



**First Annual Surveillance Report
Seafood Producers Association of Nova Scotia (SPANS):
Eastern Canada Offshore Scallop Fishery**

Certificate No.: MML-F-088

Moody Marine Ltd.

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1.0 GENERAL INFORMATION

Scope against which the surveillance is undertaken: MSC Principles and Criteria for Sustainable Fishing as applied to the Eastern Canada Offshore Scallop Fishery.

Species: Scallop (*Placopecten magellanicus*)

Area: St Pierre Bank (Scallop Fishing Areas 10, 11, & 12)
The Eastern Scotian Shelf (Scallop Fishing Area 25)
Browns and German Bank (Scallop Fishing Area 26)
Georges Bank (Scallop Fishing Area 27)

Method of capture: New Bedford scallop rakes / dredge

Date of Surveillance Visit:	24 th – 25 th May 2011			
Initial Certification	Date: 22 nd March 2010		Certificate No.: MML-F-088	
Surveillance stage	1 st	2 nd	3 rd	4 th
Surveillance team:	Lead Auditor: Paul Knapman Team members: Andrew Brand, John Angel			
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2.0 RESULTS, CONCLUSIONS AND RECOMMENDATIONS

This report contains the findings of the first surveillance audit in relation to the Seafood Producers Association of Nova Scotia (SPANS) Eastern Canada Offshore Scallop Fishery in Scallop Fishing Areas (SFA) 10, 11, 12, 25, 26, 27. The surveillance audit was carried out in accordance with the Marine Stewardship Council (MSC) Fisheries Certification Methodology (FCM) Version 6 (1).

The fishery was certified on 22nd March 2010, however, in order to reduce financial costs and avoid duplication requests for information from fisheries managers and scientists a variation to the certification methodology was accepted by the MSC to delay the annual audit for the scallop fishery and combine the surveillance site visit with the Clearwater Seafoods Limited Partnership offshore lobster fishery site visit. An announcement to this effect was published on the MSC webs on 24th February 2010. Subsequently a further announcement was published on the MSC website on 12th April notifying stakeholders of the site visit and this was forwarded to recognised stakeholders on 29th April 2011 (See appendix A).

Two members of the original assessment team were not available for the surveillance audit and so Moody Marine appointed Dr Andrew Brand to participate in the audit (See Appendix B for Andrew Brand's Bio). Dr Brand was one of the peer reviewers for the original certification assessment. Dr Brand and Paul Knapman - met with members of the client group and staff of the Department of Fisheries and Oceans (DFO) between 24th and 25th May 2011. Paul Knapman was the Lead Assessor for the certification assessment. Information and evidence was gathered on the status of the stock, the performance of the fishery throughout the year, measures to meet the Conditions of Certification and changes in management. This report has also been reviewed and endorsed by John Angel who was a team member for the certification assessment.

The following section is set out as a table within which general information about the status of the stock and the fishery for this reporting period is provided along with the surveillance team's observations, conclusions and recommendations on the current status of the fishery and the client's progress toward meeting the Conditions of Certification.

The table includes the original assessment scoring guideposts and scoring commentary and the requirements of the original Condition alongside the heading 'Activity assessed'. This identifies the areas in which the fishery was determined to perform below the level required by the MSC standard during the initial assessment, and the required actions to address these issues.

As required by the MSC certification methodology, the client – SPANS - produced an Action Plan setting out the stages involved in addressing the Conditions raised. This is set out in the table alongside the heading 'SPANS Action Plan'.

This progress has been evaluated by the Moody Marine surveillance team ('Observations' and 'Conclusion') against:

1. the commitments made in the Action Plan;
2. the intent of the original Condition; and,
3. the original scoring indicator, guideposts and commentary.

The influence of any overall legislative and management changes in the fishery are also taken into consideration.

When the Condition has been judged to have been met, a re-evaluation of the scoring allocated to the relevant Performance Indicator(s) in the original MSC assessment will be included within the evaluation, and if the score is 80 or more, then the condition is closed.

	Comments
	Stock status
Activity assessed	<p>The intent of this section is to bring background information up to date and allow subsequent condition information to be evaluated in light of the current stock situation.</p> <p>Assessment surveys funded by the fishing industry have continued to be carried out, as usual, twice a year (May and August) on Georges Bank and once a year or less on the other banks. For Georges Bank the May survey provides an initial indication of stock size at fixed stations but the August survey is more extensive and based on a stratified sampling design. This survey covers Georges Bank zones 'a' and 'b' but only the data from zone 'a' are used in the annual stock assessment.</p> <p>For Georges Bank the total allowable catch (TAC) for 2010 was 5,500t for zone 'a' and 200t for zone 'b'. The commercial catch rate for zone 'a' declined slightly from 17.43kg/hm in 2009 to 15.17 kg/hm in 2010 but remains well above the long-term median (10.15 kg/hm). Survey catch rates of recruit and fully recruited scallops were above their respective 29-year median levels, while catch rates for pre-recruits (<75 mm) were at the 29-year median level. The 2010 estimate of recruits remains high, although overall abundance of the 2006 year-class has continued to decline since it was fully observed in 2008. Fully recruited biomass, estimated to be 20,785t in 2010, increased from the 2009 estimate (16,610 t) and is above the 25-year median biomass of 12,745t but was not as high as expected due to poor growth rates. Recruit biomass, estimated to be 14,040 t in 2010 declined from the 2009 estimate (18,890 t), but is still the third highest estimated biomass since 1986. The poor condition of the scallops in 2009/10 is likely to result in lower than expected yields in 2011. The meat count of fully-recruited scallops (>95mm) in the August survey was >33 in some areas, the maximum meat count set by the regulations for this ground. The Interim TAC for zone 'a' has been reduced to 4,500t for 2011, which results in an exploitation rate of 0.16, and incoming recruitment is expected to be among the highest in the time series. Harvest scenarios ranging from 1,000 to 9,000t are all predicted to provide increases in commercial biomass for 2011. Harvest scenarios depend on the successful recruitment of the large 2006 year-class to the fishery in 2011. They assume a natural mortality of 0.1 for the recruit biomass and no fishing mortality of scallops below 95 mm.</p> <p>On Georges Bank 'b', which is considered to be a marginal area for scallop production, CPUE has declined since 2007 and the abundance of all size-classes has declined to about the long-term median level, with no prospect of an increase in commercial or recruit abundance in the near future. There was a small fishery in 2010 but no interim TAC has been set for 2011.</p> <p>The TAC for Browns Bank North was 200t in 2010 and total reported landings were 201t, with commercial catch rates at the long-term median (1991-2009). Survey catch rates of pre-recruit, recruit and fully recruited scallops were all above their respective 19-year (1991-2009) median levels. The 2005 year-class is the largest since 1991 and has now started to recruit to the fishery. Fully-recruited biomass, estimated to be 9,096 t in 2010, increased from the 2009 estimate of 5,069t due to the highest recruit biomass since 1991, estimated to be 5,077t in 2009. However, the overall condition factor (meat weight relative to shell height) for scallops on Browns Bank north declined from 2009 to 11.05 g/dm³ in 2010 and was below the long-term median (12.3 g/dm³ from 1991-2009). Continued strong recruitment in 2011 will result in a fully-recruited population dominated by younger scallops (95-105mm) and higher exploitation rates at this time could result in a loss of potential yield. An interim TAC of 500t for 2011 will result in an exploitation rate of 0.04 and an</p>

increase in fully-recruited biomass of 43% to 13,090t, assuming no change in condition factor from 2010. Harvest scenarios ranging from 200t to 1,000t were examined and all were predicted to yield increases in commercial biomass for 2011 with low probability of decline. With the majority of commercial biomass between 95-110 mm, meat counts in many areas could exceed the maximum set for this bank of 40 meats per 500g. Although the interim TAC for Browns Bank North for 2011 was initially set at 500t, following recommendations from OSAC this was raised to 1000t, effective from 17th March 2011. The increase in TAC to 1,000t will result in an exploitation rate of 0.08 and an increase in fully-recruited biomass of 36% (with a probability of biomass decline of 0.16)

On Browns South, another marginal area, there has been no fishery since 2007. The area has a very low abundance of commercial scallops of poor quality, with few recruits. There is a large cohort of pre-recruits present in the population but with the present very slow growth rates these will take a long time to reach commercial size. There was no assigned TAC for 2010 and none has been set for 2011.

There was a small fishery on German Bank in 2010 and CPUE was similar to the previous year. A much larger survey with wider coverage of the bank was established and a new cohort of pre-recruits (15-35mm) was located in the south-west corner of the bank. However, low recruitment to the fishery is expected for 2011.

For the fishing grounds on the Eastern Scotian Shelf (Sable/Western Banks and Middle Grounds) a TAC of 75t was set for 2010. Sable and Western grounds were well surveyed at 135 stratified random stations based on a historical survey index. Pre-recruit, recruit and commercial abundance was near the long-term median and a small cohort is approaching recruit size but this is not likely to significantly increase commercial biomass. CPUE in 2010 was similar to recent years. There has been no commercial fishing on the Middle grounds since 2007 but the annual survey was carried out at 15 fixed monitoring stations. The majority of scallops on this ground are now of commercial size but abundance has declined from 2007 and there is no prospect of new recruitment.

There has been no fishery on Banquereau since 2007 and no surveys have been carried out since 2006. Banquereau and St Pierre Bank are considered to be sporadic fisheries depending on occasional pulses of recruitment. Hence they are surveyed less frequently than the other grounds and only exploited periodically.

DFO undertook a 5-yearly Framework Assessment Review of the offshore scallop fishery in February 2009, after the site visit for the MSC assessment had taken place (DFO, 2009). As part of this process there was a detailed evaluation of a new analytical population model for Georges Bank 'a' to replace the cohort analysis, tuned to a commercial catch rate-stratified survey index and a commercial catch per unit effort index, which had been found to have several deficiencies. The new delay-difference population model, fit to both the survey and commercial catch rate indices, was found to produce biomass estimates that were more consistent with the pattern suggested by both the survey and commercial catch rate indices than did the cohort analysis (Jonsen et al., 2009). As a result, the delay-difference model has been used for subsequent assessments of the Georges Bank 'a' fishery (DFO, 2009a; DFO, 2009b; DFO, 2010 and, more recently, for the Browns Bank fishery (Hubley et al., 2011). This is the first analytical assessment to be carried out for Browns Bank and the first formal assessment since 1998 for this fishery, which depends on periodic large recruitments. As part of the Framework Review a detailed evaluation was also made of the survey design used for the annual August surveys on Georges Bank (Hubley, et al., 2009). In the existing design, stratification was based on annual commercial catch rates, which had several disadvantages and performed poorly in

	<p>terms of precision when evaluated against a simple random sampling design. Alternative designs were considered and the recommended design to be used in future surveys is based on the historical survey index; this was considered to have several advantages over both the original design and other alternatives.</p> <p>Furthermore, the client also provided the surveillance team with a copy of a letter signed by the Regional Director General of DFO Maritimes Region which states that:</p> <p><i>“...with respect to the assessment of the resource, stock status advice continues to be reports in DFO Science Advisory Report. Management documents have been updated as necessary, outlining objectives for the fishery and establishing a precautionary approach framework against which management advice is provided. Licence conditions, data collection, governance arrangements and consultative processes remain the same. Regarding compliance, again, there have been no material changes nor have any concerns been noted.</i></p>
Conclusions	<p>Stock status on the Canadian offshore scallop fishing grounds is currently very good. On Georges and Browns Banks, which provide the bulk of the landings, abundance is above average and recruitment is very good. Only small stocks of pre-recruit, recruit and commercial size scallops are currently present on the other banks and will support small fisheries. However, this is not unusual as these areas depend on occasional good recruitments. Growth rates and condition factors on both Georges and Browns Banks are currently low and this will affect yield and meat counts.</p> <p>The annual surveys have been carried out as scheduled and the DFO stock assessment team has done much work in the last two years to develop and enhance the sampling and analytical assessment methodology.</p>

	Comments
Activity assessed	<p>Performance Indicator 1.1.2.3 Are all major sources of fishery related mortality recorded/ estimated, including landings, fishing effort, discards, incidental mortality and mortality of juveniles?</p> <p>Scoring Guidepost 100 Landings, effort, discards and incidental mortality are accurately monitored for all fleets and parts of the stock.</p> <p>Scoring Guidepost 80 Landings and effort are accurately recorded, and trends described. Discards and incidental mortality of adults and juveniles are well estimated, but monitoring does not extend to the entire fleet and / or stock.</p> <p>Scoring Guidepost 60 Sufficient information is recorded to allow accurate estimates to be made of landings and effort. Estimates of discards and incidental mortality are available for key fleets.</p> <p>Score 75</p> <p>Scoring Rationale</p> <p>Trends in landings and fishing effort are well documented, as are discards (e.g. Rago 2005), but incidental mortalities must occur as a result of fishing. Although the extent of incidental mortality of escapees from the dredge is unknown, judging from the shock marks on scallop shells (which Caddy (1989) showed coincide closely in size with the ring diameters and inter-ring spaces), this mortality component is not negligible, and deserves further investigation.</p> <p>Indirect impacts of the gear on small scallops, especially on the first three year classes prior to commercial size, occur while passing through the dredge (e.g., Caddy 1973; 1989). Some incidental mortality of escapees must take place judging from shell shock marks caused to an unknown proportion of small scallops damaged during escapement through the dredge rings, but which recover subsequently. Monitoring shock mark frequency at size could help provide indicative estimates of the indirect mortality rate. Since the fishing strategy is usually to tow repeatedly over the same area until catch rates decline, multiplicative impacts are to be expected if small scallops are present in the tow area, and groundfish that accumulate to feed in the dredge track are liable to incidental damage. These effects have been reduced compared with the last 30 years or more, since some areas of dense young scallop aggregations are now protected from fishing within seed boxes until they reach commercial sizes, and fishing effort is more narrowly concentrated on productive bottom than previously.</p> <p>All vessels have VMS and 100% logbook completion. Effort exerted, and fishing locations, are well recorded and are used in determining CPUE, extent of fishing area, and other indices. There are two observed trips per month on Georges Bank only on a fleet of 18 vessels (pers. comm. DFO)</p> <p>Discard data are collected by observers, and since the time on deck of small scallops is reduced in the modern fishery, the efforts made to reduce this cause of mortality must be at least partially effective. Discard mortality of scallops is thought to be low unless they are left on deck for long periods during summer or winter. The move to</p>

	<p>freezer trawlers and covered decks with conveyor belts rapidly returning discards to the sea is likely to have reduced this mortality component even further. Undersized scallops are thought to have a high survival rate if rapidly returned to the water (Gavaris et al. 2005).</p> <p>Condition 1</p> <p>The incidental and discard mortality of scallops is not well known for this fishery as a result the following Condition has been set:</p> <p>The client is required to ensure that by the <u>fourth annual audit</u> all major sources of fishery related mortality, including landings, fishing effort, discards, incidental mortality and mortality of juveniles are accurately recorded/estimated for most fleets and most parts of the stock.</p> <p>To achieve this outcome, it is recommended that:</p> <ol style="list-style-type: none"> a) By the second annual audit a program is developed to assess the incidental and discard mortality of scallops. b) By the fourth annual audit information from this program is formally taken onto account within the management of the fishery.
SPANS Action Plan	<p>In order to inform management of the incidental and discard mortality of scallops, the client will examine scallop discard and incidental mortality in the offshore scallop fishery based on existing data and literature available. The assessment of mortality may incorporate an estimate or scenarios of different mortality levels into the assessment and science advice. A summary of how this work is being incorporated into the management of the fishery will be provided to an audit team by the fourth annual audit.</p>
Observations	<p>Although this Condition is not due for completion until the 4th annual audit, the client is expected to have developed a programme for assessing incidental and discard mortality by the 2nd annual audit. To date, the science team have discussed the proposed methodology and have scheduled the topic for more detailed discussion at their next meeting in June, 2011, where it will be discussed together with the requirements for meeting Conditions 2 & 3. The results and conclusions of this meeting should be presented at the 2nd annual audit, together with any analyses completed. For all three conditions there is a requirement to extend the analysis to all the banks fished, not just to Georges Bank. As the discard and incidental mortality data are collected by observers, this will require careful planning, for with relatively low stocks of commercial scallops on the other banks there are likely to be few fishing trips on which to place observers.</p> <p>The importance of incidental mortality and of a fishery management system able to react quickly to protect aggregations of juvenile scallops from intensive fishing has been shown dramatically in a recent study by Stokesbury et al. (2011) for sea scallops on the US Mid-Atlantic grounds. It is to be hoped that the monitoring of shock mark frequency as an index of incidental mortality can be investigated further in the Canadian fishery and incorporated into future studies.</p>
Conclusion	<p>Progress is on target with respect to the milestones and timeline for completing the condition.</p>

	Comments
Activity assessed	<p>Three Performance Indicators that referred to bycatch and discards failed to achieve the 80 score and so were combined into a single Condition of Certification. The Performance Indicators, their respective Scoring Guideposts, the score that was assigned and their scoring rationale is presented below along with the Condition:</p> <p>Performance Indicator 2.1.2.1 Is information available on the nature and extent of the by-catch (capture of non-target species)?</p> <p>Scoring Guidepost 100 Accurate records are kept on the nature and extent of all by-catch species.</p> <p>Scoring Guidepost 80 Information is available on non-target species directly affected by the fishery including their distribution and/or ecology. Quantitative information is available on significant by-catch. If obtained by sampling, this is considered sufficient to provide adequate information.</p> <p>Scoring Guidepost 60 Appropriate qualitative information is available on by-catch species. This enables those species caught in significant numbers to be identified.</p> <p>Score 75</p> <p>Scoring Rationale By-catch data are collected by the observer program but these data are limited to Georges Bank (60-80% of the TAC). Two observer trips are made each month (about 10% of the fishing trips). The observer program records the larger fish and invertebrates brought on board. Identification of taxa by observers is generally considered to be accurate although some groups are not identified to the species level. Approximately 150 fish and invertebrate taxa have been collected. Occurrence, weight and sometimes length of common fish are recorded. All data are archived in the DFO Virtual Data Centre. Information is available on the distribution and ecology of some bycatch species.</p> <p>The only quantitative information available is for yellowtail flounder, cod and haddock as these data are processed as part of the TRAC agreement with the US (e.g. Gavaris et al. 2007). Data on other bycatch species caught on Georges Bank have not been processed. Information is available on the distribution and ecology of some species. There are no bycatch data for the other banks being fished.</p> <p>The score could have been higher if all bycatch data currently collected were processed and if bycatch data were available from the all the banks that are fished.</p> <p>.....</p> <p>Performance Indicator 2.1.2.2 Is information available on the extent of non-retained catch (discards)?</p> <p>Scoring Guidepost 100 Accurate and verifiable information is available on the extent of all non-retained catch, and the consequences of these. Or the entire catch is landed.</p>

	<p>Scoring Guidepost 80 Adequate information is available to allow estimates of the non-retained catch to be calculated and its significance interpreted.</p> <p>Scoring Guidepost 60 Information is available of the extent of major components of non-retained catch, sufficient to identify the likely significance of this.</p> <p>Score 75</p> <p>Scoring Rationale Large scallops (100 mm+) are picked out of the catch by hand and processed (pers. comm. client). Undersized scallops are discarded over the side with the bycatch and rocks. There appear to be no quantitative data on the number of undersized scallops discarded or on their survival. However, observers apparently record an estimate to the total weight of discarded scallops. Tagging experiments in the US indicate that a substantial percentage of discarded scallops can survive if they are handled properly and returned to the water quickly. The level of discarding in the fishery is considered to be low. The industry practice of closing specific areas on Georges and Browns Bank to protect juvenile scallops until they mature should reduce the amount of discards. However, due to the lack of quantitative data, it is difficult to estimate the significance of discarding.</p> <p>The score could have been higher if quantitative discard data were available and had been presented.</p> <p>.....</p> <p>Performance Indicator 2.1.4.2</p> <p>Scoring Guidepost 100 The consequences of current levels of removal of non-target species on population status and/or ecological systems have been evaluated and determined to be within acceptable limits</p> <p>Scoring Guidepost 80 Sufficient information is available on consequences of current levels of removal of non-target species to suggest no unacceptable impacts of the fishery on population status and/or ecological systems within major fishing areas.</p> <p>Scoring Guidepost 60 The removal of non-target species could lead to impacts upon population status and/or ecological systems (applying the precautionary approach where necessary). A program is in place to identify these and, if appropriate, reduce these to acceptable, defined limits.</p> <p>Score 75</p> <p>Scoring Rationale Data on the removal of non-target species (i.e. bycatch) by the offshore scallop fishery is collected by the observer program for Georges Bank. However, bycatch data are not collected on the other banks that are fished. Despite the high selectively</p>
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of scallop dredges, on the order of 6% of the catch (minus rocks) is composed of invertebrate and finfish bycatch. Approximately 150 taxa have been collected to date. Major species of concern on Georges Bank are yellowtail flounder, cod and haddock and these are the only bycatch data processed. Observer data for other common bycatch species such as monkfish and skate have not been routinely processed. Stocks of yellowtail, cod and haddock have been depressed in recent years and the extent to which scalloping may have played a role is unknown. However, haddock is showing signs of recovery. It is judged that sufficient information is not available at this time to conclude that removal of non-target species is not having unacceptable impacts on the populations of other resource species or the ecosystem.

The industry has recently taken significant steps to reduce bycatch. Experiments have been conducted with alternate gear configurations to reduce bycatch. Time/area closures to scalloping are in place for cod and yellowtail flounder on Georges Bank to reduce bycatch during periods of spawning. Bycatch reserves have been established.

The score could be higher if all bycatch information was processed and bycatch data were available for the other banks fished.

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Condition 2

Information and assessment of discards and by-catch is not gathered from all of the Banks. As a result the following Condition has been set:

The client is required to ensure that by the second annual audit sufficient information on discarded scallops and non target species is gathered in order to evaluate the impact of the fishery on the scallop stock, non target species and/or ecological systems.

To achieve this outcome, it is recommended that:

- a) By the first annual audit, bycatch monitoring is expanded to cover all of the Banks that are fished. The same level of bycatch monitoring should be maintained on Georges Bank and at least one trip per season should be monitored on the other named Banks that are fished in the Unit of Certification.
- b) By the first annual audit, methods for collecting under-sized scallop discard data are reviewed and improvements implemented where warranted.
- c) By the second annual audit, all bycatch and under-sized scallop discard data are processed and reported on an annual basis.

SPANS Action Plan	<p>In order to better evaluate the impacts of the fishery on the scallop stock, non target species and/or ecological systems, the client will:</p> <ul style="list-style-type: none"> • Extend bycatch monitoring to other banks through the observer coverage of one trip per year on each bank outside Georges Bank • Work with DFO to review methods for collecting undersized scallop data and implement changes if and where warranted • Report main bycatch species and scallop discards on an annual basis <p>This work will be completed and provided to an audit team by the second annual audit.</p>
Observations	<p>The three Performance Indicators combined in Condition 2 are all concerned with discards or bycatch and the data for these are collected by the on-board observer programme. In the past, observer trips have only been made on the Georges Bank grounds but it is a requirement of this Condition that one trip per year should be made to all the other banks fished. Other deficiencies in the discard and bycatch analysis noted in the MSC assessment are that in the past not all the data collected have been analysed and the only quantitative data collected is the bycatch data for yellowtail flounder, cod and haddock, which are analysed and presented in the TRAC reports. The 2010 Preliminary Summary of Cod, Haddock and Yellowtail Flounder.</p> <p>Discards from the Canadian Georges Bank Scallop Fishery was provided to the surveillance team.</p> <p>Because fishing has been focused on Georges Bank it was not possible to expand bycatch monitoring to the other banks during the first reporting period associated with this audit.</p> <p>With respect to the detail of the extended bycatch monitoring of other banks, initial discussions between the client and DFO have taken place and, as with Condition 1, these issues have been scheduled for more detailed consideration in the June, 2011 meeting.</p> <p>Regarding the deficiencies noted in the analysis and reporting of bycatch and discard data there are really two issues. Firstly, the fact that not all the data collected are currently processed is a relatively straightforward matter of allocating sufficient manpower resources to the task. The second, the provision of more quantitative data, is rather more difficult to achieve where this requires changes to be made to the sampling protocol carried out by the observers. This is particularly important in the case of the under-sized scallop discard data for without quantitative data on the numbers discarded and their survival it is difficult to estimate the significance of discarding. Similarly, to assess the impact of the removal of non-target species on the populations of other species or the ecosystem requires more detailed quantitative analysis of species, in addition to yellowtail flounder, cod and haddock.</p>
Conclusion	<p>Progress in meeting this Condition has, in part, been restricted by the fact that fishing has not extended beyond Georges and, to a much lesser degree, Browns Bank. Assuming, significant progress is made with the review of methods at the June, 2011 meeting, it is expected that this condition will be closed out by the second annual audit.</p>

	Comments
Activity assessed	<p>Two Performance Indicators that referred to biological diversity, community structure and productivity failed to achieve the 80 score and so were combined into a single Condition of Certification. The Performance Indicators, their respective Scoring Guideposts, the score that was assigned and their Scoring rationale is presented below along with the Condition:</p> <p>Performance Indicator 2.1.4.3 Does the fishery have unacceptable impacts on habitat structure?</p> <p>Scoring Guidepost 100 Effects on habitat structure are well documented and are within acceptable tested/justified limits.</p> <p>Scoring Guidepost 80 Sufficient information is available on the consequences of the fishery to suggest no unacceptable impacts upon habitats within major fishing areas or on sensitive habitats elsewhere.</p> <p>Scoring Guidepost 60 There is no evidence that the fishery is having unacceptable impacts, based on a reasonable understanding of the fishery, although the issue has not been directly studied.</p> <p>Score 75</p> <p>Scoring Rationale</p> <p>The scallop fishery is focused on gravel seabed which are high energy areas subjected to considerable natural disturbance through currents and waves. Because of their size, weight and mode of operation, scallop dredges do damage habitat structure, both physical and biological. No directed experiments on the extent of habitat damage have been conducted in the area under assessment but estimates can be made from other studies. For example, it can be expected that sediments clasts are displaced, microhabitat features are flattened out and fine sediment re-suspended. Gravel seabed has a high proportion of structure-forming epifauna and these are especially vulnerable to disturbance by scallop gear. However, most of the epifauna are relatively small and larger forms such as deepwater corals are not found on scallop beds. It appears that habitat structure can recover if the seabed is left undisturbed for a period on the order of 10 years. Due to the rotational nature of the fishery, it appears that a given area of the seabed may lie fallow for several years before being re-dredged which will allow some opportunity for recovery before repeated disturbance.</p> <p>The scallop beds on Georges, Browns and German Banks have been mapped in detail using multibeam sonar and these proprietary data are shared among the clients of this assessment. Therefore, vessels can target fishing activity on the highest concentrations of scallops. As a result, the spatial footprint of the fishery has been reduced markedly in recent years on these three banks. However, this is not true on the other banks fished which do not have complete multibeam coverage. Many of the scallop beds exploited today have been fished for many years and it might be that the habitat found today is different, and less sensitive to dredge disturbance, to that existing before the fishery began. While the current healthy state of scallop populations might suggest that disturbance by dredges is not having unacceptable</p>

	<p>impacts on habitat, this might not be true for other species sharing the same habitat.</p> <p>The score would have been higher if directed experiments on the impacts of scallop dredges on habitat had been conducted in Canadian waters.</p> <p>.....</p> <p>Performance Indicator 2.1.4.4 Are associated biological diversity, community structure and productivity affected to unacceptable levels?</p> <p>Scoring Guidepost 100 The effects of the fishery on biological diversity, community structure and productivity have been quantified and are within acceptable tested/justified limits.</p> <p>Scoring Guidepost 80 Sufficient information is available on the consequences of the fishery on biological diversity, community structure and productivity. This does not indicate any unacceptable impacts.</p> <p>Scoring Guidepost 60 There is no evidence that the fishery is having unacceptable impacts, although the issue has not been directly studied</p> <p>Score 75</p> <p>Scoring Rationale Observations on the Digby scallop grounds indicate that fishing disturbance, both scallop dredging and otter trawling, over a 30 year period has changed the composition of the megabenthic community as sampled by a scallop dredge. There was a relative decline in fragile, sessile and colonial species and an increase in robust, mobile grazers and scavengers. However, no species were extirpated. While the gears and communities are not directly comparable, similar results could be expected for offshore scallop beds. Changes in community structure as a result of fishing disturbance, including scalloping, have also been suggested for Georges Bank. There also is evidence that fishing disturbance has reduced the benthic productivity of Georges Bank. The overall significance of these demonstrated impacts depends upon the spatial and temporal pattern of the dredging disturbance. Because the annual disturbance footprint appears to be relatively small (at least for the three banks where multibeam data are available) and apparently rotates within a given fishing bank from year to year, the spatial extent of impacts appears to be much less than just a few years ago. Data are available that allow the spatial and temporal pattern of the fishery to be determined in great detail but this has not yet been done. If left undisturbed, it has documented on Georges Bank that the benthic community has the ability to recover in a period of time on the order of 10 years. However, recovery rates could be lower on the other banks fished because of less favourable growing conditions.</p> <p>There is not sufficient information at this time to judge whether the observed impacts of scalloping on biological diversity, community structure and productivity are acceptable or not. This score could have been higher if directed experiments on the impacts of scallop dredges on benthic communities had been conducted in Canadian waters.</p> <p>.....</p>
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Condition 3

Analysis has not been completed to judge whether the observed impacts of scalloping on habitat and biological diversity, community structure and productivity are within acceptable limits. For this reason the following Condition has been set:

The client is required to ensure that by the third annual audit sufficient information is available on the consequence of the fishery to suggest it is not having unacceptable impacts on habitat and biological diversity, community structure and productivity. If any unacceptable impacts are identified by the fourth annual audit the client shall implement measures to ensure they are addressed.

To achieve this outcome, it is recommended that:

- a) By the second annual audit determine the spatial distribution of fishing disturbance of the seabed for all banks fished on an annual basis. This analysis should be done for as many past years as possible. Compare the spatial distributions of fishing disturbance for successive years to determine the time intervals between disturbances for all areas fished.
- b) By the second annual audit, use existing information to map the seabed habitats, and, where possible, communities of the scalloping areas for which multibeam data are not available.
- c) By the third annual audit, based on (a) and (b) above, develop a program to fill key knowledge gaps.
- d) By the third annual audit, review existing information on the sensitivity of the identified seabed habitats and associated species and the expected rates of recovery from disturbance by scallop fishing.
- e) By the third annual audit, use the above information to evaluate the likely impacts of the fishing disturbance on habitat and community structure, biological diversity and productivity as well as the risk of creating irreversible changes.
- f) Assess the acceptability of likely impacts that are identified.
- g) If unacceptable impacts are identified, by the fourth annual audit, new management strategies should be outlined and measures implemented to detect and manage the ecosystem impacts of the fishery and ensure that key elements of the ecosystem are protected.

SPANS Action Plan	<p>In order to ensure that sufficient information is available on the consequence of the fishery to suggest it is not having unacceptable impacts on habitat and biological diversity, community structure and productivity, the client will:</p> <ul style="list-style-type: none"> • Compile existing information on the spatial and temporal distribution on fishing disturbance, as well as existing data on seabed habitats and associated species by the second annual audit. • Identify any important knowledge gaps and use this existing data and information as the basis of a qualitative analysis on sensitivity of key habitats and gear impacts by the third annual audit. • Through the IFMP process, apply existing information to evaluate the risk of unacceptable impacts on ecosystem function as a result of the scallop fishery. If unacceptable impacts are identified, management strategies will be developed to mitigate impacts in areas where there is high risk of impairing ecosystem function. This will be completed by the fourth annual audit in conjunction with DFO. <p>All of the above work will be reported to an audit team as it is completed.</p>
Observations	<p>To comply with this Condition it will be necessary to compile, analyse and map existing data on the spatial and temporal distribution of fishing disturbance, together with data on seabed habitats, by the 2nd annual audit. In order to undertake this work on ecosystem analysis, the DFO research team put in a proposal for internal funding and this has been successful. The details of how this work will proceed is another topic scheduled for discussion at the June, 2011 meeting between the client and DFO. In particular the meeting will discuss how the proprietary industry multibeam data can be incorporated into GIS tools. Another aim is to identify gaps in the knowledge and develop sensitivity keys for species and habitats.</p> <p>Although no directed experiments on the impacts of scallop dredging on habitats have been carried out in Canadian waters, there have been a number of relevant studies elsewhere, including some on the US sea scallop fishery which uses the same fishing gear on adjacent grounds. While the spatial extent of impacts have undoubtedly been reduced considerably in the Canadian fishery following the introduction of multibeam targetting of suitable substrates for scallop aggregations, more detailed analysis of the spatial and temporal footprint of the fishery is necessary in order to assess what level of disturbance to seabed habitats is acceptable.</p>
Conclusion	<p>This will be quite a challenging Condition to comply with on the recommended time-scale but with the funding now assured the work would appear to be on target.</p>

	Comments
Activity assessed	<p>Two Performance Indicators that referred to management objectives failed to achieve the 80 score and so were combined into a single Condition of Certification. The Performance Indicators, their respective Scoring Guideposts, the score that was assigned and their Scoring rationale is presented below along with the Condition:</p> <p>Performance Indicator 3A.3.1 Does the management system contain clear short and long-term objectives?</p> <p>Scoring Guidepost 100 The management system contains clear and explicit short and long-term resource and environment objectives that can be measured by performance indicators.</p> <p>Scoring Guidepost 80 The management system contains short and long-term resource and environment objectives.</p> <p>Scoring Guidepost 60 Short and long-term resource and environment objectives are implicit within the management system.</p> <p>Score 75</p> <p>Scoring Rationale The long term objectives of the offshore scallop fishery are clearly outlined in the 2000 Integrated Fisheries Management Plan (IFMP):</p> <ul style="list-style-type: none"> • ensure the conservation and restoration of the resource • to the degree possible, stabilize landings over time • provide increased economic benefits for crews, vessel owners, shore workers and the people of Canada <p>The assessment team was unable to find documented short or medium objectives but several appear to be implicit in management measures and licence conditions contained in annual fishing plans:</p> <ul style="list-style-type: none"> • limit exploitation rate • protect juvenile stock and maximize value • protect incoming recruitment • reduction of bycatch of vulnerable commercial species • data collection <p>The score for this indicator would have been higher if long-term objectives were more current and short-term objectives were explicit, documented and public.</p> <p>.....</p> <p>Performance Indicator 3A3.4 Are there procedures for measuring performance relative to the objectives?</p> <p>Scoring Guidepost 100 Tested procedures are used for regular measurement of performance relative to the objectives.</p> <p>Scoring Guidepost 80</p>

	<p>There are appropriate evaluated procedures used for measuring performance relative to the objectives.</p> <p>Scoring Guidepost 60 Operational procedures exist which can be used to measure performance relative to the objectives.</p> <p>Score 75</p> <p>Scoring Rationale</p> <p>Biomass estimates are made annually using data from research cruises and meat count results. Fishery performance data is also available for George’s Bank. Survey catch rates for pre-recruits, recruits and commercial sizes are reviewed. Cohort analysis is used to estimate the age structured population abundance and fishing mortality based on the survey index, commercial catch rates and age composition in the catch.</p> <p>Monitoring measures such as observer coverage, DMP, log books and VMS assist in measuring performance relative to the long-term objectives and the short-term implied objectives of bycatch, discarding, species-at-risk, seasons, area infractions, etc.</p> <p>The score would have been higher if objectives and specific performance indicators to meet fishery and habitat concerns were clearly outlined.</p> <p>.....</p> <p>Condition 4</p> <p>The management system does not contain clear short and long term resource and environment objectives or evaluated procedures for measuring performance relative to the objectives. For this reason the following Condition has been set:</p> <p>The client is required to ensure that by the <u>first annual audit</u> explicit short and long-term resource and environment objectives and procedures for measuring performance relative to the objectives are incorporated into the management system.</p> <p>To achieve this outcome, it is recommended that:</p> <ul style="list-style-type: none"> a) By the first annual audit explicit short and long-term resource and environment objectives and review of milestones are incorporated into the management system. b) By the first annual audit appropriate procedures are implemented for measuring performance relative to the objectives
<p>SPANS Action Plan</p>	<p>The client will by the first annual audit develop explicit short term and long term objectives. These objectives and procedures for measuring performance relative to the objectives will be incorporated in the update of the IFMP and provided to an audit team</p>
<p>Observations</p>	<p>Objectives – Inclusion within the IFMP</p> <p>The present Offshore Scallop IFMP is under review and expected to be revised in the next few months in a form that follows the DFO IFMP template. In the meantime, DFO and the Offshore Scallop Advisory Committee have developed and agreed new long, medium and short term objectives for the fishery. These are</p>

	<p>presented in a tabular form set out in a “companion document” to the existing management plan. A letter from DFO to the client and provided to the audit team confirmed that, as such, they have the same status as the IFMP.</p> <p>The table of objectives summarises:</p> <ul style="list-style-type: none"> • long-term, high-level objectives related to target species and ecosystem management issues; • medium/short term objectives, tactics or measures to achieve the medium/short term objectives, and; • monitoring and evaluation methods for each medium/short term objective. <p>The long-term objectives are based on an ecosystem assessment and management framework developed for integrated ocean management in DFO’s Maritimes Region, and as such would be consistent with management approaches to other ocean activities. The wording of the medium/short term objectives is intended to be consistent with other IFMPs in the Maritimes Region and elsewhere in Canada, such as to ensure consistency in approach between fisheries.</p> <p>The long-term and short-term term objectives cover the range of resource and environment issues identified for this fishery (target species, bycatch species, PET species, habitat). Economic objectives are also identified.</p> <p>The monitoring and evaluation methods identified in the objectives table were considered by the audit team to be appropriate to measure performance relative to the identified objectives.</p> <p>Progress against objectives will be assessed in annual science/industry/fisheries management meetings including the OSAC meeting.</p>
Conclusion	<p>The condition states that the client is required to ensure that explicit short and long-term resource and environment objectives and procedures for measuring performance relative to the objectives are incorporated into the management system within the first year of certification.</p> <p>The condition relates to multiple PIs: 3A.3.1 and 3A.3.4. A score of ≥ 80 is required for all the PIs in order for the condition to be closed out. The 100 and 80 scoring guideposts (SG) for each of the PIs is provided below along with a revised scoring rationale and score.</p> <p>PI 3A.3.1 SG 100</p> <p>The management system contains clear and explicit short and long-term resource and environment objectives that can be measured by performance indicators.</p> <p>SG 80</p> <p>The management system contains short and long-term resource and environment objectives.</p> <p>The IFMP is in the process of being reviewed. DFO and OSAC have developed and agreed long, medium and short term resources and environmental objectives with methods for monitoring and evaluating. These are set out in a companion document to the existing IFMP and will be fully incorporated within the new IFMP.</p> <p>Based on the above, PI 3A.3.1 is rescored at 90.</p>

	<p>PI 3A.3.4 SG 100 Tested procedures are used for regular measurement of performance relative to the objectives.</p> <p>SG 80 There are appropriate evaluated procedures used for measuring performance relative to the objectives.</p> <p>Explicit long, medium and short term fishery resource and ecosystem objectives are presented in a companion document to the existing IFMP along with a “monitoring and evaluation framework” that identify what data and how or who will evaluate it.</p> <p>Based on the above PI 3A.3.4 is rescored at 80.</p> <p>As a result, all parts of the condition were considered by the audit team to have been met, and accordingly this condition can be closed out. As such, continued activity related to these PIs will be monitored within the normal annual surveillance audit process.</p>
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	Comments
Activity assessed	<p>Performance Indicator 3A.3.3 Do procedures include for a precautionary approach in the absence of sufficient information?</p> <p>Scoring Guidepost 100 All procedures include for evaluation of uncertainty and application of precaution at an appropriate level.</p> <p>Scoring Guidepost 80 Appropriate, formalised measures exist and are implemented to apply a precautionary approach in the development and application of operational procedures in the absence of sufficient information.</p> <p>Scoring Guidepost 60 Measures exist to implement a precautionary approach in the absence of sufficient information. There is some evidence that this is occurring</p> <p>Score 75</p> <p>Scoring Rationale The industry does implement a number of precautionary measures. This industry has recommended TAC levels below that allowed by the scientific advice. For the '08 fishery, a TAC of 5,500 tonnes was established for George's Bank "A", 1,000 tonnes lower than the maximum advised by the assessment. Voluntary closures are implemented by industry in two large areas of juvenile scallops reduces the risk of recruitment failure. In addition to the meat count limit of 33 meats per pound for George's, industry has further placed a tolerance limit on small scallops in an effort to protect future recruitment.</p> <p>Nevertheless, a formalized commitment to the application of the precautionary approach is missing in the IFMP.</p> <p>Condition 5 A formalized commitment to the application of the precautionary approach is missing within the management system. For this reason the following Condition has been set:</p> <p>The client is required to ensure that by the first annual audit formalised measures are implemented to apply a precautionary approach in the development and application of operational procedures in the absence of sufficient information.</p> <p>To achieve this outcome, it is recommended that:</p> <ol style="list-style-type: none"> a) By the first annual audit formalised measures are described and implemented to show how the precautionary approach is applied in the management system.
SPANS Action Plan	The client will by the first annual audit describe the application of the precautionary approach in this fishery in the updated IFMP, which will be provided to an audit team.
Observations	<p>Precautionary Approach (PA)– inclusion in the IFMP The audit team were provided with a “companion document” to the offshore scallop</p>

	<p>IFMP detailing the application of DFOs precautionary approach framework for scallops on Georges Bank.</p> <p>The PA framework reflects the best available knowledge with respect to biomass based proxy reference points at this point in time and may be updated as new information becomes available.</p> <p>With respect to scallops on Georges Bank, Reference Points have been developed:</p> <ul style="list-style-type: none"> • Upper (or Target) Reference Point - is set at 80% of the mean fully recruited biomass (>95 mm) from 1981 – 2009. This equates to 8,000 mt. • Lower (or Limit) Reference Point is set at 30% of the mean fully recruited biomass from 1981 – 2009. This equates to 3,000 mt. <p>As a result of developing reference points harvest control rules can be developed to guide management decisions on harvest rates under various stock status conditions.</p>
Conclusion	<p>The condition states that the client is required to ensure that by the first annual audit formalised measures are implemented to apply a precautionary approach in the development and application of operational procedures in the absence of sufficient information.</p> <p>The condition relates to a single PI. The SG 100 and 80 for the PIs is provided below along with a revised scoring rationale and score.</p> <p>PI 3A.3.3 SG 100 All procedures include for evaluation of uncertainty and application of precaution at an appropriate level.</p> <p>SG 80 Appropriate, formalised measures exist and are implemented to apply a precautionary approach in the development and application of operational procedures in the absence of sufficient information.</p> <p>A new companion document of equivalent status to the IFMP has been produced by DFO and the OSAC which explicitly describes the precautionary approach and how it is implemented and being further developed for this fishery.</p> <p>Based on the above, PI 3A.3.3 is rescored at 80.</p>

Any complaints against the certified operation; recorded, reviewed and actioned

The certified operation considered here refers to the signatories of the Seafood Producers Association of Nova Scotia's (SPANS) Eastern Canada Offshore Scallop MSC certification:

- Adams and Knickle Limited
- Clearwater Seafoods Limited Partnership
- Comeau's Sea Foods Limited
- La Have Seafoods Limited
- Ocean Choice International Limited Partnership

There were no reported incidents of any complaints against the SPANS member companies relating to the scope of MSC certification.

Any relevant changes to legislation or regulation.

No relevant changes to legislation or regulation were reported.

Any relevant changes to management regime.

The IFMP is in the process of being revised using the DFO IFMP template. As a result of the client meeting conditions of certification, i.e. explicit long and short term objectives that are monitored and evaluated; inclusion of the precautionary approach, “companion documents” have been produced that have equivalent status to the IFMP. The revised IFMP will incorporate the companion documents.

Overall Conclusions

The overall management of the fishery continues to at least the level as during the full assessment.

The client group and/or DFO have taken action toward addressing the conditions of certification raised during the MSC certification assessment resulting in the closing out of two of the five conditions within the specified timescale for completion. These will be subject to the overall review of the on-going operation of the fishery at future annual audits.

The remaining conditions are considered to be on target to be met within their specified timelines.

MSC Certification should therefore continue and surveillance audits continue to the same schedule.

Information Sources:**Meetings**

24th May – The morning was set-a-side for stakeholders to meet or speak via conference call with the audit team. No stakeholder responded to this opportunity nor was any written submission received by the team.

24th May 2011 – Paul Knapman (MML), Andy Brand (MML), Roger Stirling (SPANS), Christine Penney (Clearwater)

25th May 2011 – Paul Knapman (MML), Andy Brand (MML), Roger Stirling (SPANS), Christine Penney (Clearwater), Wendy Williams (DFO - Policy), Greg Stevens (DFO – Resource Mangement), Stefan Leslie (DFO Resource Management) , Bryan Wood (DFO C&P), Jessica Sameoto (DFO Science), Brad Hubley (DFO - Science), Scott Coffen-Smout (DFO OCMD), Stephen Smith (DFO – Science),

Reports etc

DFO. 2009. Proceedings of a Maritimes Science Advisory Process to develop a new assessment framework for Georges Bank scallop. DFO Can. Sci. Advis. Sec. Proceed. Ser. 2009/029.

DFO. 2010a. Assessment of Georges Bank Scallops (*Placopecten magellanicus*). DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2010/036.

DFO. 2010b. Preliminary Summary of Cod, Haddock and Yellowtail Flounder Discards from the Canadian Georges Bank Scallop Fishery for 2010.

DFO. 2010c. PowerPoint Presentation to OSAC – Interim Stock Status for the Banquereau; Eastern Scotian Shelf (Middle & Sable/Western, German, Browns South, Browns North, Georges ‘b’ and Georges ‘a’

DFO. 2011a. Letter to Roger Stirling from Faith Scattolon (DFO) regarding first annual audit of the Offshore Canadian Scallop Fishery.

DFO. 2011b. Letter to Roger Stirling from Stefan Leslie (DFO) regarding companion documents to the Offshore Scallop IFMP.

DFO. 2011c. IFMP Template.

DFO. 2011d. Marine ENGO Forum. Agenda.

- DFO. 2011e. Terms of Reference for the Fisheries and Oceans Canada, Maritimes Region and Marine Environmental Non-Governmental Organizations Dialogue Forum.
- DFO. 2011f. Interim Offshore Scallop Plan.
- DFO. 2011g. Letter to OSAC member from Greg Stevens (DFO) regarding an interim TAC increase on Browns Bank from 500t to 1000t.
- DFO. 2011h. Objectives for the Offshore Scallop Fishery.
- DFO. 2011i. Precautionary Approach Framework for the Offshore Scallop Fishery.
- DFO. 2011j. Browns Bank North and Georges Bank Science Advisory Report 2011 Bullet Points.
- Hubley, B., Smith, S. L. , Jonsen, I. D. & Sameota, J. 2009. Georges Bank 'a' scallop (*Placopecten magellanicus*) annual stock assessment: survey design. CSAS Research Document 2009/033.
- Hubley, B., Glass, A., Reeves, A., Sameoto, J & Smith, S. L. 2011. Browns Bank 'North' scallop (*Placopecten magellanicus*) stock assessment. CSAS Research Document 2011/042
- Jonsen, I. A. , Glass, A., Hunley, B. & Sameoto, J. 2009. Georges Bank 'a' sclop (*Placopecten magellanicus*) framework assessment: data inputs and population models. CSAS Research Document 2009/034.
- Stokesbury, K. D. E/, Carey, J. D., Harris, B. P., O'Keefe, C. E. 2011. Incidental fishing mortality may be responsible for the death of ten billion juvenile sea scallos in the Mid-Atlantic. Marine Ecology Progress Series 425: 167-173.

Standards and Guidelines used:

1. MSC Principles and Criteria for Sustainable Fishing
2. MSC Fishery Certification Methodology Version 6.1 May 2010
3. TAB Directives - all

Appendix A



Eastern Canada Offshore Scallop Fishery & Eastern Canada Offshore Lobster Fishery

MSC Certification Certification Body: Moody Marine Ltd

Combined Annual Surveillance Audits

Moody Marine Ltd, will be conducting the annual surveillance audits for the above fisheries and will make their surveillance teams – Andy Brand, Howard Powles, Paul Knapman - available to meet with stakeholders between 24th and 25th May 2011 in Halifax, Nova Scotia.

MSC certification requires annual surveillance audits of all certified fisheries. These audits have two principal functions:

1. To review any changes in the management of the fishery, including regulations, key management or scientific staff or stock evaluation
2. To evaluate the progress of the fishery against any Conditions of Certification

Should you have any information on these fisheries that you feel should be considered in the audit and/or if you would like to arrange a meeting with the surveillance team, please advise us of:

- a) your name and contact details;
- b) your association with the fishery; and,
- c) the issues you would like to discuss.

Please email or fax these details to Paul Knapman – p.knapman@moodyint.com Fax No. 1 902 422 9780

April 2011

Appendix B

Dr Andy Brand

Andy Brand worked for the University of Liverpool for 40 years on the academic staff of the Port Erin Marine Laboratory, Isle of Man, retiring in 2006 as Director of the Laboratory. During this time he developed large, well-funded, research programmes on the biology, ecology, aquaculture and fisheries of bivalve molluscs, especially scallops, and on the environmental impact of scallop dredging. He has had extensive fishery management and environmental assessment consultancy experience, including contracts with government departments and industry, and has been a member of ICES Working Groups on herring, scallops and ecosystem effects of fishing. In addition to work in the Irish Sea, he has advised on scallops and fisheries management in Alaska, Argentina, Australia, Bermuda, Chile, Ireland, France and the Philippines. He is now an Honorary Senior Fellow of the University of Liverpool and works as an independent consultant on shellfisheries. He has recent experience as an Assessor (2) and Independent Reviewer (3) for Marine Stewardship Council certifications for scallop, mussel and oyster fisheries in the Irish Sea, Faeroes, Denmark and Canada.