MSC Notice of Objection

This form should be completed in accordance with the MSC Objections Procedure. This form may be completed and emailed to the certification body and the MSC.

PART ONE: IDENTIFICATION DETAILS

<table>
<thead>
<tr>
<th>Fishery assessment to which this objection applies</th>
<th>The Aker Biomarine Krill Fishery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of certification body</td>
<td>Moody Marine</td>
</tr>
</tbody>
</table>

Contact details for objecting party

<table>
<thead>
<tr>
<th>Organisation(s)</th>
<th>Antarctic and Southern Ocean Coalition (ASOC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact person</td>
<td>James Barnes</td>
</tr>
<tr>
<td>Address</td>
<td>1630 Connecticut Ave. NW, 3rd Floor Washington, DC 20009 USA</td>
</tr>
<tr>
<td>Phone Number (including country code)</td>
<td>1-202-234-2480</td>
</tr>
<tr>
<td>Fax Number (including country code)</td>
<td>1-202-387-4823</td>
</tr>
<tr>
<td>Email address</td>
<td><a href="mailto:Jimbo0628@mac.com">Jimbo0628@mac.com</a></td>
</tr>
</tbody>
</table>

The following objection is being lodged on behalf of the above named organisation. I am authorised to make this submission on the above named organisation's behalf.

Name: James Barnes

Position: Executive Director

Signed: [Signature]

Dated: [December 4, 2009]

Note: this objection is submitted by the Antarctic and Southern Ocean Coalition, which gathers NGOs all around the world with an interest in the preservation of Antarctica. This submission reflects the concerns of a number of ASOC member organizations in relation to Moody's Marine assessment of Aker Biomarine Antarctic krill fishery, such as the Antarctic Krill Conservation Project, Greenpeace and Oceana, among others. Consequently in many sections of this document, specific concerns expressed earlier in the process by certain ASOC members are highlighted.
**PART TWO: OBJECTING PARTY’S CREDENTIALS**

| Please outline your prior involvement with this assessment | Subject fishery - 4.4.1 (a) |  
|  | Written submissions - 4.4.1 (b) | X  
|  | Meetings attended - 4.4.1 (b) |  
|  | Participation prevented/impaired - 4.4.1(c) | X  

If you are objecting on the basis that you were a party to the assessment process that made written submissions to the certification body during the fishery assessment process or attended stakeholder meetings (as per Paragraph 4.4.1 (b) of the objections procedure) or that the failure of the certification body to follow procedures prevented or substantially impaired your participation in the fishery assessment process (as per Paragraph 4.4.1(c) of the objections procedure), then please provide evidence and/or outline details to support this classification.

Other key ASOC members - who are key stakeholders in the debate over krill and this assessment - were precluded from involvement in the outreach process as only one stakeholder meeting was scheduled and it was in London. Many of the groups that have been involved through written comments are based in the US and were unable to travel to London for that meeting.

| Please state your interest in the fishery and its certification | The Aker Biomarine pelagic trawl krill fishing fleet, (subject of the assessment), is a major participant in the Antarctic krill fishery in Area 48 in the Southern Ocean waters around the Antarctic Peninsula and South Georgia, under CCAMLR management rules. ASOC and its partner the Pew Antarctic Krill Conservation Project have been advocating for management reforms in the fishery and have concerns about the Aker Biomarine krill fleet’s role in that fishery. |
### PART THREE: CATEGORISATION OF OBJECTIONS

You must complete one or more of Parts Three to Five in accordance with your answers to the following questions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>If YES, complete Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you objecting on the basis that there was a serious procedural or other irregularity in the fishery assessment process that made a material difference to the fairness of the assessment, as per Paragraph 4.8.2 (a) of the objections procedure?</td>
<td>Yes</td>
<td>No</td>
<td>4</td>
</tr>
<tr>
<td>Are you objecting on the basis that the score given by the certification body in relation to one or more performance indicators cannot be justified, and the effect of the score in relation to one or more of the particular performance indicators in question was material to the outcome of the Determination, as per Paragraph 4.8.2 (b) of the objections procedure?</td>
<td>Yes</td>
<td>No</td>
<td>5</td>
</tr>
<tr>
<td>Are you objecting on the basis that additional information not forming part of the record(^1) that is relevant to the circumstances at the date of the Determination has not been considered, as per Paragraph 4.8.2 (c) of the objections procedure?</td>
<td>Yes</td>
<td>No</td>
<td>6</td>
</tr>
</tbody>
</table>

\(^1\) As defined in Paragraph 4.7.5 (a) of the objections procedure.
PART FOUR: OBJECTION PURSUANT TO PARAGRAPH 4.8.2 (A)

4.1 Please identify:

a) the procedure(s) that you or your organisation believe were omitted or incorrectly followed by the certification body in the conduct of this assessment and the relationship of these matters to the MSC’s procedural rules, as set out in the MSC Fisheries Certification Methodology, Fishery Assessment Methodology, TAB Directives or any other rules that were in force at the time of the assessment; and/or

THE FOLLOWING IS A LIST OF DIFFERENT PROCEDURES AND/OR ELEMENTS THAT WERE INCORRECTLY ANALYSED/INTERPRETED BY THE ASSESSMENT TEAM:

Misapplication of MSC guidelines in relation to the “unit of certification”

As stated by ASOC member, Antarctic Krill Conservation Project (AKCP), in comments on the draft report, ASOC considers that the decision to assess and consider certification of krill fishing operations by Aker Biomarine, only one of dozens of operators in the krill fishery, reveals a significant problem with MSC Principles and Criteria. The sustainability of a fishery must be considered in the context of all operators involved if the MSC label is to have any credibility. This is particularly evident in the case of observer coverage, because only with accurate and extensive reports from all operators will CCAMLR have the information it needs to make effective management decisions.

The AKCP also highlighted that, in this assessment the concept of “unit of certification” is used in a way which is inconsistent with the MSC guidelines for certifiers. These guidelines specify that the unit of certification is “the fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel (s) pursuing the fish of that stock).” Although the Saga Sea operates under the pumping system, CCAMLR has not considered these operations as a different fishery since mid-water trawls are used as by the rest of the fleet. In addition, clearly the stock targeted is the same by all krill vessels operating in Area 48.

Therefore, there is no doubt that the unit of certification – again, according to the MSC guidelines for certifiers, refers to the whole Antarctic krill fishery operating in Area 48. The concept cannot be applied to one single vessel, or a group of vessels operated by a single company, as suggested by the assessment team. This is especially concerning since during the assessment Moody Marine applies the concept of “fishery” or “unit of certification” inconsistently, in an attempt to make the best fit of the Performance Indicators (PIs) under discussion. For example, in some PIs, this incorrect application of the unit of certification is used to justify a score granted to the Saga Sea independently, despite the fact that it was clear that the score could not be applied to the whole fishery due to existing flaws in the management system.

Moody Marine’s response to these comments in the final report is unsatisfactory. According to this response, the MSC methodology assesses the whole stock under Principle 1 and then limits its focus to the unit of certification for Principles 2 and, in part, 3. It is the view of ASOC that the issue of retained species (PIs 2.1.1, 2.1.2 and 2.1.3) cannot be considered with respect to the operations of Aker Biomarine only. This is because the bycatch rates of fish larvae by the Saga Sea have an accumulative impact with respect
to those produced by other vessels. It is conceptually impossible to differentiate the impact of a single vessel or a group of vessels on retained non-target species populations from the impact of the rest of the fleet operating in the same area, unless it can be shown that these vessel(s)’ bycatch rates are equal to zero (which is not the case).

**Misinterpretation of statements provided by stakeholders**

For example, in the introductory text extracted from 6. Ecosystem Characteristics – 6.4: Ecosystem Impacts (page 48) of the Draft Report, the following has been stated by Moody Marine:

> As noted by Leape et al. (2009), Option 1, which assumes the current distribution of catches continues at the higher level, resulted in impacts on the predator population in earlier ecosystem simulation runs, and was hence abandoned for further analysis. This represents an implicit acknowledgement that action on SSMU specific quotas must occur once the precautionary trigger level is reached. While the current certification has taken the position that the fishery can be considered for certification up to the trigger level, it is clear that an agreed approach to devising SSMU-level quotas is needed before moving beyond that point.

The statement above misinterprets the ideas presented by the AKCP with regards to their initial submission to this certification process. While the AKCP recognized that action at the SSMU level must occur, it did not categorize that action only as necessary when the fishery reaches the trigger level. In fact, its submission stated that “recent CCAMLR work indicates that the current catch limit (in reference to the trigger level) is not as precautionary as previously assumed” and that “delaying SSMU allocation would in fact result in an Option 1 scenario, which is estimated to have greater significant risks to the ecosystem than any of the other management options”. Thus there was no “implicit acknowledgement” in that paper that “action on SSMU specific quotas must occur once the precautionary trigger level is reached”.

**Lack of appropriate referencing throughout the report**

As submitted in the AKCP’s comments to the draft report, Moody Marine’s approach to the presentation of information and its rationale for scoring is at times confusing and at others completely insufficient. A reader’s comprehension of the scoring comments, necessary to follow Moody Marine’s reasoning behind the scores given for each indicator, is hindered by the fact that the discussion and references for each PI are grouped separately, making it nearly impossible to check Moody’s assertions against its citations. We challenge the adjudicator to attempt that exercise. As highlighted in the comments, this is especially troubling given the many instances where the assessment team makes general reference to studies, projects or data which are not commonly quoted in CCAMLR meetings.

Moody Marine’s response to this issue that “the discussion for this rationale is grouped under headings taken from the SG Guidelines table for each Performance Indicator to provide the reader with a clearer understanding of how each score was derived” simple does not address the concern that was expressed.

**Lack of appropriate information to sustain the assessment, incorrect argumentation**

As highlighted throughout the AKCP’s comments to the draft report, the draft assessment includes numerous incorrect statements about the management of the Antarctic krill fishery. These statements are used to support inappropriately high scores for several PIs, and no objective evidence or adequate
referencing is provided to sustain them. From reading Moody Marine’s final report, ASOC has the impression that the information-gathering effort was not sufficient to sustain a solid assessment of the issues at stake. There are many incorrect and partial statements throughout the report, particularly in relation to the challenges faced by the management regime. In this context, it is worth echoing a comment made by one of the peer reviewers of Moody Marine’s draft report: “there is very little evidence of meetings or interactions with experts involved in the management of the krill fishery through CCAMLR or of those who have an intimate knowledge of krill biology and ecology. This lack of direct input is reflected in some areas of the report where somewhat naïve statements are made.2

Some examples of these incorrect statements are provided here:

- “Stock, catches and predator populations are being monitored” (in relation to PI 1.2.1).
- “Sufficient information exists in relation to the stock structure to support the harvest strategy” (in relation to PI 1.2.3).
- “Catch composition, potentially providing information on selectivity and stock structure, is monitored through the observer coverage. These data are not currently used in the harvest strategy, partly because of the low level of exploitation” (in relation to PI 1.2.3).
- “Part of the monitoring procedure includes CEMP, which estimates the abundance of the predator populations” (in relation to PI 1.2.3).
- “Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule” (in relation to PI 1.2.3).
- “Measures are in place within the fishery as a result of the currently low catch level of krill (well below the precautionary trigger level), and the restriction of fishing around CEMP management sites, which will provide some localised protection” (in relation to PI 2.1.1).
- (In relation to by catch of fish larvae): “there is sufficient information to develop estimates of outcome status with respect to adult biologically based limits” (in relation to PI 2.1.3).
- “Simulation results suggest the strategy is likely to work based on current information” (in relation to PI 2.5.2).
- (In relation to CEMP): “there are key sites in each of the CCAMLR sub-areas of 48, which have high and consistent time series, being Bird Island, Signy Island, and Admiralty Bay, which provide a basis to monitor the impact of fishing of all types on predators and their breeding success” (in relation to PI 2.5.3).
- “Procedures are being developed to take account of both environmental variation and harvesting effects in the formulation of conservation measures governing commercial harvesting in the Convention Area” (in relation to PI 2.5.3).
- “The information available from the different sources, which provide Area 48 scale and smaller-scale catch data, predator numbers and trends, ecosystem interactions, and the potential impact of fishing on krill on the ecosystem, is sufficient to support the development of the strategies detailed above, in order to manage ecosystem impacts and detect any increase in risk level” (in relation to PI 2.5.3).

2 See Moody Marine’s Final Report, page 130.
Inadequate response to Peer Reviewer Comments

As highlighted in AKCP’s comments to the draft report, the certifier’s response to the numerous concerns of one of the peer reviewers is both dismissive and inadequate. It is important to note that this reviewer has extensive experience with CCAMLR and has published numerous papers on Antarctic krill. In fact, we have no doubt that he was chosen to review the draft assessment for that very reason. However, despite his ongoing participation in CCAMLR meetings, and his valuable input and up-to-date information, the assessment team failed to incorporate his information or address his concerns.

Although in some cases Moody did reduce scores based on the reviewer’s concerns, those reductions did not adequately address the substance of the issues raised. For example, in one particular case (in relation to PI 2.5.2), Moody Marine claims that “the performance of the current plan, based upon the precautionary trigger level, is considered likely to work based upon prior experience, where historical catches were much greater but appeared to have minimal impacts on the ecosystem.” To this statement the reviewer responds that “as there was no systematic monitoring of the ecosystem in the early 1980s it is not possible to make this statement.” Moody Marine admits that the reviewer has a point, reducing the score to 80, but the erroneous text in the scoring comments remains. Therefore it is difficult to understand how the new score was reached.

The report contains contradictory statements

As highlighted throughout the AKCP comments, there were frequently contradictory statements provided by the assessment team, often in relation to the same PI. This fact not only undermines the technical quality of the report but it also directly affects the result of the assessment, since these statements are used to support inappropriately high scores. A couple of examples are provided here:

- “The harvest strategy remains untested”, versus “the harvest strategy has not been fully tested”. The standard applied required the following: “the harvest strategy may not have been fully tested but monitoring is in place and evidence exists that it is achieving its objectives” (in relation to PI 1.2.1).

- “In theory a single synoptic survey is adequate” (in relation to PI 1.2.3) as opposed to “assuming complete biomass surveys occur every 10 years (the next would be no sooner than 2010), it is not clear that this would be frequent enough to monitor stock status” (PI 1.2.1).

In response to the first contradictory statement identified by the AKCP, Moody Marine’s assertion that these statements need to be “read within the full context” is unsatisfactory. Moody submits that “the stock is currently only lightly exploited, so the harvest strategy remains untested”, and it further indicates that the statement that “the harvest strategy has not been fully tested, but monitoring is in place and evidence exists that it is achieving its objectives is in response to the MSC PI text within the SG80 guidelines”, and that “this allows clarity for the reader to see how the score is derived”. The conclusion of the assessment team that the way the information is presented allows a reader to understand how the score was reached is flawed; these contradictory statements are found under the same PI. As was noted by peer reviewer Dr. Steve Nicol in relation to this PI, “no real evidence exists that the strategy is effective other than the absence of an obvious stock collapse”.

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In further response to this concern by the AKCP, the assessment team notes that “the condition was prescribed because the assessment team judged the minimum SG60 to have been attained but that the SG80 had not been”. This makes the issue even more confusing since for this specific PI (1.2.1), a score of 95 was granted. Even the most insightful reviewer of this draft assessment would not be able to follow this reasoning or explanation.

**The scoring comments are not clear and often mix up different issues**

This situation, found throughout the draft report, makes it very difficult to follow the line of thought of the assessment team in reaching its conclusions.

**The MSC standards are not consistently applied through the scoring comments to the same PI**

This situation makes very difficult to follow the application of the final standards. The AKCP comments documented this concern; however, this concern was not addressed by Moody Marine in its final report.

**Lack of consideration of stakeholder’s comments**

ASOC would like to highlight the great number of detailed comments submitted in relation to the assessment of this fishery by different organizations and independent marine scientists. The very specific concerns raised by these stakeholders in relation to the different PIs were largely ignored by the assessment team. Although the information and comments submitted are sometimes formally acknowledged by Moody Marine in its responses to the stakeholders’ comments, they are not truly incorporated in the assessment. In fact, despite the specific and well-documented concerns raised by various stakeholders, the report, and the conclusions reached remain substantially unchanged. This is a serious procedural flaw in the assessment, especially since the reading of the different stakeholders’ comments reveal common concerns about the issues that would have to be reconsidered. This should have compelled the assessment team to review its conclusions but unfortunately it did not.

**Scoring inconsistent with comments provided**

For some PIs, the comments included as a basis for scoring do not have a logical link with the score finally granted. In these cases, the information and opinions provided throughout the scoring comments fail to support the conclusion that the fishery reaches the standard given. On the contrary, in some cases the comments lead the reader to conclude that the standard is clearly not met. However, then the certifiers include a sentence such as: “given the relatively low level of catch, the level of monitoring is adequate”, to support the scoring granted. The only conclusion that the reader can take away is that the scoring was decided independently of the information gathered and presented. Specific examples can be found in relation to PIs 1.2.1; 2.1.1 and 2.1.2.

**Certifiers must not prescribe conditions during assessment – if a minimum standard is not achieved, the PI should fail**
The assessment of PIs 2.1.1, 2.1.2 and 2.13 is particularly striking. In the case of non-target retained species it is clear that, given the available information, the minimum standard for SG 60 was not achieved. This was to some extent acknowledged by the assessment team in its final remarks in relation to PI 2.1.2:

“Based upon low catch levels dictated by the current catch trigger level (620 000t), the measure can be expected to result in relatively minimal impacts on adult fish biomass, based upon plausible argument. There is some evidence that this is likely to work due to those low catch levels. **However, there is no objective basis for this confidence without additional study.**

Given the acknowledgement by the assessment team that there is no objective basis for confidence in the current strategy, it is clear that the following required standard (SG 60) was not met: “the measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species)”. Taking into account that SG 60 is a minimum score, Moody Marine should have applied this standard by not scoring this PI (as required by the MSC criteria). The appropriate action, consistent with the MSC scoring criteria, would have been to refuse certification (based on a failure to meet the minimum standard on this PI), and not to introduce a condition.

In addition, the condition introduced by the Certifier for this PI is completely unrealistic. To assess, within two years, “the associated risks that the main retained marine fish species are beyond biologically based limits, at current and trigger levels”, is an impracticable task for Aker Biomarine alone. For this assessment to be conducted, the plan outlined in the draft assessment report is that “independent scientific observers will be employed during all krill fishing operations to assess marine larvae by catch”. It is difficult to imagine how marine larvae by-catch can be assessed unless independent scientific observers can be employed on board ALL krill fishing vessels and not only on Aker’s. Taking into account the difficulties that CCAMLR has faced over the last years to agree on a systematic scientific observer scheme on krill (at the last CCAMLR meeting the Commission agreed only on 30% observer coverage), the prospects for this plan to be put into practice are very unclear to say the least.

**Presentation of false and misleading information**

False information is presented in Moody Marine Final Report on page 39, section 6.2 (By-catch, discarding, and ETP species). The report states that, “an observer monitors the Saga Sea (the unit of certification) during all fishing activities, which is a voluntary addition to activities required by CCAMLR regulations, and funded by ASOC (the Atlantic Southern Ocean Coalition).” The certifier has incorrectly stated that ASOC is providing funds for an observer aboard the Saga Sea. Nothing could be further from the truth. ASOC does not have any financial relationship with Aker Biomarine or its vessels, nor does it fund observers on board fishing vessels. This is yet another example of the certifier’s careless references. It’s also worth noting Moody Marine’s lack of care in referring to ASOC. ASOC is the ANTARCTIC and Southern Ocean Coalition; it is NOT the ATLANTIC Southern Ocean Coalition.

b) any other irregularity in the fishery assessment process that you or your organization believe made a material difference to the fairness of the assessment.

**All of our concerns are detailed in part a) of this section**
4.2 Please state why you or your organization believes that the failure to follow procedures by the certification body has significantly affected the result of the Determination such that the Determination should be altered?

See 4.1 (a)

PART FIVE: OBJECTION PURSUANT TO PARAGRAPH 4.8.2 (B)

5.1 Listing the relevant performance indicator(s) and using the template below, please clearly identify the reason(s) you or your organisation believe that the score(s) presented within the Final Report cannot be justified, ensuring you link those reasons with the requirements of Paragraphs 4.8.2 (b) (i), 4.8.2 (b) (ii) and/or 4.8.2 (b) (iii) of the objections procedure. Please provide your rationale and/or evidence in support of a different conclusion, making particular reference to the specific scoring guideposts associated with the particular performance indicator(s) in question.

PRINCIPLE 1

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: Harvest Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PI Category: Harvest strategy - 1.2.1 There is a robust and precautionary harvest strategy in place</td>
</tr>
</tbody>
</table>

**Reason**
The degree of scientific uncertainty on critical aspects of this fishery and the low level of monitoring make it very doubtful that a robust strategy is in place. ASOC believes that the score granted in relation to this PI cannot be justified. As requested, see detailed explanation in 5.2

**Rationale**
See 5.2

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: Harvest Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PI Category: Harvest control rules and tools - 1.2.2 There are well defined and effective harvest control rules in place</td>
</tr>
</tbody>
</table>

**Reason**
Inadequate reporting rules that do not incorporate green weight data, and uncertainties in relation to the conversion factors used in reporting practices undermine the management system’s capability to effective control the fishery.

**Rationale**
See 5.2

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: Harvest Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PI Category: Information / monitoring - 1.2.3 Information/monitoring: Relevant information is collected to support the</td>
</tr>
</tbody>
</table>

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| harvest strategy. |

**Reason**
Insufficient monitoring, including but not limited to the inexistence of a systematic observer program for the krill fishery, make it clear that the minimum standard of SG 60 is not met for this PI.

**Rationale**
See 5.2

### PRINCIPLE 2

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: Retained non-target species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PI Category:</strong> Outcome/Status - 2.1.1 Status: The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.</td>
<td></td>
</tr>
</tbody>
</table>

**Reason**
The level of uncertainty in relation to bycatch of fish larvae in the krill fishery, which affects depleted species (as detailed in section 5.2), does not allow to conclude that no risk or irreversible harm exists for retained species.

**Rationale**
See 5.2

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: Retained non-target species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PI Category:</strong> Management Strategy - 2.1.2 There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.</td>
<td></td>
</tr>
</tbody>
</table>

**Reason**
There is clearly no strategy in place for retained species (bycatch of fish larvae) and therefore the minimum standard is not met in relation to this PI.

**Rationale**
See 5.2

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: Management Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PI Category:</strong> Information/monitoring 2.1.3 Information/monitoring: Information / monitoring: Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.</td>
<td></td>
</tr>
</tbody>
</table>

**Reason**
Due to the patchiness of the scientific observer program, the information is inadequate to support measures to manage the issue of
retained non-target species. Although Aker Biomarine operations are subject to scientific observation, the level of study of fish larvae bycatch is yet at such incipient state that cannot support management measures to address this problem. For this reason the minimum SG 60 standard is not met.

**Rationale** See 5.2

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: ETP species</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PI Category:</strong> Information/Monitoring - 2.3.3 <strong>Relevant information is collected to support the management of fishery impacts on ETP species, including:</strong> information for the development of the management strategy; information to assess the effectiveness of the management strategy; and information to determine the outcome status of ETP species.</td>
<td></td>
</tr>
<tr>
<td><strong>Reason</strong></td>
<td>Due to the lack of systematic data collection by CCAMLR's Ecosystem Monitoring Program, and the patchiness of the scientific observer system, this PI was scored too highly. As requested, see detailed explanation in 5.2</td>
</tr>
<tr>
<td><strong>Rationale</strong></td>
<td>See 5.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PI Category:</strong> Outcome/Status - 2.5.1 <strong>The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reason</strong></td>
<td>Risk assessment conducted in the context of CCAMLR clearly shows that there is a risk to predators if fishing continues following the current historical pattern. See more detailed comments in Section 5.2</td>
</tr>
<tr>
<td><strong>Rationale</strong></td>
<td>See 5.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Component: Ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PI Category:</strong> Management Strategy - 2.5.2 <strong>There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reason</strong></td>
<td>Recent risk assessments conducted for the krill fishery (Watters et al. 2009) clearly show that measures currently in place are not sufficient to prevent irreversible harm to several krill predator populations. For this reason, the fishery does not achieve the minimum score of SG 60 for this PI. See more detailed comments in Section 5.2</td>
</tr>
<tr>
<td><strong>Rationale</strong></td>
<td>See 5.2</td>
</tr>
</tbody>
</table>
**Performance Indicator** | **Component:** Ecosystem  
---|---
**PI Category:** Information / Monitoring - 2.5.3 There is adequate knowledge of the impacts of the fishery on the ecosystem  
**Reason** | Due to the shortfalls of CEMP and the current scientific observer program for krill, it is not possible to sustain that sufficient information is available on the impacts of the fishery on ecosystem components. Therefore, ASOC considers that this PI was scored too highly. As requested, see detailed explanation in 5.2  
**Rationale** | See 5.2

**PRINCIPLE 3**

**Performance Indicator** | **Component:** Fishery- specific management system  
---|---
**PI Category:** Decision - making processes - 3.2.2 The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.  
**Reason** | In relation to the Antarctic krill fishery, it cannot be concluded that the management system decision-making processes are effective in achieving management objectives.  
**Rationale** | See 5.2.

**Performance Indicator** | **Component:** Fishery- specific management system  
---|---
**PI Category:** Research Plan - 3.2.4 The fishery has a research plan that addresses the information needs of management  
**Reason** | As it is shown throughout our comments in section 5.2, there is no krill-fishery specific research plan addressing the information needs of management.  
**Rationale** | See 5.2

5.2 For each issue identified in question 5.1, please state why you or your organisation believes that the effect of the score in relation to one or more of the particular performance indicators in question was material to the outcome of the Determination such that the Determination should be altered?
Component: Harvest Strategy

PI Category: Harvest strategy - 1.2.1 There is a robust and precautionary harvest strategy in place

Moody Marine provides a score of: 95

SG 80: The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points. The harvest strategy may not have been fully tested but monitoring is in place and evidence exists that it is achieving its objectives.

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments:

“The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points. While the harvest strategy has not yet matured, there is clear evidence of ongoing development of the strategy and interim controls on fishing that are precautionary and appropriate for the current level of development”.

ASOC believes that the statement above is solely based on Moody Marine’s view that “interim controls on fishing that are precautionary and appropriate for the current level of development” exist. Unfortunately, Moody Marine fails to specify what interim controls the statement refers to and how these controls are designed to achieve the management strategy. Thus, this statement is not supported by any objective information.

The stock is currently only lightly exploited, so the harvest strategy remains untested. If catches and stock productivity remain at the current level, the stock will not be at risk.

This statement appears inconsistent with the paragraph above and fails to show that the harvest strategy meets the requirement of SG 80. The statement that “if catches and stock productivity remain at the current level, the stock will not be at risk” is not sustained by any scientific evidence.

In addition, it is important to note that SG 80 pictures a harvest strategy that “may have not been fully tested”, while this paragraph acknowledges that the strategy “remains untested”. Judging from the meaning of these terms, “fully tested” and “untested” represent different standards and it is unclear what standard was applied by the assessment team. Logically, if the strategy “remains untested” this does not warrant a score of SG 80. The question of the difference between “fully tested” and “untested” needs to be answered as it relates to the standard that was applied. It also needs references to support their conclusion.
Monitoring of the stock, based on biomass surveys, has been patchy since the last synoptic survey, so the state of the stock is surmised based on the low levels of catch relative to the potential yield. The primary objective of the strategy is to maintain the stock at a level to protect its role in the ecosystem as the main prey species to a large number of predators. This is to be achieved, in the first instance, by limiting the exploitation in areas important to predators to levels which will not put those predator populations at risk.

Surprisingly if one looks at the score granted for this PI, the logical conclusion from this paragraph is that the state of the stock is not sufficiently monitored to show that the management strategy is meeting its objectives, as required by SG 80. The paragraph acknowledges that the monitoring of the stock “is patchy”. However, it goes on to affirm that the state of the stock is “sumised based on the low levels of catch relative to the potential yield”, which constitutes a very poor standard. Guessing that the stock must be in good state because catches are low cannot constitute an equivalent to monitoring. This statement also ignores very important factors such as:

- The last biomass survey dates from 2000 and significant errors in calculating pre-exploitation biomass ($B_0$) from the 2000 data have been identified.
- Impacts of climate change may have been significant since then
- As discussed at the last WG-EMM meeting, 99% of the catch is concentrated in coastal areas where only 27% of the krill biomass is deemed to be found.
- Uncertainties in relation to catch data (conversion factors) and krill escapement mortality (see our comments to PI 1.2.2. below) indicate that krill mortality as a result of fishing may be significantly higher than the mortality suggested by official catch data.

The factors above, together with the key role that krill plays in the ecosystem in relation to which the availability of krill in coastal areas is an essential issue, require that robust monitoring strategies be in place in order to meet a minimum sustainability standard. In these circumstances, the practice of “surmising” that the stock must be in good state because catches are low cannot constitute an equivalent to monitoring. This statement also ignores very important factors such as:

- The last biomass survey dates from 2000 and significant errors in calculating pre-exploitation biomass ($B_0$) from the 2000 data have been identified.
- Impacts of climate change may have been significant since then
- As discussed at the last WG-EMM meeting, 99% of the catch is concentrated in coastal areas where only 27% of the krill biomass is deemed to be found.
- Uncertainties in relation to catch data (conversion factors) and krill escapement mortality (see our comments to PI 1.2.2. below) indicate that krill mortality as a result of fishing may be significantly higher than the mortality suggested by official catch data.

The factors above, together with the key role that krill plays in the ecosystem in relation to which the availability of krill in coastal areas is an essential issue, require that robust monitoring strategies be in place in order to meet a minimum sustainability standard. In these circumstances, the practice of “surmising” that the stock must be in good state because catches are low cannot constitute an equivalent to monitoring. This statement also ignores very important factors such as:

In relation to the second part of the paragraph: “The primary objective of the strategy is to maintain the stock at a level to protect its role in the ecosystem as the main prey species to a large number of predators. This is to be achieved, in the first instance, by limiting the exploitation in areas important to predators to levels which will not put those predator populations at risk”: it is to note that this assessment fails to recognize that the development of management rules to limit the exploitation in areas important to predators is stalled at the level of CCAMLR’s Working Group on Ecosystem Monitoring and Management. The CCAMLR endorsed the boundaries of small-scale management units (SSMUs) in 2002, and issued a mandate to the Scientific Committee (SC) and its working groups to develop catch limits for these SSMUs, but progress on this issue has not advanced. Thus, this statement is incorrect, as there are no measures in place that are “limiting the exploitation in areas important to predators to levels which will not put those predator populations at risk”.

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3 All these issues are further developed throughout this document, and they are only listed here as an indication.
As detailed by the AKCP comments to the draft report, since 2002, 6 options for the subdivision of krill catch limits among SSMUs have been put forward at CCAMLR. Options 1-4 are “static” options, while options 5 and 6 constitute forms of feedback management.

In 2007, in view of the difficulty to implement a feedback management system for the krill fishery because of the lack of empirical data and monitoring, CCAMLR adopted a staged approach for the allocation of krill catches among SSMUs in Area 48 (applicable to Subareas 48.1 to 48.4). The idea was to implement an allocation in stages, based on the best scientific evidence available at each stage.

The initial stage of this process included an evaluation of the risks to krill, predators and the fisheries of the different options for subdividing the catch given the current uncertainties in order to determine the overall level of fishing that is believed to be “safe” and how it can be subdivided into SSMUs. It was agreed that for the development of advice for Stage 1, subdivision options 2-4 would be considered (option 1 – historical fishing pattern - was discarded as it was deemed to imply high risks to the ecosystem). Although in 2007 it was expected that advice on “Stage 1” of this subdivision could be delivered by the SC in 2008, this was not the case, as it is further explained in our comments to PI 2.5.2 below.

Furthermore, it was also agreed that the further development of feedback management approaches (Option 5) and structured fishing (Option 6) would be given priority from 2009 onwards. Nevertheless, it is important to note that the development of feedback management for the krill fishery is currently postponed and there is no agreed time for their finalization and implementation, based on the last CCAMLR meeting in October 2009 (CCAMLR XXVIII). Thus CCAMLR will not be able to start developing feedback management options (Stage 2) from 2009 onwards, as initially planned.

In the meantime, a new risk assessment (2009) conducted in the context of WG-EMM shows that the current trigger level is not as precautionary as initially thought, and that risks to the ecosystem are likely to occur if catches approach the figure of 620,000 tones. At the XXVIII CCAMLR meeting in 2009, no Stage 1 allocation was agreed. Although a very rough subdivision of the 620,000 limit amongst subareas was established, no limitation of fishing in coastal areas was adopted since Members could not reach consensus on this particular point. The measures agreed this year do not really provide protection to predators since they basically allow the historical fishing pattern to continue, posing higher risks to predators than other management options. Under these circumstances, it is difficult to see how CCAMLR could achieve its objectives until more specific measures to protect krill predators are implemented.

**The harvest strategy is reasonably precautionary with a TAC (620 000 t) interim “trigger” being set well below the estimated potential yield, but 50% higher than the highest annual catch reported in 1986/87 of 400 835 t. Once this trigger level is reached, quota management must be**

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4 See for example SC-CCAMLR XXVI, paragraphs 3.36-3.38; CCAMLR XXVI, paragraphs 4.16-4.20; SC-CCAMLR XXVII, paragraphs 3.1-3.21.

5 WG-EMM-09/12, George M. Watters, Simeon Hill, Jefferson T. Hinke, and Phil Trathan. “the Risks of not Deciding to Allocate the Precautionary Krill Catch Limit among SSMUs and Allowing Uncontrolled Expansion of the Krill Fishery up to the Trigger Level” (2009), hereafter quoted in this document as “Waters et al. (2009)”.

6 See SC-CAMLR-XXVIII, paragraph 4.26
implemented on small scale management units (SSMU). The objective of SSMU quotas would be to prevent local depletion depriving dependent predator populations of adequate opportunities to obtain their prey. Quotas based on SSMU have not yet been developed, but have been subject to considerable research and development.

The assessment team recognized that is that the trigger level is 50% higher than the highest annual catch reported in the late 1980s. As will be discussed later, at that time there was no systematic ecosystem monitoring in place and therefore there are no data on the potential impacts on predators as result of historical catch levels. The mere fact that the trigger level is so much higher than the historical maximum catch adds to the arguments presented further in this document, indicating the non-precautionary nature of the trigger level to protect predators in accordance to the latest risk assessment presented at the WG-EMM meeting in July 2009.

There is no specific justification for this catch trigger level, except that it is only 18% of the catch limit. The catch limit (potential yield) for Area 48 has been set according to the lowest level between the “recruitment” and “predator” precautionary criteria in the harvest control rule. In the last assessment, lowest yield was produced by the predator based rule. However, this catch limit will not apply until the SSMU quotas have been achieved.

As it will be further developed below, the latest simulation studies conducted (Watters et al., 2009) indicate that the trigger level may not be sufficient to protect predators from the effects of fishing as these paragraphs seem to suggest. See comments above in relation to the lack of progress on SSMU quotas by CCAMLR.

The harvest strategy has not been fully tested, but monitoring is in place and evidence exists that it is achieving its objectives. The stock, catches and predator populations are being monitored, and there is no evidence that they are being affected by harvesting. The current catches are too low to have a significant impact on the overall stock size.

It is important to note a striking inconsistency in the paragraph above with the statement included a few paragraphs before: while before it was acknowledged that “the strategy remains untested”, it is now considered that the “harvest strategy has not been fully tested”. This discrepancy has already been noted and expanded on above. In relation to the second part of the paragraph, it is clearly incorrect to say that the stock, catches and predator populations are being monitored. Lack of monitoring in relation to the stock has been briefly highlighted before; including issues related to the last biomass survey conducted -which will be further developed in our comments to PI 1.2.2- so the problems with stock monitoring will not be reiterated here. In relation to the monitoring of catches, problems related to the poor scientific observer data, the uncertainty in relation to reported catches due to the variety of conversion factors used, and the escapement mortality of krill seriously affect the monitoring capacity of the management system. In relation to predators, it is incorrect to say that predator populations are being monitored. CCAMLR’s Ecosystem
Monitoring Program (CEMP) only monitors some predator colonies in a few areas. The coverage of the program is limited and many areas that are subject to heavy fishing are not being monitored at all.\(^7\)

Most importantly, it has been recognized that, with the existing design of CEMP, it may never be possible to distinguish between different and potentially confounding causal factors, such as fishing versus environmental changes.\(^8\) In this context, the statement “there is no evidence that [predators] are being affected by harvesting” is inappropriate and cannot be used as a basis for any scoring.

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However, catches remain low largely because of market constraints rather than through management control. There is currently no incentive for IUU fishing or to misreport catches. Unless catches significantly increase, the current strategy is clearly adequate by default and direct evidence that the strategy is able to achieve its objectives would only become available as exploitation increases.

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It is difficult to understand what is meant here by “the current strategy is clearly adequate by default”. As it was mentioned before and will be further developed through this document, there are serious doubts that the harvest strategy is adequate since the currently applicable catch limit (i.e., trigger level) cannot be deemed to be sufficiently precautionary to prevent localized depletion of krill. The statement that “direct evidence that the strategy is able to achieve its objectives would only become available as exploitation increases” ignores the fact that CCAMLR has currently no effective means to monitor the impact of a catch increase on krill nor on its predators. This is because scientific observer coverage of the fishery is still patchy (see our comments to the PI 1.2.3 below) and also because of the limitations of CEMP to monitor impacts on krill predators. Unless CEMP is significantly improved and expanded, CCAMLR will have no tools available to detect impacts from fishing even if catches increase.

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Monitoring is extensive both with on-board observer coverage for biological sampling of the catch, and CEMP for monitoring the abundance of predator species. Concern has been expressed over reductions of CEMP monitoring, but it is adequate for the current level of catch. The international observer coverage, which is generally considered reliable, is less than 100% in this fishery. There has been no complete biomass survey of Area 48 since 2000, although surveys have been conducted since then covering smaller areas. Assuming complete biomass surveys occur every 10 years (the next would be no sooner than 2010), it is not clear that this would be frequent enough to monitor stock status. CPUE is not used as it is not thought likely to have a simple relationship with stock size.

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To say that “monitoring is extensive both with on-board observer coverage for biological sampling of the catch, and CEMP for monitoring the abundance of predator species” is at best, a serious misinterpretation of reality. CCAMLR working groups, and the Scientific Committee itself, have repeatedly made the point that

\(^7\) See for example WG-EMM Report 2007, paragraph 5.5. See also CCAMLR XXVI/BG 25, “The need for a strategic plan for the management of the Antarctic krill fishery – Antarctic and Southern Ocean Coalition”.

current observer coverage is clearly insufficient to support management advice. In relation to this point, it is important to highlight the fact that in the AKCP’s initial comments submitted to this process, this statement had already been made, including details of the conclusions of the different CCAMLR working groups about the lack of sufficient observer coverage in the krill fishery. In spite of this, the draft assessment report does not take account of this issue, nor have the AKCP’s concerns been addressed.

In relation to the statement that CEMP monitors abundance of predator species, this is also a misinterpretation. CEMP monitors the status of selected colonies and cannot be considered to provide predator abundance data. It is precisely the lack of sufficient information on predator abundance and demand which limits the use of option 4 for allocation of krill catch limits among SSMUs. This is because, as Option 4 applies data on krill biomass minus predator demand in each SSMU as a basis for the allocation, biased estimates in predator demand data result in this option increasing ecosystem risks. This is further explained in our comments to PI 1.2.3.

In relation to the second part of this paragraph, we agree with the following statement: “Assuming complete biomass surveys occur every 10 years (the next would be no sooner than 2010), it is not clear that this would be frequent enough to monitor stock status”. Nevertheless, in view of this reality (acknowledged by the assessment team), there is no way for this assessment to support a conclusion that monitoring is sufficient to support the management strategy.

The harvest strategy is periodically reviewed and improved as necessary. There are documented annual meetings of the working group (WGEMM) and of CCAMLR to discuss the harvest strategy, outcomes and problems. There is clear evidence of responses to management issues as they arise. Catch limits are defined in Conservation Measure 51-01 (2008) and are reviewed annually.

The first sentence of this paragraph, “the harvest strategy is periodically reviewed and improved as necessary” seems to be at odds with the acknowledgement that the strategy remains untested, as already recognized earlier in the draft assessment report. The assessment team fails to explain here how the harvest strategy has been reviewed and improved in recent years. The fact that WG-EMM and CCAMLR discuss issues and problems in relation to this fishery does not mean much unless these discussions are translated into effective measures and actions. In the case of krill, reports from WG-EMM and CCAMLR of the last seven years show major difficulties in making progress in the allocation of catch limits amongst SSMUs (even an interim, Stage 1 allocation has not progressed during the last three meetings), and in providing systematic observer coverage for the krill fishery (progress on this issue has been blocked for more than eight years now in spite of the pressing need for such a measure; only at the last CCAMLR meeting – 2009 - a 30% observer coverage was agreed, due to the lack of capacity of certain Members to implement a systematic coverage).

The statement “there is clear evidence of responses to management issues as they arise” is an empty statement if this evidence is not described. Contrary to what the assessment team states, catch limits for CM 51-01 have not been reviewed since 2007 in spite of the recent signals that the biomass estimates that support this catch limit are overestimated. CCAMLR’s Scientific Committee has agreed that in spite of

9 SC-CCAMLR XXV, para. 4.19. See also para. 2.5 - 2.8; 2.12 - 2.22; 3.4; 4.5; 4.8; 4.13; 4.20; 11.13 - 11.15; 15.16.
uncertainties in relation to biomass estimates, improvements to the protocols in setting catch limits will only be agreed and implemented after a period of five years. Thus it is incorrect to say that catch limits are reviewed annually.10

Although an amendment was introduced in 2007 to clarify that the trigger level operates as an enforceable catch limit until quotas for SSMUs are established, this trigger level has no scientific basis and was established by taking into account maximum historical catches more than 10 years old (as explained earlier in this document). Since then, impacts from climate change have increased significantly and therefore the conditions under which the trigger level operates are different now compared to the time when the maximum historical catches were recorded. Although CCAMLR has pledged to undertake a subdivision of krill catch limits amongst SSMUs as the most effective way to prevent ecosystem impacts, WG-EMM has so far failed to reach consensus on available options for this subdivision since the mandate to undertake this exercise was received in 2002. These circumstances are a long way from a situation where “there is clear evidence of responses to management issues as they arise”. Taking all this into account, the assessment team fails to support the score of SG 80 warranted in relation to this PI.

10 SC- CCAMLR- XXVII, paragraphs 3.42 and 3.43.
The harvest strategy has not been fully tested, but monitoring is in place and evidence exists that it is achieving its objectives. The stock, catches and predator populations are being monitored, and there is no evidence that they are being affected by harvesting.

**Dr. Steve Nicol:** This is not strictly correct – I am unaware of any evidence that exists that the strategy is effective other than the absence of an obvious stock collapse.

**Moody Marine Comment to Steve Nicol:** The level of monitoring here is assessed in the context of the decision rule (i.e. limit the catch at or below the trigger level). Catches are monitored and, as indicated by the reviewer, there have been many biomass surveys since the synoptic survey which should have reported a decline in biomass had there been one. For the level of catch compared to any estimate of the total biomass, this appears sufficient.

Monitoring is extensive both with on-board observer coverage for biological sampling of the catch, and CEMP for monitoring the abundance of predator species. Concern has been expressed over reductions of CEMP monitoring, but it is adequate for the current level of catch. The international observer coverage, which is generally considered reliable, is less than 100% in this fishery.

**Steve Nicol:** This comment overstates the level of monitoring quite considerably. By what standard is the level of CEMP monitoring adequate? The less than 100% international observer coverage is actually considerably less with most vessels operating without them.

**Moody Marine Comment to Steve Nicol:** It is the judgment of the assessment team that, given the relatively low level of catch, the level of monitoring was adequate. This is consistent with the application of the MSC standard across all fisheries.

Krill, with its important trophic role in the Southern Ocean ecosystem, clearly requires greater risk aversion, which is taken into account. The basis for risk management is either to gather more and better information to verify a low negative impact, or reduce risk by management action, usually reduced harvesting. In this case, risk is reduced by keeping catches to a low level. Catches at or below the current trigger level compared to estimates of the total biomass appear low enough to give an acceptable risk. Should the harvest rate increase, the level of monitoring may well become inadequate. Many of the monitoring systems being developed and discussed are preparing for the expansion in the fishery. While we support the development of the improved monitoring system, the certification assessment must apply to the fishery as it is now.

ASOC fully agrees with the reviewer’s position that the assessment team is overstating the level of monitoring and also wonders by what standard the level of monitoring is considered adequate. As expressed earlier in our comments to this PI, the “low level of catch” cannot be invoked as a valid reason for poor monitoring to be adequate. Especially, the categorization “low level of catch” cannot be regarded
simply in relation to biomass estimates at the level of the statistical area, but needs to be considered in the context of the role of krill in the ecosystem and the way the fishery operates (concentrated fishing in coastal areas).

While the level of fishing may be low in general terms, localized impact on predators may occur when coastal areas are heavily fished. It is important to highlight that 99% of krill fishing takes place in coastal areas, close to land-based predator breeding colonies, in overlap with their foraging ranges. As noted above, CCAMLR’s monitoring program is dependent on national programs and priorities, and currently only monitors predator colonies in a few sites, which are not representative of the area subject to fishing. As a result, some areas that are currently subject to intensive fishing are not being monitored at all. This is why CCAMLR’s ability to detect impacts on predators is very limited even at current catch levels. As was acknowledged by WG-EMM, with the current CEMP it is not possible to distinguish impacts deriving from fishing from environmental effects including climate change.

In relation to the comment: “there have been many biomass surveys since the synoptic survey which should have reported a decline in biomass had there been one”, it is unclear what surveys the assessment team refers to. In any case, assuming they are referring to local surveys in Area 48, this statement fails to understand the value of these surveys. As explained further in our comments to PI 1.2.3, these surveys are useful to estimate inter-annual variability, but they are not good indicators of overall status and trends in biomass. Therefore, these surveys cannot be used to sustain the conclusion that evidence exists that the management strategy is achieving its objectives. As noted above, we concur with the view of Dr. Nicol that “no evidence exists that the strategy is effective other than the absence of an obvious stock collapse”.

In summary, the reviewer’s valuable comments and information were not satisfactorily addressed by the assessment team.

Component: Harvest Strategy

PI Category: Harvest control rules and tools

1.2.2 There are well defined and effective harvest control rules in place

Moody Marine provides a score of: 80

SG 80: Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached. The selection of the harvest control rules takes into account the main uncertainties. Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.
What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

**Moody Marine comments:**

| There is a well defined harvest control rule in place that is consistent with the harvest strategy and ensures that the exploitation rate is low enough that there is little or no risk that the spawning stock biomass will be reduced below the limit reference point. The harvest rule is interpreted as the total catch being limited to the trigger level of 620 000t. This limitation ensures that the exploitation rates never approaches the target. The potential yield calculation uses B0 rather than the current biomass and will not reduce the exploitation rate as reference points are approached (i.e. there is no feedback). This calculation however is not yet actually applied as a decision rule, but does demonstrate that the current and trigger level catches are highly precautionary. The stated aim of CCAMLR is to allow the fishery to be developed towards taking the catch indicated by the HCR, which would include further research and monitoring. The exploitation rate is constrained so that limit reference points are not exceeded. The selection of the harvest control rules takes into account the main uncertainties. The main uncertainties have been considered, and explain the low value of the trigger catch relative to the surveys of krill abundance. However, the harvest control rule is commensurate the level of fishery development, and does not explicitly cover a wide range of uncertainties (e.g. climate change), which would require monitoring and adjustment of the controls in response. The potential yield estimate is generated from a probabilistic harvest control rule, based on a stochastic simulation taking into account recruitment uncertainty and biomass survey error. The lowest biomass estimate of the various methods is used as the B0 estimate, and has been adjusted downwards based on a re-evaluation in 2007. As the stock is currently considered only lightly fished, a precautionary level of catch at this stage should be sufficient. Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules. The tool used to control the harvest is the landings reported by the fishing vessels. The tools have not yet been invoked in this fishery, but the same system applies as used in the toothfish fishery, which, for the legal fishery, has been highly effective. There is some concern as to the accuracy of catch estimates, but the recording is adequate for the current level of catch. The model uses the most up-to-date parameter estimates for the life history as well as a synoptic survey which combined trawl and acoustic methods to estimate the biomass in 2000. This estimate is treated as the unexploited biomass, although some fishing has occurred before 2000. The decision rule uses a proxy for biomass at MSY, and includes an arbitrary adjustment to allow for additional biomass to support predation. |
Most of the statements in this PI are incorrect and in addition, the concerns that the AKCP expressed in its initial submission were neither taken into account nor addressed.

As has been explained throughout this document, recent analyses indicate that the trigger level is not as precautionary as initially thought (Watters et al., 2009). In addition, important uncertainties are not considered by the harvest control rules.

As was indicated last year in CCAMLR, there is uncertainty as to the amount of krill actually being removed from the ecosystem, due to the practice by fishing nations to report krill catches based on product information using a range of conversion factors without indicating product composition of catches, and the product specific conversion factors used. Uncertainty as to the krill caught in different areas hinders CCAMLR’s ability to limit catches as the catch limit is approached. According to information submitted by the Secretariat to last year’s CCAMLR meeting (2008), a reported catch of 125,000 tones (2007/08 season) may actually represent a real catch of 500,000 tones. This alarming statement indicates that under the current reporting system, it is possible for the fishery to actually approach or exceed the catch limit, without triggering the control rules that are in place to prevent fishing over the limit. In addition, as it has been clearly stated in the WG-EMM report in 2008, with the increasing range of products arising from the krill fishery, the range of conversion factors is likely to get larger.

In view of this situation, in 2008 the Scientific Committee advised that conversion factors were unlikely to be of use in providing back-estimates of landed catch. Therefore, it recommended the direct measurement of green weight of krill, and thus, requested that all vessels participating in the krill fishery in the 2008/09 season report on the utility of the methods presented by ad hoc TASO (Ad Hoc Technical Group for At-Sea Observations) in estimating green weight during operations. Finally, the Scientific Committee requested that Members obtain these reports from their vessels and present them to TASO for consideration at its 2009 meeting (which took place in July 2009). At the TASO 2009 meeting, it was decided that further assessment was still needed of the implications of using variable and fixed conversion factors, noting the need for the implementation of an accurate, repeatable volume-to-mass conversion for krill where volumetric measures are used. Therefore, there is still no standardized way to report krill catches, and significant uncertainty as to actual krill catch data remains.

In addition to the uncertainties associated with the use of conversion factors to indicate krill removals, at the last WG-EMM meeting (July 2009) the issue of krill escapement mortality was discussed and the meeting expressed further concerns on the capacity to effectively measure krill removals during fishing operations. Krill escapement mortality occurs when krill gets squeezed through the nets, an unknown percentage of which gets killed or seriously injured, without being counted as caught. Many different factors such as krill density, type of gear, speed of trawling, and mesh size (both code end and side panels) could affect unseen mortality. At that WG-EMM meeting, it was indicated that mortality of krill could be between 10 and 50% higher than that reported being caught. Therefore, concerns were expressed about this potential level of escapement mortality given the importance of the total amount of krill killed by fishing operations to any assessment and to catch allocation schemes. Furthermore, given the discrepancy between the estimates of mortality of escaped krill, together with the lack of data on the rates at which krill escape from nets in different fishing gears, the WG-EMM recommended that there should be a concerted effort to estimate escape mortality in the krill fishery, including through the evaluation of existing results and the continued development of existing models. Further, the Working Group expressed that it would be important that

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11 SC-CCAMLR XXVII, para. 4.17.
Members provide information and propose methodologies on how to measure krill escapement mortality so that this issue can be resolved rapidly.

In regards to $B_0$, at the last WG-EMM meeting (July 2009) it was concluded that current $B_0$ estimates in Area 48 contain a number or errors (i.e. in the implementation of the methodology) and under-represent uncertainty. Thus, there was agreement that $B_0$ needs to be recalculated. Unfortunately, this calculation will not take place this year and has been deferred to the next meeting of SG-ASAM (Subgroup on Acoustic Survey and Analysis Methods) in 2010. At its last meeting (October 2009), the Scientific Committee endorsed the advice from WG-EMM regarding the need to re-calculate $B_0$ for Subareas 48.1 to 48.4. It further noted that WG-EMM considered that any recalculation of the $B_0$ estimate from the CCAMLR-2000 Survey using the revised parameter is unlikely to result in a krill biomass estimate that is higher than the present biomass estimate.\(^{12}\)

In any case, a lower $B_0$ will have an impact on the risk assessment done with the FOOSA model because it will modify the yield multiplier associated to the trigger level. In practical terms, the yield multiplier would increase, representing higher probabilities of risk as the trigger level is approached (as presented in Watters et al., 2009). This means that according to FOOSA, a higher risk would be associated with the trigger level with a lower $B_0$. As a clarifying point, it is important to note that a change in the value of $B_0$ would not imply a change in the value of the trigger level as both figures have been established using different procedures. However, under the risk assessment, a lower $B_0$ would indicate higher risks to predators, reinforcing the proposal that the current trigger limit is not as precautionary as originally thought.

In summary, the information presented in paragraphs above shows that important sources of uncertainties exist not only related to the calculation of $B_0$, but also in regards to the mortality of krill as a result of fishing (still being assessed), highlighting the constrains associated with the applicability of the harvest control rules under the current conditions. For these reasons, it is not possible to sustain the scoring given to this PI, which requires that “the selection of the harvest control rules takes into account the main uncertainties”; and “available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules”. This PI is scored far too highly.

Component: Harvest Strategy

PI Category: Information / monitoring

1.2.3 Information/ monitoring: Relevant information is collected to support the harvest strategy.

Moody Marine provided a score of: 80

SG 80: Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy. Stock abundance and fishery removals are regularly

\(^{12}\) SC-CCAMLR XXVIII, para. 3.3 – 3.5
What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

In general, ASOC is concerned that the specific information included in the AKCP initial comments on key issues such as the inadequate scientific observer coverage to sustain the harvest strategy were not incorporated or addressed in the draft report. Monitoring and information aspects are among the weakest points in CCAMLR’s management strategy for krill, including problems in relation to lack of updated information on the state of the stock, determining catch data, insufficient observer coverage, and insufficient monitoring of predator species. All these issues were highlighted by many stakeholders including the AKCP and also by Dr. Steve Nicol in his review. As it will be shown throughout our comments below, these concerns were not addressed by the assessment team other than just indicating that monitoring is “adequate taking into account the low levels of catch”. As indicated in relation to PI 1.2.1 above, this statement fails to take into account relevant factors like the role of krill in the ecosystem, the magnitude of existing uncertainties, and the potential effects of localized depletion. During the 2007/08 season, official catch data indicate that more than 156,000 tonnes of krill were removed from the ecosystem (a minimum estimate taking into account issues like uncertainty of catch data and krill escapement mortality). Although this figure may seem low if one compares it with the overall catch limit for Area 48, it becomes a more significant amount if we consider that more than 99% of the catch is concentrated in coastal areas, where only 27% of the krill biomass is thought to be concentrated.

Taking into account the notable weakness of CCAMLR’s information and monitoring tools in relation to the krill fishery, the score given to this PI must be reduced.

ASOC strongly believes that if certification is granted under these circumstances, an opportunity to introduce an incentive for CCAMLR to improve its monitoring system will be lost. In relation to CEMP, there is a mismatch between CCAMLR Members contributing to the program and those that benefit from the fishery. Unfortunately, investments in the developing krill fishing industry are currently not being matched by the appropriate investments in science that would be needed for a robust, scientifically-based management system. Therefore, CCAMLR should develop funding mechanisms that ensure that the resources are available for an expanded, on-going monitoring program, such as a dedicated CEMP Fund. Fishing nations have a special responsibility in this regard. If certification is granted in the current situation, there will be no incentive for fishing Members to improve the monitoring system.

We will now offer specific comments in relation to the scoring comments provided by the assessment team in relation to this PI.

13 This was recognized by CCAMLR’s performance review which recommended CCAMLR to “develop mechanisms to address burden-sharing for research and monitoring among Members so as to reduce the current reliance on a small number of Members and consequent risk to CCAMLR’s management approaches if any of these Members reduced their input. The Review Panel viewed this with particular concern given the fundamental importance of research and monitoring to the CCAMLR management approach and the difficulties experienced by scientists in securing funding for monitoring”. See CCAMLR-XXVII/8, Report of the CCAMLR Performance Review Panel.
Moody Marine comments:

Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy. The harvest strategy is primarily based on the 2000 synoptic survey. Other biomass surveys have been conducted since 2000, but have not covered the whole of area 48 and some attempt has been made to reconstruct the time series of biomass. The surveys provide the majority of the information on stock abundance and structure. How frequently synoptic surveys will be conducted in future is not clear. The spatial distribution of biomass, which is even more uncertain, will become more important when SSMU quotas are implemented.

However, the potential yield (catch limit) is based on estimates of the unexploited stock size, so in theory a single synoptic survey is adequate.

In relation to the first part of this paragraph, it is incorrect to say "sufficient information exists in relation to the stock structure to support the harvest strategy". The patchiness of the scientific observation data considerably limits information on current stock structure so it is difficult to understand where this statement comes from. The value of partial surveys is limited as discussed some paragraphs below.

In relation to the rest of the paragraph, although it is acknowledged that the harvest strategy is based on a single study which is now nine years old, and that there is no clear plan to conduct further surveys, the assessment team concludes that "in theory a single synoptic survey is adequate". This is a rather surprising conclusion that seems to be based on a subjective opinion. This statement is also inconsistent with the statement found in Moody Marine’s scoring comments to PI 1.2.1 that "assuming complete biomass surveys occur every 10 years (the next would be no sooner than 2010), it is not clear that this would be frequent enough to monitor stock status". These inconsistent statements make it hard to understand what standard was applied by the assessment team in scoring this fishery. Furthermore, in relation to this point it is important to note that, at the last CCAMLR meeting in November 2009, no commitment was made by Members to conduct a krill biomass survey in 2010.

On substance, it is important to note here that there are many uncertainties associated with the biomass estimate resulting from the 2000 Survey which may have been overestimated (see comments on Bg in relation to PI 1.2.2). Taking into account the considerations expressed above on the concentration of catches in coastal areas and the role of krill in the ecosystem, a single survey by no means can be considered adequate, even if the catch limit is based on estimates of unexploited stock size.

In addition, the CCAMLR 2000 survey provides the baseline point for the projection of yield. It does not allow taking climate change into account since it is a single measurement. In using the KYM (krill yield model) the projection is supposed to take into account factors that might affect future trajectories of krill yield. Nevertheless, since there is no information on the impact of climate change on krill populations it is not possible to factor it in.

The assessment team makes reference to other biomass surveys conducted since 2000, not covering the whole of Area 48. We note with concern that no information is given on the dates and coverage of these surveys, that may help understand to what extent these surveys "provide information on stock abundance..."
and structure that are sufficient to support the harvest strategy”. Assuming that the authors are referring here to local surveys conducted at certain sites, such as AMLR surveys around Elephant Island, it is important to note that while these time series are useful in providing local information on krill distribution and abundance, the trends they show are not always the same as those from other areas, and there are a number of inter and intra annual changes that are difficult to interpret. Therefore, it is not possible to extrapolate krill data biomass at i.e., Elephant Island to the rest of Area 48. Therefore while these surveys are useful to estimate inter-annual variability, they are not good indicators of overall status and trends in krill biomass.

Catch composition, potentially providing information on selectivity and stock structure, is monitored through the observer coverage. These data are not currently used in the harvest strategy, partly because of the low level of exploitation. CCAMLR international observer coverage is less than 100%. The Saga Sea has an international observer on board, and within the South Georgia zone (48.3), all vessels must carry international observers. Otherwise vessels use national observers, a scheme which is not considered as reliable by all States.

The first sentence of this paragraph is basically incorrect. As indicated already, CCAMLR working groups have repeatedly indicated that the current level of observer coverage does not allow basic management questions to be addressed. In the absence of any response provide to the initial comments made by the AKCP on this issue by the assessment team, we are now obliged to transcribe here again some the information contained in that previous submission.

At its 2007 meeting, the Working Group on Ecosystem Monitoring and Management considered a range of scientific reasons for higher levels of observer coverage in the krill fishery. The working group noted that systematic coverage is needed to understand the behavior and impact of the fishery as well as routine monitoring to inform the modeling of krill stocks. The meeting made clear the need for systematic coverage extends across all areas, seasons, vessels and fishing methods. Therefore, although Aker Biomarine voluntarily submits scientific observer information to CCAMLR in relation to all of its krill fishing operations, the fact that other operators do not submit consistent scientific observer data means that the frequency in the monitoring of this fishery is insufficient to support the harvest strategy.

In 2009, WG-EMM reiterated that all krill vessels needed to have systematic deployment of scientific observers on board in order to understand the overall impact of the krill fishery, one of the objectives agreed by the Scientific Committee in 2007. As discussed at this and previous WG-EMM meetings, current observer coverage is very far from this goal, especially in Subareas 48.1 and 48.2. This point will be further expanded below.

Continuing with our commentary to the scoring comments, we note with surprise that the assessment team estimates that observer data are not currently used in the harvest strategy, “partly because of the low level of exploitation”. This statement clearly indicates a lack of understanding of the challenges that CCAMLR is facing. Any reader of the reports of WG-EMM and the Scientific Committee of the last five years would easily conclude that the only reason why observer data are not being used is the lack of statistical power of these data due to the patchiness of the observer coverage. For example, as noted before, the Scientific Committee stated in 2006 that current observer coverage is clearly insufficient to support management

advice. As explained below, no substantial progress has been made on the issue of scientific observer coverage in recent years; and only this year at CCAMLR XXVIII, 30% observer coverage was adopted by the Commission.

Similarly, the assessment team states that “otherwise vessels use national observers, a scheme which is not considered as reliable by all States”, referring to Subareas other than 48.3. This is a misleading statement in two aspects: firstly, it suggests that most vessels carry national observers outside of Subarea 48.3, which is not true (observers are carried voluntarily by a few vessels only and coverage is very limited); secondly, it suggests that appropriateness of the national observer scheme is a question of opinion. This ignores the fact that CCAMLR has designed an international scientific observation scheme which is based on bilateral arrangements between the flag State (“Receiving Member”) and the nationality State of the observer (“Designating Member”), following very specific rules adopted by the Commission. This scheme is considered to be best practice for scientific observation and it is irregular that it is not applied evenly to the krill fishery. In addition, the fact that certain vessels carry government-appointed observers on board does not necessarily mean that the data are received by CCAMLR. For example, at the last WG-EMM meeting in 2009, it was noted that Japan is not currently submitting observer data collected by Japanese national observers.

The lack of systematic observer data and the resistance by certain CCAMLR fishing Members to accept compulsory deployment of 100% observers was a primary concern of the Scientific Committee in its XXVI meeting (2007). At this meeting, an agreement was reached on a process to achieve systematic observer coverage for krill fisheries in the near future. Under this process, krill fishing nations would submit plans to the 2008 meetings of relevant CCAMLR working groups detailing how they would achieve systematic and consistent collection of scientific observation data. Discussions at the 2008 WG-EMM meeting resulted in an agreement to deploy 100% observers for a trial period of two years starting from December 2009, after which the Scientific Committee would evaluate the level of ongoing observer coverage required for the krill fishery. Unfortunately, Japan overturned this position (to which it had agreed at the meeting of the WG) and opposed the endorsement of the Scientific Committee of this agreement. Korea and China supported Japan in this position. Virtually all remaining CCAMLR Members expressed their strong disappointment with this outcome and their support for 100% observer coverage. This included krill fishing nations such as Ukraine, Russia and Norway. As it will be further developed below, prospects are low for systematic observer coverage in the krill fishery in the short term.

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Some of the more comprehensive range of information has now been obtained preparing for a higher level of exploitation. There has been research on survey methods and biomass estimation, improvements in catch sampling and the way catches are measured and reported. More accurate data will be necessary if exploitation increases. As the harvest strategy is focused on the role of the species in the ecosystem, part of the monitoring procedure includes CEMP, which estimates

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16 It was agreed that “systematic coverage” means a level of coverage that ensures data collection across all areas, seasons, vessels and fishing methods to provide consistent, high-quality data for assessment of a multi-vessel, multi-nation fishery. SC-CCAMLR XXVI, para. 3.12.
17 SC-CCAMLR XXVI, para. 3.13-3.16
18 CCAMLR XXVII, para. 11.4-11.21.
The statement above on CEMP is incorrect. **CEMP does not estimate the abundance of predator populations.** Only the breeding population size of some species in certain land-based colonies located in selected CEMP sites are recorded. A list of monitored parameters was developed for CEMP, and fieldwork and data acquisition for predator parameter of indicator species are voluntarily carried out by CCAMLR Member countries and submitted to the CCAMLR Secretariat. To be more specific, according to CCAMLR, current parameters being monitored in predator species are the following:

**CCAMLR Standard Methods for Monitoring Parameters of Predators Species**

- **Section 1: Penguins**
  - Method A1 – Adult weight on arrival at breeding colony.
  - Method A2 – Duration of the first incubation shift.
  - Method A3 – Breeding population size:
    - A: Ground count.
    - B: Aerial count.
  - Method A4 – Age-specific annual survival and recruitment.
  - Method A5 – Duration of foraging trips.
  - Method A6 – Breeding success.
  - Method A7 – Chick weight at fledging.
  - Method A8 – Chick diet.
  - Method A9 – Breeding chronology.

- **Section 2: Flying Birds**
  - Method B1 – Breeding population size.
  - Method B3 – Age-specific annual survival and recruitment.
  - Method B4 – Chick diet.
  - Method B6 – Adult annual survival and recruitment.

- **Section 3: Seals**
  - Method C1 – Duration of cow foraging/attendance cycles.
  - Method C2 – Pup growth.

- **Section 4: Monitoring non krill-dependent species**
  - Method T1 – Diet of adult Antarctic shags during the breeding season.

In addition, a CCAMLR specialist workshop on Predator Survey was conducted from 16 to 20 June, 2008, in Hobart, Australia. The workshop was aimed at getting a better understanding of the uncertainty in predator population estimates. At that meeting, it was expressed that estimates of population size should be used with demographic models in order to estimate total population size. In addition, spatial foraging and dispersal models will be needed, to be followed by diet and consumption models, to estimate total consumption. Thus, participants clearly expressed that there is some way to go before dependent species requirements for krill could be established. In addition, it was concluded that CEMP data provide valuable
insights into how one might 'correct' historical and current population surveys, but these data in themselves do not help assess population requirements. These data are critical but more in the context of process, rather than abundance.

In addition, in July 2008, the CCAMLR Working Group on Ecosystem Monitoring and Management (WG EMM) noted that estimates of predator consumption are uncertain primarily as a result of incomplete estimates of abundance of predators. It is the lack of comprehensive data on predator abundance and demand (which are strongly correlated) that rules out the use of Option 4 for allocation of krill catch limits amongst SSMUs. This is because, as Option 4 applies data on krill biomass minus predator demand in each SSMU as a basis for the allocation, biased estimates in predator demand data result in this option increasing ecosystem risks, as shown by Watters et al (2008).19

Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule. The harvest control rule is based on catch monitoring. Catch reports are obtained monthly from all vessels and there is no incentive to under-report. Although not an issue for the Aker fishery, discarding is legal in this fishery and some discarding may occur where the size of the krill is important, such as that used for human consumption or bait, but is not likely where catches are used for fish meal.

Conversion factors from the processed weight, which is actually measured, to the live weight are highly uncertain for some products. However, for the current low exploitation rate, these are not likely to be important enough to affect stock status.

"Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule" is an incorrect statement, as shown in our comments to this PI earlier in this section and to PI 1.2.2 above in relation to uncertainties related to catch data and krill escapement mortality.

Although the issue of conversion factors is acknowledged by the assessment team, it merely concludes that "for the current low exploitation rate, these are not likely to be important enough to affect stock status". This is a subjective statement, not based on any technical analysis. It cannot be considered a valid basis for scoring.

The harvest control rule requires a good understanding of the basic life history parameters. The life history remains uncertain, although there has been clear progress in understanding with results suggesting that krill is relatively long-lived for a small shrimp species. Like all crustaceans, krill cannot be aged reliably so that growth and mortality cannot be estimated easily. The information is sufficient enough to support the current harvest control rule.

The paragraph above is self-contradictory and lacks logical structure. All the information provided points at the lack of understanding in relation to the basic life history of krill, which is key for the harvest control rule. However, after listing the different information gaps, the assessment team simply concludes that "the

19 WG- EMM 2008 Report, paragraphs 2.42 and 2.102.
information is sufficient enough to support the current harvest control rule”. We fail to see the justification for the assessment team reaching the above conclusion.

There is good information on all other fishery removals from the stock. Fishing only occurs within the CCAMLR area with few if any opportunities for fishing outside. IUU catches are negligible. There is no incentive to misreport.

As shown repeatedly in this section, and also as pointed at by Dr. Nicol in his review, the statement that “there is good information on all other fishery removals from the stock” is simply incorrect, due to uncertainties in catch data krill escapement mortality.

References:

WGEMM, 2000; WGEMM, 2007; WGEMM, 2008; Demer and Conti, 2005; Demer et al., 2007; Heywood et al. 2006; Atkinson et al. 2008; WG-EMM-08/46; Foster et al. 2007; Japanese Delegation 2008; WG-EMM-08/5; WG-EMM-07/5; Saunders and Brierley 2007

In relation to the references of this section, ASOC would like to note that the reference “Japanese delegation 2008” is included here. It is unclear whether the reference is indicative of a personal communication with a Japanese delegate, or rather a formal statement by Japan at the CCAMLR 2008 meeting. In any case, the reference is concerning, since Japan is the most notable example of a CCAMLR Member that has been consistently blocking the adoption of a systematic scientific observer data-gathering plan by CCAMLR, in spite of the scientific evidence that these data are urgently needed. This has been a matter of serious concern for most WG-EMM Members. For example, in 2007, the WG-EMM report reads: “Members of the Working Group expressed their frustration that the collection of these data, which have been granted a high priority by the Scientific Committee, is being impeded by non-scientific arguments”.

This statement was made in implicit reference to position taken by Japanese scientists at that particular meeting and other meetings of the Scientific Committee and its working groups. It is unfortunate that the assessment team is including as a reference precisely the delegation that is most responsible for CCAMLR not being able to act upon best scientific advice, as required by article IX.4 of the Convention.

We are now presenting here the exchange between Steve Nicol and the assessment team, and our conclusions from this exchange:

Moody Marine answer to Steve Nicol’s comments:

1.2.3 There is good information on all other fishery removals from the stock.

Steve Nicol: This is not correct because of uncertainty in conversion factors and incidental mortality of krill therefore this criterion should be revised downwards.

Moody Marine Comment to Steve Nicol: See comments above.

20 WG-EMM 2007 Report, para. 4.56.
Component: Retained non-target species

PI Category: Outcome/Status

2.1.1 Status: The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.

Moody Marine provides a Score of: 65 (A score of 65 means that a condition has been generated- Refer Condition 2)

SG 60: Main retained species are likely to be within biologically based limits or if outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.

If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments:

As this PI considers the status of the retained non-target species, it is judged against the current catch level within the krill fishery as a whole – i.e. on average 113,000 t p.a.

Catches of adult fish during krill fishing are absent due to the fishing gear and methods employed, and the mono-specific swarming behaviour of krill. However, the nature of the Saga Sea fishing process means that the normal fish larval bycatch that occurs during krill fishing using all gears will be preserved and is therefore measurable. As a result, an identifiable retained component of the catch consists of larvae of several fish species. The CCAMLR observer on board Saga Sea monitors catches of fish larvae, and analyses of resulting data have been performed. The total larval catch is less than 5% of the total catch by weight; this can be considered a ‘main’ retained species due to the potential vulnerability of this component and the fact that there is a vulnerable species present in this catch.

ASOC considers that following the logic of the assessment team in regards to this PI which “considers the status of the retained non-target species, judged against the current catch level within the krill fishery as a whole”, it is difficult to understand why this paragraph concentrates only on the monitoring of catches of fish larvae on board the Saga Sea. For any assessment of this particular issue it would be important to consider the monitoring of catches of fish larvae conducted by the fishery as a whole (all vessels) and not by a single vessel or group of vessels (see also comments above on the misapplication of the concept “unit of certification” in this assessment). Thus, even if this section provides some information on the monitoring aspects of the Saga Sea, it is insufficient in the context of this PI.
In addition, the impact of bycatch of fish by the krill fishery is unknown and no mitigation measures are in place. Bycatch species include mackerel icefish (*Champsoscephalus gunnari*), overfished to the point of stock collapse in the 1970s and still recovering.\(^\text{21}\)

Already in 1992, sampling by research vessels in South Georgia identified bycatch of the following finfish species occurring in large numbers in krill trawls: mackerel icefish (*Champsoscephalus gunnari*), blackfin icefish (*Chaenocephalus aceratus*), and the Myctophidae. The data indicated that the bycatch of fish in the commercial krill fishery may be significant in some areas of the South Georgia shelf.\(^\text{22}\) Anecdotal information from industry sources suggest that large amount of toothfish larvae may be also caught as bycatch in this fishery.

At the CCAMLR 2008 meeting, the Scientific Committee noted that there is still uncertainty over the level of bycatch of juvenile and larval fish in the krill catch over all seasons and areas in which the krill fishery operates, and from different fishing gears. The uncertainty about the actual krill catch derived from the different conversion factors used in krill catch reporting adds even greater uncertainty to the extrapolated level of juvenile fish bycatch in the krill fishery. Further, the Commission noted that uncertainties over the level of bycatch of juvenile and larval fish in the krill fishery were still a matter of concern. Two years before, WG-EMM had noted already that the occurrence of fish larvae bycatch observed in the krill fishery was higher than the previous general understanding of bycatch in this fishery. The Working Group agreed that such results underscore the importance and need to increase observer coverage in the krill fishery.\(^\text{23}\)

In relation to specific comments made by the assessment team on the following Scoring guidepost:

Main retained species are likely to be within biologically based limits or if outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.

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\(^{21}\) The South Georgia stock recovered from three episodes of heavy exploitation in the mid-1970s and in the early and mid-1980s. However, stock size remained low after a fourth decline following the 1989/90 season. The stocks around the South Orkney and the South Shetland Islands are still only fractions of their sizes at the beginning of the fishery in 1977/78. K.H. Kock. “A Brief Description of the Main Species Exploited in the Southern Ocean”, at: http://www.ccamlr.org/pu/e/e_pubs/am/p7.htm


\(^{23}\) WG EMM 2006, para. 3.36.
important concentrations of these larval fish will be present in locations where the water circulation will lead to their retention on the shelf. These are not necessarily the same localities as those of the fishable krill aggregations because those concentrations occur in the localities where they have been brought to the region on the Antarctic Circumpolar Current.

ASOC would like to call the attention to the statement provided by the assessment team that reads “Observer analysis reports have stated that overall catches of larval fish is much lower in more southerly areas 48.1 and 48.2 than in Subarea 48.3” but it fails to provide any reference to support this statement. One wonders about this since according to the information available, the observer coverage in Subareas 48.1 and 48.2 is very low (very low numbers of hauls observed) and patchy and does not support this conclusion. As mentioned before, the SC noted in 2008 that there is still uncertainty over the level of bycatch of juvenile and larval fish in the krill catch over all seasons and areas in which the krill fishery operates, and from different fishing gears. We fail to see the rationale for the above conclusion. In addition, the assessment team fails to provide references for the remaining statements included in this paragraph, and thus, it is difficult to assess the veracity of these data and to consider this information in the right context.

Lanternfish, the second most common species in 48.3 in the winter, is no longer the subject of a directed fishery where it is abundant (Subarea 48.3), on the basis of its likely importance as a prey (forage) species in the food web. There is no formal assessment of the status of the stock, but this management measure and the low by-catch levels recorded make it very likely that krill fishing has resulted in a minimal and insignificant reduction in stock size.

We find difficult to understand how the assessment team can come to the conclusion that “krill fishing has resulted in a minimal and insignificant reduction in stock size” in relation to lanternfish when the same team acknowledges (in the same paragraph) that “there is no formal assessment of the status of the stock”. It is also difficult to understand what is the “management measure” that the assessment team is referring to.

Rockcod larvae (Notothenia spp.) were also identified within the catch. Although these larvae have not been identified down to the species level, it is precautionary to assume these include larvae of the species N. rossii. Directed fishing for the Antarctic rockcod (N. rossii) specifically has been prohibited since 1985, and recovery is being monitored for stocks which were overfished in the late 1960s and early 1970s. Prohibitions are also in place to protect other rockcod and icefish species (other than C. gunnari, this being the most common genus in 48.2 in the summer) in Area 48. Rockcod appear to remain at low population levels.

As presented by the assessment team, Rockcod larvae also have been identified within the catch (a species that was highly depleted in the late 1960s and 1970s), not having recovered and remaining at low population levels. Based on the current high level of uncertainty in regards to larvae bycatch in by the krill fishery, it is unsatisfactory that there is no reference in regards to any measure adopted in order to prevent serious or irreversible harm to this retained species and/or to hinder recovery of it (as this PI mandates).
Measures are in place within the fishery as a result of the currently low catch level of krill (well below the precautionary trigger level), and the restriction of fishing around CEMP management sites, which will provide some localised protection.

However, there is no current strategy or partial strategy to react to further findings on the level of fish larval catch within the fishery.

It is incorrect to say “measures are in place within the fishery as a result of the currently low catch level of krill”, in reference to measures to avoid posing a risk of serious or irreversible harm to retained species and/or to hinder recovery of them. The “low catch level of krill” in relation to the trigger level, as the assessment team proposes, is related to krill and not to the retained species. In addition, the low catch level cannot be viewed as a measure that maintains retained species at a high level since catches can increase to up to 620,000 tonnes and can be locally concentrated, which could have significant effects on retained species. Thus, it is wrong to suggest that there are measures in place within the fishery to provide some localized protection. Furthermore, the insufficient level of observer coverage and the high level of uncertainty on bycatch of juvenile and larval fish in the krill catch over all seasons and areas preclude taking any conclusion on the level of protection for retained species.

In regards to CEMP sites, the assessment team shows no understanding on the nature and characteristics of these sites. First of all, these are not “management sites” as the assessment team wrongly states, but monitoring sites. In addition, there is no “restriction of fishing around CEMP sites” as the assessment team also suggests. CEMP sites are land-based sites and restrictions are related to the access of nationals of contracting parties to each site as mandated by the management plan for each site in accordance with a particular permit issued for a particular activity. Thus, the information provided in this sentence is wrong; CEMP sites do not provide any localized protection.

Interestingly enough, the assessment team further states that “however, there is no current strategy or partial strategy to react to further findings on the level of fish larval catch within the fishery”. According to the above statement, there is no justification for the fishery to be awarded even the SG 60 level on this indicator.

If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.

The highest catch rates are for C. gunnari, which is considered within safe biological limits. While catch rates appear low based upon current information, the Notothenid and other icefish larval catches are of note, given the prohibitions on directed fisheries for these species (in Area 48 and Area 48.3 respectively).

As mentioned previously, the depleted status of Rockcod (Notothenia spp.) and the uncertainties in regards to the level of catch of juvenile and larvae rockcod, is a matter of concern and should be noted (and acted upon). The same applies to icefish and the uncertainties in regards to the level of larvae catch rates.

Measures in place for the krill fishery as a whole are at present the precautionary trigger level of 620 000t of krill, while practices in place to minimise impact include the current lower level of krill catches. At that trigger level, a maximal catch of 99.5 larvae per tonne equates to 61 700 000 fish larvae caught, a worst-case situation given current information, and ignoring species-specific and area-specific catch rates. This number is not insignificant, and therefore continued monitoring of larval bycatch is warranted, particularly to identify approaches to reduce catches of species (e.g. through spatial or temporal approaches) and the spawning seasons of the different stocks.

However, based upon a conservative evaluation assuming either the current total catch level of krill or the current catch trigger level is taken from one place, and in light of the high rate of natural mortality in younger fish, impacts would be expected to be no more than background variability and hence undetectable at these levels.

As stated earlier in this section, the “low catch level of krill” in relation to the trigger level, cannot be viewed as a measure that maintains retained species at a high level. Furthermore, it is confusing that the assessment team states that the maximal catch of fish larvae per tonne at a worse-case scenario is “not insignificant” so that “continued monitoring of larval bycatch is warranted, particularly to identify approaches to reduce catches of species”, but concludes that “impacts would be expected to be no more than background variability and hence undetectable at these levels”. There is no objective basis for this conclusion and thus it should not be taken into account.

At a species-specific level, while catch levels of species such as Notothenidae are relatively low (<4 individuals per tonne of krill), that bycatch limits of adults in other adult fish fisheries in the area are (for example) 300t, and the impact at current low catch levels on the viability of adult populations is likely to be slight, there remains a need to reduce bycatch of this and other species to ensure that the fishery does not hinder recovery and rebuilding.

The paragraph above does not have any reference and the conclusion that “the impact at current low catch levels on the viability of adult populations is likely to be slight” is not the result of any objective analysis but rather a subjective opinion without any information to sustain it.

References: MRAG (2009); CCAMLR CMs 34-04, 34-05, 34-06, 32-07, 33-01, 51-01, 91-01; Iwamu and Naganobu (2008); Client interview; CCAMLR (2008c)

As it has been explained in detail in the paragraphs above, the information provided by the assessment team throughout its assessment of this PI does not sustain the conclusion reached. It is clear that the level of uncertainty in relation to bycatch of fish larvae by the krill fishery (including Aker Biomarine operations) does not allow concluding, as required by this PI, that “main retained species are likely to be within biologically based limits”. The assessment team fails to provide any objective data to sustain this finding, and only speculative assumptions are presented to infer that “impacts would be expected to be no more than background variability and hence undetectable at these levels”. The status of these species is in fact “poorly known”, as acknowledged by the assessment team, and there are no “measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering
ASOC finds the response given by the assessment team to stakeholders’ comments on this point unsatisfactory. In response to concerns raised by the AKCP, ASOC and Pew, Moody Marine responds: “plausible argument based upon the calculations made by the assessment team using information from the Aker BioMarine investigations into the species and quantities of fish larvae bycatch is that in the worst case scenario, the impact would be lost within background variability”. However no quantification is given whatsoever on the magnitude of estimated larvae bycatch, or on background variability for the species concerned. This statement is therefore impossible to verify.

ASOC is also concerned about the response given by the assessment team to Dr. Steve Nicol in relation to this PI, since this response does not address the very important points raised by the reviewer.

We are now presenting here the exchange between Dr. Nicol and the assessment team, and our conclusions from this exchange:

Moody Marine answer to Steve Nicol’s comments:

2.1.1

**Steve Nicol:** Because of the uncertainties over bycatch of larval fish (some of which are highly depleted species) it is difficult to see how this fishery can meet a minimum scoring criterion.

Moody Marine Comment to Steve Nicol: The uncertainty over larval fish bycatch is noted within the SG text. However, the majority of larvae taken are from *C. gunnari*, which is considered sustainably exploited around South Georgia. For potentially over-exploited species, even when the ‘worst case’ scenario was taken within a rough calculation of the maximal larval mortality at trigger level catches, given the biology of the species the impact was considered to be negligible compared to background variability. However, a condition (condition 2) was raised to address this more fully.

As mentioned earlier in this section, the assessment team fails to provide an objective basis to conclude that “the impact was considered to be negligible compared to background variability”. Furthermore, as stated by Dr. Nicol, there are large uncertainties in regards to the bycatch of fish larvae (some of which are from highly depleted species) indicating that this fishery could not meet the minimum scoring for this PI.

Component: Retained non-target species

PI Category: Management Strategy

2.1.2 There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.
Moody Marine provides a score of: 60 (A score of 60 means that a condition has been generated-Refer Condition 2)

SG 60: There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.

The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments:

This PI is scored on the basis of the current catch trigger level of 620,000 t.

There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.

The current low catch levels of krill represent a measure that reduces the impact of krill fishing on fish larvae, while the precautionary catch trigger level represents a further measure. However, these cannot be viewed as specific (partial) strategies aimed at ensuring fish larval catches are unlikely to affect adult fish population levels; they represent partial strategies directed for krill population management, and their effectiveness for minimizing the impact of krill fishing on fish populations has not been formally evaluated.

As we have stated in the previous PI, neither the “low catch level of krill” nor the trigger level represent measures “to reduce the impact of krill fishing on fish larvae” as the assessment team suggests. The assessment team further recognizes that “they represent partial strategies directed for krill population management, and their effectiveness for minimizing the impact of krill fishing on fish populations has not been formally evaluated”. In light of the latter comment, it is clear that there is no way to determine whether the strategy might work because it “has not been formally evaluated”. Thus, this paragraph does not support the criterion used for this PI, since there is no measure in place that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding (as this PI mandates).

There is a strategy in place for collection of information directly from the fishery about other retained species. This allows the impact of future strategies to be monitored. At this stage the
level of risk to the adult stocks has been regarded as low (see 2.1.1) but ongoing research is being conducted to quantify the level of bycatch down to the species level. Work on identification of these species of bycatch and analysis of bycatch rates in the krill fishery is currently ongoing through the observer programme.

First of all, it is incorrect to say that “there is a strategy in place for collection of information directly from the fishery about other retained species”. CCAMLR has not yet been able to agree on a systematic observer coverage scheme for the krill fishery which would be the basis for any information collecting strategy. As explained repeatedly throughout this document, systematic observer coverage has been “systematically” blocked by a small minority of fishing nations over many years, and thus there is no system in place to obtain representative information on the catch rate of retained species in the krill fishery. As mentioned before, in its latest meeting (November 2009) CCAMLR agreed on 30% observer coverage to accommodate the position of some members (i.e. Korea). As it has been also already explained, this level of coverage will not be sufficient to provide a representative coverage of areas and seasons for the krill fishery. In addition, the CCAMLR’s Scientific Committee has not developed advice on the acceptable level of bycatch for different fish species (including previously depleted populations) in the krill fishery, and thus the level of risk to the adult stocks cannot be regarded as low as the assessment team suggests. As stated, this paragraph is incorrect.

C. gunnari is subject to stock assessment, while status of other species are based upon the results of scientific surveys. There is no directed fishery for lanternfish in Subarea 48.3, due to its likely importance as a prey (forage) species in the food web. There is no formal assessment of the status of the stock, but this management measure and the low by-catch levels that are recorded make it very likely that fishing has resulted in minimal and insignificant reduction in stock size.

As already mentioned in the previous PI, it is difficult to understand how the assessment team can come to the conclusion that “krill fishing has resulted in a minimal and insignificant reduction in stock size” in relation to lantern fish when the same team acknowledges (in the same paragraph) that “there is no formal assessment of the status of the stock”. This is a subjective opinion not based on any rigorous analysis and as such should not be taken into account.

Rockcod (Nototheniidae) and other icefish species larvae have also been identified within the catch. Directed fishing for the Antarctic rockcod (Notothenia rossii) has been prohibited since 1985, and recovery is being monitored for historically overfished stocks, while prohibitions on directed fishing are also in place for other icefish species. Limits on the bycatch of adult fish are also in place.

As mentioned in the previous PI, the uncertainties in regards to the level of catch of juvenile and larvae rockcod and icefish are a matter of great concern. It is not clear what the assessment team means when they state that “limits on the bycatch of adult fish are also in place”. This is a vague statement that is not sustained by any further explanation or reference. As in the previous paragraph, this is not an appropriate statement.

The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).
Based upon low catch levels dictated by the current catch trigger level (620 000t), the measure can be expected to result in relatively minimal impacts on adult fish biomass, based upon plausible argument. There is some evidence that this is likely to work due to those low catch levels. However, there is no objective basis for this confidence without additional study.

As we have clearly stated before, the current krill catch level alone cannot be regarded as a measure to maintain retained species at high levels. In addition, with the current information it is not possible to conclude that one can expect “relatively minimal impacts on adult fish biomass”. What is very disturbing is that the assessment team acknowledges that “there is no objective basis for this confidence without additional study” but provides a score to this criterion that allows the fishery to pass. This is a mistake on the part of the certifier. Under these circumstances, the assessment team should not have given a minimum score to this criterion until this further study was completed, as Dr Nicol has also suggested in his comments (here below).

References: CCAMLR CM 33-01, 34-04, 34-05, 34-06, 32-07, 51-01, 91-01; CCAMLR (2008c); MRAG (2009)
Moody Marine Comment to Steve Nicol: As per the scoring guidepost text, and as noted above, plausible argument in the worst case scenario suggested that the impact would be lost within background variability. The lack of an ‘objective basis’ for this means the fishery did not meet the level of the SG80 text, bit a score of 60 was considered appropriate.

ASOC agrees with Dr. Nicol on his comments as we have explained earlier in the document.

Component: Management Strategy

PI Category: Information/monitoring

2.1.3 Information/monitoring: Information / monitoring: Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.

Moody Marine provides a score of: 90

Moody Marine Score: 90

SG 80: Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery. Information is sufficient to estimate outcome status with respect to biologically based limits. Information is adequate to support a partial strategy to manage main retained species. Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy.

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

As a general comment in relation to this PI, it is clear that the information currently available to CCAMLR cannot support the development of measures to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species as required by this PI. The lack of systematic scientific observation data is a major impediment to achieve this. As noted above, in 2006, WG-EMM noted that the occurrence of fish larvae bycatch observed in the krill fishery was higher than the previous general understanding of bycatch in this fishery. The Working Group agreed that such results underscore the importance and need to increase observer coverage in the krill fishery.

Moody Marine comments

Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.
CCAMLR has asked Members to intensify their investigations into the by-catch of juvenile fish and to extend them to other seasons so that CCAMLR can assess more precisely where and when fish are most vulnerable to the krill fishery, and take appropriate action [http://www.ccamlr.org/pu/e_e_pubs/am/p6.htm#(ii)Midwater]. An observer is present onboard Saga Sea while fishing for krill in Area 48. An appropriate scientific protocol has been developed for sampling fish larvae within the catch, which has been analysed and reported to CCAMLR.

Identification of fish larvae sampled from the catch is ongoing. Species identification has been achieved for most species, but some have so far only been identified to genus level. Quantitative information is therefore available at the species level for specific species, and at the genus level for others.

The statement “CCAMLR has asked Members to intensify their investigations into the by-catch of juvenile fish and to extend them to other seasons so that CCAMLR can assess more precisely where and when fish are most vulnerable to the krill fishery, and take appropriate action” does not support the scoring, since until these investigations are actually carried out (or made compulsory through a conservation measure), no further information will be available on the impact of the krill fishery on juvenile fish. Thus, this statement does not have any practical implication for scoring under the current circumstances.

As explained in previous sections of this document, although the bycatch monitoring activities conducted on board the Saga Sea set a good example for other vessels, it will not provide quantitative information on the amount of main retained species taken by the whole fishery (i.e., all vessels.).

Modelling of factors which influence larval bycatch are ongoing, based on the years of data collected so far, and will help develop any further mitigation measures required for the fishery. Due to the nature of the fishery, these data are constrained in time and space, and hence a full analysis of the variability resulting from these factors has not yet been performed.

The assessment team acknowledges that a full analysis of variability of the factors which influence larval bycatch has not yet been performed. Thus, this incomplete analysis is not sufficient to sustain the needed scoring with respect to this PI.

(This achieves SG80 for the first paragraph)

It is very difficult to understand how the assessment team can conclude that based on these two paragraphs (which are not sustaining a minimum score for this criterion) a score of SG 80 can be granted to this PI.

*Information is sufficient to estimate outcome status with respect to biologically based limits.*
Given available information on fish larval catch rates by area and season (if partial in cases), biological information of adult growth and mortality estimates, available approaches for estimating at-age natural mortality, and biomass estimates for many species, there is sufficient information to develop estimates of outcome status with respect to adult biologically based limits. However, this has not yet been performed (see 2.1.1.)

It is not true that available information on fish lavae catch rates by area and season, among others, is sufficient “to develop estimates of outcome status with respect to adult biologically based limits”. As explained above, at the CCAMLR 2008 meeting, the Scientific Committee noted that there is still uncertainty over the level of bycatch of juvenile and larval fish in the krill catch over all seasons and areas in which the krill fishery operates, and from different fishing gears. Thus, this statement is incorrect. In any case, we note that the assessment team further recognized that “estimates of outcome status with respect to adult biologically based limits have not yet been performed”.

(This achieves SG80 for the second paragraph)

As in the previous criterion, it is difficult to understand how the assessment team can come to the conclusion that based on this paragraph (which does not serve to provide a minimum score) this criterion achieves SG 80 in regards to this paragraph.

Information is adequate to support a partial strategy to manage main retained species.

Information on the spatial and temporal pattern of larval catch is being developed through the ongoing international observer coverage onboard the Saga Sea. This information is adequate to support the development of partial strategies to manage the main retained species, as necessary, and will be expanded with continual coverage of the vessel in future years. Available information could support strategies such as move-on rules. (This achieves SG80 for the third paragraph).

As a general comment, it is important to note that it is unclear what is meant in this PI by a “partial strategy” and how this partial strategy can achieve sustainability at the level of outcome status. In addition, as explained before, the bycatch monitoring activities conducted on board the Saga Sea are not adequate to support a partial strategy to manage main retained species, since in order to develop this sort of strategy, the overall bycatch of the whole fishery needs to be considered. The assessment team uses the expression “to support the development of partial strategies to manage the main retained species” which is not correct and differs from the basic requirement to fulfill this criterion, “which is to support a partial strategy to manage...”. Therefore, this criterion also fails to achieve the minimum score.

Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).

An international observer monitors the Saga Sea during all fishing activities. This 100% observer coverage collects information not only on the fisheries operations, but also any bycatch, discards
and incidental mortalities that occur within the fishery. The observer covered between 20 and 86% of ‘trawls’ during the fishing season in 2006/07.

As stated repeatedly throughout this document, observer activities on board the Saga Sea are not sufficient to obtain the necessary information on the nature and extent of retained species so as to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species. The information obtained on the Saga Sea cannot be extrapolated to other vessels, fishing in different areas, using different gears, etc. In addition, 100 % observer coverage is not a clear measure of coverage since it only represents the presence of the observer on board; the relevant aspect of the observer coverage is related to the factual observation (i.e. number of hauls observed). Finally, independently of the percentage of observer coverage implemented on the Saga Sea, this criterion cannot be fulfilled since it should be applied to the whole fishery (all vessels).

Using the scientific protocol developed, the sampling of larval retained species is sufficient to detect any increase in risk level. While the lack of full identification of all species means that the ongoing mortalities of all retained species cannot be noted (some are currently only identified to genus level) further studies are underway to improve this. (This achieves SG95 for the fourth paragraph)

The scientific protocol at its best could provide information on the level of larvae retained species captured during fishing operations conducted by the Saga Sea, but by no means allows detecting any increase in risk level for retained species at the level of operations of the whole fishery, which is required by this PI. Hence, this criterion does not meet the minimum scoring and even less a value of SG95 as suggested by the assessment team.

MRAG (2009); CCAMLR (2008d); client interview

Based on all the information detailed above, ASOC believes that the level of information on retained non-target species is not sufficient to “broadly understand outcome status with respect to biologically based limits”, as required by the minimum SG 60 standard. Due to the patchiness of the scientific observer program, the information is inadequate to support measures to manage the issue of retained non-target species (see comments below on the issue of “unit if certification” for this PI). Furthermore, although Aker Biomarine operations are subject to scientific observation, the level of study of fish larvae bycatch is yet at such incipient state that cannot support management measures to address this problem.

As in relation to other PIs above, ASOC finds the response of the assessment team to stakeholders’ comments largely unsatisfactory. Moody Marine response: “P.I 2.1.3 scores against the information available and monitoring in position, for the unit of certification (Aker BioMarine vessel- The Saga Sea and not all vessels (in keeping with the MSC requirements for scoring Principle 2)). The Saga Sea has an observer present during 100% of its time at sea. The observer provides quantitative information that has been examined scientifically. This is reflected in the SG80 score of the first section (‘qualitative and some quantitative information’). This provides
sufficient information, combined with known biological parameters for the species, to develop outcome status with regard to biologically based limits for the species (as was rapidly performed to answer 2.1.1 and 2.1.2, but as noted has not been ‘officially’ performed, and is the subject of the condition arising from 2.1.1. and 2.1.2) and therefore again meets SG80 text. Information is sufficient to support a partial strategy as noted, again meeting the SG80 text. Given the continued 100% observer coverage on the unit of certification, data are collected in sufficient detail to assess ongoing mortalities of retained species, which would score at the SG100 level, but as noted not all have been identified to this level. A score of 95 was therefore given for this paragraph, which under MSC guidelines provides an overall score of 90. Additional text has been added to clarify this scoring (scores have been added to the text to show how the overall score of 90 was obtained”).

There is a fundamental problem here which is the issue of the “unit of certification” against which this PI is scored.

According to the assessment team, the MSC methodology assesses the whole stock under Principle 1 and then focuses on the unit of certification for Principles 2 and, in part, 3. I would seem that, for those PIs under principle 2, the assessment team considered the operations of the Saga Sea as an independent unit. As mentioned in our comments above, specifically focused on the concept of “unit of certification”, the issue of retained species (PIs 2.1.1, 2.1.2 and 2.1.3) cannot be considered with respect to the operations of Aker Biomarine only. This is because the bycatch rates of fish larvae by the Saga Sea have an accumulative impact with respect to those produced by other vessels. It is conceptually impossible to differentiate the impact of a single vessel or a group of vessels on retained non-target species populations from the impact of the rest of the fleet operating in the same area, unless it can be shown that these vessel (s)’ bycatch rates are equal to zero (which is not the case). We therefore find inappropriate to score this PI against the operations of the Saga Sea only. However, even in the case that only the operations of the Saga Sea were considered, the minimum score is clearly not met. This is because the level of study of fish larvae bycatch is yet at such incipient state that cannot support management measures to address this problem.

ASOC is also concerned by the lack of adequate response to one of the reviewers of the report for this PI.

We are now presenting here the exchange between Steve Nicol and the assessment team, and our conclusions from this exchange:

Moody Marine answer to Steve Nicol’s comments:

2.1.3

Steve Nicol: It is difficult to see how the scoring of this criterion was arrived at given the overall lack of data and analyses.

Moody Marine Comment to Steve Nicol: 2.1.3 scores against the information available and monitoring in position, for the unit of certification. The Saga Sea has an observer present during 100% of its time at sea. The observer provides quantitative information that has been examined scientifically. This is reflected in the SG80 score of the first section (‘qualitative and some quantitative
information’). This provides sufficient information, combined with known biological parameters for the species, to develop outcome status with regard to biologically based limits for the species (as was rapidly performed to answer 2.1.1 and 2.1.2, but as noted has not been ‘officially’ performed, and is the subject of the condition arising from 2.1.1. and 2.1.2) and therefore again meets SG80 text. Information is sufficient to support a partial strategy as noted, again meeting the SG80 text. Given the continued 100% observer coverage on the unit of certification, data are collected in sufficient detail to assess ongoing mortalities of retained species, which would score at the SG100 level, but as noted not all have been identified to this level. A score of 95 was therefore given for this paragraph, which under MSC guidelines provides an overall score of 90. Additional text has been added to clarify this scoring (scores have been added to the text to show how the overall score of 90 was obtained).

ASOC fully agrees with Dr. Nicol’s comment that it is very dubious how the assessment team provided scoring to this criterion given the overall lack of data and analyses. In relation to the comments provided by Moody Marine that “2.1.3 scores against the information available and monitoring in position, for the unit of certification”, it is important to note that this distinction in relation to the “unit of certification” is not present neither in the formulation of this PI, nor in the initial scoring comments provided by Moody Marine, which were always referred to the “fishery”. 25 On substance, ASOC believes that it is not possible to score PIs on non-target retained species in relation to the unit of certification (one vessel) only, since the impact of the fishery on these species is of a cumulative nature. Unless the Saga Sea could ensure a “zero bycatch situation”, it is impossible to determine that the impact of the Saga Sea in the context of the whole fishery is acceptable and meets the standard required (this is because the Saga Sea is contributing, to an uncertain extent, to the problem). Therefore, in order to support an effective management strategy, information on the bycatch of target non-retained species by the whole krill fishery needs to be available.

Component: ETP species

PI Category: Information/ Monitoring

2.3.3 Relevant information is collected to support the management of fishery impacts on ETP species, including: information for the development of the management strategy; information to assess the effectiveness of the management strategy; and information to determine the outcome status of ETP species.

Moody Marine provides a score of: 95

SG 100: Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.

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25 See also our comments above on the misapplication of the concept “unit of certification” in this assessment.
Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.

Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments

Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.

<table>
<thead>
<tr>
<th>ETP species can be based upon those on the CITES listing. Using South Georgia and South Sandwich Islands entries as a basis, those of concern that may relate to the fishery under certification therefore include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commerson’s Dolphin/Piebald Dolphin (Cephalorhynchus commersonii)</td>
</tr>
<tr>
<td>Spectacled Porpoise (Phocoena dioptrica)</td>
</tr>
<tr>
<td>Common Rorqual/Fin Whale (Balaenoptera physalus)</td>
</tr>
<tr>
<td>Southern Right Whale (Eubalaena australis)</td>
</tr>
<tr>
<td>Antarctic Fur Seal (Arctocephalus gazella)</td>
</tr>
<tr>
<td>Subantarctic Fur Seal (Arctocephalus tropicalis)</td>
</tr>
<tr>
<td>Southern Elephant Seal (Mirounga leonina)</td>
</tr>
<tr>
<td>CCAMLR international scientific observers record information key to the assessment of compliance with CCAMLR Conservation Measures. Under these observer protocols, detailed observer records are maintained on the presence of ETP species around the vessel during fish activity and any mortality and injury events relating to ETP species are recorded by the observers, with samples being retained for assessment by Member States. The magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species are therefore well known. The observer information obtained is sufficient to quantitatively estimate the status of ETP species interactions with a high degree of certainty. Further monitoring of ETP species (e.g. albatross) occurs through the CEMP monitoring programme.</td>
</tr>
</tbody>
</table>

Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.

The CEMP and observer programme provide considerable data to support the ETP injury and mortality mitigation strategies developed and employed by CCAMLR over the past twenty years. Information from these sources and the resulting strategies has reduced the levels of interaction and subsequent injury and mortality of ETP species greatly.
identified as monitoring continues. Where needed, the strategy can continue to develop to manage impacts, and minimise mortality and injury of ETP species. While the CEMP programme (given its land-based nature) does not include whale species – in particular baleen whales – CCAMLR have initiated joint programmes with IWC in an attempt to improve the ecosystem modelling and understanding of those krill dependent species, which should improve this information into the future.

Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.

The Saga Sea has a very good observer coverage rate, at 100% of fishing days covered. The CEMP data provides a time series of key predator population characteristics. Although the degree of data collection under this programme has varied over time, a key site in each sub-area of Area 48 continues to be monitored with high coverage. Ad hoc monitoring has also been performed using underwater camera gear, during gear development and during the early period of commercial use. This allowed direct observation of the efficacy of mitigation measures while fishing. Continued evaluation will continue through the scientific observer programme and there is a high degree of certainty that this strategy is achieving its objectives. Information is therefore sufficient to quantitatively estimate outcome status for the unit of certification with a high degree of certainty. Information from the Saga Sea is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species (although some limitations with respect to whale species are noted), and evaluate with a high degree of certainty whether a strategy is achieving its objectives. Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.

References: MRAG (2009); Watters et al. (2008a, 2008b); CCAMLR (2008d, 2008e); client interview; CCAMLR CMs 25-03 (2003), 26-01 (2008); Orr et al. (2007); observer reports; CCAMLR observer manual; interview with Greenpeace, interview with WWF; Constable (2008)

We are now presenting here the exchange between Steve Nicol and the assessment team, and our conclusions from this exchange:

Moody Marine answer to Steve Nicol’s comments:

2.3.3

Steve Nicol: This score is based on information from CEMP and from scientific observers. Because of the lack of systematic data collection by either of these processes, information is only adequate for this scoring criterion thus the score should be revised downwards.

Moody Marine Comment to Steve Nicol: There seems to be confusion here, since 2.3 scores the direct impact of the unit of certification on ETP species, rather than ecosystem impacts of the krill fishery as a whole, which are considered under 2.5. As noted in 2.3.1, direct observation through observers and underwater camera
studies has shown no fatal interactions with ETP species. In light of this, there is sufficient information to quantitatively estimate outcome status with a high degree of certainty for the unit of certification, through the mechanisms noted. To clarify this further, the following changes have been made to the final paragraph:

“Information is therefore sufficient to quantitatively estimate outcome status for the unit of certification with a high degree of certainty. Information from the Saga Sea is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species (although some limitations with respect to whale species are noted), and evaluate with a high degree of certainty whether a strategy is achieving its objectives. Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.”

ASOC agrees with Dr. Nicol that this PI was greatly over-scored by the assessment team, taking into account the lack of systematic data both from CEMP and the scientific observer program. It is hard to understand how the available data can constitute “accurate and verifiable information on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species”. For ETP species like Antarctic fur seals monitoring currently only exists in two sites (Cape Shirreff and Bird Islands), and no baleen whale species have ever been covered by CEMP.

In relation to Moody Marine’s response to the reviewer that this PI scores the direct impact of the unit of certification on ETP species, rather than ecosystem impacts of the krill fishery as a whole, we refer to our previous comments on the misapplication of the concept “unit of certification” in this assessment. In addition, it is clear from the drafting of this PI that information is required on the magnitude of ALL impacts of the fishery on ETP species, and not only direct species. This is consistent with the endangered, threatened and protected nature of these species, which merits special consideration of all sorts of impacts (direct and indirect). The overall impacts of the fishery on the ecosystem as a whole constitute a different issue, which is dealt with by PIs in 2.5. The assessment team itself seems to acknowledge this in the scoring comments to this PI when they take into account the fact that CEMP monitors krill predators. As mentioned earlier in this document, the goal of CEMP is to obtain information on the indirect impact of fishing on krill predators. In this context, it is not possible to differentiate indirect impacts on ETP predator species (such as potential competition for a key prey such as krill) by a single vessel and therefore the PI needs to be referred to the whole fishery.

Component: ecosystem

PI Category: Outcome / Status

2.5.1 The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.

26 The PI reads: “Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species”. 
Moody Marine provides a score of: 80

SG 80: The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments

The Aker BioMarine fishery is part of the larger CCAMLR managed fishery, which contributes part of the total extraction, and so this PI considers the total levels of current extraction. This status PI is therefore judged against the current catch level of krill within the fishery, of on average 113 000t.

The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.

Given the pivotal role of krill within the Antarctic ecosystem, a large amount of effort has been invested in assessing the likely impacts of krill biomass fluctuations and removals on ecosystem status and performance.

Current levels of krill extraction are at low levels compared to the precautionary biomass trigger level, which is based upon the biomass estimated from the 2000 krill survey (see 2.5.2). This precautionary level was selected on a precautionary basis using ecosystem considerations as an underlying driver, taking account uncertainty in signal strength, krill inter-annual biomass fluctuations and a risk-based simulation approach.

The predator requirement estimate of 3,466,157 tonnes is approximately 10% of the biomass estimate from the combined krill survey in 2000. Current extraction levels represent 3% of the 2000 total biomass level. At the macro-geographic scale, therefore, expert judgement expects that this level of extraction will not result in disruption to the key elements of the ecosystem structure.

This is supported by some observational and simulation evidence. The CEMP programme, supported by other site-specific monitoring studies (e.g. as performed by BAS), provides a time series of data monitoring breeding success and krill predator population numbers. While declines in particular species have been seen (e.g. Macaroni penguins), the data do not provide a link between these declines and the extraction of krill through fishing at current levels.

A first comment is directed to note the wrong statement made by Moody Marine which reads: “compared to the precautionary biomass trigger level, which is based upon the biomass estimated from the 2000 krill survey”. The trigger level is not based on the biomass estimated from the 2000 Synoptic krill survey but it is
the sum of maximum catches that took place historically in each of the Subareas 48.1 to 48.4. Furthermore, the statement provided above suggesting that there is no evidence of the link between observed declines in several krill predator species and impacts from fishing fails to incorporate the need to adopt a precautionary approach to fisheries. According to the precautionary approach, it is not appropriate to wait until conclusive evidence exists that an activity is causing irreversible harm to introduce protective measures. This is particularly relevant in the case of Antarctic krill since, as it has been noted earlier in this document, CCAMLR has acknowledged that in its current configuration, CEMP may never allow to distinguish the impacts from fishing and those caused by environmental factors. Therefore, even if it has not been proved that the decline of certain predators has been caused by krill fishing, the mere observation of a decline is a cause of concern. Until it can be shown that the decline is independent from the fishing activities, it is not possible to conclude, that fishing is not disrupting top predators.

The data have assisted in the parameterisation of complex ecosystem models to investigate the impacts of krill fishing on predator populations. Using the FOOSA model, Watters et al. examined a range of levels of krill extraction relative to the precautionary harvest rate and trigger level for SSMUs. Their simulations suggest that the current trigger level for division of krill TACs into SSMUs appears ‘highly likely’ to result in the ecosystem remaining within biologically based limits. As a result, current extraction levels, as considered within this PI, are unlikely to result in impacts to local predator populations. However, further study is needed to appropriately define SSMU-scale TAC levels and overall TAC limits. Their simulations take into account a number – but not all – areas of uncertainty. In turn, studies have indicated that localised effects of krill fishing on predators might occur. Therefore this PI is scored at 80.

The paragraph above contains confusing statements and shows a lack of adequate understanding of the risk assessment undertaken by Watters et al. in 2008 using the FOOSA model. Firstly, in is unclear what is meant by “their simulations suggest that the current trigger level for division of krill TACs into SSMUs appears ‘highly likely’ to result in the ecosystem remaining within biologically based limits”. Before discussing the substance of this statement it is important to note that the authors are using the following term: “the current trigger level for division of krill TACs into SSMUs” in a rather confusing and inaccurate way. The trigger level does not provide any instrument/tool for division of krill TACs into SSMUs as this expression might let to think. The trigger level only provides a limit that cannot be surpassed unless an allocation of krill catches amongst SSMUs is previously agreed. Thus, it does not have any conceptual relationship with the process to allocate krill catches, nor it facilitates or secures the allocation of catches, it only provides a limit. This should be clear and the term should be used in a proper way.

Going now back to substance, what the risk assessment in 2008 did was to analyse possible risks to the ecosystem associated with the use of Options 2, 3, and 4 for allocation of krill catches amongst SSMUs. Since these allocations have not been implemented (no option has been selected yet by CCAMLR), the 2008 risk assessment cannot be used to describe the risk associated with the current situation (i.e., no SSMU allocation at current catch levels). It is important to note, as we already mentioned in our initial comments, that the 2008 risk assessment did not include the analysis of Option 1 (historical distribution of catches, which corresponds to the current fishing pattern) as it had been ruled out earlier by WG-EMM because it was considered to pose a higher risk to predators. Therefore, it is incorrect to conclude that “as a result, current extraction levels, as considered within this PI, are unlikely to result in impacts to local predator populations”. It is also very surprising to note, that, although the assessment team
recognizes that “studies have indicated that localized effects of krill fishing on predators might occur”, they still conclude that the fishery is highly unlikely to disrupt key ecosystem elements. Clearly this is not a logical conclusion from the evidence presented.

Within the current trigger level, the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.

In regards to the paragraph above, in addition to the considerations already made in relation to the lack of a consistent analysis of existing data and studies, it is very important to note that there is now new evidence that confirms that the current trigger level is not sufficient to prevent ecosystem impacts as a result of fishing. Watters et al. (2009) have undertaken a new risk analysis aimed at assessing the risks of allowing expansion of the fishery up to the trigger level without SSMU allocations. The assessment has concluded that such an expansion is likely to risk depletion of krill-dependent predators. Therefore, the paper concludes that current trigger level may not be sufficiently precautionary to achieve CCAMLR’s management objectives. Consequently, in the light of the existing information it is incorrect to affirm that “with the current trigger level, the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm”. The result of this is that this fishery should not receive a score of SG 80 for this PI.

Taking into account new evidence available (the risk assessment undertaken in 2009 on ecosystem implications of the fishery under the current fishing pattern), and taking into account that the capacity in the fishery currently exists to reach the trigger level, it is not possible to state that “the fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm” as required by SG 60. Therefore, the fishery does not reach a minimum score with regards to this PI, and should not be certified.

As in other PIs, ASOC finds the response of the assessment team to stakeholders’ comments largely unsatisfactory.

Moody Marine’s response: “The expert judgement of the assessment team was that at the macro-geographic scale these levels of extraction will not result in disruption to the key elements of the ecosystem. The recognition that the localized effects of krill depletion may occur and that further study is required to appropriately define localised TACs as well as the lack of all uncertainties being taken into account by the simulations were all identified by the team within the report and scoring table text. The information was judged as being suitable to meet the MSC requirements for scoring SG80 (see above) but no higher. Changes in the pattern and level of the fishery, and new evidence arising, would be identified during the annual surveillance audits.”

It is unclear to ASOC what is meant by the assessment team when reaching the conclusion that “at the macro-geographic scale these levels of extraction will not result in disruption to the key elements of the ecosystem”. The scope of the “macro-geographic scale” is not defined. In addition, although the potential for localized depletion is generally recognized, there seems to be an underlying assumption that local depletion of krill will not affect predator populations significantly. This assumption contrasts with the findings of Watters et al (2009) which demonstrate that the current fishing pattern (i.e.,
without spatial allocation of catch limits), is likely “to risk depleting predator populations to 75% or less than the abundances that might occur in the absence of fishing”.

ASOC is also concerned about the lack of consideration of one of the reviewers’ comments to the draft report. We are now presenting here the exchange between Steve Nicol and the assessment team, and our conclusions from this exchange:

Moody Marine answer to Steve Nicol’s comments:

2.5.1

Steve Nicol: Given the uncertainties surrounding the ecology of krill, the lack of observation of the fishery (and its uncertainties) and the immature nature of the CEMP this criterion can be scored at best as: The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. The discussion on the risks associated with subdivision of the catch limits does not deal with the risks posed if the catch up to the trigger level is taken in a small area. It is a very bold and brave statement to assert that Within the current trigger level, the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. I am not sure that many scientists working in the CCAMLR community would be prepared to agree with this. Consequently the score for this criterion should be revised downwards.

Moody Marine Comment to Steve Nicol: The view expressed by the reviewer is highly precautionary, and appears contrary to both the historical pattern of the fishery and the information available from current simulation studies. It is recognised that simulation results are predicated upon the assumptions made during their development. However, a range of assumptions appear to have been used and results at the trigger point were (generally) robust to those assumptions. Changes in the pattern and level of the fishery, and new evidence arising, would be identified during the annual surveillance audits, and the score could be re-evaluated on that basis. Based upon current information, however, the score appears justified.

ASOC agrees with the reviewer’s comments above. Besides of noting the confusing answer from Moody Marine to Dr Nicol’s comments, we would like to point out again that there is now new evidence that shows that the trigger level is not sufficiently precautionary to prevent irreversible ecosystem impacts from the fishery (Watters et al., 2009). Thus it is not appropriate to wait until annual surveillance audits are performed to re-evaluate the situation, as suggested by the assessment team, since new evidence is available now that requires a new score. As we noted before, the recent risk assessment undertaken in the CCAMLR framework shows that catches up to the current trigger level may pose significant risks to krill predators. It is important to note that, as acknowledged by CCAMLR’s Scientific Committee, the capacity now exists within the fishery to exceed the 620,000 trigger level. Since it is now clear that the trigger level does not provide sufficient protection to predators from the impacts of fishing, and catches can increase up to this level with no further provisions in place, it is not possible to sustain that the “fishery is unlikely to disrupt the key

27 SC-CCAMLR XXVII, paragraph 4.4.
elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm”. As stated above, it is therefore clear that under the current trigger level the fishery does not achieve SG 60 for this PI.

Component: Ecosystem

PI Category: Management Strategy

2.5.2 There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.

Moody Marine provides a score of: 80

SG 80: There is a partial strategy in place, if necessary, that takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.

The partial strategy is considered likely to work, based on plausible argument (eg, general experience, theory or comparison with similar fisheries/ ecosystems).

There is some evidence that the measures comprising the partial strategy are being implemented successfully.

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments

There is a strategy that consists of a plan, containing measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem.

As noted in 1.1.1 and 1.1.2, the strategy for krill management has been developed in recognition of the role of krill within the ecosystem. The implicit strategy is based upon the precautionary trigger level, which cannot be breached until small-scale management units (SSMUs) are put in place, with SSMU-specific quotas. This strategy of catch limitation is operational, although fishing levels have not been nearly high enough to test the application of this plan. Therefore, the plan is implicitly used to demonstrate that the current catch is much lower than the planned catch and therefore highly precautionary. Modelling has recently been performed to assess the effectiveness of the plan (i.e. the precautionary trigger level) for maintaining ecosystem elements. However, it cannot be said that the functional relationships between the fishery and the components and elements of the ecosystem are well understood. There are well documented uncertainties within the ecosystem and krill food web, although understanding is adequate to
ASOC would like to note that Moody Marine’s scoring comments on this PI are difficult to understand since the assessment team is commenting on a different standard (SG 100) that the one finally applied (SG 80). It would be advisable that when a PI is scored downwards as a result of a reviewer’s comment, new scoring comments are prepared and referred to the SG finally applied and not to the one applied originally. Otherwise it becomes very difficult to follow through the assessment report.

With the information available, the assessment team acknowledges that it has been widely recognized that the functional relationships between the fishery and elements of the ecosystem are not sufficiently understood. This is certainly correct and several authors have highlighted it (Hill et. al, 2006; Kawaguchi and Nicol, 2007). It is rather surprising then, that the assessment team concludes that “understanding is adequate to develop and test reasonably robust strategies and the trigger level appears sufficiently precautionary to sustain predator requirements at the global scale”. This last statement is not correct for several reasons:

1. First of all, the fishery does not operate at the global scale, but a local scale, and in a concentrated way. Therefore, we think that it is not appropriate to centralize the discussion on the predator requirements at the global scale when this is not the scale at which the fishery operates. This is especially so because concern has been expressed repeatedly at CCAMLR about the overlap between krill fishing operations and the foraging range of land-based krill predators, which could result in a reduction of krill availability for these predators at certain times of the year when food is key to support breeding success.

2. As detailed by Hill et al. (2006) and others, recent attempts to model the system have suffered from a shortage of empirical data on essential issues such as trophic relationships between krill and krill predators, krill movement and distribution or the effects of environmental change on krill populations. For example, WG-EMM has acknowledged that estimates of predator consumption are uncertain primarily as a result of incomplete estimates of abundance of predators and also that local krill densities are not adequately estimated in available analyses of the CCAMLR-2000 Survey. In addition, the models do not incorporate the dynamics of fish populations whose role in the ecosystem is an important source of uncertainty.28

3. As shown above, recent studies (Watters et al., 2009) applying FOOSA provide compelling information that the current management strategy (based on the trigger level as overall krill catch limit until SSMUs are implemented) may not be precautionary, since risks to predators are expected to be significant if catches approach the trigger.

4. In their paper, and due to the level of uncertainty involved, Watters et al. (2009) clarify that their conclusions may be negatively biased, which means that the risk assessment should be considered as indicating minimum risks to the ecosystem for any given harvest rate.

28 WG-EMM 2008 Report, para. 2.102 and 2.76 to 2.83.
This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.

The current strategy of the precautionary trigger level is implemented at the Area 48-wide scale. However, the plan is already being further developed to explicitly to take into account the requirements of krill predator species at regional and local geographic level. This extension to a more complete strategy involves the designation of SSMUs (based upon predator population structures) and local-scale quotas, to minimise the chances of localised depletions and thereby restrain impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm. This plan would require a sufficiently robust reporting/observer system to ensure the process will operate as anticipated. It should be noted that this level of catch is beyond the level of fishing currently being certified. It should also be noted that previous ecosystem modelling showed that division of the precautionary trigger level quota at the SSMU level based on historical fishing patterns (option 1) has been discarded as an approach, as it would have “have relatively greater negative impacts on the ecosystem compared to the other fishing options”. Therefore, the division of SSMU-level quotas has been based upon alternative options. While the strategy is a progression beyond the current approach, the need to define and agree the basis for quota divisions means it cannot therefore be called ‘full’.

As indicated by Dr. Nicol in his review, several comments in the paragraph above ignore the status of key issues in CCAMLR discussions. For example, the statement “the plan is already being further developed to explicitly take into account the requirements of krill predator species at regional and local geographic level” ignores the fact that the plan to subdivide krill catch limits amongst SSMUs has yet to be agreed. In 2008, the Scientific Committee was unable to deliver advice to the Commission on a Stage 1 allocation based on options 2, 3 and 4, in spite of the work undertaken by WG-EMM to assess the performance of each of these options. This lack of progress was a matter of concern for the CCAMLR Commission where most Members expressed their disappointment that the lack of consensus on SSMUs did not reflect the work undertaken at the working group level. Interestingly, only a few fishing nations, including Norway, expressed the view that the subdivision of krill catch limits amongst SSMUs was not an urgent matter. Similarly, the statement “this plan would require a sufficiently robust reporting/observer system to ensure the process will operate as anticipated” is correct but ignores the fact that the issue of requiring systematic scientific observer coverage has been stalled in CCAMLR for many years, and this year only 30% observer coverage has been agreed. There are no prospects for CCAMLR to solve this issue in the short term. Until these problems are overcome, further development of the SSMU plan will not happen. The assessment of Moody Marine on these points (SSMU allocation and observers) shows a significant lack of understanding of the current situation in regards to the CCAMLR process and the current state of management of the Antarctic krill fishery.

The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.

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29 SC-CCAMLR-XXVII, 3.19 and 3.20.
30 CCAMLR XXVII, para. 4.16-4.26.
The performance of the current plan, based upon the precautionary trigger level, is considered likely to work based upon prior experience, where historical catches were much greater but appeared to have minimal impacts on the ecosystem. More reassuringly, the plan has been tested within ecosystem simulation models. These studies have shown that the current trigger level for division of krill TACs into SSMUs is ‘highly likely’ to result in the ecosystem remaining within biologically based limits. It is noted that fishing extractions greater than this level (which are not part of this certification process) may lead to impacts on predator populations, dependent upon how SSMU-level quotas are derived. It is also noted that their simulations take into account a number – but not all – areas of uncertainty. Further support for current measures comes from the CEMP programme.

ASOC believes that the statement that the trigger level is considered likely to work based upon prior experience where historical catches were much greater but appeared to have minimal impacts on the ecosystem is a too simplistic statement. ASOC agrees with Dr. Nicol that there was no systematic monitoring of the ecosystem in the early 1980s rendering it impossible to make the above statement. On the other hand, observed climate change effects in Antarctica have increased significantly since those years and therefore it is difficult to know how the system will react today under similar fishing levels.

The statement “more reassuringly, the plan has been tested within ecosystem simulation models” is incorrect. As noted above, the simulation studies conducted by Watters et al. in 2008 were aimed at assessing options for SSMU allocation of catch limits amongst SSMUs, and not to test the appropriateness of the trigger level to prevent ecosystem impacts. Although CCAMLR has agreed in concept to develop and implement the SSMU allocations, in reality this plan is at a stand-still and no recommendation for allocations have been made by the Scientific Committee.

As explained above, it is false that simulation “studies have shown that the current trigger level for division of krill TACs into SSMUs is ‘highly likely’ to result in the ecosystem remaining within biologically based limits”. In addition, as mentioned in several sections of this document, new simulation studies conducted by Watters et al. (2009) have shown that if catches increase up to the trigger level, ecosystem impacts are likely to occur. Therefore as the trigger level remains in place without any spatial limitation, it is likely that ecosystem impacts will occur as a result of fishing.

At the last CCAMLR meeting in 2009 (CCAMLR XXVIII), following an intensive discussion on the need to distribute krill fishing effort to prevent irreversible harm to ecosystems, the Commission agreed to a new interim Conservation Measure to distribute the trigger level in the krill fishery amongst Subareas 48.1, 48.2, 48.3 and 48.4. The Commission agreed that the trigger level in Conservation Measure 51-01 (620,000 tonnes) shall be distributed between Subareas 48.1 to 48.4 with no more than the following percentages from:

- Subarea 48.1: 25%
- Subarea 48.2: 45%
- Subarea 48.3: 45%
- Subarea 48.4: 15%

Although this interim measure was aimed at reducing risks to predator and the ecosystem as a result of krill fishing, it falls short of what is needed to achieve its objective. As expressed by some Members at the meeting, the percentages agreed still enable the historical fishing pattern to continue (historically about 21%
of the catch has been taken in Subarea 48.1, 46% in Subarea 48.2, 33% in Subarea 48.3 and 0% in Subarea 48.4. The best available scientific evidence provided by the Scientific Committee shows that distributing the krill catch according to the historical fishing pattern poses higher risks than other methods to distribute the catch.

Under the current circumstances, it is worth quoting here a passage of the paper prepared by Watters et al. (2009) which reads as follows: “In this document our objective is to assess the risks of not deciding to allocate the precautionary krill catch limit among SSMUs and allowing uncontrolled expansion of the krill fishery up to the current trigger level. This is equivalent to assessing the risks of status quo management and of allocating the catch limit among SSMUs on the basis of the spatial distribution of historical krill catches (Option 1). We use the same methodological approach reviewed and endorsed at the last meeting of the WG-SAM and applied at the last meeting of the WG-EMM. Using the reference set of parameterizations developed by Watters et al. (2008a), we show that FOOSA simulates minimal impacts by the current krill fishery, but an uncontrolled expansion of the fishery up to the current trigger level is likely to risk depletion of krill-dependent predators. Therefore, the current trigger level may not be sufficiently precautionary to achieve the objectives of Article II.”

Finally, the last statement of the paragraph by the assessment team that reads “further support for current measures comes from the CEMP programme” ignores the fact that in its current configuration, CEMP does not allow to identify the impacts from fishing as opposed to other effects such as environmental changes. Extensive information on the lack of sufficient coverage by CEMP has been already provided elsewhere in this document.

There is some evidence that the measures comprising the partial strategy are being implemented successfully.

While modelling has been performed to assess the performance of the strategy, the full evidence for implementation is not yet available, partly due to the current low-levels of krill fishing in comparison to the precautionary trigger level. In turn, the strategy has not yet been tested for the impacts on the other retained species (see 2.2.2).

While it is hard to understand what kind of evidence lead the assessment team to think that the “measures comprising the partial strategy” were being implemented successfully taking into account the information available at the time of the assessment, it is now unmistakable – with the recent risk assessment undertaken in the CCAMLR framework - that the current strategy is not likely to be successful. Until CCAMLR introduces some kind of precautionary measures to prevent local concentration of catches in coastal areas, the ecosystem will be at risk from the effects of krill fishing. Therefore the fishery does not reach SG 60 with respect to this PI.

Audit Trace References
Watters et al. (2008a, 2008b); CCAMLR CMs 51-01, 91-01; Trathan and Hill (2008); CCAMLR (2008e); Trathan et al. (2008); Leape et al. (2009)

31 SC-CAMLR-XXVIII, Annex 4, Table 4
32 SC-CAMLR-XXVIII, paragraph 4.26
33 Watters et al. (2009).
As it has been the case in numerous parts of this draft assessment report, and especially in this section, references are provided very generally, not allowing the reader to verify what statements from the assessment report are supported by the references provided later in the text. In other cases, references are provided to support some statements/conclusions by the assessment team when in reality those references do not support those conclusions. This is the case of the paper by Leape et al. (2009) quoted above, which does not support any of the conclusions presented in this section. In fact, none of the concerns expressed in that paper were addressed nor taken into account by the assessment team.

For the reasons expressed above, ASOC submits that there are no measures in place that “take into account potential impacts of the fishery on key elements of the ecosystem”. In view of the evidence presented, it cannot be said that current measures “are considered likely to work, based on plausible argument”. Therefore the minimum score of SG 60 is clearly not reached for this PI.

As in other PIs, ASOC finds the response of the assessment team to stakeholders’ comments largely unsatisfactory.

Moody Marine’s response: the lack of a complete ecosystem strategy is noted within the text as is the lack of full evidence for its implementation, partly due to the low levels of krill fishing. The testing of the strategy for the impacts on elements such as retained species has also not been tested. This was discussed by the assessment team within the main report text and the scoring tables. Simulation results suggest the strategy is likely to work based on current information and this was considered sufficient to evaluate that the strategy is considered likely to work based upon plausible argument (e.g. general experience, theory or comparison with similar fisheries/ecosystems- see SG80 scoring guidelines within table 2.5.2). However, if further information comes to light during the annual surveillance audits, the score could be re-evaluated on that basis (e.g. rapid increase in quota uptake, decision to sub-divide quota based upon approaches indicated to be non-precautionary through simulation).

ASOC finds it difficult to understand how the statement “simulation results suggest the strategy is likely to work based on current information” can be sustained; especially when state-of-the-art simulation studies conducted in the context of CCAMLR, specifically for the Antarctic krill fishery, unequivocally show that under current measures, depletion of krill predators is likely to occur (Watters et al., 2009). Therefore taking into account the existence of these very specific scientific results developed by CCAMLR scientists, it is not appropriate to use general biased arguments instead such as “general experience, theory or comparison with similar fisheries/ecosystems”. It is also surprising to read that the assessment team may re-evaluate the score in the light of new evidence such as “a rapid increase of the fishery”, or a “decision to sub-divide quota based upon approaches indicated to be non-precautionary through simulation”. A division of the quota based upon non-precautionary approaches is precisely what happened at the last CCAMLR meeting, as indicated above.

ASOC is also concerned about the lack of consideration of one of the reviewers’ comments to the draft report. We are now presenting here the exchange between Dr. Steve Nicol and the assessment team, and our conclusions from this exchange:
Moody Marine answer to Steve Nicol’s comments:

2.5.2 The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved. The performance of the current plan, based upon the precautionary trigger level, is considered likely to work based upon prior experience, where historical catches were much greater but appeared to have minimal impacts on the ecosystem.

Steve Nicol: As there was no systematic monitoring of the ecosystem in the early 1980s it is not possible to make this statement. The discussion on SSMUs ignores the issue that there is no agreed plan to divide the catch and that there is still a considerable risk at a level of 620,000 tonnes. As the measures have not been adequately tested this criterion needs to be adjusted downwards.

Moody Marine Comment to Steve Nicol: the lack of a complete ecosystem strategy is noted within the text, and the score was reduced as a result. Simulation results suggest the strategy is likely to work based on current information.

ASOC agrees with the reviewer’s comments with respect to this PI and thinks that just down-scoring from SG 100 to SG 80 does not adequately address the concerns raised. In addition, the last statement provided by the assessment team that “simulation results suggest the strategy is likely to work based on current information” is incorrect, and no information is provided to verify it. It is unfortunate to see that in answer to the very specific concerns expressed by Dr. Nicol, only a subjective, non verifiable and incorrect statement is provided. As Dr. Nicol has stated “there is still a considerable risk at a level of 620,000 tonnes”. Thus, the answer provided by the assessment team is not appropriate.

Moody Marine Comment to Steve Nicol: However, if further information comes to light during the annual surveillance audits, the score could be re-evaluated on that basis (e.g. rapid increase in quota uptake, decision to sub-divide quota based upon approaches indicated to be non precautionary through simulation). In acceptance of some of the observations raised by the reviewer, however, the score has been reduced to 80.

As indicated before, new results arising from the risk assessment undertaken by Watters et al. (2009) indicate that if catches increase up to the trigger level, ecosystem impacts are likely to occur. Therefore, it is not appropriate to wait for annual surveillance audits to re-score this PI, since current information already shows that as the trigger level remains in place without any spatial limitation, there is absolutely no guarantee that ecosystem impacts will not occur as a result of fishing. In consequence, the score for this PI should be reduced to reflect that SG 60 is not achieved.

Component: Ecosystem

PI Category: Information / Monitoring
2.5.3 There is adequate knowledge of the impacts of the fishery on the ecosystem

Moody Marine provides a score of: 85

SG 80: Information is adequate to broadly understand the functions of the key elements of the ecosystem.

Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but may not have been investigated in detail. The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.

Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.

Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments

Information is adequate to broadly understand the key elements of the ecosystem

Information collected through the observer programme, CEMP studies, fisheries logbooks, and in particular ecosystem studies that feed into and support the activities of CCAMLR within the Ecosystem Monitoring and Management group provides sufficient information to broadly understand the elements of the ecosystem. Krill form the basis of the Antarctic food chain, as well as representing the equivalent of the ‘small pelagic’ fish species in the region. As such, maintaining the abundance of krill to underpin the food chain above it is seen as imperative to maintaining a healthy marine ecosystem. As a result, the main interactions between krill and the rest of the ecosystem elements (including fishing) have been investigated. The food web of the Southern Ocean is very well studied, while prey requirements of predators has been the subject of considerable research, along with behavioural and spatial considerations of predator/prey interactions. Krill are known to affect predators such as seabirds and fish when krill population levels are low (e.g. due to low krill recruitments).

CCAMLR monitors the effects of fishing and other ecosystem effects on the species in the Antarctic ecosystem that are either preyed upon by krill or prey on krill, the latter through the CCAMLR Ecosystem Monitoring Program (CEMP) and links with IWC. The Information collected through CEMP has two main functions in order to identify and understand the key elements of the Antarctic ecosystem: (1) Detect and record significant changes in critical components of the marine ecosystem within the Convention Area, to serve as a basis for the conservation of Antarctic marine living resources; and (2) Distinguish between changes due to
harvesting of commercial species and changes due to environmental variability, both physical and biological.

CCAMLR states that CEMP’s major function is to monitor the key life-history parameters of selected dependent species (‘indicator species’, which are likely to respond to changes in the availability of the harvested species i.e. krill). The following species have been set as the CEMP indicator species:

**Harvested species:** Euphausia superba

**Dependent Species:** Pygoscelis adeliae (Adélie penguin), Pygoscelis antarctica (Chinstrap penguin), Pygoscelis papua (Gentoo penguin), Eudyptes chrysolophus (Macaroni penguin), Diomedea melanophrisy (Black-browed albatross), Thalassoica antarctica Antarctic petrel, Daption capense (Cape petrel), Arctocephalus gazella (Antarctic fur seal), Lobodon carcinophagus (Crabeater seal).

CCAMLR has developed CEMP standard methods and established sampling sites. The ‘CEMP Standard Methods’ include data collection methods and procedures for data analysis aimed at yielding standardised information for comparisons across species and sites. CEMP sites are located in three Integrated Study Regions (ISR) and in a network of additional sites. Sampling levels between CEMP sites vary widely, with data collection in some locations having stopped in the last 20 years. However, there are key sites in each of the CCAMLR sub-areas of 48, which have high and consistent time series, being Bird Island, Signy Island, and Admiralty Bay, which provides a basis to monitor the impact of fishing of all types on predators and their breeding success. However, some more localised impacts may not be identified due to the shortfalls in data collections from some sampling sites. In turn, while information on the relationships between predators and krill are expanding, they are reliant on available information, which can be limited spatially and temporally. However, available information has proved sufficiently robust for ecosystem modelling approaches.

ASOC insists that the statement that information obtained from active CEMP sites in each Subarea “provide a basis to monitor the impact of fishing on all types of predators and their breeding success” is incorrect. As indicated earlier in this document, the current configuration of CEMP does not allow distinguishing the effects of fishing from those associated with environmental change. In addition, information arising from different CEMP sites with similar geographical and oceanographic features, indicate contradictory trends on predator parameters which are difficult to explain.

In regards to the statement: “available information has proved sufficiently robust for ecosystem modelling approaches”, the statement is also incorrect and it ignores the fact that the usefulness of the models is seriously limited due to the lack of empirical data. It has been repeatedly noted by CCAMLR scientists that there is lack of data for the validation of models (see, i.e., Hill et al, 2006).

**Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.**

CCAMLR regularly reviews the analyses of CEMP data, and conducts annual assessments that attempt to document ecosystem ‘health’. Trends in CEMP parameters and the occurrence of anomalous years in the monitored parameters are identified by species and site. Changes which
reflect natural environmental variation and those which may reflect the effects of harvesting are examined. Procedures are being developed to take account of both environmental variation and harvesting effects in the formulation of conservation measures governing commercial harvesting in the Convention Area.

As it has been indicated before it is incorrect to say that "procedures are being developed to take account of both environmental variation and harvesting effects in the formulation of conservation measures governing commercial harvesting in the Convention Area". This has been the intention when CEMP was established, but to date no procedures have been developed as a result of the information provided by CEMP since the current configuration of CEMP does not allow to come up with any conclusion in regards to the fishing impact or environmental variations. Until CEMP is significantly reformed and expanded in its coverage, it will not be possible to incorporate monitoring data into the formulation of specific conservation measures. This was also acknowledged by CCAMLR’s performance review panel when recommending CCAMLR to “review, and as necessary revise, CEMP to ensure that it can support the application of these procedures and other management decision-making processes in order to achieve the objectives of Article II. Consider approaches to fishery development and monitoring that will allow separation of the effects of fishing and natural variability, or at least that have a demonstrably high probability of achieving the objectives of Article II in spite of not being able to separate these two effects”. 34

Data are examined regularly, for example through specific workshops (E.g. WG-EMM Predator Survey Workshop) and through the annual CCAMLR-EMM process. Independent review of the methods and statistical approaches noted that the quality of statistical methodology presented was ‘impressive’, and no substantive criticisms of the methods adopted were noted.

The statements above are not entirely correct. There are not specific workshops in CCAMLR that regularly examine CEMP data. For example, the Predator Survey Workshop was not aimed at looking into data resulting from CEMP, actually CEMP site data were considered, but not to any great extent. In addition, the main outcome of the workshop was a list of key species that participants felt were important to assess in terms of krill consumption, followed by an assessment of their current population status. As it was indicated, for some species data are simply not adequate to make any clear statements about their population status. Actually, one of the pending issues for CCAMLR is to undertake a major revision of the current CEMP so as to come up with a monitoring program that could provide the necessary information for the development of conservation measures. The current CEMP does not allow making any inference about the impact of krill fishing operation or as a result of environmental changes.

In relation to the independent review mentioned by the assessment team, it is not clear to what review they refer to. Secondly, while the statistical methodology may be appropriate, the lack of empirical data does not allow understanding the “main interactions between the fishery and these ecosystem elements”, such as krill predators, as required by this PI. Therefore the standard above is not met.

However, information is currently limited on the interactions between the fishery and retained larval fish stages. While this is being investigated, the preliminary nature of the study means it has not – yet – been investigated in detail, although the observer plan means that it can be in future years.

The statement is misleading, as it seems to suggest that the only problem in relation to this PI is the lack of information in relation to the interactions between the fishery and larval fish. It ignores the fact that understanding of the interactions between the fishery, predators and environmental forcing are still poorly understood. Having said this, although the assessment team recognizes the lack of data on the impact of krill fishing on fish larvae, they are wrong when they say that the observer plan will allow investigating this in detail in future years. The only plan proposed for systematic observer coverage in krill fishing was the one recommended by WG-EMM in 2008, and it was blocked at the level of the Scientific Committee by Japan and Korea at the CCAMLR meeting the same year (see comments to PI 1.2.3 above). Only recently, at the last CCAMLR meeting (2009) 30% observer coverage was agreed – which is far from the needed systematic observer coverage.

As explained in several parts of this document, scientific observer data in the krill fishery have been gathered voluntarily and are still extremely limited. As a consequence, the necessary information to come up with solid management strategy decisions (and adapt them as changes are occurring) does not exist. Based on the results of the last meeting of WG-EMM (July 2009), the issue of systematic observer coverage has been deferred to WG-SAM (Working Group on Statistics, Assessments and Modelling) in 2010, which should come up with a recommendation for observer coverage for CCAMLR that hopefully will be taken a decision in October/November 2010. Thus, the conclusions of the assessment team are incorrect and do not reflect the current situation regarding observers.

The impacts of the fishery on target, Bycatch, Retained and ETP species and Habitats are identified and the main functions of these Components in the ecosystem are understood.

Sources of fishery impact are identified and measured. There is evidence that the Saga Sea method of fishing results in no direct impacts on bycatch species, ETP species or habitats. As noted above, the impacts on retained larval fish are being investigated.

It is totally unclear what is meant by “sources of fishery impact are identified and measured”. CCAMLR lacks any method to measure the impact of fishing on krill predators, other than direct interaction between fishing vessels and marine mammals or seabirds. Therefore, this standard is clearly not met. In relation to the impact of krill fishing operations conducted by the Saga Sea on larval fish, the expression that these impacts “are being investigated” does not fulfil the PI since this is a work that has been initiated recently and for which no conclusive results have been obtained yet. In any case, some authors are proposing that the impact on fish larvae could be large. In addition, as explained in relation to PIs 2.1.1-2.1.3, the impact of fishing on larval fish by the fishery at large (by the other vessels) is not being investigated, which adds to the uncertainties in regards to understanding the impacts on the ecosystem.

35 See for example WG-EMM 2006 Report, para. 3.36.
The understanding of the functionality of components underpins a number of ecosystem models that have been developed for the Southern Ocean and areas within it. These have ranged from predator-prey models through to energy flow models and mass-balance models using ECOPATH. A mass-balance model has been developed for CCAMLR sub area 48.1, giving a description of the food web dominated by the phytoplankton–krill–top predators chain, and complemented with alternative food pathways (e.g. through Electrona antarctica), which together gives an enhanced complexity to the system. Model limitations exist, and data gaps include patterns during the winter season, grouping of functional groups, and steady state assumptions. An ECOPATH model for the Scotia Sea/South Georgia shelf has also been developed under the BAS Discovery 2010 programme. This research programme is also using fatty acid and stable isotope analysis to improve both food web structure and model performance. In turn, international cooperation through CCAMLR will improve the model further, with the joint IWC/CCAMLR workshop aiming to include whales within ecosystem models, including that for the Scotia Sea, by sharing consumption/provisioning rates. This workshop included the examination of methods that can incorporate the impacts of future climate change within ecosystem models.

The information provided in the paragraph above is confusing and non-relevant to the scoring of this PI as it presents details of specific projects that are uncoupled from the discussion of this PI.

In relation to the “mass-balance model developed for Subarea 48.1” that is mentioned by the assessment team, it is unclear to what model they refer to since it is not referenced in the report.

In relation to the cooperation between IWC and CCAMLR, while it is a positive initiative that may provide interesting insights into the role of cetaceans in the functioning of the Southern Ocean ecosystem in the near future, until now, no information has been obtained from this cooperation that may support the conclusions required by this PI.

Further models have been specifically developed within CCAMLR to aid ecosystem management decisions, the impact of future decisions on krill abundance and hence predator status, and the movement toward small-scale management units within the fishery. These include the models FOOSA, SMOM and EPOC.

While it is true that these models are being developed, as mentioned above, the use of the models is limited by the lack of empirical data. In addition, in recent CCAMLR meetings, the use of these models to provide advice on SSMU allocations have been blocked for several reasons, lack of empirical data to validate the models being one of them. As a result, the next step in CCAMLR model development is uncertain.36

**Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.**

The information collected through observers, ecosystem studies and the CEMP provides sufficient information to parameterise the ecosystem models described above. These have been used to examine the main consequences for the ecosystem as a result of fishing at different levels.

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36 See, for example, WG-EMM 2008 Report, paragraph 2.100
The paragraph above is too general in focus and incorrect in its conclusion. As it has been shown throughout this document, neither the observer scheme nor CEMP are currently sufficient to identify effects from fishing on the ecosystem, due to their partial coverage and lack of data. In addition, the ecosystem studies mentioned in this paragraph have not being referenced so that it is unclear about what studies the assessment team is referring to.

Information is sufficient to support the development of strategies to manage ecosystem impacts.

The information available from the different sources, which provide Area 48 scale and smaller-scale catch data, predator numbers and trends, ecosystem interactions, and the potential impact of fishing on krill on the ecosystem, is sufficient to support the development of the strategies detailed above, in order to manage ecosystem impacts and detect any increase in risk level.

The paragraph above contains incorrect statements and an incorrect conclusion. First of all, as illustrated throughout this document, there is currently insufficient data on predator abundance in Area 48 both at the large and small scale. Therefore there is no information on “predator numbers” as indicated by the assessment team. There is no empirical information on the impact of fishing on the ecosystem either, only risk assessments using current models which due to the uncertainties involved, are indicators of minimum risks. As reiterated throughout these comments, the last risk assessment undertaken in this context (Watters et al., 2009) indicates that risks to the ecosystem are high if catches approach the current catch limit of 620,000 tonnes. Consequently, it is clear that the standards required for this PI are not met.

Audit Trace References
Agnew (1997); observer reports, Orr et al. (2007); CCAMLR (2008a, 2008b, 2008e); Cornejo-Donosoa and Antezana (2008); Constable (2008); Hill et al. (2007); Plagányi and Butterworth (2008), Watters et al. (2008a, 2008b); Everson (2000); interview with Greenpeace; interview with WWF; Leape et al. (2009)

ASOC is very concerned by the reference by the assessment team to interviews with NGO stakeholders to support their conclusions. We compel the authors to indicate what statements made by these stakeholders during the consultation phase have been used to support their conclusions. Similarly, we wonder (again) what statements found in Leape et al. (2009) were considered by the assessment team to support their findings.

Due to the shortfalls of CEMP and the scientific observer program for krill, it is not possible to sustain that sufficient information is available on the impacts of the fishery on ecosystem components. Therefore, ASOC submits that this PI was scored too highly.

We are now presenting here the exchange between Steve Nicol and the assessment team, and our conclusions from this exchange:

Moody Marine answer to Steve Nicol’s comments:
2.5.3 Information / monitoring. There is adequate knowledge of the impacts of the fishery on the ecosystem.

**Steve Nicol:** Because of the lack of a mandatory observer scheme, the shortfalls of the CEMP program and the uncertainties over bycatch it is difficult to see how information/monitoring can be considered adequate. WG-EMM has on numerous occasions pointed out the inadequacy of this sort of data collection. This criterion is scored far too highly.

**Moody Marine Comment to Steve Nicol:** While the Saga Sea has 100% international observer coverage, other vessels fishing with alternative gears within the fishery may have local observer coverage. The discussion on observer coverage within CCAMLR is noted, as pointed out by the reviewer. In turn, the issue on the shortfalls in CEMP data coverage noted earlier are valid. The first SG text scores between 80 and 100, given that knowledge of the key elements of the system is good and key elements are broadly understood. The second SG text scores between 80 and 100, given that the main interactions have been investigated, although as noted there are gaps in the information. The third SG text scores between 80 and 100, as available information does allow the main functions of the ecosystem components to be known, and in some cases well understood. The fourth SG text scores 80, noting the issues with the CEMP data. The fifth SG text also scores 80, for the same reason. Therefore, the overall score for this PI has been reduced to 85.

ASOC agrees with the comments made by Dr. Nicol in his review. Simply “noting” that there are issues in relation to the coverage of CEMP or CCAMLR’s scientific observer scheme does not mean anything unless the scoring is performed in accordance with this acknowledgement. In addition, earlier in this section, the assessment team mentioned the following: “The information collected through observers, ecosystem studies and the CEMP provides sufficient information to parameterize the ecosystem models described above”. It is unclear how come on one hand they recognize (note) the shortfall in CEMP data but on the other hand they are stating that the information collected through CEMP, among others, is sufficient to reach conclusions in relation to the ecosystem.

As it has been shown throughout the comments to this PI and in our previous submission, the standards are not met to achieve the minimum score of 60.

Component: Fishery- specific management system

PI Category: Decision - making processes

3.2.2 The fishery-specific management system includes effective decision-making processes that result in measures and strategies.
Moody Marine provides a score of: 90

SG 80: There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.

Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.

Decision-making processes use the precautionary approach and are based on best available information.

Explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments

There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives. CCAMLR has well established, transparent and effective decision-making processes. They allow for stakeholder input and clear scientific analysis of the data available within the Working Groups and Scientific Committee, and they result in conservation measures and fisheries strategies designed to achieve their short- and long-term fishery-specific objectives.

Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. Generally, fisheries-specific issues identified in relevant research are included in the decision-making processes within the Working Groups and Scientific Committee as appropriate. Where and when necessary, modifications are made to the monitoring and evaluation of the fisheries (through modifications to the complex data-recording systems and observer logbooks). However, we note that there has not yet been adherence to all relevant management issues, notably the need to employ independent international observers to monitor the fishery.

Decision-making processes use the precautionary approach and are based on best available information. The CCAMLR decision-making processes operate on a well publicized schedule and include stakeholder involvement, including observers from different NGOs and stakeholder and interested bodies. CCAMLR has shown, for example through the reduction of seabird mortality and measures to identify and protect VMEs that it is proactive in meeting newly identified management issues. All CCAMLR decision-making on catch limits is based on the precautionary approach (see documentation in section 6 above) and the best available information by national experts working closely together in Working Groups, the Scientific Committee and the Commission.
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Formal reporting to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. The whole CCAMLR process is based on dialogue and formal reporting.

ASOC submits that the conclusions of the assessment team do not reflect the reality of CCAMLR politics in relation to Antarctic krill fisheries management. The existence of a formal decision-making process is of little use unless that process can deliver the required decisions in a reasonable timeframe. Although it is true that the CCAMLR Convention prescribes the application of a precautionary approach to fisheries management, it is becoming increasingly difficult for CCAMLR bodies to fulfill this mandate, especially in relation to Antarctic krill. During the assessment process, many stakeholders and one of the peer reviewers raised serious concerns about this problem. Nevertheless, Moody Marine’s assessment of the situation remains unchanged in its final report.

ASOC points out specifically to comments made by peer reviewer Dr. Nicol and by the AKCP, who highlighted very specific problems related to the decision-making process in CCAMLR that affect the capacity of the Commission to take important decisions for the management strategy on krill fisheries. The most notable example is the requirement for systematic scientific observer coverage on board krill vessels, which has been blocked for almost ten years by a small minority of fishing nations, in spite of the repeated calls by the Scientific Committee and its working groups that systematic observer coverage is urgently needed. Another issue that is stalled in CCAMLR’s krill agenda is a clear plan to establish quotas at the SSMU level in Area 48, a measure which is key to manage impacts of krill fishing on the ecosystem.

The assessment team’s response to Dr. Nicol that in comparative terms, CCAMLR is performing “far better than other areas or commissions” is largely unsatisfactory. This PI is supposed to evaluate the appropriateness of the management system in the context of this fishery and its specific challenges.

ASOC would like to quote here a fragment of CCAMLR's performance review report, which identifies examples of slow response, or inability to respond to scientific advice by the Commission. Interestingly, the case of krill is identified as the most notable example:

“Recommendations for improved biological research and fishery operations in the krill fisheries have been made for many years without adoption and implementation, or with very limited adoption and implementation. This is despite the operation and development of the krill fishery, and its potential effects on dependent species, being one of the main motivations for the establishment of CCAMLR, and that the krill fishery is in most respects a new or exploratory fishery. Specific improvements that are implemented for other CCAMLR fisheries, that have been formally recommended for the krill fishery, but that have not been adopted and implemented in the krill fishery include: mandatory sampling, reporting and verification by CCAMLR scientific observers; VMS reporting, access and use; 5-day catch and effort reporting, and monthly finescale catch and effort reporting; spatial restrictions, including SSMUs for catch limits; target species move-on rules; by-catch limits and move-on rules; gear and mesh size restrictions; fishery-based research program. Formal recommendations on some of these issues (e.g. scientific observers) go back to at least the year 2000 but without adoption”.

See page 139 of Moody Marine’s final report.
Most of the challenges highlighted by the performance review panel in relation to krill fisheries management continue unaddressed, including key issues such as scientific observers, spatial restrictions, and a research plan, which have been signaled throughout this document. Clearly, although CCAMLR has established formal decision-making processes to deal with relevant issues, in reality, these processes are not resulting in measures and strategies that achieve fishery-specific objectives, as required by this PI. CCAMLR decision-making processes may be deemed to be effective in general, but certainly not for krill, as highlighted by CCAMLR’s performance review.

Taking into account these problems, it is hard to understand how the assessment team led to the conclusion that a SG 80, or even a SG 60, is achieved.

In addition, the response of the assessment team to Dr. Nicol that “not everyone will be happy with the direction that response takes” trivializes the seriousness of the issues under discussion.

The issue of systematic observer coverage on board krill vessels is not a question of preference, it is a minimum scientific requirement to gather the necessary information to establish an adequate management regime, and as such it has been repeatedly called for by CCAMLR’s Scientific Committee. CCAMLR’s inability to adopt this recommendation means that the minimum score for SG 60 is not achieved for this PI.

Component: Fishery-specific management system

PI Category: Research Plan

3.2.4 The fishery has a research plan that addresses the information needs of management

Moody Marine provides a score of: 100

SG 100: A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC’s Principles 1 and 2. Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.

What follows is a detailed explanation on several elements provided by Moody Marine (Moody Marine comments are provided in boxes) that were assessed incorrectly and the associated explanation why we considered this was the case:

Moody Marine comments

A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC’s Principles 1 and 2.
A comprehensive research plan by CCAMLR exists for krill fisheries, focusing on the monitoring of krill catches, scientific observation and environment monitoring. The research plan and its results are disseminated to all interested parties in a timely fashion and are widely and publicly available.

ASOC submits that the paragraph above is incorrect since a comprehensive research plan for the Antarctic krill fishery does not exist. As explained below, CCAMLR has not agreed on a plan to tackle the lack of empirical data on key issues for the management of krill fishing in Area 48. In fact, NGOs and CCAMLR Members have recently highlighted this problem and have made specific proposals for a CCAMLR research plan on krill.

In fact the inexistence of a “fishery-based research program” is one of the pending issues in relation to CCAMLR’s management of the krill fishery in view of CCAMLR’s performance review panel (see comments to PI 3.2.2). In spite of these calls, CCAMLR has not yet made any progress on this respect, and no concrete plans have been agreed on this respect for the foreseen future. The data gathered through the observer program, CEMP and monitoring of catches does not replace the need for focused research and are not part of a comprehensive plan. In addition, as it has been reiterated throughout this document, data gathered through these channels are patchy and insufficient to achieve the management objectives consistent with MSC principles and indicators. Therefore it is not possible to say that “a comprehensive research plan by CCAMLR exists for krill fisheries, focusing on the monitoring of krill catches, scientific observation and environment monitoring”.

Consequently, this statement is incorrect and cannot be the basis of the scoring for this PI.

There is still a considerable degree of scientific uncertainty in relation to krill fisheries management. CCAMLR needs to address these uncertainties as a matter of priority in order to make allocation of catch limits amongst SSMUs, a key component to prevent irreversible harm to the ecosystem. For example, we are still a long way from understanding the biology of krill to the point that would enable us to predict how krill populations react to environmental changes (Kawaguchi & Nicol, 2007). Furthermore, the distribution and abundance of krill between and within different areas of the South Atlantic needs to be better understood and will have important implications for management of krill fishing at the SSMU level. Even at a large scale, there are important uncertainties in relation to krill biomass, the last survey being almost 10 years old and no plans to undertake a new survey. As noted above, some attempts have been made to model complex food webs in the Southern Ocean, but there is a shortage of data on substantial parts of these food webs (Hill et al, 2006). In relation to krill predators, most research has been conducted on land-based predators. In spite of these efforts, better understanding of population sizes, diet and foraging ranges of key predator species is still needed. On the other hand, there is a gap in the understanding of the foraging ecology of pelagic krill predators as compared to land-based predators. This includes whales and mesopelagic fish, the latter having been recently identified as a major source of uncertainty in relation to which very little information is available.

In May 2007, an international workshop was convened by the Lenfest Ocean Program under the title “Identifying and Resolving Key Uncertainties in Management Models for Krill Fisheries”. It gathered

[38 See CCAMLR XXVI/BG 25, “The need for a strategic plan for the management of the Antarctic krill fishery”, by the Antarctic and Southern Ocean Coalition; CCAMLR-XXVII/43, “Current uncertainties in scientific data for risk assessments in the allocation of krill catch limits among SSMUs in Area 48”, by the Delegation of the Ukraine.]

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scientists from within and outside the CCAMLR community working on krill, krill predators and krill fisheries. The workshop identified uncertainties in relation to krill specific issues, interaction of krill and predators, and the interactions of the krill-based ecosystem and the physical environment (including long-term changes). As acknowledged by a CCAMLR workshop in 2008, there is still some way to go before dependent species requirements for krill could be established. For some species that have been identified as key species in terms of krill consumption, available data are simply inadequate.

CCAMLR contemplates the development of a research plan for new and exploratory fisheries, a requirement that applies to fishing in new areas where no catch limits are in place. However, this requirement does not apply to the krill fishery operating in the current fishing grounds (Subareas 48.1-48.4), even though the research needs for the development of a management system at the SSMU level are imperative. It has been noted that krill fishing vessels can gather and provide invaluable information for management in complementary ways to research vessels (Kawaguchi & Nicol, 2007). However, krill vessels fishing in Subareas 48.1-48.4, where Aker Biomarine is currently operating, are not required to provide this information nor there is a specific plan in this regard.

The CCAMLR Ecosystem Monitoring Programme (CEMP; Agnew 1997) provides cross-cutting data on environment and predator abundance to link into fisheries data and targets research at an ecosystem approach to management of the krill fishery.

As highlighted repeatedly throughout this document, there is a major shortfall on CEMP data, which has been even acknowledged by the assessment team, so it is difficult to understand how this general statement about CEMP could support the high score granted for this PI. The statement above only provides a general statement on the nature of CEMP, but it does not give an accurate idea of the effectiveness of the program to inform management decisions, nor on the amount or quality of data that are being generated by the program. In addition, as it has been already clarified in this document, CEMP does not provide information on predator abundance; neither can currently show any light on the effects of fishing on the ecosystem. Therefore the paragraph above is basically incorrect and cannot support the scoring granted.

An additional research programme for the client group vessels has been developed between Aker BioMarine and British Antarctic Survey and utilising CCAMLR Scientific Observers supplied by MRAG Ltd for 2009. Data requirements above and beyond the standard set of CCAMLR observer data have been defined and will be implemented.

ASOC finds it unfortunate that a research program is generally referred to without providing any detail on what issues this research program is looking at, duration, spatial and seasonal coverage, etc. In any case, it is clear that, since the program only provides information associated to the operations of the Saga Sea, it cannot offer data that could be extrapolated to the overall fishery. Thus, this individual research program will not be sufficient/appropriate to address the information needs for the management of the krill fishery as a whole, which is the purpose of this PI.

In regards to this PI, we are also concerned about how the comments provided by Dr. Steve Nicol (one of the peer reviewers) were not taken into account.

See WG-EMM 08/8, Report of the Predator Survey Workshop (Hobart, Australia, 16 to 20 June 2008).
We are now presenting here the exchange between Dr. Nicol and the assessment team, and our conclusions from this exchange:

**Moody Marine answer to Dr. Steve Nicol’s comments:**

3.2.4 Research plan. The fishery has a research plan that addresses the information needs of management.

**Dr. Steve Nicol:** This may be true but it has proved extremely difficult to ensure that the work deemed important by WG-EMM is actually carried out. Because of the difficulty of actioning the plan this criterion ought to be scored lower.

**Moody Marine Comment to Steve Nicol:** The score is based on the existence of a comprehensive research plan, so the score is in our opinion correct. The effectiveness of that research plan are not addressed in this sub principal, only its existence and communicability.

ASOC agrees with Dr. Nicol’s concerns and shares his view that this PI was scored too highly. Moody Marine’s response to the reviewer is confusing and avoids addressing the main question addressed. Clearly the reviewer’s comment was aimed at pointing out that the standard for this PI is not met. The PI focuses on the existence of a comprehensive research plan that addresses the information needs of management, a plan which, as indicated by the formulation of SG 100, should: “provide the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC’s Principles 1 and 2”. Therefore it is inappropriate to say, in response to the reviewer’s concerns, that “the effectiveness of the research plan is not addressed in this sub principal”, because the effectiveness of the plan is an integral part of the same standard. In addition, earlier in this PI the assessment team stated that “the research plan and its results are disseminated to all interested parties in a timely fashion and are widely and publicly available”. When reading this statement one wonders if the effectiveness of the supposed research plan is not addressed here what is the point of stating that the results are being disseminated. In any case, as stated before, it is clear that there is no comprehensive research plan and therefore, the standards are not met to achieve the minimum score of 60, let alone a score of SG 100.

**ASOC is also very concerned with about Moody Marine’s response to NGO stakeholders in relation to this PI.**

**Moody marine’s response to stakeholder’s comments:** “the research evaluated within this assessment to provide appropriate research on Principle 1 and Principle 2 for this fishery is considered as being appropriate for the scale and intensity of the current fishery (circa 112 000t per annum) with a long term commitment to ensure a sustainable long-term krill fishery. Additional research programmes such as those being developed between Aker and the British Antarctic Survey to supply data above and beyond the standard set of CCAMLR observer requirements will also be provided to CCAMLR”. 

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Again ASOC finds this response largely unsatisfactory. The assumption that the intensity of the fishery is low may be valid for a single-species management situation, but fails to take into account ecosystem considerations and the potential effects of localized depletion. Comments from the AKCP to Moody Marine’s draft report provided new information about the risks of the krill fishery to predators as catches approach the trigger level, but this information seemed to be ignored by the assessment team. In addition, it is important to note here that the figure provided by Moody Marine to illustrate the size of the fishery is not up-to-date. In 2007/08, the total reported krill catch was 156,521 tones. By September 2009, the total reported catch was 123,948 tones.\textsuperscript{40} It is therefore clear that the inexistence of a comprehensive research plan for the krill fishery is major problem, in spite of the “relatively low” current level of fishing.

We must also reiterate here our comments above on the research program developed between Aker and the British Antarctic Survey. NGO stakeholders had expressed concerns in their comments to Moody’s draft report that no details about this research program had been provided, such as what kind data would come out of this research. No details are provided in the final report either. In addition, as indicated above, it is clear that, since this program will only provide information associated to the operations of the Saga Sea, it cannot offer data that could be extrapolated to the overall fishery. Clearly, this individual research program will not be sufficient/appropriate to address the information needs for the management of the krill fishery as a whole, which is the purpose of this PI.

\textsuperscript{40} See SC-CAMLR-XXVII, Table 3, and SC-CCAMLR XXVIII, Table 2 (Preliminary total catch (tonnes) of target species reported in 2008/09 - December 2008 to September 2009)