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Triton Initiative: FY22 Communications, Outreach, and Engagement End-of-Year Report

September 2022

Cailene M Gunn
Rachael M Gallodoro



Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

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Richland, Washington 99354

Acronyms and Abbreviations

| | |
|-------------------|--|
| BOEM | Bureau of Ocean Energy Management |
| BSEE | Bureau of Safety and Environmental Enforcement |
| DOE | Department of Energy |
| FY | fiscal year |
| JMSE | <i>Journal of Marine Science and Engineering</i> |
| ME | marine energy |
| NOAA | National Oceanic and Atmospheric Administration |
| OES-Environmental | Ocean Energy Systems-Environmental |
| PNNL | Pacific Northwest National Laboratory |
| SEO | search engine optimization |
| SME | subject matter expert |
| TCOE | Triton Communication, Outreach, and Engagement |
| TFIT | Triton Field Trials |
| WPTO | Water Power Technologies Office |

Executive Summary

The Department of Energy (DOE) Water Power Technologies Office (WPTO) Triton Initiative supports the advancement of the marine energy (ME) industry through environmental monitoring research and technology development. This report presents the results and analysis of the Triton Initiative's communications, outreach, and engagement (TCOE) efforts in fiscal year 2022. The primary TCOE goals were to: (1) educate and raise awareness of ME and the role of Triton's environmental monitoring research in supporting the industry; (2) build trust with audiences through transparent communications and outreach; and (3) evaluate and refine TCOE tactics based on feedback and metrics. To support these goals, the TCOE team used multiple platforms and approaches. Notable achievements include:

- 12 newsletter issues sent to 189 subscribers with an average open rate of 56%.
- 10 Triton Stories, resulting in 3,086 collective views contributing to 45% of all Triton website views.
- 82 Triton-specific social media posts, which generated a total of 87,876 impressions, 1,048 post-clicks, and 7,814 video views.
- 6,791 Triton website views and over 1,270 new website users, with increased search engine optimization ranking in several categories.
- 3 Triton researchers interviewed as guests on two different podcasts, Water Women and Big Deep: An Ocean Podcast.
- A Triton special issue of the *Journal of Marine Science and Engineering* (JMSE) featuring 10 peer reviewed publications. All articles ranked in the top 25%, and two in the top 5%, for digital attention of all research outputs scored by Altmetric.
- A seven-part webinar series called Triton Talks to share and discuss research and results from the research published in the JMSE special issue.

Triton leveraged unique opportunities, particularly the JMSE special issue, to disseminate research results to end users, educate stakeholders, and gain valuable feedback. These concerted communication efforts increased exposure across platforms ultimately resulting in greater reach and access across audiences. Based on audience analyses of webinar attendees and newsletter subscribers, the TCOE team was able to successfully engage with general audiences, research partners, and ME stakeholders, including subject matter experts from government agencies, research organizations, and the regulatory community.

The TCOE task established channels to gather input and create opportunities for two-way communication with people engaged with Triton's outreach efforts. The feedback received will enable the TCOE team to support its goals for ongoing evaluation of outreach and engagement tools while continuing to build trust in the ME community and educate diverse audiences about the impactful research conducted by the Triton Initiative.

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1.0 Introduction

The Triton Initiative directly supports the Department of Energy's (DOE) Water Power Technologies Office (WPTO) goal of improving environmental monitoring of marine energy (ME) devices to advance the role of the ocean toward a path to a clean energy future. Triton's mission is to reduce barriers to permitting and facilitating the deployment of ME devices. This mission is accomplished by conducting environmental monitoring research, supporting the development of monitoring technologies and sensors, and making recommendations regarding instrumentation and methods to inform regulators, developers, stakeholders, and the general scientific community. Communications, outreach, and engagement efforts are critical to the success of Triton, which involves keeping the stakeholders within the ME industry well informed of the recommendations and providing access to environmental monitoring data, and fostering collaborations between researchers and industry partners to conduct relevant science.

The overarching goal of the Triton Communications, Outreach, and Engagement (TCOE) task is to share and promote Triton's research and results with stakeholders and research partners, with the added benefit of serving the broader ME industry by increasing awareness about ME as an emerging renewable energy resource. This report presents the results and analysis of communications activities from October 1, 2022 – September 30, 2022, in the second year of the TCOE task, as outlined in the fiscal year 2022 (FY22) TCOE Plan. We highlight notable successes and lessons learned from FY22, assess the TCOE target audiences, and identify the most effective channels and activities used to connect with those audiences to achieve the TCOE goals.

1.1 Goals

In support of Triton's mission, the TCOE task used and established several tactics and activities to conduct FY22 communications and outreach in service of three primary goals:

Educate and raise awareness of ME and the role of Triton's environmental monitoring research in reducing barriers for device testing and installation.

Build trust through transparent communication content and consistent messaging with our key audiences and ME stakeholders.

Evaluate and refine communication, outreach and engagement tools, and tactics used to share content and inform key audiences, determine the most effective channels for gathering feedback, and measure the success of communication activities with those audiences.

Efforts to advance FY22 goals included refining channels established in FY21—including [Triton Stories](#), project newsletter, social media, video development, and partner collaborations—as well as establishing new channels, such as the [Triton Talks webinar series](#), publication of a [special issue](#) in a peer-reviewed journal, and the expansion of the [project website](#). Other avenues such as conferences, workshops, podcasts, and print materials were also used to increase exposure to the project's research, capabilities, team, and products, and connect with the TCOE target audiences, which include research partners, ME stakeholder, and general audiences (see Section 1.2). Additionally, through e-mail outreach, webinars, and surveys, the TCOE task created opportunities to gather feedback from audiences to help refine communications and outreach tactics to connect with those audiences and align Triton's research to support the industry effectively.

The expected metrics and FY22 outcomes of each activity presented in the FY22 TCOE Plan were measured based on the target of success summarized in Table A1 of the Appendix. Expected metrics were determined for each category based on input from the project sponsor and Pacific Northwest National Laboratory's (PNNL's) communications specialists. Success of all FY22 activities was measured based on both the outcome relative to the target metric, as well as contextual and qualitative information. Additionally, evaluation included how well each tactic was able to contribute to the goals, as outlined in this report. Using surveys and open feedback channels as pathways to learn about audiences and how they interact with content also provides insight on effective or ineffective tactics. Measuring success was also a valuable opportunity to assess the effectiveness of tactics relative to reaching key audiences and the project goals to support an iterative communication process.

1.2 Key Audiences

A crucial part of achieving the FY22 TCOE goals was to better understand and clarify Triton's target audiences and the most effective ways to reach them. Understanding the communities, roles, and influences within each target enables the TCOE team to develop effective communication strategies to connect with target audiences and achieve the stated goals. To do this, TCOE efforts involved monitoring audience composition and conducting an analysis to identify specific audiences in the purview of how they consume information and what Triton content interests each group the most. The team learned more about each audience through direct outreach and engagement, surveys, and metrics such as sources of website pageviews or newsletter engagements. With this information, the TCOE team sought opportunities to tailor content to specific audience groups and their needs to most effectively achieve the goals to educate and build awareness within research and ME communities, and to build trust with these audiences.

Triton's outreach focused on three main targets: ME stakeholders, research partners, and general audiences, which were broken down into subgroups (outlined in Table 1). Each primary audience and subgroup has distinct interests and goals, with the potential to guide and direct Triton research topics and the ME industry. For example, research partners include scientists and engineers at state and federal agencies, environmental monitoring technology developers, academic institutions, other national laboratories, and subject matter experts (SMEs). Within each of those communities, we may collaborate to propose projects, address research questions, and bolster impact. The ME stakeholder audience group consists of regulators, consultants, permitting decision-makers, and those involved with ME stakeholder engagement. These subgroups include both end users of Triton's research products and decision-makers who can influence the future trajectory of Triton's research based on the needs of the industry. While both research partners and ME stakeholders are key audiences, the types of content and level of technical detail required to communicate with each effectively varies. For example, peer-reviewed publications and conference presentations are more technical and tend to attract researchers naturally, ME stakeholders were found to engage with the newsletter and workshops, and webinars appealed to both groups.

Table 1. TCOE target audiences and subgroups

| Target Audience Group | Subgroups | Impact |
|-----------------------|--|--|
| Research Partners | SMEs and researchers in relevant fields, including those from academic institutions, state and federal government agencies, national laboratories, or the private sector, and sensor and environmental monitoring technology developers | This group includes researchers and organizations with relevant expertise and capabilities that Triton may collaborate with to propose or execute projects that advance Triton’s mission or influence future research |
| ME Stakeholders | Developers, regulators, permitting decision-makers, consultants, stakeholder engagement professionals, and other ME end users | This group includes end users who utilize Triton’s research products to inform ME industry decisions and can also provide insights into how Triton can effectively address research needs |
| General Audiences | Science-interested public, media professionals, workforce development professionals, students pursuing relevant degrees, marine conservation organization members, and coastal citizens, including communities and industries with strong ties to ME testing locations | General audiences who have the ability to influence the trajectory of the ME for better or worse; educating these audiences about the benefits of ME and Triton’s research helps build awareness, foster support, and inspire the next generation ME workforce |

1.3 Audience Analysis

An audience analysis is a valuable process used to identify and better understand audience needs, including their roles, knowledge about topics, and interests. Analyzing an audience requires ancillary data about who is consuming information, their role and affiliation, and insights regarding how they consume content. This critical step advances our ability to share knowledge, change perception, or initiate action within certain interest groups. This impact can be challenging to quantify, which underscores the importance of collecting participant data and closely tracking feedback.

1.3.1 Audience Composition

Triton’s TCOE audiences are generally self-selecting, such as through newsletter signups, webinar attendance, and engagement with the website, stories, or science-oriented social media accounts. Newsletter subscribers were collated through a subscription form promoted through direct outreach to stakeholders, social media posts, and a website lead generator. The form asked subscribers for their name, email, and affiliation, allowing them to be categorized for audience composition tracking. Additionally, similar information was gathered when audience members registered for Triton Talks webinars, including e-mail, role within the ME industry, affiliation, and country. Audience data from both the newsletter and webinar were used to determine audience composition, which includes a primary audience composition as well as sub-audience composition for each. Audience compositions were tracked throughout FY22 to keep a record on what target audiences were being reached, which helped guide promotional efforts and align with channels known to reach target groups.

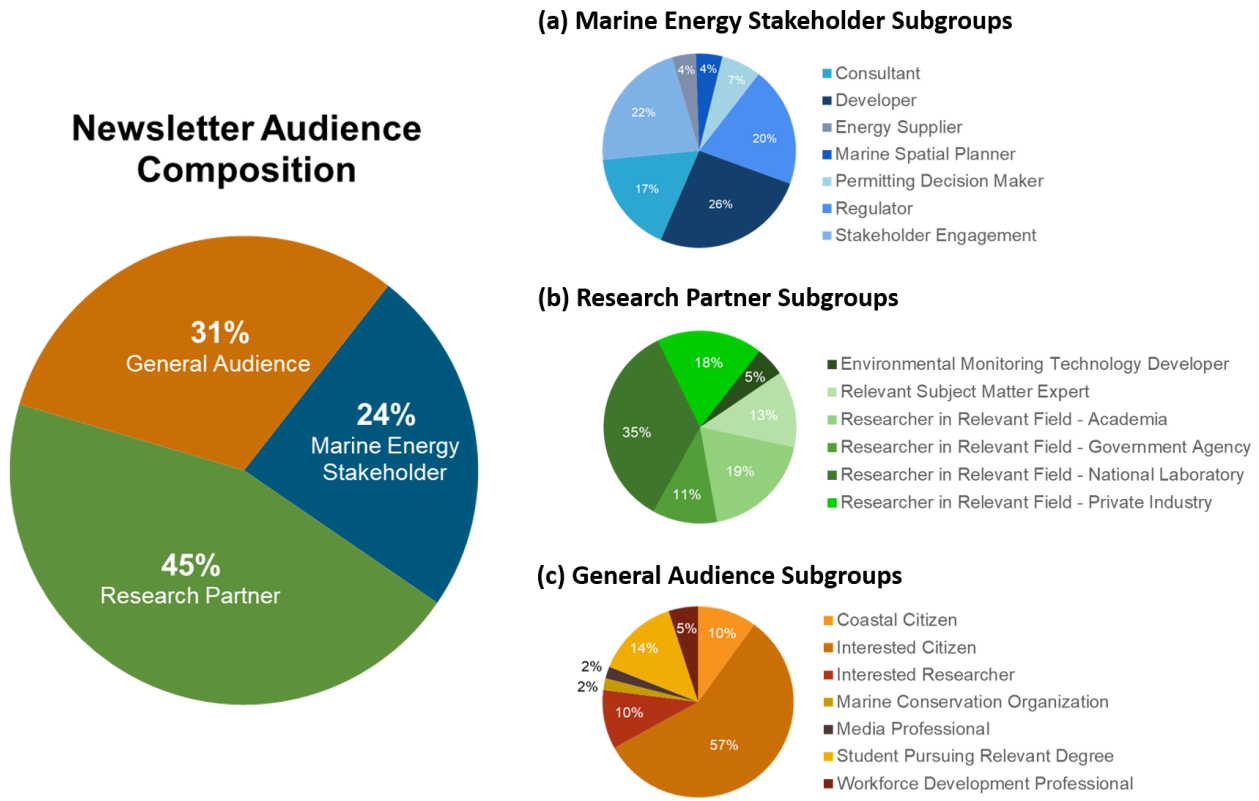


Figure 1. Newsletter subscriber audience composition (n=189) including primary audiences and subgroups within each

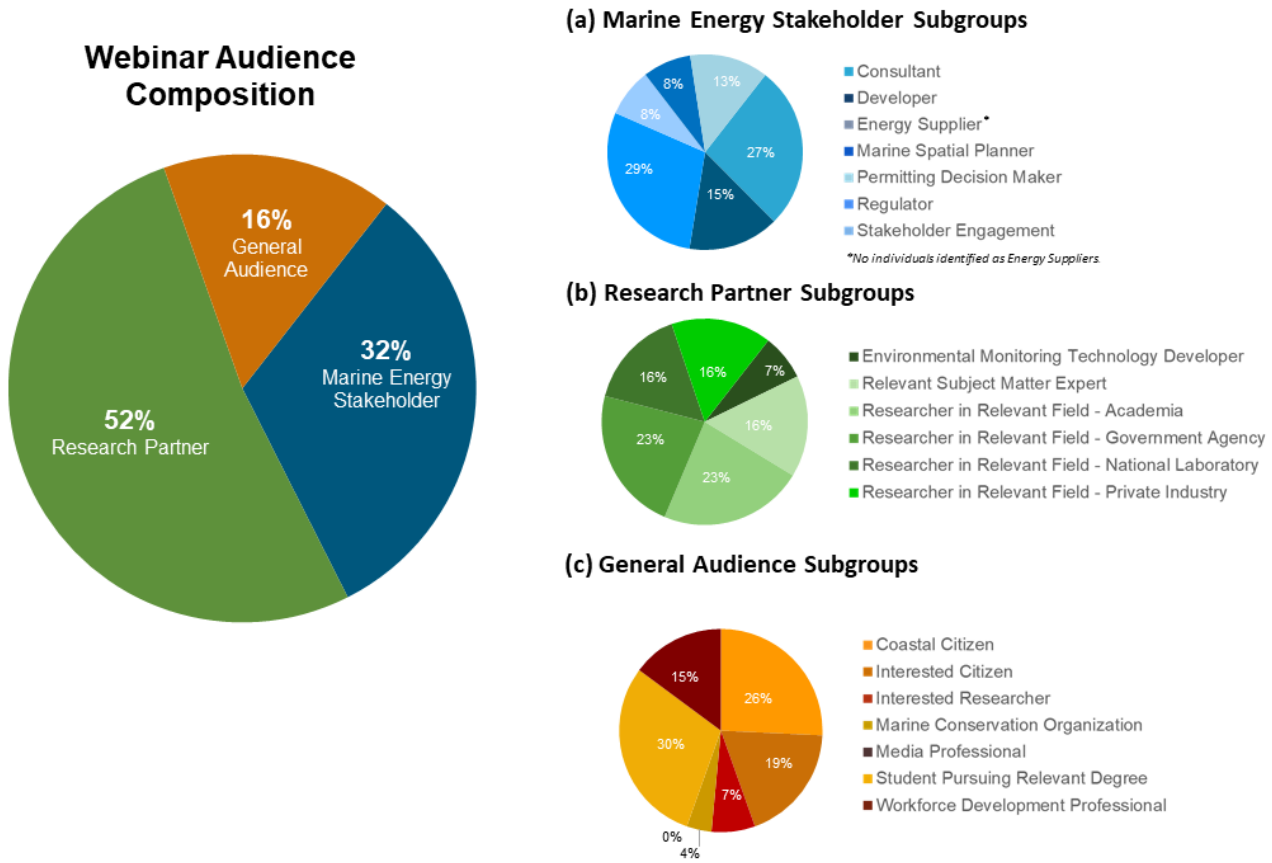


Figure 2. Webinar attendee audience composition (n=165) including primary audiences and subgroups within each

While there is overlap between newsletter and webinar audiences and affiliations, it is evident that the newsletter attracts a broader audience, including 31% general audiences, 24% ME stakeholders, and 45% research partners (Figure 1), while the webinars—which offered topic-specific project details—attracted more technical audiences, including 52% research partners, 32% ME stakeholders, and 16% general audiences (Figure 2).

Top affiliations for both content channels include influential government and academic research organizations, regulatory agencies, and ME research and test centers within Triton’s target groups—many of whom may include possible research partners or end users of Triton’s research products. For example, agencies such as the Bureau of Ocean Energy Management (BOEM), the Bureau of Safety and Environmental Enforcement (BSEE), and DOE WPTO have an understanding about the environmental monitoring data needs and uncertainties related to ME permitting and are valuable audiences to gather feedback from. Majority of webinar attendees include researchers in relevant fields, ME stakeholders, and end users, which indicates that the target audiences are being reached successfully, allowing presenters to tailor their content and adjust the level of technical information based on their awareness.

Top 10 newsletter subscriber affiliations include BCS, Incorporated (a WPTO clean energy communications partner), BOEM, CalWave Power Technologies Inc., DOE, National Renewable Energy Laboratory, National Oceanic and Atmospheric Administration (NOAA), PNNL, Oregon State University, U.S. Coast Guard, and University of Washington.

The top 10 webinar attendee affiliations include BSEE, BOEM, U.S. Fish and Wildlife Service, Fundy Ocean Research Centre for Energy, NOAA's National Marine Fisheries Service, New York State Department of Environmental Conservation, Oregon State University, PNNL, and DOE WPTO. Webinar live attendees joined from all over the world, hailing from Australia, Barbados, Canada, Chile, Colombia, Dominican Republic, Ireland, Mexico, Netherlands, Norway, the United Kingdom, and other coastal nations. It is valuable to know that audiences from around the world are attending webinars, indicating that Triton's reach extends beyond the affiliated interest groups based in the United States and suggests that Triton's research is applicable and relevant to international industry professionals and the general scientific community.

Through the newsletter and webinar audience analyses, several sub-audience groups were identified as valuable communities to track within each target group. This includes ME stakeholders such as marine spatial planners, professionals involved with stakeholder engagement within the ME industry, and energy suppliers. General audiences included the media, students pursuing relevant degrees such as ocean engineering or ME topics, workforce development professionals, and coastal community members who work in industries with strong ties to ME testing locations. By better identifying new subgroups and the proportion of each within the broader audiences allows us to better educate and build awareness of Triton research and related topics to these groups. It is also possible that subgroups outside the research partner audience base could include potential collaborators, or communications partners to help broaden the TCOE reach. Knowledge of these subgroups helps the TCOE team identify new influential communities or ME roles that may be beneficial to engage with in service of the task goals and/or Triton's mission—for example, individuals in the commercial fishing industry may be willing to engage in valuable conversations about ME deployments and effects to fisheries and habitats.

1.3.2 Feedback and Response

An audience analysis and the quantification of impact relies on feedback through surveys, direct interaction, and digital engagement. Feedback is important in the service of the TCOE goals related to education, trust, and evaluation. Our ability to engage our audiences relies on receiving feedback so we can dynamically alter our approaches and strategies to share content, inform key audiences, and determine the most effective channels. Continuing to collect feedback aids our ability to measure the success of the communication activities with each audience group.

In order to establish consistent channels to gather feedback on an ongoing basis, Triton developed a webinar survey, created an open-comment "Ask Triton" survey to share on public-facing Triton platforms, tracked comments via social media, promoted the use of the tritonme@pnnl.gov e-mail address to connect with audiences, held question-and-answer sessions as part of all webinars, and carefully tracked direct feedback from interactions with partners or audiences throughout the year. Data from these efforts, presented throughout this report, were used to adjust content and tactics throughout the year to better reach audiences and show that their feedback is being incorporated.

Overall feedback throughout FY22 was positive, but all responses and critiques received were assessed to adjust and improve content and tactics. A simple example of how feedback constructively informed and strengthened efforts is through the Triton Talks webinar series survey. In response to the question, "How can we improve the webinar series?" an engaged survey respondent shared that they enjoyed the webinar, but it was not clear how to get the

recording. In previous webinars, we had provided a link to the webinar playlist and told attendees to go to the website or access it via the newsletter, but this simple recommendation helped the team identify a clear need for post-webinar follow-up. After this recommendation, an e-mail with links to recorded webinars and pertinent resources and announcements for following webinars was sent to all webinar registrants. This follow-up allowed those who could not attend the live webinar to access the information and created additional opportunities to promote future webinars. After implementing this follow-on communication, webinar recording views, newsletter subscribers, and registrants for future webinars all increased on days the e-mails were sent. This example also demonstrates the power of feedback when establishing a new channel—while this engagement method may have been clear to projects that had previously held a webinar series, this reminder served as an important learning point for the TCOE team as the Triton Talks webinar series was being established in FY22.

Feedback also helps the team gauge what topics are of most interest to audiences. For example, as part of a promotional effort to disseminate Triton's publications in a journal special issue (see Section 2.1), a Triton Story was written to discuss the impact of the special issue, including details on a paper that included discussions about sustainability and life cycle assessment next steps. Social media posts to promote the story highlighted this marine energy sustainability topic. Not only did these posts perform very well in terms of impressions and engagements, but the topic also received feedback from audiences such as "Interesting! Sustainability considerations are important for seeing the big picture," from a reader of the Stories. This feedback indicated that audiences are curious to learn more about ME sustainability and life cycle assessment discussions, which inspired a more robust discussion of these topics through the Triton Talks webinar series and writing of a Triton Story dedicated to this topic. Survey responses from this webinar and comments in the question-and-answer session further validated audience interest in this topic and may inform future research or collaborations in this area. Specific examples of how feedback was used to adjust and strengthen TCOE specific efforts have been discussed in detail throughout Section 2.0.

2.0 Notable Successes

The TCOE framework takes a multi-pronged approach to achieving its goals by using many channels and activities in concert to increase exposure, reach, and impact. The TCOE strategy shifted from establishing channels and processes in FY21 to refining tactics to increase the impact and transparency of Triton's research while building trust with the scientific results that inform ME industry decisions.

Below are notable successes and challenges we overcame, which were significant for achieving our FY22 goals.

2.1 Publication of *Journal of Marine Science and Engineering* Special Issue

The Triton Initiative's Triton Field Trials (TFiT) activities, conducted from 2018 to 2022, explored and tested cost-effective methods and instrumentation used to monitor potential environmental stressors associated with ME systems. The project culminated in the publication of 10 Triton research papers in a special issue in the *Journal of Marine Science and Engineering* (JMSE) titled "[Technology and Methods for Environmental Monitoring of Marine Renewable Energy](#)," with Triton researchers Lenaig Hemery and principal investigator Joe Haxel as guest editors. The papers within this special provide open-access, peer-reviewed recommendations to promote consistent, transferable, and cost-efficient methods for environmental monitoring data collection and analysis for the ME industry. It is the first large-scale set of environmental monitoring methodology recommendations for the ME industry produced from field tests in the United States, with findings from the publications designed to be used by decision-makers within the industry. The special issue also included a preliminary investigation of anthropogenic light as a potential environmental consideration, reviewed predictive modeling methods, discussed the value of communications for ME projects, and addressed setting-specific temporal data collection needs and discussions on sustainability and life cycle assessments. By publishing results, recommendations, and detailed information about project methods and processes in a peer-reviewed journal, this special issue supports the TCOE goals of building trust and transparency with our audiences. Additionally, publication in an open-access journal makes this public dissemination more effective, increasing access to results, increasing exposure, and enhancing the research cycle.

Since its release, the special issue has received over 10,468 views and 18 citations across all papers. Furthermore, according to public data from Altmetric, which measures the digital attention a research output receives based on number of views and mentions, sources of views, and audience engagement, all papers ranked in at least the top 25% of all research outputs scored. Two papers (Staines et al., 2022 and Gunn et al., 2022) scored within the top 5% of all research outputs scored by Altmetric.

This special issue included a [communications-focused paper](#) on Triton's TCOE framework and presented the first year of implementation as a case study. As of September 30, 2022, this paper had 1,535 views, which is the second highest viewed paper in the special issue. This paper offers a unique perspective on the value of communications for the ME industry and provides practical recommendations on how to implement communications that can be meaningful for the ME industry. By publishing this topic and results in a peer-reviewed scientific journal, the TCOE team is able to target more technical audiences within the research partner and ME stakeholders groups who may not consider communications and outreach as part of

research efforts. Additionally, this paper, which to our knowledge is the first of its kind for the ME field, helps establish Triton as a thought leader in the communication and outreach for ME research projects. Inclusion of the TCOE framework and approaches in science communication and science, technology, engineering, and mathematics (STEM) education research is valuable not only for advancing Triton's goals but contributing to the impactful, and quickly evolving academic field of science communications.

While the special issue in itself was a major science communications accomplishment that supported TCOE goals, it also inspired several pieces of other content designed to disseminate the special issue results and recommendations to end users, including a PNNL news feature, a Triton Story, related social media and newsletter content, and the Triton Talks webinar series. Dissemination tactics aimed at increasing the readership of the special issue by the research community and building trust in Triton's research process by providing in-depth information about the TFiT research process and giving audiences the opportunity to ask questions.

2.2 Triton Talks Webinars

In February 2022, Triton launched the Triton Talks webinar series to establish a platform to disseminate TFiT results and recommendations published in the JMSE special issue. The webinar series supported the goal to increase transparency and awareness, generate discussion with key audiences, make results accessible, and promote TFiT's results and recommendations to the audiences. It also helped in establishing an audience base, platform, and mechanisms to gather feedback to improve future webinars, and produce webinar recordings that will be sustainable, informational pieces of content that will serve the project for years in the future.

The webinar series provided Triton's researchers an opportunity to discuss their fieldwork, expertise, methods, results, and recommendations with key ME stakeholders and end users. Each presentation concluded with an open question-and-answer session. Webinars also served as a platform for promoting Triton content, events, and news, inviting audiences to participate in discussions around Triton's research topics, connect with TCOE content, subscribe to the newsletter, and provide feedback through a survey.

2.2.1 Webinar Outcomes

A total of 165 individuals attended live webinars, excluding Triton team members, 13% of which attended at least two of the seven in the series. The most attended webinar was a two-topic webinar on underwater noise and anthropogenic light research, which attracted 139 registrants, 86 of whom attended live (see Table A1). The majority (52%) of all webinar attendees were research partners, including scientists and SMEs in relevant fields (Figure 2b), as well as 32% ME stakeholders, comprising regulators, consultants, ME device developers, permitting decision-makers, and other influential end users (see Figure 2a). The general audiences (Figure 2c) who attended the webinars included workforce development professionals, students pursuing relevant degrees, and coastal community members, including coastal and marine industry workers such as commercial fisherman.

In FY22, we found that direct outreach and follow-up were critical for the dissemination of webinar recordings to those who could not attend the webinars live, and the promotion of future webinars and other Triton content such as the newsletter. This type of outreach also helps build name recognition and helps establish the tritonmre@pnnl.gov mailbox as a connection point. The post-webinar recordings, posted to the [Triton Talks YouTube playlist](#), received 67-184

views on YouTube (Table A2). The highest number of webinar recording views was that for the [TFiT introductory webinar](#), which was an informational, behind the scenes look at the TFiT campaign with speakers Samantha Eaves, Joe Haxel, and Alicia Amerson. Spikes in YouTube views and survey responses were observed after sending the post-webinar follow-up e-mail to all webinar registrants, indicating interested audiences and those who were unable to attend live sessions are accessing recordings.

Feedback from the webinars was gathered through a SurveyMonkey survey, by collating direct feedback from attendees, and through information from question-and-answer sessions. One attendee, who is an environmental consultant at the European Marine Energy Centre in Scotland provided feedback via e-mail, sharing “I wanted to give some praise to the Triton Initiative project and its outputs/talks - since joining [the European Marine Energy Centre] my role now focuses predominantly around environmental monitoring, and it has been an excellent resource to keep up with and refer to!”

These types of feedback help the TCOE team understand not only who is attending webinars and watching recordings, but how they are using them in their current role. Additionally, by asking about a registrant’s role in ME, we also gain insights into communities and platforms to tap into. For example, when one registrant noted they were a coastal citizen interested in learning about TFiT and were part of the Global Marine Community email listserv, TCOE identified an e-mail list or community to potentially pursue in the future.

2.2.2 Webinar Survey Results

The webinar survey was shared at the end of each webinar, via e-mail to registrants, in the newsletter, and on the Triton website. Based on survey results:

- 90% of those surveyed responded “likely” to attend or watch another of Triton’s webinar series; with one individual responding otherwise, selecting “not likely” with the explanation that “the light impacts on marine wildlife is currently the only topic of direct relevance to my work. However, if I have a link to the recordings of the seminars, I will forward them on to others who work in the renewable energy sector,” indicating that the attendee sees value in the webinars beyond their specific topic of interest.
- 85% of those surveyed shared that the information was new or somewhat new to them, which indicates that we provided attendees opportunities to learn. This supports the TCOE goal of building awareness and educating target audiences about Triton’s research, role, and relevance.
- 90% of respondents indicated they would be likely to suggest the webinar series to a friend or colleague.

We received multiple responses like “Keep up the great work!” “Excellent presenters and content,” and “I love to see how more technical things are being broken down in a fun, engaging way. Kudos!” in open-comment boxes providing feedback into how our efforts are being received by target audiences.

One respondent commented that they are not affiliated with the ME industry, explaining “I am a high school teacher and will discuss this project along with others this Fall semester when I introduce my new students to the field of environmental research.” Audiences like teachers, who have the ability to expose students to fields in ME and environmental monitoring, not only help support the TCOE goal of increased exposure but can inspire the next generation of ME

researchers and educate general audiences about emerging topics. This type of feedback is extremely valuable for understanding broader impacts of Triton's efforts that traditional metrics do not provide.

Question-and-answer sessions following each webinar also provided valuable information about what aspects of the presented work were of specific interest to attendees; for example, the final webinar discussions on ME sustainability yielded several questions about life cycle assessment and growth curves. Additionally, there was a survey response from an attendee who stated, "I enjoyed this, and would like an addition of how Triton sustainable engineering methods have been used in the industry today if applicable." Recognizing that Triton's audiences are interested in these topics and may support or collaborate on research in this area in the future is valuable for assessing ongoing areas of research or focus.

Based on webinar survey results, future topics of interest or those to expand upon include:

- Collision and underwater noise models
- Science communication
- Wave energy deployments and contribution to energy supply
- More in-depth talks on anthropogenic light as a new stressor of concern
- Establishing environmental monitoring confidence levels for peer-reviewed analyses
- Minimization and mitigation strategies
- Sustainability impact modeling and growth curves
- Ways someone outside the industry can help Triton's mission

Such responses provide a window to see what types of content audiences are interested in and how Triton may be able to offer future content that aligns with these interests. While some of these topics were covered in subsequent webinars and others are outside Triton's scope, there may be opportunities to address some of these requests. For example, the respondent interested in wave energy deployments and contributions to energy supply could inspire a collaborative webinar with Triton's partners at CalWave Power Technologies to discuss this topic and discuss Triton's field trials around the CalWave xWave wave energy converter. Several responses requested more in-depth discussions about anthropogenic light and mitigation strategies, which could help justify a webinar, workshop, or informational video expanding on this topic in the future. Such feedback, used in tandem with data analytics, can help inform possible Triton research decisions and TCOE content.

2.3 Newsletter

The [monthly newsletter](#) supports TCOE goals to educate and build trust with audiences by offering a consistent channel to share research information and behind the scenes project information, and providing details on ways to connect with Triton research products and a platform to promote feedback channels. The newsletter was a high-performing communications channel; with open rates increasing from an average of 50.4% in FY21 to 56.0% in FY22 (see Table A3), which is over double the industry average of 25.5%. Between October 2021 and September 2022, the TCOE team sent 12 issues to 189 subscribers (includes undeliverable subscribers), 80 of which were new in FY22. Newsletter content included a feature on Triton Stories, related news features or PNNL stories, highlights on fieldwork, new research projects,

spotlights to showcase researchers and partners, and general topical news items. A new section called “In Other Energy News” was developed to highlight any relevant events, updates, or project information from other marine or offshore energy projects; this section serves to create a space for collaboration with partners and cross-promotion with projects such as Ocean Energy Systems (OES)-Environmental and offshore wind energy projects.

Triton’s self-selecting group of interested subscribers is composed of all target audiences and subgroups. This unique audience mix allows for hyper-focused engagement and exposure to specific topics and content. Some of the most engaged newsletter subscribers included the chief operating and chief technology officers of CalWave Power Technologies, Inc., a research partner at Integral Consulting, Inc., a graduate student pursuing a career in ME environmental monitoring, a regulator at BSEE, fisheries researchers at NOAA, a developer at Neptunya Ocean Power, and a consultant at H.T. Harvey and Associates. These audience members comprise influential members of the ME community who we want to stay informed, remain aware of Triton’s many content channels, and have access to Triton’s research products.

Since the newsletter has a broad audience base (see Figure 1), it provides a valuable platform to share content that may be of interest to all three TCOE primary audience groups. This includes informal stories that may appeal to more general audiences, technical publications or webinars for research partners and ME stakeholders, broadly appealing field updates, and a platform to drive all subscribers to the project website. Additionally, the newsletter archive offers a record of Triton project highlights that is hosted on the project website for audiences interested in the evolution of the project.

Beyond subscriber information, it is challenging to establish a method to gather feedback for this channel. One NOAA collaborator gave kudos to the Triton team at a conference and told Triton leadership that it inspired their group to start a newsletter. While feedback like this is helpful, there was no established method to gather feedback on the newsletter. In August 2022, the TCOE team launched “Ask Triton,” an open-comment survey shared in each newsletter to anonymously ask questions to researchers, offer comments about Triton’s work, or provide suggestions. This survey aims to elevate the newsletter from a one-way communication channel to a two-way communication method that will help audiences feel more engaged with Triton content. The hope is that this will be a tool to gain insights into the information newsletter subscriber’s desire and support the future refinement of newsletter and other TCOE content.

2.4 Informal Written Publications

2.4.1 Triton Stories

In FY22, the [Triton Stories blog](#) supported the TCOE goals of building trust by publishing transparent and detailed written content about Triton’s research, team members, and topics related to Triton’s mission and success. The stories increase awareness of Triton’s role in ME research and connect the reader to why the initiative’s research matters. Additionally, these stories link to other website content (e.g., videos, graphics, other stories, website pages, publications, and partners) and provide an invitation and link to subscribe to the monthly newsletter. These stories offer Triton an opportunity to highlight project partners, demonstrate the broad reach the program has within the industry, and inform readers about events, publications, and careers within the project.

The ten Triton Stories published in FY22 were viewed a total of 3,086 times (see Table A4). The most successful stories published in FY22 include the October [story on Triton intern Christa](#)

[Hvidsten](#), February [story on creative communications specialists](#), and March [story on ocean engineering with Emma Cotter](#). High readership on these stories indicate that audiences enjoy behind the scenes details on effort related to Triton and are interested in stories that highlight the people behind the research, particularly women in science. Additionally, stories published prior to FY22 were read a total of 473 times, indicating the content is still relevant to TCOE audiences even a year or more after publication.

2.4.2 Additional Features

PNNL also wrote a [feature story](#), with consultation from the Triton team, to promote the Triton JMSE special issue. This feature was specifically designed to target the media and promote the research on a variety of news outlets. The release was picked up by multiple channels, including [CleanTechnica](#), [AAAS EurekAlert!](#), and [Newswise](#). This successfully drove traffic to the special issue as demonstrated by increased abstract and article views for all papers on the day the news release was published.

In FY22, the TCOE team also worked with OES-Environmental to collaborate on a magazine article in Sea Technology Magazine, leveraging their similar target audiences to increase overall reach in support of TCOE goals. This article focused on educating ocean science-interested audiences about environmental monitoring for ME, the research OES-Environmental and Triton are conducting to support the progression of the industry, and the synergies between the two projects. The article is expected to be released in October 2022 and will be disseminated via Triton's many channels, including the newsletter, website, and social media. This is only one of many possible collaborations with OES-Environmental in the future, as target audiences are related and we can mutually benefit from exposure on our subsequent communications platforms.

2.4.3 Challenges Overcome

Topics for monthly stories are contingent on the progress of various Triton projects; when story subjects shift, filling in with less compelling content does not provide the audience with a product that meets our desired standards and can result in lower performance metrics. Additionally, the turnover time for typical Triton Stories content is about a month, which includes drafting of the content, internal reviews, copyediting, sponsor reviews, staging, website quality control, and publication by PNNL's web manager. When adhering to a monthly schedule, which was the case through June 2022, a Triton Story was always in progress in some capacity with little room for delays due to staff shortages, unexpected sicknesses, vacation leave, technical issues, and other concurrent time consuming or technical deliverables. Delays in Triton Stories publication has a trickle effect, impacting when newsletters are sent and how other content is promoted, or performs due to variable "live" time each month.

Due to the above challenges, Triton's communications content metrics for stories, website, and social media experienced declines in April and May of 2022 (see Table A4 and Figure A1). The May Triton story topic replaced a planned field research topic that needed to be pushed with a discussion on project coordination, with the content receiving the lowest pageviews of any story in FY22 (90 total views compared to the average of 217 views per story for other stories published in FY22). In consultation with PNNL communications specialists and the project sponsor, we proposed that Triton Stories be based on big project highlights and milestones such as exciting fieldwork, project details, results, staff accomplishments, and/or partnerships that may be of higher interest to target audiences. Changing the frequency of Triton Stories to every other month allows the team to be more strategic about story topics and to better manage

unexpected delays or staffing complications outside of our control. With this publication frequency, highlights can be well-promoted on diverse channels, allowing more time and funding to be available to pursue other effective strategic communications and outreach efforts, such as increased webinars and social media campaigns to drive traffic to the website.

After a month of implementing this change, increased metrics were observed for all content, with continued success in subsequent months. This change highlights a need to evaluate the TCOE content schedule and planned activities on a regular basis, to continue to engage with the WPTO sponsor regarding any changes, and ultimately to make sure that planned deliverables and timelines continue to align with and support the stated goals. Additionally, it shows the TCOE team's dedication to the goal to refine communication, outreach and engagement tools and tactics used to share content and inform key audiences.

2.5 Social Media

Social media provide a relatively low-cost opportunity to reach stakeholders and further promote more high-investment efforts, such as Triton Stories or videos. Social media efforts support TCOE goals by providing educational content and updates about Triton's ME environmental monitoring research and driving PNNL's science-interested audiences to other Triton content. Throughout FY22, project-related content was posted regularly (bi-weekly to monthly) on Instagram, LinkedIn, Twitter, and Facebook through PNNL's channels.

Triton-focused posts and stories generated a total of 87,876 impressions (number of times a piece of content is viewed), 2,592 engagements, 1,048 post clicks, and 7,814 video views (see Table A5). With just under 100,000 touch points of engagement, the PNNL social media team observed interest in Triton content from the organization's following.

The top performing Triton posts of FY22 were two videos highlighting TFiT changes in habitat field research in LA Jolla, California, which provided a behind the scenes look at field testing and the all-women team of scientists who conducted this research (Figure 3). The video posts received comments like "Thank you Triton team and partners! We are so grateful for your support" from CalWave Power Technologies Instagram Account and "Awesome video— happy to be able to support the Pacific Northwest National Laboratory in this critical effort!" on LinkedIn from CalWave's chief operations officer.

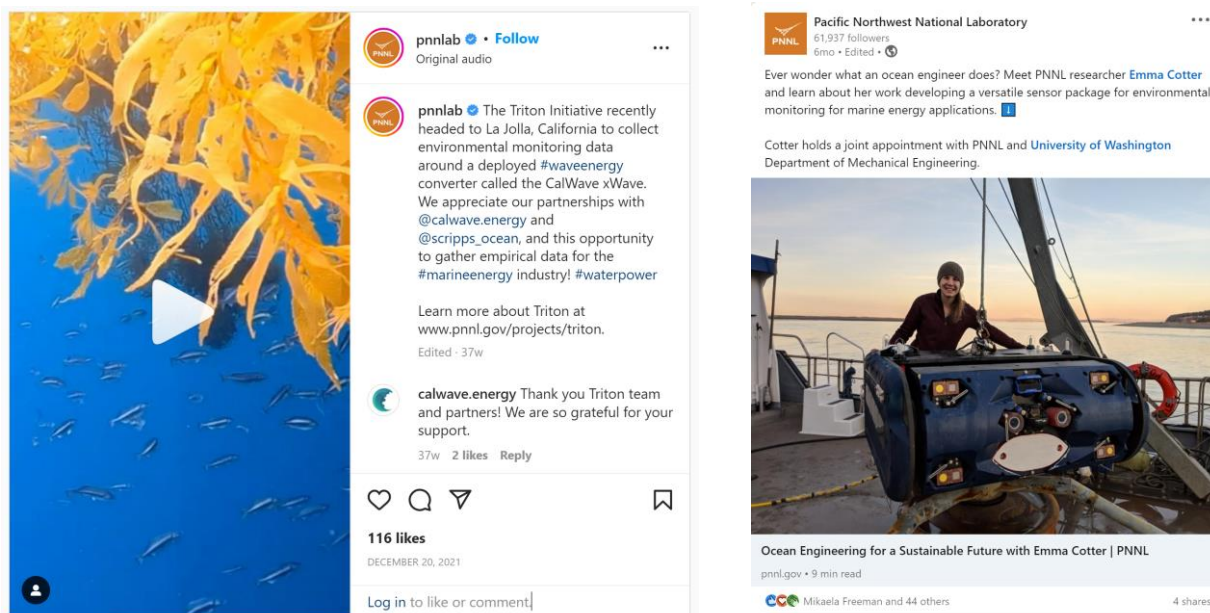


Figure 3. Screenshots of high-performing Triton social media content including an Instagram reel highlighting TFiT changes in habitat fieldwork (left) and a post promoting a Triton Story on ocean engineer, Emma Cotter (right)

We found sharing posts or video content on multiple social media platforms allowed the benefits of each platform to be leveraged and the following to be reached. One of the highlight [videos about TFiT changes in habitat field research](#) shared directly on all social media platforms resulted in 2,708 total direct video views on social media compared to 150 views on YouTube achieved through promotion via the newsletter and website alone. This video was also shared by a Jennifer Garson, director of WPTO, which increased to project exposure to key audiences within the ME stakeholder group. While social media metrics can be unpredictable and fluctuate frequently, it increases opportunities for exposure, name/brand recognition, and reach to new audience members—these are not always easy factors to quantify but can significantly contribute to the overall impact and visibility of Triton.

Our best performing non-video post promoted a Triton Story featuring Triton ocean engineer Emma Cotter (Figure 3). In this post we garnered over 7,900 impressions over all platforms. This Triton Story was one of the most read publications of the year, with the top sources of traffic to the story in the month of publication coming from LinkedIn and Facebook. There were 126 story pageviews within 24 hours of corresponding promotional social media posts being published, demonstrating the value of social media as a vehicle to drive traffic to Triton content. These trends were also evident for other Triton Stories.

2.5.1.1 Strengths Categorized Based On Platform

In FY22, LinkedIn was the best performing platform for Triton's content in terms of impressions, followed by Facebook, Instagram, and Twitter, respectively. Each social media platform has strengths that can be used advantageously. LinkedIn is most successful for building professional networks. Since a large percentage of Triton's audience members are researchers in relevant fields and the science-interested public, it is not surprising Triton's content has consistently performed well on this platform. Additionally, through LinkedIn we can connect to

groups such as “Blue Economy” and “Ocean Power” which help distribute our content to audiences specifically interested in Triton’s research topics. Making up 36% of all impressions from Triton content in FY22, LinkedIn is the primary social media platform we plan on leveraging in FY23 for audience acquisition and engagement. Such efforts may include further engagement with topic-specific groups, engaging specific audiences via direct outreach through this channel, and utilizing LinkedIn events for promotion of future webinars and workshops.

Twitter has served as a preferred social network platform to teach and engage people about the importance of science and disseminating scientific publications. Aligning with this, the top performing posts on Twitter shared a story about the JMSE special issue and the impact of TFiT, an intern’s story about her underwater acoustic research with Triton, and a post sharing a fact about wave energy that linked to a Triton Story about ME devices. Facebook tends to be best for sharing content with links, photos, and video. Of all platforms, Facebook had the most engagements (based on the number of likes, comments, and shares a post receives) and second highest number of impressions. The top performing posts on Facebook were the same as those on Twitter.

The largest number of video views came from an Instagram reel, with 4,630 views and just over 4,600 impressions. Instagram reels were introduced in August 2020 and according to HubSpot, this feature now accounts for up to 20% of user activity on Instagram. Reels create an excellent opportunity for informative and shareable content to reach users in fun and engaging ways. In an ever-changing landscape of digital outreach capabilities, collaboration with PNNL’s social media specialists helps the TCOE team find ways to capitalize on opportunities and take advantage of current trends, like reels, that may increase Triton’s exposure.

2.6 Website

The [Triton project website](#), hosted on PNNL's main platform since Spring 2021, serves as the central hub for resources and content related to the project. The website includes highlights of all the projects within the Triton program, with transparent and accessible project information and ways to connect to all TCOE content. The website is an essential tool for communication and outreach to connect stakeholders and other audiences with TCOE content as well as inform research partners who would benefit from Triton’s expertise, facilities, and informational resources.

The Triton website received a total of 6,791 website views, 45% of which were from Triton Stories views and 26% from the Triton Home page (see Table A6). The most accessed pages on the project website were Triton Home, the Triton Stories landing page, Meet the Team, Underwater Noise, TFiT, and Triton News. These results suggest that users are primarily visiting the website for general project information, to connect with the team, and to access specific topical and project information, like Triton’s underwater noise research. The website was accessed by 2,674 website users in FY22, including 1,270 new users. User data do not include Triton Stories views due to website analytics limitations. The top 10 countries the website was accessed from include United States, United Kingdom, Sweden, China, France, Germany, Netherlands, Chile, India, Canada, and Mexico, which are all countries pursuing ME actively.

Source data show that 48% of Triton website users are accessing pages through search engines, 25% from direct links, likely from Triton content, 10% from social media, and 6% from the Triton newsletter (Figure 4). These data underscore the importance of search engine

optimization (SEO) analysis to increase search ranking, since the majority of pageviews are accessed through organic searches via Google or other search engines.

Pageviews by Source

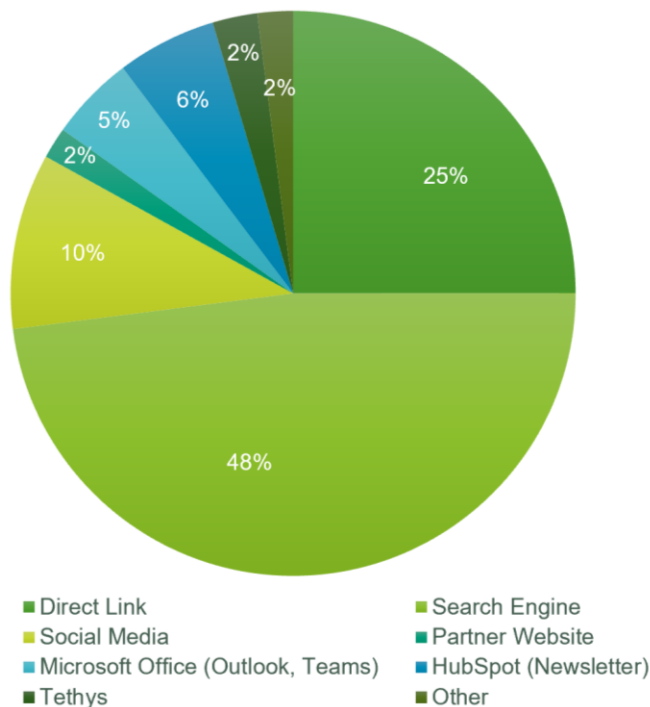


Figure 4. Triton project website pageviews by source. Triton Stories data not included.

Due to a change in PNNL’s SEO capabilities, a new SEO analysis was not conducted in FY22. However, keywords identified in FY21 SEO efforts were utilized during the FY22 website updates, which allowed us to benefit from previous efforts. Based on 13 tracked terms, the Triton website increased rank in five of the 13 categories between March 1, 2022, and September 1, 2022, including the number two result for “collision risk” and the number five result for “environmental monitoring technology.” Triton’s website remains the first result for “marine energy predictive modeling.” Additionally, the Triton Talks webinar on underwater noise research is the first result when “marine energy underwater noise” is searched on Google, and the Triton JMSE special issue is the second result when searching “marine energy environmental monitoring.” The SEO capabilities are once again available and will be incorporated in FY23 to continue to improve search rankings and exposure in search engine results.

Even though website views were slightly under the target for the year (Table A1. Summary of metrics of communications and outreach success by channel (October 2021 to September 2022)) this was the first full year of Triton’s website being posted on the PNNL main platform, so FY22’s website analytics can serve as a baseline for future growth assessments. The FY22 website updates included the development of new pages to accurately represent Triton’s research, including projects launched in FY22. The updates will be published at the end of

FY22, which will allow a new baseline to be set and metrics to be tracked fully in FY23. Incorporating changes later in the FY allowed project updates to reflect the details and goals of each project once established. Inclusion of pages such as “Anthropogenic Light in the Marine Environment” and “Acoustic Particle Motion” provide opportunities to attract audiences with interests in these topics to explore the Triton website and increase pageviews moving forward.

2.7 Partner Collaboration

Throughout the implementation of the FY22 TCOE Plan, the team strategically connected with partners to collaborate on the creation of communication-based content and provide exposure to one another’s audiences. These efforts help serve the TCOE goals of increasing exposure and awareness of Triton’s research and process, informing audiences about ME topics, and building transparency and trust by showcasing collaborations.

In partnership with BioSonics, Inc., a long-standing partner of Triton, several pieces of valuable content were developed. This content includes a flyer and Triton informational package which was presented at the 2022 Water Power Week and a technical, informative [video to highlight the Collision Risk Data Collection project](#), which has 228 views on YouTube. Triton also helped connect the BioSonics team with WPTO communication efforts to help develop and review scripts for videos highlighting ME research and featuring successes from the Triton/BioSonics technology development partnership. Fostering this relationship not only has resulted in continued collaborations on valuable research efforts but has resulted in discussions about other mutually beneficial communications opportunities, including a potential feature in a National Public Radio story, which BioSonics reached out to Triton about for engagement. In one correspondence with the TCOE team, a partner at BioSonics shared, “Thank you very much for the great support you give BioSonics. We value our relationship with the PNNL Triton team very much. It is a big deal for us!”

In partnership with Solid State Lighting Services, Inc. the TCOE team wrote a collaborative story on anthropogenic light in the marine environment, presented the topic in the most successful of all Triton Talks webinars, and published a paper in the JMSE special issue. Based on performance of social media and newsletter features on this collaboration, and based on webinar survey results, this topic is of great interest to audiences.

Communication with partners at CalWave Power Technologies, a wave energy device developer, has also led to increased exposure and opportunities for collaboration. CalWave has offered reviews of Triton Stories highlighting collaborative research, and has shared these stories in their newsletter, on their website, and on social media. CalWave’s support has helped increase exposure to engineers, ME device developers, and interested researchers in relevant fields through these efforts. CalWave’s communications lead shared, “the success of the pilot and industry as a whole was/is made possible with PNNL's help and we can't thank you all enough for your partnership.” The TCOE team is also in discussion with CalWave partners on future collaborative written or video content to continue support of each other’s efforts.

The TCOE team will continue to pursue opportunities to collaborate on written pieces, newsletter highlights, social media campaigns, and other creative communication efforts. Efforts will also be made to engage with other PNNL teams, like OES-Environmental, to find opportunities to collaborate and create joint content that will be mutually beneficial for topical research and engagement opportunities. The cross-promotion of these efforts is invaluable in supporting the goal of increasing exposure to each other’s relevant audiences and informing target audiences, not only in terms of Triton’s role in the advancement of the ME research, but

also to promote collaborative efforts that bring together expertise that make our research possible.

2.7.1 Acoustic Particle Motion Workshop

In May 2022, Triton principal investigator, Joe Haxel, and his team hosted a PNNL workshop on acoustic particle motion for ME, a topic of emerging importance among ME regulators and decision-makers. The workshop convened numerous SMEs from multiple countries to discuss the best way to measure particle motion to characterize underwater sound around ME installations. The goals of the workshop were to: (1) highlight the importance of acoustic particle motion measurements for ME and how they can inform acoustic regulatory concerns; (2) put forward best practices for particle motion data collection and standard analysis, metrics and reporting specific for regulators; and (3) identify particle motion data gaps and make recommendations for next steps in research. Acoustic particle motion SME, Arthur Popper of Environmental BioAcoustics LLC was invited to give the keynote address at the workshop, which led to a partnership and potential publication on this topic.

This workshop enabled Triton to connect with both existing and new partners to address an area of research of increasing importance to the ME industry. The event involved coordination with multiple private organizations, university partners, and federal agencies, including BOEM, National Marine Fisheries Service, and DOE. It also helps establish Triton in a leadership role within this topic of study and demonstrates that Triton is a collaborative research team dedicated to outreach and engagement that can help move the industry forward through proactively addressing regulatory concerns.

Topic-specific workshops like this help directly connect with audiences within the research partner and ME stakeholder target groups and provide opportunities to learn from one another and build trust and transparency within these groups. In FY23, Triton hopes to seek out and create opportunities for engagement via workshops to advance Triton's involvement, expertise, and leadership within specific topic areas.

3.0 Lessons Learned

3.1 Evaluate Strategy Regularly

One of the greatest lessons learned in FY22, aligned with one of our primary goals, is to evaluate our efforts regularly to make sure time and focus are being used most effectively and strategically. Key learnings from the Triton Stories content schedule change in May 2022, as explained in Section 2.4, demonstrates a need to regularly assess TCOE content and the cadence of content development and publication. This example emphasizes the need to build content around the most compelling and valuable topics and stories, rather than adhering to a strict content schedule. Ensuring high-value efforts, such as Triton Stories, are tightly linked to goals and help keep content development efforts strategic, effective, intentional, and impactful.

Communications, particularly in the digital space, is ever-evolving in terms of audience compositions, platform algorithms, technical capabilities, as well as institutional best practices and capabilities. This accentuates the importance of strategically evaluating and adapting communication strategies and approaches to keep up with the changing landscape and maximize reach, relevance, and impact. To address this need, the TCOE team plans to schedule quarterly audience analyses and evaluations of TCOE efforts and content schedules during FY23 and adjust as needed based on what most effectively reaches and connects with target audiences at the time.

3.2 Diverse Content Is Needed To Reach Diverse Audiences

Given the breadth of the target audiences identified for Triton's research results, products, and other TCOE content, the use of diverse tactics is necessary to reach each target. One of the challenges with Triton's communication efforts is that our diverse audiences require different levels of background, contextual information, and/or technical detail. Each audience must be considered when developing TCOE content in service of the task goals. The output for achieving goals may be different for each target, for example, the information and content needed to educate and raise awareness of ME and the role of Triton's environmental monitoring research may be different for a research partner versus the general public. The key is to continue to improve and promote broader platforms such as the website or newsletter that appeal to all audiences and guides them to more audience-specific content. In FY23, TCOE will continue to strategize ways to effectively engage a diverse community of ongoing and prospective people that would either benefit from Triton's outputs or be able to help advance our objectives and goals for future research and impact. Engaging with outreach and communication professionals, within PNNL or outside of the laboratory, may be one way to elevate our ability to maximize the impact and reach of our content.

3.3 Success Of Promotional Strategies Impacts Outcomes

While the Triton Talks webinar was overall considered a success, as outlined in Section 2.2, there were many lessons learned throughout the planning and implementation of the series. As shown in Table A2, the webinar series registration numbers and attendance rates declined in winter of 2022. Despite promotion on all normal TCOE channels, we did not receive the desired results, which determined the need to increase exposure outside Triton's established following and subscriber base. The TCOE team then tested different methods of targeted direct outreach, including e-mail, promotion via partners, social media groups, and listservs. Through such efforts, we were able to reach different members of our target audience and expand the Triton

reach considerably. This process helped identify the need for development of direct outreach plans to continue to expand Triton's reach and tap into new digital communities that key audiences may reside.

Additionally, we found success in combining webinar topics of interest into two-topic, hour-long webinars, which gathered larger audiences and cross-promoted research products within Triton's project. This type of simple, but strategic change, yielded immediate results with a four-fold increase in attendees in July over June. Navigating this challenge put an emphasis on quality over quantity, as more time was available for promotion of one two-topic webinars than two shorter events—a valuable lesson learned that will be carried into FY23 through quarterly strategy evaluations.

3.4 Feedback is Essential

One of the most challenging steps in any outreach or engagement effort is measuring success. This is because there is no single definition, metric, or method that encapsulates overall communication effectiveness. Evaluation can be quantitative or qualitative in terms of measuring the steps that advance the overall goals. The key piece of assessing the audience involves gathering direct assessments that indicate whether our efforts are supporting our goals. While FY22's efforts created several channels for gathering feedback, incorporating ways to quantifiably measure effectiveness, specifically related to target goals, will be valuable for the future growth of the TCOE efforts. Determining opportunities for feedback, while balancing survey fatigue, will likely rely on expansion of Triton's network and audiences in to increase the number of available respondents to provides insights. The TCOE team will continue to find appropriate venues and avenues to conduct surveys and gather feedback throughout FY23.

4.0 Next Steps

An effective communications strategy includes feedback loops to tailor communication efforts. This inherently makes its implementation an adaptive and iterative process where metrics and feedback inform future efforts. While strategic and thoughtful planning is critical, it is expected that tactics will be adjusted as the communication efforts mature and possibly evolve in the coming years. There will likely be unanticipated challenges, new strategies, or audiences to consider, and we aspire to build on existing content like the Triton Stories blog and the Triton Talks webinar series. While we may not continue the webinar series in the same capacity, we aim to connect to the audience base built through that effort, by conducting live events or the development of topical educational videos. We will rely on the survey results and audience suggestions to support and guide our future decisions and content. We will strategically plan events, workshops, webinars, and publications to share and disseminate new Triton research, findings, and future efforts. For ongoing and new communication avenues, we will continue to solicit feedback from specific audience groups to inform Triton's research and/or communications approaches.

The TCOE team will keep establishing new platforms to gather feedback and foster relationships that enable feedback through direct interaction, which will help refine content and make sure efforts and tactics are serving TCOE goals. Furthermore, working on new content or channels that were not initially planned or considered might bring more success in terms of better reaching key audiences and/or wider exposure and impact. This may include hosting workshops or panels to bring together valuable audiences, communities, and stakeholders to maintain relationships, nurture trust, and better understand industry needs as topics evolve. Such efforts may also be used to discuss communications and outreach efforts within the ME industry, both to learn from others and to help maintain Triton as a thought leader in the ME science communications space. Through efforts like this, we aim to promote opportunities for collaboration and two-way communication, learning from others in the industry in both technical and strategic communications capacities that benefit broader goals for ME.

Next steps also include increased direct outreach to new partners to identify opportunities for collaboration and to determine mutually beneficial prospects to bolster impact and increase exposure to each other's audiences. This should extend to other WPTO projects and include cross-collaboration with relevant industries such as offshore wind. With an established TCOE framework and baselines for metrics, our goal is to further refine tactics and take advantage of an iterative process to maximize the impact of TCOE efforts while supporting Triton's mission.

5.0 References

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Appendix

Table A1. Summary of metrics of communications and outreach success by channel (October 2021 to September 2022)

| Channel | FY21 TCOE Plan Target Metrics | End of FY22 Result (Oct 1, 2022 – Sept 30, 2022) |
|---------------------|--|---|
| Website | <ul style="list-style-type: none"> 7,500 total website views in fiscal year 2022 (FY22) 2,000 website users in FY22, including 750 new users Increase search ranking as a result of search engine optimization (SEO) analyses | <ul style="list-style-type: none"> 6,791 total website views (3,705 from Triton project website, 3,086 from story pageviews) 2,674* website users in FY22 (*including 1,269 new users) Increased search ranking in five of 13 categories tracked, when including content such as publications, Triton increased rank in 8 of 13 categories |
| Triton Stories Blog | <ul style="list-style-type: none"> 12 Triton Stories to be published in FY22 60 pageviews per story | <ul style="list-style-type: none"> Published 10 Triton Stories in FY22 90-348 pageviews per story (average 217 pageviews per story) PNNL published one feature story Co-authored one magazine article |
| E-mail | The ID tritonmre@pnnl.gov to be used for all correspondences with audiences | The ID tritonmre@pnnl.gov was exclusively used for all correspondences with audiences |
| Social Media | <ul style="list-style-type: none"> 2-3 posts per month on @PNNLab Instagram 1 post per month each on PNNL's LinkedIn, Facebook, and Twitter platforms | <ul style="list-style-type: none"> 2-3 months posts per month on @PNNLab Instagram 1-3 post per month each on PNNL's LinkedIn, Facebook, and Twitter platforms |
| Newsletter | <ul style="list-style-type: none"> 12 newsletter issues to be sent in FY22 75 new subscribers to newsletter 15 clicks per newsletter 40% open rate per newsletter | <ul style="list-style-type: none"> 12 newsletter issues published in FY22 80 new subscribers to newsletter 16-44 clicks per newsletter (average 25 clicks/newsletter) 51.7%-61.0% open rate per newsletter (average 56.0%) |
| Podcasts | <ul style="list-style-type: none"> Outreach to 10 new podcasts Three Triton team member as guests on two different podcasts | <ul style="list-style-type: none"> Identified 10 new podcasts to conduct outreach to, awaiting updated Pacific Northwest National Laboratory (PNNL) podcast guidance to send e-mails Three Triton team members interviewed as guests on two different podcasts, including the Water Women Big Deep: An Ocean |

| Channel | FY21 TCOE Plan Target Metrics | End of FY22 Result (Oct 1, 2022 – Sept 30, 2022) |
|-------------------------------|--|--|
| | | Podcast; the two Big Deep episodes are to be released in October 2022 |
| Branding Materials | <ul style="list-style-type: none"> Produce Triton/PNNL co-branded templates for presentations, posters, reports, and flyers Triton logo refresh | <ul style="list-style-type: none"> Produced Triton/PNNL co-branded templates for presentations, posters, reports, and flyers Triton logo refreshed to align with Department of Energy (DOE) standards |
| Publications | Publish 9 papers | Published 10 papers in a <i>Journal of Marine Science and Engineering</i> (JMSE) special issue |
| Webinars | <ul style="list-style-type: none"> Launch webinar series with seven webinars in FY22 Create survey to gather feedback after each webinar | <ul style="list-style-type: none"> Launched webinar series with seven webinars in FY22, with 165 total live attendees and 689 total post-webinar recording views Created a survey to gather feedback after each webinar |
| Conferences and Presentations | <ul style="list-style-type: none"> Attend seven conferences in FY22 Present at seven conferences in FY22 | <ul style="list-style-type: none"> Attended four conferences in FY22 Presented seven talks at four conferences in FY22 Discussed Triton at six tours at PNNL-Sequim for external and DOE partners Co-chaired one session at Ocean Sciences Meeting 2022 Led a workshop on Acoustic Particle Motion |
| Videos | <ul style="list-style-type: none"> All webinars to be posted as videos on YouTube and hosted on Triton website Two videos to be developed highlighting Triton's stressor/receptor interaction research | <ul style="list-style-type: none"> All webinars were posted as videos on YouTube and hosted on Triton website Two videos and one reel developed highlighting Triton's Triton Field Trials (TFiT) and collision risk data collection research. The stressor/receptor interaction research was not highlighted in this FY due to unavailability of project information |

*Due to limitations in metrics reporting, user data do not include data from Triton Stories because they exist on separate platforms within the PNNL website.

Table A2. Summary of metrics for Triton webinar series

| Webinar Month | Feb | Mar | Apr | May | Jun | Jul | Sept |
|-------------------|------------|---------------------|-------|-------------------------|----------------|--------------------------------------|-----------------------------------|
| Webinar Topic | TFIT/Intro | Predictive Modeling | Comms | Electro-magnetic Fields | Collision Risk | Anthropogenic Light/Underwater Noise | Changes in Habitat/Sustainability |
| Number registered | 54 | 47 | 38 | 31 | 28 | 139 | 92 |
| Number Attended | 31 | 18 | 11 | 17 | 21 | 86 | 52 |
| Attendance Rate | 57% | 38% | 29% | 55% | 75% | 62% | 57% |
| Recording Views | 184 | 91 | 89 | 67 | 87 | 103 | 68 |

Table A3. Summary of Triton newsletter metrics for FY22

| Month | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept |
|--------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| Subscribers | 118 | 121 | 119 | 119 | 123 | 131 | 136 | 141 | 142 | 145 | 158 | 174 |
| Open Rate | 59% | 48% | 56% | 58% | 60% | 60% | 61% | 54% | 59% | 52% | 53% | 53% |
| Total Clicks | 39 | 16 | 22 | 31 | 24 | 17 | 20 | 17 | 44 | 17 | 16 | 34 |
| Click Through Rate | 28% | 17% | 15% | 20% | 18% | 13% | 16% | 16% | 21% | 16% | 8.4% | 18% |
| Read Rate | 51% | 51% | 55% | 49% | 51% | 52% | 46% | 50% | 60% | 55% | 60% | 65% |
| Skim Rate | 47% | 47% | 45% | 49% | 47% | 45% | 53% | 50% | 39% | 45% | 38% | 35% |
| Glance Rate | 2% | 2% | 0% | 2% | 2% | 3% | 2% | 0% | 2% | 0% | 2% | 0% |

Table A4. Summary of Pageviews for Triton Stories and PNNL Highlights Published in FY22

| Month | Topic | Title | Total Page Views |
|---------------|-------------------------|--|------------------|
| October 2021 | Triton internship story | The Perspectives of a Triton Intern with Christa Hvidsten | 325 |
| November 2021 | Introducing researching | Introducing Triton 3.0: Researching Stressor/Receptor Interactions | 157 |

| Month | Topic | Title | Total Page Views |
|----------------|--|--|------------------|
| | stressor/receptor projects | | |
| December 2021 | Anthropogenic light | Does Light Affect Underwater Wildlife? | 248 |
| January 2022 | Year in review and highlight on partnerships | Partners Make Triton's Research Possible: A Year of Collaborative Research | 200 |
| February 2022 | Creative science communications | Bringing Science to Life with Creative Science Communications | 348 |
| March 2022 | Ocean engineering with Emma Cotter | Ocean Engineering for a Sustainable Future with Emma Cotter | 335 |
| April 2022 | ME devices and site-specific monitoring | One Size Does Not Fit All: Environmental Monitoring for ME | 201 |
| May 2022 | Project coordination with Nicole Loosveldt | Organization is Key! The Role of Project Coordination in Research with Nicole Loosveldt | 90 |
| June 2022 | PNNL feature story on JMSE special issue | PNNL Makes Waves in New Issue of Journal of Marine Science and Engineering | 442 |
| July 2022 | TFiT and the impact of JMSE special issue | Triton Field Trials Special Issue Makes a Splash for ME | 156 |
| September 2022 | ME sustainability considerations | Considering the Whole Environment: Discussing Sustainability for ME with Tyler Harris and Alicia Amerson | 111 |

Table A5. Summary of Triton social media metrics in FY22 by platform

| Platform | Number of Posts | Total Impressions | Average Impressions/ Post | Total Triton Link Clicks | Total Engagements |
|-----------|-----------------|-------------------|---------------------------|--------------------------|-------------------|
| Facebook | 16 | 23,012 | 1,438 | 554 | 1,083 |
| Instagram | 29 | 16,833 | 580 | Not Determined | 164 |
| LinkedIn | 21 | 31,611 | 1,505 | 384 | 742 |
| Twitter | 16 | 16,420 | 1,026 | 110 | 603 |
| Totals | 82 | 87,876 | Not Applicable | 1,048 | 2,592 |

Table A6. Website metrics by page pre- and post- website migration

| Webpage/Category | FY22 Total Pageviews |
|---|----------------------|
| Total Pageviews (Not Including Stories) | 3,705 |
| Triton Stories (All) | 3,086 |

| | |
|---|--------------------|
| Total Users | 2,674 ^a |
| Total New Users | 1,270 ^a |
| Triton Home (pnnl.gov/Projects/Triton) | 1,766 |
| Triton Stories Landing Page | 409 |
| Meet The Team | 180 |
| Underwater Noise | 174 |
| Triton Field Trials | 162 |
| Triton News | 147 |
| Resources | 129 |
| Biosonics Perimeter Detector | 92 |
| Collision Risk | 74 |
| Integral Noise Spotter | 72 |
| Work With Us | 59 |
| University Of Washington DAISY | 55 |
| Electromagnetic Fields | 51 |
| Environmental Monitoring Technology Development | 42 |
| Changes In Habitat | 41 |
| Woods Hole Oceanography Institute Electromagnetic Field Detection | 39 |
| Technology Development | 37 |
| Technology Research | 35 |
| Funding Opportunity Award Technical Development | 31 |
| Integral Benthic Habitat Mapping | 29 |
| University Of Washington 3G-AMP | 29 |
| Florida Atlantic University UMSLI | 27 |
| Me Predictive Modeling | 25 |

^a Does not include users of Triton Stories (published as Highlights independent from Triton project site); the data are only for Triton's project website.

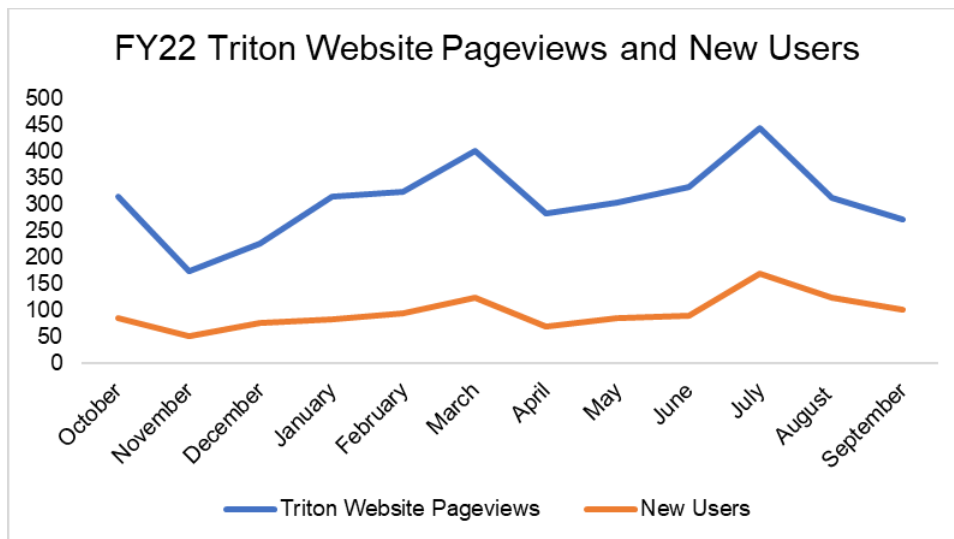


Figure A1. Triton website pageviews and new users by month, not including Triton Stories

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