



Report on otolith exchange of European hake (2011)

by

Carmen Piñeiro and María Sainza
Instituto Español de Oceanografía
IEO, Vigo, Spain

carmen.pineiro@vi.ieo.es

maria.sainza@vi.ieo.es

<http://www.ieo.es>

Introduction

At the last Hake Age estimation Workshop conducted in November, 2009 (WKA EH 2009, ICES 2010) it was recommended that a new otolith exchange be undertaken in order to build on the findings of the Workshop. It was proposed that the WebGR tool (which is available at <http://webgr.azti.es/>) would be used for reading and subsequent analysis. WebGR was developed to support the organization and data analysis of calibration workshops for both age and maturity information. The main goal of this exercise was to assess the impact of moving the interpretation criteria on precision. IEO was responsible for the organization and coordination of the exchange that started on the 6th of April and finished on the 30th of June of 2011.

Objectives

- To analyse the results of the hake otolith exchange to check the precision and bias of readers when using the new guidelines described at the last workshop (WKA EH 2009).
- To test WebGR as an otolith exchange tool.

Material and Methods

Readers from 8 research institutes: MI, IPIMAR, IEO, IFREMER, AZTI, COISPA and HCMR participated in the exchange. All readers, except R13 and R15, were involved in the previous workshop (WKA EH 2009).

Reader	Name	Institution	Degree of Exp.	Country
R1	C. Piñeiro	IEO	Expert	Spain
R2	M. Sainza	IEO	Expert	Spain
R3	J. Rey	IEO	New	Spain
R6	S. Dores	IPIMAR	Expert	Portugal
R8	J. Felix	IFREMER	Expert	France
R9	S. Beattie	MI	Expert	Ireland

R11	P. Carbonara	COISPA	Expert	Italy
R12	J.L. Pérez	IEO	Intermediate	Spain
R13	A. Maceira	AZTI	Expert	Spain
R15	T. Woods	CEFAS	Intermediate	England
R16	E. Lefkaditou	HCMR	New	Greece
R18	S. Warnes	CEFAS	Expert	England

The exchange collection consisted of calibrated digital images of otolith sections from 237 fish collected during all seasons of 2006. An excel workbook including additional information, like date and area of capture, total length and sex of respective specimens, has been also provided to the readers. The length range of fish selected was between 20 cm and 80 cm TL (Figure 1) from ICES Divisions VIIIc-IXa. Sectioned otoliths were prepared by IEO using standard procedures for calcified structures as described by Piñeiro *et al.* (1996). The interpretation of the otoliths was based on the new guidelines agreed in the last Workshop (WKAEH 2009, ICES 2010) in order to improve the precision of age estimation:

- Each annulus (annual translucent zone) consists of bands of several thinner translucent rings. Interpreting these individual components of the *annuli* as complete *annuli*, is a potential cause of over estimation of age when reading hake otoliths.
- Using different levels of magnification helps to reveal the pattern of translucent and opaque bands within the section. Changing the source of light from transmitted to reflect light can also help in the interpretation of the otolith.
- Marking the location of the *annuli* (annual translucent zones): for inter-calibration exercises, each image should be marked at the point where each annulus ends and the following season's opaque growth begins. This is difficult to interpret in hake, but it is the outer edge of the last translucent band/ring in each group of these zones or rings, that the reader considers to represent an annulus.
- The growth pattern should be considered based on growth bands around the whole of the transversal section (TS), including both axes, ventral and dorsal.

The sample used in the exchange was also read by two expert readers (R1 and R2) using the traditional method employed prior to the 2009 Workshop (Piñeiro & Saínza, 2003). This allowed for estimation of intra-readers precision using different otolith interpretation criteria: the traditional method previously agreed and new guidelines established at the last workshop (WKAEH 2009, ICES 2010).

Otolith interpretation was undertaken on digital images that were available at WebGR. All readers were required to annotate the rings they considered to be *annuli* on digital images by using the WebGR tool (Figure 1). The information provided to the readers was:

1. WebGR manual with the instructions on how to use the package.
2. Ageing protocol on hake otolith reading (PROTOCOL_HKEXCH_11.doc)
3. Date of capture and sex of the fish to be aged.
4. The otolith size, since every otolith image has a bar scale of 1 mm.

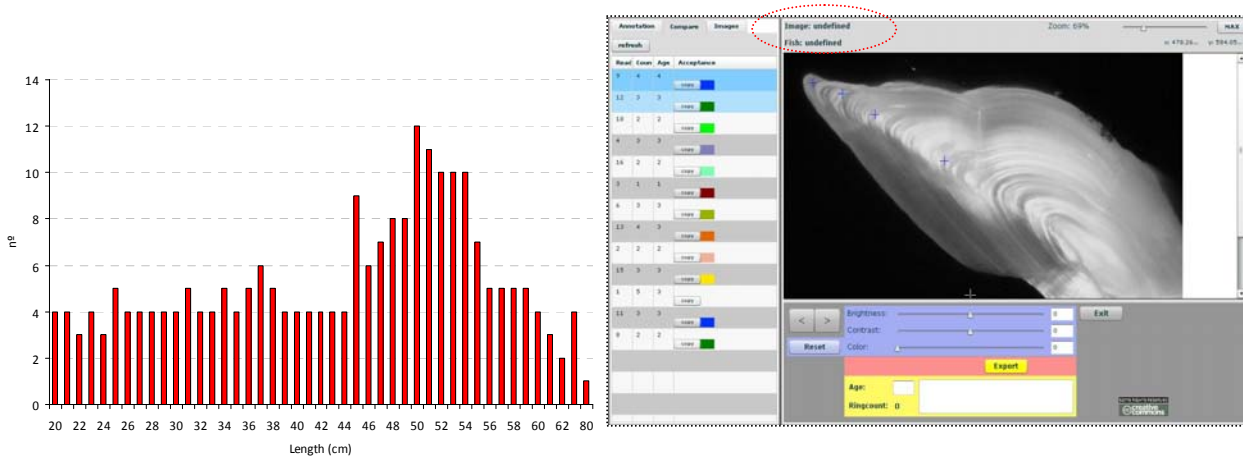


Figure 1.-Length frequency distribution of the fish sampled (left) and WebGR screen for otolith ring annotations (right). The browse annotation screen shows otolith section interpreted by reader. (The red circle indicates the lack of information from image and fish attributes).

Once the exchange was completed by all readers the application was used to produce a statistical table with the results of the calibration exercise showing the following parameters:

- Average percent age error (APE), Beamish and Fournier (1981):

$$APE = \frac{100}{n} \sum_{i=1}^n \left(\frac{1}{r} \sum_{j=1}^r \frac{|x_{ij} - \bar{x}_i|}{\bar{x}_i} \right)$$

n = number of otoliths

r = number of readings for each otolith

x_{ij} = the j value of age estimation for the i otolith

\bar{x}_i = average age calculated for the i otolith

- Coefficient of Variation (CV):

$$CV = \frac{100}{n} \left[\sum_{i=1}^n \left(\frac{sd}{\bar{x}_i} \right) \right]$$

sd = the standard deviation for the i otolith

In order to test the results of the statistical analysis undertaken by WebGR, the Excel ad-hoc Workbook for age reading comparison (Eltink *et al.*, 2000) which has been used in calibration exercises conducted so far was also completed. Additional results were obtained based on the following analysis:

- **PA (percentage of agreement):** 100 x (no. of readers agreeing with modal age/total no. of readers).
- **Box-whisker plot:** to summarise the observations and comparing the distribution of the otolith readings by reader.

RESULTS:

1. - **Inter-readers calibration exercises** The results of readings and the basic information about otolith collection are summarized in **(annexes 1 and 2)**:

- **Outcomes of Web GR:** the average of CV and of APE obtained from all readers were 33.1% and 2.17% respectively (Table 2).
- **Excel ad-hoc Workbook:** the average of CV and APE obtained from all readers were 33.1% and 24.9 % respectively. In addition the PA value was 62.3% (Table 2).

Age range estimated was between 0 to 6 ages. All these results indicated a low level of precision which was also demonstrated by the analysis of the annotated images that showed a high variation in the perception of bands or growth structures among readers (Figure 2).

The interpretation of bands by readers presented high variability as it was displayed in the Box-whisker plot as consequence of difficulty of applying the new guidelines (Figure 3). This plot indicate too that the subjective interpretation of successive opaque and translucent zones is not restricted to the readers without experience or only larger fish but common across all size analyzed. The majority of readers assigned ages between 1 and 3.

2.- **Comparative analysis** Both tools gave the same results for CV but not for APE. This means that WebGR does not calculate APE correctly (Table 2). In addition, this application neither calculated the mean value of CV for the whole exercise and nor the PA.

All readers (N:12)						
Method	N	Fish range TL (cm)	Age range (years)	APE %	PA %	CV %
WebGR (http://webgr.berlios.de)	237	20-80	0-6	2.2	NA	NA
Excel ad-hoc workbook (Eltink <i>et al.</i> , 2000)				24.9	62.3	33.1

Table 2.- Outcomes of Web GR and Excel ad-hoc Workbook based on the guidelines established at the last Workshop (WKA EH 2009).

3.- **Intra-readers** precision for the traditional method and new guidelines are given in the following table:

R1&R2	N	PA	CV	APE
Traditional method	237	70.0	6.4	4.4
New guidelines		46.0	26.2	17.5

Table 3.- Results obtained by using both methods employed by two expert readers.

guidelines are not validated yet and the precision management in the absence of accuracy cannot, under any account, guarantee data quality (De Pontual *et al.*, 2006). Furthermore these new guidelines were established more in a descriptive way to help in the interpretation of the band formation of increments around the otolith than on a rigorous study of ring pattern formation. Therefore this produces a high level of subjectivity in the interpretation.

WebGr was a very useful tool to use for the purposes of this exchange since it saves both time and money and presents also potential advantages for running calibration exercises among different countries and institutions. Table 4, summarizes the advantages and the necessary improvements required to improve the functionality of WebGr. Initial use of the package is very encouraging and with the improvements suggested will have widespread support.

Advantages	Improvements
Speed and economy for calibration exercises.	To improve the initial menu and facilitate the upload and download of the images and data.
All participant readers analyze the same images and have exactly the same information.	To correct the calculation of APE and provide the average APE for the whole calibration exercise.
	New outputs are necessary from WebGR: Percentage agreement and the average CV for the whole calibration exercise.
	To provide information on image and fish attributes (see Figure 1) in the annotation browse menu where is displayed the image of otoliths with the rings interpreted by reader.
	Overlapping of the ring marks by reader (see Figure 2).
	To give information from ring distances of reader interpretations.
	To include in the annotation interface the confidence level of the reader on their otolith reading, in order to reflect the quality of the data (good: 1; medium: 2; and unreadable: 3).
	To facilitate the removal of the records of the images or data by sets instead of having to do it one by one as it is now.

Table 4. - Summary of advantages of the WebGR and suggested improvements to improve functionality and ease of use.

Conclusions

1. The variable degree of participant experience in age determination of hake otoliths produced a high variability in the results.
2. The new guidelines are not sufficient to rule out individual subjectivity of interpretation of hake otoliths. This is due to the lack of a validated method that is necessary to confirm the frequency of growth rings in the otoliths.

3. Results clearly show the unsuitability of these new guidelines since the precision management in the absence of accuracy cannot, under any account, guarantee data quality (De Pontual *et al.*, 2006).
4. We are still not at a stage where we can validate the age of hake from otoliths as the new method is still subjective to a large extent. The new guidelines are a first step towards the age determination of hake from otoliths. However research on the effects of environmental factors on otolith formation in combination with work on daily growth and tagging experiments will add to the overall understanding of the otolith structure and interpretation.
5. The results of this exchange demonstrated that will not be possible to build up a transitional error matrix to rebuild historical ALKs due to the interpretation of hake otoliths for age estimation is imprecise and still cannot be validated.
6. In summary, the use of the WebGR is very useful for calibration exercises; however, some improvements are needed for efficient running of the application in order to encourage general use of the tool (see Table 4).

Recommendations

Including more images using different magnification and lighting methods within exchanges employing tools such as WebGR will help the interpretation of ageing for complex species such as hake reducing the overall costs and speed up the process since the major cost of any ageing workshop or exchange is the costs of getting everyone together.

This work could be undertaken by the appropriate staff with ageing expertise at different institutes and workshops could then be used to review any outcomes of this work which would hopefully speed up the process of obtaining a robust method for determining the age of hake from otoliths.

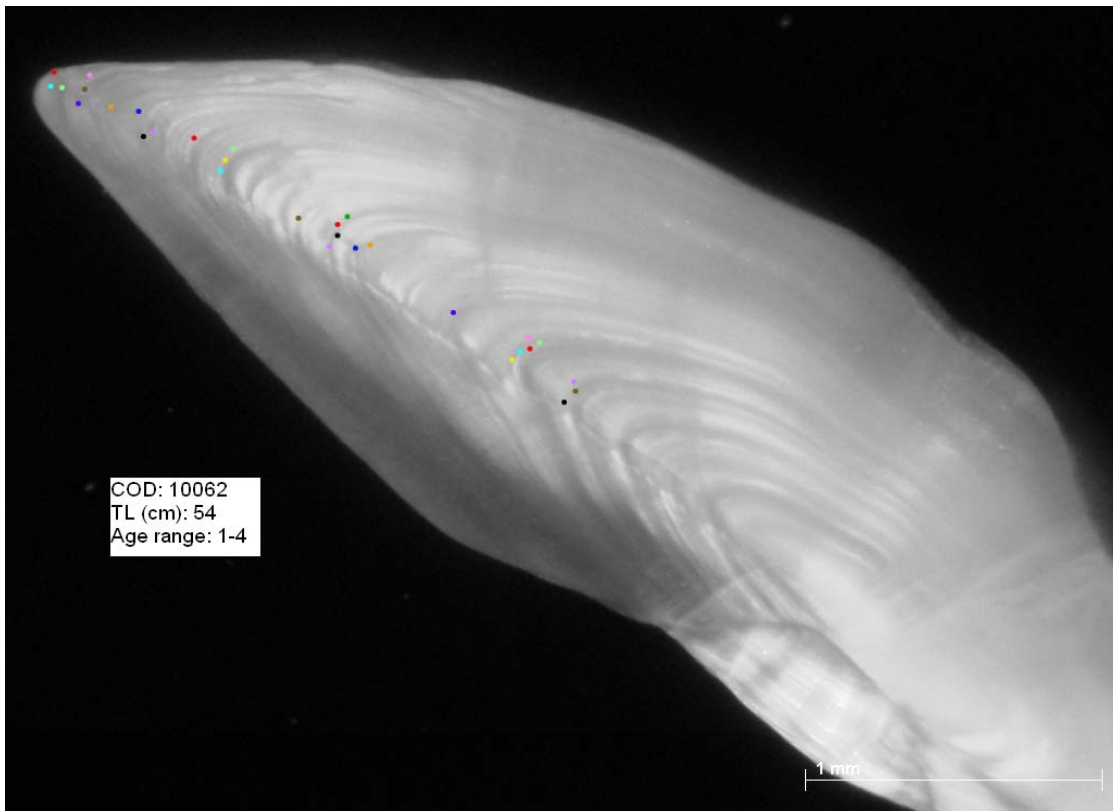


Figure 2. - Interpretation of an otolith from a fish of 54 cm (TL) with the annotated rings overlapped showing the different interpretation done by readers that goes from 1 to 4 ages.

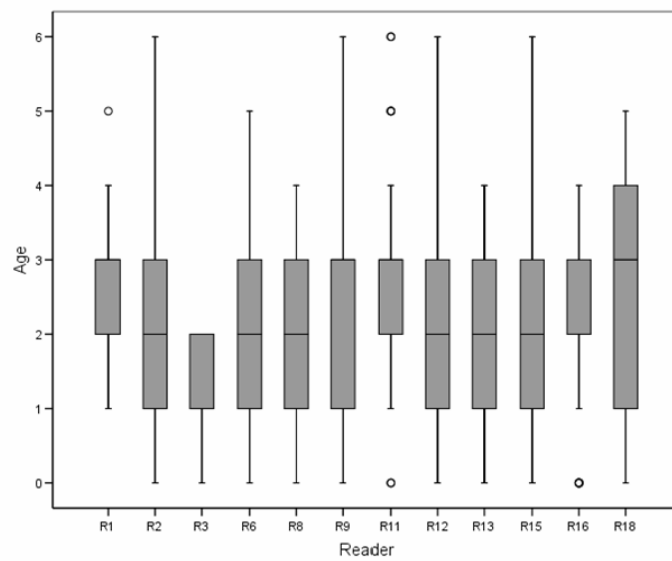


Figure 3.- Box whisker plot of age readings conducted by all readers showing the age estimation values.

References

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ANNEX 1

Expertise level	Expert	Expert	Intermediate	Expert	Expert	Expert	Expert	Intermediate	Expert	Intermediate	Expert	Intermediate	Expert	Group	APE	CV	STDDEV	VARIANCE
NAME	CG	MS	JR	SD	FJ	SB	PC	JLP	AM	TW	EL	SW	-	-	-	-	-	
INSTITUTION	IEO	IEO	IEO	IPIMAR	IFREMER	MI	COISPA	IEO	AZTI	CEFAS	HCMR	CEFAS	-	-	-	-	-	
Stock assessment	yes	yes	no	yes	no	yes	no	no	yes	no	no	no	-	-	-	-	-	
READER	1	2	3	6	8	9	11	12	13	15	16	18	-	-	-	-	-	
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cod890_lab06_20x.jpg	2	1	1	1	1	1	1	1	1	1	1	1	-	0.641	25.5125	0.2764	0.0764	
cod891_lab06_20x.jpg	1	1	1	1	1	1	1	1	1	1	2	1	-	0.641	25.5125	0.2764	0.0764	
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cod613_lab06_20x.jpg	2	2	1	2	2	2	2	2	2	1	2	2	-	0.7576	20.3279	0.3727	0.1389	
cod638_lab06_20x.jpg	2	2	1	2	2	4	2	2	2	3	2	2	-	0.641	31.7162	0.6872	0.4722	
cod639_lab06_20																		

ANNEX 1

Expertise level	Expert	Expert	Intermediate	Expert	Expert	Expert	-	Intermediate	Expert	Intermediate	-	Expert	Group	APE	CV	STDDEV	VARIANCE
NAME	CG	MS	JR	SD	FJ	SB	PC	JLP	AM	TW	EL	SW	-	-	-	-	-
INSTITUTION	IEO	IEO	IEO	IPIMAR	IFREMER	MI	COISPA	IEO	AZTI	CEFAS	HCMR	CEFAS	-	-	-	-	-
Stock assessment	yes	yes	no	yes	no	yes	no	no	yes	no	no	no	-	-	-	-	-
READER	1	2	3	6	8	9	11	12	13	15	16	18	-	-	-	-	-
cod10446_dem06_20x.jpg	4	3	1	3		3	4	3	2	2	2	2	-	2.1944	33.4323	0.8814	0.7769
cod10461_dem06_20x.jpg	3	3	1	3		4	3	3	3	3	2	2	-	0.9091	27.4874	0.7497	0.562
cod10463_dem06_20x.jpg	4	2	1	2	2	3	2	2	2	2	2	2	-	0.641	31.7162	0.6872	0.4722
cod327_lab06_20x.jpg	2	2	2	3	3	3	3	2	3	1	3	3	-	1.6667	25.8199	0.6455	0.4167
cod594_lab06_20x.jpg	3	3	1	2	3	3	3	3	2	2	2	3	-	1.6667	25.8199	0.6455	0.4167
cod626_lab06_20x.jpg	3	2	1	2	2	3	3	2	2	2	2	3	-	4.6296	26.4497	0.5951	0.3542
cod633_lab06_20x.jpg	3	2	1	2	2	4	3	2	2	3	2	3	-	1.4368	31.4153	0.7592	0.5764
cod640_lab06_20x.jpg	3	2	2	3	3	3	3	2	2	3	2	3	-	1.3441	19.0841	0.493	0.2431
cod647_lab06_20x.jpg	3	2	2	4	3	3		2	3	2	3	3	-	2.4242	22.6078	0.6166	0.3802
cod651_lab06_20x.jpg	3	2	2	3	3	5	3	2	3	3	3	3	-	0.2381	26.0298	0.7592	0.5764
cod657_lab06_20x.jpg	2	1	1	2	2	3	2	2	2	1	2	3	-	4.7101	33.3963	0.6401	0.4097
cod668_lab06_20x.jpg	3	2	2	3	3	2	2	2	3	2	3	3	-	1.6667	20	0.5	0.25
cod677_lab06_20x.jpg	3	2	2	3	3	3	3	3	3	2	3	3	-	0.7576	15.7459	0.433	0.1875
cod685_lab06_20x.jpg	4	3	2	3	3	3	3	3	2	2	3	3	-	0.2381	16.9031	0.493	0.2431
cod757_lab06_20x.jpg	2	2	1	2	1	2	2	2	2	2	2	3	-	4.1667	28.8675	0.5774	0.3333
cod825_lab06_20x.jpg	3	2	1	2	2	3	2	2	3	1	2	3	-	0.641	31.7162	0.6872	0.4722
cod846_lab06_20x.jpg	3	3	2	3	3	3	3	3	2	2	3	3	-	0.4902	13.1533	0.3727	0.1389
cod850_lab06_20x.jpg	2	2	2	2	2	3	2	2	3	3	2	3	-	1.1905	20.2031	0.4714	0.2222
cod863_lab06_20x.jpg	3	3	2	2	3	3	3	3	3	3	3	3	-	2.451	13.1533	0.3727	0.1389
cod867_lab06_20x.jpg	3	3	2	3	3	3	3	3	3	2	3	3	-	0.4902	13.1533	0.3727	0.1389
cod1300_lab06_20x.jpg	3	3	2	4	3	3	3	3	3	2	3	3	-	0.2381	16.9031	0.493	0.2431
cod1356_lab06_20x.jpg	4	6	2	4	3	5	6	6	3	6	2	3	-	1.6667	36.4417	1.5184	2.3056
cod1465_lab06_20x.jpg	3	3	1	3	3	3	4	3	4	1	2	3	-	0.7576	33.6077	0.9242	0.8542
cod1575_lab06_20x.jpg	3	3	1	3	3	3	3	3	2	1	2	3	-	2.0202	31.8605	0.782	0.6116
cod2455_lab06_20x.jpg	4	3	2	3	3	4	3	3	3	3	2	3	-	3.0303	20.1008	0.603	0.3636
cod2457_lab06_20x.jpg	3	3	2	3	2	2	3	3	2	3	3	3	-	2.0833	17.6777	0.4714	0.2222
cod2458_lab06_20x.jpg	4	3	1	2	2	3	3	3	2	3	3	3	-	1.3441	24.7779	0.6401	0.4097
cod2549_lab06_20x.jpg	3	3	2	3	2	3	3	3	2	3	2	3	-	0.7576	21.6407	0.5951	0.3542
cod2558_lab06_20x.jpg	2	3	1	2	2	3	3	2	3	3	2	3	-	1.4368	26.4867	0.6401	0.4097
cod2564_lab06_20x.jpg	2	3	1	1	1	1	3	0	1	3	2	3	-	5.9524	57.735	1.0104	1.0208
cod2577_lab06_20x.jpg	2	2	1	2	1	2	2	2	1	1	2	3	-	1.1905	34.0068	0.5951	0.3542
cod2594_lab06_20x.jpg	2	2	2	2	2	2	2	2	1	2	2	3	-	0.3953	24.595	0.5143	0.2645
cod2602_lab06_20x.jpg	3	2	1	2	2	2	2	2	1	2	2	3	-	0.3623	25.7221	0.493	0.2431
cod2640_lab06_20x.jpg	2	2	1	3	2	2	2	2	2	2	2	3	-	0.3333	23.6643	0.493	0.2431
cod2643_lab06_20x.jpg	3	3	2	4	3	3	3	3	3	3	3	3	-	2.7778	13.6083	0.4082	0.1667
cod2644_lab06_20x.jpg	3	3	1	2	3	3	3	3	3	3	2	3	-	1.0417	23.3854	0.6236	0.3889
cod2648_lab06_20x.jpg	2	2	1	2	3	2	3	2	2	2	2	3	-	0.9259	26.4497	0.5951	0.3542
cod2652_lab06_20x.jpg	2	2	1	3	3	2	2	2	2	1	2	3	-	0.3333	30.7246	0.6401	0.4097
cod2657_lab06_20x.jpg	3	2	1	3	3	2	3	2	2	2	2	3	-	2.0115	26.4867	0.6401	0.4097
cod2665_lab06_20x.jpg	3	3	1	3	2	3	3	3	3	3	2	3	-	1.0417	23.3854	0.6236	0.3889
cod2667_lab06_20x.jpg	3	5	1	4	2	2	5	3	2	4	3	3	-	0.2252	38.5076	1.1873	1.4097
cod2668_lab06_20x.jpg	3	3	1	3	3	3	3	3	3	3	3	3	-	0.4902	19.5096	0.5528	0.3056
cod2670_lab06_20x.jpg	3	3	1	3	3	3	3	3	4	3	3	3	-	0.2381	21.9461	0.6401	0.4097
cod2672_lab06_20x.jpg	3	2	2	2	3	2	3	2	3	2	3	3	-	1.6667	20	0.5	0.25
cod10051_dem06_20x.jpg	4	3	1	2	2	4	4	1	3	3	2	3	-	5.2083	38.5276	1.0274	1.0556
cod10062_dem06_20x.jpg	2	3	1	2	2	4	2	3	1	3	3	3	-	1.4368	35.6692	0.862	0.7431
cod10097_dem06_20x.jpg	3	3	1	4	2	4	3	3	2	2	2	3	-	1.0417	31.8689	0.8498	0.7222
cod10216_dem06_20x.jpg	2	3	1	3	2	2	2	2	2	2	2	3	-	4.6296	26.4497	0.5951	0.3542
cod10223_dem06_20x.jpg	2	3	1	3	3	4	3	3	2	3	2	3	-	2.0833	27.9508	0.7454	0.5556
cod10230_dem06_20x.jpg	2	2	1	2	2	3	2	2	2	3	2	3	-	0.641	25.5125	0.5528	0.3056
cod10255_dem06_20x.jpg	3	2	1	3	2	2	2	2	2	1	2	3	-	3.6667	30.7246	0.6401	0.4097
cod10276_dem06_20x.jpg	3	4	1	3	2	4	3	3	3	2	2	3	-	0.7576	30.1511	0.8292	0.6875
cod10277_dem06_20x.jpg	3	4	1	3	2	4	4	4	2	1	2	3	-	4.7022	40.5081	1.0679	1.1405
cod10339_dem06_20x.jpg	3	2	1	4		3	3	3	2	2	2	3	-	1.9481	30.7226	0.782	0.6116
cod10403_dem06_20x.jpg	3	3	1			3	3	3	2	2	2	3	-	2	26.8328	0.6708	0.45
cod10409_dem06_20x.jpg	2	3	1	3	3		3	2	3	2	2	3	-	2.0202	26.7078	0.6556	0.4298
cod10418_dem06_20x.jpg	3	3	1	2		0	3	2	2	2	2	3	-	4.7431	43.0413	0.9	0.8099
cod10433_dem06_20x.jpg	3	4	2			4	4	4	2	2	2	3	-	3.3333	29.8142	0.8944	0.8
cod10448_dem06_20x.jpg	3	3	2	4		6	3	3	3	3	2	3	-	0.5195	32.3249	1.0285	1.0579
cod10531_dem06_20x.jpg	3	3	2	2	3	3	3	3	2	2	2	3	-	1.8817	19.0841	0.493	0.2431
cod10534_dem06_20x.jpg	3	3	2	2	2		3	3	1	2	2	3	-	1.6835	26.7078	0.6556	0.4298
cod10384_dem06_20x.jpg	3	3	1	2		3	3	3	2	3	2	3	-	2.0202	26.7078	0.6556	0.4298
cod298_lab06_20x.jpg	3	3	2	3	3	3	3	3	3	3	3	4	-	0	13.6083	0.4082	0.1667
cod299_lab06_20x.jpg	3	3	2	3	3	4	3	3	3	3	3	4	-	0.2252	15.9894	0.493	0.2431
cod301_lab06_20x.jpg	2	3	2	3	3	4	3	3	4	3	2	4	-	2.7778	23.5702	0.7071	0.5
cod305_lab06_20x.jpg	3	3	2	3	3	4	3	3	4	2	3	4	-	0.2252	20.7599	0.6401	0.4097
cod306_lab06_20x.jpg	4	3	2	4	3	4	4	4	3	2	3	4	-	1.6667	22.3607	0.7454	0.5556
cod308_lab06_20x.jpg	3	3	2	4	3	4	4	4	4	3	3	4	-	1.6667	18.7083	0.6236	0.3889
cod310_lab06_20x.jpg	4	3	2	3	3	3	3	3	3	3	3	4	-	0.2252	15.9894	0.493	0.2431
cod312_lab06_20x.jpg	3	2	2	3	3	4	4	2	4	2	3	4	-	3.0303	28.4268	0.8528	0.7273
cod314_lab06_20x.jpg	3	3	2	3	3	4	3	3	4	2	3	4	-	2.4775	20.7599	0.6401	0.4097
cod316_lab06_20x.jpg	3	2	2	4	3	4	4	2	4	2	3	4	-	2.4775	27.957	0.862	0.7431
cod317_lab06_20x.jpg	3	2	2	4	4	3	4	3	4	2	3	4	-	2.193	25.2412	0.7993	0.6389
cod323_lab06_20x.jpg	2	3	2	3	3	3	3	3	3	2	2	4	-	0.7576	21.6407	0.5951	0.3542
cod326_lab06_20x.jpg	3	2	2	4	4	4	4	2	3	2	3	4	-	2.9279	27.957	0.862	0.7431
cod331_lab06_20x.jpg	3	2	2	4	4	4	4	2	4	2	3	4	-	2.193	28.343	0.8975	0.8056
cod332_lab06_20x.jpg	3	3	2	4	4	4	5	3	4	4	3	4	-	0.969	21.1871	0.7592	0.5764
cod333_lab06_20x.jpg	3	2	2	4	3	4	4	2	4	2	3	4	-	2.4775	27.957	0.862	0.7431
cod334_lab06_20x.jpg	4	3	2	3	3	4	4	3	3	3	3	4	-	1.9231	18.3114	0.5951	0.3542
cod645_lab06_20x.jpg	3	3	2	3	3	4	3	3	2	3	3	4	-	0	19.245	0.5774	0.3333
cod646_lab06_20x.jpg	3	2	2	3	3	4	3	2	3	3	2	4	-	0.4902	24.2536	0.6872	0.4722

ANNEX 1

Expertise level	Expert	Expert	Intermediate	Expert	Expert	Expert	-	Intermediate	Expert	Intermediate	-	Expert	Group	APE	CV	STDDEV	VARIANCE
NAME	CG	MS	JR	SD	FJ	SB	PC	JLP	AM	TW	EL	SW	-	-	-	-	-
INSTITUTION	IEO	IEO	IEO	IPIMAR	IFREMER	MI	COISPA	IEO	AZTI	CEFAS	HCMR	CEFAS	-	-	-	-	-
Stock assessment	yes	yes	no	yes	no	yes	no	no	yes	no	no	no	-	-	-	-	-
READER	1	2	3	6	8	9	11	12	13	15	16	18	-	-	-	-	-
cod2671_lab06_20x.jpg	3	2	2	4	3	2	3	2	3	2	3	4	-	0.7576	26.2432	0.7217	0.5208
cod10274_dem06_20x.jpg	3	3	1	3	2	3	3	3	3	2	3	4	-	0.7576	26.2432	0.7217	0.5208
cod10408_dem06_20x.jpg	2	3	1	3		3	3	3	2	3	2	4	-	1.2539	29.2596	0.7714	0.595
cod10414_dem06_20x.jpg	3	3	1	3		3	3	3	3	3	2	4	-	4.2857	26.7261	0.7483	0.56
cod10417_dem06_20x.jpg	4	4	1	3		4		4	2	3	2	4	-	0.3226	33.6784	1.044	1.09
cod10445_dem06_20x.jpg	4	5	2	4		4	5	5	2	2	2	4	-	3.9627	34.7812	1.2332	1.5207
cod10454_dem06_20x.jpg	3	3	2	4		4	3	3	3	2	2	4	-	0	24.6183	0.7385	0.5455
cod10487_dem06_20x.jpg	3	3	2	3	3	4	3	3	2	3	2	4	-	0.2381	21.9461	0.6401	0.4097
cod10513_dem06_20x.jpg	3	4	2	4	3	5	3	4	3	2	2	4	-	0.641	28.4373	0.9242	0.8542
cod10524_dem06_20x.jpg	4	3	2	3	3	4	4	3	2	2	2	4	-	2.7778	27.2166	0.8165	0.6667
cod10529_dem06_20x.jpg	3	4	1	3	3	4	4	4	2	2	2	4	-	5.5556	33.3333	1	1
cod300_lab06_20x.jpg	3	4	2	4	3	4	4	4	4	4	3	5	-	0.7576	20.3279	0.7454	0.5556
cod303_lab06_20x.jpg	3	2	2	3	3	4	3	2	3	3	3	5	-	2.7778	27.2166	0.8165	0.6667
cod304_lab06_20x.jpg	3	3	2	4	3	4	4	3	3	3	3	5	-	1.6667	22.3607	0.7454	0.5556
cod318_lab06_20x.jpg	3	3	2	4	4	3	4	3	4	2	3	5	-	1.6667	25.4951	0.8498	0.7222
cod319_lab06_20x.jpg	2	3	2		3	4	3	3	3	2	3	5	-	3.0303	28.4268	0.8528	0.7273
cod324_lab06_20x.jpg	3	3	2	5	4	4	4	2	3	3	3	5	-	1.4228	27.9159	0.9538	0.9097
cod325_lab06_20x.jpg	3	3	2	4	4	4	4	3	3	3	3	5	-	3.8618	22.2206	0.7592	0.5764
cod335_lab06_20x.jpg	3	3	2	4	3	4	4	3	4	1	3	5	-	3.2051	31.0881	1.0104	1.0208
cod336_lab06_20x.jpg	3	3	2	3	3	4	3	3	2	3	3	5	-	0.2252	24.6228	0.7592	0.5764
cod655_lab06_20x.jpg	4	3	2	4	4	3	4	3	3	2	3	5	-	0.8333	25.4951	0.8498	0.7222
cod663_lab06_20x.jpg	3	2	1	3	3	3	3	2	3	3	3	5	-	5.3922	31.6774	0.8975	0.8056
cod666_lab06_20x.jpg	3	2	2		4	3	4	2	4	2	4	5	-	2.3377	32.3249	1.0285	1.0579
cod814_lab06_20x.jpg	2	3	2	3	3	4	3	3	3	2	3	5	-	2.7778	27.2166	0.8165	0.6667
cod2641_lab06_20x.jpg	4	3	2	4	2	3	3	3	3	2	3	5	-	5.1802	27.957	0.862	0.7431
cod2647_lab06_20x.jpg	3	2	1	3	3	2	3	3	3	3	2	5	-	2.2727	33.6077	0.9242	0.8542
cod10052_dem06_20x.jpg	4	4	1	5	3	5	4	2	3	4	0	5	-	4.1667	46.3681	1.5456	2.3889
cod10271_dem06_20x.jpg	3	3	1	4	3	3	3	3	3	3	3	5	-	0.2674	29.1162	0.9	0.8099
cod10488_dem06_20x.jpg	2	3	1	4	3	4	4	3	2	2	2	5	-	3.0952	38.226	1.1149	1.2431
cod10528_dem06_20x.jpg	4	4	1	3	3	4	3	4	2	2	2	5	-	2.4775	36.1597	1.1149	1.2431
cod10549_dem06_20x.jpg	4	5	2	4	4	3	4	4	3	2	2	5	-	3.5714	29.7381	1.0408	1.0833
Mean of distances to mean	0.5094	0.4496	0.9364	0.3886	0.3437	0.4996	0.3983	0.3819	0.4571	0.5562	0.4063	0.6182	-	-	-	-	-

ANNEX 2

Fish no	Fish length	Sex	Landing month	CG(IEO)	MS(IEO)	JR(IEO)	SD (IPIMAR)	IF(FJEMER)	SB(MI)	PC(COISPA)	JLP(IEO)	AM(AZTI)	TW(CEFAS)	EL(HCMR)	SW(CEFAS)	MODAL age	Percent agreement	Precision CV
				Reader 1	Reader 2	Reader 3	Reader 6	Reader 8	Reader 9	Reader 11	Reader 12	Reader 13	Reader 15	Reader 16	Reader 18			
cod10003_dem06_20x.jpg	34.0	f	9	2	1	1	1	1	2	6	2	2	4	1	1	1	50%	77%
cod10009_dem06_20x.jpg	30.0	m	9	1	1	1	1	1	1	1	1	0	2	0	0	1	67%	69%
cod10033_dem06_20x.jpg	36.0	f	9	3	1	1	2	1	3	3	3	3	3	1	1	3	42%	51%
cod10036_dem06_20x.jpg	49.0	f	9	3	2	1	3	2	4	3	3	3	3	2	2	3	50%	31%
cod10051_dem06_20x.jpg	51.0	m	9	4	3	1	2	2	4	4	1	3	3	2	3	3	33%	40%
cod10052_dem06_20x.jpg	80.0	f	9	4	4	1	5	3	5	4	2	3	4	0	5	4	33%	48%
cod10053_dem06_20x.jpg	45.0	f	9	3	3	1	3	2	4	3	3	3	4	3	2	3	58%	29%
cod10061_dem06_20x.jpg	45.0	f	9	2	3	1	2	2	1	2	3	1	2	2	2	2	58%	35%
cod10062_dem06_20x.jpg	54.0	f	9	2	3	1	2	2	4	2	3	1	3	3	3	3	42%	37%
cod10067_dem06_20x.jpg	33.0	f	9	2	1	1	1	1	1	1	1	1	1	1	1	1	92%	27%
cod10082_dem06_20x.jpg	37.0	f	9	2	2	1	2	1	2	2	2	2	2	2	1	2	75%	26%
cod10084_dem06_20x.jpg	38.0	m	9	2	2	1	2	1	2	2	2	1	2	2	1	2	67%	30%
cod10086_dem06_20x.jpg	31.0	f	9	1	1	1	1	1	1	1	1	0	1	1	1	1	92%	31%
cod10087_dem06_20x.jpg	58.0	f	9	3	3	1	4	2	4	3	3	3	2	2	3	3	42%	33%
cod10100_dem06_20x.jpg	46.0	f	9	2	2	1	2	1	1	1	2	1	1	1	2	1	58%	36%
cod10125_dem06_20x.jpg	33.0	m	9	3	2	1	1	1	1	1	1	1	1	1	1	1	83%	50%
cod10139_dem06_20x.jpg	40.0	m	9	2	3	1	2	2	2	3	2	1	3	2	2	2	58%	32%
cod10171_dem06_20x.jpg	49.0	m	10	2	3	1	3	2	4	3	3	3	2	2	2	2	42%	32%
cod10216_dem06_20x.jpg	48.0	m	10	2	3	1	3	2	2	2	3	2	2	2	3	2	58%	28%
cod10223_dem06_20x.jpg	51.0	m	10	2	3	1	3	3	4	3	3	2	3	2	3	3	58%	29%
cod10225_dem06_20x.jpg	25.0	f	10	1	1	1	0	1	1	1	1	0	1	1	1	1	83%	47%
cod10230_dem06_20x.jpg	41.0	m	10	2	2	1	2	2	3	2	2	2	3	2	3	2	67%	27%
cod10241_dem06_20x.jpg	21.0	f	10	2	0	0	0	0	1	1	0	0	2	1	1	0	42%	101%
cod10252_dem06_20x.jpg	22.0	m	10	1	0	0	0	0	1	0	0	0	1	1	1	0	58%	124%
cod10253_dem06_20x.jpg	23.0	f	10	2	0	0	1	1	1	1	0	0	1	1	1	1	58%	83%
cod10255_dem06_20x.jpg	52.0	f	10	3	2	1	3	2	2	2	2	2	1	2	3	2	58%	32%
cod10271_dem06_20x.jpg	63.0	f	10	3	3	1	4	3	-	3	3	3	3	3	5	3	73%	31%
cod10274_dem06_20x.jpg	56.0	m	10	3	3	1	3	2	3	3	3	2	3	3	4	3	67%	27%
cod10276_dem06_20x.jpg	48.0	m	10	3	4	1	3	2	4	3	3	3	2	2	3	3	50%	31%
cod10311_dem06_20x.jpg	23.0	f	10	1	0	0	0	0	1	1	1	0	1	1	1	1	58%	88%
cod10312_dem06_20x.jpg	32.0	m	10	2	1	0	1	0	1	2	1	2	1	1	1	1	58%	62%
cod10339_dem06_20x.jpg	59.0	f	10	3	2	1	4	-	3	3	3	2	2	2	3	3	45%	32%
cod10348_dem06_20x.jpg	29.0	m	10	1	1	1	1	-	1	1	1	0	1	1	1	1	91%	33%
cod10365_dem06_20x.jpg	24.0	f	10	1	1	1	1	-	1	1	1	1	0	1	1	1	91%	33%
cod10366_dem06_20x.jpg	43.0	f	10	3	3	1	1	-	3	3	3	1	1	2	2	3	45%	45%
cod10367_dem06_20x.jpg	27.0	f	10	2	1	1	0	-	1	1	1	0	1	1	1	1	73%	59%
cod10370_dem06_20x.jpg	25.0	f	10	1	1	0	1	-	1	1	1	1	1	-	1	1	90%	35%
cod10384_dem06_20x.jpg	45.0	m	10	3	3	1	2	-	3	3	3	2	2	3	3	3	55%	28%
cod10403_dem06_20x.jpg	45.0	m	10	3	3	1	-	-	3	3	3	2	2	2	3	3	60%	28%
cod10408_dem06_20x.jpg	51.0	f	10	2	3	1	3	-	3	3	3	2	3	2	4	3	55%	31%
cod10414_dem06_20x.jpg	50.0	f	10	3	3	1	3	-	3	-	3	3	3	2	4	3	70%	28%
cod10417_dem06_20x.jpg	56.0	f	10	4	4	1	3	-	4	-	4	3	2	4	4	4	50%	36%
cod10418_dem06_20x.jpg	51.0	f	10	3	3	1	2	-	0	3	2	2	2	3	2	3	45%	45%
cod10420_dem06_20x.jpg	28.0	f	10	2	1	0	1	-	1	1	1	1	1	1	1	1	82%	45%
cod10431_dem06_20x.jpg	28.0	f	10	2	1	1	1	-	1	1	1	1	1	1	1	1	91%	28%
cod10433_dem06_20x.jpg	55.0	f	10	3	4	2	-	-	4	4	4	2	2	2	3	4	40%	31%
cod10439_dem06_20x.jpg	35.0	f	10	3	1	1	1	2	2	2	1	2	1	1	1	1	58%	45%
cod10445_dem06_20x.jpg	51.0	m	10	4	5	2	4	-	4	5	5	2	2	2	4	4	36%	36%
cod10446_dem06_20x.jpg	46.0	m	10	4	3	1	3	-	3	4	3	2	2	2	2	3	36%	35%
cod10448_dem06_20x.jpg	57.0	m	10	3	3	2	4	-	6	3	3	3	2	3	3	3	64%	34%
cod10454_dem06_20x.jpg	61.0	f	10	3	3	2	4	-	4	3	3	3	2	2	4	3	45%	26%
cod10457_dem06_20x.jpg	32.0	f	10	2	2	1	1	1	2	2	2	1	2	1	1	2	50%	35%
cod10461_dem06_20x.jpg	49.0	f	10	3	3	1	3	-	4	3	3	3	2	2	2	3	64%	29%
cod10463_dem06_20x.jpg	44.0	m	10	4	2	1	2	2	3	2	2	2	2	2	2	2	75%	33%
cod10464_dem06_20x.jpg	39.0	m	10	2	2	1	2	1	2	2	2	2	2	2	1	2	75%	26%
cod10478_dem06_20x.jpg	36.0	f	10	3	2	1	1	1	2	2	2	1	2	1	1	1	50%	42%
cod10487_dem06_20x.jpg	54.0	f	10	3	3	2	3	3	4	3	3	2	3	2	4	3	58%	23%
cod10488_dem06_20x.jpg	59.0	f	10	2	3	1	4	3	4	4	3	2	2	2	5	2	33%	40%
cod10500_dem06_20x.jpg	26.0	m	10	2	1	0	1	1	1	1	1	1	2	1	1	1	75%	48%
cod10509_dem06_20x.jpg	36.0	f	10	2	2	1	1	1	2	2	2	1	2	1	1	2	50%	35%
cod10513_dem06_20x.jpg	52.0	m	10	3	4	2	4	3	5	3	4	3	2	2	4	3	33%	30%
cod10524_dem06_20x.jpg	50.0	f	10	4	3	2	3	3	4	4	3	2	2	2	4	4	33%	28%
cod10528_dem06_20x.jpg	51.0	f	10	4	4	1	3	3	4	3	4	2	2	2	5	4	33%	38%
cod10529_dem06_20x.jpg	51.0	f	10	3	4	1	3	3	4	4	4	2	2	2	4	4	42%	35%
cod10531_dem06_20x.jpg	53.0	f	10	3	3	2	2	2	3	3	3	2	2	3	3	3	58%	20%
cod10534_dem06_20x.jpg	47.0	f	10	3	3	2	2	2	-	3	3	1	3	2	3	3	55%	28%
cod10549_dem06_20x.jpg	61.0	f	10	4	5	2	4	4	4	3	4	3	2	2	5	4	42%	31%
cod110259_dem06_20x.jpg	20.0	f	10	1	0	0	0	0	1	0	0	0	1	0	0	0	73%	171%
cod110277_dem06_20x.jpg	47.0	m	10	3	4	1	3	2	-	4	4	2	1	2	3	3	27%	42%
cod110409_dem06_20x.jpg	58.0	f	10	2	3	1	3	3	-	3	2	3	2	2	3	3	55%	28%
cod1182_lab06_20x.jpg	21.1	f	4	1	0	0	1	1	1	1	0	1	1	1	1	1	75%	60%
cod1259_lab06_20x.jpg	20.1	f	4	1	0	0	1	1	0	1	0	1	0	0	1	1	50%	104%
cod1292_lab06_20x.jpg	22.1	m	4	1	0	0	1	1	1	1	0	1	0	1	1	1	67%	74%
cod1300_lab06_20x.jpg	54.0	f	4	3	3	2	4	3	3	3	3	3	2	3	3	3	75%	18%
cod1338_lab06_20x.jpg	24.1	m	4	1	0	0	1	2	0	1	0	1	1	0	1	1	50%	98%
cod1356_lab06_20x.jpg	47.0	m	4	4	6	2	4	3	5	6	6	3	6	2	3	6	33%	38%
cod1370_lab06_20x.jpg	24.1	f	4	1	1	0	1	1	1	1	1	1	1	1	1	1	92%	31%
cod1388_lab06_20x.jpg	25.0	m	4	1	1	1	1	1	1	1	1	1	2	1	1	1	92%	27%
cod1416_lab06_20x.jpg	21.3	u	4	2	1	1	1	1	1	1	1	1	1	1	1	1	92%	27%
cod1461_lab06_20x.jpg	37.1	m	4	3	3	1	2	2	3	3	3	2	2	2	3	3	50%	28%
cod1465_lab06_20x.jpg	45.2	m	4	3	3	1	3	3	3	4	3	4	1	2	3	3	58%	35%
cod1468_lab06_20x.jpg	34.4	m	4	3	-	1	2	2	1	2	2	1	2	2	2	2	55%	37%
cod1473_lab06_20x.jpg	34.1	m	4	3	2	1	2	2	2	2	2	2	1	1	2	2	67%	31%
cod1484_lab06_20x.jpg	37.0	m	4	3	3	1	2	2	2	3	3	2	2	2	2	2	50%	33%
cod1526_lab06_20x.jpg	25.1	f	4	2	1	1	1	1	1	1	1	1	1	1	1	1	92%	27%
cod1548_lab06_20x.jpg	34.5	m	4	3	2	1	2	1	2	3	2	2	1	2	2	2	58%	35%
cod1575_lab06_20x.jpg	40.5	m	4	3	3	1	3	-	3	3	3	0	1	2	3	3	64%	33%
cod1589_lab06_20x.jpg	23.1	m	4	1	1	1	1	1	1	1	1	2	1	1	1	1	83%	

ANNEX 2

Fish no	Fish length	Sex	Landing month	CG(IEO)	MS(IEO)	JR(IEO)	SD (IPIMAR)	FJ (IFREMER)	SB(MI)	PC(COISPA)	JLP(IEO)	AM(AZTI)	TW(CEFAS)	EL(HCMR)	SW(CEFAS)	MODAL age	Percent agreement	Precision CV	
				Reader 1	Reader 2	Reader 3	Reader 6	Reader 8	Reader 9	Reader 11	Reader 12	Reader 13	Reader 15	Reader 16	Reader 18				
cod2636_lab06_20x.jpg	39.5	m	7	3	3	1	2	2	2	3	2	1	3	2	2	2	50%	33%	
cod2640_lab06_20x.jpg	48.5	f	6	2	2	1	3	2	2	2	2	2	2	2	3	2	75%	25%	
cod2641_lab06_20x.jpg	55.0	f	6	4	3	2	4	2	3	3	3	3	2	3	5	3	50%	29%	
cod2642_lab06_20x.jpg	52.5	f	6	2	2	2	3	2	2	3	2	3	2	3	4	2	58%	27%	
cod2643_lab06_20x.jpg	62.5	f	6	3	3	2	4	3	3	3	3	3	3	3	3	3	83%	14%	
cod2644_lab06_20x.jpg	52.0	f	6	3	3	1	2	3	3	3	3	3	3	2	3	3	75%	24%	
cod2645_lab06_20x.jpg	55.0	f	6	3	3	1	3	3	2	3	3	4	3	3	4	3	67%	27%	
cod2646_lab06_20x.jpg	53.0	f	6	3	2	1	3	3	3	3	2	4	3	3	4	3	58%	29%	
cod2647_lab06_20x.jpg	50.5	f	6	3	2	1	3	3	2	3	3	3	3	2	5	3	58%	35%	
cod2648_lab06_20x.jpg	46.5	f	6	2	2	1	2	3	2	3	2	3	2	2	3	2	58%	28%	
cod2652_lab06_20x.jpg	51.0	f	6	2	2	1	3	3	2	2	2	2	1	2	3	2	58%	32%	
cod2653_lab06_20x.jpg	51.0	f	6	3	3	2	3	3	3	3	3	3	2	2	4	3	67%	20%	
cod2656_lab06_20x.jpg	54.5	f	6	3	3	2	3	3	3	3	3	3	3	3	4	3	83%	14%	
cod2657_lab06_20x.jpg	46.5	f	6	3	2	1	3	3	2	3	2	2	2	3	3	3	50%	28%	
cod2658_lab06_20x.jpg	56.5	f	6	4	4	2	4	3	3	4	4	3	3	3	4	4	50%	20%	
cod2661_lab06_20x.jpg	51.0	f	6	3	3	2	3	3	2	3	3	3	2	2	4	3	58%	23%	
cod2662_lab06_20x.jpg	59.0	f	6	4	3	2	4	3	3	3	3	3	3	3	4	3	75%	17%	
cod2663_lab06_20x.jpg	54.0	f	6	3	3	2	3	3	3	4	3	4	4	4	3	4	50%	20%	
cod2664_lab06_20x.jpg	45.0	f	6	2	2	2	2	-	2	2	2	2	2	2	2	2	100%	0%	
cod2665_lab06_20x.jpg	48.0	f	6	3	3	1	3	2	3	3	3	3	2	2	3	3	75%	24%	
cod2667_lab06_20x.jpg	49.0	f	6	3	5	1	4	2	2	5	3	2	4	3	3	3	33%	40%	
cod2668_lab06_20x.jpg	55.5	f	6	3	3	1	3	3	3	3	3	3	3	3	3	3	92%	20%	
cod2669_lab06_20x.jpg	57.0	f	6	3	2	2	4	3	2	3	2	3	2	3	4	3	42%	27%	
cod2670_lab06_20x.jpg	53.5	f	6	3	3	1	3	3	3	3	3	3	3	3	3	3	83%	23%	
cod2671_lab06_20x.jpg	58.0	f	6	3	2	2	4	3	2	3	2	3	2	3	4	3	42%	27%	
cod2672_lab06_20x.jpg	45.0	f	6	3	2	2	2	2	3	2	3	2	3	2	3	3	50%	21%	
cod298_lab06_20x.jpg	50.6	f	2	3	3	2	3	3	3	3	3	3	3	3	4	3	83%	14%	
cod299_lab06_20x.jpg	51.2	f	2	3	3	2	3	3	4	3	3	3	3	3	4	3	75%	17%	
cod300_lab06_20x.jpg	54.5	f	2	3	4	2	4	3	4	4	4	4	4	4	3	5	4	58%	21%
cod301_lab06_20x.jpg	53.1	f	2	2	3	2	3	3	4	3	4	3	2	4	4	3	50%	25%	
cod303_lab06_20x.jpg	47.4	m	2	3	2	2	3	3	4	3	2	3	3	3	5	3	58%	28%	
cod304_lab06_20x.jpg	56.1	f	2	3	3	2	4	3	4	4	3	3	3	3	5	3	58%	23%	
cod305_lab06_20x.jpg	55.4	f	2	3	3	2	3	3	4	3	3	4	2	3	4	3	58%	22%	
cod306_lab06_20x.jpg	55.0	f	2	4	3	2	4	3	4	4	4	3	2	3	4	4	50%	23%	
cod308_lab06_20x.jpg	58.3	f	2	3	3	2	4	3	4	4	3	4	3	3	4	3	50%	20%	
cod310_lab06_20x.jpg	54.1	f	2	4	3	2	3	3	3	3	3	3	3	3	4	3	75%	17%	
cod312_lab06_20x.jpg	50.4	m	2	-	2	2	3	3	4	4	2	4	2	3	4	2	36%	30%	
cod314_lab06_20x.jpg	52.1	f	2	3	3	2	3	3	4	3	3	4	2	3	4	3	58%	22%	
cod316_lab06_20x.jpg	54.9	f	2	3	2	2	4	3	4	4	2	4	2	3	4	4	42%	29%	
cod317_lab06_20x.jpg	57.5	f	2	3	2	2	4	4	3	4	3	4	2	3	4	4	42%	26%	
cod318_lab06_20x.jpg	61.0	f	2	3	3	2	4	4	3	4	3	4	2	3	5	3	42%	27%	
cod319_lab06_20x.jpg	53.4	f	2	2	3	2	-	3	4	3	3	3	2	3	5	3	55%	30%	
cod323_lab06_20x.jpg	44.0	m	2	2	3	2	3	3	3	3	3	3	2	2	4	3	58%	23%	
cod324_lab06_20x.jpg	63.2	f	2	3	3	2	5	4	4	4	2	3	3	3	5	3	42%	29%	
cod325_lab06_20x.jpg	63.5	f	2	3	3	2	4	4	4	4	3	3	3	3	5	3	50%	23%	
cod326_lab06_20x.jpg	54.5	f	2	3	2	2	4	4	4	4	2	3	2	3	4	4	42%	29%	
cod327_lab06_20x.jpg	48.1	m	2	2	2	2	3	3	3	3	2	3	1	3	3	3	58%	27%	
cod331_lab06_20x.jpg	59.6	f	2	3	2	2	4	4	4	4	2	4	2	3	4	4	50%	30%	
cod332_lab06_20x.jpg	63.1	f	2	3	3	2	4	4	4	5	3	4	4	4	3	4	50%	22%	
cod333_lab06_20x.jpg	59.6	f	2	3	2	2	4	3	4	4	2	4	2	3	4	4	42%	29%	
cod334_lab06_20x.jpg	57.2	f	2	4	3	2	3	3	4	4	3	3	3	3	4	3	58%	19%	
cod335_lab06_20x.jpg	57.3	f	2	3	3	2	4	3	4	4	3	4	1	3	5	3	42%	32%	
cod336_lab06_20x.jpg	52.6	f	2	3	3	2	3	3	4	3	3	3	2	3	5	3	67%	26%	
cod492_lab06_20x.jpg	20.6	u	3	1	0	1	1	1	1	1	1	1	1	1	1	1	92%	31%	
cod498_lab06_20x.jpg	22.5	m	3	2	0	1	1	1	1	1	1	1	0	1	1	1	75%	56%	
cod505_lab06_20x.jpg	21.8	f	3	1	0	1	1	1	1	1	1	1	0	1	1	1	83%	47%	
cod536_lab06_20x.jpg	23.5	f	3	1	1	1	1	1	1	1	1	1	1	1	1	1	100%	0%	
cod538_lab06_20x.jpg	25.1	m	3	1	1	1	1	1	1	1	1	1	1	1	1	1	100%	0%	
cod543_lab06_20x.jpg	27.1	f	3	2	1	1	-	1	1	1	1	1	1	1	1	1	91%	28%	
cod569_lab06_20x.jpg	39.4	m	4	3	3	1	3	2	3	3	3	2	1	2	2	3	50%	33%	
cod584_lab06_20x.jpg	40.4	f	4	2	2	1	2	2	2	2	2	2	1	2	2	2	83%	21%	
cod585_lab06_20x.jpg	42.4	m	4	2	2	1	2	3	2	2	2	2	2	2	2	2	75%	27%	
cod594_lab06_20x.jpg	40.4	m	4	3	3	1	2	3	3	3	3	2	2	2	3	3	58%	27%	
cod596_lab06_20x.jpg	38.5	m	4	3	2	1	2	2	4	2	2	2	1	2	2	2	67%	38%	
cod613_lab06_20x.jpg	43.4	m	4	2	2	1	2	2	2	2	2	2	1	2	2	2	83%	21%	
cod626_lab06_20x.jpg	44.3	m	4	3	2	1	2	2	3	3	2	2	2	2	3	2	58%	28%	
cod633_lab06_20x.jpg	41.0	m	4	3	2	1	2	2	4	3	2	2	3	2	3	2	50%	33%	
cod638_lab06_20x.jpg	36.2	m	4	2	2	1	2	2	4	2	2	2	2	3	2	2	75%	33%	
cod639_lab06_20x.jpg	37.0	f	4	2	1	1	2	2	3	1	1	1	3	2	2	2	42%	43%	
cod640_lab06_20x.jpg	47.0	m	4	3	2	2	3	3	3	3	2	2	3	2	3	3	58%	20%	
cod645_lab06_20x.jpg	60.0	f	4	3	3	2	3	3	4	3	3	2	3	3	4	3	67%	20%	
cod646_lab06_20x.jpg	55.1	f	4	3	2	2	3	3	4	3	2	3	2	4	3	3	50%	25%	
cod647_lab06_20x.jpg	56.0	f	4	3	2	2	4	3	3	-	2	3	2	3	3	3	55%	24%	
cod648_lab06_20x.jpg	60.2	f	4	3	2	2	4	4	5	4	2	4	3	3	4	4	42%	30%	
cod651_lab06_20x.jpg	49.0	m	4	3	2	2	3	3	5	3	2	3	3	3	3	3	67%	27%	
cod654_lab06_20x.jpg	42.0	f	4	3	1	1	2	2	2	2	1	2	1	2	2	2	58%	36%	
cod655_lab06_20x.jpg	62.5	f	4	4	3	2	4	4	3	4	3	3	2	3	5	3	42%	27%	
cod656_lab06_20x.jpg	52.1	f	4	4	2	2	4	3	4	4	2	3	2	3	4	4	42%	29%	
cod657_lab06_20x.jpg	45.5	f	4	2	1	1	2	2	3	2	2	2	1	2	3	2	58%	35%	
cod661_lab06_20x.jpg	58.6	f	4	3	2	2	4	3	4	4	2	3	2	3	4	3	33%	28%	
cod663_lab06_20x.jpg	50.0	f	4	3	2	1	3	3	3	3	2	3	3	3	5	3	67%	33%	
cod664_lab06_20x.jpg	52.0	f	4	3	2	2	3	3	3	3	3	3	3	3	4	3	75%	18%	
cod666_lab06_20x.jpg	53.2	f	4	3	2	2	-	4	3	4	2	4	2	4	5	2	36%	34%	
cod668_lab06_20x.jpg	60.7	f	4	3	2	2	3	3	2	2	2	3	2	3	3	3	50%	21%	
cod677_lab06_20x.jpg	47.5	m	4	3	2	2	3	3	3	3	3	3	2	3	3	3	75%	16%	
cod678_lab06_20x.jpg	53.0	f	4	3	2	2	4	3	3	4	3	4	2	3	4	3	42%	26%	
cod681_lab06_20x.jpg	49.9	f	4	4	2	2	3	3	3	3	3	4	3	3	4	3	58%	22%	
cod683_lab06_20x.jpg	60.5	f	4	4	2	2	4	4	4	4	3	3	3	3	4	4	50%	23%	
cod684_lab06_20x.jpg	42.0	f	4	2	2	1	2	2	-	2	2	2	1	2	2	2	82%	22%	
cod685_lab06_20x																			