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Department of the Environment and Heritage

Assessment of the
Tasmanian Scallop Fishery

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Disclaimer

This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government *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 Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999*. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

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Assessment of the ecological sustainability of management arrangements for the Tasmanian Scallop Fishery

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EXECUTIVE SUMMARY

Background

The Department of Primary Industries, Water and Environment, Tasmania (DPIWE) has submitted a document for assessment under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft document *Assessing the Ecological Sustainability of the Tasmanian Scallop Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in June 2005. The submission was released for a thirty-day public comment period that expired on 2 September 2005. One public comment was received. DPIWE provided a response to the issues raised, but no changes were made to the submission as a result of public comment.

The submission reports on the Tasmanian Scallop Fishery (TSF) against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission, associated documents, the public comments and DPIWE's response to the comments.

Table 1: Summary of the TSF

Area	The area of the fishery extends from the high water mark to 20 nautical miles into Bass Strait and from the high water mark out to 200 nautical miles off the rest of the State of Tasmania.
Fishery status	The target species within Tasmanian waters is currently considered to be in recovery after being historically overfished.
Target Species	Commercial scallops (*Pecten fumatus*).
Byproduct Species	Doughboy (*Mimachlamys asperrimus*) and queen scallops (*Equichlamys bifrons*).
Gear	Commercial – scallop dredge. Recreational/Indigenous – currently dive only though recreational dredge entitlements still exist.
Season	Peak catch and effort occurs between winter and spring, although the fishery has only opened in six of the last ten years.
Commercial harvest	About 4,125 t of scallops were harvested in the TSF in 2004 (out of a possible 4,253.2 t). Total Allowable Commercial Catch (TACC) in 2005 was 3,721.6 t.
Value of commercial harvest	Up to $6 million, with the 2004 beach value of scallops being $5.5 million.
Recreational and Indigenous harvest	Take is believed to be relatively small but is unquantified.
Commercial licences issued	92 in 2005, though less than 30 boats regularly operate in the fishery. Most operators also have access to one or both of the Victorian and Bass Strait Central Zone (BSCZ) scallop fisheries.
Management arrangements	Output controlled through a TACC of 3,721.6 t in 2005 based on aggregation of 10,730 scallop units @ 350 kg per unit. Units are the basis for Individual Transferable Quotas (ITQs).

	Input controlled through: • limited entry (fishers must also hold a scallop entitlement) and a minimum unit holding to operate; • minimum size limits to allow for two spawnings; • spatial management regime, where most of the fishery area is closed and only certain defined areas opened if criteria met; • seasonal closure – fishing only allowed when scallops have reached optimum condition and to maximise opportunity for successful recruitment; • limits on number, dimensions and structure of dredges; and • possession limits.
Export	Mainly a domestic market, although export grew substantially in 2005, particularly to France.
Bycatch	Bycatch is relatively low, consisting mostly of molluscs such as dog cockles (*Glycymeris sp.)* and the native oyster (*Ostrea angas).* Diogenid hermit crabs *(Paguristes tuberculatus)* and the introduced screw shell (*Maoricolpus roseus)* are also taken as bycatch.
Interaction with Threatened Species	Considered low, but potentially greater interactions with syngnathids. Possible minor interactions with seals, sharks, cetaceans and seabirds.

The area of the fishery includes waters surrounding the state of Tasmania. The fishery area extends from the high water mark to 20 nautical miles into Bass Strait and from the high water mark out to 200 nautical miles around the remainder of the state. While part of the fishery area is in Commonwealth waters, the entire fishery is managed by Tasmania under an Offshore Constitutional Settlement (OCS) agreement between the Australian Government and the Government of Tasmania. Fishing effort has mainly been concentrated around the Bass Strait islands and the north east coast of Tasmania for the last 15 years.

The commercial fishery targets commercial scallops (*Pecten fumatus*), however fishers can also take doughboy (*Mimachlamys asperrimus*) and queen scallops (*Equichlamys bifrons*). Historically these other species have not been targeted and catches are low relative to commercial scallops, however doughboy scallops can be found in reasonable numbers in some scallop beds. No other species are allowed to be retained.

The target species (*Pecten fumatus*) inhabits Australia's southern waters from the central New South Wales coast to west of the South Australia-Western Australia border, and is regarded as being a single stock across this range. The species is harvested from three jurisdictions (Victoria, Australian Government and Tasmania) although Zacharin (1994) reported that commercial abundances were restricted to 5 distinct fishing zones: Port Phillip Bay, Lakes Entrance, Bass Strait, northern Tasmania and eastern Tasmania.

P. fumatus is a functional hermaphrodite which normally reaches sexual maturity in two years. In Bass Strait spawning peaks in early spring and is prolific, with up to1 million eggs produced by an individual. Larval scallops (spat) drift as plankton for up to six weeks before first settling, when they attach themselves to seaweed, mussel or oyster shells and remain attached until 6mm long. The small scallops then detach and settle into the sediment, burying themselves so that only the top shell is visible (Kailola *et al*., 1994). The spat grow quickly and reach 70 to 75 mm shell height within 18

months. Spat survival appears dependent upon the nature of the seabed, with sandy/muddy sediments allowing burrowing to occur, which increases protection.

Scallop fisheries worldwide are notorious for their variability in recruitment and abundance. There appears to be a direct relationship between the levels of adult stock and amount of larvae, but no corresponding relationship between the amount of larvae and number of juveniles that settle. The extent to which scallops on a specific bed may contribute towards recruitment over a broader area depends on weather conditions - primarily wind strength and direction over the summer months - and the extent to which these contribute to the dispersal of larvae away from that bed. Simulation studies of Bass Strait scallop larval dispersal (Hammond *et al.*, 1994) found that a major management implication is that, as the number of beds becomes reduced, self-seeding becomes more important as a means of maintaining the viability of beds. If high fishing-induced mortality occurs on a scallop bed once it is fished, the future viability of that bed is in doubt since it cannot be assumed that it will be replenished by settlement of spat from elsewhere (AFMA, 2002). Given the historical overfishing of scallop stocks in Bass Strait, and the overall low population status of commercial scallops across its range, recruitment is probably more likely from adjacent, rather than distant, populations/scallop beds.

Scallops are preyed upon by starfish, whelks, globefish and octopus, although scallops are unlikely to exclusively comprise the diet of any of these species.

Scallop dredging started in the early 1900s in the Derwent River estuary, spreading into the D'Entrecasteaux Channel by the 1920s and then to other eastern Tasmanian areas. However, by the 1970s all eastern Tasmanian grounds were severely depleted and operations had moved to Port Phillip Bay (Victoria) (Caton & McLoughlin, 2004). Beds off northern Tasmania were found in the early 1970s but by the late 1980s there were virtually no productive southern Australian scallop grounds left (Caton & McLoughlin, 2004). Stricter management arrangements commenced in the mid-1980s including the requirement to prove past history for future access, allocation of fishing units, non-transferability of licences (initially), limit on vessel numbers and fishery closures.

The fishery was totally closed for 8 years from the end of 1987 until 1995 to promote the rebuilding of the scallop stock. Partial recovery of the stock in some areas led the fishery to be opened for short seasons in 1995, 1996, 1998 and 1999, although the fishery again closed between 2000 and 2002.

Following the introduction of 'bag' quotas in the 1990s, transferable units were introduced in 2000 to encourage restructuring in the fishery. A total of 10,730 scallop units were issued to operators and these remain in place as a fundamental component of the fishery. To limit the level of catch increasing as a result of activating effort from latent units and licences, the quota unit value was reduced effectively reducing the 'bag' quota unit value based on volume (equating to around 950 kg) to a weight based value " kilogram scallop unit" of 500 kg. These measures reduced the total potential catch from 10400 t (if all units were activated and used) to a more conservative level of 5,350 t.

In 2002, a scientific survey identified extensive areas of scallops off Flinders Island, however, the fishery remained closed as the majority of these scallop were undersize. By 2002, a high level of interest in the fishery had developed indicating that it was highly probable that most scallop licences would be activated and most scallop units would be seasonally transferred. This may have resulted in the potential catch exceeding 4200 t and the trigger point relating to capacity of active licences being reached. DPIWE took a proactive approach and the scallop unit value was reduced to

400 kg prior to the commencement of the fishery opening in June 2003. The change reduced the maximum potential catch from 5,350 t to 4,280 t.

In addition, industry restructuring resulted in a reduction of licences to 92 by 2005. While the industry accepted that there were no guarantees that they would catch their quota each season, DPIWE considered it created an expectation for the opening of all areas that fulfilled the discard criteria in the immediate season. After the fishery experienced considerable difficulties in re-establishing markets after being out of the market place during the period of total fishery closure (1999 to June 2003), a spatial management strategy was refined to focus on providing for continuity of fishing seasons, thus limiting the number of closed years, and this continues to be a primary aim of the management of the fishery. The intention is to develop harvesting plans for potential open areas, ranking the order which particular areas could be opened including, where feasible, reserve areas to ensure fishing seasons 2-3 years into the future.

In 2005, a new management plan was introduced which allowed the Minister to set and alter the quota unit value by public notice. The alteration in unit value effectively sets the TACC for any particular year, and is based on the best available stock information at that time. DPIWE intend to use this management tool in combination with the harvesting plans discussed above to maximise the likelihood of continuous fishing years.

In 2005, the Tasmanian Aquaculture and Fisheries Institute (TAFI) advised that surveys had not indicated signs of significant recruitment of scallops and that the amount of known harvestable scallop stocks was likely to be less than the cumulative TACC over the next few years. To assist in meeting the objective of continuous fishing years, and to continue stock rebuilding, DPIWE adopted a precautionary approach and reduced the TACC to 3,721.6 t (by altering the unit value to 350 kg) for the 2005 season. The fishery was also informed that unless further information becomes available to indicate a different trend in the stocks, a more conservative approach would be implemented for the 2006 season.

Since the periods of total fishery closure in the 1980s and 1990s, fishery management measures have been progressively introduced to improve the opportunities for the stocks to rebuild and maintain an adequate standing stock that can be fished in a sustainable manner. The main current fishery management arrangements include a TACC and ITQs, a minimum size limit, a spatial management system (with significant closed areas), seasonal closures, gear limitations and limited entry to this fishery. Currently there are 92 licences, though less than 30 regular operators. Some operators own multiple licences in order to combine the units attached to each, making their operations more commercially viable.

Commercial fishing for scallops in Tasmania is done solely by dredging. Dredges (typically 3-4 metres wide) are deployed from the rear of the fishing vessel and are attached by a single cable. They consist of a toothbar or ‘scraper’ bar on the bottom of the ‘mouth’ of the dredge. As the dredge is dragged along the bottom the teeth dig into the substrate (typically soft sand or mud), lifting the scallops so that they are caught in the dredge. Each dredge run lasts for about 15 minutes after which it is lifted and emptied. The gear is typically deployed on the shelf in water deeper than 20 metres where the best scallop beds tend to occur.

The catch efficiency of the toothed mud dredge has been estimated at between 1% and 28%, depending on the size of scallop, density of the beds, sea bed type and vegetation, and the duration of each dredge pass (McLoughlin *et al*., 1991). This figure would be greatly improved where scallop beds consist predominantly of large (>90 mm shell width) scallops, as per the main criteria for opening a scallop bed to commercial fishing in the TSF.

A maximum tooth length applies to reduce benthic impacts, and a minimum specified gap between the teeth allows a degree of size selectivity for retaining catch. Direct information on bycatch in the fishery is limited, however, a bycatch survey undertaken in the BSCZ Scallop Fishery demonstrated that 39 species comprised most of the bycatch in that fishery (Semmens, 2000). Additional scientific surveys within Tasmanian and Commonwealth waters since 2001 have shown that bycatch is mainly comprised of introduced screw shell (*Maoricolpus roseus*), diogenid hermit crabs (*Paguristes tuberculatus*), dog cockles (*Glycymeris* sp.) and the native oyster (*Ostrea angas*). Impacts to bycatch species are reduced in the TSF due to the practice of returning bycatch to the immediate vicinity as quickly as possible.

Some species that may be affected by this fishery are currently listed protected species under the Commonwealth EPBC Act. Possible protected species interactions in this fishery are primarily with syngnathids, which may be taken if dredging occurs in areas outside the "clean" grounds. Interactions with cetaceans, seals and seabirds may also occur but do not appear to result in mortality of these species. Limited evidence to date suggests that interaction with any protected species group is very low. These interactions are assessed under Principle 2 of this report.

The take of scallops by the Indigenous and recreational sectors within Tasmanian waters is not significant, with these fisheries opening for the first time in 5 years in 2005. These fisheries are dive fisheries only. There is still provision for recreational scallop dredges to be used, though a recreational dredge season has not been open since the 1990s. Apart from the restrictions on method, the recreational fishery is managed through licences, seasons, bag and possession limits, size limits and some area restrictions.

Commercial scallop is a target species for the other scallop fisheries in Bass Strait – the Australian Government-managed BSCZ Scallop Fishery and the Victorian Scallop Fishery in northern Bass Strait waters. Both of these fisheries harvest with dredged and all three fisheries target the same scallop stock. Recent effort in the BSCZ Scallop Fishery has also been focussed around Flinders Island off north-eastern Tasmania.

The BSCZ Scallop Fishery was assessed under the EPBC Act in 2002 and was declared a Wildlife Trade Operation for a period of 3 years. This fishery is now due for reassessment and is currently defined as 'overfished' by the Bureau of Rural Sciences (BRS). The Victorian Scallop Fishery is currently being assessed. There is potential for the bottom-trawl component of the South East Trawl Sector of the Australian Government Southern Eastern Shark and Scalefish Fishery to take scallops as bycatch if target species and area of operation change in the future. To date, fishing operations have been outside areas where scallops are found although operators in Australian Government fisheries fishing in Tasmanian coastal waters have a combined possession limit of 500 kg whole weight of all species of the Phylum Mollusca (including scallops).

The legislation that governs the fishery's management includes the Tasmanian *Living Marine Resources Management Act 1995*, the *Fisheries (Scallop) Rules 2005* and the *Fisheries (General) Regulations 2000*. The *Fisheries (Scallop) Rules 2005* have been declared a management plan under Part 3 of the Tasmanian *Living Marine Resources Management Act 1995*.

Overall assessment

The material submitted by DPIWE indicates that the TSF operates in accordance with the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. DEH considers that the TSF is a well managed fishery that is unlikely to have an unacceptable or unsustainable impact on the environment in the short to mid term. Recommendations have been

developed to ensure that the risk of impact is minimised in the longer term. Overall, the sophisticated spatial management regime, use of a TACC and ITQs in the fishery, minimum size limit, seasonal closures and gear restrictions suggests that the fishery is being managed in an ecologically sustainable way.

In making its assessment DEH, while noting that the scallop stocks have been overfished in the past, considers that the range of management measures are sufficient to ensure that the fishery is conducted in a manner that does not lead to over-fishing in the future and that stocks are not currently overfished. Taking into account the spatial management regime, monitoring of take by individual fishers and the measures used by DPIWE to maximise the targeted nature of the fishery, DEH considers that fishing operations are managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. Management of this fishery has a history of reacting appropriately to threats to sustainability and DEH is confident that DPIWE will continue to provide this high quality management.

The assessment finds that the fishery is managed in an ecologically sustainable way and its operation is consistent with the objects of Part 13A of the EPBC Act. DEH recommends that the export of species taken in the fishery should be exempt from the export requirements of Part 13A of the EPBC Act, with that exemption to be reviewed in 5 years. DEH considers that the fishery, as managed in accordance with the management regime is not likely to cause serious or irreversible ecological damage over this period.

As the official fishery area encompasses Commonwealth as well as State waters, consideration under Part 13 of the EPBC Act is required regarding the impact of the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species.

Protected species occurring in the fishery area include syngnathids, seals, sharks, cetaceans and seabirds. The fishery has only limited recorded interactions with these species groups, though there is potential for a greater interaction with syngnathids if fishing effort spreads into areas outside the main commercial fishing grounds and into those habitats where syngnathids are found. However, management is moving towards greater definition of scallop grounds which would result in fewer interactions with syngnathids. The actual and potential impact on Part 13 species under the management arrangements is considered low and adequate protection is provided. There are no listed threatened ecological communities in the fishery area.

DEH recommends that the TSF management regime be declared an accredited management plan under sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the regime relates does not, or is not likely to, adversely affect the survival in nature of listed threatened species or population of that species, or the conservation status of a listed migratory species, cetacean species or listed marine species or a population of any of those species. DEH also considers that the management regime requires that all reasonable steps are taken to avoid the killing or injuring of protected species, and the level of interaction under current fishing operations is low. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the management regime, would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

To further strengthen the effectiveness of the management arrangements for the TSF, and to contain the environmental risks in the medium to long term, DEH has developed a series of recommendations. The implementation of these and other commitments made by DPIWE in the submission will be monitored and reviewed as part of the next DEH review of the fishery in 5 years time.

Recommendations

1. DPIWE to advise DEH of any material change to the fishery's management arrangements that could affect the criteria on which EPBC Act decisions are based, within 3 months of that change being made.
2. By the end of 2006, DPIWE to develop fishery specific objectives to guide ecologically sustainable harvest of byproduct species and to minimise interactions with protected species. As part of the review of the "Tasmanian Scallop Fishery Policy Document – June 2000", or by no later than December 2006, DPIWE to also develop performance indicators and performance measures, linked to the existing and new objectives, for target and byproduct species, protected species interactions and ecosystem impacts.
3. DPIWE to monitor the status of the fishery in relation to the performance measures once developed. Within 3 months of becoming aware of a performance measure not being met, DPIWE to commence a review and finalise a clear timetable for the implementation of appropriate management responses, where appropriate.
4. From 2006, DPIWE to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure once developed.
5. DPIWE to work with the relevant jurisdictions to actively pursue consistent and/or complementary management arrangements for the commercial scallop stock off south-east Australia, where appropriate.
6. DPIWE to review the harvesting strategy employed in the TSF to ensure that it is adequately precautionary. DPIWE should consider the available scientific information regarding maintaining spatially distributed scallop beds and the impacts of fishing of the southeast Australian scallop stock. Notably, DPIWE should consider the recommendations of the FRDC project titled "Juvenile Scallop Trashing Rates and Bed Dynamics: Testing the Management Rules for Scallops in Bass Strait". DPIWE to also take into account the cumulative impacts of fishing on the entire scallop stock targeted in southeast Australia as relevant information becomes available.
7. To support the implementation of the Protected Species Interaction Monthly Record DPIWE, within 12 months, to develop and implement an education program for fishers to promote the importance of protected species protection and accurate incident reporting.
8. Should new information determine that the fishery is having significant interactions with any endangered, threatened or protected species, DPIWE to develop appropriate measures to mitigate those interactions. Measures should be implemented within 12 months of the information becoming available.
9. DPIWE to review the current management regime within the TSF to ensure that it takes account of ecosystem impacts, in particular:

   - high risk impacts of fishing identified through ecological risk assessments relevant to the fishery;
   - important juvenile/spawning/refuge grounds identified for byproduct and protected species; and
   - the impacts of fishing on benthic habitats.

   During the review DPIWE is to liaise with the Victorian Department of Primary Industries and the Australian Fisheries Management Authority and consider information relating to the risk assessment of their respective fisheries.

PART I - MANAGEMENT ARRANGEMENTS

The TSF is managed by DPIWE.

The management regime is described in the following documents, all of which are, or will be publicly available:

- the *Fisheries (Scallop) Rules 2005;*
- the Tasmanian Scallop Fishery Policy Document – June 2000;
- the revised Tasmanian Scallop Fishery Policy Document (due to be released for public comment in 2006);
- the Tasmanian *Living Marine Resources Management Act 1995;*
- the *Fisheries (General) Regulations 2000*; and
- relevant Gazetted public notices and some minor licence conditions.

A number of other documents, including research reports, scientific literature and discussion papers are relevant to the management of the fishery.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Because of the importance of the management regime and documents referred to above to DEH's assessment of the fishery, an amendment could change the outcomes of the assessment and decisions stemming from it. Decisions resulting from this assessment relate to the arrangements in force at the time of the decision. In order to ensure that these decisions remain valid, DEH needs to be advised of any changes that are made to the management regime and make an assessment that the new arrangements are equivalent or better, in terms of ecological sustainability, than those in place at the time of the original decision.

Recommendation 1: *DPIWE to advise DEH of any material change to the fishery's management arrangements that could affect the criteria on which EPBC Act decisions are based, within 3 months of that change being made*.

Management of the fishery incorporates a sound range of consultative mechanisms and a clear commitment to effective consultation with a variety of stakeholders. The Scallop Fishery Advisory Committee (ScFAC) is the key forum for such consultation. ScFAC is appointed by the Minister under the Tasmanian *Living Marine Resources Management Act 1995* to provide advice about the management of the scallop fishery. The representation of the current committee includes: five scallop fishers, one conservation/community representative, two processors, a Tasmanian Marine Police Officer, a research scientist from TAFI and the DPIWE Fisheries Management Officer (scallop). Currently the Manager (Wild Fisheries Management Branch, DPIWE) chairs the committee.

The *Living Marine Resources Management Act 1995* also prescribes a consultative process for the development of a management plan. This process includes the preparation and distribution of an options paper and draft plan, regional consultative meetings, a formal public consultation period (30 days) on the draft plan and a report submitted to the relevant Minister on issues raised during the public comment period. The peak commercial and recreational fishing bodies, the Tasmanian Fishing Industry Council and the Recreational Fishing Industry Council, the Tasmanian Scallop Fisherman's Association and the Tasmanian Association for Recreational Fishing are also consulted during the development or amendment of a management plan.

TAFI provides independent research advice to DPIWE for the TSF. Catch information derived from fishers catch records and survey information that includes the extent, size structure and density of

scallop beds may be used to provide advice regarding seasonal operational matters. This includes appropriate harvest levels, including total fishery closures, limiting area or reducing the total allowable catch. Open forums are held each year prior to a ScFAC meeting where TAFI staff provide the findings of the pre-season surveys undertaken by industry under scientific direction. Overall, DEH considers the level of consultation and expertise to be sound and is confident that the management agency will continue to ensure interested parties are consulted appropriately.

The fishery is managed according to the policy regime described in the Tasmanian Scallop Fishery Policy Document – June 2000, with amendments, which contains a number of objectives for fisheries management relating to the target species and to ecosystem impacts. DEH is concerned, however, that there are no specific objectives relating to byproduct species or to protected species interactions. While recognising that the current take of byproduct is low, DEH considers that a precautionary harvesting objective relating to byproduct species would be appropriate. This is particularly important given that doughboy scallops can be found in significant numbers in some scallop beds and DPIWE have stated that its risk assessment process evaluated a moderate risk of impacting on doughboy scallops. Similarly, while interactions with protected species are likely to be low, some interactions with syngnathids have been reported and the occurrence of such interactions can increase depending on the areas opened to fishing activity. Consequently, DEH considers that an objective to minimise interactions with protected species in the TSF would also be appropriate.

DEH also notes that the fishery has little performance criteria apart from the criteria used for determining whether a scallop bed should be opened. DEH believes that performance indicators and measures need to be developed to ensure that the objectives for management of the fishery can be met, performance of the fishery can be measured and management action taken as required. DEH considers that it would be appropriate to develop such performance measures as part of the review of the Tasmanian Scallop Fishery Policy Document – June 2000 that is expected to be completed in 2006.

Recommendation 2: *By the end of 2006, DPIWE to develop fishery specific objectives to guide ecologically sustainable harvest of byproduct species and to minimise interactions with protected species. As part of the review of the "Tasmanian Scallop Fishery Policy Document – June 2000", or by no later than December 2006, DPIWE to also develop performance indicators and performance measures, linked to the existing and new objectives, for target and byproduct species, protected species interactions and ecosystem impacts.*

In addition, performance measures should be capable of detecting and responding to changes in stock status. A clear process for responding to breaches of performance measures is required to ensure that prompt management action is taken to address any threats to sustainability.

Recommendation 3: *DPIWE to monitor the status of the fishery in relation to the performance measures once developed. Within 3 months of becoming aware of a performance measure not being met, DPIWE to commence a review and finalise a clear timetable for the implementation of appropriate management responses where appropriate.*

Management of the fishery is based on a mixture of input and output controls. Such controls include:

- a TACC and ITQs;
- limited entry, with 92 licences current;
- a requirement to hold a scallop fishing entitlement;
- gear restrictions;

- spatial management with controlled release of open areas and the majority of the fishery area closed; and
- minimum size limit on scallops.

The submission states that the Tasmania Police Marine and Rescue Division is responsible for compliance inspections, investigations and prosecutions in Tasmania. DPIWE also has a service agreement for Victorian Fisheries Officers to conduct compliance monitoring of TSF landings at Victorian ports. DPIWE operates a vessel monitoring system and conducts quota monitoring in conjunction with the Tasmania Police Marine and Rescue Division.

For recreational fishing, part of the compliance program focuses on community awareness and education. A key part of this is the distribution of pamphlets to educate fishers about the rules relating to the recreational take of scallops. In addition, Fishcare volunteers conduct beach and sea patrols and school visits to assist in educating the wider community and fishers about general fisheries education, including the scallop fishery. Direct policing of bag and possession limits are also undertaken.

Operational arrangements, including the determination of season dates, open areas and catch limits, are reviewed on an annual basis. For the commercial fishery, at least one consultative meeting involving industry is held, where an update of research information and the status of the stocks is provided. Industry has input into the operational arrangements for the season which is enhanced by its involvement in the scientific surveys to determine the status of scallop beds in the fishery. In addition, the Tasmanian Scallop Fishery Policy Document – June 2000 specifies trigger points for management review which, when met, leads to a review of the management arrangements by the Fisheries Minister. These trigger points relate to the number of active vessels in the fishery and the capacity of the active licences. While it is unlikely that either of these trigger points will be met in the short term, the Policy document also acknowledges that there may also be additional factors, such as those relating to the level of illegal fishing, the environment, market, or requests from sectors of the fishery that could lead to a review of the management of the fishery.

The current key management document for the TSF, "The Tasmanian Scallop Fishery Policy Document – June 2000", has undergone several policy changes during minor annual reviews between 2002 to 2005. A policy review by DPIWE is underway and a new strategic policy document is being progressed for expected completion in 2006. DEH expects that the new policy document will encompass measures to address many of the issues raised in this assessment.

DEH notes that the *Fisheries (Scallop) Rules 2005*, is a public document, as is the Tasmanian Scallop Fishery Policy Document – June 2000, which can be obtained directly from DPIWE or from their website. However, DEH considers that public reporting of performance on a fishery-by-fishery basis would enhance transparency and public accountability. DEH therefore suggests that for each fishery, including the TSF, DPIWE publicly report against each fishery performance measure on an annual basis (note that a requirement for the development of performance measures for the fishery is expressed in **Recommendation 2**).

Recommendation 4: *From 2006, DPIWE to report publicly on the status of the fishery on an annual basis, including explicit reporting against each performance measure once developed.*

Fishery-dependent data relating to the target species is collected on a regular basis in the fishery through logbooks and through the vessel monitoring system. Some fishery independent information is also collected, primarily through the industry-chartered scientific surveys and surveys directly funded through the Fisheries Research and Development Corporation (FRDC) and other sources. Discussion of the information collection system can be found in Part II of this report.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is contained under Principle 2 of this report.

The TSF is one of three fisheries targeting commercial scallops off south-eastern Australia. Under OCS arrangements, commercial fishing for scallops is divided into the following:

- Victorian Scallop Fishery;
- Australian Government BSCZ Scallop Fishery; and
- Tasmanian Scallop Fishery

On 9 July 2004 the three jurisdictions prepared a joint Options Paper entitled "A review of the OCS Arrangements for Bass Strait Scallops". While DPIWE have advised that the Tasmanian Government has adopted a position that significant support from the TSF is needed to drive changes to the jurisdictional management of the fisheries, as yet no formal changes have been made to the arrangements. DEH notes that DPIWE holds an observer position on the Management Advisory Committee for the Australian Government-managed BSCZ Scallop Fishery and that there is some degree of shared research and consultation on management of the different scallop fisheries between the management agencies. However, DEH also notes that there are significant differences in the management arrangements between the three scallop fisheries, despite the fact that they all target the same stock. DPIWE has provided an undertaking to attempt to work constructively with the Australian Government to harmonise management providing it follows the spatial management regime used in the TSF. DPIWE has also committed to consider the issue of rationalising jurisdictional management in an open and constructive manner in 2007. Given that the spatial management regime used in the TSF is relatively precautionary, DEH encourages DPIWE to actively participate in OCS arrangement discussions to ensure the long term sustainability of the shared scallop stock.

Recommendation 5: *DPIWE to work with the relevant jurisdictions to actively pursue consistent and/or complementary management arrangements for the commercial scallop stock off south-east Australia, where appropriate*.

DEH considers that the current management arrangements comply with all relevant threat abatement plans and recovery plans and is moving in the direction of adopting strategies to be compliant with the National Policy on Fisheries Bycatch. DEH expects that DPIWE will also ensure compliance with any future plans or policies as they are developed.

No regional or international management regimes, to which Australia is a party, are of direct relevance to the fishery. The prime international regime affecting the fishery is the United Nations Convention on the Law of the Sea. The management regime essentially complies with this. Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the submission, the fishery's compliance with their requirements can be assessed by examination of Part II of this report. The application of the International Convention for the Prevention of Pollution from Ships (MARPOL) to vessels operating in the fishery is addressed under Principle 2, Objective 3.

DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

Conclusion

DEH considers that the TSF management regime is documented, publicly available and transparent, and is developed through a consultative process. The management arrangements are adaptable and underpinned by appropriate objectives for target species and ecosystem impacts. However, objectives need to be developed for byproduct and protected species, and more specific performance measures and indicators also need to be developed. The fishery has performance criteria relating to the decision to open a scallop bed to commercial fishing, but these require further development to ensure that the effectiveness of management arrangements can be measured and reviewed.

The management arrangements are capable of controlling the harvest through a combination of input and output controls appropriate to the size of the fishery. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

The management regime aims to take into account arrangements in other jurisdictions, and adheres to arrangements established under Australian laws and international agreements, although DEH has recommended that DPIWE work more closely with relevant jurisdictions targeting scallop stocks to ensure the shared stock is adequately protected.

DEH considers that there is scope to further refine the management arrangements, both internally in the fishery and across the south-east Australian scallop fisheries, and has provided a number of recommendations for improvements in the longer term.

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

Catch data has been collected for the fishery since 1972 and, since the introduction of a quota monitoring system, now provides a high level of confidence in the estimates of the total landings. The system incorporates the scallop catch record section within the quota docket, in combination with other details recorded on the quota docket. It is a legislative requirement for fishers to complete the catch record section for each day of fishing and to complete the quota docket for each scallop unloading. This provides some means of validating fishery dependent catch information. DPIWE report that the details recorded on the catch record section include fishing locality block, estimated catch per block, fishing duration, and depth. However, it is unclear whether fishers are required to record the catch of scallops to species level. DEH considers it unlikely that such a requirement exists, given that only the total weight or number of containers of scallop, rather than a total by species, is required to be recorded on the quota docket. While recognising that the amount of byproduct species caught is currently low, DEH considers that the quota dockets utilised in the TSF should be enhanced to provide recording of catch by species, as this will provide data by which the performance measures and indicators for byproduct species (as required under **Recommendation 2**) can be measured.

DEH also notes that operators are not required to record discarded scallops in their logbooks, even though discards would generally consist of undersized or damaged scallops. However, DPIWE states that it is not necessary to collect quantitative data on discards from commercial fishers since discard criteria, such as percent of undersized scallops, is used to determine if areas are suitable to open for commercial dredge fishing. If the discard rate is too high, the area remains closed to fishing. DEH agrees that this arrangement is likely to minimise the occurrence of discards in the TSF and consequently the necessity of recording discards in commercial logbooks.

A vessel monitoring system is also utilised in the TSF, which allows DPIWE to monitor compliance with spatial closures and to gather real time, fine spatial data of fishing effort. Further fishery dependent information is gathered from TAFI, who is commissioned by DPIWE to conduct pre-season scientific surveys of particular areas. These surveys use industry chartered scallop vessels and sample locations of prospective scallop beds. Data collected by these surveys includes the locations of scallop beds, population size structure, approximate extent of beds, bycatch data and other information such as recovery rates, scallop shell condition and roe condition. Scientific surveys may also include video or benthic observations. In addition, operators are granted a research quota allocation for undertaking approved research surveys. As a consequence, more extensive monitoring is now occurring with surveys being undertaken in broader areas, including in areas that may not necessarily have a high likelihood of commercially abundant scallop beds, and to monitor known scallop beds.

Recreational fishing licences are required for the recreational take of scallops. This enables DPIWE to survey licence holders with respect to catch and effort. A survey of licence holders for the 2005 fishing season by TAFI should provide information on catch and effort in this sector of the fishery.

DPIWE states that it hopes to further develop industry based surveys and catch sampling techniques to improve the knowledge of the resource. Such improvements should arise from a new FRDC research project, "Facilitating Industry Self-Management for Spatially Managed Stocks: A scallop case study". The project is expected to commence in late 2005. Other fishery independent information is available from research on commercial scallops undertaken in the other scallop fisheries off south-eastern Australia. In addition, scientific surveys and monitoring of scallop beds in Tasmanian waters have been conducted by TAFI on an annual basis around Flinders Island since 2001, and also in waters adjacent to these survey sites in Commonwealth waters. An additional FRDC funded scallop research project, "Juvenile Scallop Trashing Rates and Bed Dynamics: Testing the Management Rules for Scallops in Bass Strait" will help to improve knowledge of the stocks in a particular area and to develop cost effective techniques that will improve biomass estimation in the long term. It is expected that a final report for this project will be available by the end of 2005.

Overall, given the range of fishery dependent and independent data gathered by DPIWE and the mechanisms for regularly reviewing the data requirements, DEH considers that there is a reliable information collection system in place appropriate to the scale of the fishery. Continuation of existing data collections and research programs, combined with some extension and refinement of such activities will be important for the future management of the fishery.

Assessment and Management Response

The submission reports that there is no comprehensive estimate of potential productivity of scallop stocks for all areas of the fishery because the patchy distribution of scallops makes it difficult to apply standard biomass estimation techniques with confidence. DPIWE also considers it unlikely that recruitment indicators will be developed for the fishery in the foreseeable future, and report that it is not feasible or cost effective to have a formal and comprehensive stock assessment of scallops covering the geographic distribution of scallops in all Tasmanian waters.

DEH notes that within the TSF an annual review of the fishery, using all available stock information, is undertaken to develop a "fishery harvesting and survey plan". This process ranks areas based on the degree of knowledge, suitability or otherwise for harvesting and survey needs. Such information is also used to determine whether an adjustment to the TACC is necessary. Using past catch history, anecdotal information and the results of exploratory surveys, DPIWE addresses criteria including density of scallops, extent of beds and population structure of the beds to rank areas to be opened to fishing activity. The main performance measure that DPIWE uses in ranking these areas is based on population structure, where an area with more than 20% undersize (less than 90mm) scallops is not considered for opening and will instead be monitored.

Doughboy and queen scallops are the only byproduct allowed to be retained during commercial scallop fishing. Catches of these species are low compared to commercial scallops. Doughboy scallops, however, can be found in relatively significant numbers in some scallop beds. DPIWE states that its risk assessment process evaluated a moderate risk of impacting on doughboy scallops. The identified risk is a result of the TACC being based on the take of commercial scallops and external forces having the ability to shift catch towards doughboy scallops (which can be taken as part of the licence holder's quota allocation). DPIWE recognises that an appropriate management measure is needed to monitor the take of doughboys. In contrast, DPIWE notes that queen scallops,

due to the location of the commercial fishery, are rarely encountered and that this is likely to continue to be the case under the spatial management system which focuses on commercial scallop beds. DEH recognises that the level of take of byproduct is currently low and that the risk to theses species is also likely to be low. However, as stated in the 'Information Requirements' section, DEH considers that logbooks should be enhanced to include reporting of scallop catch by species as such data could be used to assess the performance of the fishery against the performance measures and indicators that are to be developed for byproduct species under **Recommendation 2**.

Potential removals of scallops from Tasmanian waters include direct harvest in the TSF, and recreational and indigenous harvest. The commercial fishery operates under an ITQ (unit-based) system, the sum of which provides the annual TACC. Fishers are required to record all scallops caught and retained, which are then decremented against their unit holdings. Logbook data is validated against processor returns. Thus, DPIWE has good records of removals in the commercial fishery, which can be taken into account when monitoring target species catch levels. The recreational and Indigenous harvests are known to be small and discards from these sectors are likely to be minimal due to the hand collection (dive) nature of the fishery. Undersized scallops (less than 90mm shell width) may occur in small numbers in beds that are opened to the commercial fishery and, while the number of discarded undersize scallops is likely to be low, mortality is likely to be relatively high given the damage caused by dredging operations. However, it is reported that fishers tend to voluntarily avoid areas found to contain undersized scallops as it is not in their commercial interests to continue fishing these locations. The vessel monitoring system is likely to assist in monitoring the voluntary avoidance of these areas and compliance with legislative closures. These measures reduce the likelihood of the scallop fishing activities adversely affecting undersize scallops. There is also likely to be direct harvest and mortality from damage caused by trawling operations, although this has not been quantified.

The TSF management regime aims to maintain ecologically viable stock levels through a range of input and output controls. These measures are outlined in Table 1 and Part I of this report. DEH considers that the combination of the input controls should ensure adequate protection of the target stocks, but notes that this is contingent upon the TACC being set at a sustainable level. It is clear that initial TACCs set for the TSF were set too high and that this contributed to the decline in the overall stock. However, DEH notes that the TACC for the TSF has been successively reduced via reduction in the unit value (from equivalent to 950 kg prior to 2000 to 350 kg per unit in 2005). The management regime clearly has the ability to further adjust the TACC (via unit value adjustments) and recent history indicates that when warranted, these adjustments will be made. DEH is confident that DPIWE's willingness to respond to threats to the target species stock will ensure that the fishery continues to harvest an environmentally sustainable proportion of the scallop stock in the future.

DEH has some concern that the overall fishing mortality across the range of commercial scallop fisheries operating in southeast Australia may have the potential to seriously undermine the effectiveness of DPIWE's management strategies. DPIWE states that the spatial management strategy utilised in the TSF is particularly effective for taking into account the distribution and spatial structure of the stocks. DEH recognises that the spatial management regime utilised in the TSF is relatively precautionary and conducted on a fine spatial scale (individual scallop beds). However, DEH is concerned that, in determining whether particular scallop beds should be opened to fishing activity, DPIWE does not appear to consider the impacts of harvesting particular scallop beds on the scallop population as a whole. DEH considers that DPIWE should look more holistically at scallop populations when deciding whether or not to open particular scallop beds. This is particularly important given that it has been shown that spawning and recruitment of scallop populations is somewhat density dependent, and dependent upon the proximity of other scallop

beds. While a TACC, which limits total catch, is set for the entire fishery, DPIWE does not appear to consider the amount of scallop that can be sustainably harvested from each scallop bed, or the amount that can be harvested whilst ensuring adequate density remains for spawning and recruitment in the fished and nearby scallop beds. In addition, damage to scallops is known to increase as boats continue to fish the same grounds and DEH considers that DPIWE should also consider the frequency with which a particular scallop bed has been fished and likely impacts to scallop condition.

DPIWE have advised DEH that it intends to consider the outcomes of the FRDC project "Juvenile Scallop Trashing Rates and Bed Dynamics: Testing the Management Rules for Scallops in Bass Strait", when the final report is released. This project is considered likely to provide advice on the effectiveness of the spatial management regime, and make recommendations to improve the management arrangements.

Recommendation 6: *DPIWE to review the harvesting strategy employed in the TSF to ensure that it is adequately precautionary. DPIWE should consider the available scientific information regarding maintaining spatially distributed scallop beds and the impacts of fishing of the southeast Australian scallop stock. Notably, DPIWE should consider the recommendations of the FRDC project titled "Juvenile Scallop Trashing Rates and Bed Dynamics: Testing the Management Rules for Scallops in Bass Strait". DPIWE to also take into account the cumulative impacts of fishing on the entire scallop stock targeted in southeast Australia as relevant information becomes available.*

DPIWE states that the high variability of scallop stocks makes it difficult to establish meaningful performance measures and trigger points and that, currently, the criteria used to determine many factors in the fishery are subjective. DEH considers that, although the establishment of meaningful performance measures and trigger points for the fishery may be difficult, their formal inclusion in management arrangements is necessary to maximise the likelihood of the continued sustainability of the fishery. The Tasmanian Scallop Fishery Policy Document – June 2000 contains formal decision making criteria for the fishery, although these mainly relate to criteria used for determining whether to open the season, or a particular scallop bed. These criteria apply to the discard rate where an area must not have greater than 20 percent of undersized scallops to be considered for opening for commercial fishing.

DEH notes that DPIWE has made a commitment to incorporate appropriate performance indicators relating to the sustainability of the resource, decision-making criteria and new trigger points into the new strategic policy document to be released in 2006. DEH has recommended that, as part of the review of the Tasmanian Scallop Fishery Policy Document – June 2000, DPIWE develop performance indicators and measures for target species to ensure that the objectives for management of the fishery can be met, performance of the fishery can be measured and management action taken as required (**Recommendation 2**). DEH has also recommended that DPIWE monitor the status of the fishery in relation to these performance measures and, in the event that a trigger point is breached, respond appropriately in a timely manner (**Recommendation 3**). While recognising the current low take of byproduct species, DEH has also recommended that a precautionary harvesting objective be developed for byproduct species, along with associated performance measures and indicators.

Conclusion

DEH considers that the management regime in the TSF has greatly improved in recent years and is now precautionary to the extent that it provides for the fishery to be conducted in a manner that does not lead to overfishing. DEH considers that the information collection system and stock assessment and management arrangements generally are sufficient to ensure that the fishery is

conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

DEH considers that there is scope to further refine some of the existing information collection, assessment and management responses and has provided a recommendation for improvements in the longer term.

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'*

It is generally accepted that Bass Strait scallop stocks were overfished in the past. There are now signs of recovery of scallop stocks in the TSF and DEH considers that, overall, stocks are in a period of recovery. While it appears that the TACC was historically set too high, and pressure on the stocks may have been exacerbated by dredging operations in areas with significant numbers of undersized scallops, DPIWE has been able to aid the recovery through past fishery closures, reductions in unit values (and as a consequence the TACC) and the move to the spatial management system which does not allow access to scallop beds with more than 20% undersized scallops (based on survey results).

DEH believes it is crucial that management continues to focus on the recovery of the scallop stock to ecologically viable levels. A major aspect of this recovery is the protection of sufficient parental biomass of commercial scallops within the fishery to avoid recruitment failure. The retention of sufficient parental biomass in scallop beds adjacent to beds that are still depleted from historical overfishing should be inherent in DPIWE's decision-making process for the opening of areas to commercial fishing. DEH has recommended that DPIWE consider such biological requirements and past fishing effort on particular areas when reviewing the harvesting strategy employed in the fishery (**Recommendation 6**).

DPIWE acknowledges that the application of the current management strategies is not yet proven and total fishery closures will be considered if necessary. DEH is confident that, through DPIWE's responsible approach to management of the fishery and the implementation of the recommendations made in this report, the scallop populations within its jurisdiction can be recovered to ecologically viable stock levels and these levels can be maintained through precautionary management measures.

Conclusion

The recognition that commercial scallops were historically overfished is being addressed through the current and proposed management arrangements for the fishery. DEH considers that there is a high probability that the stocks will recover if DPIWE continues to implement and further refine its spatial management strategy in line with its commitments and the recommendations in this assessment.

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

Operators are required to record information on bycatch in the compulsory logbooks. DPIWE notes that, due to the complexities of identification, these industry records serve to monitor bycatch of large taxonomic groups only. However, in some cases specific information may be sought, such as for monitoring the distribution and bycatch of introduced pests. Scallop vessels have been issued 'Introduced Pest Kit' packages detailing the identity of introduced species. This is particularly applicable to the introduced screw shell which may be found in large numbers in some areas, and is one of the main species taken as bycatch in the TSF.

More detailed bycatch information for the TSF is available from scientific surveys and from industry based surveys with an observer on board. Information from these surveys is likely to overestimate the amount of bycatch taken in the fishery since the aim of the surveys is to locate and define the area of commercially viable scallop beds and they are conducted with a dredge liner to retain smaller scallops for population structure analysis.

Further information on bycatch will become available from the FRDC project "Juvenile Scallop Tashing Rates and Bed Dynamics: Testing the Management Rules for Scallops in Bass Strait". An objective of this project is to determine the major bycatch species taken with commercial scallop dredging gear in Bass Strait. It is expected that a final report will be available by the end of 2005.

Assessment

Bycatch in the TSF is considered to be at low risk, although a formal risk assessment has not been conducted for the fishery. The nature of dredges and their operation means that many species, such as those that occur in the water column or those that are able to avoid the relatively slow moving dredge, will not be taken as bycatch during fishing operations. Other species, such as molluscs and other sedentary species, are clearly at greater risk.

Bycatch composition can vary considerably depending on the area fished. However, scientific surveys conducted within Tasmanian and Commonwealth waters since 2001 have demonstrated that the most abundant species taken as bycatch are:

- the introduced screw shell (*Maoricolpus roseus*);
- diogenid hermit crabs (*Paguristes tuberculatus*);
- dog cockles (*Glycymeris* sp.); and
- native oysters (*Ostrea angas*).

DEH notes that bycatch abundance can depend on the density of scallop beds, with bycatch from densely populated scallop beds being relatively low compared to more sparse beds. DEH considers that the pre-season surveys undertaken by TAFI to determine which beds to open would be likely to identify the most densely populated beds, as these would provide more commercially viable fishing grounds. However, even if a less densely populated area was opened, the species that have been

identified as comprising the main portion of bycatch would be unlikely to be at significant risk from the TSF.

DEH notes that further information on bycatch in the TSF is likely to arise from the FRDC project "Juvenile Scallop Tashing Rates and Bed Dynamics: Testing the Management Rules for Scallops in Bass Strait". DPIWE have advised that they will review and consider the results of this project when the final report is released in late 2005. DEH expects that DPIWE will respond to any new information regarding bycatch appropriately.

Management response

The current management arrangements for the TSF prohibit the take of species other than scallops. This provides a major disincentive for commercial operators to target and/or retain species other than scallops.

While no specific group of indicator species has been identified or is being monitored, a number of management measures utilised in the TSF specifically reduce the impacts to bycatch species. For example, the dredge gear used has specified mesh sizes and spacing of 'teeth' to allow the exit of small species, only relatively small and discrete areas are open to fishing effort and fishing effort is rotational. In addition, individual dredge runs only last around 15 minutes and it is industry practice to return any bycatch to the immediate vicinity of where they were taken. This is likely to reduce the mortality rate of any bycatch that is taken.

The spatial management system, by only opening relatively small areas to commercial fishing, and by focussing effort on areas of relatively high abundances of mature scallops, also has the effect of limiting the bycatch taken in the fishery. As the scallop beds are further defined and effort limited to these areas the amount of bycatch taken in the fishery should be further reduced.

Conclusion

DEH considers that there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that DPIWE would undertake appropriate actions to ensure that bycatch species are not threatened by this fishery.

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

No information is currently collected specifically regarding interaction with protected species. However, detailed bycatch information has been recorded for the vast majority of tows from scientific and industry based surveys with an observer on board, and this has provided some data on protected species interactions.

To address this information gap, DPIWE intends to incorporate a "Protected Species Interaction Monthly Record" into the scallop logbook prior to the 2006 season. DEH considers that such a requirement would be appropriate and that it is important for information collected on protected species interactions to be accurate and validated. DEH therefore considers that the TSF may benefit from an education program that enables accurate reporting, promotes appropriate handling techniques and highlights the importance of minimising interactions with protected species.

Recommendation 7: *To support the implementation of the Protected Species Interaction Monthly Record DPIWE, within 12 months, to develop and implement an education program for fishers to promote the importance of protected species protection and accurate incident reporting.*

Assessment

Protected species occurring in the area of the TSF include seals, sharks, cetaceans, seabirds and syngnathids. Interactions with cetaceans, seals, seabirds and shark species are likely to be minimal given the slow movement of dredge gear, which provides an opportunity for protected species to escape capture. Any impacts would likely relate to general shipping activities (eg presence of vessel causing animals to veer from previous course, collisions with vessel, effects of lighting on seabirds). The impacts on these species should be better quantified with the introduction of the Protected Species Interaction Monthly Record, supported by the education program (**Recommendation 7**).

Syngnathids are considered to be at greater risk of capture, although this risk is also low given that scientific surveys conducted between 2001 and 2005 recorded only one interaction with a syngnathid. DPIWE also considers the risk to be low due to the localised nature of the fishery in comparison to the relatively large distribution of syngnathid species. DEH notes that syngnathids have been taken in dredges during surveys in Bass Strait and that these species are more likely to be taken during surveys searching for scallop beds than during commercial fishing operations. This will increasingly be the case until the commercial scallop beds are better defined.

No threatened ecological communities have been identified in the area of the fishery and therefore no assessments are being performed.

While DEH considers interactions with protected species in this fishery to be minimal, should this situation change, or a risk assessment process indicate otherwise, DEH expects that appropriate actions will be undertaken to ensure the fishery avoids mortality or injury to these species and avoids or minimises impacts on threatened ecological communities.

Recommendation 8: *Should new information determine that the fishery is having significant interactions with any endangered, threatened or protected species, DPIWE to develop appropriate*

measures to mitigate those interactions. Measures should be implemented within 12 months of the information becoming available.

Management response

No management measures have been introduced into the fishery specifically to minimise impacts with protected species, given that the risk to this group is low. However, the nature of the current management arrangements ensures that impacts are minimised. In particular, the spatial management regime confines fishing effort to discrete areas, which in turn is likely to minimise interactions. Ongoing monitoring of protected species interactions will occur from the 2006 season with the requirement to record interactions in the scallop logbook. DEH has recommended that this recording system be supported by an education program to ensure that reports are accurate (**Recommendation 7**).

DPIWE states that, should the ongoing monitoring and assessments identify significant risks associated with particular areas or species, then appropriate mitigation measures will be considered at that time. In this event, DEH has recommended that such mitigation measures be implemented within 12 months (**Recommendation** 8). DEH has also recommended that an objective and associated performance measures and indicators be developed for protected species interactions (**Recommendation 2**).

Conclusion

DEH notes that interactions with protected species in this fishery are currently minimal and considers that 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. Should this situation change, or a risk assessment process indicate otherwise, DEH expects that appropriate actions will be undertaken to ensure the fishery avoids mortality or injury to these species and avoids or minimises impacts on threatened ecological communities.

Recommendations have been developed to ensure that the risk of unacceptable impact on protected species is minimised in the longer term.

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

Limited fishery dependent information is collected on ecosystem impacts, although the fishery is encouraged to engage in surveys of broader waters that are not open to fishing. While the primary aim of these surveys is to identify potential open areas for the commercial fishery, they also assist in collecting information about habitat types and help identify areas that should be avoided such as sensitive habitats and juvenile scallop beds.

Several projects currently being undertaken by TAFI will also contribute information on ecosystem impacts specific to the fishery. The FRDC project "Juvenile Scallop Trashing Rates and Bed Dynamics: Testing the Management Rules for Scallops in Bass Strait", is studying the bed dynamics and impact of fishing on scallop beds and aims to determine the impact of fishing on

different size classes of scallops, the major bycatch species taken with commercial scallop dredging gear and the effects of scallop dredging on benthic fauna. Although the majority of commercial fishing tends to occur on sandy habitat in high water flow environments, information from a habitat mapping project being conducted by TAFI will assist in identifying specific sensitive areas, such as extensive seagrass or sponge communities.

DEH notes the relative lack of information collection and research covering the fisheries impact on the ecosystem and environment generally. However, DEH understands that this lack of information is the case across a range of Australian and international fisheries and, until appropriate research techniques and programs are developed and implemented, this will continue to be the case. DEH strongly supports research in this area.

Assessment

DPIWE conducted an ecological risk assessment of the TSF is 2003. Participants included DPIWE staff, researchers from TAFI, several scallop industry representatives and the community and conservation representative from the ScFAC. The workshop analysed risks based on the standard process for determining the "Consequence" and "Likelihood" of risks.

The risk assessment found that there is a moderate risk from the fishery on benthic biota in the sand dynamic area of the fishery, with a low risk in the inshore sheltered, non-sand habitats (including seagrass) and fragmented reef areas. The risk to sandy areas is clearly from the dredge itself which digs into bottom sediment and disturbs the benthic ecosystem. The low risk to other habitat areas such as inshore sheltered areas, seagrass habitats and fragmented reef areas is a result of the spatial management regime which targets fishing effort to the most commercially viable scallop beds (these are usually located on sandy habitats, which are the preferred habitat for scallops).

Impacts of the fishery on trophic levels and prey species are considered to be low. Scallops are unlikely to comprise the sole food source of any prey species, particularly since scallop populations fluctuate widely, even in unfished populations. Due to this variability species that prey on scallops would need to be highly adaptable and thus the harvest of scallops from a small number of beds under the spatial management system is unlikely to have a significant impact on these species. Scallops are filter feeders and therefore are at the lower end of the food chain.

Potential exists for fishing activities to facilitate the spread of marine pests. The introduced New Zealand screw shell (*Maoricolpus roseus*) is found in large quantities during surveys within the area of the TSF. However, areas where large quantities are observed are not opened for fishing under the spatial management regime. In addition, catches from surveys and bycatch from fishing operations are sorted in the immediate vicinity of the dredging and returned to the same location. These practices are likely to minimise the risk of the TSF contributing to the spread of marine pests.

Impacts to water quality are also likely to be low. Dredging for scallops tends to occur in open-ocean high energy sandy substrates and the TSF is unlikely to cause significant further impacts to water quality. MARPOL applies to all fisheries and compliance is generally achieved through industry education programs and codes of conduct. DPIWE states that it intends to work in conjunction with industry to develop codes of practice which encourage scallop fishers to consider potential impacts on the general ecosystem and employ methods of fishing that minimise fishing impacts. In this regard DPIWE is supporting the new natural resource management fishing industry extension officer to develop codes of practice for particular Tasmanian fisheries, including the scallop fishery. DEH suggests that the code of conduct should include initiatives to facilitate compliance with MARPOL.

DEH recognises the relatively precautionary nature of the TSF but considers that there is scope for DPIWE to take more account of the impacts of the fishery on the wider ecosystem in which it operates. This is particularly important given that the scallop stocks targeted in the fishery are still recovering after being overfished historically, and the risk assessment conducted by DPIWE has identified the fishery as having a moderate risk on the benthic biota. DEH notes that the Australian Fisheries Management Authority has commissioned the Commonwealth Scientific and Industrial Research Organisation to conduct an ecological risk assessment for the BSCZ Scallop Fishery, which is adjacent to the TSF. While the results of this assessment are not yet available, it is possible that it may raise issues relevant to the TSF, given that both fisheries target the same stock and are likely to have similar ecosystem impacts. DEH considers that DPIWE should take into account the results from this, or other, ecological risk assessments, once available, and implement management responses where necessary. DEH notes that the implementation of a precautionary spatial management regime would be a key component of the revised precautionary harvesting approach recommended under **Recommendation 7**.

Recommendation 9: *DPIWE to review the current management regime within the TSF to ensure that it takes account of ecosystem impacts, in particular:*

- *high risk impacts of fishing identified through ecological risk assessments relevant to the fishery;*
- *important juvenile/spawning/refuge grounds identified for byproduct and protected species; and*
- *the impacts of fishing on benthic habitats.*

During the review DPIWE is to liaise with the Victorian Department of Primary Industries and the Australian Fisheries Management Authority and consider information relating to the risk assessment of their respective fisheries.

Management response

DPIWE uses a range of management measures to minimise impacts on the ecosystem from the TSF. These include; closing all areas to scallop fishing until surveys indicate particular areas contain commercially viable scallop populations, monitoring compliance with fishery closures by requiring all vessels with commercial dredges to have a functioning vessel monitoring system, limiting the number of fishers able to participate by restricting the number of commercial licences issued, limiting the total width of each dredge and the length of the teeth on the tooth bar, excluding highly sensitive areas from survey areas (and therefore from potential opening) and using area closures to extend no fishing buffer zones around marine protected areas where appropriate. While some of these measures were not introduced for the purpose of reducing impacts to the ecosystem, they still achieve this purpose.

To further reduce any impacts to the ecosystem in which the TSF operates DPIWE has, in its response to public comments, committed to implementing a policy directive that ensures that habitat mapping information is considered when defining boundaries to open areas to ensure highly sensitive areas are not impacted by dredge fishing. DEH notes that the current habitat maps are generally restricted to inshore areas and that there is more work to be done to define sensitive areas in deeper waters where the commercial fishery operates. In this respect, information gathered from the industry-chartered surveys should be fed into the habitat mapping information and used in the consideration of open areas. Where areas are identified as being highly sensitive to dredge fishing, such as extensive seagrass beds and sponge communities, DEH considers that they should be clearly identified and permanently closed to dredge fishing.

DPIWE states that appropriate management measures to address any environmental or ecosystem issues will be considered when they are identified. In addition to the current spatial management arrangements, DPIWE states that it is prepared to exclude access to dredge methods by legislation, policy or voluntary means. DEH considers the development of an objective and associated performance measures and indicators for ecosystem impacts (**Recommendation 2**) will enable DPIWE to monitor the performance of the fishery and its impact on the ecosystem and respond in a timely manner.

The Marine Division of DEH is currently leading a bioregional marine planning process in the area of the fishery. The planning process, as specified in the South East Regional Marine Plan, aims to ensure the ecologically sustainable use of the resources in the planning area and will help to integrate management across jurisdictions and sectors. The Marine Division is also in the process of identifying potential candidate areas for the National Representative System of Marine Protected Areas as part of the bioregional planning process. The bioregional planning process is a potential vehicle for pursuing sustainable fisheries objectives, particularly where cross sectoral or cross jurisdictional approaches are required. DPIWE should continue to engage in the process as far as practical. More information is available at www.oceans.gov.au.

Conclusion

DEH considers that the fishery is conducted in a sufficiently precautionary manner to minimise the impact of fishing operations on the ecosystem generally. Recommendations have been developed to ensure that the risk of significant impact by the fishery on the marine environment generally is minimised in the longer term.

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LIST OF ACRONYMS

BRS	Bureau of Rural Sciences
BSCZ	Bass Strait Central Zone
DEH	Department of the Environment and Heritage
DPIWE	Department of Primary Industries, Water and Environment
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FRDC	Fisheries Research and Development Corporation
ITQ	Individual Transferable Quota
MARPOL	International Convention for the Prevention of Pollution from Ships
OCS	Offshore Constitutional Settlement
ScFAC	Scallop Fishery Advisory Committee
TACC	Total Allowable Commercial Catch
TAFI	Tasmanian Aquaculture and Fisheries Institute
TSF	Tasmanian Scallop Fishery