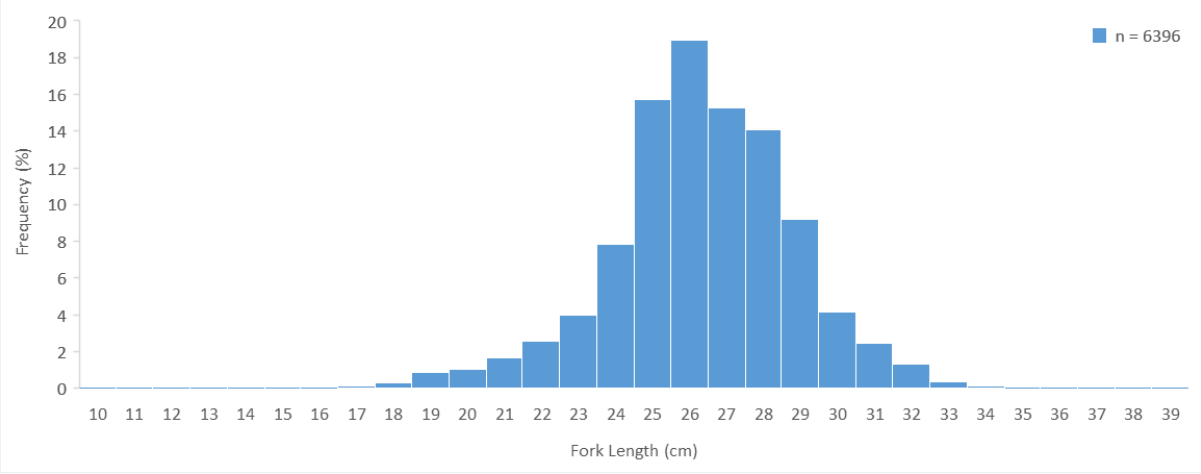

Figure 2. Length composition of Eastern Sea Garfish landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

The distribution of sampling approximated the fishery landings. Twenty-five catches were sampled at a fisher's personal processing shed in ocean zone 5.

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 2019/20: ***6***

Data and Monitoring Plan for 2019/20

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

Length Frequency data required to investigate/ determine if QMS results in changes in harvesting strategies (sizes and sexes). Potentially removed once assessment methodology defined. Extending port monitoring to 2019/20 will allow a 2-year comparison to the LF data collected via the MEMS EG trap survey (4700 crabs measured yr. 1).

Aim of the Port Monitoring sampling for 2019/20

To collect size composition data that are representative of the commercial landed catch from the Clarence River and Coffs Harbour Fishermen's Coop.

Sampling design

Length Frequency data from the Estuary General Fishery were collected through the Clarence River Fishermen's co-operative and Coffs Harbour 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 2019/20.

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													115887

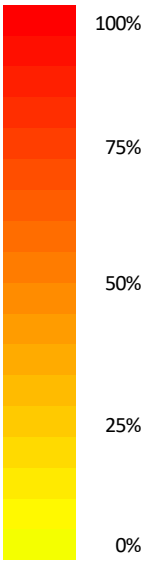

Table 2. The number of days sampled for Giant Mud Crab by month and area during 2019/20. The shaded heat map represents the reported commercial landings.

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	2	2	2	2	2	2	1	2	2	2	2	2	23
EG Region 3	4	3	5	5	4	3	4	5	5	4	6	2	50
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	6	5	7	7	6	5	5	7	7	6	8	4	73
Total	6	5	7	7	6	5	5	7	7	6	8	4	73

Table 3. The number of catches sampled for Giant Mud Crab by month and area during 2019/20. 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	4	3	3	5	5	2	5	9	7	7	4	58
EG Region 3	6	3	5	5	4	4	4	5	8	5	8	3	60
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	10	7	8	8	9	9	6	10	17	12	15	7	118
Total	10	7	8	8	9	9	6	10	17	12	15	7	118

Table 4. The number of Giant Mud Crabs sampled by month and area during 2019/20. 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	102	162	58	23	269	242	270	245	380	275	296	142	2464
EG Region 3	116	78	100	74	131	195	373	286	458	251	294	169	2525
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	218	240	158	97	400	437	643	531	838	526	590	311	4989

Total	218	240	158	97	400	437	643	531	838	526	590	311	4989

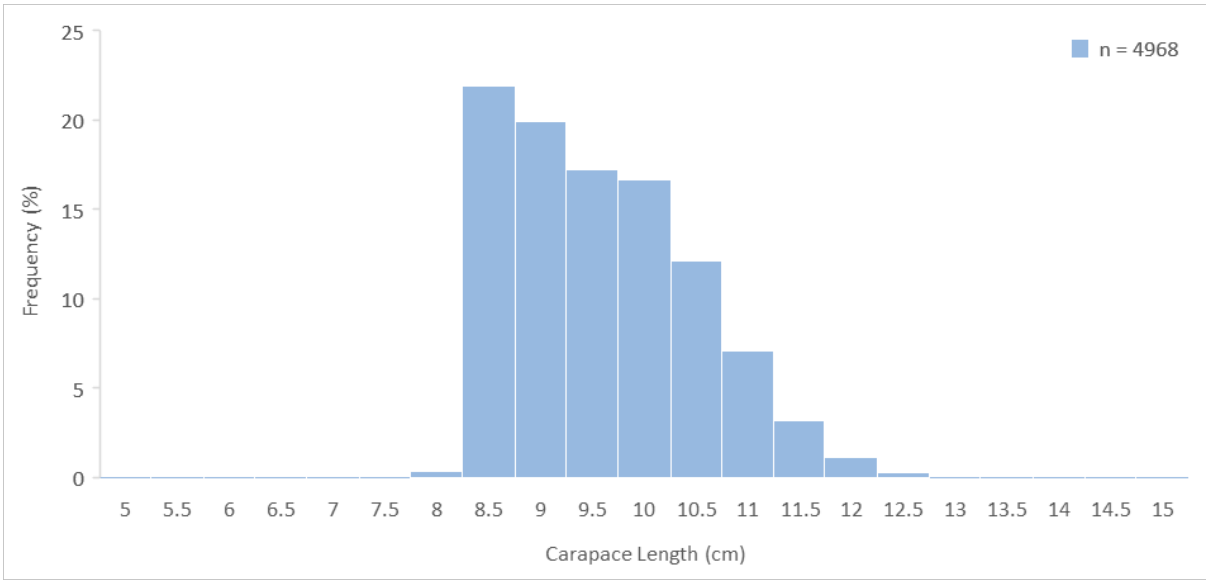

Figure 1. Length composition of Giant Mud Crab landed by the commercial fishery for 2019/20. Crabs were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

The distribution of sampling, for the most part, approximated the fishery landings.

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 2019/20: ***11***

Data and Monitoring Plan for 2019/20

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

Annual lengths and ages required for assessment. Comparison with Charter boat observer program. Last aged 2015/16 with no improvement in stock. Given SAFS status of Depleted it is more important to update the assessment. Will seek Commonwealth input too.

Aim of the Port Monitoring sampling for 2019/20

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 as many ocean zones as possible through Iluka/Maclean Fishermen's co-operative, Coffs Harbour Fishermen's co-operative and the Sydney Fish Markets. For each location, all catches 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 2019/20.

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													23530.3

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

Table 2. The number of days sampled for Grey Morwong by month and area during 2019/20. 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							1						1
Zone 2	1	1	1			1	1	1	1				7
Zone 3	2	4	4	3	2	2	2	3	4	5	6	3	40
Zone 4													
Zone 5		1	1		1					2	2	1	8
Zone 6	5	5	5	4	5	5	2	2	3	1	2	2	41
Zone 7													
Zone 8													
Zone 9	3					1	1					2	7
Zone 10			1		1	2	1	1	2			2	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)	11	11	12	7	9	11	8	7	10	8	10	10	114
Total	11	11	12	7	9	11	8	7	10	8	10	10	114

Table 3. The number of catches sampled for Grey Morwong by month and area during 2019/20. 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							1						1
Zone 2	1	1	1			1	1	1	1				7
Zone 3	3	5	4	3	2	2	2	3	5	5	6	3	43
Zone 4													
Zone 5		1	1		1					2	3	1	9
Zone 6	10	8	11	7	11	6	3	2	3	1	2	5	69
Zone 7													
Zone 8													
Zone 9	3					1	1					2	7
Zone 10			1		1	2	1	1	4			2	12
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	17	15	18	10	15	12	9	7	13	8	11	13	148
Total	17	15	18	10	15	12	9	7	13	8	11	13	148

Table 4. The number of fish sampled for Grey Morwong by month and area during 2019/20. 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							56						56
Zone 2	6	14	26			6	18	77	53				200
Zone 3	23	63	88	68	63	74	131	94	246	133	371	63	1417
Zone 4													
Zone 5		25	20		15					42	32	9	143
Zone 6	233	321	334	179	256	333	109	65	111	18	76	116	2151
Zone 7													
Zone 8													
Zone 9	228					41	74					67	410
Zone 10			11		9	27	47	20	168			48	330
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5													
EG Region 6													
EG Region 7													
Total (area known)	490	423	479	247	343	481	435	256	578	193	479	303	4707
Total	490	423	479	247	343	481	435	256	578	193	479	303	4707

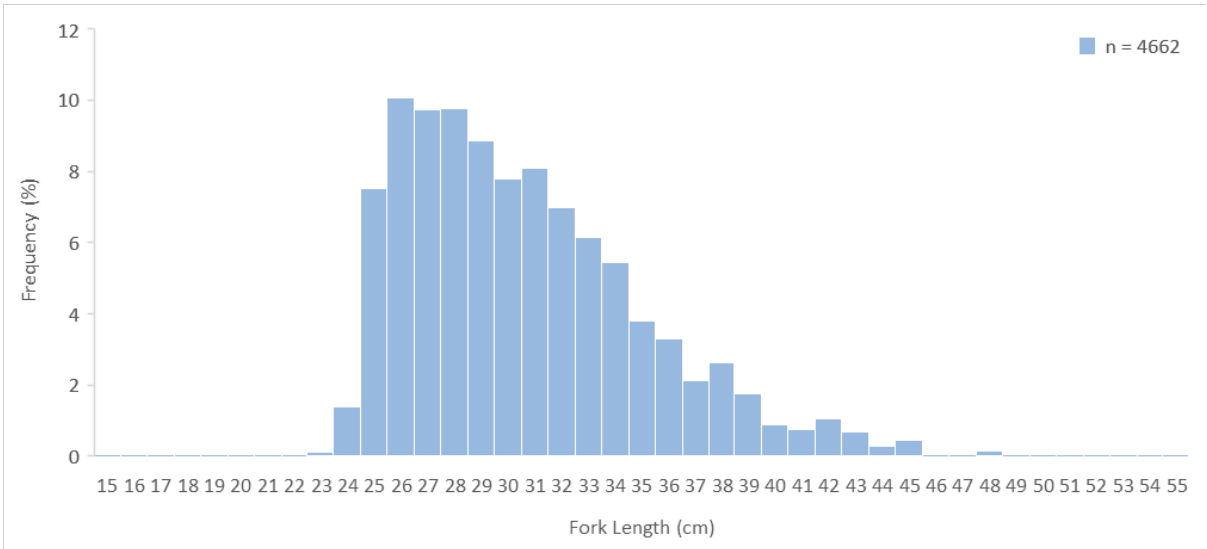

Figure 1. Length composition of Grey Morwong landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

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.

Length based monitoring only this year, not possible to collect otoliths this year due to competing priorities and the difficulty in obtaining samples to purchase as the fishery is so small. Development of a recovery program and co-ordination of a cross-sectoral sampling program is required.

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 2019/20: ***17***

Data and Monitoring Plan for 2019/20

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

'Overfished' species for 15+ years, ideally age-based assessment model required for monitoring. Need at least length data (particularly for estuary meshnet fishery), ages collected by Research Angler Program frame donations could be applied to lengths via ALKs for age-based assessment, but current ages from the commercial catch would be better.

Aim of the Port Monitoring sampling for 2019/20

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

Sampling design

Length Frequency data were collected for as many estuaries as possible through Ballina, Iluka/Maclean and Coffs Harbour Fishermen's co-operative and the Sydney Fish Markets. 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 2019/20.

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													54355.7

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

Table 2. The number of days sampled for Mulloway by month and area during 2019/20. 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									1				1
Zone 2					1	1				1			3
Zone 3							1			1	3	1	6
Zone 4								1					1
Zone 5	1							3		1			5
Zone 6						2	2	1	2	3			10
Zone 7								1		2			3
Zone 8													
Zone 9													
Zone 10													
EG Region 1	1								1				2
EG Region 2	1		1	1			1			1	4	4	13
EG Region 3	1									1	1	2	5
EG Region 4	3	2	1	1		1	3	3	3		9	8	34
EG Region 5	2		1			1	1	5	3		2	2	17
EG Region 6	2		1	4	2	2		1		1	1	5	19
EG Region 7													
Total (area known)	11	2	4	6	3	7	8	15	10	11	20	22	119
Total	11	2	4	6	3	7	8	15	10	11	20	22	119

Table 3. The number of catches sampled for Mulloway by month and area during 2019/20. 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									1				1
Zone 2					1	1				1			3
Zone 3							1			1	4	1	7
Zone 4								1					1
Zone 5	1							3		1			5
Zone 6						2	2	1	2	4			11
Zone 7								1		2			3
Zone 8													
Zone 9													
Zone 10													
EG Region 1	1								1				2
EG Region 2	2		1	1			1			1	10	10	26
EG Region 3	1									1	1	2	5
EG Region 4	3	2	1	1		1	3	4	4		11	12	42
EG Region 5	2		1			1	1	6	3		2	5	21
EG Region 6	2		1	4	2	2		1		1	1	5	19
EG Region 7													
Total (area known)	12	2	4	6	3	7	8	17	11	12	29	35	146
Total	12	2	4	6	3	7	8	17	11	12	29	35	146

Table 4. The number of fish sampled for Mulloway by month and area during 2019/20. 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									8				8
Zone 2					1	1				3			5
Zone 3							1			1	22	2	26
Zone 4								2					2
Zone 5	1							26		1			28
Zone 6						3	5	1	13	17			39
Zone 7								5		29			34
Zone 8													
Zone 9													
Zone 10													
EG Region 1	17								2				19
EG Region 2	2		1	1			2			1	144	81	232
EG Region 3	3									15	38	92	148
EG Region 4	7	6	15	1		2	19	28	5		28	142	253
EG Region 5	13		5			1	6	26	56		2	27	136
EG Region 6	4		1	10	5	2		1		2	2	16	43
EG Region 7													
Total (area known)	47	6	22	12	6	9	33	89	84	69	236	360	973
Total	47	6	22	12	6	9	33	89	84	69	236	360	973

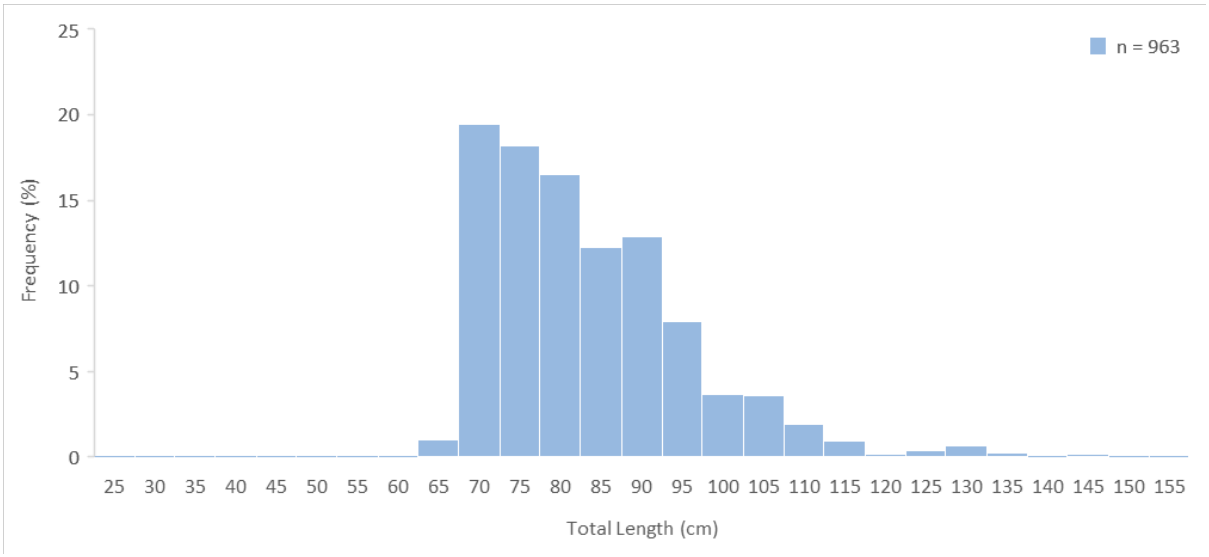

Figure 1. Length composition of Mulloway landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

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.

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 2019/20: **39**

Data and Monitoring Plan for 2019/20

Ranking for Port Monitoring: **21**

Base case port monitoring required to inform a reliable assessment:

Rank for biology – **not required**

Rank for lengths - **21**

Rank for ages – **15**

Species lead commentary

Depleted stock. Age-based assessment required. Lengths should be easy; however consider collaborative sampling via the charter boat observer study.

Aim of the Port Monitoring sampling for 2019/20

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 Ballina, Iluka/Maclean and Coffs Harbour 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 2019/20.

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													13367.5

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 2019/20. 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					1						1		2
Zone 2	1			1		1	1	1	1				6
Zone 3	3	3	3	3	1	4	2	2	6	8	5	1	41
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)	4	3	3	4	2	5	3	3	7	8	6	1	49

Total	4	3	3	4	2	5	3	3	7	8	6	1	49

Table 3. The number of catches sampled for Pearl Perch by month and area during 2019/20. 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					1						1		2
Zone 2	1			1		1	1	2	1				7
Zone 3	3	3	4	4	1	7	2	2	6	10	5	1	48
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)	4	3	4	5	2	8	3	4	7	10	6	1	57

Total	4	3	4	5	2	8	3	4	7	10	6	1	57

Table 4. The number of fish sampled for Pearl Perch by month and area during 2019/20. 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					13						16		29
Zone 2	4			16		1	48	84	93				246
Zone 3	21	28	36	76	23	121	60	13	195	267	96	13	949
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)	25	28	36	92	36	122	108	97	288	267	112	13	1224

Total	25	28	36	92	36	122	108	97	288	267	112	13	1224

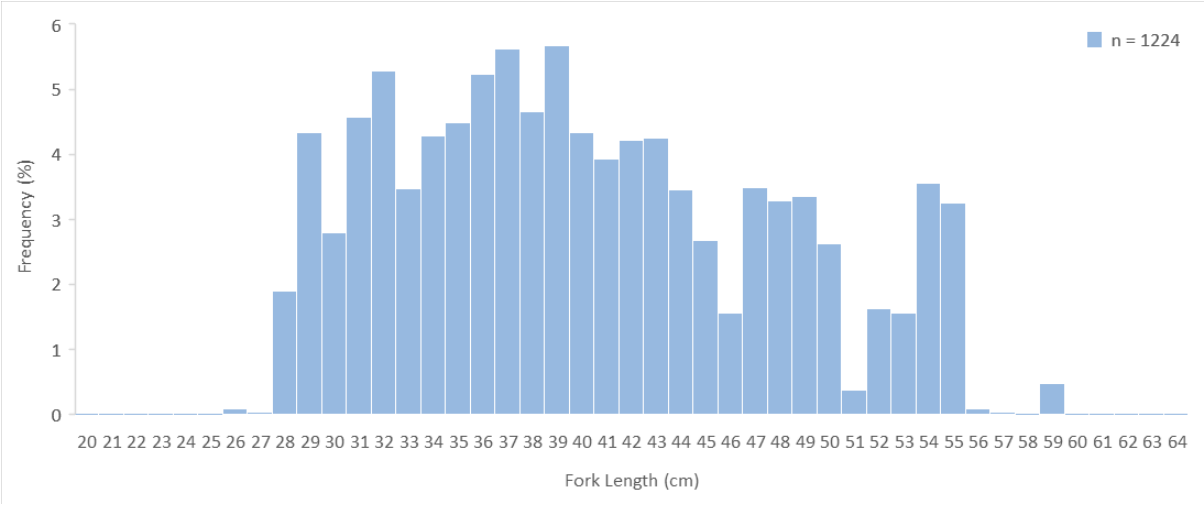

Figure 1. Length composition of Pearl Perch landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Commercial landings of Pearl Perch are relatively small at around 12 t during 2019/20 and confined to northern NSW. Therefore, sampling of 57 catches and 1224 individuals was considered sufficient during 2019/20.

Pipi

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	New South Wales	EGF	Sustainable	Catch, CPUE

EGF Estuary General Fishery (NSW)

Prioritization and justification

Species Priority Ranking for 2019/20: **8**

Data and Monitoring Plan for 2019/20

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 – **not required**

Species lead commentary

Liaising with industry about requirements.

Aim of the Port Monitoring sampling for 2019/20

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

Sampling design

Length Frequency data from the Estuary General Fishery were collected for primarily ocean zones 3 and 4 (South West Rocks) through the Sydney Fish Market. All catches from South West Rocks that were on the floor on the day of sampling were attempted to be sampled. Pipis were measured for maximum shell width (nearest 0.5 cm rounding down).

Pipi sampling is based on month and ocean zone strata for data expansion using reported commercial landings for each month and ocean zone. This is because, while the fishery is Estuary General managed, Pipi catches on ocean beaches are reported by the ocean Grid and Site codes. Historically, 1997 to 2009, Pipi catches were also reported by ocean zone. These expansions are done using the PISCES software.

Sampling graded catches

Almost all Pipi catches are ungraded, however, where there was more than one grade, all grades were sampled. Approx. 100 individuals were measured from each grade.

Results

Table 1. Reported landings heat map of Pipi by month and area during 2019/20.

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													110448

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

Table 2. The number of days sampled for Pipi by month and area during 2019/20. 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	2					1						4
Zone 4	1	2	1	1	1		1			4	3	2	16
Zone 5		1											1
Zone 6													
Zone 7													
Zone 8													
Zone 9		2											2
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)	2	7	1	1	1	0	2	0	0	4	3	2	23

Total	2	7	1	1	1	0	2	0	0	4	3	2	23

Table 3. The number of catches sampled for Pipi by month and area during 2019/20. 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	2					2						5
Zone 4	1	3	2	1	2		1			5	4	3	22
Zone 5		1											1
Zone 6													
Zone 7													
Zone 8													
Zone 9		2											2
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)	2	8	2	1	2	0	3	0	0	5	4	3	30

Total	2	8	2	1	2	0	3	0	0	5	4	3	30

Table 4. The number of Pipi sampled by month and area during 2019/20. 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	143	212					164						519
Zone 4	119	334	262	100	200		100			615	524	374	2628
Zone 5		126											126
Zone 6													
Zone 7													
Zone 8													
Zone 9		275											275
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)	262	947	262	100	200	0	264	0	0	615	524	374	3548

Total	262	947	262	100	200	0	264	0	0	615	524	374	3548

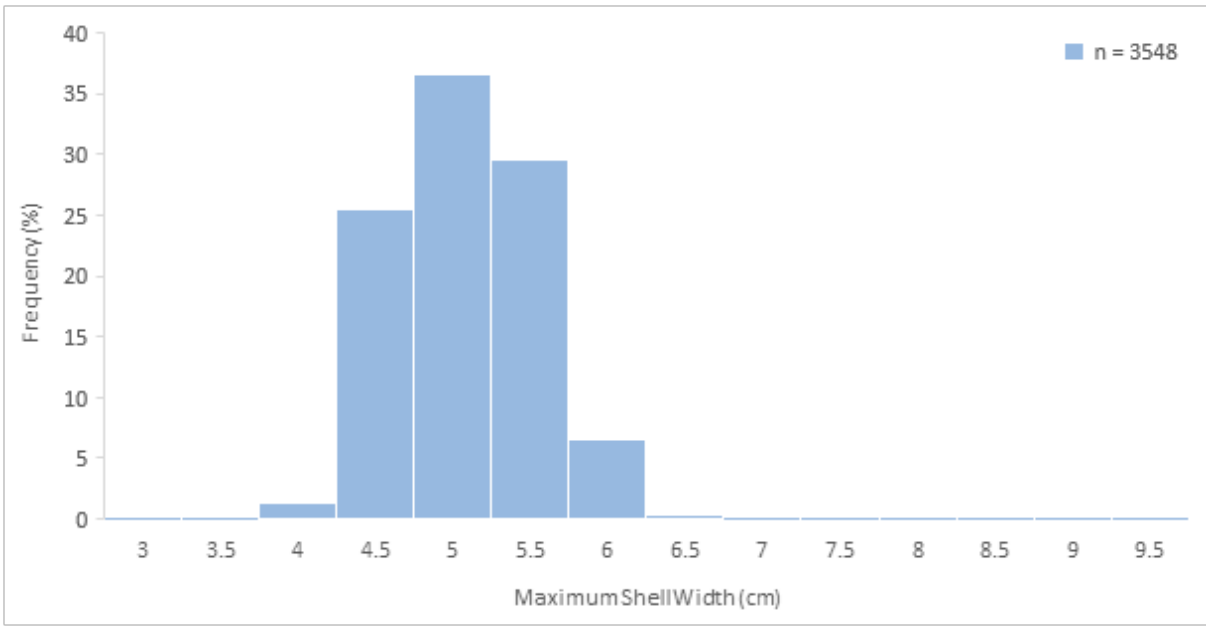

Figure 1. Length composition of Pipi landed by the commercial fishery for 2019/20. Pipis were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Comprehensive sampling was done from the Ocean Zone 4 region only during 2019/20.

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 2019/20: ***23***

Data and Monitoring Plan for 2019/20

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

Despite problems with gaining representative (or any) samples of Red Urchin from the SFM during 2018, Red Sea Urchins are a quota managed species in NSW, with current management concerns related to sustainability with proposal by industry to introduce a MLL of 120 mm. Further the TAC Committee in their Red Urchin determination in 2018 recommended introducing a 115 mm MLL (in addition to other recommendations), without which they suggest more conservative TACC decisions in future.

Status is Undefined. There are no current data (outside of catch returns) to inform assessment or any issue w.r.t. MLL.

Sampling protocol provided in 2017, utilised in 2018 (to low level of success) should be reconsidered and reinvested in to gain some commercial length/width data.

Aim of the Port Monitoring sampling for 2019/20

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

Sampling design

Opportunistic length frequency data to be collected from 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 2019/20.

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													12685.1

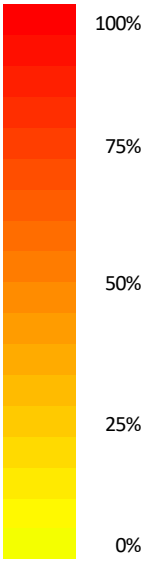

Table 2. The number of days sampled for Red Sea Urchin by month and area during 2019/20. The shaded heat map represents the reported commercial landings.

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							1						1
Zone 7	2						1						3
Zone 8		1											1
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)	2	1	0	0	0	0	2	0	0	0	0	0	5
Total	2	1	0	0	0	0	2	0	0	0	0	0	5

Table 3. The number of catches sampled for Red Sea Urchin by month and area during 2019/20. 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							1						1
Zone 7	2						1						3
Zone 8		1											1
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)	2	1	0	0	0	0	2	0	0	0	0	0	5
Total	2	1	0	0	0	0	2	0	0	0	0	0	5

Table 4. The number of Red Sea Urchin sampled by month and area during 2019/20. 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							33						33
Zone 7	93						23						116
Zone 8		73											73
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)	93	73	0	0	0	0	56	0	0	0	0	0	222

Total	93	73	0	0	0	0	56	0	0	0	0	0	222

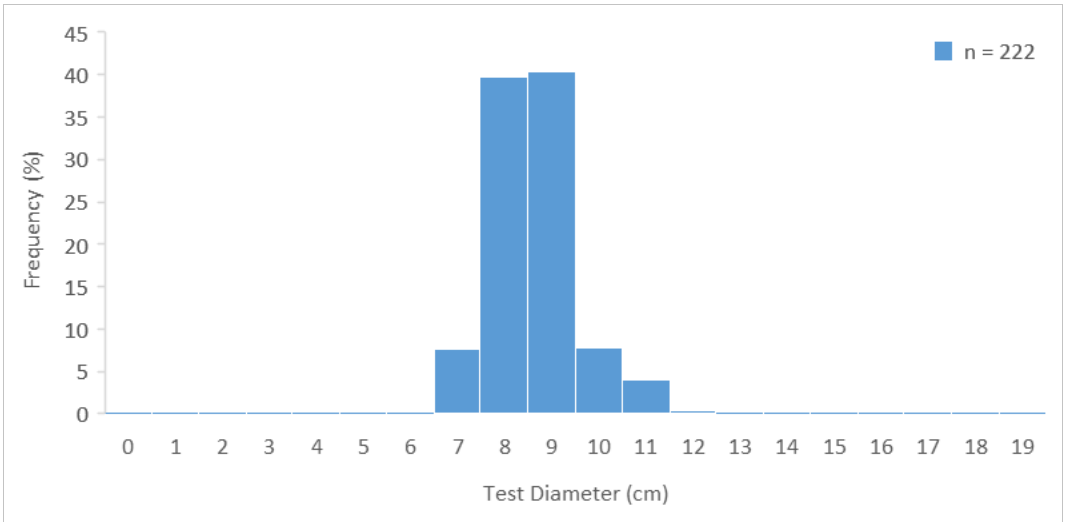

Figure 1. Length composition of Red Sea Urchin sampled through the Port Monitoring program during 2019/20. Urchins were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

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.

Sand Whiting

STOCK STATUS OVERVIEW (2018)

Stock status determination

Jurisdiction	Stock	Fisheries	Stock status	Indicators
New South Wales	New South Wales	EGF, OHF	Sustainable	Catch, effort and CPUE, length and age, mortality rate

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

Prioritization and justification

Species Priority Ranking for 2019/20: **33**

Data and Monitoring Plan for 2019/20

Ranking for Port Monitoring **19**

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

SAFS species with a concerning decrease in recreational catch in NSW. Going to ITQ in Qld with harvest strategy also being developed, supported by biomass modelling using historical age and length data. Would be good to collect updated age and size structure information in NSW to assess relevance of that assessment for our stocks.

Aim of the Port Monitoring sampling for 2019/20

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

Sampling design

Length Frequency data from Estuary General Fishery and Ocean Haul Fishery were collected through Clarence River Fishermen's Co-op and the Sydney Fish Markets. Sampling primarily focused on the Clarence River and Wallis Lake. For each location, all catches that were on the floor on the day of sampling were attempted to be sampled. Sand Whiting were measured from the tip of the nose to fork length (nearest cm rounding down).

Sand Whiting 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.

A sample of approximately 30 fish from both Clarence River and Wallis Lake were 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

All Sand Whiting catches are graded, generally into 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 Sand Whiting by month and area during 2019/20.

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													97703.9

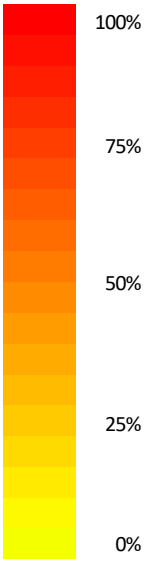

Table 2. The number of days sampled for Sand Whiting by month and area during 2019/20. The shaded heat map represents the reported commercial landings.

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													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	1	3	4	4	3	3	1	2	4	2	2	4	33
EG Region 3													
EG Region 4	2	2	1	2	2		2	3	4	4	7	4	33
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	3	5	5	6	5	3	3	6	8	6	9	8	67

Total	3	5	5	6	5	3	3	6	8	6	9	8	67

Table 3. The number of catches sampled for Sand Whiting by month and area during 2019/20. 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	1	6	10	9	5	6	2	2	6	4	2	9	62
EG Region 3													
EG Region 4	2	4	2	5	3		3	5	8	9	10	6	57
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	3	10	12	14	8	6	5	9	14	13	12	15	121

Total	3	10	12	14	8	6	5	9	14	13	12	15	121

Table 4. The number of fish sampled for Sand Whiting by month and area during 2019/20. 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								440					440
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	10	124	374	1092	495	324	75	30	206	221	6	75	3032
EG Region 3													
EG Region 4	180	340	159	633	350		191	444	609	807	545	420	4678
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	190	464	533	1725	845	324	266	914	815	1028	551	495	8150

Total	190	464	533	1725	845	324	266	914	815	1028	551	495	8150

Table 5. The number of fish sampled for ageing Sand Whiting by month and area during 2019/20. 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								28					28
Zone 6													
Zone 7													
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2	25	43	18	34	30	30	30	30	30	30	8	52	360
EG Region 3													
EG Region 4	30	30	15	30	30		30	15	30	35	40	40	325
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	55	73	33	64	60	30	60	73	60	65	48	92	713

Total	55	73	33	64	60	30	60	73	60	65	48	92	713

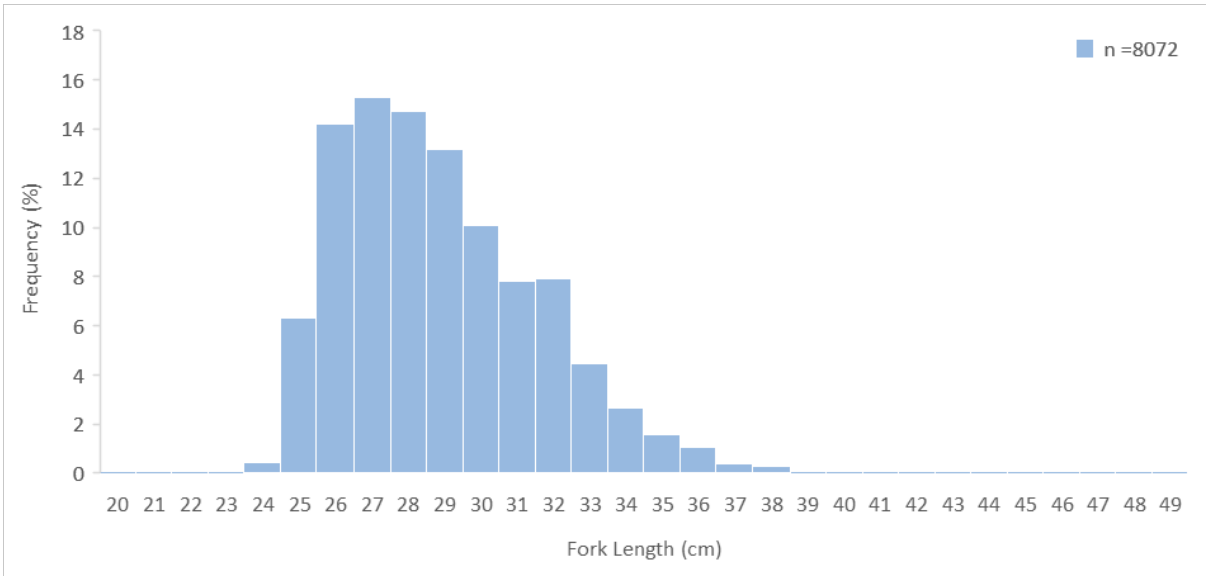

Figure 1. Length composition of Sand Whiting landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

Comprehensive sampling was achieved for Clarence River and Wallis Lake in 2019/20.

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 2019/20: ***19***

Data and Monitoring Plan for 2019/20

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 2019/20

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 from the end of April and throughout the month of May and covered ocean zones 1 to 5. For each catch sampled, length frequency data from an ungraded subsample of female sea mullet heads was collected. Sea Mullet were measured from the back of the head to the tip of the mouth (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, a subsample of randomly selected heads were processed for ageing. The number selected per catch was determined by the total catch weight of each catch.

Results

Table 1. Reported landings heat map of Sea Mullet by month and area during 2019/20.

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													2957485.4

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

Table 2. The number of days sampled for Sea Mullet by month and area during 2019/20. 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											6		6
Zone 2													
Zone 3											6		6
Zone 4										1	4		5
Zone 5										1	6		7
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	0	0	0	0	0	0	0	0	2	22	0	24

Total	0	0	0	0	0	0	0	0	0	2	22	0	24

Table 3. The number of catches sampled for Sea Mullet by month and area during 2019/20. 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											6		6
Zone 2													
Zone 3											6		6
Zone 4										1	5		6
Zone 5										3	6		9
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	0	0	0	0	0	0	0	0	4	23	0	27

Total	0	0	0	0	0	0	0	0	0	4	23	0	27

Table 4. The number of fish sampled for Sea Mullet by month and area during 2019/20. 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											564		564
Zone 2													
Zone 3											540		540
Zone 4										112	439		551
Zone 5										319	525		844
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	0	0	0	0	0	0	0	0	431	2068	0	2499

Total	0	0	0	0	0	0	0	0	0	431	2068	0	2499

Table 5. The number of fish sampled for ageing Sea Mullet by month and area during 2019/20. 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											120		120
Zone 2													
Zone 3											128		128
Zone 4										31	89		120
Zone 5										33	79		112
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	0	0	0	0	0	0	0	0	64	416	0	480

Total	0	0	0	0	0	0	0	0	0	64	416	0	480

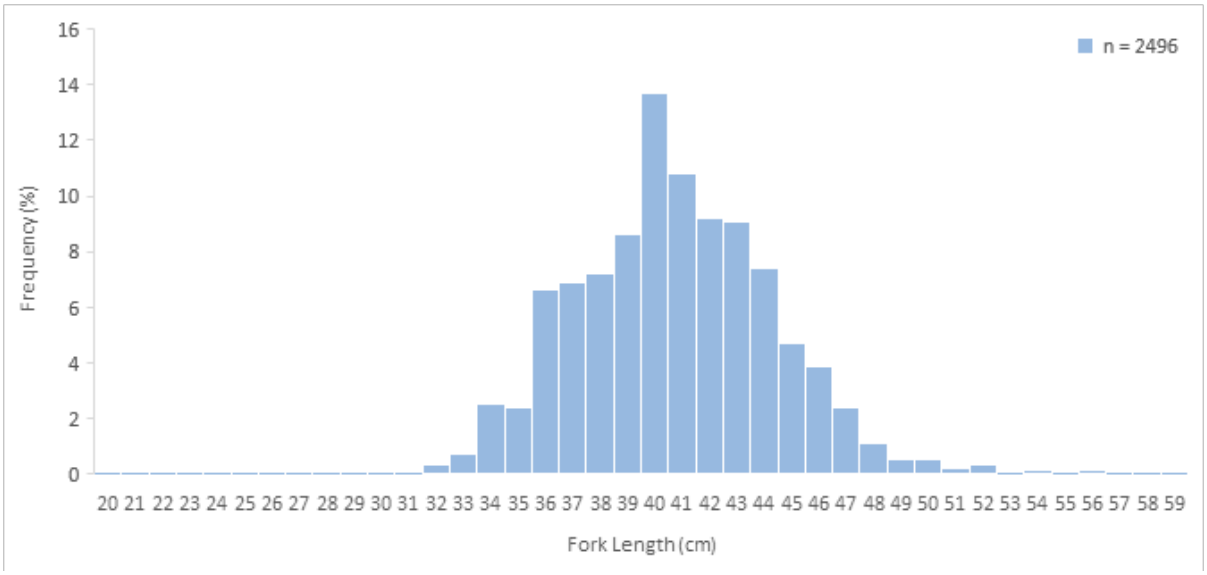

Figure 1. Length composition of female Sea Mullet landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

Due Covid-19 restrictions in travel, sampling at Markwell Fisheries in Chinderah was unable to be done this year. The factory manager collected a random sample of female sea mullet heads from various catches along the NSW coast and sent them down to the SIMS laboratory to be processed for length and age data. Head: fork length ratio was then calculated from the following years measurements to ensure this year's data is comparable to all other years of data collected for sea mullet. Unfortunately, no male data were collected this year.

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 Fingal Bay (Ocean Zone 5) up to Kingscliff beach (Ocean Zone 1).

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 2019/20: ***4***

Data and Monitoring Plan for 2019/20

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

SAFS 2018 status for NSW is 'Depleting', warranting more frequent monitoring. Annual length and age samples have been recommended in the Data Monitoring Plan (DMP). The Port Monitoring Program has been used for historic monitoring of this species, so provides the most standardised data source for assessment of trends through time. Given the known size selectivity occurring within the Commercial Fishery, it would be useful if Port Monitoring samples included line-caught individuals in addition to the more common trawl-caught individuals. Collection of larger/older individuals could be supplemented through sampling from the Recreational Fishery. Silver Trevally is the 4th highest priority in the most recent Species Priority List.

Aim of the Port Monitoring sampling for 2019/20

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

Sampling design

Length Frequency data from all state fisheries were collected through the Sydney Fish Markets. 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 2019/20.

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													35268.1

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

Table 2. The number of days sampled for Silver Trevally by month and area during 2019/20. 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							1					1	2
Zone 6	6	4	4	4	4	4	4	4	1	5	3	3	46
Zone 7		1	1	1		1	4	3				1	12
Zone 8			1					1	1	3		2	8
Zone 9	2											1	3
Zone 10			1		1		1						3
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4			1						2	1	2	2	8
EG Region 5			1	1	3		1		1	1	2		10
EG Region 6	1	1				2		3	2	5	3	2	19
EG Region 7		1	2	1				1		1		1	7
Total (area known)	9	7	11	7	8	7	11	12	7	16	10	14	119
Total	9	7	11	7	8	7	11	12	7	16	10	14	119

Table 3. The number of catches sampled for Silver Trevally by month and area during 2019/20. 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							1					1	2
Zone 6	12	6	6	7	8	4	4	4	1	8	5	5	70
Zone 7		1	1	1		1	5	3				1	13
Zone 8			1					1	1	3		2	8
Zone 9	2											1	3
Zone 10			1		2		1						4
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4			1						2	2	2	4	11
EG Region 5			1	2	3		1		1	1	2		11
EG Region 6	1	1				2		4	2	7	3	3	23
EG Region 7		1	2	1				1		1		1	7
Total (area known)	15	9	13	11	13	7	12	13	7	22	12	19	153
Total	15	9	13	11	13	7	12	13	7	22	12	19	153

Table 4. The number of fish sampled for Silver Trevally by month and area during 2019/20. 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												24	24
Zone 4													
Zone 5							99					26	125
Zone 6	275	302	305	189	338	92	345	219	18	300	118	132	2633
Zone 7		95	15	75		30	265	247				56	783
Zone 8			102					70	24	329		33	558
Zone 9	40											19	59
Zone 10			34		110		17						161
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4			4						32	12	36	82	166
EG Region 5			8	139	241		30		80	25	63		586
EG Region 6	29	23				34		71	79	694	158	93	1181
EG Region 7		9	114	86				14		18		9	250
Total (area known)	344	429	582	489	689	156	756	621	233	1378	375	474	6526
Total	344	429	582	489	689	156	756	621	233	1378	375	474	6526

Table 5. The number of fish sampled for ageing Silver Trevally by month and area during 2019/20. 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	20	20	20	20	20		20	20			23	30	193
Zone 7		20					20	20				30	90
Zone 8													
Zone 9													
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4													
EG Region 5				13	20								33
EG Region 6										52	30		82
EG Region 7													
Total (area known)	20	40	20	33	40	0	40	40	0	52	53	60	398
Total	20	40	20	33	40	0	40	40	0	52	53	60	398

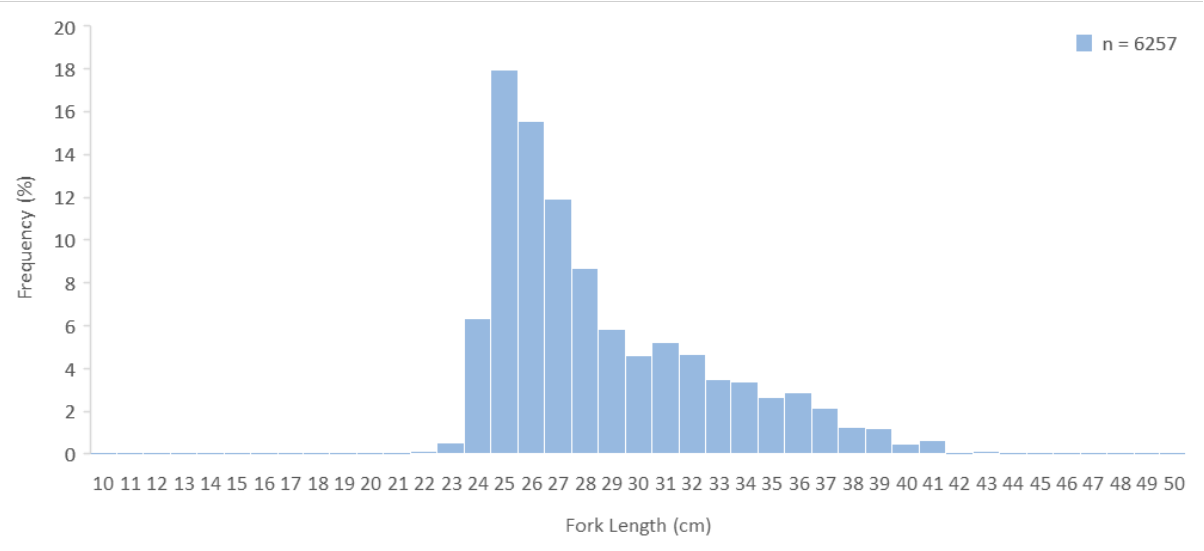

Figure 1. Length composition of Silver Trevally landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

Commercial landings of Silver Trevally during 2019/20 were relatively small; however, the port monitoring sampling was reasonably comprehensive.

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 2019/20: ***10***

Data and Monitoring Plan for 2019/20

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

Although Stout were scheduled for age and lengths in 2018/19 - sampling from the OPT observer program did not occur as planned, and no otoliths appear to have been collected. The Qld age-structured biomass modelling is to be updated in 2020/21 using data from both NSW and Qld to estimate an RBC for both regions.

Aim of the Port Monitoring sampling for 2019/20

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

Sampling design

Export box sampling was done at the Iluka and Coffs Harbour Fishermen's co-operatives, 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 2019/20.

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													268004

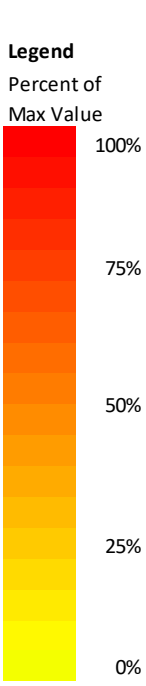

Table 2. The number of days sampled for Stout Whiting by month and area during 2019/20. The shaded heat map represents the reported commercial landings.

Month-->	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total by Area
Ocean Zone/EG Region													
Zone 1													
Zone 2	4	1	2	2	1	2	1	1	1	1		1	17
Zone 3	1	1			1				1	1			5
Zone 4													
Zone 5				1	1								2
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)	5	2	2	3	3	2	1	1	2	2	0	1	24

Total	5	2	2	3	3	2	1	1	2	2	0	1	24

Table 3. The number of catches sampled for Stout Whiting by month and area during 2019/20. 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	4	1	2	2	1	2	1	1	1	1		1	17
Zone 3	1	1			1				1	1			5
Zone 4													
Zone 5				1	1								2
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)	5	2	2	3	3	2	1	1	2	2	0	1	24

Total	5	2	2	3	3	2	1	1	2	2	0	1	24

Table 4. The number of fish sampled for Stout Whiting by month and area during 2019/20. 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	248	78	89	140	21	133	21	26	51	147		165	1119
Zone 3	17	21			23				4	20			85
Zone 4													
Zone 5				10	1								11
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)	265	99	89	150	45	133	21	26	55	167	0	165	1215

Total	265	99	89	150	45	133	21	26	55	167	0	165	1215

Table 5. The number of fish sampled for ageing Stout Whiting by month and area during 2019/20. 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	22	22	46	44	21	42	21	22	22	22		22	306
Zone 3		21			23				4	20			68
Zone 4													
Zone 5				10	1								11
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)	22	43	46	54	45	42	21	22	26	42	0	22	385

Total	22	43	46	54	45	42	21	22	26	42	0	22	385

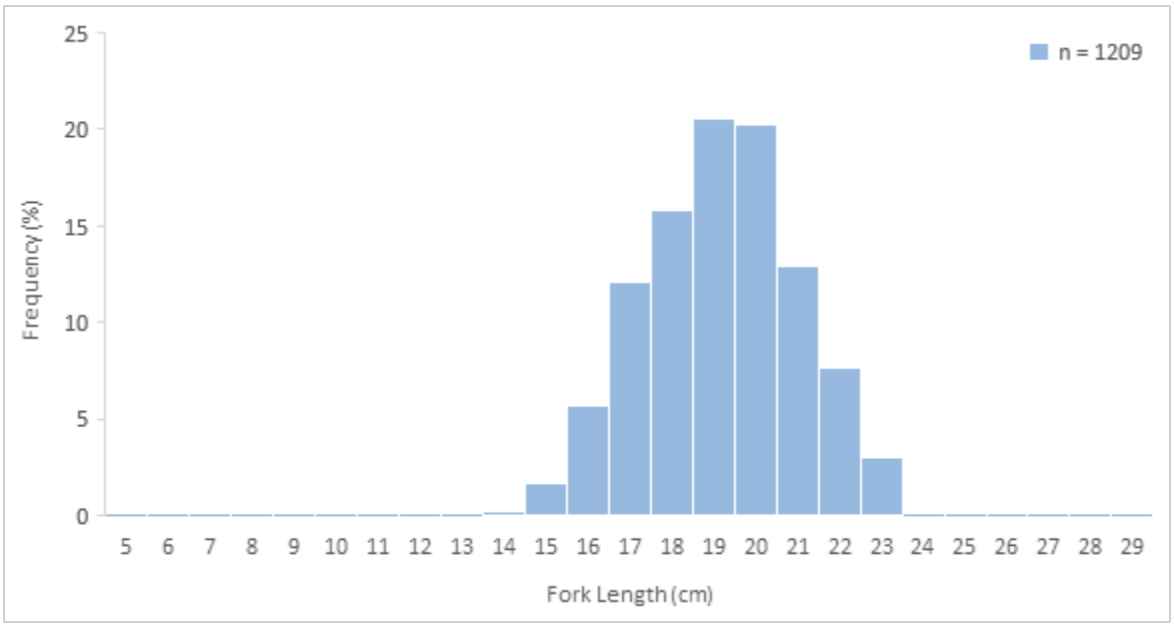

Figure 1. Length composition of Stout Whiting landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES. Number of lengths used to create figure may differ slightly from number of lengths measured due to length rules in PISCES software.

Commentary

While sampling was undertaken according to the catch breakdown, only export boxes were sampled at Iluka and Coffs Harbour Fishermen's Co-operatives. 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.

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 2019/20: **26**

Data and Monitoring Plan for 2019/20

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 – **10**

Species lead commentary

'Eastern biological stock 'Undefined' due to lack of data from Qld, Vic, Tas and SA. 'Depleted' in NSW - current commercial harvest at historical low, rec harvest larger (~double). Need length data at least, ages collected by Research Angler Program frame donations can be applied to length frequencies via ALKs for age-based assessment, but current ages from the commercial catch would be better.

Aim of the Port Monitoring sampling for 2019/20

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 2019/20.

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													110269

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 2019/20. 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				1	1	2	1				11
Zone 3	2	3	8	4	1	5			4	2	7	4	40
Zone 4													
Zone 5													
Zone 6	1	3	3	1	3	3	4	2	4	2	3	2	31
Zone 7								2	2	3	2		9
Zone 8							2	1			1		4
Zone 9	2	3	1				1		1	3			11
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)	8	12	12	5	5	9	8	7	12	10	13	6	107

Total	8	12	12	5	5	9	8	7	12	10	13	6	107

Table 3. The number of catches sampled for Yellowtail Kingfish by month and area during 2019/20. 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	5	4				1	2	2	1				15
Zone 3	3	5	8	6	1	7			4	2	8	4	48
Zone 4													
Zone 5													
Zone 6	1	6	5	1	4	4	4	3	8	4	7	3	50
Zone 7								2	2	3	2		9
Zone 8							2	1			1		4
Zone 9	2	4	1				1		1	3			12
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)	11	19	14	7	6	12	9	8	16	12	18	7	139

Total	11	19	14	7	6	12	9	8	16	12	18	7	139

Table 4. The number of fish sampled for Yellowtail Kingfish by month and area during 2019/20. 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	322	131				19	24	30	4				530
Zone 3	56	123	505	280	31	79			64	17	95	208	1458
Zone 4													
Zone 5													
Zone 6	12	390	94	1	58	51	17	17	14	22	54	17	747
Zone 7								32	60	174	58		324
Zone 8							7	1			3		11
Zone 9	98	210	39				51		43	139			580
Zone 10													
EG Region 1													
EG Region 2													
EG Region 3													
EG Region 4					18								18
EG Region 5													
EG Region 6													
EG Region 7													

Total (area known)	488	854	638	281	107	149	99	80	185	352	210	225	3668

Total	488	854	638	281	107	149	99	80	185	352	210	225	3668

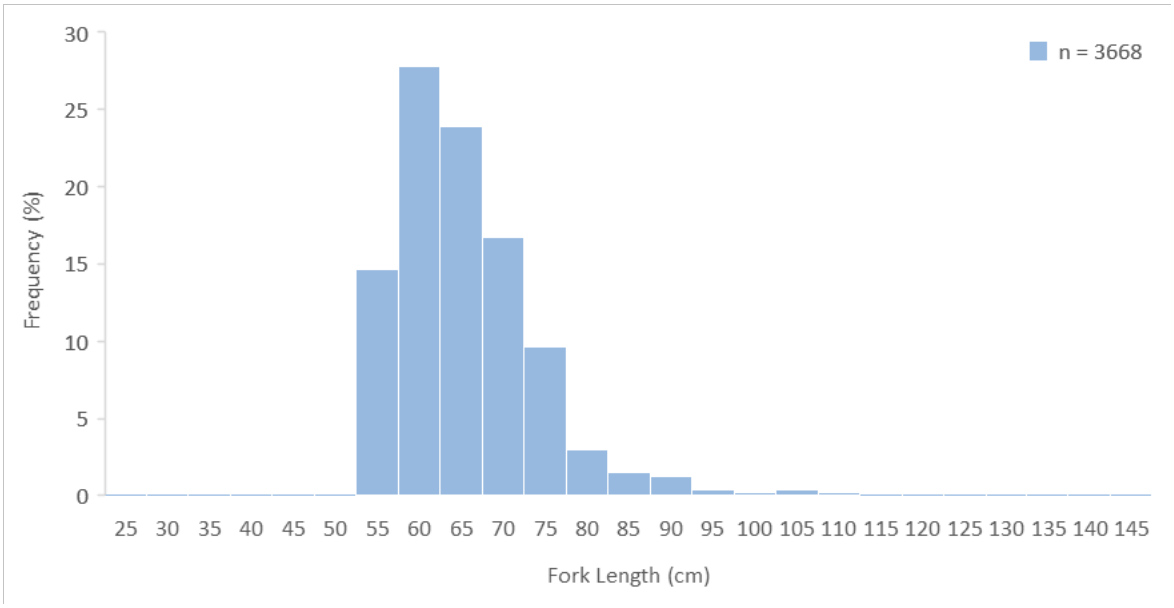

Figure 1. Length composition of Yellowtail Kingfish landed by the commercial fishery for 2019/20. Fish were sampled through the Port Monitoring program and combined according to the reported commercial landings in each sampling strata using the software PISCES.

Commentary

Sampling during 2019/20 reflected the distribution of commercial landings, with the majority of landings coming from ocean zone 3. Unfortunately, it was not possible to collect biological data through the port monitoring program with the existing resources.

Appendices

Appendix A -Staff

Core funded

John Stewart
James Craig
Anne-Marie Hegarty
Caitlin Young
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Commercial Trust funded

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Glen Cuthbert
Glenn Campbell
Angela Russell
Chantelle Clain
Holly Gunton
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Appendix B - Species Priority List 2019/20

Species priority list for research for 2019/20, ranked highest to lowest. The multi-criteria decision analysis (MCDA) was based on commercial and recreational management weightings. Species selected for port monitoring in 2019/20 are highlighted.

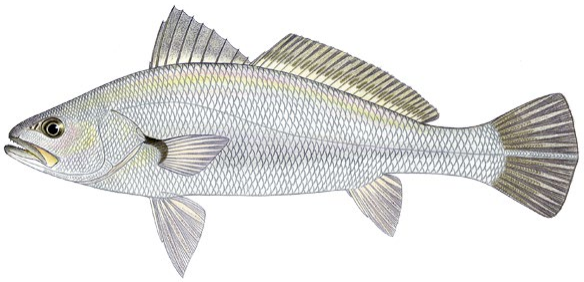
MCDA score	Common Name	MCDA score	Common Name	MCDA score	Common Name
11.063	Bluespotted Flathead	3.950	Green Sea Urchin	1.251	Cunjevoi
10.589	Eastern School Whiting	3.608	Spanish Mackerel	1.250	Estuary Perch
10.166	Gemfish	3.417	Loligo Squid	1.154	Freshwater Shrimp
9.686	Silver Trevally	3.344	Cockles	1.098	Australian Herring
9.498	Blacklip Abalone	3.312	Bass Groper	1.048	Australian Bass
9.274	Giant Mud Crab	3.134	Australian Bonito	1.021	Golden Perch
9.201	Eastern King Prawn	3.094	Tailor	1.000	Black Bream
9.062	Pipi	3.001	Crimsonband Wrasse	0.954	Bastard Trumpeter
8.285	Eastern Rock Lobster	2.865	Spotted Mackerel	0.953	Ribaldo
7.959	Stout Whiting	2.657	Royal Red Prawn	0.951	Bluethroat Wrasse
7.860	Grey Morwong	2.654	Common Jack Mackerel	0.951	Blue Warehou
7.817	Tiger Flathead	2.640	John Dory	0.950	Spangled Emperor
7.774	Pink Ling	2.619	Mirror Dory	0.950	Elephantfish
7.726	Spanner Crab	2.609	Yellowfin Tuna	0.950	School Mackerel
7.634	Dusky Flathead	2.606	Jackass Morwong	0.950	Silver Warehou
7.572	Blue-eye Trevalla	2.462	Shovelnose Rays	0.943	Angel Sharks
7.565	Mulloway	2.282	Estuary Cobbler	0.914	Eastern Pigfish
7.557	Yellowtail Scad	2.263	Dart	0.530	Trawl Octopus
7.330	Sea Mullet	2.246	Mahi	0.337	Wobbegong Sharks
7.199	Redfish	2.232	Leatherjackets-other	0.335	Greentail Prawn
7.076	Eastern School Prawn	2.207	Periwinkle (Turban Shell)	0.327	Red Gurnard and Latchets
7.006	Blue Mackerel	2.200	Mangrove Jack	0.322	Mackerel Tuna
6.960	Red Sea Urchin	2.094	Yabby (freshwater)	0.320	Tiger Prawn (Brown)
6.920	Snapper	2.020	Sawsharks	0.310	Gloomy Octopus
6.719	Australian Sardine	1.983	Murray Cod	0.309	Red Morwong
6.651	Yellowtail Kingfish	1.942	Purple Sea Urchin	0.309	Frigate Mackerel
6.515	Yellowfin Bream	1.921	Blacktip Sharks (Common)	0.307	Diamondfish
6.208	School Shark	1.906	Sandbar Shark	0.306	Striped Perch
6.193	Eastern Sea Garfish	1.905	Dusky Whaler	0.305	Bigeyes
5.934	Blue Swimmer Crab	1.877	Rock Blackfish	0.304	Hammerhead Sharks
5.665	Luderick	1.866	Goulds (Arrow) Squid	0.303	Tiger Shark
5.627	Ocean Perch	1.850	Striped Marlin	0.303	Tilefish
5.354	Sand Whiting	1.700	Southern Bluefin Tuna	0.302	Boarfish
5.258	Dogfish	1.437	Red Mullet	0.301	Blue Shark
5.094	Eastern Australian Salmon	1.436	Flounders	0.300	Mantis Shrimps
5.057	Trumpeter Whiting	1.411	Soles	0.300	Ghostsharks
4.965	Ghost Nipper	1.386	Whitebait - Sandy Sprat	0.300	Banded Morwong
4.943	Silver Sweep	1.348	Sand Mullet	0.026	Maori Octopus
4.929	Pearl Perch	1.346	Cuttlefish	0.022	Forktail Catfish
4.708	Hapuku	1.336	Eastern Red Scorpionfish	0.002	Pale Octopus
4.667	Ocean Jackets	1.300	River Garfish	0.000	Snook
4.597	Southern Calamari	1.285	Banded Rockcod		
4.567	Gummy Shark	1.268	Hairtail		
4.481	Beachworms	1.265	Whaler Sharks - other		
4.450	Balmain Bugs	1.265	Southern Maori Wrasse		
4.199	River Eels	1.258	Australian Anchovy		
4.108	Common Silverbiddy	1.256	Cobia		
4.017	Tarwhine	1.255	Eastern Blue Groper		
4.016	Goldspot Mullet	1.254	Mako Sharks		
4.013	Teraglin	1.252	Longtail Tuna		

Appendix C - Ballina co-op sampling Procedures July 2019 – June 2020

Sampling schedule

2019/20	Newcastle
Mulloway	Opportunistic
Pearl Perch	Opportunistic
Eastern King Prawns	4 days/month

Mulloway (*Argyrosomus japonicus*)



Sample days

- Opportunistically up to 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.

Pearl Perch (*Glaucosoma scapulare*)

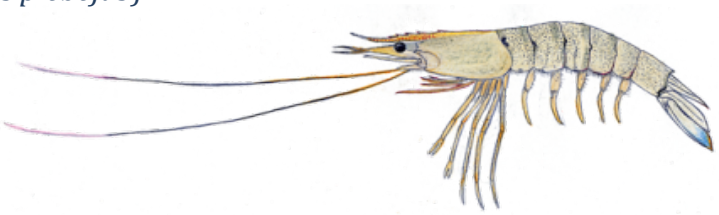
Sample days

- Opportunistically up to 4 days per month

Lengths required

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

Eastern King Prawn (*Melicertus plebejus*)



Sample days

- 4 days/month

Lengths required

- 3 catches per day, at least 50 prawns per grade. Sample from each grade in a catch.

- The following data needs to be recorded for each individual prawn measured within a sample: Sex (male or female) and Carapace length (to the nearest 0.1 cm).

- Record total catch weight of each individuals fishers catch (total catch weight is by grade)

How to measure prawns

The length of prawns is expressed as a carapace length. The carapace length is measured as the length in a straight line from the base of the eye orbit (or eye socket) to the center of the posterior margin of the carapace (i.e. the back of the carapace), as shown in Figure 1. Carapace length is measured in millimeters (mm).

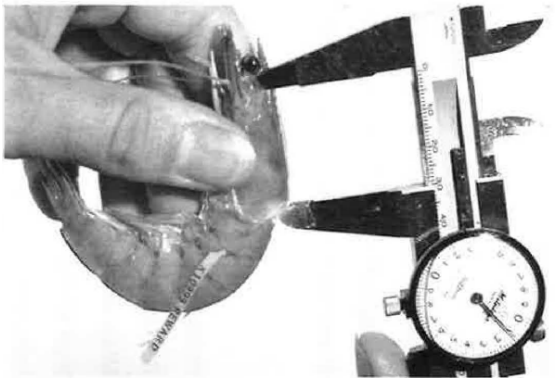


Figure 1. Carapace length of a prawn being measured using calipers. Note the locations of the caliper jaws at the back of the eye socket and back of the carapace.

How to determine sex

A prawn's gender can be determined by examining its genetalia:

- **Male prawns** are identified by a copulatory organ (petasma) between the first pair of swimming legs (see Figure 2).
- **Female prawns** have identical swimming legs and no organ between the foremost pair. Rather, females have a thelycum between the fifth pair of walking legs which provides an anchor site for the male sperm packet received during copulation (see Figure 2).

Males and females can therefore be separated on the presence or absence of a petasma between the first pair of swimming legs and the presence or absence of a thelycum between the last pair of walking legs.

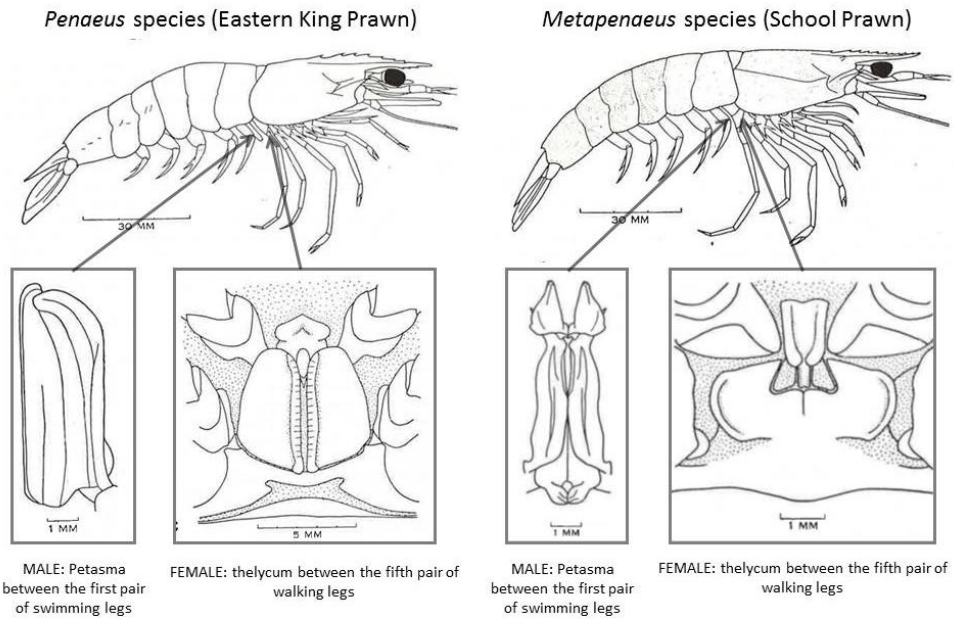


Figure 2. Idealized diagram of prawn copulatory organs for sex identification (pictures from Dall *et al.* 1990).

Appendix D - Clarence River co-op sampling Procedures July 2019 – June 2020

Sampling Schedule

2019/20	**Clarence**
Bluespotted flathead	2-3 LF days/month (10 otoliths/month)
Eastern King Prawn	2 LF days/month
Eastern school whiting (FRDC genetics)	20 otoliths/month
Stout Whiting (FRDC genetics)	20 otoliths/month
Export whiting box (FRDC genetics)	1 export box/month
Giant mud crab	2 LF days/month
Mulloway	Opportunistic
Pearl Perch	Opportunistic
Sand Whiting	2-3 LF days/month (30 otoliths/month)
School Prawn	2-3 LF days/month (2 x 0.5kg per sample day)

Bluespotted Flathead (*Platycephalus caeruleopunctatus*)

Sample days

- 2-3 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 total length (TL) to the nearest whole cm below true length.

Otoliths required

- 10 otoliths from 1 catch per month taken proportionately from each grade.
- Field code **Mac-Pc 1**

Eastern King Prawn (*Melicertus plebejus*)

Sample days

- 2 days/month
- Ocean Prawn Trawl – All months (Ideally boats from Iluka)
- Estuary Prawn Trawl - Oct 2019- March 2020

Lengths required

- 2 catches per day, at least 50 prawns per grade. Sample from each grade in a catch.
- The following data needs to be recorded for each individual prawn measured within a sample: Sex (male or female) and Carapace length (to the nearest 0.1 cm).
- Record total catch weight of each individuals fishers catch (total catch weight is by grade)

How to measure prawns

The length of prawns is expressed as a carapace length. The carapace length is measured as the length in a straight line from the base of the eye orbit (or eye socket) to the center of the posterior margin of the carapace (i.e. the back of the carapace), as shown in Figure 1. Carapace length is measured in millimeters (mm).

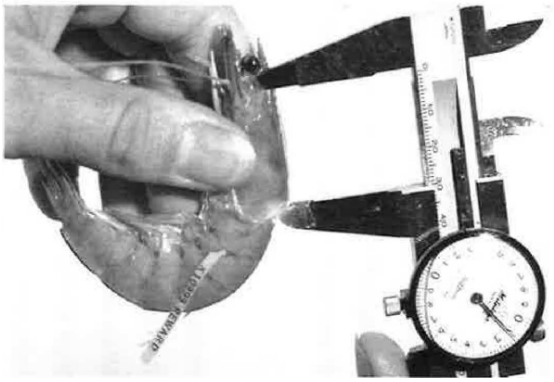


Figure 1. Carapace length of a prawn being measured using calipers. Note the locations of the caliper jaws at the back of the eye socket and back of the carapace.

How to determine sex

A prawn's gender can be determined by examining its genetalia:

- **Male prawns** are identified by a copulatory organ (petasma) between the first pair of swimming legs (see Figure 2);
- **Female prawns** have identical swimming legs and no organ between the foremost pair. Rather, females have a thelycum between the fifth pair of walking legs which provides an anchor site for the male sperm packet received during copulation (see Figure 2).

Males and females can therefore be separated on the presence or absence of a petasma between the first pair of swimming legs and the presence or absence of a thelycum between the last pair of walking legs.

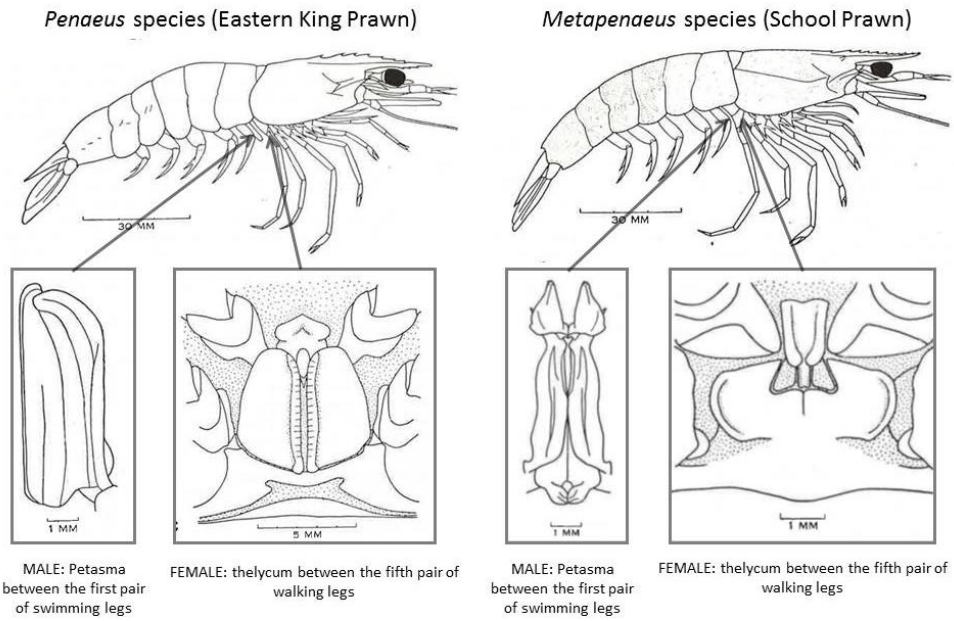


Figure 2. Idealized diagram of prawn copulatory organs for sex identification (pictures from Dall *et al.* 1990).

Eastern School Whiting (*Sillago flindersi*)

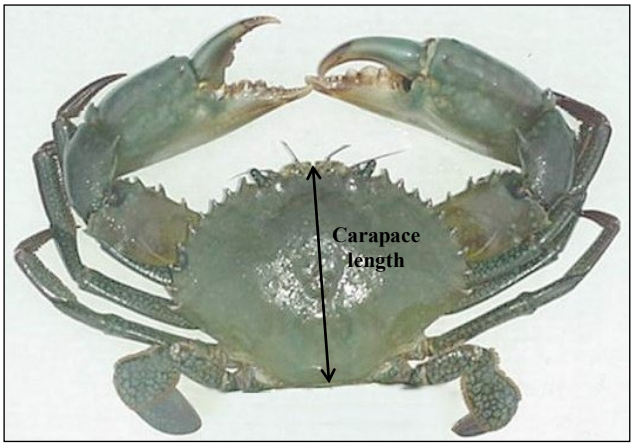
Picture of a Stout whiting (*Sillago robusta*)

EXPORT whiting box

Sample days

- 1 x 8kg export box per month. Delivery to Coffs Harbour will be arranged.

Giant Mud Crab (*Scylla serrata*)



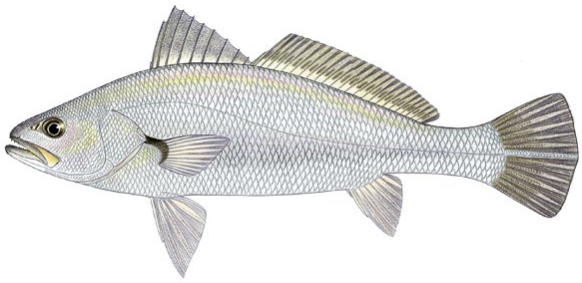
Sample days

- 2 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

Mulloway (*Argyrosomus japonicus*)



Sample days

- Opportunistically up to 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.

Pearl Perch (*Glaucosoma scapulare*)

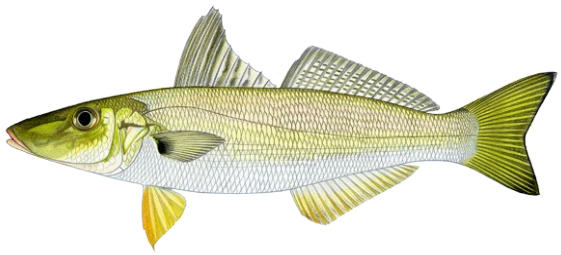
Sample days

- Opportunistically up to 4 days per month

Lengths required

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

Sand Whiting (*Sillago ciliata*)



Sample days

- 2-3 days per month

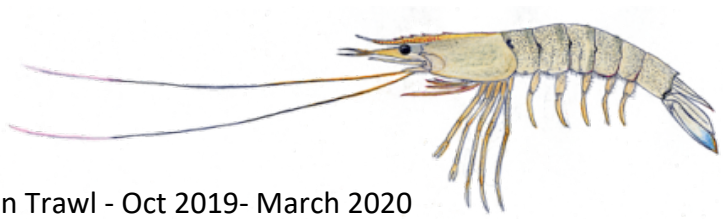
Lengths required

- Try and measure from as many different fishermen as time allows.
- Measure from all grades if required.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Otoliths required

- 30 otoliths from 1 catch per month taken proportionately from each grade.
- Field code **Mac-Sc 1**

School Prawn (*Metapenaeus macleayi*)



Sample days

- Estuary Prawn Trawl or Ocean Prawn Trawl - Oct 2019- March 2020
- 2 days/month

Lengths required

- 2 catches per day, at least 50 prawns per grade. Sample from each grade in a catch.
- The following data needs to be recorded for each individual prawn measured within a sample: Sex (male or female) and Carapace length (to the nearest 0.1 cm).
- Can purchase 0.5kg and process in the lab if time is limited in the co-op.

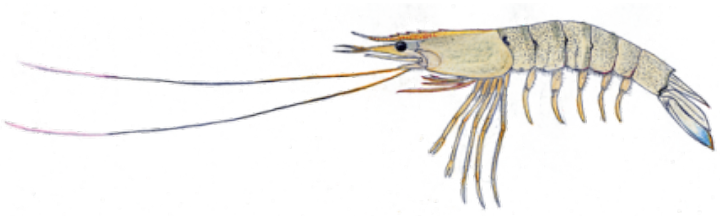
How to measure and sex prawns – refer to Eastern King Prawn protocol

Appendix E - Coffs Harbour co-op sampling procedures July 2019 – June 2020

SAMPLING SCHEDULE

2019/20	Nelson Bay
Eastern King Prawn	2 LF days/month
Eastern School Whiting	2-3 LF day/month
Giant Mud Crab	2 LF days/month
Grey Morwong	3 LF days/month
Mulloway	Opportunistic
Pearl Perch	Opportunistic
Stout Whiting	2-3 LF days/month
Yellowtail Kingfish	3 LF days/month

Eastern King Prawn (*Melicertus plebejus*)



Sample days

- 3 days/month

Lengths required

- 2 catches per day if possible, at least 50 prawns per grade. Sample from each grade in a catch.\
- The following data needs to be recorded for each individual prawn measured within a sample: Sex (male or female) and Carapace length (to the nearest 0.1 cm).
- Record total catch weight of each individuals fishers catch (total catch weight is by grade)

How to measure prawns

The length of prawns is expressed as a carapace length. The carapace length is measured as the length in a straight line from the base of the eye orbit (or eye socket) to the center of the posterior margin of the carapace (i.e. the back of the carapace), as shown in Figure 1. Carapace length is measured in millimeters (mm).

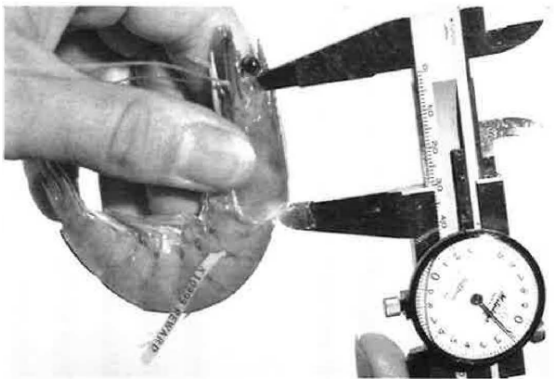


Figure 1. Carapace length of a prawn being measured using calipers. Note the locations of the caliper jaws at the back of the eye socket and back of the carapace.

How to determine sex

A prawn's gender can be determined by examining its genetalia:

- **Male prawns** are identified by a copulatory organ (petasma) between the first pair of swimming legs (see Figure 2);
- **Female prawns** have identical swimming legs and no organ between the foremost pair. Rather, females have a thelycum between the fifth pair of walking legs which provides an anchor site for the male sperm packet received during copulation (see Figure 2).

Males and females can therefore be separated on the presence or absence of a petasma between the first pair of swimming legs and the presence or absence of a thelycum between the last pair of walking legs.

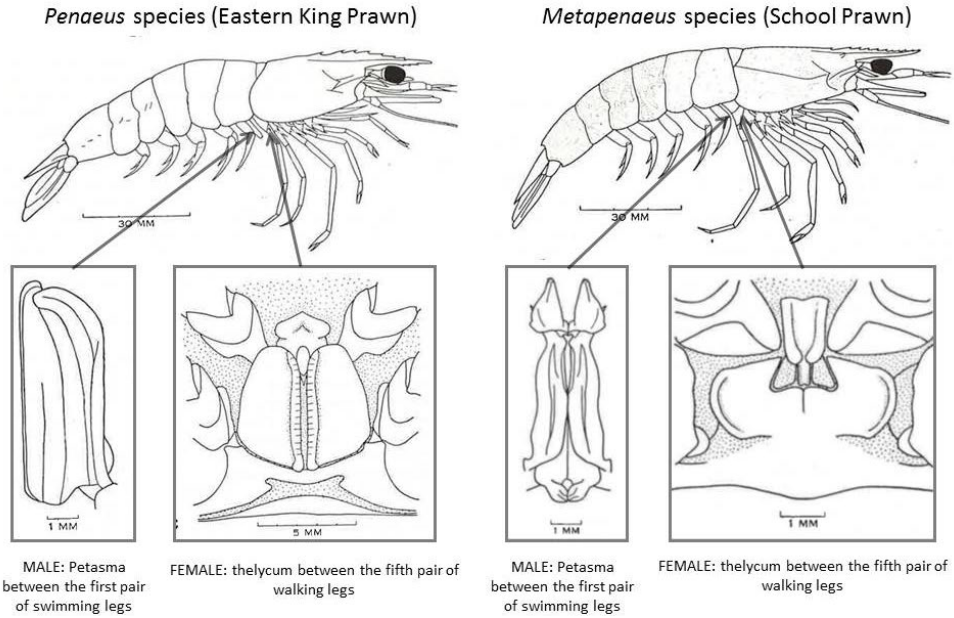
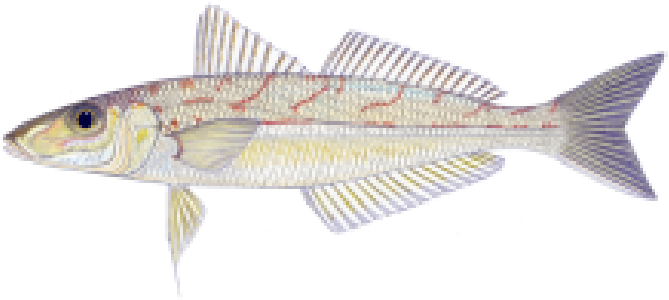


Figure 2. Idealized diagram of prawn copulatory organs for sex identification (pictures from Dall *et al.* 1990).

Eastern School Whiting (*Sillago flindersi*)



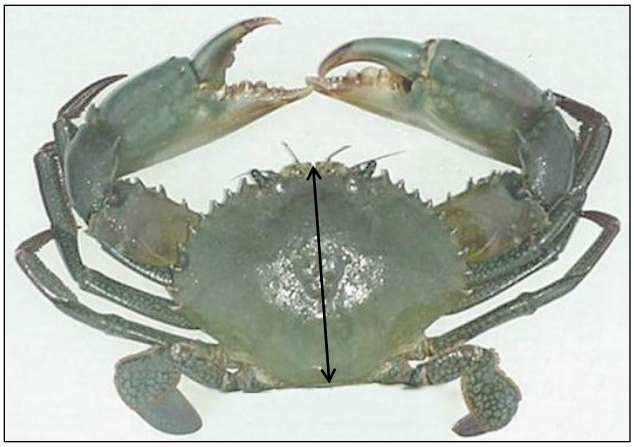
Sample days

- 2-3 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.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Giant Mud Crab (*Scylla serrata*)



Sample days

- 2 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

Grey Morwong (*Nemadactylus douglasii*)

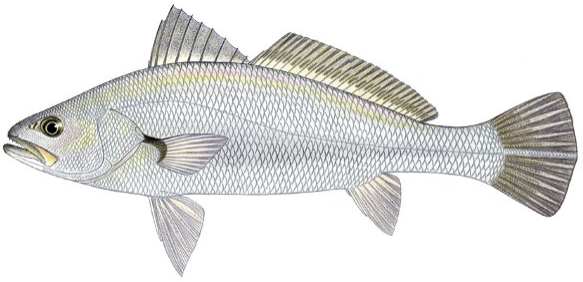
Sample days

- Opportunistically up to 3 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.

Mulloway (*Argyrosomus japonicus*)



Sample days

- Opportunistically up to 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.

Pearl Perch (*Glaucosoma scapulare*)

Sample days

- Opportunistically up to 4 days per month

Lengths required

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

Stout Whiting (*Sillago robusta*)

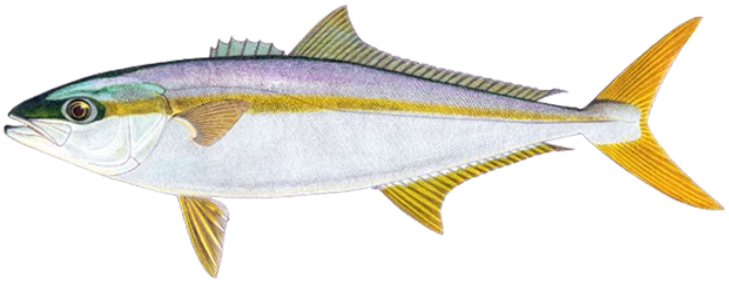
Sample days

- 2-3 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.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Yellowtail kingfish (*Seriola lalandi*)



Sample days

- 3 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.

Appendix F - Nelsons Bay co-op sampling procedures July 2019 – June 2020

SAMPLING SCHEDULE

2019/20	**Nelson Bay**
Bluespotted Flathead	3 LF days/month (15 otoliths/month)
Eastern King Prawn	2 days/month
Eastern School Whiting	1 LF day/month (15 otoliths/month)
Eastern sea garfish	Opportunistic (40 otoliths/month)
Giant mud crab	2 LF days/month
Grey morwong	3 LF days/month
Mulloway	Opportunistic

Bluespotted Flathead (*Platycephalus caeruleopunctatus*)

Sample days

- 3 days/month

Lengths required

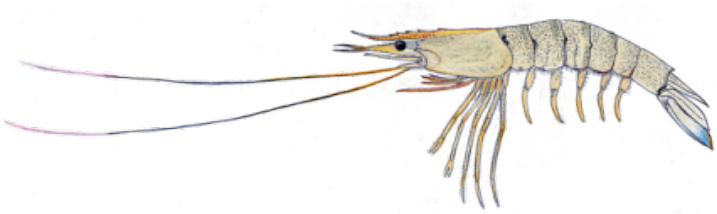
- Measure FISH TRAWL catches only
- Measure all the catches on the floor on the day and time of sampling. Try and measure from as many different fishermen as time allows.
- Measure catches as total length (TL) to the nearest whole cm below true length.

Otoliths required

15 otoliths from 1 catch per month taken proportionately from each grade.

Field code **NB-Pc 1**

Eastern King Prawn (*Melicertus plebejus*)



Sample days

- 2 days/month

Lengths required

- 3 catches per day, at least 50 prawns per grade. Sample from each grade in a catch.
- The following data needs to be recorded for each individual prawn measured within a sample: Sex (male or female) and Carapace length (to the nearest 0.1 cm).
- Record total catch weight of each individuals fishers catch (total catch weight is by grade)

How to measure prawns

The length of prawns is expressed as a carapace length. The carapace length is measured as the length in a straight line from the base of the eye orbit (or eye socket) to the center of the posterior margin of the carapace (i.e. the back of the carapace), as shown in Figure 1. Carapace length is measured in millimeters (mm).

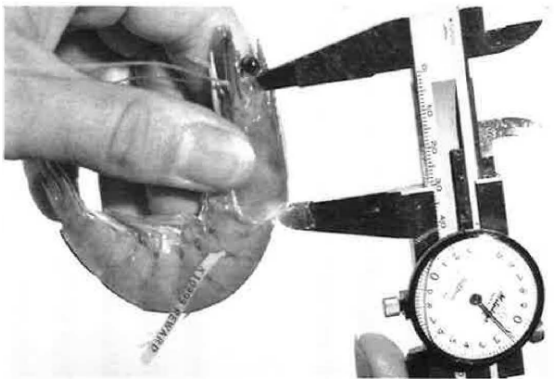


Figure 1. Carapace length of a prawn being measured using calipers. Note the locations of the caliper jaws at the back of the eye socket and back of the carapace.

How to determine sex

A prawn's gender can be determined by examining its genetalia:

- **Male prawns** are identified by a copulatory organ (petasma) between the first pair of swimming legs (see Figure 2);
- **Female prawns** have identical swimming legs and no organ between the foremost pair. Rather, females have a thelycum between the fifth pair of walking legs which provides an anchor site for the male sperm packet received during copulation (see Figure 2).

Males and females can therefore be separated on the presence or absence of a petasma between the first pair of swimming legs and the presence or absence of a thelycum between the last pair of walking legs.

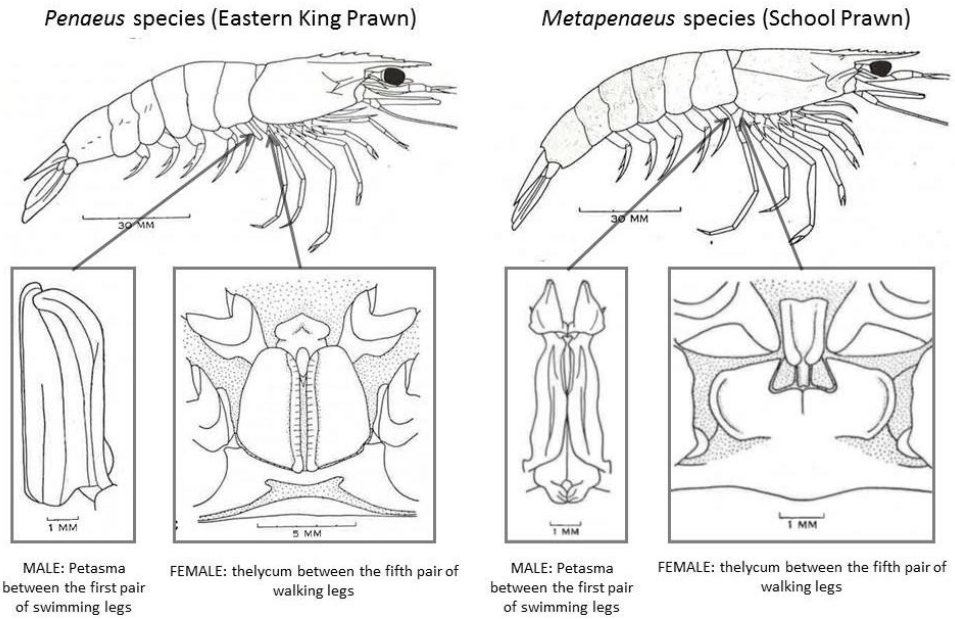
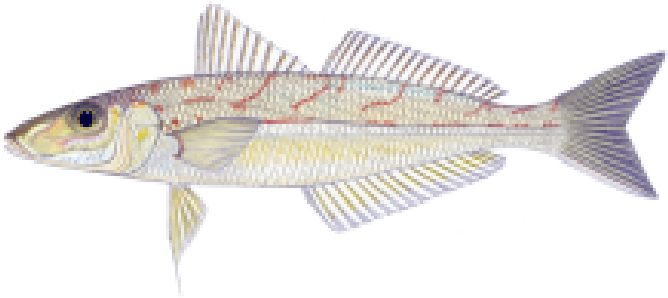


Figure 2. Idealized diagram of prawn copulatory organs for sex identification (pictures from Dall *et al.* 1990).

Eastern School Whiting (*Sillago flindersi*)



Sample days

- 1 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.
- Measure catches as fork length (FL) to the nearest whole cm below true length.

Otoliths required

15 otoliths from 1 catch per month taken proportionately from each grade.

Field code **NB-Sf 1**

Sea Garfish (*Hyporhamphus australis*)

Sample days

- Opportunistically up to 4 days per month between December 2019 to April 2020.

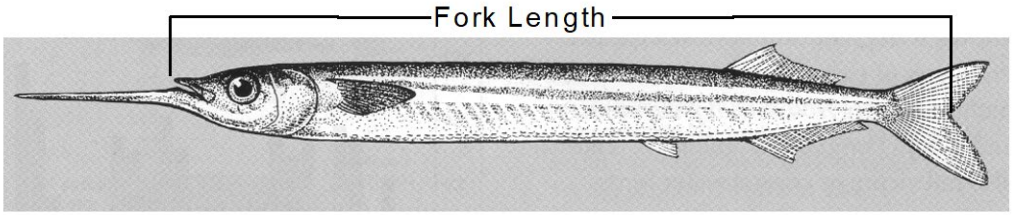
Lengths required

- 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.

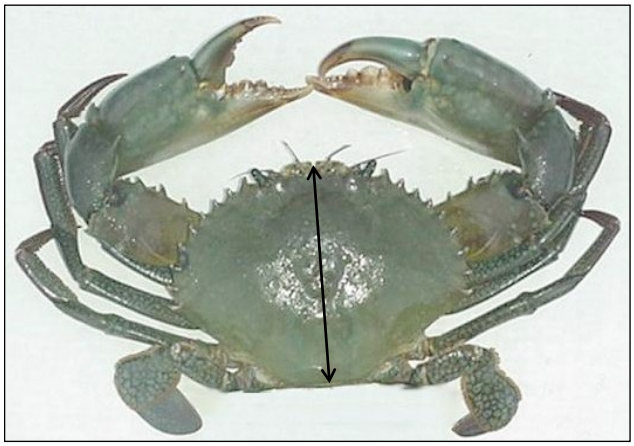
Otoliths required

20 otoliths per catch taken proportionately from each grade. Collect otoliths from 2 catches per month; 40 otoliths in total per month.

Field code **NB-Ha 1**



Giant Mud Crab (*Scylla serrata*)



Sample days

- 2 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

Grey Morwong (*Nemadactylus douglasii*)

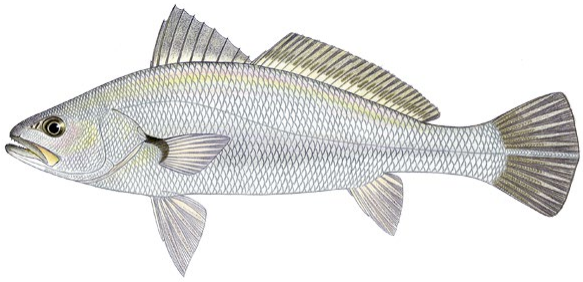
Sample days

- Opportunistically up to 3 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.

Mulloway (*Argyrosomus japonicus*)



Sample days

- Opportunistically up to 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.

Appendix G - Newcastle co-op sampling procedures July 2019 – June 2020

SAMPLING SCHEDULE

2019/20	Newcastle
Bluespotted flathead	3 LF days/month
Eastern King Prawn	2 days/month
School Prawn (October – March)	2-3 days/month
Giant mud crab	2 LF days/month
Grey morwong	3 LF days/month
Mulloway	Opportunistic

Bluespotted Flathead (*Platycephalus caeruleopunctatus*)

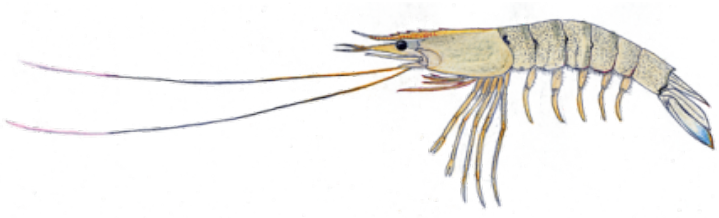
Sample days

- 3 days/month

Lengths required

- Measure either fish trawl or prawn trawl 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 total length (TL) to the nearest whole cm below true length.

Eastern King Prawn (*Melicertus plebejus*)



Sample days

- 2 days/month

Lengths required

- Up to 3 catches per day, at least 50 prawns per grade, per catch. Sample from each grade in a catch.
- The following data needs to be recorded for each individual prawn measured within a sample: Sex (male or female) and Carapace length (to the nearest 0.1 cm).
- Record total catch weight of each individuals fishers catch (total catch weight is by grade)

How to measure prawns

The length of prawns is expressed as a carapace length. The carapace length is measured as the length in a straight line from the base of the eye orbit (or eye socket) to the center of the posterior margin of the carapace (i.e. the back of the carapace), as shown in Figure 1. Carapace length is measured in millimeters (mm).

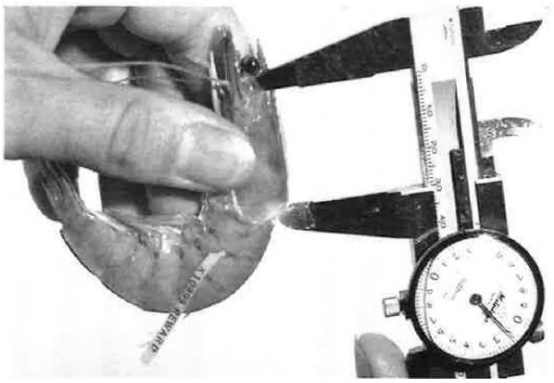


Figure 1. Carapace length of a prawn being measured using calipers. Note the locations of the caliper jaws at the back of the eye socket and back of the carapace.

How to determine sex

A prawn's gender can be determined by examining its genetalia:

- **Male prawns** are identified by a copulatory organ (petasma) between the first pair of swimming legs (see Figure 2);
- **Female prawns** have identical swimming legs and no organ between the foremost pair. Rather, females have a thelycum between the fifth pair of walking legs which provides an anchor site for the male sperm packet received during copulation (see Figure 2).

Males and females can therefore be separated on the presence or absence of a petasma between the first pair of swimming legs and the presence or absence of a thelycum between the last pair of walking legs.

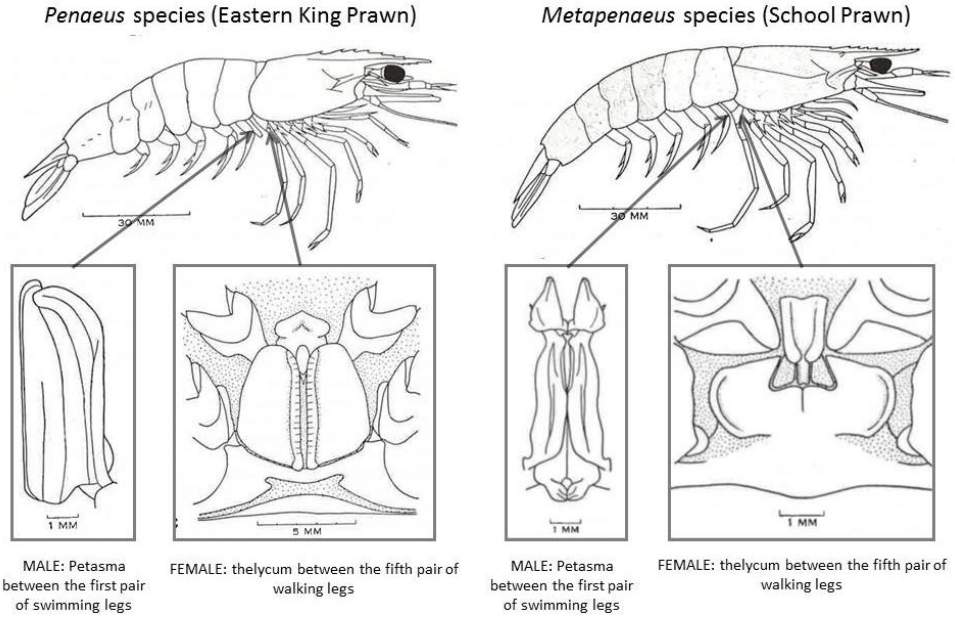
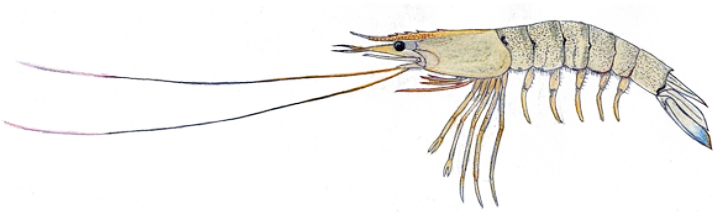


Figure 2. Idealized diagram of prawn copulatory organs for sex identification (pictures from Dall *et al.* 1990).

School Prawn (*Metapenaeus macleayi*)



Sample days

- October 2019 to March 2020
- 2 -3 days/month

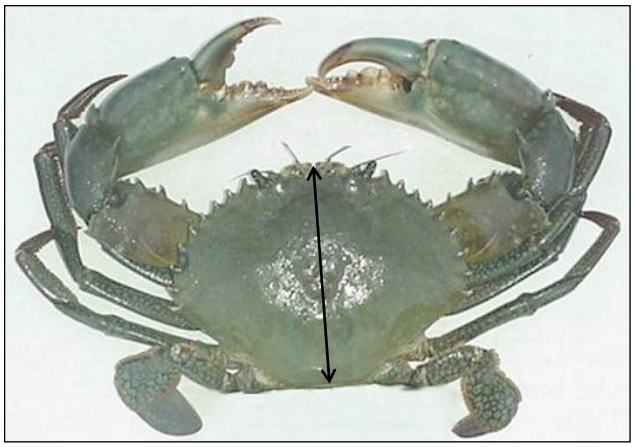
Lengths required

- Purchase 0.5kg from each grade in a catch and process in the lab. If freezing samples, make sure to include a waterproof label with fisher details and date.

- The following data needs to be recorded for each individual prawn measured within a sample: Sex (male or female) and Carapace length (to the nearest 0.1 cm). See eastern king prawn for sexing information.

- Record total catch weight of each individuals fishers catch (total catch weight is by grade)

Giant Mud Crab (*Scylla serrata*)



Sample days

- 2 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

Grey Morwong (*Nemadactylus douglasii*)

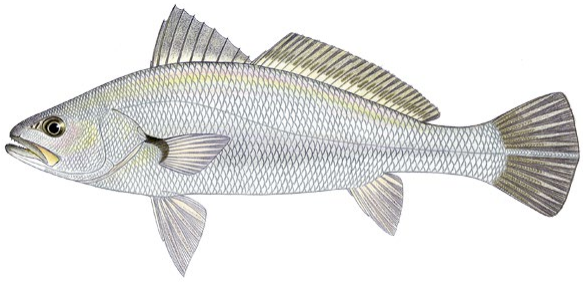
Sample days

- Opportunistically up to 3 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.

Mulloway (*Argyrosomus japonicus*)



Sample days

- Opportunistically up to 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.

EQUIPMENT & PROCEDURES

Contact details

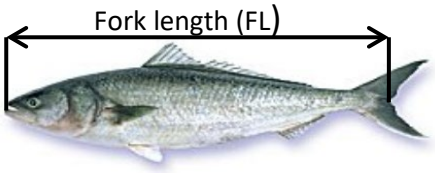
For sending log sheets, datasheets, otoliths or if any equipment needs to be replaced, please contact us via the following details:

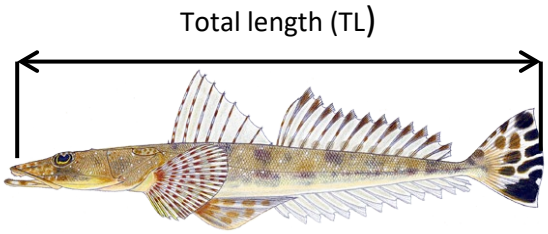
Anne-Marie Hegarty/Caitlin Young
NSW Fisheries
Sydney Institute of Marine Science
Bldg. 19 Chowder Bay Road, Mosman, 2088, NSW
Ph. (02) 9435 468
Anne-Marie: 0416289042 (A-M) and Caitlin: 0439 497 924
Fax (02) 9527 8459
Email: anne-marie.hegarty@dpi.nsw.gov.au or caitlin.young@dpi.nsw.gov.au

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 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 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.