INTRODUCTION OF NEW STOCKS INTO THE QUOTA MANAGEMENT SYSTEM ON 1 OCTOBER 2008

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PURPOSE OF PAPER

1 The purpose of this paper is to provide stakeholders preliminary information and risk analyses for ten species under consideration for introduction to the quota management system (QMS) in October 2008. MFish welcomes any additional information from stakeholders that will assist with determining whether these species should or should not be introduced into the QMS, or that identify sustainability or utilisation concerns for any other species that should be considered for introduction to the QMS.

2 These species are:

i) bellowsfish species

ii) broadnosed sevengill shark

iii) capro dory

iv) hagfish

v) lamprey

vi) mirror dory

vii) scabbardfish

viii) seahorse

ix) sharpnosed sevengill shark

x) silver dory

3 There is little information available for these stocks. The attached information briefs and associated risk analyses provide the rationale for introducing or not introducing these species into the QMS.

4 Following the receipt of submissions, MFish will finalise the list of species that will be considered for introduction to the QMS on 1 October 2008. IPPs will be prepared for each of these species and released for consultation prior to final advise being provided to the Minister of Fisheries. Stakeholders are asked to forward their comments on the information briefs and risk analyses by 29 June 2007 to Tracey Steel, PO Box 102, Wellington or by e-mail to tracey.steel@fish.govt.nz

5 MFish also note that consultation on the QMS introduction standard has recently closed. A copy of the QMS introduction standard IPP is attached as Annex 1.

INTRODUCTION

6 Over the past seven years, MFish has undertaken a programme to introduce species into the Quota Management System (QMS) as part of its strategic direction to manage fisheries under the QMS framework and to meet its obligations to Maori under the Deed of Settlement.

7 MFish considers the QMS framework generally provides the best means of meeting the purpose of the Fisheries Act - to provide for utilisation while ensuring sustainability. However, the Ministry acknowledges the QMS may not always be the most appropriate framework to manage some stocks, and that other methods of active management, or indeed no active management, may be most appropriate.

8 In November 2006 MFish released the QMS introduction process standard for consultation. This standard sets out an annual process to enable MFish to consistently and transparently identify stocks or species that should be considered for QMS introduction. Although this process standard has yet to be finalised, the Ministry has opted to use the draft standard to identify stocks for QMS introduction in October 2008.

9 The stocks MFish considered in this paper were identified by application of the criteria described in detail in the QMS introduction process standard. Draft information briefs and risk analyses have been developed for each of these species and are provided here for consultation with stakeholders. The risk analyses are expressed in terms of the risk to the stock of not introducing it to the QMS. Information provided in submissions will be used to finalise the list of species that will be proposed for introduction to the QMS in October 2008.

10 Once the list of species has been finalised, MFish undertakes two processes to introduce a stock or species into the QMS.

11 The first process requires the Minister of Fisheries' decision on whether it is appropriate to manage a stock or species under the QMS framework. To assist with the Minister's decision, MFish prepares an Initial Position Paper (IPP) for consultation with relevant stakeholders. The IPP discusses whether the QMS better meets the Minister's obligations under the Fisheries Act, and proposes stock or species management area boundaries, the unit of measure, and fishing year. Subsequent to consultation on the IPP, MFish prepares a Final Advice Paper (FAP) to assist the Minister with his or her decisions on the recommendations contained within the paper. If the Minister agrees to introduce a species to the QMS, MFish will prepare a *Gazette Notice* to give effect to his or her decisions.

12 The second process to support the introduction of new stocks or species into the QMS focuses on the setting of appropriate sustainability measures and other management controls. Setting of sustainability measures (as set out in s 11 of the Fisheries Act) includes the setting of total allowable catches, total allowable commercial catches, and recreational and customary allowances. It may also include controls such as method or area restrictions for harvesting of the stock, if appropriate. MFish prepares a second IPP for consultation on proposed sustainability measures and other management controls. A subsequent FAP is prepared to assist with the Minister's decisions on the proposals set out in the IPP.

13 In January 2007, MFish developed a list of potential species for QMS introduction in October 2008 or October 2009, based on a the criteria described in the draft QMS introduction process standard (see Annex 1). These criteria included inclusion on Schedule 4C or 4D of the Act, large changes in catch over time, or any other concerns, including anecdotal information and

international obligations. Lamprey, seahorse and sharpnosed sevengill shark are all listed on schedule 4C of the Fisheries Act 1996 (the Act).

14 The following allocation rules apply for any new stock introduced into the QMS: 20% of quota is allocated to Te Ohu Kai Moana (the Commission) as part of the Crown's Treaty settlement, and the remaining 80% is allocated to the Crown in most cases. The Crown then makes this 80% available for public tender, which means highest bidder gets the quota.

BELLOWSFISH

Species Code	Common Name(s)	Scientific Name
BBE	Banded Bellowsfish Red-Banded Bellowsfish	*Centriscops humerosus*
BEL	Bellowsfish	*Centriscops spp.*
BLB	Blue-Banded Bellowsfish	*Centriscops obliquus*
CBE	Crested Bellowsfish Elevated Bellowsfish	*Notopogon lilliei*
NOF	Trumpet Orange Bellowsfish	*Notopogon fernandezianus*
SNI	Snipefish	*Macrorhamphosus scolopax*

15 Bellowsfish species in New Zealand (including snipefish and trumpet) all derive from the ***Macrorhamphosidae*** scientific family. Appearances can be very similar between species, with misidentification common even amongst scientists. Demonstrative of this is a description of the historical nomenclature of the banded bellowsfish by Stewart & Roberts (2004) which suggests that that the BLB "blue-banded bellowsfish" (currently listed in FIS as ***Centriscops obliquus***) is not a valid species, and is actually part of the BBE "banded bellowsfish" species.

16 Stewart and Roberts (2004) work on bellowsfish species also implies the need to consider the Snipefish (SNI) as a bellowsfish species. The snipefish derives from the same family (***Macrorhamphosidae***) as other New Zealand bellowsfish species, and is very similar in appearance, distribution and length. Research reveals that various bellowsfish species are known internationally as snipefish. The inclusion of the snipefish in any consideration of bellowsfish management in New Zealand may thus be warranted.

17 It is suggested that some consolidation of bellowsfish species is necessary. First, the blue-banded bellowsfish (BLB) does not appear to constitute an individual species and should thus be discarded as a unique species code. Second, snipefish (SNI) and trumpet (NOF) should be considered in the same management context as other bellowsfish species, as they derive from the same family classification (***macrorhamphosidae***) and are near identical in appearance and distribution to other bellowsfish species.

Biological information

Growth, reproduction and recruitment

18 All of these bellowsfish species have population doubling times of 1.4 – 4.4 years (Fishbase 2007). Juveniles feed mainly on pelagic invertebrates, mainly copepods, while adults feed on bottom invertebrates. Maximum size of species in the bellowsfish complex is given in the table below.

Species	Maximum size (cm)
Banded bellowsfish (BBE)	30
Crested bellowsfish (CBE)	26c
Trumpet (NOF)	20
Snipefish (SNI)	20

Distribution

19 Bellowsfish species are found between the seabed and midwater on the lower continental shelf, over sand. Juveniles are found in oceanic surface waters, adults normally live close to the bottom (normally in 50 to 350 m depth). Banded bellowsfish (BBE) is found from Northland to Campbell Plateau and from Challenger Plateau to Chatham Islands. Crested bellowsfish (CBE) is found around the continental shelf of NZ, with an apparent bias to the south and east of the South Island, schooling at depths of 90 to 300m.

20 Trumpet (NOF) is found all around New Zealand, though it appears to be less common than other bellowsfish species. It schools at depths of 20 to 880m.

21 Snipefish (SNI) is found from the Kermadecs to the Southern Snare Shelf, and primarily on the east coast of NI. It schools at depths of 30 to 600m and is often found in schools of several hundred.

22 75% of bellowsfish (BEL), 98% of banded bellowsfish (BBE) and 82% of crested bellowsfish (CBE) are taken by bottom trawl. However, 95% of snipefish (SNI) are taken by mid-water trawl. This may reflect different distribution or depth range between snipefish and other bellowsfish species, though this is not shown in Stewart & Roberts (2004) analysis.

Habitat, environmental effects and protected species interactions

23 There is no specific information on habitat interactions, protected species interactions or the environmental effects of fishing for bellowsfish. However, anything which is linked to the target species and fishing methods would be applicable. 75% of the *Macrorhamphosidae* caught were reported to be taken by bottom trawl, 25% by mid-water trawl. Data suggesting that some bellowsfish was caught by set net and cod pot may be inaccurate. In any case, the amount of bellowsfish reported as being caught by these methods is insignificant.

Fishing method	Total estimated catch of *Macrorhamphosidae* (kg), 1996-2006
Bottom Trawl	787,362
Mid-water Trawl	267,437
Set Net	2
Cod Pot	1

Associated species

24 Data on target species and fishing methods is derived from estimated catch reports which are generally less reliable than landings data. As the table below shows, the majority of reported catches of *Macrorhamphosidae* are as bycatch in fisheries targeting squid, red cod, barracouta, hoki, jack mackerel, scampi and hake. This varies to some extent depending on which bellowsfish species is reported. A reported 190 kg of bellowsfish (BEL) taken as a target species can probably be attributed to inaccurate reporting.

Target species	Total estimated catch of *Macrorhamphosidae* (kg), 1996-2006
Squid	287,052
Red Cod	198,210
Barracouta	185,480
Hoki	118,004
Jack Mackerel	114,290
Scampi	68,624
Hake	60,318
Dark Ghost Shark	9,000
Blue Warehou	4,700
Alfonsino	3,593
Red Gurnard	3,000
Ling	800
Sea Perch	634
Silver Warehou	600
White Warehou	406
Bellowsfish (BEL)	190
Flatfish	92
Orange Roughy	91
Bluenose	68
Oreo	50
Black Cardinalfish	41
Spiny Dogfish	40
Tarakihi	15
Silverside	10
Blue cod	1

25 Information from the commercial fishing sector reveals that unspecified bellowsfish species also appear as by-catch of the queen scallop fishery (QSC) in FMA 3, primarily east of Dunedin. However, there is no catch data to corroborate this, suggesting an under-reporting of this by-catch.

Social, economic, cultural information

26 No species of *Macrorhamphosidae* are targeted as a commercial fishery. Information from NIWA (2001) and the commercial fishing sector suggests that these species have no commercial value, except insofar as accidental by-catch can be used for fishmeal. Fish are reported to be too bony and small to provide a usable fillet.

27 Landings data is for the different bellowsfish species over the period 1996 – 2006 is shown in the table below.

Species	BBE	BEL	CBE	SNI	All
1996/97	16,213	56,787	9,879	0	82,879
1997/98	56,233	47,284	0	0	103,517
1998/99	12,717	27,103	0	78,428	118,248
1999/00	15,072	23,213	5,730	50,361	94,376
2000/01	88,029	84,968	12,074	1,999	187,070
2001/02	127,249	122,822	12,696	4,053	266,820
2002/03	153,272	127,328	33,022	16,718	330,341
2003/04	182,267	145,411	54,123	33,248	415,049
2004/05	197,992	134,663	22,282	161	355,098
2005/06	127,027	102,136	45,088	963	275,215

28 Considerable annual variation in reported catch is clearly visible across the different bellowsfish species in the table above. This variation persists even when reported catches are aggregated, which suggests variation cannot be attributed solely to misidentification of individual bellowsfish species. However, it is unclear what factors may be contributing to the highly variable annual reported catch totals for *Macrorhamphosidae* species. Natural population variability amongst *Macrorhamphosidae* species is a possible contributor, though an absence of biological data on these species means this is would be difficult to confirm. Changes in fishing method or location may also influence total *Macrorhamphosidae* reported catch, though this is not evident in the analysis of *Macrorhamphosidae* by-catch fisheries.

29 There is no known recreational or customary fishing for any of the bellowsfish species.

Management information

30 No management information exists for bellowsfish species.

Customary fishery characteristic, methods, catch information

31 None known

Existing management information

32 Apart from the requirement to report this species as a catch, there is very little other management data available.

International obligations

33 None known

Treaty settlement obligations

34 None known

Recommendation

35 For management purposes, it may be beneficial to treat all *Macrorhamphosidae* species collectively, whether introduced into the QMS or otherwise. There are several reasons for this:

a) the relatively low level of catches of across all *Macrorhamphosidae* species;

b) the similar physical and distributional characteristics between the *Macrorhamphosidae* species; and

c) the high probability that fishers will not correctly differentiate between the different species, thus potentially invalidating much of the catch data, itself a major reason for incorporating species into the QMS.

References:

NIWA (2001) Assessment of non-quota species. **

Stewart, A. & Roberts, C. (2004) Bellowsfish in New Zealand. *Seafood New Zealand* April 2004 61-63.

www.fishbase.org, February 2007.

Severity/likelihood risk analysis

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.
Analysis: 36 Data shows rising, if variable landings for bellowsfish species. It is likely that the overall increase in reported landings of bellowsfish species over the last 10 years reflects improved catch reporting rather than an increase in actual landings. From the available information, it appears unlikely that current fishing practices will jeopardise bellowsfish species viability. 37 At present, bellowsfish species are not a target fishery or subject of any other specific human use. Even if future generations were to find uses for these fish species, (assuming similar fishing methods and effort) it is likely that these species would still be present in viable populations. However, it would be prudent for the Ministry to continue to monitor bellowsfish species landings, and review management if landings suggested major changes to current catch levels.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.
Analysis: 38 The risk of adverse effects on the aquatic environment from fishing for bellowsfish species under an open access management regime is considered to be minimal. 39 All species of bellowsfish are caught as a bycatch in long established fisheries (e.g. squid) and, despite the increase in reported landings (noted above), there is no evidence to suggest that the stock is being fished beyond sustainable levels. Bellowsfish species are thought to have a population doubling time of 1.4 – 4.4 years, which suggests the stocks are reasonably fast-growing and resilient. 40 75% of bellowsfish species catches are by bottom trawl. This has an impact on the aquatic environment, but as bellowsfish species are not targeted and only taken as an unwanted bycatch, the impact of bottom trawling cannot be attributed to fishing for bellowsfish.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Generic objective 3: Risk to providing access that enables social, cultural and economic wellbeing.
Analysis: 41 Bellowsfish species are not targeted by commercial fisheries and have no commercial value except as by-catch that can be used for fishmeal. 42 Furthermore there is no known recreational or customary fishing for any of the bellowsfish species, and no management information exists for bellowsfish in New Zealand. There are no specific international obligations or Treaty settlement obligations known to exist for bellowsfish. 43 However the bellowsfish species have intrinsic value and contribute to biodiversity and sustainability of marine ecosystems.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Objective(s) returning highest score: None

Risk based on severity/likelihood (low, medium, high): Low

BROADNOSED SEVENGILL SHARK

Species: *Notorynchus cepedianus*
Common name: Broadnosed sevengill shark (also known as cow sharks)
Maori name: *Tuatini*
Species code: SEV
Stock area : 1-10 + T

Biological information:

Growth, reproduction and recruitment

44 Broadnosed sevengill shark grows to a maximum size of approximately 3 m, with the maximum published weight of 107 kg, and a maximum reported age of 49 years. Female sharks mature at approx 190-200cm. This species is ovoviviparous (young are born live) with 82-95 young in a litter. Fishers have observed large aggregations of these sharks in shallow waters during summer and it is possible that these are breeding groups.

Spatial and temporal distribution and key areas (feeding, spawning and migration)

45 Broadnosed sevengill sharks are found from Northland to Stewart Island, in depths of 0-570m, on the continental shelf. They are often found outside the surf zone of sandy beaches, and in bays and estuaries, with larger individuals ranging into deeper waters.

46 Broadnosed sevengill sharks feed on other sharks, rays, bony fish, dolphins and porpoises, seals, and mammalian carrion like sheep, rats, and rabbits washed out to sea during floods.

Habitat interactions

47 Broadnosed sevengill sharks usually cruise steadily and slowly near the bottom, often in shallow water of less than one metre. They may cause some localised disturbance to the bottom substrate when in shallow bays as they tend to become almost beached in very shallow water and thrash around as they search for prey.

Environmental conditions

48 This species is normally found in temperate waters, and is possibly tolerant of estuarine salinity changes.

Protected species interactions

49 Hector's dolphin tails and body parts have been found in the stomachs of this species.

Stock assessments

50 For broadnosed sevengill sharks, there are no estimates of current or reference biomass, or sustainable yield.

Social, Economic, Cultural:

Commercial fishery characteristics, methods, catch information

51 Broadnosed sevengill sharks are caught as a by-catch in targeted set-netting for school shark and rig, and also in some bottom trawls.

52 Broadnosed sevengill sharks have historically been valued for liver oil which is high in vitamin A. The skin is also used for high grade leather and the flesh and fins are is sold for human consumption.

53 Reported landings since 1988 are in total 53.6 tonnes. However, from a review of the raw landing data it would appear that the weight of fins is often wrongly declared as the greenweight. The potential result of this is that a significant part of the catch landing statistics are under reported by a factor of 30 (the conversion factor for greenweight to fins). Broadnosed sevengill sharks may also be mis-reported as other species (for example school shark (smaller individuals)) or discarded.

Recreational fishery characteristics, methods, catch information

54 Sevengill sharks are regularly caught around the coast of the South Island by recreational fishers. They are caught by boat and surf anglers. In fishing competitions, the winning fish for weight is often a sevengill shark. Catch volumes are unknown; anecdotal evidence[1] suggests that this is a very widely targeted and caught surf casting species, common on the east coast of the South Island. This is also backed up by broadnosed sevengill sharks being caught in shark nets at some popular swimming beaches on the east coast of the South Island.

Customary fishery characteristics, methods, catch information

55 Customary catch records since 1999 show no catch of broadnosed sevengill sharks. Historical references relate to the lower teeth of the broadnosed sevengill shark being used by Maori to remove the flesh from human bones.

Existing management information

56 Apart from the requirement to report this species as a catch, there is little other information as far as actual management data.

Provisional catch history implications (Schedule 4D stocks)

57 Not a Schedule 4D stock (no PCH).

International obligations

58 None known.

Treaty settlement obligations

59 None known.

[1] Joe Chidgey, well known Canterbury recreational fisherman (personal communication to Mark Geytenbeek, 2006)

References:

Ayling, T. (1982) Collins Guide to the Fishes of New Zealand.

Castro, J. (1983) The Sharks of North American Waters. Texas A&M University Press.

Compagno, L. (1984) FAO Species Catalogue 4 Sharks of the World.

Stewart, A. (2002) At Sixes and Sevens with Four Cow Sharks. Seafood New Zealand (2002) 10 (7):65-68
www.fishingmag.co.nz/surfcasting-sevengillers.htm

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.
Analysis: 60 Broadnosed sevengill sharks are not targeted by commercial fishing; they are a bycatch of a number of fishing methods including set netting, bottom trawl, and bottom long lining. The choice of fishing gear can also influence the retention of sharks once caught (eg, the use of steel traces). The concern about sharks, in general, centers on misreported commercial catch figures, because. It appears that the weight of fins landed is often declared as the greenweight. The potential result of this is that part of the catch could be under reported by a factor of 30. 61 Introduction into the QMS would possibly go some way to preventing misreporting problems. Under the QMS additional management controls could be included such as inclusion on schedule six (Stocks which may be Returned to the Sea or Other Waters), and a review of conversion factors. 62 This species is a target for recreational surf casters and other fishers on the east coast of the South Island, controlled by a daily bag limit of one fish. Anecdotal information from recreational fishers suggests that this species is not as abundant as it once was. 63 In general, sharks are long-lived; togther eith ovoviviparity and relatively low fecundity, they are susceptible to overfishing. It is these biological attributes that suggest that active management is required
Severity of impact (low, medium or high) : Medium Likelihood of impact (low, medium or high): Medium
Risk score (1-9) :4

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.
Analysis: 64 Since broadnosed sevengill shark is a bycatch of existing target fisheries, the impact on the environment of retaining an open access regime compared with QMS introduction would remain the same. In the unlikely event that this species was targeted for finning, the continued use of existing fishing methods would mean no increase in fishing related environmental impact. Since the broadnosed seven gill shark is an apex predator, over-exploitation could lead to change in the local habitat interaction.
Severity of impact (low, medium or high) :Low Likelihood of impact (low, medium or high) :Medium
Risk score (1-9) :2

Generic objective 3: Risk to providing access that enables social, cultural and economic well being.
Analysis: 65 At present the commercial sector is reporting landings of broadnosed sevengill sharks at a consistent level, with average annual landings of approx 3,000 kg for the last 14 years. Although this appears to be an underestimate (for the reasons set out above), at this point there appears to be no boom or bust cycle that would indicate problem with continued access. Recreational daily bag limits appear to be working well, although anecdotal comments from recreational sources on the apparent drop in abundance should be considered.
Severity of impact (low, medium or high) :Low Likelihood of impact (low, medium or high) :Medium
Risk score (1-9) :2

Objective(s) returning highest score: Objective 1

Risk based on severity/likelihood (low, medium, high):Medium

Immediacy and uncertainty risk analysis (for medium risk stocks or species only):

Immediacy of impact on objective returning highest score:
Analysis: 66 Broadnosed sevengill sharks are caught in most FMAs as a result of bottom trawl, bottom long line and set net fishing activity. Due to the fact that these are poorly reported as a specific catch, the reliability of the reported greenweight caught is questionable. Since most of the catch is reported as school shark (smaller individuals), or discarded, it would make sense to use additional management tools under the QMS such as Sixth Schedule listing. This would mitigate the possible constraints on the target fisheries of a TAC being set. The effect of fishing on a population whose stock structure is unknown makes it difficult to speculate on the immediacy of any effect of commercial take on this species; they may be vulnerable to overfishing due to ovoviviparity and low fecundity.
Immediacy value (low, medium or high) : Medium

Uncertainty of information used in analysis of objective returning highest score:
Analysis: 67 Review of landing information shows a consistent level of reported catch, but, there appears to be a high level of misreporting of greenweight. Because reported catch is unreliable, fishing related impacts could already be affecting the population. Some weight should be given to the information received from the recreational fishers.
Uncertainty value (low, medium or high) : Medium

Collation of additional management information

Ease of implementation
Analysis: 68 The inclusion of this species into the QMS would be relatively easy. Specific measures that could be considered include: • Inclusion on the Third Schedule to the 1996 Act as a species managed with an alternative Total Allowable Catch, because of the biological characteristics of the species. Reporting problems associated with this fishery make setting the TAC difficult, and quantifying the known mistakes requires a more in-depth analysis of the available catch data. • Allowing the return of live broadnosed sevengill shark to the water under Schedule 6; • Review of conversion factors for broadnosed sevengill shark; • Setting a deemed value for broadnosed sevengill shark; and • Making consequential amendments to the reporting regulations.
Conclusion: The refined analysis of the catch data could make setting the TAC relatively simple to achieve.

Relationship with other QMS stocks or species
Analysis: 69 TAC setting needs to take into account the variety of target fisheries in the QMS taking this species as a bycatch. Due to quality issues, catch data will require further analysis to ensure that the TAC covers bycatch of these other target fisheries. Provisions to cover the recreational take should be made.
Conclusion: Need to ensure adequate provision for bycatch for the established target fishery operations and the associated fishing methods of which Broadnosed sevengill shark are a by catch.

Deployment of MFish resources:
Analysis: 70 There has been generic work done in relation to the NPOA (sharks). The preparation of an IPP and the finer analysis of the relevant catch data could be completed relatively easily. MFish may have to focus on the reporting requirements of this species should it be introduced to the QMS.
Conclusion: Broadnosed sevengill shark is already a reportable species, but will require some resources to make sure that fishers comply with reporting requirements.

Provisional catch history implications:
Analysis: 71 There are no PCH implications according to data obtained from the report titled 'Validation and Eligibility Catch Dataset Extraction Rules for Schedule 4C and 4D Stocks or species', Fish Serve, 2005.
Conclusion: Set TAC without PCH associated issues

Risk Evaluation

72 Risk after severity/likelihood analysis is MEDIUM; and immediacy and/or uncertainty is MEDIUM or HIGH? Yes - stock is in GROUP 2

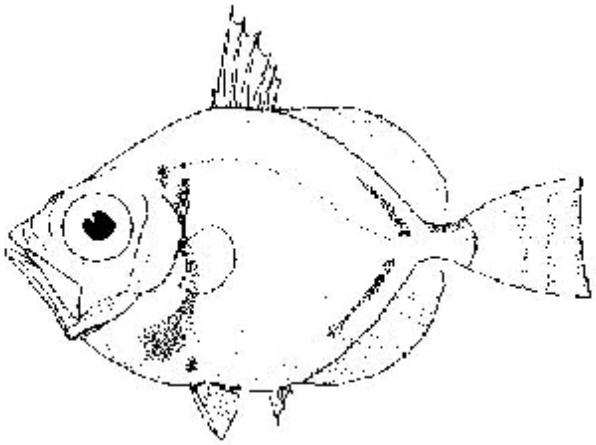
CAPRO DORY

Species:	*Capromimus abbreviatus*
Common Name:	Capro Dory
Species code:	CDO
Stock area:	1-10

Biological information:

Morphology, growth, reproduction and recruitment

73 The capro dory has the thin, deep body typical of dories but is much smaller than the other New Zealand dories. The average individual is only 5 - 10 cm in length. There is no information available on the reproduction or recruitment of this species.



Drawing by Dr Tony Ayling.url

Spatial and temporal distribution and key areas (feeding, spawning, migration)

74 Capro dory inhabits the New Zealand continental slope and is reported from water depths of 200 - 500 m. Capro dory is taken as bycatch in QMAs 1 - 9 and thus appears to be a widespread species in New Zealand.

75 There is no information available regarding feeding, spawning or migratory behaviour.

Habitat interactions

76 No information is available.

Associated species (bycatch and target)

77 Capro dory is taken as bycatch in several QMS species target fisheries.

Environmental conditions

78 No information is available.

Protected species interactions

79 None known.

Stock Assessment

80 There are no estimates of current or reference biomass, or sustainable yield.

Social, Economic, Cultural

Commercial fishery characteristics, methods, catch information etc

81 Due to the widespread distribution, capro dory is taken as bycatch in several different trawl target fisheries. For the fishing years 2001/02 – 2005/06 total EEZ reported catch of capro dory is approximately 404 tonnes. The following table summarises the total catch distribution by QMA for those years.

QMA1	QMA2	QMA3	QMA4	QMA5	QMA6	QMA7	QMA8	QMA9	QMA10
131.5 t	74.4 t	27.3 t	15.3 t	71 t	1.1 t	55.2 t	23.6 t	4.2 t	0 t

82 Although over 10 target fisheries report CDO as bycatch, the SQU, BAR, JMA, and TAR fishery reports by far the most CDO bycatch. Other fisheries that report smaller quantities of CDO bycatch are SCI, and HOK.

83 As illustrated by the following table, during the fishing years 2001/02 – 2005/06, reported catches have not shown large year-to-year variation. Due to the small size of individual CDO, it is unlikely that an economically viable CDO fishery would develop should this species enter the QMS.

2001/02	2002/03	2003/04	2004/05	2005/06
74.8 t	82.7 t	88.4 t	82.7 t	74.9 t

Recreational fishery characteristics, methods, catch information etc.

84 MFish has no information on recreational catch of capro dory.

Customary fishery characteristics, methods, catch information etc.

85 None known.

Management

Existing management information

86 None known

Provisional catch history implications (Schedule 4C stocks or species)

87 None

International obligations

88 Nothing specific.

Treaty settlement obligations

89 None known.

References:

1. www.fishbase.org

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.

Analysis:

90 Capro dory is taken as bycatch of established trawl fisheries that target several mid- and deep-water QMS species. Due to the nature of catch-reporting obligations for non-QMS species, unless the bycatch species is estimated to be among the 5 most abundant species taken in a given trawl, catches do not have to be reported. The capro dory catch data therefore are, at best, only indicative of annual catch and of year-to-year catch variability. Conclusions regarding risk drawn from such data are therefore likely to be highly uncertain.

91 Reported catch data for the fishing years 2001/02 – 2005/06 indicate that approximately 75 – 88 tonnes of capro dory bycatch are taken each year by those fishers who reported the species. The 5-year time series of catch data do not show any marked increase or decrease in catch but reported catches peaked at 88.4 tonnes in 2004/05. Although the yearly tonnage does not seem particularly high, the estimated catch levels imply that a very high number of individuals are removed from the stocks each year due to the small size (5 – 10 cm) of individual capro dory. Capro dory are caught as bycatch in long established fisheries and the catch data suggest that the stocks are not being fished beyond sustainable levels. As indicated in the Information Brief, nothing is known regarding reproduction, recruitment, or habitat interactions of capro dory.

92 The level of risk is likely to be low, but MFish should monitor capro dory catch data and reconsider management interventions if reported catches change markedly and/or if TACCs of associated target QMS species are adjusted to higher levels.

Severity of impact (low, medium or high) : Low

Likelihood of impact (low, medium or high) : Low

Risk score (1-9) : 2

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.

Analysis:

93 The risk of adverse effects on the aquatic environment from catch of capro dory under an open access management regime is low due to the fact that there is no target fishery for the species. Some catches of capro dory are taken by bottom trawl but only as a consequence of a target fishery for QMS species.

94 Nothing is known of the habitat interactions or of the marine ecosystem role of capro dory but due to their widespread habitat, they must certainly have some function in the marine ecosystem

Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Generic objective 3: Risk to providing access that enables social, cultural and economic wellbeing.
Analysis: 95 Capro dory are not targeted by commercial fisheries and have no present commercial value to fishers with the possible exception for use in fishmeal plants by those vessels so equipped. MFish has doubts whether an economically viable market is possible for capro dory due primarily to their small size 96 There is no known recreational or customary take of capro dory. There are no specific international obligations or Treaty settlement obligations known for capro dory. 97 Capro dory have intrinsic value and contribute to biodiversity and sustainability of marine ecosystems.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Objective(s) returning highest score: None

Risk based on severity/likelihood (low, medium, high): Low

HAGFISH

Species:	*Eptatretus cirrhatus, E. goliath, Neomyxine biniplicata, Nemamyxine elongata*
Common Name:	New Zealand Hagfish (aka blind eel, snot eel)
Species code:	HAG
Stock area:	1-10

Biological information:

Classification

98 New Zealand has four species of hagfish, a group found only in the sea[2]. The New Zealand hagfish is a primitive eel-shaped fish, a surviving remnant of one of the earliest groups of fishes that first appeared over 350 million years ago, and which does not have jaws, bony skeleton, eyes, or true fins.

99 Despite their common names, hagfish are not eels but are members of the superclass Agnatha, the 'jawless fishes', a group that includes the modern hagfish and lamprey[3]. Instead of vertically articulating jaws like Gnathostomata (vertebrates with jaws), they have a pair of horizontally moving structures with rasp-like horny projections for pulling off food. There are typically six short tentacle-like protrusions around the mouth, which is a small sucking disc on the front of the body. The skeleton is cartilaginous and hagfish have no paired pectoral or pelvic fins, nor do they have scales. Some taxonomists split the hagfish from the rest of the vertebrates and use the name Craniata as the clade that includes both the hagfish and vertebrates[4].

Morphology, Physiology and Behaviour

100 The hagfish is round-bodied in cross-section and flattened towards the hind end forming small flaps that resemble fins. They have a line of large mucus glands down each side and can produce large quantities of sticky slime when disturbed. Color varies from pink-brown to dark brown, covered by a blue-grey layer of mucus when seen underwater. At nearly 1 metre in length, New Zealand hagfish *Eptatretus cirrhatus* is one of the larger hagfish known[5].

101 Hagfish are blind, hence they are often called blind eels, and they exude copious quantities of blue slime from their skin if disturbed, which is why they are also known as snot eels, and from which the typical species *Myxine glutinosa* was named. Hagfish produce the slime from around 200 specialised glands; when feeding, they produce only a small amount of slime, but when cornered or captured, the fish oozes from all glands at once. The slime begins as a small amount of thick white fluid that absorbs seawater and expands several hundred times in volume.

[2] Compared with eels which are mostly catadromous (live in fresh water and enter the sea to spawn).
[3] There is also debate about whether hagfish are strictly fish since they belong to a much more primitive lineage than any other group commonly defined as fish (Chondricthyes and Osteichthyes)
[4] Other taxonomists further split hagfish from lampreys into separate classes: (i) Myxini: jawless vertebrates: Hagfish; and (ii) Cephalaspidomorphi: jawless vertebrates.
[5] A new species of giant seven-gilled hagfish *E. goliath* was recently discovered at the head of the Hauraki Canyon at 811 m depth. The single specimen, at 1,275 mm TL and 6.2 kg, is the largest hagfish yet known (Mincarone & Stewart 2005).

102 To rid itself of its own slime, the hagfish ties itself in an overhand knot, then sweeps the knot toward the head, scraping itself clean. This traveling-knot behavior may assist hagfish in extricating themselves from the jaws of predatory fish, and the 'sliming' itself also acts as a distractant to predators, since the slime clogs up the gills of fish predators, either suffocating them or driving them off.

Growth, reproduction and recruitment

103 Individual hagfish are hermaphroditic with both ovaries and testes, but the female gonads remain non-functional until the individual has reached a particular stage in its lifecycle. They produce only sperm or eggs at any one season, but they can produce sperm one year and eggs the next. Hagfish do not have a larval stage (cf lampreys, which have a long larval phase). Minimum population doubling time is thought to be 4.5 - 14 years.

104 Hagfish tend to live on and in muddy sea floors in very dense aggregations. Because females tend to produce large eggs in small numbers, their population sizes suggest a low natural mortality rate.

Spatial and temporal distribution and key areas (feeding, spawning, migration)

105 Hagfish tend to be quite common in their range of south and east Australia and around New Zealand; they are bathydemersal, non-migratory and marine, with a depth range of 40 to 700 m. Hagfish in tropical waters are usually found at about 600m or deeper on the ocean floor, whereas in cold waters they are sometimes seen in tidal pools.

106 Hagfish are generally scavengers of dead fish and marine mammal corpses which they locate entirely by smell, although they will attack living fish, polychaete worms and crabs which they detect either by movement or smell. Since hagfish don't have teeth, they can't bite through tough whale skin or fish scales. Unless other scavengers have already opened a carcass, hagfish enter through the gills, mouth or anus, then eat from the inside out, rasping through the flesh with their tooth-studded tongues. Hagfish have a sluggish metabolism and can go months between feedings.

Habitat interactions

107 Hagfish play a crucial role in the marine food chain, by eating a range of organisms, dead or alive. In particular they consume everything from dead whales to discarded offal and bycatch from commercial trawling fleets.

Associated species (bycatch and target)

108 None known.

Environmental conditions

109 None known.

Protected species interactions

110 Hagfish are an important food for some octopuses, seabirds, fish, seals and dolphins.

Stock Assessment

111 There are no estimates of current or reference biomass, or sustainable yield.

Social, Economic, Cultural

Commercial fishery characteristics, methods, catch information etc

112 Hagfish are eaten in Japan and Korea; purses, shoes and wallets advertised as eelskin are often made from hagfish skin in Korea. Overfishing in Asia has decimated local hagfish stocks, so the Asian hagfish fishery has looked to North America. Thus there may be potential markets for New Zealand hagfish.

113 Other potential applications of hagfish products include manufacture of synthetic gels, biodegradable polymers, space-filling gels, and as blood coagulants by utilising the strong, threadlike fibers similar to spider silk found in the mucous, and the mucous itself.

114 MFish is aware of recent interest in hagfish as a target commercial fishery. It is likely that both meat and skins will be exported.

115 From 2001-02 to 2005-06 New Zealand hagfish landings ranged between 12 and 36 tonnes per annum. Most landings were bycatch associated with the ling longline, crayfish potting and scampi fisheries. Total landings for the 2006-07 fishing year-to-date exceed 200 tonnes.

Recreational fishery characteristics, methods, catch information etc.

116 Anecdotal evidence suggests that recreational fishers try to avoid catching hagfish due their slime.

Customary fishery characteristics, methods, catch information etc.

117 Hagfish, or tūere is good eating once the slime is removed, and is a taonga species for iwi. Tūere was very much a part of the Ngati Koata staple diet and is considered a delicacy. Although tūere is not unique to Ngati Koata, it is more readily available to Ngati Koata than it is to other iwi, especially around D'Urville Island (Jim Elkington).

Existing management information

118 In the mid to late 1980s, MFish issued permits to Korean fishermen to fish for tuere, to allow them to harvest the skins. Koreans were catching large quantities in 1000 metres of water, but were discarding the meat. Jim Elkington led a delegation to the Ministry of Fisheries on behalf of Ngati Koata, objecting to the Koreans wasting the meat by dumping it, and offering to drop the objection if the Koreans would give the meat to local marae. The Koreans were not prepared to do that, so MFish cancelled the permit.

119 Special permits have been issued in the past to public aquariums for educational purposes.

Provisional catch history implications (Schedule 4C stocks or species)

120 None

International obligations

121 Nothing specific.

Treaty settlement obligations

122 None known.

References:

Mincarone, M. & Stewart, A. (2006) A New Species of Giant Seven-gilled Hagfish (Myxinidae: Eptatretus) From New Zealand. *Copeia* 2006 (2) 225–229 www.bioone.org.

Jim Elkington (2001) Statement of Evidence of James Hemi Elkington for Hearing 26 February – 2 March 2001 before the Waitangi tribunal WAI 566

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.
Analysis: 123 Until very recently, the only significant New Zealand hagfish target fishery was the customary fishery. It is likely that relatively small volumes will continue to be taken for customary use in the future; furthermore, only a small amount of hagfish is taken as incidental bycatch in other commercial fisheries. Therefore there does not appear to be any urgency to introduce hagfish to the QMS on the grounds of sustainability (although local depletion could be an issue). Should the developing fishery continue to grow in the near future and large volumes of hagfish harvested, the question as to whether hagfish should be introduced to the QMS could be addressed then (that is, for October 2009 onwards).
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Medium
Risk score (1-9) : 2

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.
Analysis: 124 The impacts of hagfish fishing on the environment under either an open access management regime or under the QMS are likely to be minimal. Fishing for hagfish traditionally involved using dead sheep or other carcases to attract hagfish; the hagfish latched on and were hauled out of the water. Commercial fishers would likely either retain bycaught hagfish (which equates to no increase in fishing-related environmental impact) or target hagfish using pots, which are environmentally benign relative to, say, bottom trawling.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Generic objective 3: Risk to providing access that enables social, cultural and economic wellbeing.
Analysis: 125 Currently, non commercial fishers (both customary and recreational fishers) may take as much hagfish as they wish, although historically, some open access fisheries have demonstrated a boom-and-bust cycle. Plans to target hagfish commercially by the single group who is known to be targeting hagfish are still in their initial phase therefore the commercial hagfish fishery is not yet proven; nevertheless, this group may target hagfish, should they wish, under an open access regime with few constraints. Should the harvest of hagfish become significant in the future and friction occur between competing groups, QMS introduction could be addressed then.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Objective(s) returning highest score: 1

Risk based on severity/likelihood (low, medium, high): low

LAMPREY

Species:	*Geotria australis*
Common Name:	Lamprey / Piharau / Kanakana
Species code:	LAM
Stock area:	1-10

Biological information:

Growth, reproduction and recruitment

126 Lamprey juveniles (ammocoetes) live in burrows in silty river edges and migrate out to sea after 3-5 years. As they approach migration, juvenile lampreys develop eyes and change to a bright silvery-blue, just like the adults. However, they are only about 100 mm long at this stage.

127 After another 2-5 years at sea the adults (which are over 400 mm long) migrate back up streams between April and August to breed and die. Adults move upstream at night, and sometimes reach as far as 250 km inland. Spawning is thought to take place in smaller tributaries rather than large rivers.

128 Little else is known about their breeding habits, and spawning has never been observed. However, upstream migration is likely inhibited by dams and weirs.

Spatial and temporal distribution and key areas (feeding, spawning, migration)

129 Lampreys are found throughout New Zealand, and also in Australia and South America.

130 Generally they occur close to the coast at low altitudes, but can use their circular sucker to surmount obstacles such as small waterfalls during their migration to spawning sites. The adults do not feed while in fresh water, however, and so are not parasitic on other freshwater fish.

131 Whilst at sea, lamprey are parasites on marine life. It is not known what species lampreys feed on at sea, but some anecdotal evidence suggests that they feed on whales. Lampreys have been recorded in the stomachs of albatross.

132 Land use and habitat modifications (including dams and other obstructions) have severly impacted lamprey distribution and abundance.

Habitat interactions

133 Because of their secretive nature, adults are seldom seen, preferring to hide along the river margins away from the main flow. Studies have shown the migration upstream normally occurs at night time, while during the day adult lamprey shelter under cover aside river margins. Studies suggest that juvenile lamprey are also associated with shelter.

Associated species (bycatch and target)

134 There is no information available to quantify relationships between lamprey and other harvested species. However, studies have shown positive relationships between the presence of lamprey, shortfin eel, longfin eel, and bullies.

Environmental conditions

135 No information available.

Protected species interactions

136 None known.

Stock Assessment

137 There are no estimates of current or reference biomass, or sustainable yield.

Social, Economic, Cultural

Commercial fishery characteristics, methods, catch information etc

138 None known. The only reported lamprey landings are 41 kg from FMA 6 in the 1991/92 fishing year.

139 A few special permits allow aquarium display.

Recreational fishery characteristics, methods, catch information etc.

140 None known.

Customary fishery characteristics, methods, catch information etc.

141 Maori consider lamprey to be a taonga and a delicacy. In the South Island they are known as kanakana and in the North Island as piharau.

142 Lampreys were historically an important food resource for Maori, who constructed elaborate weirs to harvest the resource. However, many traditional lamprey fisheries are now extinct. The traditional fishery still occurs on a small scale in the Wanganui River near Pipiriki and in other parts of Taranaki. Traditional hand gathering of lampreys still occurs at the Mataura Falls and Niagara Falls in Southland.

143 For some hapu, lamprey would be the most valuable and highly prized fisheries resource. For Whanganui hapu for example, lamprey would be more than just a delicacy. The whole activity and history of fishing for lamprey is an integral part of the culture and sense of beloning to the river and its natural resources, both biological and physical.

144 MFish has no customary harvest data available.

Management

Existing management information

145 There are no recreational bag limits for lamprey.

146 Lamprey in FMA 3, 5 and 7 are on schedule 4C and still subject to a permit moratorium.

Provisional catch history implications (Schedule 4C stocks or species)

147 Not applicable.

International obligations

148 Nothing specific.

Treaty settlement obligations

149 The Ngati Ruanui, Ngai Tahu, and Ngati Mutunga Treaty settlements prohibit the commercial harvest of lamprey unless the Minister can demonstrate a commercial harvest is sustainable.

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.
Analysis: 150 The only identifiable lamprey fisheries are local customary fisheries, however, MFish has no information about the volume of the customary harvest relative to stock size. 151 Where lamprey habitat is modified there is the potential for adverse effects on the stock. For example, some Wanganui River Maori have commented to MFish staff that lamprey are not as available as much now as in the past. This is more likely related to habitat modification than level of harvest. 152 There is no information that demonstrates the extent of lamprey bycatch in the eel fishery. MFish believes that the level of bycatch mortality is probably low.
Severity of impact (low, medium or high): Low Likelihood of impact (low, medium or high): Low
Risk score (1-9) : 1

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.
Analysis: 153 Lamprey harvest methods are benign relative to more destructive methods like bottom trawling and dredging. Hand-picking is most common, although in some locations customary fishers build elaborate weirs to trap lamprey.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Generic objective 3: Risk to providing access that enables social, cultural and economic wellbeing.
Analysis: 154 Access is available to all fishing sectors under the current management regime. Customary fishers extract the most value from the lamprey fishery. MFish is unable to quantify the effects of any increase in recreational and commercial harvest on customary value. However, MFish expects friction between sectors should recreational and commercial fishers start targeting lamprey. In addition, MFish does not know if the lamprey fishery can support recreational and economic commercial fisheries.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high): Low
Risk score (1-9) : 1

Objective(s) returning highest score: nil

Risk based on severity/likelihood (low, medium, high): low

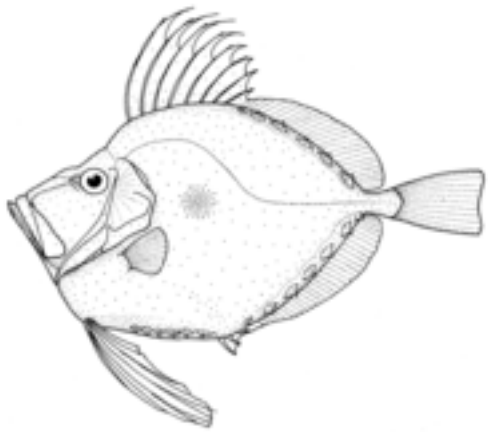
MIRROR DORY

Species:	*Zenopsis nebulosus*
Common Name:	Mirror Dory
Species code:	MDO
Stock area:	1-10

Biological information:

Morphology, growth, reproduction and recruitment

155 The mirror dory resembles the john dory but has an angular head with a more upturned mouth and lacks scales. The body of the fish is a uniform silver colour with an indistinct dark blotch on the flank. Individuals attain an average of 20 to 35 cm in length but can reach a maximum of 50 cm. There is no information available on the reproduction or recruitment of this species.



Spatial and temporal distribution and key areas (feeding, spawning, migration)

156 Mirror dory inhabits the New Zealand shelf and is reported from water depths between 200-300 meters. It appears to inhabit open sandy and muddy environments on the outer shelf. Mirror dory is taken as bycatch in QMAs 1-9 and thus appears to be a widespread species in New Zealand.

157 There is no information available regarding feeding, spawning or migratory behaviour.

Habitat interactions

158 No information is available.

Associated species (bycatch and target)

159 Mirror dory is taken a bycatch in a number of QMS target species fisheries.

Environmental conditions

160 No information is available.

Protected species interactions

161 None known.

Stock Assessment

162 There are no estimates of current or reference biomass, or sustainable yield.

Social, Economic, Cultural

Commercial fishery characteristics, methods, catch information etc

163 Due to the widespread distribution, mirror dory is taken as bycatch in several different trawl target fisheries. For the fishing years 2001/02 – 2005/06 total EEZ reported catch of mirror dory is approximately 323 tonnes. The following table summarises the total catch distribution by QMA for those years.

QMA1	QMA2	QMA3	QMA4	QMA5	QMA6	QMA7	QMA8	QMA9	QMA10
211 t	76 t	11.7 t	3 t	2.5 t	0.05 t	4.2 t	1.8 t	2.5 t	9.6 t

164 Although over 20 target fisheries report MDO as bycatch, the HOK fishery reports by far the most MDO bycatch. Other fisheries that report significant quantities of SDO bycatch are SKI, TAR, LIN, and SCI.

165 As shown in the following table, during the fishing years 2001/02 – 2005/06, reported catches have not shown large year-to-year variation.

2001/02	2002/03	2003/04	2004/05	2005/06
69 t	53 t	67 t	64 t	70 t

Recreational fishery characteristics, methods, catch information etc.

166 MFish has no information on recreational catch of mirror dory.

Customary fishery characteristics, methods, catch information etc.

167 None known.

Management

Existing management information

168 None known

Provisional catch history implications (Schedule 4C stocks or species)

169 Not applicable

International obligations

170 Nothing specific.

Treaty settlement obligations

171 None known.

References:

1. www.fishbase.org

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.
Analysis: 172 Mirror dory is taken as bycatch of established trawl fisheries that target several mid- and deep-water QMS species. Due to the nature of catch-reporting obligations for non-QMS species, unless the bycatch species is estimated to be among the 5 most abundant species taken in a given trawl, catches do not have to be reported. The mirror dory catch data therefore are, at best, only indicative of annual catch and of year-to-year catch variability. Conclusions regarding risk drawn from such data are therefore likely to be highly uncertain. 173 Reported catch data for the fishing years 2001/02 – 2005/06 indicate that approximately 53–70 tonnes of mirror dory bycatch are taken each year by those fishers who reported the species. The 5-year time series of catch data show an recent increase in catches that peaked at 70 tonnes in 2005/06 from a low of 53 tonnes in 2002/03. Mirror dory are caught as bycatch in long established fisheries and the catch data imply that the stocks are not being fished beyond sustainable levels. As indicated in the Information Brief, nothing is known, however, regarding reproduction, recruitment, or habitat interactions of mirror dory. 174 The level of risk is likely to be low, but MFish should monitor mirror dory catch data and reconsider management interventions if reported catches change markedly and/or if TACCs of associated target QMS species are adjusted to higher levels.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 2

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.
Analysis: 175 The risk of adverse effects on the aquatic environment from catch of mirror dory under an open access management regime is low due to the fact that there is no target fishery for the species. Some catches of mirror dory are taken by bottom trawl but only as a consequence of a target fishery for QMS species. 176 Nothing is known of the habitat interactions or of the marine ecosystem role of mirror dory but due to their widespread habitat, they must certainly have some function in the marine ecosystem.
Severity of impact (low, medium or high) : Low

Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Generic objective 3: Risk to providing access that enables social, cultural and economic wellbeing.
Analysis: 177 Mirror dory are not targeted by commercial fisheries and have no present commercial value to fishers with the possible exception for use in fishmeal plants by those vessels so equipped. If mirror dory was introduced into the QMS, fishers would be required to land it, using freezer space that would otherwise be used for target species or other, more valuable bycatch 178 There is no known recreational or customary take of mirror dory. There are no specific international obligations or Treaty settlement obligations known for mirror dory. 179 Mirror dory have intrinsic value and contribute to biodiversity and sustainability of marine ecosystems.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Objective(s) returning highest score: None

Risk based on severity/likelihood (low, medium, high): Low

SCABBARDFISH

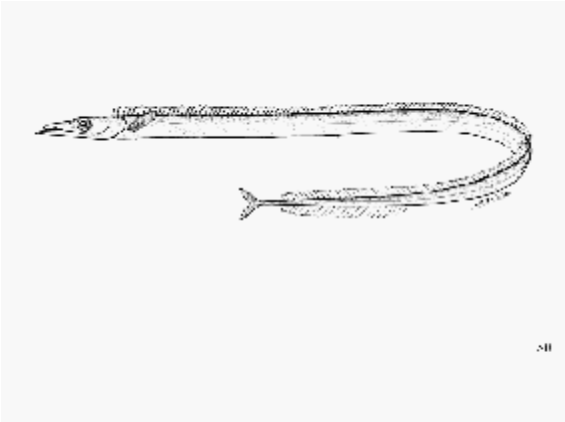
Species:	*Benthodesmus elongatus, Benthodesmus tenuis (?)*
Common Name:	Elongate frostfish/Big Eye Scabbardfish/ScabbardFish
Species code:	BEN
Species Type:	Group species
Correct Scientific Name:	*Benthodesmus* spp.
Stock area:	1-10

180 Note: although the species code BEN includes the family Benthodesmus, only the specie *Benthodesmus elongatus* is common in the New Zealand EEZ. There is a single reference to *Benthodesmus tenuis* (see reference 1) in the New Zealand EEZ but no other sources report the specie to be common in New Zealand.

Biological information:

Morphology

181 *Benthodesmus elongatus* grows to a maximum length of 100 cm. Morphologically it is very similar to frostfish (FRO) except that *Benthodesmus elongatus* has a much greater ratio of length to maximum body depth than FRO. *Benthodermus elongatus* has a silvery body with dark jaws and opercle. The inside of the mouth and gill cavities are black.



Benthodesmus elongatus

Growth, reproduction and recruitment

182 Despite a 300 year-old target fishery in the North Atlantic, basic knowledge of the biology of scabbardfishes is very limited. There is no information on growth, reproduction or recruitment for BEN.

Spatial and temporal distribution and key areas (feeding, spawning, migration)

183 BEN occurs on the New Zealand shelf at reported depth range of approximately 200 – 950 m. The majority of reported catch is off west coast of the South Island. Reported prey include crustaceans (prawns and euphausiids), small finfish, and squid. Spawning characteristics known

include that they are nonguarders, open water/substratum egg scatterers. *Bathydersmus elongatus* is a batch spawner with 5,000 to 16,000 eggs per spawn. No information is available regarding migration behaviour.

Habitat interactions

184 Similar habitat interaction and behaviour unknown but may be similar to frostfish (FRO).

Associated species (bycatch and target)

185 BEN is a bycatch of deep to mid-water trawls that target hoki (HOK) and hake (HAK). Lesser amount of bycatch is reported from the jack mackerel (JMA), silver warehou (SWA), and barracouta (BAR) fishery.

Environmental conditions

186 Unknown

Protected species interactions

187 None known.

Stock Assessment

188 There are no estimates of current or reference biomass, or sustainable yield.

Social, Economic, Cultural

Commercial fishery characteristics, methods, catch information etc

189 BEN is primarily a bycatch of deep- to mid-water trawls that target hoki and hake. Most reported BEN catch is from QMA 7 (west coast of the South Island) with subordinate catch from QMA 5 (southwest coast of South Island). Reported BEN catch for the 2001/02 - 2005/06 fishing years from QMA 7 and QMA 5 are approximately 571 tonnes (562 tonnes from QMA 7 and 9 tonnes from QMA 5). For the same period, reported BEN catches from all other QMAs are approximately 6 tonnes.

190 Midwater trawls consistently catch more scabbardfish than bottom trawls. Whether this catch pattern is due to BEN occupying the water column slightly above the bottom and thus more available to midwater trawling gear with its greater headline height, or is due to the greater swept volume of the midwater trawl gear is unclear. Catches are generally higher at night, regardless of gear type.

191 On the Hokitika Canyon hoki grounds, there is no spatial pattern to the BEN catches – they are caught both inside and outside the Hokitika Canyon, and uniformly over the depth range covered by hoki tows. There is a seasonal pattern to the BEN catch, with catches falling off markedly in August. The reason for this is unknown.

192 Due to similar morphology and habitat, it is possible that much reported BEN may in fact be QMS species FRO. Most of the reported FRO catch is taken from QMA 7.

193 Opinions sought from industry sources are split regarding a potential market for BEN. An individual with experience in the North Atlantic black scabbardfish industry believes that there is a potential market for BEN. According to the source, the high length to body depth ratio and silvery skin of BEN would be a potential market advantage in producing a narrow, silver-skinned, skin-on-fillet unlike that produced from the black-skinned North Atlantic scabbardfish. An alternative opinion was received from another industry source who expressed doubt that a viable BEN market could be developed at this time given that no market currently exists for New Zealand-sourced FRO.

Recreational fishery characteristics, methods, catch information etc.

194 MFish has no information on recreational catch of BEN

Customary fishery characteristics, methods, catch information etc.

195 None known.

Management

Existing management information

196 None

Provisional catch history implications (Schedule 4C stocks or species)

197 Not applicable

International obligations

198 Nothing specific.

Treaty settlement obligations

199 None known.

References:

1. Paulin, C.; A. Stewart, C. Roberts & P. McMillan (1989) New Zealand Fish: A complete guide. National Museum of NZ Miscellaneous Series No. 19. GP Books, Wellington, 279 pp.

2. www.fishbase.org and references within

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.

Analysis:

200 Scabbardfish is taken primarily as bycatch in established mid- and deep-water QMS trawl fisheries that target hoki and hake. Due to the nature of catch-reporting obligations for non-QMS species, unless the bycatch species is estimated to be among the five most abundant species taken in a given trawl, catches do not have to be reported if they are not landed. The scabbardfish catch data therefore are, at best, only indicative of annual catch and of year-to-year catch variability. Conclusions regarding risk drawn from such data are therefore likely to be highly uncertain.

201 Reported catch data for the fishing years 2001/02 – 2005/06 indicate that approximately 83 –149 tonnes of scabbardfish bycatch are taken each year by those fishers who reported the species. The annual catches are shown in the following table. The value in parentheses is the HOK 1 quota for the indicated fishing year.

2001/02 (HOK 1=200000 t)	2002/03 (HOK 1=200000 t)	2003/04 (HOK 1=180000 t)	2004/05 (HOK 1=100000 t)	2005/06 (HOK 1=100000 t)
83 tonnes BEN	87 tonnes BEN	149 tonnes BEN	146 tonnes BEN	82 tonnes BEN

202 Reported catches vary markedly over the five fishing years and it is uncertain what causes such variation. Because scabbardfish is taken primarily by the hoki trawl fishery, it is not unreasonable to expect the bycatch levels to mimic the downward adjustment in the hoki quota in 2003/04 and in 2004/05. As the table demonstrates, such a pattern does not occur. Whether the reported catch levels reflect natural annual BEN stock variation, irregular catch reporting, misidentification of FRO as BEN or of BEN as FRO is impossible to judge. As indicated in the Information Brief, nothing is known regarding reproduction, recruitment, or habitat interactions of scabbardfish.

203 Given the highly variable reported catch, the level of risk to scabbardfish stocks is difficult to assess. MFish should monitor future catch data and reconsider management interventions if reported catches continue to decline in the following one or two fishing years and/or if TACCs of hoki and/or hake are adjusted to higher levels.

Severity of impact (low, medium or high) : Low?

Likelihood of impact (low, medium or high) : Low

Risk score (1-9) : 2

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.
Analysis: 204 The risk of adverse effects on the aquatic environment from catch of scabbardfish under an open access management regime is low due to the fact that there is no target fishery for the species. Some catches of scabbardfish are taken by bottom trawl but only as a consequence of a target fishery for an associated QMS species. 205 Nothing is known of the habitat interactions or of the marine ecosystem role of scabbardfish but due to their widespread habitat, they must certainly have some function in the marine ecosystem.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Generic objective 3: Risk to providing access that enables social, cultural and economic wellbeing.
Analysis: 206 Scabbardfish are not targeted by commercial fisheries and have no present commercial value to fishers with the possible exception for use in fishmeal plants by those vessels so equipped. 207 There is no known recreational or customary take of scabbardfish. There are no specific international obligations or Treaty settlement obligations known for scabbardfish. 208 Scabbardfish, however, have intrinsic value and must in some manner contribute to the biodiversity and sustainability of marine ecosystems.
Severity of impact (low, medium or high) : Low Likelihood of impact (low, medium or high) : Low
Risk score (1-9) : 1

Objective(s) returning highest score: None

Risk based on severity/likelihood (low, medium, high): Low

SEAHORSE

Species:	*Hippocampus abdominalis*
Common name:	Big-belly seahorse, New Zealand pot-belly seahorse
Maori name:	kioremoana, manaia, hinamoki
Species code:	SHO
Stock area:	1-10 +T

Biological information:

Growth, reproduction and recruitment

209 Seahorses grow to a maximum size of approximately 35cm in length, with a life span of around 5-10 years. Males reach breeding age at about one year old. A unique and unusual feature is that seahorse males become pregnant. The female inserts her ovipositor into the brood pouch of the male and lays her eggs; the male then fertilises the eggs and they embed in the wall of his pouch. After approximately 30 days of pregnancy, the male seahorse goes into labour, typically at night at the full moon. The offspring are fully independent after birth. The most numerous brood reported numbered over 1100 offspring. Seahorses are pelagic in the first stage of life or hold onto floating debris at the surface with their tail, and settle on the bottom after they reach a length of 30mm.

Spatial and temporal distribution and key areas (feeding, spawning and migration)

210 This species is found all around New Zealand, occurring as deep as 100m. Seahorses usually live amongst seaweeds, sponges and artificial structures (like wharfs) in harbours and sheltered coastal bays by using its prehensile tail to hold on. Seahorses are voracious feeders eating mainly crustaceans, such as shrimps and other small animals living in the seaweed. Seahorses are relatively strong swimmers and can swim over hundreds of metres in a day.

Environmental conditions

211 This species of seahorse lives in temperate waters and is possibly tolerant of estuarine salinity changes in harbours and coastal bays.

Protected species interactions

212 The big bellied seahorse is listed as ‘data deficient’ on the IUCN Red List 2006. All seahorses are listed on appendix II of CITES.

Stock assessments

213 There are no estimates of current or reference biomass, or sustainable yield, for seahorses.

Social, Economic, Cultural

Commercial Fishery characteristics, methods, catch information

214 This species of seahorse is both a targeted catch and incidental by-catch. The total reported catch total between 2001 and the present is 913kg. Research has been carried out by NIWA to demonstrate the commercial viability of seahorse aquaculture; seahorse aquaculture has been shown to be economic and a few start-up ventures are now developing.

Recreational fishery characteristics, methods, catch information

215 There is a small recreational take of seahorses for the fish hobbyist and these seahorses are highly prized. The extent and volume of recreational take are unknown.

Customary fishery characteristic, methods, catch information

216 None known. No documented customary take.

Existing management information

217 Apart from the requirement to report this species as a catch, there is very little management data.

Provisional catch history implications (Schedule 4C stocks)

218 Seahorse is listed on schedule 4C of the Fisheries Act 1996. Nine landings of seahorse are recorded in the qualifying period 1 October 1990 - 30 September 1992[6].

International obligations

219 CITES and Australian Environment Protection and Biodiversity Conservation Act 1999 (Seahorses are a listed marine species).They are a controlled export internationally and are completely protected in Australia.

Treaty settlement obligations

220 None known.

References:

Australian Museum Fish Site-Fish Facts. Big-belly seahorse (March, 2004) http://www.amonline.net.au/fishes/fishfacts/fish/habdom.htm

http://www.arkive.org/species/GES/fish/Hippocampus_abdominalis/more_info.html

New Zealand Journal of Marine and Freshwater Research,2002,Vol.36:655-660 Fishbase (March, 2004).

http://www.fishbase.org/Summary/SpeciesSummary.cfm?ID=46324&genusname=Hippocampus&speciesname=abdominalis

[6] Validation and Eligibility Catch Dataset Extraction Rules for Schedule 4C and 4D Stocks,' (FishServe 2005)

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.
Analysis: 221 Seahorse is a by-catch of the trawl fishery, and also caught in set nets and crayfish pots. Introduction to the QMS would increase reporting of catch and allow the possible use of the Sixth Schedule for return of live seahorses to the sea. Although the extent of illegal fishing for this species is unknown, the developing aquaculture business in this species appears to have the potential to satisfy commercial demands in a more cost effective manner than harvest from the wild.
Severity of impact (low, medium or high) :low Likelihood of impact (low, medium or high): low
Risk score (1-9) :1

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.
Analysis: 222 Since by-catch levels from established trawl fisheries are fairly low, neither retaining the open access regime nor inclusion in the QMS would appear to adversely effect the aquatic environment. If the economics of seahorse trade change and demand is high, then possible targeted fishing could increase and then controls on open access may be more applicable.
Severity of impact (low, medium or high) :low Likelihood of impact (low, medium or high): low
Risk score (1-9) :1

Generic objective 3: Risk to providing access that enables social, cultural and economic well being.
Analysis: 223 Given the potential of aquaculture to meet demand and the fact that throughout the world seahorses are endangered and appear on CITES, it might be appropriate to deal with access to this fishery outside the QMS. This could be achieved as part of an international strategy geared toward the protection of seahorses. Alternatively, seahorses could be introduced to the QMS with a low TAC and high deemed value to discourage bycatch, and include seahorses on the Sixth Schedule.
Severity of impact (low, medium or high) :Low Likelihood of impact (low, medium or high) :low
Risk score (1-9) :1

Objective(s) returning highest score: nil

Risk based on severity/likelihood (low, medium, high): low

SHARPNOSED SEVENGILL SHARK

Species: *Heptranchias perlo*
Common name: Sharpnosed sevengill shark (also known as cow sharks)
Species code: HEP
Stock area: 1-10 + T

Biological Information:

Growth, reproduction and recruitment

224 Sharpnosed sevengill sharks grow to a maximum size of approximately 1.4 m. Males mature at 0.85 m; and females at 0.90-1.05 m. Females are ovoviviparous (young born live) with 6-20 young in a litter. Sharpnosed sevengill sharks may breed year round, but gestation time and reproductive periodicity is unknown. Virtually no other information on biology, intrinsic rate of increase etc is known.

Spatial and temporal distribution and key areas (feeding, spawning and migration)

225 Sharpnosed sevengilled sharks are found from Northland to Stewart Island, in depths of 300-600m, sometimes deeper, and have been recorded at 1000m. Sometimes this species aggregates near seamounts, and is also found on upper continental shelf. The sharpnosed sevengill shark feeds on pelagic fish and squids and crustaceans. It is an agile and voracious predator.

Environmental conditions

226 This species is wide-ranging in all tropical and temperate seas.

Protected species interactions

227 The sharpnosed sevengill shark has 'Near Threatened' Status on the IUCN Red list of threatened species (2006).

Stock assessments

228 There are no estimates of current or reference biomass, or sustainable yield, for this species.

Social, Economic, Cultural:

Commercial fishery characteristics, methods, catch information

229 Sharpnosed sevengill sharks are caught as a by-catch of targeted bottom trawl and longline fisheries. They have minor commercial value, and are possibly used as fish meal. The unwashed flesh is said to be mildly toxic.

230 Total reported landings since 1992 total only 2,346kg. However, there has been an increase in recent landings - from around 100-200kg in the 1995-2004 period to 1430 kg in 2005-06 fishing year. Furthermore, from a review of the raw landing data it would appear that the weight of fins is often wrongly declared as the greenweight. The potential result of this is that a significant part of

the catch - landing statistics are under reported by a factor of 30 (the conversion factor for greenweight to fins).

Recreational fishery characteristics, method, catch information

231 None known

Customary fishery characteristics, methods, catch information

232 None known

Existing management information

233 Apart from the requirement to report this species as a catch, there is very little other information available for this species.

Provisional catch history implications (Schedule 4C stocks)

234 Sharpnosed sevengill sharks are listed on schedule 4C of the Fisheries Act 1996. No landings of sharpnosed sevengill sharks are recorded in the qualifying period 1 October 1990 - 30 September 1992[7].

International obligations

235 None known

Treaty Settlement obligations

236 None known

References:

Ayling, T. (1982) Collins Guide to the Fishes of New Zealand

Compagno, L. (1984) FAO Species Catalogue 4 Sharks of the World

IUCN 2004. *2004 IUCN Red List of Threatened Species*. <www.iucnredlist.org>.

Stewart, A. (2002) At Sixes and Sevens with Four Cow Sharks Seafood New Zealand August 2002 10(7) 65-68. www.fishingmag.co.nz/surfcasting-sevengillers.htm

[7] Validation and Eligibility Catch Dataset Extraction Rules for Schedule 4C and 4D Stocks,' (FishServe 2005)

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.
Analysis: 237 Sharpnosed sevengill shark are not targeted by commercial fishers; they are a bycatch of a number of fishing methods including set netting, bottom trawl and bottom long lining. The choice of fishing gear can also influence the retention of sharks once caught (eg, the use of steel traces). The concern about sharks centres on misreported commercial catch figures. It appears that the weight of fins landed is often declared as the greenweight. The potential result of this is that part of the catch could be under reported by a factor of 30. 238 Introduction into the QMS would possibly go some way to clearing up the problem of misreporting. Under the QMS additional management controls could be included such as inclusion in schedule six (Stocks which may be Returned to the Sea or Other Waters), and a review of conversion factors. 239 The recreational fishery is controlled by a daily bag limit of one fish in FMAs 3, 4, 5 and 6. 240 Compared with other shark species the productivity of sharpnosed sevengill shark is low, therefore, the ability of the stock to replace sharks removed by fishing is limited. It would be a concern if sharpnosed sevengill sharks were to become a target fishery, hence, it is not anticipated that there is much room for development beyond a by-catch fishery.
Severity of impact (low, medium or high) : Medium Likelihood of impact (low, medium or high): Medium
Risk score (1-9) :4

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.
Analysis: 241 Since sharpnosed sevengill shark is a bycatch of existing target fisheries, the impact on the environment of retaining an open access regime or QMS introduction would remain the same. In the unlikely event that this species was targeted for finning, the continued use of existing fishing methods would mean no increase in fishing-related environmental impact. Since the sharpnosed sevengill shark is an apex predator, over-exploitation could lead to change in the local habitat interaction.
Severity of impact (low, medium or high) :Low Likelihood of impact (low, medium or high) :Medium
Risk score (1-9) :2

Generic objective 3: Risk to providing access that enables social, cultural and economic well being.
Analysis: 242 Reported commercial landings of sharpnosed sevengill sharks is very low - an average annual landing of approximately 170kg over the last 14 years- and is mostly discarded. This figure is thought to be under reported (as set out above). There is no significant recreational catch reported. Since the flesh of sharpnosed sevengill shark is reported to be mildly toxic, there is little commercial interest in utilising this species.
Severity of impact (low, medium or high) :Low Likelihood of impact (low, medium or high) :low
Risk score (1-9) :1

Objective(s) returning highest score: Objective 1

Risk based on severity/likelihood (low, medium, high):Medium

Immediacy of impact on objective returning highest score:
Analysis: 243 Sharpnosed sevengill sharks are caught in most FMAs as a result of bottom trawl, bottom long line and set net fishing activity. Due to poorly reporting as a specific catch, the reliability of the reported greenweight catch is very questionable. As most of the catch is discarded, it would make sense to allow the use of additional management tools under the QMS such as Sixth Schedule listing, which would mitigate the possible constraints on the target fisheries of the TAC. The effect of fishing on a population whose stock structure is unknown makes it difficult to speculate on the immediacy of any effect of commercial take on this species. However, it should be noted that it has a low productivity and is listed as 'Near Threatened' in the ICUN Red List of threatened species.
Immediacy value (low, medium or high) : Medium

Uncertainty of information used in analysis of objective returning highest score:
Analysis: 244 Review of the landing information shows an increase in recent landings - from around 100-200kg in the 1995-2004 period to 1430 kg in 2005-06 fishing year. Because reported catch is unreliable, fishing related impacts could already be affecting the population. Landing figures are speculative, at best, for example the 95% of reported catch for 2005-06 in FMA 3 came from the same vessel on two consecutive trips.
Uncertainty value (low, medium or high) : medium

Collation of additional management information:

Ease of implementation
Analysis: 245 The inclusion of this species into the QMS would be relatively easy. Specific measures that could be considered include: • Inclusion on the Third Schedule to the 1996 Act, as a species managed with an alternative Total allowable Catch, because of the biological characteristics of the species. Reporting problems associated with this fishery make setting the TAC difficult. Quantifying the known mistakes may require a more in-depth analysis of the available catch data. • Allowing the return of live sharpnosed sevengill shark to the water; • Review of conversion factor for sharpnosed sevengill shark; • Setting a deemed value for sharpnosed sevengill shark; and • Making consequential amendments to the reporting regulations.
Conclusion: The refined analysis of the catch data could make setting the TAC a little easier and transparent , this should be relatively simple to achieve.

Relationship with other QMS stocks or species
Analysis: 246 TAC setting needs to take into account the species is a by-catch of a variety of target fisheries. Due to quality issues, catch data will require further analysis to ensure that there is a suitable amount of TAC to cover this by-catch. Provisions to cover the recreational take should be made.
Conclusion: Need to ensure adequate provision for by-catch for the established target fishery operations and the associated fishing methods of which sharpnosed sevengill shark are a bycatch.

Deployment of MFish resources:
Analysis: 247 Generic work has been completed in relation to the NPOA (sharks). The preparation of an IPP and the finer analysis of the relevant catch data could be completed relatively easily. MFish may have to focus on the reporting requirements of this species should it be introduced to the QMS.
Conclusion: As it is already a reportable species, some resources will be required to ensure that fishers comply with reporting requirements.

Provisional catch history implications:
Analysis: 248 There are no PCH implications according to data obtained from the report titled 'Validation and Eligibility Catch Dataset Extraction Rules for Schedule 4C and 4D Stocks or species', Fish Serve, 2005.
Conclusion: Set TAC without PCH associated issues

Draft Risk Evaluation

249 Is risk after severity/likelihood analysis MEDIUM; and immediacy and/or uncertainty is MEDIUM or HIGH? Yes - stock is in GROUP 2

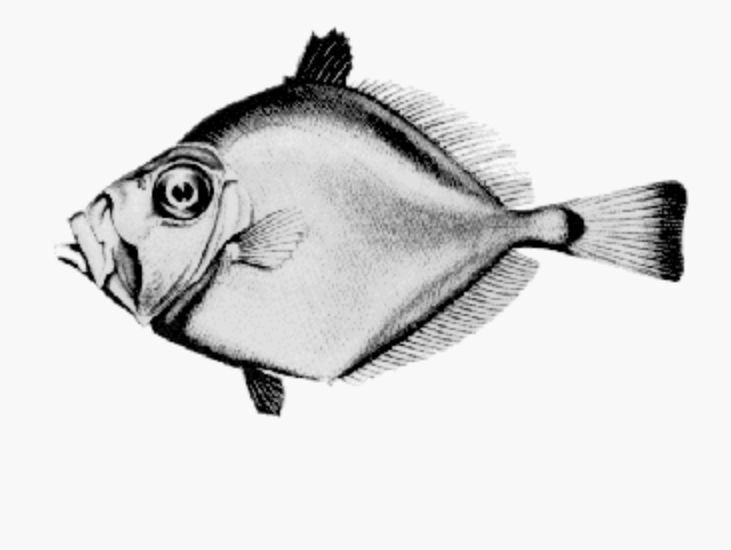
SILVER DORY

Species:	*Cyttus novaezealandiae*
Common Name:	Silver Dory
Species code:	SDO
Stock area:	1-10

Biological information:

Morphology, growth, reproduction and recruitment

250 The silver dory has the thin, deep body typical of the dories. The body is a uniform silver colour, the fins are pink, and the spiny dorsal and pelvic fin tips are black. Individuals attain an average of 20 to 30 cm in length but can reach a maximum of 40 cm. There is no information available on the reproduction or recruitment of this species.



Spatial and temporal distribution and key areas (feeding, spawning, migration)

251 Silver dory inhabits the New Zealand shelf and slope and is reported from water depths between 20 - 450 meters. Silver dory is taken as bycatch in all QMAs 1 - 9 and thus appears to be a widespread species.

252 There is no information available regarding feeding, spawning or migratory behaviour.

Habitat interactions

253 No information is available.

Associated species (bycatch and target)

254 Silver dory is taken as bycatch in a large number of QMS species target fisheries.

Environmental conditions

255 No information is available.

Protected species interactions

256 None known.

Stock Assessment

257 There are no estimates of current or reference biomass, or sustainable yield.

Social, Economic, Cultural

Commercial fishery characteristics, methods, catch information etc

258 Due to the widespread geographic distribution, silver dory is taken as bycatch in at least 30 target fisheries. For the fishing years 2001/02 – 2005/06 total EEZ reported catch of silver dory is 3736 tonnes. The following table summarises the total catch distribution by QMA for the fishing years 2001/02 – 2005/06.

QMA1	QMA2	QMA3	QMA4	QMA5	QMA6	QMA7	QMA8	QMA9	QMA10
116 t	28 t	360 t	79 t	1148 t	6 t	700 t	704 t	595 t	0 t

The total catch for each of the cited fishing years is shown in the following table.

2001/02	2002/03	2003/04	2004/05	2005/06
353 t	936 t	854 t	1034 t	559 t

259 Although over 30 target fisheries report SDO as bycatch, the JMA fishery reports by far the most SDO bycatch. Other fisheries reporting significant quantities of SDO bycatch are SQU, BAR, HOK. The SKI, SWA, TAR, and WWA fisheries report moderate bycatch amounts.

Recreational fishery characteristics, methods, catch information etc.

260 MFish has no information on recreational catch of silver dory.

Customary fishery characteristics, methods, catch information etc.

261 None known.

Management

Existing management information

262 None known

Provisional catch history implications (Schedule 4C stocks or species)

263 SDO is a Schedule 4D stock

International obligations

264 Nothing specific.

Treaty settlement obligations

265 None known.

References:

1. www.fishbase.org

Severity/likelihood risk analysis:

Generic objective 1: Risk to maintaining the potential of the stock to meet the reasonably foreseeable needs of future generations.

Analysis:

266 Silver dory is taken as bycatch of established trawl fisheries that target numerous mid- and deep-water QMS species. Due to the nature of catch-reporting obligations for non-QMS species, unless the bycatch species is estimated to be among the 5 most abundant species taken in a given trawl, catches do not have to be reported. The silver dory catch data therefore are, at best, only indicative of annual catch and of year-to-year catch variability. Conclusions regarding risk drawn from such data are therefore likely to be highly uncertain.

267 Reported catch data for the fishing years 2001/02 – 2005/06 indicate that approximately 353 – 1034 tonnes of capro dory bycatch are taken each year by those fishers who reported the species as shown in the following table.

2001/02	2002/03	2003/04	2004/05	2005/06
353 tonnes	936 tonnes	854 tonnes	1034 tonnes	559 tonnes

268 Reported catches vary markedly over the five fishing years and it is uncertain what led to the large decrease in catch from 1034 tonnes in 2004/05 to 550 tonnes in 2005/06. Because silver dory is taken as bycatch in at least 30 fisheries that target QMS species, the decline might reflect overall decreased effort in associated target fisheries, natural annual variation in silver dory stocks, change in fishing grounds of associated species that take the majority of silver dory bycatch, or a fishing-related cause that affects silver dory stock abundance.

269 Given the highly variable reported catch, the level of risk to silver dory stocks is difficult to assess. MFish should monitor silver dory catch data and reconsider management interventions if reported catches continue to decline in the following one or two fishing years and/or if TACCs of associated target QMS species are adjusted to higher levels

Severity of impact (low, medium or high) : Low?

Likelihood of impact (low, medium or high) : Low

Risk score (1-9) : 2

Generic objective 2: Risk to avoiding, remedying or mitigating any adverse effects of fishing on the aquatic environment.

Analysis:

270 The risk of adverse effects on the aquatic environment from catch of silver dory under an open access management regime is low due to the fact that there is no target fishery for the species. Some catches of silver dory are taken by bottom trawl but only as a consequence of a target fishery for QMS species.

271 Nothing is known of the habitat interactions or of the marine ecosystem role of silver dory but due to their widespread habitat, they must certainly have some function in the marine ecosystem.

Severity of impact (low, medium or high) : Low

Likelihood of impact (low, medium or high) : Low

Risk score (1-9) : 1

Generic objective 3: Risk to providing access that enables social, cultural and economic wellbeing.

Analysis:

272 Silver dory are not targeted by commercial fisheries and have no present commercial value to fishers with the possible exception for use in fishmeal plants by those vessels so equipped.

273 There is no known recreational or customary take of silver dory. There are no specific international obligations or Treaty settlement obligations known for silver dory.

274 Silver dory, however, have intrinsic value and contribute to biodiversity and sustainability of marine ecosystems.

Severity of impact (low, medium or high) : Low

Likelihood of impact (low, medium or high) : Low

Risk score (1-9) : 1

Objective(s) returning highest score: None

Risk based on severity/likelihood (low, medium, high): Low

ANNEX 1. QMS INTRODUCTION PROCESS STANDARD