

WORKING GROUP ON THE VALUE OF COASTAL HABITATS FOR EXPLOITED SPECIES (WGVHES)

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International Council for the Exploration of the Sea Conseil International pour l'Exploration de la Mer

H.C. Andersens Boulevard 44-46 DK-1553 Copenhagen V Denmark Telephone (+45) 33 38 67 00 Telefax (+45) 33 93 42 15 www.ices.dk info@ices.dk

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Editors

David Eggleston • Olivier Le Pape

Authors

Alexander C. Hyman • Benjamin Ciotti • David Eggleston • Elliot Brown • Francesco Colloca • Karen van de Wolfshaar • Kenneth Rose • Kieran Hyder • Olivier Le Pape • Rochelle D. Seitz • Rom Lipcius • Suzanne Poiesz



Contents

i	Executive summary	ii
ii	Expert group information	iii
1	Review the application of the nursery habitat concept in management of exploited species and assess the need for refinement of the definition (ToR a)	1
2	Collate and document lessons learned on conservation of habitat for exploited species using experiences from different countries (ToR c)	2
3	Analyse the contribution of juvenile abundance indices in forecasting stock recruitment to better utilize available information (ToR d)	3
4	Science highlights	4
5	References	5
Annex 1	: List of participants	7
Annex 2	2: WGVHES resolution	. 10

i Executive summary

The Working Group on the Value of Coastal Habitats for Exploited Species (WGVHES) aims to assess and quantify habitat value for fisheries management.

The two primary products of this group for 2019–2021 were an analysis of the contribution of juvenile abundance indices in forecasting stock recruitment in order to better utilize available information for management and a review of the application of the nursery habitat concept of exploited species.

A paper was published about the use and performance of survey-based pre-recruit abundance indices for inclusion in stock assessments of coastal-dependent species (Le Pape *et al. ICES JMS* 2020). The analyses (which involved assessment scientists) was that survey-based pre-recruit abundance indices were under-used because of uncertainties in sampling efficiency, sampling of juveniles in coastal habitats was outside the area covered by large-scale surveys, and targeted coastal surveys for juveniles are conducted on limited scales. However, our analysis of the relationship between survey-based pre-recruit indices and assessment-generated recruitment indices revealed that survey-based pre-recruit abundance indices were sufficiently accurate for predicting future recruitment. Surveys of juvenile fishes should be further considered in fisheries management.

The WG assembled an extensive literature review on methods for assessing Habitat Quality of Juvenile Fish in Coastal Environments. The WG developed a set of rules for evaluating 3221 papers that were identified using a keyword search. The 996 papers that passed abstract screening have been reviewed and their features entered into a universal Access database. Features included basic information on location, species, spatial and temporal scales, and what metrics and measures were used for quantifying habitat quality based on abundance, growth, survival, and juvenile-to-adult linkage. The database will provide a rich source of information for further analyses.

Overall, the WG's products demonstrate the importance of habitat considerations for exploited coastal specie, and highlight significant gaps in knowledge. The WG will continue efforts on: 1) methods for assessing juvenile habitat, including hard bottom substrate, and emerging novel ecosystems under changing climate; 2) essential fish habitat, management implications, and produce a brief that synthesizes the > 10 years of the WG for management and policy.

ii Expert group information

Expert group name	Working Groups on Value of Coastal Habitat for Exploited Species (WGVHES)
Expert group cycle	Multiannual
Year cycle started	2019
Reporting year in cycle	3/3
Chair(s)	David Eggleston, USA
	Olivier Le Pape, France
Meeting venue(s) and dates	24–28 June 2019, Rome, Italy (9 participants)
	29 June – 3 July 2020, online meeting (14 participants)
	21–25 June 2021, online meeting (15 participants)

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Review the application of the nursery habitat concept in management of exploited species and assess the need for refinement of the definition (ToR a)

The work focused on a systematic review of methods used to assess juvenile habitat quality. Recent synthesis papers have provided critiques and new suggestions for frameworks to identify nursery habitats for fisheries species. The ability of field methods to collect the necessary data has not been rigorously addressed but is crucial for effective implementation of these frameworks. The aim of our work on this ToR was to identify how the quality of juvenile habitats can be most effectively measured to fulfil a range of management and research needs. Specifically, we sought to:

- O1. Systematically review how juvenile habitat quality has been measured in the past, focusing particularly on abundance, growth, survival and juvenile–adult linkage, to evaluate the development and current status of research in this area.
- O2. Evaluate the ability of existing and forthcoming methods to measure juvenile habitat quality at appropriate spatial and temporal scales.
- O3. Use O1 and O2 to identify future challenges, examples of good practice and future opportunities to measure juvenile habitat quality.

The group brainstormed approaches to the topic and came up with search terms and systematic review methodology to tackle the research objectives. We conducted searches of the literature, identifying 3221 papers of potential interest. We screened the titles of these papers to remove 382 which did not meet a set of predetermined inclusion criteria.

We developed methods to systematically screen abstracts of the papers against inclusion criteria and to validate and crosscheck decisions to ensure consistency across the group. We continued to refine our criteria and methodology to optimise consistency and efficiency using training datasets and exercises.

We screened abstracts of all the 2839 papers that remained after title screening phase. This yielded 996 papers for full-text screening and data extraction. We developed methodology and soft-ware tools to extract the data and undertook training exercises to ensure consistency among participants. We undertook data extraction on the 996 papers and developed a pipeline for data collation, processing, quality control and analysis in R.

We explored results from the systematic review and put this in context of broader expertise of our group, to identify the focal points for a review paper. We developed an outline draft that will form the basis of writing towards intended submission in late 2022. We expect that this will be a landmark review supporting future research into fish habitat, but also of benefit to managers and policy makers working towards the alignment of conservation with fisheries management through, for example, Essential Fish Habitat, Natural Capital and Ecosystem-based approaches.

In addition to this publication, work on this ToR has had important additional outcomes:

We have generated an exhaustive database of the ca. 1000 studies that have published in the area that our WG focuses on. This will be an important resource to support the work of WGVHES over the coming years.

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2 Collate and document lessons learned on conservation of habitat for exploited species using experiences from different countries (ToR c)

The goal of this ToR is to use the experiences to date as case studies, along with the long history of the USA use of essential fish habitat, to develop issues and guidance (a perspectives paper) on how to incorporate habitat considerations into fisheries management and ecosystem restoration. Fisheries management continues to progress towards EBFM, and habitat restoration of coastal environments is also increasing, often involving large monetary investments. In both cases, there are technical, scientific, and socio-political factors and influences that can create challenges to implementation of habitat conservation in fisheries management and to large-scale restoration efforts. For example, complex life cycles result in bottlenecks outside of the influence of the habitat of interest, species responses are often a mix of winners and losers, other multiple stressors can dampen responses to changes in habitat, climate change can offset gains by increased habitat, and the public often has unrealistic expectations of the magnitude and speed of ecological responses. In the perspectives paper, the WG will use case studies to illustrate the major benefits, issues, and challenges (lessons learned) associated with explicit consideration of habitat quality and quantity in management and restoration. To the extent possible, we will offer suggestions on how to anticipate and address these issues. This type of paper is made possible by the international mix of WG members and is greatly facilitated by in-person discussion.

3 Analyse the contribution of juvenile abundance indices in forecasting stock recruitment to better utilize available information (ToR d)

The work was based on a review of Recruit-Stock relationships for ICES species for which there are stock assessment reports by accumulating available data from stock assessments. The group investigated the link between juvenile abundance for coastal nursery dependent species and future recruitment in the stocks, and the interest to integrate juvenile abundance indices in short term forecasts to improve advice in stock assessment. The goals are to address:

- 1. What is the frequency of the use of juvenile abundance indices in recruitment forecasts in the framework of stock assessment groups (and what are the drivers of and the barriers to this use)?
- 2. When juvenile abundance indices are used, what is the level of accuracy in recruitment forecasts, and what are the drivers of this level of accuracy?

Over the 185 ICES stocks have been examined. Among the 78 stocks with juvenile coastal dependence, 49 use short-term forecasts in stock assessment. Survey-based pre-recruit abundance indices were available for 35 of these stocks, but only 14 were used to forecast recruitment. The questionnaire indicated that the limited use of survey-based pre-recruit abundance indices was primarily due to sampling inefficiency, which may preclude reliable recruitment estimates. The sampling is inefficient because the juvenile coastal distribution is outside the geographical area covered by large-scale surveys or targeted coastal surveys are conducted on limited spatial and temporal scales. However, our analysis of the relationship between survey-based pre-recruit indices and assessment-generated recruitment indices revealed that survey-based pre-recruit abundance indices were sufficiently accurate to provide useful information for predicting future recruitment. We recommend expansion of the use of survey-based indices of pre-recruit abundance in stock assessment and recruitment forecasting, and consideration of how to include juveniles in ongoing and future surveys.

The following paper was published in the primary literature:

Le Pape O., Vermard Y., Guitton J., Brown E.J., van de Wolfshaar K., Lipcius R.N., Støttrup J.G., Rose K.A., (2020) The use and performance of survey-based pre-recruit abundance indices for possible inclusion in stock assessments of coastal-dependent species. *ICES Journal of Marine Science*. 77(5), 1953–1965. /10.1093/icesjms/fsaa051. 3

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4 Science highlights

- The group paper on "The use and performance of survey-based pre-recruit abundance indices for possible inclusion in stock assessments of coastal-dependent species", published in June 2020 (ICES JMS, main findings detailed above), was well received and already cited 3 times one year after.
- Olivier Le Pape was invited to give two presentations on "Integrating essential fish habitats into fisheries management and marine conservation" in December 2018 during the FAO Fish Forum; and in February 2019 during the annual congress of the General Fisheries Commission for the Mediterranean. The aim of these events was to discuss progress on the protection of essential fish habitats under Article 8 of the EU Common Fisheries Policy and its contribution to rebuilding fish stocks in the Mediterranean Sea.

5 References

Directly produced by the group

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Champagnat J., Lecomte J.B., Rivot E., Douchet L., Martin N., Grasso F., Mounier F., Labadie P., Loizeau V., Bacq N., **le Pape O.** (accepted.) All together is better: the multidisciplinary assessment of nearshore nursery habitat restoration for a population of marine fish and related fisheries. *Marine Ecology Progress Series*

Presentations

- **Champagnat J.,** Rivot E., **Le Pape O.** (2021) How essentiels fish habitats impact population productivity and resilience. Poster, ICES Annual Science Conference. 6-10 September 2021.
- **Ciotti BJ (2021)** Identification of essential flatfish habitats in south west England. South-West Marine Ecosystems, UK.
- **Ciotti BJ (2021)** Use of sandy beaches in SW England by juvenile flatfishes: identifying the essential habitats that sustain fisheries. Salcombe and Kingsbridge Estuary Forum, UK.
- **Ciotti BJ (2020)** Identifying Essential Fish Habitat: measures of habitat quality. Severn Estuary Ecological Research Forum, UK.
- Le Pape O., Régimbart A., Vaz S. (2019) Integrating essential fish habitats into fisheries management and marine conservation: An ongoing process in France. Communication. General Fisheries Commission for the Mediterranean (GFCM) Working Group on Marine Protected Areas (WGMPA), Rome, Italy, 18-21 February 2019.
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- van de Wolfshaar, K. E, Barbut L, Lacroix. G. (2019) Sole growth and survival under climate change conditions. SWIMWAYs: Understanding connectivity within the life cycles of coastal fish, 24-26 September 2019. Hamburg Germany

Annex 1: List of participants

WGVHES 2021 meeting

		Country	
Name	Institute	(of institute)	Email
David Eggleston	Center for Marine Sciences and Tech- nology, North Carolina State Univer- sity	USA	eggleston@ncsu.edu
Romuald Lipcius	Virginia Institute of Marine Science, College of William & Mary	USA	rom@vims.edu
Rochelle Seitz	Virginia Institute of Marine Science, College of William & Mary	USA	seitz@vims.edu
Josianne Støttrup	DTU Aqua	Denmark	jgs@aqua.dtu.dk
Karen van de Wolfshaar	Wageningen Marine Research	Netherlands	karen.vandewolfshaar@wur.nl
Elliot J. Brown	DTU Aqua	Denmark	elbr@aqua.dtu.dk
Olivier Le Pape	Agrocampus Ouest, UMR985 ESE Ecologie et santé des écosystèmes	France	olivier.le.pape@agrocampus- ouest.fr
Kenny Rose	University of Maryland Center for Environmental Science, Horn Point Laboratory	USA	krose@umces.edu
Francesco Colloca	Stazione Zoologica "Anton Dohrn"	Italy	francesco.colloca@szn.it
Benjamin Ciotti	University of Plymouth	UK	Benjamin.ciotti@plym- outh.ac.uk
Suzanne.Poiesz	NIOZ Royal Netherlands Institute for Sea Research	Netherlands	suzanne.poiesz@nioz.nl
Kieran Hyder	CEFAS	UK	kieran.hyder@cefas.co.uk
Margot Maathuis	Wageningen Marine Research	ageningen Marine Research Netherlands	
Daniele Ventura	Rome University	Italy daniele.ventura@uniroma1.	
Alexander C. Hy- man	Virginia Institute of Marine Science, College of William & Mary	USA	achyman@vims.edu
Juliette Cham- pagnat	Agrocampus Ouest, UMR985 ESE Ecologie et santé des écosystèmes	France	juliette.champagnat@agrocam- pus-ouest.fr
Andrea Schiavetti	DTU Aqua	Denmark	

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WGVHES 2020 meeting

Name	Institute	Country (of institute)	Email
David Eggleston	Marine, Earth & Atmospheric Science	USA	eggleston@ncsu.edu
Olivier le Pape	UMR INRA-Agrocampus Eco- logy et Santé des Ecosysteme	France	Olivier.le.pape@agrocampus- ouest.fr
Benjamin Ciotti	School of Marine Science and Engineering	UK	benjamin.ciotti@plymouth.ac.uk
Daniele Ventura	Sapienza University of Rome	Italy	daniele.ventura@uniroma1.it
Francesco Col- loca	National Research Council Inst tute for Coastal Marine Enviror ment (IAMC)	ti- Italy 1-	francesco.colloca@iamc.cnr.it
Kenneth Rose	Center for Environmental Sci- ence	USA	krose@umces.edu
Suzanne Poiesz	Royal Netherlands Institute for Sea Research	Nether- lands	suzanne.poiesz@nioz.nl
Elliot Brown	DTU Aqua, National Institute o Aquatic Resources	of Denmark	elbr@aqua.dtu.dk
Karen van de Wolfshaar	Wageningen Marine Research	Nether- lands	Karen.vandeWolfshaar@wur.nl
Kieran Hyder	Centre for Environment, Fisher ies and Aquaculture Science	- UK	kieran.hyder@cefas.co.uk
Rochelle D. Seitz	Virginia Institute of Marine Sci- ence	- USA	seitz@vims.edu
Rom Lipcius	Virginia Institute of Marine Sci- ence	- USA	rom@vims.edu
Margot Maathuis	Wageningen Marine Research	Nether- lands	margot.maathuis@wur.nl
Alexander C. Hy- man	Virginia Institute of Marine Sci- ence	USA	achyman@vims.edu

WGVHES 2019 meeting

Name	Institute	Country (of institute)	Email
David Eggleston	Marine, Earth & Atmospheric Science	USA	eggleston@ncsu.edu
Olivier le Pape	UMR INRA-Agrocampus Eco- logy et Santé des Ecosysteme	France	Olivier.le.pape@agrocampus- ouest.fr
Benjamin Ciotti	School of Marine Science and Engineering	UK	benjamin.ciotti@plymouth.ac.uk
Daniele Ventura	Sapienza University of Rome	Italy	daniele.ventura@uniroma1.it
Francesco Col- loca	National Research Council Insti- tute for Coastal Marine Environ- ment (IAMC)	Italy	francesco.colloca@iamc.cnr.it
Kenneth Rose	Center for Environmental Sci- ence	USA	krose@umces.edu
Josianne Støttrup	DTU Aqua, National Institute of Aquatic Resources	Denmark	jgs@aqua.dtu.dk
Elliot Brown	DTU Aqua, National Institute of Aquatic Resources	Denmark	elbr@aqua.dtu.dk
Karen van de Wolfshaar	Wageningen Marine Research	Netherlands	Karen.vandeWolfshaar@wur.nl

Annex 2: WGVHES resolution

The **Working Group on the Value of coastal Habitat for Exploited Species** (WGVHES), chaired by Olivier Le Pape, France, and David Eggleston, USA, will work on ToRs and generate deliverables as listed in the Table below.

	MEETING DATES	VENUE	R EPORTING DETAILS	Comments (change in Chair, etc.)
Year 2019	24–28 June	Rome, Italy		
Year 2020	29 June – 3 July	by corresp/ webex		physical meeting cancelled - remote work
Year 2021	21–25 June	Online meeting	Final report by 1 September to SCICOM	

ToR descriptors

ToR	DESCRIPTION	BACKGROUND	<u>Science Plan codes</u>	DURATION	Expected Deliverables
a	Review the application of the nursery habitat concept in management of exploited species and assess the need for refinement of the definition	There is a need for a quantifiable definition in science and a pragmatic definition in management	1.4; 5.2	year 1–2	Review manuscript
b	Review and report on evidence that hard bottom and biogenic habitats support commercially important species	Lack of information on the value of structured habitats; continuation of ongoing work by expanding to additional habitat types and new aspects	1.4; 5.2	1, 2, 3	Review manuscript(s) and report to ICES
с	Collate and document lessons learned on conservation of habitat for exploited species using experiences from different countries	Many countries are defining essential fish habitat and using experiences from various countries will increase efficiency and consistency of its application in management	5.2; 6.1; 6.2	1, 2, 3	Report to ICES and perspectives manuscript
d	Analyse the contribution of juvenile abundance indices in forecasting stock recruitment to better utilize available information	There is an interest to integrate juvenile abundance indices in short-term forecasts to improve advice in stock assessement.	5.2	1, 2	Manuscript

Summary of the Work Plan

Year 1	Continue the work on ToR a and begin the writing process.
	Finalise the review of hard-bottom habitats and continue ToR b with the inclusion of biogenic habitats and other aspects.
	Initiate the work on ToR c and continue the work on ToR d, following comprehensive scoping during the previous year.
Year 2	Complete the work on ToR a and continue the work on ToR b, c and d.
Year 3	Finalise the ongoing work in ToR b, c and d and identify future research priorities or management needs

Supporting information

Priority	The current activities of this EG will lead ICES into issues related to the importance of coastal habitat for fisheries management.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group is normally attended by 10–15 members and guests.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	There are no obvious direct linkages.
Linkages to other committees or groups	There are no obvious direct linkages.
Linkages to other organizations	There are no obvious direct linkages.

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