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NSW Trawl Whiting Harvest Strategy

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Contents

Introduction

Purpose

A harvest strategy is a framework that specifies pre-determined actions in a fishery for defined species (at the stock or management unit level) necessary to achieve the agreed ecological, economic and social management objectives (Sloan et al. 2014).

This Trawl Whiting Harvest Strategy applies to the NSW components of stocks of Eastern School Whiting (*Sillago flindersi*), which NSW shares with the Commonwealth, and Stout Whiting (*Sillago robusta*), which NSW shares with Queensland.

The Goal of the Trawl Whiting Harvest Strategy is:

'To contribute, in cooperation with other jurisdictions, to maintaining robust, sustainable stocks of Eastern School Whiting and Stout Whiting to support a profitable commercial fishery, with social, cultural and economic benefits to the community.'

This supports the Ocean Trawl Fishery Management Strategy 2007 vision for:

'A profitable Ocean Trawl Fishery which provides the community with fresh local seafood and carries out fishing in an ecologically sustainable manner.'

To ensure there is a strong likelihood of achieving this harvest strategy's objectives, this Trawl Whiting Fishery Harvest Strategy:

1. provides a framework to support determinations of Total Allowable Catch (TAC) for Trawl Whiting (Eastern School Whiting and Stout Whiting combined) taken in the NSW Ocean Trawl Share Management Fishery, and
2. identifies complementary management measures, for consideration and implementation as necessary.

Introduction of harvest strategies and evaluation of ecological risk in NSW fisheries are key activities under Initiative 6 of the NSW Marine Estate Management Strategy 2018-2028.

Fishery description

Eastern School Whiting and Stout Whiting are primarily harvested in the Ocean Trawl Share Management Fishery. The fishery has two main fleets – ocean prawn trawl and fish trawl – which differ in terms of gear used, targeting practices and geographical area of operation.

Smaller catches of Eastern School Whiting are taken in NSW by the Southern Fish Trawl Restricted Fishery, which operates within 3 nautical miles of the coast, south of a line drawn due east from Barrenjoey Head.

Since May 2019, catches of Eastern School Whiting and Stout Whiting combined, taken in the Ocean Trawl Share Management Fishery, have been subject to quota management. There is no quota management in the Southern Fish Trawl Restricted Fishery.

A determination of Total Allowable Catch (TAC) for Trawl Whiting must be made, either by the independent Total Allowable Fishing Committee (TAFC) or by the Secretary of the Department, as directed by the Minister, for each 12-month fishing period between 1 May and 30 April. The TAC is allocated to holders of Ocean Trawl - Trawl Whiting Quota Shares as individual transferable quota, proportional to their shareholdings.

The first Trawl Whiting TAC, for the 2019/20 fishing period, was determined by the Secretary as 1,189.1 tonnes (t). This figure was based on the largest annual reported catch of Trawl Whiting in NSW in the preceding 10 years. The TAFC then made TAC determinations for the following two years: 898 t for the 2020/21 fishing period and 1,066 t for the 2021/22 fishing period.

Additional management controls in the Ocean Trawl Fishery include limited entry, effort quota in the inshore and offshore prawn trawl sectors, various bag limits and spatial and temporal closures, gear restrictions and reporting requirements.

The Eastern School Whiting stock is shared with the Commonwealth and Stout Whiting is shared with Queensland. Fishing for Eastern School Whiting in the Commonwealth Southern and Eastern Scalefish and Shark Fishery (SESSF) has been quota managed since 1993. Fishing for Stout Whiting in the Queensland Finfish (Stout Whiting) Trawl Fishery has been quota managed since 1998. Eastern School Whiting and Stout Whiting stocks are currently (2021) assessed as being *Sustainable* under the Status of Australian Fish Stocks (SAFS) classification scheme, with spawning stock biomass levels at 41% and 42% of unfished levels, respectively.

Recreational fishing for Eastern School Whiting and Stout Whiting in NSW is negligible. Aboriginal harvest of each species in NSW is unknown and assumed to be small, with negligible impact on the stock. Notwithstanding this, all fisheries sectors have a legitimate interest in the management of the fishery, as reflected in this harvest strategy's strategic and operational objectives to maintain ecosystem function and enhance or support access.

Scope

This harvest strategy identifies a Goal, Strategic Objectives and Operational Objectives for the Trawl Whiting fishery in NSW. It contains:

- indicators used to track the performance of the fishery over time,
- an outline of the data monitoring and assessment regime used to assess the level of each indicator and the overall status of the stock,
- reference points including target (where we want the fishery to be), limit (where we don't want the fishery to be) and trigger reference points, and
- decision rules that provide guidance to the Total Allowable Fishing Committee (TAFC) or Secretary in making a determination of Trawl Whiting TAC under Part 2A of the *Fisheries Management Act 1994*.

This harvest strategy does not establish formal resource sharing arrangements within NSW or between NSW and other jurisdictions. It does, however, demonstrate the importance of collaboration on data collection and stock assessment, and of complementary management measures throughout the biological ranges of the two whiting species.

All harvest strategies need to be regularly reviewed. This harvest strategy will be reviewed 1, 3 and 5 years after its adoption, or as otherwise required. Some areas are already identified for possible future improvement (see Strategic Management Options and Research Priorities).

Ecologically sustainable development

NSW harvest strategies support Ecologically Sustainable Development (ESD) by seeking to integrate ecological, economic, social and cultural dimensions of fisheries management, consistent with the NSW Fisheries Harvest Strategy Policy, the *Fisheries Management Act 1994* and Australia's National Strategy for Ecologically Sustainable Development 1992.

An Environmental Impact Assessment (EIS) and Fishery Management Strategy have been completed for the Ocean Trawl Fishery, to assess and monitor environmental performance. Ecological Risk Assessments (ERA) for the Ocean Trawl Fishery are also underway. If an ERA identifies impacts from Trawl Whiting fishing with an unacceptable level of risk, these may be managed through review of the harvest strategy or other appropriate mechanisms.

Harvest Strategy

Objectives

This harvest strategy is established under the NSW Fisheries Harvest Strategy Policy to meet legislated objectives of the *Fisheries Management Act 1994*, the *Marine Estate Management Act 2014*, and the Fisheries Management (Ocean Trawl Share Management Plan) Regulation 2006. These legislated objectives are reflected in this harvest strategy's Goal and Strategic Objectives, while the Operational Objectives are tailored to Trawl Whiting (Table 1).

Table 1. Goal, Strategic Objectives and Operational Objectives of the NSW Trawl Whiting Harvest Strategy

Goal
To contribute, in cooperation with other jurisdictions, to maintaining robust, sustainable stocks of Eastern School Whiting and Stout Whiting to support a profitable commercial fishery, with social, cultural and economic benefits to the community.
Strategic objectives
1. Ensure sustainable stock levels and avoid severely compromising recruitment. 2. Manage the impacts of the fishery on the environment by minimising risks to non-target species, promoting the conservation of biological diversity, and ensuring ecologically sustainable development. 3. Manage risks and improve opportunities for profitable commercial fishing for Trawl Whiting over the long term and ensure flow-on benefits to the community. 4. Integrate the interests of recreational fishers in management of the fishery. 5. Integrate the interests of Aboriginal people in management of the fishery, and protect the rights of Aboriginal fishers to cultural fishing opportunities.
Operational objectives
1. Contribute, in cooperation with other jurisdictions, to maintaining these stocks at a target of 48% of unfished spawning stock biomass (B48). 2. Contribute, in cooperation with other jurisdictions, to ensuring these stocks remain above a limit of 20% of unfished spawning stock biomass (B20). 3. Implement a targeted rebuilding strategy, in cooperation with other jurisdictions, if spawning stock biomass of either stock decreases to or below B20.

Indicators

Primary Indicators

Primary Indicators are used to track the performance of a fishery in relation to the Operational Objectives of this harvest strategy. The primary indicator for Trawl Whiting is spawning stock biomass (B) as a proportion of unfished spawning stock biomass.

Estimates of current spawning stock biomass and fishing mortality, as well as projections into the future, are obtained from stock assessments for each species (see '**Assessment**').

Secondary indicators

Secondary indicators can be used to track fishery performance in relation to Strategic Objectives, provide supplementary information in relation to Operational Objectives, or indicate a risk to the stocks before assessment outcomes are available. The following secondary indicators will be routinely monitored as far as practicable:

- fishing mortality rate (used in **Decision rules** to adjust harvest in response to biomass)
- annual total catches and discards in NSW and in other jurisdictions (if available)
- proportion of total catch caught by each jurisdiction for each species
- species composition of NSW catch relative to predicted species composition from the preliminary TACs (see below, Figure 1)
- standardised catch rates by fleet and weighted averages in NSW and in other jurisdictions (if available)
- catch rates for the most recent fishing period relative to projected catch rates from the quantitative stock assessment
- age- or size-structure of the catch.

More generally, any other issues arising with the stock, fishery or markets and any other relevant research findings since the previous TAC determination will also be considered. There is also the potential to include indicators for other Strategic Objectives as better information becomes available on ecological risk, economic performance and social benefits.

Monitoring and assessment

To know the current level of indicators relative to target, trigger and limit reference points, it is necessary to monitor the fishery, collect data and undertake assessments. The two whiting species comprising Trawl Whiting are monitored and assessed as separate biological stocks in collaboration with other relevant jurisdictions: Eastern School Whiting is assessed as a single biological stock across south-eastern Australia; Stout Whiting is assessed as a single biological stock across eastern Australia. Stock status determinations for the NSW part of each stock consider the outputs of the joint stock assessments for each species, in years where these are available, and analyses of NSW fisheries and biological data in all years. A single stock assessment report is prepared each year for the TAFC or Secretary to support a determination of TAC for both species combined.

Monitoring

Information used to monitor primary and secondary indicators relative to reference points for Eastern School Whiting and Stout Whiting caught in NSW waters includes:

1. catch and effort information for each species, fleet and fishing method reported by commercial and charter boat fishers via logbook reporting, and real-time quota reporting using mobile applications. Future data sources could include vessel monitoring systems (GPS applications). The data captured for each fishing event includes: date and location of capture, endorsement, fishing method and effort quantity used, weight of each species retained, and processing methods (e.g. filleted)
2. species composition, and representative length and age data for each species, collected from port monitoring of catches, retained catch samples and/or fishery-independent onboard observers (with ages derived from sectioned otoliths)
3. discard estimates for each species, fleet and fishing method monitored through onboard observers. Future data sources could include automated electronic monitoring (onboard cameras), retained discard samples or logbook reporting
4. recreational and cultural fishing catch information, if available.

Assessment

Biological stock status is determined by assessing current spawning stock biomass depletion of each species in relation to reference points defined in the harvest strategy, and whether current fishing pressure is adequately controlled through management to prevent overfishing. Assessment of biological stock status for Eastern School Whiting and Stout Whiting in NSW waters is done by DPI according to the Status of Australian Fish Stocks (SAFS) criteria (see Table 1 of the NSW Fisheries Harvest Strategy Policy). The 2021 TAC determination was supported by the 2020/21 joint stock assessments for Eastern School Whiting and Stout Whiting (Day et al. 2020; Wortmann and Hall 2021). These assessments were the basis for classifying both stocks as *Sustainable* under Status of Australian Fish Stocks (SAFS) criteria.

A quantitative stock assessment of Eastern School Whiting is scheduled every 3–5 years as a collaboration between the Commonwealth and NSW. This assessment uses an integrated age-structured population model called Stock Synthesis and involves a 5-fleet biomass model that includes catch, catch rate, discards, and length and age data from both jurisdictions. The assessment provides estimates of current spawning stock biomass relative to unfished biomass, current fishing mortality estimates (spawning potential ratio) and projected recommended biological catches (RBCs) according to the harvest strategy decision rules. RBCs include catch by different fisheries and sectors as well as discards.

A quantitative stock assessment of the entire biological stock of Stout Whiting is undertaken every 3 years using an integrated age-structured population model (Stock Synthesis was used for the first time in 2020). The joint assessments include Queensland and NSW catches, catch rates and discards, and historical length and age structure information from the Queensland part of the stock. Future assessments will incorporate NSW size and age structure data. The joint stock assessment provides estimates of current spawning stock biomass relative to unfished biomass, current fishing mortality estimates and projected RBCs according to the harvest strategy decision rules.

In interim years, between full quantitative stock assessments, a reduced range of data are monitored and assessed, including secondary indicators listed above. Trends in a weighted average of standardised catch rates can be used to assess stock status against SAFS criteria.

NSW assessments will in future report on this harvest strategy, comparing primary and secondary indicators against reference points and measuring the extent to which operational objectives are being achieved.

Reference points

Target reference point

Spawning stock biomass of Eastern School Whiting and Stout Whiting should be maintained at or above a target reference point of 48% of unfished spawning stock biomass (B48).

The target fishing mortality (F48 or F_{targ}) is the level of fishing mortality that would result in a spawning stock biomass of B48.

Time to target. Stocks of Eastern School Whiting and Stout Whiting should be rebuilt to the target reference point within 5 years following adoption of this harvest strategy.

Trigger reference point

Spawning stock biomass of Eastern School Whiting and Stout Whiting should be maintained above 35% of unfished spawning stock biomass (B35) to reduce risk of declining toward the limit reference point in poor recruitment years, to maintain *Sustainable* stock status and limit the likelihood of TAC adjustments in non-assessment years. For Eastern School Whiting, B35 will be used as a trigger reference point, below which the TAC should be reduced at a faster rate. A trigger reference point is not used for Stout Whiting, so that this NSW harvest strategy may be consistent with the Queensland harvest strategy.

Limit reference point

Spawning stock biomass of Eastern School Whiting and Stout Whiting should be maintained above a limit reference point of 20% of unfished spawning stock biomass (B20) to minimise risk of recruitment failure. The fishing mortality limit (F20 or F_{lim}) is the level of fishing mortality above which overfishing is occurring and biomass is depleting.

Decision rules

Decision rules are designed to maintain stocks at, or close to, the target level, with increasing safeguards to support ongoing sustainability and return to target levels should trigger or limit reference points be breached due to issues including fishing mortality, data uncertainty and unforeseen environmental events or other impacts on the stocks.

These decision rules are divided into several parts, reflecting the fact that:

1. Trawl Whiting quota is comprised of two species, so each species needs to be considered separately before a single TAC is determined for both species
2. robust estimates of spawning stock biomass and fishing mortality are only available from quantitative stock assessments (done for each species every 3–5 years), therefore different decision rules are needed for non-assessment years.

This harvest strategy stipulates that:

1. in years when a quantitative stock assessment is available for Eastern School Whiting, multi-year TACs are set based on average RBCs projected by the most recent assessment for each species, according to the decision rules outlined in Tables 3 and 4 and Figures 1 and 2
2. in years when a quantitative stock assessment for Eastern School Whiting is not available, the TAC is only modified if there is a substantial change in a weighted average of standardised catch rates, according to the decision rules in Table 5.

Figure 1 illustrates how the decision rules will operate to recommend a combined Trawl Whiting TAC. Starting with quantitative stock assessments for each species, separate decision rules will be applied to give a preliminary TAC for each species. These will then be summed to give a combined Trawl Whiting TAC. Using separate decision rules for each species ensures that the NSW harvest strategy is compatible with both the Commonwealth and Queensland harvest strategies for Eastern School Whiting and Stout Whiting respectively.

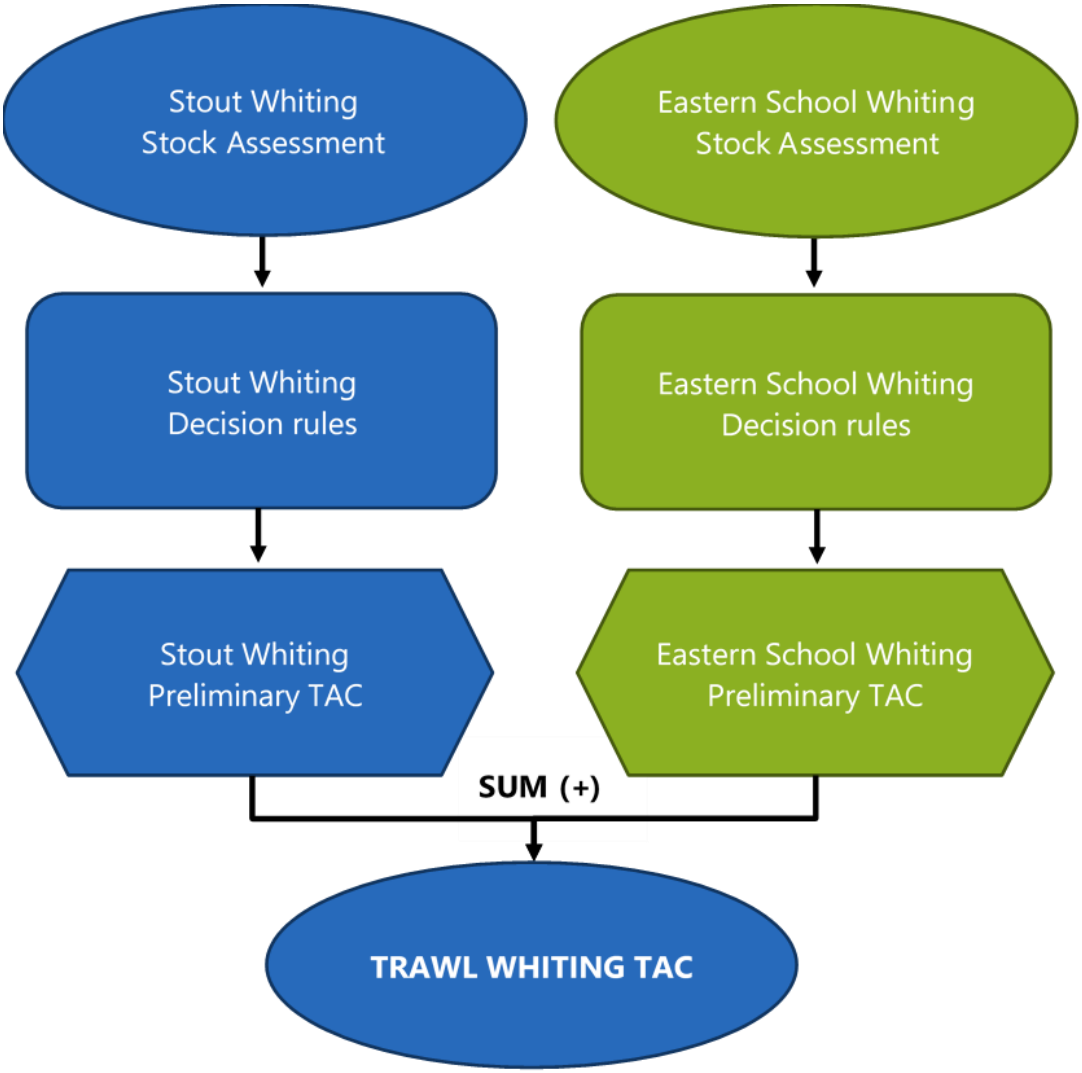

Figure 1: Process for implementing decision rules to recommend Trawl Whiting TAC

Decision rules for Eastern School Whiting in assessment years

The decision rules summarised in Table 2 and Figure 2 apply to Eastern School Whiting in years when a robust quantitative assessment is available to estimate current spawning stock biomass (B) relative to unfished biomass and to estimate targeted fishing mortality.

Table 2: Decision rules for Eastern School Whiting preliminary TAC in assessment years

Reference Point	Condition	Decision rule
Target B48 (F48)	If B ≥ B48 (biomass at or above target	Fish at F_{targ} = F48 (set TAC based on fishing mortality that takes stock towards or keeps it at target)
	If B48 > B ≥ B35 (biomass is below target and at or above trigger)	Fish at F_{targ} = F48 (set TAC based on fishing mortality that takes stock towards target)
Trigger B35	If B35 > B > B20 (biomass is below trigger and above limit)	Fish at F_{targ} = F48 × (B - B20) / (B35 - B20) (set TAC based on fishing mortality that reduces as stock approaches limit)
Limit B20 (F20)	If B ≤ B20 (biomass is at or below limit)	F_{targ} = 0 1. no targeted fishing 2. implement Rebuilding Strategy

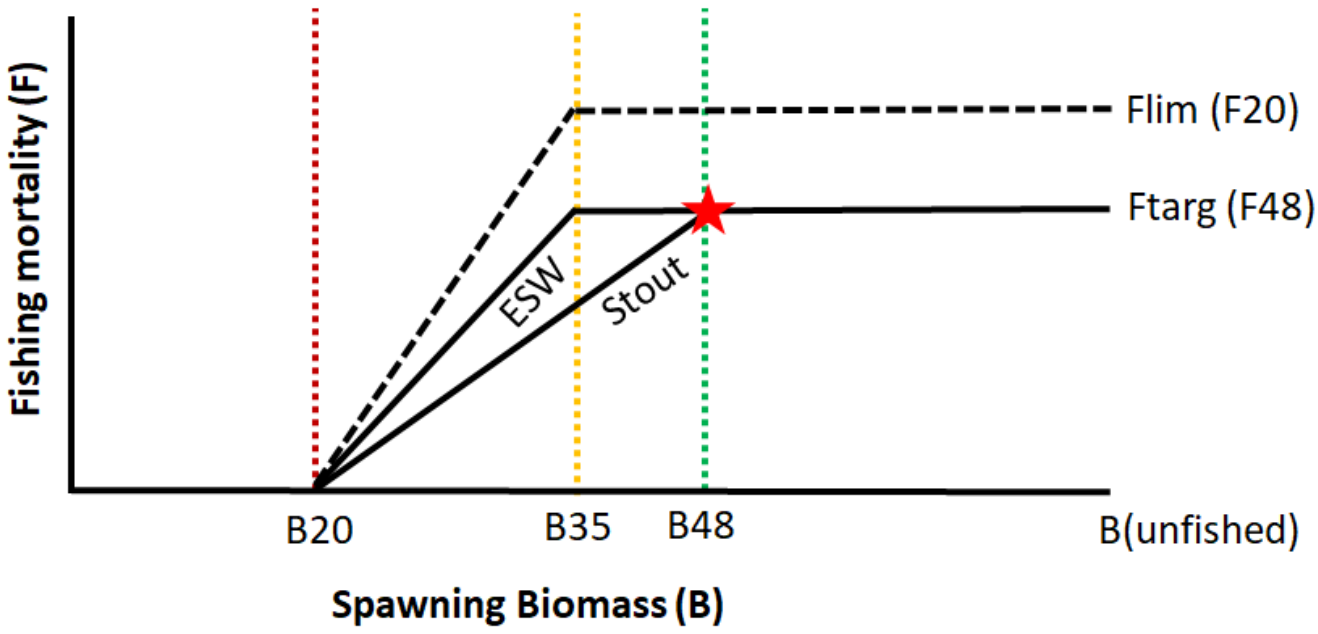

Figure 2: Decision rules for Eastern School Whiting (ESW) and Stout Whiting (Stout) in relation to key reference points for spawning stock biomass (B20 limit, B35 trigger and B48 target) and fishing mortality (F20 limit and F48 target). Red star indicates target biomass and fishing mortality for both species

Decision rules for Stout Whiting in assessment years

The decision rules summarised in Figure 2 and Table 3 apply to Stout Whiting in years when a robust quantitative assessment is available to estimate current spawning stock biomass (B) relative to unfished biomass, and to estimate targeted fishing mortality. No trigger reference point is used for Stout Whiting, consistent with the Queensland harvest strategy.

Table 3: Decision rules for Stout Whiting in assessment years

Reference Point	Condition	Decision Rule
Target B48 (F48)	If B ≥ B48 (biomass is at or above the target reference point)	Fish at F_{targ} = F48 (set TAC based on fishing mortality that takes stock towards or keeps it at target)
	If B48 > B > B20 (biomass is below target and above limit)	Fish at F_{targ} = F48 × (B - B20) / (B48 - B20) (set TAC based on fishing mortality that reduces as stock approaches limit)
Trigger	Not applicable to Stout Whiting	
Limit B20 (F20)	B ≤ B20	F_{targ} = 0 1. no targeted fishing 2. implement Rebuilding Strategy

Converting RBCs into TACs

The Eastern School Whiting and Stout Whiting stock assessments generate RBCs according to the above decision rules (see '**Assessment**' section) which must be converted into a multi-year TAC (MYTAC) via the following steps:

1. average projected RBCs over 3 to 5 years (as basis for multi-year 'preliminary TAC')
2. deduct discards
3. deduct catches by other jurisdictions/fisheries/sectors.

The 'preliminary TACs' for each species (Eastern School Whiting and Stout Whiting) can then be summed to give a MYTAC for the two species combined.

Decision rules for non-assessment years

The decision rules summarised in Table 4 apply to Eastern School Whiting and Stout Whiting in interim years between quantitative stock assessment for Eastern School Whiting, when trends in a weighted average of standardised catch rates are used as a relative index of abundance and proxy for biomass estimates.

Decision rules for non-commercial sectors

As non-commercial harvest of Eastern School Whiting and Stout Whiting in NSW is currently negligible, there are no specific decision rules for these sectors in this harvest strategy. This may be reviewed when the harvest strategy is reviewed, especially if there is any increase in harvest by non-commercial sectors over time.

Table 4: Decision rules for Eastern School Whiting and Stout Whiting in non-assessment years

Biomass estimate in full assessment year	Weighted average of standardised catch rates in most recent fishing period relative to catch rates projected in assessment for same period			
	*Substantially above catch rates projected	Above or unchanged	Below	*Substantially below catch rates projected
Above or at B48	Consider increasing TAC	Continue MYTAC	Continue MYTAC	Continue MYTAC and monitor
Between B48 and B35	Consider increasing TAC	Continue MYTAC	Continue MYTAC	Monitor and consider decreasing TAC
Between B35 and B20	Continue MYTAC	Continue MYTAC	Consider decreasing TAC	Consider decreasing TAC and request full assessment

***'Substantially' denotes catch rates outside the expected level of variability**

Rebuilding strategy

The decision rules for TAC setting under this harvest strategy have been designed to operate while biomass of both species is above B20 (i.e. classified as *Sustainable* or *Depleting;* Table 5). If the biomass of one of the two species falls to B20 or below (i.e. classified as *Depleted*), the combined TAC may not constrain fishing mortality on the depleted stock, so causing further depletion. To address this circumstance, DPI would implement a Rebuilding Strategy at B20.

Rebuilding Strategies must be developed before they are needed. For Trawl Whiting, the trigger to develop a Rebuilding Strategy will be if a stock is at or below 25% of the unfished level (B25). The Rebuilding Strategy will be informed by an investigation into reasons for the decline and will aim to rebuild the stock back to B25 within a specified timeframe. The Rebuilding Strategy should result in stock status changing from *Depleted* to *Recovering* and eventually *Sustainable*. A revised harvest strategy would then work toward the B48 target.

Guiding principles for management actions under a Rebuilding Strategy include: setting a TAC on the basis of the healthier stock, with complementary measures (e.g. gear modifications, bag and possession limits, spatial controls) to protect the weaker stock; engaging with industry and the relevant other jurisdiction (Queensland or the Commonwealth) to develop compatible management measures; and developing a data monitoring and assessment plan. More detailed management options are given in Table 6. The suitability of these would be reviewed as a Rebuilding Strategy is developed.

Table 5. General mapping between decision rules and SAFS classifications

Decision rules for combined TAC	***SAFS stock status* and indicator value**	
	Eastern School Whiting	**Stout Whiting**
Adjust TAC as per decision rules	*Sustainable* Biomass above B20	*Sustainable* Biomass above B20
Adjust TAC as per decision rules	*Depleting* Fishing mortality above level that would reduce biomass to limit	*Sustainable* Biomass above B20
Adjust TAC as per decision rules	*Sustainable* Biomass above B20	*Depleting* Fishing mortality above level that would reduce biomass to limit
Adjust TAC as per decision rules	*Depleting* Fishing mortality above level that would reduce biomass to limit	*Depleting* Fishing mortality above level that would reduce biomass to limit
Implement Rebuilding Strategy for Eastern School Whiting; review harvest strategy	*Depleted* Biomass less than B20	*Sustainable* Biomass above B20
Implement Rebuilding Strategy for Stout Whiting; review harvest strategy	*Sustainable* Biomass above B20	*Depleted* Biomass less than B20
Implement Rebuilding Strategy for both species; review harvest strategy	*Depleted* Biomass less than B20	*Depleted* Biomass less than B20

Table 6. Management options for a Rebuilding Strategy
(green: effective; amber: less effective; red: ineffective)

Concept	**Effectiveness and other considerations**
Voluntary industry commitment to avoid weaker stock	Could be effective in reducing mortality; requires fishers to adhere to commitment; recognises multi-species nature of fishery
Spatial closures (no trawling in designated waters)	Highly effective in reducing mortality; efficacy subject to location and impact on access to other key species
Modify fishing gear	Effective in reducing mortality; recognises multi-species nature of fishery
Temporal closures (no trawling at certain times in designated waters)	Highly effective in reducing mortality; efficacy subject to location and timing and impact on access to other key species
Bag/possession limit	Effective complimentary measure; discourages targeting or fishing in areas of high abundance; can be used to reduce waste (unavoidable discards)
Prohibit take	Effective complimentary measure; discourages targeting or fishing in areas of high abundance; efficacy subject to waste (unavoidable discards)
Size limit	Unlikely to be effective; efficacy subject to selectivity of fishing gear
Reduce post-harvest mortality (hoppers / flooding sorting trays)	Unlikely to be effective; high mortality in otter trawl nets

Review and improvement

Schedule of performance assessment and review

This harvest strategy has been developed based on current knowledge to support existing management arrangements, notably the setting of a combined TAC by the independent TAFC or the Secretary. If current knowledge or management arrangements change significantly, or there are substantiated reasons to doubt the accuracy of data inputs, the harvest strategy would need to be reviewed This harvest strategy will in any case be reviewed 1, 3 and 5 years after its adoption, or if a Rebuilding Strategy is required. The DDG Fisheries may also decide to review this harvest strategy at any time if determined, considering the best available information, including the primary and secondary indicators identified earlier, that its objectives are unlikely to be achieved.

Any information relevant to the fishery for Eastern School Whiting and Stout Whiting in NSW should be considered during formal reviews of the harvest strategy, including submissions from industry and other stakeholders.

Strategic management options and research priorities

As this is the first harvest strategy for Trawl Whiting, there are several issues that are not fully resolved. These could be addressed in a future revised harvest strategy, in conjunction with stakeholders, as better information becomes available. This may enable some Strategic Objectives to be operationalised through development of relevant indicators, reference points and decision rules.

The following strategic management options and research priorities have been identified:

1. confirming stock structure for Eastern School Whiting (underway)
2. testing the harvest strategy through methods such as Management Strategy Evaluation to further analyse management options and risks
3. evaluating benefits/risks associated with using a combined TAC for Trawl Whiting
4. improving species-specific data on catch, catch rates and discards to further reduce uncertainty in stock assessments and projections
5. optimising fishing for trawl whiting by reducing discards and increasing the biomass able to be fished
6. improving economic data and monitoring (underway) and performance assessment
7. improve data available for Ecological Risk Assessment
8. improving analysis and integration of ecological, economic and social indicators
9. discussing and developing resource sharing arrangements with other jurisdictions.

The Trawl Whiting Harvest Strategy Working Group identified several improvements to fishery monitoring that would further reduce uncertainty in stock assessments. These include implementing shot-by-shot reporting of catches, collecting information on species targeted and capture depth, and regularly updating estimates of discard rates. Vessel monitoring systems could be used to automate the collection of location and effort data. Other factors for consideration in stock assessments include potential influences of changes in market preferences or targeting practices on catch rates. DPI will work with industry to establish the feasibility of these improvements.

Definitions

Decision Rule: pre-agreed management actions to control intensity of fishing in order to achieve the objectives

Indicator: a quantity that can be measured and used to track changes with respect to an operational objective

Limit Reference Point: the value of an indicator that is unacceptable because the stock or management unit has become depleted or recruitment-overfished

Operational objective: an objective that has a direct and practical interpretation in the context of a fishery and against which performance toward achievement can be evaluated

RBC: recommended biological catch; the estimated total removals the stock could sustain to move towards, or to maintain biomass at the target level

Reference point: the value of an indicator that can be used as a benchmark of performance against an operational objective

Shot: a single deployment of a trawl net, from the time the net is deployed to the time it is retrieved to the boat

Spawning Stock Biomass: total weight of fish (males and females) in a stock that are old enough to spawn; unless specifically indicated as 'female spawning stock biomass', which refers to the total weight of spawning-age females only

TAC: Total Allowable Catch

TAFC: Total Allowable Fishing Committee

Target Reference Point: the value of an indicator that is desirable or ideal and at which fisheries management should aim

Trigger Reference Point: the value of an indicator for a fish stock or management unit at which a change in the level of monitoring or management is considered or adopted

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