



# **Initial Position Paper on the proposed introduction of carpet shark into the Quota Management System on 1 October 2014**

MPI Discussion Paper No: 2014/01

ISBN No: 978-0-478-42340-2 (online)  
ISSN No: 2253-3907 (online)

January 2014

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# Executive Summary

1. The purpose of this Initial Position Paper (IPP) is to seek tangata whenua and stakeholders views on whether carpet shark (*Cephaloscyllium isabellum*) should be introduced into the Quota Management System (QMS) on 1 October 2014 by way of determination by the Minister for Primary Industries (the Minister) under section 17B of the Fisheries Act 1996 (the Act).
2. The Minister's key decision, whether to make a determination to make carpet shark subject to the QMS, is made under section 17B(1) and (2) of the Act. If satisfied that the current management is a) not ensuring the sustainability of the stock or species or b) is not providing for the utilisation of carpet shark, the Minister must determine to make carpet shark subject to the QMS unless he determines that the purpose of the Act would be better met by setting one or more sustainability measures under section 11.
3. Carpet shark are endemic to New Zealand and occur all around mainland New Zealand, including the Chatham and Stewart Islands. Carpet shark are found in waters from 0 – 690m deep, and are generally found at around 85m depth. This species is considered to be primarily a shelf or coastal species.
4. Carpet shark are currently managed using an open access fishery. It is taken mainly as a bycatch in several fisheries targeting QMS species. Since 2003, both landings and discards of carpet shark have steadily increased. In the 2011/12 fishing year 98 tonnes of carpet shark was landed with 236 tonnes being discarded.
5. Carpet shark have been identified through the Ministry for Primary Industries' (MPI's) annual fish planning cycle as a species for consideration under section 17B(1)(b) of the Act. That is, open access to carpet shark does not provide a suitable framework to enable stakeholders to provide for their economic well-being. Although open access does provide for the utilisation of carpet shark, MPI believes that utilisation of the species would be optimised under the QMS. The security of rights and access provided by the QMS would enable rights holders to invest in developing the fishery and lead to incentives to better utilise carpet shark.
6. The Minister has an option to choose to impose measures under section 11 of the Act rather than introducing carpet shark into the QMS, however, MPI does not feel that

section 11 measures will sufficiently address the management issues that the carpet shark fishery faces.

7. MPI proposes that carpet shark be subject to the 1 October to 30 September fishing year and that the unit of measurement for carpet shark be expressed in greenweight.
8. MPI proposes two options for carpet shark Quota Management Areas (QMAs). The first option has four QMAs:
  - QMA 4 is based on Fisheries Management Area (FMA) 4.
  - QMA 10 is based on FMA10.
  - North Island combined QMA 1 (FMAs 1, 2, 8 and 9).
  - South Island combined QMA 3 (FMAs 3, 5, 6 and 7).
9. The second option has nine QMAs:
  - QMA 1 is based on FMA 1.
  - QMA 2 is based on FMA 2.
  - QMA 3 is based on FMA 3.
  - QMA 4 is based on FMA 4.
  - QMA 5 is based on FMA 5.
  - QMA 6 is based on FMA 6.
  - QMA 7 is based on FMA 7.
  - QMA 8 is based on FMA 8 and 9 combined to make one west coast North Island QMA.
  - QMA 10 is based on FMA 10.
10. Any further division of the QMAs at this time could impose unnecessary costs on fishers and MPI.

## Background

11. Steadily increasing catches have resulted in carpet shark being identified through MPI's annual fish planning cycle as meeting the QMS introduction standard. In the 2011/12 fishing year there were reported landings of 98 tonnes of carpet shark with 236 tonnes been discarded. Nine years earlier, in the 2002/03 fishing year there were reported landings of only 13 tonnes with 60 tonnes been discarded (Appendix 1, Figure 4).

12. The existing management framework is no longer appropriate if it is not meeting the purpose of the Act – to provide for the utilisation of fisheries resources while ensuring sustainability. In this case, the Minister may choose to implement measures under section 11 of the Act, or introduce carpet shark into the QMS. MPI considers that the QMS framework generally provides the best means of meeting the purpose of the Act but that other methods of active management may be more appropriate.
13. Carpet shark are predominantly a bycatch species of trawl and set net fisheries. However, in recent years reported catches, discards, and landings have increased. Appendix 1 provides further details on the biological characteristics of carpet shark and the recent history of the fishery.

## Statutory Considerations

14. The Minister's key decision, whether to make a determination to make carpet shark stocks subject to the QMS, is made under section 17B(1) and (2) of the Act. If satisfied that current management is a) not ensuring sustainability or b) is not providing for the utilisation of carpet shark, the Minister must determine to make carpet shark subject to the QMS unless he determines that the purpose of the Act would be better met by setting one or more sustainability measures under section 11.
15. Generically, MPI considers the QMS is the best framework available within the Act to provide for the utilisation of fisheries resources while ensuring sustainability (purpose of the Act) regardless of the section 11 measure chosen. However, specific assessment of ability to ensure sustainability and provide for utilisation of carpet shark is outlined later in this paper.
16. Section 17B(3) requires that before any determination under section 17B is made the Minister must consult with those persons or organisations whom he considers to be representative of the classes of persons who have an interest in the relevant determination.
17. If the Minister determines under section 17B to make a stock subject to the QMS. Section 18 requires the Minister by notice in the *Gazette* to declare the stock to be subject to the QMS on and from the first day of the fishing year stated in the notice.
18. Should the Minister determine to introduce carpet shark into the QMS section 19 requires the Minister must publish in the *Gazette* the following matters:

- Define the quota management areas – note section 19(2) requires that the Minister shall, as far as practicable, maintain the same QMAs for different species. MPI considers that the QMA options proposed in this paper are consistent with this obligation.<sup>1</sup>
  - State the fishing year in respect of the stock. MPI is proposing that the fishing year for the proposed carpet shark stocks should be 1 October to 30 September.
  - State whether the total allowable commercial catch (TACC) and the annual catch entitlements (ACE) are to be expressed in meatweight or greenweight. MPI is proposing that the unit of measurement for carpet shark be expressed in greenweight.
  - Make provision for such other matters as may be contemplated by the Act.
19. Additionally section 19(7) of the Act requires that before the Minister makes a declaration that a stock is subject to the QMS, he must consult with those persons or organisations whom he considers are representative of those classes of persons having an interest in the matters set out in section 19(1) – set out above in paragraph 19.
20. This IPP seeks submissions on both the proposed introduction of carpet shark into the QMS and on the matters referred to in paragraph 19 of this IPP.

## **QMS Introduction Guidelines**

21. MPI is committed to ensuring that there are appropriate development opportunities for non-QMS finfish species. The statutory considerations as to whether a stock or species may be introduced to the QMS are addressed throughout this IPP.
22. Stocks or species are assessed based on evidence of a significant change in reported catch over time. This change may be positive, denoting fishery development as either a target or bycatch species, or negative, indicating a possible sustainability concern.
23. Change in commercial catch is assessed over the three years preceding each annual review. The analysis is undertaken on catches for all non-QMS stocks or species, totalled for each 6 month period within this timeframe.
24. Two values are used to define a significant change for a given stock:

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<sup>1</sup> Note section 19(3) of the Act which provides that if the Minister is satisfied that any species in the waters around the Chatham Islands can, for fisheries management purposes, be managed effectively as a unit, a notice under section 18 may create around the Chatham Islands a separate QMA for that species. Both options proposed in this IPP for carpet shark QMAs are consistent with section 19(3).



- catch exceeding 20 tonnes for any of the 6 month periods and the difference in catch between the minimum and maximum 6 monthly totals exceeding fifty percent of the minimum 6 monthly total; and
- catch exceeding 100 tonnes for any of the 6 month periods.

## **Fisheries Plan Objectives**

25. The New Zealand Government's long term goal for fisheries is "New Zealanders maximising benefits from the use of fisheries within environmental limits". To support this goal MPI has developed a draft National Fisheries Plan for Inshore Finfish (the Finfish Plan), which is a policy document setting out management objectives for all inshore finfish fisheries. The Finfish Plan is being trialled for two years before it is refined and improved. Once this has been done, formal approval of the Finfish Plan will be sought from the Minister. However, because of the sheer number of fish stocks it is not practical to set out stock-specific management objectives (or harvest strategies) for every stock. Therefore, stocks in the Finfish Plan have been grouped to facilitate multi-stock objective setting and service delivery.
26. Stocks in the Plan have been grouped according to their biological vulnerability and their desirability to fishers (potential fishing pressure). Non-QMS stocks were assigned into their own category (Group 7) – this currently includes carpet shark – reflecting the current low desirability and hence lower risk in general associated with these stocks.
27. Group 7 species are generally managed as open access fisheries, which MPI considers will enable utilisation in most cases. However, if the non-QMS framework is not adequately providing for utilisation whilst ensuring sustainability, MPI will take appropriate action. The management approach minimises constraints so that opportunities for developing these fisheries can be realised where appropriate and sustainable. It also minimises management costs.
28. The stock sustainability objective for Group 7 stocks is to ensure catch is at a level that is sustainable. Catches are monitored to ensure catch is stable or fluctuates without trend.

## **2013 Draft National Plan of Action for Sharks (NPOA-Sharks)**

29. The NPOA-Sharks is a policy document and is a public statement about how the New Zealand Government intends to deliver on both the conservation of shark populations and

sustainability of shark fisheries. The purpose of the NPOA-Sharks is to ensure the conservation of sharks, the appropriate management of fisheries that catch sharks, and the long term sustainable use of sharks.

30. Sharks share a number of biological characteristics that make them vulnerable to fishing. The impacts of fishing are likely to constitute the greatest threats to the sustainability of shark populations.
31. The draft 2013 NPOA-Sharks suggests that the primary tool to manage extractive use and sustainability of sharks is the QMS. When catches are indicated to be steadily increasing for a species of shark currently managed outside the QMS, such as carpet shark, the preferred response is to introduce the species into the QMS.

## Problem Definition

32. Carpet shark within New Zealand's Exclusive Economic Zone (EEZ) are currently fished under an open access regime. The issue is whether or not this regime is ensuring the sustainability or providing for the utilisation of the species.
33. MPI has limited information indicating concerns over carpet shark sustainability other than increasing levels of catch and its vulnerability to overfishing. It is unclear whether this increase in reported catch is an indication of better reporting, more of this species being landed, or a greater abundance overall.
34. Although reporting of all non-QMS discards is required, the high level of discards in this fishery means it is difficult to assess current catch with any certainty. When this is combined with the susceptibility of this species to overfishing, there is a risk that the current regime is not adequately ensuring sustainability. Carpet shark catches exceeds the values for QMS introduction as covered in paragraph 24.

## Summary of Options

### OPTION 1

35. Under the *status quo* carpet shark would remain as an open access species outside the QMS, but the use of sustainability measures under section 11 will be considered.

## **OPTION 2 – INTRODUCE CARPET SHARK INTO QMS ON 1 OCTOBER 2014**

36. Option 2 is to recommend to the Minister that he introduce carpet shark into the QMS on 1 October 2014 and within that option:
- define the QMA's for carpet shark (either following QMA Option A or QMA Option B);
  - state the fishing year for carpet shark to be 1 October to 30 September; and
  - state the unit of measure for carpet shark to be kilograms greenweight.
37. Should the Minister agree to introduce carpet shark into the QMS, MPI will commence a separate process for recommending the setting of total allowable catches (TACS), TACCs and allowances. Tangata whenua and stakeholders will again be consulted during that process. If the Minister agrees to introduce carpet shark into the QMS, 20% of carpet shark quota will be allocated to Maori (via Te Ohu Kai Moana Trustee Limited) and 80% to the Crown. The Crown-held quota would be tendered at the earliest opportunity.

## **Analysis of Management Options**

### **OPTION 1**

38. Under Option 1 carpet shark would remain an open access species outside the QMS, but the use of sustainability measures under section 11 will be considered.
39. Continuing to manage carpet shark outside the QMS is an option available for the Minister's consideration. In assessing the appropriateness of this option, the Minister must look at sustainability and utilisation considerations and whether they are best provided for by retaining carpet shark outside the QMS.

### **Sustainability**

40. In the 2011/12 fishing year there was reported landings of 98 tonnes of carpet shark with 236 tonnes been discarded. Nine years earlier, in the 2002/03 fishing year there was reported landings of only 13 tonnes with 60 tonnes been discarded (Appendix 1, Figure 4).
41. MPI has limited information indicating sustainability concerns for carpet shark stocks apart from steadily increasing catches and a moderate to high vulnerability to overfishing.

42. MPI does not consider that section 11 measures on their own can effectively manage the sustainability issues identified for the carpet shark fishery, should a target fishery develop in the future. There is a risk that sustainability concerns, such as overfishing and localised depletion, would increase under an open access regime.
43. Under an open access regime, input controls to limit harvest levels could be set under section 11 to address sustainability concerns (for example, competitive catch limits, area, method, and seasonal controls). However, these tools alone may not be sufficient to prevent localised depletion of carpet shark. For example, under section 11, the Minister can set a catch limit for stocks outside the QMS, when there are sustainability concerns for a stock. But in the absence of a property right it is possible fishers will ‘race to catch’ carpet shark until the catch limit is reached. Also, seasonal controls are likely to focus intensive effort during short periods of time on carpet shark populations without necessarily ensuring the long-term sustainability of the populations.

### **Utilisation**

44. Carpet shark are currently taken as a bycatch of trawl and set net fisheries. The open access regime does not prevent a target fishery developing if it is economically viable to do so. However, the lack of defined rights in the non-QMS environment means that fishers would have no entitlement to a future share of the resource should the species be introduced into the QMS in the future. This uncertainty around future access does create poor incentives for long term market development because market share cannot be guaranteed.
45. There is a low level of utilisation of carpet shark with the majority of the catch discarded. Of the catch utilised, a high percentage is landed as fins only.
46. As long as carpet shark remains outside the QMS it will be subject to the annual assessment process undertaken by MPI to determine whether non-QMS stocks or species should be considered for introduction into the QMS.

### **Costs**

47. Management outside the QMS is likely to discourage investment in either catching carpet shark or developing markets for this species. It also means MPI is less able to ensure that catches can be constrained to a sustainable level. In fact, there is some uncertainty regarding the level of reporting of species outside the QMS. Setting catch limits under section 11 would only constrain the target fishery of carpet shark but not the bycatch.

48. Although open access does not prevent utilisation, without the security provided by the QMS the potential to develop better means of utilisation of the fishery is unlikely to be fully realised. MPI believes that the section 17B(1)(b) test for carpet sharks is therefore likely met.

### **Benefits**

49. As with other non-QMS species there are no administrative barriers to entry to the carpet shark fishery. This means that anyone can fish for carpet shark, provided they have a fishing permit, and will be able to take as much of this species as they want. They also have the option of discarding any unwanted carpet shark catch, which in most circumstances would be illegal if carpet shark entered the QMS.

## **OPTION 2 – INTRODUCE CARPET SHARK INTO QMS ON 1 OCTOBER 2014**

### **Sustainability**

50. In the 2011/12 fishing year there was reported landings of 98 tonnes of carpet shark with 236 tonnes been discarded. Nine years earlier, in the 2002/03 fishing year there was reported landings of only 13 tonnes with 60 tonnes been discarded (Appendix 1, Figure 4).
51. MPI has limited information indicating sustainability concerns for carpet shark stocks apart from steadily increasing catches and a moderate to high vulnerability to overfishing.
52. As well as setting a TAC, management under the QMS could also include use of section 11 measures, such as the retention of any method restrictions to further support sustainability.

### **Utilisation**

53. MPI believes that open access may not be providing a suitable framework to enable stakeholders to provide for their economic well-being.
54. The QMS provides a framework that enables people to invest in, and develop a fishery when they choose to do so. MPI believes that management of carpet shark under the QMS framework is likely to lead to incentives promoting more optimal utilisation. The rights of quota owners under the QMS should lead to improved levels of utilisation and the development of new markets for carpet shark.

55. In addition, the QMS provides the most effective means of providing for the utilisation interests of all sectors, through the setting of a TAC, allocating the resource between sectors, and application of measures that effectively constrain commercial catches. It is acknowledged that management under the QMS could also include use of section 11 measures, such as the retention of method restrictions.
56. Section 11 measures (such as catch limits) cannot effectively address the management issues identified above. Specifically, MPI considers that the QMS provides greater incentives to commercial fishers to develop and manage the fishery sustainably through the provision of secure property rights. The introduction into the QMS will provide better opportunity to manage environmental effects and enable utilisation through the allocation of rights than the use of measures under section 11 on their own. The allocation of rights will provide better incentives than exist currently for rights holders to collectively manage the carpet shark fishery. The allocation of transferable rights also provides the best opportunity to enable social, cultural and economic well-being to be derived from the fishery.
57. Accordingly, MPI does not consider that the purpose would be better met by setting one or more sustainability measures under section 11, when compared to the benefits of introduction into the QMS.

## **Costs**

58. There are additional costs associated with QMS entry. This includes the cost of acquiring ACE or paying deemed values and the requirement to pay cost recovery levies (quota owners only). Cost recovery levies cover research, observer coverage, compliance services and registry costs.
59. If carpet shark enter the QMS fishers will have to land catch that otherwise could have being discarded (unless it is included in Schedule 6 of the Act).
60. It is possible that restrictive TACCs for the carpet shark QMAs could constrain other target fisheries. This could provide incentives for discarding or misreporting of carpet shark. If fishers cannot source enough ACE for carpet shark bycatch they may have to stop fishing for their target species. MPI will endeavour to set sustainable carpet shark TACCs so that this situation is mitigated as best as possible.

## Benefits

61. The primary benefit of QMS introduction (and consequent allocation or tendering of quota) is that those parties who purchase quota will have appropriate incentives to invest in the fishery. This approach is likely to provide the best opportunity for maximising benefits of the fishery as the security provided by quota ownership will allow owners to invest in better utilising and developing better markets for this species.
62. Should carpet shark enter the QMS a TAC would set a cap on the catch and fishers would be required to keep all catch (unless carpet shark is included on Schedule 6 of the Act) and to balance their catch with ACE. If they were unable to balance catch they would be required to pay deemed values for any catch in excess of ACE holdings. Due to increasing carpet shark catches (Appendix 1, Figure 4) MPI believes these measures are now necessary to ensure the sustainability of the carpet shark fishery.
63. The establishment of a defined stock also provides greater opportunity for better planning and organisation around management of the stock by all stakeholders, including non-commercial fishers.
64. Better quality information on carpet shark catches may arise as MPI believes that currently some carpet shark catch may be discarded without being reported. Catch of all QMS species above the minimum legal size (MLS) is required to be reported.
65. The increasing level of discards of this species (Appendix 1, Figure 4) runs counter to the drive of the policy framework of the NPOA-Sharks; however, under the QMS, the requirement to retain catches will provide some incentive to use more of the catch, supporting the increased utilisation policy as laid out in the NPOA-Sharks.
66. Measures to address the effects of fishing of a stock on the aquatic environment can be set under section 11 for both open access and QMS management regimes. However, the QMS has inherent incentives to mitigate the potential effects of fishing on the aquatic environment and on other fisheries sectors.

## OTHER MANAGEMENT CONTROLS CONCURRENT WITH ENTRY TO QMS

67. Should the Minister determine to introduce carpet shark into the QMS, section 18 of the Act requires his decision to be accompanied by a notice in the *Gazette*. Section 19 specifies the matters to be covered in such a notice include QMAs, the fishing year, the

unit of measurement, and any such matters as maybe contemplated by the Act.

Accordingly, these matters are described in more detail below.

### **Quota Management Areas**

68. The Act sets out two statutory obligations that must be considered when defining QMAs for stocks introduced into the QMS:

- as far as practicable, the same QMAs should be maintained for different species (s19(2)); and
- a separate QMA may be set for the waters surrounding the Chatham Islands if the species can be managed effectively as a unit (s19(3)).

69. In addition, MPI has developed a set of principles to assist in defining practical QMAs. In considering these statutory obligations and principles, MPI considers the following are key issues in defining QMAs for carpet shark, should it be introduced:

- There is no biological information available to indicate separate carpet shark stocks. The species is very widely distributed in New Zealand waters.
- The characteristics of the carpet shark fishery and the species' distribution means it is largely impracticable to maintain the same QMAs as the associated target species.
- It is appropriate to set a separate QMA for waters surrounding the Chatham Islands.

70. Taking into account the principles and key management issues noted above, it is proposed that carpet shark be managed either within nine or four QMAs, which are based on the FMA boundaries.

### **QMA Option A**

CAR 1 (FMAs 1, 2, 8 and 9)

71. This proposed QMA incorporates FMAs 1, 2, 8 and 9. Combining these four FMAs into one North Island QMA should alleviate any unnecessary costs on fishers and MPI.

CAR 3 (FMA 3, 5, 6 and 7)

72. This proposed QMA incorporates FMAs 3, 5, 6 and 7. Combining these four FMAs into one South Island QMA should alleviate any unnecessary costs on fishers and MPI.

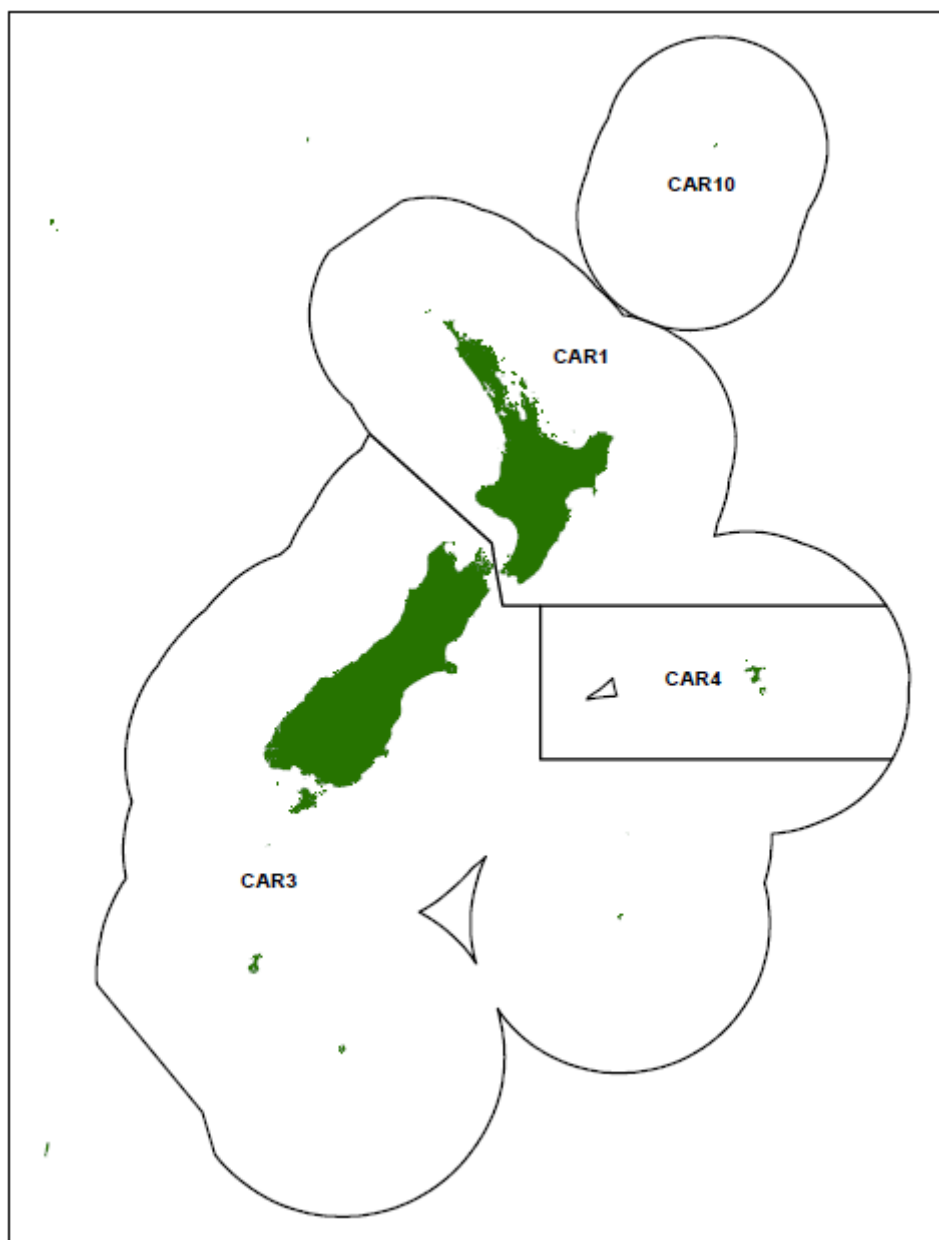
CAR 4 (FMA 4)

73. This proposed QMA incorporates FMA 4, the waters around the Chatham Islands.

CAR 10 (FMA 10)



74. This proposed QMA incorporates FMA 10. There is no data on commercial catch of carpet shark in FMA 10 and there is unlikely to be any development of a fishery in this area. However, given the important characteristics of the Kermadecs area (FMA 10), which includes extensive marine reserves, it is appropriate to maintain a separate QMA for carpet sharks (to be set on a nominal basis given that this area is rarely, if ever, fished).



**Figure 1: QMA Option A – proposed QMAs for carpet shark**

***QMA Option B***

CAR 1, 2, 3, 5, 6 and 7 (FMAs 1, 2, 3, 5, 6 and 7)

75. These proposed QMAs align with the matching FMAs. There is no information to support separating carpet shark into smaller biological stocks at this stage. Any further division of QMAs at this time could impose unnecessary costs on fishers and MPI.

CAR 8 (FMA 8 & 9)

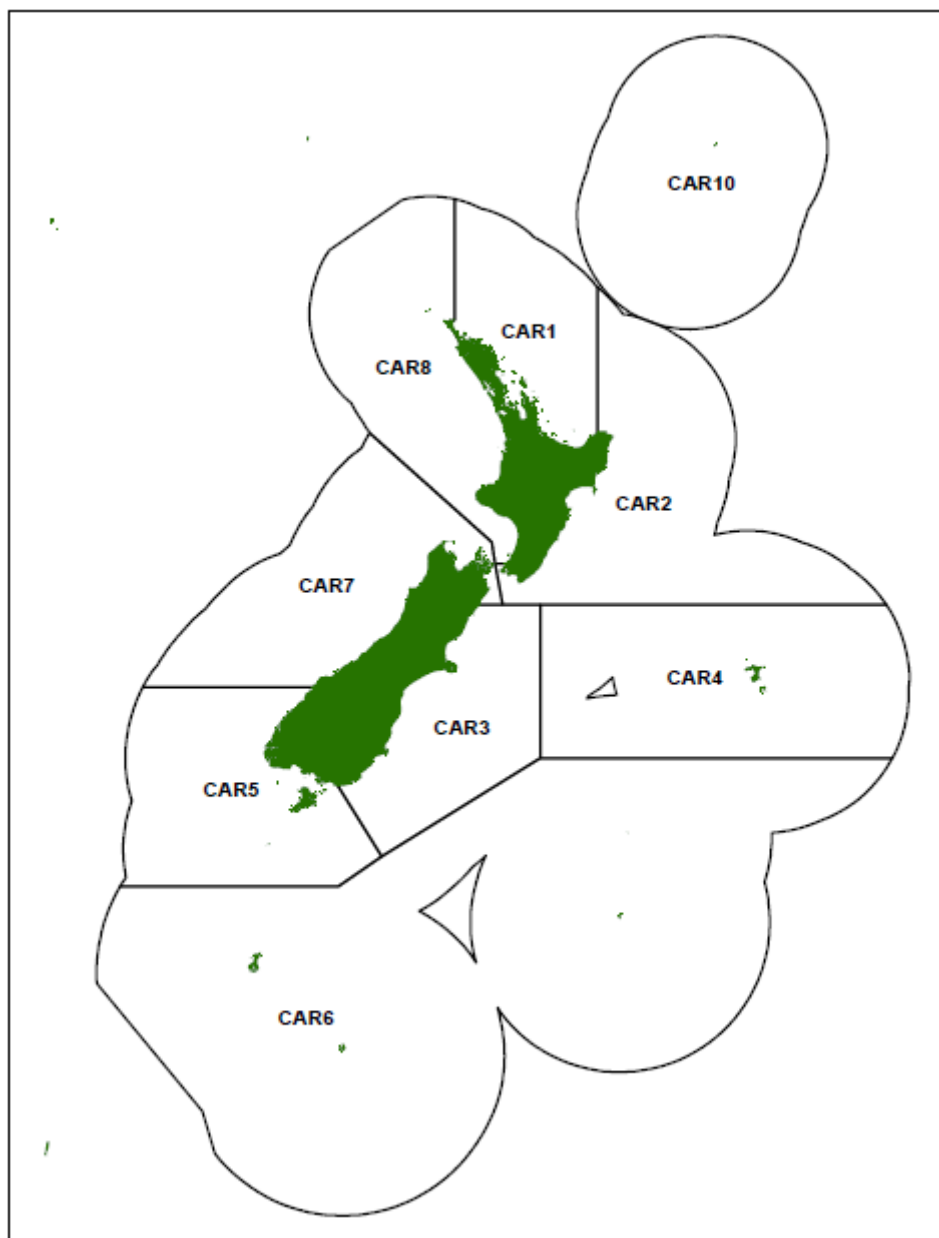
76. This proposed QMA incorporates FMAs 8 and 9. Carpet shark are taken as a bycatch in bottom trawl and set net fishing operations along the west coast of the North Island. Combining these two FMAs into one QMA should alleviate any unnecessary costs on fishers and MPI.

CAR 4 (FMA 4)

77. This proposed QMA incorporates FMA 4, the waters around the Chatham Islands.

CAR 10 (FMA 10)

78. This proposed QMA incorporates FMA 10. There is no data on commercial catch of carpet shark in FMA 10 and there is unlikely to be any development of a fishery in this area. However, given the important characteristics of the Kermadecs area (FMA 10), which includes extensive marine reserves, it is appropriate to maintain a separate QMA for carpet sharks (to be set on a nominal basis given that this area is rarely, if ever, fished).



**Figure 2: QMA Option B – proposed QMAs for carpet shark**

### **Option A and B contrasted**

79. The smaller QMAs proposed under QMA Option A could impose greater costs on those fishing in multiple areas. However, with limited biological information available for carpet shark, such as estimated growth rates, fecundity and seasonality of spawning, these smaller proposed QMAs are likely to better mitigate any potential overfishing of the species.
80. Conversely, the combined QMAs proposed under QMA Option B representing the coastal areas of the North and South Islands would only require most fishers to source ACE for the CAR 1 or CAR 3 QMAs, or CAR 4 if they intend fishing the Chatham Rise

(Chatham Island) area. It is very unlikely a fisher would require ACE for carpet shark in the proposed CAR 10 QMA.

### **Fishing Year**

81. Should carpet shark be introduced into the QMS, MPI proposes that the fishing year be from 1 October to 30 September of the following year. This is consistent with the fishing year that applies to the associated trawl and set net fisheries.

### **Meatweight or greenweight**

82. The proposed unit of measurement is greenweight. Greenweight has been used historically for management purposes in the carpet shark fishery. This unit of measure also applies to all the associated fisheries. There does not appear to be any rationale for changing this unit of measure should carpet shark be introduced into the QMS.

### **Other matters**

83. A decision will need to be made as to what group carpet shark will be in for the purposes of the Finfish Plan. The grouping of stocks with similar characteristics in the Finfish Plan allows management objectives to be applied at the group level. Shark species are generally placed in Group 5.

## **Other Management Issues**

84. Should the Minister agree to introduce carpet shark stocks into the QMS on 1 October 2014, MPI will consult on additional management measures such as TACs/TACCs and allowances, deemed values, possible inclusion on Schedule 6 of the Act and consequential regulatory amendments.
85. Under Schedule 6 stocks may be returned to the sea or other waters in accordance with stated requirements.
86. The stated requirements for carpet shark would likely be the same as for other shark species on Schedule 6: A commercial fisher may return any carpet shark to the waters from which it was taken if – (a) that carpet shark is likely to survive on return; and (b) the return takes place as soon as practicable after the carpet shark is taken.

# Appendix 1 – Biological and Fishery Information

## BIOLOGICAL INFORMATION

87. *Cephaloscyllium isabellum* can be known by a number of different names including: carpet shark, draughtsboard shark, swell shark, and pekapeka (Maori). The species code for carpet shark is CAR.

### Description

88. The carpet shark is a small, benthic-dwelling species. The average length of a carpet shark is 70 – 100cm. Adult specimens rarely exceed 150cm. The body of the carpet shark is stocky and striking in colouration – variegated brown with irregular dark brown patterning. The ventral surface of the shark is light and uniform in colour.
89. Two small, spineless dorsal fins are present and the second dorsal fin is smaller than the first (Figure 3). There are five gill openings, no labial furrows, and the anterior nasal flaps do not reach the mouth. The carpet shark is a member of the cat shark (Scyliorhinidae) family, one of the most diverse shark families, comprising 15 genera and around 90 species. Similar to other species of cat shark, the carpet shark has characteristically elongated cat-like eyes with nictating eyelids and a longitudinal fold in the lower eyelid.

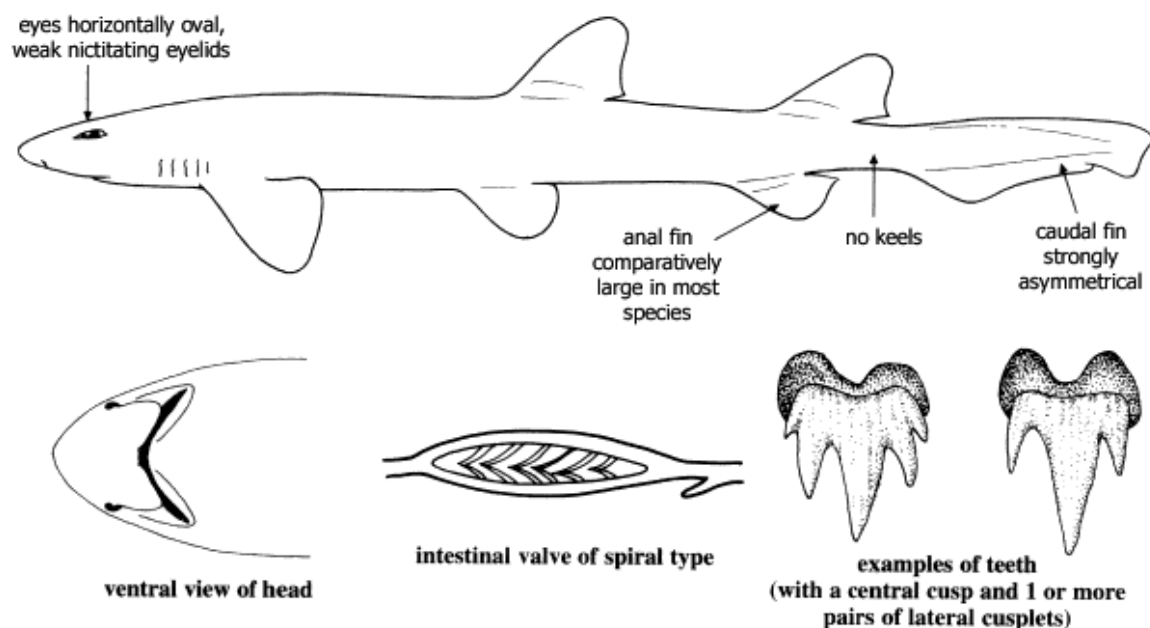


Figure 3: Identification key for species of the Scyliorhinidae (cat sharks)

### **Distribution, habitat and behaviour**

90. Carpet sharks are endemic to New Zealand and occur all around mainland New Zealand, including the Chatham and Stewart Islands. Carpet shark are found in waters from 0 – 690m deep, and are generally found at around 85m depth. It is considered to be primarily a shelf or coastal species.
91. Carpet sharks are nocturnal. During the day, they rest in caves or under overhangs within rock/reef habitats, where their external colours allow them to camouflage with their surroundings. At night, carpet sharks will venture widely around sandy and rocky regions to prey upon small fish, cephalopods and a range of other invertebrates (crabs, worms and shellfish).

### **Growth, reproduction and recruitment**

92. Growth rates and age at maturity are unknown. However, most shark species tend to have relatively slow growth rates and a relatively late onset of maturity. Mature adult male carpet sharks (>69cm) tend to be smaller than mature adult females (>86cm).
93. Fecundity estimates and the seasonality of spawning are unknown for carpet sharks. Carpet sharks are oviparous (egg-layers). Most shark species are known to have very low fecundity when compared to teleost (bony) fishes. Juvenile carpet sharks hatch at around 16cm body length, and are much larger and more energetic than juvenile teleosts. As such, the survivorship of juvenile carpet sharks is relatively high, although estimates of recruitment are unknown.

### **Associated and protected species**

94. There is no target fishery for carpet shark. It is taken as a bycatch in several QMS target fisheries (including school shark, rig, tarakihi and red cod). Any protected species interactions are associated with these target fisheries.
95. There is no information available regarding the importance of carpet shark within local and broader marine ecosystems (e.g. food webs, indicator and dependent species, trophic cascades etc).

### **Stock assessment**

96. Stock assessment for carpet shark has not been done. There are no estimates of absolute or relative abundance of carpet shark, 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.

97. A significant amount of international scientific concern has been raised about the sustainability of harvesting levels for a number of shark species. Sharks tend to be vulnerable to overfishing because they have low growth rates, moderate to high ages at maturity, and low fecundity. The International Union for the Conservation of Nature and Natural Resources (IUCN) has evaluated the population status of carpet shark as a species of Least Concern (LC) on the Red List of Threatened Species.

### **Environmental effects of fishing**

98. Carpet shark is not currently targeted by commercial fishers. Should carpet shark become a commercially-targeted species, it would likely be taken by set net. The environmental effects associated with this method would apply.

## **SOCIAL, ECONOMIC, CULTURAL INFORMATION**

### **Recreational fishery characteristics**

99. Carpet shark is not thought to be a target species for recreational fishers. However, the Large Scale Multi Species (LSMS) survey recorded 453 caught by recreational fishers in 2011.

### **Commercial fishery characteristics**

100. New Zealand's shark catch has increased steadily since 1975. There are approximately 70 species of sharks within the New Zealand EEZ, and eleven of these are currently managed within the QMS. Approximately 85% of the total commercial landings for sharks and rays are included in the QMS.
101. Carpet shark is not a commercially targeted species – its capture is generally a result of incidental bycatch but has some commercial value. Carpet shark is currently caught in an open access fishery as a non-QMS species. There does not appear to be any commercial demand specifically for carpet shark, although carpet shark caught is typically utilised for its fins. To some extent, the combined TAC limits of the target species may be limiting the total catch of carpet sharks.

## Commercial fishing method

102. Carpet shark is an incidental bycatch from the commercial fishing methods of bottom trawling and set netting. There is also a small amount of bycatch from bottom longlines and rock lobster potting.

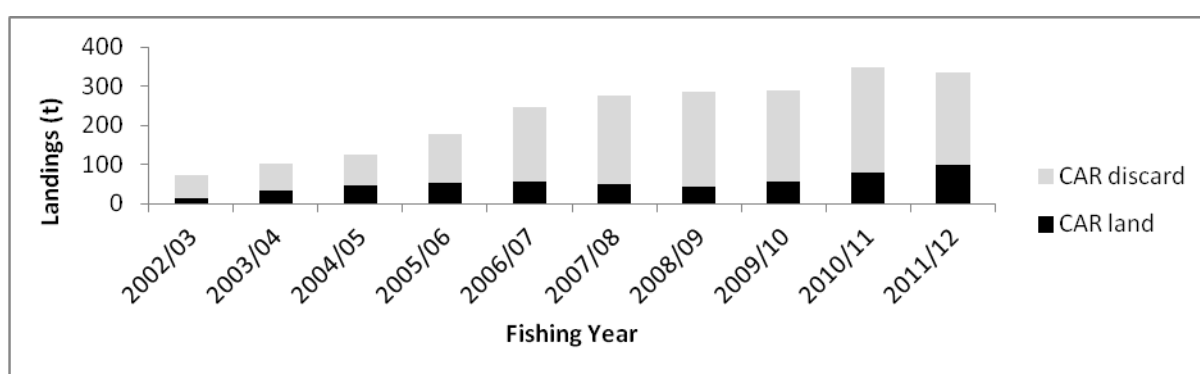
## Commercially landed catch

103. Estimated catch data from catch effort returns, together with corresponding landing information, provides the catch data set for carpet sharks.

104. A number of factors have resulted in some uncertainty within the data set for carpet shark. As there are many shark species within the New Zealand EEZ, and some of these are encountered relatively infrequently, there are sometimes instances where species are mis-identified and consequently mis-reported. Also, approximately 4-5% of the annual commercial shark catch is reported against generic stock codes such as 'other sharks and dogs' (OSD).

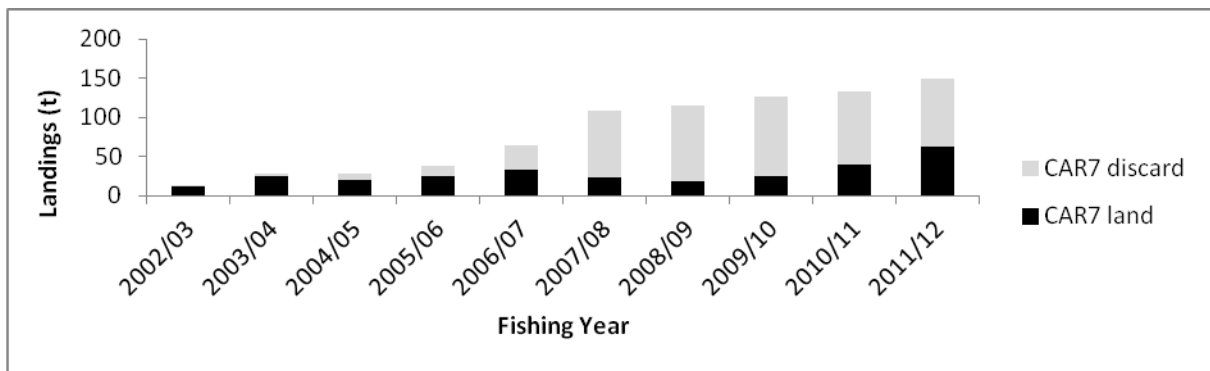
105. Since 2002, both landings and discards of carpet shark have steadily increased. In the 2011/12 fishing year 98 tonnes of carpet shark was landed with 236 tonnes been discarded (Figure 4).

106. The highest landed catches of carpet shark are consistently taken in FMA 7 (Figure 5), while FMA 8 has had the highest proportion of landed versus discarded carpet sharks for all of the FMAs (Figure 6).

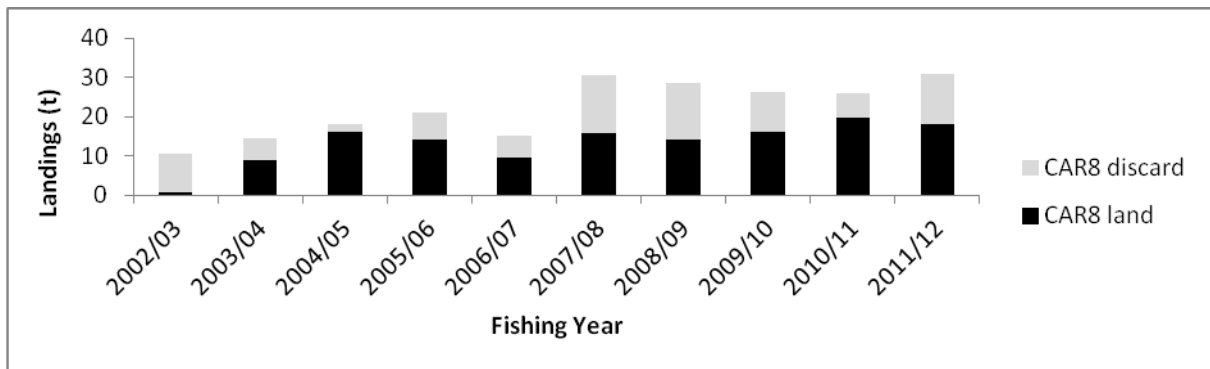


**Figure 4: Landed and discarded carpet shark catch in all FMAs combined**

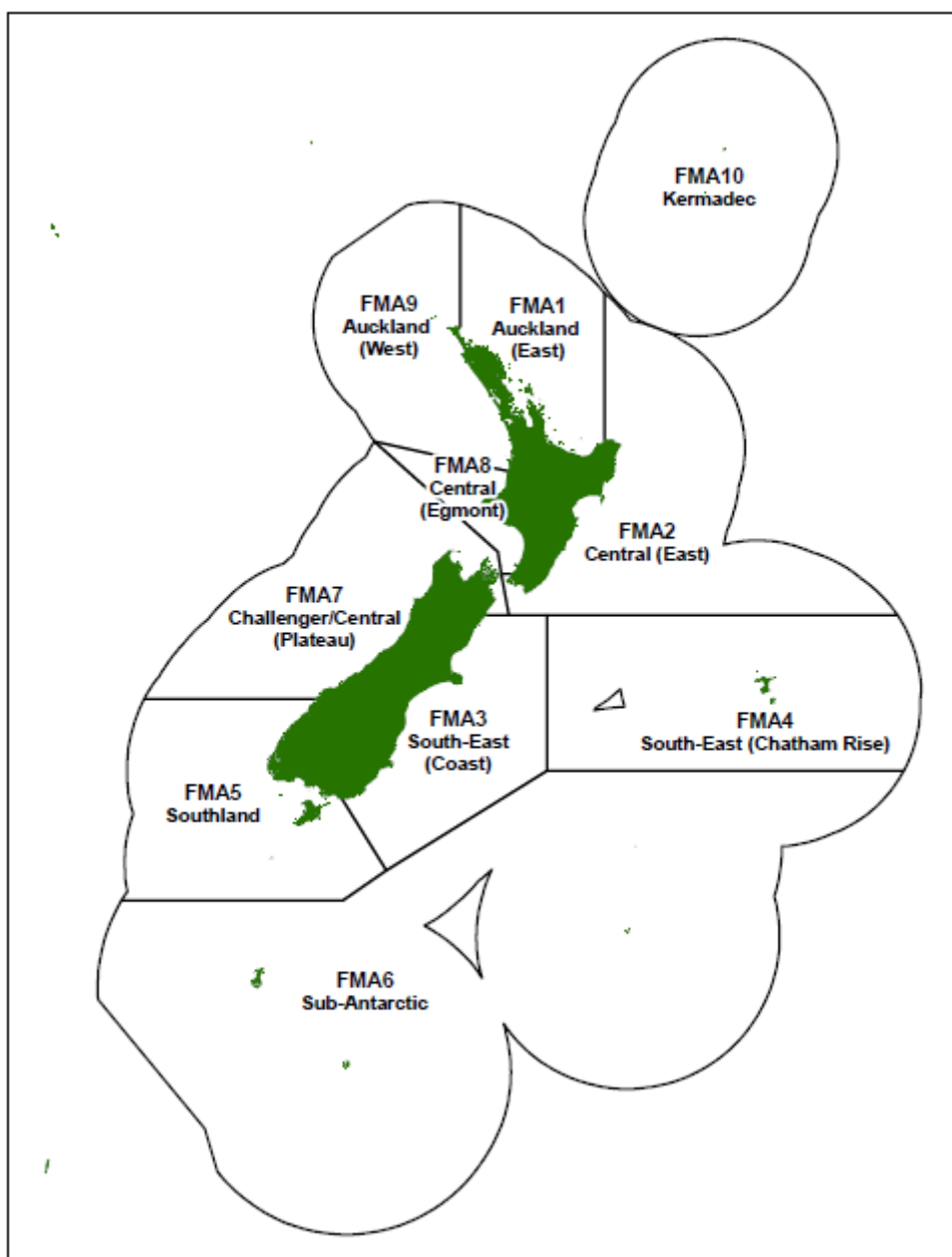




**Figure 5: Landed and discarded carpet shark catch in FMA7**



**Figure 6: Landed and discarded carpet shark catch in FMA8**



**Figure 7: Fisheries Management Areas (FMAs)**