



Proposed Introduction of Section 11 Sustainability Measures for Hagfish Pots

Final Advice Paper

MPI Information Paper No: 2014/20

ISBN No: 978-0-478-43731-7 (online)
ISSN No: 2253-394X (online)

August 2014

Disclaimer

The information in this publication is not government policy. While every effort has been made to ensure the information is accurate, the Ministry for Primary Industries does not accept any responsibility or liability for error of fact, omission, interpretation or opinion that may be present, nor for the consequences of any decisions based on this information. Any view or opinion expressed does not necessarily represent the view of the Ministry for Primary Industries.

Requests for further copies should be directed to:

Publications Logistics Officer
Ministry for Primary Industries
PO Box 2526
WELLINGTON 6140

Email: brand@mpi.govt.nz
Telephone: 0800 00 83 33
Facsimile: 04-894 0300

This publication is also available on the Ministry for Primary Industries website at <http://www.mpi.govt.nz/news-resources/publications.aspx>

© Crown Copyright, August 2014 - Ministry for Primary Industries

Contents

Page

Executive Summary	1
Key Considerations	2
Need to Act	2
Stock Status	3
Relevant Fishery Information	3
Consultation	5
Submissions	6
Final Proposals	7
Other issues raised in submissions	7
Assessment against Statutory Obligations	8
Recommendations	12
Option 1	12
Option 2	12

PROPOSED INTRODUCTION OF SECTION 11 SUSTAINABILITY MEASURES FOR HAGFISH POTS

Executive Summary

1. The Ministry for Primary Industries (MPI) is aware of plans by industry to increase targeted fishing pressure on hagfish. MPI considers that hagfish stocks, which are fished using pots, are vulnerable to overfishing, and recommends that measures be put in place to protect juvenile hagfish to better ensure sustainability of hagfish populations.
2. MPI has also provided you with final advice requesting that you consider introducing common hagfish into the Quota Management System (QMS). Regardless of whether or not you make a determination to introduce common hagfish into the QMS, MPI considers that additional measures are necessary to ensure sustainable harvesting. The proposed action (along with the *status quo*) is outlined below (Table 1).

Table 1: Proposed options for sustainability measures for hagfish

	Hagfish sustainability measures
Option 1 (<i>Status quo</i>)	No sustainability measures are set. Under the <i>status quo</i> , there are no restrictions on the number and diameter of escape holes (fishers typically use from 100 - 500 12 mm holes to facilitate sinking).
Option 2 (MPI preferred option)	Set a minimum number of escape holes for each pot used to target hagfish (MPI recommends 100), and a minimum escape hole diameter (MPI recommends 18 mm).

3. MPI's preferred option (Option 2) is to introduce a requirement for a minimum number of escape holes with each hole to be at or above a certain size. This is because information from overseas indicates that escape holes are effective at increasing the average size of catch in hagfish fisheries, and they are expected to be more effective than other management measures. The proposal in this paper is intended to allow for more juvenile hagfish to escape than under current pot configurations. It is considered to be necessary whether or not hagfish are introduced into the QMS, and is recommended to be implemented as soon as practicable.
4. Specific information on the optimal number and size of escape gaps is not available. Submissions from stakeholders did not suggest alternative options.

5. As outlined in the IPP, you may choose any minimum number of escape holes between 100 and 500 or any other minimum diameter between 12 mm and 30 mm that you deem appropriate, as consulted on in the IPP. MPI recommends a minimum of 100 escape holes at least 18 mm in diameter on any pot used to target hagfish in New Zealand waters. Setting a minimum of 100 escape holes is conservative as most hagfish pots already have between 100 and 500 holes to facilitate sinking. MPI recommends a minimum diameter of 18 mm as an initial requirement until more information can be gathered.

Key Considerations

NEED TO ACT

6. Hagfish are slow growing and low productivity species. They have no known migration or larval phase. These factors make hagfish sensitive to overfishing and serial localised depletion.
7. MPI is aware of plans by industry to increase targeted fishing pressure on hagfish stocks in the immediate future. There is a market preference for fish 300 mm and larger. However, hagfish are not thought to first reproduce until a size between 412 mm and 534 mm for females, and up to 585 mm for males. Consequently, the fishery is predominantly targeting juveniles.
8. MPI considers that there is a need to increase the average size of hagfish caught in traps. There is a risk that hagfish released at the surface do not survive. Anecdotal information from fishers suggests that many hagfish brought up in pots are highly likely to survive when returned to the water. However, if hagfish become stressed in pots and have started sliming, they are less likely to survive. Some trials conducted on hagfish species overseas indicate that they can be sensitive to fluctuations in temperature and salinity, and this may decrease survival of individuals returned to the water.
9. Management action is therefore needed to promote the escapement of juvenile hagfish at the seafloor. Evidence from overseas indicates that hagfish are able to locate and exit traps through escape holes. Information relating escape hole diameter and hagfish size are not available for New Zealand hagfish species; however, MPI believes that setting a sustainability measure for escape holes based on the best available information is now necessary.

Biological Characteristics of Hagfish

10. Hagfish species are considered to have a moderate to high vulnerability and low resilience to overfishing.¹ There may be as many as seven species of hagfish in New Zealand waters, but a target fishery only exists for the common hagfish, *Eptatretus cirrhatous*.

¹ Fishbase.org

11. The common hagfish is a low productivity species, and it is thought to be very slow growing. Evidence suggests that females undergo their first spawning event between 412 mm and 534 mm. Male Hagfish develop later than females, and may not mature until a size of up to 585 mm. Evidence from species overseas indicates that hagfish can take up to 2 or 3 years after maturing to produce only 20 – 30 eggs, and development of the embryo is also slow, with early stages developing at only 7 months in the species *Eptatretus burgeri*.
12. The common hagfish is present throughout coastal-shelf New Zealand waters. It is found between depths from as shallow as 1 m to up to 900 m, but is most common between 90 m and 700 m. No estimates of population size are available.
13. Literature offers some indication of how the body depth and width of the common hagfish varies with body length. Based on ranges estimated by Mincarone and Fernholm², common hagfish of length 585mm may have a body depth that varies between 35 mm and 58.5 mm, and a body width that varies between 26 mm and 42 mm. However, MPI expects that hagfish will escape from holes smaller than their estimated depth or width would suggest. There is no information available for the common hagfish relating escape hole size and the depth, width, or length of an individual that can escape, other than anecdotal information offered by fishers.

STOCK STATUS

14. Stock assessments have not been done for any hagfish species. There are no estimates of absolute or relative abundance of hagfish, and the level of natural mortality is unknown. There is insufficient scientific information available to calculate estimates of current biomass, maximum sustainable yield, or the biomass that can support the maximum sustainable yield.

RELEVANT FISHERY INFORMATION

15. A target fishery exists for the common hagfish. The majority of fishing pressure is concentrated at around the 450 m depth contour, and therefore other hagfish species are unlikely to be frequently taken in association with the common hagfish. However, it is likely that any hagfish species caught in the past have been reported under the species code for the common hagfish (HAG). Therefore, MPI is not sure if discarded hagfish taken as bycatch in other fisheries is predominantly common hagfish.
16. Common hagfish have been targeted since 2006. Catch records indicate a drastic decrease in landings after 2009/10 (Figure 1); however, MPI is aware that this was primarily due to a company that was responsible for the majority of the fishing effort going out of business. Reported commercial catches and observer information suggests that there is a high level of discarding in the target fishery (Figures 1 and 2). This is driven by a market preference for fish of over 300 mm, and a high level of catch of smaller individuals. MPI is also aware that some members of industry have a preference for taking fish larger than 400 g, or roughly 550 mm.

² Mincarone, M. M. And Fernholm, B. 2010. Review of Australian hagfishes with description of two new species of *Eptatretus* (Myxinidae). *Journal of Fish Biology* 77: 779 - 801

17. Hagfish has been fished infrequently in South Island waters to date, but fishing pressure is expected to increase there over the next year, potentially dramatically. MPI understands that new vessels have entered the fishery for the frozen trade in the past of couple months, and are targeting the east and west coast South Island, and Chatham Rise. Furthermore, MPI is aware of plans by industry fishing for the live trade to expand fishing effort once complications with keeping the hagfish alive are sorted out.

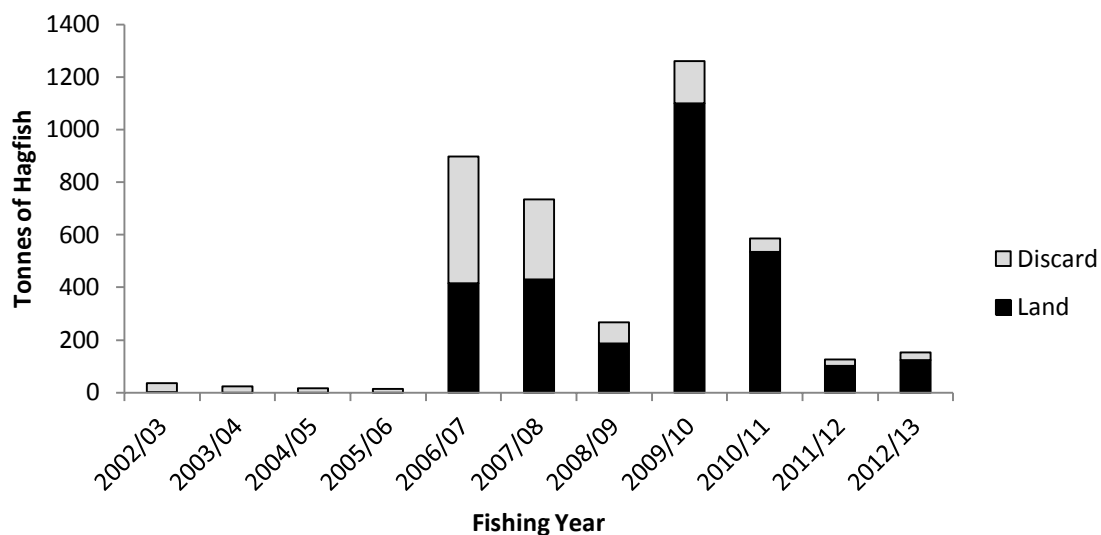


Figure 1: Total reported landed and discarded catch for hagfish from the 2002/03 fishing year to the 2012/13 fishing year

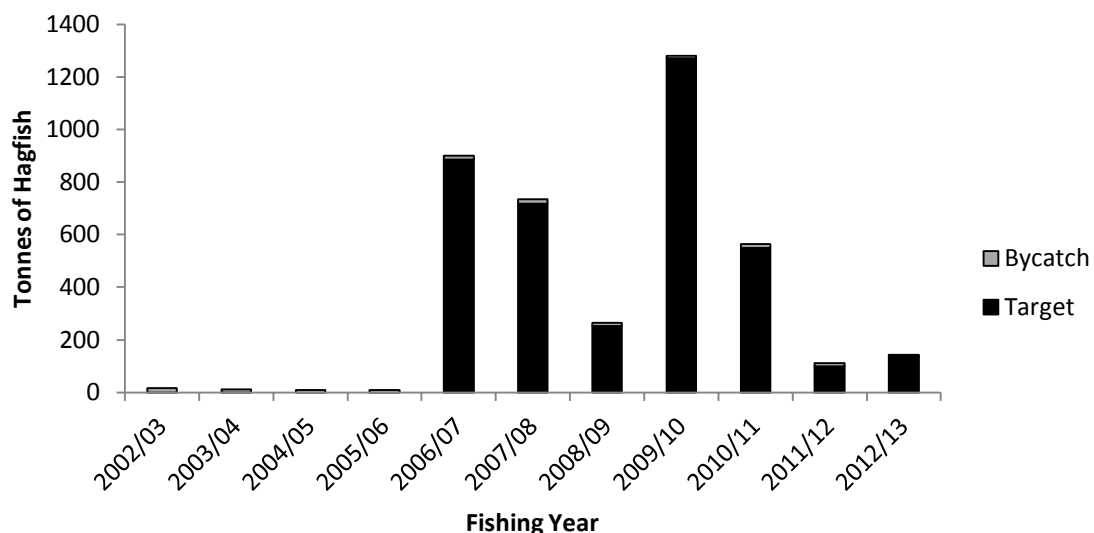


Figure 2: Total reported targeted catch for hagfish and bycatch of hagfish (including landings and discards) from the 2002/03 fishing year to the 2012/13 fishing year

18. MPI is aware that there have been difficulties during the development of the live trade in keeping hagfish alive. There may be high mortality of hagfish taken for the live trade and kept in holding tanks before the fish are landed.

19. The commercial fishery is driven by an export market to Korea. The common hagfish is sold as meat, which is considered a delicacy and believed to hold aphrodisiac properties. Hagfish is exported as either a frozen product with a port price of \$3-3.5 kg or as a live product with a port price of \$12.0 kg. Anecdotal information collected by an observer suggests that these prices may have reached much higher levels in the past (up to \$30 for live and \$12 for frozen around 2009).
20. The common hagfish is targeted with pots. Hagfish pots typically have up to 5 entrance holes, and hundreds of “escape” holes, which primarily function to help the pots sink. MPI is aware that at the peak of hagfish fishing in 2009 there were gear conflicts with other fishing methods and hagfish pots were lost with resulting potential for ghost fishing. Ghost fishing occurs when lost fishing gear continues to trap individuals, driving up levels of mortality.
21. Common hagfish has primarily been taken in FMAs 1, 2, and 7. Low levels of take have been reported for FMAs 3, 4, 5, 6, 8, and 9. However, MPI is also aware that there has been misreporting in this fishery, with some fishers reporting the FMA that they are landing hagfish in, and not the FMA that the hagfish were caught in. As a result, MPI does not know whether or not the reported landings-by-FMA is reliable information.
22. Hagfish are taken as bycatch, primarily in the rock lobster fishery, by bottom trawl in the scampi fishery, and bottom long line in the ling fishery. Levels of bycatch are considered to be low, averaging 4.3 tonnes per year in ling and 0.6 tonnes per year in rock lobster since 1990, and 1.7 tonnes per year in scampi since 2001.
23. MPI has little information regarding a recreational or a customary fishery for hagfish. Hagfish is not a reported catch in the NZ recreational marine fishing survey 2011-12.

Consultation

24. An IPP was released on 24 January 2014 seeking tangata whenua and stakeholders' views on whether to implement a minimum number of escape holes each of a minimum diameter for hagfish pots.
25. MPI received two submissions responding to the proposal to introduce management measures for hagfish pots. These are attached for your reference.
26. The submissions were from:
 - Brian Deadman
 - Seafood New Zealand

SUBMISSIONS

Stakeholder views

27. Brian Deadman is a commercial fisherman directly involved with the hagfish fishery. He supports the introduction of management measures for this fishery. Specifically, he supports a minimum number of 100 escape holes, and a minimum diameter for these holes of 15 mm – 18 mm.
28. Mr Deadman does not support the *status quo*, or the largest of the size range for escape hole diameter suggested in the IPP. He states that fish of 500 mm – 600 mm will go through a 30 mm escape hole, and thus setting a minimum diameter of 30 mm will end the fishery. Anecdotal information from other fishers involved in the fishery collected during the consultation period supports this claim.
29. Seafood New Zealand also supports the introduction of controls on escape holes for hagfish pots. However, they state that they have no information to assist us in the setting of the number or diameter of escape holes. They urge caution, though, in setting management measures to promote the survival of juveniles.

MPI Response

30. MPI consulted on 30 mm as a maximum escape hole size, based on information from overseas that indicated this size escape hole was required in pots for a species similar to the New Zealand common hagfish, in order to ensure sustainability and promote juvenile survival. MPI recognises that there is no information available for the New Zealand common hagfish relating escape hole size and the size of fish that may escape, and accepts the suggestion from fishers that 30 mm is likely to be too large a minimum escape hole diameter for hagfish pots.
31. MPI proposes setting an escape hole diameter smaller than 30 mm until better information on the relationship between escape hole diameter and hagfish size can be collected for New Zealand hagfish species. Setting a minimum escape hole diameter as high as 30 mm may cause an unnecessary barrier to utilisation, and prevent the development of the fishery. MPI agrees that 100 is a suitable minimum number of escape holes given that this number will apply to pots of varying size, and must be suitable for the smaller pots in addition to larger pots. MPI recommends a minimum diameter of 18 mm for these required escape holes to allow for juvenile escapement.

FINAL PROPOSALS

32. MPI recommends that you introduce sustainability measures under section 11 of the Act for pots used to target hagfish. Specifically, MPI proposes a minimum of 100 escape holes at least 18 mm in diameter on any pot used to target hagfish in New Zealand waters (Option 2).
33. The available information indicates that hagfish are highly susceptible to localised depletion and overfishing. MPI considers that an important first step in developing sustainable management in this fishery is to promote juvenile survivorship by allowing them the best chance to escape pots as possible. This will be achieved through setting a minimum number of escape holes each with a minimum diameter, as stated.
34. MPI has little information to inform setting of a minimum escape hole diameter. The available information on width and depth versus length relationships does not offer us any indication of how hagfish bodies are able to get through escape holes. Discussions with fishers, and Mr Deadman's submission, each indicate that hagfish are highly likely to be able to escape through holes that are considerably smaller than the width/depth and length relationships would suggest.
35. MPI considers that it is prudent to set a small escape hole initially, until specific information for our common hagfish is collected that can inform us how the average length of hagfish individuals caught in traps relates to the escape hole size that is used.
36. MPI also considers that introduction of escape holes will incur a cost to fishers involved in the target fishery. MPI expects this cost to be minimal, given that smaller holes are already made in pots to aid sinking, and considers this cost necessary to aid the survival of juvenile hagfish.

OTHER ISSUES RAISED IN SUBMISSIONS

37. Other issues were raised in submissions that were outside the scope of the initial position paper. Mr Deadman suggested that a minimum pot size was necessary as small pots can kill a lot of hagfish. MPI recognises that other management measures may also be useful in promoting the sustainability of this fishery, but has not consulted on these at this time. Currently, MPI has insufficient information to inform a consultation on pot size. The available information from fishers involved in the common hagfish fishery is conflicting as to whether small or large pots are more likely to lead to increased mortality. MPI may explore these options further as new information is collected on the fishery over time.

ASSESSMENT AGAINST STATUTORY OBLIGATIONS

Purpose of the Act

38. Section 8 of the Act says that the purpose of the Act is to provide for the utilisation of fisheries resources while ensuring sustainability. Ensuring sustainability means maintaining the potential of fisheries resources to meet the reasonably foreseeable needs of future generations; and, avoiding, remedying, or mitigating any adverse effects of fishing on the aquatic environment. Utilisation means conserving, using, enhancing, and developing fisheries resources to enable people to provide for their social, economic, and cultural well-being.
39. MPI considers that Option 2 better satisfies the purpose of the Act than Option 1. Option 1 does not provide protection for juvenile hagfish, which MPI considers to be important for the fishery whether or not hagfish are managed as open access, or under the QMS as recommended in the concurrent FAP on QMS introduction. Option 2 has the potential to increase the survival rate of juvenile hagfish by mandating larger escape holes. Both options will allow for utilisation of the fishery; however, utilisation may be maximised under Option 2, as this option will promote long-term utilisation by reducing wastage through unnecessary juvenile mortality.

General Obligations

40. In setting or varying sustainability measures, you must also act in a manner consistent with New Zealand's international obligations to fishing and the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992.
41. A wide range of international obligations relate to fishing, including use and sustainability of fishstocks, and maintaining biodiversity (s 5(a)). MPI considers that the management options presented for hagfish are consistent with these international obligations.
42. MPI also considers the proposed management options to be consistent with the provisions of the Treaty of Waitangi (Fisheries Claims) Settlement Act 1992 (s 5 (b)).
43. There is an obligation to provide for input and participation of tangata whenua and have particular regard to kaitiakitanga (under section 12 of the Act). MPI provided the opportunity for tangata whenua to provide input into the options proposed during the consultation period. No submissions were received.

Environmental Principles

44. Section 9 of the Act requires you to take into account the following environmental principles:
- a) associated or dependent species be maintained at or above a level that ensures their long term viability;
 - b) the biological diversity of the aquatic environment should be maintained; and
 - c) habitat of particular significance for fisheries management should be protected.
45. MPI considers that both the options presented in this paper satisfy obligations under section 9 of the Act. Interactions with associated or dependent species are not likely to be altered considerably by the options in this paper, and are thought already to be low. There is very little bycatch associated with hagfish pots, and this is not expected to increase under the options presented. If anything, Option 2 may allow a higher chance of escape for small bycatch species (those able to fit through 18 mm escape holes). It is not known how species may be affected by the removal of hagfish; however, the options present in this paper are not likely to exacerbate or result in any further negative impacts. Nor are the options expected to jeopardise the maintenance of biological diversity, or impact negatively on habitat of particular significance for fisheries management.

Information Principles

46. Section 10 says you must take into account the following information principles when exercising or performing functions, duties or powers under the Act in relation to the utilisation of fisheries resources or ensuring sustainability:
- a) decisions should be based on the best available information;
 - b) decision makers should take into account any uncertainty in the available information;
 - c) decision makers should be cautious when information is uncertain, unreliable, or inadequate; and
 - d) the absence of, or any uncertainty in, any information should not be used as a reason for postponing or failing to take any measure to achieve the purpose of the Act.
47. The options and analysis presented in this paper and in the accompanying FAP on the proposed introduction of the common hagfish into the QMS reflect the best available information on hagfish and the use of hagfish pots, and outline the uncertainty in the information available where it is relevant to your decision making.

Section 11 Considerations

48. Section 11(1) says that you may set any sustainability measure after taking account of: any effects of fishing on any stock and the aquatic environment; any existing controls under the Act that apply to the stock or area concerned; and the natural variability of the stock concerned.
49. MPI considers that the options in this paper will not negatively impact on any other stock or on the aquatic environment. There will not be impacts on existing controls, as currently there are no controls in place for the hagfish fishery. Additionally, MPI expects that through promoting juvenile survival of hagfish, this will help safeguard the fishery against natural variability in the stock over time.
50. Section 11(2) says that before setting any sustainability measure you must have regard to:
- a) any regional policy statement, regional plan, or proposed regional plan under the Resource Management Act 1991;
 - b) any management strategy or management plan under the Conservation Act 1987;
 - c) sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000 (for the Hauraki Gulf as defined in that Act);
 - d) a planning document lodged by a customary marine title group under the Marine and Coastal (Takutai Moana) Act 2011;
- that apply to the coastal marine area and are considered by the Minister to be relevant.
51. There are no regional policy statements, regional plans, or proposed regional plans under the Regional Management Act 1991 that MPI considers relevant to the hagfish fishery. Similarly, there are no management strategies or management plans under the Conservation Act 1987 that MPI considers relevant to the options presented in this paper. Hagfish are not relevant in sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000. There are no planning documents lodged by a customary marine title group under the Marine and Coastal (Takutai Moana) Act 2011 that involve hagfish. Therefore, MPI considers that there are no relevant provisions under section 11(2) that are relevant to the options presented in this paper.
52. Section 11(2A) says that before setting any sustainability measure you must take into account: any conservation services or fisheries services; any relevant fisheries plan approved under this Part; and any decision not to require conservation services or fisheries services. MPI considers that there are no conservation services or fisheries services in place for hagfish. Similarly, no decisions not to require conservation services or fisheries services concern the hagfish fishery.

53. The National Fisheries Plan for Deepwater and Middle-depth Fisheries (the Deepwater Plan) has been approved under section 11(2A) of the Act. MPI intends to manage the target hagfish fishery as an inshore fisheries stock. In this case, the relevant plan would be the draft National Fisheries Plan for Inshore Finfish, which has not yet been approved under the Act. MPI considers that the scope of the Deepwater Plan includes the management of bycatch fish stocks taken with target deepwater species. Hagfish is taken as bycatch in two deepwater fisheries: ling and scampi. However, given that the options in this paper relate only to sustainability measures for pots used in the target hagfish fishery, MPI considers that the Deepwater Plan does not impact on the options presented in this paper.
54. Section 11(4)(b) allows you to implement sustainability measures by notice in the *Gazette* or by regulations under section 298 of the Act. MPI proposes implementing sustainability measures for any pot used to target hagfish by notice in the *Gazette*. Waiting to implement regulations under section 298 of the Act could take time. MPI considers that with escalating fishing pressure, concerns over the sustainability of hagfish stocks require more urgent action than is possible by regulation. The *Gazette* notice process will allow changes to hagfish pots to be made more quickly, and this is expected to have benefits for the sustainability of the fishery, by facilitating an increased rate of survival for juvenile hagfish.

Recommendations

55. MPI recommends that you:

Note that the prerequisites for introducing sustainability measures for any pot used to target hagfish under section 11 of the Act (including consultation) have been met

Noted

And choose either:

Yes/ No

OPTION 1

(*Status quo*)

Agree to retain the *status quo* for the fishery, which is to have no sustainability measures set. Density and diameter of escape holes will remain optional for fishers.

OR

Yes/ No

OPTION 2

(MPI preferred option)

Agree to set sustainability measures for escape holes by notice in the *Gazette* as follows:

- i) **set** a minimum number of 100 escape holes for each pot used to target hagfish; and
- ii) **set** a minimum diameter of 18 mm for each of the required minimum number of escape holes outlined in i).

Note that if you agree to set sustainability measures for escape holes by notice in the *Gazette* MPI will instruct the Parliamentary Counsel Office to draft the necessary notice for your signature

Noted

Agreed / Agreed as Amended / Not Agreed

Scott Gallacher
Deputy Director General
Regulation and Assurance
On behalf of Director-General

Hon Nathan Guy
Minister for Primary Industries

/ / 2014