NOAA West Watch Evaluation

A Report of Findings to NOAA's Western Regional Collaboration Team

Executive Summary

"We've talked about how we can engage and get the information that we're distilling to communities. It's great and fine for NOAA to be engaging across itself and that's important. But, ultimately, we're doing all of this because we want to help communities. … We've recognized that the information that is provided in the webinar is quite technical, and so how do we, by identifying those community liaisons, help get that information into a format that communities can use?"

In 2015, a mass of abnormally warm water aggregated in the northeast Pacific Ocean. Coupled with an El Niño event, the climate anomaly led to extreme environmental impacts on NOAA's served communities. At this time, the NOAA West Regional Collaboration Team started offering monthly webinars to NOAA experts and key partners as a way to track these anomalous environmental conditions and improve information transfer within the agency to aid decision-making.

Once these environmental events ended in 2016, NOAA West Watch webinars transitioned to a bi-monthly format, and now function as a communication tool for climate and marine conditions in the NOAA West region. This research builds on a 2016 attendee survey that has guided NOAA West Watch management for the past three years. However, the webinars have since stagnated, seeing limited audience growth, a lack of external participation, and limited two-way discussion.

In mid-2017, a subset of NOAA West Team members, including the interim NOAA West Regional coordinator and Oregon Sea Grant director, developed a proposal to conduct a second evaluation of NOAA West Watch webinars. This proposal sought to confirm the assumed usefulness of this communication tool, while exploring ways to broaden the audience to external resource managers. The proposal team thought there could be "community-based experts" (CBEs), defined as state, local, or tribal resource managers; local government planners; industry personnel; or other science practitioners who have close ties to their communities and who could be part of NOAA West Watch webinars. These CBEs could translate technical content presented in the webinar for their communities, while also soliciting community observations about these environmental conditions to report back to NOAA West Watch in a two-way communication system.

The purpose of this study was to understand how NOAA West Watch's content is being used, by whom, and how the process of delivering the tool might be improved. The research followed a mixed-methods approach to evaluating NOAA West Watch: (1) webinar "coordinators" (developers, presenters, and decision-makers) were interviewed; (2) current NOAA West Watch attendees were surveyed; and, (3) community-based experts in Oregon were solicited by email to watch a webinar and provide their feedback through a follow-up interview.

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This report summarizes the findings from this research study, presenting a series of Action Items that emerged through the research and substantiated by relevant literature to improve both the design and delivery of NOAA West Watch. These Action Items are:

1. Update the guiding goals and outcomes to reflect a desired use as a two-way communication tool.
2. Define and share a clear geographic scope and scale.
3. Create a set of presentation guidelines for all presentations.
4. Update webinar logistics so information about the webinar is easy to find and technological challenges are minimal.
5. Design and increase discussion/engagement of NOAA West Watch by fostering relationships with both the current attendees and potential new audiences, including expanding the advertisement system.
6. Provide a consistent source of funding and an operational home.

Introduction

In late 2015, under the guidance of the NOAA West Regional Coordinator and Climate Services Director, NOAA West created the Western Regional Environmental Conditions and Impacts Coordination (WRECIC) webinars. These monthly webinars sought to share information regarding rapidly evolving environmental anomalies (e.g., El Niño, the Blob) with a target audience of NOAA experts and key partners. Additionally, webinar attendees were asked to report impacts from these anomalous conditions to the webinar that related to NOAA's work and responsibilities. These webinars precipitated from a need to share information across NOAA line offices in the West region to improve response to these changing conditions. The NOAA West Team used their line office contacts and network to advertise WRECIC by word of mouth.

Once the anomalous environmental conditions ended in mid-2016, the NOAA West Team evaluated WRECIC by surveying the webinar's attendees. The survey was distributed to 88 attendees (51 NOAA, 37 partners) and received 28 responses, for an overall response rate of 32%. Results from the 2016 survey found that

1. the El Niño and climate summary were the most important information segments on the webinar, while the open discussion was the least important;
2. having such a large NOAA West geographic scope created difficulties for determining an appropriate and applicable spatial scale of information for all attendees;
3. the open discussion section format was ineffective;
4. respondents would like an every-other-month timeline for sustained webinars; and
5. the webinars should include more partners and external audiences, but suggested that potential attendees would need to have some background of climate science to understand the content.

The NOAA West Team continued the webinars in early 2017, rebranding them as NOAA West Watch and using the survey results as a guide for the restart. The webinars transitioned to a bi-monthly format, and expanded to include recurring presentations from the three Integrated Ocean Observing Systems (IOOS) operators on the West Coast: the Northwest Association of Networked Coastal Ocean Observing Systems (NANOOS), the Central and Northern California Ocean Observing System (CeNCOOS), and the Southern California Coastal Ocean Observing System (SCCOOS). A typical webinar included an update on regional climate outlooks, El Niño Southern Oscillation (ENSO) status update, a guest speaker presentation, a nearshore ocean condition update from the IOOS operators, and a discussion of environmental impacts to the region.

Although the survey results had suggested expanding the audience, minimal effort was made to reach external groups, so any audience growth occurred only by word-of-mouth advertisement. The webinar continued as a one-way communication system where the coordinators provided information to the current attendees (NOAA experts and key partners) (Figure 1).

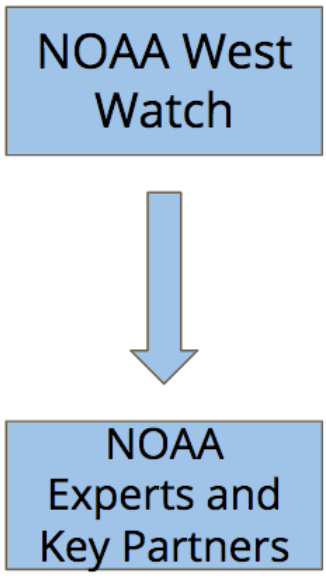

Figure 1. NOAA West Watch's current one-way communication structure, where the webinar transfers information to a current audience of NOAA experts and key partners.

However, the NOAA West Team was still interested in determining how NOAA West Watch's content could better reach NOAA's served communities. So, in mid-2017, a group of NOAA West Team members, including the interim NOAA West Regional coordinator and the Oregon Sea Grant director, decided to conduct a second evaluation of NOAA West Watch webinars. The proposed evaluation sought to confirm the assumed usefulness of the communication tool, while exploring ways to expand the webinar to external audiences and increase broad engagement.

The NOAA West Team members proposed that there could be "community-based experts" (CBEs) (e.g., state, local, or tribal resource managers; industry; non-governmental organizations; or other science practitioners) who could participate in NOAA West Watch webinars. The Team members thought these CBEs could serve as translators of the webinar's technical information to their communities or stakeholders of interest. In return, the Team members thought the CBEs could gather community observations regarding environmental anomalies and report them back to NOAA West Watch, creating a two-way communication system to connect scientific expertise with on-the-ground observation (Figure 2).

By including CBEs, who serve as both translators of scientific information and community representatives, the NOAA West Team hoped to improve its communication of scientific information to its constituents while also using community observations to improve their research. As such, this research sought to understand what an "effective" communication tool meant to the three research groups (webinar coordinators, current attendees, and community-based experts) and how to achieve effectiveness of both one-way and two-way communication systems.

To achieve the broad goals above, this research sought to answer one overarching question—***How can NOAA West Watch be an effective two-way communication tool for informing decision-makers about environmental condition anomalies?***—and two sub-research questions:

1. How is the information provided by NOAA West Watch (the forecasts and predictions) **being used** by NOAA and the current audience for **decision-making?**
2. How does the information provided and the format in which it is presented **prepare** coordinators and audiences (current attendees and CBEs) for **two-way communication**?

These three research questions guided this study to understand how this communication tool and its content are being used, by whom, how the process can be improved, and the institutional barriers that impede the evolution of this communication tool.

Methods

In order to evaluate the content and delivery of this communication tool, a mixed-methods approach was used with three groups of research participants. Using both qualitative and quantitative data creates a picture of changes that occurred with NOAA West Watch and how and why those changes took place (Rubin & Rubin, 2005). Quantitative data provided an explicit measure of outcomes, while qualitative data provided the context needed to get a deeper look into intangible aspects (social hierarchies, institutional barriers, etc.) of the issue at play (Fazey et al., 2014). Two study populations (coordinators, and community-based experts) provided qualitative data, while one study population (current attendees) provided quantitative data. In addition, observational data were gathered during NOAA West Watch webinars to contextualize interview information.

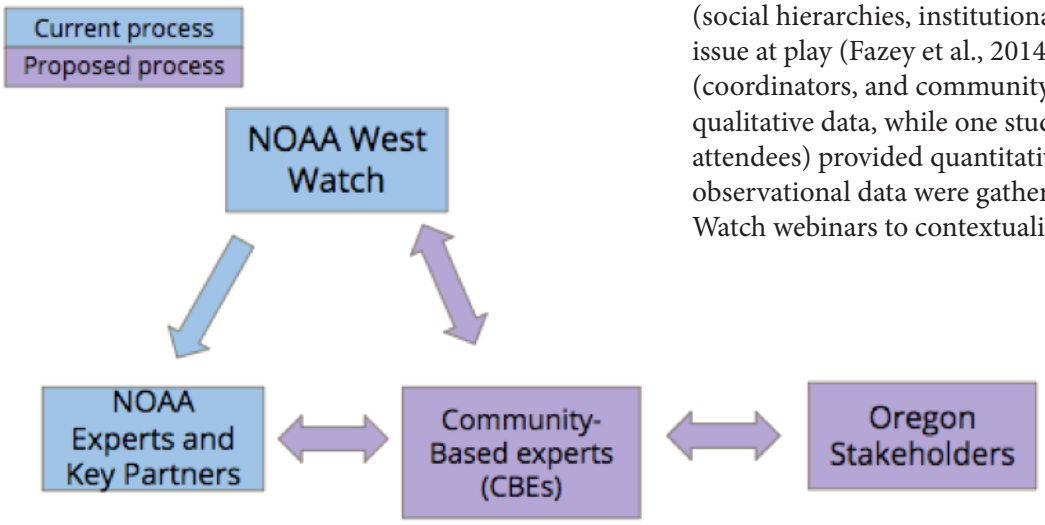

Figure 2. Current one-way communication mechanism between NOAA West Watch and NOAA experts (blue), and proposed two-way communication system including CBEs (purple).

Study populations and data collection

Coordinators

The term "coordinator" in this study includes individuals who at some point served as a developer, presenter, or decision-maker for NOAA West Watch or WRECIC. Breaking this down even further, decision-makers were defined as those who did not participate in the development and running of NOAA West Watch webinars but were participants in NOAA West Team decisions. These individuals serve as "encultured" or "key" informants, providing insight into the institutional culture surrounding NOAA and NOAA West Watch webinars (Rubin & Rubin, 2005).

Coordinators were interviewed either on the phone or in-person at a location of the interviewee's choosing. In total, 10 coordinator interviews were completed over the 14-month course of this research. All interviews were audio recorded. Of the 10 coordinators who were interviewed, 5 were involved in West Watch on a daily basis (e.g., leading the webinar, presenting, etc.) at the start of this research in 2017, while the other five had no active role.

Community-based experts

Community-based experts (CBEs) were identified as individuals who worked in Oregon environmental disciplines such as resource managers (tribal, state, local), non-governmental organizations, industry, and other science practitioners/professionals with close ties to their communities (Table 1). CBEs were selected with the help of Oregon Sea Grant (OSG). As an organization with extension capacity, OSG has developed relationships with coastal and marine stakeholders and helped identify CBEs who they thought would fit within the research goals. Additionally, participating CBEs were asked to recommend additional participants in a modified snowball sampling technique (Auerbach & Silverstein, 2003).

CBE data collection occurred over 14 months, which included seven bimonthly webinars. Prior to a webinar, CBEs would be solicited by email to watch the upcoming webinar and provide their feedback on the content and format during a follow-up, semi-structured interview (Auerbach & Silverstein, 2003). CBEs were added to the webinar's email distribution list when requested, but only participated in the research after the first webinar viewing. Of the 35 solicited CBEs, 12 watched a webinar and 8 participated in a post-webinar interview (Table 1). Four CBEs who watched a webinar did not respond to a request for a post-webinar interview.

Current attendees

The NOAA West Team maintains an email list of current webinar attendees, who are assumed to be NOAA personnel and key partners. Using this list, a questionnaire was distributed by email to current attendees. Individuals who were included in the coordinator interviews or added to the webinar as a CBE did not receive a questionnaire request. It is important to note that there are likely individuals who tune into the webinar but are not on the NOAA-provided email distribution list, and this coverage error was considered in generalizations and recommendations made with the survey data (Dillman, 2011).

To recruit research participation, those listed on the current attendee email distribution list were sent an email request to complete the questionnaire that included a link to the online tool. Of the 111 emailed attendees, 48 completed the questionnaire, for a 43% overall response rate. Figure 3 gives the job categorization for the NOAA West Watch email distribution list and survey respondents. From these figures, the survey respondent job categories are not

Table 1. Number of solicited community-based experts from each organizational category.

Organization	Number solicited	Number participated in webinar	Number interviewed
State manager/scientist (e.g., fisheries, land use, marine policy)	12	7	4
Non-governmental organization	6	3	3
Local manager/scientist	4	0	0
Tribal manager/scientist	4	1	1
Federal manager/scientist	4	1	0
Extension agent	3	0	0
Fisherman	2	0	0

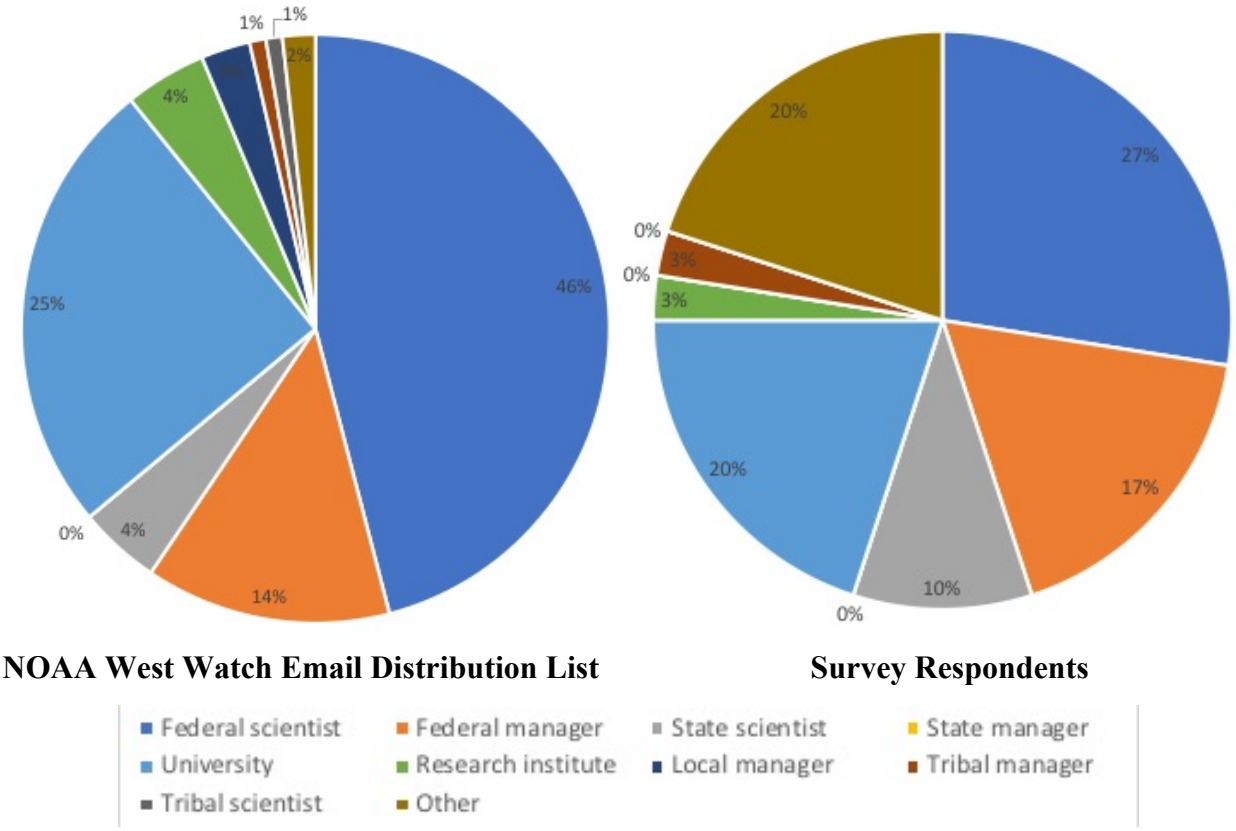

Figure 3. Distribution of job categories for the NOAA West Watch email distribution list (left) and current attendee survey respondents (right).

representative of the email distribution list; the survey respondents had a much lower percentage of "federal scientists" and a larger percentage of "other" job types. However, there is currently no mechanism to identify who participates in the webinars, so there is an assumption that the survey respondents are more representative of the actual webinar attendees than the email distribution list.

The questionnaire was created and distributed on Qualtrics online software, following the tailored design method of Dillman (2011). The tailored design method attempts to reduce overall survey error by decreasing the perceived costs and increasing perceived benefits of completing the survey. For example, the research team attempts to build trust and credibility with respondents by demonstrating the value of each survey response and having multiple personalized contacts with attendees. Additionally, questions were worded to pique respondent interest while appearing useful and easy to answer. This includes using formatting guidelines to create an easy-to-follow survey. Questions posed a mix of scale, multiple-choice, and open-ended responses to elicit perspectives regarding the effectiveness of the webinar's content and process.

Data analysis

Interview data

All interview data (coordinators and CBEs) were transcribed from audio recording into Microsoft Word. The transcriber created clean-read transcripts, where the fundamental meaning behind spoken statements was maintained while removing fillers, natural repetition, and grammatical errors to make for easier reading (Kvale, 2007). Transcripts were coded in MaxQDA 18 using the grounded theory approach, where themes were built through an iterative coding process (Auerbach & Silverstein, 2003). Throughout the iterative coding process, other researchers coded a subset of transcripts and reviewed common codes to identify missing themes to practice inter-coder reliability. This increases validity and reliability of qualitative data analysis (Auerbach & Silverstein, 2003).

Survey data

Questionnaire responses from the current attendees were compiled in Qualtrics, and all survey data were exported to a Microsoft Excel sheet for analysis in IBM Statistical Package for the Social Sciences. Open-ended

questions were transferred to a Microsoft Word document, and coded in MaxQDA 18 using the same coding process as interview data.

Summary of Findings

Results from all three research groups (coordinators, current attendees, community-based experts) led to the formation of three overarching research findings. These findings are presented below to provide context for the Action Items:

1. As a one-way communication tool, NOAA West Watch has an effective process for communicating technical environmental content to its intended audience.
2. While both the current audience and community-based experts are satisfied with the technical content presented in the webinar, there is consensus that this information can be presented more effectively.
3. NOAA West Watch is not an effective two-way communication tool in its current capacity and format. All groups appear to want more engagement but are discouraged by the lack of dedicated time and unclear method for discussion (e.g., phone in or chat box) on the webinar.

Summary of Action Items

When considering how to improve NOAA West Watch and work toward two-way communication, the webinar's coordinators should consider the following six Action Items that emerged through this research and were substantiated by relevant literature. Depending on the coordinators' decision to stay as a one-way communication tool or increase engagement in a two-way format, certain Action Items below may not be implemented.

Action Item #1 relates to the goals and objectives of NOAA West Watch. Currently, the goals are successful for NOAA West Watch in a one-way capacity. The table below suggests which Action Items to implement to improve NOAA West Watch in either a one-way or a two-way capacity:

Keep NOAA West Watch as one-way	Transition NOAA West Watch to a two-way system
Action Item #2 Action Item #3 Action Item #4 Action Item #6	Action Items #1-6

Action Item #1: Create clear and appropriate guiding goals and outcomes for NOAA West Watch.

NOAA West Watch's current guiding goals from the coordinators' perspective are to: (1) communicate information about changing environmental conditions, and (2) communicate the impacts that those changing conditions have on communities. The coordinators expect the webinars' audiences to have better contextual awareness of environmental conditions in the West.

The webinar is meeting these goals and outcomes with the current attendees and CBEs. There was consensus that these two audience groups are using information to provide context to their local environments.

However, these goals and outcomes are fairly abstract, and do not reflect the intent to transition to a two-way communication system. In accordance with science communication literature, NOAA West Watch needs to have clearer guiding goals and expectations for how the webinars are expected to deliver the identified outcomes. Recommendations for how to implement this Action Item include the following.

- Coordinators should document/state the webinar's guiding goals and intended outcomes. Audiences should have a clear understanding of these goals and intended outcomes.
- Coordinators should commit to and implement a clear project timeline, which would include evaluative benchmarks. This timeline should be shared with the webinar's audience.
- If the webinar is formatted as a two-way system with an expanded audience that includes CBEs with decision-making roles, the coordinators should clearly document how they expect the information to inform environmental decision-making. While a minority, individuals in all three research groups suggested having more of a discussion about why the data or trends matter, or potential implications to species or communities of interest, if there is an intent for NOAA West Watch to inform management.

Action Item #2: Define and communicate the content's geographic scope and scale.

From quantitative survey results, the current attendees appear to be satisfied with the content's current geographic scope. However, qualitative results across all three research groups found that it is challenging to cater to the broad geographic interests represented on NOAA West Watch. With these qualitative results, though, there was a lack of consensus whether there should be more marine- or terrestrial-based information. Additionally, a minority of current attendees and CBEs indicated that the geographic scale of information was occasionally too high level for their decision-making needs.

To help improve the overall clarity of NOAA West Watch's goals, outcomes, and message, an appropriate geographic scope and scale should be defined and documented for the audience. With a clear geographic scope, attendees can adjust their expectations about what information they will receive in the webinars. Additionally, presenters may be more cognizant about the spatial distribution of their provided information. To implement this Action Item, NOAA West Watch's decision-makers may consider

- the appropriate balance between wide regional applicability and sub-regional managerial application. A broader spatial distribution may appeal to a more diverse audience, but CBEs and attendees indicated they sometimes needed more fine-scale information for use in management and decision making.
- using guest speaker presentations as a way to remedy the spatial distribution challenge. Typical webinar information may be more broad-scale, while guest speakers can fill in sub-regional information needs indicated by the attendees.
- connecting attendees to other information sources if their information needs are not met. For example, if attendees requested drought-related information for inland locations, coordinators may point these individuals to the NIDIS Drought Early Warning System webinars.

Action Item #3: Create a standardized program structure for all information segments.

Currently, webinar presenters are given minimal preparation and have the freedom to present what they think is relevant information during NOAA West Watch. The coordinators do request that information be kept applicable for the broad disciplines represented on the calls. While a majority of the audience (current attendees and CBEs) is satisfied with the technical content presented in NOAA West Watch, there was consensus across all research groups that the presentation format for this information needs to be improved.

Program design literature emphasizes the importance of creating a structured learning plan that aligns with the goals and outcomes of the education activity (Action Item 1). Currently, it is unclear how the information presented in NOAA West Watch is expected to increase understanding of environmental condition anomalies. Once clear goals and outcomes have been defined, a more structured program should be developed that fills the information needs of the current audience.

A clear program structure would be akin to providing presentation guidelines. These guidelines may include the following points.

- Slide format guidelines to help improve delivery.
  - —Make sure all figures are introduced each webinar.
  - —Minimize the number of figures used on one slide.
  - —Enlarge each figure and make sure axes are readable on a computer screen.
  - —Consider including a "main takeaway" text box with each figure/slide.
- Standardize the amount of time for each presenter. Determine the appropriate protocol when presenters run over their allotted time.
- Clearly define the purpose of each presentation, especially for the guest speaker. For example, clearly indicate whether a guest speaker is providing an overview of an upcoming managerial tool, a seasonal retrospective of some environmental events, or emerging relevant research. If presenters are highlighting available managerial tools, clearly indicate where attendees can access these tools.
- Determine what is considered appropriate technical jargon for NOAA West Watch. Consider that technical jargon may not translate across all represented fields/backgrounds on the webinar.

Action Item #4: Update webinar logistics so information about NOAA West Watch is easy to find and technological challenges are minimal.

Critical to the success of any science communication tool is the effective management of that tool's technology. However, the current audience does not frequently visit NOAA West Watch's website, and the CBEs did not know where to find additional information. Since webinar technology is widely used for this type of broad communication, effective technology use can increase

visibility while also providing scientific information in easy-to-use formats. Considerations for how the webinar's technology and logistics can improve include

- making the NOAA West Watch online repository easier to find and navigate. The website should be more broadly advertised and used as a repository for all webinar items (e.g., future recordings, list of highlighted managerial tools, etc.).
- considering moving to an automated email system. Certain webinar technologies monitor the audience's interaction with the webinar, such as the number of subscribers, shares with other individuals, or the number of live versus recorded views. This information could inform how the coordinators choose to engage with their audience. An automated system could also provide more consistent reminders, increase the ease of opting in or out of the webinar system, offer a mechanism to facilitate easy feedback after each webinar, and enhance the coordinator's awareness of who is tuning in to NOAA West Watch.
- considering providing webinar recordings. Attendees enjoyed having the slides emailed prior to webinars so they could follow along. However, all three research groups described benefits of adding webinar recordings. Specifically, recordings can be used to connect with relevant individuals who previously may not have heard about the webinar.
- muting all attendees during each webinar. Presenters can be selectively unmuted during their respective segments. Reducing these interruptions creates a better experience for the audience while also increasing credibility with potential new attendees.

Action Item #5: Build relationships with both current attendees and potential new audiences to increase discussion and engagement.

Since it is functioning in a one-way communication capacity, NOAA West Watch has minimal engagement and discussion with its current attendees. The coordinators do not clearly explain how current attendees are expected to engage (e.g., by phone or chat box) or why their engagement matters. Additionally, most webinars run out of time to have dedicated discussion about anomalous environmental conditions. Similarly, current engagement methods with new audiences are largely ineffective; the word-of-mouth advertisement has stagnated the audience's growth by not reaching all potentially interested individuals/organizations.

However, all three research groups expressed interest in increasing the amount of discussion and engagement on the webinars. An emphasis now needs to be placed on building relationships that result in discussion and broad engagement. Recommendations for how to do this include

- clearly defining an engagement/discussion goal, in alignment with Action Item #1. Documenting an engagement goal will demonstrate to audiences why their perspective matters and how it will be used. This goal should outline
  - —what the audience should engage over. Clearly define that the webinar would benefit from receiving environmental impacts reports from its audience.
  - —what mechanism, over which input, should be delivered. For example, consider enabling a chat box function that can remedy attendees' speaking over one another.
  - —whether environmental impacts should be reported outside the webinars. A repository of these reports could be kept on NOAA West Watch's website.
- providing a feedback mechanism at the end of each webinar. Some webinar systems have built-in post-webinar surveys. This feedback should be incorporated into the NOAA West Watch operation so the webinar can continually adapt to its audience's information needs.
- expanding the advertisement system internally and externally to increase the impact of NOAA West Watch and bring fresh perspectives. Instead of using word-of-mouth, the current attendees' professional networks should be heavily leveraged, the webinars should be advertised in technical websites/groups/list serves (e.g., oneNOAA webinars, NOAA and IOOS websites), and the webinar should partner with practitioner networks (Sea Grants, RISAs) to assist with advertisement.
  - —When implemented with Action Item #4, the combination of an improved website and webinar recordings may increase advertisement capability. If possible, the website should include a sign-up option for interested individuals.

Action Item #6: Find a consistent source of funding.

NOAA West Watch webinars are clearly valuable to the coordinators, current attendees, and potential new audiences represented by the CBEs. This communication tool has the ability to connect broad audiences with timely environmental condition information in an easy-to-use, one-stop-shop format. Having a consistent

source of funding to continue these webinars long-term may ultimately help information reach decision-makers and increase broad, interdisciplinary regional connections.

Conclusions

The goal of this work was to identify how NOAA West Watch webinars could transform from a one-way to a two-way communication tool that engages natural-resource managers, practitioners, and professionals. NOAA West Watch has the potential to increase regional communication of anomalous environmental conditions, which could improve response to community impacts resulting from these events. While the evaluation team can make recommendations for improving this system, future usefulness of NOAA West Watch ultimately lies with cooperation from both NOAA West Watch coordinators and their attendees. Additionally, institutional barriers such as funding will need to be addressed if this tool is to have a long-term impact.

Benefits from relationship-building and two-way communication have been documented extensively in literature. Multiple studies demonstrated that scientific information transfer is most effective when there is a built relationship between researchers and managers (Barbour, 2007; Roux et al., 2006; Ryan & Cerveny, 2011). This transfer is effective because researchers and managers can understand each other's information needs and barriers to obtaining that information. Because these information needs can be better understood and addressed, two-way communication can lead to better alignment of research questions and management challenges where both parties are contributing to knowledge production (Eppler, 2007; Fowler & Hobbs, 2009; Matso & Becker, 2014).

Improving NOAA West Watch and increasing broad communication has clear advantages to NOAA. As a mission-based agency, NOAA is mandated to share the results of publicly-funded work. This research demonstrates that not only can this tool support broad dissemination of important science, but having feedback from information users can help these providers improve communication of their work. Additionally, attempting to quantify broad dissemination can help NOAA demonstrate the value of this tool, which is increasingly important in funding-limited environments. Finally, although NOAA West Watch has had limited success in soliciting environmental impacts from its audience, there is potential for this particular mechanism to improve as more community-based experts are included and engagement expectations are clearly communicated.

Benefits to NOAA West Watch audiences go beyond just saving time or having information aggregated in one location. In this era of information overload, it can be challenging and daunting for science users to find information they need and to synthesize it for decision-making. Communication tools like NOAA West Watch expose managers to information they previously may not have found. Additionally, these science stakeholders can communicate the information needs they have that can be addressed by the information providers coordinating the tool. Finally, natural-resource managers and other practitioners or professionals are often intimately involved with their communities. Involving these community-based experts gives NOAA's constituents a voice in the scientific process and in environmental policy on a regional, federal level. Without these representatives, community needs and perspectives may not be fully understood or considered in decision-making.

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Published by Oregon Sea Grant, 1600 SW Western Blvd., Suite 350, Corvallis, OR 97333. Phone: 541-737-2714. Web: seagrant.oregonstate.edu/

Funding for this report was provided by Oregon Sea Grant and appropriations made by the NOAA West Regional Collaboration Team. The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of these funders.

Sea Grant Oregon
ORESU-S-19-001

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

Oregon State University