



Strategic Assessment of the
Bass Strait Central Zone Scallop Fishery

Environment Australia

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This document is an assessment carried out by Environment Australia of a commercial fishery against the Commonwealth's Guidelines for the Ecologically Sustainable Management of Fisheries. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Part 13 and 13A of the EPBC. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Commonwealth Government.

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**Assessment of the ecological sustainability of management arrangements for
the Bass Strait Central Zone Scallop Fishery**

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EXECUTIVE SUMMARY

Background

The Australian Fisheries Management Authority (AFMA) submitted the *Assessment Report - Bass Strait Central Zone Scallop Fishery (BSCZSF)* to the Commonwealth Minister for the Environment and Heritage on 20 December 2001. AFMA's report was prepared in accordance with the *Terms of Reference for the Strategic Assessment of the Bass Strait Central Zone Scallop Fishery*. Among others it contains an assessment of the BSCZSF against the *Commonwealth's Guidelines for assessing the ecologically sustainable management of fisheries*. The purpose of AFMA's document is to provide for an assessment of the impacts of actions taken under the proposed Fishery Management Plan (FMP) under Parts 10, 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Minister for the Environment and Heritage signed an Agreement with AFMA for the Strategic Assessment of the BSCZSF on 31 May 2001. Following public consultation, Terms of Reference for the fishery were adopted for the strategic assessment. The draft *Assessment Report Bass Strait Central Zone Scallop Fishery* and the draft *Bass Strait Central Zone Scallop Fishery Management Plan 2001* were released for public comment for a period of sixty days. The public comment period ended on 19 September 2001 with a number of submissions received. This document reports on the assessment of the BSCZSF against the Terms of Reference, including the Commonwealth's *Guidelines for the ecologically sustainable management of fisheries*.

The Scientific Committee on Wildlife Use (SCWU) provides independent advice to the Commonwealth Minister for the Environment and Heritage. They considered the proposed management arrangements for the BSCZSF and their recommendations have been considered throughout this strategic assessment.

Target species	Commercial Scallop (<i>Pecten fumatus</i>)
Byproduct species	Doughboy Scallop (<i>Chlamys (Mimachlamys) asperrimus</i>)
Fishing methods	Dredging
Input Controls	<ul style="list-style-type: none"> • Limited entry; • Two spatial closures (one current) • Closure of juvenile beds • A seasonal closure during spat settlement and growth.
Output Controls	<ul style="list-style-type: none"> • A Total Allowable Catch (TAC) of 1000 tonnes that can increase • A size limit of 80mm shell width.
Catch Trend	Highly variable, currently very low
Number of operators	154 concessions
Bycatch species	Various, mainly benthic species
Protected species	Various sharks, seabirds, syngnathids and solenostomids in area with low interaction.

Table 1 outlines the major elements of the fishery. The Bass Strait Central Zone Scallop Fishery (BSCZSF) operates in the Commonwealth jurisdiction of Bass Strait between the Victorian Scallop Fishery and the Tasmanian Scallop Fishery. The management arrangements allow for trawl or dredge gear to be used. In the past only dredge gear has been used. The fishery targets commercial scallops (*Pecten fumatus*) with a byproduct of doughboy scallops (*Chlamys (Mimachlamys) asperrimus*). These are the only species that can be retained in this fishery.

The catch data indicate that the fishery has collapsed twice. While it is clear that there have been major declines in the stock and some recovery, movement of fishers to other fisheries in periods of declining catch complicates interpretation of the extent of the stock reductions. The following figures have been converted from other weight types and therefore are not exact. The fishery achieved its maximum take of 24500t shell weight in 1983 and then crashed to 6200t in 1984 before dropping to 132t in 1987. A series of closures and restrictions were applied and there was very little to no catch until a partial recovery between 1993 to 1997. In 1995 the catch was about 9100t, however the catch of less than 1000t in 1998 resulted in closure of the fishery for the 1999 season. Some limited exploratory fishing under permits occurred in 2000 and 2001. The new management regime has been developed to manage the decision to open the fishery and the consequent fishing operations, should stocks recover to levels that can sustain fishing.

There are 154 permits currently issued in the fishery. Effort has varied over the history of the fishery. As fishers tend not to be wholly dependent on the fishery but hold concessions for other fisheries, there have been variable levels of latent effort. Fishing trips are required to be in a single jurisdiction, except under special circumstances and with the approval of the managers of both jurisdictions. Product has been exported as well as sold into domestic markets.

AFMA is introducing a management plan designed to improve the management of the fishery. The basic management premise for the new plan is that beds exposed to substantial fishing effort will lead to 100% mortality of scallops through damage, disease and predation. The management arrangements preserve a quantity of the target stock which AFMA have identified as a biological bottom line beyond which the status of the fishery would be undesirable for biological and ecological reasons. This component of the stock is essentially an implied limit reference point that management, by denying fishing access, will not allow to be breached. Significant fishing will occur on open mature scallop beds. The biological bottom line is preserved through the implementation of:

- Two spatial closures with a defined reproductive potential, catch rate and enforceability;
- The closure of juvenile beds;
- A seasonal closure during the spat settlement and growth stage;
- A size limit to allow for two major spawnings; and
- A precautionary TAC of 1000 tonnes shell weight which can increase when the fishery is assessed as able to support increased fishing pressure.

Overall Assessment

Environment Australia has several concerns regarding this fishery. These include:

- The lack of reliable information on both scallop biology and the environment within which the fishery takes place and the resulting significant uncertainties;
- The current over-fished status of the stock;
- The potential for fishing operations to significantly impact a large area of varying benthic habitat types; and
- The difficulty in obtaining external research funding and industry support as a result of the current status of the fishery.

Such uncertainties diminish the ability to move management to the system based framework outlined in the Commonwealth Guidelines for the Ecologically Sustainable Management of Fisheries. The assessment has identified six key areas requiring further improvement to ensure improved management of the fishery regarding ecological sustainability criteria. These are:

1. The management arrangements proposed for this fishery effectively manage the scallop stock at an implied limit reference point. There are high risks associated with managing any stock at its limit reference point. Consequently AFMA should, by 30 June 2005, review whether the current limit reference point applying in the fishery is sufficient to ensure long-term stock viability and allow scallops to fulfil their ecological function. During this period, AFMA should implement actions to build and maintain stocks above the current limit reference point to ensure a higher limit reference point can be implemented if necessary. Ideally, AFMA should also work towards identifying and implementing a target reference point for the fishery in the future.
2. AFMA has identified the need to conduct an analysis of the vulnerability of doughboy scallops to overfishing as part of a wider project of ecological risk assessment. This analysis should be completed by 30 June 2005. If this analysis concludes that doughboy scallops are vulnerable to overfishing AFMA should implement actions to remedy this impact as a priority.
3. The effects on the environment of the benthic impacts of this fishery are uncertain and, as a precautionary measure, areas in the fishery should be protected from these impacts. AFMA should implement a structured approach, including stakeholder consultation, to identifying values and areas to be conserved within the fishery. There are significant areas of the fishery that have not, and cannot, be fished using current technology. These areas are also unlikely to contain commercial quantities of scallops. Although currently there is little utility in closing such areas, they should be broadly identified and closed by 30 June 2005 to prevent possible future impacts of the fishery. There are also significant areas of the fishery where fishing can occur using existing technology, but where fishing does not occur because there are no commercial scallop beds in these areas. The remaining part of the fishery comprises areas that are currently fished for scallops. By 30 June 2005, sufficient areas of representative habitats and ecological communities in both of these segments of the fishery must be broadly identified and protected from the impact of the fishery to ensure benthic impacts of the fishery on the environment are managed in a precautionary manner.

4. The Bycatch Action Plan (BAP) should be modified to specify contingent action to be taken in the event that adequate funding is not available to undertake information gathering.
5. The BAP commits to implementing remedial actions to remedy impacts on bycatch when required pending the result of a review. Timetables to implement these remedial actions should be incorporated into the BAP.
6. EA is satisfied the fishery is not likely to adversely affect the survival, recovery or conservation status of protected species, and that the protected species that the fishery is most likely to interact with are the syngnathids and solenostomids. AFMA is implementing a strategy to ensure that reliable information is collected on interactions between the fishery and listed species. The implementation of this strategy should occur by 30 June 2005. If an impact on protected species is indicated, AFMA should implement measures to reduce interactions to a level that does not threaten the conservation status of the impacted species.

Conclusion

Part 10 of the EPBC Act requires that Commonwealth managed fisheries undergo strategic assessment to determine whether actions taken in the fishery have a significant impact on the environment in Commonwealth Marine Areas. Under this Part, the Minister for the Environment and Heritage may accredit a management plan to exempt actions taken in accordance with the management plan from further impact assessment approval.

EA is satisfied that there has been an adequate assessment of the impacts that activities taken in accordance with the management regime, have, will have or are likely to have, on the environment of a Commonwealth marine area. EA also considers that actions taken in this fishery will not have an unacceptable or unsustainable impact on the environment in a Commonwealth marine area over the next three years while AFMA implements the above areas of further work to improve the management of the fishery.

It is therefore recommended that the draft *Bass Strait Central Zone Scallop Fishery Management Plan 2001* be accredited under section 33 of the EPBC Act. If AFMA fails to carry out this work or if further analysis shows there is an unsustainable impact in the long term it will be recommended that the Minister for the Environment and Heritage revoke the declaration and accreditation of the plan under section 33 of the EPBC Act.

As the fishery operates in Commonwealth waters, consideration under Part 13 of the EPBC Act is required *vis-à-vis* the impact of the fishery on threatened species, migratory species, cetaceans and listed marine species. Assessment of the impact on protected species in the BSCZSF considered the entire management regime, including the management plan, regulations, strategic research plan and BAP.

A number of protected species occur in the fishery area. However, the fishery has minimal interaction with these species and the risk of impact on species protected in Part 13 of the Act is considered to be low. As all reasonable steps are taken to

avoid the killing or injuring of protected species, and the fishery is unlikely to have significant impact on the species, a declaration under sections 208A, 222A, 245 and 265 of the EPBC Act would be appropriate. Such a declaration would serve to accredit the BSCZSF Management Plan and provide individual fishers, operating in accordance with the plan, with an exemption from permit requirements if they are at risk of taking or injuring listed species in Commonwealth waters.

There are many uncertainties in this fishery and therefore inclusion of the catch on the list of exempt native specimens without monitoring or interim review would not be sufficiently precautionary. As a consequence, we consider the appropriate course of action to be to declare the fishery to be an approved Wildlife Trade Operation (WTO) with the actions specified in the above recommendations as conditions to the declaration. Specifically, the WTO declaration would allow the export of Commercial Scallops (*Pecten fumatus*) and Doughboy Scallop (*Chlamys (Mimachlamys) asperrimus*) under permits. This declaration would be effective for a period of three years. The WTO declaration will require annual reporting on the progress of implementing the conditions and other managerial commitments.

PART I - MANAGEMENT ARRANGEMENTS

The BSCZSF is managed by the Australian Fisheries Management Authority (AFMA). Its management procedures fit within the structure of AFMA and include:

- An eight member Board of Directors;
- A small management team;
- Other AFMA and support staff;
- A Scallop Management Advisory Committee (hereafter referred to as the MAC) that is an expertise-based committee with members from AFMA, research, industry and environment and conservation areas; and
- A Scallop Fishery Assessment Group (hereafter referred to as the FAG) with membership of fishery scientists, industry and fishery managers.

AFMA's *Assessment Report for the BSCZSF* outlines in general terms the structure, accountability and consultative process of AFMA. The *BSCZSF Management Plan* draws its legislative powers from the *Fisheries Management Act 1991*. AFMA's submission includes copies of:

- *The Bass Strait Central Zone Fishery Management Plan 2001 (FMP)*;
- *The Fisheries Management (Bass Strait Central Zone Scallop Fishery) Regulations 2001*;
- The Draft Five Year Strategic Research Plan 2001 – 2006 for BSCZSF; and
- The Bycatch Action Plan for BSCZSF (the BAP).

These documents have been developed through a consultative process that has involved interaction with stakeholders through the MAC, the FAG and public consultation periods.

Currently, there is no FMP for this fishery. Fishing is conducted under permits issued under the *Fisheries Management Act 1991*. There were 154 permits for the BSCZSF at March 2001. Of these, 25% were active in 1993 and 75% were active in 1998.

The proposed management regime aims to be strategic by containing objectives and performance measures in the FMP and BAP. An annual review is conducted against the measures in the FMP and biennially against the measures in the BAP.

The proposed management arrangements use both input and output controls to manage the level of take. Input controls limit the amount of effort placed on the resources. In BSCZSF, input controls include:

- Limited entry (currently 154 permits);
- Two spatial closures which preserve a defined reproductive potential. These closures can be exchanged for other beds if they meet particular biological and managerial criteria;
- Closure of juvenile beds (which are defined as containing greater than 20% undersized scallops); and
- A seasonal closure during spat settlement and growth.

Output controls manage the level of take in a fishery by restricting the quantity of product coming out of the fishery. The management arrangements for the BSCZSF apply the following output controls:

- A precautionary but flexible Total Allowable Catch (TAC) of 1000 tonnes that can increase if biological and managerial criteria are met; and
- A size limit of 80mm shell width. AFMA believes this size limit allows the scallops to spawn twice before they reach the size where they can be retained.

The management arrangements are enforced through landing inspections and catch and effort logbooks which are verified by catch disposal records, observer data and vessel inspections. Vessel movements and fishing patterns are monitored through compulsory Integrated Computerised Vessel Monitoring Systems (ICVMS).

The United Nations Convention on the Law of the Sea (UNCLOS) is the international agreement that gives Australia the right to define an Exclusive Economic Zone (EEZ). There are no additional international or regional management regimes to which Australia is a party that are specifically relevant to this fishery. The *Commonwealth Policy on Fisheries Bycatch* requires the development of bycatch action strategies to minimise bycatch. AFMA has developed the BSCZSF BAP and this is assessed under Principle two of the Guidelines.

PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

Stock Status and Recovery

Principle 1: *“A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover”*

Maintain ecologically viable stocks

Objective 1: *“The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability”*

Information requirements

Information and data in the BSCZSF are collected and monitored through logbooks, catch disposal records, VMS data, opportunistic observer data and a pre-season scientific survey. Scientific research indicates that less than 20% of the scallops of a fished area are retained in the fishing gear on a single pass (McLoughlin et al 1991). This can complicate data collection as catches taken by a single pass are only indicative of bed status and not quantitative. In addition, a high proportion of the biomass that is not retained will not survive. Indirect fishing mortality occurs as scallops not retained in the fishing gear may be damaged. This can result in increased disease and predation. As a precautionary measure, due the uncertainty of the efficiency of the fishing gear, managers in this fishery assume that the catch represents 100% of the scallops in a dredged area, as any not retained may not survive.

The current catch and effort logbook was developed to apply to all of the three scallop fisheries in Bass Strait and was implemented in 1999. Fishers are required to record temporal effort, spatial effort, and catch data for fishing in the entire Bass Strait. Prior to this, fishers had reported these data in a separate logbook for BSCZSF since 1992. Before this time, Victoria and Tasmania collected data from areas that are now part of the Central Zone. These landing records need to be adjusted to account for changes in the areas covered by Commonwealth and State jurisdictions during the history of the scallop fishery in Bass Strait. Current logbook data are verified through ICVMS and catch disposal records. Landing inspections and observer data will also be used as verification when they are available.

Independent observers will be used opportunistically when industry recommends a new bed for assessment as either a juvenile bed (greater than 20% under 80mm shell width) or as a fishable bed (which may increase the TAC). This involves the presence of a fully trained observer on a vessel for an unspecified period of time to collect data on catch and bycatch. Management arrangements for these beds will depend on the result of the assessment of the observer data.

A pre-season survey will take place annually. The study areas will vary depending on research priorities identified by the FAG, management requirements and

available funding. Successful tenders will conduct the surveys. The 2000, 2001 and 2002 tenders were won by the Tasmanian Aquaculture and Fisheries Institute (TAFI). The surveys will generally be used to reassess closed beds to ensure they are capable of preserving the biological bottom line, or implied limit reference point, for the stock. Basic requirements (eg. performance objectives, provisions, degree of institutionalisation and reliance of fishery opening on results) for the independent surveys are not clearly specified in the AFMA submission.

The Draft Five Year Strategic Research Plan 2001 – 2006 was developed by AFMA in consultation with the FAG and the MAC. It aims to provide a comprehensive guide to current and future needs for this fishery and outlines those areas of research currently seen as most relevant to industry. AFMA is actively supporting and promoting research applications in line with this strategic research plan to obtain independent data. Only a small number of the recent applications have been successful. A possible underlying factor may be that the current state of the fishery does not demonstrate that there will be sufficient economic returns for the user group (ie the fishing industry).

There is limited historical data for this fishery prior to the last few years other than general catch and effort levels. These data are coarsely defined.

Assessment

Traditional stock assessment models, on which management decisions and arrangements could be based, cannot be applied effectively in this fishery. Highly variable recruitment rates make it very difficult to measure and predict stock fluctuations with an acceptable level of certainty, using the methods currently employed. The Fisheries Research and Development Corporation (FRDC) funded a project in 1994 to examine the effects of biological environmental factors and of fishing practises on recruitment and abundance of scallops. This project concluded that existing data was not sufficient to provide much detail on the ways in which environmental conditions are associated with scallop biology and the success of the fishery. Notwithstanding these problems, some correlations between environmental factors and the fishery have been demonstrated (Sporiac, Coleman and Gason, 1997).

The Scallop Fishery Assessment Group (the FAG) was established in 2001 to prepare research plans for the fishery and to conduct various fishery assessments. It currently has eight members who represent scientists, industry and management.

In the absence of a formal stock assessment and in light of the difficulties in establishing an effective predictive model, the plan establishes two spatial closures to preserve broodstock. The FAG assesses the status of closed areas and potential new beds to ensure they meet the minimum biological and preservation requirements. The value of reproductive potential in each closure must be equivalent to that of the Eastern closure in 2000. These assessments are based on fishery independent data and the FAG is confident that they ensure a low risk of the biological bottom line, or implied limit reference point, being breached.

An assessment report will be prepared annually against the performance indicators in the FMP, including the implementation of strategies to maintain or rebuild the

stock. The FAG is still developing best methods for assessment against this measure. They require more data in order to develop an appropriate assessment model/tool.

Beds with greater than 20% undersized scallops are closed as juvenile beds. The FAG assesses juvenile beds after a period of time to decide whether their population dynamics have changed significantly and whether the beds should therefore be reclassified as mature beds and consequently opened to fishing. Under current arrangements this analysis can be based on new observer or survey data or conducted as a purely desktop study considering known data and growth rates.

There is currently no stock assessment of the byproduct species, the Doughboy Scallop. The submission suggests that one will be conducted once more data become available. AFMA has commissioned the CSIRO to conduct an ecological risk assessment of the fishery and both commercial and doughboy scallops will be considered in this assessment.

The submission suggests that although this fishery shares the same stock as the Tasmanian and Victorian fisheries, the interaction between sub-stocks is low when stocks are at low levels and remaining beds are separated by large distances, as beds are thought to principally replenish their surrounding area. There has been contention within the scientific circles regarding this theory and there has been no conclusive evidence to prove this argument (Young, 1991). Other evidence suggests a degree of mixing between scallop beds. This is most likely to occur where beds are in close proximity. For example, there was a significant juvenile recruitment detected in the Tasmanian jurisdiction earlier this year which is believed to be the result of spatfall from the protected scallop bed in the BSCZSF which is only a short distance away. Currently, Tasmanian and Victorian catch and known scallop beds are not considered in the current assessment process. AFMA believes that the management response is sufficient to maintain stocks at the limit reference point without any additional seeding from the two neighbouring fisheries.

There are several ways in which AFMA addresses the uncertainty associated with jurisdictional relationships. The fishery managers from both the Tasmanian and Victorian scallop fisheries are permanent observers on the MAC and have involvement in discussion of recommendations to management. This ensures the promotion of coordinated research and management. Research results and information are shared between jurisdictions where applicable.

Management Response

The FMP uses two spatial closures for broodstock preservation, closures of juvenile beds, seasonal closures during spawning, a precautionary but flexible TAC and a minimum size limit to ensure the sustainability of the stock. There are decision rules in place to ensure these measures are applied as appropriate. There are also several enforcement and compliance tools in place to ensure these arrangements are effective. These include catch disposal records, ICVMS, port inspections and observer verification in some instances. The ICVMS uses a reverse onus of proof approach in that if a vessel is in a closed area and does not respond to an AFMA message it is in breach of its permit agreement.

The FMP preserves an amount of broodstock through the closure of two beds of scallops, one each side of the Strait. These beds can be exchanged (and subsequently dredged) for other beds, including those identified with a majority of juvenile scallops, if they meet the closure criteria. These criteria are:

1. It can be effectively protected
2. Parts of the areas should have a catch rate of 2 bags per hour
3. It should be a sufficient size to ensure that its reproductive potential, taking into account factors such as age and condition, is roughly equivalent to the closed bed east of Flinders Island in 2000.

The closures may be one bed, an area of many small beds or part of a large bed. The first criteria reduces the chance of the closures being declared as part of a large bed.

The catch rate specified in criteria 2 has been determined assuming that only 25% of the scallops on a bed are retained in the fishing gear. Therefore a bed that is assessed as providing 2 bags of scallops per hour should, in reality, contain enough scallops to provide 8 bags per hour if the fishing gear was capable of collecting all of them. This catch rate has been determined by AFMA on the recommendation of the FAG as the minimum amount required to provide sufficient cross-fertilisation. This is an important point to identify as reproductive efficiency in many species is known to decrease when there are decreases in density. The FAG has made this recommendation however it is important to note the lack of conclusive information to support this assumption.

The assumption of 25% dredge efficiency is not consistent with the more precautionary assumption of 100% dredge efficiency applied in the rest of the AFMA submission. The report implies that a dredge efficiency of 100% is assumed in this fishery to provide conservative estimates of scallop biomass in beds. EA is satisfied that although this figure is inconsistent, the criteria for reproductive potential and the combination of other management responses should ensure the maintenance of stock at the limit reference point.

The required reproductive potential of the bed was defined by the only remaining known productive scallop bed in the fishery area. This bed is East of Flinders Island and abuts the jurisdictional line of the Tasmanian scallop fishery. The management arrangements require the closure of an equivalent bed in the West of the fishery however there is currently no other known suitable bed anywhere in the fishery.

The decision to exchange closed beds can be based on pre-season survey data or mid-season observer data. Observer surveys are conducted if industry identifies a scallop bed and seeks AFMA's approval for that bed to be assessed against the decision rule criteria as listed above.

A size limit of 80mm shell width applies in the fishery. This size is thought to allow for two major spawnings, however there is little conclusive information on growth and spawning rates of scallops in this area. The preservation of two beds of broodstock (as described above) is intended to prevent recruitment overfishing and

therefore EA is satisfied that the combination of other management responses ensure that the stock should be maintained at the limit reference point.

The survival of caught juvenile scallops once released is uncertain. However, beds assessed as greater than 20% undersized scallops will be closed to fishing pressure until assessed as mature. This applies the size limit in a practical way and aims to ensure that fishing pressure does not significantly affect juvenile populations. Juvenile beds are closed when industry identifies a bed and recommends it to AFMA for assessment. An observer survey is conducted on the bed and the FAG assesses the data. The reclassification of a bed from juvenile to mature can be done through observer data or a desktop investigation considering known information and growth rates.

A seasonal closure from 21 December to 30 April is applied to avoid disruption of spat settlement and growth of juvenile scallops.

A precautionary TAC of 1000t shell weight is applied at the beginning of the fishing season. It is assumed to be precautionary as AFMA suggest that 1000t may be taken from a bed without significantly impacting the bed and causing the death of all remaining scallops through damage, disease and increased predation. This TAC will increase if precautionary management requirements are met and scallop beds are identified and assessed as available for fishing.

Significant scallop population variations have occurred in this fishery in the past. It is not certain whether these fluctuations are a result of environmental stimuli and not fishing pressure. Management arrangements address this uncertainty by including a trigger to increase the TAC during the fishing season. In this way, fishers will be able to obtain maximum benefit from a year of extremely high stock levels.

In order for the precautionary TAC to be increased mid-season, two protected beds must be closed. The remaining open areas must then be assessed (based on observer data) as suitable for fishing with a higher TAC. An increase of 4050t will occur, in instalments of 1350t on each of 1 July, 1 August and 1 September. Once the initial increase is triggered, the following two increases will occur automatically. If, 14 days before any of these increases, >70% of the TAC has been caught, the FMP requires that AFMA and the MAC must determine an increase in the TAC of greater than 1350t.

AFMA believes that the proposed management arrangements also protect the byproduct species (doughboy scallop). This species does not have a minimum size limit. The FMP implements a TAC of 100 tonnes until more data become available. AFMA considers this TAC as highly precautionary. As there is currently no market for this species it is possible that greater than 100 tonnes of doughboy scallops may be caught and killed but not retained.

Conclusion

EA believes that the management response proposed does not have a high chance of ensuring that the fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range with acceptable levels

of probability. We are unable to conclude that there is a sound estimate of the potential productivity of the fished stocks or the proportion that could be harvested.

There is an implied limit reference point in this fishery. This point indicates the limit beyond which the state of the fishery is not considered desirable. Garcia (1996) states that if a limit reference point is inadvertently reached, management action should severely curtail or stop fishery development, as appropriate, and corrective action should be taken. Stock rehabilitation programmes should consider this point as a very minimum rebuilding target to be reached before the rebuilding measures are relaxed or the fishery is re-opened.

Protecting a defined amount of broodstock while allowing extensive fishing in other areas is intended to ensure that a biological bottom line, or limit reference point, is preserved. Managing a fishery at or about a limit reference point is not likely to provide for recovery of the stock above this point. EA is concerned that this reference point was defined by closing the only remaining known productive scallop bed at the time of plan development. The limit reference point was not determined through an analysis of the ecology of the fishery to ensure that it is sufficient to ensure long-term stock viability and allow scallops to fulfil their ecological role. It is thus not a system-based biological limit reference point. The current implied limit reference point should be reviewed to ensure it meets this objective.

This review may conclude that the current limit reference point is not sufficient to meet its objective. AFMA should be in a position by the conclusion of this review to implement a higher limit reference point if required. EA therefore recommends that during the intervening period AFMA should implement actions to build and maintain stocks above the current point to ensure it can implement a higher limit reference point if necessary.

There are high risks associated with managing any stock at a limit reference point, particularly when it has been developed with limited information on the extent of suitable habitat, stock structure and status and relationships with adjacent harvesting operations. Ideally, a target reference point should be developed to ensure maximum security and benefit to the environment and the fishery. EA accepts that this fishery is currently not in a position to realistically develop and implement a meaningful and accurate target reference point. The logistics of this fishery may be such that one may never be identified. Nevertheless EA recommends that AFMA work towards identifying and implementing a target reference point for the fishery in the future.

The submission commits to undertake a stock assessment of the doughboy scallop once more data become available. This is an area of concern for EA as fishing pressure is thought to occur on the primary habitat of this species and very little is known of the impact on the population. Due to potential low survival after interaction with fishing gear, doughboy scallop population may be significantly impacted even if they are not retained as byproduct. The vulnerability of doughboy scallops to the fishery may be identified through a CSIRO ecological risk assessment of the fishery commissioned by AFMA. AFMA should ensure this

analysis is completed and that actions to remedy impact, if required, are implemented as a priority.

AFMA proposes that an assessment to determine whether to reclassify a juvenile bed as a mature bed could be based on observer data or on a desktop study considering known growth and recruitment rates. EA has concerns regarding the use of a desktop investigation for this decision. There is significant uncertainty regarding recruitment, growth rates and distribution of commercial scallops in this area, and therefore EA believes that a desktop study could not currently be conducted that would provide information with an acceptable level of certainty. The FAG provides a high level of expertise and AFMA has committed, as a performance measure in the proposed FMP, to rebuild stocks of any depleted fish resources. EA is therefore satisfied that these concerns will be addressed by the FAG and AFMA if and when such a situation arises.

AFMA proposes to protect juvenile scallop beds by identifying and closing beds with greater than 20% of retained scallops smaller than the 80mm size limit. The protection of newly identified juvenile beds requires industry to nominate an area to AFMA for an observer survey and assessment. In this way, it is likely that a bed will receive fishing pressure before industry nominates it to AFMA. There is very little to prevent significant fishing on these beds prior to this assessment apart from the integrity of the fishers. In addition, commercial operations may make it difficult for industry to identify when and where the decision rule may have been triggered.

ICVMS data are currently used by AFMA to identify when an operator is fishing in an area of unknown scallop potential. If effort concentrates in new grounds AFMA is able to contact the fisher and suggest an observer survey. As stocks, and consequently effort, increase spatially, it will be harder for AFMA to detect subtle trends in ICVMS data. The limit reference point currently used in the fishery could be maintained without the closure of juvenile beds. This management arrangement however is a positive step to rebuilding stock above the current level. With the proposal for the development of system-based biological reference and limit points, as discussed above, this is an area that AFMA should pursue to achieve their objective. Action to address this may include a lower juvenile catch rate than 20% of retained scallops to trigger an observer survey, but retaining the current trigger of 20% for the decision to close a juvenile bed. This will help to protect juvenile beds before fishing pressure reduces them to unsustainable levels.

The catch rate criteria for the spatial closures has been developed using a dredge efficiency assumption of 25% that is inconsistent with the precautionary dredge efficiency assumption of 100% applied elsewhere in the fishery. EA believes that management arrangements and decision rules, by the nature of their relationship, should always be consistent. We are surprised that the FAG would develop a criteria that is inconsistent with the managerial approach and concerned that AFMA would adopt it. In this case however, the third criteria of the decision rule specifies the required reproductive potential of a bed. EA is satisfied that this third criteria will ensure that the decision to close a bed for broodstock preservation is sufficiently precautionary.

Recommendations

- The management arrangements proposed for this fishery effectively manage the scallop stock at an implied limit reference point. There are high risks associated with managing any stock at its limit reference point. Consequently AFMA should, by 30 June 2005, review whether the current limit reference point applying in the fishery is sufficient to ensure long-term stock viability and allow scallops to fulfil their ecological function. During this period, AFMA should implement actions to build and maintain stocks above the current limit reference point to ensure a higher limit reference point can be implemented if necessary. Ideally, AFMA should also work towards identifying and implementing a target reference point for the fishery in the future.
- AFMA has identified the need to conduct an analysis of the vulnerability of doughboy scallops to overfishing as part of a wider project of ecological risk assessment. This analysis should be completed by 30 June 2005. If this analysis concludes that doughboy scallops are vulnerable to overfishing AFMA should implement actions to remedy this impact as a priority.

Promote recovery to ecologically viable stock levels

Objective 2: *“Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes”*

The Bass Strait has experienced very large fluctuations of commercial scallop stock levels during the history of this fishery. Currently, AFMA has recognised that stocks are depleted below acceptable levels. The management regime has in recent years aimed to sufficiently preserve a proportion of the stock to encourage rebuilding to an implied limit reference point (but basically no higher), while still ensuring data collection and funding by allowing economically feasible fishing to occur under a precautionary catch limit.

The proposed FMP has incorporated the measures of the previous arrangements (eg the spatial closures) and has formalised an objective relating to stock recovery. The FMP is designed to be sufficient to preserve stock at an implied limit reference point to ensure future productivity both in times of high stock and those of stock depletion. The current limit reference point was implemented as it encompassed the preservation of the only known commercially significant bed remaining in the fishery. It was not an actual point identified using a rigorously tested process.

The natural fluctuations in population levels have, in the past, been almost impossible to assess and predict. This demonstrates the probable influence of environmental factors in highly variable recruitment. As a result, the proposed FMP does not detail an ideal level to achieve for optimum ecological and economic benefits (ie a target reference point). There is a high risk that the fishery will always be managed at the bottom line.

Conclusion

Due to a lack of information, and the difficulty in predicting stock fluctuations, a time frame has not been implemented for the fishery to recover to the limit

reference or a target reference point. However, AFMA must annually report against a performance criteria to this effect and significant fishing cannot occur until the limit reference point is preserved (ie closures identified and closed). The recommendations listed in Objective one of Principle one will address the concerns arising in this objective.

Ecosystem impacts

Principle 2: *“Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem”*

Bycatch protection

Objective 1: *“The fishery is conducted in a manner that does not threaten bycatch species”*

Information Requirements

There has been limited bycatch data collected from the BSCZSF in the past. The majority of data that are available is not representative of commercial fishing operations. The proposed FMP requires the implementation of a Bycatch Action Plan (BAP) and this has been included in the AFMA submission. The BAP has recognised the limited available information on the amount and composition of bycatch as an issue and proposes to address this by:

- Communicating the need for improving the quality of bycatch information to industry;
- Developing a logbook requiring bycatch information recording;
- Developing a long-term strategy for independent data collection and monitoring; and
- Requesting recording of bycatch in opportunistic observer surveys.

The BAP requires that logbooks allowing for the recording of bycatch information be distributed before the second opening of the fishery after implementation of the BAP. These logbooks have now been distributed and provide for recording of 4 species/type per 5 fishing days. This is not a large number of recording fields, however given the known levels of bycatch in the fishery EA is satisfied that this should provide the basis for improved reporting in the future.

The reliability of bycatch data from industry is often an issue of concern in any fishery as identification and quantification requires time and specialised skills. However, the BAP does require AFMA to educate industry on the importance of high quality bycatch recording. It is not possible to make an assessment on the robustness of this system until it has been implemented in the fishery.

Bycatch data are also collected through limited independent means. The BAP commits to the development of a long-term independent bycatch data collection and monitoring strategy by 31 March 2002. The strategy has been completed since AFMA’s submission and the data collection methods described in this report reflect the outcomes of the new strategy. The scientific surveys in 2000 and 2001 collected information on bycatch.

Independent surveys are usually a reliable data source. Under these management arrangements, survey requirements may change depending on research priorities and the surveys may not be commercially representative. They will also predominantly take place in closed areas. These areas may not represent the ecology of all fishing grounds.

Observer trips will probably be more common in the next few years if the stock rebuilds and new beds are identified by industry for assessment. This will be an important verification of the accuracy of the logbook records. This is an ideal data source, however these are only obtained on rare occasions when areas require assessment for reproductive or sustainability potential.

AFMA is also encouraging the development of research applications to funding agencies. The strategic research plan for the fishery identifies quantifying and reducing the impact on bycatch as a high priority, however research programs to investigate the issue rely on securing funding from external agencies.

The uncertainty and low levels of dredge efficiency in this fishery have been discussed earlier in this assessment under objective one of principle one. The bycatch information collection system as described above suffers in that it does not encompass bycatch that is damaged or killed but not retained in the gear. There are currently no formal mechanisms to obtain data on these impacts on bycatch however independent surveys may continue to develop video recording of the environment as an information collection tool.

Assessment

AFMA has commissioned CSIRO to conduct an ecological risk assessment of the fishery as part of a larger Commonwealth project. This will be completed by August 2003 and will consider target, byproduct, bycatch and broader ecological impacts where possible. The exact goals, objectives and requirements of this project are not specified in the AFMA submission. This makes it very difficult to assess whether it meets the requirements of these guidelines. EA looks forward to seeing the results in August 2003.

Scientific surveys in 2000 and 2001 identified over 100 species of bycatch in the fishery area. Not all of these were caught in areas currently fished however. Semmens and Haddon (2001) identified the most dominant species of bycatch as tulip shells, crassatellas, dog cockles, mud oysters, ascidian, spider crabs and sponges. They also commented that the common bycatch species, particularly spider crabs and sponges, are likely to be severely damaged through interactions with dredges.

Based on the current low level of data, the FAG has made an initial assessment that scallop harvesting operations in the fishery result in low levels of bycatch and consequently low impacts on the populations of these species. This assessment will be refined through the CSIRO project and the acquisition of more bycatch data.

The BAP requires the FAG to assess the likely impact on any bycatch species and populations taken in the fishery by analysing independent research bycatch data

and comparing it with scallop logbook data. The effectiveness of the management arrangements will be reviewed against the performance measures every two years.

The requirement of the BAP for the FAG to monitor and assess bycatch relies quite heavily on the acquisition of new data. The FAG will develop methods of monitoring and assessing bycatch trends. The final bycatch assessment method is therefore not yet decided, but will be based on the best available information and will be assessed both annually against the performance indicator in the FMP and in the biennial assessment against the BAP. As a result, no indicator bycatch species have been identified yet and the decision on whether to identify any has not been made.

Management Responses

There are no arrangements in the plan that relate to avoiding capture and mortality of benthic bycatch species. The use of spatial and seasonal closures as measures to manage target stocks will offer bycatch species protection to a minimal degree. The spatial closures can be swapped for other areas that may have experienced fishing pressure however and will therefore not provide continual protection. In addition, there is currently insufficient information on bycatch species to determine whether the seasonal closure from December to April protects them during their own reproductive or biological cycles.

The BAP requires that if assessment actions identify that bycatch (including habitat) species and populations cannot be maintained, an assessment and action must be implemented to minimise bycatch. The submission is silent on what these actions may be, time requirements for them to be implemented or justification for why they are not already in place. This obligation may cause AFMA to close areas if the assessment concludes that the problem is localised, or to develop new technologies. The assessment must be conducted within 3 months of identifying the need, however no time lines are identified for action. EA recommends that AFMA clearly identify timeframes for these actions.

The FAG has identified bycatch issues as a high research priority. They and AFMA are actively promoting research proposals to address the information gaps, however there have been no successful applications recently.

Conclusion

The submission does not clearly demonstrate that the capture of, or damage to, bycatch species is sustainable. Despite the fact that anecdotal evidence suggests that bycatch is lower on highly prolific scallop beds the management arrangements do not ensure that the fishery is conducted in a manner that does not threaten bycatch species.

The submission suggests that AFMA will improve the low levels of bycatch data, and consequently address the need identified in the strategic research plan, by encouraging the development of research applications to funding agencies. Applications for this fishery have not been very successful in recent times and EA believes that they are unlikely to be until catches in the fishery improve significantly. The priorities in the research strategy should not be overlooked however. EA therefore recommends that AFMA specify contingent action to be

taken in the event that adequate funding is not available to undertake information gathering.

AFMA contends that fishing only occurs in 5% of the area to which the FMP will apply. A large proportion of the total area of the fishery is not suitable for dredging. The MAC assessed the benefits of closing areas not historically fished at a meeting earlier this year. Such a closure may not be effective in preserving all bycatch species if their distribution is limited to the sediment and habitat types only found in fishing grounds. Extensive closures would certainly act as a precautionary measure to preserve the majority of species in the region as historic effort has tended to be localised within the most productive grounds.

EA recommends the closure of significant areas of the fishery to dredging. Specification, discussion and justification for this recommendation are included under objective three of principle two.

Recommendations

- The effects on the environment of the benthic impacts of this fishery are uncertain and, as a precautionary measure, areas in the fishery should be protected from these impacts. AFMA should implement a structured approach, including stakeholder consultation, to identifying values and areas to be conserved within the fishery. There are significant areas of the fishery that have not, and cannot, be fished using current technology. These areas are also unlikely to contain commercial quantities of scallops. Although currently there is little utility in closing such areas, they should be broadly identified and closed by 30 June 2005 to prevent possible future impacts of the fishery. There are also significant areas of the fishery where fishing can occur using existing technology, but where fishing does not occur because there are no commercial scallop beds in these areas. The remaining part of the fishery comprises areas that are currently fished for scallops. By 30 June 2005, sufficient areas of representative habitats and ecological communities in both of these segments of the fishery must be broadly identified and protected from the impact of the fishery to ensure benthic impacts of the fishery on the environment are managed in a precautionary manner.
- The Bycatch Action Plan (BAP) should be modified to specify contingent action to be taken in the event that adequate funding is not available to undertake information gathering.
- The BAP commits to implementing remedial actions to remedy impacts on bycatch when required pending the result of a review. Timetables to implement these remedial actions should be incorporated into the BAP.

Protected species and threatened ecological community protection

Objective 2: *“The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities”*

Information Requirements

As discussed previously, there is currently very little information on the composition and abundance of bycatch in the BSCZSF. Anecdotal evidence

suggests there is very little interaction with endangered, threatened or protected species.

There is currently no provision in the logbook for specific recording of interactions with these species and there has been only limited fishery independent monitoring. The new logbook developed in 1999 includes a generic bycatch recording area of 4 lines per 5 fishing days. AFMA is working with the EA Marine Species Section to develop a generic reporting system for listed species to be applied across all Commonwealth fisheries. However this is in very early stages of development and no indication of timing of the outcome has been provided.

The BAP has specified several actions and performance indicators to improve bycatch data collection in the fishery. Endangered, threatened and protected species will be encompassed under this general bycatch data collection strategy.

Interactions with protected species in this fishery could only be recorded where the specimen was retained in the fishing gear. Dredging can cause injury or mortality to individuals without retaining them (McLoughlin et al, 1991). The current data collection system does not provide for the recording of these interactions. Scientific surveys have trialed the use and recommended further investigation of video footage as an assessment tool. AFMA has acknowledged this recommendation but has not committed to pursuing under the formal management arrangements.

There are currently no threatened ecological communities identified within or abutting the BSCZSF.

Assessment

The EPBC Act database (available through the Environment Australia website – www.ea.gov.au) identified numerous listed syngnathid species as well as two shark species (Great White Shark and Grey Nurse Shark) present within the area of the fishery. The only recorded interaction is the catch of one big-bellied seahorse in the Eastern closure during a scientific survey. This species is a listed marine species under the *EPBC Act 1999*.

Information on any interaction is dependent on reports from industry and observer records (and minimal survey data that may not be representative of commercial scallop operations). There has not been any recorded interaction with any endangered, threatened or protected species from the commercial operation of this fishery. It is uncertain whether the lack of reports in the past was due to nil interactions with protected species or the lack of capacity or inclination of the industry to identify, record and report the interaction. Previously there were no formal reporting mechanisms for protected species in this fishery.

An assessment based on the lack of records and anecdotal evidence has concluded that the current and potential risk of impacts of the fishery on these species are very low. AFMA has suggested that a further assessment will be conducted if more data become available. Bycatch data acquisition (as listed above under 2.1) aims to provide for such an assessment.

This issue will also be addressed as part of the CSIRO ecological risk assessment project. As discussed earlier, details of this risk assessment were not included in the AFMA submission.

Management Responses

The FMP requires that AFMA implement a BAP for the fishery. The BAP has been developed by AFMA and was included in the submission as a component of the management arrangements. The BAP requires that bycatch is monitored and assessed by the FAG. If the FAG determines that the bycatch (including habitats) species and populations are not maintained an assessment must occur within 3 months and action must be implemented to minimise bycatch. The submission is silent on possible actions and timeframes for this action to occur.

Due to the low levels of interaction currently perceived in the fishery the FMP does not include any management responses specifically aimed at minimising or mitigating interaction with endangered, threatened and protected species.

Conclusion

There are no threatened ecological communities currently identified in or abutting the fishery area.

This fishery has reported very low levels of interaction resulting in the mortality of, or injuries to, endangered, threatened or protected species. EA believes that as the majority of such species within the fishery area are relatively mobile and unlikely to occur solely within fished habitat, the risk of the fishery to their conservation status is not substantial.

AFMA has committed to educating fishers on the importance of high quality bycatch data. It is unclear whether this process will involve education on protected species identification. The lack of reports of interaction may be a reflection of the industry's inability to recognise and identify species with conservation status concerns.

AFMA is currently in the process of developing a generic protected species reporting system for all Commonwealth managed fisheries intended to meet the requirements of the EPBC Act. EA recommends that this system be implemented within the fishery as a priority. In addition, AFMA should monitor and analyse these data and, if an impact on a species is detected, enact measures to reduce interactions to a level that does not threaten the conservation status of the impacted species.

EA is therefore satisfied that the management regime requires persons engaged in fishing under the plan to take all reasonable steps to ensure that protected species are not killed or injured as a result of fishing. We are also satisfied that the fishery is not likely to adversely affect the survival or recovery in nature of any threatened species or the conservation status of any protected species.

Recommendations

- EA is satisfied the fishery is not likely to adversely affect the survival, recovery or conservation status of protected species, and that the protected

species that the fishery is most likely to interact with are the syngnathids and solenostomids. AFMA is implementing a strategy to ensure that reliable information is collected on interactions between the fishery and listed species. The implementation of this strategy should occur by 30 June 2005. If an impact on protected species is indicated, AFMA should implement measures to reduce interactions to a level that does not threaten the conservation status of the impacted species.

Minimising ecological impacts of fishing operations

Objective 3: *“The fishery is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally”*

Information Requirements

Data collection related to target, byproduct, bycatch and protected species within the fishery is described under objectives one and two of principle two. The only additional data collected related to the ecosystem generally is the requirement for fishers to record depth and bottom type in logbooks.

The AFMA submission details several research projects recently proposed to collect and collate further information on the ecosystem and impacts of fishing activity however none of these projects have been successful in securing funding to date. There have been research projects in the past that have investigated the elements of ecosystem impact of dredging. Although some research occurred in Bass Strait, none of these projects took place within the BSCZSF. The variability of sediment type and environment makes it very difficult to assume that the conclusions from these projects are appropriate in the BSCZSF.

The scientific surveys in 2000 and 2001 trialed the use of video footage as a non-destructive and complementary environmental assessment method. These surveys concluded that the use of video footage merited further investigation. AFMA has not made a formal commitment to conduct this investigation.

Assessment

The arrangements for bycatch assessment are outlined in objective one of principle two. A comprehensive assessment of the impact of the fishery on the ecosystem has not yet been designed. EA understands from discussions with a scientific member and the Chair of the FAG that the members intend to develop appropriate assessments for ecosystem impacts as data become available.

In the interim, AFMA has commissioned the CSIRO to conduct an ecological risk assessment. As stated above, details of this assessment have not been detailed in the AFMA submission. EA looks forward to viewing the results when they become available.

EA is in the process of commissioning an assessment of sponge beds in this area for a potential Marine Protected Area (MPA) declaration. This assessment will be completed by July 2002 and future conservation options for the area will be considered following the outcomes of this assessment.

Management Response

The fishing gear in BSCZSF does not have any plastic or synthetic components. Nor does it require bait, floats or other material commonly found as fishing debris. The vessels are required to comply with MARPOL (International Convention on the Prevention of Pollution from Ships - Marine Pollution) requirements and observers and AMFA officers have reported that crews handle their plastic waste in a responsible manner.

The Victorian Ocean Scallop Association will develop a code of practice for scallop fishing in all three scallop fisheries in Bass Strait within the life of the FMP. This will recommend, among other things, areas that for ecological reasons should not be harvested. The BAP contains a performance indicator regarding this code of practice, however it is not being developed by AFMA and therefore its completion and implementation are not within their power. In addition, adoption of the code by industry is purely voluntary and therefore there will be no management response available if no one chooses to adopt it.

It has been recognised by AFMA, SCWU and interested parties that current dredging practises could be improved to the benefit of both commercial operations and the ecosystem. Research has been conducted in the past to develop better fishing gear however there was no alteration to fishing operations. This was because a commercial trial indicated significantly lower scallop retainment. The BAP highlights this as an issue but does not specify any action to address it.

Conclusion

The management arrangements proposed do not ensure that the fishery is conducted in a manner that minimises the impact of fishing operations on the ecosystem generally.

It is generally accepted that dredging is an intrusive and destructive fishing practise. Currie and Parry (1994) concluded that their research indicated that scallop dredging changed the benthic community structure at their study site in Port Phillip Bay, Victoria, and similar results have been found in other dredging research around the world. EA believes that this level of potential impact is not acceptable in a fishery in an area as large as BSCZSF with no spatial restrictions for environmental protection.

Currently, research in BSCZSF is conducted using standard commercial gear. This prevents any assessment of ecosystem impact without further impacting upon it. Research in Port Phillip Bay in 1996 used divers to gather biological and physical data on fished and unfished areas. This enabled meaningful quantitative analysis of environmental data without further damaging the environment under examination. The previous two scientific surveys in BSCZSF trialed the use of video footage for complementary assessment. The AFMA submission acknowledges the benefits of developing non-destructive methods of research and suggests that these may be further investigated in the future. This development is not identified or committed to in the formal management arrangements however.

The BSCZSF covers a very large area with diverse habitat types. Currently, fishing only occurs in proportionally small grounds within the fishery area,

approximately 5% of the fishery. The defined fishery area includes many large areas of habitat and sediment types that are inappropriate for dredging and do not support scallop populations. The BAP includes an assessment of restricted fishing to areas of historical dredging, however it makes no commitment to action this.

The AFMA submission indicates that scallops in the BSCZSF favour coarse sandy bottoms with strong tidal flows. There are currently no areas of this habitat type within the fishery that are permanently protected from fishing pressure. In this way, there are no areas where other species and communities, that may also favour this habitat type, are able to exist or rebuild. The spatial closures to protect scallop broodstock will also protect other species in these areas, however these beds may be swapped for others and subsequently dredged. Sponges and other sessile invertebrates that provide significant relief and small-scale cover in such habitat may include slow-growing and long-lived species.

Due to the lack of success in this fishery in developing and implementing alternative fishing gear with less significant benthic impacts, it appears that there is no immediate method of reducing the regional impact of the fishing gear without reducing the spatial distribution of the effort. This issue is compounded by the current status of the fishery and the limited prospect of high quality gear development research. EA therefore recommends that areas of representative habitat and ecological communities be closed permanently to dredging within the fishery.

The fishery area can be viewed as comprising three groups of areas based on fishing potential and attractiveness.

1. Areas that have not, and cannot, be fished using current technology;
2. Areas that can be fished but are not currently as they do not possess commercial scallop beds; and
3. Areas that are currently fished and contain commercial scallop beds.

EA believes that areas that have not and cannot be fished should be broadly identified and closed as soon as possible to prevent possible future impacts of the fishery.

EA also believes that selected representative areas in the other two groups should be closed to prevent possible future impacts of the fishery. The amount of area closed should be sufficient to ensure that the benthic impacts of the fishery on the environment are managed in a precautionary manner.

These areas should be identified through a structured approach. It should involve extensive consultation with industry, and any others who are currently most familiar with the habitats and ecosystems within the fishery. The amount of areas closed should be sufficient to meet ecological requirements. The FAG should assess the extent of areas suggested to ensure they are sufficient, with the assessment subject to external review.

Recommendations made previously in this report will address the concerns arising from this objective.

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Acronym List

AFMA	Australian Fisheries Management Authority
BAP	Bycatch Action Plan
BSCZSF	Bass Strait Central Zone Scallop Fishery
CSIRO	Commonwealth Scientific Industry Research Organisation
EA	Environment Australia
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
FAG	Fishery Advisory Group
FMP	Fishery Management Plan
ICVMS	Integrated Computerised Vessel Monitoring System
MAC	Management Advisory Committee
MARPOL	International Convention on the Prevention of Pollution from Ships (Marine Pollution)
MPA	Marine Protected Area
SCWU	Scientific Committee on Wildlife Use
SPRAT	Species Profile and Threats Database
TAC	Total Allowable Catch
TAFI	Tasmanian Aquaculture and Fisheries Institute
UNCLOS	United Nations Convention on the Law of the Sea