Species identification workshops 2012 and 2013: Gobies and Elasmobranchs

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Report number 13.009

IMARES Wageningen UR

(IMARES - Institute for Marine Resources & Ecosystem Studies)

Publication date: 26 augustus 2013

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Gobies
Up until now, gobies of the genus *Pomatoschistus* have not been identified to the lowest taxonomic level during The Demersal Fish Survey (DFS), Sole Net Survey (SNS) and Beam Trawl Survey (BTS). It is however an abundant genus in the catches in the shallow coastal zone stations and it can be assumed that the species play a role in the coastal ecosystem. The correct identification on board is however questionable. For that reason, during the 2012 DFS extra attention has been paid to identification of *Pomatoschistus* species.

On each of the three vessels carrying out the DFS, a *Pomatoschistus* expert (Cindy van Damme or Bram Couperus) was taken on board for one week. On board Stern and Schollevaar all *Pomatoschistus* have been identified to the species, and on board Isis part of the specimens were identified to the species, and part was taken to the lab. Samples were frozen following a protocol to keep the quality of the fish as good as possible and were taken back to the lab for identification.

Main problems arose in identification of *P. lozanoi* and *P. minutus.* As even the experts did not agree, it is proposed to treat *P. lozanoi* and *P. minutus* as a group of species, and to identify the other species to the species level.

Elasmobranchs
From identification workshops and tests on demersal fish and benthos it became clear that specific attention should be paid to the elasmobranch species. On 20 March 2013 a dedicated species identification workshop focusing on elasmobranch species was organised for IMARES employees. Main purpose of the workshop was quality assurance of species identification of elasmobranch species. IMARES projects influenced by the quality of this species identification are i.a. the seagoing statutory task surveys, statutory task discard projects, PULSMON.

The species to be identified were collected during the BTS2011 and BTS 2012 and stored in the freezer. Results are presented by expertise level of the employees. The expertise level was based on expertise and responsibilities during surveys and discard sampling.

The results of the test and workshop were in line with earlier workshops focusing on fish and macrobenthos.

1 Introduction

1.1 Gobies

Up until now, gobies of the genus *Pomatoschistus* have not been identified to the lowest taxonomic level during The Demersal Fish Survey (DFS), Sole Net Survey (SNS) and Beam Trawl Survey (BTS). It is however an abundant genus in the catches in the shallow coastal zone stations and it can be assumed that the species play a role in the coastal ecosystem. *Pomatoschistus* species are too small to be caught in the beam trawls used during the BTS and SNS, both using 4 cm mesh in the cod-end. The DFS net is however suitable to catch the species as the cod-end has a 2 cm mesh.
Identification of *Pomatoschistus* species to the lowest taxonomic level will add value to the current survey. The correct identification on board is however questionable. For that reason, during the 2012 DFS extra attention has been paid to identification of *Pomatoschistus* species.

1.2 Elasmobranchs

From identification workshops and tests on demersal fish and benthos it became clear that specific attention should be paid to the elasmobranch species. On 20 March 2013 a dedicated species identification workshop focusing on elasmobranch species was organised for IMARES employees, and was compulsory for employees participating in fish surveys on board of research vessels or sampling at commercial fishing vessels at sea. Employees not involved in those projects, were allowed to join the workshop on a voluntary basis.

The workshop was primarily organised for quality assurance of species identification of elasmobranch species IMARES projects influenced by the quality of this species identification are i.a. the seagoing statutory task surveys, statutory task discard projects, PULSMON.

2 Gobies workshop

2.1 Materials and Methods

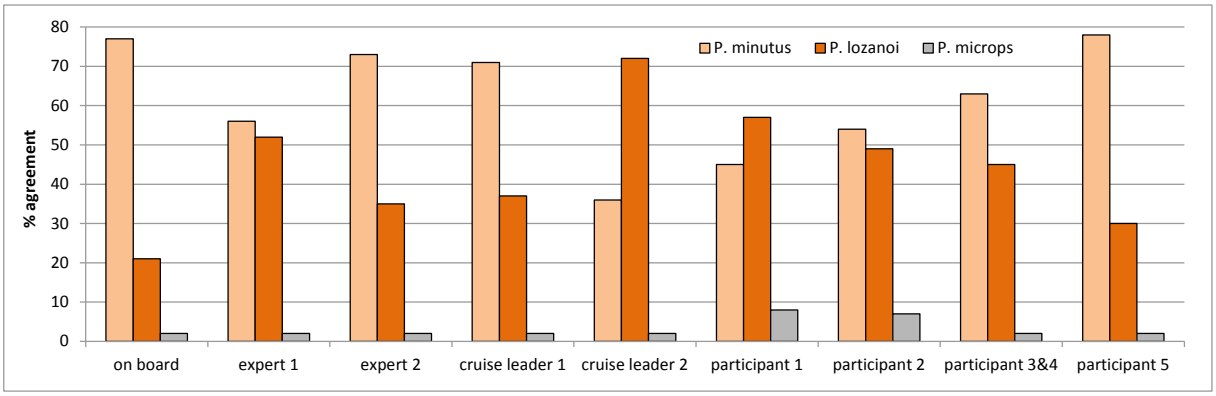
On each of the three vessels carrying out the DFS, a *Pomatoschistus* expert (Cindy van Damme or Bram Couperus) was taken on board for one week. On board Stern and Schollevaar all *Pomatoschistus* have been identified to the species, and on board Isis part of the specimens were identified to the species, and part was taken to the lab. Samples were frozen following a protocol to keep the quality of the fish as good as possible and were taken back to the lab. A selection of those samples has been identified by nine dedicated people: two experts, two out of three cruise leaders, and a number of people that joined the 2012 DFS. All agreed that the quality of the samples was good.

2.2 Results

The results (Table 2.2.1) show that in general, the agreement is very low, even for the two experts, although it varied between samples. For some samples the agreement was quite high, like samples 1 and 11. Only few *P. microps* were present, but it looks like people are well able to distinguish this species from the other species *P. lozanoi* and *P. minutus*.

Table 2.2.1. *Pomatoschistus* identifications on board and during the workshop at IMARES.
min=*P. minutus*, loz=*P. lozanoi*, mic= *P. microps*

	on board			expert 1			expert 2			cruise leader 1			cruise leader 2			participant 1			participant 2			participant 3&4			participant 5		
nr.	min	loz	mic	min	loz	mic	min	loz	mic	min	loz	mic	min	loz	mic	min	loz	mic	min	loz	mic	min	loz	mic	min	loz	mic
1	8		2	8		2	8		2	8		2	8		2	8		2	7		3	8		2	8		2
2	10			9	1		10			10			1	9		4	6		10			10			10		
3	10				10		10			4	6			10		5	5		7		3	5	5		10		
4	10			5	5		6	4		5	5			10		2	7	1	4	6		6	4		10		
5	10			8	2		10			10			2	8		6	4		7	3		8	2		10		
6	5	5		3	7		4	6		2	8		1	9		4	6		4	6		4	6		4	6	
7	8	2		8	2		9	1		7	3		8	2		5	1	4	8	2		6	4		10		
8	6	4		7	3		8	2		7	3		5	5		4	6		3	7		8	2		8	2	
9					10			10		10			5	5		1	9			10			10			10	
10	6	4		4	6		4	6		4	6		2	8		2	8			10		4	6		4	6	
11	4	6		4	6		4	6		4	6		4	6		4	5	1	4	5	1	4	6		4	6	
	77	21	2	56	52	2	73	35	2	71	37	2	36	72	2	45	57	8	54	49	7	63	45	2	78	30	2



Figuur 8.1. *Pomatoschistus* (*minutus, lozanoi of microps*) identification on board and in during the workshop in the lab, all samples.

3 Elasmobranch workshop

3.1 Materials and Methods

3.1.1 Materials used

The elasmobranchs used for the test were collected during the beam trawl survey in 2011 and 2012. In total, 9 elasmobranch species were frozen on board, in separate plastic bags per species. The day before the workshop, the samples were put to unfreeze. The selection of the species to use for the workshop was done by Ingeborg de Boois and Henk Heessen. All 9 elasmobranch species were used in the test and workshop.
Additionally, participants were asked to write down the sex of the species. The answer has not been taken into account in the scores, but distinction of male and female elasmobranchs has been discussed during the feedback.

3.1.2 Workshop setup

As the setup in earlier years was convenient, it was decided to stick to the same design for 2013. The workshop was split in two parts:
(1) Testing (morning)
(2) Workshop, room for discussion and study (afternoon)

During the workshop 9 elasmobranch species (Annex 1) were identified. The species were put on two tables and numbered. For the testing, all participants filled out a form (Annex 2), putting the species name to the number on the list. During the test it was not allowed to use any reference material for species identification. Participants were encouraged to mention on their forms distinctive identification criteria when being in doubt between two species, as a measure for their knowledge of distinctive species characteristics. In a field work situation it can be expected that in those cases employees check reference material available on board.

27 IMARES employees joined the identification test. About ten employees declined the invitation due to other obligations.
In the afternoon, the species were named and the identification criteria were discussed. Although on a voluntary basis, almost all participants joined this meeting.

3.1.3 Expertise levels

Before the test, the participants were divided in three categories, based on experience and responsibilities:
1=no experience and no need to develop species identification skills
2=some experience, and tasks related to species identification with back-up (i.e. identification at the lab, people joining cruises but not as a cruise leader)

3=experienced or experience needed for quality assurance of the activities carried out in projects (e.g. cruise leaders on demersal discard sampling trips or surveys)
In Annex 3 the expertise level for each participant is listed.

3.1.3.1 Setting expertise level boundaries

In 2011, expertise level boundaries were set for demersal fish and benthos, based on the data of 2010 and 2011. Minimum required scores by expertise level were defined in order to monitor identification skills and assure identification quality. As the expertise level boundaries seem to be well chosen, the same values have been used for this test.
The minimum score for expertise level 3 was set on 80% and for expertise level 2 on 60% correct species identification.

Table 3.1.3.1 Minimum scores based on the set boundaries

	Expertise level 2	Expertise level 3
Minimum % of species correctly identified	60	80
2013 minimum score (based on 9 species)	5.4	7.2

For participants in expertise level 2 and 3 all results have been compared to the minimum requirements. For results lower than the minimum, the employee received a message to be aware of the low result and to improve species identification before the next test. Employees exceeding the minimum of the next expertise level received a message that he/she will be in the next expertise level at the next test.
The heads of department received an email containing the names of those who attended the test, the expertise level and whether or not they exceeded the next level criteria.

3.1.4 Data processing

When species were identified correctly to the lowest taxonomic level, 1 point was assigned. Wrong identification or empty fields were scored as 0. When the correct main identification criteria for two similar species were put on the list, this was scored as 0.5.

The completed forms were entered in an Excel spreadsheet. After the workshop, all participants received a personal e-mail containing the proper species list, the individual test result and the average result for the category. In the Excel sheet, the number of empty fields is also registered as a measure for the knowledge gaps of the employee.

3.2 Results

3.2.1 Results by expertise level

Table 3.2.1.1 contains the minimum, average and maximum score by expertise level. The maximum possible score was 9 (the number of species to identify). The pattern of the scores is clear: the less experienced employees have lower scores. However, there is a clear overlap in scores of the different expertise levels.

Table 3.2.1.1 Results per expertise level

Expertise level	Number of participants	Minimum score	Average score	Maximum score
1	12	0	6	9
2	4	6	7	9
3	11	4	8	9

The comparison of the scores with the set boundaries for expertise levels 2 and 3 are in Table 3.2.1.2.

Table 3.2.1.2 Results per expertise level compared with boundaries

Expertise level	Number of participants	< 60%	>= 60%	>= 80%
1	12	12		
2	4		2	2
3	11		2	9

3.2.2 Results by species

To be able to identify gaps in knowledge and species that need extra attention, table 3.2.2.1 lists the percentage of correct identification. At the top, *Mustelus* with the best identification score. *Mustelus asterias* as well as *M. mustelus* were accepted as distinction is only possible by genetic research (Farrell *et al.*, 2009). At the bottom, the lowest identification score for *Raja clavata*.

Table 3.2.2.1 Results per species, all expertise levels

Dutch species name	Scientific species name	Sum of scores	Times filled in	% (based on no. participants)
Mustelus	*Mustelus* sp.	24	27	88
blonde rog	*Raja brachyura*	22	27	81
hondshaai	*Scyliorhinus canicula*	22	27	81
koekoeksrog	*Leucoraja naevus*	21	27	77
vleet	*Dipturus batis*	20	27	74
gevlekte rog	*Raja montagui*	19.5	27	72
Doornhaai	*Squalus acanthias*	19.5	27	72
Sterrog	*Amblyraja radiata*	18	27	66
Stekelrog	*Raja clavata*	14	27	51

Pictures: left Mustelus sp. And right Raja clavata

In Tables 3.2.2.2a, 3.2.2.2b and 3.2.2.2c the results are listed by expertise level.

Table 3.2.2.2a Results per species, expertise level 3

Dutch species name	Scientific species name	Sum of scores	Times filled in	% (based on no. participants)
blonde rog	*Raja brachyura*	11	11	100
Mustelus	*Mustelus*	11	11	100
Hondshaai	*Scyliorhinus canicula*	10	11	90.9
koekoeksrog	*Leucoraja naevus*	10	11	90.9
gevlekte rog	*Raja montagui*	9.5	11	86.4
Sterrog	*Amblyraja radiata*	9	11	81.8
Vleet	*Dipturus batis*	9	11	81.8
Doornhaai	*Squalus acanthias*	8	11	72.7
Stekelrog	*Raja clavata*	7	11	63.6

Table 3.2.2.2b Results per species, expertise level 2

Dutch species name	Scientific species name	Sum of scores	Times filled in	% (based on no. participants)
Doornhaai	*Squalus acanthias*	4	4	100
Hondshaai	*Scyliorhinus canicula*	4	4	100
Mustelus	*Mustelus*	4	4	100
vleet	*Dipturus batis*	4	4	100
gevlekte rog	*Raja montagui*	3	4	75
sterrog	*Amblyraja radiata*	3	4	75
blonde rog	*Raja brachyura*	2	4	50
koekoeksrog	*Leucoraja naevus*	2	4	50
stekelrog	*Raja clavata*	2	4	50

Table 3.2.2.2c Results per species, expertise level 1

Dutch species name	Scientific species name	Sum of scores	Times filled in	% (based on no. participants)
blonde rog	*Raja brachyura*	9	12	75
koekoeksrog	*Leucoraja naevus*	9	12	75
Mustelus	*Mustelus*	9	12	75
hondshaai	*Scyliorhinus canicula*	8	12	66.7
doornhaai	*Squalus acanthias*	7.5	12	62.5
gevlekte rog	*Raja montagui*	7	12	58.3
vleet	*Dipturus batis*	7	12	58.3
sterrog	*Amblyraja radiata*	6	12	50
stekelrog	*Raja clavata*	5	12	41.7

3.3 Discussion

3.3.1 Expertise level

When organising an identification workshop, it is important to decide upon the set of species, and the expertise level should be related to this set. Often, a participant is very experienced in identifying pelagic species but not in demersal species, or experienced in the identification of fresh water fish and not in marine fish. For this test, the expertise levels of the demersal fish and benthos have been slightly modified. The results in table 3.1.1 confirm the expectation that scores of experienced employees are higher than scores of inexperienced employees, although it is difficult to take the middle expertise level into account as there were only 4 people in this category.
The boundaries for the expertise levels as a percentage of the number of species in the test seem to be well chosen.

3.3.2 Material used

It is important to note that the quality of the material used was poorer than if fresh material would have been available. To keep the quality of the frozen samples as high as possible, it is important not to put too many specimens in one plastic bag, and to freeze soon after collection.

3.3.3 Sources of misidentification

In this chapter, only the results of the highest expertise level will be taken into account. Less experienced employees will always be joined by an experienced employee when joining a survey or sorting samples in the lab. The experienced employees, however, are responsible for final identification and need to have the skills and knowledge to put the right names to the species.

Basically, there are two major methods for species identification:

1. active identification: identification by looking at the main identification criteria for the species
2. passive identification: using your reference framework of species to identify the species

3.3.3.1 Active identification

Generally, this is done when someone does not have any experience in the field or when obvious unknown species are present in the catch. In this case, reference material is used to identify the species. This method is also used when similar species are often present in the sample. Mostly the identifier knows the criteria to look at by heart, although it might be necessary to use references to decide which criteria match which particular species. This might have applied to e.g. *Raja brachyuran* vs. *Raja montagui*, but as for expertise level 3 correct identification for *R. brachyura* was 100%, this was not the case. In one of the photo books used for identification on board, the main identification criteria is described. It might well be that all experienced employees have seen this text so often when on board that they unexpectedly know it by heart. This proves that misidentification for look-alike species will decrease when proper identification material is available, and that it is relevant to write the main identification criteria next to the photo's.

3.3.3.2 Passive identification

This is done by everyone who has to do the first selection when seeing a less commonly occurring species. This identification method is mainly based on *habitus* of the species and also on the geographical area. When seeing a less familiar species, one will start excluding a number of species and if there is a species left in the reference framework which basically matches the criteria of the species in the sample, it will be identified as such. It is to be expected that information on the catch location will decrease the

error, but not exclude the possibility of misidentification. Additionally, being in the field might result in more than one occurrence of the 'reference species' and increases the chance to identify other - unknown- species as 'something else'. However, even then, there has to be awareness of the possibility to catch similar species outside the known distribution range of the species. An example is *Squalus acanthias* which was often misidentified due to unawareness of the species.

3.3.4 Problematic species

The identification of *Raja clavata* seems to be difficult. The Dutch names of the species is probably partly causing the confusion, mainly with *Amblyraja radiata*.

4 Conclusions

4.1 Gobies

The workshop as well as taking experts on board was very useful and showed that *P. microps* can well be distinguished from *P. lozanoi/minutus*. On the other hand, many problems arose in identification of *P. lozanoi* and *P. minutus.* As even the experts did not agree, it is proposed to treat *P. lozanoi* and *P. minutus* as a group of species, and to identify the other species to the species level.

4.2 Elasmobranchs

The first dedicated identification workshop for elasmobranch species was useful. All participants were eager to identify the species according to their knowledge. Participants wanted to exceed the results of their colleagues and really put an effort in identifying the species correctly.

The workshop results show that the experienced employees (experience level 3) are well capable to identify most species to the correct lowest taxonomic level. As the group of less experienced employees with tasks related to species identification was small, it is not possible to draw conclusions for this group. The scores of the group with expertise level 1 are not relevant from the perspective of quality assurance as they will not be responsible for species identification of demersal fish and benthos in any way. It is however, useful to have information about this group, as people might exceed expectations with respect to identification skills.

It seems to be useful to set an expertise level before the start of the test, based on experience and responsibility. Additionally, the boundaries for expertise level 2 and 3 create the possibility to monitor progress in identification skills, in relation to the responsibility of the employee involved.

Quality Assurance

The identification workshop is part of the IMARES quality assurance. Testing the knowledge and discussing the species afterwards, makes IMARES employees as well as hires personnel aware of the relevance of good identification, and gives on the other hand information about the expertise level of the individual.

IMARES utilises an ISO 9001:2008 certified quality management system (certificate number: 124296-2012-AQ-NLD-RvA). This certificate is valid until 15 December 2015. The organisation has been certified since 27 February 2001. The certification was issued by DNV Certification B.V. Furthermore, the chemical laboratory of the Fish Division has NEN-EN-ISO/IEC 17025:2005 accreditation for test laboratories with number L097. This accreditation is valid until 27 March 2013 and was first issued on 27 March 1997. Accreditation was granted by the Council for Accreditation.

References

Boois, I.J. de. 2012. Species identification workshop 2012: fish and macro-zoobenthos. Internal IMARES report 12.001.

Boois, I.J. de. 2011. Species identification workshop 2011: fish and macro-zoobenthos. Internal IMARES report 11.008.

Boois, I.J. de. 2010. Species identification workshop: fish and macro-zoobenthos. Internal IMARES report 10.007.

Farrell, E.D., M.W. Clarke and S. Mariani, 2009. A simple genetic identification method for Northeast Atlantic smoothhound sharks (Mustelus spp.). ICES J. Mar. Sci. (2009) 66 (3): 561-565. doi: 10.1093/icesjms/fsn218

ICES. 2007. Report of the Workshop on Taxonomic Quality Issues in the DATRAS Database (WKTQD), 23-25 January 2007, ICES, Copenhagen. ICES CM 2007/RMC:10. 45 pp.

ICES. 2009a. Report of the International Bottom Trawl Survey Working Group (IBTSWG), 30 March—3 April 2009, Bergen, Norway. ICES CM 2009/RMC:04. 241 pp.

ICES. 2009b. Report of the Working Group on Beam Trawl Surveys (WGBEAM), 9–12 June 2009, La Rochelle, France. ICES CM 2009/LRC:04. 196 pp.

Annex 1. Elasmobranch species list 2013

nummer	soort	species
A01	Sterrog	*Amblyraja radiata*
A02	Stekelrog	*Raja clavata*
A03	Blonde rog	*Raja brachyura*
A04	Koekoeksrog	*Leucoraja naevus*
A05	Gevlekte rog	*Raja montagui*
A06	Vleet	*Dipturus batis*
A07	Mustelus	*Mustelus sp.*
A08	Doornhaai	*Squalus acanthias*
A09	Hondshaai	*Scyliorhinus canicula*

Annex 2. Elasmobranch workshop form 2013

Determinatie elasmobranchen 20 maart 2013
Elasmobranch species identification 20 March 2013
Tafel/table A

Naam/name……..

Nummer Number	Soort Species	Evt. onderscheidend kenmerk tov andere soort(en)
A1		
A2		
A3		
A4		
A5		
A6		
A7		
A8		
A9		

Annex 3. Participant list and expertise level 2013

name	last name	expertise level
Ben	Griffioen	1
Daniel	van Denderen	1
Esther	van den Braak	1
Eric	Visser	1
Harriet	van Overzee	1
Marloes	Kraan	1
Mascha	Rasenberg	1
Rianne	Laan	1
Ruben	Hoek	1
Sebastian	Uhlmann	1
Sieto	Verver	1
Peter	van der Kamp	1
Corrina	Hinrichs	2
Cindy	van Damme	2
Jurgen	Batsleer	2
Lorna	Fässler-Teal	2
André	Dijkman Dulkes	3
Betty	van Os	3
Bram	Couperus	3
Gerrit	Rink	3
Henk	Heessen	3
Kees	Groeneveld	3
Marcel	de Vries	3
Rosemarie	Nijman	3
Ralf	van Hal	3
Hendrik Jan	Westerink	3
Hanz	Wiegerinck	3