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Identification accuracy of six species of deepsea sharks sampled at sea by MPI observers, October 2016 to December 2017.

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The accuracy of at-sea identification of six species of deepsea sharks by MPI observers was determined by NIWA using photographs taken at the time of sampling. DNA barcoding analysis was also used to identify specimens that lacked photographs, using muscle tissues taken by the observers from each shark specimen. The six species sampled in the study were:

- Seal shark *Dalatias licha*, BSH
- Leafscale gulper shark *Centrophorus squamosus*, CSQ
- Owston's dogfish *Centroscymnus owstonii*, CYO
- Longnose velvet dogfish *Centroselachus crepidater*, CYP
- Baxter's lantern dogfish *Etmopterus granulosus*, ETB
- Plunket's shark *Proscymnodon plunketi*, PLS

Observers were requested to sample up to 15 specimens of each species per trip to ensure that sampling was spread over different observers, fisheries and times of year. Sampling started in about October 2016 with a target total sample size of about 100 specimens per species and finished in December 2017.

NIWA identifications were made for 263 specimens using good quality images from observers. DNA barcoding analysis was used successfully for 68 specimens where photographs were missing. Analyses were made to examine the probability that observers correctly identified each shark species. Key results were:

- Sampling coverage: 17 observers, 19 trips, but 3 observers on 5 trips provided almost half of the total samples.
- Total observer identifications: 331
- Total correct identifications (determined by NIWA): 302 (91%) of samples
- Misidentifications: 29 (9%) samples, but 15 (5%) came from a single observer trip which sampled 17 sharks.

	BSH	CSQ	CYO	CYP	ETB	PLS	Total	Proportion (%)
Observer id.	66	68	20	55	74	48	331	100
NIWA id.	53	64	18	53	72	42	302	91
Misidentified	13	4	2	2	2	6	29	9
Probability of correct observer id. (%)	80	94	90	96	97	88	–	–

1. INTRODUCTION

This report fulfils part of the reporting requirements for Objective 1 of Project ENV2015-03, "Addressing Key Information Gaps Identified by the Shark Qualitative Risk Assessment", funded by the Ministry for Primary Industries. The objectives were:

1. To collect and analyse biological information to improve estimates of risk for inshore and deepwater shark species identified as being at relatively high risk.
2. To improve observer identification of deepwater sharks.

This project aimed to confirm the accuracy of observer identification of some of these species, and if the benefits were considered worthwhile, put in place mechanisms to improve identification. Observers are tasked with recording the catch composition and weights of fish species taken during commercial fishing operations to a higher level of detail than is required by vessel staff for statutory catch and effort recording. Several deepsea sharks are considered vulnerable to exploitation because of their low reproductive rate and low relative abundance, and there is uncertainty about the accuracy of their identification by observers. Six relatively abundant shark species were sampled for this study (Figure 1):

- Seal shark (*Dalatias licha*), BSH
- Leafscale gulper shark (*Centrophorus squamosus*), CSQ
- Longnose velvet dogfish (*Centroselachus crepidater*), CYP
- Baxter's lantern dogfish (*Etmopterus granulosus*), ETB
- Owston's dogfish (*Centroscymnus owstonii*), CYO
- Plunket's shark (*Proscymnodon plunketi*), PLS

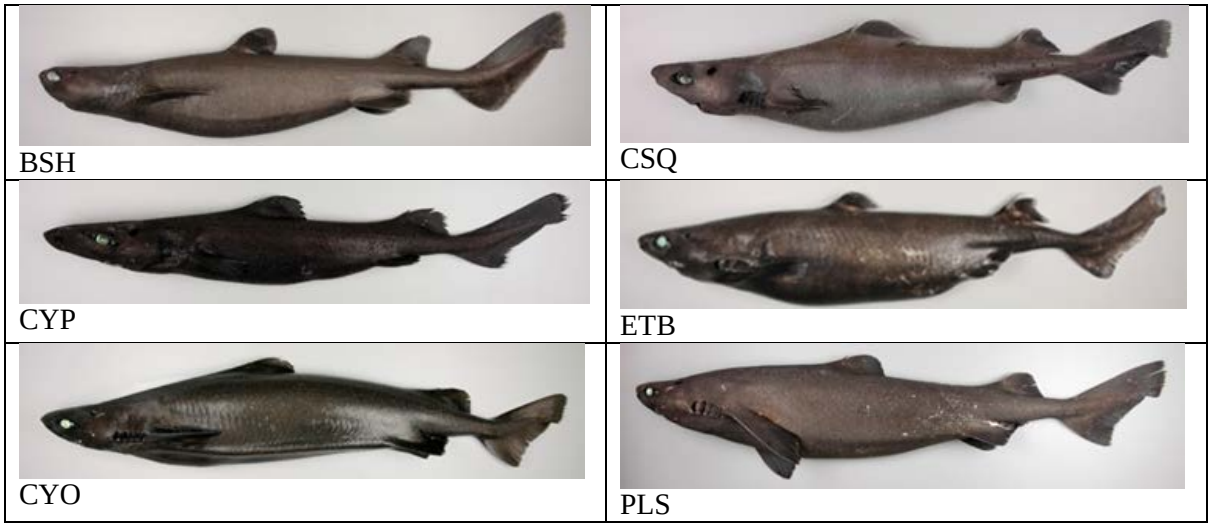

Figure 1: Six shark species sampled by MPI observers (NIWA file images). Seal shark (BSH), leafscale gulper shark (CSQ), longnose velvet dogfish (CYP), Baxter's lantern dogfish (ETB), Owston's dogfish (CYO), Plunket's shark (PLS).

These shark species are similar in overall appearance, i.e., dark colouration, two dorsal fins, no anal fin, and relatively small size with maximum lengths less than 200 cm total length (TL), but often less than 100 cm. Seal shark differs from the other five shark species in lacking fin spines at the anterior of both first and second dorsal fins. Baxter's dogfish has distinctive, large, curved dorsal fin spines. Longnose velvet dogfish has an elongated snout while the others have a short snout. Owston's dogfish has a strong

ridge on the lower belly from below the pectoral fin to the pelvic fin, and small skin denticles (smooth skin) but is easily confused with velvet dogfish, *Zameus squamulosus* (not sampled), which has a weak belly ridge and small skin denticles (skin like fine sandpaper), and Portuguese dogfish, *Centroscymnus coelolepis*, (not sampled) which has a weak belly ridge and large, flat, spade-like skin denticles (visually obvious). Leafscale gulper shark is dark greyish when small but larger fish are pale brownish and all sizes have the top of the eye covered with soft skin (with denticles). Leafscale gulper shark is easily confused with Plunket's shark, but the latter is dark greyish-black at all sizes (darker at large size), and lacks the soft skin covered top of the eye.

2. METHODS

Observer identifications were determined by NIWA using a combination of photographs and DNA barcoding analysis of muscle tissue samples that had been collected for a subset of specimens by the observers. Before sampling started it was proposed to carry out DNA barcode analysis for 10 randomly selected samples from each species to check on the NIWA photographic identification. But towards the end of sampling it became clear that the original plan needed to be modified for two reasons. Firstly, there were relatively large numbers of samples/specimens missing observer photographs, which was not expected. Secondly, the good quality of observer photographs meant that specimens of the six target shark species could be identified from photographs with a much higher degree of confidence than expected. A modified plan was agreed with MPI to enable the (limited) DNA barcode resources to be preferentially used to identify the specimens with missing photographs. This change enabled specimens with missing photographs to be identified by DNA barcoding and increased the sample sizes.
Estimates and CVs of the mean successful observer identification rate were made for each species using the final identification results from photographs and DNA barcoding.

2.1 Sampling design

The sampling regime aimed for a coefficient of variation (CV) for a mean identification error rate of about 30%, and it was estimated that an initial total sample size of up to about 100 specimens per species would be required to achieve this. Sample sizes of 100 fish were expected to be difficult to achieve for the less abundant species (e.g., seal shark, Plunket's shark) so samples were compiled over time to maximise numbers, with plans to extend the sampling for selected species if required. Sampling was ideally to be spread over at least three observers, over different tows, over different fisheries, to cover the full range of variation in identification accuracy. The timing and frequency of sampling was uncertain because of the relatively unpredictable nature of observer coverage, i.e., observers are placed on vessels at short notice, and are required to perform multiple tasks during any trip.

2.2 Observer sampling

A request to collect samples was sent to the Ministry's Observer Programme in August 2016. These shark species are captured by deepwater trawlers so we suggested an initial focus on those vessels, possibly extending the sampling to other fisheries later, e.g., bottom long-line.
For the six species listed above, observers were requested to:
1. Identify each specimen using the usual procedures and record the trip, station number, observer's name, specimen number, species, length, weight, and sex.

2. Take photographs of each specimen including the whole fish (lateral), a close-up lateral of the head, and a close-up of the underside of the head. Images were labelled with the observer's identification.
3. Take a small sample of muscle, label and freeze for DNA barcoding.
4. Pass images, frozen tissue samples, specimen identification, and trip data to NIWA at the end of the observer trip.

This procedure allowed estimates of 'false positives' to be made, i.e., where other species were incorrectly identified as one of the six species of interest. 'False negatives', i.e., where a specimen was incorrectly identified as a species outside of the six of interest, for example another species in the same genus, were not detected by this design. To do so would require photographing and tissue-sampling other species of sharks, including, for example Portuguese dogfish, velvet dogfish, shovelnose dogfish (*Deania calcea*), and lucifer dogfish (*Etmopterus lucifer*).

Sampling was extended, at the request of MPI, from the scheduled project end date (September 2017) until December 2017 because by June 2017 some species still had low sample numbers, i.e., longnose velvet dogfish (16), Owston's dogfish (5), and Plunket's shark (28).

2.3 Confirmation of observer identification from observer photographs

The observer photographs were examined to determine identification. In most cases the photographs were of good quality and enabled ready identification. Example photographs are provided in Appendix 1. Photographs were missing for 68 specimens and instead the muscle tissue was used for DNA barcoding identification.

2.4 Confirmation of observer identification from DNA barcoding

For some sharks, tissue samples were collected but no photographs were received, so identification was carried out with DNA barcoding using the muscle tissue sample. DNA was extracted using a DNeasy Blood and Tissue Extraction kit (Qiagen, Hilden, Germany) according to the manufacturers' instructions, and diluted 1:100 for subsequent polymerase chain reaction (PCR) analysis. A portion of the cytochrome oxidase gene (COI) was amplified using published primers FishF2 and FishR1 (Ward et al., 2005, cited in Vérissimo et al. 2014), using 3µl of diluted DNA as the template and annealing at 55°C. Products were assessed by electrophoresis on a 1% agarose gel to check for successful amplification, cleaned using ExoSAP-IT reagent (USB, Cleveland, Ohio, USA) and sequenced at Macrogen Inc., Seoul, Korea.

Electropherograms were examined and trimmed using Geneious 10.2.3. (Biomatters, Auckland), and were compared with existing sequences in GenBank using BLAST (Altschul et al., 1990, implemented at https://blast.ncbi.nlm.nih.gov/Blast.cgi). Sequences were regarded as successfully identified if they matched existing sequences attributed to the target species at greater than 99.5% homology.

The method was successfully tested using seven Plunket's shark (PLS) samples collected from three stations during a research trawl survey of west coast South Island in July 2016 (trip TAN1609). All tissue samples received from the four observer trips where no photographs were received were analysed to provide NIWA DNA barcoding identifications (n = 68). Three samples identified by one observer as

seal shark (BSH) on one trip, but identified by NIWA using the photographs as Portuguese dogfish (*Centroscymnus coelolepis*, CYL), were also analysed to confirm the NIWA identification.

2.5 Analytical methods

The probability of successful identification by MPI observers for all six shark species was calculated. The relative experience of each observer was also considered, using the number of days at sea for each observer as a relative index of experience, with the expectation that experienced observers would have a higher probability of successful identification. The target fisheries covered by the observer sampling were also tabulated.

3. RESULTS

3.1 Observer photograph samples

A list of the observer photographs received by NIWA, and a comparison of the observer and NIWA identifications from photographs only, are given in Appendix 2. The main findings were:

- 263 observer photographs were received from 19 trips
- 68 specimens did not have photographs
- no photographs were received from four trips, and 16 photographs (57 specimens sampled) were missing from a fifth trip
- 240 of the observer identifications were confirmed by NIWA for the six shark species of interest
- 23 of the observer samples were misidentified by observers, as follows: 13 BSH (NIWA: 9 CYL, 3 CYO, 1 PLS), 4 CSQ (NIWA: 4 PLS), 1 CYP (NIWA: 1 ETB), 2 ETB (NIWA: 2 CYP), 3 PLS (NIWA: 2 CSQ, 1 CYL)

3.2 Observer tissue samples and DNA barcoding analysis

A list of the tissue samples received from observers for all trips, the tissues used for DNA barcoding analysis, and the DNA barcoding results are provided in Appendix 3. The main findings were:

- 310 tissue samples were received (one per specimen) from 19 trips
- 68 tissue samples were successfully used to provide DNA barcoding identification
- Barcoding results showed 6 misidentifications, including: 2 CYO (2 CYL), 1 CYP (1 SND, shovelnose dogfish, *Deania calcea*), 3 PLS (3 BSH).
- 3 additional tissue samples from specimens identified by NIWA (from observer photographs) as Portuguese dogfish (CYL), were successfully used to confirm the NIWA identifications.

3.3 Combined photograph and DNA barcoding identification

All identification results are summarised in Table 1. Main findings:

- 331 samples identified by observers
- 302 (91%) of the identifications of the six target species (BSH, CSQ, CYO, CYP, ETB, PLS) were confirmed to be correct by NIWA
- 29 (9%) of observer samples were misidentified, with 15 (5%) from one trip
- Misidentified samples included 16 of the six target species and 13 of two other shark species

Table 1: Samples of sharks identified by observers at sea, and identified by NIWA using the observer photographs and DNA barcoding. BSH seal shark, CSQ leafscale gulper shark, CYL Portuguese dogfish, CYO Owston's dogfish, CYP longnose velvet dogfish, ETB Baxter's lantern dogfish, PLS Plunket's shark, SND shovelnose dogfish. –, no data.

	Target species							Other shark species		
	BSH	CSQ	CYO	CYP	ETB	PLS	Total	CYL	SND	Total
Observer photo identification	66	65	6	36	58	32	263	–	–	–
Correct photo identification	53	61	6	35	56	29	240	10	–	10
Misidentification - photographs	13	4	0	1	2	3	23	–	–	–
Observer tissue for DNA barcoding	0	3	14	19	16	16	68	–	–	–
Correct DNA identification	0	3	12	18	16	13	62	2	1	3
Misidentification - DNA barcoding	0	0	2	1	0	3	6	–	–	–
Total misidentification	13	4	2	2	2	6	29	–	–	–
Total observer identification	66	68	20	55	74	48	331	–	–	–
Total correct identification	53	64	18	53	72	42	302	12	1	13

A comparison of the samples identified by observers and by NIWA is presented in Table 2 to highlight the species that proved more difficult for observers to identify. These included:

- Portuguese dogfish (CYL), Owston's dogfish (CYO), and Plunket's shark (PLS) were misidentified as seal shark (BSH)
- Plunket's shark (PLS) was misidentified as leafscale gulper shark (CSQ)
- Portuguese dogfish (CYL) was misidentified as Owston's dogfish (CYO)
- Baxter's dogfish (ETB) and shovelnose dogfish (SND) were misidentified as longnose velvet dogfish (CYP)
- Longnose velvet dogfish (CYP) was misidentified as Baxter's dogfish (ETB)
- Seal shark (BSH), leafscale gulper shark (CSQ), and Portuguese dogfish (CYL) were misidentified as Plunket's shark (PLS)

Table 2: Comparison of observer and NIWA shark identifications. BSH, seal shark; CSQ, leafscale gulper shark; CYL, Portuguese dogfish; CYO, Owston's dogfish; CYP, longnose velvet dogfish; ETB, Baxter's lantern dogfish; PLS, Plunket's shark; SND, shovelnose dogfish. –, 0 or no data.

	Observer identification	NIWA identification							
		BSH	CSQ	CYO	CYP	ETB	PLS	CYL	SND
BSH	66	53	–	3	–	–	1	9	–
CSQ	68	–	64	–	–	–	4	–	–
CYO	20	–	–	18	–	–	–	2	–
CYP	55	–	–	–	53	1	–	–	1
ETB	74	–	–	–	2	72	–	–	–
PLS	48	3	2	–	–	–	42	1	–

3.4 Probability of successful observer identification

Interpretation of results is limited because of the low sample sizes for some species, e.g., CYO (n = 21), and unbalanced sampling design. An analysis of the identification accuracy for deepsea sharks (BSH, CSQ, CYO, CYP, ETB, and PLS), and the relative experience of the MPI observers (sea days as observers) is presented in Table 3.

Table 3: Summary of samples of deepsea sharks identified by each MPI observer, probability of successful identification and relative experience of each observer.

Observer	Number of trips	No. of fish	Proportion of total	Probability of Success	Experience (Days)
1	2	91	0.27	1.00	688
2	1	39	0.12	1.00	150
3	2	28	0.08	1.00	2163
4	1	20	0.06	1.00	689
5	1	19	0.06	1.00	2095
6	1	15	0.05	1.00	500
7	1	14	0.04	1.00	2037
8	1	10	0.03	1.00	614
9	1	10	0.03	1.00	33
10	1	2	0.01	1.00	2200
11	1	1	0.00	1.00	93
12	1	21	0.06	0.95	2344
13	1	12	0.04	0.83	2241
14	1	16	0.05	0.81	2429
15	1	5	0.02	0.80	73
16	1	11	0.03	0.36	2269
17	1	17	0.05	0.12	62

Eleven of the 17 observers achieved 100% accuracy, although two of these had a low total sample size (1–2 sharks). Only two observers achieved accuracy rates less than 80%. Experience (days at sea as an observer) did not appear to be an important determinant of accuracy; of the two observers with the lowest accuracy, one was very experienced and the other very inexperienced.

Three observers on five trips provided about 48% of the total samples, which was not ideal as it meant that the sampling was not well spread over the 19 trips. The experience of the top three observers (greatest number of correct identifications) varied from inexperienced to very experienced but all achieved 100% identification accuracy.

The trips covered a range of target trawl fisheries including: hoki (10 trips); silver warehou (9 trips); orange roughy (8 trips); arrow squid and ling (5 trips each); oreos and barracouta (4 trips each); hake, blue warehou, white warehou (3 trips each); and southern blue whiting and hapuku/bass (1 trip each). These trips were well spread across the main fishery areas especially the Chatham Rise, sub-Antarctic, South Island east and west coasts, but with some coverage of areas outside of the EEZ (Louisville Ridge, Lord Howe Rise, and Challenger Plateau). Samples were taken solely from trawl tows – mainly bottom trawls but also some midwater trawls.

An analysis of identification success by species is shown in Table 4. There was a greater than 80% probability of achieving a successful identification for each species. Results were influenced by the low rates of success from two trips and suggest lower probability of successful identification of seal shark, Owston's dogfish, and Plunket's shark.

Table 4: Probability of successful identification for 6 shark species by MPI observers

	BSH	CSQ	CYO	CYP	ETB	PLS
No. of fish	66	68	20	55	74	48
Probability of success (%)	80.3	94.1	90.0	96.4	97.3	87.5
CV (%)	6.1	3.0	7.5	2.6	1.9	5.5
Number of observers	8	9	6	12	9	9

The proportion of successful identifications by species was plotted against experience (sea days) for each observer in Figure 2, highlighting the good success rate of most observers for a range of levels of experience. One inexperienced observer had a low proportion of identification success for seal sharks (BSH).

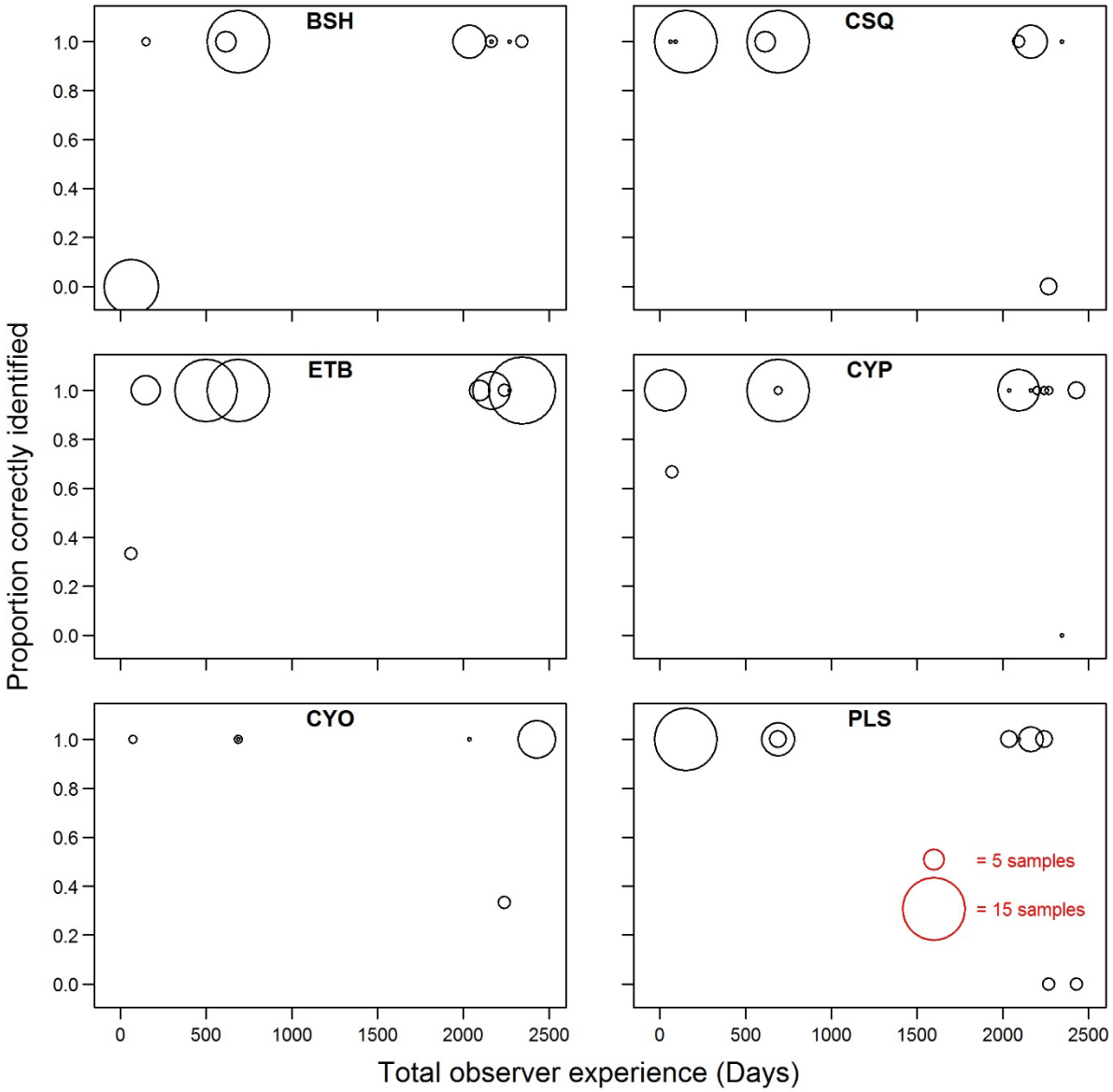

Figure 2: Proportion of correctly identified sharks, by species and observer, plotted against observer experience (number of days at sea). Each circle represents an individual observer, with circle size proportional to the number of fish identified.

4. DISCUSSION

This study provided the opportunity for an objective, independent assessment of the quality of identification of six deepsea sharks by MPI observers. Adequate sample sizes and sampling spread proved difficult to achieve, possibly because observers are required to undertake numerous tasks on any one trip, and many observer trips are carried out at short notice, which makes sampling difficult to plan. Resources are limited so observers may be placed on vessels focused on high priority fisheries that may not catch the deepsea sharks requested, e.g., the target jack mackerel fishery carried out largely by large (ex)charter vessels and the west coast South Island target hoki fishery, also carried out mostly by larger vessels. NIWA relied on the MPI Observer programme to select observers for each trip and selection criteria are not recorded. This may have resulted in some bias, but by the time sampling concluded there was a wide range of observer experience (number of days at sea) for the 17 observers who sampled sharks for this study which suggests that there was a good spread of observer capability and experience.

Results suggest that many observers can provide consistently accurate identifications for the six species of deepsea shark examined in this study, but a few may not. This was a valuable exercise and should probably be carried out on a regular basis, for these and other bycatch species of interest, to provide a quality control check and indicate any training suggestions.

Specialist identification from observer photographs was highly successful, and the three different angles (whole fish, closeup lateral head, closeup underside of head) proved necessary and sufficient to confirm detail not seen in the wider shot. Observer photograph quality was of sufficient quality to provide identification in all cases. The DNA barcoding identification was also a success, and was used when photographs were not received, and meant that no observer samples were lost, i.e., tissues were used where photographs were lost, and fortunately photographs were received for all samples where tissues were not received. The alternative to these methods of confirming observer identifications would be to retain and freeze each whole shark, and send the samples to a specialist for analysis, a more expensive and cumbersome solution that is unrealistic on anything but small scales.

Suggestions to improve identification include:

1. Feedback from this exercise to the training provider to allow extra time to teach the distinguishing features of seal shark (*Dalatias licha*) from other deepsea sharks; Owston's dogfish (*Centroscymnus owstonii*) from the closely similar Portuguese dogfish *Centroscymnus coelolepis*, and Plunket's shark *Proscymnodon plunketi* from leafscale gulper shark (*Centrophorus squamosus*).
2. Training in species identification should not necessarily just be targeted based on observer experience, studies such as this can be used to refine participation in observer identification training.
3. Aim to place experienced and inexperienced observers on the same trip to enable learning at sea.
4. If possible avoid sending inexperienced observers alone on trips to parts of New Zealand where shark species diversity is likely to be greater, or unusual, e.g., west coast South Island, Challenger Plateau, North Island, northern New Zealand.

5. ACKNOWLEDGMENTS

This work was funded by the New Zealand Ministry for Primary Industries under Project ENV201503. We thank MPI observers for collecting the samples and MPI Observer programme staff, particularly Adrian McNabb, for coordinating the sampling and passing on the photographs and tissue samples to NIWA. Thanks to Craig Marsh (now Auckland University) who completed the survey design when the study started and also carried out preliminary analyses of results. We thank Malcolm Francis for a useful review of the document.

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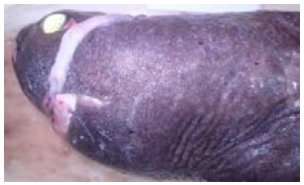
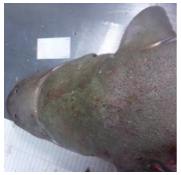
Appendix 1: Example observer photographs of shark species sampled from October 2016 to December 2017. Whole lateral view, lateral close-up of head, ventral close-up of head.

Seal shark (BSH)

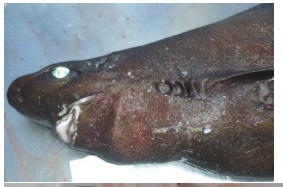




Leafscale gulper shark (CSQ)





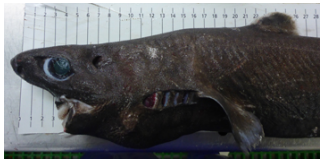
Owston's dogfish (CYO)


Longnose velvet dogfish (CYP)

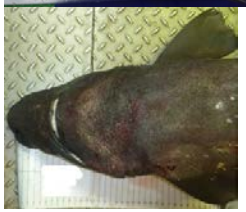


Baxter's lantern dogfish (ETB)


Plunket's shark (PLS)





Appendix 2: Identifications made by observers at sea and those by NIWA using the observer photographs (photo ids.), and percentage agreement. Other species = other shark species identified by NIWA. BSH, seal shark; CSQ, leafscale gulper shark; CYL, Portuguese dogfish; CYO, Owston's dogfish; CYP, longnose velvet dogfish; ETB, Baxter's lantern dogfish; PLS, Plunket's shark. –, 0 or no data.

Trip	Observer						Total	NIWA - photo ids.						Total		Other species
	BSH	CSQ	CYO	CYP	ETB	PLS		BSH	CSQ	CYO	CYP	ETB	PLS		Agreement (%)	CYL
1	15	15	2	2	7	–	41	15	15	2	2	7	–	41	100	–
2	–	–	–	–	15	–	15	–	–	–	–	15	–	15	100	–
3	5	5		–	–		10	5	5	–	–	–	–	10	100	–
4	3	1	1	–	16		21	3	1	–	–	16	–	20	95	–
5	15	15	2	2	–		34	15	15	2	2	–	–	34	100	–
6	–	–	–	–	–		0	–	–	–	–	–	–	–	–	–
7	8	–	1	1	–	4	14	8	–	1	1	–	4	14	100	–
8	2	15	–	–	7	15	39	2	15	–	–	7	15	39	100	–
9	3	8	–	1	9	6	27	3	8	–	1	9	6	27	100	–
10	1	–	–	–	–		1	1	–	–	–	–	–	1	100	–
11	–	1	–	–	–		1	–	1	–	–	–	–	1	100	–
12	13	1	–	–	3		17	–	1	3	2	1	1	2	12	9
13	1	4	–	2	1	3	11	1	2	–	2	1	4	4	36	1
14	–	–	–	–	–		0	–	–	–	–	–	–	–	–	–
15	–	–	–	–	–		0	–	–	–	–	–	–	–	–	–
16	–	–	–	–	–		0	–	–	–	–	–	–	–	–	–
17	–	–	–	2	–		2	–	–	–	2	–	–	2	100	–
18	–	–	–	10	–		10	–	–	–	10	–	–	10	100	–
19	–	–	1	15	–	4	20	–	–	1	15	–	4	20	100	–
Totals	66	65	7	35	58	32	263	53	63	9	37	56	34	240	–	10

Appendix 3: Muscle tissue samples taken by observers received at NIWA, compared to the observer photographs received, tissue used for DNA barcoding analysis, and barcode results. BSH, seal shark; CSQ, leafscale gulper shark; CYL, Portuguese dogfish; CYO, Owston's dogfish; CYP, longnose velvet dogfish; ETB, Baxter's lantern dogfish; PLS, Plunket's shark; SND, shovelnose dogfish.

Trip	Tissue samples received								Tissue samples analysed for barcode						DNA barcoding results								
	BSH	CSQ	CYO	CYP	ETB	PLS	Total tissues	Total photos	CSQ	CYO	CYP	ETB	PLS	Total	BSH	CSQ	CYO	CYP	ETB	PLS	Total (correct)	CYL	SND
1	15	15	2	2	15	8	57	41	–	–	–	8	8	16	–	–	–	–	8	8	16 (16)	–	–
2	–	–	–	–	15	–	15	15	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
3	5	5	–	–	–	–	10	10	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
4	–	1	–	–	10	–	11	21	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
5	15	15	2	2	–	–	34	34	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
6	–	3	–	10	5	1	19	0	3	–	10	5	1	19	–	3	–	10	5	1	19 (19)	–	–
7	8	–	1	1	–	4	14	14	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
8	2	15	–	–	6	15	38	39	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
9	3	7	–	–	9	–	19	27	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
10	1	–	–	–	–	–	1	1	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
11	–	1	–	–	–	–	1	1	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
12	13	1	–	–	3	–	17	17	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
13	1	4	–	2	1	3	11	11	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
14	–	–	9	4	–	3	16	0	–	9	4	–	3	16	3	–	9	4	–	–	16 (13)	–	–
15	–	–	2	3	–	–	5	0	–	2	3	–	–	5	–	–	2	2	–	–	5 (4)	–	1
16	–	–	3	2	3	4	12	0	–	3	2	3	4	12	–	–	1	2	3	4	12 (10)	2	–
17	–	–	–	–	–	–	0	2	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
18	–	–	–	10	–	–	10	10	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
19	–	–	1	15	–	4	20	20	–	–	–	–	–	0	–	–	–	–	–	–	0	–	–
Total	63	67	20	51	67	42	310	263	3	14	19	16	16	68	3	3	12	18	16	13	68 (62)	2	1