



Research

Social license through citizen science: a tool for marine conservation

Rachel Kelly^{1,2,3,4}, Aysha Fleming^{3,5}, Gretta T. Pecl^{3,4}, Anett Richter^{1,2} and Aletta Bonn^{1,2,6}

ABSTRACT. Active and meaningful public engagement is necessary to foster informed and publicly accepted natural resource management. Citizen science presents an important avenue by which to achieve such engagement. Citizen science is the active involvement of the public in science to address scientific questions, often of common interest or concern, by collecting and analyzing data, and publishing and communicating science via diverse outlets. Here, we explore whether and how citizen science can also play a role in generating social license for marine conservation, using European marine citizen science as a case study. Social license is a concept that reflects community views and expectations on the use and management of natural resources. To date, social license in the marine space has largely focused on public perceptions of industrial and extractive uses of the marine environment, and limited research has explored social license for conservation. We highlight important linkages between social license and citizen science that can work synergistically to support conservation. We use in-depth qualitative interviews and a semiquantitative online survey of marine citizen science coordinators to investigate how citizen science can play a role in enhancing social license and the mechanisms through which it can occur. Our findings indicate that citizen science can enhance social license by improving ocean literacy and marine citizenship. We demonstrate that marine citizen science has considerable potential to generate and develop social license for marine conservation in Europe and elsewhere.

Key Words: *citizen science; marine conservation; ocean literacy; social license*

INTRODUCTION

Public engagement through dialogue and participation in science is essential to improve knowledge about the environment and to support evidence-based decision making for sustainable use of ecosystems and natural resources. Transparent and culturally appropriate natural resource management is imperative (Christie et al. 2017) to foster sustainable environmental development. Society's role in decision making is increasingly recognized (e.g., Aarhus Convention [United Nations Economic Commission for Europe 1998], IPBES-6 [IPBES 2018]), and the concept of social license has become an important theme for development, particularly toward fostering stakeholder engagement and communication (Lacey et al. 2017). Understanding social acceptability of natural resource uses is crucial for environmental management (Gall and Rodwell 2016); a failure to consider whether social license exists for conservation activities can result in the failure and contestation of initiatives and management decisions (Garnett et al. 2018). However, limited knowledge exists on how to obtain and maintain social license through public engagement, which we consider includes good transparency and diversified means of communication for community dialogue (Kelly et al. 2018).

Defined most simply, social license is “an unwritten social contract” from the public for government, industry, or science to use and manage natural resources, including the marine environment (Moffat et al. 2016). Social license suggests that society (i.e., communities and stakeholders) can award or withhold permission for an activity, and the term is increasingly used to describe implicit acceptance by communities for various uses of natural resources (Hall et al. 2015, Kendal and Ford 2018a). Discussion around social license is growing in the media

and in different bodies of academic literature, both in terrestrial and marine contexts (Boutilier 2014, Kelly et al. 2017), arguably in response to an increasingly (mis)informed society and decreasing trust in politics, government (Smits et al. 2017), and natural resource management (van Putten et al. 2018a).

Although not directly associated with law, the concept of social license owes its considerable power to the legal ramifications it can indirectly incur on resource users. It can be considered a precursor and decisive precondition to legal license (Garnett et al. 2018) and is a process that requires establishing meaningful partnerships among operations, communities, and governments based on mutual trust (Parsons and Moffat 2014). Social license is theorized as the ongoing acceptance or approval from stakeholder communities, and public “acceptance” is conceptualized as a minimum requirement for social license (Boutilier et al. 2012). The term social license has also been synonymized to “free, prior and informed consent” (Yates and Horvath 2013), “social acceptability” (Gall and Rodwell 2016), and “social responsibility” (Edwards and Trafford 2016). Here, we interpret “social license for marine conservation” as community acceptance or support of marine conservation activities and policies, e.g., in relation to species or habitat protection, marine resource usage, marine protected areas, etc. We interpret “improving social license” to mean increasing current public acceptance of such activities and policies.

Meaningful community engagement and dialogue is central to the development of social license (Rooney et al. 2014). Social license is dynamic, typically requiring time and effort to obtain, and can be challenged or lost as community values and perceptions change over time. As such, it is frequently easier to

¹Helmholtz-Center for Environmental Research - UFZ, Permoserstraße 15, 04318 Leipzig, Germany, ²German Centre for Integrative Biodiversity Research (iDiv), Deutscher Platz 5e, D-04103 Halle-Jena-Leipzig, Germany, ³Centre for Marine Socioecology, University of Tasmania, Hobart 7001, Tasmania, ⁴Institute for Marine & Antarctic Studies, Hobart, Tasmania 7001, Australia, ⁵CSIRO Land and Water, Castray Esplanade, Hobart, Tasmania 7004, Australia, ⁶Institute of Biodiversity, Friedrich Schiller University Jena, Dornburger Str. 159, 07743 Jena, Germany

identify where social license is not granted than where it is (Yates and Horvath 2013). Further, the impermanent and intangible nature of social license renders it difficult to measure (Hall et al. 2015), and little research to date has explored mechanisms for obtaining social license (Moffat and Zhang 2014). However, actions that have been linked to increasing likelihood of social license include meaningful dialogue with communities and demonstrated responsible behavior with regard to the use of natural resources (Yates and Horvath 2013). Furthermore, there is consensus that trust provides an essential foundation for social acceptance and social license (Prno 2013, Boutilier 2014, Moffat and Zhang 2014, Bursey and Whiting 2015, Edwards and Trafford 2016).

Because the use of the term “social license” extends across different industries, activities, and sectors, it is likely that the understanding of the concept will change and evolve (Boutilier 2014). This ambiguity associated with the concept’s metaphorical roots (Cooney 2017) adds to the appeal of social license as an opportunity to improve understanding, if it can be used contextually (Prno 2013) and to serve the interests of all parties (Kelly et al. 2017). In recent years, the concept of social license has evolved for use in a conservation context, as opposed to an industry context (i.e., Voyer et al. 2015, Garnett et al. 2018, Kendal and Ford 2018a). In this instance, gaining social license implies achieving and maintaining public trust that resource users and managers are using natural resources and spaces ethically, in accordance with societal expectations. Communities are increasingly concerned as to how natural resources, including the marine environment, are used and developed; if such practices and uses are not perceived as socially acceptable, they are unlikely to obtain social license (Edwards and Lacey 2014). Conservation involves compromise (Dick et al. 2016), and from a conservation perspective, social license presents a flexible means to demonstrate and leverage community influence on natural resource developments and protection (Garnett et al. 2018).

It is increasingly evident that social license is important for using, developing, and protecting marine spaces (Kelly et al. 2017), but it remains unclear how social license might best be achieved through public engagement in practice. Some research has been initiated on social license for the “blue economy” (Soma and Haggett 2015), and discussion around social license for conservation is growing (i.e., Garnett et al. 2018, Kendal and Ford 2018a); for example, marine conservation science has been highlighted as needing to earn and develop social license (Kelly et al. 2018). To our knowledge, no empirical research has been conducted yet into social license for biodiversity conservation, or specifically, marine conservation in Europe. Here, we aim to determine whether citizen science is a novel means through which social license can be developed to improve conservation success and sustainability in the marine environment.

Citizen science is often, but not always, a partnership between members of the public and professional scientists to address scientific questions and issues of common concern (Shirk and Bonney 2015). Comparably to social license, citizen science provides a means for citizens and stakeholders to voice opinions, to engage in resource monitoring, to learn about science and scientific processes, and to evaluate and promote decision making that might otherwise exclude them (Cigliano et al. 2015). Citizen

science programs are rapidly gaining acceptance as an integral part of engagement among society, science, and policy (Pecl et al. 2015, Hecker et al. 2018a), and although developments have been made in recent years (Hecker et al. 2018b), understanding of the utility of citizen science in a marine policy and management context is limited.

Community engagement has been established as essential toward achieving social license (Dare et al. 2014, Hall and Jeanneret 2014). In particular, the relationships developed through such engagement will facilitate communication and mutual understanding toward obtaining social license (Yates and Horvath 2013). The literature documents many instances of community protest against marine conservation initiatives, including marine protected areas (Voyer et al. 2015, Brennan 2018), and of noncompliance in recreational fisheries (Bergseth and Roscher 2018), and a need for more open public engagement with marine conservation has been identified (Kelly et al. 2018). We suggest that marine citizen science presents a potential platform to engage with the public more actively; to establish relationships and dialogue that can connect them with science and policy; and to increase understanding, acceptance, and support for marine conservation.

We specifically focus on the potential for marine citizen science to create a foundation for social license for marine conservation and we investigate European marine citizen science as a case study. The marine policy landscape is young and emergent within Europe, and the European Union (EU) promotes sustainable growth of maritime and coastal activities, as well as sustainable use of coastal and marine resources. However, although initiatives have been adopted to enhance the protection of the European marine environment (i.e., 2008 Marine Strategy Framework Directive, 2014 Marine Spatial Planning Directive), challenges to the effective implementation of European marine environmental management and legislation remain. A large component of these challenges include substantive criticism of “inadequate stakeholder engagement” in EU policy making (e.g., Soma and Haggett 2015). Impediments to new and planned developments include a lack of social acceptance or social license.

Linking social license to citizen science

The link between citizen science and public support for conservation and science has been advocated in the literature but has rarely been examined (Overdevest et al. 2004, Aceves-Bueno et al. 2015, Forrester et al. 2017). Ours is the first attempt to link social license theory with citizen science, aiming to investigate the potential for marine citizen science to enhance social license for marine conservation and to produce practical outcomes that can be applied to sustainable ocean management. In Table 1, we synthesise key related features of social license and citizen science from the literature and highlight common elements between the concept of social license and the practice of citizen science.

Trust is identified as a central shared component in this analysis and is also a major determinant of whether social license is granted (Boutilier 2014, Moffat and Zhang 2014). Social license is founded upon trust-based dialogue and relationships, which require maintenance and development (Yates and Horvath 2013). Trust is closely tied to processes of public engagement (Hall and Jeanneret 2014, Moffat and Zhang 2014) and takes time as parties begin to understand each other’s expectations and engage in

Table 1. Synthesis of key elements common to social license and citizen science.

Social license (SL)	Key element	Citizen science (CS)
Communicating and constructing quality, two-way, meaningful dialogue with and among stakeholders is essential to generate SL (Moffat and Zhang 2014, Zhang et al. 2018)	 Engagement	Maintaining volunteer participation in CS is required to build and develop project capacity (Bonney et al. 2009, Martin et al. 2016c, Nursey-Bray et al. 2018)
Earning SL requires bringing stakeholders together to discuss, debate, and define issues and improve community relations (Moffat and Zhang 2014, Lacey et al. 2017)	 Connecting stakeholders	CS brings diverse users together to share information and experiences, building relationships that might otherwise not exist (Aceves-Bueno et al. 2015, Bonney et al. 2016)
Addressing SL issues by facilitating dialogue allows communities to raise concerns and opinions they might not otherwise have the opportunity to share (Edwards and Lacey 2014, Jijelava and Vanclay 2017)	 Community Representation	Collaborative development of CS between researchers and the public can identify issues and questions of community interest and enhance societal relevance of science (Thiel et al. 2014, Bonney et al. 2016)
Sharing perceptions, opinions, and experiences can enlighten stakeholders, industry, and government on the experiences of other groups (Gallois et al. 2016, Jijelava and Vanclay 2017)	 Learning & Understanding	Learning-by-doing in CS enhances understanding and scientific literacy (Bela et al. 2016, Turrini et al. 2018); participants also gain greater awareness about threats to their examined ecosystem through direct experience (Bonney et al. 2009, Crall et al. 2012)
Earning SL demands that parties demonstrate that their use of the ecosystem and data is credible, legitimate, and trustworthy (Moffat and Zhang 2014, Gall and Rodwell 2016, Jijelava and Vanclay 2017)	 Legitimacy	Citizen science promotes reflection and discussion about how science interacts with society and its values; jointly developing projects legitimizes data collection, production, and application (Aceves-Bueno et al. 2015, Göbel et al. 2016, Elliott et al. 2017)
Communicating and debating groups' interests and concerns encourage dialogue and cooperation to achieve agreement and earn SL (Gallois et al. 2016, Zhang et al. 2018)	 Cooperation & Partnerships	Working together in CS brings scientists and nonscientists together to develop and achieve joint research and educational objectives (Bonney et al. 2009, Nursey-Bray et al. 2018, Turrini et al. 2018)
Legitimizing uses of the environment increases the trustworthiness of the decision making it informs (Boutilier 2014, Jijelava and Vanclay 2017); community trust is crucial for obtaining SL (Voyer et al. 2015); trust is integral to all decision-making processes and is a central component of SL (Dare et al. 2014, Moffat and Zhang 2014)	 Trust*	Promoting public engagement and involvement in collecting evidence that informs management increases understanding and trust in these management interventions and, by extension, the people and institutions that make them (Aceves-Bueno et al. 2015, Hind-Ozan et al. 2017)
SL gives a voice to communities, that they might act as overseers of their local environments and resources (Boutilier 2014, Cullen-Knox et al. 2017)	 Stewardship	Connecting the public to the natural environment through CS can increase awareness, attachment, and willingness to protect it (Danielsen et al. 2010, Crall et al. 2012, Chen et al. 2015, Bonney et al. 2016, Newman et al. 2017)

[†]Procedural fairness is a known component for achieving social license (Moffat and Zhang 2014, Lacey et al. 2017); however, it is not a feature shared with citizen science, and thus, we do not identify it here. Further, while we recognize that trust is complex and multifaceted, the different types, forms, and components of trust are not explored separately here. We identify trust as an important component of social license and citizen science more generally.

meaningful dialogue (Edwards and Trafford 2016). Ineffective engagement and relationship building can produce distrust (Prno 2013) and resistance to future attempts to develop dialogue.

In our discussion of the outcomes of our study, we highlight trust as a predictor of social license. We explore marine citizen science coordinators' perceptions of marine citizen science and the concept of social license, as well as the potential for marine citizen science to promote trust and enhance social license for conservation. We build on the results of our survey and interviews to discuss how the two concepts influence knowledge exchange

and development, and reflect on how citizen science can foster synergistic effects to improve engagement, ocean literacy, marine citizenship, trust, and ultimately, social license for marine conservation in Europe.

METHODS

We examined marine citizen science projects in Europe to investigate their potential role in promoting social license. Building on this theme, we explored linkages between the concepts of social license and citizen science. We used an adaptive theory approach in this study, akin to that of Vann-Sander et al. (2016).

In comparing and contrasting the concepts of social license and citizen science, we anticipated that new theory would be generated; it was thus necessary to ensure that all relevant information on the topic was captured effectively as it emerged through the research process.

To achieve this thorough examination, we combined in-depth qualitative interviews with an online semiquantitative survey of marine citizen science managers. We adopted this mixed-methods approach to engage as deeply and actively with participants as possible, to understand their perceptions of marine citizen science and its connection to social license occurring in practice. This mixed-methods approach ensured a complete assessment of citizen science coordinators' views on the value and potential of citizen science as a tool to enhance social license for marine conservation. Human ethics approval for this research was authorized by UFZ Datenschutz (Data Protection), Leipzig, Germany (23/06/2017).

Surveys

The initial research phase consisted of an online survey of marine citizen science project coordinators, through which we aimed to obtain information on the extent of projects in Europe and their objectives (i.e., education, data collection), as well as coordinators' perceptions of European marine management and conservation. This sample of projects was obtained from the European Marine Board's report on marine citizen science (Garcia-Soto et al. 2017) and was further supplemented by sharing the survey online among colleagues in wider networks to disseminate it to other potential respondents. Of the initial ($N = 60$) project coordinators approached, 34 (56.67%) coordinators responded to the online survey (conducted using Lime Survey). The survey data was analyzed in Excel (for Mac 2016). The list of survey questions is provided in Appendix 1.

Interviews

Following the survey, potential interviewees were identified from the survey respondents. All respondents were invited to partake in the interview stage, and 15 agreed to do so. These semistructured interviews were conducted by the lead author in July, August, and September 2017. The interviews lasted between 30 and 80 min, were conducted over the phone and audio recorded, and were transcribed by the lead author. To ensure the anonymity of all participant responses, interviewee names were replaced with identity codes, which were used to identify any quotations. The interview questions focused on the organization of citizen science, as well as project objectives, their development, and their potential connection to social license. Interviewees were also asked questions about their understanding and awareness of the concept of social license, both in a general sense and in a marine context. The list of interview questions is provided in Appendix 1.

All interview transcripts were subjected to thematic analytical evaluation using NVIVO 11.4.3 (QSR International, Melbourne, Australia). Initial codes were generated, and themes were developed iteratively using a grounded theory approach (Haywood 2016). Themes were reviewed, compared, and redefined when required to identify relationships between codes. Hierarchical coding was used to organize the transcripts into themes and thus produced the resulting six key themes of the study. These themes are presented below and represent the

synthesized responses from the interviews, as opposed to the questions that acquired them.

ANALYSIS OF THEMES

The online survey responses represent 34 projects of varied size and purpose from more than eight European countries, the majority of which are located in the UK (19 projects or 55.8%). A full list of projects, locations, focus, and participation is provided in Appendix 2. The coordinators' responses represent a diversity of projects. The surveyed projects vary considerably in size, scope, and intent. We note that project design influences project potential to collect and share scientific information and to engage with the public (Shirk et al. 2012). Consistent with other studies on citizen science, the projects described here generally do not formally document and report on any participant learning objectives or achievements (Bela et al. 2016); hence, the interview phase assessed these elements of citizen science.

The 15 projects for which we performed interviews (Table 2) were largely representative in type and opinion of the 34 projects sampled in the online survey (Appendix 2). Both the oldest (1970s) and most recent (2017) projects were included in the interview phase. The diversity of countries of respondents to the survey were also mostly represented in the interviews. We note, however, that not all European marine countries are represented in our study and deduce that this may be a result of marine citizen science not necessarily occurring in some countries, and the English language barrier. Future European studies could focus, for instance, on the Mediterranean or Baltic Sea regions and include the diversity of languages that would be required. All project coordinators surveyed and interviewed in our study observed that marine citizen science could work to influence marine policy and management in Europe. However, we highlight that the results presented here represent the views and responses of coordinators only, and, as such, cannot be considered representative of the marine citizen science community as a whole.

The interview coding (i.e., analysis of qualitative data) produced six key themes: (1) developing understanding, (2) communicating, (3) project logistics, (4) advancing citizen science, (5) people and partnerships, and (6) connecting. Developing understanding was the most commonly identified theme (147 references across all 15 sources), and connecting was the least mentioned (with 76 references across all 15 sources). We next elucidate these six themes and refer to existing literature to identify their interplay and roles in citizen science and social license.

Developing understanding: linking social license and citizen science

This discussion theme largely focused on developing understanding of the concepts of citizen science and social license. Interviewees' responses to questions about their understanding of the concept of social license provided insight into how the term might develop under a conservation context, i.e., as called for by Kendal and Ford (2018b). Documenting how social license is interpreted by different parties can guide theoretical development of the concept by expanding and challenging definitions of social license and by comparing how different communities perceive and make sense of social license (Parsons and Moffat 2014). Although the term "social license" was new to all but one of the interviewees, most of the coordinators were familiar with the sense of the

Table 2. Overview of the 15 marine citizen science projects for which we obtained interviews. These projects represented six countries, had varying levels of establishment (i.e., ranging from very new to long established), had different objectives with regard to marine research and conservation, and were supported by different funding schemes.

Project name	Country	Website	Year established	Marine focus	Funding source
BeachExplorer	Germany	https://www.beachexplorer.org/	2012	Intertidal	Federal ministry
Big Seaweed Search	UK	http://www.nhm.ac.uk/seaweeds	2009	Seaweeds	Lottery funded
Capturing Our Coasts Bangor	UK (Wales)	https://www.capturingourcoast.co.uk/	2015	Intertidal	Lottery funded
Capturing Our Coasts Newcastle	UK (England)	http://www.ncl.ac.uk/nes/outreach/marine/projects/capturingourcoast/	2015	Intertidal	Lottery funded
Dive Into Science	UK	http://www.diveintoscience.org/	2008	Marine environment	None
My Ocean Sampling Day	Germany (Global)	http://www.my-osd.org/	2014	Plankton (aquatic bacteria)	Institute, federal ministry, EU
One Ocean Forum	Italy (and wider Mediterranean)	https://www.oneoceanforum.org/en/	2017	Marine environment	Rolex, Audi, other companies
Open Litter Map	Ireland	https://openlittermap.com	2017	Marine litter	Participant donations
ORCA	UK	http://www.orcaweb.org.uk	1995	Marine mammals	ORCA charity
Seasearch	UK	http://www.seasearch.org.uk/	1970s	Marine environment	National conservation bodies
Secchi Disk Study	UK	http://www.secchidisk.org/	2012	Marine environment	Secchi Disk Foundation
Spot the Jellyfish (Spot the Alienfish)	Malta (and wider Mediterranean)	http://oceania.research.um.edu.mt/jellyfish/	2010 (2017)	Jellyfish	International Ocean Institute, Malta Tourism Authority
Studland Tagging Project	UK (England)	http://www.theseahorsetrust.org/	1999	Seahorses	Sponsorship, donations
The Big Jellyfish Hunt	Ireland	https://www.facebook.com/ecojel/	2008	Jellyfish	EU INTERREG IVA (2008–2012), no funding (2013–)
Waves of Waste	UK	http://www.ywt.org.uk/waves-waste	2010	Marine litter	None

concept, albeit under different names; for example, interviewees from the UK and Ireland synonymized the term with “buy-in” and “public acceptance”, and “public pressure” was another term used by interviewees.

There was strong support from all interviewees in favor of using citizen science to generate social license for marine conservation. It was widely accepted that creating social license would require specific project design and objectives. Interviewees also highlighted that, “The first step in that is people have to care and be engaged with that kind of environment, and citizen science definitely builds that sense of ownership,” (interviewee C2). It was generally felt that social license actions were already happening to some degree in many places, e.g., petition for legal protection of seahorses, community resistance to coastal development plans.

Coordinators’ understanding of the role of citizen science and social license largely tied into themes discussed in other studies, i.e., citizen science can enhance scientific literacy, improve ecological knowledge, promote connections with nature and locality, strengthen social ties, and influence participants’ sense of stewardship and environmental responsibility (Haywood 2016, Turrini et al. 2018).

It comes back to the simple thing of bridging the gap and making them feel valued and having an important role in

marine conservation, which is what citizen science does, it gives them that buy-in. (Interviewee A4).

Interviewees’ understanding of the term “citizen science” varied depending on the context or scope of their project. Terminology is particularly dynamic in citizen science because the field continues to develop, expand, and diversify (Eitzel et al. 2017). Most coordinators did not wish to be restricted by a definition of citizen science and were keen to extend their projects more broadly and to partner with other schemes that did not necessarily conduct citizen science. One coordinator did, however, take umbrage with the term citizen science and preferred to use the term “conservation volunteers” (interviewee B4), which the interviewee found was more accepted by the project’s participants. B4 felt that the use of the word science can discourage “ordinary” members of the public, who may feel that they do not have a sufficient background in scientific research. Certainly, the meaning of citizen science can represent different things to different people and can create confusion about its nature and utility (McKinley et al. 2017). We highlight that one of the challenges of using citizen science as a means to create social license is that the objectives of citizen science need to be transparent to participants (see *Cooperation and partnerships* in Table 1). Defining these objectives with participants can be considered a project objective in itself.

Communicating: engagement and connecting stakeholders

The theme of communicating focused on the importance of engagement and data sharing in opening science to the public, particularly the different means by which marine citizen science projects interacted with their participants and how participants shared this information more widely. Engagement and sharing knowledge about the marine environment was seen as a “very strong purpose” (interviewee C2) of marine citizen science. Modes and frequency of engagement varied widely (e.g., newsletters, seminars, beach-meets, training sessions, online forums, email updates, beachside billboards) and occurred frequently (often daily) to very rarely (largely because of funding or time constraints). Consistent with other studies, coordinators highlighted the value of personal and face-to-face communication with participants in developing rapport and for engendering meaningful relationships beyond transactional interactions (Martin et al. 2016a).

There was strong consensus that “communication is key” (interviewee A4). Many coordinators underscored the role of the Internet in their ability to share information and to communicate efficiently with a wide public network and more easily for both participants and organizers. Social media (i.e., Facebook, Twitter) improved projects’ ability to recruit participants and to remain in contact with them. For example, “The Big Jellyfish Hunt” is a project that communicates to its participants only through Facebook, and “Open Litter Map”, one of the youngest projects in this study (established 2017), is also only Internet based. The importance of the Internet for these projects is not surprising. Mobile technologies facilitate much broader participation in citizen science programs that make use of developing technologies (Pimm et al. 2015). However, different marine user groups require different engagement strategies, and projects must consider their own goals and capacities when designing and implementing participant engagement (Hind-Ozan et al. 2018). Social license is founded on meaningful dialogue and communication (Yates and Horvath 2013), but exploration is required as to whether citizen science can best achieve this through face-to-face or digital media interactions.

Similarly to social license, engaging the public in citizen science and involving them in data collection that informs management can legitimize data and generate trust in its validity and application (Aceves-Bueno et al. 2015). Data sharing was an objective for several of the projects, particularly those that developed partnerships with government or academic institutions. Many projects provided data that were used in marine protected area designations and now contribute to monitoring efforts within those areas. Others such as the “Secchi Disk Study” published their data in scientific papers in open-access peer-reviewed journals (see Secchi Disk Seafarers et al. 2017). The ORCA Trust is the lead partner of the European Marine Cetacean Monitoring Coalition, a consortium of eight cetacean-monitoring organizations across Europe that are “collecting data to help inform policy and legislation, to improve the conservation of our marine space” (interviewee A4).

Sharing data was seen as a major influencing tool for marine citizen science. It was agreed that “people spreading the word” (interviewee B1) and expanding awareness of data collected or knowledge learned through marine citizen science played a big

role in disseminating information to the wider public (i.e., participants’ families, friends, and community networks). These observations align with other experiences in the literature, which show that volunteering in citizen science projects increases participants’ concern about conservation issues, and that participants disseminate the knowledge they learn to their wider social networks (Johnson et al. 2014, Nursey-Bray et al. 2018). Successful engagement experiences may generate positive perceptions and influence the development of trust and, consequently, social license (Dare et al. 2014). Citizen science data can educate already proenvironmental participants and help them disseminate and argue the importance of marine conservation among their wider networks (Cigliano et al. 2015). Context is key when seeking to obtain and develop social license and requires identifying and understand local and community needs and interest to aid communication and to build relationships with communities and marine stakeholders (Prno 2013, Hall and Jeanneret 2014); social license has been likened to “an exercise in science communication” (Gallois et al. 2017).

Project logistics: community representation

Another theme identified in the interviews relates to practical aspects of project logistics and successfully making citizen science happen. Funding was identified by most coordinators as a primary limitation to development and engagement. The funding sources that supported projects varied greatly and included government grants, corporate sponsorships, scientific institutes, lottery funding, donations, and membership fees. Several projects had no direct source of funding whatsoever, and they struggled to expand their engagement, recruitment, and research activities. Citizen science can be a cost-effective means to gather data for scientific research (Aceves-Bueno et al. 2015), and there are numerous benefits to investing in citizen science development to enhance scientific, social, and political outcomes (Hecker et al. 2018b). Improving funding opportunities can enhance the likelihood of producing accurate and pertinent data for marine conservation. Overcoming funding challenges is critical to enhance the capacity of marine citizen science and its social and environmental impacts (Schläppy et al. 2017).

Other limitations included meeting participants’ expectations and incorporating diverse values into development, as well as successfully retaining participants that were recruited to projects:

There’s a lot of politics in conservation, as I’m sure you’re finding out. (Interviewee B4).

That is always a challenge, how do we get more people interested? (Interviewee C5).

These limitations further emphasize the need to increase the availability of specific resources that can enhance potential partnerships and promote public engagement. Communities invoke real power and increasingly know how to use it (Boutillier 2014). Investing in marine citizen science can enhance project capacity to engage more widely with communities and address societal concerns in the research, which can legitimize the resulting data to communities and decision makers, with the aim of improving understanding and ocean literacy that can enhance social license for conservation.

Advancing citizen science: learning, understanding, and legitimacy

Developing marine citizen science projects to promote public awareness of marine issues and social acceptance of conservation was a strong subject in this theme. Although several of the projects were stagnant because of funding or other constraints, and others were only becoming established, all projects were hoping to develop and expand their scientific activities and engagement. Coordinators emphasized that marine citizen science is “not a one-size-fits-all approach” (interviewee A5), and that two-way communication between participants and coordinators is vital for developing projects that can be maintained successfully in the long term. Legitimacy and accountability are crucial components of stakeholder and community perspectives (Johansen and Nielsen 2011). In advancing marine citizen science for the value of science and policy, planners must be careful to match their programs’ methods of engagement, public involvement, and participation appropriately with the type of project and focal aims (McKinley et al. 2017).

The coordinators discussed project success in improving people’s understanding of marine species and ocean environments, particularly the success of marine citizen science in promoting ocean literacy: “They always learn something new; they always get excited,” (interviewee A2). The majority of coordinators spoke of their very positive experiences of improved participant awareness and understanding, and how these had changed and enhanced participants’ perceptions of the marine environment. However, several interviewees articulated concerns about whether citizen science project outcomes have the potential to reach all members of the public, and about the difficulties in retaining participants for longer time periods. These challenges are also felt in social license issues, where some members of the public are more engaged than others, and where the “loudest voice” might in fact not be the most representative (Cullen-Knox et al. 2017). A further difficulty is that evolving social norms and expectations will affect public acceptability and social license for marine conservation (Dare et al. 2014). An objective for future citizen science and social license research may be in determining how to ignite and sustain interest in marine science and conservation issues (Ballard et al. 2018).

People and partnerships: cooperation, partnerships, and connecting stakeholders

This theme was centered around engaging participants and partnerships from across society. Partnership building with other groups and organizations was seen as a means for projects to “strengthen the research data, the quality of the data we were getting, and the engagement and messaging we were doing” (interviewee C2). Citizen science can bring experts and nonexperts together in partnerships that foster shared positive action to cocreate knowledge and build understanding (Dickinson et al. 2012, Jordan et al. 2012) that can enhance social license. Although levels of involvement and influence varied, benefits that projects sought and gained through partnerships included the ability to recruit more participants, more scope to engage with the public, enhanced ability to share data they collected, and larger pools of funding to expand project activities. In the UK, in particular, many projects were affiliated with government agencies, which reflects their policy relevance (Owen and Parker 2018). Coordinators believed that the larger their project network, the larger the impact their projects activities could have.

The larger the diversity with citizen science, I think that the higher are the chances it has an impact on social license. (Interviewee C4).

Participant types varied across and within projects, recruiting from “every single walk of life, from dustbin men to scientists to all those in between” (interviewee B4). This observation is consistent with a growing body of literature that recognizes citizen science participants as diverse and representative of many kinds of people (Thiel et al. 2014, Cigliano et al. 2015). It is also a positive indicator of the potential of citizen science to engage a range of social subgroups, which is necessary to develop social license for conservation. This observation reflects the value of marine citizen science for engaging with a large body of the European public, building understanding and enhancing ocean literacy, to enhance social license for marine conservation efforts. Projects that recruit from populations with more diverse groups of age, attitude, and education are more likely to engage participants with varied views on conservation (Forrester et al. 2017).

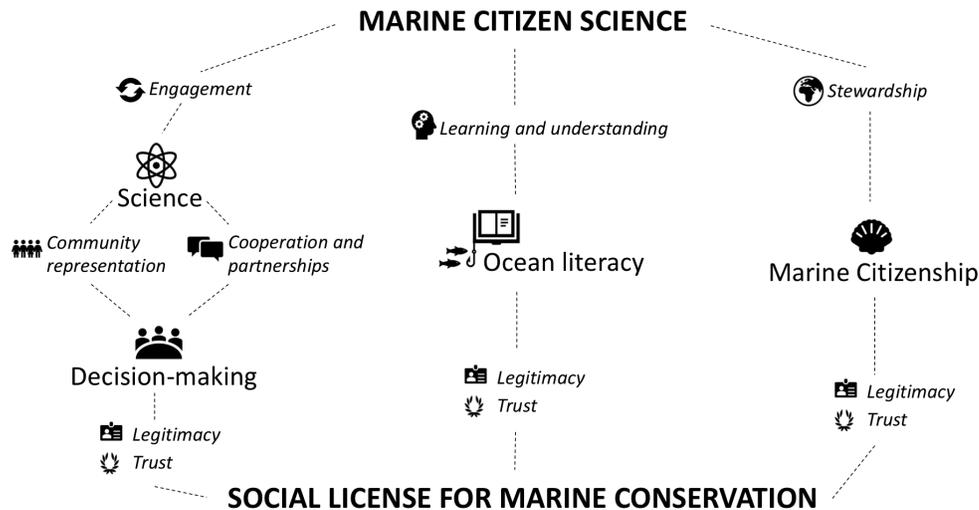
We note, however, that other research suggests that a large proportion of marine citizen science participants are more highly educated than the general public (Martin et al. 2016c). Participants are also self-selected and are likely to already hold positive views toward science and conservation before they engage in citizen science (Bonney et al. 2016, Martin et al. 2016b). This area is certainly pertinent for exploration that would guide development of recruitment and engagement for citizen science in Europe and elsewhere. It is important to consider who participates in these projects when developing marine citizen science to enhance ocean literacy and improve social license. When developed appropriately, the participatory structure of citizen science can promote the inclusion of diverse perspectives in decision-making processes (McKinley et al. 2017) and can increase the legitimacy and social license of decisions made in marine management.

Connecting: trust, marine citizenship, and stewardship

Creating ownership through citizen science and improving marine citizenship were seen as key outcomes of connecting participants to the marine environment. The interviewees largely agreed that marine citizen science is a valuable means to raise awareness and provide opportunities for the public to learn by doing and to connect them to marine environments they would not normally be aware of or have exposure to. Participation in marine citizen science was considered a pivotal step for generating ocean literacy and reducing the “disconnect between people and nature” (interviewee C5) to legitimize conservation and improve its social license. However, there was consensus that developing marine citizen science for this purpose would require adequate planning to address these objectives. The coordinator opinions reflect those in the literature about the need to understand the potential of citizen science as a communication and engagement tool (Groulx et al. 2017).

The process of earning social license is similar to that of citizen science because it brings members of the public together to discuss and address issues of common concern. Citizen science is undoubtedly valuable in fostering environmental stewardship (McKinley et al. 2017) because participants most frequently have strong positive attitudes toward the environment, demonstrate proenvironmental behavior, and believe that their actions

Fig. 1. Marine citizen science legitimizes science to the public and enhances ocean literacy and marine citizenship to enhance social license for marine conservation.



contribute to the value of natural resource conservation (Merenlender et al. 2016). Stewardship also plays a role in social license because it gives communities a voice to oversee usage and development of their local environments and can instill public responsibility for natural resources (Table 1) and develop marine citizenship (Fig. 1). Projects in our study demonstrated that “citizen science gives [participants] a closer relationship with their local environment, or whatever environment they’re sampling from... [and] ultimately gives people a greater understanding of the natural world and the environment in general” (interviewee B5). Feelings of connectedness and ownership are known to increase participants’ trust in the citizen science to which they are contributing (Dickinson et al. 2012). These feelings of trust are also a major determinant of whether participants will award social license (Boutilier 2014).

Marine citizen science was seen to legitimize marine conservation by connecting people to their local and marine environments and generating a sense of place through ownership of that space.

It’s more likely that people protect what they know and what they value. (Interviewee A3).

It gives ownership of an area to stakeholders who normally feel disconnected. (Interviewee B3).

I think that is very, very powerful, when you get the locals themselves caring about the marine environment. (Interviewee B1).

This observation is in agreement with results of other studies that show that people frequently need to experience the ocean (and its problems) personally before they are likely to change their views and attitudes (Steel et al. 2005). Leveraging this “power of place” is posited as a valuable means to improve conservation decision making and increase participation in citizen science (Newman et

al. 2017). We identify this sense of place component as one that requires future exploration and development in the marine context (van Putten et al. 2018b), especially for enhancing marine citizenship. Marine citizenship, i.e., an individual’s rights and responsibilities regarding the marine environment, necessitates increased awareness about marine issues, adequate understanding about the personal role and behavior involved in creating and solving these issues, and a positive shift in values that can promote ocean-friendly, proenvironmental behavioral decisions (McKinley and Fletcher 2012).

Ownership, developing ocean literacy, and marine stewardship were seen as requirements for generating understanding and personal connection to the ocean and trust in decision makers managing marine spaces. Trust was an important topic strongly linked to communication because participants who continue to be engaged effectively will continue to trust citizen science projects and their outcomes (Hind-Ozan et al. 2018). This can legitimize research and the data collected and increase the trustworthiness and social license of the marine management decisions they inform. The project coordinators largely agree that developing trust for marine conservation in Europe is a complex challenge that will need to be met with complex, complementary approaches because often, “people trust what they want to hear” (interviewee C4). Participants’ interaction with scientists was seen as a way to legitimize data and decisions, again through personal contact and developing understanding of the processes and entities involved.

DISCUSSION

Sustainable natural resource management, including marine conservation, requires that management and policies are socially accepted. Public involvement in natural resource issues and decision making increasingly is expected. Community ability to influence political decision making, particularly through

lobbying activities, has set a precedent for the development of social license in natural resource management (Cullen-Knox et al. 2017), and promoting a need for social license highlights the importance of community perspectives in conservation (Kendal and Ford 2018a). Citizen science is one means of public engagement that can strongly improve social license for marine conservation.

The results of our study are in agreement with other studies that have shown that citizen science can engage and inform the public about science and the natural environment and enhance empowerment to act (Martin et al. 2016a, McKinley et al. 2017, Nursey-Bray et al. 2018). Public engagement achieved through citizen science, via joint data collection and collaborative research, can innovate research and societal processes at the science-policy interface (Hecker et al. 2018b). This public engagement also provides an avenue to develop social acceptance, allowing communities and society to partake in and influence policy development and decisions that will affect them (Soma and Haggett 2015). Establishing this dialogue with and among marine stakeholders is imperative to achieve the more meaningful relationships underpinning social license for conservation (Moffat and Zhang 2014).

Our interview analysis finds that there is strong support in favor of using citizen science as a platform to develop social license for marine conservation. However, these results represent the views and responses of citizen science coordinators only and are not representative of the wider marine citizen science community. Citizen science programs provide opportunity for open discourse that is accessible to the public (McKinley et al. 2017), and our study demonstrates that citizen science can play a role in enhancing social license for marine conservation (Fig. 1) in Europe by: (1) legitimizing science, i.e., opening science to the public and creating a joint evidence base for decisionmaking; (2) improving ocean literacy, i.e., building participants' understanding about marine issues; and (3) promoting marine citizenship by connecting participants to the ocean.

We have determined that trust is a strong linkage between the concepts of social license and citizen science. Legitimizing research and use of the marine environment through citizen science increases the trustworthiness and social license of the marine management decisions it informs (Boutilier 2014, Jijelava and Vanclay 2017). Marine citizen science can legitimize marine conservation by connecting people to marine environments and enhancing their understanding of marine issues. Citizen science involves the public in data collection and decision making that gives legitimacy to management decisions by increasing transparency (Reed 2008). Building upon legitimacy and community trust can help to create social license (Boutilier et al. 2012). However, there is no easy way to establish social license (Prno 2013); it is a dynamic and ongoing process of community engagement actively seeking to maintain trust (Zhang et al. 2018).

Citizen science may also be an effective means to promote scientific literacy among the public (Bonney et al. 2009), and our study has demonstrated its value in promoting ocean literacy. Citizen science promotes reflection and discussion on how science interacts with society and societal values and how we can embed these more deeply into public thinking and decision making (Storksdieck et al. 2016). Citizen science can foster broader

societal impacts, especially in promoting conservation awareness because "personal conversation is probably the biggest spreader of education" (interviewee B4). Engagement achieved through citizen science can enhance flows and exchanges of information among communities, scientists, marine managers, and policy decision makers to help produce solutions that promote better environmental and social outcomes and therefore can help to mitigate conflict in natural resource management (McKinley et al. 2017).

There is widespread agreement on the need and importance of incorporating stakeholder groups and the public into marine conservation management through meaningful participation and engagement (Voyer et al. 2012, Brown et al. 2016). Citizen science is ideally placed for this engagement and can act as a catalyst for individual behavioral change that is linked to environmental stewardship of marine systems (Cigliano et al. 2015). In a similar way to which social license provides a voice for communities (Boutilier 2014, Cullen-Knox et al. 2017), participation in citizen science can instill volunteers with a sense of ownership, of both the data they collect (Reed 2008) and the areas that they monitor (Newman et al. 2017). Fostering these connections and developing feelings of ownership can enhance marine citizenship and increase public support and social license for marine conservation.

We have identified how marine citizen science may influence knowledge and opinions, connect diverse users of the marine environment, and improve ocean literacy to improve social license for marine conservation in Europe and, potentially, elsewhere. We synthesized linkages between the concepts of social license and citizen science (Table 1) that we hope can guide the development of further research on the role of citizen science in enhancing social license. Another direction for future research could be to explore dissimilarities between the concepts of social license and citizen science, and in what instances the concepts perhaps might not work to enhance one another.

As we have described, social license and citizen science are complex processes that both emerge from positive, potentially diverse, public engagement. For instance, social media has been identified as an emerging tool with which to earn and improve social license (Yates and Horvath 2013). The transferability of our results to other disciplines is another avenue of research that could be pursued. There would also be value in obtaining participant views of citizen science, social license, and marine conservation to complement our study because citizen science volunteers can represent a diverse range of people with various backgrounds and incentives to participate (Thiel et al. 2014). Recognizing diversity and heterogeneity in the public's connection to the sea is critical for addressing public needs appropriately in marine conservation engagement efforts (Jefferson et al. 2015).

The concept of social license is useful because it recognizes the importance and power of communities (Morrison 2014). In considering the need for social license, organizations such as government agencies can design agendas and actions that attempt to obtain public support and approval (Jijelava and Vanclay 2017). We suggest that marine management and decision-making authorities consider marine citizen science as a tool to engage the public and work toward achieving support and social license for their activities.

CONCLUSION

Obtaining social license for conservation requires engagement with communities that promotes dialogue and cooperation (Zhang et al. 2018). Citizen science can be a means to foster this cooperation by providing opportunities for individuals to participate in coordinated research efforts (Shirk et al. 2012). We have demonstrated clear linkages between citizen science and social license that are useful for exploration and application not only in a marine context, but also in terrestrial space. We have highlighted how the concepts of social license and citizen science influence knowledge exchange and development in drawing from sources in the literature and discussing our results.

We have identified how citizen science can foster synergistic effects to improve engagement, ocean literacy, trust, and, ultimately, social license for marine conservation (Fig. 1). Participants in marine citizen science have the opportunity to learn and experience how science is conducted and how it contributes to conservation, decision making, and management, and this experience can be a powerful, transformative, and legitimizing experience (McKinley et al. 2017). We propose that marine citizen science is strategically placed to promote trust and enhance social license for marine conservation. Marine citizen science can serve as a valuable platform to connect the public to ocean environments, but it should not be assumed that participants will automatically support ocean protection or conservation management. Generating social license through marine citizen science requires developing meaningful relationships with participants and earning their trust through engagement, education, sharing of information, dialogue, and transparency. Achieving such objectives in Europe requires planning resources, staff, and expertise, to which many European marine citizen science projects do not have access.

Our research supports growing policy calls that highlight the development of marine citizen science as an imperative objective to achieve engagement, ocean literacy, and marine citizenship. To achieve these aims and to enhance social license for conservation, more opportunities for citizen science, including funding, will need to be made available. The costs of policy implementation associated with a lack of social license can escalate rapidly across community, governmental, market, and environmental expenditures. European marine conservation requires public awareness, understanding, and social license, and marine citizen science is a purposeful means by which to achieve these aspects.

Responses to this article can be read online at:
<http://www.ecologyandsociety.org/issues/responses.php/10704>

Acknowledgments:

We are grateful to all citizen science managers who offered their knowledge and expertise for our study. This research was approved by UFZ Datenschutz (Data Protection), Leipzig, Germany (23/06/2017). RK was supported by the Green Talents Awards Programme for High Potentials in Sustainable Development by the German Ministry of Education and Research (BMBF). The study also received funding from the European Union's Horizon 2020

research and innovation programme (grant agreement 6417, ECOPOTENTIAL). GP was supported by an Australian Research Council Future Fellowship. The authors thank the members of the Ecosystem Services research team at UFZ/Div for their advice in developing this manuscript. We also thank two anonymous reviewers for their constructive comments for improving this manuscript.

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1. Survey Questions

Thank you for following the link to this survey!

Successful marine environmental management addresses the **needs and interests of stakeholders and communities**. We are researchers interested in the perceptions and opinions of Marine Citizen Science coordinators and participants in European projects. Our study investigates whether Marine Citizen Science promotes public understanding of marine environmental issues and whether this promotes public support and acceptance for current marine management in the EU.

Our project builds upon data collected by the **European Marine Board** and seeks to address some of the necessary conservation actions it has identified (see <http://marineboard.eu/publication/advancing-citizen-science-coastal-and-ocean-research-position-paper>). This survey is also part of the ECOPOTENTIAL research project (<http://www.ecopotential-project.eu/>). We will conduct surveys of Citizen Science co-ordinators and participants from marine projects in the EU to advise this data. Following this, we will conduct selected interviews with several coordinators and participants. The summarised and anonymised information we collect will be made available to all participants and Marine Citizen Science projects that take part in the study, as well as the European Marine Board's Working Group. The data will not be passed onto other persons or groups. Data will be saved for 5 years, and after this period all data will be deleted.

This survey component will take approx. 10 minutes to complete. It asks questions on 1) your Marine Citizen Science project, and your opinions on 2) participant engagement and perceptions, 3) marine management in Europe. Participation in the survey is voluntary. You are free to withdraw from this survey at any stage, your personal details will remain confidential.

If you wish to conduct this survey in a language other than English, please email X

Thank you very much in advance for taking part in this survey.

Survey for Marine Citizen Science Coordinators

I agree to conduct this survey, that my answers will remain anonymous, and that the survey results may be published to inform understanding and development of Marine Citizen Science in Europe. This consent can be revoked at any time.

1. Which Marine Citizen Science project do you coordinate/participate in?
Name: _____ Weblink: _____
2. What are your responsibilities in this role? *Please tick all that apply.*
 - a. I coordinate participants and project activities
 - b. I manage the data we collect in the project
 - c. I engage with the participants on outreach and education
 - d. I teach/organise science for the project
 - e. Other, please identify: _____
3. In what year (approx.) was your Marine Citizen Science project established? _____
 - a. Approx. how many participants does your project engage with? _____
 - b. Approx. how many of these participants are **active** within the project? _____

4. Does your project actively engage and educate participants on these issues? *Please tick all that apply.*
- Biodiversity (i.e. species, habitats)
 - Ecosystem services (i.e. recreation)
 - Climate change
 - Marine regulation (i.e. fisheries)
 - Marine conservation in general (i.e. protection, regulation)
 - European level marine conservation/management
 - State/National level marine conservation/management
 - Other

It is important for us to understand **how** your project engages and educates participants on these issues. Can you please provide some detail?

5. Do you think that participation in Marine Citizen Science increases participant's general understanding about:
- The marine environment?
A lot ... Not at all (Likert) / Don't know. Can you provide any evidence for this from your project? _____
 - Marine conservation?
A lot ... Not at all (Likert) / Don't know. Can you provide any evidence for this from your project? _____
6. Do you think that participation in Marine Citizen Science increases participant's general support for marine conservation and regulation? *A lot ... Not at all (Likert) / Don't know*
It is important for us to understand **how Citizen Science increases support**, please explain _____
7. Do you think that participants in your Marine Citizen Science Project trust EU government to manage European marine environments and resources? *Trust a lot / A little / Neutral / Somewhat / Do not trust at all (Likert)*
8. Do you trust EU government to manage European marine environments and resources? *Trust a lot / A little / Neutral / Somewhat / Do not trust at all (Likert)*
9. Do you think your country's government manages its marine environment and resources (i.e. fisheries, etc.) well? *Extremely well / Very well / Okay / Badly / Very badly*
- Do you think that your country's government manages its marine environment and resources in accordance to EU regulations? *Extremely well / Very well / Okay / Badly / Very badly / Don't know*
10. In your opinion, do you think that participants in your Marine Citizen Science project are **more likely to support marine regulation and conservation**, than:
- before they engaged with Citizen Science?
Less likely / more likely / likely / about the same / less likely / least likely
 - people who do not engage with Citizen Science?
Less likely / more likely / likely / about the same / less likely / least likely
11. Do you think Citizen Science can work to influence marine policy and management in Europe? *Yes / No / Don't know*
How? _____

12. Male / Female / Prefer not to specify

13. Age

- a. Under 18
- b. 18-25
- c. 26-35
- d. 36-45
- e. 46-55
- f. 55-64
- g. 65+

14. Job title _____

Name of Organisation _____

15. We value your opinion and support very much. If you have any additional information, comments or further contacts you think we should approach please let us know here:

16. How easy did you find this survey? (*Likert*)

17. Would you like to receive a summary of the results via email? *Please provide your:*

Name _____

Email address _____

**Thank you very much for conducting this survey.
We are grateful for your time and expertise!**

2. Interview Questions

Their Citizen Science project

1. Can you tell me a bit about your project? *Size, research, history, who runs it, funding?*
2. What is the main purpose (focus/benefit) of your project?
For my own info, to 'tick off' when they answer:
 - *Collecting data and producing new knowledge for science*
 - *Providing data that marine managers and policy-makers can use*
 - *Educating the public about marine issues and science (and creating environmental behavioural change)*
 - *Benefiting nature, by learning about it (and protecting it)*
3. How does your project interact with its participants? *Internet, meet-ups, newsletters, education sessions, programme training, etc.*

Citizen Science more generally

4. What does 'citizen science' mean for you?
Do you think others would agree? Are there other meanings you agree/disagree with? (Do you think your project is 'citizen science'?)
5. Do you see a role for citizen science to inform the public about marine conservation and protection?
*How could it be used to promote such communication and exchange?
Has your citizen science project informed (taught) participants about marine conservation?
Increased awareness? Changed opinions? How?*

Marine Citizen Science in Europe

6. Do you think citizen science can influence marine conservation and management in Europe? *How? At what scale (temporal, spatial)?* (adapted from Vann-Sander et al. 2016)
7. Do you think the awareness that citizen science creates about marine issues can promote greater trust in marine conservation and management? *(Clarify) Compared to those who don't participate in citizen science? How? Can you give any examples?*
8. Apart from the usual expectations of public awareness, education and data collection, do you think citizen science could be used a tool in other ways for marine conservation? (adapted from Vann-Sander et al. 2016)

Social Licence

9. Have you heard about social licence?
(Define it here – 'ongoing approval or broad social acceptance')
Where? In what context? What does 'social licence' mean to you?
Do you think social licence actually occurs? Where? For which groups? Local, regional, national? Can you give any examples?
10. **Do you think marine citizen science programmes can influence social licence for marine conservation and protection in Europe?**
(Explain question) In what ways? Through what processes? Can you give any examples?

Closing thank you. Ask for anything I might have missed in my questions, any other information they'd like to give or think is useful. Explain that results will be shared when they're published, hopefully early 2018.

19	iSeahorse	EU-wide	www.iSeahorse.org	2013	475	100	1	0	0	0	1	0	0		Yes
20	Secchi Disk study	UK	www.secchidisk.org	2013	2000	2000	0	0	1	0	1	0	0	Global issues	Yes
21	UK National Marine Mammal Monitoring	UK	http://www.seawatchfoundation.ac.uk	1976	3,000	2,000	1	1	1	1	1	1	1		Yes
22	Seasearch	UK	www.seasearch.org.uk	1998	200/yr	400/yr	1	0	1	1	1	1	1		Yes
23	Big Seaweed Search	UK	www.nhm.ac.uk/seaweeds	2009	500	250	1	0	1	0	1	0	0		Yes
24	Beach Explorer	Germany	www.beachexplorer.org	2014	10000	1000	1	0	0	0	1	0	0		Yes
25	ORCA Marine Mammal Surveyors	UK	orcaweb.org.uk	2006	800	500	1	0	0	0	1	1	1		Yes
26	One Ocean Forum	Italy	https://www.oneoceanforum.org/en/	2017			0	1	1	0	1	0	1		Yes
27	The Shore Thing	UK	www.mba.ac.uk/shore_thing	2006	5000+	<1000	1	0	1	0	1	0	0		Yes
28	Sealife Survey	Ireland	http://www.mba.ac.uk/recordi ng/	2005	1300	540	1	0	0	0	0	0	0		Yes
29	Emmett Johnston	Ireland	www.baskingshark.ie	2009	10-50	10	1	0	0	1	1	1	1		Yes
30	VBRANT	EU-wide	www.vbrant.eu	2010	15	4	1	1	1	1	1	1	1		Yes
31	The Big Jellyfish Hunt	Ireland	https://www.facebook.com/ecojel/?ref=bookmarks	2009	2300	100's	1	0	0	0	0	1	0	Jellyfish diversity	Yes
32	Great Eggcase Hunt	UK	www.sharktrust.org/eggcase	2003	>3000	>3000	1	0	0	0	1	0	1		Yes
33	Spot the Jellyfish (& Spot the Alien Fish)	Malta	www.ioikids.net/jellyfish; (www.aliensmalta.eu)	2010 (2017)	1000- 2000	100- 200	1	0	1	0	1	0	1		Yes
34	Dive Into Science	UK	www.diveintoscience.org	2015	7000 dives	unk.	0	0	1	1	1	0	0		Yes