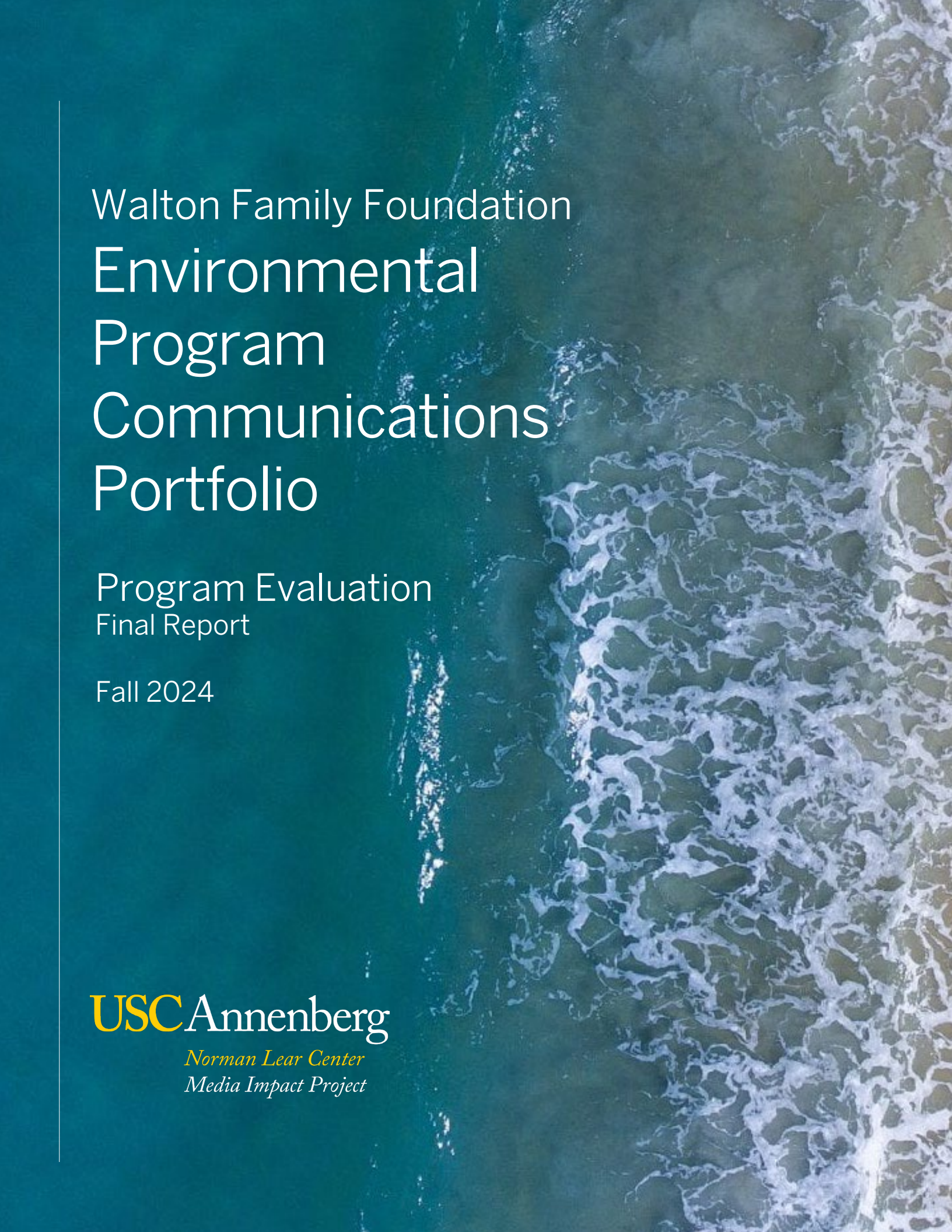

Walton Family Foundation

Environmental Program Communications Portfolio

Program Evaluation

Final Report

Fall 2024

USC Annenberg
Norman Lear Center
Media Impact Project

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EXECUTIVE SUMMARY

INTRODUCTION

According to a United Nations report, water is at the center of the climate crisis. Climate change is affecting global temperatures, increasing severe weather events (e.g., floods, droughts), and associated societal damages (e.g., land loss, reduced biodiversity). The Walton Family Foundation's (WFF) Environment Program's mission is to improve water quality and availability through climate-resilient approaches to agriculture, water resources management, and sustainable fisheries. WFF dedicates resources to communications because amplifying water and environmental media content helps accelerate efforts to protect rivers, oceans, and the communities they support.

OBJECTIVE

WFF is interested in better understanding how and when funding journalism and other communications-based activities helps to drive progress on other Environment Program goals. So, WFF partnered with the USC Norman Lear Center's Media Impact Project (MIP) to evaluate the impact of its Environment Program Communications grantee portfolio.

METHODS

Our evaluation involved two phases:

- **FORMATIVE INVESTIGATION** to determine how WFF intends Environment Program Communications (**COMMS**) to drive progress, identify target audiences, understand what metrics and evidence of impact grantees currently track and desire to know more about, and collect a broad sample of the content grantees had created. The following activities were conducted:
  - Interviews with WFF staff to develop and refine a Theory of Change
  - Survey and interviews with grantees
  - Documents and metrics review
  - Preliminary Twitter analysis

- **SUMMATIVE RESEARCH** to analyze COMMS outputs, particularly environmental journalism content; investigate how general and desired target audiences are responding to sample content; and, explore how desired audience targets view and value this type of content. Activities included:
  - Content analysis of a large sample of grantees' articles from the Mississippi River Basin (MRB), Colorado River Basin (CRB), and Oceans' portfolios

- Social media analyses for grantees' content posted to X/Twitter,[1] Reddit, and YouTube
- Interviews with grasstops (i.e., decision-makers in industry, government policymakers)

TAKEAWAYS FOR GRANTEES/JOURNALISTS

CONTENT FEATURES

Many of the research-based best practices we studied were associated with greater Twitter traction, such as:

- **Avoiding overly complex language** by using short, pithy sentences and reducing "big words" when possible
- **Connecting science to health outcomes** to increase immediacy and reveal how audience members are directly impacted by issues such as water quality and availability
- **Using visual aids** such as videos, photos, and infographics to attract attention and arouse interest
- **Incorporating diverse perspectives** by interviewing POCs, indigenous community members, and others directly affected by water quality and availability issues
- **Long-form journalism articles** which dive deeply into investigating, examining, and explaining issues with depth and complexity

GENERAL AUDIENCE RESPONSES TO CONTENT

- Social media comments indicate that grant-funded content is confirming many audience members' beliefs about:
  - causes of and solutions to water-related issues,
  - concerns about unsustainable practices in fishing and farming,
  - and the need for better regulations to protect consumer interests and the environment
- Audience members responded to grant-funded content by posting calls to action, such as:
  - advocating for sustainable, locally supported farming practices,
  - encouraging the involvement of Native Americans to utilize their wisdom in drought management and promote local conservation efforts,
  - advocating for international standards on fish labeling,
  - and highlighting the need for corporate accountability
- Furthermore, audience members reveal information about their backgrounds and/or location as a way of enhancing the credibility or authority of their opinions. This may point towards an underlying reason why local news coverage and community-centered journalism are

[1] As the platform rebranded as "X" is still commonly referred to as "Twitter," we will use the latter name throughout this report. This platform was selected for investigation and analysis at project outset due to its role as a public forum, with 25% of US adults using it to get news, discuss topics, and view posts directly from public officials (See 2021 study by the Pew Research Center). Despite the decline of Twitter's influence and credibility since Elon Musk's acquisition in 2022, the core metrics we analyzed—such as reach, impressions, and engagement—remain relevant across digital platforms. We supplemented our research with data from YouTube and Reddit. The overall insights and lessons gained from this study—such as leveraging influencers, engaging active communities, and promoting consistent content sharing—are still highly applicable and relevant to both established and emerging social media environments.

consistently perceived as more credible than national news outlets and programs.[2] People instinctively trust those closer to, and perhaps more directly impacted, by important issues.

- Audience responses often expressed frustration, annoyance, and concern toward grant-funded content, pointing to possible sticking points like dissatisfaction with government policies and environmental practices. Paired with tones of sarcasm and disapproval, these emotions suggest opportunities for funders and journalists to address audience frustrations by focusing on sustainable solutions and policy improvements.

UNDERSTANDING AND REACHING TARGET AUDIENCES

Interviewed grasstops saw water and climate reporting that focuses on crisis, conflict, doom, and gloom, as counterproductive to readers taking action. Instead, they saw an opportunity in reporting focused on alignment between states and constituencies.

- This is consistent with our formative research finding: Grantees believe **hopefulness** enhances the quality and engagement potential of content. Bombarding audiences with apocalyptic climate and water stories leads to reader fatigue, trauma, and inaction.
- Furthermore, several interviewed grantees also pointed to audiences' growing awareness of how water issues connect to other environmental problems affecting their communities, livelihoods, and health.[3]

Media trends that grasstops associated with impactful environmental media included:

- Leveraging social media, affinity networks, trade publications, and newsletters for dissemination;
- Focusing on investigative journalism to cover water-related issues;
- Using keywords in online articles for targeted reach (e.g., those most salient to congresspeople including their municipalities and last names, as many have Google alerts set up to capture these posts).

NEXT STEPS

MIP recommends continuing to research WFF and grantees' desired target audiences to learn more about their lifestyles, careers, water and environmental interests, and content awareness and usage. Activities could include:

- Focus groups with key constituencies in WFF's geographies (e.g., farmers, fishermen, ranchers; Native American tribes)
- Survey-based audience research in WFF's regions of interest
- Experimental research to test audiences' media preferences (e.g., online articles vs. podcasts, news videos); the impact of grant-funded stories; reactions to terms like "climate change" in headlines vs. text of articles

[2] In 2018, a study by the Poynter Media Trust discovered that even during the Trump presidency, party-line differences in media trust were "substantially lower for local media sources than national ones—a finding that is driven by independents and Republicans, who report higher levels of trust in news sources within their community." Guess, A.; Nyhan, B.; & Reifler, J. (August 10, 2018) "All Media Trust is Local? Findings from the 2018 Poynter Media Trust Survey." Available at: cpb-us-e1.wpmucdn.com/sites.dartmouth.edu/dist/5/2293/files/2021/03/media-trust-report-2018.pdf

[3] Bloomberg's Green editor, Aaron Rutkoff believes that "climate's impact on the essential news agenda - business, politics, finance, technology, and human lives— makes it an accessible topic for most newsrooms." See "Climate journalism: bandwagon, zeitgeist or audience growth opportunity?" Available at: www.journalism.co.uk/news/is-climate-change-the-new-black-/s2/a823040/

TAKEAWAYS FOR PROGRAM OFFICERS/FUNDERS

CONTENT FEATURES

Many of the identified best practices associated with greater Twitter traction require journalists to have resources and tools at their disposal, such as:

- **Multimedia storytelling:** adding infographics, photos, and videos to stories
- **Incorporating diverse perspectives:** interviewing POCs, indigenous community members, and others directly affected by water quality and availability issues
- **Long-form journalism:** articles which dive deeply into investigating, examining, and explaining issues with depth and complexity

GENERAL AUDIENCE RESPONSES TO CONTENT

- Grant-funded content posted to social media platforms provided audiences a forum to:
  - call out the U.S. government and/or representatives, and express their deep dissatisfaction with federal response and policies regarding the drought and water management;
  - convey their frustration with state-level policies and actions regarding water management;
  - show their support and recognition of Native American communities' struggles and contributions to sustainable water practices;
  - and share their anger, frustration, and disgust toward foreign countries or governments destructive fishing and environmental practices.
- Grant-funded content was also reposted ("amplified") by groups within WFF's desired target audience, such as: BIPOC communities, residents of the Mississippi River Basin (MRB) and Colorado River Basin (CRB) states, and agriculture, water, and environmental non-profit organizations.
- Audience responses often expressed frustration, annoyance, and concern toward grant-funded content, pointing to possible sticking points like dissatisfaction with government policies and environmental practices. Paired with tones of sarcasm and disapproval, these emotions suggest opportunities for funders and journalists to address audience frustrations by focusing on sustainable solutions and policy improvements.

UNDERSTANDING TARGET AUDIENCES' RESPONSES TO CONTENT

- Interviewed grasstops saw WFF-supported environmental media reach decision-makers primarily at the local/state levels but also at the federal level. They pointed out specific trends, associated with reaching target audiences, including making use of social media and affinity networks (e.g., TikTok, LinkedIn, newsletters), using trade publications to reach farmers and ranchers, and incorporating strategic keywords to reach Congressional staffers who often have Google News alerts set up for their municipalities and names.

- Several challenges were named in connection to the general reporting landscape and water reporting specifically:
  - Grasstops saw **local news sources** as more likely to reach regional constituencies that could vote on the most salient issues and make water-positive behavioral changes (e.g., water conservation, farming practices).
  - **National news publications** were go-to sources for the grasstops to inform their work and build coalitions around their issues.
  - **Local reporting** was seen as raising regional public awareness which in turn lead to the activation of decision-maker groups: policymakers and leaders of farmer, rancher, and fishermen's organizations.
  - **Water issues** tend to be complex and layered, therefore more difficult to cover than other environmental topics. It is important to educate "newcomers" to effectively cover these topics to prevent oversimplification, misrepresentation, doom-and-gloom or crisis-based stories.
- Media trends that grasstops associated with impactful environmental media included strengthening the ability of philanthropy to support local environmental media.
- Focusing attention on water issues was viewed as an opportunity, since covering these issues is a less "politicized" way to talk about climate. However, grasstops acknowledged this as a challenge, since water issues are complex and layered, understaffing may cause reporters to be stretched too thin, and "newcomers" to water issues tending to simplify and misrepresent knotty water issues.

NEXT STEPS

MIP recommends finding ways to support grantees in building skills and scientific knowledge, and continuing to research WFF and grantees' desired target audiences to learn more about their lifestyles, careers, water and environmental interests, and content awareness and usage. Activities could include:

- Grow capacity and support for reporters to accurately represent water issues to mitigate potential misunderstanding and simplification (e.g., by creating training programs, mentorships by seasoned reporters, and providing support to attend environment, climate, and water-focused conferences.
  - A bespoke water-focused environmental reporting curriculum could be developed in partnership with USC's Center for Climate Journalism and Communication.[4] MIP has partnered with this center to evaluate the impact of their podcast, *Electric Futures*. Our team would welcome the opportunity to collaborate by evaluating grantees' satisfaction, learning, and other impacts.

- Focus groups with key constituencies in WFF's geographies (e.g., farmers, fishermen, ranchers; Native American tribes)
- Survey-based audience research in WFF's regions of interest
- Experimental research to test audiences' media preferences (e.g., online articles vs. podcasts, news videos); reactions to terms like "climate change" in headlines vs. text of articles; the impact of grant-funded stories (as philanthropic funding for journalism is increasing how does that affect the public's trust in the coverage?)
- Strategic social media monitoring

[4] In "Funding the Future of Environmental Journalism—DRAFT," Meghan Parker indicates that a "general lack of scientific training…raises the stakes for editors and journalists who may be afraid to publish for fear of facing charges of inaccuracy or bias."

INTRODUCTION

PROJECT BACKGROUND

The Walton Family Foundation (WFF) is a family-led foundation established in 1987 to improve K-12 education, protect rivers, oceans and the communities they support, and to support a vibrant and inclusive Northwest Arkansas and create economic opportunities in the MS Delta. Historically, the foundation has worked with communities to seek ideas and work toward lasting solutions with the people closest to social and environmental problems.[5] WFF believes that protecting water during climate change is among the most important challenges facing us today and imperiling future generations.[6]

Climate change is affecting global temperatures, increasing severe weather events (e.g., floods, droughts), and associated societal damages (e.g., land loss, reduced biodiversity). Water is at the center of the climate crisis.[7] **The WFF's Environment Program's mission is to protect water resources in the face of climate change to support healthier ecosystems and communities for generations.**

ENVIRONMENT PROGRAM COMMUNICATIONS (COMMS) INVESTMENTS

Recognizing that amplifying media content could help accelerate river and ocean restoration, and protection efforts, WFF increased the role for communications in their grantmaking programs in the new five-year strategy launched in January 2021. WFF provides grants for environmental journalism and other relevant media content, in support of water resilience, agricultural sustainability, and sustainable fisheries by:

- Building capacity for environmental journalism;
- Enhancing other grantees' ability to use communications;
- Supporting and promoting programmatic outcomes; and
- Showcasing water issues through the lens of climate change.

These investments in Environment Program Communications (**COMMS**) are part of a strategic effort to promote the broad narrative that water change is climate change. The COMMS investments drive toward five-year strategic goals identified by each of WFF's **three** key geographic regions (see Figure 1):

[5] WFF Website: About Us

[6] WFF Website: Our Work

[7] United Nations: Climate Action. Water— At the center of the climate crisis.

Figure 1. WFF Key Geographic Regions

- Colorado River Basin (CRB)[8]
- Mississippi River Basin (MRB)[9]
- Global Oceans environments (OCEANS)

Overarching goals across regions included:

- Raising awareness of environmental issues and solutions, in general publics and in communities of farmers, fishermen, and ranchers
- Increasing diversity of voices talking about these issues, especially voices of communities directly impacted by environmental issues
- Elevating the quality and quantity of water coverage in environmental media
- Reaching decision-makers ("grasstops") to support more water-positive advocacy, funding, and policy

The WFF Environment Program is interested in better understanding how and when funding journalism, and other communications-based activities, helps to drive progress on program goals. To this end, they engaged the USC Norman Lear Center's Media Impact Project (MIP) to evaluate its **Environment Program Communications** (COMMS) grantee portfolio.[10]

WFF is interested in better understanding the factors that contribute to impactful communication materials and real-world change in communities. Project findings will be used internally to guide communications grantmaking, support partners on ways to apply communications to advance strategy, and externally to inform funders on best practices in environmental journalism.

[8] Upper basin states: Colorado, Utah, Wyoming; lower basin states: Arizona, California, Nevada, New Mexico; countries: United States and Mexico.

[9] Particularly Coastal Louisiana; Upper Mississippi River (Illinois, Indiana, Iowa); and other states: Arkansas, Colorado, Georgia, Kansas, Kentucky, Maryland, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Virginia, West Virginia, Wisconsin, Wyoming, plus Alberta and Saskatchewan.

[10] Up to July 2022, when the list was pulled. An important note on scope—almost all grantees in the Environment Program portfolio develop communications materials to reach a certain audience, though it may not be the main focus of their work. Those grantees were not included in this evaluation. Only grantees whose primary focus and expertise is in communications are included. The main type of analyzed content was news stories, primarily journalistic articles.

FORMATIVE EVALUATION: WHAT WORKS?

The formative evaluation phase was designed to clarify the WFF COMMS's theories of change and key audiences for each region, and to explore grantees' experiences and impressions of their effectiveness thus far. To this end, MIP examined the following research questions:

R1. Who are the audiences WFF is trying to reach?

R2. What questions do WFF grantees have with regard to evaluating success of their work?

R3. How do grantees define success?

R4. What baseline data should WFF be collecting to determine the relative effectiveness of COMMS toward environment program goals?

In the formative research phase, grantee surveys and interviews with geography team leads showed that each of the three WFF geographies has its own unique target audience identifiers and thematic emphases (see Table 1), reflecting specific concerns and priorities related to water issues, and overlapping audiences, inclusive of "grasstops" and "grassroots."

- **Grasstops** refer to individuals in positions to affect water policy and environmental legislation (e.g., elected representatives, government officials, bureaucratic agencies) and decision-makers in industries, community organizations, and local authorities
- **Grassroots** refer to residents of the focal regions and groups whose livelihoods impact and are directly impacted by water issues (e.g., farmers, fishermen, ranchers); advocacy and interest groups; collectives/cooperatives

Formative surveys and interviews revealed that WFF staff and grantees are similarly interested in communicating water-related issues of importance in their local communities to those directly impacted (the "grassroots") and those in positions to change regulatory policies and industry practices (the "grasstops").

Formative findings also revealed that grantees' knowledge about audience access and usage of their content is limited to general public reach data (e.g., page views for online articles), and spontaneous feedback from audience members (e.g., utterances, emails). Despite a general confidence that their practices for conveying stories are attracting attention and inspiring audience engagement, grantees desired more resources, support, and examples for ways to evaluate the impact of their work.

Table 1. Target Audiences by Region

	ALL GEOGRAPHIES	COLORADO RIVER BASIN (CRB)	MISSISSIPPI RIVER BASIN (MRB)	OCEANS
Grassroots	• College students/ young people • Millennials, Gen Z • Educators • BIPOC communities • Community-based organizations (CBOs) • Wider public, particularly rural	• Farmers/ranchers • Spanish-speaking Latinos • Social media users • Coloradans • Public radio listeners/PBS viewers • Local news viewers	• Mississippi River Basin population • Rural audiences • Row crop farmers • Conservation community • Journalists	• Small scale fisheries • Fishermen's collectives • Activists • Environmentalist community
Grasstops	• Policymakers • Scientists • Foundations/ philanthropists • Industry leaders • decision-makers • Movement organizers	• Government decision-makers • Water managers • Agricultural landowners • Community leaders • Corporations/ corporate leaders • Municipalities	• Government, corporate, institutional policy-makers • Community leaders • Faith leaders • Scholars • Policy experts	• Policymakers/ government officials • Academics • Fishery managers • Bureaucracies managing fisheries

SUMMATIVE EVALUATION: WHAT WORKED?

In the summative evaluation phase, we used a mixed-methods approach—including content analyses, analysis of social media reach and engagement, interviews with decision-makers in each region, and a deep-dive qualitative analysis of social media responses to three stories—to understand the impact of WFF's COMMS-supported content. Although a variety of content types[11] are created by COMMS grantees, environmental journalism articles were selected as the content for evaluation. WFF-funded content analyzed in this report is mainly the text-based environmental journalism articles (or "stories") published by WFF grantees, and distributed via social media. However, the social media analysis also includes a broadcast on ABC News. We examined the degree to which this content incorporated "best practices"[12] in environmental journalism; and whether use of best practices was associated with greater engagement. We also investigated how WFF's key constituencies in each region (e.g., industry leaders, policymakers, decision-makers), whom they call "grasstops," use this information in their work.

The summative research tasks were informed by the results from the formative evaluation and theories of change we developed in consultation with WFF staff. Our formative research tasks found that most of the interviewed grantees and all of the WFF geographies' leads share a focus on *water issues* as an effective and compelling package for communicating about climate and environment-related problems and solutions. Water

[11] Content types include: podcasts/radio reports, television/YouTube video segments, academic research reports, and books. However, not all of these were available or suitable for content and social media analyses.Transcripts were rarely available for the audio/visual content. Books and research reports are too long for consistent coding within the current scope of our work.

[12] A list of best practices for maximizing the impact of science journalism was drawn from previous NLC research on effective science communication in journalism and supplemented by expert opinions from grasstops interviews. See Rosenthal et al. (2022) Measuring the Impact of Science Journalism.

issues are seen as immediate, concrete, and less polarizing than other types of environmental concerns. The three geographies in the Environment Program have specific strategic and geographic priorities.

Because the three geographies had distinct foci, we used keywords and key audiences specific to the regions to approach research questions about the relevance of the content and how it's landing for audiences.

The body of this report is arranged into three topical sections:

- **Part 1:** Investigating the presence of best practices in environmental journalism and connections to theories of change;
- **Part 2:** Analyzing general audiences' (e.g., grassroots, public) responses to WFF-funded content;
- **Part 3:** Understanding target audiences' (e.g., grasstops) perceptions, uses, and recommendations for environmental media.

A detailed **Report Roadmap** is provided at the end of the Methods section to follow.

METHODS[13]

CONTENT ANALYSIS AND TWITTER[14] METRICS

SAMPLE IDENTIFICATION

During the formative phase, MIP compiled a master list of 2,615 grantee story titles and links published between 2014 and 2023, along with an initial geography designation for each story, based on the grantees' locations. Due to WFF's long history of grant-making in the Louisiana Coastal region, the greatest number of published stories were from there; conversely, a much smaller number of Oceans stories had been produced. To balance regional representations as much as possible, MIP included all possible Oceans stories, and oversampled CRB stories, randomly selecting an even number of CRB and MRB stories into the initial sample of 700 stories. The WFF team reviewed the selection and flagged for replacement stories not aligned with grantmaking strategies. A keyword analysis (using keywords from ToCs) was conducted to highlight previously unselected stories most likely to align with program goals. Stories containing ToC keywords were randomly selected from the initial list to add as replacements.[15] During content analysis, eleven stories had to be dropped as they were duplicates with different titles (e.g., shorter versions reprinted on different platforms), or suitable text was unavailable.

The final analyzed sample contains 689 stories:

- 50% MRB;
- 43% CRB;
- 9% OCEANS.

CODING PROCEDURE

Drawing from previous research, we identified **best practices for maximizing impact through science journalism**.[16] We also developed several theory-informed, emerging best practices for examination.

Using a combination of human coding (HUM) and Linguistic Inquiry and Word Count software (LIWC), we measured 28 variables consistent with best practices in the 689 WFF-funded stories (asterisks indicate variables for which *lower* values are consistent with best practices). The LIWC software provides data for the average *New York Times* (NYT) article as a reference for print journalism more broadly. To aid with interpretation, we include comparisons between WFF-supported and NYT stories.

- **Refrain from overly complex terminology:** Avoiding scientific jargon and complicated language can increase audience understanding of water-related issues.
  - [LIWC] Reading difficulty score*

[13] See Appendices at end of report for methodological details: A: Content Analysis; B: Social Media Analysis; C: Grasstops Interviews.

[14] As the platform rebranded as "X" is still commonly referred to as "Twitter," we will use the latter name throughout this report.

[15] See Appendix A for more information on samples.

[16] Best practices were drawn from previous NLC research on effective science communication in journalism and supplemented by expert opinions from grasstops interviews. See Rosenthal et al. (2022) Measuring the Impact of Science Journalism.

- [LIWC] Number of big words (seven letters or longer)*
- [LIWC] Keywords associated with WFF COMMS theories of change

- **Multimedia storytelling:** A photograph or infographic can increase reader interest and attention, while infographics can help communicate data in an effective and engaging manner.
  - [HUM] Number of photographs
  - [HUM] Photos of humans
  - [HUM] Audio or video components
  - [HUM] Data visualizations

- **Bring science close to home:** Writing local stories can make scientific findings feel relevant and personal to audiences.
  - [HUM] Local news publication
  - [HUM] Match between location of subject matter and publication
  - [LIWC] Quote from local source
  - [HUM] Local section of publication

- **Connect science to health outcomes:** Health framing is one of the best methods to motivate behavior change, especially among conservative and moderate audiences.
  - [LIWC] Relevance to wellness
  - [LIWC] Relevance to health
  - [LIWC] Relevance to illness
  - [LIWC] Relevance to human health problems

- **Positive stories:** Environmental problems may seem daunting, which is why stories with a hopeful tone that suggest solutions may be more palatable to audiences.
  - [LIWC] Mention of legislation
  - [LIWC] Positive tone
  - [LIWC] Future-oriented language
  - [LIWC] Past-oriented language*
  - [LIWC] Solutions-oriented language
  - [HUM] Problem-focused headline*

- **Diverse perspectives:** Diverse newsrooms can show how science topics impact underserved communities.
  - [HUM] Author race and gender
  - [HUM] Photo subject race and gender

- [LIWC] Mention of indigenous groups

- **Emerging best practices:**
  - [LIWC] Mention of "climate change"
  - [LIWC] Mention of specific businesses
  - [LIWC] Mention of specific politicians
  - [LIWC] Word count[17]

TWITTER REACH AND ENGAGEMENT

Impressions:
The total number of times Twitter users may have seen tweets that mention the story title or link. It is calculated by summing the number of relevant tweets published by each Twitter account multiplied by the account's number of followers.

Engagement:
The total number of times Twitter users liked, commented on, or reshared tweets that mention or link to the story..

For the 689 WFF-supported stories, we used Twitter (now X) API Pro access to collect tweets that mentioned either story title or story URL as of November 31, 2023.[18] We captured Twitter **impressions** and composite **engagement** and examined correlations between these metrics and variables consistent with best practices.

DEEP DIVE SOCIAL MEDIA ANALYSIS

AMPLIFIER ANALYSIS

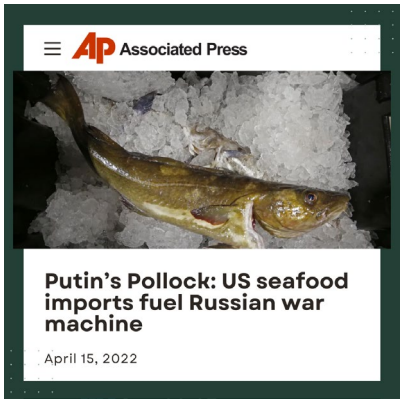
Within each of WFF's subregions, we identified the top five stories that garnered the most Twitter impressions as well as the top five stories that generated the most Twitter engagement. For each of these top stories, we identified the top ten Twitter users (amplifiers) who generated the most impressions, as well as the most engagement. After removing repeat accounts across datasets (e.g., @AP, @StarTribune, @NewsHour, etc.), we were left with a total of 279 unique amplifiers. For each user, we extracted their username, bio description—a short self-description from their profile page—and any URL included in the bio typically linking to a personal website, blog, or business page. We then analyzed the extracted user information based on whether they belonged to a media organization, were individual journalists, and if they fell into any of the 10 WFF's key audience categories as identified in the formative phase of our research.

ONLINE DIALOGUE ANALYSIS

To better understand online audience reactions to WFF-supported stories delivered on a variety of media platforms, we selected three stories for in-depth qualitative analysis (one in each region that included one broadcast news segment and two online text-based stories). The stories were selected in consultation with WFF based on several factors, including unique keywords in the headline and text, high reach and engagement on social media, and anecdotal evidence from the WFF team regarding the popularity and strategic interest of the stories.

[17] It is unclear from existing evidence whether a high word count would be positively or negatively associated with impact.

[18] For simplicity, we will refer to the platform as Twitter and posts as tweets throughout.



- **Oceans:** "Putin's Pollock: US seafood imports fuel Russian war machine" in The *Associated Press* by Joshua Goodman and Helen Wieffering (April 15, 2022). This article tells the story of how US imports of Russian seafood, particularly pollock, are inadvertently funding Russia's military activities. The report highlights the significant volume of seafood trade between the two countries and its implications for global trade and national security, emphasizing the need for stricter regulations and a reevaluation of trade policies to prevent supporting adversarial regimes.

- **Mississippi River Basin (MRB):** "Nitrate pours into Mississippi River and other U.S. waterways, report says" in *Wisconsin Watch* by Bennet Goldstein (October 8, 2022). This story provides an in-depth look at the alarming levels of nitrate pollution entering the Mississippi River and other U.S. waterways. The report details the sources of this pollution, primarily agricultural runoff, and its detrimental effects on water quality, aquatic life, and human health. It underscores the urgent need for more effective environmental policies and agricultural practices to mitigate the impact of these toxic chemicals on America's waterways.

- **Colorado River Basin (CRB):** "Native American tribes plea for help as Colorado River dries up" broadcast on *ABC News* by Kayna Whitworth (October 6, 2021). This news segment covers the severe drought in the southwest, where the drying up of the Colorado River has forced over 40 million people, including members of 29 Native American tribes, to ration water. These reports highlight the significant impact of water shortages on local farmers and communities, along with the urgent need for sustainable water management solutions.

We then collected and analyzed social media dialogue associated with the three stories:

- For the two text-based stories (Oceans and MRB), we collected 432 Reddit comments.
- For the video news segment (CRB), we collected 3,331 YouTube comments.

To examine the impact of these stories on social media audiences, we used a combination of large language models (LLMs) and human coding to analyze various aspects of online dialogue. We focused on 26 different variables that captured broad categories such as thematic content, sentiments expressed toward different stakeholder groups (e.g., U.S. or foreign governments, farmers, fishermen, Native Americans), and emotional tone. We also assessed cognitive and behavioral responses, including mentions of calls to action, self-identification (e.g., profession or location of the commenter), and indications of learning new information, confirming existing beliefs, or expressing intentions to take actions.[19]

[19] See Appendix B for detailed methodology.

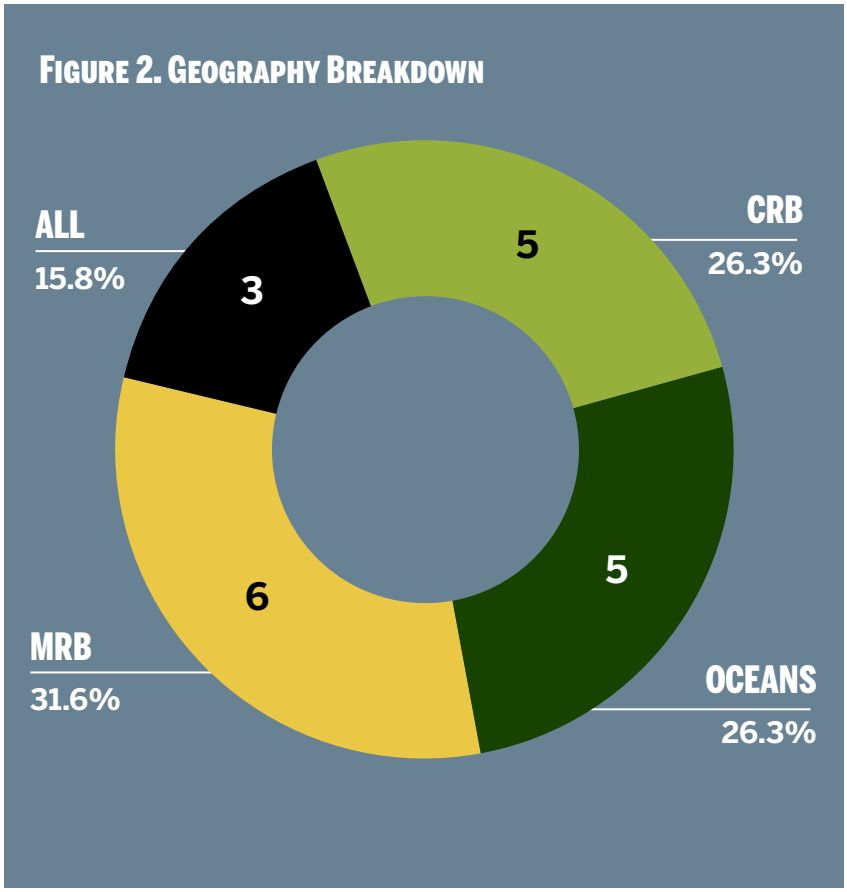
GRASSTOPS INTERVIEWS

We conducted **19 semi-structured in-depth interviews with 21 grasstops**—people that represented key audiences and groups for WFF's COMMS portfolio. Grasstops mostly came from academic, industry-facing, and decision-making roles, but also served as key informants on grassroots audiences, such as farmers, fishermen, and ranchers, and residents in the two river basins of interest.

A pool of potential interviewees were suggested by the WFF COMMS team, in consultation with leads from the geography teams to accurately represent the key grasstops across the regions.The interviews were held with representatives from the following overlapping groups:[20]

- **Local/state policy:** 13 individuals
- **Federal policy:** 5 individuals
- **Nonprofits:** 7 individuals
- **Academics:** 3 individuals
- **Industry-related:** 2 individuals

The interviewees represented the three geographies and some represented all geographic regions (usually the federal level) with the breakdown illustrated in Figure 2:



Interview questions centered on ways in which grasstops currently apply and leverage environmental media in their work, and ways in which they could see these media leveraged for impact in the future.[21] These interviews were recorded, transcribed, and systematically coded for indicators of impact, characteristics of environmental media associated with impact, and challenges and opportunities associated with environment-focused media going forward.

We also coded every mention of media organizations and particular individuals working in environmental media (e.g., journalists) to better understand which positively-framed outlets and voices are seen as trustworthy, applicable, and connected to WFF.

[20] Some interviewees represented more than one professional group.

[21] See interview protocol here.

REPORT ROADMAP

The remainder of this report is structured around a number of research questions within three main areas of focus and a fourth section that discusses takeaways and emerging recommendations:

TABLE 2. SUMMATIVE EVALUATION QUESTIONS AND RESEARCH TASKS

	EVALUATION QUESTIONS	SUMMATIVE EVALUATION RESEARCH TASKS					
		GRASSTOPS INTERVIEWS	CONTENT ANALYSIS	TWITTER METRICS	TWITTER CORRELATION ANALYSIS	TWITTER AMPLIFIER ANALYSIS	SOCIAL MEDIA DEEP DIVE
1. CONTENT FEATURES	**1.1** To what extent is WFF-supported content consistent with identified best practices; and how much do WFF-funded stories in each region address issues specific to that region?		X				
	1.2 What features of WFF-supported content attract the most attention?		*informs Twitter analysis*		X		
	1.3 Which content features, outlets, and best practices were seen by the grasstops as effective for environmental media?	X					
2. GENERAL AUDIENCE RESPONSES TO CONTENT	**2.1** How do audiences respond to WFF-funded content?			X			X
	2.2 Does WFF-funded content raise awareness and inspire action on key issues?						X
	2.3 Who are the top amplifiers promoting WFF-supported content; and what is the overlap with WFF's desired target audiences (e.g., grasstops)?	X				X	
3. UNDERSTANDING AND REACHING TARGET AUDIENCES	**3.1** What do we know about the target audiences—grasstops in particular—accessing environmental media content?	X					
	3.2 What do we know about target audiences—grasstops in particular—using environmental media content?	X					
	3.3 What do grasstops see as challenges and opportunities for environmental media?	X					

PART 1: CONTENT FEATURES

In the formative phase of our research, MIP asked grantees what topics and types of stories they believe resonate with their target audiences. The factors they mentioned were largely consistent with best practices MIP[22] and others have identified in prior research, such as:

- Incorporate multimedia (e.g., video, data visualizations, photos)
- Show solutions to identified problems
- Link issues to depolarize water and climate coverage
- Feature how issues affect local conditions and vulnerable communities

In a preliminary analysis to investigate how these and other best practices feature in their outputs, we examined 689 stories from three geographic regions of interest to determine how much WFF-funded journalism addresses water-related issues. We found that **77% of all stories centered water-related topics**.[23] We then examined these 689 stories to determine the presence or absence of journalistic qualities associated with identified best practices for science journalism.

1.1: TO WHAT EXTENT IS WFF-SUPPORTED CONTENT CONSISTENT WITH IDENTIFIED BEST PRACTICES?

Overall, the WFF stories were consistent with best practices that were applicable to their projects. For instance, stories made generous use of helpful visuals and used age-appropriate language for their audience.

1. Refrain from overly complex terminology

Stories used language that was similar in complexity to the average *New York Times* (NYT) article. Because the NYT sample was not specific to science journalism, this suggests WFF-supported stories are communicating science using ordinary language.

- Stories in our sample were written at an 11th-grade reading level on average, which is approximately the same level of complexity as NYT articles.
- The average number of words per sentence was 18.5, compared to 19.9 for NYT articles.
- 26% of the words in each story were seven letters or longer, which is equivalent to NYT articles at 25%.

[22] See "Measuring the Impact of Science Journalism."

[23] **Miscellaneous descriptive statistics:**
- 96% of the stories included links for readers to share the story on social media.
- 77% were associated with a subsection of the periodical. Of these, 23% were part of an "environment" section.
- 58% came from nonprofit publications.
- 8% were listed as part of a series of stories.

2. Use multimedia storytelling

Most WFF-supported stories made use of engaging images, particularly photographs of people. About one-third included a visual representation of data.

- Most stories (92%) had at least one photograph.
- Stories had 3.6 photographs on average.
- 53% of stories had at least one photograph of a human being.
- 33% of stories had at least one infographic or visual representation of data.
- 17% of the stories had an audio component, and 12% had a video component.
- 3% of the stories in our sample were primarily non-text (podcast episodes or videos).

3. Bring science close to home

Consistent with the best practice of creating stories local audiences can relate to, nearly half were in local or regional publications, and most had subject matter that matched the location of the publication. A majority of WFF-funded stories in each region address issues specific to that region.

- 92% of stories from MRB grantees had subject matter in one of the MRB states.[24]
- 64% of stories from CRB grantees had subject matter in one of the CRB states.[25]
- 63% of stories were local—the location of the subject matter matched the location of the publication.
- 47% of the stories came from local or regional (below state-level) publications.
- 11% included a quote from a local resident.
- 8% were filed under the "local" section of the publication.

4. Connect science to health outcomes [26]

WFF stories addressed health problems fairly infrequently, although WFF stories scored slightly higher than NYT on its use of "wellness" terms.[27] This may represent a missed opportunity for connecting with audiences.

- 17% of stories mentioned at least one human health problem.
- The average story in our sample had a "wellness" score of .06 (NYT = .04).
- The average story in our sample had a "health" score of .31 (NYT = .51).
- The average story in our sample had an "illness" score of .10 (NYT = .16)

[24] Stories were coded as MRB-relevant if the subject matter took place in a state that falls within the Mississippi River Basin: Minnesota, Wisconsin, Illinois, Iowa, Missouri, Kentucky, Tennessee, Arkansas, Mississippi, Louisiana, Kansas, Oklahoma.

[25] Stories were coded as CRB-relevant if the subject matter took place in a state that falls within the Colorado River Basin: Utah, California, Arizona, Colorado, Wyoming, New Mexico, Nevada.

[26] Health frames may be useful insofar as they make environment-related news stories seem *personal.* As one environmental journalist has observed, "people really want to know how this changing climate is going to affect them personally, and there's nothing more personal than health" (HHMI & Pulitzer Center, 2021). Similarly, Petrovic et al. (2014) have advocated for additional research on health frames for affecting reader views of climate change, as "personal perception of risk, which is likely to be linked to health, is one of the strongest motivators of behavioral change" (p. 245). Available at link.springer.com/article/10.1007/s10584-014-1192-2

[27] Differences from NYT listed here are significant at p<.001.

5. Include positive stories

While more than a quarter of stories addressed solutions to environmental problems or environmental legislation, they tended to focus more on the past or present than the future. However, future-focus story scores were higher than the NYT average.

- 37% of stories used a "problem" framing, while 27% contained words pertaining to "solutions."
- 30% of stories mentioned pro-environmental legislation.
- The average "positive tone" score was 34.3 (NYT = 37.1).
- The average story in our sample had an "future focus" score of 1.49 (NYT = .93).
- The average story in our sample had an "present focus" score of 4.03 (NYT = 2.98).
- The average story in our sample had an "past focus" score of 3.55 (NYT = 4.76).

6. Incorporate diverse perspectives

While more than half of the authors of WFF-funded stories were women, few were people of color.[28] There is significant room for improvement in terms racial diversity in both newsrooms and sources.[29]

- 54% of all authors were women, and 53% of stories had at least one woman author.
- Only 12% of authors in our sample were POC, and 12% of stories had at least one POC author.
- 17% of stories mentioned at least one Native American group.
- 29% of stories had at least one photo of a woman.
- 17% of stories had at least one photo of a person of color.

7. Emerging best practices

About one-third of the articles we analyzed specifically mentioned climate change, as a substantial portion of WFF articles connected water issues to the climate crisis.

- 36% of all stories mentioned climate change, and 37% of stories with water-focused headlines mentioned climate change.
- 12% mentioned a specific corporation that is contributing to an environmental problem.
- 36% of stories mentioned at least one politician.
- The average word count in our sample was 1,190, which is higher than the average word count in NYT articles (744).

[28] Demographic characteristics were determined by coders, based on the apparent or "street" race/gender of authors—how the authors are gender or race-presenting, which may not always line up with how the authors identify. Both gender and race items had adequate reliability. See Appendix A for detailed methodology.

[29] The percentage of POC authors in our sample (12%) is strikingly lower than the percentage of Americans who identify as POC (38%), as per the US Census. This discrepancy may suggest an opportunity for newsrooms to foster more diverse writing staffs that approximate real breakdowns of racial demographics in the US (though we make no claims here about what would constitute a "correct" level of diversity). As one of our grasstops suggested, environmental media may do well to include diverse perspectives and voices—especially those of marginalized communities who are often disproportionately affected by environmental issues—such that the demographics of newspaper decision-makers more accurately reflect those of audiences being served.

1.2: WHAT FEATURES OF WFF-SUPPORTED CONTENT ATTRACT THE MOST ATTENTION?

Having established the degree to which WFF stories were consistent with best practices for maximizing impact, we sought to understand whether such stories garnered greater social media impressions and engagement.

- **Engagement:** stories that primarily addressed a **water-related issue,** had a **problem-focused headline,** or had a greater number of **geography-specific keywords** (CRB, MRB, and OCEANS) all had **greater engagement.**

Many of the identified best practices were associated with greater Twitter traction. Statistical comparisons, including Logistic Regression, Pearson correlation, Spearman correlation, t-test, Mann-Whitney U test and Chi-Square test, revealed that stories incorporating best practices had significantly higher impressions and engagement compared to stories that did not follow these practices.[30]

Impressions:
The total number of times Twitter users may have seen tweets that mention the story title or link. It is calculated by summing the number of relevant tweets published by each Twitter account multiplied by the account's number of followers.

Engagement:
The total number of times Twitter users liked, commented on, or reshared tweets that mention or link to the story..

1. Refrain from overly complex terminology

- Stories with fewer words per sentence had **greater impressions**.
- Stories with a lower percentage of "big words" had **greater engagement**.

2. Multimedia storytelling

- Stories with a video component, more photos, and at least one infographic all had **higher impressions and engagement**.

3. Bring science close to home

- Stories in local and city publications had **lower impressions and engagement**.
- Stories in national news publications had **higher impressions and engagement**.
- This is a best practice for maximizing impact at a local level. As such, overall impressions and engagement may not be a valid indicator of the local impact of stories.

4. Connect science to health outcomes

- Stories with more health- and wellness-related keywords garnered **higher impressions**.
- Stories with more health-, wellness-, and illness-related keywords, as well as those that mentioned human health problems, had **greater engagement**.

[30] See Appendix B for statistical significance levels for each of the findings in this section.

5. Diverse perspectives

- Stories with more POC authors and indigenous terms all drew **higher impressions and engagement**.

6. Emerging best practices

- Stories that mentioned climate change more frequently in the body of the story **garnered greater impressions and engagement**.[31]
- Stories that mentioned specific businesses as causes of environmental problems **garnered greater impressions and engagement**.
- Longer stories received **more impressions and engagement**.

1.3: WHAT CONTENT FEATURES, OUTLETS, AND BEST PRACTICES WERE SEEN BY THE GRASSTOPS AS EFFECTIVE FOR ENVIRONMENTAL MEDIA?

In surveys and interviews conducted during our formative research, several grantees voiced concerns about their limited ability to fully and accurately assess impacts associated with the content they create and distribute.[32] MIP used these interests to help guide our investigation on how decision-makers ("grasstops") view the environmental media they consume, and what they see as best practices.

Best practices for impact, as seen by grasstops

Grasstops highlighted specific **best practices and examples of environmental media poised to make an impact** (Figure 3). For example, fifteen grasstops saw impact potential for media that adequately covers **complexity** (e.g., multilayered water policies and their consequences) and nine underscored the use of **economic framing**, such as showing evidence that conserving water and adopting farming practices to reduce run-off are cost effective.

The importance of in-depth, **accurate** reporting was made clear by the grasstops discussing the value of:

- citing **authoritative** sources and involving **experts** in reporting (9)
- incorporating **diverse voices** (8), particularly Indigenous people living in the affected regions
- using **data** and **science** to support the reporting (6)
- taking journalists on **tours** and **field trips** so they can experience the water issues they are writing about (3)

Some of these best practices were ones we have identified and studied, such as making content accessible and accurate, while including diverse voices, perspectives, and data. Others were novel or specific to water, such as the emphasis on complexity or the recommendation to highlight **alignment**—or

[31] This finding challenges conventional wisdom which suggests that "climate change" may be an unpopular topic in news media. However, this finding should be interpreted with caution, as there were no articles in our sample that mentioned "climate change" in the headline. Furthermore, mentions of climate change may be correlated with other "lurking" variables that better explain article engagement. Nevertheless, some empirical evidence suggests that audiences may be increasingly interested in climate change journalism.

[32] Challenges included lack of data collection skills and tools, lack of capacity to conduct research, and dependence on informal channels or spontaneous feedback (e.g., emails, direct conversations) to provide examples of their work affecting policymakers decisions and other impacts.

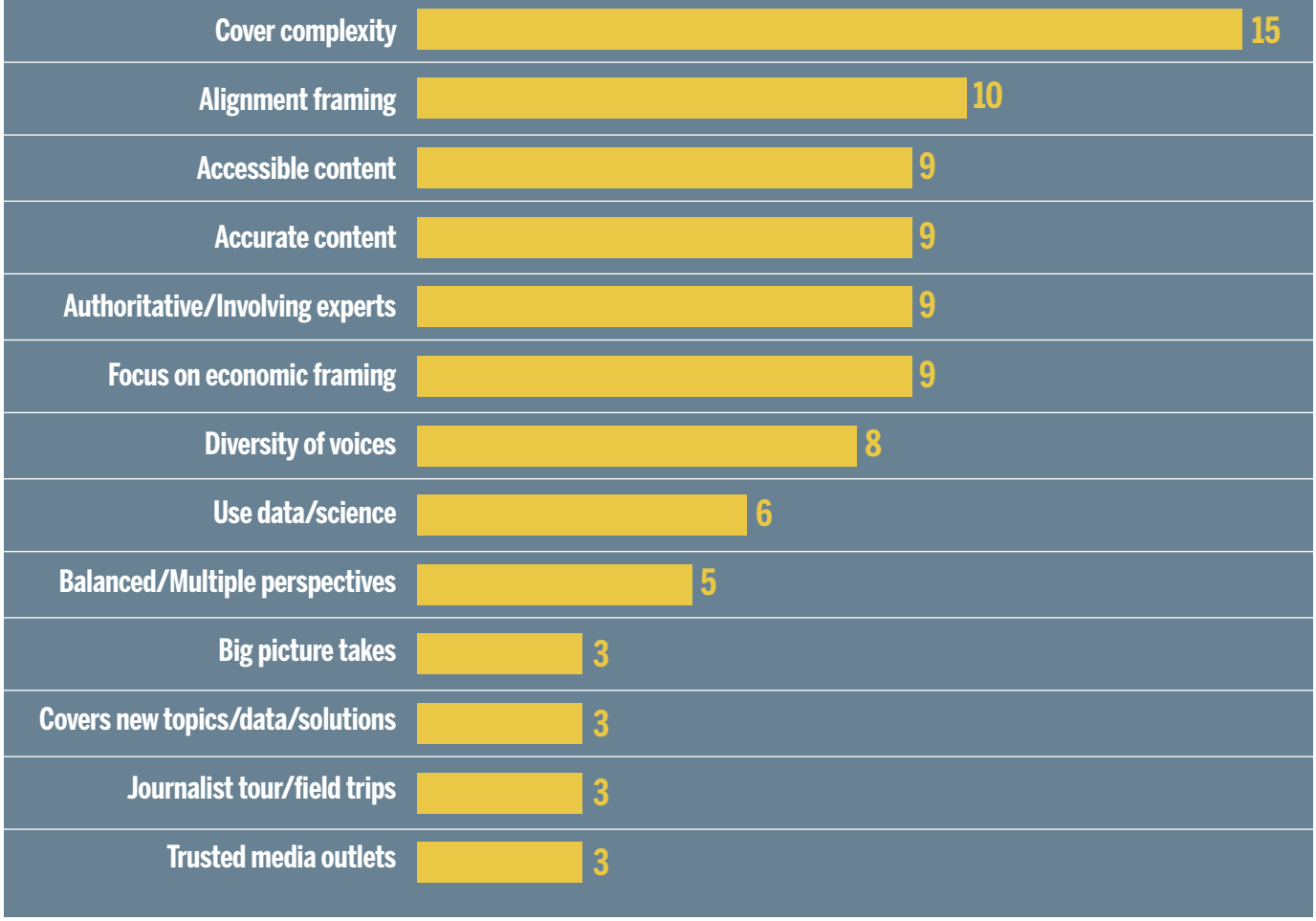
showing ways in which actors, states, and municipalities are aligned and on the same page with respect to water policy (10). In terms of content, we heard about leading with **new data** and **solutions** (3) while explaining the **"big picture"** or what is at stake in connection to water (3).

Overall, grasstops saw **an increase in water coverage** in local and national publications but thought **a shift away from the gloom narrative in that coverage** would be more productive:

- *"The intensity of the crisis always drives more journalism and more public interest from readers and viewers."* (Interviewee, state/local policy).
- *"(M)y sense of the general coverage is that it tends to be more focused on the problem currently, consistent with the phrase, 'If it bleeds, it leads,' right? So if you have a big negative story here, it captures a lot of attention [and] coverage, a big flood or the wildfires or disaster"* (Interviewee, federal/academic).

Types of outlets and content features mentioned by interviewed grasstops

FIGURE 3. MOST OFTEN BROUGHT UP PRACTICES ASSOCIATED WITH IMPACT, BY NUMBER OF INTERVIEWEES:



In most interviews, national publications were seen as important resources. Specifically, series in **national publications** (e.g., *New York Times*, *Washington Post, NPR*), national nonprofit news (e.g., *ProPublica*), and issue-specific publications (e.g., academic reports from institutes and universities, SeafoodSource, writer John Fleck's blog) were seen as go-to resources to inform grasstops' work.

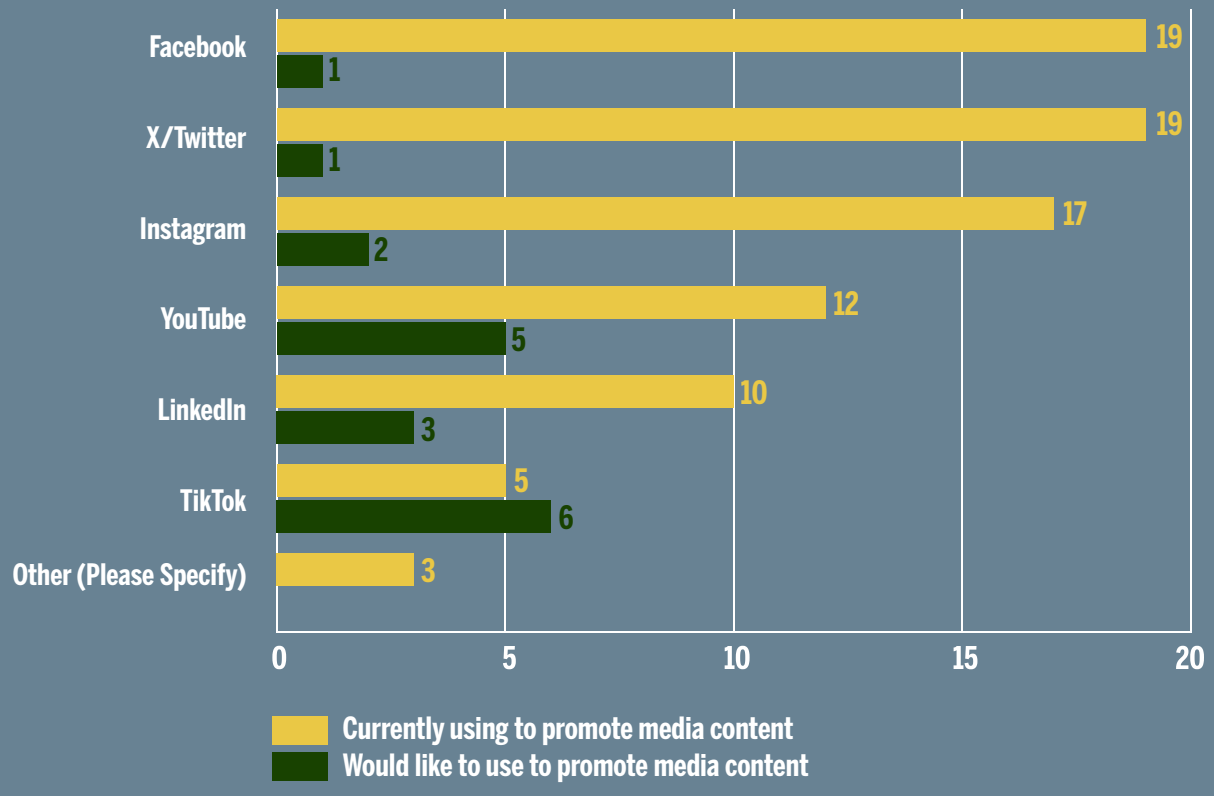
There were differences in the types of outlets and coverage positively emphasized in the interviews, varying by role and region:

- Representatives from **state and local governments** and **state and local government organizations** saw it as a success when water- and environment-related issues from their region were well covered at the **national** level. At the same time, they saw **local** news sources as more likely to reach regional constituencies that could directly vote on the most salient issues and make short-term water-positive behavioral changes.
- Representatives from the **federal level** and the **MRB** region saw rural news markets as largely untapped and poised to have a significant impact for the future of water and environmental legislation. In part, the emphasis on reaching rural audiences was seen as important to reaching both farmers and ranchers, as well as voters invested in agricultural and water-related issues.
- In the **CRB** region, there was an extensive discussion of news framing. Specifically, *conflict* frames—or, the focus on states and government agents battling for water—were considered unhelpful and harmful, while *consensus-building* frames—or, articles that focus on coalition building between states and agents, and ways in which state constituencies can work together—were seen as useful.

PART 2: GENERAL AUDIENCE RESPONSES TO CONTENT

In the formative phase of our research, MIP learned from grantees that they intentionally use a variety of media platforms and genres to reach their target audiences. Social media, online news, and online videos were the platforms a large majority of grantees used.[33] Many of the grantees surveyed in the formative phase used one or more social media platforms to increase readership and engagement with their content. Others indicated that they would like to develop the ability to use these platforms in the future, particularly image- and video-based platforms (e.g., Instagram, YouTube, and TikTok), see Figure 4.[34]

FIGURE 4. SOCIAL PLATFORMS IDENTIFIED TO INCREASE READERSHIP/ENGAGEMENT



[33] "Grantees also placed particular importance on multimodal media content and reaching audiences where they are — whether that is a podcast, radio, print newspaper, digital news, social media, etc. Framing the content to meet these audiences' interests was also crucial. Capturing audience attention with variations of the same messages across a variety of platforms was seen as critical to achieving impact."

[34] Of the 21 grantees who responded to this question, three indicated they also promote their media content via email, blog, website, and wire.

In this section, we focus on understanding how general audiences react to and interpret WFF-funded media content on social media platforms such as Twitter, YouTube, and Reddit.

2.1: HOW DO AUDIENCES RESPOND TO WFF-FUNDED CONTENT?

From the publication dates to the time of data collection (November 2023), approximately 21,762 tweets about 699 selected stories had been posted. These tweets had a combined reach of 432 million, representing the total number of followers of the Twitter users who shared the stories. This reach may exceed the U.S. population, as it includes global Twitter users, many of whom may follow the same accounts. The tweets were seen approximately 818 million times (impressions), since users often view the same tweet multiple times. Additionally, these tweets received around 62,000 engagements—including likes, comments, and shares—reflecting the combined activity across all 699 stories.

The table below summarizes the overall totals, maximum values, and percentiles (25th, 50th, 75th, and 95th) for each Twitter metric. The 95th percentiles provide a more accurate estimate of the maximum values, as discrepancies between the maximum and the 95th percentile are largely due to a few outlier stories with common phrases in their titles, which increases the volume of irrelevant data. [35] [36]

TABLE 3. TWITTER RESPONSES TO WFF-FUNDED CONTENT

SUMMARY	TOTAL	25th Percentile	50th Percentile	75th Percentile	95th Percentile	Max
Count of Tweets	21,762	4	10	25	116	741
Likes	40,526	2	11	32	218	3,466
Comments	3,390	0	1	3	22	409
Reshares	12,267	1	4	12	65	671
Composite Engagement (Likes+Comments+Reshares)	62,195	4	17	49	325	4,188
Reach[35]	432,010,974	14,271	56,425	219,489	1,433,114	39,051,430
Impressions[36]	817,773,760	16,611	64,149	258,863	2,164,746	80,797,345

Note: Decimals have been rounded up to the nearest whole number.

[35] **Reach**: The total number of people who may have seen tweets that mention the story title or URL. It is calculated by summing the number of followers of each Twitter account that published a story-related tweet(s).

[36] **Impressions**: The total number of times Twitter users may have seen tweets that mention the story title or link. It is calculated by summing the number of relevant tweets published by each Twitter account multiplied by the account's number of followers.

2.2: DOES WFF-FUNDED CONTENT RAISE AWARENESS AND INSPIRE ACTION ON KEY ISSUES?

The three WFF news stories we analyzed prompted meaningful engagement and dialogue among social media audiences. While social media comment sections are often seen as dominated by extreme views, they can still offer valuable insights into how people interpret and respond to content. In this case, many users shared their pre-existing views and knowledge about the topics covered in the news stories. Further, they occasionally urged others to take actions in response to the news content. Though not always reflective of broader public opinion, these discussions highlight key themes, concerns, and areas of advocacy. The nature of these responses varied between the two platforms—YouTube and Reddit—with some audiences using the space to validate their beliefs and others calling for change, demonstrating how social media can both shape and reflect public dialogue.

Reinforcing pre-existing views and knowledge

On YouTube,[37] 42% of commenters (172) indicated that the broadcast validated their existing views related to the causes of and solutions related to the topic. These comments, often matter-of-fact in tone, expressed pride in their knowledge and frustration with those who are less aware. Key themes included: confirming concerns about unsustainable farming practices (10%, n=17), desire for practical solutions and innovations such as cloud seeding and desalination technology (5%, n=8), and recognition of indigenous knowledge in water conservation (5%, n=6).

- *"Climate change! Please! The planet is overpopulated and we are destroying the planet by building everywhere, polluting everywhere and depleting our food sources. Overpopulation is the planet's biggest problem."*
- *"I don't like the fact that society for years doesn't listen to Native Americans. [They] are the only ones that care more about the earth than anyone else. It's sad. Climate change isn't the threat, it's us who are making these problems. We're way too populated! Too many morons and not enough chiefs."*

On Reddit, 67% of comments (143) indicated the news stories confirmed their existing beliefs, often expressing skepticism and criticism towards the fishing and food industries. Themes included confirming negative views about health risks posed by Chinese fleets (63%, n=90), reinforcing support for local and sustainable fishing practices (17%, n=24), and the need for better regulations to protect consumer interests and the environment (8%, n=12).

- *"For those who don't know, fish in China that are shipped overseas go through a process of cleaning and chemical bleaching that robs them of flavor and nutrients."*
- *"The amazing thing is that the money spent on the purchase and application of these nitrates is a waste of money that not only affects all of us, but the bottom lines of the farmers using it themselves. The only ones benefiting are the companies selling a false narrative regarding the reasons for applying it and the consequences."*

[37] Story by ABC News, "Native American tribes plea for help as Colorado River dries up" by Kayna Whitworth (October 6, 2021).

Prompting Calls-to-Action

On YouTube, 30% of comments (125) included calls-to-action such as: advocating for sustainable, locally supported farming practices, including vertical and agrivoltaic farming, desalination, rainwater harvesting, and reducing fracking (30%, n=40); emphasizing the need to educate farmers on sustainable farming and water usage, promote plant-based diets, and highlight moral obligations towards nature and sustainability (15%, n=18); encouraging the involvement of Native Americans, utilizing their wisdom in drought management and promoting local conservation efforts (10%, n=12); and supporting international practices and new regulations, such as enforcing environmental laws, improving urban planning, and diversifying water sources (10%, n=8).

- *"Plant native crops! Farming and living in a desert requires a different relationship with water."*
- *"I hope somebody in position to make a change is reading this. Diverting some water in Wyoming (possibly from the Snake River headwaters) into the Flaming Gorge Reservoir and raising the winter time flows of the Green River (which flows into the Colorado River) could help refill Lake Mead."*

On Reddit, 20% of comments (42) included calls-to-action such as: calling for broader regulatory and policy changes, advocating for international standards on fish labeling, and urging lawmakers and corporations to disengage from Chinese and Russian business practices, including imposing sanctions (43%, n=18). Many also urged individuals to eat only American-caught fish and boycott Chinese products, reflecting an anti-China sentiment. Key themes included: urging individuals to make informed choices about seafood consumption, stop the spread of misinformation about the fishing industry, and work together to find solutions (29%, n=12); and highlighting the need for corporate accountability, calling on the fishing industry to internalize costs, and clean up its practices; and criticizing misleading article thumbnails and titles (12%, n=5).

- *"Big Ag needs to stop hiding behind the Iowa Farm Bureau and quite literally 'get its shit together' with regard to nitrate runoff. There's really no excuse any more. We have precision fertilizer release now, and a whole host of practices that can minimize runoff. The only thing preventing a much better set of practices is stubbornness and legislative capture at the local level."*

Encouraging new knowledge or behavioral changes

A small fraction of social media audiences[38] reported learning new information that prompted them to rethink and adjust their actions. On YouTube, six commenters mentioned learning something new, such as:

- Cotton is grown in Arizona and farming occurs in desert areas.
- The United States and Mexico share similar water scarcity problems.
- Most of Arizona's water is used for agriculture.
- A surprising number of people are rational and solution-oriented about water issues.

[38] Small numbers (<10) are reported as whole numbers rather than percentages.

Furthermore, three commenters mentioned taking or intending to take actions such as storing water, going vegan, and supporting "real Americans."

Similarly, on Reddit, three commenters reported learning new information, such as:

- Harmful practices in international seafood trade
- The existence of a processed seafood product called "Surimi"
- The fact that some U.S.-caught fish is processed in China

A slightly higher number of Reddit commenters (5%, n=11) mentioned taking or intending to take actions based on the new information. These actions included:

- Avoiding Chinese products
- Checking food labels for trusted origins
- Buying food from U.S. sources to ensure seafood safety
- Sharing a YouTube video or follow-up questions to exchange information about seafood processing practices

Shaping sentiment toward key stakeholders

We examined the overall sentiment (positive, negative, neutral) toward key audiences that WFF is interested in reaching, as mentioned in YouTube and Reddit comments. These groups included the U.S. government and its representatives, U.S. states, foreign countries and governments, Native Americans, farmers, and fishermen. The analysis reveals how these key stakeholders are perceived by social media audiences, providing insights that can help WFF and its grantees craft messages addressing specific concerns or leveraging positive sentiment, such as the support for Native American knowledge in water conservation.

The ABC News report engaged YouTube viewers in discussing these key stakeholder groups:

- **The U.S. government or its representatives** were mentioned in 9% (38) of comments. An overwhelming 84% (32) expressed negative sentiment, indicating a deep dissatisfaction with federal response and policies regarding the drought and water management. Only one comment was positive, and three were neutral.
    - *"I'm Native and knowing that the American government can help refugees from other lands, but they can't help those from their own backyard is unforgiving. After all, we accepted those who were hungry and needed shelter in our lands to take from us and treat us like animals. Remember who fed you and gave you water??"* (Negative)

- **U.S. States (e.g., Arizona, California, Nevada)** appeared in 13% of comments, with nearly half expressing negative sentiment (55%, n=29), which reflects frustration with state-level policies and actions regarding water management. Less than half of comments were neutral (43%, n=23) while one comment was positive.
    - *"The wonderful state of California uses its Colorado water to do noble acts like growing almonds*

at the expense of 5,000 gallons of water per one pound of shelled almond yield. Top it off California officials have under reported amounts taken from aquifers." (Negative)

- **Native Americans** were discussed in 10% of comments (40), with a majority of these (73%, n=29) expressing positive sentiment toward Native Americans. Overall, commenters showed support and recognition of Native American communities' struggles and contributions to sustainable water practices. Three were negative, and 25% (10) were neutral.
  - *"Native Americans of the Southwest know better than anyone how to manage water and the detrimental effects of not managing it correctly. They have lived through historical droughts and survived. Best to listen to them."* (Positive)

- **Farmers** were discussed in 20% of comments (84). Of these, nearly half (46%, n=39) expressed negative sentiment toward farmers, often criticizing their water usage and management. Eight comments were neutral and four were positive.
  - *"Funny how the farmer sucking all the water out is complaining they don't have enough?? maybe you over extended your farming operation according to the resources available."* (Negative)
  - *"Unpopular Opinion: People shouldn't live in Arizona, it's too dry, it's taking up the water for everyone else. These farmers are super important, but just move to some place where it actually rains so you don't have to take water from the Colorado river."* (Positive)

Similarly, the two online news articles sparked discussions about these stakeholder groups on Reddit:

- **The U.S. government or its representatives** were mentioned in 18% (39) of Reddit comments, with more than half (56%, n=22) expressing negative sentiment such as frustration, anger, and disappointment towards the government. 28% (11) were neutral, and six were positive.
  - *"If you are American and think you are living your life without Chinese products, think again. It's not our fault though, it's our politicians' fault for selling out American industry." (*Negative*)*
  - *"Fresh fish anyone?? Caught in the ocean, weeks before processing. This US ban is saving lives." (*Positive*)*

- **U.S. States (e.g., Alaska, Minnesota)** were mentioned in 5% (15) of comments, half of which expressed negative sentiment while the other half were neutral. The remaining three were positive.
  - *"This isn't true at all. There's hundreds of processing plants IN Alaska that handles the processing of the fish, eggs are sent to Japanese buyers and very little fish in Alaskan waters doesn't get processed within several hundred miles on a floating processor or it goes to a land based processor IN Alaska." (*Negative*)*
  - *"Minnesota at least has laws for 50' riparian buffers in streams now, which is a big way to improve the situation from their end."* (Positive*)*

- **Foreign countries or governments (e.g., Russia, China, Japan)** were discussed in 47% (101) of comments, with 65% of these comments (65) expressing negative sentiment such as anger, frustration, and disgust. 31% (31) were neutral, and five were positive.

- *"Putin's poisoned pollack. China's main product is terror and destruction of their environment and its workers."* (Negative)
- *"I can't speak for all but if you do it in Japan you'll get quality. There are exceptions but mostly what you'll find is as good as its counterpart in a department store."* (Positive)

- **Fishermen** were discussed in four comments, of which three expressed negative sentiment. One was neutral.
  - *"Keep in mind too, that it's pretty environmentally damaging to fish any fish larger than your finger in length."* (Negative)

Overall emotional responses in discussions

We used a large language model (Nous-Hermes-13b) to detect the emotions expressed in each comment, with two student coders verifying accuracy and identifying any missed nuances. The model showed high accuracy, correctly identifying emotions for 87% of YouTube comments (356) and 92% of Reddit comments (197) on Reddit.

Across both platforms, **frustration** was the most common emotion (64%, n=400), followed by annoyance at 39% (244) and concern at 23% (144). These emotions often accompanied matter-of-fact tones (29%, n=181), sarcasm (14%, n=88), and disapproval (16%, n=100).

On YouTube, nearly one-in-four YouTube commenters (23%, n=94) shared views in a matter-of-fact manner, focusing on criticisms and practical solutions (e.g., suggesting what appears to be obvious solutions to a drought issue). Disapproval and sarcasm each accounted for 21% (86) of comments.

- *"This is absurd! What the hell else do you expect to happen when you are fueling a desert full of golf courses, homes and agriculture crops off a river???"*
- *"This isn't a case of climate change. It's a population one. The deserts of the southwest United States never had the proper resources to sustain 40 million people. This was a matter of time. PLAY STUPID GAMES WIN STUPID PRIZES. Enjoy the heat dummies."*

On Reddit, nearly one-third of comments (34%) had an informative tone, with users frequently sharing information and sparking off-topic discussions driven by the platform's conversational nature. Sarcastic (7%), judgmental (6%), and assertive (5%) tones were common during disagreements, as well as an approving tone (12%) when users agreed with each other.

- *"Russia only exports like $4 billion worth of seafood annually. That's like one week of their oil and gas revenue. Sure every bit matters but if you ain't hitting them where it hurts it really doesn't matter."*
- *"Those nitrates just make the drinking water taste like FREEDOM and GOD-FEARING and FAMILY VALUES You whining socialist commie America haters"*

2.3: WHO ARE THE TOP AMPLIFIERS PROMOTING WFF-SUPPORTED CONTENT AND WHAT IS THEIR OVERLAP WITH WFF'S DESIRED TARGET AUDIENCES[39] (E.G., GRASSTOPS)?

In addition to determining how grasstops value and use COMMS stories in their work, we also looked for patterns in which groups were helping to spread these stories to their own followers.

Media organizations accounted for 41% of the top amplifiers, followed by individual journalists (13%). This is likely because Twitter users who seek these types of stories follow the news outlets and journalists who create them. Other types of top amplifiers corresponded to WFF's key audiences identified in the formative phase of our research. Residents of the Mississippi River Basin (MRB 13%) and the Colorado River Basin (CRB 5%) were identified based on their mentions of being in or from a city or state within those regions.

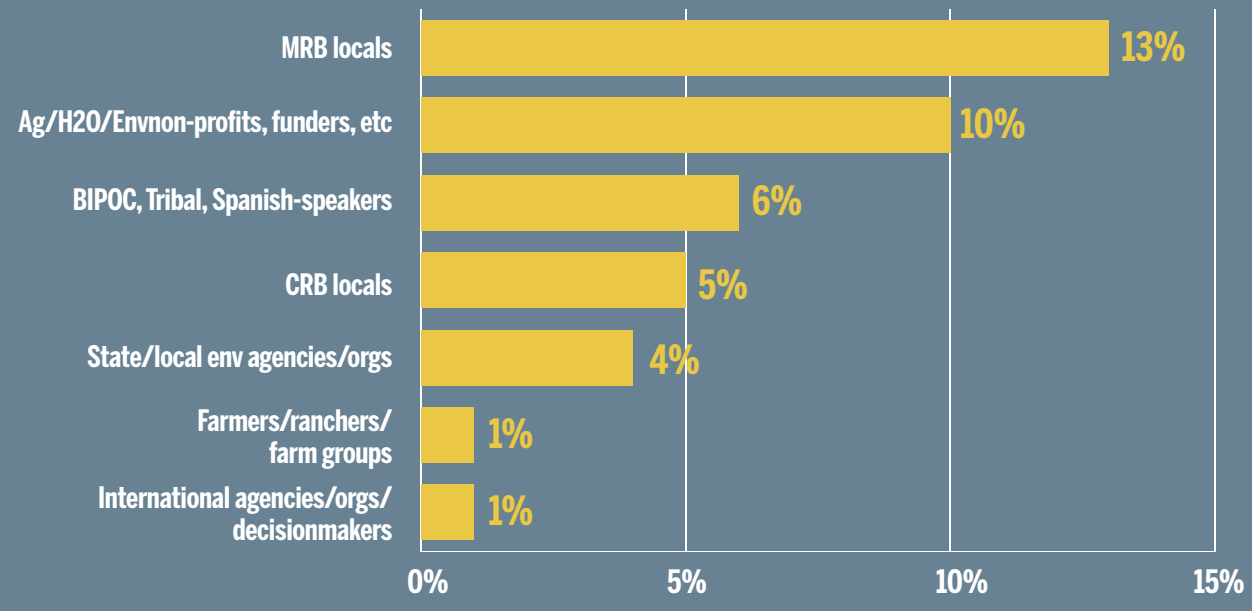
Overlap between top amplifiers and target audiences

Several groups within WFF's desired target audience are actively amplifying the stories, such as:

- MRB local residents (13%)
- Agriculture, water, environmental non-profit organizations including funders and philanthropies (10%)
- BIPOC communities (6%)

However, some key groups, like state or local environmental agencies and organizations (4%) and farmers/ ranchers (1%), show lower levels of amplification (see Figure 5).

FIGURE 5. REPRESENTATION OF THE TYPES OF GROUPS WFF WISHES TO REACH AMONG THE TOP STORY AMPLIFIERS:



[39] Informed by ToCs

We did not find amplifiers from fishermen's groups, environmental organizations, or the seafood industry within the available data; however, this may be due to the low proportion of Oceans stories (9% of sample) available at the time.

Other audience characteristics

WFF COMMS grants aim to increase awareness of water-related issues in their target locations, and with grasstops and affected members of key industries. Because lasting water solutions will require changes in how water is used, WFF describes the purpose behind their grantmaking thusly:

- *"Big decisions to protect water must include those closest to the problem. To learn how to grow enough food, while protecting soil and water—we listen to farmers. To keep enough fish in the ocean —we listen to fishermen. To find ways to use less water in the West—we learn from tribal nations. They have lived there longer than anyone else."*[40]

Our social media analysis[41] revealed that:

- Among the 5% of YouTube commenters (20) who shared information about themselves, a majority (16) **mentioned their locations to enhance the credibility or authority of their opinions.** The specific locations cited were: Arizona (5), California (4), United States (2), Alaska (1), Georgia (1), Lake Michigan (1), Navajo & Apache Counties (1), Colorado River (1).
- 8% (18 out of 215) of Reddit comments **revealed information about their professional backgrounds or location.** We found that less than half (7 out of 18) specified their professions in food regulation and safety, food processing, fine dining service, academic research, food manufacturing, electrical work, and agriculture. Another seven commenters shared their locations which included Iowa (2), Pacific Northwest (2), United States (1), Minnesota (1), and Europe (1).

[40] WFF Environment statement of purpose: www.waltonfamilyfoundation.org/our-work/environment-program

[41] These findings are based on any comments that included self-revealing information (e.g., location, profession).

PART 3: UNDERSTANDING AND REACHING TARGET AUDIENCES

In this section, we focus on understanding how grasstops and their constituents react to and use WFF-funded media content in their work. The section ends with grasstops' opinions regarding the current challenges and opportunities for environmental media.

3.1: WHAT DO WE KNOW ABOUT THE TARGET AUDIENCES—GRASSTOPS IN PARTICULAR—ACCESSING ENVIRONMENTAL MEDIA CONTENT?

WFF COMMS target audiences include both *grassroots*, referring to farmers, fishermen, and ranchers, residents of the Mississippi and Colorado river basins, and members of BIPOC communities; and, *grasstops*, referring to policy and decision-makers at local, state, international levels, and in the industry.

MIP conducted 19 semi-structured in-depth interviews with 21 people who represent the target audiences of grasstops: key decision-making groups identified in the formative phase of our research.[42] Interviewees discussed ways in which they and their colleagues leverage environmental media for their professional aims.

Grasstop interviewees named several key audiences actively using and engaging with environmental media in general,[43] and WFF-funded environmental media in particular. These audiences included:

- Federal policymakers (8 mentions)
- Local policymakers (15 mentions)

Other mentions of reached audiences focused on local publics (e.g, Lower Basin voters), policy experts, and environmental coalitions working on issues concerning the nexus of water, climate, and agriculture. These were the audiences being reached by environmental media, according to the grasstop interviews.

Because the interviewees represented WFF's key audiences, we highlight the valued environmental media sources they identified, focusing on:

- authority (expert-informed research reports and books)
- complexity (multi-article deep dives in national publications like the *New York Times*)
- local points of view (regional publications).

[42] These interviews were recorded, transcribed, and systematically coded for indicators of impact, characteristics of environmental media associated with impact, and challenges and opportunities associated with environment-focused media going forward.

[43] Interviews discussed environmental media in terms of any media (inclusive of TV, film, radio, podcasts, etc) focused on environmental issues.

Grasstops made use of national and local publications for different purposes:

- *"We look to more national media venues for a more objective take on climate issues, and we pay attention to local sources more to understand the temperature and the culture and the context that we are working in"* (Interviewee, nonprofit).

Journalists and organizations named in connection with impact

In the grasstops' interviews, 46 individuals and 166 specific organizations were mentioned in connection to **impactful environmental media.** The mentions often focused on particular media companies and outlets as exemplars of creators of environmental media that do work that is accurate, balanced, and moving.

We tagged the mentions for valence and for connections to WFF. We looked for both direct connections, or media companies and sources funded by COMMS (e.g., PBS, *Financial Times*), and for indirect connections, with companies and sources linked to grantees (e.g., subgrantees of Pulitzer or Water Desk). **Positive mentions** mostly praised coverage in stories or multi-story campaigns, for instance:

- "The Financial Times *recently has stepped up and done some really, really great reporting, particularly around multinational and multilateral fora negotiations."* (Interviewee, federal policy)

Out of the 79 organically mentioned organizations associated with impactful environmental media, 31 (39%) had direct or indirect ties to WFF COMMS. Aside from grantees (e.g., KUNC), outlets where Water Desk and Pulitzer awardees placed stories were prominently featured (e.g., *Los Angeles Times*, Grist, Iowa Public Radio, The Weather Service).

3.2: WHAT DO WE KNOW ABOUT TARGET AUDIENCES—GRASSTOPS IN PARTICULAR—USING ENVIRONMENTAL MEDIA CONTENT?

MIP's formative research cataloged WFF grantees' knowledge of the broader impacts of the environmental media content they create. These impacts were grouped into two main categories and these categories were also relevant to grasstop interviews:

- **Indirect influence** includes amplification of stories by grasstops and members of WFF's key audiences so that these stories reach a broader audience, and inform public discussions (e.g., on social media platforms).
- Communications that reach and motivate decision-makers to take action would be examples of a **direct influence**.

Examples of Indirect Influence

Grasstops interviews showed a consensus that consistent local and regional reporting on water issues raises public awareness, which then **activates** changemaker groups such as policymakers and leaders in farming, ranching, and fishing organizations.

Philanthropy, according to federal-level grasstops, effectively supports **local reporting** in legacy media, which informs publics and builds support for environmental issues and practices. In tandem, **non-governmental organizations (NGOs)** can reach politicians and policymakers directly working on those issues. For these grasstops, philanthropy is well-suited to create an enabling communications environment, while NGOs working on specific water and environment issues can execute on communication tactics and timelines to reach government decision-makers. Examples provided included: an enabling environment could look like more resources for drumbeat-based local reporting about water issues, while NGO tactics could look like placing a well-timed story about a state-based water issue that the state's policymakers consume. Interviews thus underscored the value of partnering with NGOs and collectives on the ground.

Examples of Direct Influence

The interviewed policymakers and organization leads detailed what environmental media they use in service of their work and how they use it. Engagement with environmental media contributed to concrete results on the ground for capacity and awareness building.

- *"(H)aving so much more national and regional media covering Colorado River issues has been very positive, at least in terms of having the general public and the nation be more tuned to what's happening and what matters here living in the West. I think that there's been an elevation of literacy when it comes to water issues as a result of that, because it can be maybe easy to ignore a little article that comes out in a local paper about that water issues, but if you're constantly seeing headlines and front page news on these major sources, I think everyone takes note of that."* (Interviewee, state/local policy)

Grasstops mentioned positive **snowball effects** from local coverage, where attention to water issues in regional outlets would beget more attention to water in neighboring outlets and in national ones. This effect was often mentioned by CRB state/policy representatives. One example of local to national coverage effect was CNN and NBC picking up the story of water speculation and hedge funds buying up land in the Colorado Basin after local publications wrote about the topic.

Grasstops believe that focusing attention on water issues is both an **opportunity** (since covering these issues is a less "politicized" way to talk about climate), and **challenge**, since water issues are complex and layered. Grasstops commended specific journalists focused on water issues and the environment, like Ian Urbina, Julie Eliperin, Luke Runyon, Rhiannon Saegert, Mark Schleifstein, Aime Williams, and others, gaining credibility with public audiences and water-focused decision-makers alike. Journalists that get it "right" were prized by grasstops as they saw reporters stretched too thin and 'newcomers' to water issues tending to simplify and misrepresent knotty water issues. Growing capacity and support for

reporters to accurately represent water issues and the stakes of water issues can help mitigate potential misunderstanding and simplification. Attendance of environment, climate, and water-focused conferences and mentorships by seasoned reporters in this space could also bolster capacity.

Grasstops mentioned that in-depth local and national coverage of water issues in CRB helped elevate the awareness of farmers and the general public in the Basin and increased information-seeking behaviors from key stakeholder groups, such as voters looking up resources for water preservation.

In Oceans, an oft-cited example of media influence was Ian Urbina's reporting on illegal fishing in the Outlaw Oceans Project.[44] Briefings on this project attracted the largest audience for this type of journalism that the grasstops have seen. Further, Urbina's report was linked to direct changes in the work of an interagency group focused on illegal fishing by drawing large audiences in briefings. According to interviewees, these reports "lit a fire" under seafood organizations, encouraging them to convene, share lessons, and act on ways to mitigate public perceptions of being possibly associated with forced labor. These were given as examples in which communications media can have a direct impact.

3.3: WHAT DO GRASSTOPS SEE AS CHALLENGES AND OPPORTUNITIES FOR ENVIRONMENTAL MEDIA?

Challenges and risks as seen by grasstops

Grasstops named specific challenges that stall environmental media impact. Some of the challenges addressed the current informational media landscape more generally and some were specific to media about environmental and climate topics.

General news media landscape challenges for impact included:

- the reduction in independent and local news sources
- loss of public trust in the media
- growing polarization in news and audiences
- commonly seen frames of doom, gloom, and crisis
- misinformation and greenwashing (e.g., in oil-related industries)
- resource constraints and time restrictions

Mentioned challenges and risks specific to **environmental media** had to do with the complexity of the issues and the potential for misuse, including:

- difficulties reporters and media creators have in processing the **volume of information** and data available
  new data on water and fishing not being in the public domain
- an overemphasis on individuals (e.g., politicians) at the expense of groups and companies
- a trend toward the **oversimplification** of environment, climate, and water issues

[44] MIP advised and evaluated the impact of the social media campaign in support of Urbina's book launch and speaking tour. Watson-Currie, E., Jung, E., Vempati, S., Jauriqui, V. & Rosenthal, E. (2020). *The Outlaw Ocean: Final Evaluation Report on Social Media Analysis*. USC Annenberg Norman Lear Center.

- **misinformation** and **overinterpretation** of the data;
- **cooptation** of the data, messages, or facts for special interests
- and the possibility of **backlash**

Ten grasstops said news stories can often oversimplify complex water issues and seven highlighted that the volume of information in covering water is formidable. For example, several representatives of nonprofit organizations talked about issues relevant to their work being misrepresented or oversimplified in the media, leading to public distrust. Mentioned instances of oversimplification in Colorado included talk of water reduction being funded, where a large proportion was not funded, and alarming messages that the Lower Basin is running out of water and not doing anything about it, where the region has been taking steps toward conservation. Grasstops saw oversimplification as a byproduct of cursory reporting but also due to perceived incentives in the media to report more dramatic, crisis-based stories that captured public attention and generated clicks.

Eight grasstops named *crisis* and *doom/gloom framing* (i.e., dwelling on water as a crisis; pitting states and actors against each other) as particularly unhelpful (e.g., turf arguments in the news over Colorado River water ownership and pitting states against one another in coverage of water negotiations). This is consistent with what grantees[45] told MIP during our formative research: **hopefulness** enhances the quality and engagement potential of content. Bombarding audiences with apocalyptic climate and water stories leads to reader fatigue, trauma, and inaction. For this reason, grantees thought it more effective to infuse stories with hopefulness, sometimes linked to human entrepreneurship, in order to inspire audiences to engage more with the content and, eventually, act on the portrayed issues.
In terms of **backlash**, several grasstop interviewees mentioned that their stakeholders and audiences often distrust reporting funded by a single source, expecting an agenda instead of impartiality.

- *"How do we maintain impartiality among media*

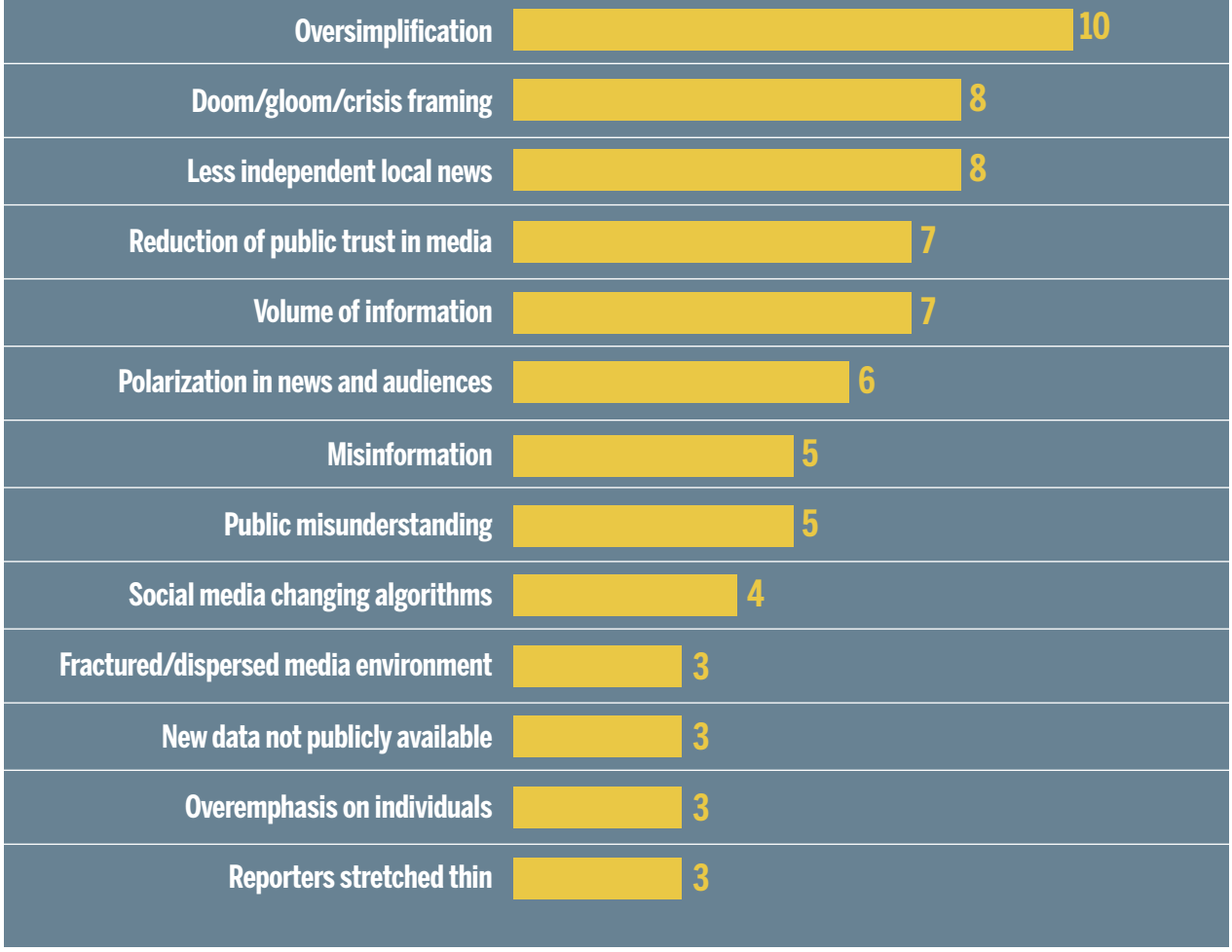
[45] Three interviewed grantees criticized negatively framed "doom and gloom" reporting on water and climate.

representatives that we know are being funded by a single entity no matter what that entity is? Because that is a constant chirp in the back of our brains about what coverage comes from that effort and that funding." (Interviewee, state/local policy)

In a world where philanthropy is increasingly supporting local media, ways in which journalism funding are disclosed need further research, in order to better understand how audiences interpret the disclosures and feel about "firewalls" between funders and reporters.

- *"[T]he general public doesn't understand why they need to know about these issues. The general public can understand something that sounds like crisis, that sounds like shortage, that sounds urgent. But when it comes to the day-to-day issues related to why those things might be urgent or all of that, it's about things that I think the general public doesn't understand why they should care about infrastructure and investments and all the things that make the system work."* (Interviewee, state/local policy)

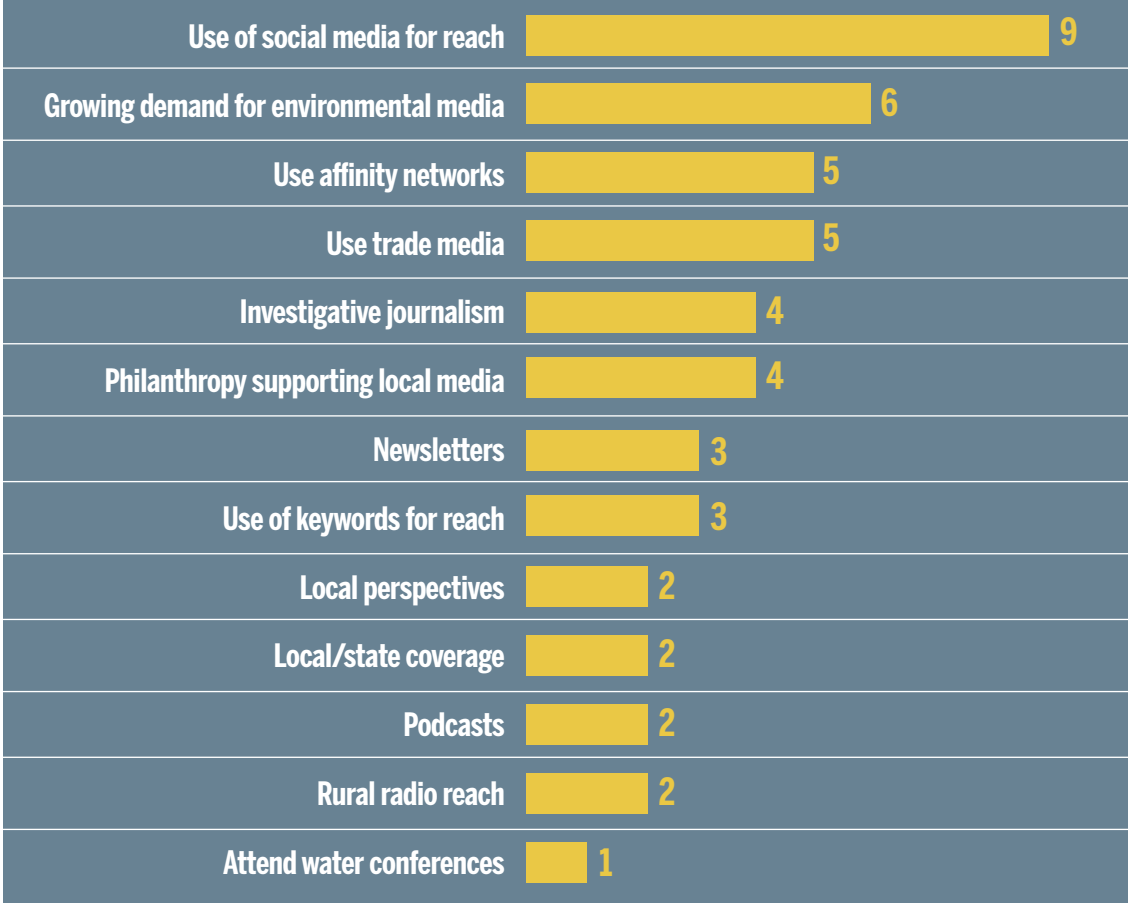
FIGURE 6. MOST OFTEN BROUGHT UP CHALLENGES, BY NUMBER OF INTERVIEWEES:



Opportunities for impactful environmental media as seen by grasstops

Interviewed grasstops named several **media trends** they see as associated with impact (Figure 7).

FIGURE 7. MENTIONED OPPORTUNITIES FOR IMPACT THROUGH ENVIRONMENTAL MEDIA, BY NUMBER OF INTERVIEWEES:



The **supply-side trends** most often mentioned included:

- leveraging social media (9), trade media (5), affinity networks (5), and newsletters (3) for dissemination of water-related communications
- focusing on investigative journalism for coverage (4) and the use of keywords in online articles (such as those most salient to congresspeople including their municipalities and last names) for targeted reach (3)
- strengthening the ability of philanthropy to create enabling conditions for local environmental media (4).

On the **demand side**, a notable trend articulated by the grasstops was the increase of public demand for environmental media (6). Many of the environmental trends noticed by grasstops highlighted the **competitive attention economy implicit in reaching busy target audiences**, such as federal policymakers, farmers, fishermen, ranchers, and rural publics. The saturated media market meant that the grasstops saw federal policymakers with Google alerts set up for their names and issues and that social media and trade media, specialized podcasts, and affinity groups (e.g., LinkedIn posts, group chats) as avenues to reach strategic audiences.

CONCLUSION

EMERGING IMPLICATIONS FOR GRANTEES/JOURNALISTS

1. Meet target audiences where they are

Although raising awareness in the general public is important, reaching specialized audiences—from collectives of farmers, fishermen, and ranchers to key state and federal decision-makers—requires strategic dissemination.[46] Strategic channels highlighted in our research included:

- Social media, especially affinity networks on LinkedIn and Twitter
- Trade publications
- Water, fishing, and agriculture-focused blogs and websites
- Research and academic repositories
- Multimodal content (including podcasts and films)

2. Collaborate and Innovate

- **Use Visuals.** A majority of the WFF-funded content in our sample made generous use of helpful visuals to inform and engage audiences.
- **Collaboration and Media Coverage:** Environmental media teams that use traditional media as well as new media types (social media, podcasts, etc.) can broaden reach and influence. Engaging with both local and national media ensures wider coverage and raises public awareness.
- **Multimedia Communication and Storytelling**: Using visuals and compelling narratives makes environmental issues more relatable and can effectively communicate complex data.

3. Inform target audiences

- **Name the Issues.** Articles that discussed climate change tended to have more engagement on social media. This indicates that contrary to popular opinion that climate change alienates audiences, there may be an unrealized appetite for content that explicitly discusses climate change in relation to water issues. According to the research, water reporting had several important social functions, including:
  - **Awareness Building**: Reporters could simplify complex environmental issues without loss of accuracy and complexity in order to educate the public about water-related issues. Even without overtly attempting to persuade audiences to take action, stories featuring innovations

[46] MIP acknowledges this may not align with a business model of reaching the widest possible general audience to gain subscriptions. However, our formative research surfaced that a substantial portion of grantees are interested in communicating water-related issues of importance in their local communities to those in positions to change regulatory policies and industry practices (the "grasstops"), as well as to those directly impacted (the "grassroots").

and solutions with a hopeful tone may be motivating for audiences. According to interviews, local and trade publications were the public go-to's for actionable information, such as water-positive behavior changes and local elections, while national publications act as sources for scientific consensus and coalition-building .

- **Investigative Journalism and In-depth Coverage:** Dedicated investigative reporting and thorough coverage helps to uncover insights about water issues, policies, and solutions. Interviewed grasstops saw reporting that focused on water conflict between states and municipalities as divisive.
- **Combating Misinformation:** It's important for reporters to address misinformation to ensure that the public receives accurate and reliable information, fostering informed decision-making in regards to water use and the connection between everyday water issues and big picture climate discussions.

4. Encourage change

- **Balance Short and Long Form.** Articles in our sample were almost twice as long as the average NYT article. While one might expect longer articles to be ignored in the digital media age, higher word count was, in fact, associated with higher engagement and impressions on social media. This suggests that audiences may be interested in longer journalistic pieces. Several interviewed grasstops mentioned that long form articles and series in national publications were valuable in their work, while they saw short form content as especially informative for young people and audiences less invested in water issues
- **Informing Action**: Providing actionable steps for the public and following up on reported issues can facilitate real-world changes.
- **Collaborative Reporting:** Grantees already collaborate with a variety of organizations, including other newsrooms and media outlets, sharing knowledge, creating new opportunities, and developing joint projects. Covering a story by showing the different implications across a variety of communities is one way of developing longer and more complex narratives about water quality and access issues. Readers interested in these complex issues may be likely to follow a series of related stories: Authors and platforms could cross-promote one another's stories.

5. Strategize social media posts

Incorporating social media tools can enhance message delivery and enable tracking of content spread across multiple social media platforms (e.g., YouTube, TikTok, Reddit). For example, journalists could:

- Develop a list of popular water- and climate-related hashtags and influencers for projects to build brand identity and aid amplification.
- Create engaging short form content (videos, infographics) to capture the attention of younger, digital-savvy audiences. For example, create short Instagram Reels or Stories showcasing behind-the-scenes footage from environmental projects or interviews with key experts. This can spark curiosity and drive viewers to explore the full story on other platforms such as articles or YouTube.

- Adapt the same message for different platforms to maximize reach and engagement. For example, use TikTok for short, attention-grabbing videos, YouTube for deeper, long-form interviews, Instagram for visually appealing infographics, and Reddit for in-depth discussions. This approach engages diverse audiences and reinforces key messages across multiple channels, bolstering impact.[47]

EMERGING IMPLICATIONS FOR PROGRAM OFFICERS/ FUNDERS

1. Prioritize educational outreach

- **Develop a training curriculum** in designing journalism for impact using the best practices identified as effective for increasing reach and engagement. Provide insights on ways to engage and center the voices of marginalized communities and tribal representatives. This could be a bespoke program designed for WFF COMMS grantees, such as offered by USC's Center for Climate Journalism and Communication (CCJC).[48] MIP has partnered with this center previously to evaluate the impact and reception of their podcast, *Electric Futures*. The MIP team would welcome an opportunity to collaborate with CCJC by evaluating grantees' satisfaction, learning, and other program impacts, including media training workshops and presentations of best practices for climate podcasting and news reporting geared toward relevant grantees and trainees.
- Alternatively, MIP could **develop a Tipsheet** based on this research or a Guide for WFF grantees and other funders of environmental journalism.
- **Incentivize existing grantees** to mentor new grantees, journalists new to water reporting, and/or journalism students, such as by providing them with funding for interns or travel stipends for speaking events, such as conferences, to connect with other journalists, stay current on research and resources, and avail themselves of professional development programs by the Society of Environmental Journalists and others.[49]
- **Facilitate in-person or online panels and information sessions** where established journalists specializing in water issues and the environment (e.g., Luke Runyon, Ian Urbina) can share their expertise and advise new grantees, journalism students, and others interested in expanding capacity to cover these complex topics.

[47] At the time formative evaluation interviews and surveys were conducted, most grantees were already using some social media to promote their content, with more desiring to do so in the future, particularly on image and video oriented platforms (e.g., Instagram, YouTube, TikTok).

[48] In "Funding the Future of Environmental Journalism—DRAFT," Meghan Parker indicates that in addition to a fear that climate and environmental topics are politicized and may alienate audience segments, a "general lack of scientific training…raises the stakes for editors and journalists who may be afraid to publish for fear of facing charges of inaccuracy or bias."

[49] During the formative phase, grantees shared examples of how grant-funding had already benefited their organizations, such as by providing resources for training, reporting trips, and attendance at conferences or events for skill enhancement and networking. Grasstops shared their perspectives about how difficult and resource-intensive it is to do high quality water reporting and get the intricate information across in simple ways.

2. Prioritize representation and reach

- **Community Voices and Diverse Perspectives:** Elevate voices from different communities, especially those directly impacted by environmental issues, to ensure a more inclusive and comprehensive dialogue.[50] A disproportionate percentage of the authors in our sample were white (88%), suggesting a need for more diversity in newsrooms, especially as communities of color are disproportionately affected by the environmental impacts of climate change. MIP's formative research surfaced WFF COMMS grantees' examples of ways in which their content had helped amplify voices from communities being harmed by water quality issues and environmental degradation, and bringing interested parties together to advocate for change in their communities. Communities centered by grantees have included BIPOC audiences, Native storytellers, Spanish-speaking publics, and smaller fishing communities and cooperatives. Journalists sharing backgrounds, perspectives, and characteristics in common with members of the communities they are covering can be beneficial toward establishing connections, trust, and understanding with interviewees, as well as helping to ensure interviewees' emotional health, privacy, and safety will be respected and protected.[51]
- **Positive Stories:** Highlight success stories, technological innovations, and positive developments in connection to water issues in order to inspire and motivate the audience, showcasing the effectiveness of various environmental initiatives.
- **Hyper-local Stories:** Feature content rooted in issues important to local communities and communities of color to help inspire audience engagement. In social media posts, audience members revealed information about their backgrounds and/or locations as a way of enhancing the credibility or authority of their opinions. This may point towards an underlying reason why local news coverage and community-centered journalism are consistently perceived as more credible than national news outlets and programs.[52] People instinctively trust those who are closer to, and perhaps more directly impacted by important issues.Thus, it is important to continue supporting local news desks as "One-fifth of Americans live in news deserts...Nearly 1,800 communities across the United States no longer have sufficient local news coverage from any source."[53]
- **Targeted Reach:** Support different kinds of publications to reach specific target audiences. Local constituencies, farmers, fishermen, and ranchers are more likely to read local newspapers

[50] Training for grantees on best practices for inviting and working with indigenous and BIPOC communities to showcase their voices and stories could be incorporated into a bespoke training program by USC's Center for Climate Journalism and Communication, as detailed in Item #1. Prioritize educational outreach. Their podcast, *Electric Futures*, provides an example of their "commitment to using research-based climate communications best practices, including a narrative storytelling approach." See Press Release from January 24, 2024, available at climatecenter.usc.edu/wp-content/uploads/2023/12/Electric-Futures-Press-Release.pdf

[51] Discussed and exemplified by panelists featured in Pulitzer Center's webinar "Beyond the Outsider's Gaze: Partnering With Communities in Visual Storytelling," (9/16/24) featuring grantees Justin Maxon, Brian L. Frank, and Judith Surber, and guest contributor Jacqueline Bates.

[52] In 2018, a study by the Poynter Media Trust discovered that even during the Trump presidency party-line differences in media trust were "substantially lower for local media sources than national ones — a finding that is driven by independents and Republicans, who report higher levels of trust in news sources within their community." Guess, A.; Nyhan, B.; & Reifler, J. (August 10, 2018) "All Media Trust is Local? Findings from the 2018 Poynter Media Trust Survey,." Available at: cpb-us-e1.wpmucdn.com/sites.dartmouth.edu/dist/5/2293/files/2021/03/media-trust-report-2018.pdf

[53] Communities of color are particularly poorly represented in both newsrooms and coverage. See report from the MacArthur Foundation "Inviting in Philanthropy to Strengthen Local News and Democracy" (February 7, 2023), at: www.macfound.org/press/perspectives/inviting-in-philanthropy-to-strengthen-local-news-and-democracy

and trade publications. Interviewed grasstops were interested in national publications for a more "objective" take on water, climate, and environmental issues. Interviewees also mentioned that Congressional staffers often use Google News alerts to track news specific to their office, indexing last names and municipality names. Thus, the use of specific keywords may increase the likelihood that these stories will show up in policymakers' news feeds.

3. Support social media integration

Fund projects that incorporate social media tools to enhance message delivery and track content spread across multiple social media platforms (e.g., YouTube, TikTok, Reddit). For example:

- **Encourage grantees to create short form content** (videos, infographics) to engage younger, digital-savvy audiences.[54] If necessary, provide additional resources and/or incorporate into the training curriculum suggested above.
- Promote the creation and consistent use of popular **climate-related hashtags and influencers** for projects to build brand identity and aid amplification.

[54] At the time formative evaluation interviews and surveys were conducted, most grantees were already using some social media to promote their content, with more desiring to do so in the future, particularly on image and video oriented platforms (e.g., Instagram, YouTube, TikTok).

APPENDIX A: CONTENT ANALYSIS METHODS

SAMPLE IDENTIFICATION

During the formative phase, MIP compiled a master list of 2,615 grantee story titles and links,[55] along with an initial geography designation for each story, based on the grantees' locations:

- 66% were from grantees funded by the Mississippi River Basin portfolio (MRB).
- 31% were from grantees funded by the Colorado River Basin portfolio (CRB).
- 3% were from grantees funded by the Oceans portfolio (Oceans).

As so few were available, all Oceans stories were selected into the initial sample to maximize representation of this region.[56] To balance regional representations as much as possible, MIP oversampled CRB stories, randomly selecting an even number of CRB and MRB stories into the initial sample of 700 stories:

- 45% MRB
- 45% CRB
- 10% Oceans

The WFF team reviewed the selection and flagged for replacement stories not aligned with grantmaking strategies.[57] A keyword analysis (using keywords from ToCs) was conducted to highlight previously unselected stories most likely to align with program goals. Stories containing ToC keywords were randomly selected from the initial list to add as replacements.[58]

The final analyzed sample contains 689 stories:

- 50% (MRB);
- 43% (CRB);
- 9% Oceans.

[55] Sources included grantees' reports, WFF lists of grantees' stories, and interviews with grantees like Pulitzer.

[56] Later a few Oceans stories were dropped (e.g., unrelated to WFF's grantmaking strategies, links unavailable, full-text unavailable).

[57] WFF's reasons for rejection included story content not directly related to Environmental Program goals, focus outside WFF's main interests, and target audience inconsistent with WFF's key audiences.

[58] During content analysis, 11 stories had to be dropped as they were duplicates with different titles (e.g., shorter versions reprinted on different platforms), or suitable text was unavailable.

CODEBOOK

Drawing from grasstops interviews and secondary research,[59] we identified **seven overarching best practices for effective science communication** and measured their presence in our sample of **689 WFF-funded articles.**[60] We also developed several previously untested, theory-informed best practices for empirical validation in social media analysis. Informed by research and expert guidance, these best practices are context-specific and oriented toward different types of impact. Importantly, the application of best practices depends on the context of the work and the particular goals of the journalistic endeavor.

We measured 27 journalistic qualities that fall under seven overarching best practice categories:

1. Refrain from overly complex terminology: Avoiding scientific jargon and complicated language can increase audience understanding of water-related issues.[61]

- What is the reading difficulty score of this article?[62]
- What percentage of "big words" does this article contain?[63]
- Does this article contain any keywords associated with WFF theories of change?[64]

2. Multimedia storytelling: A photograph or infographic can increase reader interest and attention, while infographics can help communicate data in an effective and engaging manner.

- How many photographs are included in this article?[65]
- Does the article contain photos of human beings?[66]
- Does this article include any audio or video components?[67]
- Does this article show any graphical visualizations of data?[68]

[59] Rosenthal et al. (2022) Measuring the Impact of Science Journalism

[60] During the content analysis phase we were unable to locate suitable text corresponding to 10 of the links that were used in the quantitative Twitter analysis. As such, the content analysis sample (n = 689) is slightly lower than the quantitative Twitter analysis sample (n = 699), submitted as an interim deliverable. We have adjusted the Twitter dataset to match the content analysis sample to assess correlations between the story features and Twitter impressions and composite engagement.

[61] Some of our grasstops noted that environmental media can play a crucial role in simplifying complex environmental issues and making them easy to understand for the general public. Additionally, they observed that academic experts who can effectively communicate complex information in lay language are particularly valuable.

[62] Reading difficulty scores are computed as a function of words per sentence and syllables per word.

[63] "Big words" are defined as those that are seven letters or longer, and tabulated using Linguistic Inquiry and Word Count software (LIWC).

[64] These keywords were generated by the MIP team based on the Theories of Change developed in our formative phase of research.

[65] According to one grasstops interviewee, photos can tell a powerful story and evoke emotions. Selecting the right photos that accurately represent the issue at hand can help engage and inform the audience.

[66] "A story where people learn about the background, where they connect in a personal way with somebody's passion or personality—those stories tend to do well" (Rosenthal et al., 2022).

[67] One grasstops interviewee suggested that exploring alternative media formats, such as podcasts, can be effective in reaching and engaging audiences. Podcasts offer a platform for in-depth discussions and storytelling, allowing for a deeper exploration of environmental issues.

[68] One grasstops interviewee suggested that infographics can help simplify complex issues and make information more easily understandable for the public; they can visually represent data, timelines, and decision-making processes, which can be highly effective in conveying information.

3. Bring science close to home: Writing local stories can make scientific findings feel relevant and personal to audiences.

- Is this article published by a local news organization?[69]
- Does the location of the article subject matter correspond to the location of the publication? (Is the article local?)[70]
- Does this article include a quote from someone who lives in the location of the article subject matter?[71]
- Is the article listed in the "local" section of the publication?[72]

4. Connect science to health outcomes: Health framing is one of the best methods to motivate behavior change, especially among conservative and moderate audiences.[73]

- How much does this article pertain to wellness?[74]
- How much does this article pertain to health?[75]
- How much does this article pertain to illness?[76]
- Does this article mention any human health problems?[77]

5. Positive stories: Environmental problems may seem daunting, which is why stories with a hopeful tone that suggest solutions may be more palatable to audiences.

- Does this article mention any government legislation that is intended to address an environmental problem?[78]
- Does this article have a positive emotional tone?[79]

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[69] Our grasstops interviewees suggested that local media outlets can play a crucial role in cultivating knowledge and understanding among the local community.

[70] Grasstops suggested that by highlighting local conservation efforts, featuring stories of individuals or businesses making a difference, and providing independent perspectives, local media can have a significant impact.

[71] "A story where people learn about the background, where they connect in a personal way with somebody's passion or personality—those stories tend to do well" (Rosenthal et al., 2022).

[72] Our grasstops interviewees suggested that local media outlets can play a crucial role in cultivating knowledge and understanding among the local community.

[73] Rosenthal et al., 2022

[74] This item was measured by using a dictionary of wellness-related words developed by LIWC.

[75] This item was measured by using a dictionary of health-related words developed by LIWC.

[76] This item was measured by using a dictionary of illness-related words developed by LIWC.

[77] This item was measured by creating a dictionary of the most 100 most common human ailments and supplemented with general illness-related terms (sick, illness, ailment, etc.). This dictionary was validated by positively correlating article scores with illness-relevant scores produced using LIWC (Cohen's $d = .7$, $p < .001$).

[78] One of our grasstops suggested that media can serve as a form of pre-accountability by following and reporting on government actions related to environmental issues. This coverage can create expectations and pressure for policymakers to prioritize environmental concerns and continue previous initiatives. This item was measured with LIWC using a proprietary NLC dictionary and double-checked manually by coders.

[79] Tone was computed using a LIWC's emotional-positivity index: "The emotional-positivity index was calculated as the difference between the LIWC scores for positive emotion words (e.g., happy, good, nice) and negative emotion words (e.g., kill, ugly, guilty)...Higher scores indicate greater overall emotional positivity." Boyd, RL et al. (2022). *The development and psychometric properties of LIWC-22*. Austin, TX: University of Texas at Austin.

- Is the language of this article future-oriented or past-oriented?[80]
- Does this article contain the word "solutions" or other words that are predictors of quality solutions journalism?[81]
- Is the headline of this article problem-focused?[82]

6. Diverse perspectives: Diverse newsrooms can show how science topics impact underserved communities.

- What are the racial and gender demographics of authors?[83]
- What are the racial and gender demographics of photo subjects?[84]
- Does this article mention the names of any indigenous American groups?[85]

7. Emerging best practices: We also measured miscellaneous items to test several emerging best practices:

- Does this article mention "climate change"?[86]
- Does this article specify any private corporations, businesses, or companies?[87]
- Does this article mention any politicians?[88]
- What is the word count of this article?[89]

18 items were coded using Linguistic Inquiry and Word Count software (LIWC). The LIWC software provides data for the average New York Times (NYT) article as a reference for print journalism more broadly. To aid with interpretation, we include comparisons between WFF-supported and NYT stories.

[80] Future-oriented language may be associated with imagining solutions and effects of environmental problems.

[81] Solutions Journalism (SJ) focuses on the how-to's of problem solving and can be useful in engaging audiences who feel overwhelmed, pessimistic, or defeatist about daunting topics.

[82] This item is included as a *negative* measure of article positivity. It was coded manually by researchers and student coders. Articles that were coded as having a problem frame were significantly associated with lower emotional positivity scores.

[83] See Rosenthal et al. (2022) for a discussion of the importance of diversity in newsrooms.

[84] One of our grasstops suggested that environmental media should strive to include diverse perspectives and voices, especially those of marginalized communities who are often disproportionately affected by environmental issues.

[85] One of our grasstops advised that articles should focus on undercovered topics, such as indigenous conservation and reaching Hispanic communities and communities of color. This item was measured with LIWC using a NLC proprietary dictionary and double-checked manually by coders.

[86] There is an ongoing debate about the business case for explicitly mentioning climate change in popular media (see Giaccardi et al., 2022).

[87] Some have hypothesized that calling out polluting corporations in journalism can produce engaging articles and foster social change. A grasstops interviewee suggested that targeting industry and business leaders through media coverage can encourage them to take action and make changes; by highlighting sustainable practices or exposing greenwashing, media can influence corporate behavior and promote environmental responsibility. This item was measured with LIWC using a NLC proprietary dictionary and double-checked manually by coders.

[88] One grasstops interviewee suggested that environmental media can have a greater impact on policymakers and decision-makers who pay attention to coverage that mentions their names.

[89] It may be equally plausible that longer articles would be positively *or negatively* associated with impact. One grasstops interviewee suggested that concise articles or stories that explain complex environmental issues in a simple and accessible manner have been found to generate a lot of traction and readership. At the same time, in-depth, investigative reports or series that delve into complex environmental issues can be highly impactful for readers who are interested in understanding the nuances and details. Thus, we might defensibly hypothesize a positive or negative correlation between word count and social media impressions. This item was measured with LIWC using a NLC proprietary dictionary and double-checked manually by coders.

15 items were manually coded by USC interns. Manual coding followed a two-month training period that included several rounds of testing and refining the codebook and the coding procedures. These 15 variables were subjected to additional reliability analysis by double coding 20% of the sample and computing Krippendorf's Alpha scores for each variable. All human-coded variables achieved adequate reliability. (Location and locality of each periodical were coded retroactively via secondary research.)

Table 4. Interrater reliability for human coded items

Variables	Krippendorf's Alpha[90]
What is the race of this author	0.80
How many authors wrote this article?	0.88
How many photographs are in this article?	0.98
Is there at least one photo of a human being in this article?	0.92
Is there at least one infographic in this article?	0.90
What is the gender of this author?	0.95
Does this article have an audio component?	0.81
Does this article have a video component?	0.87
Does this article have at least one photograph of a person of color?	0.91
Does this article have at least one photograph of a woman?	0.95
Does this article have at least one photograph of a woman of color?	0.93
Is this article primarily non-text?	1.00
What is the newspaper section of this article?	0.90
What is the location of this article?	0.89
Is the headline of this article problem-focused?	0.61

[90] Alpha values of 1.00 indicate "perfect" reliability for the item. Alpha values greater than .6 indicate adequate reliability. Alpha values between .4 and .6 indicate marginal reliability.

APPENDIX B: SOCIAL MEDIA ANALYSIS METHODS

TWITTER METRICS

In November 2023, we acquired a Twitter API Pro account, to access historical data from Twitter. We collected all tweets that mentioned either story title or story URL as of November 31, 2023, using this Twitter API Pro access. We then cataloged the reach, impressions, and composite engagement associated with 699 WFF-funded stories.

- **Reach:** The total number of people who may have seen tweets that mention the story title or URL. It is calculated by summing the number of followers of each Twitter account that published CC-related tweet(s).
- **Total Impressions:** The total number of times Twitter users may have seen tweets that mention the story title or link. It is calculated by summing the number of relevant tweets published by each Twitter account multiplied by the account's number of followers.
- **Composite Engagement:** The total number of times Twitter users liked, commented on, or reshared tweets that mention or link to the story.

RELATIONSHIP BETWEEN USE OF BEST PRACTICES AND TWITTER METRICS

We also examined the relationships between the presence of content associated with emerging best practices for science journalism (49 content variables) and Twitter metrics (impressions and composite engagement) across 689 stories.[91] We performed a Logistic Regression, Pearson correlation, Spearman correlation, T-test, Mann-Whitney U test and Chi-Square test.

- For categorical variables with two categories (absence:0, presence:1), we performed the T-test, Mann-Whitney U test, Chi-square test, depending on the sample variance.
- For continuous variables, we performed Pearson correlation, Spearman correlation, and Linear Regression analysis.

[91] During the content analysis phase we were unable to locate suitable text corresponding to 10 of the links that were used in the quantitative Twitter analysis. As such, the content analysis sample (n = 689) is slightly lower than the quantitative Twitter analysis sample (n = 699), submitted as an interim deliverable. We have adjusted the Twitter dataset to match the content analysis sample to assess correlations between the story features and Twitter impressions and composite engagement.

Best Practice 1. Refrain from overly complex terminology

- Stories with fewer words per sentence had **greater impressions** (P<.001***).[92]
- Stories with a lower percentage of "big words" had **greater engagement** (P<.05*).

Best Practice 2. Multimedia storytelling

- Stories with a video component, more photos, and at least one infographic all had **higher impressions** (P<.001***) **and engagement** (P<.001***).

Best Practice 3. Bring science close to home

- Stories in local and city publications had **lower impressions** (P<.001***) **and engagement** (P<.001***).
- Stories in national news publications had **higher impressions** (P<.001***) **and engagement** (P<.001***).
- This is a best practice for maximizing impact at a local level. As such, overall impressions and engagement may not be a valid indicator of the local impact of stories.

Best Practice 4. Connect science to health outcomes

- Stories with more health (P<.01**) and wellness (P<.05*) related keywords garnered **more impressions**.
- Stories with more health, wellness, and illness related keywords, as well as those that mentioned human health problems, had **greater engagement** (P<.01**).

Best Practice 5. Positive stories

- Stories with more present-related keywords and that mentioned legislation received **more impressions** (P<.05*) **and engagement** (P<.01**).
- Stories with more future-focused keywords had **lower impressions** (P<.001***) **and engagement** (P<.01**).[93]

Best Practice 6. Diverse perspectives

- Stories with more POC authors (P<.01**) and indigenous terms (P<.05*) drew **more impressions**.
- Stories with more POC authors (P<.01**) and indigenous terms (P<.001***) drew **more engagement**.

[92] Interpreting P-values: <.05* is significant; <.01** is highly significant; <.001*** is very highly significant.

[93] Stories with future-focused keywords might come off as less pressing or more speculative, which could explain the lower engagement. Whereas, content that's tied to current events or real-world implications (e.g., present-related keywords, mentions legislation) resonates more with audiences on social media.

Emerging best practices

- Stories that mentioned climate change more frequently **garnered greater impressions** (P<.05*) **and engagement** (P<.001***).
- Stories that mentioned specific businesses as causes of environmental problems **garnered greater impressions** (P<.05*) **and engagement** (P<.01**).
- Longer stories received **more impressions** (P<.001***) **and engagement** (P<.001***).

AMPLIFIER ANALYSIS

For each of WFF's three subregions, we identified the top five stories that garnered the most impressions as well as the top five stories that generated the most engagement. For each of these top five stories, we identified the top ten amplifiers (Twitter users) who generated the most impressions (N=200), as well as the most engagement (N=184). Using Twitter API (Pro), we extracted the following information about each user:

- **Username**: The unique identifier or handle for a user on Twitter
- **Number of tweets**: The count of tweets posted by the user for the given story
- **Follower count**: The number of followers that the user who posted the tweet has
- **Bio description**: A short summary written by the user to describe themselves or their account. It appears on their profile page and can include details about their interests, profession, or any other personal information they choose to share
- **URL in the bio**: A web address included in the user's bio description. It is typically used to link to the user's personal website, blog, business page, or any other relevant online presence

After removing repeat Twitter accounts (e.g., @AP, @StarTribune, @NewsHour, etc.) across datasets, one student coder analyzed a total of 279 unique amplifiers based on 12 WFF's key audiences in the formative phase of our research. The variables include:

- "Media organization(Yes, No)"
- "Individual journalist (Yes, No)"
- If they fall under any of the 10 WFF's key audience categories as identified in the formative phase of our research.

Here is a list of top 10 amplifiers with the most impressions for each of the top 5 stories generating the highest impressions.

DEEP DIVE SOCIAL MEDIA DIALOGUE ANALYSIS

Story Selection

We analyzed social media dialogue associated with three WFF-funded news stories that represent each of three regions—Oceans, Mississippi River Basin, and Colorado River Basin. In consultation with WFF, we selected one video-based news story published on YouTube and two text-based news stories published via online news outlets, to examine online audiences' reactions expressed toward stories delivered on a variety of media platforms. We also considered factors like unique keywords in the headline and text, high reach and engagement on social media, and anecdotal evidence from the WFF team regarding the popularity and strategic interest of the stories.

- **Story 1 Oceans:** "Putin's Pollock: US seafood imports fuel Russian war machine" in The Associated Press by Joshua Goodman and Helen Wieffering (April 15, 2022). This article tells the story of how US imports of Russian seafood, particularly pollock, are inadvertently funding Russia's military activities. The report highlights the significant volume of seafood trade between the two countries and its implications for global trade and national security, emphasizing the need for stricter regulations and a reevaluation of trade policies to prevent supporting adversarial regimes.
- **Story 2 Mississippi River Basin:** "Nitrate pours into Mississippi River and other U.S. waterways, report says" in Wisconsin Watch by Bennet Goldstein (October 8, 2022). This story provides an in-depth look at the alarming levels of nitrate pollution entering the Mississippi River and other U.S. waterways. The report details the sources of this pollution, primarily agricultural runoff, and its detrimental effects on water quality, aquatic life, and human health. It underscores the urgent need for more effective environmental policies and agricultural practices to mitigate the impact of these toxic chemicals on America's waterways.
- **Story 3 Colorado River Basin:** "Native American tribes plea for help as Colorado River dries up" in ABC News by Kayna Whitworth (October 6, 2021). This news segment covers the severe drought in the southwest, where the drying up of the Colorado River has forced over 40 million people, including members of 29 Native American tribes, to ration water. These reports highlight the significant impact of water shortages on local farmers and communities, along with the urgent need for sustainable water management solutions.

Data Collection

For the two online news stories, we identified three subreddits that mention the story title and the url to the published story. Using the Python Reddit API Wrapper (PRAW), we extracted a total of 432 Reddit comments and replies (Story 1: 384 comments, Story 2: 48 comments). For the ABC News broadcast segment published on its YouTube channel, we extracted a total of 3,331 YouTube comments associated with the video.

Analysis

To examine the impact of these stories on social media audiences, we used large language models (LLMs) and human coding. After removing duplicates, we analyzed a 20% randomly-selected subsample of YouTube comments (N = 432) and 215 Reddit comments. Two student coders evaluated these comments based on 26 variables, including sentiment toward the U.S. government, Native Americans, states, and farmers, as well as emotion, tone, attitudes, calls to action, self-identification, and behavioral responses (Table 5).

We employed the large language model (Nous-Hermes-13b) to detect the emotions in each comment. Two student coders reviewed the model's outputs for accuracy, identified any missed emotions, and captured nuances like tone and attitudes. We further examined the overall sentiment (positive, negative, neutral) toward commonly mentioned stakeholder groups of interest to WFF, including the U.S. government and its representatives, U.S. states, foreign countries and governments, Native Americans, farmers, and fishermen.

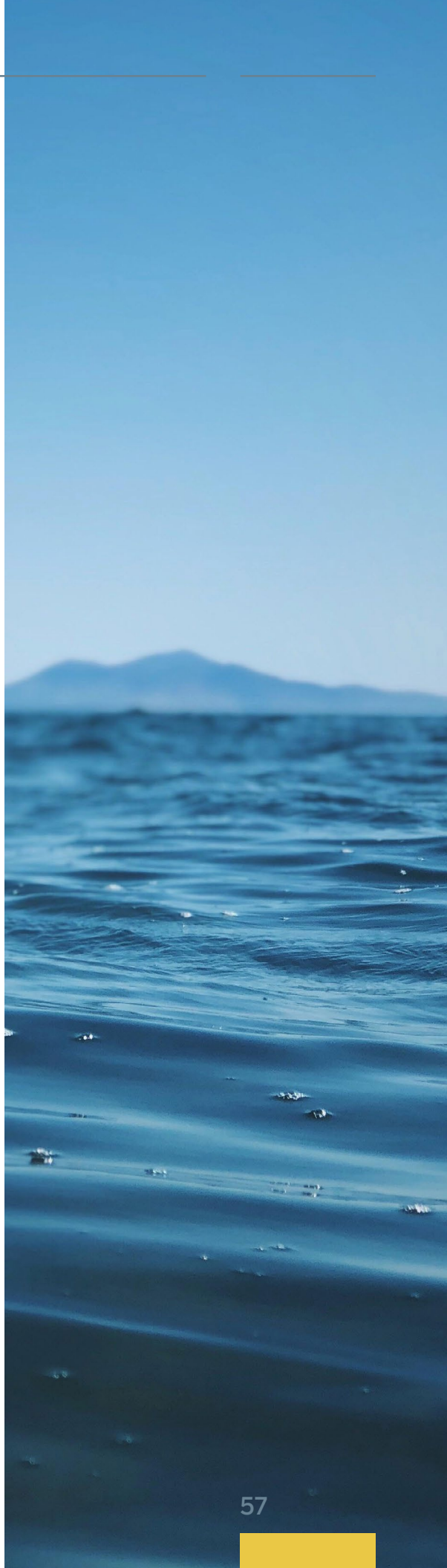
Additionally, we explored cognitive responses expressed in the comments (e.g., learning something new, reinforcing existing beliefs) as well as behavioral responses (e.g., call-to-action, intent to take action).To better understand the social media users, we examined self-disclosed information in comments, focusing on the commenter's location and profession.

Results of the reliability analysis indicate there was acceptable agreement between the coders on all items except for emotional reactions, for which reliability was borderline.

Table 5. Interrater reliability for human coded items

Variables	Krippendorf's Alpha[94]
If a [stakeholder group*] is mentioned in a comment, what sentiment is expressed toward that group? (Positive, Neutral, Negative) *Stakeholder groups include: US government, U.S. state, foreign country or government, farmers, fishermen, Native Americans.	0.80
Do you agree with the emotions/ tones identified by the LLM in the analyzed social media comment? (Yes, No, Mixed)	0.88
Does the comment include any call-to-action? (Yes, No)	0.98
Does the comment include any self-disclosed information about the commenter? (Yes, No)	0.92
If yes, is the profession mentioned? (Yes, No)	0.90
If yes, is the location mentioned? (Yes, No)	0.95
Does the comment express learning new knowledge, feelings, beliefs or behaviors? (Yes, No)	0.81
Does the comment express confirming existing knowledge, feelings, beliefs or behaviors? (Yes, No)	0.87
Does the comment express having taken any action or intention to take any action? (Yes, No)	0.91

[94] Alpha values of 1 indicate "perfect" reliability for the item. Alpha values greater than .6 indicate adequate reliability. Alpha values between .4 and .6 indicate marginal reliability.



APPENDIX C: GRASSTOPS INTERVIEW METHODS

MIP held 21 semi-structured in-depth interviews with people that represented key audiences and groups for WFF's COMMS portfolio. The interviews were held with representatives from the following groups:

- **Local/state policy:** 13 individuals
- **Federal policy:** 5 individuals
- **Nonprofits:** 7 individuals
- **Academics:** 3 individuals
- **Industry-related:** 2 individuals

Questions centered on ways in which grasstops currently apply and leverage environmental media in their work and ways in which they could see these media leveraged for impact in the future.

- These interviews were recorded, transcribed, and systematically coded for indicators of impact, characteristics of environmental media associated with impact, and challenges and opportunities associated with environment-focused media going forward.
- We also coded every mention of media organizations and particular individuals working in environmental media (e.g., journalists) to better understand which positively-framed outlets and voices are seen as trustworthy, applicable, and connected to WFF.

SAMPLE QUESTIONS:

1. Describe your role and what your team does.
    a. What are your goals dealing with environment, water, policy, climate, conservation?
2. How do you and your team use media and journalism in support of this work?
    a. Are there particular sources or voices that are your go-tos to get information for this work? Examples of sources or stories? Why these?
    b. Are there particular sources or voices that you consider particularly trustworthy in your field? Examples? Why these?
    c. Are there particular sources or voices that are currently gaining more traction in your field than in prior years? Examples? Why these?
    d. Are there any particular sources or voices you're hearing about through word-of-mouth in your local community / industry?
    e. Any particular sources or voices you believe are resonating with your constituents?

3. Could you give examples of media and/or journalism coverage making an impact on your work?
    a. What aspects of the coverage were especially important?
4. In general, how do you think media/journalism affect work in your field?
    a. Are there specific challenges in terms of media/journalism making an impact in your field? Any examples of this?
    b. Are there specific opportunities in terms of media/journalism making an impact in your field? Any examples of this?
    c. What topics do you feel are undercovered by environment-related media?
    d. What information needs do you have that are well met and unmet given the current media landscape or what you have access to?

Walton Family Foundation
Environmental Communications Portfolio

Program Evaluation
Final Report

Fall 2024

Report by:
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