



NSW Strategy to assist with the rebuilding of Harrisson's and Southern dogfish populations

October 2012

(See also the Addendum to this Strategy prepared in February 2013)



Introduction

Both Harrison's and Southern dogfish (*Centrophorus harrissoni* and *C. zeehani* respectively) have been nominated for listing under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). These species have experienced high levels of depletion in most of their core range area, which includes NSW coastal waters of between about 200 to 1000m in depth. Much of the depletion was caused over several decades by the Commonwealth Trawl Sector where the majority of trawl activity was within the core depth ranges of these species. Studies by the CSIRO suggest that most of the remnant populations are now found on the seamounts off the NSW coast, and in NSW-managed waters between Wollongong and Port Macquarie. Also, the life history characteristics of these species (and most other deepwater sharks) such as the extended time to reach sexual maturity and low reproductive rates, will make recovery a slow process.

It is possible that both species will be listed as threatened species in the 'conservation dependent' category. This category provides for fishing operations to continue as long as a plan of management exists that stops the decline of, and supports the recovery of, the species. This Strategy is aimed at ensuring the rebuilding of both species to at least 25% of their unfished biomass, giving a greater chance for them to be listed in the 'conservation dependent' category rather than in the higher threatened species categories. Current scientific projections show that recovery of stocks to this level is expected to take about 86 years for Harrison's dogfish and 62 years for Southern dogfish.

Both NSW and the relevant Commonwealth agencies (primarily the Australian Fisheries Management Authority (AFMA)) must work together to reduce the risk posed by each jurisdiction's fisheries on these sharks. This Strategy applies only to areas and methods under NSW jurisdiction.

The CSIRO reviewed all known and available datasets and scientific literature that included information on dogfish. Much of the fishery-independent information was gained from the Kapala research surveys done by Fisheries NSW in the mid-late 1970s and again in the late 1990s. This information, as well as catch and effort information supplied to CSIRO by Fisheries NSW from commercial fisheries logbooks, was used to estimate depletion levels.

For Harrison's dogfish, the depletion estimate for the entire east coast population is that about 10% of the unfished biomass remains. As previously stated, most of the depletion has occurred in waters south of Barrenjoey Headland due to the Commonwealth trawl fishery. The depletion estimate for this south-east area is that only 6% of the unfished biomass remains. In contrast, the depletion estimates for the area north of Barrenjoey (waters solely under the jurisdiction of NSW) are around 30% of the unfished biomass.

For Southern dogfish, the depletion estimate for the entire eastern population is about 10% of the unfished biomass remaining, with the greatest level of depletion occurring south of the NSW/VIC border. Like for Harrison's dogfish, the area north of Barrenjoey Headland indicates that there has been less depletion (estimated level around 30%) than elsewhere for this population.

While the management arrangements imposed in both NSW and Commonwealth managed waters in recent years have slowed the decline of these species, further action to reduce interactions and assist with their rebuilding was recommended by an independent review of the Commonwealth's Draft Upper Slope Dogfish Management Strategy done in June 2011. Therefore, to assist with the rebuilding of Harrison's and Southern dogfish populations, it is necessary to reduce: (i) the mortality of inadvertently captured dogfish, and (ii) the likelihood of interactions.

In order to assist with the rebuilding of Harrison's and Southern dogfish populations, Fisheries NSW has developed a strategy to reduce interactions with, and associated mortality of, the capture of these shark species. This Strategy provides details on the specific measures NSW will implement to reduce the risk of fishing methods under its jurisdiction to these species.

Fisheries NSW undertook a risk assessment of all ocean-based fishing methods (commercial and recreational) and their potential impacts on each of the 26 species of deepwater sharks that are present in waters off NSW. The results of the risk assessment show that, for most methods, there is a low potential impact on most species. The results for the two species under current consideration are as follows:

- Harrison's dogfish – at high risk from dropline and bottom setline/trotline fishing, at medium risk from handline and royal red prawn trawl fishing, and at low or no risk from all other methods.
- Southern dogfish – at high risk from dropline and bottom setline/trotline fishing, at medium risk from handline fishing, and at low or no risk from all other methods.

Accordingly, this Strategy focuses on the high and medium risk methods known to (or with the greatest potential to) capture dogfish, as well as addressing methods that could interact with them. For example, fish trawling in NSW waters was assessed as low risk because it only occurs along a small percentage of the State managed fishery and less commonly in the core depth ranges of dogfish. However, on the occasions when interactions do occur, mortality is highly likely and is something the Strategy aims to avoid.

The Strategy restricts activities that may interact with only one population for each species. For Harrison's dogfish, this is the Harrison's dogfish (margin) population, and for Southern dogfish, it is the Southern dogfish (eastern) population. For the purpose of this Strategy, the terms "Harrison's dogfish" and "Southern dogfish" are specific to these populations.

When reading this Strategy, please note that NSW has jurisdiction over all commercial line fishing methods in waters along the entire NSW coastline and out to the 4000 m isobath. In the 200–1000 m depth range that these species occur, NSW has jurisdiction over trawl fisheries north of Barrenjoey Headland only. Hereafter the collective term 'trawling' is used to refer to both fish and prawn trawling. Fish trawling only occurs as far north as Smoky Cape (South West Rocks), whereas prawn trawling occurs to the Queensland border. NSW also has jurisdiction for recreational and charter boat fishing activities in waters off NSW.

The Strategy aims to be as complementary as possible with the Commonwealth Upper-Slope Dogfish Management Strategy. The only area under consideration for providing additional protection to Harrison's and Southern dogfish where both jurisdictions have overlapping management responsibilities is the area of the current Endeavour dogfish closure off Sydney. Fisheries NSW needs only to manage the impacts of line fishing in this area as all other fishing methods under the jurisdiction of NSW do not interact with these species.

The details of the Strategy have been developed in consultation with the commercial fishing industry and peak recreational and charter fishing advisory bodies. The outcome of rebuilding Harrison's and Southern dogfish populations have been at the forefront of those discussions.

Strategy

The Strategy is comprised of two elements. The first outlines a suite of measures that will apply to all recreational, charter and commercial fishing methods and in all waters under NSW jurisdiction, irrespective of depth area. The second is focused on some of the more important areas for these species, and proposes restrictions to certain commercial fishing methods based on a combination of depth and area.

Additionally, the CSIRO estimated the levels of depletion that have occurred for Harrison's and Southern dogfish. Due to the likely overestimation of cumulative historical NSW fishing effort levels, the CSIRO has acknowledged that the relative depletion of each species in waters solely under the jurisdiction of NSW are likely to be towards the upper part of the estimate range. For Harrison's dogfish the upper limit is 0.32. For Southern dogfish, the upper limit is 0.3. Therefore, the Strategy is likely to further improve those estimates.

Furthermore, in this Strategy any restrictions to fishing in the proposed Commonwealth Marine Reserve (CMR) network were developed with industry for the purposes of rebuilding Harrison's and Southern dogfish. Any additional restrictions to fishing in CMRs must be developed by the Commonwealth Department of Sustainability, Environment, Water, Populations and Communities. The overall management strategy for ensuring that each species reaches its targeted point of recovery is partly reliant on the CMRs to provide adequate protection to, and enable rebuilding of, the populations of Harrison's and Southern dogfish, as part of the overall strategy for protecting biodiversity in Australia's ocean waters.

All waters under NSW jurisdiction

The following restrictions will apply to all NSW waters:

- Prohibit the landing (for sale) of Harrison's and Southern dogfish by commercial fishers. However, commercial fishers will be able to land the species for scientific/identification purposes as, and when, authorised by Fisheries NSW. In other words, those species will effectively become a protected species with a 0 kg trip limit.
- Prohibit the landing of deepwater shark species, including Harrison's and Southern dogfish, by recreational and charter boat fishers. In other words, those species will effectively become a protected species with a 0 kg trip limit.
- Development and extension of an education kit to assist commercial fishers with identification issues, handling methods to maximise post release survival and to increase reporting accuracy. This extension program is expected to be highly beneficial for the small number of commercial fishers who access the deeper waters where these sharks reside, and to provide a marked improvement in identification capabilities. This will facilitate the correct identification of other deepwater shark species so they can be landed as lawful catch while allowing Harrison's and Southern dogfish to be released with good prospects for survival.

Handlining (in both commercial and recreational fisheries) has been assessed as being a medium risk to Harrison's and Southern dogfish as it can occur in the core depth ranges and along the distributional range of those species. The above measures aim to reduce the mortality risk of this method by prohibiting the landing of both species in the commercial fisheries and undertaking an education campaign to ensure that they are unhooked carefully and released back into the ocean as soon as possible. For the recreational fishery, the above measures will reduce the mortality risk of this method by prohibiting the landing of all deepwater sharks. Fisheries NSW already undertakes a continuous extension campaign to promote catch-and-release fishing and best practice handling techniques in the recreational sector for releasing fish to maximise their survival. Specific guidelines for dogfish will be incorporated into this campaign. Similarly, these best practice techniques can be provided to commercial fishers during the identification program.

Furthermore, only circle hooks are able to be used on set line commercial fishing methods. Circle hooks are known to provide a higher incidence of mouth hooking in many species which may increase the likelihood of post release survival of both Harrison's and Southern dogfish. Also, auto-dehookers are not used by NSW fishers.

Additional protection measures in restricted areas

The “restricted areas” in the Strategy cover the depth range in NSW managed waters of 200–1000 m on the continental slope unless otherwise stated. Refer to Figure 1 for an indication of where restrictions will apply.

Commercial line fishing restricted area – between the southern boundary of the extended Endeavour dogfish closure and the northern boundary of the Five Canyons habitat segment.

Action within the restricted area:

- Prohibit the methods of bottom setlining/trotlining (high risk methods)
- Prohibit commercial droplining (high risk method) other than:
 - attended lines with a single weight, and
 - ≤20 hooks per line, and
 - ≤20 min soak time per line, and
 - the use of best practice handling techniques to increase post-release survival, and
 - observer coverage.

Bottom setlining/trotlining is already prohibited within the existing Endeavour dogfish closure implemented by Fisheries NSW in April 2011. To further protect Harrison’s and Southern dogfish in this area, the depth ranges have been extended to cover the core depth range. The area of this closure will be extended southward to complement the extension proposed by AFMA and both jurisdictions will continue to prohibit/restrict commercial fishing operations in that area up to Barrenjoey Headland. North of Barrenjoey Headland, the restrictions outlined above will only apply to NSW fishers.

The commercial droplining fishing method described above falls into the category of ‘minor line’ fishing. Work done by the CSIRO indicates that this type of fishing has minimal interactions with gulper sharks and that if gulper sharks are caught, the limited soak times and small number of hooks (resulting in the sharks being released more quickly) means that survival is likely to be high.

Trawl fishing restricted areas – no trawling within the Five Canyons habitat segment and a mixture of trawl closures along the coast from Barrenjoey Headland to the Queensland border. Note that fish trawling is not permitted north of Smoky Cape (South West Rocks).

Action within the restricted area:

- Prohibit fish and prawn trawl fishing in areas where depths span the species’ core depth range (250 – 1000 m) to areas where only partial depth ranges are protected from trawling (650 – 1000 m or 850 – 1000 m) (Figure 1).

It is acknowledged that the majority of the area to be closed to trawl fishing does not cover the entire depth range for Harrison’s and Southern dogfish. Relatively little trawl fishing (fish or prawns) occurs in the core depth ranges yet the deeper areas that remain open to trawl fishing provide for significant commercial fishing opportunities when weather and oceanographic conditions are suitable. Additionally, the remaining open areas are not all trawlable grounds so the impact on the two gulper shark species is limited as indicated by the depletion estimates in waters solely under NSW jurisdiction (closer to 0.3 for each species).

In addition to the above, trawl fishers who still access the deeper waters (out to 850 m) will be required to carry on-board observers when requested. Observers will monitor the level of interaction with Harrison’s and Southern dogfish. If these interactions are assessed as being contrary to the aims of rebuilding these species, Fisheries NSW will work with industry to develop bycatch reduction devices to exclude these sharks from the catch, or other alternatives. Royal red prawn trawling was assessed as a medium risk method to Harrison’s dogfish. This is due to the proportion of NSW waters that this activity can operate within and that it occurs in the deeper parts of the Harrison’s dogfish core depth range. However, there has been limited targeting of royal red prawns in recent years and the restricted area actions, observer coverage, and additional actions (if needed) will further reduce the risk of this method on Harrison’s dogfish.

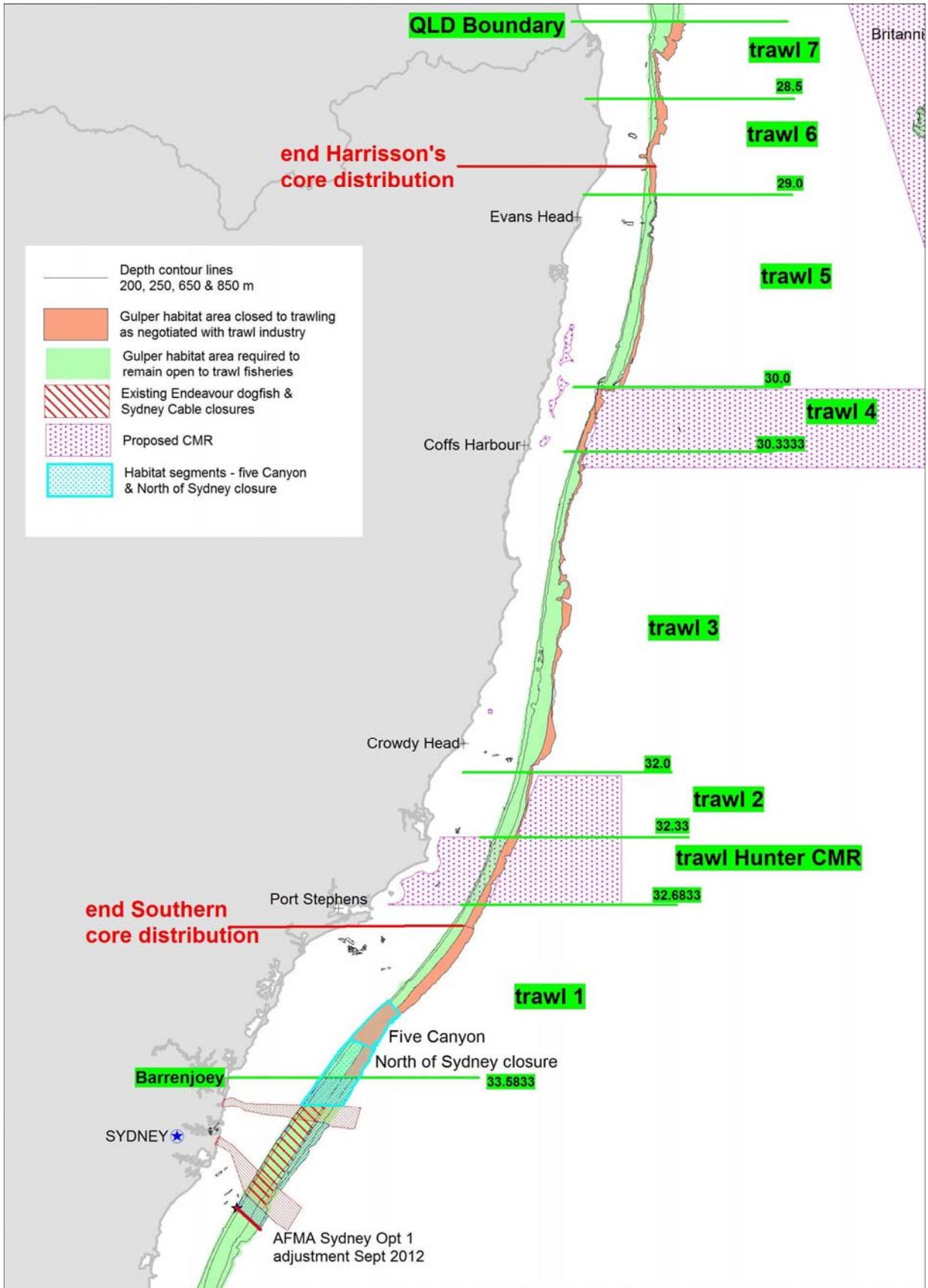


Figure 1 – Indication of areas to be closed under the Strategy. ‘Trawl’ headings relate to closures in Table 1. Restrictions to commercial line fishing methods are from the extended Endeavour dogfish closure (labelled AFMA Sydney Opt 1) to the northern border of the Five Canyons habitat segment. CMR = Commonwealth Marine Reserve.

Assessment of protection measures in restricted areas

Table 1 provides an assessment of the estimated percentages of current biomass, carrying capacity and area of Harrison's and Southern dogfish (by population) that will be afforded protection by the restricted area measures outlined above. It does not assess the restrictions that will be implemented for all waters under NSW jurisdiction (e.g. zero take of these species in the commercial fisheries (for sale) or the recreational fishery), or improved survivability with better handling techniques. Thus, the assessment should be viewed as a minimum level of protection afforded to these species under the Strategy.

As mentioned, this assessment indicates NSW's contribution to the rebuilding of each stock. Naturally, if assessed by jurisdiction, the contribution by NSW will be significantly higher given that NSW has approximately 31.4% of the Harrison's (margin) population and 11.1% of Southern (eastern) population entirely under its jurisdiction. Note that the extended Endeavour dogfish closure has been included in this Strategy, in addition to it being in AFMA's Upper-Slope Dogfish Management Strategy, as protection measures in this area also need to be implemented by Fisheries NSW.

While total percentages are provided in Table 1, the figures are not representative of complete closures to all methods, as indicated. Closures to both high risk line fishing methods and to trawling are in the Extended Endeavour dogfish closure and the Five Canyons segment. It is therefore difficult to assess the exact numerical contribution provided by this Strategy to the rebuilding of Harrison's and Southern dogfish populations. However, Fisheries NSW believes that assessing the characteristics of current biomass, carrying capacity and area together provides the best interpretation of closure effectiveness.

From Table 1 it is evident that much of the estimated current biomass of Harrison's and Southern dogfish will be protected by the Strategy. Fisheries NSW believes that protecting the existing sharks provides the best avenue for rebuilding. Table 1 also indicates that the closure areas also provide sufficient area for rebuilding (carrying capacity estimates). While it would be advantageous to close all areas with a potentially high carrying capacity, it is not practical to do so given that there may be no sharks in that area to assist with rebuilding. Also, the underlying data used to estimate carrying capacity is from the *RV Kapala* surveys. The most recent survey was completed 15 years ago and the pre-fishing survey, the basis for estimated carrying capacity, was completed over 30 years ago. There is no guarantee that the estimated carrying capacity is still available since regime shifts have likely occurred during this time and other species may have taken up this niche. The percentages of area to be closed is provided as a guide as to how the Strategy would have compared under the initial habitat proxy proposal to close 25% of core habitat to reach the limit reference point of rebuilding the populations to 25% of their unfished biomass.

While the Trawl 7 closure has been assessed as providing no real value to the rebuilding strategy due to this area being outside the assessed core distributional range for Harrison's dogfish, Fisheries NSW still believes that this area does provide a benefit to the stock. There is no evidence on the level of stock segregation either between the margin and seamount populations or among the seamounts. Advice has been provided that, as a precautionary measure, the eastern Australia population should be assessed as two separate populations: the continental margin population and the seamount population. However, this advice assumes that Harrison's dogfish can swim between seamounts. If this is indeed the case, then it is possible for them to swim from some of the seamounts to the continental margin habitat at this part of the coastline.

Table 1 – Estimated percentages of current biomass, carrying capacity and area of Harrison’s and Southern dogfish by population that will be afforded protection by the Additional protection measures. See Figure 1 for location of trawl-specific area closures and habitat segments. N/A indicates that closure is outside the species’ core distribution range. Note that C’wealth Auto-longlining is not permitted in NSW waters.

Closure	Harrison’s (margin)			Southern (eastern)			Level of closure
	Current biomass	Carrying capacity	Area	Current biomass	Carrying capacity	Area	
Extended Endeavour dogfish closure	10.8	11.2	8.6	41.4	11.3	14.1	Completely closed to all high risk methods e.g. C’wealth trawl, NSW bottom setlining and droplining
North of Sydney segment	4.1	2.3	1.8	4.2	2.3	2.9	Closed to NSW bottom setlining and droplining
Five Canyons segment	3.6	2.0	1.5	3.6	2.0	2.5	Completely closed to all high risk methods e.g. bottom setlining and droplining
Trawl 1 incl Hunter CMR	7.8	4.8	4.0	6.3	3.5	4.4	Closed to trawling in waters deeper than 650 m to 1000 m
Trawl 2	0.2	0.1	0.1	N/A	N/A	N/A	Closed to trawling in waters deeper than 850 m to 1000 m
Trawl 3	2.3	1.8	2.0	N/A	N/A	N/A	Closed to trawling in waters deeper than 650 m to 1000 m
Trawl 4	0.4	0.5	0.8	N/A	N/A	N/A	Closed to trawling in waters between 260 m to 1000 m i.e. core depth range
Trawl 5	0.4	0.5	0.8	N/A	N/A	N/A	Closed to trawling in waters deeper than 850 m to 1000 m
Trawl 6	0.2	0.2	0.3	N/A	N/A	N/A	Closed to trawling in waters deeper than 250 m to 1000 m i.e. almost entire depth range
Trawl 7	N/A	N/A	N/A	N/A	N/A	N/A	Closed to trawling in waters deeper than 650 m to 1000 m
Proposed Hunter CMR (additional to above NSW trawl closure in that area)	2.0	1.5	1.5	N/A	N/A	N/A	Limited effectiveness under CMR proposal
Proposed Clarence CMR	Covered by Trawl 4	Covered by Trawl 4	Covered by Trawl 4	Covered by Trawl 4	Covered by Trawl 4	Covered by Trawl 4	Limited effectiveness under CMR proposal but covered by Trawl 4 closure
Totals (excl CMRs)	29.8%	23.4%	19.9%	55.5%	19.1%	23.9%	

Implementation

The required legislative instruments to enable the arrangements within this Strategy to take effect will be implemented, to commence by 28 February 2013. An education kit will be produced and extension program commenced as a priority.

Monitoring

Fisheries NSW and stakeholders are keen to participate in the development and on-ground monitoring of Harrison's and Southern dogfish populations in waters off NSW. Fisheries NSW will continue to liaise with the appropriate Commonwealth departments in this regard.