

Social Media Use Reveals Public Perceptions of Prescribed Burning

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Social Media Use Reveals Public Perceptions of Prescribed Burning

Abstract

Public acceptance and support of prescribed burning is critical for its continued use as an essential and effective land management tool in the southeastern U.S. For this practice to continue and expand, land management agencies and private landowners must have public acceptance and support for prescribed fire policy. Without it, they could face increased burn restrictions, as seen in parts of the western U.S., which might lead to decreased acres burned in the Southeast. Most research on public perceptions of prescribed burning has occurred in the West, but that level of research has been lacking in the Southeast. Our research seeks to fill a knowledge gap in a region where prescribed fires are more frequent than wildfires. To determine the current public perceptions of prescribed fire in the Southeast, we examined social media responses following two prescribed burns that resulted in smoke impacts to two major metropolitan areas in Florida. Data were collected and analyzed from social media platforms for the agencies conducting the burns, emergency response and law enforcement agencies, and traditional media. Our research found that Facebook and X (formerly Twitter) were the primary platforms used by the various agencies with Facebook having the higher number of public engagements. This study culminated in recommendations for improving fire science communication to the public to increase acceptance of prescribed fires on public and private lands and improve fire science policy. We recommend further research due to the rapidly changing environment of science communicators' use of social media to disseminate information.

Keywords

Keywords: communication platforms, public perception, Uses and Gratifications Theory

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Introduction

The use of prescribed burning in the southeastern U.S. is primarily viewed as a public ‘right’ due to legislation protecting burners unless gross negligence is proven (Yoder et al., 2004; Sun & Tolver, 2012). Florida is the model for the practice of prescribed burning used by many other states (Sun & Tolver 2012) and for prescribed burning legislation (Wade & Brenner, 1992). Florida is also where Prescribed Fire Councils (groups working together to promote the responsible use of prescribed fires) originated (Wenger 2000), influencing legislation and landowner training. When prescribed burns go as planned, the gradual effects on the landscape are rarely noticed. But when they escape, the consequential negative impacts can increase public concern (Ryan et al., 2013), thus supporting the need for constant messaging supporting the many benefits of prescribed burning, which include but are limited to improved wildlife habitat, natural area aesthetics, firefighter safety, as well as reducing the potential negative impacts of wildfires.

Successful outreach and communication contribute significantly to successful prescribed burn programs (Ascher et al., 2012; McCaffrey & Olsen, 2012; Toman et al., 2013; McCaffrey, 2015). For instance, information such as the time and place of planned or ongoing prescribed fires or updates on active wildfires that might impact these communities must be relayed in real-time. Prescribed fire communication professionals can also use these social media platforms to provide research and science-based prescribed burning education to audiences to increase acceptance and support (Toman et al., 2006; McCaffrey & Olsen, 2012; Toman et al., 2015). Social media platforms allow the public to ask questions and comment on the topics posted. Prescribed fire communication professionals can also reply directly to the public’s posts, answering questions and responding to comments (Petersen et al., 2017). This, in turn, allows the professionals to gauge public sentiment, including whether the information and education provided is supported and understood as it was intended (McCaffrey & Olsen, 2012). Access to feedback from the public provides communicators other benefits, such as identifying rumors, misconceptions, and misperceptions, which assist prescribed fire communication professionals as they form their topics of discussion and message points (Toman et al., 2006; Bruine de Bruin & Bostrom, 2013). Messaging can then be designed with more accurate information, effectively establishing the official sources and sites for prescribed fire information.

Today’s communication platforms are no longer dominated by newspapers, television, and magazines (Varner, 2012). Instead, audiences use multiple platforms, including but not limited to websites, texts, digital newspapers, blogs, podcasts (Telg & Irani, 2012), and social media such as Facebook, X, Instagram, and YouTube (Topno, 2016). The public has become dependent on social media over traditional media (Petersen et al., 2017; Dupey & Smith, 2018) to satiate their expectations for immediate access to news and information with easy access from smartphones and tablets (Petersen et al., 2017; Dupey & Smith, 2018). These platforms flourish on two-way communication from social exchanges (Telg & Irani, 2012), offering a tool for users to communicate with one another even across geographical areas (Widyastuti, 2021). These emerging platforms also provide communication professionals many options when tailoring their communication plans for various audiences.

Occasionally, there are days with favorable weather conditions when multiple prescribed burns occur within a region. This is an ideal opportunity for prescribed fire communication professionals to inform the public about prescribed fire operations, educate them on the benefits of prescribed burning, and learn from their responses. On one such day, January 21, 2020, many

natural resources professionals took advantage of ideal winter weather conditions across Florida to conduct prescribed burns. Despite the ideal conditions of acceptable dispersion, wind direction, and cool temperatures, two of these burns negatively affected air quality in two large metropolitan areas after smoke traveled unpredicted long distances (Fig. 1). Prescribed burns conducted by the St. Johns River Water Management District, hereafter called Orlando Smoke, and the Florida Forest Service, hereafter called Tampa Smoke, resulted in smoke impacts to the cities of Orlando and Tampa, Florida, respectively.

Prescribed fires are typically announced on social media, and these fires were no exception. Various emergency response and law enforcement agencies, media outlets, as well as the agencies conducting the burns, posted information on their respective social media platforms, and received mixed reactions from the public. The data collected from the social media sites Facebook and X, which local agencies commonly use, included public comments, questions, and agency responses, were analyzed to determine current sentiments. This sample was selected using purposeful sampling, which is often used in qualitative research to identify and select information of interest as it relates to the research topic (Palinkas, et al., 2013). The purpose of this study was to examine which social media platforms are chosen by audiences to obtain information on prescribed fires occurring near and impacting their areas and what their comments and questions reveal using principles from Uses and Gratifications Theory. This research aimed to answer the research question: What does social media use reveal about current perceptions regarding the use of prescribed burning in Florida, as discovered by comments, questions, and discussions posted by the public on social media platforms during these two prescribed burns? Koswatta et al. (2022) found in their review of communication media that social media have various factors that influence perceptions of science. They emphasized that communicating science to the public can be challenging in the current media-focused climate and that it is vital to construct messaging highlighting scientific evidence. This study culminates in recommendations for improving fire science messaging on social media platforms to increase public acceptance of prescribed fire use on public and private lands and improve fire science policy.

Literature Review

Public acceptance and support of prescribed burning is critical for its continued use as an essential and effective land management tool in the southeastern U.S. Most research on this topic has occurred in the West but is lacking in the Southeast. Our research fills a knowledge gap where prescribed fires are more frequent than wildfires. To determine public perceptions of prescribed fire in the Southeast, we examined social media responses following two prescribed burns resulting in smoke impacts to two major metropolitan areas in Florida.

Since 2008, American adults have significantly increased their use of social media (Ortiz-Ospina, 2019). Widyastuti (2021) found social media is the preferred source of information widely used by the public. The use of social media in science communication has also increased, revealing new elements such as social networks and following social media influencers as potential impacts on perceptions of science (Koswatta et al., 2022). This reflects the need to explore these new factors because the environment of science-related communication is ever-changing.

One of the differences between social media and traditional media is communicators can directly respond to and interact with users as well as quickly reach large populations with their

messages (McQuail, 2010). Communicators miss the opportunity to effectively engage with their audiences when not receiving feedback from them (Stacks & Watson, 2009). Compared to unidirectional (one-way) outreach, interactive communications are preferred because they allow the audience to ask questions and receive feedback, building trust with the communicator (Steelman & McCaffrey, 2015; Novak et al., 2022). Houts et al. (2006) and Harrison (2002) found visual messages, compared to text-based messages, are more convincing and motivating. Bialik (2018) found 14% of adults admitted to changing their opinions on an issue after viewing social media content, and Widyastuti (2021) asserted behavior can be affected through the effective use of social media. Communicators should consider these findings when deciding when and how to use social media for prescribed fire messaging.

Information about fires reaches diverse audiences with many attitudes and opinions related to fire (Absher & Vaske, 2007). Fires and their associated smoke were probably a common occurrence in pre-Euro-America (Leenhouts 1998; Stephens et al., 2007) when indigenous Americans were practicing cultural burning, but the recent history of fire suppression and the rise of urbanization resulted in a public unfamiliar with the use of fires for management (Ryan et al., 2013). Public willingness to accept smoke, aesthetic impacts, and possible risks associated with prescribed burning may vary significantly across these fragmented communities, thereby impacting attitudes (McCaffrey, 2006; Quinn-Davidson & Varner, 2012). Audience members sometimes connect personal experiences with fire information found online that validates their thoughts, feelings, and opinions (Rosen et al., 2022). Often, the fear and reactions to metaphors and sensational descriptions used by media (such as the recent media coverage of the recent wildfires in California, Canada, and Maui) can negatively impact the acceptance of prescribed fire use (Matlock et al., 2017). Matlock et al. (2017) also found audiences knew prescribed fires were needed to reduce wildfire risk but still disliked the treatments conducted near their homes. They were more accepting of prescribed fires in remote areas and thought they posed unacceptable risks in the wildland-urban interface where homes are located near wooded areas. Still, other groups were more tolerant of smoke impacts from prescribed burns if they had experienced smoke from wildfires (Weisshaupt et al., 2005). They viewed prescribed fires as an effective tool to reduce wildfire risk and smoke impacts. Weisshaupt et al. (2005) also found some groups accepted smoke impacts from prescribed fires as long as the forest received benefits. These examples demonstrate that audiences may express various values and attitudes when reacting to prescribed fire effects that directly impact them.

The southeastern U.S. leads the nation in the application of prescribed fire, with Florida alone burning an average of 2.1 million acres a year (Florida Forest Service, 2022). The use of prescribed fire has been shown to reduce the number of potential negative impacts from wildfires (Addington et al., 2015). Other benefits include keeping our wildland firefighters safer and increasing land value through improving aesthetics, increasing the biodiversity of habitats, and encouraging healthy populations of fire-dependent species, many of which are threatened and endangered due to fire suppression (Wade, 1989; Jacobson et al., 2001; Wann et al., 2020). Public acceptance is a priority for successfully using prescribed fire (Quinn-Davidson & Varner, 2011). Increasing knowledge can decrease concerns and raise positive expectations for management outcomes. Several studies on the acceptance of forest fuel treatments indicate that familiarity with and/or knowledge of the practice strongly indicates acceptance (Absher & Vaske, 2006; Toman et al., 2011; McCaffrey & Olsen, 2012). For example, Blanchard and Ryan (2007) found that individuals with a greater understanding of prescribed fire had fewer concerns regarding the negative impacts on aesthetics or wildlife. Furthermore, McCaffrey (2004) found

that people exposed to prescribed burning educational materials are less likely to possess concerns about possible negative impacts on aesthetics and wildlife or from smoke and are more likely to have positive expectations regarding improved wildlife habitat and diversity. Other researchers also found that prior knowledge of prescribed burns may impact concerns and expectations regarding fuel treatment outcomes thereby influencing acceptance (Loomis et al., 2001; Brunson & Schindler, 2004).

When citizens receive science news from scientists (rather than news filtered through journalists or other gatekeepers), they are more likely to trust the information (Huber et al., 2019). Bode et al (2021) point to the important role of experts in correcting misinformation on social media. They also found that organizational credibility increased when the organization engaged in correcting misinformation on social media. Social media presents an opportunity for scientists to speak directly to public audiences with accessible information (Biermann et al., 2024; Neuberger et al., 2023). Huber et al (2019) found social media news use to be more strongly related to trust in science than traditional news use. Diddi and Lundy (2017) pointed to the value of organizations using social media to engage directly with audiences in tailoring health information to meet specific information needs.

Prescribed fire messaging can be tailored for both traditional and new media platforms to meet the specific needs of varying audiences. For example, broad messaging on the benefits of prescribed fire would fit well for traditional media. In contrast, new media would be the preferred platform for specific messaging for a particular burn.

As with traditional forms of media, individuals' reasons for adopting social media are likely to vary based on the medium selected and the characteristics of that medium (Quan-Haase & Young, 2010). For example, X users are attracted to brief streams of information content tailored to their individual interests (Johnson & Yang, 2009). Obiala et al. (2022) emphasized that the internet and social media have become a vital source of information on almost every subject. Social media is rapidly becoming the preferred method of gathering information to meet those needs, often directed by social norms (Lu & Lin, 2022; Ku et al., 2013).

Methods

Comments from agencies reporting information on their social media platforms, as well as responses from the public, were retrieved and analyzed. The Florida counties impacted by the smoke from the burns (Fig. 1) were identified to help determine which social media accounts should be evaluated. The impacted counties included Citrus, Hernando, Hillsborough, Levy, Marion, Orange, and Pasco. We conducted a review of the social media platforms of each of the Florida Forest Service districts impacted by the burn: Waccasassa Forestry Center, Withlacoochee Forestry Center, and the Orlando District; St. Johns River Water Management District; Sheriff's Offices, Fire Rescues, and Emergency Management offices; as well as local media outlets from impacted counties (Table 1). Reporting agencies were broadly grouped into three categories: (1) Government, which excluded law enforcement but included state land management agencies, county fire rescue, and the National Weather Service (NWS); (2) Law enforcement, including Sheriff's Offices; and (3) Media, including TV, radio, and newspaper sources. Data from the posts and articles about the burns and the resulting smoke were downloaded. The comments and responses were manually collected, and screenshots of the posts, including associated photos, were saved. The sampling procedure resulted in 464 total posts, which included 436 public responses related to the burns from January 21, 2020. It was

determined that each reporting agency used Facebook and X as the primary platforms. Comments irrelevant to the burns (28) were excluded from analyses.

Qualitative coding was the method used to record basic information and the predominant topics for each social media response. These codes included: 1) social media platform, 2) county/area the post originated from, 3) agency or media outlet, 4) date of the post or article, 5) common words/values/topics, and 5) the comments themselves. Two researchers examined each response and independently coded common topics and whether the statements were positive, negative, neutral, or dual (i.e., a positive sentiment followed by a negative statement). The researchers compared their data and were in 100% agreement on the topics that emerged from the responses signaling intercoder reliability. The findings were consistent and replicable, demonstrating dependability, and accurately reflected the respondents' sentiments rather than the researchers' biases or motivations, demonstrating confirmability. Topics were added as they were encountered in the posts and were not predetermined before coding. Some posts spanned multiple topics or included emojis or photos, which was noted and used to code sentiments.

Quantitative evaluation of the coded sentiments and raw comments were analyzed using sentiment analysis in R Statistics (R Development Core Team 2022). We used the 'dplyr' and 'tidytext' R Packages (Silge & Robinson, 2016; Wickham et al., 2023) to summarize the most frequent words after removing common stop words, such as "and," "or," and "the." Trends in the data identified with the qualitative coding method were visualized with graphs created by the 'ggplot2' R package (Wickham, 2016).

Results

There are several social media platforms such as Instagram and TikTok that are popular with various demographic groups. We researched other platforms and did not find any posts containing comments on these burns. The agencies we studied predominately use the platforms Facebook and X for their information outreach. Therefore, the final list of posts in our data came from these two platforms. Our results indicate there were 436 variable responses to the two fires on the Facebook and X platforms used by these agencies. Facebook had a higher number of public engagements than X (Table 1). Posts with the highest number of responses were identified on the Facebook pages of Citrus County Sheriff's Office (law enforcement), Pasco County Fire Rescue (government), and Citrus County Chronicle (media).

The quantitative content analysis revealed that the most mentioned words were smoke, burn, burns, windy, day, and controlled (Fig. 2). The following words were used in sentences with negative sentiments: smoke, bad, smell, burn, burns, and burning. Positive words were safe, pretty, love, strong, helping, and glad. The public demonstrated a high use of law enforcement, government, and media social media sites to describe their positive, negative, and neutral feelings regarding both burns (Fig. 3). In all, there were ten dominant, recurring topics: Smoke/haze or breathing difficulties, Lack of planning or forethought, Weather conditions, Location where smoke was observed, Ash falling from the sky, Wildfires in California/Australia/Florida, Wildlife, Vegetation or plants, Gratitude for the post or the burn and Traffic and road closures. Smoke, planning, weather, location, and ash were the most frequently mentioned topics in the social media posts regarding smoke from both burns (Fig. 4).

There was a high level of concern for the smoke-related health impacts and the windy weather conditions on the day of the prescribed burns. The majority of the comments were either negative or neutral. While positive comments were not as predominant, it is worth noting that

there were a notable number of comments from ‘champions’, those who are passionate about their support of prescribed burning. The criteria used for determining champions was based on the positive and supportive comments they contributed to the social media posts. For examples of comments associated with the most frequent topics, see Table 2.

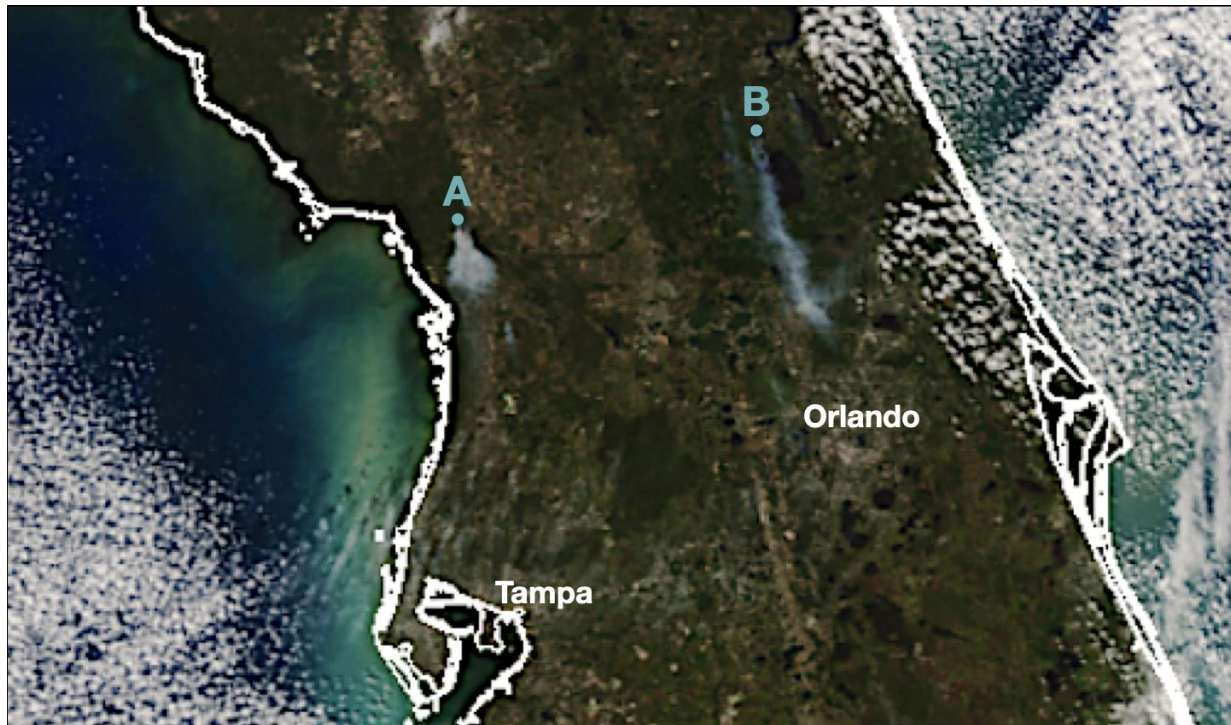


Figure 1. Map indicating the location of prescribed fires and drifting smoke plumes that affected (A) Tampa, FL, and (B) Orlando, FL, on January 21, 2020. *Map source:* NOAA Satellite Maps – Global Archive

Table 1

Social media comment totals on Facebook and X by reporting agency in reference to smoke impacts in Tampa and Orlando from January 21, 2020, prescribed fires.

<i>Fire</i>	<i>Reporting Agency</i>	<i>Agency Type</i>	<i>Facebook</i>	<i>X</i>
<i>Tampa Smoke</i>	Citrus County Sheriff's Office	Law Enforcement	130	0
	Pasco County Fire Rescue	Government	65	5
	Citrus County Chronicle	Media	64	0
	WTVT	Media	63	0
	Marion County Sheriff's Office	Law Enforcement	21	0
	Florida Forest Service, Waccasassa Forestry Center	Government	16	0
	Citrus County Fire Rescue	Government	5	0
	Hillsborough County Fire Rescue	Government	0	4
	NWS Tampa Bay	Government	0	4

Fire	Reporting Agency	Agency Type	Facebook	X
	Florida Forest Service, Withlacoochee Forestry Center	Government	2	0
	Totals		366	13
<i>Orlando Smoke</i>	WFTV Ch. 9	Media	51	0
	Orange County Fire Rescue	Government	6	10
	CH. 6 WKMG	Media	7	0
	WDBO 96.5	Media	4	0
	Orlando Sentinel	Media	2	1
	St. Johns River Water Management District	Government	2	0
	Florida Forest Service, Orlando District	Government	0	2
	Totals		72	13

Table 2

List of representative comments for some common topics and discussions involving champions of prescribed burning.

Topic	Representative comments
Smoke	“Smoky and smelly in Temple Terrace [a city near Tampa, FL] when I left work.” “That explains the huge cloud of smoke and why my asthma was worse than usual.” “Try living with a breathing problem and this heavy smoke.” “It’s drifted all the way to Brandon [a city east of Tampa, FL] in Hillsborough County.” “Downtown Tampa is completely covered in smoke.” “It’s reached its way down to Macdill [an Air Force Base near downtown Tampa, FL]!”
Gratitude	“The reason they are doing these is for your safety. Unless u want a California or Australia...” “Prescribed fires help reduce the catastrophic damage of wildfire on our lands...” “Thanks for letting us know! We were very curious...” “Good job guys!!” “Thank you” “Nice job. Keep up the good work.” “My son is helping with this burn.”
Location	“It’s terrible right now in Lutz in Hillsborough County! You would have thought it was closer.”

Topic	Representative comments
	"I know. It's so weird. You would think it is super close to us."
Wildlife	"But won't the wild animals potentially die due to the thick smoke and fire..." "What happens to our furry friends living there?"
Weather	"It's crazy with this wind! They could burn the whole county down." "Way too windy, yikes." "Isn't it just a little windy to be burning?"
Champions	Person A: "Why are they burning?! Wildlife is already struggling for places to live..." Person B responded to Person A: "You need to understand the benefits of prescribed burns for the wildlife." Person C responded to Person A: "A controlled burn rids the forest of built-up materials that create the uncontrolled fires." Person D: "Why are we having intentional fires? Trees provide oxygen for us to live." Person E responded to Person D: "California and Australia are why. Don't want super fires." Person F responded to Person D: "Not burning trees. Just build-up of undergrowth and dead materials..." Person G responded to Person A: "It's also good for wildlife. The fire will burn off the dead leaves and brush. New growth will begin immediately."

Figure 2

List of the 20 most frequently used words in social media comments in reference to smoke impacts in Tampa and Orlando from January 21, 2020 prescribed fires.

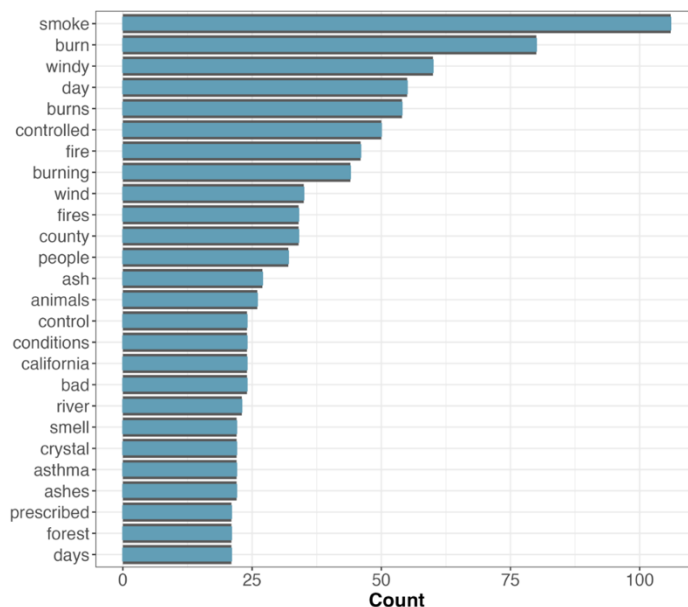


Figure 3

Proportion of social media posts by sentiment for each agency type in reference to smoke impacts in Tampa and Orlando from January 21, 2020, prescribed fires.

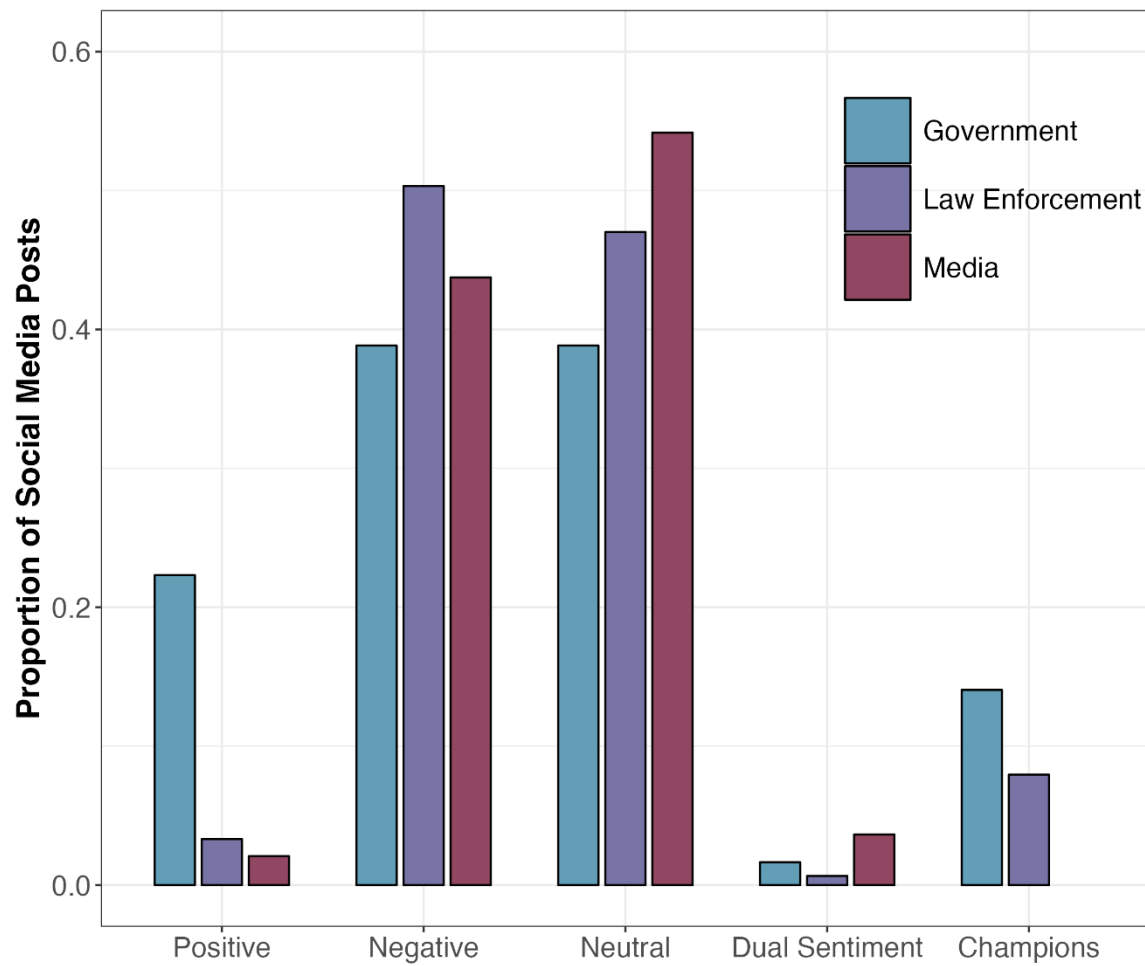
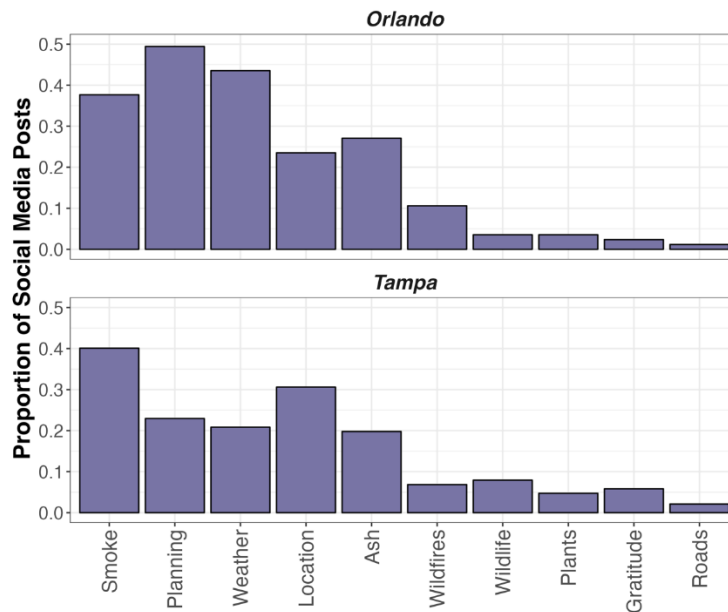


Figure 4

Proportion of social media posts by topic in reference to smoke impacts in Tampa and Orlando from January 21, 2020, prescribed fires. See methods for more detailed descriptions of each topic.



Discussion

This study aimed to understand the current perceptions of audiences regarding the use of prescribed burning as revealed by audience engagement on social media platforms in areas affected by two prescribed burns in Florida. This research provided results that were representative of audience respondents. The data we gathered from government, law enforcement, and media agencies in the areas impacted by these burns was from primarily used social media platforms, Facebook and X. Our study revealed that audiences chose Facebook as the predominant social media site for their engagement. There were more responses on posts from law enforcement, government, and media than on those from the agencies conducting the prescribed burns.

Using the UGT as a theoretical framework, this study sought to determine the social media platforms with which audiences chose to engage. We found that audiences predominantly selected social media posts from specific agency Facebook sites identified in our research, thereby supporting UGT. The uses and gratifications motivations for engaging with media were used to understand what type of posts (according to their motivation for prescribed fire information) audiences were engaged in most to satisfy and fulfill their needs. Communication methods currently depend on social media to widely disperse information in a timely, efficient, and cost-effective manner (Rhoades et al., 2009; Ferree, 2015). Social media has become a primary communication tool used by 69% of the public (Pew Research Center, 2017). Studies by the Pew Research Center (2017) indicate that Facebook (68%) has become the predominately

used social media channel by Americans, followed by Instagram (28%). Considering this, our study endeavored to determine patterns of social media use to infer what type of outreach is most often chosen by the public and, thereby, the most effective at increasing social acceptance of fuels treatment work, specifically prescribed fire. Our findings concurred with those of the Pew Research Center (2017).

Audience sentiments were identified through the variety of their comments, questions, and concerns. Based on our previously cited research, it was unsurprising that predominantly negative sentiments were related to the health-related impacts of smoke and bad smells. Concern was expressed for how the smoke was impacting their asthma, namely causing breathing difficulties. Concern about planning and controlling the fires on a particularly windy day, the location of the fires, and ash from the fires were also mentioned. Other comments focused on the locations of smoke impacts as well as questions about the origin of the smoke and ash.

We found it encouraging that audiences also posted positive comments of gratitude to those conducting the burns. They recognized that the burns were ignited to reduce wildfire risk and promote healthy wildlife habitats. Some people even expressed feeling safer in areas where prescribed burns were conducted. Our data also revealed many ‘champions’ who posted answers to questions posed by others, defending the actions of those conducting prescribed burns, and providing additional supporting information. We suggest that these supportive comments from ‘champions’ are an emerging trend that can assist in building the capacity of prescribed fire messengers. These ‘peer-to-peer’ conversations on social media platforms can increase the strength of communication outreach.

Recent research suggests that the most effective outreach methods should consider audience objectives and be interactive. Novak et al. (2022) completed a study in Colorado that yielded results that differ from this study. They assessed the effectiveness of prescribed fire and forest restoration outreach by comparing the perspectives of those who provided information to the public and members of the public who received information. Interviews with information providers revealed that the least effective communication strategies were unidirectional information delivery techniques such as social media, press releases, and print media. Social media was not widely used by community members, except for the NextDoor application, which was used to gather up-to-date information about things happening in their local community. Interviews showed that the public initially preferred interactive communication to understand prescribed fire management goals and planned activities. Most outreach targets then preferred to receive ongoing information in the form of email notifications. This builds on existing literature that shows that outreach strategies should change over time to suit the audiences’ evolving topical information needs (Monroe et al., 2006; Ardoin et al., 2013; McDaniel, 2014). Research by Monroe et al. (2006) also shows that a key component of effective outreach is for information providers to understand the knowledge and beliefs of their audience(s) in tailoring information to meet audience needs. In addition, Monroe et al. (2006) found that the most effective forms of communication are interactive, so it is unsurprising that both information providers and outreach targets in research by Novak et al. (2022) preferred interactive events (e.g., tours, events, one-on-one consultations). Successful communication, therefore, requires investment in engaging with audiences and discovering their information needs.

Research indicates most residents living in fire-prone areas across the U.S. have a basic understanding of the risks as well as the ecological benefits associated with fire. In general, they support the use of prescribed fires as an effective forest management and wildfire mitigation practice (Toman et al., 2006; Toman et al., 2011; McCaffrey & Olsen, 2012). Although there has

been an increase in research focused on applied theories of learning, behavior change, and social marketing in natural resources communication (Ardoin et al., 2013), our research indicates that studies specifically relating to prescribed burning is lacking. In addition, research has rarely been specific to outreach programs and how effectively they address the needs of both the information providers and their target audience (Novak et al., 2022). This research fills the need for communication outreach methods specific to prescribed fire.

Recommendations

Public acceptance and support are critical for the continued use of prescribed fire as one of our most effective land management tools in the southeastern U.S. Positive perception messaging typically focuses on reducing the potentially damaging effects of wildfires with the application of prescribed fire. Negative public perceptions of prescribed fire are generally associated with smoke impacts and perceived effects on wildlife and their habitats (Jacobson et al., 2001; McCaffrey, 2006), which was observed in this study. These concerns should be directly addressed with messaging explaining the differences between smoke impacts from prescribed fires compared to wildfires. Furthermore, messaging should explicitly address concerns for wildlife as research has shown that communications should be aimed at countering some of the common misconceptions that prescribed fires contribute to increased animal mortality and injury as well as the destruction of habitats (Jacobson et al., 2001; Jones et al., 2022). In addition, providing information on the benefits to habitats, especially those containing fire-dependent flora and fauna, would help to dispel these inaccuracies (Main & Tanner, 1999). Thus, continuing to use and increase the area burned with prescribed fire on our public and private lands is vital.

As these findings indicate, social media is a known source for audiences to receive information on topics of interest. Communicators should use social media to address the diversity of audience concerns, thereby positively impacting perceptions of prescribed fire. Social media can also be used to quickly reach large audiences and receive feedback from those audiences in real-time. Communication professionals from natural resource agencies can increase their prescribed fire communications by partnering their messaging with agencies that audiences currently turn to for information. By collaborating with partner agencies in developing messaging and outreach methods, communication exposure is increased across multi-agency platforms. This will also foster continuity of messaging, establishing these agencies as trusted sources of prescribed fire information. We recommend that partner agencies direct their followers to each other's platforms, encouraging audience media selections. This demonstrates the use of the Uses and Gratifications Theory since this theory is audience-centered and emphasizes individual preferences in choosing media to fulfill their specific information needs.

Audience concerns associated with smoke and wildfire risk seemed to be incentives for seeking information about prescribed burns affecting their areas based on audience comments. We, therefore, predict that early phases of outreach would be most effective for gaining the attention of a larger number of community members if framed in the context of community protection from wildfire. However, Novak et al. (2023) found that a singular focus for outreach may be overly narrow as more community members understand and become more interested in the ecological benefits of prescribed burning. Therefore, a two-phase approach to public outreach is recommended: a general information campaign to increase understanding of the benefits of

prescribed fire and a more focused campaign to delve into individual burn projects, creating opportunities for interactive learning (Novak et al., 2023).

We suggest that purposeful planning for social media communications could effectively accomplish both goals. One phase could foster a greater understanding of the wildfire risk reduction and ecological benefits of prescribed burning by focusing on a one-way outreach approach. For example, disseminating informational posts on social media sites, specifically Facebook, should be effective as it is the most widely used social media platform (Pew Research Center, 2017). A second phase could provide specific information on individual prescribed burns occurring locally. Even though both of these methods might be considered one-way outreach (Novak et al., 2023), they do offer an interactive communication method by providing audiences with a platform and encouraging them to post their concerns, questions, and comments. Social media then provides a conduit for communicators to meet the varying needs of their audiences, who are then motivated to follow the agency platforms they trust for accurate and up-to-date information.

We recommend that communicators consider the strength of community ‘champions’ posting on their social media platforms. Peer-to-peer conversations might provide effective messaging and should be encouraged. These interactions could provide valued support in dissuading misinformation and rumors and encourage trust in the agency posting the information. We suggest future research examine platforms such as Nextdoor or Facebook groups (like “Word-of-Mouth”) to discern how people are sharing information during prescribed burns. Communicators may also discover there are active “champions” on these platforms.

Limitations for this research included the relatively small amount and type of data selected for analysis. To gather larger sample sizes, we suggest that future research consider including social media platform posts from additional prescribed burns that contributed smoke impacts to metropolitan areas throughout the southeast. In addition, this study did not include a method of gathering data from respondents to evaluate the motivations for their choices. No evaluation of public knowledge, public perceptions of messages about prescribed burns, or their perceived trust of information sources were measured. We recommend further qualitative research with respondents to achieve these findings.

This study provides insights and recommendations to assist future research on effective prescribed burn communications tailored to meet audience information needs. Communicators can also improve fire science policy by understanding the preferred social media platforms of their audiences. There is a need to explore science-related communication further because it is ever-changing and evolving (i.e., social media, social networks, and social influencers) (Koswatta et al., 2022). Many platforms are available for prescribed burn messaging, including recent media platforms like podcasts and blogs. Acknowledging that each of these has followers with various interests, we suggest considering these emerging platforms to create inclusive outreach that addresses differing audience concerns, thereby increasing support and positive perceptions of the use of prescribed burning. Our findings can be used to improve ongoing outreach in this study area and inform similar efforts in other regions in the future.

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