

Routine Influences on Aquaculture News Selection: A Q Method Study With New England Journalists

Science Communication

2019, Vol. 41(5) 602–632

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DOI: 10.1177/1075547019862554

journals.sagepub.com/home/scx

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Abstract

Environmental journalists, as gatekeepers, often become arbiters of risk and benefit information. This study explores how their routine news value judgments may influence reporting on marine aquaculture, a growing domestic industry with complex social and ecological impacts. We interviewed New England newspaper journalists using Q methodology, a qualitative dominant mixed-method approach to study shared subjectivity in small samples. Results revealed four distinct reporting perspectives—“state structuralist,” “neighborhood preservationist,” “industrial futurist,” and “local proceduralist”—stemming from the news value and objectivity routines journalists used in news selection. Findings suggest implications for public understanding of, and positionality toward, natural resource use and development.

Keywords

environmental journalism, gatekeeping, news values, objectivity, Q methodology, aquaculture

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The news we consume arrives by way of gatekeeping—a social process extending beyond simple story selection to comprise the complex decision making of various gatekeepers (Shoemaker & Vos, 2009). By allowing or impeding messages, gatekeepers, including journalists, influence news production at five levels of analysis: individual, routine practice, media organization, social institution, and social system (Shoemaker & Reese, 2014). In the case of environmental news, the multifaceted nature of issues, such as climate change, further complicates the gatekeeping process and the associated barriers journalists face when reporting on associated human health, economic, and governance applications.

Posing implications for water quality, food security, and biodiversity, marine aquaculture, or the farming of aquatic species, such as finfish or shellfish, in saltwater or brackish water, is one such environmental issue garnering increasing attention in the United States. Though domestic aquaculture production is minimal on a global scale (National Marine Fisheries Service [NMFS], 2017), industry growth has spurred considerable controversy in some areas (Hanes, 2018; Johnson & Hanes, 2017). Furthermore, as recent news media content analyses have shown, the coverage of marine aquaculture often presents both risks (e.g., ecological impacts) and benefits (e.g., job creation; Rickard & Feldpausch-Parker, 2016; Rickard, Noblet, Duffy, & Brayden, 2018).

In this study, we apply Q method with New England journalists to examine news selection in the context of marine aquaculture. Using quantitative and qualitative data, we use journalists' interpretations of selected news statements to understand the influence of "news value" and "objectivity" routines on content decisions, specifically related to the balance of risk and benefit information. After presenting four distinct reporting perspectives, or factors, emergent from the data, we suggest practical and theoretical implications of this work.

News Routines and Selection

News production routines help journalists make decisions about what issues or events to cover and how to cover them (Shoemaker, Eichholz, Kim, & Wrigley, 2001). They are the patterned practices and rules that "form the immediate context, both within and through which these individuals do their jobs" (Shoemaker & Reese, 2014, p. 165). Routines stem from audiences, organizations, and information sources and place constraints on the question of "what is news?" As a result, journalists contend with tensions among the presumed content preferences of their audience, the format requirements and deadlines imposed by their organization, and the availability of reputable

news sources. These tensions suggest that news is not only a social artifact but also the product of decisions made by journalists when considering their various stakeholders (Shoemaker, 2006). In this study, we are concerned with the cognitive judgments journalists use to select aquaculture news content and how those judgments are influenced by “news value” and “objectivity” routines, which have proved particularly pertinent to the framing of environmental issues in the news media (e.g., Boykoff & Boykoff, 2004, 2007).

News Values

When journalists make news selection judgments, they evaluate content using established news values, which provide a benchmark for a story’s relative newsworthiness (Shoemaker & Reese, 2014). These values reflect socio-cultural functions and help predict whether an issue or event will be selected for news (Harcup & O’Neill, 2017). The “news value” concept was first introduced by Lippmann (1922/1961) and later formalized by Östgaard (1965) and Galtung and Ruge (1965) to explain bias in international news coverage. They hypothesized the likelihood an event will be covered in news is dependent on the quantity of newsworthy elements inherent in the event itself; however, as studies began to investigate this hypothesis, researchers (e.g., Schulz, 1976) began to question whether news values were, in fact, objective qualities of events or subjective interpretations journalists attributed to stories. Staab (1990) describes this ideological shift as one from a causal model to a functional model, where news values are not only understood as the causes but also the effects of journalistic decision making.

Catalogues of news values have been conceptualized using psychological and cultural theories (Galtung & Ruge, 1965; Shoemaker, 2006), professional experience (Bell, 1991; Harcup & O’Neill, 2001), observation of and interviews with journalists (Schultz, 2007), and literature reviews (Caple & Bednarek, 2013). While each catalogue varies with respect to the number of and context in which news values are investigated, Shoemaker and Reese (2014) suggest most comprise six core values: Timeliness (how recent), proximity (how geographically or culturally close), impact (how prominent), oddity (how unusual or novel), human interest (how elite), and conflict (how controversial). The influence of these and other related news values has been investigated primarily through quantitative content analysis of published print news (Galtung & Ruge, 1965; Harcup & O’Neill, 2001, 2017; Schulz, 1976; Shoemaker & Cohen, 2006). This content analytic approach, however, has been criticized for its inability to assess the prominence of news values in stories that are not published and to elaborate on why coverage contains particular news values (Bednarek & Caple, 2017; Harcup & O’Neill, 2001). As

a result, more ethnographic approaches have both been advocated and enacted, including newsroom observations and in-depth interviews with news producers (Buckalew, 1969; Lester, 1980; Masterton, 2005).

Objectivity

When journalists make news selection judgments, they rely not only on routine conceptualizations of news values but also on professional values. Principal among these values is objectivity, which has been described as “a moral ideal, a set of reporting and editing practices, and an observable pattern of news writing” (Schudson, 2001, p. 149). The “objectivity” concept developed out of an interest to preserve democracy amid the growing presence of political propaganda in the early 20th century (Schudson, 1978, 2001). While early conceptualizations of objectivity called for “the highest of scientific virtues . . . and a keen understanding of the quantitative importance of particular facts” (Lippmann, 1922/1961, p. 82), the actual practice of objectivity relies on well-intentioned but ambiguous calls for factuality (truthfulness and relevance) and impartiality (nonpartisanship, balance) in professional codes of conduct (Schudson, 1978, 2001; Streckfuss, 1990; S. Ward, 1999; Westerståhl, 1983).

The role of impartiality, in particular, is critical to understand given circumstances in which journalists express subjective judgments—a central focus of the present research. Historically, journalists interpreted the call for impartiality as the need to maintain nonpartisanship, providing news statements that neither supported nor opposed public figures or issues (Boudana, 2016). As a result, journalists were seen as passive transcribers of news still susceptible to political manipulation (Cunningham, 2003). Recognizing an increased need for validity checks and issue interpretation amid the time and space constraints already imposed on them, journalists turned to “balance,” intentionally providing equal attention to competing sources and their claims (Applegate, 2009; Boudana, 2016; Entman, 1989), as a means to operationalize the objectivity routine (Boudana, 2016; Dunwoody & Peters, 1992). In practice, balance can mean contrasting the two dominant sides of a story (Applegate, 2009; Boudana, 2016; Boyer, 1981), often relying on official sources for one or both (Cunningham, 2003). This “balance” can introduce informational bias when weight-of-evidence or alternative arguments are neglected in news coverage (Boykoff & Boykoff, 2004, 2007; Dunwoody, 2005).

Aquaculture Context

The complexity and politicization of environmental topics may increase journalistic reliance on news value and objectivity routines in news coverage. Boykoff and Boykoff (2004, 2007), for example, traced the use of the routine

in newspaper reports about climate change, demonstrating not only that balance led to informational bias but also that news values significantly influenced this use of balance. To extend these findings, we introduce a contemporary environmental issue, marine aquaculture development, with implications for U.S. coastal communities, including those in New England.

Aquaculture Development

Marine aquaculture, or the farming of aquatic species in a saltwater or brackish environment, is a complex news topic comprising social and ecological issues. While the United States is a minor aquaculture producer on the global scale, the industry is growing (NMFS, 2017) and represents an increasing share of global food production (Food and Agriculture Organization of the United Nations, 2018). U.S. farms are raising many varieties of finfish, shellfish, and sea vegetables, but Atlantic salmon (*Salmo salar*) and eastern oyster (*Crassostrea virginica*) constitute the largest commercial aquaculture operations (Table 1; NMFS, 2017), together, contributing more than \$200 million to the Northeast and Mid-Atlantic regions (National Oceanic and Atmospheric Administration, 2013). Marine aquaculture in Maine is the largest among New England states (Aquaculture Research Institute, 2017), due in large part to industrial-scale Atlantic salmon farms (Lapointe, 2013).

After a half-century of marine farming efforts in this region, aquaculture has become a fixture of local politics, economics, and culture. Through complex and often contentious public discussion and deliberation, federal and state agencies, regional fisheries councils, universities, and local communities have each acknowledged the coupled relationship between the social and ecological impacts of aquaculture (Hanes, 2018; Johnson & Hanes, 2017). The recent proliferation of aquaculture operations has solidified the future of the industry in the New England economy, but debates concerning risks and benefits to the local environment nonetheless recur (Rickard et al., 2018). Such debates are replayed in news media and have become the central concern of a growing body of communication research examining aquaculture media discourse.

Aquaculture News

Research on aquaculture print news has relied primarily on quantitative content analysis (e.g., Amberg & Hall, 2010; Feucht & Zander, 2016; Froehlich, Gentry, Rust, Grimm, & Halpern, 2017; Schlag, 2011). Results suggest most newspaper coverage about aquaculture is reserved for iconic, high-value species, including Atlantic salmon, and for recurrent references to high-profile events, such as escapes of farm-raised species into surrounding waterways

Table 1. Regional Comparison of Population, Aquaculture Production, and Newspaper Media.

	New England	Maine	Massachusetts	Rhode Island
Population (% rural) ^a	14,444,865 (19.2)	1,328,361 (61.3)	6,547,629 (8.0)	1,052,567 (9.3)
Saltwater farms leased (acres) ^b	171 (24,191)	22 (970)	110 (410)	19 (91)
Food fish farms (sales in \$1,000) ^b	34 (510)	11 (D)	10 (D)	—
Mollusk farms (sales in \$1,000) ^b	200 (34,031)	22 (D)	132 (D)	21 (5,734)
Atlantic salmon farms (sales in \$1,000) ^b	4 (D)	4 (D)	—	—
Eastern oyster farms (sales in \$1,000) ^b	174 (10,162)	17 (D)	123 (D)	21 (D)
Largest daily newspaper (average circulation) ^c		Portland Press Herald (47,076)	Boston Globe (277,687)	Providence Journal (67,394)
Daily newspapers (weekly newspapers) ^d	56 (137)	5 (21)	20 (57)	3 (10)

Note. D = withheld to avoid disclosing data for individual farms. New England comprises the states of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont.

^aU.S. Census, 2010. ^bU.S. Census of Aquaculture, 2013. ^cAlliance for Audited Media, 2017. ^dGale Directory for Publications and Broadcast Media, 2018.

(Diana, 2009). Furthermore, researchers have observed a tendency for aquaculture news stories to balance risk and benefit information (Olsen & Osmundsen, 2017; Rickard & Feldpausch-Parker, 2016), which has been shown to have a negative effect on attitudes, especially among people unfamiliar with the issue (Robertson, Carlsen, & Bright, 2002). In many cases, messages about aquaculture benefits are used to contextualize the industry through employment and landings data, while messages about risk refer to more complex concerns related to the biophysical environment (e.g., pollution and genetic dilution), social environment (e.g., coastal aesthetic and water access), and/or human health (e.g., genetically modified food and disease; Amberg & Hall, 2010; Duffy & Rickard, 2017; Rickard & Feldpausch-Parker, 2016). Until recently, news attention to aquaculture was almost exclusively focused on salmon; however, finfish now compete with shellfish and sea vegetables for news attention in some regions (Duffy & Rickard, 2017; Rickard & Feldpausch-Parker, 2016).

Research Questions

While New England presents a unique social and environmental context, the similarities in the way its news media frames aquaculture suggest that issues related to politics, economics, and environmental risk are also publicly salient (Duffy & Rickard, 2017; Rickard & Feldpausch-Parker, 2016). Instead of focusing on existing media content, this study engages with an earlier stage in the news production process, examining how routine decisions about content come to be made. Focusing specifically on the influence of routine news value judgments on content selection, we ask the following research question:

Research Question 1: When reporting on marine aquaculture, what news frames do journalists consider of the most and the least value?

Further acknowledging the complexity of coverage, and the multiple frames from which journalists can select, we also ask the following research question:

Research Question 2: When reporting on marine aquaculture, how do routines motivate journalists to promote the frames ranked as most important?

Q Methodology

A qualitative dominant mixed-method approach to study subjectivity (Ramlo, 2016), Q methodology compares how individuals with common viewpoints

understand an issue (Brown, Durning, & Selden, 2007). The issue (in this case, aquaculture) guides development and sampling from the “concourse,” or universe of communicable elements (Goldman, 1999; McKeown & Thomas, 2013; Ramlo, 2016; Stephenson, 1993). These elements are used as a point of self-reference for participants who sort them according to their own subjectivities. Q methodology is therefore an exploratory process wherein “issues of ‘substantive inference’ (generalization *about*) warrant preferential treatment over matters of ‘statistical inference’ (generalization *to*)” (Thomas & Baas, 1992, p. 22). In other words, Q methodology is primarily concerned with revealing the diversity of viewpoints that exist about an issue, not how prevalent a particular viewpoint is in a population. As a result, Q cannot support hypotheses, but it can “bring a sense of coherence to research questions that have many, potentially complex and socially contested answers” (Watts & Stenner, 2005, p. 75). Some past applications of Q methodology with journalists include exploring their role in environmental reporting (Giannoulis, Botetzagias, & Skanavis, 2010), international television reporting (Kim, 2002), new media reporting (Singer, 1997), and news story selection (Ward, 1967). Below, we specify study sampling and design, as well as data analysis, interpretation, and validity.

Sampling

Q methodology requires two sampling types: The Q sample (or Q-set) includes all elements sampled from concourse, while the P sample (or P-set) includes all people selected to perform the Q-sorting. Contrary to traditional survey practices, Q methodology symbolizes the number of elements in a concourse as N , rather than the number of people (or their Q-sorts), which it instead symbolizes as n (McKeown & Thomas, 2013). This is due to Q’s inverted nature—recognizing people as the “variables” of interest (Watts & Stenner, 2005).

Constructing the Q sample is one of the more labor-intensive tasks in designing a Q study. The goal is to approximate a concourse by sampling its linguistic or nonlinguistic elements, usually statements or photographs, which represent the full range of viewpoints. Most Q samples rely on naturalistic elements of discourse, such as quotations from in-person interviews or items from published media (McKeown & Thomas, 2013). Selected elements are then adapted for internal consistency often following structured design principles. Stephenson (1993) advocates Fisher’s (1935/1971) principles of factorial experimentation, and similar variants appear in Brown (1970) and Sæbjørnsen, Ellingsen, Good, and Ødegård (2016).

In this study, 40 statements were selected from more than 400 newspaper articles published in Maine from 2000 to 2015 about the development of aquaculture. The statements reflect the reported frames and aquaculture species previously identified in quantitative content analysis (Duffy & Rickard, 2017). The number of statements per frame varied to reflect their relative prominence in the news: economics (6), politics (5), environmental risk (4), research (4), aesthetics (4), food quality (4), sustainability (4), environmental benefit (3), health benefit (3), and health risk (3). The number of statements per aquaculture species was similarly varied: general reference (22), finfish (7), shellfish (7), and sea vegetable (4). Among these statements, consideration was also given to whether they provided favorable (15), unfavorable (15), or neutral (10) information as perceived by aquaculture proponents.

While Q sample construction followed an informal structure based on previous research, substantial effort was made to retain “the natural phrasing of the original communications representing the linguistic context of the discourse” (McKeown & Thomas, 2013, p. 22). Given the long-standing norm of objective, fact-based reporting in news, the Q sample was primarily composed of factual, nonevaluative, and value-neutral statements. While somewhat unusual in traditional approaches to Q methodology, the inclusion of objective elements does not limit the expression of subjectivity when positive or negative values are assigned through a statement ranking scale (McKeown & Thomas, 2013). Such an approach has been used in studies on editorial news selection (Ward, 1967) and news consumption (Galow, 1973; Sanders, 1967). Indeed, the approach preserves the naturalistic news reading experience and permits analysis of the self-referent interpretations of the participants in context.

Constructing the P sample is dependent on the viewpoints of interest and the bounds of the concurrence under study, with the goal of selecting participants who represent sufficiently diverse issue interests and experience to permit direct comparison of different viewpoints within a concurrence. Structured factorial designs may be employed to help select participants, as is common in Q sample construction; however, more pragmatic considerations, such as geographical context and participant availability, often limit their practicality (McKeown & Thomas, 2013). Furthermore, Q methodology follows an intensive approach to analysis specifically adjusted to account for small sample sizes (McKeown & Thomas, 2013).

In this study, 15 newspaper journalists with aquaculture reporting experience were identified from the New England states of Maine, Massachusetts, and Rhode Island using criterion and snowball sampling approaches, such as identifying journalists who had written about the topic and soliciting their

recommendations for additional participants at their own or other news outlets (Miles & Huberman, 1994). The purposive P sample provides a point of triangulation with the results from existing aquaculture content analyses of news coverage in the same region (Duffy & Rickard, 2017; Rickard et al., 2018; Rickard & Feldpausch-Parker, 2016). Among the journalists, median professional experience was 27 years (range: 2-32 years), and staff positions varied from general assignment, environment, or business reporter to chief editor.

Design

Journalists were presented with the 40 aquaculture news statements printed on cards and asked, *Which of the following issues do you think are important to consider when you report on aquaculture?* They were explicitly and regularly encouraged to reflect on how any of the statements might be used in a news story and why specific statements have news value. The journalists were asked to read the statements (e.g., “near-shore salmon pens have raised serious concerns about pollution”) and subsequently sort them into one of three piles: statements perceived to be “more important,” “less important,” and statements that were not easily sorted into the first two piles. This initial sort prepared the journalists for the main Q-sort, where they placed each statement on a matrix scale from “less important” (−4) to “more important” (+4). To facilitate this process, journalists were asked to reread statements from the first pile, select the two statements they perceived to be most important, and place these statements on the matrix in the +4 positions (Figure 1). This procedure continued until all of the important statements (+N) were distributed. Next, journalists sorted the two least important statements on the −4 positions of the matrix, followed by the remaining less important statements (−N). Finally, journalists placed the remaining undecided statements in the middle of the matrix. Journalists were permitted to swap statement positions throughout the sorting process, and most elected to do so. Once the journalists confirmed their ranking for each of the 40 news statements, they were recorded.

Following the Q-sort, journalists were interviewed about the process, including what thoughts they had about the statements in general, how specific news frames they identified were used in stories, and why they were motivated to make specific statement rankings. While special attention was given to statements placed at the extreme ends of the matrix scale, journalists (both prompted and unprompted) reflected on statements across the entire scale.

The multistage Q-sort and debriefing interviews were jointly conducted in person (average length = 45 minutes) between May and December 2017

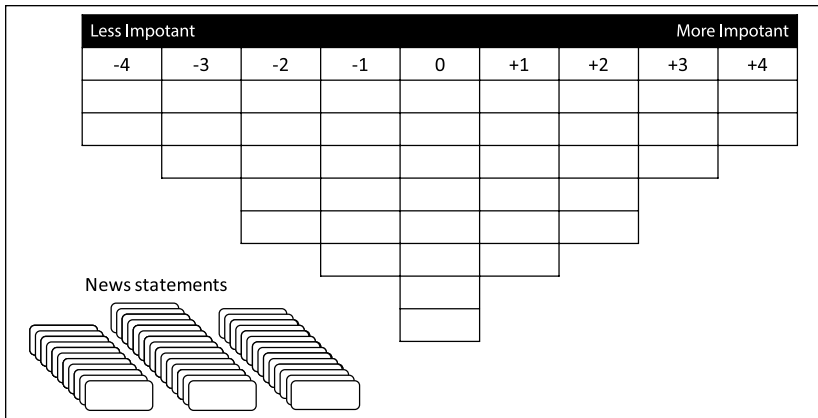


Figure 1. Q methodology matrix for statement ranking.

Note. Journalists were forced to sort concourse elements into a quasnormal distribution with 40 positions for 40 news statements.

following standard Q methodology practice (McKeown & Thomas, 2013; Watts & Stenner, 2005). Journalists spent an additional 45 minutes on a questionnaire and semistructured interview about environmental journalism (results not reported). With consent, all activities were audiotaped and transcribed by a professional transcription service.

Analysis

Individual journalist Q-sorts were loaded into PQ Method 2.35 statistical software. First, a matrix of Q-sort correlations was computed to reveal similarities between journalists' full sorts (McKeown & Thomas, 2013). Then, principal component analysis revealed patterns in sorting choices by grouping journalists' shared reporting viewpoints. These "perspectives" are represented as individual factors. The factors were rotated using varimax orthogonal rotation to explore which explained the most variance. Four factors were selected using statistical and theoretical criteria: eigenvalues greater than 1 (Kaiser, 1960); explained variance greater than 10%; and the degree to which the solution was interpretable using descriptive information such as newspaper circulation and relative statement rankings (McKeown & Thomas, 2013; Watts & Stenner, 2005).

The final PQ Method analysis generated four factor-representative Q-sorts from the averaged weightings of all journalist Q-sorts (McKeown & Thomas, 2013; Watts & Stenner, 2005). Each averaged Q-sort represents a particular

reporting perspective, and factor loadings indicate the degree to which an individual journalist's Q-sort corresponds with any of the four perspectives. Significant loadings were determined using the formula $2.58(1/\sqrt{N})$, where N is the number of statements (McKeown & Thomas, 2013). Factor loadings above 0.41 were significant at the .01 level. Journalists with statistically significant "pure" loadings (i.e., no cross-loading) were retained (Giannoulis et al., 2010). Factor loadings of journalists (Table 2) and factor scores of statements (Table 3) were interpreted and triangulated with data from the debriefing interview transcripts.

Interpretation

To describe the perspective each factor contributes, the results focus on identifying salient statements ranked at the extremes (-4 , -3 , $+3$, and $+4$), distinguishing statements for the respective factor ($p < .05$), and describing accompanying journalist motivations, as gleaned from the debriefing interview. We also provide a brief discussion on consensus statements, which received similar rankings across all four factors.

Validity

Q practitioners argue that validity concerns fade because there is "no external criterion by which to appraise a person's own perspective," so the emergent factors "must represent functional categories of the subjectivities at issue" (Brown, 1993, p. 106). While we acknowledge the reporting perspectives inherent in the factor-representative Q-sorts, we used several verification strategies to ensure methodological rigor (Morse, Barrett, Mayan, Olson, & Spiers, 2002) and upheld Lincoln and Guba's (1985) tenets of "trustworthiness" by facilitating open-ended discussion with journalists about news selection decisions, ensuring consistent research protocols, and debriefing among the researchers.

Results and Discussion

Analysis of journalist Q-sorts revealed four factors that together account for 56% of the cumulative variance (Table 2). Three factors had at least two Q-sorts (i.e., journalists) with statistically significant pure loadings. The fourth factor had only one significant pure loading (i.e., one journalist); however, given its theoretical importance, this single factor was retained (McKeown & Thomas, 2013; Watts & Stenner, 2005). Below, we name and interpret each of the four factors, incorporating quantitative and qualitative data.

Table 2. Factor Loadings of Journalists After Varimax Rotation.

Journalist ID	News focus	News format	Topic focus	Factor A	Factor B	Factor C	Factor D
J02	Local	Print/online	Shellfish	0.8045*	-0.2228	-0.1442	0.2664
J12	Local	Print/online	Shellfish	0.64*	0.3247	0.0407	-0.09
J09	Statewide	Online	Shellfish	0.6195*	0.3275	0.2189	0.0632
J14	Local	Print/online	Shellfish	0.5573*	0.3353	0.3436	-0.0435
J06	Local	Print/online	Finfish	0.8597*	0.0382	0.21	0.0243
J10	Statewide	Print/online	Finfish	-0.0212	0.8077*	-0.3265	-0.0358
J05	Statewide	Print/online	Shellfish	0.0767	0.7683*	0.246	0.3164
J15	Statewide	Print/online	Mixed	0.3945	0.6305*	0.1436	-0.4416
J01	Statewide	Print	Finfish	0.3675	0.5587*	0.2491	0.1845
J07	Statewide	Print/online	Mixed	0.2995	0.4328*	0.3405	-0.569
J13	Statewide	Print/online	Mixed	0.0636	0.0415	0.7998*	0.0562
J11	Statewide	Print/online	Mixed	0.1479	-0.0027	0.6713*	-0.1912
J03	Local	Print/online	Mixed	0.106	0.1321	-0.0762	0.7312*
J04	Local	Print/online	Shellfish	0.5269	0.1354	0.1682	0.5662
J08	Local	Print/online	Mixed	0.1884	0.3948	0.4435	0.4135
Variance (%)				22	18	13	12

Note. Asterisk indicate statistically significant "pure" loadings ($p < .01$).

Table 3. Average Statement Rank and Z Score Per Factor.

No.	Statement	Factor A		Factor B		Factor C		Factor D	
		Rank	Z score	Rank	Z score	Rank	Z score	Rank	Z score
1	Mussels are an extra lean food with protein and Omega-3 ^{††}	-2	-1.257	-1	-0.777	-2	-0.742	-2	-0.958
2	A local trailblazer supports the sustainable foodie culture	2	0.911	-3	-1.364*	0	-0.167	0	0.000
3	Company fined for operating without water quality permit	-1	-0.372	0	0.109	-1	-0.409	2	0.958
4	Shellfish filter algae and pollution from surrounding waters	2	1.246	0	-0.107	1	0.742	1	0.479
5	The sea vegetable market is environmentally sustainable	1	0.531	0	-0.015	-1	-0.613	0	0.000
6	DMR is on the verge of granting a new lease	0	0.285	-2	-0.941*	0	-0.075	4	1.916**
7	Pesticides from aquaculture could harm lobster fishery	0	0.031	4	1.864**	0	0.037	1	0.479
8	Research recommends limits for farmed salmon consumption	-4	-1.730*	-2	-0.870	-1	-0.409	-1	-0.479
9	There is debate about taste and quality of farmed and wild fish	-2	-1.011	1	0.534**	-2	-0.780	-2	-0.958
10	Farmed salmon contain more cancer-causing pollutants	-3	-1.448	0	-0.181	2	1.113**	-2	-0.958
11	Farmers in Maine sell \$50 to \$100 million in products per year	4	1.984*	2	0.663	2	0.817	2	0.958
12	Rapid increase of oyster farms harms resident enjoyment	3	1.467	1	0.393	3	1.689	0	0.000

(continued)

Table 3. (continued)

No.	Statement	Factor A		Factor B		Factor C		Factor D	
		Rank	Z score	Rank	Z score	Rank	Z score	Rank	Z score
13	DMR will hold a public hearing about a controversial lease [†]	2	0.635	1	0.582	-1	-0.242	1	0.479
14	Maine's coast and food promotes sustainable investment	2	0.807	-1	-0.230	3	1.151	-1	-0.479
15	A public scoping session will be held	-1	-0.287*	-2	-0.955	-3	-1.151	3	1.437**
16	A proposed farm may affect wildlife	0	0.183	3	1.523**	1	0.167	-3	-1.437**
17	A farm will expand with help from a new NOAA grant [†]	-2	-1.282	-1	-0.824	-1	-0.575	0	0.000
18	A community meeting will be held	-1	-0.339	-3	-0.979*	0	-0.167	2	0.958*
19	A new journal article raises valid concerns about the industry	0	-0.233	-2	-0.941	4	1.726**	-2	-0.958
20	Aquaculture takes pressure off of oceans	1	0.388*	2	1.120*	-1	-0.575	-3	-1.437
21	The toxins collected in shellfish can harm people	1	0.473	0	-0.047	-2	-1.113	-2	-0.958
22	DMR will study the site before granting a lease	0	0.091*	2	0.846	-4	-1.931**	3	1.437
23	Maine oysters are often considered the best in the market	-2	-0.649	-4	-2.081**	1	0.780*	-1	-0.479
24	Kelp is high-quality food product [†]	-1	-0.602	-3	-1.171	-2	-0.742	0	0.000
25	The state's 180 aquaculture farms employ 600 people	3	1.402	3	1.474	0	0.075	0	0.000
26	Fish pens raise concerns about pollution, disease, escapes	-3	-1.453**	4	2.045*	2	0.947	2	0.958
27	Oysters vary in taste by region like wine	0	-0.241	-4	-2.322**	1	0.575	-1	-0.479
28	New research makes progress on cultivation methods	1	0.562	0	0.148	4	2.097**	-1	-0.479

(continued)

Table 3. (continued)

No.	Statement	Factor A		Factor B		Factor C		Factor D	
		Rank	Z score	Rank	Z score	Rank	Z score	Rank	Z score
29	40 Full-time jobs were lost as a result of an operation closure	0	0.025	2	0.934	2	0.780	4	1.916
30	The aquaculture business is committed to sustainability	-1	-0.344	-1	-0.275	-3	-1.726**	1	0.479
31	Kelp cleans waters	1	0.295	0	0.135	0	0.000	-3	-1.437*
32	Kelp is good source of vitamins	0	-0.047	-2	-0.908	-2	-0.742	0	0.000
33	Nonnative oysters could compete for and limit nutrients	-2	-0.611	-1	-0.500	0	-0.204	-4	-1.916**
34	New research helps the testing and development of vaccines	-3	-1.567**	2	0.653	3	1.522	1	0.479
35	DMR enacted new regulations††	1	0.322	1	0.578	2	0.984	2	0.958
36	Leases cost \$50 per acre per year	-1	-0.379	-1	-0.257	-4	-1.893**	0	0.000
37	Salmon is healthy protein and good source of vitamins	-4	-1.898	0	0.033	-3	-1.484	-1	-0.479
38	A lease could affect local character, recreation, and tourism	3	1.355**	1	0.302	0	-0.204	-4	-1.916**
39	There is a need for siting guidelines on noise and appearance††	2	0.601	1	0.511	1	0.204	1	0.479
40	The lease could affect ocean-front access and navigation	4	2.157	3	1.295	1	0.538	3	1.437

Note. DMR = Department of Marine Resources; NOAA = National Oceanic and Atmospheric Administration. The above Q statements are abbreviated versions of the statements adapted from original news content. Rank and Z score data represent the average weighted sorts per factor (n = 15 sorts). Daggers indicate consensus statements among all factors: †p < .05, ††p < .01. Asterisks indicate distinguishing statements for that factor: *p < .05, **p < .01.

Factor A: Neighborhood Preservationists

A total of 5 out of 15 journalists loaded on this factor, which accounts for 22% of the explained variance (Table 2). All but one journalist wrote for a newspaper with locally based news and circulation (e.g., Mid-Coast, Maine); the remaining journalist wrote for a state-focused, online-only publication. These journalists attributed the most importance to coverage of marine aquaculture that cited economic figures and impacts on other (non-aquaculture) marine users (Table 3). Specifically, these individuals perceived statements about aquaculture's ability to disrupt oceanfront access to wild fisheries and recreational navigation (statement 40), local resident enjoyment (12), and coastal scenic character (38) as important reporting considerations. These journalists likewise perceived statements about aquaculture's contribution to state revenue (11) and employment (25) as important. They attributed the least importance to aquaculture coverage that cited salmon, specifically as a risky (8, 10) or beneficial (37) food source, and as an environmental risk (26, 34).

In this factor, news story scope and newspaper circulation area appeared to motivate journalists' value rankings. Journalists specifically acknowledged a need for local frames in reporting on aquaculture, and sometimes sought to distinguish themselves and their publication from other journalists at larger publications, as the following quotation suggests:

In the local paper, where we cover planning board meetings and public scoping [sessions]—if we hear there's a scuffle that would rise to news—whereas if I worked for a bigger paper, I think one farm bothering a few neighborhoods. If it was small, I probably wouldn't write about it. (J14)

Indeed, several of these journalists explicitly considered the scope of the newspaper and suggested that the coverage should match the scale of "neighborhood" conflict. This is further supported by the importance they attributed to statements about marine aquaculture's potential to affect the lived experience of coastal residents and other users, as exemplified in the following:

Most stories I've read about proposed aquaculture projects—there's always a neighborhood—there's concern about the scenic character. And that seems very valid, so I'm imagining if I'm covering a hearing and someone's going to stand up and say "I don't wanna be looking at those lights flashing off these floats on my house." (J12)

Supporting the salience of this perspective, recent scholarship has suggested that residents near existing or proposed marine aquaculture installations may perceive the projects as threatening their "lived experience"—that is, one's

physical surroundings (e.g., coastal views and water access) and related social-psychological reactions (e.g., place attachment; D'Anna & Murray, 2015). The need to promote this local aesthetic conflict may be tempered with news content about economics. Indeed, the economic statements valued by journalists in this factor were not localized to their particular region; however, the journalists expressed motivation to rank them as more important because they provided a source of local contextualization or balance. As the journalists explained,

This is a very depressed economy up here, people are very interested in the number of jobs that'll be created. (J06)

You know aquaculture is a growing industry in this region and you know that's positive, it's great. But there seems to be a struggle right now to balance that against the concerns of both traditional fisheries, like the clam diggers and lobstermen, as well as riverfront property owners and recreational boaters. (J02)

These journalists acknowledged their preference to balance risks to coastal uses with benefits to the economy, a perspective that may align with how New England residents make sense of the complex issue of marine aquaculture development (Rickard et al., 2018). Importantly, when paired with an intensely local focus, other issues, including how aquaculture relates to general seafood consumption or human health, become less salient, as typified in the following quotations:

We don't have any—we don't deal with salmon. . . . Oyster aquaculture is the big thing around. (J09)

It's framed so much as a business issue and a cultural issue that people don't ever seem to be talking about the flavor or health from the perspective of someone who's gonna be consuming these products. (J14)

Thus, journalists' promotion of statements about non-aquaculture coastal uses and their contextualization or balance of place-based concerns with economics suggests these journalists report on aquaculture using a distinctly "neighborhood preservation" perspective.

Factor B: State Structuralists

A total of 5 out of 15 journalists loaded on this factor, which accounts for 18% of the explained variance (Table 2). Each journalist wrote for a newspaper with a statewide news focus and circulation. They attributed the most

importance to aquaculture coverage that cited aquaculture's impact on the coastal environment and state economy (Table 3). Specifically, they perceived statements about aquaculture's impact on other species (16, 26) and industries (7, 40) as important reporting considerations. These journalists also perceived the statement about aquaculture-based employment opportunities (25) as an important consideration. They attributed the least importance to coverage that cited aquaculture food products, specifically related to their taste or quality (23, 24, 27) and environmental sustainability (2), and community meetings (18). The lack of importance attributed to local aquaculture is further supported given these journalists also ranked a statement about a proposed aquaculture farm (6) significantly lower than did journalists associated with other factors.

In this factor, journalists appeared motivated to assign value to news statements by the statewide scope of their newspaper. Indeed, journalists' value rankings of news content reflected an affinity toward statements that described broad impacts relevant to residents across their state, rather than specific to a community:

I was trying to keep sort of the big picture in mind, what has an impact for Maine residents, you know. (J01)

The jobs, the amount of value, the industry, the overall benefits. And some reference to the overall benefits and costs, environmental impacts and economic value . . . just a hit of the big picture is always important to have. (J07)

When asked to specify, journalists tended to note the importance of physical impacts of marine aquaculture on the state's coastal environment, including water pollution and habitat disturbance. Other impacts viewed as high in news value included conflict with major industries (and state employers), which journalists often framed in an economic context:

The coastal conflicts in Maine, especially because you have the lobster industry or tourism, which I mean are the two biggest coastal industries we have. (J07)

You know, it's people who do it to earn a living or meet a market need otherwise there wouldn't be a demand for it. But there's also environmental concerns and you have to balance those two against each other. (J15)

Similar to journalists in Factor A (neighborhood preservationists), these journalists were explicit about their need to balance marine aquaculture concerns with benefits; however, the journalists' broad geographical and industry focus meant that some issues (e.g., industry trends) were perceived as more important than others (e.g., product quality):

Some of these things on individual [aquaculture lease] applications, again it would have to be highly unusual for me to write about it. I'm usually looking at the industry-wide statewide trends, and I'd write about individual operations, but it would always be in the context of those bigger issues. (J05)

There are a bunch of things here on the quality and taste of different products . . . but they're not the key issues, so that's just why they're lower down. (J05)

Journalists acknowledged deliberation in assigning issue importance, suggesting that concerns about aquaculture were of high news value if they could be “appropriately” scaled (i.e., framed as relevant to the state and/or beyond). Journalists therefore attributed less importance to local concerns and more importance to issues that could be more easily discussed in broader terms, such as interindustry or environmental issues that threaten to change the role of and access to the region's traditional fisheries. Thus, we argue that these journalists report on aquaculture using a “state structure” perspective.

Factor C: Industrial Futurists

A total of 2 out of 15 journalists loaded on this factor, which accounts for 13% of the explained variance (Table 2). Both journalists wrote on the business beat for a newspaper with a statewide news focus and circulation. Unsurprisingly, these individuals attributed the most importance to coverage of aquaculture that cited new marine aquaculture developments and the impacts of industry trends (Table 3). Specifically, they perceived statements about aquaculture research that affects industry-wide development (19, 28, 34) as important reporting considerations. Furthermore, these journalists noted industry trends, including an increase in shellfish aquaculture operations (12) and an increase in investment opportunities (14), as having high news value. They attributed the least importance to aquaculture coverage that cited routine local regulatory requirements (15, 22, 36), an environmentally sustainable aquaculture business (30), and salmon as a beneficial food source (37).

In this factor, journalists attributed the highest value to news statements describing novel trends in the aquaculture industry. Often, journalists saw value in representing these industry trends in the context of conflict. For example, one journalist indicated as follows:

That's an important element of a story—conflict. So “the rapid increase over the past three years”—there's a trend; that's important, they have a trend—“has alarmed some area residents who fear it could have an adverse impact on the

estuary and their enjoyment of it.” There’s the conflict. That’s what I look for in a story. (J13)

These journalists promoted other contexts, such as economics, and they acknowledged the role of news scope in identifying the important trends. As one journalist in this factor suggested,

Maybe it’s because we’re the state paper, but I don’t generally write about specific individual [aquaculture] projects unless it’s a first, a worst, a last, a huge employer, or a huge dollar or revenue generator. We tend to write about trends. (J11)

People in Kennebunk [Maine] don’t care if the Jonesport guy is angry unless you can write about it as a trend. (J11)

Whereas journalists associated with other factors used the economic context as source of balance against environmental or place-based concerns, these journalists appeared to use economics to support claims about trends in what they viewed as a vital industry:

It tends to be about dollars, jobs, Maine’s singular position in an industry. (J11)

The journalists’ promotion of statements about the impacts of new trends, particularly in research or business, meant their scope was not location based. Instead, the scope was focused on development of the aquaculture industry itself, offering an “industrial future” perspective.

Factor D: Local Proceduralist

Only 1 out of 15 journalists loaded on this factor, which accounts for 12% of the explained variance.¹ The journalist wrote for a newspaper with a local news focus and circulation and attributed the most importance to specific local aquaculture operations (Table 3). In particular, the journalist perceived statements about a farm proposal (6), regulatory requirements (15, 22), farm siting (40), and the impact of a business closure (29) as important reporting considerations. The importance given to local politics is further supported given this journalist also ranked a statement about a community meeting (18) significantly higher than did other factors. In contrast, this journalist attributed the least importance to aquaculture coverage that cited impacts on native species (16, 33), an aesthetic concern (38), and aquaculture’s potential benefit to the environment (20, 31).

In this factor, history of conflict emerged as the leading motivation for the journalist to assign value to news statements. Specifically, the journalist acknowledged that much local conflict was due to a contentious regulatory process in the newspaper's circulation area, as exemplified by the journalist's characterization of the state-level marine aquaculture lease renewal proceedings as "very heated" (J03). Within the regulatory process, the journalist described conflict related to public participation at official meetings, specifically the opportunity for locals to voice their concerns:

I mean the whole story is about, presumably, somebody is applying for a lease, and either there is, or is going to be, or just has been a scoping session, or an application filed, or a public hearing. The crux of all of those stories is that people have come to express their concerns about the impact of aquaculture on the coast of Maine. (J03)

The journalist's local news scope meant favoring stories focused on individual proponents, such as aquaculture farmers; individual opponents, such as waterfront homeowners; and individual farm operations, existing or proposed. Furthermore, the journalist suggested that the reasons for public contention were so often repeated that the type of aquaculture became almost a nonissue:

You almost forget. I mean, what's being farmed almost becomes a forgotten issue. It's the background, the history. All of those things are specific to specific stories, and if you are writing for a local paper . . . what would get them going . . . would be a proposal relating to some specific project. (J03)

Thus, this journalist's promotion of statements about historical aquaculture conflict within local regulatory processes offers a distinctly "local procedural" perspective to aquaculture reporting.

Correlation and Consensus

While not the primary focus of the results, it is instructive to note correlations between some factors. For example, Factors A (neighborhood preservationists) and C (industrial futurists) exhibited the highest correlation ($r = .26$), meaning journalists whose sorts loaded highly on one of those two factors tended to be more similar than journalists whose sorts loaded highly on the other factors. In addition, journalists shared the same opinion about six statements ($p < .05$), meaning the rankings of the six statements were relatively consistent across individuals in all four factors. These news statements

addressed the regulatory process of aquaculture (13, 35, 39); a large federal research grant focused on aquaculture development in Maine (17); and aquaculture food products (1, 24). Because these statements tended to be ranked similarly and as neutral in importance (Table 3), they provide limited information to differentiate the discourses. Instead, these consensus statements shed light on the type of issue framings that tend not to stimulate strong news value judgments among the journalists.

Conclusions and Implications

This research followed two main objectives: (a) adapting Q method to an environmental news context using actual news statements and (b) assessing the gatekeeping influence of news value and objectivity routines on journalists' news content decisions, specifically related to balancing risk and benefit information about marine aquaculture. In pursuing these objectives, we extended our understanding of existing, largely descriptive, research documenting aquaculture coverage in U.S. print news media to consider journalists' motivations for producing such coverage.

Limitations

We acknowledge several limitations to this research. First, though generalizability of the results to populations outside those sampled is not a goal of Q studies (Brown et al., 2007), the validity of the emergent factors could nonetheless have been improved with the inclusion of more journalists. Furthermore, as our Q study did not follow Fisher's (1971) factorial design, and included objective (i.e., news content) rather than subjective statements, our approach diverged from more traditional expressions of Q methodology; however, as explained above, we believe such decisions are justified given the substantive context of our research. Second, while the research team jointly discussed the Q-sort and supporting interview data, the lead author served as the sole coder of qualitative data and primary interpreter of quantitative data. To minimize this limitation, the lead author frequently shared emergent findings with the research team and made changes based on this feedback. Third, this study considered value judgments related to a relatively narrow issue (i.e., marine aquaculture) from individuals working in a likewise limited geographic area (i.e., New England). As explained below, future research should consider applying a similar methodology to broader environmental science-based issues (e.g., types of coastal development) of interest to journalists from a broader geographic swath. Finally, in considering exclusively print news, this study did not attend to the possible influence communication source and/or

channel may exert on journalists' value judgments (Berkowitz, 2009; Shoemaker et al., 2001; Tandoc & Vos, 2016); expanding the study scope to include individuals creating content in venues other than traditional print media (e.g., blogs, social media, etc.), and/or including content gleaned from nontraditional formats would be useful directions for future research.

Practical Implications

This study offers several implications related to science communication practice. First, our findings suggest that Q methodology can be used to extract and analyze the multiple perspectives embedded in media coverage. This extends the findings of quantitative content analysis by suggesting how and why specific media frames become salient in different news contexts for different audiences. While we applied Q methodology to understand the gatekeeping routines of news producers, Q methodology can be applied to test gatekeeping at all levels of influence.

Second, extrapolating results from this study to the print news industry, one can imagine that continued changes to its organization may affect what frames are used to describe complex and emerging environmental issues such as aquaculture (Pew Research Center, 2017). If newspaper consolidation affects the diversity of discourses available to the public, news readers may lose geographically relevant contexts critical for understanding the relative risks and benefits of marine aquaculture development. For example, journalists from state-based newspapers tended not to rank information on shellfish aquaculture as a reporting priority, due in large part to the smaller scale of farm operations and the low economic contribution relative to other aquaculture species, such as salmon. As a result, important benefits, such as improved water quality, and risks, such as conflicts over the privatization of coastal land, are excluded from the discourse. When seeking information from news, then, local readers may be met with a discourse that does not match their local experience, in turn, affecting trust in print media and marine aquaculture development.

Finally, since Q method offers an inherently reflexive process, journalists participating in this study were challenged to identify and defend content biases by acknowledging routine-level reporting norms. Arguably, this opportunity to engage in professional reflexivity may improve "journalists' capacity for self-awareness; their ability to recognize influences and changes in their environment, alter the course of their actions, and renegotiate their professional self-images" (Ahva, 2013, p. 791). By reflecting on editorial decision-making processes, journalists could, in the spirit of producing effective and engaged science communication, (re)conceptualize and/or revise

their message objectives to bolster public issue interest and education (Besley, Dudo, & Yuan, 2018).

Theoretical Implications

From a theoretical standpoint, this study suggests multiple implications for routine gatekeeping practices in environmental news selection. First, results suggest that the newsworthiness of aquaculture is largely dependent on how journalists attribute individual news values to a story. While many journalists in our study relied on the same news values (e.g., proximity, impact, and conflict) when selecting news content, the stories they sought to produce were very different. These differences were related to how journalists defined and interpreted news values in the context of perceived audience interests and higher level organizational constraints, such as newspaper circulation area and news beat. For example, journalists in each factor cited “conflict” as a newsworthy element of aquaculture coverage, but their interpretation of the news value was dependent on the intended scope of the story. Therefore, journalists with more localized reporting areas (i.e., neighborhood preservationists and local proceduralists) tended to promote coverage of conflict among coastal residents, whereas journalists with more generalized reporting areas (i.e., state structuralists and industrial futurists) tended to promote coverage of conflict among coastal industries. That said, journalists with a generalized reporting area but a specific news beat (i.e., industrial futurists) cited additional news values, such as “oddity” and “human interest,” to emphasize the region’s growing reliance on a relatively new industry. These considerations for audience (or circulation area) and news beat not only influence how news values are defined and attributed to stories but also suggest who is worthy of coverage at different scales.

Second, results confirm the use of balance as a gatekeeping routine in environmental reporting (Yang, 2004). The neighborhood preservationists and state structuralists in our study tended to use balance as a means to contrast risk and benefit information. To date, this relationship between risk and benefit has been demonstrated in research on aquaculture news content (e.g., Amberg & Hall, 2010; Feucht & Zander, 2016; Olsen & Osmundsen, 2017; Rickard & Feldpausch-Parker, 2016), but it has not been explicitly demonstrated in gatekeeping research. Journalists who used balance in our study cited motivations related to the complexity of the topic and the need to contextualize its impacts at appropriate scales. This led journalists to balance economic benefits of marine aquaculture development with risks to either the local social or state biophysical environment, but not to both. While this decision sustains perceived trade-offs between positive economic and negative

environmental impacts—typified in the “jobs-versus-environment” false dichotomy—it reveals how attempts to provide balance can actually discourage the use of certain frames.

Finally, results confirm how news value and objectivity routines may interact to produce informational bias in environmental news coverage. This bias can have an impact on public opinion by (de)legitimizing certain news frames without providing important context. In early climate change coverage, for example, journalists’ use of balance produced bias by delegitimizing the prevailing “anthropogenic climate change” frame (Boykoff & Boykoff, 2004, 2007). In aquaculture coverage, however, journalists’ use of balance may produce bias in a different way. The risk-benefit balance we observed through journalists’ news selection judgments suggest that bias is not necessarily related to the legitimacy of competing frames but to their appropriate scale. As a result, the localized or generalized scale at which journalists define specific news frames, such as environmental risk, may limit audiences’ ability to accurately attribute the risks (e.g., to finfish or shellfish aquaculture) or evaluate them in contrast to other frames (e.g., economics). Thus, journalists’ tendency to value and, more importantly, to balance benefit and risk information suggests critical implications for public understanding of, and positionality toward, natural resource use in general and marine aquaculture development specifically. In future work, we suggest that researchers conduct boundary searches and/or comparative case studies to identify other relevant contemporary environmental issues at the local, regional, and/or national scale for which this issue of balancing risk and benefit information might be likewise impactful on public opinion formation. This research could employ in-depth interviews, ethnographic observations, and surveys to reveal the salience of alternative environmental frames or to further contextualize how journalist role conceptions, audience conceptions, and/or source use influence news production routines.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by National Science Foundation Award #1355457 to Maine EPSCoR at the University of Maine.

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Note

1. While the focus of analysis is on shared perspectives, researchers may consider factors with one pure loading when there is sufficient theoretical justification (McKeown & Thomas, 2013; Watts & Stenner, 2005). In this case, the “local proceduralist” had more aquaculture reporting experience than the other New England journalists interviewed. The journalist also gives preference to stories on the regulatory conflict associated with aquaculture operations, which is a reporting perspective not represented elsewhere. Further support for this perspective is provided by the two journalists who cross-loaded on multiple factors, including Factor D.

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