Cruise report
Victor Angelescu (VA0219)

Joint *Illex* pre-recruitment survey (FIFD & INIDEP)

VA/0219

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16 September 2019

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Acknowledgements

We thank the Captain and crew of the RV Victor Angelescu, and scientists and staff from INIDEP for their assistance and hospitality during the cruise and our stay in Mar del Plata.

For citation purposes this publication should be referenced as follows:

Randhawa HS, Hall J (2019) Cruise report VA/0219: Joint *Illex* pre-recruitment survey. Fisheries Department, Directorate of Natural Resources, Falkland Islands Government, Stanley, Falkland Islands. 81 pp.

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Cruise report VA/0219: Joint *Illex* pre-recruitment survey (Feb 1st – March 6th 2019)

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Introduction

Since the establishment of the South Atlantic Fisheries Commission (SAFC) in 1990, a series of joint research cruises, between the Falkland Islands Government Fisheries Department (FIFD) and the Argentine Government's *Instituto Nacional de Investigación y Desarrollo Pesquero* (INIDEP), focusing on the recruitment of the Argentine shortfin squid (*Illex argentinus*) and southern blue whiting (*Micromesistius australis australis*) have taken place since 1994. However, the last joint survey was conducted in 2004.

This report summarises the: (1) statolith collection collected by FIFD staff; (2) biological data on squid, elasmobranchs, and finfish species included on the agenda of the Scientific Sub-Committee (SSC) of the SAFC (this was a point of contention between both UK and Argentine delegations); and (3) catch log data only for species included in the agenda of the SSC of the SAFC (this was a point of contention between both UK and Argentine delegations). In addition to biological and catch data, oceanographic data and benthos samples were collected, but not reported herein. Please refer to Winter (2019) for the stock assessment report for *I. argentinus* based on this research cruise.

Research Vessel*:*

The Argentine RV Víctor Angelescu is a stern trawler, whose main characteristics are:

Length overall	52.8 m
Beam	12.8 m
Draught	4.8 m
Main engines (2)	1,050 kW
Maximum speed	13 knots

The vessel has a sailing autonomy of 40 days with a crew of 14 persons and accommodation for 17 scientists. It is equipped with a broad band scientific echosounder (SIMRAD EK-80) operating split beam transducer of 18, 38, 70, 120, 200 and 333 kHz in frequency. A multibeam echosounder (SIMRAD ME-70), Omni sonar (SIMRAD FX-93) and ADCP (Acoustic Doppler Current Profile) were in continuous operation during the cruise. A net sonar with video camera FS-70 and net sensors SIMRAD PX system were available for the monitoring of the trawling performance and were used nearer the end of the cruise to confirm the net opening.

Cruise objectives*:*

- To confirm the summer distribution and concentration areas of *I. argentinus.*
- To estimate the biomass and number of recruits of de the South Patagonian Stock of *I. argentinus* (SPS).
- To collect biological data (length frequency distributions, weight at length, sex and maturity stages) to assist in stock differentiation.
- To determine the distribution and relative abundance of the finfish species.
- To collect biological samples of finfish species (size, weight, sex, maturity stages).
- To obtain environmental parameters (temperature, salinity, chlorophyll) to elaborate an oceanographic diagnosis of the research area.
- To collect benthos samples to investigate its composition.

Methods

Survey area*:*

The total survey area of 55,610.61 nm^2 was divided into 8 strata as per previous *Illex* surveys on the Patagonian Shelf (Fig 1). The survey area was bounded by 45 and 51°S and strata were bounded by latitude, longitude, and depth (from 100 to 400 m) (Figure 1).

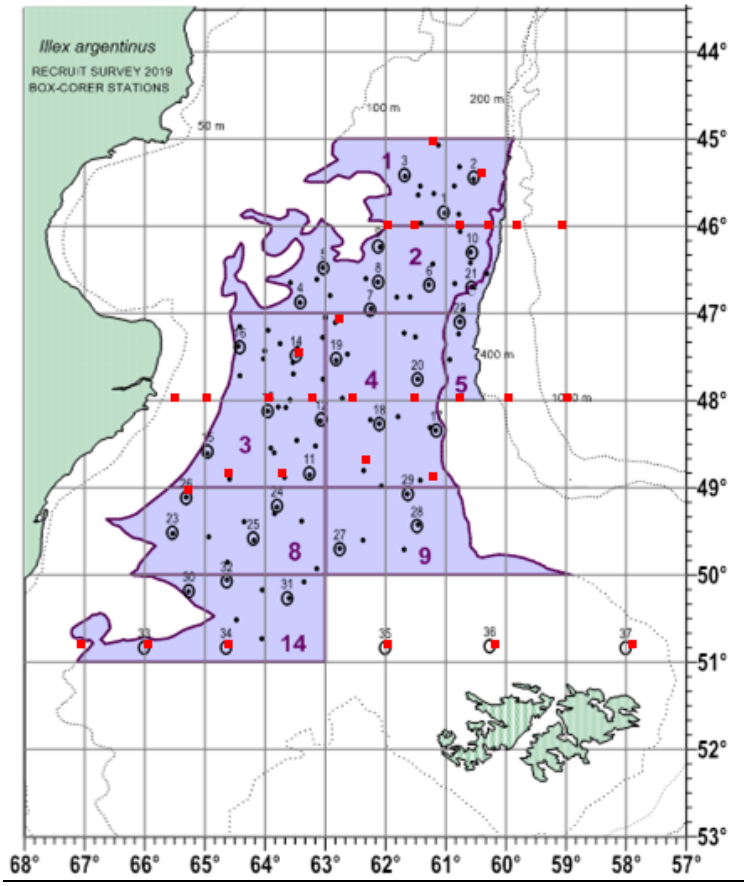

Figure 1. Map depicting approximate locations and number of the Box-Corer stations for benthos (empty circles). Full black circles depict all 98 proposed trawl stations, while red squares correspond to the 30 oceanographic stations.

Fishing Gear*:*

Bottom net with the following characteristics:

Bridles lower (m):	48.5
Bridles upper (m):	50.0
Net length with codend (m):	62.97
Net length without codend (m):	40.97
Head rope (m):	35.5
Ground rope (m):	45.0
Wings mesh (mm):	300
Codend mesh (mm):	110
Codend liner mesh (mm):	20
Door type:	Super V (Morgere SPF08)
Door weight (kg):	1,000

Trawling*:*

Each trawl was 15 minutes on the bottom in duration and covered approximately 1 nautical mile. All trawling activities were restricted to between sunrise and sunset. A total of 98 trawl stations were planned, but due to inclement weather, only 86 were performed. It had been agreed to between both delegations, prior to the research cruise, that stratum 1 could be eliminated from this survey if time constraints prevented the completion of the cruise as outlined in the original Cruise Plan.

Oceanography*:*

CTD was deployed at 30 stations, of which 21 were included in three latitudinal sections located at 46°S, 48°S and 50°30'S (Figure 1). A high performance CTD (SBE25 or SBE911), equipped with sensors for temperature, conductivity and oxygen, fluorescence sensor and altimeter was used. Water samples were collected in Nansen bottles to calibrate the salinity and to measure the chlorophyll, at selected stations in the bottom, while the remaining sampling depths were determined following the fluorescence profile shape: near the surface, at the fluorescence maximum and immediately below it.

Benthic survey*:*

The epifaunal benthic communities were characterized by means of by-catch samples obtained during trawling hauls. Species will be identified ashore by INIDEP scientists, and some specimens were collected for taxonomic purposes when required. Benthic infaunal communities were also studied using a Box-Corer (0.01 m^2) following a depth gradient. Samples were sieved (500 μm) and fixed in 5% formalin on board for pending examination by INIDEP scientists ashore.

Role of FIFD scientists onboard*:*

The role of FIFD scientists was sorting the catch, collecting statoliths from *I. argentinus* and *Doryteuthis gahi* and ensuring that these statolith collections covered the length frequency and maturity stage range for each stratum. Statoliths from individual *I. argentinus* were split between FIFD and INIDEP. FIFD scientists were not involved in measuring, weighing, or assessing maturity from squid, finfish, and elasmobranchs, or in collecting otoliths from finfish species.

Data:

Station, catch, and biological data (on species agreed to on the agenda of the SSC or the SAFC) were shared with the FIFD cruise leader at the end of each stratum. It was the responsibility of the FIFD cruise leader to perform data checks and ask INIDEP to make any corrections. Oceanographic data were shared at the end of the cruise with the FIFD cruise leader and uploaded to FIFD's shared drive to be checked by the FIFD Stock Assessment Scientist (Data). Data on benthos and from benthic grabs are to be shared once analyses are completed.

Results, statolith collection, and daily logs*:*

February 1st

Jack and I checked out of hotel at 7:30 and INIDEP picked us up at hotel at 7:45. We helped move equipment from INIDEP to the vessel. The vessel is located in the naval yard and we were unable to visit the vessel prior to boarding. We boarded the vessel at 9:15 and had a safety briefing by the 2nd officer from 9:30 to 10:00. We sailed off at 11:00. We saw approximately 150 common dolphins around the vessel as we headed south of Mar del Plata towards our first oceanographic station at 50.8S 58.0W.

February 5th

After completing six oceanographic stations and five box-core stations (benthos), the first trawl of the cruise was made late in the afternoon.

Trawl 1.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	14	AD141	50.03570	63.09540	146	
End			50.04070	63.08240	148	0.01408

Catch log – in kg; two rays correspond to the two most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	species	DGH	DGS
Trawl1	0.025	7.52	0.360	0.026	-	-	-	8.58	RMC	-	6.70

Statolith collection (N = 1 ILL):

Station	Species	Serial No	Sex	Maturity	Length (mm)	Weight (g)	Notes
AD141	ILL	1	M	1	11.0	25	1 statolith

February 6th

Three trawls were made.

Trawl 2.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	14	1	50.10081	63.21377	142	
End			50.11016	63.21678	143	0.01404

Trawl 3.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	14	3	50.25990	64.01140	138	
End			50.25040	64.01440	138	0.01344

Trawl 4.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	14	4	50.30280	64.28890	131	
End			50.30960	64.29990	132	0.01242

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl2	37.88	4.92	2.30	49.18	9.54	-	-	1.860	RMC	1.92	2.84
Trawl3	1.92	11.70	1.98	0.30	5.16	-	-	6.460	RMC	2.06	2.60
Trawl4	3.57	4.58	3.94	5.16	2.32	-	0.134	2.860	RPX	0.88	2.54

Statolith collection (N = 65 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
1	ILL	1	F	5	27.9	441	
1	ILL	2	M	5	23.5	295	
1	ILL	3	M	3	23.5	301	
1	ILL	4	F	1	23.3	278	
1	ILL	5	F	2	25.6	362	
1	ILL	6	M	4	23.3	264	
1	ILL	7	M	5	23.0	252	
1	ILL	8	M	4	21.7	213	
1	ILL	9	M	4	23.6	264	
1	ILL	10	F	3	23.6	247	
1	ILL	11	F	1	24.9	280	
1	ILL	12	F	1	21.1	188	
1	ILL	13	M	5	24.5	330	
1	ILL	14	F	4	26.5	410	
1	ILL	15	F	1	24.3	282	
1	ILL	16	M	4	23.0	271	
1	ILL	18	M	4	22.3	252	
1	ILL	19	M	4	21.0	217	
1	ILL	20	F	1	23.0	261	
1	ILL	21	M	4	22.5	271	
1	ILL	22	F	2	24.5	295	
1	ILL	23	F	1	24.1	278	
1	ILL	24	F	5	25.2	301	
1	ILL	25	M	4	23.1	305	
1	ILL	26	F	1	25.3	310	
1	ILL	27	F	2	23.9	276	
1	ILL	28	F	1	24.8	279	
1	ILL	29	M	3	20.6	208	
1	ILL	30	M	2	22.0	195	
1	ILL	31	F	1	23.0	266	
1	ILL	32	F	1	22.4	251	
1	ILL	33	M	3	20.5	199	
1	ILL	35	F	1	23.0	258	
1	ILL	36	F	3	23.4	257	
1	ILL	37	F	2	23.5	258	
1	ILL	38	F	5	26.2	357	
1	ILL	39	F	2	23.9	286	
1	ILL	40	F	2	24.0	294	
1	ILL	41	F	3	27.0	389	
1	ILL	42	F	1	22.9	239	
1	ILL	43	F	1	24.5	300	
1	ILL	44	M	3	22.5	259	
1	ILL	45	F	1	23.0	252	
1	ILL	46	F	1	23.2	248	

Statolith collection ctd

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
1	ILL	47	F	3	24.3	278	
1	ILL	48	F	3	25.1	352	1 statolith
1	ILL	50	F	1	22.0	234	
3	ILL	1	M	3	22.7	271	
3	ILL	2	F	1	22.6	257	
3	ILL	3	F	2	26.2	410	
3	ILL	4	F	1	20.9	187	
3	ILL	5	F	1	24.0	270	
3	ILL	6	M	3	23.1	295	
3	ILL	7	M	4	23.0	286	
4	ILL	1	F	2	24.3	330	
4	ILL	2	F	1	13.2	50	
4	ILL	3	F	2	24.5	312	
4	ILL	4	M	4	24.7	352	
4	ILL	5	F	2	26.2	413	1 statolith
4	ILL	6	F	2	25.0	351	
4	ILL	7	F	3	25.2	379	
4	ILL	8	F	2	25.0	311	
4	ILL	9	F	2	24.1	293	
4	ILL	10	F	3	26.3	371	
4	ILL	11	F	2	26.2	410	

February 7th

The first trawl was expected on deck at 7:00 am. Unfortunately, there were issues with the vertical opening of the net on two occasions which required a re-start. Similar issues occurred on the last trawl of the day, which only necessitated a single repeat. Overall, three trawls were made on the day.

Trawl 5.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	14	2	50.10800	64.05120	131	
End			50.10480	64.06570	132	0.01129

Trawl 6.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	14	AD142	50.03340	64.40360	124	
End			50.03670	64.41810	125	0.01145

Trawl 7.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	14	5	50.11840	65.17350	156	
End			50.12390	65.18630	117	0.01188

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl5	561.06	7.48	1.82	2.60	3.34	-	-	15.210	RPX	2.86	2.52
Trawl6	0.97	7.82	0.98	1.54	3.96	-	-	11.200	RPX	5.14	1.70
Trawl7	-	13.16	0.53	-	2.57	-	-	4.420	RFL	2.34	-

Statolith collection (N = 18 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
2	ILL	1	M	5	22.0	237	
2	ILL	3	F	1	25.0	289	
2	ILL	5	F	2	22.0	215	
2	ILL	14	F	1	21.8	204	
2	ILL	15	F	3	26.1	265	
2	ILL	17	M	4	24.6	369	
2	ILL	27	F	2	27.0	390	1 statolith
2	ILL	35	M	5	22.5	248	
2	ILL	43	M	4	20.6	188	
2	ILL	51	F	2	22.5	248	
2	ILL	59	M	3	18.5	118	1 statolith
2	ILL	67	F	2	27.3	429	
2	ILL	73	M	3	19.5	165	
2	ILL	78	F	1	20.4	185	
2	ILL	82	M	2	22.6	253	
2	ILL	106	M	4	20.7	240	
2	ILL	122	F	2	28.0	462	
2	ILL	124	M	1	12.5	37	1 statolith

February 8th

Two trawls were made on the day.

Trawl 8.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	16	49.30889	65.32039	107	
End			49.29950	65.31463	99	0.01107

Trawl 9.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	AD83	49.06890	65.19280	109	
End			49.05960	65.18790	108	0.01161

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl8	19.37	5.320	2.38	0.48	4.06	-	-	9.320	RBR	29.84	3.92
Trawl9	482.70	0.255	42.24	-	0.15	-	-	7.794	RMG	17.73	1.18

Statolith collection (N = 74 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
16	ILL	1	M	4	24.5	322	
16	ILL	2	M	4	22.7	293	
16	ILL	3	F	3	24.2	296	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
16	ILL	4	M	4	25.1	342	
16	ILL	5	F	2	22.3	230	
16	ILL	6	F	1	24.0	304	
16	ILL	7	M	2	23.2	303	
16	ILL	8	F	3	24.7	312	
16	ILL	9	F	3	24.0	281	
16	ILL	10	M	4	23.2	272	
16	ILL	11	M	4	21.4	210	
16	ILL	12	F	3	23.1	268	
16	ILL	13	F	2	27.4	411	
16	ILL	14	F	1	22.5	197	
16	ILL	15	M	4	23.2	264	
16	ILL	16	M	4	21.7	220	
16	ILL	17	M	4	22.1	215	1 statolith
16	ILL	18	F	2	23.1	294	
16	ILL	19	F	3	27.0	411	1 statolith
16	ILL	20	M	4	22.0	245	
16	ILL	21	F	2	25.7	334	
16	ILL	22	F	1	22.3	227	
16	ILL	23	M	4	25.2	337	
16	ILL	24	M	4	24.0	313	
16	ILL	25	F	4	24.3	310	
16	ILL	26	F	5	26.7	420	
16	ILL	27	F	2	22.3	225	
16	ILL	28	M	4	24.5	336	
16	ILL	29	M	4	25.6	370	
16	ILL	30	F	1	21.8	222	
16	ILL	31	M	1	17.2	90	
16	ILL	32	M	4	21.6	206	
16	ILL	33	F	2	19.1	137	
16	ILL	34	F	3	28.0	469	
16	ILL	35	M	4	22.1	227	
16	ILL	36	F	2	25.6	358	
16	ILL	37	M	2	15.4	71	
16	ILL	38	F	1	21.8	193	
16	ILL	39	F	1	22.1	214	
16	ILL	40	M	4	21.3	231	
16	ILL	41	F	3	26.1	399	
AD83	ILL	1	F	3	26.1	384	
AD83	ILL	2	F	5	22.9	252	1 statolith
AD83	ILL	3	F	2	24.2	315	1 statolith
AD83	ILL	7	F	4	26.6	362	
AD83	ILL	8	F	2	28.1	459	
AD83	ILL	9	F	4	26.1	385	
AD83	ILL	11	F	4	23.9	271	
AD83	ILL	13	F	2	23.4	261	
AD83	ILL	15	F	2	26.1	324	
AD83	ILL	16	F	3	27.8	412	
AD83	ILL	19	F	2	19.1	134	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
AD83	ILL	21	F	2	24.2	268	
AD83	ILL	22	F	1	23.6	239	
AD83	ILL	25	F	2	26.9	414	
AD83	ILL	26	F	4	24.4	296	
AD83	ILL	32	M	1	17.5	110	
AD83	ILL	35	M	5	23.1	302	
AD83	ILL	36	F	3	25.1	291	
AD83	ILL	39	F	3	25.1	319	
AD83	ILL	40	F	5	29.9	530	
AD83	ILL	45	M	5	24.9	333	
AD83	ILL	46	M	3	22.6	207	
AD83	ILL	47	M	1	18.6	117	
AD83	ILL	51	M	5	24.7	324	
AD83	ILL	52	F	3	22.4	241	
AD83	ILL	56	M	5	23.9	292	
AD83	ILL	59	F	5	21.6	209	
AD83	ILL	61	F	5	27.2	394	
AD83	ILL	63	F	5	25.1	331	
AD83	ILL	64	F	5	25.7	335	
AD83	ILL	66	F	3	22.1	223	
AD83	ILL	73	M	3	19.9	154	
AD83	ILL	78	F	1	17.9	107	

February 9th

Unfortunately, weather was bad and trawl was deferred to 10:00, then noon, and then 16:00. It was one of the roughest days I have experienced at sea. A single trawl was made on the day.

Trawl 10.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	AD82	49.33020	64.52750	118	
End			49.33750	64.53580	118	0.01076

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl10	56.56	0.255	1.39	1.69	10.48	-	-	6.864	RBR	17.61	5.06

Statolith collection (N = 27 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
AD82	ILL	1	F	5	27.2	416	1 statolith
AD82	ILL	3	F	2	23.3	259	
AD82	ILL	11	M	4	20.0	179	
AD82	ILL	12	F	5	23.0	263	
AD82	ILL	14	M	3	21.2	199	
AD82	ILL	15	F	1	20.0	159	
AD82	ILL	23	F	5	24.8	319	
AD82	ILL	24	M	3	17.5	112	
AD82	ILL	27	F	5	23.5	267	
AD82	ILL	28	M	3	19.8	168	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
AD82	ILL	32	F	3	23.4	274	
AD82	ILL	37	F	4	22.9	212	
AD82	ILL	46	M	4	20.5	213	
AD82	ILL	52	M	3	17.5	108	1 statolith
AD82	ILL	53	F	5	24.0	294	
AD82	ILL	54	F	4	25.5	353	
AD82	ILL	59	F	2	21.5	218	
AD82	ILL	64	F	1	23.5	260	
AD82	ILL	68	M	2	18.0	115	
AD82	ILL	71	M	3	16.9	99	
AD82	ILL	73	F	5	26.0	347	1 statolith
AD82	ILL	76	M	4	19.9	199	
AD82	ILL	82	M	3	24.5	325	
AD82	ILL	87	M	3	20.5	191	1 statolith
AD82	ILL	89	F	2	21.6	207	
AD82	ILL	93	F	4	25.0	334	
AD82	ILL	98	F	1	19.5	192	1 statolith

February 10th

We experienced a much calmer day today and were able to work without major impediments due to weather. Unfortunately, one of the winch cables frayed and snapped during hauling of the first trawl, causing a delay of an hour while crew fixed the problem. Once fixed, normal activities resumed. Work continued through the afternoon. Unfortunately, the last trawl was cancelled as the door spread was inconsistent during the trawl. To be repeated on Monday morning. Overall, three trawls were made on the day.

Trawl 11.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	AD81	49.51597	64.38434	122	
End			49.52050	64.39680	122	0.00977

Trawl 12.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	12	49.34800	64.11260	125	
End			49.35450	64.12340	125	0.01105

Trawl 13.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	15	49.24130	64.38434	122	
End			49.24860	64.39680	122	0.01016

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl11	35.56	2.14	3.14	0.62	8.23	-	-	8.772	RPX	5.28	-
Trawl12	1.69	3.34	1.36	0.41	7.14	-	-	3.646	RPX	9.37	3.10
Trawl13	1.45	1.98	0.80	0.15	5.59	-	-	4.052	RBR	4.20	-

Statolith collection (N = 27 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
AD81	ILL	12	F	1	20.9	202	
AD81	ILL	26	M	3	21.7	223	
AD81	ILL	29	M	2	14.4	68	
AD81	ILL	38	F	1	24.3	337	
AD81	ILL	53	M	3	22.6	228	
AD81	ILL	62	F	1	16.9	95	
AD81	ILL	69	F	1	25.1	338	1 statolith
AD81	ILL	76	F	2	15.8	73	
AD81	ILL	79	M	2	14.2	65	1 statolith
AD81	ILL	126	F	1	14.3	65	
AD81	ILL	129	M	2	14.2	70	
AD81	ILL	134	M	2	16.2	83	
12	ILL	1	M	1	15.2	79	
12	ILL	2	F	1	16.6	87	
12	ILL	3	M	2	16.5	93	
12	ILL	4	F	1	16.8	95	
12	ILL	5	F	1	14.7	62	1 statolith
12	ILL	7	M	1	14.2	52	
12	ILL	9	F	2	20.5	186	
12	ILL	16	F	1	15.9	66	
12	ILL	17	F	1	15.2	81	
12	ILL	19	F	2	16.4	83	1 statolith
12	ILL	20	M	4	15.8	81	1 statolith
15	ILL	5	F	4	23.5	266	
15	ILL	6	F	2	15.1	85	
15	ILL	8	F	1	16.3	77	
15	ILL	11	F	2	15.5	76	1 statolith

February 11th

Four trawls were completed on the day.

Trawl 14.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	14	49.13888	63.49490	128	
End			49.14770	63.49850	128	0.01123

Trawl 15.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	13	49.17860	63.50220	127	
End			49.18780	63.50640	126	0.01176

Trawl 16.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	17	49.22587	63.24586	142	
End			49.23529	63.24106	142	0.01253

Trawl 17.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	8	11	49.55623	63.08486	145	
End			49.56428	63.09146	146	0.01250

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl14	11.65	4.64	3.91	0.16	12.31	-	-	4.458	RMC	13.14	4.64
Trawl15	38.41	7.66	7.04	2.47	21.88	-	-	7.210	RBR	8.71	5.91
Trawl16	3.86	3.76	1.02	0.12	5.16	-	-	6.563	RPX	1.43	7.47
Trawl17	0.07	1.32	3.21	0.93	4.56	-	-	9.088	RBR	0.23	1.24

Statolith collection (N = 10 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
11	ILL	1	M	3	15.3	68	
13	ILL	23	F	4	22.7	248	
13	ILL	24	M	1	12.7	51	
13	ILL	84	F	1	25.2	368	
13	ILL	91	M	4	16.5	119	
13	ILL	96	M	2	26.0	345	
13	ILL	120	F	3	21.1	190	
13	ILL	129	F	2	28.2	458	
14	ILL	12	M	1	13.5	50	
14	ILL	14	M	1	14.2	57	

February 12th

Given the significant distance between stations, three trawls were completed.

Trawl 18.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	9	10	49.41497	62.44597	148	
End			49.41752	62.45997	148	0.01296

Trawl 19.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	9	9	49.34999	62.22167	159	
End			49.35998	64.22301	153	0.01331

Trawl 20.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	9	8	49.47375	61.28836	166	
End			49.47091	61.30261	163	0.01215

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl18	6.98	3.02	5.94	1.04	1.13	-	0.076	0.880	RMC	-	1.70
Trawl19	-	3.16	7.72	6.92	2.40	-	-	10.958	RFL	0.90	-
Trawl20	-	9.72	10.81	0.20	6.65	-	-	5.924	RMC	0.20	-

Statolith collection (N = 25 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
10	ILL	1	F	2	24.6	310	
10	ILL	2	M	4	22.4	278	
10	ILL	3	M	4	22.3	228	
10	ILL	4	F	2	23.6	283	
10	ILL	5	F	4	26.5	409	
10	ILL	6	F	3	25.2	333	
10	ILL	7	F	3	25.8	332	
10	ILL	8	F	2	23.2	260	
10	ILL	9	M	4	22.1	237	
10	ILL	10	M	4	23.5	280	
10	ILL	11	F	5	23.9	307	
10	ILL	12	F	4	26.2	353	1 statolith
10	ILL	13	F	2	17.8	127	
10	ILL	14	F	2	22.4	229	
10	ILL	15	M	4	21.1	227	
10	ILL	16	M	4	22.5	233	
10	ILL	17	F	2	24.2	311	
10	ILL	18	F	2	22.3	219	1 statolith
10	ILL	19	F	2	23.1	283	
10	ILL	20	F	4	26.3	344	
10	ILL	21	F	1	22.9	230	
10	ILL	22	F	3	24.0	277	
10	ILL	23	F	3	23.7	291	
10	ILL	24	M	3	19.6	173	
10	ILL	25	M	2	24.1	357	

February 13th

Five trawls were completed on the day.

Trawl 21.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	9	7	49.25208	61.27475	162	
End			49.26089	61.27972	162	0.01275

Trawl 22.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	9	6	49.05933	61.38347	150	
End			49.06907	61.38649	149	0.01361

Trawl 23.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	39	48.56362	61.26038	161	
End			48.57092	61.27023	161	0.01138

Trawl 24.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	38	48.58892	62.03796	145	
End			48.58911	62.05303	147	0.01096

Trawl 25.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	37	48.46917	62.22370	149	
End			48.47602	62.21301	148	0.01150

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl21	0.05	0.74	0.90	-	3.34	-	-	-	-	-	2.56
Trawl22	-	0.12	0.44	-	-	-	-	-	-	-	-
Trawl23	13.96	1.90	8.04	0.06	27.44	-	-	20.102	RPX	1.32	-
Trawl24	-	0.21	17.58	2.18	4.50	-	-	5.122	RMC	1.08	2.87
Trawl25	5.32	0.96	4.34	2.93	1.63	-	-	5.700	RFL	0.97	-

Statolith collection (N = 46 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
7	ILL	1	M	2	12.5	46	
37	ILL	1	F	5	24.2	276	
37	ILL	2	F	3	26.5	405	
37	ILL	3	F	3	28.5	420	
37	ILL	11	M	4	24.3	319	
37	ILL	18	M	5	21.6	227	
37	ILL	19	M	5	20.6	188	
37	ILL	26	F	5	21.4	196	
37	ILL	27	F	5	27.2	400	1 statolith
39	ILL	1	F	2	24.2	332	
39	ILL	2	M	4	22.2	234	1 statolith
39	ILL	3	F	5	23.2	285	
39	ILL	4	F	2	23.2	245	
39	ILL	5	F	5	22.5	213	1 statolith
39	ILL	7	M	4	22.5	228	
39	ILL	8	F	2	23.5	264	1 statolith
39	ILL	10	F	3	22.4	224	
39	ILL	11	F	3	24.1	254	
39	ILL	12	F	3	24.2	289	
39	ILL	13	F	4	23.1	228	1 statolith
39	ILL	14	M	4	21.5	214	
39	ILL	15	F	2	24.2	278	
39	ILL	17	F	3	23.6	212	
39	ILL	18	M	4	23.1	257	
39	ILL	19	F	2	22.0	207	1 statolith
39	ILL	20	F	3	26.0	349	
39	ILL	21	F	5	23.2	243	
39	ILL	22	M	5	23.5	308	
39	ILL	23	M	4	20.6	181	
39	ILL	24	F	3	22.0	188	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
39	ILL	26	M	4	15.6	78	
39	ILL	27	M	4	21.8	201	
39	ILL	28	F	2	21.2	190	
39	ILL	29	F	5	27.9	379	1 statolith
39	ILL	30	M	4	20.3	180	
39	ILL	31	F	4	24.2	249	
39	ILL	32	F	5	22.6	229	
39	ILL	34	F	4	24.0	271	1 statolith
39	ILL	37	F	4	25.1	318	
39	ILL	39	F	3	23.5	271	
39	ILL	42	F	2	21.2	185	
39	ILL	47	F	4	23.4	263	
39	ILL	48	M	5	23.5	284	1 statolith
39	ILL	49	M	4	23.4	245	
39	ILL	51	F	3	25.9	334	
39	ILL	54	F	5	24.0	276	

February 14th

Six trawls were planned for today, but the second trawl had to be repeated on three occasions due to strong underwater currents dragging the doors sideways and causing the net opening to collapse. Unfortunately, only three trawl stations could be completed.

Trawl 26.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	61	48.49879	63.17563	140	
End			48.49896	63.19111	139	0.01337

Trawl 27.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	56	48.32519	63.11276	138	
End			48.33766	63.10525	138	0.01101

Trawl 28.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	57	48.27500	63.28006	119	
End			48.27773	63.26617	118	0.01074

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl26	-	-	0.53	0.22	-	-	-	0.879	RMC	0.32	-
Trawl27	65.96	0.87	4.67	0.43	0.47	-	-	7.880	RPX	2.12	1.53
Trawl28	-	-	1.00	-	0.25	-	-	2.020	RBR	1.63	-

Statolith collection (N = 43 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
56	ILL	1	F	3	24.8	281	
56	ILL	2	F	4	26.6	395	
56	ILL	3	M	4	23.2	255	
56	ILL	4	F	1	22.8	251	
56	ILL	5	F	2	23.8	266	
56	ILL	6	F	1	21.8	243	
56	ILL	7	F	3	24.6	305	
56	ILL	8	F	3	25.2	322	
56	ILL	9	F	2	24.6	281	
56	ILL	10	F	2	24.1	306	
56	ILL	11	M	4	22.4	226	
56	ILL	12	M	4	23.8	267	
56	ILL	14	M	5	21.2	189	
56	ILL	15	M	1	22.7	262	
56	ILL	16	F	2	23.4	246	1 statolith
56	ILL	17	M	3	21.1	217	
56	ILL	19	F	1	23.6	260	
56	ILL	21	F	1	25.1	306	
56	ILL	22	M	5	25.2	328	
56	ILL	23	F	1	23.1	272	
56	ILL	25	M	4	26.1	355	
56	ILL	26	M	4	25.2	331	
56	ILL	27	F	2	24.7	328	
56	ILL	28	F	3	26.2	370	
56	ILL	34	M	4	21.5	201	
56	ILL	36	F	2	26.2	386	
56	ILL	37	M	4	21.4	228	
56	ILL	38	F	3	26.5	336	
56	ILL	39	M	4	22.0	227	
56	ILL	40	M	5	21.6	235	1 statolith
56	ILL	41	F	2	22.5	241	
56	ILL	43	F	4	28.6	445	
56	ILL	44	M	5	23.4	317	
56	ILL	49	F	1	24.2	288	
56	ILL	61	F	5	28.3	479	
56	ILL	69	F	1	25.2	347	
56	ILL	70	M	5	23.3	257	
56	ILL	71	F	2	21.3	231	
56	ILL	74	F	2	22.0	210	
56	ILL	76	M	4	20.3	197	
56	ILL	79	M	3	22.7	239	
56	ILL	85	M	5	22.3	256	
56	ILL	87	M	4	24.0	337	

February 15th

Five trawl stations were completed today, although the last one had to be repeated. This was the first day *Doryteuthis* statolith samples were collected.

Trawl 29.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	58	48.33397	63.54061	119	
End			48.34039	63.52905	120	0.01206

Trawl 30.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	59	48.35938	63.51742	121	
End			48.36946	63.51811	122	0.01186

Trawl 31.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	60	48.52920	63.41692	125	
End			48.53531	63.42868	124	0.01161

Trawl 32.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	AD31	48.53682	64.35709	112	
End			48.52962	64.36633	112	0.01101

Trawl 33.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	AD32	48.34156	64.55215	108	
End			48.33692	64.54566	109	0.00720

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl29	0.37	0.58	0.48	0.06	-	-	-	1.037	RMC	-	0.90
Trawl30	9.80	0.97	0.25	0.06	0.25	-	-	3.560	RBR	-	1.18
Trawl31	121.12	2.98	7.78	0.29	6.08	-	-	6.360	RFL	5.96	2.08
Trawl32	1.42	15.14	6.38	-	2.46	-	-	7.579	RMG	4.42	1.12
Trawl33	-	5.40	10.34	-	2.86	-	0.76	2.692	RMG	2.62	4.07

Statolith collection (N = 24 ILL; 18 LOL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
58	ILL	1	F	5	27.5	374	
59	ILL	1	F	2	25.2	324	
59	ILL	3	F	4	26.3	353	
59	ILL	9	F	5	23.5	262	
59	ILL	23	F	1	9.5	18	
59	ILL	27	F	5	23.5	284	
59	ILL	28	F	2	25.0	310	
59	ILL	35	F	3	25.3	379	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
59	ILL	38	F	5	23.2	301	
60	ILL	2	F	5	27.5	449	
60	ILL	10	M	1	9.0	15	1 statolith
60	ILL	18	F	1	21.2	179	
60	ILL	22	F	2	26.3	350	
60	ILL	39	F	4	29.0	466	
60	ILL	55	F	4	28.5	446	
60	ILL	83	M	2	21.5	209	
60	ILL	86	M	3	22.3	227	
60	ILL	97	F	3	23.1	277	
60	ILL	102	M	3	21.1	206	1 statolith
60	ILL	113	F	3	28.5	481	
60	ILL	140	F	4	28.2	452	
AD31	ILL	3	M	5	22.1	290	
AD31	ILL	5	M	1	15.9	75	
AD31	ILL	6	F	1	9.5	18	
AD31	LOL	1	J	0	8.0	17	
AD31	LOL	2	M	1	7.3	15	
AD31	LOL	3	M	1	8.2	20	
AD31	LOL	4	M	1	8.5	21	
AD31	LOL	5	M	1	7.9	16	
AD31	LOL	6	F	4	12.1	52	
AD31	LOL	7	F	1	9.1	25	
AD31	LOL	8	M	3	9.5	29	
AD31	LOL	9	M	2	8.9	24	
AD31	LOL	10	M	2	10.9	36	
AD31	LOL	12	M	1	7.6	16	
AD31	LOL	13	J	0	7.1	12	
AD31	LOL	14	M	1	8.5	22	
AD31	LOL	15	M	2	9.1	25	
AD31	LOL	16	M	1	8.3	18	
AD31	LOL	18	J	0	7.3	15	
AD31	LOL	19	M	2	9.5	25	
AD31	LOL	20	J	0	7.0	12	

February 16th

Five trawl stations were sampled today, despite the lengthy steam between some of these. Processing of the catch was completed at 21:30 and because the last trawl came up late (after 19:30), dinner was not served until 22:00.

Trawl 34.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	53	48.07053	63.57952	111	
End			48.06100	63.58220	111	0.01021

Trawl 35.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	52	48.04360	63.45328	110	
End			48.04401	63.46796	108	0.01084

Trawl 36.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	51	48.04493	63.36441	113	
End			48.04629	63.37920	112	0.01053

Trawl 37.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	41	47.59650	63.35744	110	
End			47.00595	63.36280	110	0.01096

Trawl 38.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	55	48.12573	63.08916	127	
End			48.12092	63.10241	122	0.01167

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl34	14.47	0.09	10.40	0.07	3.47	-	-	3.100	RPX	2.20	2.10
Trawl35	14.09	0.20	2.84	0.05	2.77	-	-	1.034	RBR	2.31	-
Trawl36	1.82	0.17	2.44	-	5.98	-	-	4.130	RBR	4.01	-
Trawl37	0.49	0.43	2.14	-	1.33	-	-	3.098	RPX	3.04	-
Trawl38	56.21	0.41	1.26	0.10	3.31	-	-	6.288	RBR	0.54	-

Statolith collection (N = 33 ILL; 19):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
41	ILL	1	M	7	17.5	105	
51	ILL	4	M	3	20.7	190	
52	ILL	6	M	4	19.2	148	
52	ILL	18	F	3	26.7	390	
52	ILL	19	M	4	25.2	332	
52	ILL	21	F	5	28.5	446	
52	ILL	23	F	3	27.4	440	
52	ILL	37	M	2	9.1	18	
52	ILL	48	M	6	16.5	123	
53	ILL	1	F	5	25.0	373	
53	ILL	7	F	5	25.6	305	
53	ILL	8	F	5	26.0	349	
53	ILL	9	F	2	25.8	311	
53	ILL	10	F	5	22.7	242	
53	ILL	11	F	7	20.6	170	
53	ILL	13	M	6	16.0	92	
53	ILL	15	F	2	21.6	184	
53	ILL	25	F	3	22.5	226	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
53	ILL	29	F	3	23.8	263	
53	ILL	34	F	7	20.1	173	
53	ILL	36	M	6	20.5	196	
53	ILL	37	M	4	20.3	191	1 statolith
53	ILL	41	M	4	19.0	172	
53	ILL	42	M	4	17.5	118	
53	ILL	43	M	6	21.7	246	
53	ILL	47	F	5	26.3	372	1 statolith
53	ILL	48	F	5	24.3	268	
53	ILL	49	M	6	18.0	159	
55	ILL	10	M	4	24.2	307	
55	ILL	50	M	2	21.6	234	
55	ILL	52	F	3	22.2	246	
55	ILL	63	M	3	19.5	146	
55	ILL	78	F	7	24.1	257	
41	LOL	1	M	1	7.3	16	
41	LOL	2	M	2	8.0	18	
41	LOL	3	F	1	6.3	12	
41	LOL	4	M	1	7.6	15	
41	LOL	5	F	1	6.4	8	
41	LOL	6	M	1	7.3	15	
41	LOL	7	F	1	6.4	9	
41	LOL	8	F	1	7.5	15	
41	LOL	9	F	1	7.6	15	
41	LOL	10	M	2	7.6	16	
41	LOL	11	F	1	7.3	14	
41	LOL	12	M	1	7.6	15	
41	LOL	13	F	2	8.9	27	
41	LOL	14	F	1	8.0	18	
41	LOL	15	M	1	7.6	17	
41	LOL	16	F	1	7.7	17	
41	LOL	18	M	1	6.6	11	
41	LOL	19	M	1	6.6	10	
41	LOL	20	F	1	7.1	13	

February 17th

Six trawls were conducted on the day.

Trawl 39.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	31	47.58804	62.43382	142	
End			47.57683	62.43214	139	0.01385

Trawl 40.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	32	48.12945	62.15745	146	
End			48.12286	62.16887	146	0.01172

Trawl 41.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	33	48.15443	62.06128	139	
End			48.16122	62.07196	139	0.01342

Trawl 42.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	34	48.11120	61.47696	144	
End			48.10841	61.46085	142	0.01385

Trawl 43.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	35	48.18552	61.15234	150	
End			48.19016	61.13943	155	0.01312

Trawl 44.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	36	48.19856	61.09715	158	
End			48.18887	61.09538	159	0.01299

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl39	3.26	0.34	5.94	3.58	22.84	-	-	2.640	RFL	1.37	4.82
Trawl40	76.84	0.24	2.58	0.30	6.95	-	-	7.352	RBR	3.74	-
Trawl41	0.04	-	0.33	-	3.20	-	-	2.572	RBR	1.32	-
Trawl42	0.27	0.96	1.88	0.45	2.11	-	-	5.412	RBR	0.91	1.36
Trawl43	36.38	0.07	0.04	-	0.81	-	-	4.336	RBR	0.24	2.98
Trawl44	-	0.42	-	1.69	0.68	-	-	1.404	RBR	-	-

Statolith collection (N = 43 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
31	ILL	1	F	2	22.5	223	
31	ILL	2	M	7	18.6	134	
31	ILL	3	M	7	17.3	121	
31	ILL	4	M	7	16.4	120	
31	ILL	5	M	7	16.9	100	1 statolith
31	ILL	8	M	6	21.4	252	
31	ILL	9	M	7	18.1	103	
31	ILL	10	M	6	21.5	236	
31	ILL	11	M	5	22.4	271	1 statolith
31	ILL	12	M	7	17.6	107	
31	ILL	16	M	6	19.8	159	
31	ILL	17	M	6	20.9	214	
31	ILL	18	F	6	24.3	238	
32	ILL	5	F	5	25.2	287	
32	ILL	8	F	1	22.6	211	
32	ILL	11	F	2	23.1	242	
32	ILL	14	F	5	26.5	348	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
32	ILL	16	F	2	19.2	120	
32	ILL	19	F	1	24.0	259	
32	ILL	20	M	5	26.0	364	
32	ILL	26	M	4	24.2	274	
32	ILL	32	M	3	22.0	219	
32	ILL	36	F	1	23.4	264	
32	ILL	39	F	4	22.5	216	
32	ILL	41	F	1	25.0	304	
32	ILL	43	F	1	23.2	244	
32	ILL	45	F	1	25.0	311	
32	ILL	47	M	5	25.2	343	
32	ILL	48	F	5	26.0	364	
32	ILL	53	F	2	26.0	322	
32	ILL	54	F	3	27.5	435	
32	ILL	59	F	2	25.0	290	
33	ILL	1	M	1	12.3	42	1 statolith
35	ILL	2	M	5	24.2	346	
35	ILL	5	F	5	28.5	485	
35	ILL	31	F	1	22.8	246	1 statolith
35	ILL	34	F	3	25.0	328	
35	ILL	41	F	4	25.5	313	
35	ILL	54	F	4	26.2	358	
35	ILL	77	F	4	26.2	340	
35	ILL	81	M	6	19.9	198	
35	ILL	82	M	4	20.9	228	
35	ILL	103	M	5	20.9	211	

February 18th

After performing three overnight CTD stations, there was a long steam towards the next station in deeper waters. The seas were rough during the day and the only trawl of the day was completed in the evening (19:00). Given sea conditions, collection of statoliths was difficult and resulted in a greater number of squid from which only a single statolith was collected.

Trawl 45.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	5	20	47.31314	60.55313	261	
End			47.32289	60.55963	262	0.01398

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl45	121.13	2.98	7.78	0.29	6.08	-	-	6.584	RGR	-	-

Statolith collection (N = 50 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
20	ILL	1	M	5	21.5	305	
20	ILL	2	F	1	23.0	280	
20	ILL	3	F	3	25.4	357	
20	ILL	4	M	4	22.9	308	
20	ILL	5	M	4	22.6	289	1 statolith

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
20	ILL	6	M	4	21.6	235	
20	ILL	7	F	3	28.0	461	
20	ILL	8	M	4	23.6	256	
20	ILL	9	F	4	30.4	538	1 statolith
20	ILL	11	M	4	23.2	280	
20	ILL	12	M	4	20.2	188	
20	ILL	13	F	3	24.5	315	1 statolith
20	ILL	14	M	4	21.6	234	
20	ILL	15	F	4	26.5	420	
20	ILL	16	F	5	26.9	412	
20	ILL	17	M	4	24.0	300	
20	ILL	18	F	2	25.6	320	
20	ILL	19	F	5	27.3	421	
20	ILL	20	F	5	23.6	277	
20	ILL	21	F	5	25.8	367	
20	ILL	23	F	5	27.7	435	
20	ILL	25	M	4	24.2	327	
20	ILL	26	F	5	26.8	425	
20	ILL	29	F	5	24.1	284	1 statolith
20	ILL	30	F	5	28.2	476	1 statolith
20	ILL	36	F	3	27.0	408	
20	ILL	37	F	3	25.2	340	1 statolith
20	ILL	38	F	4	26.0	358	
20	ILL	40	M	4	26.3	364	
20	ILL	42	F	2	24.2	285	
20	ILL	43	F	5	28.4	501	
20	ILL	44	F	3	27.7	442	
20	ILL	46	M	5	24.2	374	
20	ILL	47	M	5	23.2	301	
20	ILL	48	F	3	25.3	331	
20	ILL	49	M	6	22.5	244	
20	ILL	54	M	4	21.7	211	
20	ILL	55	F	5	25.8	353	
20	ILL	56	F	3	26.5	383	
20	ILL	60	F	4	25.9	395	
20	ILL	62	F	3	26.2	387	
20	ILL	65	M	5	24.2	384	
20	ILL	77	F	2	24.6	288	76 on label
20	ILL	78	F	4	25.5	327	1 statolith
20	ILL	79	F	3	24.9	303	
20	ILL	82	M	6	21.5	245	
20	ILL	83	F	2	27.6	388	1 statolith
20	ILL	87	M	4	20.9	210	
20	ILL	104	M	7	21.0	212	
20	ILL	126	F	7	22.3	190	

February 19th

This morning, the seas are calmer and a full day of trawl stations was expected. The first trawl hit the deck at 8:30, but the trawl had to be repeated due to issues with the net during the trawl. The trawl was repeated and on deck by 10:00. The second trawl was on deck just before noon, the third one mid-afternoon and the last one just after 19:00. The lengthy time between the third and fourth stations today was due to the long steam time between trawls 48 and 49.

Trawl 46.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	5	21	47.11699	60.46467	278	
End			47.10723	60.46105	279	0.01452

Trawl 47.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	5	22	47.07134	60.46686	250	
End			47.08144	60.47347	258	0.01348

Trawl 48.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	5	19	46.57975	60.42250	273	
End			46.57173	60.41420	273	0.01176

Trawl 49.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	25	47.15711	61.30646	135	
End			47.14651	61.31006	136	0.01312

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl46	25.45	-	6.20	-	-	-	-	5.580	RGR	-	-
Trawl47	-	-	2.43	-	1.52	0.91	-	19.780	RGR	-	-
Trawl48	-	0.47	10.88	2.05	3.65	1.44	0.27	11.990	RAL	-	-
Trawl49	0.78	18.42	11.28	0.45	1.95	-	-	-	-	0.55	5.00

Statolith collection (N = 22 ILL; 17 LOL):

Station	Species	Serial No	Sex	Maturity	Length (mm)	Weight (g)	Notes
21	ILL	1	M	4	22.0	246	
21	ILL	3	F	1	25.3	343	
21	ILL	5	F	2	26.4	404	
21	ILL	6	F	3	24.6	310	
21	ILL	9	F	2	26.5	391	
21	ILL	19	F	1	24.0	315	1 statolith
21	ILL	24	F	3	28.1	477	
21	ILL	35	F	4	28.8	455	
21	ILL	36	F	1	23.9	305	
21	ILL	37	F	2	28.0	467	
21	ILL	38	M	5	23.2	323	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
21	ILL	43	M	4	25.0	353	
21	ILL	44	F	2	23.8	249	
21	ILL	47	M	4	25.9	399	
21	ILL	52	F	2	28.0	430	
21	ILL	53	F	3	23.6	280	
21	ILL	56	F	3	25.5	306	
21	ILL	58	F	4	25.5	330	
21	ILL	61	M	5	22.5	306	
21	ILL	65	F	4	24.7	352	
21	ILL	71	F	1	24.5	313	
21	ILL	75	F	2	23.2	237	
25	LOL	1	M	2	9.1	23	
25	LOL	2	M	2	7.5	15	
25	LOL	3	M	2	10.0	29	
25	LOL	4	F	4	11.2	41	
25	LOL	5	M	2	10.0	27	
25	LOL	6	M	3	12.0	49	
25	LOL	7	M	1	9.1	19	
25	LOL	8	M	1	7.1	13	
25	LOL	9	M	3	10.7	36	
25	LOL	10	M	1	7.8	16	
25	LOL	11	M	1	7.4	14	
25	LOL	12	M	2	9.2	24	
25	LOL	13	M	1	7.0	11	
25	LOL	14	F	2	10.0	30	
25	LOL	15	M	1	7.4	14	
25	LOL	16	M	1	7.5	16	
25	LOL	17	M	2	8.0	20	

February 20th

Expected winds of 45-50 knots cut the day short after a single trawl that was on deck before 8:00.

Trawl 50.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	24	47.13535	61.41357	137	
End			47.12604	61.42046	142	0.01139

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl50	3.54	0.79	5.84	0.38	1.17	-	-	-	-	0.90	-

Statolith collection (N = 5 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
24	ILL	1	F	5	21.5	209	
24	ILL	3	M	6	22.2	271	1 statolith
24	ILL	7	M	6	20.9	186	
24	ILL	10	F	6	24.0	239	
24	ILL	14	F	7	21.3	166	

February 21st

Four trawls were completed on the day. However, the first trawl had to be repeated three times due to big swells that caused issues with the net opening during the first attempt and the doors getting tangled during the second attempt. Therefore, first successful trawl of the day was on deck just before noon.

Trawl 51.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	27	47.28855	62.36382	122	
End			47.29380	62.37647	121	0.01198

Trawl 52.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	28	47.30599	62.47280	122	
End			47.30793	62.48778	121	0.01175

Trawl 53.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	29	47.04958	62.48331	117	
End			47.05379	62.49601	117	0.01300

Trawl 54.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	4	30	47.01690	62.57439	116	
End			47.02639	62.57947	115	0.01231

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl51	371.58	0.50	0.64	3.61	5.12	-	-	7.266	RBR	1.67	-
Trawl52	12.93	0.30	0.65	-	0.80	-	-	36.426	RBR	2.68	2.46
Trawl53	11.43	0.10	0.64	-	4.24	-	-	2.720	RBR	-	-
Trawl54	6.45	0.13	-	-	38.10	-	-	5.876	RBR	1.15	-

Statolith collection (N = 31 ILL):

Station	Species	Serial No	Sex	Maturity	Length (mm)	Weight (g)	Notes
27	ILL	4	F	7	24.2	238	
27	ILL	16	F	2	27.4	396	
27	ILL	20	M	5	25.2	388	
27	ILL	26	F	1	24.5	306	
27	ILL	29	M	6	22.0	219	
27	ILL	30	F	7	25.0	302	
27	ILL	37	F	7	23.7	249	
27	ILL	40	F	8	22.6	214	
27	ILL	76	F	8	23.2	197	Ided as 77
27	ILL	90	F	7	25.2	227	
27	ILL	93	M	3	22.9	235	
27	ILL	100	F	7	23.2	263	
27	ILL	102	M	7	21.0	194	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
27	ILL	112	M	6	24.3	298	
27	ILL	142	F	8	22.6	149	1 statolith
28	ILL	5	M	7	21.2	168	
28	ILL	9	M	6	18.8	164	
28	ILL	20	M	7	15.4	89	1 statolith
28	ILL	22	M	7	15.7	121	
28	ILL	25	M	6	23.1	339	
28	ILL	31	M	7	19.2	137	
28	ILL	43	M	7	19.7	161	
29	ILL	3	M	7	20.0	210	
29	ILL	8	M	6	17.2	159	
29	ILL	9	M	6	17.9	159	
29	ILL	11	M	6	18.1	159	
29	ILL	28	F	7	21.2	237	
29	ILL	39	F	3	20.6	194	
29	ILL	42	F	6	22.3	235	
29	ILL	44	M	5	19.1	172	
30	ILL	10	F	2	26.6	361	

February 22nd

Six trawls were completed on the day without any issues.

Trawl 55.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	40	47.17684	63.01960	117	
End			47.18659	63.02201	117	0.01096

Trawl 56.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	47	47.23771	63.26324	118	
End			47.24772	63.26639	119	0.01219

Trawl 57.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	48	47.28473	63.28469	119	
End			47.29443	63.28847	119	0.01058

Trawl 58.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	49	47.33506	63.33208	119	
End			47.34385	63.33722	119	0.01084

Trawl 59.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	50	47.42806	63.33582	116	
End			47.43582	63.33662	115	0.00937

Trawl 60.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	54	47.45763	63.02918	111	
End			47.46691	63.03135	111	0.01149

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl55	2.84	0.57	0.29	0.05	8.96	-	-	26.850	RBR	7.96	-
Trawl56	10.39	0.59	0.82	0.08	6.64	-	0.40	6.340	RFL	12.97	3.01
Trawl57	5.66	1.39	7.88	0.12	2.60	-	-	8.642	RFL	33.44	-
Trawl58	0.27	-	1.46	0.19	1.06	-	-	3.734	RFL	2.06	2.32
Trawl59	-	0.17	0.74	-	0.45	-	0.33	6.040	RBR	3.89	1.00
Trawl60	0.30	0.03	0.38	-	0.78	-	-	3.324	RBR	1.85	-

Statolith collection (N = 34 ILL; 20 LOL):

Station	Species	Serial No	Sex	Maturity	Length (mm)	Weight (g)	Notes
40	ILL	1	M	6	18.8	148	
40	ILL	2	M	6	19.1	188	
40	ILL	3	M	6	16.2	129	1 statolith
40	ILL	4	M	6	19.0	164	
40	ILL	5	M	7	17.1	124	
40	ILL	9	F	6	24.0	270	
40	ILL	11	M	6	17.1	126	
40	ILL	12	F	7	24.4	315	
40	ILL	13	M	6	23.0	279	
40	ILL	14	F	5	22.4	253	
40	ILL	15	M	7	19.5	147	
40	ILL	16	M	6	17.1	155	
47	ILL	5	F	1	11.3	28	
47	ILL	10	F	4	27.0	404	
47	ILL	12	M	6	21.0	224	
47	ILL	13	M	1	11.1	26	
47	ILL	14	M	6	20.5	184	
47	ILL	16	M	7	18.6	151	
47	ILL	17	M	7	16.7	114	
47	ILL	19	F	4	29.0	461	
47	ILL	21	M	5	24.3	328	
47	ILL	27	M	5	18.8	168	
47	ILL	41	M	7	18.0	96	
47	ILL	42	M	7	16.3	92	
47	ILL	44	M	7	15.3	93	
47	ILL	46	F	6	26.3	391	
47	ILL	48	F	7	23.2	223	
48	ILL	1	M	6	22.5	263	
48	ILL	4	M	6	23.1	336	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
48	ILL	6	M	6	22.6	282	
48	ILL	15	M	7	19.1	141	
48	ILL	20	F	1	13.2	45	
48	ILL	23	M	1	11.0	28	1 statolith
54	ILL	2	F	1	13.4	59	
48	LOL	1	M	4	11.8	47	
48	LOL	2	M	4	14.6	61	
48	LOL	3	M	4	14.0	58	
48	LOL	4	M	4	12.9	50	
48	LOL	5	M	4	15.3	77	
48	LOL	6	F	1	11.2	44	
48	LOL	7	M	2	13.5	57	
48	LOL	8	M	1	5.7	6	
48	LOL	9	F	1	10.1	34	
48	LOL	10	F	5	12.2	50	
48	LOL	11	F	1	8.7	23	
48	LOL	12	M	2	7.7	17	
48	LOL	13	F	1	8.5	19	
48	LOL	14	M	1	11.3	45	
48	LOL	15	F	1	10.7	43	
48	LOL	16	M	4	15.3	78	
48	LOL	17	M	3	12.0	48	
48	LOL	18	M	4	12.4	90	
48	LOL	19	M	1	6.3	9	
48	LOL	20	M	3	11.1	36	

February 23rd

The day began early knowing that a storm was approaching, thus the plan was to attempt six trawls. First trawl was on deck at 7:30, second at 10:00, and third just before noon. Between the second and third haul, the Captain advised us that the Coast Guard had given him orders to seek shelter in the Gulf of San Jorge as a storm was coming our way. The vessel immediately left the area after the third station seeking shelter. During the afternoon, it was very difficult to get any work done as the seas were rough. Given the destination, the vessel had to steam through the storm in order to reach shelter. The vessel rolled and pitched for much of the afternoon, making it difficult to concentrate on mundane tasks such as reading and data entry/analysis. Little did we know that this storm would end up costing us four and a half days of fishing…

Trawl 61.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	46	47.19072	63.45895	111	
End			47.18329	63.46872	115	0.01075

Trawl 62.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	43	47.26461	64.01265	112	
End			47.25713	64.02187	116	0.01339

Trawl 63.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	44	47.30774	64.01986	113	
End			47.29950	64.02432	112	0.01093

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl61	14.97	1.59	0.78	0.26	82.65	-	0.13	8.392	RFL	15.56	7.66
Trawl62	2.48	0.16	0.24	-	-	-	0.45	2.088	RFL	1.68	3.49
Trawl63	2.05	1.58	2.34	-	0.57	-	0.93	1.180	RMC	10.34	8.25

Statolith collection (N = 16 ILL; 19 LOL):

Station	Species	Serial No	Sex	Maturity	Length (mm)	Weight (g)	Notes
43	ILL	1	F	3	25.0	345	
43	ILL	2	F	5	25.3	351	
43	ILL	3	F	2	24.4	326	
43	ILL	4	F	3	22.9	270	
43	ILL	5	F	4	24.6	351	
43	ILL	6	F	2	23.4	271	
43	ILL	7	M	4	24.0	313	1 statolith
43	ILL	8	F	1	22.6	252	
46	ILL	2	M	4	26.2	344	
46	ILL	6	F	4	24.3	294	
46	ILL	11	F	4	24.1	316	
46	ILL	13	M	4	27.0	441	1 statolith
46	ILL	18	F	4	23.0	240	
46	ILL	22	F	6	24.5	316	
46	ILL	32	F	6	26.6	381	
46	ILL	51	M	5	24.2	283	
44	LOL	1	M	2	9.7	31	
44	LOL	2	F	1	8.8	26	
44	LOL	3	M	2	10.9	39	
44	LOL	4	F	1	9.6	33	
44	LOL	5	M	1	10.1	33	
44	LOL	6	M	1	7.5	15	
44	LOL	7	M	2	9.5	28	
44	LOL	8	M	1	8.5	18	
44	LOL	9	F	1	8.7	22	
44	LOL	10	M	2	12.3	49	
44	LOL	11	F	1	10.2	28	
44	LOL	12	M	1	8.2	20	
44	LOL	13	M	1	8.8	23	
44	LOL	14	M	2	9.7	28	
44	LOL	16	M	2	8.2	19	
44	LOL	17	M	4	15.5	71	
44	LOL	18	M	2	8.6	20	
44	LOL	19	M	1	8.9	22	
44	LOL	20	M	2	8.2	19	

February 27th

A series of CTD stations were performed overnight and the vessel then steamed the entire day towards our first trawl station. The only trawl of the day arrived on deck at 20:00. Net sonar and camera were installed. It was interesting to view the footage and data from the bridge.

Trawl 64.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	AD35	47.08713	64.25352	106	
End			47.09666	64.25327	106	0.01021

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl64	0.84	0.60	1.52	0.09	0.43	-	-	4.080	RFL	13.10	2.87

February 28th

An early start was expected as there was much to catch up on, thus the plan was to attempt five trawls. First trawl was on deck at 7:30, second at 11:00, third at 14:30, and last just after 18:00. Given the steaming distance to the next station, it was decided to call it a day. Additional footage from the net camera and sonar information were collected and viewed.

Trawl 65.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	45	47.41855	64.25134	115	
End			47.42846	64.25254	115	0.01171

Trawl 66.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	AD34	47.23602	64.25589	117	
End			47.24454	64.25795	117	0.00978

Trawl 67.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	3	42	47.11509	63.57193	107	
End			47.12490	63.57329	106	0.01101

Trawl 68.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	78	46.51583	63.26204	110	
End			46.52898	63.26497	113	0.01080

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl65	0.35	0.28	-	-	-	-	-	0.512	RMG	0.28	0.22
Trawl66	-	0.53	0.42	-	-	-	-	0.692	RPX	-	-
Trawl67	0.93	0.47	0.88	-	1.47	-	-	2.658	RFL	3.26	5.50
Trawl68	1.51	0.20	-	-	0.34	-	-	1.752	RFL	0.20	2.20

Statolith collection (N = 9 ILL; 13 LOL):

Station	Species	Serial No	Sex	Maturity	Length (mm)	Weight (g)	Notes
42	ILL	2	F	6	25.3	383	
78	ILL	1	M	7	18.6	164	
78	ILL	2	M	7	20.0	192	
78	ILL	3	F	7	24.5	208	
78	ILL	4	M	7	17.7	120	
78	ILL	5	M	7	16.0	100	1 statolith
78	ILL	6	M	7	17.5	114	
78	ILL	7	F	7	22.0	135	
78	ILL	10	M	7	16.2	79	
42	LOL	2	M	5	16.2	84	
42	LOL	3	M	5	16.3	73	
42	LOL	4	F	5	12.1	55	
42	LOL	5	F	3	9.1	23	
42	LOL	6	M	4	11.0	35	
42	LOL	7	M	4	9.6	31	
42	LOL	8	M	3	10.1	29	
42	LOL	9	M	4	12.3	49	
42	LOL	10	M	4	11.6	40	
78	LOL	1	F	5	12.6	44	
78	LOL	2	F	6	13.0	56	
78	LOL	4	F	2	9.6	30	
78	LOL	5	F	2	8.9	23	

March 1st

Another early start to still try to catch up, thus the plan was to attempt five trawls, and this was achieved! First trawl was on deck at 7:00 and the last one just after 19:30.

Trawl 69.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	77	46.39524	63.34042	117	
End			46.40297	63.33175	115	0.01011

Trawl 70.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	75	46.36575	63.08470	113	
End			46.35719	63.07753	113	0.01148

Trawl 71.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	76	46.28497	63.01675	107	
End			46.29427	63.02165	108	0.01095

Trawl 72.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	74	46.48163	62.55065	113	
End			46.49143	62.54818	114	0.01085

Trawl 73.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	69	45.55550	62.19380	119	
End			45.55243	62.20777	119	0.01150

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl69	32.89	6.15	-	-	0.39	-	-	3.030	RFL	1.19	1.16
Trawl70	15.89	0.24	0.48	-	18.75	-	0.86	1.918	RFL	3.53	2.44
Trawl71	17.31	0.12	1.58	-	11.97	-	0.25	4.654	RFL	1.95	1.51
Trawl72	3.63	0.43	1.18	-	10.86	-	0.32	17.054	RFL	4.42	7.02
Trawl73	2.68	0.62	34.94	-	10.70	-	0.71	1.526	RBR	0.92	-

Statolith collection (N = 79 ILL; 15 LOL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
69	ILL	1	M	4	21.0	192	
69	ILL	10	M	6	17.9	156	1 statolith
69	ILL	12	M	6	23.0	279	
74	ILL	13	F	4	25.4	370	
74	ILL	14	M	5	23.2	215	
75	ILL	12	F	8	23.2	135	
75	ILL	13	M	5	20.5	224	
75	ILL	14	M	7	19.1	118	1 statolith
75	ILL	15	M	7	18.8	148	
75	ILL	40	M	6	17.3	142	
75	ILL	45	F	5	27.0	362	
75	ILL	53	M	5	23.0	289	
75	ILL	55	M	7	20.4	165	
75	ILL	60	M	7	15.3	98	
75	ILL	68	F	6	27.3	358	1 statolith
75	ILL	82	F	6	23.2	235	
75	ILL	86	M	5	18.7	154	1 statolith
76	ILL	11	M	7	18.0	145	
76	ILL	16	M	7	19.9	160	
76	ILL	25	F	6	29.9	482	
76	ILL	27	M	6	16.7	129	
76	ILL	28	M	6	23.0	283	1 statolith
76	ILL	29	M	6	22.4	255	
76	ILL	30	M	6	22.3	225	
76	ILL	50	F	1	18.3	119	
76	ILL	54	F	2	25.2	283	
76	ILL	58	M	6	22.8	272	
76	ILL	59	M	5	24.0	314	
76	ILL	61	F	6	28.2	410	
76	ILL	66	M	6	16.8	169	1 statolith

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
77	ILL	1	M	7	19.3	151	
77	ILL	2	M	6	19.2	153	
77	ILL	3	M	7	16.8	115	
77	ILL	4	M	6	19.3	177	
77	ILL	5	M	6	20.1	205	
77	ILL	6	F	4	25.3	328	
77	ILL	8	F	7	25.1	261	
77	ILL	9	M	6	21.3	233	
77	ILL	10	M	5	20.5	226	
77	ILL	11	M	4	22.3	230	
77	ILL	12	F	5	25.9	337	
77	ILL	13	M	5	21.9	255	
77	ILL	15	M	7	19.4	144	1 statolith
77	ILL	16	M	6	20.2	215	
77	ILL	17	M	6	18.3	150	
77	ILL	18	M	5	21.0	208	
77	ILL	19	M	7	18.0	156	1 statolith
77	ILL	20	M	4	25.5	341	
77	ILL	22	F	5	22.6	250	
77	ILL	24	M	4	24.3	285	
77	ILL	26	F	4	26.3	343	
77	ILL	28	F	6	27.1	386	
77	ILL	29	F	8	22.5	152	
77	ILL	30	M	5	22.3	280	
77	ILL	31	F	2	24.0	244	
77	ILL	32	M	5	22.6	309	
77	ILL	34	F	6	25.3	304	
77	ILL	35	F	7	24.2	222	
77	ILL	38	F	7	23.2	186	
77	ILL	39	M	6	21.0	175	
77	ILL	46	F	5	25.2	318	
77	ILL	49	M	4	21.2	230	
77	ILL	56	M	1	13.6	44	
77	ILL	58	M	6	18.3	163	
77	ILL	59	F	8	24.5	187	
77	ILL	60	M	4	22.3	247	
77	ILL	64	F	6	25.9	331	
77	ILL	69	F	1	25.6	290	
77	ILL	71	F	2	23.1	222	1 statolith
77	ILL	74	F	5	24.2	303	1 statolith
77	ILL	76	F	7	23.4	175	
77	ILL	79	M	4	23.8	290	
77	ILL	81	F	2	24.3	267	
77	ILL	82	M	5	24.5	359	
77	ILL	83	F	2	23.2	251	1 statolith
77	ILL	89	M	7	15.3	74	
77	ILL	90	M	6	23.7	345	
77	ILL	106	M	1	13.2	44	
74	LOL	1	M	1	5.1	7	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
74	LOL	2	F	1	9.0	27	
74	LOL	3	F	4	11.7	45	B
74	LOL	4	M	1	9.2	27	
74	LOL	5	M	2	8.3	19	
74	LOL	6	M	3	8.7	24	
74	LOL	7	M	1	5.8	6	
74	LOL	8	M	1	10.1	31	
74	LOL	9	M	1	9.0	24	
74	LOL	10	F	1	11.4	48	
74	LOL	11	F	5	12.2	47	B
74	LOL	12	M	1	9.9	28	
74	LOL	14	M	1	6.5	10	
74	LOL	15	F	2	10.0	31	
74	LOL	16	M	2	8.5	21	

March 2nd

Anthoer early start still trying to catch up, thus the plan was to attempt six trawls, and this was achieved without any issues! First trawl was on deck at 7:00 and the last one just after 20:00.

Trawl 74.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	67	46.36128	62.20021	115	
End			46.35153	62.19923	114	0.01106

Trawl 75.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	68	46.38409	62.06349	113	
End			46.39338	62.05850	113	0.01107

Trawl 76.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	70	46.48968	61.48816	123	
End			46.49535	61.47659	126	0.01106

Trawl 77.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	71	46.49076	61.35801	137	
End			46.48172	61.35335	138	0.01246

Trawl 78.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	72	46.39871	61.14896	139	
End			46.39090	61.14050	139	0.01122

Trawl 79.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	73	46.31075	61.13266	138	
End			46.30106	61.13313	138	0.01053

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl74	3.64	0.25	0.68	-	70.14	-	0.70	3.228	RBR	0.50	-
Trawl75	3.88	0.29	25.70	0.06	13.65	-	-	2.766	RFL	0.53	-
Trawl76	1.70	0.20	0.13	-	20.92	-	-	5.928	RBR	-	-
Trawl77	2.12	0.42	4.62	5.10	18.32	-	-	4.240	RFL	0.79	-
Trawl78	0.17	0.55	1.68	0.04	6.88	-	-	4.534	RBR	1.24	-
Trawl79	3.39	0.31	0.10	0.14	4.74	-	-	3.108	RBR	1.79	1.70

Statolith collection (N = 8 ILL; 31 LOL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
67	ILL	5	F	5	27.7	360	
68	ILL	13	M	4	23.0	258	
70	ILL	2	F	3	22.0	197	
71	ILL	10	F	3	22.0	231	
73	ILL	2	F	3	24.2	283	
73	ILL	3	F	5	23.5	331	
73	ILL	5	F	6	22.2	197	1 statolith
73	ILL	7	F	6	29.3	406	
72	LOL	1	M	1	5.1	5	
72	LOL	2	F	2	9.7	29	
72	LOL	3	M	2	10.0	29	
72	LOL	4	F	2	10.7	35	
72	LOL	5	F	3	9.4	33	
72	LOL	6	M	2	9.5	26	
72	LOL	7	F	1	9.0	20	
72	LOL	8	M	1	8.5	19	
72	LOL	9	M	2	8.5	19	
72	LOL	10	F	1	9.5	25	
72	LOL	11	F	2	9.9	28	
72	LOL	12	M	1	8.6	20	
72	LOL	13	M	1	9.4	23	
72	LOL	14	M	1	6.0	7	
72	LOL	15	F	1	8.7	20	
72	LOL	16	F	1	8.9	19	
72	LOL	17	F	1	8.2	16	
72	LOL	18	M	1	8.3	18	
72	LOL	19	F	1	8.2	16	
72	LOL	20	F	1	5.3	6	
72	LOL	21	F	1	6.9	10	
72	LOL	22	F	1	8.5	20	
72	LOL	23	M	1	7.2	15	
72	LOL	24	F	1	8.0	17	
72	LOL	25	F	1	8.3	17	
72	LOL	26	M	1	8.1	19	
72	LOL	27	M	1	6.9	10	
72	LOL	28	J	0	5.3	5	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
72	LOL	29	F	1	6.0	7	
72	LOL	30	F	1	5.5	5	
72	LOL	31	F	1	6.3	8	

March 3rd

Another early start still trying to catch up, thus the plan was to attempt six trawls, and this was achieved without any issues! First trawl was on deck at 7:30 and the last one just after 19:00.

Trawl 80.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	65	46.40141	60.49692	152	
End			46.39361	60.50847	152	0.01197

Trawl 81.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	5	23	46.40544	60.33234	252	
End			46.39685	60.32481	249	0.01388

Trawl 82.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	5	18	46.32388	60.19272	394	
End			46.31576	60.19255	382	0.01175

Trawl 83.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	64	46.26106	60.34976	150	
End			46.25152	60.34964	157	0.01215

Trawl 84.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	63	46.17635	60.34998	144	
End			46.16695	60.34494	147	0.01269

Trawl 85.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	62	46.02662	60.45360	128	
End			46.01707	60.45268	129	0.01021

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl80	12.61	0.41	1.72	0.43	6.74	-	-	8.048	RBR	-	-
Trawl81	1.34	1.19	14.80	0.11	16.54	-	-	-	-	-	-
Trawl82	3.85	-	13.06	-	1.26	-	51.10	1.720	RAL	-	-
Trawl83	33.62	0.28	3.16	0.17	2.58	-	-	2.244	RBR	0.18	-
Trawl84	1.81	0.37	4.06	0.19	7.82	-	-	9.120	RBR	-	-
Trawl85	7.76	0.30	1.65	-	4.59	-	-	10.208	RBR	-	-

Statolith collection (N = 64 ILL; 30 LOL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
18	ILL	3	M	6	23.0	294	
18	ILL	5	M	7	15.6	99	
18	ILL	6	M	5	22.4	344	
18	ILL	8	M	7	16.8	89	
18	ILL	11	F	5	24.7	318	
18	ILL	13	M	7	15.1	86	
18	ILL	15	M	7	21.2	135	
23	ILL	1	M	7	16.2	80	
23	ILL	2	M	7	20.2	157	
23	ILL	3	F	5	21.5	228	1 statolith
23	ILL	4	M	7	16.7	96	1 statolith
23	ILL	6	M	7	17.2	104	
23	ILL	7	M	7	18.3	130	
23	ILL	8	F	1	20.0	184	
23	ILL	9	M	7	18.6	153	1 statolith
62	ILL	6	M	7	14.4	108	
62	ILL	18	F	8	24.3	175	
62	ILL	22	M	5	17.8	147	
62	ILL	25	M	7	21.5	184	
62	ILL	47	F	8	22.1	113	
64	ILL	1	F	5	31.2	636	1 statolith
64	ILL	2	F	4	24.5	322	
64	ILL	14	M	5	26.0	408	
64	ILL	16	F	5	24.6	349	
64	ILL	17	F	6	24.0	320	1 statolith
64	ILL	25	F	5	26.0	337	1 statolith
64	ILL	26	M	4	20.5	177	
64	ILL	33	F	4	24.0	325	
64	ILL	42	F	5	23.6	256	
64	ILL	44	F	4	23.2	244	
64	ILL	50	M	5	19.5	205	
64	ILL	64	F	4	27.3	426	
64	ILL	68	F	1	20.9	186	
64	ILL	81	F	5	26.6	397	
64	ILL	88	M	6	16.9	121	
64	ILL	89	F	5	22.3	263	
64	ILL	109	M	5	18.4	167	
64	ILL	110	F	4	27.2	397	
64	ILL	115	F	4	23.2	246	1 statolith
64	ILL	131	M	4	19.4	178	1 statolith
65	ILL	2	F	2	23.5	271	
65	ILL	4	F	3	25.2	345	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
65	ILL	5	F	5	24.5	321	
65	ILL	6	F	7	20.7	173	1 statolith
65	ILL	8	F	1	24.5	293	
65	ILL	9	F	6	23.9	258	
65	ILL	10	F	1	22.5	211	
65	ILL	12	F	2	22.6	226	1 statolith
65	ILL	13	M	4	20.7	183	1 statolith
65	ILL	14	F	3	28.7	458	
65	ILL	17	M	3	18.2	153	
65	ILL	19	F	1	21.3	200	
65	ILL	23	M	4	20.3	191	
65	ILL	24	F	3	25.1	314	
65	ILL	25	F	2	22.7	259	1 statolith
65	ILL	26	F	1	22.5	222	
65	ILL	27	F	1	20.5	180	
65	ILL	29	F	1	23.7	282	1 statolith
65	ILL	32	F	1	23.1	232	
65	ILL	34	F	8	26.1	272	
65	ILL	47	M	2	21.0	180	
65	ILL	48	F	2	21.6	213	
65	ILL	49	F	1	22.3	220	
65	ILL	53	F	2	21.2	184	
62	LOL	1	M	4	18.8	107	
63	LOL	1	F	2	8.9	26	
63	LOL	2	F	2	9.6	27	
63	LOL	3	M	1	5.7	7	
63	LOL	4	F	1	7.1	13	
63	LOL	5	M	1	6.9	12	
63	LOL	6	M	1	6.5	10	
63	LOL	7	F	2	10.0	29	
63	LOL	8	M	2	9.4	28	
63	LOL	9	F	2	9.4	26	
63	LOL	10	M	1	5.6	8	
63	LOL	11	F	2	12.7	35	
63	LOL	12	F	2	9.3	26	
63	LOL	13	F	1	5.2	7	
63	LOL	14	F	1	5.6	7	
63	LOL	15	F	1	5.9	13	
63	LOL	16	F	1	5.9	10	
63	LOL	17	F	1	5.0	6	
63	LOL	18	F	1	5.4	6	
63	LOL	19	M	1	6.0	9	
63	LOL	20	F	1	7.1	13	
63	LOL	21	J	0	5.7	7	
63	LOL	22	F	1	6.8	9	
63	LOL	23	F	1	6.0	8	
63	LOL	24	J	0	5.1	5	
63	LOL	25	F	1	4.7	4	
63	LOL	26	J	0	4.5	5	

Statolith collection ctd.

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
63	LOL	27	M	1	5.5	6	
63	LOL	28	J	0	5.0	5	
63	LOL	29	J	0	4.8	4	

March 4th

The last scheduled trawl of the research cruise arrived on deck around 10:30 and once processed, we spent several hours cleaning the factory and gear. The vessel then steamed back towards Mar del Plata.

Trawl 86.

	Stratum	Station	Latitude (°S)	Longitude (°W)	Depth (m)	Area (nM^2)
Start	2	66	46.12472	62.06490	109	
End			46.11573	62.06009	109	0.01032

Catch log – in kg; RAY correspond to the most abundant (by weight) species in the catch.

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	RAY	Species	DGH	DGS
Trawl86	17.60	0.31	1.58	-	16.64	-	0.36	9.364	RFL	5.06	2.27

Statolith collection (N = 4 ILL):

Station	Species	Serial No	Sex	Maturity	Length (cm)	Weight (g)	Notes
66	ILL	15	M	5	19.8	202	
66	ILL	33	F	8	23.6	196	
66	ILL	65	F	8	23.2	184	
66	ILL	95	F	7	22.0	165	

Catches per stratum:

Table 1. *Cumulative catches of squid, finfish, and sharks per stratum – in kg*

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	BLU	GRX	DGH	DGS
Stratum2	162.18	11.44	83.25	6.13	226.03	-	3.21	-	-	22.30	18.30
Stratum3	326.82	25.19	68.26	2.07	134.85	-	3.01	-	-	125.32	57.52
Stratum4	545.24	25.33	59.77	15.63	121.54	-	-	-	-	17.90	19.49
Stratum5	221.81	2.14	57.41	4.85	28.78	9.09	51.37	-	-	-	-
Stratum8	651.32	31.06	66.48	7.02	79.56	-	-	-	-	107.55	32.52
Stratum9	6.96	16.75	25.81	8.16	13.52	-	0.08	-	-	1.10	4.26
Stratum14	605.42	57.18	11.91	58.81	26.89	-	0.13	-	-	15.20	18.90

Table 2. *Cumulative catches of skates per stratum – in kg*

Species	RAL	RBR	RBZ	RDO	RFL	RGR	RMC	RMG	RPX	RSC	SYM
Stratum2	-	61.41	-	-	54.12	-	5.54	-	12.84	-	-
Stratum3	-	76.53	-	-	62.21	-	28.29	11.99	47.98	-	-
Stratum4	9.82	75.95	-	-	30.54	-	28.90	-	26.74	0.78	-
Stratum5	13.71	10.27	2.13	2.49	-	31.94	-	-	-	1.00	-
Stratum8	-	49.49	-	-	11.46	-	26.31	18.96	47.45	-	-
Stratum9	-	7.07	-	-	10.96	-	13.78	-	8.84	-	-
Stratum14	-	10.72	-	-	12.56	-	28.88	0.95	38.69	-	-

CPUE per stratum:

Table 3. *CPUE of squid, finfish, and sharks per stratum – in kg/hr*

Species	ILL	LOL	PAR	BAC	KIN	TOO	WHI	BLU	GRX	DGH	DGS
Stratum2	38.16	2.69	19.59	1.44	53.18	-	0.76	-	-	5.25	4.31
Stratum3	50.80	3.92	10.61	0.32	20.96	-	0.47	-	-	19.48	8.94
Stratum4	137.46	6.39	15.07	3.94	30.64	-	-	-	-	4.51	4.91
Stratum5	147.87	1.43	38.27	3.23	19.19	6.06	34.25	-	-	-	-
Stratum8	252.12	12.02	25.73	2.72	30.80	-	-	-	-	41.63	12.59
Stratum9	5.49	13.22	20.38	6.44	10.67	-	0.06	-	-	0.87	3.36
Stratum14	336.34	31.77	6.62	32.67	14.94	-	0.07	-	-	8.44	10.50

Table 4. *CPUE of skates per stratum – in kg/hr*

Species	RAL	RBR	RBZ	RDO	RFL	RGR	RMC	RMG	RPX	RSC	SYM
Stratum2	-	14.45	-	-	12.73	-	1.30	-	3.02	-	-
Stratum3	-	11.90	-	-	9.67	-	4.40	1.86	7.46	-	-
Stratum4	2.48	19.15	-	-	7.70	-	7.29	-	6.74	0.20	-
Stratum5	9.14	6.85	1.42	1.67	-	21.29	-	-	-	0.67	-
Stratum8	-	19.16	-	-	4.44	-	10.18	7.34	18.37	-	-
Stratum9	-	5.58	-	-	8.65	-	10.88	-	6.98	-	-
Stratum14	-	5.96	-	-	6.98	-	16.04	0.53	21.49	-	-

Benthos

Table 5. *Benthos per trawl (kg)*

Trawl	Station	Stratum	Benthos (kg)	Notes
1	AD141	14	0.52	
2	1	14	4.56	Sea urchins and anemones
3	3	14	9.38	
4	4	14	8.50	
5	2	14	4.76	
6	AD142	14	52.30	
7	5	14	5.36	
8	16	8	4.00	
9	AD83	8	10.32	
10	AD82	8	20.56	
11	AD81	8	-	
12	12	8	7.80	
13	15	8	14.36	
14	14	8	8.44	
15	13	8	29.32	
16	17	8	12.02	
17	11	8	-	
18	10	9	3.06	
19	9	9	25.22	
20	8	9	2.54	
21	7	9	-	
22	6	9	-	
23	39	4	46.96	
24	38	4	62.68	
25	37	4	31.36	
26	61	3	-	
27	56	3	7.00	Includes 2.86 kg of *Macrocystis*
28	57	3	13.96	
29	58	3	0.36	
30	59	3	0.54	
31	60	3	23.54	
32	AD31	3	25.92	
33	AD32	3	23.92	
34	53	3	21.74	
35	52	3	24.30	
36	51	3	36.92	
37	41	3	38.00	
38	55	3	8.76	
39	31	4	20.70	
40	32	4	2.96	
41	33	4	9.70	
42	34	4	22.12	

Benthos per trawl (kg)

Trawl	Station	Stratum	Benthos (kg)	Notes
43	35	4	3.40	
44	36	4	2.66	
45	20	5	2.16	
46	21	5	0.16	
47	22	5	-	
48	19	5	0.82	
49	25	4	37.84	
50	24	4	17.60	
51	27	4	8.82	
52	28	4	16.12	
53	29	4	0.36	
54	30	4	-	
55	40	3	1.74	
56	47	3	40.54	
57	48	3	84.46	
58	49	3	53.44	
59	50	3	32.70	
60	54	3	0.40	
61	46	3	20.96	
62	43	3	2.92	
63	44	3	32.54	
64	AD35	3	-	
65	45	3	5.54	
66	AD34	3	-	
67	42	3	2.98	
68	78	2	3.82	
69	77	2	5.50	
70	75	2	14.92	
71	76	2	36.74	
72	74	2	9.12	
73	69	2	3.02	
74	67	2	21.84	
75	68	2	7.06	
76	70	2	2.57	
77	71	2	-	
78	72	2	2.21	
79	73	2	9.66	
80	65	2	1.80	
81	23	5	0.03	Skate eggs
82	18	5	0.01	
83	64	2	1.52	
84	63	2	0.22	
85	62	2	3.28	
86	66	2	10.52	

Biological data:

Illex argentinus* (ILL) – Figures 2 – 5; Tables 6 - 8*:

The length distribution of *Illex argentinus* is similar between strata (Figure 2), but there is a greater proportion of males in stratum 2 and a greater proportion of females in strata 8 and 14 relative to the others. A total of 3,452 ILL (1,622 females, 1,829 males, 1 undetermined sex) was sampled from seven strata; 809 from stratum 2 (117 females and 692 males), 626 from stratum 3 (364 females and 262 males), 682 from stratum 4 (308 females, 374 males), 249 from stratum 5 (128 females and 121 males), 741 from stratum 8 (479 females, 262 males), 27 from stratum 9 (16 females, 10 males, and 1 undetermined sex), and 318 from stratum 14 (210 females, 108 males).

From the length-weight relationships in different strata some trends emerge. The most notable is that generally, there is little difference in weight for a given length between immature males and females. Males mature at smaller sizes, hence by the time they reach 220 mm, most males are mature (stage IV or V), while females at that size are generally still at stages I, II, or III. The length-weight relationship in males predicts that males, as they grow to very large sizes (> 250 mm) would become much heavier than females. However, this is rarely the case as males somatic growth decreases substantially from about 220 mm, and larger males would most likely enter stages VI and VII, be spent, with thinning mantle. In strata 2 – 5, we observe that males in the 175-200 mm range are much heavier than females of similar sizes (Table 8). This relates to females at that size being immature, whereas majority of males in this range from this stratum are spent (stages VI or VII), thus having a thin mantle, but fully developed gonad. This suggests that in strata 2 – 5 (in the north of the survey area), there is a mix of Summer and Winter spawning stocks of ILL, whereas in strata 8, 9, and 14 (in the south of the survey area), only the Winter spawning stock is found.

Stratum 2:

In stratum 2, males were significantly more abundant than females and measured on average 196.9 mm (range 132.0 to 263.0 mm DML; median = 196.0 mm; N = 692), and females 241.2 mm (range 183.0 to 312.0 mm DML; median = 242.0 mm; N = 117) (Figure **2**). The majority of males were spent with 78.9% of males in stages VI and VII, whereas the majority of females were in stage V (21.4%) with a large proportion in stages I and II (16.2 and 14.5%, respectively) (Figure **2**). This is indicative of a mixed population consisting of summer and winter spawning stocks. When looking at these two stocks more closely, we find that male individuals comprising the summer spawning stock are generally smaller than those from the winter spawning stock, whereas females are of approximately the same size (Figure **3**). Males of the summer spawning stock measured on average 191.3 mm (range 144.0 to 238.0 mm DML; median = 192.0 mm; N = 546), and females 245.8 mm (range 207.0 to 299.0 mm DML; median = 243.0 mm; N = 37). Males of the winter spawning stock measured on average 217.8 mm (range 132.0 to 263.0 mm DML; median = 220.0 mm; N = 146), and females 239.0 mm (range 183.0 to 312.0 mm DML; median = 241.0 mm; N = 80). Examining the length-weight relationships, males are generally heavier than females at the same size (Figure **4**; Table **6**) and this is true for both stocks (Figure **5**; Table **7**).

Stratum 3:

In stratum 3, females were significantly more abundant than males. Males measured on average 215.3 mm (range 90.0 to 270.0 mm DML; median = 222.0 mm; N = 262), and females 239.7 mm (range 95.0 to 290.0 mm DML; median = 240.0 mm; N = 364) (Figure **2**). The majority of males were in stage IV (65.5%), whereas the majority of females were in stages I and II (25.3 and 37.4%, respectively) (Figure **2**), with fewer than 20% of males and 4% of females being spent. *Illex* in stratum 3 consist of a mixed population of summer and winter spawning stocks. When looking at these two stocks more closely, the population is dominated by individuals of the winter spawning stock (89.9%) where male individuals comprising the summer spawning stock are

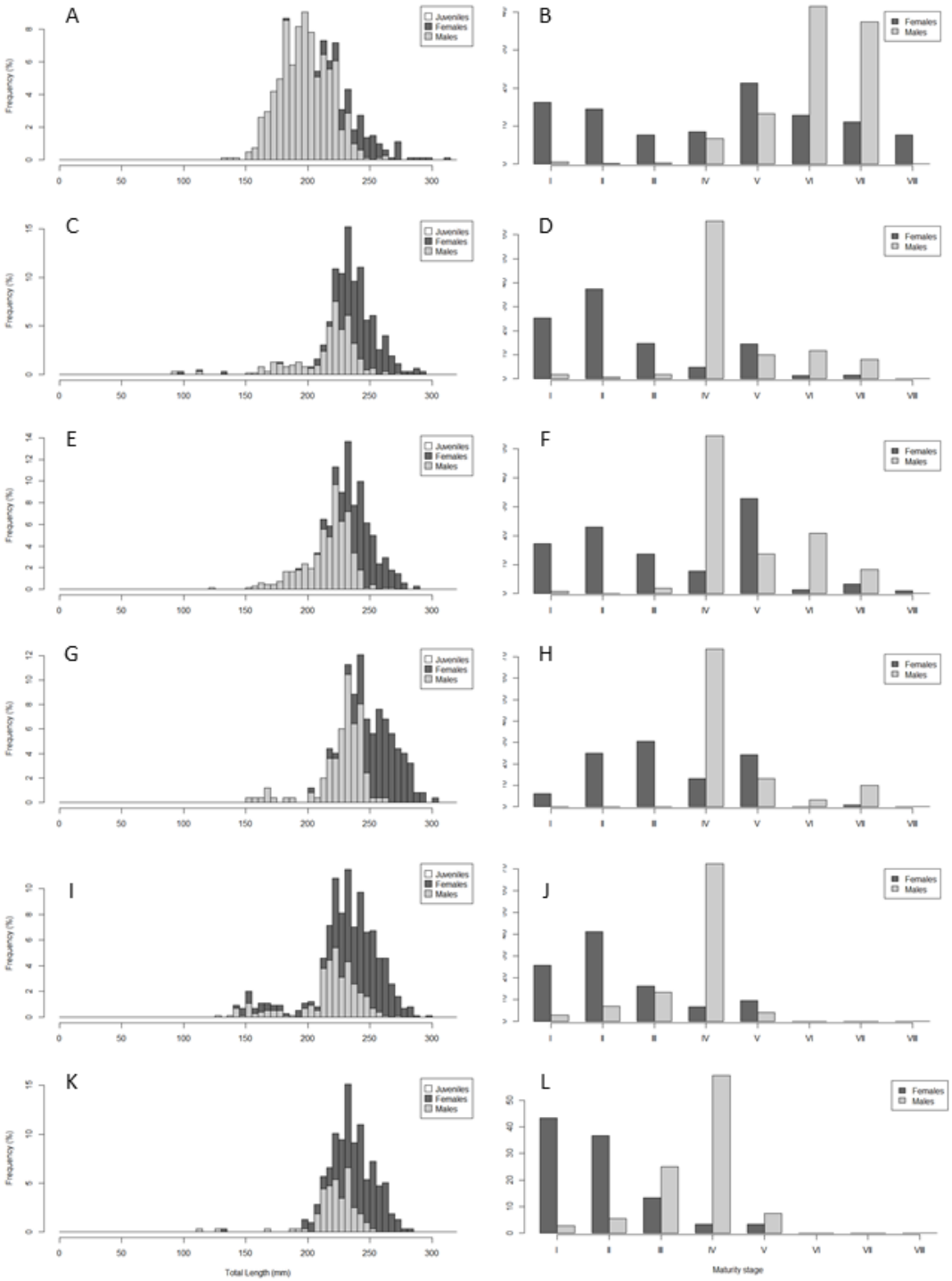

Figure 2. Length frequency distribution (A, C, E, G, I, K) and proportion of the different stages of maturity (B, D, F, H, J, L) for *Illex argentinus* in strata 2 (A, B), 3 (C, D), 4 (E, F), 5 (G, H), 8 (I, J), and 14 (K, L). Of note, graphs for the 27 *Illex* individuals processed from stratum 9 are not included in this figure.

generally smaller than those from the winter spawning stock, and females are of approximately the same size (Figure **3**). Males of the summer spawning stock measured on average 186.6 mm (range 153.0 to 231.0 mm DML; median = 182.0 mm; N = 52), and females 236.3 mm (range 201.0 to 266.0 mm DML; median = 244.0 mm; N = 11). Males of the winter spawning stock measured on

average 222.4 mm (range 90.0 to 270.0 mm DML; median = 223.5 mm; N = 210), and females 239.8 mm (range 95.0 to 290.0 mm DML; median = 240.0 mm; N = 353). Examining the length-weight relationships, males are generally heavier than females at the same size (Figure **4**; Table **6**) and this is true for both stocks (Figure **5**; Table **7**).

Stratum 4:

In stratum 4, males were slightly more abundant than females. Males measured on average 215.4 mm (range 123.0 to 265.0 mm DML; median = 222.0 mm; N = 374), and females 242.9 mm (range 192.0 to 285.0 mm DML; median = 243.0 mm; N = 308) (Figure **2**). The majority of males were in stage IV (54.5%) with almost 30% being spent (stages VI – VIII), whereas the majority of females were in stage V (32.8%), with less than 6% spent and a fair proportion of females in stages I and II (17.2 and 23.1%, respectively) (Figure **2**). *Illex* in stratum 4 consist of a mixed population of summer and winter spawning stocks. When looking at these two stocks more closely, the population is dominated by individuals of the winter spawning stock (81.5%) where male individuals comprising the summer spawning stock are generally smaller than those from the winter spawning stock, and females are of approximately the same size (Figure **3**). Males of the summer spawning stock measured on average 195.9 mm (range 154.0 to 243.0 mm DML; median = 195.0 mm; N = 109), and females 234.5 mm (range 212.0 to 255.0 mm DML; median = 237.0 mm; N = 17). Males of the winter spawning stock measured on average 223.5 mm (range 123.0 to 265.0 mm DML; median = 224 mm; N = 265), and females 243.4 mm (range 192.0 to 285.0 mm DML; median = 243.0 mm; N = 291). Examining the length-weight relationships, males are generally heavier than females at the same size (Figure **4**; Table **6**) and this is true for both stocks (Figure **5**; Table **7**), although females from the winter spawning stock tend to be heavier than males when > *c.*275 mm (Figure **5**; Table **8**). Given the large contribution of the winter spawning stock to the overall population in this stratum, females are generally heavier than males at DML > 280.5 mm (Figure **4**; Table **1**Table **8**).

Stratum 5:

In stratum 5, males and females each comprised approximately 50% of the population. Males measured on average 226.7 mm (range 151.0 to 263.0 mm DML; median = 232.0 mm; N = 121), and females 258.9 mm (range 200.0 to 304.0 mm DML; median = 259.5 mm; N = 128) (Figure **2**). The majority of males were in stages II, III, and V (25.0, 30.5, and 24.2%, respectively), whereas the majority of females were in stage IV (73.6%) (Figure **2**). Less than 1% of males and 13% of females were spent. *Illex* in stratum 5 consist of a mixed population of summer and winter spawning stocks. When looking at these two stocks more closely, we find that the population is dominated by individuals of the winter spawning stock (93.2%) where male individuals comprising the summer spawning stock are generally smaller than those from the winter spawning stock (Figure **3**). Males of the summer spawning stock measured on average 189.7 mm (range 151.0 to 230.0 mm DML; median = 184.5 mm; N = 16), and the lone female sampled measured 223.0 mm. Males of the winter spawning stock measured on average 232.3 mm (range 202.0 to 263.0 mm DML; median = 234 mm; N = 105), and females 259.1 mm (range 200.0 to 304.0 mm DML; median = 260.0 mm; N = 127). Examining the length-weight relationships, males are generally heavier than females at the same size (Figure **4**; Table **6**) and this is true for the winter spawning stock as well, but was not assessed for the summer spawning stock given the low number of individuals observed (Figure **5**; Table **7**). Females from the winter spawning stock tend to be heavier than males when > 320.5 mm DML (Figure **5**).

Stratum 8:

In stratum 8, females were significantly more abundant than males. Males measured on average 216.6 mm (range 127.0 to 271.0 mm DML; median = 222.0 mm; N = 262), and females 235.8 mm (range 142.0 to 299.0 mm DML; median = 240.0 mm; N = 479) (Figure **2**). The majority of

males were in stage IV (77.9%), whereas the majority of females were in stages I and II (18.2 and 43.2%, respectively) (Figure **2**). No single male or female was spent. *Illex* in stratum 8 consist of a single population of winter spawning individuals. Examining the length-weight relationships, males are generally heavier than females at the same size (Figure **4**; Table **6**).

Stratum 9:

In stratum 9, females were significantly more abundant than males, although only 27 individuals were recovered. Males measured on average 205.4 mm (range 125.0 to 241.0 mm DML; median = 222.0 mm; N = 10), and females 238.6 mm (range 178.0 to 265.0 mm DML; median = 238.0 mm; N = 16) (Figure **2**). The majority of males were in stage IV (60.0%), whereas the majority of females were in stage II (50.0%) (Figure **2**). No single male or female was spent. A single unsexed individual was observed (240.0 mm). *Illex* in stratum 8 consist of a single population of winter spawning individuals. The length-weight relationships were not assessed given the low number of *Illex* sampled.

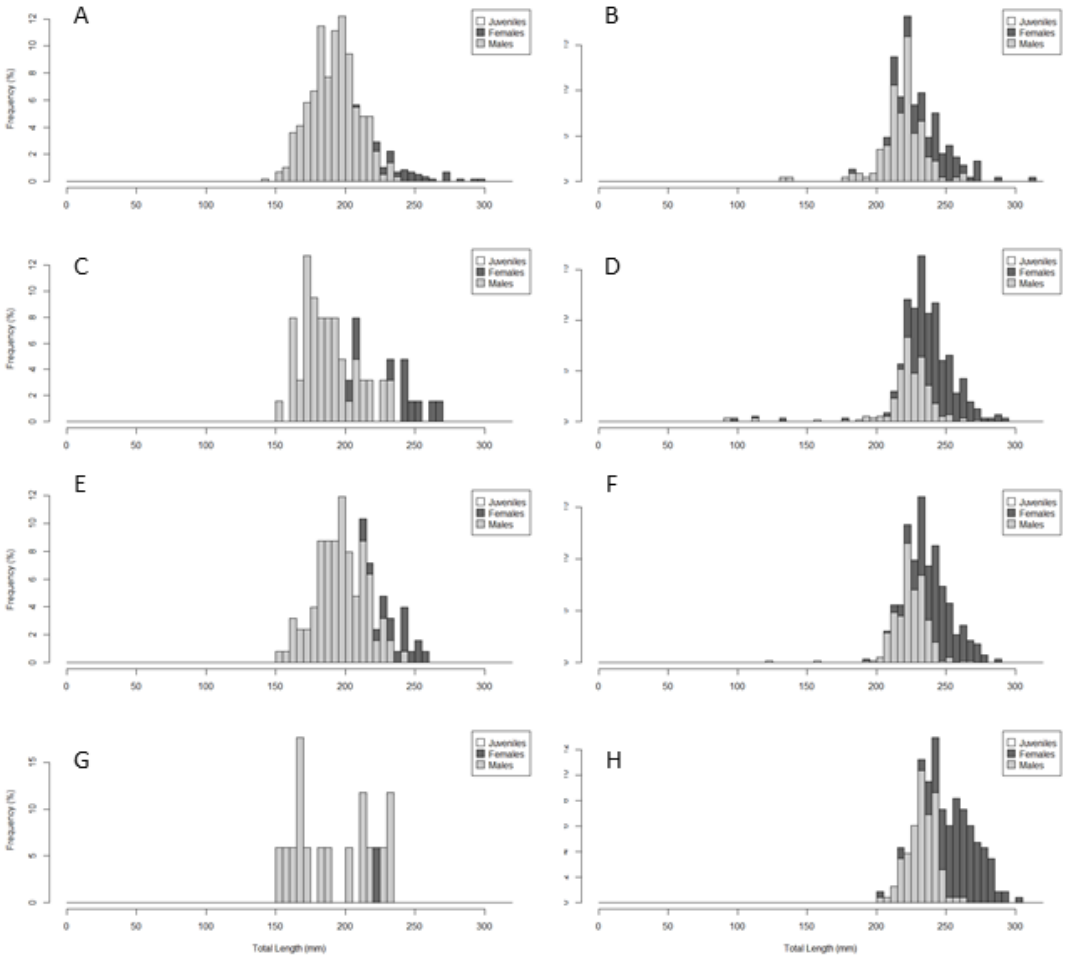

Figure 3. Length frequency distribution for *Illex argentinus* summer spawning stock (A, C, E, and G) and winter spawning stock (B, D, F, and H) in strata 2 (A, B), 3 (C, D), 4 (E, F), and 5 (G, H).

Stratum 14:

In stratum 14, females were significantly more abundant than males. Males measured on average 220.9 mm (range 111.0 to 252.0 mm DML; median = 223.0 mm; N = 108), and females 239.2 mm (range 132.0 to 280.0 mm DML; median = 240.0 mm; N = 210) (Figure **2**). The majority of males were in stage IV (59.3%), whereas the majority of females were in stages I and II (43.3 and

36.7%, respectively) (Figure **2**). No single male or female was spent. *Illex* in stratum 14 consist of a single population of winter spawning individuals. Examining the length-weight relationships, males are generally heavier than females at the same size (Figure **4**; Table **6**).

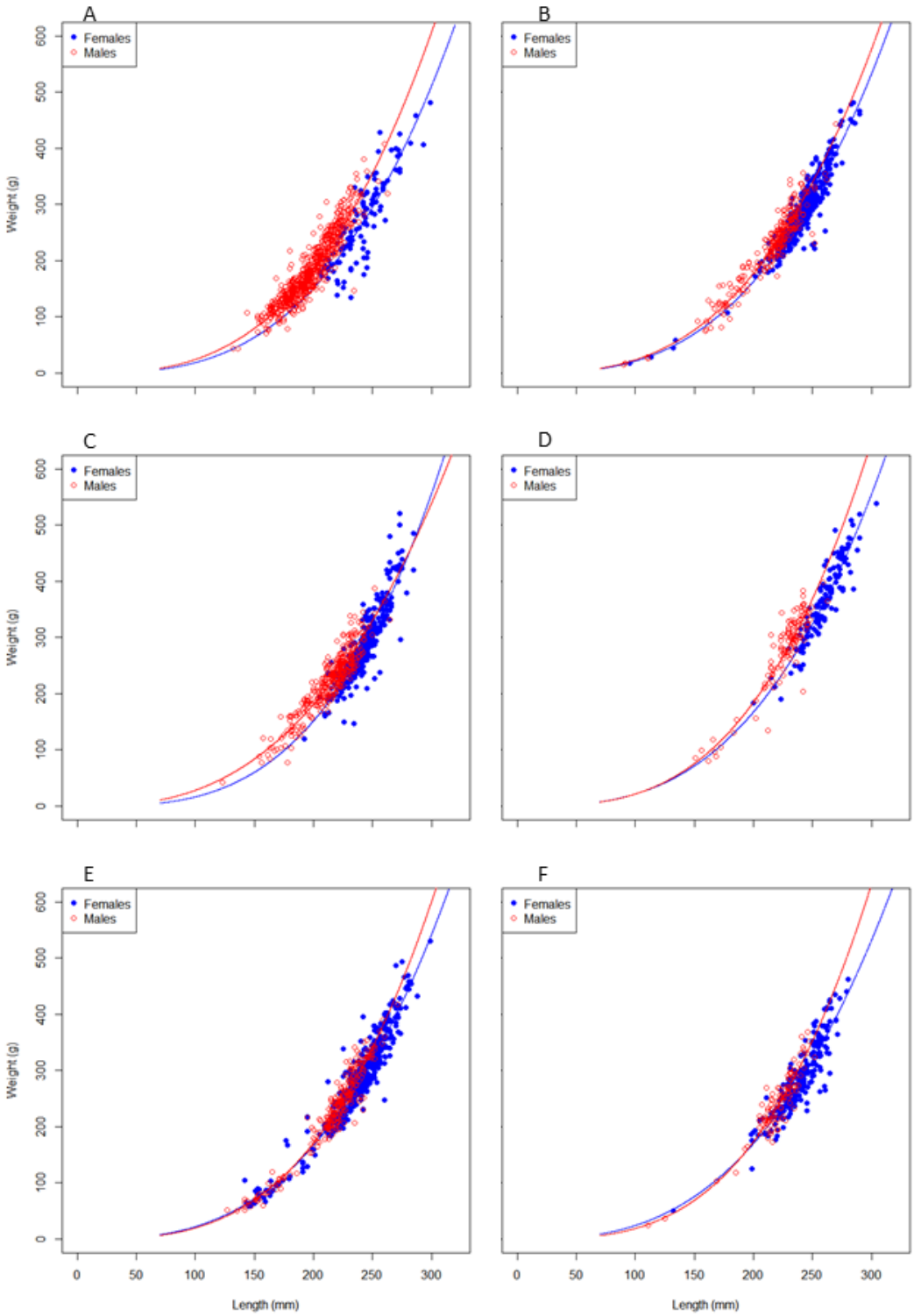

Figure 4. Length to weight relationship of *Illex argentinus* sampled during the VA/0219 joint research cruise in Argentine waters for strata: 2 (A); 3 (B); 4 (C); 5(D); 8 (E), and 14 (F). Of note, data from stratum 9 are not shown given the few *I. argentinus* sampled. The lines (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^{b}, where a represents the intercept and b the slope. Values for the different parameters and fit are summarised in Table 6.

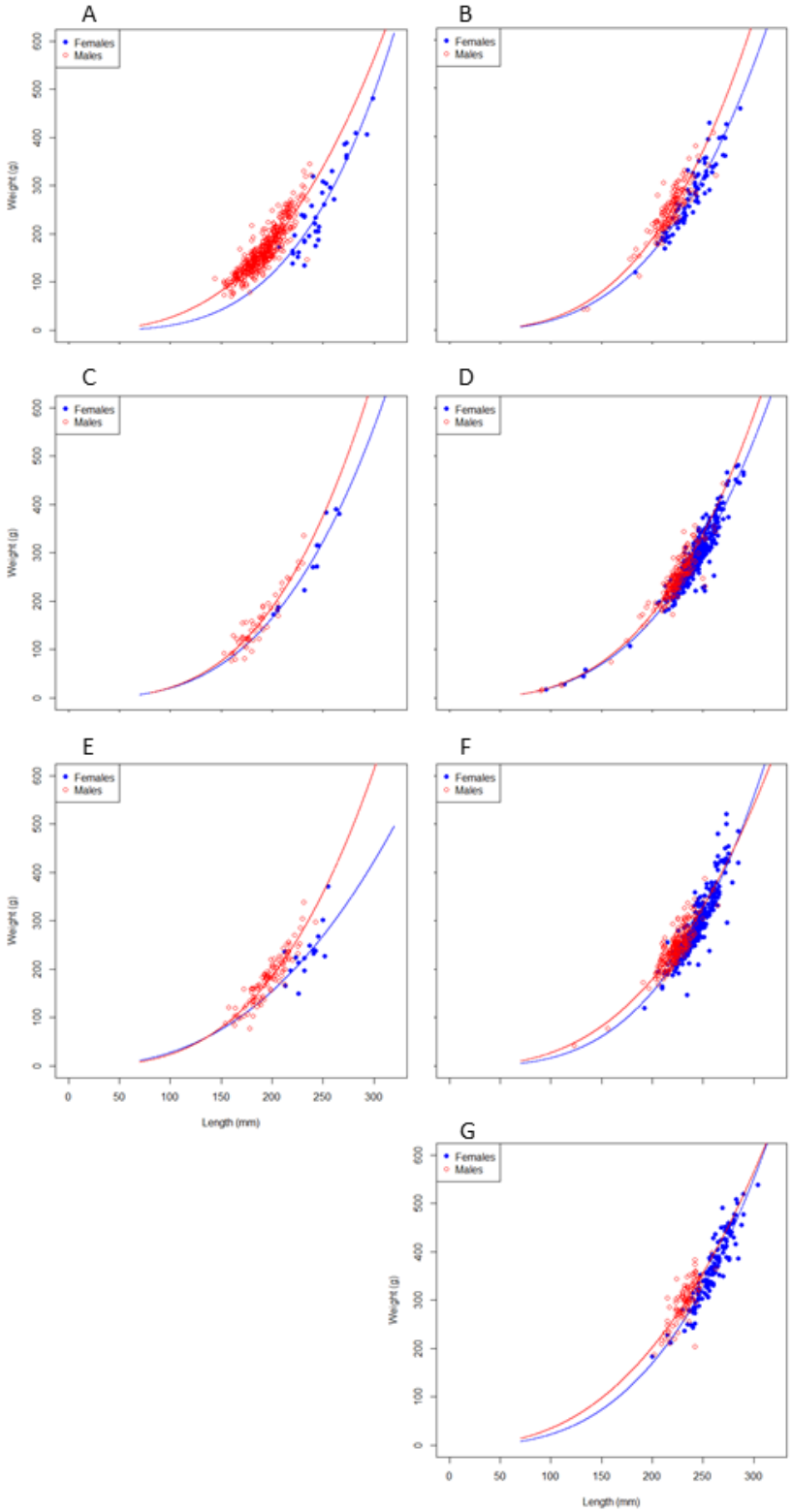

Figure 5. Length to weight relationship of *Illex argentinus* summer spawning stock (A, C, and E) and winter spawning stock (B, D, F, and H) sampled during the VA/0219 joint research cruise in Argentine waters for strata: 2 (A); 3 (B); 4 (C); and 5(D). The lines (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^{b}, where "a" represents the intercept and "b" the slope. Values for the different parameters and fit are summarised in Table 7.

Table 6. Summary of the power equation (Weight = aL^b) defining the length to weight relationship of male and female *Illex argentinus* from the different strata, where "a" corresponds to the intercept, "b" to the slope, and "*L*" to the dorsal mantle length.

Stratum	Males		Females	
	Equation	r^2	Equation	r^2
2	$0.0000342155 * L^{2.926243}$	0.86	$0.0000185626 * L^{3.003349}$	0.74
3	$0.0000368103 * L^{2.904485}$	0.94	$0.0000309291 * L^{2.921098}$	0.95
4	$0.0001208970 * L^{2.684183}$	0.87	$0.0000064288 * L^{3.204046}$	0.80
5	$0.0000137150 * L^{3.098385}$	0.89	$0.0000266572 * L^{2.954370}$	0.87
8	$0.0000126007 * L^{3.099577}$	0.96	$0.0000339817 * L^{2.907645}$	0.94
9	$0.0000147329 * L^{3.078594}$	0.98	$0.0000759711 * L^{2.764005}$	0.95
14	$0.0000079094 * L^{3.190058}$	0.93	$0.0000582609 * L^{2.809800}$	0.85

Table 7. Summary of the power equation (Weight = a*L^b) defining the length to weight relationship of winter and summer spawning stock male and female *Illex argentinus* from the different strata, where "a" corresponds to the intercept, "b" to the slope, and "*L*" to the dorsal mantle length.

Stratum		Males		Females	
		Equation	r^2	Equation	r^2
2	Summer	$0.0000731029 * L^{2.780239}$	0.80	$0.0000009265 * L^{3.522333}$	0.77
	Winter	$0.0000213229 * L^{3.019211}$	0.85	$0.0000170448 * L^{3.030973}$	0.90
3	Summer	$0.0000124474 * L^{3.119634}$	0.83	$0.0000207720 * L^{2.999498}$	0.94
	Winter	$0.0000245539 * L^{2.977677}$	0.95	$0.0000310247 * L^{2.920364}$	0.95
4	Summer	$0.0000320915 * L^{2.939091}$	0.83	$0.0003125000 * L^{2.476637}$	0.47
	Winter	$0.0001029670 * L^{2.712513}$	0.80	$0.0000071914 * L^{3.184628}$	0.82
5	Summer	$0.0000264908 * L^{2.963163}$	0.87	-	-
	Winter	$0.0003150440 * L^{2.524385}$	0.61	$0.0000368111 * L^{2.896552}$	0.87
8	Summer	-	-	-	-
	Winter	$0.0000126007 * L^{3.099577}$	0.96	$0.0000339817 * L^{2.907645}$	0.94
9	Summer	-	-	-	-
	Winter	$0.0000147329 * L^{3.078594}$	0.98	$0.0000759711 * L^{2.764005}$	0.95
14	Summer	-	-	-	-
	Winter	$0.0000079094 * L^{3.190058}$	0.93	$0.0000582609 * L^{2.809800}$	0.85

Doryteuthis gahi* (LOL) – Figures 6, 7; Tables 9, 10*:

The length distribution of *Doryteuthis gahi* is similar between strata (Figure **6**), but two distinct cohorts of males and females in stratum 2 (the most northerly) can be seen, whereas other strata seem to consist primarily of a single cohort (Figure **6**). In all strata, a greater proportion of males than females (Figure **6**) is found with most individuals being immature, but with males generally in more advanced stages of maturity (Figure **6**). A total of 2,401 LOL (813 females, 1,588 males) was sampled from seven strata; 348 from stratum 2 (159 females and 189 males), 597 from stratum 3 (223 females and 374 males), 379 from stratum 4 (103 females, 276 males), 83 from stratum 5 (34 females and 49 males), 452 from stratum 8 (165 females, 287 males), 192 from stratum 9 (75 females, 117 males), and 350 from stratum 14 (54 females, 296 males).

From the length-weight relationships in different strata some trends emerge. The most notable is that generally, there is little difference in weight for a given length between males and females, except in stratum 14 (Figure **7**; Table **9**; Table **10**). However, this might be an artefact of our sample consisting primarily of immature males and females with too few mature individuals (Figure **6**) to affect the inflexion of the power relationship between length and weight for this species (Figure **7**).

Stratum 2:

In stratum 2, males were slightly more abundant than females and measured on average 78.51 mm (range 43.0 to 188.0 mm DML; median = 82.0 mm; N = 189), and females 78.55 mm (range 40.0 to 156.0 mm DML; median = 82.0 mm; N = 159) (Figure **6**). However, two distinct cohorts are apparent in both sexes (Figure **6**). In males, the first cohort has a mode at 50 mm DML, while the second has a mode at 85 mm DML (Figure **6**). In females, these modes are apparent at 50 mm DML and 90 mm DML, respectively (Figure **6**). The majority of males and females were in stage I on the maturity scale (64.0 and 79.2%, respectively), with a single female spent (Stage VI) (Figure **6**). Examining the length-weight relationships, we find that females are generally the same weight as males at the same size, but at much larger sizes DML < 120 mm, females become heavier than males (Figure **7**; Table **10**). This trend is different to that observed for *I. argentinus* and is explained by *D. gahi* males and females in the sampled population being more or less at the same stages of maturity throughout the sampling area.

Table 8. Table showing predicted weight (g) for *Illex argentinus* summer (shaded in grey) and winter spawning stock males (**in bold**) and females from different strata at different sizes (mm).

Stratum	Stock	Sex	150	175	200	225	250	275	300
2									
	Summer	Males	**82.0**	**125.9**	**182.5**	**253.3**	**339.5**	**442.4**	**563.5**
		Females	42.8	73.7	118.0	178.7	258.9	362.2	492.2
	Winter	Males	**79.2**	**126.2**	**188.9**	**269.5**	**370.5**	**494.0**	**642.4**
		Females	67.2	107.2	160.7	229.6	316.0	421.8	549.1
3									
	Summer	Males	**76.5**	**123.7**	**187.7**	**271.0**	**376.5**	**506.9**	**665.0**
		Females	69.9	111.0	165.7	236.0	323.7	430.8	559.2
	Winter	Males	**74.1**	**117.7**	**174.5**	**247.8**	**339.2**	**450.5**	**583.7**
		Females	70.3	110.2	162.8	229.6	312.3	412.5	531.9
4									
	Summer	Males	**79.8**	**125.6**	**185.9**	**262.8**	**358.2**	**474.0**	**612.1**
		Females	76.6	112.2	156.2	209.1	271.4	343.7	426.4
	Winter	Males	**82.3**	**125.0**	**179.6**	**247.2**	**329.0**	**426.0**	**539.4**
		Females	61.2	100.0	153.0	222.7	311.4	421.9	556.6
5									
	Summer	Males	**74.3**	**117.4**	**174.4**	**247.2**	**337.7**	**448.0**	**579.7**
		Females							
	Winter	Males	**98.1**	**144.8**	**202.8**	**273.0**	**356.2**	**453.1**	**564.4**
		Females	74.0	115.6	170.2	239.4	324.9	428.2	550.9
8									
	Winter	Males	**70.0**	**112.9**	**170.8**	**246.1**	**341.2**	**458.5**	**600.4**
		Females	72.2	113.0	166.7	234.7	318.9	420.7	541.8
9									
	Winter	Males	**73.7**	**118.5**	**178.7**	**256.9**	**355.3**	**476.4**	**622.8**
		Females	78.6	120.3	174.1	241.0	322.5	419.7	533.9
14									
	Winter	Males	**69.2**	**113.1**	**173.2**	**252.2**	**352.9**	**478.4**	**631.4**
		Females	75.8	116.9	170.1	236.9	318.5	416.3	531.6

Stratum 3:

In stratum 3, males were significantly more abundant than females and measured on average 87.55 mm (range 42.0 to 169.0 mm DML; median = 83.0 mm; N = 374), and females 87.37 mm (range 50.0 to 156.0 mm DML; median = 83.0 mm; N = 223) (Figure **6**). Individuals are on average larger than in the previous stratum, but this is due to a single cohort being observed that is most similar to the second cohort in stratum 2 (Figure **6**), but slightly smaller, perhaps due to cooler waters leading to slower growth in stratum 3. The majority of males and females were in stage I on

the maturity scale (51.6 and 73.1%, respectively), with 2.2% of females being spent (Stage VI) (Figure **6**). Examining the length-weight relationships, we find that females are generally the same weight as males at the same size, but at much larger sizes DML < 120 mm, females become heavier than males (Figure **7**; Table **10**). This trend is different to that observed for *I. argentinus* and is explained by *D. gahi* males and females in the sampled population being more or less at the same stages of maturity throughout the sampling area.

Stratum 4:

In stratum 4, males were significantly more abundant than females and measured on average 79.05 mm (range 42.0 to 137.0 mm DML; median = 78.0 mm; N = 276), and females 78.55 mm (range 49.0 to 141.0 mm DML; median = 76.0 mm; N = 103) (Figure **6**). Individuals are on average most similar in size to those from stratum 2, most likely due to squid from mixed cohorts, but dominated by intermediate size individuals (Figure **6**). Given stratum 4 is in deeper waters than stratum 3 and south of stratum 2, it is assume that this intermediate size might be due to slower growth in cooler waters, i.e. individuals of the second cohort, but smaller. This needs to be verified by reading the statoliths. The majority of males and females were in stage I on the maturity scale (55.4 and 69.9%, respectively), with a single male being spent (Stage VI) (Figure **6**). Examining the length-weight relationships, we find that females are generally the same weight as males at the same size (Figure **7**; Table **10**). Contrary to strata 2 and 3, even at larger sizes, males and females remain the same predicted size (Table **10**) but this is most likely an artefact created by the absence of large individuals in our sample. This trend in length to weight relationship is different to that observed for *I. argentinus* and is explained by *D. gahi* males and females in the sampled population being more or less at the same stages of maturity throughout the sampling area.

Stratum 5:

In stratum 5, few LOL were sampled due to the low abundance of LOL at increasing depths (only stratum with stations of depths greater than 250 m). In this restricted sample, males were more prevalent than females and measured on average 88.47 mm (range 50.0 to 115.0 mm DML; median = 89.0 mm; N = 49), and females 93.18 mm (range 74.0 to 122.0 mm DML; median = 91.5 mm; N = 34) (Figure **6**). Individuals are on average larger than in the previous strata, but this is due to a single cohort being observed that is most similar to the second cohort in stratum 2 (Figure **6**). A majority of males were in stages I and II (40.8 and 46.9%, respectively) and the majority of females were in stage I (52.9%) (Figure **6**). Examining the length-weight relationships, despite the absence of larger individuals in our samples, similar to strata 2 and 3, we find that females are generally the same weight as males at the same size, but at much larger sizes DML < 120 mm, females become heavier than males (Figure **7**; Table **10**). This trend is different to that observed for *I. argentinus* and is explained by *D. gahi* males and females in the sampled population being more or less at the same stages of maturity throughout the sampling area.

Stratum 8:

In stratum 8, males were significantly more abundant than females and measured on average 79.16 mm (range 55.0 to 175.0 mm DML; median = 75.0 mm; N = 287), and females 80.95 mm (range 50.0 to 141.0 mm DML; median = 75.0 mm; N = 165) (Figure 6). Individuals are on average intermediate to both cohorts observed in stratum 2 (Figure 6). We assume that LOL in this stratum belong to that second cohort as this stratum is located further south than stratum 2 would grow slower than those in warmer waters of stratum 2, but represent the same cohort. The majority of males and females were in stage I on the maturity scale (61.3 and 75.2%, respectively) (Figure 6). Examining the length-weight relationships, females are generally the same weight as males at the same size, but at much larger sizes DML < 120 mm, females become heavier than

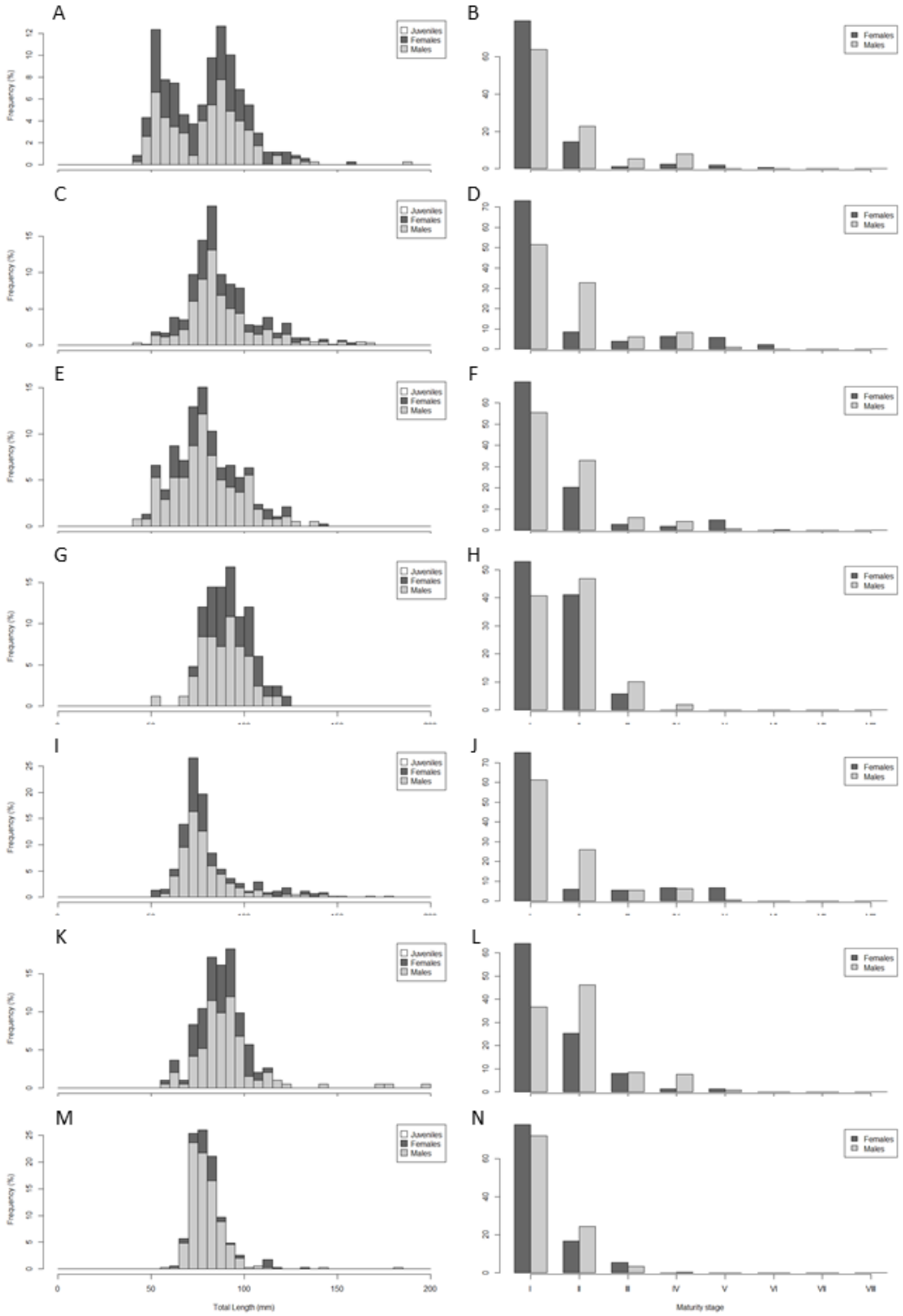

Figure 6. Length frequency distribution (A, C, E, G, I, K, M) and proportion of the different stages of maturity (B, D, F, H, J, L, N) for *Doryteuthis gahi* in strata 2 (A, B), 3 (C, D), 4 (E, F), 5 (G, H), 8 (I, J), 9 (K, L), and 14 (M, N).

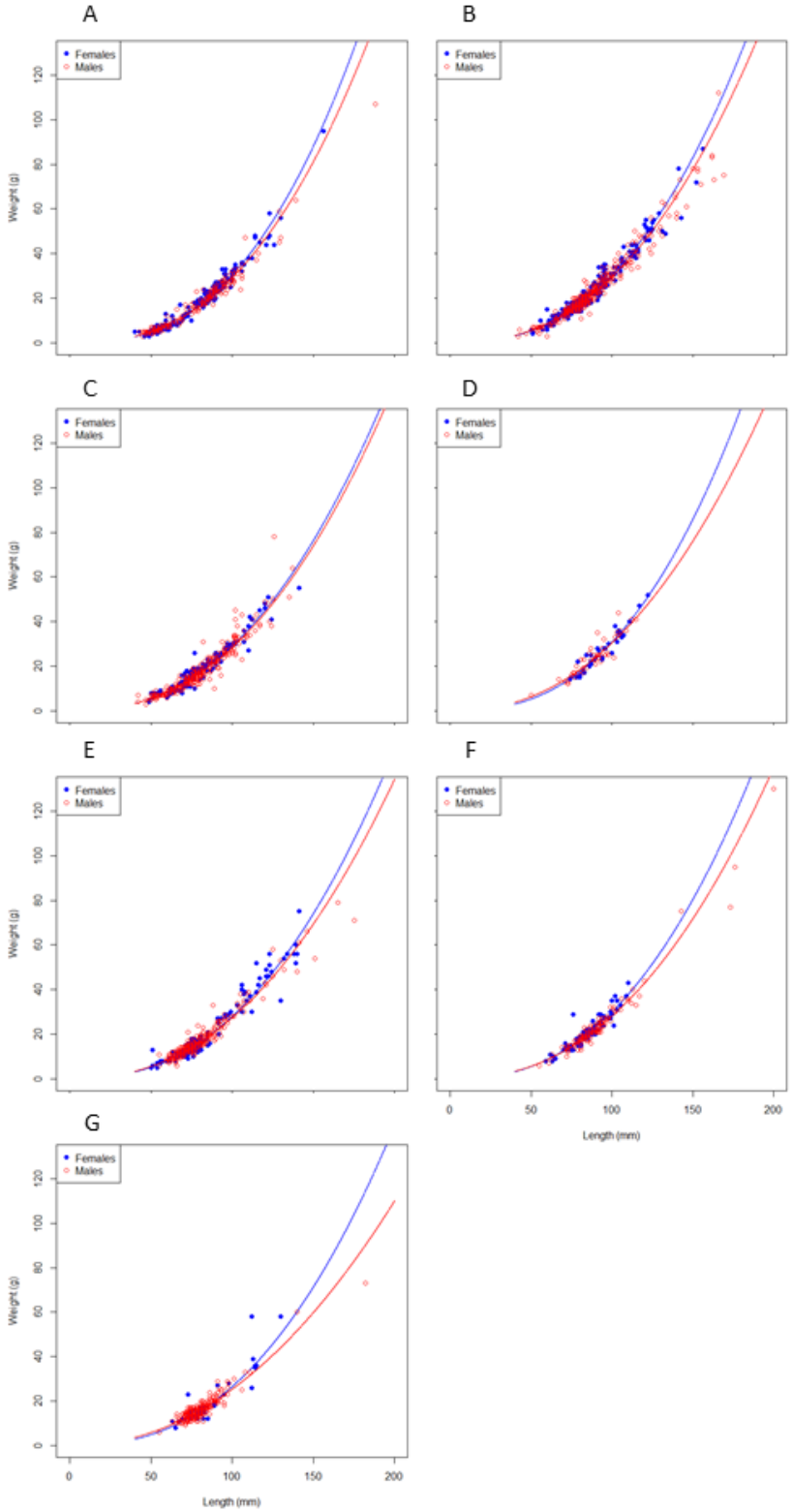

Figure 7. Length to weight relationship of *Doryteuthis gahi* sampled during the VA/0219 joint research cruise in Argentine waters for strata: 2 (A); 3 (B); 4 (C); 5(D); 8 (E), 9 (F), and 14 (G). The lines (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^{b}, where "a" represents the intercept and "b" the slope. Values for the different parameters and fit are summarised in Table 9.

males (Figure **7**; Table **10**). This trend is different to that observed for *I. argentinus* and is explained by *D. gahi* males and females in the sampled population being more or less at the same stages of maturity throughout the sampling area.

Stratum 9:

In stratum 9, males were more abundant than females and measured on average 90.23 mm (range 55.0 to 200.0 mm DML; median = 87.0 mm; N = 117), and females 85.61 mm (range 59.0 to 110.0 mm DML; median = 86.0 mm; N = 75) (Figure **6**). Individuals are on average most similar to the second cohort in stratum 2, with a handful of individuals from that first cohort (Figure **6**). A majority of males were in stages I and II (36.8 and 46.2%, respectively) and the majority of females were in stage I (64.0%) (Figure **6**). Examining the length-weight relationships, females are generally the same weight as males at the same size, but at much larger sizes DML < 100 mm, females become heavier than males (Figure **7**; Table **10**). However, this needs to be interpreted with caution given the absence of females larger than 110 mm DML from our sample. This trend in length to weight relationship is different to that observed for *I. argentinus* and is explained by *D. gahi* males and females in the sampled population being more or less at the same stages of maturity throughout the sampling area.

Stratum 14:

In stratum 14, males were significantly more abundant than females and measured on average 79.03 mm (range 55.0 to 182.0 mm DML; median = 78.0 mm; N = 296), and females 83.52 mm (range 63.0 to 130.0 mm DML; median = 80.0 mm; N = 54) (Figure **6**). As per stratum 8, individuals are intermediate in size to both cohorts from stratum 2 (Figure **6**). It is assumed that LOL in this stratum (further south than stratum 2) would grow slower than those in warmer waters of stratum 2, but represent that second cohort. The majority of males and females were in stage I on the maturity scale (72.0 and 77.8%, respectively) (Figure **6**). Examining the length-weight relationships, females are generally the same weight as males at the same size, but at much larger sizes DML < 120 mm, females become heavier than males (Figure **7**; Table **10**). This trend is different to that observed for *I. argentinus* and is explained by *D. gahi* males and females in the sampled population being more or less at the same stages of maturity throughout the sampling area.

Table 9. Summary of the power equation (Weight = aL^b) defining the length to weight relationship of male and female *Doryteuthis gahi* from the different strata, where "a" corresponds to the intercept, "b" to the slope, and "*L*" to the dorsal mantle length.

Stratum	**Males**		**Females**	
	Equation	**r^2**	**Equation**	**r^2**
2	$0.000272 * L^{2.515931}$	0.96	$0.000176 * L^{2.619594}$	0.96
3	$0.000505 * L^{2.383589}$	0.95	$0.000335 * L^{2.479043}$	0.95
4	$0.000544 * L^{2.359368}$	0.93	$0.000526 * L^{2.372217}$	0.92
5	$0.000925 * L^{2.258687}$	0.88	$0.000268 * L^{2.530168}$	0.91
8	$0.000712 * L^{2.292684}$	0.91	$0.000449 * L^{2.397850}$	0.93
9	$0.000664 * L^{2.313307}$	0.95	$0.000411 * L^{2.431630}$	0.89
14	$0.001472 * L^{2.118122}$	0.79	$0.000347 * L^{2.441422}$	0.84

Table 10. Table showing predicted weight (g) for *Doryteuthis gahi* males (in bold) and females from different strata at different sizes (mm).

Stratum	Sex	50	75	100	125	150	175	200
2								
	Males	**5.1**	**14.2**	**29.3**	**51.3**	**81.2**	**119.6**	**167.4**
	Females	5.0	14.4	30.5	54.8	88.3	132.2	187.6
3								
	Males	**5.7**	**14.9**	**29.5**	**50.3**	**77.7**	**112.1**	**154.2**
	Females	5.5	14.9	30.4	52.9	83.1	121.8	169.6
4								
	Males	**5.5**	**14.4**	**28.5**	**48.2**	**74.1**	**106.6**	**146.1**
	Females	5.6	14.8	29.2	49.6	76.4	110.1	151.2
5								
	Males	**6.4**	**15.9**	**30.4**	**50.4**	**76.1**	**107.8**	**145.7**
	Females	5.3	14.9	30.8	54.2	85.9	126.9	177.9
8								
	Males	**5.6**	**14.2**	**27.4**	**45.7**	**69.4**	**98.9**	**134.3**
	Females	5.3	14.1	28.1	47.9	74.2	107.3	147.8
9								
	Males	**5.7**	**14.4**	**28.1**	**47.1**	**71.8**	**102.6**	**139.7**
	Females	5.6	14.9	30.0	51.6	80.4	117.0	161.8
14								
	Males	**5.8**	**13.8**	**25.4**	**40.7**	**59.9**	**83.0**	**110.1**
	Females	4.9	13.1	26.5	45.7	71.3	103.9	143.9

FINFISH – Figures 8 – 11; Tables 11 – 15:

Rock cod (Patagonotothen ramsayi***) - PAR***

A total of 456 PAR (218 females, 209 males, 19 juveniles, and 10 unsexed individuals) was sampled from seven strata. Males measured on average 20.53 cm (range 12.0 to 35.0 cm TL; median = 19.0 cm; N = 209), and females 20.70 cm (range 10.0 to 34.0 cm TL; median = 19.0 cm; N = 218) (Figure **8**). At least four cohorts are apparent (Figure **8**). There was little difference in maturity between males and females as the vast majority were still immature or resting. The majority of males and females were in stage I (80.0 and 81.7%, respectively) (Figure **8**). From the length-weight relationships, some trends emerge. The most notable is that generally, there is little difference in weight for a given length between males and females (Figure **8**; Table **11**). However, this might be an artefact of our sample consisting primarily of immature males and females with too few mature individuals having invested significant resources in gonadal development (Figure **8**) to affect the inflexion of the power relationship between length and weight for the different sexes in this species (Figure **8**).

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 6,536 PAR (2,887 females, 3,558 males, and 100 juvenile). Males measured on average 20.28 cm TL (range 8.0 to 42.0 cm TL) and females 20.64 cm TL (range 9.0 to 41.0 cm TL). There was no significant difference in TL for either males or females between Falkland waters and the Argentine EEZ (t_{259} = 0.15; p = 0.44 and t_{255} = 0.16; p = 0.44, respectively).

Red cod (Salilota australis***) - BAC***

A total of 338 BAC (146 females, 185 males, 6 juveniles, and 1 unsexed individual) was sampled from seven strata. Males measured on average 22.01 cm (range 14.0 to 61.0 cm TL; median = 18.0 cm; N = 185), and females 24.66 cm (range 13.0 to 78.0 cm TL; median = 22.0 cm; N = 146) (Figure **9**). At least three cohorts are visible (Figure **9**). There was little difference in maturity between males and females as the vast majority were still immature or resting. The majority of males and females were in stage I (93.0 and 93.2%, respectively) (Figure **9**). From the length-weight relationships, some trends emerge. The most notable is that generally, there is little difference in weight for a given length between males and females (Figure **9**; Table **12**). However, this might be an artefact of our sample consisting primarily of smaller males and females with too few larger and mature adult individuals having invested significant resources in gonadal development (Figure **9**) to affect the inflexion of the power relationship between length and weight for the different sexes in this species (Figure **9**).

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 3,445 BAC (1,982 females, 1,442 males, 19 juvenile, and 2 unsexed individuals). Males measured on average 30.38 cm TL (range 13.0 to 84.0 cm TL) and females 35.20 cm TL (range 13.0 to 85.0 cm TL). Males and females were significantly larger in Falkland waters than in the Argentine EEZ (t_{341} = -11.2; p < 0.0001 and t_{190} = -10.8; p < 0.0001, respectively). In both areas, the first cohort at 17-18 cm was abundant.

Table 11. Table showing predicted weight (g) for *Patagonotothen ramsayi* males and females at different sizes (cm).

Sex	5	10	15	20	25	30	35
Males	0.9	8.9	33.5	85.6	177.1	321.0	530.8
Females	0.9	8.5	32.6	84.6	177.4	324.8	541.7

Table 12. Table showing predicted weight (g) for *Salilota australis* males and females at different sizes (cm).

Sex	10	20	30	40	50	60	70
Males	10.1	74.6	240.4	551.4	1,049.8	1,776.7	2,772.1
Females	10.1	74.4	239.4	548.9	1,044.5	1,767.0	2,756.1

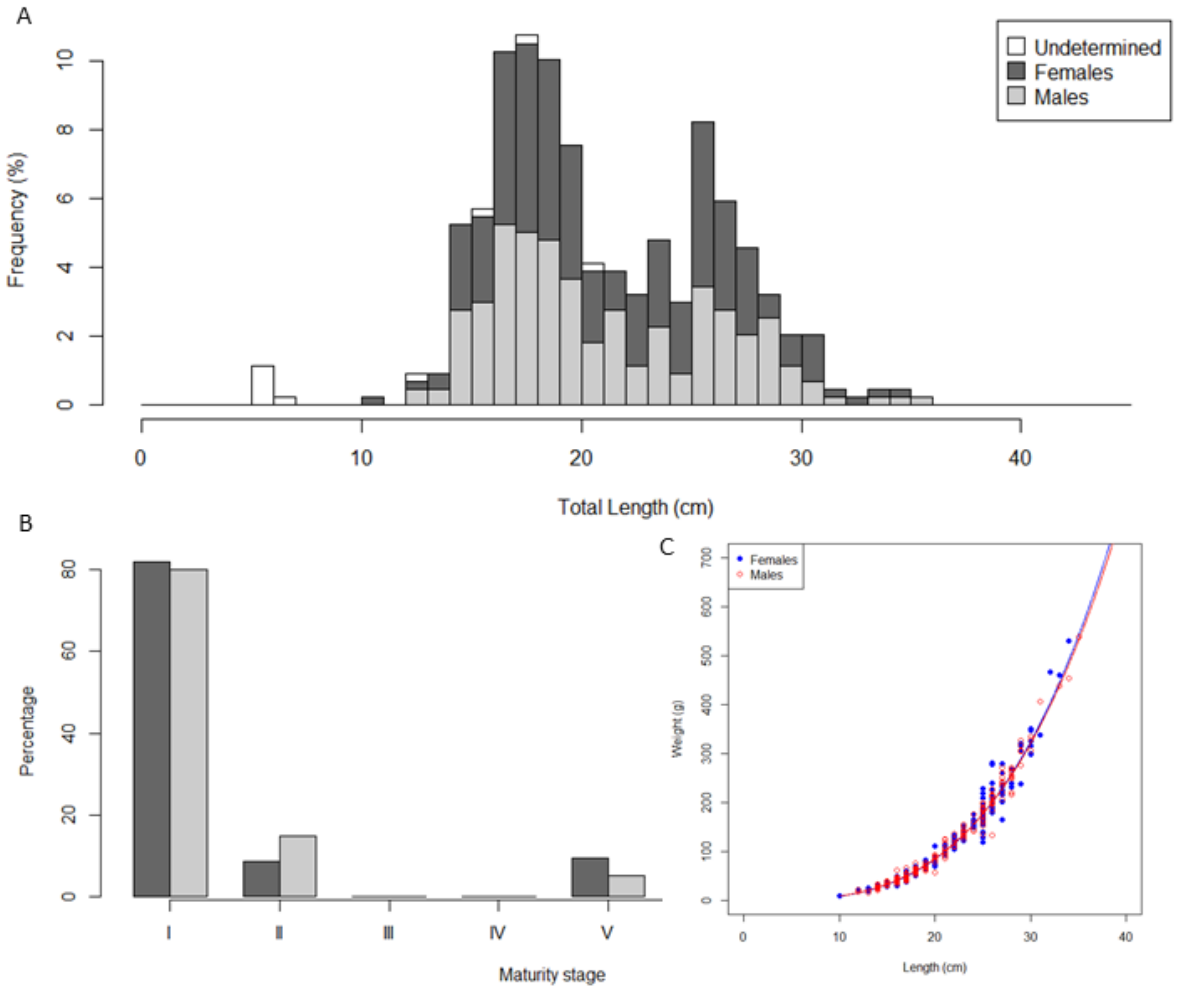

Figure 8. Length frequency distribution (A), proportion of the different stages of maturity (B), and the length to weight relationship for *Patagonotothen ramsayi* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (C) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^b, where "a" represents the intercept and "b" the slope. Values for the different parameters and fit are summarised in Table 15.

Kingclip (Genypterus blacodes***) - KIN***

A total of 586 KIN (244 females and 342 males) was sampled from seven strata. Males measured on average 58.18 cm (range 25.0 to 110.0 cm TL; median = 51.0 cm; N = 342), and females 56.89 cm (range 24.0 to 114.0 cm TL; median = 49.0 cm; N = 244) (Figure **10**). There was little difference in maturity between males and females as the vast majority were still immature or resting. The majority of males and females were in stage I (69.3 and 75.8%, respectively) (Figure **10**). From the length-weight relationships, some trends emerge. The most notable is that generally, there is little difference in weight for a given length between males and females (Figure **10**; Table **13**).

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 2,826 KIN (1,572 females and 1,254 males). Males measured on average 56.82 cm TL (range 35.0 to 115.0 cm TL) and females 64.49 cm TL (range 32.0 to 118.0 cm TL). There was no significant difference in TL for males between Falkland waters and the Argentine EEZ (t_{422} = 1.3; p = 0.10). Females were significantly larger in Falkland waters than in the Argentine EEZ (t_{293} = -5.7; p < 0.0001).

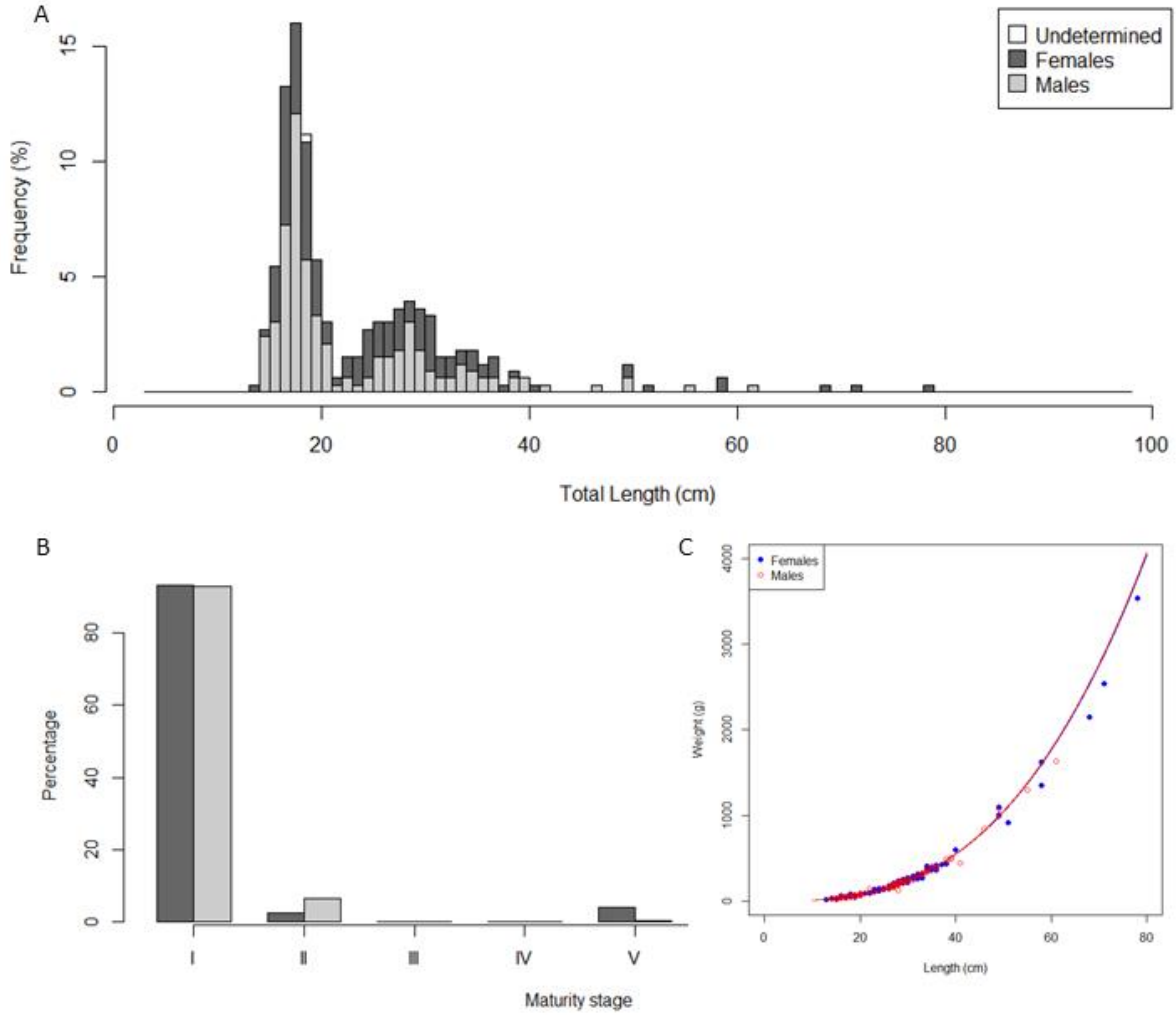

Figure 9. Length frequency distribution (A), proportion of the different stages of maturity (B), and the length to weight relationship for *Salilota australis* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (C) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^b, where "a" represents the intercept and "b" the slope. Values for the different parameters and fit are summarised in Table 15.

Table 13. Table showing predicted weight (g) for *Genypterus blacodes* males and females at different sizes (cm).

Sex	20	35	50	65	80	95	110
Males	25.8	152.2	471.2	1,082.2	2,089.8	3,602.7	5,733.2
Females	25.3	151.0	471.8	1,091.0	2,118.0	3,667.5	5,858.6

Hoki (Macruronus magellanicus***) - WHI***

A total of 60 WHI (37 females and 23 males) was sampled from seven strata. Males measured on average 53.65 cm (range 31.0 to 72.0 cm TL; median = 55.0 cm; N = 23), and females 51.89 cm (range 33.0 to 70.0 cm TL; median = 52.0 cm; N = 37) (Figure **11**). There was little difference in maturity between males and females as the vast majority were still immature or resting. The majority of males and females were in stage I (82.6 and 94.6%, respectively) (Figure **11**). From the length-weight relationships, some trends emerge. The most notable is that generally, there is little difference in weight for a given length between males and females (Figure **11**; Table **14**). However, this might be an artefact of our small sample size. No comparison was attempted between animals collected from Falkland waters and those from the Argentine EEZ given that different length measurements were utilised during these respective surveys.

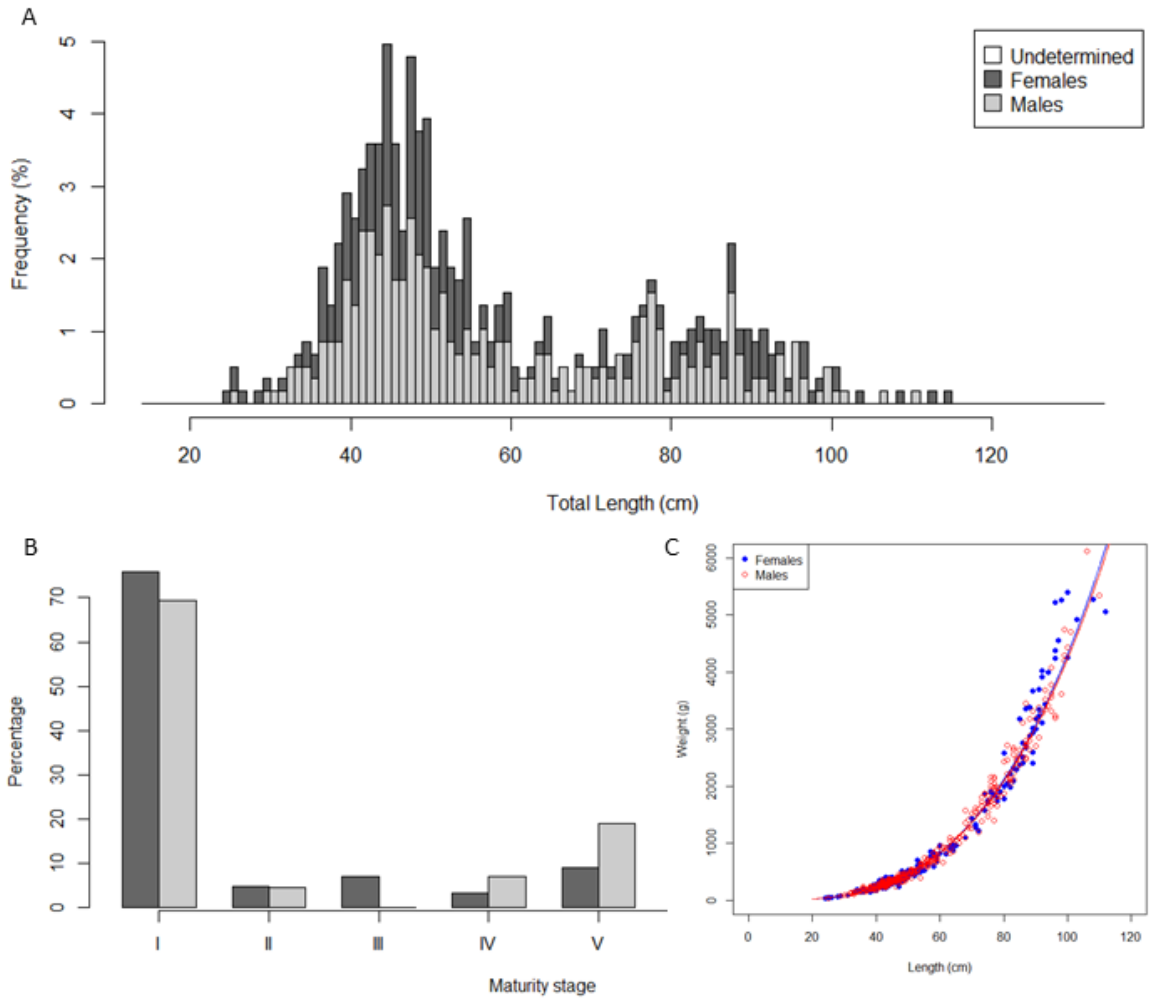

Figure 10. Length frequency distribution (A), proportion of the different stages of maturity (B), and the length to weight relationship for *Genypterus blacodes* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (C) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^b, where "a" represents the intercept and "b" the slope. Values for the different parameters and fit are summarised in Table 15.

Table 14. Table showing predicted weight (g) for *Macruronus magellanicus* males and females at different sizes (cm).

Sex	30	40	50	60	70	80	90
Males	94.5	213.9	403.1	676.5	1,048.1	1,531.3	2,139.4
Females	101.4	221.6	406.4	666.8	1,013.6	1,456.9	2,006.2

Patagonian toothfish (Dissostichus eleginoides***) - TOO***

A total of seven TOO (four females and three males) was sampled from seven strata. Males measured 39.0, 42.0, and 46.0 cm, respectively, and females 39.0, 47.0, 63.0, and 68.0 cm, respectively. All TOO were immature, i.e. stage I on the maturity scale. Too few animals were sampled to generate a reliable length to weight relationship for TOO.

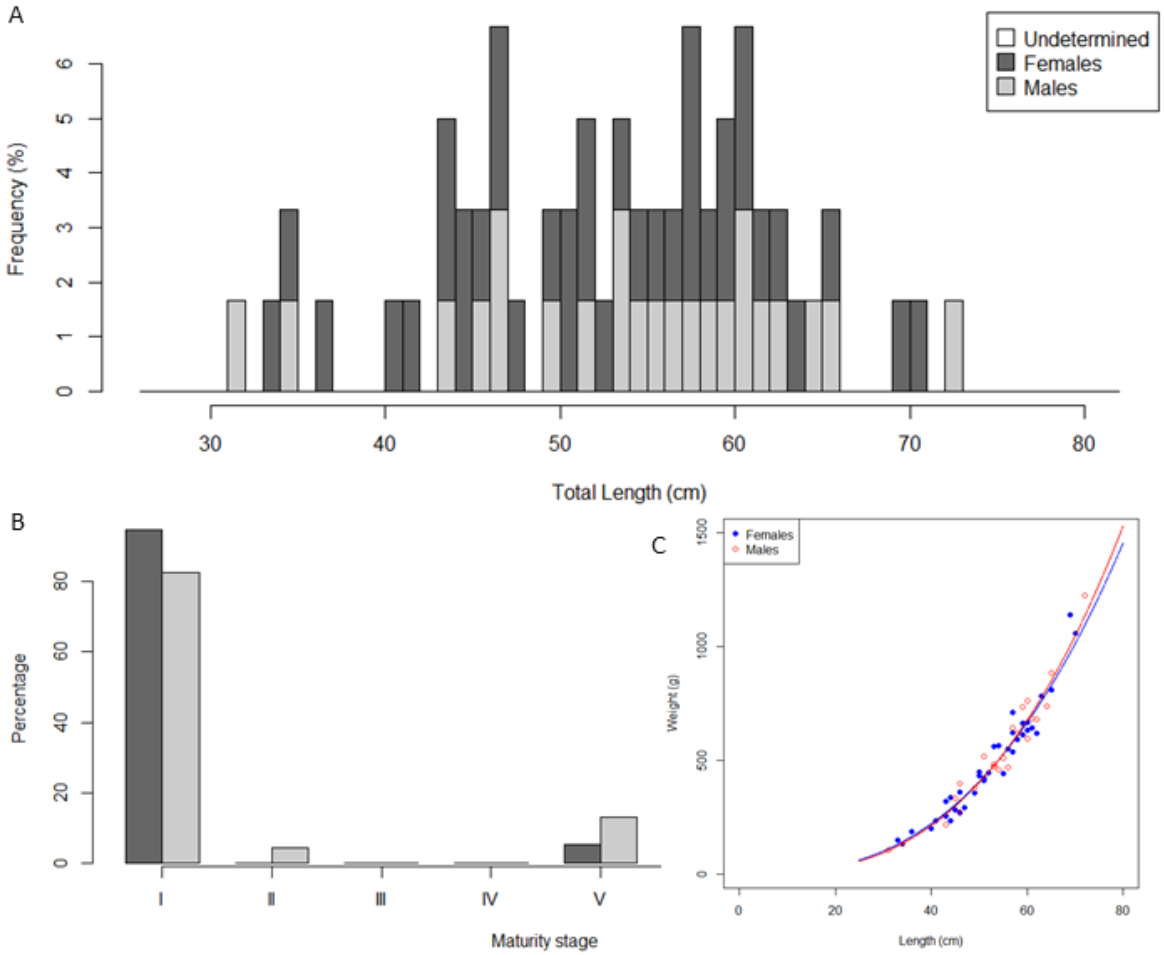

Figure 11. Length frequency distribution (A), proportion of the different stages of maturity (B), and the length to weight relationship for *Macruronus magellanicus* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (C) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^{b}, where "a" represents the intercept and "b" the slope. Values for the different parameters and fit are summarised in Table 15.

Table 15. Summary of the power equation (Weight = aL^{b}) defining the length to weight relationship of male and female finfish from the VA/0219 joint research cruise in Argentine waters, where "a" corresponds to the intercept, "b" to the slope, and "*L*" to the total length.

Species	Males		Females	
	Equation	r^2	Equation	r^2
Patagonotothen ramsayi	0.004887 * $L^{3.261423}$	0.98	0.004080 * $L^{3.317898}$	0.98
Salilota australis	0.013127 * $L^{2.885833}$	0.99	0.013171 * $L^{2.883686}$	0.99
Genypterus blacodes	0.001945 * $L^{3.169150}$	0.99	0.001761 * $L^{3.194893}$	0.99
Macruronus magellanicus	0.006043 * $L^{2.839487}$	0.96	0.009851 * $L^{2.716604}$	0.96

SHARKS – Figures 12, 13; Tables 16 – 18:

Cat shark (Schroederichthys bivius***) - DGH***

A total of 578 DGH (262 females and 316 males) was sampled from seven strata. Males measured on average 55.90 cm (range 32.0 to 82.0 cm TL; median = 56.0 cm; N = 316), and females 48.97 cm (range 9.0 to 63.0 cm TL; median = 50.0 cm; N = 262) (Figure **12**). There was little difference in maturity between males and females as the vast majority were still immature or

maturing. The majority of males were in stages I and III (41.8 and 34.5%, respectively) (Figure **12**). The majority of females were in stages II and III (37.1 and 33.1%, respectively) (Figure **12**). From the length-weight relationships, some trends emerge. The most notable ones are that females are heavier than males at a given weight and that males tend to attain larger sizes than females (Figure **12**; Table **16**). Males do attain larger sizes than females. Hence the greater extreme of the length to weight relationship may not be attained in females. No biological data were collected during the concurrent demersal survey in Falkland waters, precluding any comparisons for this species.

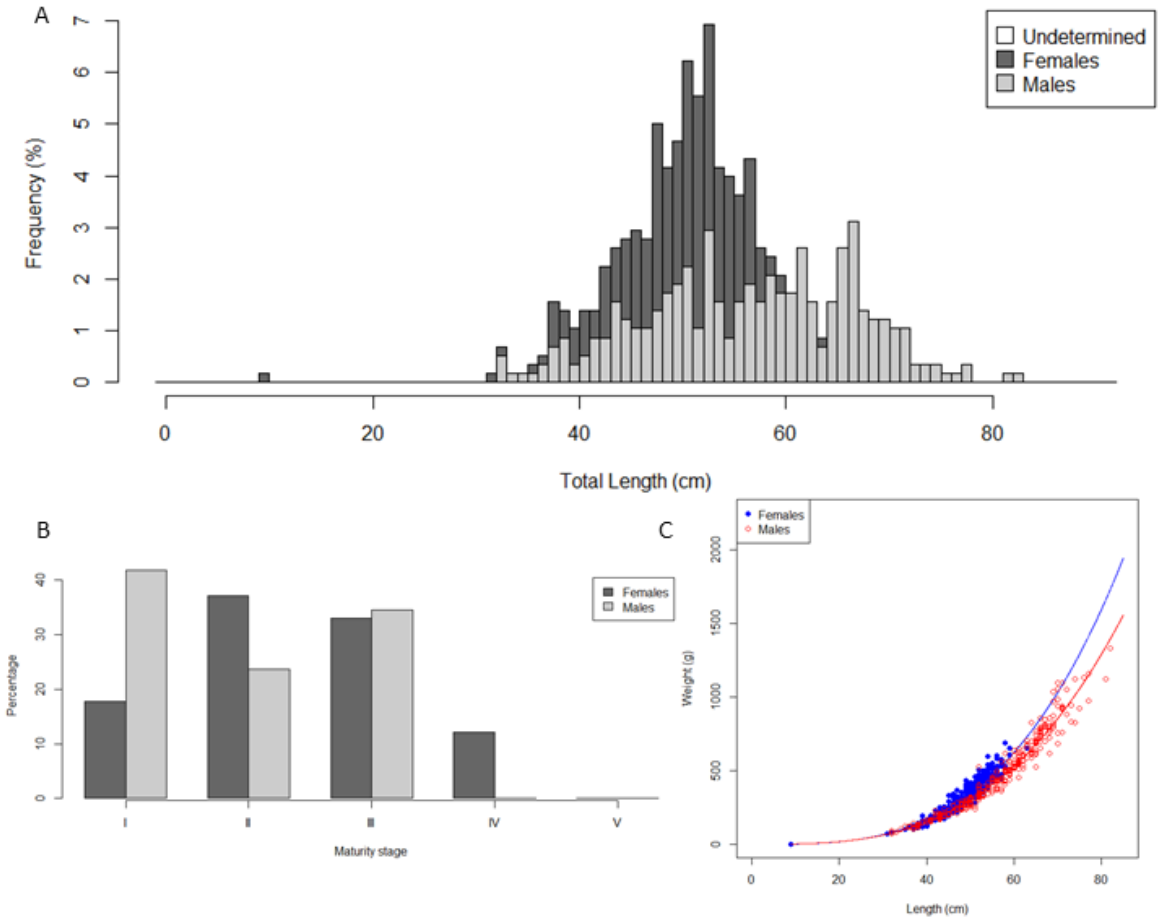

Figure 12. Length frequency distribution (A), proportion of the different stages of maturity (B), and the length to weight relationship for *Schroederichthys bivius* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (C) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^{b}, where "a" represents the intercept and "b" the slope. Values for the different parameters and fit are summarised in Table 18.

Table 16. Table showing predicted weight (g) for *Schroederichthys bivius* males and females at different sizes (cm).

Sex	20	30	40	50	60	70	80
Males	17.8	62.4	151.8	302.3	531.0	854.9	1,291.4
Females	17.3	65.0	166.2	344.2	624.1	1,032.2	1,595.9

Dogfish (Squalus acanthias***) - DGS***

A total of 133 DGS (77 females and 56 males) was sampled from seven strata. Males measured on average 64.45 cm (range 41.0 to 77.0 cm TL; median = 68.0 cm; N = 56), and females 61.45 cm (range 37.0 to 88.0 cm TL; median = 63.0 cm; N = 77) (Figure **13**). There was an interesting difference in maturity between males and females as the vast majority of males were in stage III (78.6%) (Figure **13**), whereas the majority of females were in stage I (52.0%) (Figure **13**).

From the length-weight relationships, some trends emerge. The most notable ones are that females are heavier than males at a given weight and that females tend to attain larger sizes than males (Figure **13**; Table **17**). No biological data were collected during the concurrent demersal survey in Falkland waters, precluding any comparisons for this species.

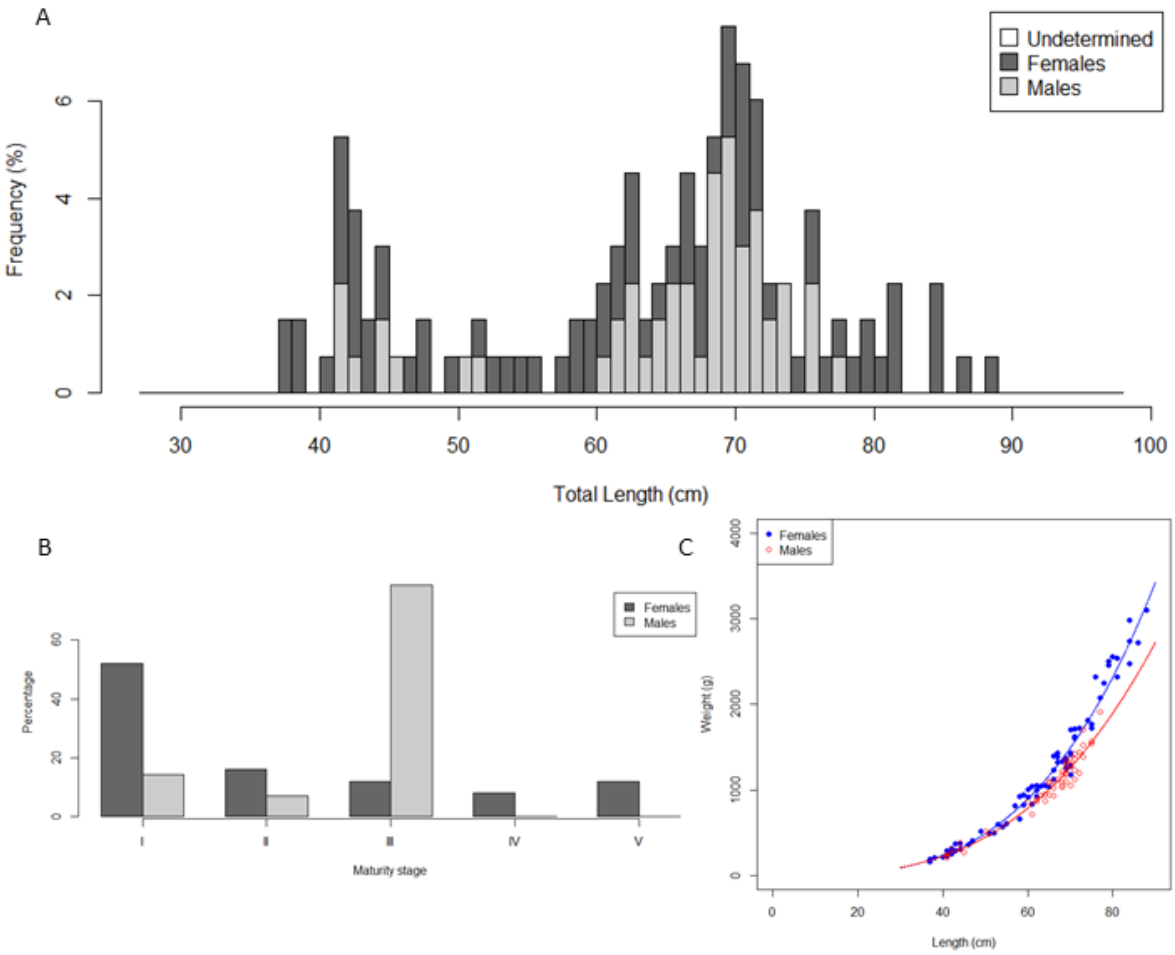

Figure 13. Length frequency distribution (A), proportion of the different stages of maturity (B), and the length to weight relationship for *Squalus acanthias* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (C) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^{b}, where "a" represents the intercept and "b" the slope. Values for the different parameters and fit are summarised in Table 18.

Table 17. Table showing predicted weight (g) for *Squalus acanthias* males and females at different sizes (cm).

Sex	30	40	50	60	70	80	90
Males	94.4	227.8	451.0	788.1	1,263.3	1,901.3	2,726.8
Females	90.9	235.2	491.5	897.6	1,493.6	2,321.7	3,425.8

Table 18. Summary of the power equation (Weight = aL^{b}) defining the length to weight relationship of male and female sharks from the VA/0219 joint research cruise in Argentine waters, where "a" corresponds to the intercept, "b" to the slope, and "*L*" to the total length.

Species	Males		Females	
	Equation	r^2	Equation	r^2
Shroederichthys bivius	$0.001707 * L^{3.089092}$	0.97	$0.000982 * L^{3.263585}$	0.95
Squalus acanthias	$0.002838 * L^{3.061359}$	0.97	$0.001201 * L^{3.303184}$	0.99

SKATES – Figures 14 – 19; Tables 19 – 27:

***Amblyraja doellojuradoi* - RDO**

A total of four RDO (two females and two males) was sampled from seven strata. The males measured 29.0 and 45.0 cm in total length and 22.0 and 34.0 cm in disc width, respectively. The females measured 35.0 and 42.0 cm total length and 25.0 and 31.0 cm in disc width, respectively. For each sex, one individual was assessed as Stage I and the other at Stage III on the maturity scale. Weights of male RDO were 280 and 1,046 g, and 360 and 806 g for females. Too few RDO collected from both this survey and the concurrent demersal survey in Falkland waters to enable size comparisons between populations.

***Bathyraja albomaculata* - RAL**

A total of 15 RAL (10 females and 5 males) was sampled from seven strata. Males measured on average 49.40 cm total length (range 42.0 to 56.0 cm; median = 49.0 cm; N = 5) and on average 35.0 cm disc width (range 31.0 to 40.0 cm; median = 33.0 cm; N = 5), and females 57.20 cm total length (range 36.0 to 67.0 cm TL; median = 58.5 cm; N = 10) and on average 40.10 cm disc width (range 24.0 to 46.0 cm; median = 42.0 cm; N = 10) (Figure **14**). There was little difference in maturity between males and females as the vast majority were still immature or maturing (Figure **14**). From the length-weight relationships, some trends emerge. The most notable one is that males < 55 cm total length are heavier than females, but in larger individuals, females are heavier than males (Figure **14**; Table **22**). However, differences between male and female disc width at a given size are less pronounced (Figure **14**; Table **22**). The ratio of disc width to total length is greater in smaller individuals than in larger ones (Figure **14**; Table **22**). However, these trends need to be interpreted with caution given the small number of individuals sampled during this survey.

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 11 RAL (6 females and 5 males). Males measured on average 46.80 cm DW (range 42.0 to 44.0 cm DW) and females 39.0 cm DW (range 31.0 to 48.0 cm DW). Males were significantly larger in Falkland waters than in the Argentine EEZ (t_4 = -4.1; p = 0.007). There was no significant difference in DW for females between Falkland waters and the Argentine EEZ (t_9 = 0.3; p = 0.38).

***Bathyraja brachyurops* - RBR**

A total of 222 RBR (119 females and 103 males) was sampled from seven strata. Males measured on average 52.85 cm total length (range 28.0 to 77.0 cm; median = 54.0 cm; N = 103) and on average 37.88 cm disc width (range 18.0 to 57.0 cm; median = 39.0 cm; N = 103), and females 52.16 cm total length (range 24.0 to 85.0 cm TL; median = 52 cm; N = 119) and on average 37.64 cm disc width (range 16.0 to 57.0 cm; median = 37.0 cm; N = 119) (Figure **15**). There was little difference in maturity between males and females as the vast majority were still immature or maturing (Figure **15**). From the length-weight relationships, some trends emerge. The most notable one is that there is no difference in weight between males and females for a given size up to 62.5 cm total length, from which point on, females are heavier than males (Figure **15**; Table **23**). These differences are also apparent when examining disc width to weight relationship (Figure **15**; Table **23**). The ratio of disc width to total length is similar between males and females regardless of size (Figure **15**; Table **23**).

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 110 RBR (69 females and 41 males). Males measured on average 38.07 cm DW (range 22.0 to 63.0 cm DW) and females 42.83 cm DW (range 21.0 to 70.0 cm DW). There was no significant difference in DW for males between Falkland waters and the Argentine EEZ (t_{58} = -0.1; p = 0.46). Females were significantly larger in Falkland waters than in the Argentine EEZ (t_{116} = -3.1; p = 0.001).

***Bathyraja cousseauae* - RBZ**

A total of three RBZ (two females and one male) was sampled from seven strata. The lone male measured 46.0 cm in total length and 32.0 cm disc width. The females measured 33.0 and 55.0 cm total length and 21.0 and 37.0 cm in disc width, respectively. All three animals were assessed at Stage I on the maturity scale. Too few RBZ collected from both this survey and the concurrent demersal survey in Falkland waters to enable size comparisons between populations.

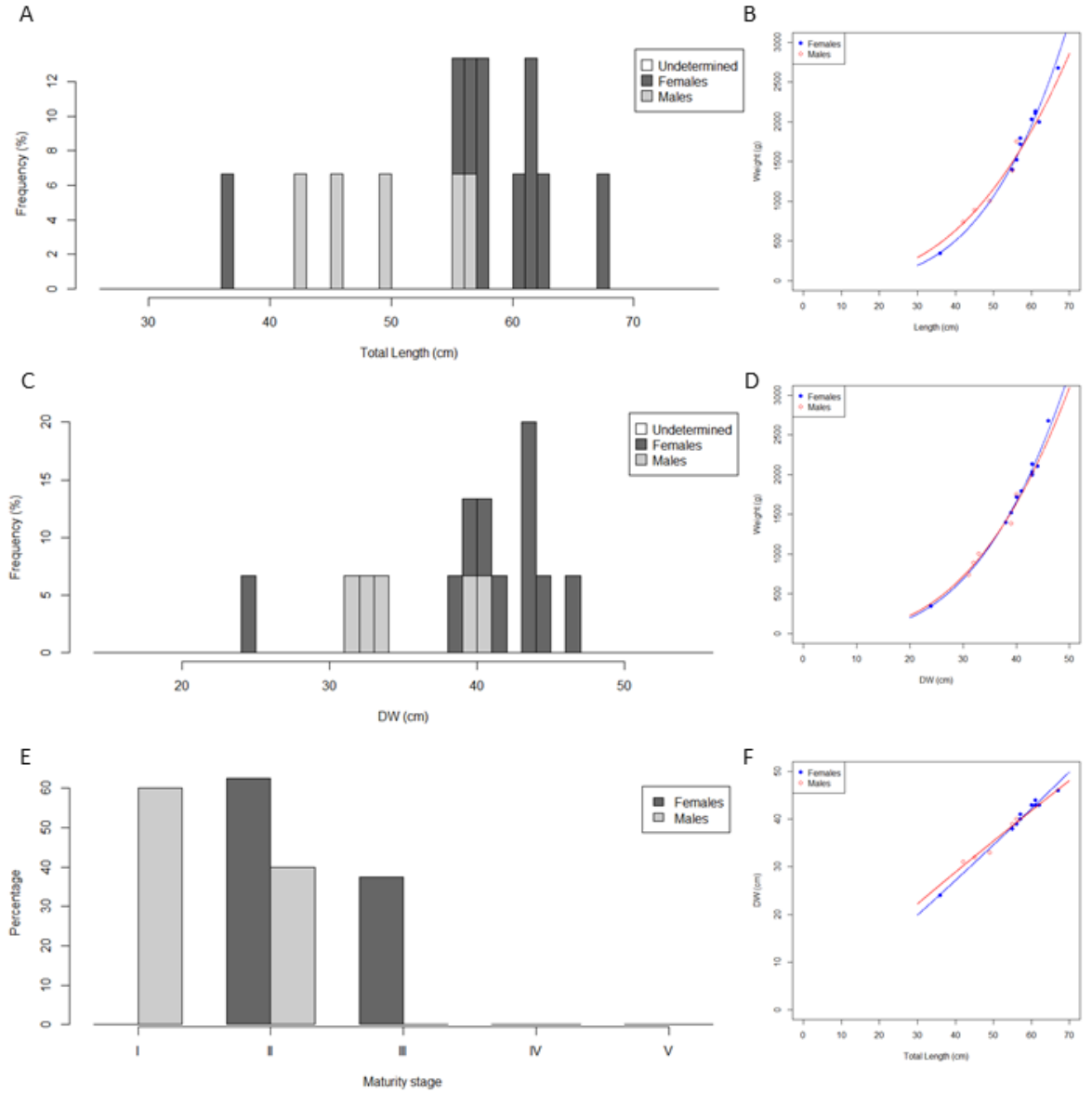

Figure 14. Length frequency distribution (A), total length to weight relationship (B), disc width frequency distribution (C), disc width to weight relationship (D), proportion of the different stages of maturity (E), and the disc width to length relationship for *Bathyraja albomaculata* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (B) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^b, where "a" represents the intercept and "b" the slope. The lines in (D) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * DiscWidth^b, where "a" represents the intercept and "b" the slope. The lines in (F) (males in red and females in blue) represent the best fit for a linear regression defined as DiscWidth = a * Length + b, where "a" represents the slope and "b" the intercept. Values for the different parameters and fit are summarised in Table 19, Table 20, and Table 21.

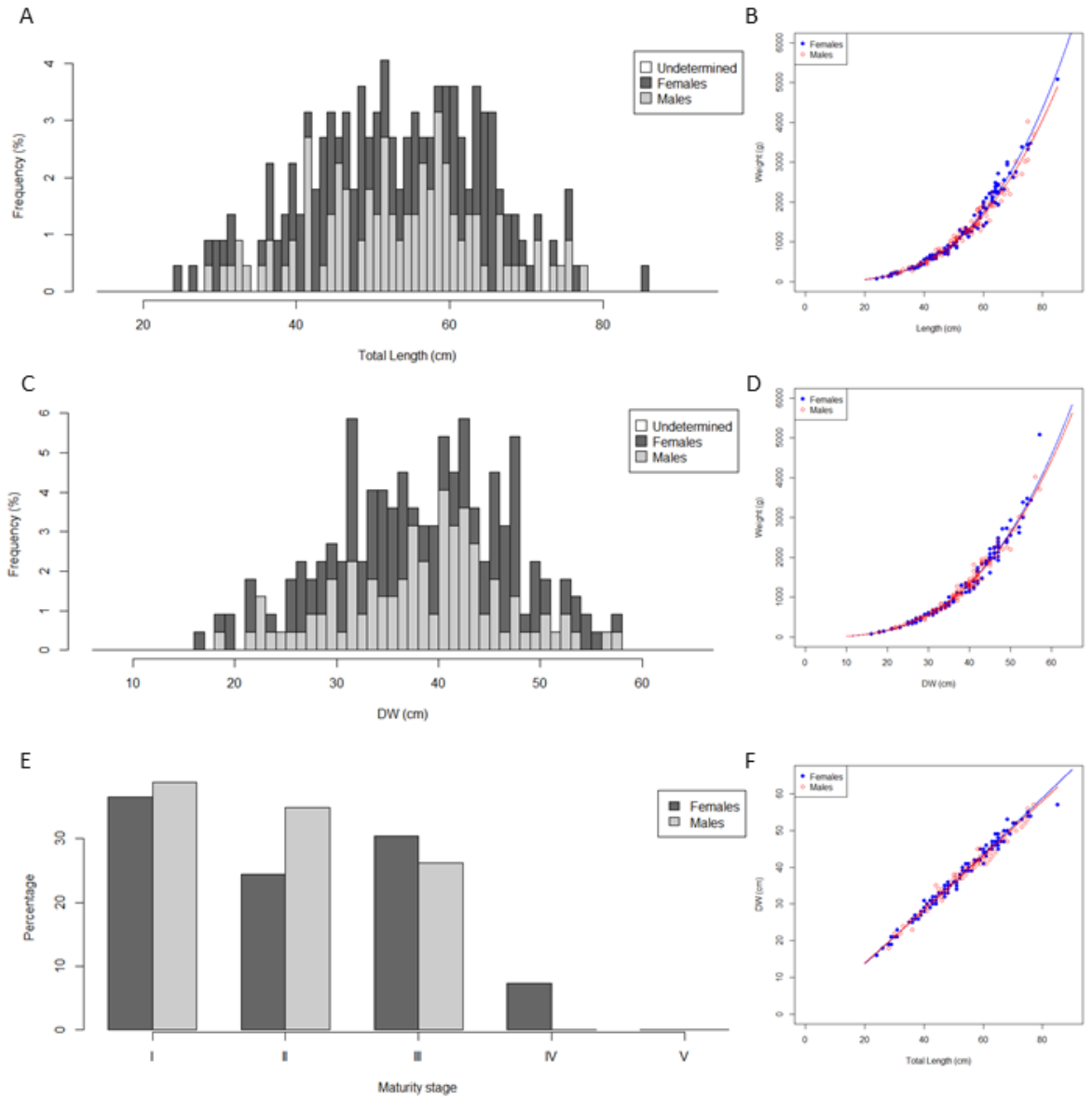

Figure 15. Length frequency distribution (A), total length to weight relationship (B), disc width frequency distribution (C), disc width to weight relationship (D), proportion of the different stages of maturity (E), and the disc width to length relationship for *Bathyraja brachyurops* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (B) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^b, where "a" represents the intercept and "b" the slope. The lines in (D) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * DiscWidth^b, where "a" represents the intercept and "b" the slope. The lines in (F) (males in red and females in blue) represent the best fit for a linear regression defined as DiscWidth = a * Length + b, where "a" represents the slope and "b" the intercept. Values for the different parameters and fit are summarised in Table 19, Table 20, and Table 21.

Bathyraja griseocauda **- RGR**

A total of seven RGR (four females and three males) was sampled from seven strata. The males measured between 53.0 and 62.0 cm in total length and between 38.0 and 49.0 cm in disc width. The females measured between 32.0 and 130.0 cm total length and 22.0 to 66.0 cm in disc width, with the disc width for the 130 cm female not measured. The maturity of the 130 cm female was not assessed. All other RGR, were assessed as Stage I on the maturity scale, except for the 93 cm female (Stage II). Weight of these RGR ranged from 210 to 19,700 g.

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 18 RGR (10 females and 8 males). Males measured on average 36.38 cm DW (range 15.0 to 76.0 cm DW) and females 59.80 cm DW (range 24.0 to 100.0 cm DW). There was no significant difference in DW for males between Falkland waters and the Argentine EEZ (t_9 = 1.0; p = 0.18). There was no significant difference in DW for females between Falkland waters and the Argentine EEZ (t_5 = -0.1; p = 0.46).

***Bathyraja macloviana* - RMC**

A total of 153 RMC (70 females and 83 males) was sampled from seven strata. Males measured on average 45.81 cm total length (range 19.0 to 58.0 cm; median = 49.0 cm; N = 83) and on average 30.36 cm disc width (range 12.0 to 38.0 cm; median = 32.0 cm; N = 83), and females 46.60 cm total length (range 23.0 to 57.0 cm TL; median = 47 cm; N = 70) and on average 30.91 cm disc width (range 15.0 to 39.0 cm; median = 31.5 cm; N = 70) (Figure **16**). There was little difference in maturity between males and females as the vast majority were still immature or maturing (Figure **16**). From the length-weight relationships, some trends emerge. The most notable one is that there is no difference in weight between males and females for a given size up to *c.*50 cm total length, from which point on, females are heavier than males (Figure **16**; Table **24**). These differences are also apparent when examining disc width to weight relationship (Figure **16**; Table **24**). The ratio of disc width to total length is similar between males and females regardless of size (Figure **16**; Table **24**).

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 38 RMC (14 females, 23 males, and 1 juvenile). Males measured on average 33.04 cm DW (range 9.0 to 40.0 cm DW) and females 33.71 cm DW (range 25.0 to 37.0 cm DW). Males were significantly larger in Falkland waters than in the Argentine EEZ (t_{33} = -1.9; p = 0.036). Females were significantly larger in Falkland waters than in the Argentine EEZ (t_{26} = -2.8; p = 0.005).

***Bathyraja magellanica* - RMG**

A total of 56 RMG (21 females and 35 males) was sampled from seven strata. Males measured on average 35.20 cm total length (range 16.0 to 63.0 cm; median = 28.0 cm; N = 35) and on average 23.20 cm disc width (range 10.0 to 42.0 cm; median = 18.0 cm; N = 35), and females 33.10 cm total length (range 20.0 to 61.0 cm TL; median = 26 cm; N = 21) and on average 21.95 cm disc width (range 13.0 to 43.0 cm; median = 17.0 cm; N = 21) (Figure **17**). Females were evenly split between the first four stages of maturity, whereas a majority of males were at Stage I (Figure **17**). From the length-weight relationships, some trends emerge. The most notable one is that there is no difference in weight between males and females for a given size up to *c.*37.5 cm total length, from which point on, females are heavier than males (Figure **17**; Table **25**). These differences are also apparent when examining disc width to weight relationship (Figure **17**; Table **25**). The ratio of disc width to total length is similar between males and females regardless of size (Figure **17**; Table **25**). No RMG were collected from the concurrent demersal survey in Falkland waters to enable size comparisons between populations.

***Bathyraja multispinus* - RMU**

A total of two RMU (one female and one male) was sampled from seven strata. The male measured 32.0 cm in total length and 22.0 cm in disc width, and weighed 296 g (Stage I on the maturity scale). The female measured 84.0 cm in total length and 56.0 cm in disc width, and weighed 4,180 g (Stage II on the maturity scale). Too few RMU collected from both this survey and the concurrent demersal survey in Falkland waters to enable size comparisons between populations.

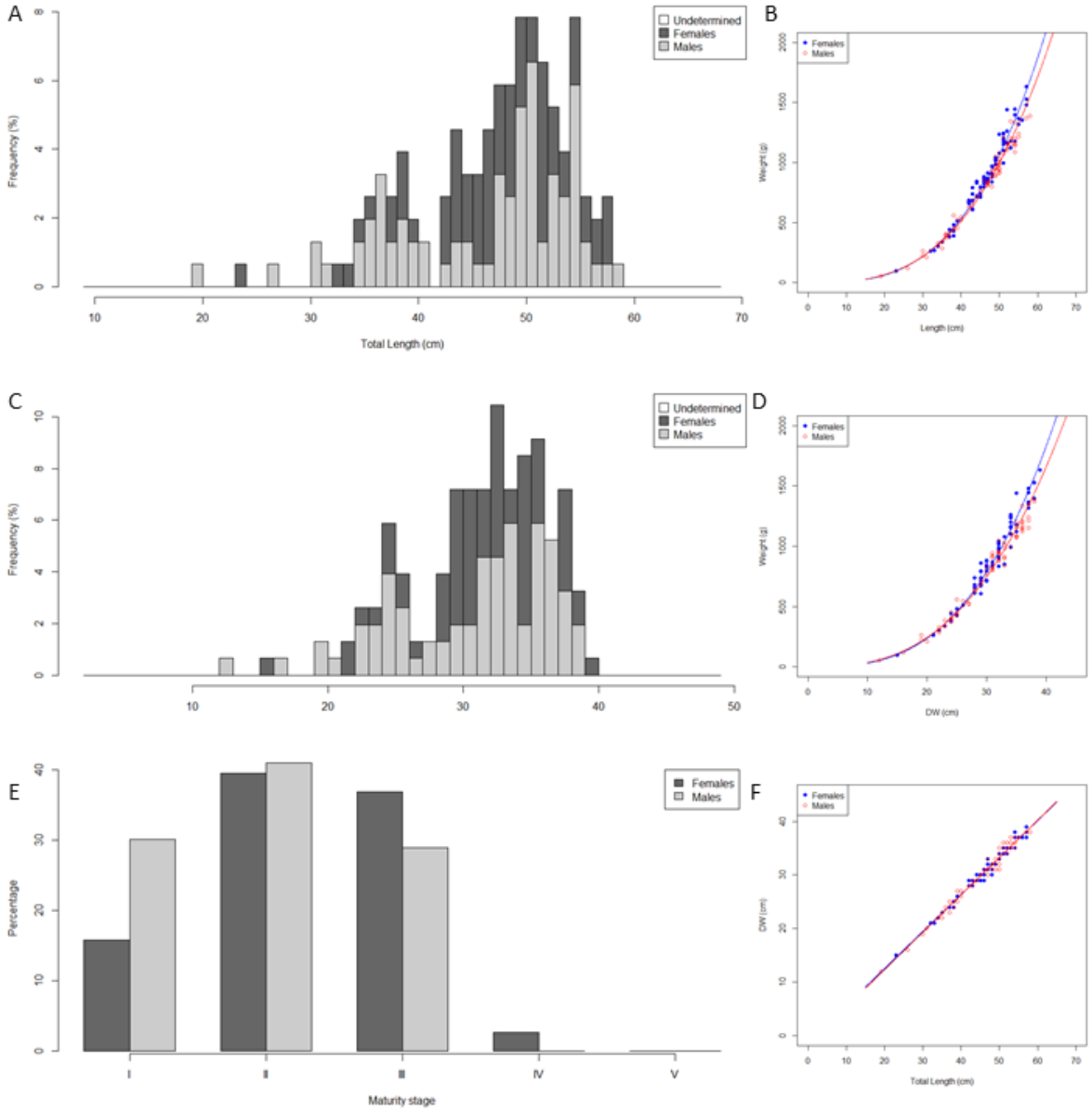

Figure 16. Length frequency distribution (A), total length to weight relationship (B), disc width frequency distribution (C), disc width to weight relationship (D), proportion of the different stages of maturity (E), and the disc width to length relationship for *Bathyraja macloviana* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (B) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^{b}, where "a" represents the intercept and "b" the slope. The lines in (D) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * DiscWidth^{b}, where "a" represents the intercept and "b" the slope. The lines in (F) (males in red and females in blue) represent the best fit for a linear regression defined as DiscWidth = a * Length + b, where "a" represents the slope and "b" the intercept. Values for the different parameters and fit are summarised in Table 19, Table 20, and Table 21.

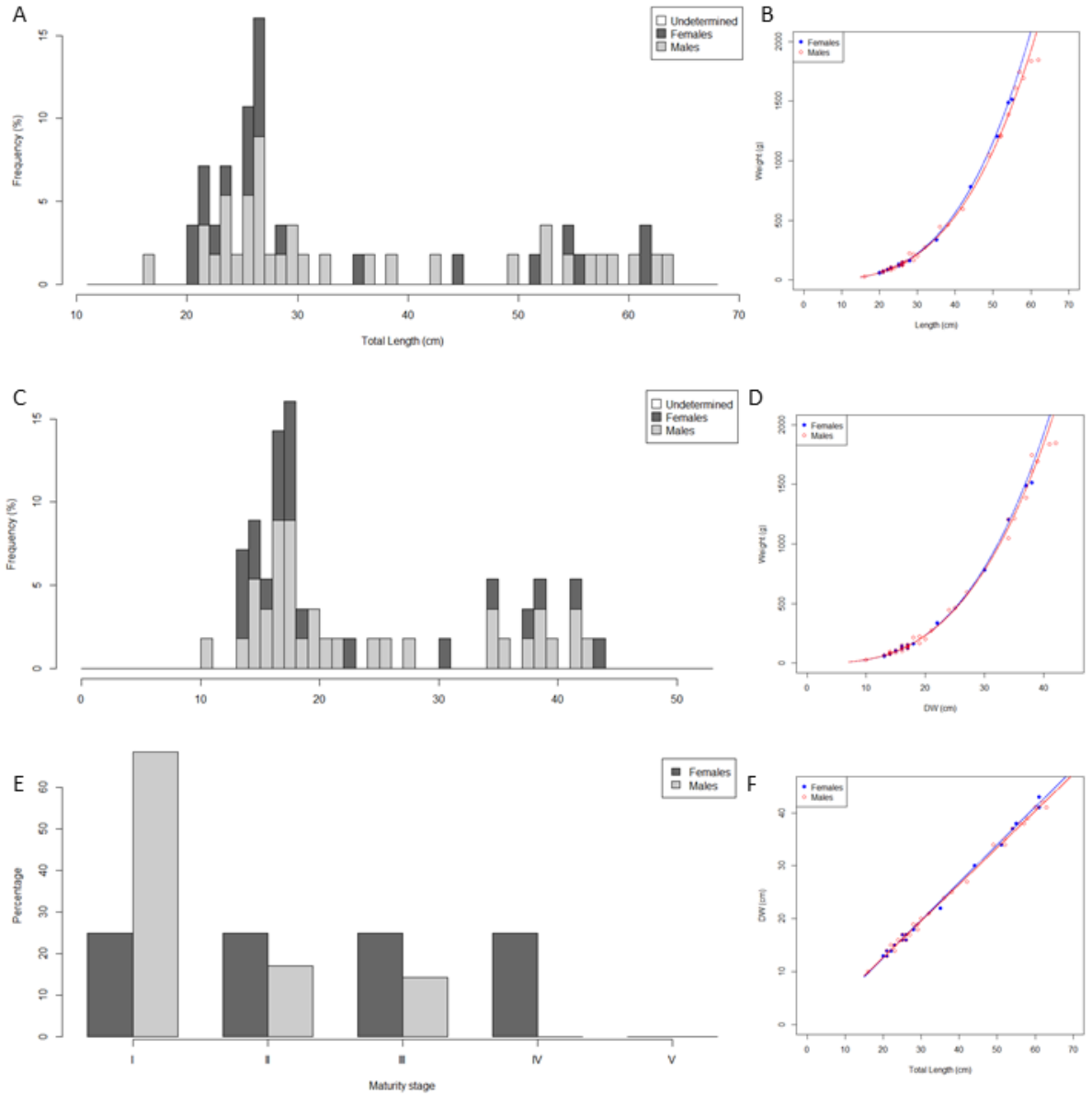

Figure 17. Length frequency distribution (A), total length to weight relationship (B), disc width frequency distribution (C), disc width to weight relationship (D), proportion of the different stages of maturity (E), and the disc width to length relationship for *Bathyraja magellanica* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (B) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^b, where "a" represents the intercept and "b" the slope. The lines in (D) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * DiscWidth^b, where "a" represents the intercept and "b" the slope. The lines in (F) (males in red and females in blue) represent the best fit for a linear regression defined as DiscWidth = a * Length + b, where "a" represents the slope and "b" the intercept. Values for the different parameters and fit are summarised in Table 19, Table 20, and Table 21.

***Bathyraja scaphiops* - RSC**

A total of five RSC (four females and one male) was sampled from seven strata. The male measured 30.0 cm in total length and 21.0 cm in disc width, and weighed 216 g (Stage I on the maturity scale). The females measured between 37.0 and 42.0 cm total length and 25.0 and 29.0 cm in disc width. The maturity of only two females was assessed and both were in Stage I. Female RSC weighed between 308 and 476 g. Too few RSC collected from both this survey and the concurrent demersal survey in Falkland waters to enable size comparisons between populations.

Discopyge tschudii

A single male *Discopyge tschudii* was sampled from the seven strata. The male measured 31.0 cm in total length and 25.0 cm in disc width, and weighed 184 g (Stage III on the maturity scale). No *D. tschudii* were collected from the concurrent demersal survey in Falkland waters to enable size comparisons between populations.

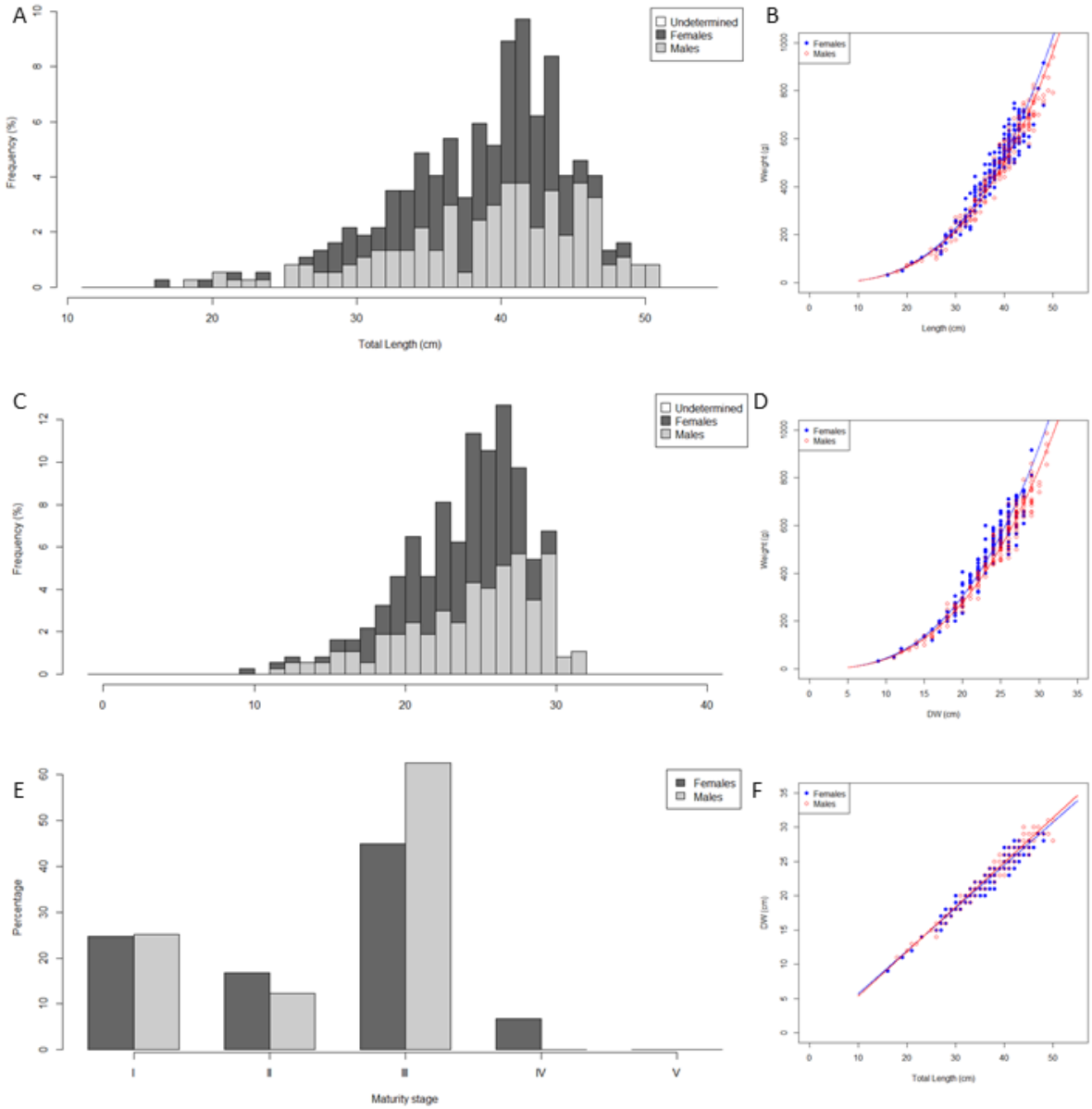

Figure 18. Length frequency distribution (A), total length to weight relationship (B), disc width frequency distribution (C), disc width to weight relationship (D), proportion of the different stages of maturity (E), and the disc width to length relationship for *Psammobatis* sp. sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (B) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^b, where "a" represents the intercept and "b" the slope. The lines in (D) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * DiscWidth^b, where "a" represents the intercept and "b" the slope. The lines in (F) (males in red and females in blue) represent the best fit for a linear regression defined as DiscWidth = a * Length + b, where "a" represents the slope and "b" the intercept. Values for the different parameters and fit are summarised in Table 19, Table 20, and Table 21.

***Psammobatis* sp. - RPX**

A total of 370 RPX (191 females and 179 males) was sampled from seven strata. Males measured on average 38.61 cm total length (range 18.0 to 50.0 cm; median = 40.0 cm; N = 179) and on average 23.96 cm disc width (range 11.0 to 31.0 cm; median = 25.0 cm; N = 179), and females 37.79 cm total length (range 16.0 to 48.0 cm TL; median = 39 cm; N = 191) and on average 23.08 cm disc width (range 9.0 to 29.0 cm; median = 24.0 cm; N = 191) (Figure **18**). A greater proportion of both males and females were observed at Stage III on the maturity scale (Figure **18**). From the length-weight relationships, some trends emerge. The most notable one is that there is no difference in weight between males and females for a given size up to *c.*40 cm total length, from which point on, females are heavier than males (Figure **18**; Table **26**). These differences are also apparent when examining disc width to weight relationship (Figure **18**; Table **26**). The ratio of disc width to total length is similar between males and females regardless of size (Figure **18**; Table **26**).

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 16 RPX (9 females and 7 males). Males measured on average 27.43 cm DW (range 26.0 to 29.0 cm DW) and females 23.44 cm DW (range 14.0 to 26.0 cm DW). Males were significantly larger in Falkland waters than in the Argentine EEZ (t_{15} = -6.4; $p < 0.0001$). There was no significant difference in DW for females between Falkland waters and the Argentine EEZ (t_9 = -0.3; p = 0.39).

Table 19. Summary of the power equation (Weight = aL^b) defining the length to weight relationship of male and female skates, where "a" corresponds to the intercept, "b" to the slope, and "*L*" to the total length.

Species	Males		Females	
	Equation	r^2	Equation	r^2
Bathyraja albomaculata	$0.030758 * L^{2.692796}$	0.95	$0.002227 * L^{3.342593}$	0.99
Bathyraja brachyurops	$0.006190 * L^{3.057033}$	0.98	$0.003855 * L^{3.180869}$	0.99
Bathyraja macloviana	$0.009004 * L^{2.969072}$	0.99	$0.005842 * L^{3.096407}$	0.98
Bathyraja magellanica	$0.004797 * L^{3.151052}$	1.00	$0.003729 * L^{3.232599}$	1.00
Psammobatis sp.	$0.010807 * L^{2.913865}$	0.97	$0.010156 * L^{2.945862}$	0.95
Zearaja chilensis	$0.003114 * L^{3.200601}$	0.99	$0.004129 * L^{3.126727}$	0.99

Table 20. Summary of the power equation (Weight = aDW^b) defining the width to weight relationship of male and female skates, where "a" corresponds to the intercept, "b" to the slope, and "*DW*" to the disc width.

Species	Males		Females	
	Equation	r^2	Equation	r^2
Bathyraja albomaculata	$0.043197 * L^{2.858096}$	0.95	$0.020540 * L^{3.063182}$	1.00
Bathyraja brachyurops	$0.025640 * L^{2.946511}$	0.99	$0.019961 * L^{3.015219}$	0.99
Bathyraja macloviana	$0.060167 * L^{2.771630}$	0.98	$0.035470 * L^{2.941452}$	0.98
Bathyraja magellanica	$0.030482 * L^{2.984645}$	0.99	$0.026130 * L^{3.037819}$	1.00
Psammobatis sp.	$0.082088 * L^{2.714257}$	0.98	$0.078536 * L^{2.757495}$	0.95
Zearaja chilensis	$0.007372 * L^{3.183402}$	0.99	$0.009325 * L^{3.118841}$	0.99

Table 21. Summary of the linear regression equation (DiscWidth = a * *L* +b) defining the width to length relationship of male and female skates, where "a" corresponds to the slope, "b" to the intercept, and "*L*" to the total length.

Species	Males		Females	
	Equation	r^2	Equation	r^2
Bathyraja albomaculata	$0.66354 * L + 2.21180$	0.94	$0.74035 * L - 2.24280$	0.98
Bathyraja brachyurops	$0.72658 * L - 0.50780$	0.98	$0.74556 * L - 1.26061$	0.98
Bathyraja macloviana	$0.69627 * L - 1.55071$	0.98	$0.68982 * L - 1.22555$	0.98
Bathyraja magellanica	$0.69166 * L - 1.14639$	1.00	$0.71162 * L - 1.59888$	1.00
Psammobatis sp.	$0.64949 * L - 1.11292$	0.96	$0.62579 * L - 0.56905$	0.94
Zearaja chilensis	$0.77870 * L - 0.03781$	0.99	$0.77790 * L - 0.00443$	0.99

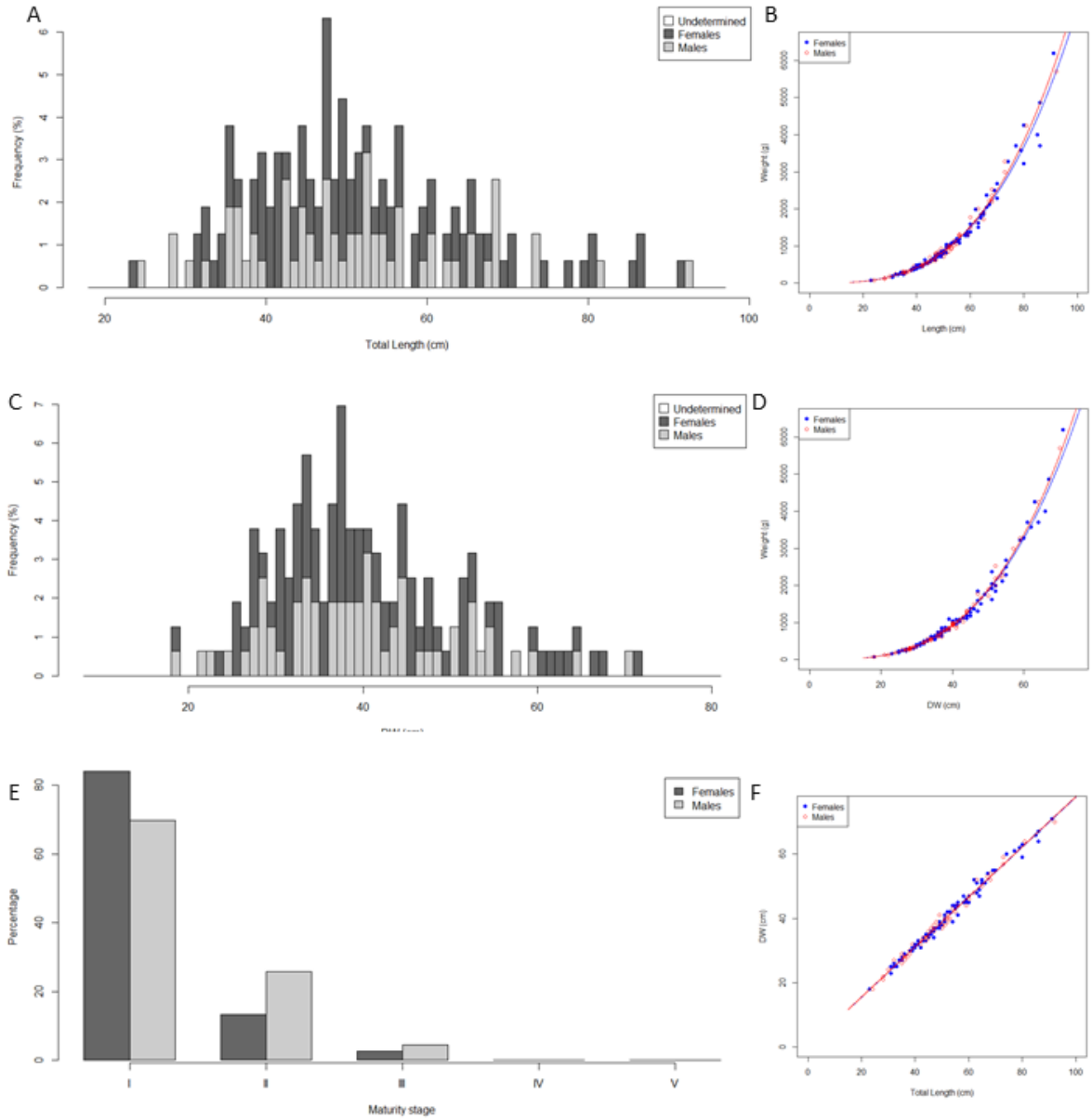

Figure 19. Length frequency distribution (A), total length to weight relationship (B), disc width frequency distribution (C), disc width to weight relationship (D), proportion of the different stages of maturity (E), and the disc width to length relationship for *Zearaja chilensis* sampled during the VA/0219 joint research cruise in Argentine waters. The lines in (B) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * Length^b, where "a" represents the intercept and "b" the slope. The lines in (D) (males in red and females in blue) represent the best fit for a power function defined as Weight = a * DiscWidth^b, where "a" represents the intercept and "b" the slope. The lines in (F) (males in red and females in blue) represent the best fit for a linear regression defined as DiscWidth = a * Length + b, where "a" represents the slope and "b" the intercept. Values for the different parameters and fit are summarised in Table 19, Table 20, and Table 21.

***Zearaja chilensis* - RFL**

A total of 158 RFL (92 females and 66 males) was sampled from seven strata. Males measured on average 50.15 cm total length (range 24.0 to 92.0 cm; median = 49.5 cm; N = 66) and on average 39.09 cm disc width (range 18.0 to 70.0 cm; median = 38.5 cm; N = 66), and females 51.65 cm total length (range 24.0 to 92.0 cm TL; median = 49 cm; N = 92) and on average 40.18 cm disc width (range 18.0 to 71.0 cm; median = 37.0 cm; N = 92) (Figure **19**). The majority of males and females were in Stage I on the maturity scale (Figure **19**). From the length-weight

relationships, some trends emerge. The most notable one is that there is no difference in weight between males and females for a given size up to *c.*70 cm total length, from which point on, males are heavier than females (Figure **19**; Table **27**). These differences are also apparent when examining disc width to weight relationship (Figure **19**; Table **27**). The ratio of disc width to total length is similar between males and females regardless of size (Figure **19**; Table **27**).

Data from the concurrent demersal survey in Falkland waters (see Arkhipkin et al 2019) measured a total of 83 RFL (77 females and 6 males). Males measured on average 45.83 cm DW (range 41.0 to 57.0 cm DW) and females 56.19 cm DW (range 35.0 to 77.0 cm DW). Males were significantly larger in Falkland waters than in the Argentine EEZ (t_8 = -2.5; p = 0.017). Females were significantly larger in Falkland waters than in the Argentine EEZ (t_{167} = -9.8; p < 0.0001).

Table 22. Summary table for *Bathyraja albomaculata* showing predicted disc width (DW) (cm) for males and females at different total lengths (TL) (cm), predicted weights (W) (g) for males and females at different total lengths (TL) (cm), and predicted W for predicted DW for both males and females.

Predicted	Sex	30	40	45	50	55	60	70
DW from TL								
	Males	22.1	28.8	32.1	35.4	38.7	42.0	48.7
	Females	20.0	27.4	31.1	34.8	38.5	42.2	49.6
W from TL								
	Males	292.1	633.8	870.4	1,155.9	1,494.2	1,888.7	2,860.4
	Females	192.8	504.4	747.7	1,063.4	1,462.3	1,955.9	3,274.4
W from DW								
	Males	300.5	640.5	873.4	1,151.2	1,490.3	1,883.0	2,874.6
	Females	198.6	520.8	767.7	1,083.2	1,476.2	1,955.4	3,207.5

Table 23. Summary table for *Bathyraja brachyurops* showing predicted disc width (DW) (cm) for males and females at different total lengths (TL) (cm), predicted weights (W) (g) for males and females at different total lengths (TL) (cm), and predicted W for predicted DW for both males and females.

Predicted	Sex	25	35	45	55	65	75	85
DW from TL								
	Males	17.7	24.9	32.2	39.5	46.7	54.0	61.3
	Females	17.4	24.8	32.3	39.7	47.2	54.7	62.1
W from TL								
	Males	116.2	325.1	700.8	1,294.3	2,156.9	3,340.5	4,897.7
	Females	107.8	314.4	699.3	1,324.0	2,252.5	3,551.0	5,287.5
W from DW								
	Males	121.9	333.3	710.9	1,298.1	2,126.1	3,261.6	4,739.0
	Females	109.8	319.7	709.1	1,320.9	2,225.8	3,472.1	5,090.3

Table 24. Summary table for *Bathyraja macloviana* showing predicted disc width (DW) (cm) for males and females at different total lengths (TL) (cm), predicted weights (W) (g) for males and females at different total lengths (TL) (cm), and predicted W for predicted DW for both males and females.

Predicted	Sex	20	25	30	35	40	50	60
DW from TL								
	Males	12.4	15.9	19.3	22.8	26.3	33.3	40.2
	Females	12.6	16.0	19.5	22.9	26.4	33.3	40.2
W from TL								
	Males	65.7	127.4	218.8	345.8	514.1	997.2	1,713.5
	Females	62.4	124.5	218.9	352.9	533.6	1,064.8	1,872.6
W from DW								
	Males	64.6	128.6	220.0	349.2	518.7	997.7	1,681.4
	Females	61.2	123.5	221.0	354.6	538.8	1,066.7	1,856.2

Table 25. Summary table for *Bathyraja magellanica* showing predicted disc width (DW) (cm) for males and females at different total lengths (TL) (cm), predicted weights (W) (g) for males and females at different total lengths (TL) (cm), and predicted W for predicted DW for both males and females.

Predicted	Sex	20	25	30	35	40	50	60
DW from TL								
	Males	12.7	16.1	19.6	23.1	26.5	33.4	40.4
	Females	12.6	16.2	19.7	23.3	26.9	34.0	41.1
W from TL								
	Males	60.3	121.9	216.5	351.9	536.0	1,082.7	1,923.2
	Females	59.9	123.2	222.1	365.5	562.9	1,157.9	2,087.6
W from DW								
	Males	60.0	121.9	219.3	358.0	539.4	1,076.2	1,899.0
	Females	57.5	123.4	223.6	372.3	576.1	1,173.5	2,087.8

Table 26. Summary table for *Psammobatis* sp. showing predicted disc width (DW) (cm) for males and females at different total lengths (TL) (cm), predicted weights (W) (g) for males and females at different total lengths (TL) (cm), and predicted W for predicted DW for both males and females.

Predicted	Sex	20	25	30	35	40	45	50
DW from TL								
	Males	11.9	15.1	18.4	21.6	24.9	28.1	31.4
	Females	11.9	15.1	18.2	21.3	24.5	27.6	30.7
W from TL								
	Males	66.8	128.0	217.7	341.1	503.4	709.5	964.4
	Females	69.1	133.3	228.1	359.2	532.3	753.1	1,027.2
W from DW								
	Males	68.2	130.1	222.5	343.8	505.7	702.2	949.1
	Females	72.6	140.0	234.3	361.5	531.7	738.5	990.5

Table 27. Summary table for *Zearaja chilensis* showing predicted disc width (DW) (cm) for males and females at different total lengths (TL) (cm), predicted weights (W) (g) for males and females at different total lengths (TL) (cm), and predicted W for predicted DW for both males and females.

Predicted	Sex	20	30	40	50	60	75	90
DW from TL								
	Males	15.5	23.3	31.1	38.9	46.7	58.4	70.0
	Females	15.6	23.3	31.1	38.9	46.7	58.3	70.0
W from TL								
	Males	45.4	166.3	417.7	853.2	1,529.2	3,123.5	5,598.5
	Females	48.3	171.6	421.7	847.3	1,498.4	3,010.5	5,323.9
W from DW								
	Males	45.4	166.1	416.5	849.2	1,519.5	3,095.9	5,511.6
	Females	49.1	171.5	422.0	848.1	1,499.6	2,995.6	5,299.3

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