

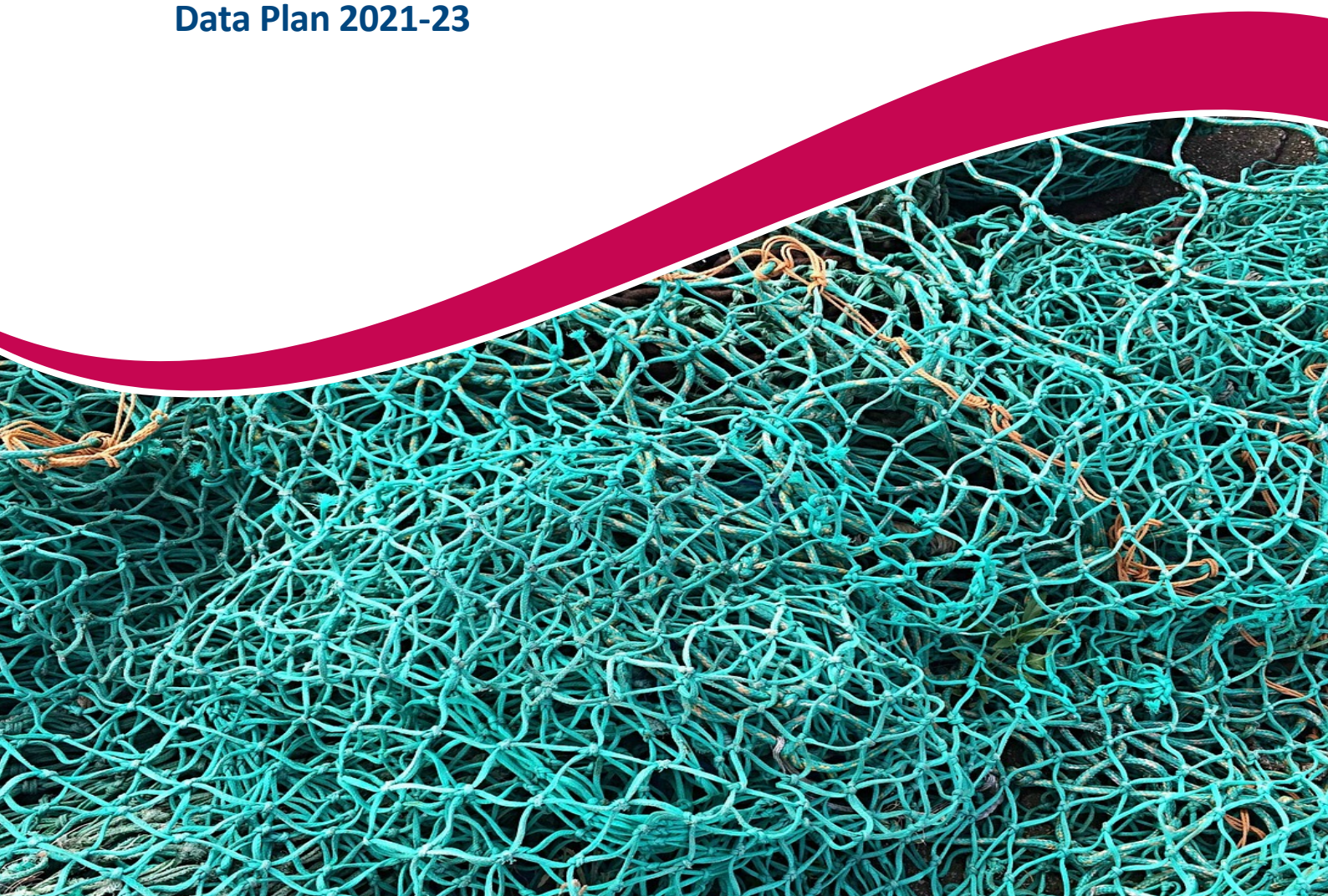


Australian Government

Australian Fisheries Management Authority

Southern and Eastern Scalefish and Shark Fishery

Data Plan 2021-23



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Acronyms

AFMA	Australian Fisheries Management Authority
CDR	Catch Disposal Record
CPUE	Catch per unit effort
ERA	Ecological Risk Assessment
ERM	Ecological Risk Management
FIS	Fishery Independent Survey
GABRAG	Great Australian Bight Resource Assessment Group
GABMAC	Great Australian Bight Trawl Sector Management Advisory Committee
GHAT	Gillnet Hook and Trap sector
HSF	Harvest Strategy Framework
MAC	Management Advisory Committee
MYTAC	Multi-year total allowable catch
RAG	Resource Assessment Group
RBC	Recommended biological catch
SEMAC	South East Management Advisory Committee
SERAG	South East Resource Assessment Group
SESSF	Southern and Eastern Scalefish and Shark Fishery
SESSFRAG	Southern and Eastern Scalefish and Shark Fishery Resource Assessment Group
SharkRAG	Shark Resource Assessment Group
TAC	Total allowable catch
TEP	Threatened, Endangered and Protected
VMS	Vessel Monitoring System

1. Introduction

The purpose of this document is to provide a clear plan for collecting data needed to support fishery management decisions and assessments in the Southern and Eastern Scalefish and Shark Fishery (SESSF).

The *Fisheries Management Act 1991* (the Act) sets out the broad objectives for the Australian Fisheries Management Authority (AFMA) to manage fisheries and ensure that fisheries are ecologically sustainable and economically efficient. Each year the AFMA Commission makes decisions on sustainable catch limits for the key commercial species and AFMA implements management arrangements to keep catch of commercial species within these limits and minimise impacts on protected species, other bycatch and habitats.

In order to make management decisions in pursuit of its objectives, AFMA needs an accurate measure of what is being caught (total fishing mortality and impacts) and an assessment of what is an acceptable catch and impact. These two questions provide the basis for AFMA's data collection and scientific assessment processes.

The core data collected includes a measure of what is caught (catch) and how it has been caught (effort). This data is primarily collected and reported by fishers directly through daily fishing logbooks and catch disposal records (CDRs). Independent verification of catch reports is important to ensure accurate data collection and AFMA is increasingly investing in cost effective data verifications tools. This includes the use of vessel monitoring systems (VMS) that verify boat location as well as Electronic Monitoring (e-monitoring) systems that include cameras and sensors to enable independent verification of catch and effort.

Catch and effort data is used to support ecological risk assessments (ERAs) for all non-commercial species and habitats that interact with fishing gear as well as scientific stock assessments for commercial species. At a minimum AFMA needs catch and effort data to be collected in a fishery to provide a measure of what is caught and support assessments of what is ecologically sustainable.

The AFMA Ecosystem Based Fisheries Management Framework ([Figure 1](#)) provides high-level guidance on the legislative and policy framework, and what types of assessments are applied to each species group. Commercial species are assessed using quantitative stock assessments and managed in accordance with the *Commonwealth Harvest Strategy Policy 2018* (the HSP) and broader impacts on the marine environment, including for bycatch and Threatened, Endangered and Protected (TEP) species, are assessed through ERAs and are managed in accordance with the objectives of the *Commonwealth Fisheries Bycatch Policy 2018* (the Bycatch Policy).

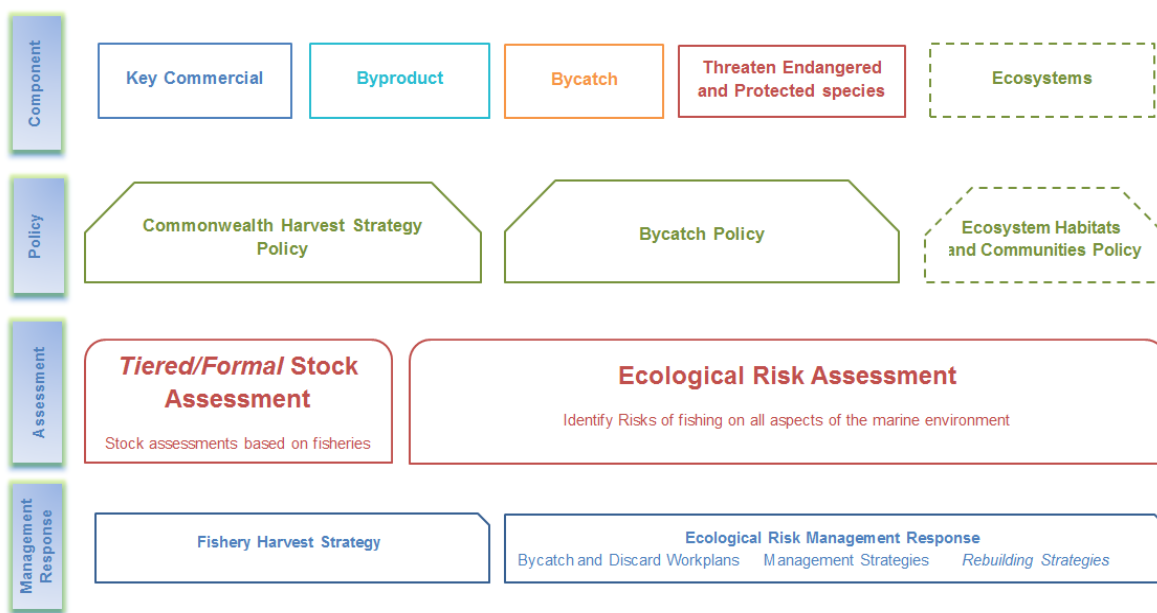


Figure 1 AFMA's Ecosystem Based Fisheries Management Framework

Objectives

The objectives of this data plan are to define the data needs to support the monitoring, assessment and management of:

- commercial species under the [SESSF Harvest Strategy Framework](#) (HSF; AFMA 2020) to support the objectives of the HSP; and
- non-commercial species, including bycatch and TEP species, under the [SESSF Ecological Risk Management Strategy](#) to support the objectives of the Bycatch Policy.

The data plan should also compliment the objectives of SESSF Five-year Strategic Research Plan (2021-25) to ensure future priority research can be supported with data.

2. Monitoring and data collection

AFMA utilises a suite of monitoring and data collection programs in the SESSF which can typically be categorised as fishery dependent, which relies on information collected during commercial fishing operations, and fishery independent, which involves collecting data which is not influenced by fisher behaviour. The combination fishery dependent and fishery independent programs and monitoring tools utilised in the SESSF is intended to provide a cost-effective approach to collecting the data required to inform management decisions and assess the impact of commercial fishing on the ecosystem.

Fishery dependent data

Logbooks and Catch Disposal Records

AFMA requires operators to record catch and effort information which is then used for various purposes, including but not limited to; informing management decisions, supporting AFMA's reporting requirements, monitoring catch, undertaking stock assessments and supporting research.

All SESSF operators are required to complete daily fishing logbooks for each shot or fishing operation. Historically, these were completed on paper sheets, but more recently, electronic logbooks have been implemented across the fishery.

Logbooks include detailed catch and effort information such as the port and date of departure and return, gear type and fishing method, hours trawled, number of hooks set or length of gillnet set, species ID and weight of fish kept and discarded¹; and interactions with TEPs. Catch and effort data from commercial logbooks is used for many purposes, and is a key input for analyses of catch per unit of effort (CPUE) which is the main index of abundance for most SESSF commercial species. Logbook data is also used to inform ERAs for non-commercial species. **Tables 9 and 10** provide a detailed overview of the data collected in logbooks.

When fish are landed in port, operators are also required to fill in Catch Disposal Records (CDRs) which include verified weights of all species landed to licenced fish receivers. Weights in CDRs are considered more accurate than logbooks for determining the total landed weight and are an important input to commercial species stock assessments. CDRs are also used to monitor landed catch of SESSF quota species against total allowable catch (TAC) limits and to decrement quota.

Electronic Monitoring

E-monitoring integrates video, sensors and programmable loggers to record data that can be used to independently verify logbook catch, effort and wildlife interactions. A typical e-monitoring system uses sensors to detect and record fishing activity. An on-board computer takes this information from the sensors and GPS to record video and other information about fishing activities. Information is stored on the system for detailed analysis and some information is transmitted to AFMA for real-time monitoring.

E-monitoring is currently implemented in the GHAT on shark gillnet boats and hook boats to validate logbook catch and effort data, verify catch, and reporting of TEP species interactions. One hundred per cent of fishing activity is monitored for boats with e-monitoring, however the percentage of footage which is reviewed depends on the data being collected. The review coverage GHAT sector is as follows:

- 10 per cent catch review of all fishing events per drive with a minimum of one catch review per drive;

¹ Different discard reporting requirements are in place for specific gear types in the SESSF – See Chapter 3

- An additional 30 per cent TEP review of all manual longline fishing events per drive. This is to support achieving the 10% coverage requirement of the Seabird Threat Abatement Plan (TAP) in the hook sector².
- 100 per cent TEP review for all gillnet fishing events within Australian Sea Lion (ASL) Management Zones including all events on trips if only one event for that trip is within an ASL zone. For automatic longline methods, the corresponding sets of the reviewed hauls will also be assessed for seabird mitigation.
- Fishing events outside the SESSF (e.g. High Seas) will be excluded from the 10 per cent sampling regime. Ad-hoc reviews may occur upon direction of AFMA for TEP review with trips and events annotated.

E-monitoring is not currently capable of collecting biological data such as length, sex and age data for fish. The utility of e-monitoring to collect and validate data in other sectors will continue to be explored and considered in the context of cost-effectiveness relevant to other data collection programs.

Vessel Monitoring Systems

Vessel Monitoring Systems (VMS) are employed by AFMA for the delivery of near real time boat location information in order to effectively monitor the movements of all Commonwealth endorsed fishing boats. Each VMS unit routinely produce positional reports which contain information such as the boats current location, course and speed for the purpose of domestic compliance, fisheries management and research.

The VMS system is a vital tool to ensure compliance with fishery management arrangements, particularly where fishing activity needs to be restricted to certain areas or zones. VMS data can also be used for fine-scale position data for stock assessments.

Integrated Scientific Monitoring Program

The Integrated Scientific Monitoring Program (ISMP) provides fisheries managers, research organisations, environmental agencies, the fishing industry and the wider community with independent, reliable, verified and accurate information on the fishing catch, effort and practice of Commonwealth boats.

The ISMP was designed so that coverage is proportional to fishing effort within and across fisheries, and the data collected is sufficient to provide inputs to stock assessments, including ERAs, and broader fishery management objectives. Generally, the ISMP is used to:

- verify logbook information;
- determine levels of interaction with TEP species;
- quantify levels of bycatch and status of discards (mortality rates);
- collect biological data for stock assessments and research projects on-board or at port (e.g. collection of otoliths – fish ear bones – to age fish, and collect sex and length data of fish);
- record environmental observations;
- collect anecdotal information (qualitative data) for research;
- quantify level of depredation (if high coverage);

² To be reviewed subject to achieving 10% coverage across all boats in the hook sector

- educate fishers (e.g. data collection, species identification, handling TEP species, tag recovery, compliance regulations).

The document [Revised sampling regime for the Southern and Eastern Scalefish and Shark Fishery](#) (Bergh et al, 2009) provides a detailed overview of the sampling design for the SESSF.

The SESSF Resource Assessment Group (SESSF-RAG) reviews the coverage and sampling targets annually, and this review informs the ISMP Plan. **Table 3** to **Table 8** provides a summary of the biological sampling targets for SESSF species across the various sectors and programs, and a more detailed overview of the ISMP Plan is published on the SESSF Website each year after the SESSF-RAG data meeting in August.

Industry based data collection programs

Industry (crew) based data collection programs have been implemented in some sectors of the SESSF with a focus on collecting biological data to either supplement or replace the ISMP program. Depending on the complexity of the fishery and the number of species for which data is required, industry based programs can provide a cost-effective alternative for collecting data.

There has been a long-standing industry based data collection program in the Great Australian Bight Trawl Sector (GABT) which provides length frequency information for deepwater flathead and Bight redfish, which is used as a key input to the Tier 1 stock assessments for these species. While there are no specific sampling targets under this program, the [GABT Operators Handbook](#) outlines protocols for sampling fish lengths from each shot.

An industry based data collection program was introduced in the GHAT in 2018 as an alternative to on-board observers. Currently, the Shark Industry Data Collection Program (SIDaC) is implemented under a formal co-management agreement, and sampling targets are defined for key species in the GHAT: blue-eye trevalla (**Table 4**), gummy shark (**Table 5**), pink ling (**Table 6**), ribaldo (**Table 7**), and school shark (**Table 8**).

Fishery independent data

Most of the SESSF stock assessments use some form of CPUE time series data from logbooks as the main index of stock abundance. Fishery independent data provides a time-series of information, ideally an index of abundance, which can be used in addition to, or instead of, commercial CPUE data for key target species.

Trawl surveys

Until 2016, the key source of fishery independent data in the Commonwealth Trawl Sector (CTS) of the SESSF was the Fishery Independent Survey (FIS). The FIS was discontinued in 2020 because it was not considered to be cost-effectively delivering outcomes to support stock assessments or management of the fishery.

A FIS is still the primary source of fishery independent data in the GABT, and provides relative abundance indices for deepwater flathead and Bight redfish. Various biological and environmental data are collected by scientific observers on-board including: target species; catch rate (kg/shot); fishing method; and fishing depth. Information which provides a relative abundance index of other main by-product and bycatch species is also obtained.

Acoustic Surveys

Acoustic surveys provide acoustic based biomass estimates as inputs to stock assessments, either as an index of abundance or as a line of evidence to help inform the model. The surveys are typically undertaken during commercial fishing operations, based on a structured survey design using calibrated transducers which are either mounted to the hull of the boat, towed as an independent device, or attached to fishing gear.

In the SESSF, acoustic surveys are currently completed for the blue grenadier winter spawning aggregation on the west coast of Tasmania, the orange roughy spawning aggregation on the east coast of Tasmania, and for orange roughy spawning aggregation on the Cascade Plateau. The timing and frequency of these surveys is scheduled in the SESSF Annual Research Statements, and is dependent on timing of stock assessments, but also fishing effort and the availability of suitable boats to undertake the survey.

Close-Kin Mark Recapture

In the GHAT, the Close-Kin Mark-Recapture (CKMR) methodology has been adopted for school shark, and is being considered for other key species in the SESSF. CKMR uses genetic sampling to estimate abundance based on the number of parent–offspring pairs identified in the samples.

Research Projects

Research projects are used to collect and assess additional data required for scientific or management purposes where significant data gaps are identified. In the past, this has included:

- tagging programs for migration and stock structure studies;
- genetic data for studies of stock structure;
- stomach contents data for food-web and predation studies;
- environmental and oceanographic data as inputs to stock dynamics, migrations and production models;
- survivorship of discard species; and
- biological characteristics of target and non-target species.

Further information about the AFMA Research Program, including the SESSF Strategic Research Plan, can be found on the AFMA website at www.afma.gov.au/research.

3. Commercial Species

Under the [SESSF Harvest Strategy Framework](#) (HSF; AFMA 2020), stock assessments are conducted for all quota species which are typically referred to as commercial species – and can be further categorised as either key commercial or byproduct species. The HSP defines key commercial species as those most relevant to the objective of maximising net economic returns to the Australian community from management of the fishery, whereas byproduct species make a lesser contribution to the value of the catch

in a fishery. Key commercial species are generally targeted, and mostly retained, whereas byproduct species are either rarely encountered and usually retained, or frequently encountered and rarely retained.

All quota species are subject to a Total Allowable Catch (TACs) in the SESSF, and as such require stock assessment to understand the status of the stocks and their interaction with the fisheries that target them. For stock assessment models to produce reliable estimates, the data must be accurate, representative and of sufficient quantity. If the data does not meet the above criteria, poor model estimates may result in poor management decisions.

The HSF uses a tiered approach designed to apply different types of assessments and cater for different amounts of data available for different stocks. Each commercial stock is assessed depending on the amount and type of information available to assess stock status and also what level of assessment is needed. Each stock assessment tier has its own harvest control rule or decision rule that is used to determine the recommended biological catch (RBC). The RBC provide the best scientific advice on what the total fishing mortality (landings from all sectors plus discards) should be for each species. A recommended TAC is then calculated using rules outlined in the HSF. Further information on the assessment Tiers is available in the HSF.

Table 1 provides a general overview of the fishery dependent data requirements for each stock assessment tier, which are further detailed in [Section 9 – Logbook data and methods of verification and independent data collection](#).

Catch: Includes information on retained and discarded catch recorded in daily fishing logbooks and catch disposal records, and informs estimates of fishing mortality, catchability and CPUE.

Effort: Includes information recorded in daily fishing logbooks including gear type, hours fished, number of hooks or length of net, location and depth fished, and is used to estimate CPUE, fishing mortality and gear selectivity.

Biologicals: Includes information on age and size structure (derived from otolith and vertebrae samples), length frequencies, sex structure and gonad stage. These are either collected through the SESSF ISMP or industry/crew based programs and inform inputs to stock assessments such as growth, recruitment, natural mortality, age at maturity, stock structure, catchability and gear selectivity.

Table 1 General fishery dependent data requirements for SESSF stock assessment Tiers.

Tier Level	Description	Catch	Effort	Length	Age	Sex	Gonad Stage
Tier 1	Robust assessment of fishing mortality and biomass based on fishery dependent and independent data	X	X	X	X	X	X
Tier 3 ³	Empirical estimates of fishing mortality based on size and/or age data	X	X	X	X		

³ Not currently applied to any species in the SESSF

Tier Level	Description	Catch	Effort	Length	Age	Sex	Gonad Stage
Tier 4	Empirical estimates of relative biomass based on fishery dependent or fishery independent surveys	X	X				
Tier 5	Weight of evidence approach, may estimate the central tendency of sustainable catches (such as the median catch, average catch, or 3 rd highest catch) when catch data is not available.	X		X	X		
ERA	Considers recent estimates of fishing mortality (F) relevant to F_{MSY} . Other indicators, such as CPUE or length frequencies also considered.	X	X	X			

Logbooks are the main source of catch and effort data in the SESSF. In the CTS and GABT, the ISMP is the main source of biological data, but also provides estimates of discards for commercial species which cannot be reliably estimated from logbooks. There is also a crew-based sampling program in the GABT which provides valuable length frequency data to support stock assessment for key commercial species.

In the GHAT, logbook data are verified using e-monitoring and biological data is collected using industry/crew data collection programs⁴. Further detail regarding these programs are provided under [Fishery dependent data](#), and **Table 3** to **Table 8** detail the species-specific biological sampling targets for SESSF quota species.

Some stock assessments also incorporate fishery independent data, including abundance indices derived from acoustic surveys, trawl surveys or genetic analysis of tissue samples. Further detail regarding these programs are provided under [Fishery independent data](#).

4. Non-Commercial Species

The Bycatch Policy provides guidance on managing those aspects of bycatch that are not currently subject to commercial fishery management provisions as outlined in the HSP i.e. non-commercial species. Under the Bycatch Policy, species that are incidentally caught and returned to the sea, or killed/injured as a result of interacting with fishing equipment are referred to as bycatch species, and can be considered as either general bycatch or bycatch relating to *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed species, also referred to as TEPs.

AFMA's Ecological Risk Management (ERM) Guidelines outline the need to avoid and minimise bycatch, and encourage industry led solutions to minimise bycatch of TEP species. A continued focus on greater accuracy in bycatch reporting within Commonwealth fisheries is necessary in order to progress the ecologically sustainable development of fisheries and ensure the sustainability of the species, populations and ecosystems with which fisheries interact.

⁴ Currently the Shark Industry Data Collection Program (SIDaC)

Ecological Risk Assessments (ERAs) are the primary method for assessing the impact of commercial fishing on non-commercial species, as well the broader ecosystem. The ERA framework involves a hierarchy of risk assessment methodologies progressing from a qualitative analysis at the first stage, to a more detailed and quantitative analysis at the final stage. This approach allows easy identification of high and low risk species, as well as those that are data deficient. For more details on the ERA process, see the [Guide to AFMA's Ecological Risk Management](#).

ERAs rely on data collected from logbooks, CDRs, ISMP and independent monitoring programs. Improvement in the data collected will allow fisheries management to better assess and mitigate the impact of commercial fishing operations on the environment and account for the cumulative impact of Commonwealth fisheries on bycatch and TEP species.

Bycatch Species

For non-trawl methods, operators are required to report non-quota discards to the highest possible taxonomic resolution (species is preferred) in the daily fishing logbooks. In some sectors, discards are verified using e-monitoring – further information about e-monitoring coverage, including coverage and review rates, is detailed above and in individual TEP management strategies that can be found on AFMA's website www.afma.gov.au/sustainability-environment/protected-species-management.

Due to the nature of trawl fishing, where catch is brought on board in large bags, and discards are batched as mixed species, reporting to the species level is not currently possible. For trawl methods in the SESSF, operators are required to report non-quota discards into groups that have been developed based on commonly discarded species with similar morphology (**Table 2**). It is expected that these changes will improve the quality of discard reporting in SESSF trawl sectors, and reduce operator workload. Obtaining accurate discard data will improve the understanding of stock status and allow for implementation of more efficient management arrangements.

Table 2 Bycatch reporting – non-quota discard groups for the trawl sectors of the SESSF

CAAB Code	Common Name (CAAB Taxon Report)	Name in logbooks
37465000	Triggerfishes and Leatherjackets	Leatherjackets
37990084	Scorpionfishes, gurnards & latchets	Scorpionfishes/Gurnards/Latchets
37439918	Gemfishes	Barracoutas
37440000	Hairtails & cutlassfishes	Frostfish/Hairtails
37990077	Dories	Dories/Oreodories
37990020	Fish oceanic/marine	Other Finfish
23590000	Cephalopods	Squids/Octopus/Cuttlefishes
37020923	Dogfishes (squalidae)	Dogfish (inc Spurdog)
37990030	Skates & Rays (mixed) (Rajiformes)	Skates/Rays/Stingarees/Guitarfish
37990003	Sharks (other)	Other Sharks
10000000	Sponges	Sponges

Threatened, endangered and protected species

The EPBC Act lists four different categories of protected species in Commonwealth areas.

Threatened – this generally includes species with low population numbers and those that have lost some of their habitat or face other threats to their survival.

Migratory species – species that move between countries and across international boundaries. Whales are an example of a migratory species. These animals require special protection under the Convention on Migratory Species. Australia joined many other countries in signing this convention.

Marine species – species listed in this category are provided with general protection to make sure their population numbers do not decline. They cannot be killed, injured, traded, taken, kept or moved without a special permit.

Cetaceans – all cetaceans (whales and dolphins) are included in this category.

Operators are required to report interactions with TEPs in their daily fishing logbooks, and AFMA uses this information for reporting purposes, and to monitor interaction rates against triggers established in various TEP management strategies, such as:

- The Threat Abatement Plan 2018 for the incidental catch (or bycatch) of seabirds during oceanic longline fishing operations (www.antarctica.gov.au/about-antarctica/environment/plants-and-animals/threat-abatement-plan-seabirds/);
- The [Gillnet Dolphin Strategy](#); and
- The [Australian Sea Lion Management Strategy](#).

These strategies can be found on AFMA's website at [Protected species management & commercial fish species rebuilding strategies](#).

5. Reporting

Quarterly Reporting

A Memorandum of Understanding (MOU) between the AFMA and the Department of Agriculture, Water and the Environment (DAWE) allows AFMA to report interactions with protected species in AFMA managed fisheries on behalf of fishers. AFMA periodically provides summary reports on protected species interactions to the Department. The record of protected species interactions for AFMA managed fisheries as reported in fishery logbooks are published on the AFMA website on a quarterly basis. This report is compiled from official logbook records submitted to AFMA by fishers (concession holders).

Reporting to MACs and RAGs

AFMA reports on the TEP interactions to MACs and RAGs on a regular basis. This is facilitated through bycatch and discard work plans, fishery updates and consultative group advice on TEP management strategies. These reports are generated using logbook data, EM reports and observer data.

WTO annual report

All fisheries granted export approval under the EPBC Act are required to produce annual reports containing the information outlined in Appendix B of the Australian Government's *Guidelines for the Ecologically Sustainable Management of Fisheries – 2nd Edition* (the Guidelines).

The annual report summarises management arrangements across the SESSF, and uses data collected across the various monitoring and data collection programs mentioned above to provide an overview of the SESSF against reporting requirements and conditions outlined in the WTO. Further information about the WTO, including the WTO assessment report for the SESSF, can be found on the DAWE website at [Southern and Eastern Scalefish and Shark Fishery | Department of Agriculture, Water and the Environment](#).

6. Data Management

AFMA oversees the collection of large amounts of fishery data that are collected through methods outlined in Section 4. Data collected from on-board observers, crew based sampling, port sampling, logbooks, VMS and e-monitoring are all stored in-house by AFMA by various methods. These data sources are collected via systems directly integrated into the AFMA database (e.g. electronic logbooks), via paper forms submitted and manually entered into the database (e.g. TEP interaction forms, observer reports) and via vendors who analyse the data to then provide reports to AFMA (e.g. e-monitoring).

Logbook, CDR, VMS and observer program data is currently stored on the AFMA database for internal use, and is also provided to research organisations for data analysis services. E-monitoring footage is analysed by an AFMA contractor and annotated catch data is stored in AFMA databases. Annotated e-monitoring data is compared to logbook data for the same shots and comparison reports are sent to fishers and stored by AFMA. These data are used internally for day-to-day management activities and externally for stock assessments, ERAs and other ad-hoc data needs. Data is provided on request to organisations or individuals requiring the data for research when confidentiality agreements are agreed to.

AFMA has recently developed a data strategy for improving the agency's data management and analytics. The data strategy aims to establish common methods, practices, tools and processes to manage, manipulate and share data within and outside of the organisation in a consistent manner, while providing flexibility to those business areas with unique needs.

Figure 2 (below) outlines the data lifecycle and AFMA's business requirements.

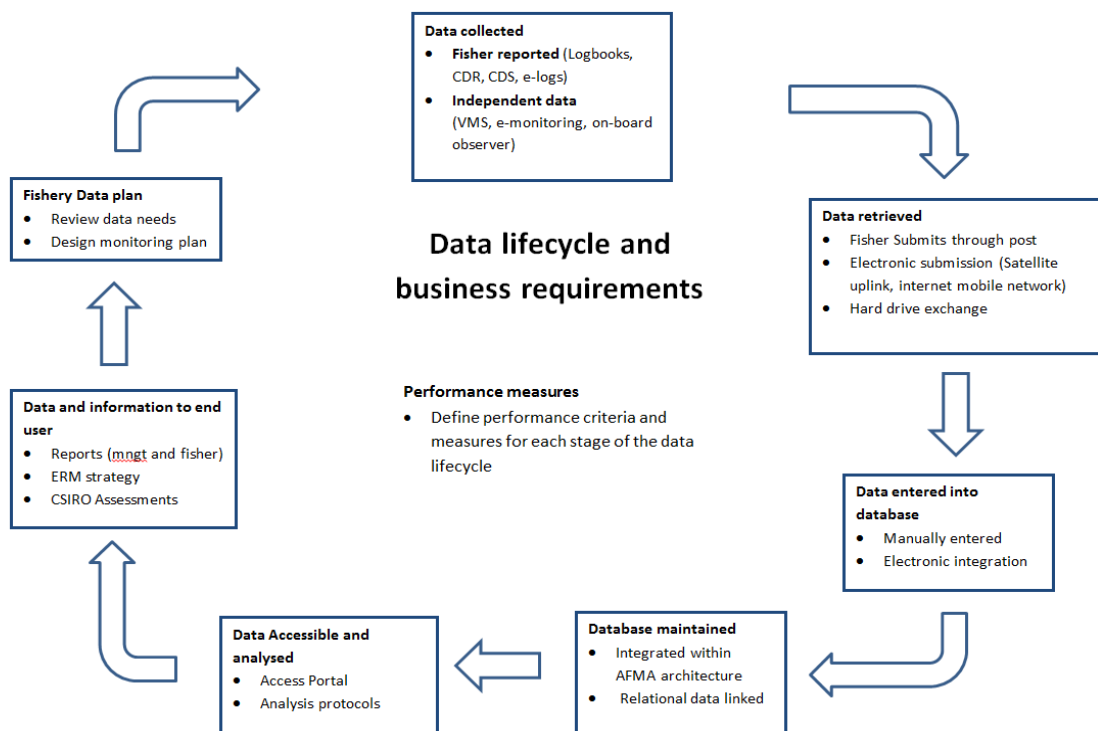


Figure 2 Summary diagram depicting the stages in the fisheries data lifecycle.

7. Data plan review

SESSFRAG will review this plan at its annual data meeting, which is typically held in August, prior to individual RAGs meet, and undertake stock assessments. SESSFRAG will identify and prioritise data needs and gaps for SESSF quota species, bycatch species and TEPs, to ensure the data collected is sufficient to inform research, stock assessments and management decisions.

A key part of this process is the review of the ISMP and industry based sampling programs and whether sampling targets (**Table 3 to Table 8**) are being achieved and whether any changes are required.

8. Action items and ad-hoc data collection

In addition to the sampling requirements identified in **Table 3 to Table 8**, AFMA may identify the need to collect additional data on an ad-hoc basis. This section serves as a register of these data collection requirements and will be reviewed and reported against annually.

Gummy and school shark ([SharkRAG March 2021](#))

Collection of 75 samples (dual length measurements partial and total) for each species greater than 160cm total or 100cm partial as a once off collection. The data collection must be measured in accordance with ISMP sampling protocols.

Table 3 SESSF Species sampling targets (last updated March 2021 – SESSF Chairs meeting)

Green – High priority

Orange – Medium priority

Red – Low priority

Species	MYTAC Species?	Responsible RAG	Source/Program	Gear/Zone	Lengths			Biologicals		
					2021	2022	2023	2021	2022	2023
Tier 1 / Close-Kin Mark-Recapture										
School shark	3-Year MYTAC	SharkRAG	Industry	GHAT Gillnet & Longline (see sampling design Table 8)	2700	3220	3220	700	1480	1480
			ISMP	CTS Trawl (deepwater)		250	250		250	250
Tier 1										
Bight redfish	5-Year MYTAC	GABRAG	Industry	GABT Trawl (FIS scheduled where BOLD)	As per GABT Ops Manual			-	-	-
			ISMP		2000	2000	2000	570	570	570
Blue grenadier	3-Year MYTAC	SERAG	ISMP	CTS Trawl (N-spawn)	1500	1500	1500	800	800	800
			ISMP	CTS Trawl (Spawn) (AOS scheduled where BOLD)	2000	2000	2000	1000	1000	1000
			ISMP	GABT Trawl	500	500	500	500	500	500
Deepwater flathead	3-Year MYTAC	GABRAG	Industry	GABT Trawl (FIS scheduled where BOLD)	As per GABT Ops Manual			-	-	-
			ISMP		2000	2000	2000	570	570	570
Gummy shark	3-Year MYTAC	SharkRAG	Industry	GHAT Auto-Line & Gillnet (see sampling design Table 5)	2700	2700	2700	700	700	700
Orange rough (Albany & Esperance)	N/A – Rebuilding Sp.	GABRAG	ISMP	GABT Trawl	1000	1000	1000	1000	1000	1000
Orange roughy (eastern)	3-Year MYTAC	SERAG	ISMP	CTS Trawl (Spawn)	1000	1000	1000	1000	1000	1000
				Acoustic Optical Survey			1000			1000
Orange roughy (southern)	N/A – Rebuilding Sp.	SERAG	ISMP	CTS Trawl (Pedra Branca)	1000	1000	1000	1000	1000	1000
				CTS Trawl (Southern Zone)	-	-	-	-	-	-
Orange roughy (western)	N/A – Rebuilding Sp.	SERAG	ISMP	CTS Trawl (Western Zone)	-	-	-	-	-	-
			WORRP	WORRP (North)	1000	1000	1000	1000	1000	1000
				WORRP (Central)	1000	1000	1000	1000	1000	1000
WORRP (South)	1000	1000		1000	1000	1000	1000			

Species	MYTAC Species?	Responsible RAG	Source/Program	Gear/Zone	Lengths			Biologicals		
Orange roughy (Cascade)	Single-year TAC	SERAG	ISMP	CTS Trawl	1000	1000	1000	1000	1000	1000
Pink ling	3-Year MYTAC	SERAG	Industry	GHAT Auto-line (see sampling design Table 6)	720	720	720	400	400	400
				CTS Trawl (East)	1000	1000	1000	400	400	400
			ISMP	CTS Trawl West)	1000	1000	1000	400	400	400
Redfish	N/A – Rebuilding Sp.	SERAG	ISMP	CTS Trawl	2000	2000	2000	1000	1000	1000
School whiting	3-Year MYTAC	SERAG	ISMP	CTS Trawl	1000	1000	1000	300	300	300
				CTS Seine	1500	1500	1500	300	300	300
Silver warehou	3-Year MYTAC	SERAG	ISMP	CTS Trawl (East)	1000	1000	1000	450	450	450
				CTS Trawl (West)	1000	1000	1000	450	450	450
Jackass morwong	3-Year MYTAC	SERAG	ISMP	CTS Trawl (East)	1000	1000	1000	600	600	600
				CTS Trawl (West)	1000	1000	1000	600	600	600
Tiger flathead	3-Year MYTAC	SERAG	ISMP	CTS Trawl	1000	1000	1000	450	450	450
				CTS Seine	1000	1000	1000	700	700	700
Gemfish (eastern)	N/A – Rebuilding Sp.	SERAG	ISMP	CTS Trawl (Non Spawn)	1700	1700	1700	350	350	350
				CTS Trawl (Spawn)	300	300	300	300	300	300
Tier 4										
Alfonsino	3-Year MYTAC	SERAG	ISMP	CTS Trawl	1000	1000	1000	-	-	-
John dory	Single year TAC	SERAG	ISMP	CTS Trawl	2000	2000	2000	500	500	500
Blue eye trevalla	Single-year TAC	SERAG	ISMP	CTS Trawl ⁵	-	-	-	-	-	-
			Industry	GHAT Auto-line (see sampling design Table 4)	1200	1200	1200	750	750	750
Mirror dory	Single-year TAC	SERAG	ISMP	CTS Trawl (East)	1000	1000	1000	-	-	-
				CTS Trawl (West)	1000	1000	1000	-	-	-
Blue warehou	N/A – Rebuilding Sp.	SERAG	ISMP	CTS Trawl (East)	1000	1000	1000	450	450	450
				CTS Trawl (West)	2000	2000	2000	450	450	450
Ocean perch (offshore)	3-Year MYTAC	SERAG	ISMP	CTS Trawl (Offshore)	1000	1000	1000	-	-	-

⁵ Catch is historically low, no target required

Species	MYTAC Species?	Responsible RAG	Source/Program	Gear/Zone	Lengths			Biologicals		
Sawshark	3-Year MYTAC	SharkRAG	Industry	GHAT Gillnet & Longline	-	-	-	-	-	-
			ISMP	CTS Trawl	-	-	-	-	-	-
Smooth oreodory (cascade)	3-Year MYTAC	SERAG	ISMP	CTS Trawl	-	-	-	-	-	-
Ribaldo	3-Year MYTAC	SERAG	Industry	GHAT Auto-Line (see sampling design Table 7)	1000	1000	1000	-	-	-
Royal red prawn	3-Year MYTAC	SERAG	ISMP	CTS Trawl	2000	2000	2000	-	-	-
Silver trevally	Single-year TAC	SERAG	ISMP	CTS Trawl	2000	2000	2000	-	-	-
Gemfish (western)	3-Year MYTAC	SERAG	ISMP	CTS Trawl	2000	2000	2000	-	500	-
				GABT Trawl	1000	1000	1000	-	600	-
Tier 5										
Deepwater shark (eastern)	3-Year MYTAC	SERAG	ISMP	CTS Trawl	1000	1000	1000	1000	1000	1000
Deepwater shark (western)	3-Year MYTAC	SERAG	ISMP	CTS Trawl	1000	1000	1000	1000	1000	1000
Oreo, basket	3-Year MYTAC	SERAG	ISMP	CTS Trawl	1000	1000	1000	-	-	-
Weight of evidence										
Elephant fish	3-Year MYTAC	SharkRAG		-	-	-	-	-	-	-
Smooth oreodory (other)	Single-year TAC	SERAG	ISMP	CTS Trawl	1000	1000	1000	500	500	500

Table 4 Sampling regime for blue-eye trevalla caught by auto-longline in the GHAT.

Method	Collection zone	Lengths (N)				Biologicals & tissue samples (N)			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Auto-Longline	20	75	75	75	75	47	47	47	47
	30	75	75	75	75	47	47	47	47
	40	75	75	75	75	47	47	47	47
	50	75	75	75	75	47	47	47	47
	Total	1200				750			

Table 5 Proposed gummy shark yearly sampling schedule for length and vertebrae data collection. (SA = South Australia; TAS = Tasmania; BS = Bass Strait).

Method	Collection zone	Lengths (N)				Vertebrae (N)			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Gillnet	Adelaide/Robe	150	150	150	150	Combined gear types			
	Lakes/San Remo	200	200	200	200				
	Triabunna/Hobart	125	125	125	125				
Longline	Adelaide/Robe	100	100	100	100	50	50	50	50
	Lakes/San Remo	0	0	0	0	75	75	75	75
	Triabunna/Hobart	100	100	100	100	50	50	50	50
	Total	Gillnet: 1900 Longline: 800				700 (1 trip per zone/gear type)			

Table 6 Proposed sampling regime for pink ling caught by auto-longline in the GHAT.

Method	Collection zone	Lengths (N)				Biologicals (N)			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Auto-Longline	20	45	45	45	45	25	25	25	25
	30	45	45	45	45	25	25	25	25
	40	45	45	45	45	25	25	25	25
	50	45	45	45	45	25	25	25	25
	Total	720				400			

Table 7 Proposed sampling regime for ribaldo caught by auto-longline in the GHAT.

Method	Collection zone	Lengths (N)				Biologicals (N)			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Auto-Longline	20	63	63	63	63				
	30	63	63	63	63				
	40	63	63	63	63				
	50	63	63	63	63				
	Total	1000							

Table 8 School shark yearly sampling schedule for length and vertebrae data collection. (SA = South Australia; TAS = Tasmania; BS = Bass Strait). Lengths to be taken from the same animals as vertebrae, vertebrae to have tissue attached, no more than 50 samples per shot.

Method	Collection zone	Lengths (N)				Vertebrae (N)			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Gillnet	Adelaide/Robe	100	100	100	100	Combined Gear Types			
	Lakes/San Remo	250	250	250	250				
	Devonport/Triabunna	125	125	125	125				
Longline	Adelaide/Robe	100	100	100	100	50	50	50	50
	Lakes/San Remo	0	0	0	0	75	75	75	75
	Devonport/Triabunna	100	100	100	100	50	50	50	50
Any Method (Inc. GABTF)	West Tas	65	65	65	65	65	65	65	65
	West SA	65	65	65	65	65	65	65	65
Auto-longline	Deepwater (>183m)	65	65	65	65	65	65	65	65
Total		Gillnet: 1900 Hook: 800 Any method: 260 Deepwater: 260				1480 (1 trip per zone/gear type, no more than 50 samples per shot)			

9. Logbook data and methods for verification and independent collection

Table 9 SESSF logbooks.

Gear Type	Logbook	Electronic schema
Hook & Gillnet	LN01B/NT01B	ELINE
Trap	TR01	EGNET
Trawl	EFT01C	ESEINE

Table 10 Data collected using logbooks, including methods for verification and independent collection.

Types of logbook data collected	Data verified or collected independently			
	E-monitoring ⁶	On-board observers	VMS	Port based observers
Fishing boat & crew details				
Boat name	✓	✓	✓	✓
Voyage start date	✓	✓	✓	✓
Gear details				
Gear type/method	✓	✓		✓ ⁷
Gear details / measurements		✓		
Mitigation details	✓ ⁸	✓		
Vessel activity				
Inshore/Offshore		✓	✓	
Shot date	✓	✓	✓	
Start fishing time	✓	✓		
Start fishing position	✓	✓	✓	
End fishing position	✓	✓	✓	
Start haul time	✓	✓		
End haul time	✓	✓		
Offal discharge		✓		
Minimum depth	✓	✓		
Maximum depth	✓	✓		
Shot details				
Shot date / number	✓	✓		
Mitigation deployed	✓	✓		
No. of hooks, length of net, shots		✓		
Total gear lost (mainline length, # hooks)		✓		

⁶ Currently used on shark gillnet and some hook boats to validate logbook data

⁷ Where a single gear type is used on a trip

⁸ Details of some mitigation can be collected via e-monitoring.

Types of logbook data collected	Data verified or collected independently			
	E-monitoring ⁶	On-board observers	VMS	Port based observers
Catch				
Boat name	✓	✓	✓	
Shot number	✓	✓		
Voyage ID	✓	✓		
Retained species weight		✓		✓
Retained species piece count	✓	✓		✓
Discard species weight		✓		
Discard species piece count	✓	✓		
Life status of discards		✓		
Biological data				
Date	✓	✓		
Time	✓	✓		
Species identification	✓	✓		
Catch location	✓	✓	✓	
Life status	✓	✓		
Fate	✓	✓		
Retained species length/weight ⁹		✓		✓
Discard species length/weight ⁶		✓		
Otolith/vertebra ⁶		✓		✓
Wildlife interactions				
Species name	✓	✓		
Number of species interacted with	✓	✓		
Date	✓	✓		
Time	✓	✓		
Shot number	✓	✓		
Latitude/Longitude	✓	✓		
Caught during set/haul/other	✓	✓		
Band or tag number		✓		
Life status	✓	✓		

⁹ Not collected in logbooks

10.Data requirements and sources by species groups

Table 11 Overview of data requirements for species groups and collection sources. Developed by SESSFRAG Feb 2019

✓ Indicates data is currently collected ✓ Indicates potential for data collection ○ Indicates verification of data.

Source	Data type	Target				Byproduct				Bycatch				TEPS				Conserve Program		
		GABT	CTS	GN	Hook	GABT	CTS	GN	Hook	GABT	CTS	GN	Hook	GABT	CTS	GN	Hook	TRWL	Hook	SHRK
Logbooks	Catch*	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓
	Discards					✓	✓	✓	✓	✓	✓	✓	✓					✓	✓	✓
	Effort / location	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Gear details	✓	✓	✓	✓	✓	✓	✓	✓											
	Baiting Ratio				✓															
	Depth	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Interactions													✓	✓	✓	✓			
	Life Status													✓	✓	✓	✓			
	Depredation																			
	CTD#	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓
EMS	Catch			○	○			○	○			○	○			○	○		○	○
	Effort																			
	Discards			○	○			○	○			○	○			○	○		○	○
	Length			✓	✓															
	Spp comp			○	○			○	○			○	○			○	○		○	○
	Landed catch																			
	TEP interactions														○	○				
ISMP – On-board	Catch*									✓	✓	✓	✓					✓	✓	✓
	Discards	✓	✓			✓	✓			✓	✓							✓	✓	✓
	Gear																			
	Interactions													✓	✓					
	Spp pres													✓	✓					
	Retained length	✓	✓			✓	✓													
	Discarded length	✓	✓			✓	✓													

		Target				Byproduct				Bycatch				TEPS				Conserve Program		
Source	Data type	GABT	CTS	GN	Hook	GABT	CTS	GN	Hook	GABT	CTS	GN	Hook	GABT	CTS	GN	Hook	TRWL	Hook	SHRK
	Age	✓	✓			✓	✓													
	Mitigation deployment													✓	✓					
	Tissue samples	✓	✓																	
	Biologicals	✓	✓																	
ISMIP - Port	Retained length	✓	✓			✓	✓													
	Age	✓	✓			✓	✓											✓		
	Tissue samples	✓	✓																	
	Biologicals	✓	✓																	
FIS	Catch	✓	✓			✓	✓			✓	✓									
	Effort/location	✓	✓			✓	✓			✓	✓									
	Depth	✓	✓			✓	✓			✓	✓									
	TEP interactions													✓	✓					
	Length	✓	✓																	
	Age	✓	✓																	
	Tissue sample	✓	✓																	
	Environment	✓	✓																	
Industry	Discarded length	✓	✓	✓	✓															
	Retained lengths	✓	✓	✓	✓															
	Age	✓	✓	✓	✓															
	Tissue samples	✓	✓	✓	✓															
	Biologicals	✓	✓	✓	✓															
	Environment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

*Used to calculate catch per unit effort

#Conductivity, Temperature, Depth

11. References

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