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# Tensions Between Democracy and Expertise in the Florida Keys

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Tensions Between Democracy and Expertise in the Florida Keys

by

Elizabeth A. Loyer

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Master of Arts  
with a concentration in Rhetoric and Composition  
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College of Arts and Sciences  
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## **DEDICATION**

I would like to dedicate my work to my parents, without whom I would not be the person I am today. Thank you for the support and love that you have given me throughout my life. Thank you also for understanding when I would vanish into my room for days at a time to work on schoolwork. Without you both, it is safe to say my stress levels would be far higher. I love you both.

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## **ABSTRACT**

The proposed release of genetically modified mosquitoes (GMM) in the Florida Keys to combat the spread of diseases such as Zika prompted heated local debate, turning a seemingly routine mosquito control policy into a public scientific controversy. Arguments about the GMM derive from inventional commonplaces where the historical conflict between democratic systems of civic deliberation and the epistemic authority of expertise is instantiated. This project analyzes the topoi that Keys participants gather around to generate their argumentative positions as published in public, local print and digital news articles, blog posts, and letters to the editor between 2011 and 2016. Investigating the commonplaces that orient the argumentative trajectories of Keys participants reveals that each relational topos intersects with individual worldviews, risk assessments, and standards and can therefore be used for contradictory arguments. The many complex and connected factors that influence participant positions must be appreciated and acknowledged in any such civic deliberation about a science-related policy or technology. There is no easy resolution for such conflicts, such as clarifying scientific data for the public, to generate consensus; the irresolvable tension between democracy and expertise underlies public scientific controversies and requires mutual respect and appreciation for the varied reasons why people disagree to move towards more productive civic discourse.

## INTRODUCTION

Genetically modified organisms (GMOs) are a technoscientific advance that have become a major source of contention around the world. Typically, the label is used to refer to modified crops or food products, but it has recently been applied to animals whose genes have been modified as a form of pest control or for other purposes helpful to humans. Such organisms, whether crop or insect, are patented products and living trademarks. As Haraway (1997) remarks when discussing OncoMouse™ (the first patented animal) such inventions blur the boundaries between nature and culture, nonhuman and human, technology and organism, and problematize the notion of uncritical, disconnected science. In the Florida Keys, GMOs, trademarked organisms, and the contentious balancing of different risks are all converging in a public scientific controversy about the use of genetically engineered (GE) or genetically modified mosquitoes (GMM) to combat the spread of global disease.

The proposed testing of the OX513A, or Friendly™ Aedes, genetically engineered (GE) mosquito to fight the spread of dengue, chikungunya, Zika, and yellow fever in the Keys has met local community backlash. The conflict over the trial has resulted in a public scientific controversy that has been ongoing since 2011, when the Florida Keys Mosquito Control District (FKMCD) first announced to the public their plan to partner with Oxitec to release OX513A. Since the arrival of Zika in the Keys in 2016 (Delgadillo), even the World Health Organization has stated that GE mosquitoes might be needed to control disease vectors (“Stopping Zika”). However, the plan has provoked vocal opposition and divided residents of Monroe County. Citizens have expressed concerns about the relative safety, need for, and merits of the plan, arguing that the GMM will bring unintended consequences for the ecological balance, public health, and tourism in the Keys (“Latest Information”). Some have taken issue with the federal approval of the plan, questioning the validity of the approval process, including the conflicting voting



results from two distinct November 2016 ballots, and voicing dissatisfaction with the responses of Oxitec and the FKMCD, as well as suspicion of their motives and trustworthiness. Participants on both sides of the issue have requested additional, independent research into the GMM as a prerequisite for proceeding.

Public scientific controversies (PSCs), like the one in the Keys, are disputes where “technical authority intersects with public interests within salient political exigencies” (Crick and Gabriel, 2010, p. 202). PSCs arise when pragmatic concerns about policies related to technical or science-based issues develop, and such controversies always involve factors beyond just science (Brante, 1993; Wynne, 2003). There are many reasons why PSCs have fascinated scholars, but the Keys controversy is of particular interest because it provides a timely and politically relevant opportunity to examine participant worldviews and a local instantiation of the historical conflict between democracy and expertise (Brante, 1993), as well as the inherently contradictory nature of both democracy and expertise as salient argument-generating topoi. In PSCs, the choices under deliberation often boil down to qualitatively different risks where far more is at stake than just what can be quantified and calculated (Beck, 2009, p. 4). The debate in the Keys provides a small, situated controversy that is in many respects a textbook case of communication breakdown and mutual mistrust between citizens and technoscientific authorities.

Rhetoric, as an art of contingency, probability, and deliberation (Danisch, 2010) and an integral part of civic deliberation, is well suited to study the ways that implicit worldviews and value-judgements influence and are revealed in arguments regarding participant positions. The kinds of public policy decisions that can result from PSCs create standards and norms for how to navigate and reach temporary deliberative closure when democracy and expertise clash. These standards, whether legislative, organizational, or interactional, generate resources from which future publics can draw (Majdik and Keith, 2011; Wynne, 2003). The interactions in the Keys and the fate of the FKMCD GMM trial could pave the way for other US communities to use or fight the use of GE organisms for disease vector control or other yet unknown uses. Depending on how the situation is handled and temporary resolution reached, these standards that result from the GMM controversy will support or corrode democratic institutions and practices (Crick and Gabriel, 2010, p. 220) and reflect particular definitions of expertise and the place of

community members in defining and addressing such problems. Concern about the precedents set by this controversy are reflected in and press heavily upon arguments for and against the trial.

Participants worldviews and perspectives on the meaning and balancing of democracy and expertise influence the arguments they make about the place of the GMM in the Keys. Arguments reflect the local community and its concerns, such as the representation of the voices of temporary residents in the deliberative process. The tension between democracy and expertise coalesces into commonplaces, or topoi, to which participants bring their values and experiences. Although each topos can be conceived of as relational, many factors including community and personal identity influence and intersect to generate complex participant positions. Trying to achieve consensus by only spreading more information about the science behind the GMM does not take into account the complexity of these policy debates or the varied reasons Keys residents have for disagreeing on what should be done. PSCs such as the Keys controversy provide the opportunity to examine how participants negotiate the meaning of democracy and correct time and process for engaging with community members.

## THE GROWTH OF THE FLORIDA KEYS CONTROVERSY

In 2009, dengue, a hemorrhagic fever with no existing medicinal treatments or vaccines, arrived in the Florida Keys (“Dengue”). The Keys saw an outbreak of 27 cases in 2009 and 66 cases in 2010, all non-fatal (Fitzsimmons, 2011). Diseases such as dengue and chikungunya are transmitted by the *Aedes aegypti* (Ae) mosquito, a strain that is non-native to the Americas and feeds primarily on humans (“Florida Keys”). The Florida Mosquito Control District (FKMCD) is the local government organization dedicated to addressing health threats and hindrances posed by mosquitoes. While the FKMCD primarily funds pesticide spraying and community outreach programs in the Keys, Ae has proved tricky to fight due to increasing resistance to four of the six pesticides used (“Florida Keys”). To address the health threat Ae poses, the FKMCD began a collaboration with the British company Oxitec, planning a field trial aimed at reducing the local Ae population. Oxitec developed a strain of Ae in 2002 engineered in such a way that, when released into the wild to mate, the offspring of local and modified Ae will die off from autocidal genes (“Technology”). They have run trials in the Cayman Islands, Panama, and Brazil.

The FKMCD hoped to begin the Keys trial in May, 2011, but was delayed while seeking permits (O’Hara, 2011a). The plan was brought to the Key West City Commission in March, 2011, with the intention of beginning tests in December of that year, pending Agriculture Department approval (Pollack, 2011). However, once the plan was announced to the public, local residents began to voice concerns about the relative safety, need for, and merits of the release plan and arguing that the mosquitoes will bring unintended consequences on the ecological balance, public health, and tourism in the Keys (“Latest Information”). Townhall meetings hosted by the FKMCD and Oxitec in 2011 and 2014 met with further opposition. The Key West City Commission passed a resolution against the trial in 2012 (“City

Commission”). Afterwards, the trial’s proposed location was relocated to the neighborhood Key Haven, outside the Key West city borders.

Local real estate agent Mila de Mier has been a particularly vocal opponent of the plan, spearheading a petition in 2012 that has more than 170,000 signatures, travelling to Congress to voice protest, and running the Facebook page and blog “Never Again” to organize opposition. Opponents have been politically and civically engaged, contacting the FKMCD, the governor, and state senators, as well as the FDA to voice their disapproval of the final ruling that the mosquitoes do not have a significant impact (“FDA Publishes,” 2016). Some have spoken against the expedited FDA findings, as they did not evaluate the danger to human health via accidental ingestion or bites, the mobility of mosquitoes beyond the testing grounds, or the potential of OX513A to actually reduce the spread of disease (“Groups Call,” 2012; “Groups Slam,” 2016; Alvarez, 2015). Many are dissatisfied with the information shared by the FKMCD and Oxitec and feel their requests for third party testing or additional research have been ignored.

The US corporation Intrexon acquired Oxitec in 2015 and hired a PR company to aid the Keys release (Atkins, 2016d). Suspicion of the motives and trustworthiness of the corporation and government organization underlies some of the opposition to the plan. Oxitec has since trademarked the name Friendly™ Aedes, hoping to improve the mosquito’s image and emphasize its lack of negative impact on humans and the environment alike. Residents in opposition to the plan have noted the lack of dengue in the Keys since 2010, arguing that the possible risks brought by the trial will not bring any benefits to the area. The arrival of Zika to Florida in 2016 has increased the urgency proponents feel, as by August, 2016 there were already 15 confirmed locally transmitted cases in Florida (Delgado; “FDA Allows”). The World Health Organization has stated that GE mosquitoes might be needed to combat the spread of Zika (“Stopping Zika”).

Local officials decided to hold off on the trial until locals participated in a nonbinding vote November 11, 2016. Two ballot initiatives were included: one only for Key Haven residents and one for all of Monroe County (Joseph, 2016). The initiative asked whether voters were in favor of the FKMCD

conducting an effectiveness trial in Key Haven using the GMM to suppress an invasive, disease-carrying mosquito (Servick, 2016). Although 57% of Monroe County voters were in favor of the trial, 65% of Key Haven voters were against the release. While the referendum was nonbinding, the FKMCD board members plan to follow both voting results by proceeding to the next steps of the plan (“Technology”) while seeking a new testing site elsewhere in Monroe County (Oxitec, 2016). Overall, the controversy has been a “PR disaster” (Axford, 2015d). Tensions have risen on both sides of the debate and the controversy has hosted a variety of arguments contesting varying points of the GMM plan and process.

## **PROBLEM STATEMENT**

PSCs, although often frustrating for those embroiled in their seemingly endless debates, provide excellent opportunities to study politically and socially relevant communicative practices and impasses, conflicting and implicit worldviews, and argumentative warrants. They can also be opportunities for action research, as Blythe, Grabill, and Riley (2008) demonstrate in their study of a proposed dredging project aiming to build a disposal facility near two schools. For instance, Lindeman and Graham (2005) and Lindeman (2013) also provide good examples of studies, respectively, on how teams in the US Fish and Wildlife Service used rhetorical strategies reflecting different values to alternately privilege wildlife or human uses of the river and on how a grassroots movement stopped California's moth insecticide plan.

The controversy in the Keys provides an example of the kind of debate that emerges when participants hold varied opinions on the place of citizen participation in science-based policy decision-making. The situation is complex with many points of contention perpetuating the debate, ranging from concerns about proper democratic processes and infrastructure, to different risk-benefit weightings, to varied notions of evidence validity and sufficiency. Expertise and authority are always a key factor in PSCs as they lie between scientific knowledge and political action (Brante, 1993, p. 182), and the controversy in the Keys demonstrates this well. The situation has been poorly handled by several authoritative institutions but regardless of whether the trial succeeds wildly or fails to ever reach fruition, it has the potential to set a precedent—not only for the Keys, but for the nation as well.

Studies that have discussed the Keys controversy so far have mainly focused on the ethics of global health GMOs (Nading, 2015), how the trial could help fight disease in nearby islands (Kolbe and Ngai, 2016), the approval process and why the EPA might have stronger jurisdictional claim on the matter over the FDA (Aldrich, 2016), and ethical issues in deciding where to hold the trials (Resnik, 2014).

Additionally, many scientists have discussed the technical side of OX513A and its implementation (for example, Rey, 2014; Beech, Miller, and Benedict, 2014; Williams, 2010; Versteeg, Wang, & Beaumier, 2016). Opponents have created and released their own resources, spreading documents such as de Mier's talking points guide *Genetically Modified Mosquitoes*. Multiple opinion surveys on the trial have been conducted, with somewhat contradictory results that have also spurred heated debate over the actual opinions residents have about the plan. Zarlengo, examining the contentious townhall meetings, has discussed the use of strategic irrationality by Keys citizens as a rhetorical strategy (2016).

This study addresses how scholarly conceptions of the conflict between democracy (civic participation) and authority (expertise) shed light on the Keys controversy and how, in return, the Keys controversy influences our conception of the historical tension between democracy and expertise. I focus on how the Keys controversy and arguments by proponents and opponents exemplify this uneasy tension between citizen engagement and expert authority, which is only exacerbated by manifold understandings of what democratic participation and processes or epistemic expertise mean. Towards that end, I seek to answer the following research questions:

**RQ 1:** How can the controversy in the Keys be understood through the historical tension between democracy (public deliberation and participation) and authority (expertise, epistemic authority)?

**RQ 2:** How do the topoi used by controversy participants reflect and instantiate this clash between democracy and expertise in local arguments regarding the Keys controversy?

Drawing on the tension between rational and social, expert and democratic, as described by scholars such as Latour and Longino, I focus on the embodiment of this tension in the local, publicly produced documents from the Keys. I argue that this conflict centers not around the question of whether the mosquito will work but of how Keys residents and the institutions in charge of the trial are negotiating the kind of world they want to live in through arguments with implicit assumptions about democracy, authority, and the GE plan. Participant worldviews, values, and other unquantifiable factors influence their conceptions of risk and how the decision-making process *should* function.

Rhetoric is well suited for such a case study because deliberative matters are inherently qualitative and worldviews reveal themselves through communicative practices. As Danisch (2010) argues, uncertainty and contingency require collective deliberation about policy, leaving rhetoric—which deals with contingency, opinion, and context—highly apropos to studying democracy as well as PSCs (p. 175). There is always the hope that by studying controversy and communication breakdowns, more productive discourse can be achieved, but the tension between democracy and authority has a long history and can only reach temporary, contextual balance rather than permanent resolution. This tension between two already complex issues is instantiated in the ongoing dialogue about the GMM, where participants—particularly the FKMCD and Oxitec—frequently still derive arguments grounded in the debunked deficit model of communication. The deficit model is propelled by an underlying belief that the public suffers from a sort of knowledge deficit that leads to skepticism or outright hostility to technoscience. In other words, if knowledge is considered to be objective fact divorced from context and problems involving technoscientific matters, such as the GMM controversy, are just caused by a knowledge deficit, then such PSCs can be resolved if only the public just understood all of the facts (Gross, 1994; Latour, 1999). Public input can then be relegated to an afterthought and limited to unilateral education from experts to lay-people, illustrating the fundamental tension between expertise and democracy. While sometimes misunderstandings about a technology or the way scientific processes or assessments function and what results mean really do drive certain participant positions, a lack of knowledge is by far not the sole cause of PSCs nor even the primary one. The deficit model has fallen out of favor because its top-down, overly reductionist approach is not representative of actual scientific or public policy practice, but it still lingers in science communication. The notion of expertise and what counts as an expert is an important generator of PSC argumentative positions, as expertise lends authority to the speaker. Although expertise is a contested notion, it is still generally considered a positive attribute. When a small set of experts defined *a priori* focus only on imparting facts to the public, they miss other major sources of policy-making disagreement and stand counter to many notions of democracy, which prioritize more voices rather than just the voices of those with scientific expertise.



As a topos, rather than apolitical theory, democracy has generated countless political movements and narratives seeking to tame or understand urgent changes in the material conditions of life (Cintron, 2010). Democracy can be conceived of as a storehouse of social energy that organizes our subjectivities, social relations, and material conditions (Cintron, 2010, p. 102). Rhetorically speaking, it is an implicit value system with related topoi evoking an abstract and nebulous ideal that has been deployed differently by different people to rationalize a great number of seemingly contradictory values and policies (Cintron, 2010). Topoi can be conceived of as continually negotiated relational nodes (Wetherbee, 2015). Democracy, as a topos, is also considered a relational concept (see also Cruikshank, 1999). The specific topoi related to democracy that emerge in a given case depend on the exact controversy and its time and place. So, while similar topoi can emerge across different PSCs (the topos of the taxpayer is observed by Rai, 2016 and also occurs in Keys arguments for the GMM controversy), not all topoi related to democracy will occur as prominently in all cases. Citizens hold diverse notions of how best to run a country resulting in the best good and of how to balance between public participation of the many in deliberative matters and the technical expertise of those with the epistemic authority to “know” about those matters (Rai, 2010; Rai, 2016). The nature of democracy and expertise are both contested in each instantiation of this tension and the balancing between the two is therefore always temporary and contingent. The Keys PSC, like all civic matters, has led community members to express their opinions and to put forth their arguments about what is happening, what is at stake, and what ought to happen next. In other words, their arguments about the GMM trial are a specific, localized instantiation of the debate not over (or not merely over) technical specifics, but instead over what kind of world Keys locals want to live in and how they, at this time in history, want to balance the conflict between democracy and expertise.

Particularly early on in the GMM controversy, the FKMCD was no stranger to the deficit model, which only served to incite counterarguments about the undemocratic nature of the trial approval process. The Keys is no exception to the heated debates over the right of citizens to participate, when, and to what extent that routinely crop up in PSCs. The GMM controversy has gained national attention in part because

it embodies this irresolvable tension. While even the most thorough and diligent investigation into the communication problems and sources of argument spurring on the GMM debate could never generate a universal solution, it is my hope that careful examination of the emergent topoi can still shed insight beneficial to better understanding the nature of the Keys controversy, as a timely and relevant instantiation of the democracy and epistemic authority tension.

## METHODOLOGY

To answer my research questions, I turn to the concept of topoi to examine the commonplaces from which Keys locals generate their arguments and, more specifically, how these topoi reflect and shed light on the conflict between democracy and expertise in the GMM controversy.

Aristotle discusses the concept of topoi, or commonplaces, as locations from which arguments can be found, invented, or constructed (*On Rhetoric*). Aristotle separated his discussion of topoi into two categories, general and special or specific, and provided heuristics of 28 topoi such as examining the consequences of an act or whether there is a precedent. Each topos can generate different arguments for or against something, and, alongside mimicry, topoi serve as tools for invention, one of the five canons of rhetoric (Burton, 2007). However, Aristotle did not provide a specific definition for topos, which has therefore been differently defined and conceived of as rhetorical scholarship has evolved (Muckelbauer, 2008; Wetherbee, 2015). Concepts that are related to or sometimes used synonymously with topoi include patterns, warrants, categories, and lines of arguments. More specifically, topoi categorize relationships between ideas and provide a heuristic for argument invention (Burton, 2007). In more recent scholarship, such as Candice Rai's *Democracy's Lot*, topoi are often conceived of as phrases such as equality, citizenship, freedom, or taxpayers (2016, p. 33). Topoi like equality or democracy evoke greater meanings than can be defined for a single word, calling on shared cultural motifs (Wetherbee, 2015, p. 17). Rather than serving as transcendent means for deriving singular logical decisions, topoi are radically ambivalent and can be used for wildly varied purposes and positions (Rai, 2016). Arguments concerning the democratic process in the Keys could contend that holding a direct vote about the issue would strengthen the structures of the local democracy by involving the voices of the community directly, or that holding a vote would not be as inclusive as it should be (since many residents of the Keys are temporary

residents and are registered to vote elsewhere), or even that holding a vote would corrode the functioning of the democratic process in the Keys by impeding the ability of elected representatives to make the decisions they are elected to make.

To examine the topoi in the GMM controversy, I rely primarily on Rai's (2016) and Wetherbee's (2015) conception of topoi. Wetherbee examines topoi as generative and specific "nodes of discourse that allow rhetors to make connections" (p. 61). Topoi are relational by nature and function as loci around which identity, politics, and form—to draw from Burke's *A Rhetoric of Motives*—aggregate (p. 57). In this way, topoi help orient audiences because they draw from cultural specifics, localized in particular times and places (p. 18, 62). Topoi are one classical procedure for invention, alongside stasis, the procedure of asking questions to determine whether the debate is conjectural, definitional, qualitative, or translational (Burton, 2007). Regardless of which point of stasis is being debated, the orienting commonplaces from which participants generate their arguments are relational. Those relational topoi are ideological as well as logical (Wetherbee, p. 62). Similarly, Rai discusses topoi as communal rhetorical structures that are not universal but instead localized in time and space, requiring the one generating the argument to be oriented to local rhetorics (p. 36). Both Rai and Wetherbee are less interested in defining exactly what a topos is but instead focus on the functionality of topoi, or, in other words, what topoi *do*. To better understand how the tension between the conflicting forces of democracy and expertise sheds light on the GMM controversy and is instantiated in the topoi that generate participant arguments in the Keys, I narrow my focus to the particular time (2011-2016) and place (the Florida Keys) where this debate is centered.

The historical tension between democracy and epistemic authority provides intellectual resources with which to frame and understand the Keys controversy and to examine the commonplaces from which Keys locals derive their arguments for and against the GMM trial. I examine the inventional topoi used in Keys residents and how not only the differing understandings of both democracy and expertise but also the tension between those two forces can help us to better understand the Keys controversy. I focus here on public print and digital documentation aimed at a wide local audience. News articles, letters to the

editor, and voice columns or editorials are public and vocal, encapsulating some of the major positions held by participants and shared at large with the community. In these spaces, participants engaged with the controversy and with each other and put the topoi discussed under analysis to work supporting their arguments about the GMM. Writings authored by non-journalist residents are especially rich and often detailed looks into prolonged arguments—and sometimes direct ongoing interactions with other opinion pieces and residents—about the GMM. Such public print and digital documentation provides a look at one forum showcasing Keys publics debating the GMM and would be complemented in the future by ethnographic work precluded here by time and money. Rather than aiming at exhaustive comprehensiveness, my analysis discusses examples representing different topoi related to democracy and expertise that generate participant arguments as expressed in such public print documentation to illustrate how such topoi shape the course of the GMM debate. I limit my examination to statements in such documents produced by residents of the Keys (including part-time residents) as determined by the range of FKMCD voting districts. As the agency that proposed and would be the local organization running the trial, the FKMCD is guided by a board of commissioners elected by residents across the Florida Keys.

The following case study began as a class project during Spring of 2015, investigating what factors beyond a possible lack of knowledge about the GMM were generating the Keys controversy. While reading relevant literature on PSCs, the class collectively located and read news articles about the proposed plan, searched for local blogs, conducted interviews, and transcribed recordings of town hall meeting. Initial work on the project proceeded abductively, tacking between the texts and the concepts discussed in the literature to develop an understanding of the controversy.

To examine how the GMM controversy in the Keys can be better understood through the tension between democracy and expertise and related topoi, I located publicly shared popular newspapers and local blogs published from the initial announcement of proposed GMM trial in 2011 through October, 2016. I identified popular print and digital newspapers in the Keys through online searches for “Keys news,” “Keys newspaper,” and “Keys paper.” Relevant articles were initially identified through keyword searches for “Oxitec,” “Intrexon,” “genetic\* mosquito\*,” and “mosquito\*” in online archives for each

paper, and were further refined to remove articles not related to the GMM proposed trial and those articles not including participant statements or positions, such as those articles focused on mosquito control more broadly, on announcing the candidates for upcoming FKMCD elections, or bulletins advertising FKMCD meeting dates and locations. Participant positions examined are expressed in 164 articles published in the following newspapers, including in letters to the editor and anonymous quotes. (See Table 1.)

**Table 1.** Local Keys News Sources about the GMM

<b>Newspaper or News Site</b>	<i>The Citizen</i>	<i>Florida Keys News</i>	<i>The Blue Paper</i>	<i>Konk Life</i>	<i>Keys Weekly</i>	Total
<b>Number of Articles</b>	71	47	21	20	5	164

71 articles from *The Citizen*, a 125-year old newspaper with a circulation of 8,000 daily (Schmida); 47 articles from *Florida Keys News*, operated by Keynoter Publishing, which includes two community newspapers (the *Keynoter* and the *Reporter*) with average circulation of 12,500 copies and 7,500 copies per issue respectively (Keynoter Publishing); 21 articles from *The Blue Paper*, digital “sequel” to *Key West: The Newspaper*, the longest running Key West independent weekly paper (Cooper); 20 articles from *Konk Life*, a growing community physical and digital newspaper with more than 2,000 Facebook followers available at 650 Key West locations (KONK Life); and 5 articles from *Keys Weekly*, which has the self-proclaimed largest newspaper circulation in the Florida Keys, with five weekly community newspapers and over 1,800 Twitter followers (“Who We Are”).

To further capture additional voices of Keys locals, I identified local blogs through online searches for “Keys blog,” removing travel blogs from the results. Although this process yielded few blogs belonging to users both willing to identify their residency in the Keys and with blogs that provided any relevant results based on keyword searches for “Oxitec,” “Intrexon,” “genetic\* mosquito\*,” or “mosquito,\*” 62 posts across three blogs belonging to Keys locals and discussing the GMM were identified. (See Table 2.)

**Table 2:** Local Blog Posts about the GMM

<b>Blog</b>	<i>Never Again</i>	<i>Key West Lou</i>	<i>Key West Diary</i>	Total
<b>Number of Posts</b>	50	10	2	62

50 posts by Mila de Mier, a resident of Key West and founder of the social media environmental activist blog *Never Again*; 10 posts by Louis Petrone, or *Key West Lou*, a resident of Key West; and 2 posts by Conchscooter, a resident of Ramrod Key who runs the blog *Key West Diary*.

These blog posts are examined alongside participant positions argued in print and digital newspapers because of the capacity of blogs and online commentaries to facilitate the progression and connection of individual experiences and commonplaces to larger or global arguments and narratives (Rai, p. 175); just as topoi can serve as orienting nodes, so too can blogs help emerging publics to mobilize around an issue and develop plans of action (Wetherbee, 2015; Rai, 2016).

These 226 articles and blog posts were read through to identify quotes and positions from Keys locals. Through open coding, emergent patterns and commonplaces were categorized as they emerged in the data. Returning to the literature on democracy and expertise and making connections between the open coding categories (axial coding), these initial categories were reorganized to examine how the tension between and within these forces generates arguments regarding the GMM trial (Lewis-Beck, Bryman, & Liao, 2004). The open coding category observing how various arguments positioning different participants as mis/informed could be connected with the coding category containing arguments about the sufficiency of scientific evidence and whether or not it was too soon to be able to gauge the GMM's possible risks. Together, these codes became the axial topos examining how the relationship between participants and epistemic credibility was negotiated argumentatively. It is difficult to clearly partition controversy arguments and warrants into clean boxes because participants seamlessly thread together many variables influencing their positions pertaining to the PSC. An argument concerning whether communal health or individual healthcare and bodily rights are more important might touch on

the right to vote, the transparency of the democratic process, and ethical precedents for medical experimentation and trials all in the same breath. And if democracy is where expertise is problematized, it is so in part because the concept of democracy itself is multifaceted.

As it is the FKMCD proposed trial that has sparked the debate, I focus on what the locals are saying about the controversy and not on the broader conversation about GMM that developed when this controversy reached the national stage. Even without physical presence, an analysis of the popularly distributed local thoughts on the controversy through news documents and blogs provides a good starting point. It is important to acknowledge that this study captures the most vocal proponents and opponents but excludes other arguments for and against the plan. The voices of those not printed or quoted in the newspapers examined and those without blogs or easily accessible blogs are missing from this study. Locating and documenting these less visible voices would be an advantage of extended ethnographic work. Similarly, this study deemphasizes the organizational and governmental statements found in documents spread by the FKMCD and Oxitec, such as educational materials or advertisements.



## UNDERSTANDING THE TOPOI OF DEMOCRACY AND EXPERTISE

Democratic systems of government have historically stood at odds with the concept of expertise, which provides epistemic authority. Moreover, the defining and bounding of “expert” and “democratic” are hotly contested. I draw from the prolific scholarship on this tension, as well as on the differing conceptions of expertise and on the contradictory ways democracy is deployed in everyday life, to examine common intentional topoi grounding Keys participant positions. In particular, Latour’s and Longino’s work on the dichotomizing of knowledge, Collins and Evans’, Wynne’s, and Majdik and Keith’s work on expertise, and Cintron’s, Rai’s, and Asen’s studies on the rhetorical ways democracy is used in argumentation provide a framing lens for discussion of how the GMM controversy exemplifies the tension between democracy and expertise. The Keys PSC is sustained by conflicting values and worldviews and will therefore only ever reach tenuously contextual local resolution. However, scholarship on this tension provides a starting point with which to approach the controversy and to better understand the commonplaces from which Keys locals generate arguments for and against the GMM.

The tension between democratic participation and epistemic authority stretches far back in history. As Latour puts it, “the Greeks made one invention too many” when they developed both a democratic system of governance and modes of scientific reasoning (1999, p. 218). If truth can be translated without loss (as mathematical demonstration aims for) but the government encourages public participation, then technical expertise is bound to come into conflict with that system of governance. The tension that results concerns whether expertise should grant more weight to one’s opinion on policy matters, and how to balance that weight. In a lab, experimental and theoretical decisions are clearly tilted to favor experts, but in politics, where the problems at hand are not so clear-cut, can arise rapidly and with great urgency, and intersect with any number of non-rational factors, the question of how to proceed and

how to balance such contradictory priorities emerges in stark relief. PSCs in particular provide fertile ground for this conflict to play out.

This contention grows in part from the dichotomizing, or purification and separation, of the rational/natural from the social/cultural. Longino (2002) examines the epistemological consequences brought about by shifts in philosophy of science towards defining the rational and the social as mutually exclusive. Scientific judgment is therefore grounded evidentially, unlike the social, and reliance on experts who “know” cognitively is encouraged. Such a view precludes examining or understanding the context through which such knowledge is generated. This scientific knowledge could pertain to a body of content, to particular practices, or to a state of knowing relational to objects, subjects, or content (p 8, 77-8). Latour refers to this process in modernity as purification, where the defining of nature and culture as mutually exclusive separates humans from non-humans ontologically (1993, p 11). Purification is not a bad process or goal, but Latour argues that it must be partnered with the twin complementing process of hybridization or translation, which takes broader contextual networks into account, putting many factors both human and non-human back into conversation. When the rational/natural and social/cultural are defined to be mutually exclusive, the domain of facts is thus divided from the domain of politics, carrying many far-reaching consequences for not only how knowledge is generated but also for how we dwell and govern. In essence, this dichotomy sets the stage for the tension between democracy (social/cultural politics) and a particular kind of expertise (cognitive knowledge of the rational/natural).

As a result of placing the rational/natural and social/cultural in dichotomy, the existence of absolute truth becomes theoretically possible. Cognitive knowledge is then superior to the messy subjectivity of daily life. The process of knowledge purification requires a quest for absolute certainty that chops away all of the smaller steps involved in the actual generation of knowledge and yields knowledge in the form of facts that are definitionally exempt and exclusive from social, contextual, or human influence (Latour, 1999). In practice, statements of knowledge cannot be fully removed from “the contexts in which [they were] determinable” (Longino, 2002, p. 94). This is not to say that knowledge should be treated as less real or that all facts are therefore subjective and can be disregarded at random

(Latour, 1999). The generative contexts in which knowledge is produced are complex and networked, and it is through the strength of these other factors, including the processes, resources, and constraints of discovery that scientific knowledge gains its relative veracity (Latour, 1999). Ignoring these contexts and emphasizing only on purification, but not translation or the context of the network, has major consequences as technoscientific institutions rapidly proliferate hybrid creations often ignored until their unforeseen consequences come to light.

Problems such as climate change and nuclear power carry many costs that are not fully quantifiable and bring far-reaching consequences. Such hybrid technoscientific creations result in wicked problems—difficult or even impossible to fully solve because of their complex, networked, and mercurial nature, interweaving technical facts, political realities, and ethical concerns, values, and perceptions (Rittel and Webber, 1973). Wicked problems can be different sizes, from large and global to small and local; it is easier to reach temporary resolution for a local instantiation of such a problem, as when a school or city adopts energy efficient measures to combat climate change, than for the entire global issue. The GMM controversy, like many debates that occur when genetically engineered products reach the public, is part of one such wicked problem. The solution to wicked problems is not to stop inventing in an attempt to prevent such problems from ever occurring. They are already here and it is not feasible to stop scientific innovation from ever proceeding or to dictate that all possible scenarios of future consequences must be known in advance before implementing new technologies. Such demands are impractical, if not impossible. As Latour argues, the way forward is not to stop creating or inventing but instead to spend more care and energy “loving” these creations responsibly (2012) and putting the natural environment “out there” back into conversation with policy matters “in here.” Only by abandoning and ignoring these creations as Frankenstein did his “monster” do these hybrids become devastating. It is fitting that genetic modifications, one such complex technoscientific creation, are often referred to as “franken-” foods or (or in the Keys, “frankenskeeters”) for their engineering of living organisms (Latour, 2011). Attempts to resolve PSCs, which frequently arise from such wicked problems, by focusing only on the “purified”

science aspects but on not the full debate, lively and entangled in the broader network of reality, misses the core nature of such controversies entirely and results in communication breakdowns.

One major misstep that can spark a PSC occurs when the nature of a wicked problem is not adequately recognized or addressed. When officials view a problem as a mere technical matter, it is easy to fall back on the deficit model and assume that facts will resolve the disagreement. After all, if facts are the only relevant aspect of the problem, then facts are also the solution. The ramifications of the deficit model approach can even be tacitly hidden in the policy procedures and documents guiding the public interactions of institutions such as the FKMCD. The Keys provides yet another example that no matter how weighted towards one side of the tension an issue may begin, the other side (in this case democratic participation) is likely to make itself heard. Educational town hall meetings, held in 2012 and 2014, did not end the controversy. The conditions in which a disagreement or debate may be settled in a lab are different from those by which a policy decision may be made or argument about policy resolved.

The different time-tables by which scientific research and democratic deliberation take place necessitate different approaches. Although there are many jokes and complaints about inefficiency in Congress or nothing getting accomplished in politics, policy making moves comparatively swiftly next to the methodical and meticulous process of scientific innovation. This is why PSCs are ultimately civic rather than epistemic conversations (Latour, 1999; Collins and Evans, 2002). When a natural disaster or public health epidemic strikes, swift action is needed with real lives on the line. Public policy cannot wait for everything to be certain and all unknowns made clear—for one thing, policy making must take place while those involved are still alive. Politics, in other words, is about “trying to decide, on the spot, in real time, what to do next” (Latour, 1999, p. 227). There is no small scaling up of experiments as in a lab to precede the implementation of policy decisions that affect real people or has real world consequences (Latour, 1999, p. 242). The FKMCD saw diseases such as dengue and Zika as pressing concerns requiring immediate action to prevent loss of human life and sought policy action accordingly. However, public health policy is complicated, and if personal health decisions require the weighing and balancing of risks and benefits, then communal health decisions require such even more so.

As epistemic matters, PSCs are not only on more urgent timetables than science studies but also involve a great diversity of factors as well. Kuhn (1962) showed that even scientific progress in laboratories is influenced by the persuasiveness of new paradigms, which in part depends on factors such as judgments of the sufficiency of evidence or the capacity of new paradigms to allow for new questions and lines of inquiry. And any scientist can attest that whether we want them to or not, funding, time, space, other limited resources, and cultural climate can shape, build room for, or block particular avenues of research. When technoscience moves out of the lab, these sorts of factors other than just technical expertise come more obviously into play. Risk, for example, is not purely rational—there is no neutral way to assess risks or decide what quantity or quality of evidence is sufficient to warrant particular decisions or judgements. In the Keys, positions on the GMM question are driven by individual and community identity, personal worldviews, and particular boundings of who should be heard and how the collective should make such decisions.

In PSC communication, participants may approach the debate as if it were a “fact” based matter, where more information will solve the conflict, or a more complex negotiation of differing values, worldviews, and other factors. These approaches can be classified as matters of fact (MoF) or matters of concern (MoC) (Latour, 2004). To treat the GMM as an MoF, as the FKMCD has (Zarlengo, 2016), is to focus on one partial aspect of the debate and to emphasize the rational/natural side of the knowledge divide. However, to approach a controversy as an MoC requires acknowledging the hybrid, networked nature of the debate with all of the attachments that enmesh the partial and narrowly perceived MoF. In other words, the GMM is only one part of the controversy in the Keys. Dismissing the factors beyond “objective” fact as emotional, irrational, or “mere” politics reduces a complex PSC to an MoF—which only turns a blind eye to the greater context, rather than removing its importance. When the FKMCD initially planned for public input to be mostly limited to educational materials going from FKMCD officials to the public, Keys residents were not assuaged. Such communication strategies appear to aim at circumventing deeper public involvement, bringing the tension between expertise and democracy into relief once more. No amount of discussing the specificities of GE technologies could resolve this issue

when up for debate are concerns such as what evidence is relevant, trustworthy, or sufficient, how the approval process should proceed to protect democratic integrity, or whether the community should emphasize policy for overall health of the collective or the individual right to make personal health care choices.

In the Keys, as the FKMCD started the controversy from a position of relative power to define the issue at hand (controlling disease vectors), their proposed solution (the GMM trial) has been the subject of debates about evidence, authority, and trustworthiness. The FKMCD's initial privileging of epistemic authority over a more democratic policy solution such as a vote is an unsurprising result of the lingering results of the original rational/natural division from the social/cultural. If transcendental truth exists and knowledge requires finding objective and absolute facts, then policy choices regarding technoscientific matters are no choices at all. Those backed by "truth" or expertise are left to dictate the course of action—technocratic rather than democratic governance. In other words, "[t]ruth enters and the agora is emptied" (Latour, 1999, p. 225)—nothing remains to discuss. In a democratic system of government, this unsurprisingly leads to conflict. When the rational is privileged, expertise imparts an authority and form of superiority that is highly sought after. Credentials serve as one method of gatekeeping by demarcating specialists from the masses. However, who qualifies as an expert and what counts as expert knowledge has been categorically and definitionally challenged, as Collins and Evans (2002) do in their argument that people with experiential knowledge should be included as experts.

Collins and Evans address the issue of extending technical expertise and decision-making beyond credentialed experts and argue for a more varied understanding of expertise. Primarily, they contend that experience can be a basis for expertise as well, providing the example of sheep farmers sharing their knowledge of the ecology of their farmland with scientists. They create three categories of expertise: non-experts, those with interactional expertise (the ability to interact with others on the issue), and core-set expertise (the expertise to contribute to and develop knowledge on the issue) (p. 254). Participants such as the FKMCD may have the core knowledge to thoroughly understand the GMM, but not necessarily the interactional expertise to be able to effectively solicit and incorporate the expertise held by the broader

Keys community. Some participants have argued similarly, pointing out that former FKMCD director Doyle was better at lab work than at directing the public handling of this sort of issue (de Palma, 2016a). Keys residents are, as Collins and Evans would put it, experience-based experts in the local norms and values of the region that are important when an issue involves local planning. They are therefore more likely to understand some of the disadvantages the GE mosquito trial might bring to the area (Collins and Evans, 2002, p. 267). However, while Collins and Evans argue that expertise must be extended beyond academic degrees, they would argue that Keys locals only have a very partial sort of local experience that must be combined with other forms of expertise and any less obvious advantages an action might bring. While Collins and Evans began this work of extension while differentiating between political and technical considerations (p. 267), others such as Wynne and Majdik and Keith contend that they did not go far enough.

Extending expertise as Collins and Evans (2002) do still limits expertise by prioritizing (Western) science and scientific knowledge. The core set of experts, even when extended to include experiential experts as described, is still held to western scientific norms and is the only group in position to define the problem at hand. In PSCs, the situation is not limited to technical or scientific matters. Community members and technoscientific institutions are influenced by cultural contexts when weighing risks and possible courses of action (Danisch, 2010, p. 187). Wynne (2003) argues that Collins and Evans correctly capture the variability of kinds of expertise but mistake the proper time for citizens to begin contributing their expertise. Wynne asserts that by relying on only scientists and those following western scientific norms and processes, Collins and Evans promote scientism rather than the more symmetrical conversations they aim to promote. For example, if the problem to solve concerns the safety of a community, then what the threshold for “safe” is and how to balance other priorities (privacy, funding, freedom) with possible solutions are definitional questions that should involve the impacted community from the very start of the discussion, rather than being settled a priori by scientists alone (Wynne, 2003, p. 407). Handing citizens binary choices (e.g., do we use the GMM), or even choices such as which neighborhood the trial should be conducted in, essentializes scientific frameworks while neglecting

matters of context and contingency (Wynne, 2003, p. 404). The democratic concern of how to live well together cannot be answered without allowing or including more voices, the voices of the many and varied publics, in defining what counts as “well,” for whom, and in what contexts. In other words, issues of right and wrong are relative not absolute and therefore require more voices and not limited or fewer ones (Latour, 1999, p. 242-3). Limited by urgency, resources, and the plurality of the multitude, politics requires “a disseminated knowledge as multifarious as the multitude”—a knowledge of the whole from the whole (p. 228-9). But an approach that incorporates the views of the many raises concerns from experts about whether the masses can be trusted to make policy judgements and decisions “in their best interests” or for the “best” good of the community, rather than for personal, individual interests.

Any democratic society knows the cacophony and disorder that can accompany the political process. When the natural and cultural are divided, if decisions seem possible to make through purely rational means, and are therefore best imparted by experts as discussed earlier, then the inclusion of non-experts or non-rational factors such as emotions and other impossible to quantify factors such as ethical prioritizations appear to be impediments to policy making (Latour, 1999, p. 217). The majority of the populace, through sheer numbers, could overwhelm the voice of experts in what Latour calls “mob rule,” and only institutionalized and organized expertise could overcome such a fate, as Socrates once proposed (Latour, 1999, p. 223). Fear of the masses is pervasive, but is also a sort of self-fulfilling prophecy (Bauer, 2009, p. 225). There are always some people who will protest based on misinformation or misunderstandings and those who strategically seek to forestall resolution and prolong controversy. However, the more scientists and experts distrust and exclude the public from policy decisions, the more the public distrusts technoscientific institutions in turn. Knowing they have been excluded from contributing to the defining and solving of a community problem, Key residents fight back. And it has been shown that efforts to educate a community about related technoscientific principles do not automatically correspond to or yield trust, nor even a more positive attitude towards that technoscience (Collins and Evans, 2002; Danisch, 2010; Bauer, 2009). Deficit model communication strategies reflect the powerful extent to which fear of mob rule lingers today and are unequipped to even acknowledge this



resultant distrust, let alone combat it (Wynne, 2007, p. 104). Even as technoscientific institutions have grown in size and authority, science's sway over policy and decision-making is crumbling as people lose faith in the ability of such institutions to progressively march society forward towards a better tomorrow, or even just to be able to handle the consequences of technoscientific progress (Beck, 2009). Opponents of the GMM in the Keys often express such distrust and cite concerns about possible unintended consequences, questioning who will bear the real cost of such mistakes or misfortune (Bethune 2016b).

To productively move this debate forward, the problem cannot be preemptively defined before being brought to the community, which requires the kind of interactional expertise (e.g., rhetoric and communication) Collins and Evan discuss, as well as an appreciation for the value of different forms of knowledge and experience that are relevant to a PSC. Responding to the conversation on the nature of expertise, Majdik and Keith (2011) conceptualize expertise "through and as argument" in a dialogic and contingent sense (p. 371). They argue that expertise is important but is not primarily oriented towards knowledge (p. 382). Instead, expertise is enacted and problematized in democracy (p. 373), constituted by and of democratic values and practices rather than through one's relation to epistemic materials (p. 371). Majdik and Keith assert that expertise is always problem-centric, or in other words, a civic issue. Even among the technoscientific "core set" of experts, relevant knowledge is generated through a long series of arguments, experiments, research, and persuasion (Collins and Evans, 2002; Kuhn, 1962; Latour, 1999). If expertise is thus viewed as enacted through argument and especially democracy, this further complicates the tension between expertise and democracy. Both expertise and democracy are complex and negotiated concepts. In part, this is why discussing participant positions in the Keys is a messy endeavor.

Citizens who feel their democratic rights are being infringed upon or their voices ignored have a history of protesting these slights to assert their agency. Some Keys residents have pushed back against the imposition of expert-led frames defining the problem and what they contest is a misrepresentation and misunderstanding of their concerns and questions (Wynne, 2003, p. 107; Blythe, Grabill, & Riley, 2008). Policymaking organizes how varied publics live together and the rules governing how to live well.

Unsurprisingly, arguments on PSC-related policies frequently invoke the ideals of democracy. Yet these ideas are pluralistic and the exact procedures by which democracy should function or mediums for voices to be heard are not unanimously agreed upon. While fear of mob rule still crops up in expert arenas, democracy has come to represent an ill-defined virtue standing counter to various evils such as fascism (Cintron, 2010). Drawing on the work of theorists such as Paley and Cruikshank, Cintron (2010) argues that democracy has been ontologized as a topos with automatic morality, often invoking a sense of “fairness” or “equality” (p. 106). However, democracy itself is but one large organizing topos with many related topoi that can all be applied towards a variety of arguments with different purposes. This inventional flexibility cannot be constrained but should not be equated automatically with “good” (p. 111-113). Because democratic topoi often carry presumed moral weight, they are strategically deployed to rhetorically occupy the moral high ground (Rai, 2016, p. 82). Complete consensus is an impossibility in democracy. The many commonplaces of invention connected to the ideals of democracy reveal the contradictory and varied positions it can be used to defend or refute.

Democratic topoi are contingent and contextual, organizing beliefs, worldviews, and everyday actions (Cintron, 2010; Rai, 2010, 2016). In her study of Uptown Chicago housing debates, Rai identifies several democratic topoi, including democracy as an inclusive and transparent process or as taxpaying property ownership. These topoi mobilized public participation, influenced arguments, and bolstered participant credibility (or were used in an attempt to) in the Keys, just as they were in Uptown (Rai, 2016, p. 82). Arguments strengthened through connections to the concept of democracy can be strategically forwarded to prolong debate and forestall resolution (Rai, 2016, p. 92). Rai notes that comments on blogs and posts and expressions of individual concerns gain power and momentum as they aggregate around central, universal themes such as justice and transform personal affect into widespread commonplaces (2016, p. 196-7). And democratic topoi brought to bear on many aspects of policymaking. Elected boards to governmental organizations, such as school boards (Asen, 2015) or the FKMCD board, are symbols of democracy, places where non-credentialed experts or “ordinary people” can have direct impact on policy decisions. From his fieldwork with 3 school boards, Asen (2015) observed board policies and

communications as instantiations of democratic and educational processes (p. 4-5), resulting in ongoing negotiations and weighing of texts and contexts by the boards and (p. 8-9), revealing their networked nature and the navigation of local, state, and federal government laws and organizations such boards must manage (p. 15). While the issue in the Keys is not education, there are many parallels between the democratic processes represented by school boards and those represented by mosquito control boards. While Asen does not specifically refer to them as topoi, his study examines three deliberative themes that are similar in nature to the kinds of democratic commonplaces discussed by Rai. Of the themes he observed, the role of trust in deliberation as a relational practice that can be strengthened or weakened is highly reminiscent of a topos revealed through Keys participant positions, as they critique the motivations of others for forwarding different arguments.

Democratic topoi as relational and orienting nodes are not just logical but ideological (Wetherbee, 2015). They serve as rallying points for participants to craft persuasive arguments and motivate real action. The notion of topoi, democracy, and expertise I work from are drawn from the scholars I have discussed and I view all three as negotiated, networked, and complex, grounded in the multiplicity and inventional flexibility that related commonplaces provide. Keys controversy participants work to define, challenge, redefine, and resolve the problems and solutions to the diseases carried into their community by these mosquitoes. The twin concerns of democracy and expertise seesaw back and forth, finding temporary balance in local instantiations of this ancient global conflict.

The handling of the proposed GMM trial in the Keys and the subsequent heated and prolonged debate provides a good microcosm to examine democracy, expertise and their tension as they play out in local participant arguments. While the 2016 ballot initiative results nixed the Key Haven GMM trial, the search for a testing site in the Keys continues. Although PSCs may reach closure through any number of methods other than achieving consensus among participants, such as by vote, outside pressure, legislation, fatigue (Engelhardt and Caplan, 1987), it is the nature of deliberation that such seemingly resolved states of consensus will require future renegotiation and inevitably return to division and strife. Topoi are similarly places always in motion, always relational, transient, and grounded in materiality and context

(Wetherbee, 2015, p. 58). The Keys controversy from 2011-2016 is not only grounded in the particular identity and place of the Keys but also the contemporary concerns and worldviews of its inhabitants. The Keys PSC has been plagued by numerous communication problems. I now turn to discuss in greater depth some of the topoi participant positions gather around and how these topoi reflect the tension between democracy and expertise.

## ANALYSIS

Building off of the notion of topoi as relational and orienting nodes (Wetherbee, 2015), I find it useful to discuss the major commonplaces Keys residents generate their arguments from as relations between two different aspects or variables in the GMM controversy network. In the arguments published in public print and local documents, seven major recurring topoi emerge. These topoi focus on the relation between: 1) participants and epistemic credibility, 2) public health concerns and the community, 3) participants and each other, 4) citizen and community, 5) participants and responsibility, 6) past and future, and 7) public and process. These topoi embody different aspects of the irresolvable and ongoing conflict between democracy and epistemic authority, as well as the complex and conflicting ways that democracy and expertise themselves are nuanced. Some of these topoi, such as the relation between a participant and epistemic credibility, generate arguments that are more focused on one aspect of the tension between democracy and expertise, but all instantiate the tension and are locally contextualized. A topos about the relation between public health concerns and the community can be deployed in many PSCs globally, but in the Keys specifically a phrase such as “no consent” becomes a sort of orienting shorthand (Wetherbee), a reference to the Key’s audience’s familiarity with the ongoing debate and the existing arguments by invoking particular associations and emotions and helping the audience anticipate the expected argumentative trajectory (Ross, 2017, p. 13-14). Therefore, while the section titles describe the particular relation of each topos quite broadly, I examine moments in the debate in greater detail to demonstrate and clarify how those relations are strategically deployed to support arguments for and against the GMM. The selected statements help to demonstrate and clarify particularly salient examples of the argumentative positions generated by Keys locals from each topos.

## **Topos One: The Relation Between Participants and Epistemic Credibility**

Many participants in the GMM debate draw on the authority of scientific knowledge or credentials to bolster their claims and enhance the persuasiveness of their arguments. These arguments focus on using the relationship between a participant, sometimes the speaker but sometimes another person, and knowledge. Being perceived as knowledgeable is generally considered to be a positive thing and relevant knowledge can add weight to one's position. By arguing that someone has or does not have epistemic credibility, participants working from this topos can support or attack positions on either side of the controversy. The three senses of knowledge discussed by Longino (2002) are useful in examining the different approaches participants can take when generating arguments about the relationship between a participant and epistemic credibility—namely that they do or do not have it for some relationship with knowledge. These three senses are knowledge as: a relational state with regards towards content, objects, or subjects; a body of content, such as genetic engineering or public health; or a set of productive practices (Longino, 2002, p. 79). Conceptions of knowledge and expertise can be deployed normatively to differentiate between those who “deserve” to be labeled as experts or informed participants and those who are misinformed or whose knowledge is irrelevant to the topic under debate. The division of the rational from the social Longino discusses encourages reliance on cognitive knowledge, an emphasis that remains in effect today and leads PSC participants who are not part of scientific institutions to frame their arguments in an effort to also benefit from appearing objective and scientifically informed. Alternatively, some participants—still working from the perception of scientific evidence as a necessary component to make an informed, persuasive opinion—instead focus on presenting others as possessing misinformation or insufficient scientific knowledge, delegitimizing their argumentative stances.

The western rational, scientific mode of thinking and knowing is still culturally privileged and dominant when attempting to make logical arguments in policy deliberations. This narrowed conception of knowledge often excludes others, as those with the power to make policy tend to view alternate modes of knowing or other factors influencing decisions such as values and emotions to be less valid (Condit, 2014, p. 11). In order to gain credibility and avoid being perceived as merely emotional, members of the

public can work to ground their arguments scientifically. By arguing that an opponent is not performing western scientific knowledge-generating practices correctly or sufficiently, the opponent's argument can be weakened. For several years, the FKMCD approached the debate as if the central concern was ensuring everyone knew enough of the science about how the GMM mosquito is modified and how it functions. This made it easy to dismiss opposition as merely being misinformed. However, these facts cannot erase debate over what constitutes sufficient evidence and whose opinions and knowledge holds relevant authority. Participants hold vastly different conceptions of what qualifies someone as being mis/informed, what counts as "good" science, and when scientific procedures are being properly followed.

Some arguments based on the relationship between participant and epistemic credibility focus on the participant's "state of knowing"—the common parlance in the Keys had to do with being mis/informed. It follows that a particular state of knowing can be used argumentatively to discredit others, claiming that a participant does not know enough or understand enough for their claims to be valid, or to lend credence to a speaker by supporting their ethos. The FKMCD and its supporters frequently argue that opponents are in need of education about the mosquitoes or even are just unwilling to listen to reason. In particular, as the former FKMCD director, Doyle repeatedly argued that opposition stemmed from misunderstandings of the data (Atkins 2016a; O'Hara, 2012b) held by those with "anti-science attitudes" (Gilbert, 2014a). Going so far as to say that "with this project, facts aren't important" (Filosa, 2016b), Doyle not only is able to position his opponents as distant from the facts of the matter but also to fall back on the deficit model approach. This approach presumes that a state of knowing directly translates into clear policy actions. If the facts were important, then expertise alone would resolve the controversy.

Opponents of the GMM trial argue that the FKMCD is spreading misinformation or is not as informed as they portray. For example, David Bethune argues that the use of the word "sterility" to explain how the GMM functions is inaccurate to the science GMM (Atkins, 2016a). Key Largo resident Mara Daly contends that those who support the trial need to be educated about "the very real, scientifically based problems" with the GMM release (Kahn, 2016). Opponents position themselves as having carefully completed their own research to "think for ourselves, and form our own conclusions"

(Prosser, 2016a). In other words, they are informed, but the body of content is not necessarily persuasive or sufficient.

While the deficit model contends that knowing enough will lead to consensus and support for technoscientific policies, it misses the possibility of dissent about the sufficiency of that knowledge. Sufficient knowledge is hard to quantify and varies from person to person. In Longino's second sense of knowledge as "content," the transition from knowledge to action reaches the forefront. Reacting to arguments by GMM proponents that opponents are science-deniers who automatically discount bodies of scientific knowledge, John Prosser argues that instead they require additional scientific information (2016a). The existing content is insufficient. Partly, opposing positions on sufficiency of science knowledge to make credible arguments about the GMM have to do with trust and whether scientific authorities are trusted to provide full, complete, and relevant information. As discussed earlier, accusations that Oxitec and the FKMCD are misleading Keys residents do not evince such trust. I will discuss trust in more detail when examining the relation between participants. Proponents perceive the existing body as sufficiently proving the GMM trial to be effective, good, or persuasive science (Condelli, 2012; Smith in Axford, 2015c; *The Citizen* staff, 2015; Lagraves, 2016c). Disagreement over the body of scientific knowledge on the GMM creates a communication breakdown when proponents assume the evidence they present is enough to convince others that the trial should happen and opponents shift the argument back to contend that more research needs to be conducted. Often, this manifests in arguments about scientific practices and whether the existing studies are asking the right questions or gathering enough data. Arguing that there is not sufficient content is a stalling tactic to slow or halt PSC policies.

The rigor and methodical nature of scientific processes of knowledge generation give credibility to their findings. Unlike politics, science can afford to test ideas slowly and carefully. The rational/natural and cultural/social dichotomy makes absolute certainty seem possible and it serves as an ideal end goal in the quest for knowledge. In practice, absolute certainty is unattainable, but this image of science as certain that has been sold to the public backfires tremendously when controversy participants demand it. People have lost faith in the ability of technoscientific institutions to predict and handle the consequences of their



innovations (Beck, 2009), such as the GMM. Whether it is their intended purpose or not, arguments that Oxitec and the FKMCD present sufficient evidence following the ideal practices of science function to delay or even forestall the GMM trial entirely. In demanding certainty, opponents of the GMM focus on the third sense of knowledge: the proper practices of production. Keys residents have argued that the studies available do not look far enough in the future, are not supported by enough independent or peer reviews, and that they do not ask enough questions about the pertinent risks. Scholarship on PSCs such as climate change (Oreskes and Conway, 2010, Ceccarelli 2011) or the cancerous effects of cigarettes (Gee and Michaels, 2008) describes how the expectation of absolute certainty from scientific institutions and the presence of any reasonable margin of error or uncertainty can, when brought into public policy debates, be strategically used against scientific consensus to tremendous effect. This manufactured doubt rhetorically slows down political progress and binds it to the very long-term time scale of science.

Some opponents argue that it is too soon to fully understand the GMM technology and its impact. These Keys residents propose that, until long-term studies or research can be pursued, the Keys should continue to rely on alternative mosquito control measures (Bethune, 2016b; Smith-Williams, 2012b; Schuh, 2014; anonymous, 2016a). In other words, understanding the GMM mosquitoes will take “many, many years” (anonymous, 2016a), and for now, “[i]t’s enough to know that we don’t know” what might happen (Bethune, 2016b). Emphasizing that scientific studies take time, these controversy participants give their arguments epistemic credibility by generating arguments concerning the proper processes and practices of scientific knowledge. Requiring longer-term studies before considering the GMM trial argues that there is insufficiently persuasive epistemic knowledge to adequately make this policy decision; another request for more research revolves around who is conducting the studies in question. The FKMCD drew critique when Keys residents found that most of the scientific information provided to the public about the GMM trial originated from Oxitec itself. While trial proponents argue that the existing research has already involved peer review, opponents focus on the relative trustworthiness of evidence provided by a company that stands to earn money. These opponents argue for additional “proper testing” with oversight (Welber, 2015), peer review (Welber, 2015; Kofoid in O’Hara, 2012c; de Mier in Axford,

2015c; de Mier, 2016; O’Hara, 2015c), and independent testing or alternate expert opinions (Gutierrez in O’Hara, 2012d; Smith-Williams, 2012a, 2012b; Bethune, 2016a). Casting the epistemic credibility of Oxitec’s work into doubt, these arguments connect to the processes of scientific knowledge, allowing non-experts to argue against the sufficiency and persuasiveness of existing research. Such participants argue that scientific research must be replicable and verifiable by other, outside sources. Still others argue that the existing research does not ask the right questions, bringing up concerns about the lack of research into accidental ingestion of the GMM (Smith in Gilbert, 2014b; Hanson in “Groups Slam,” 2016), the possibility of the GMM to develop bacterial resistance due to exposure to tetracycline and fail to reduce the AE population (Norris in Goodhue, 2016a; Atkins, 2016c), whether the plan would truly result in a reduction of the Ae population or block the spread of disease (FKEC, 2015; “Groups Slam,” 2016), or even whether GMM would put the ecosystem at risk (Perls in “Groups Slam,” 2016; anonymous, 2016c; Wray, Russo, & de Mier, 2016). In this way, the weight of scientific expertise that does not yet exist can be brought to support current participant arguments. If there is the possibility of unintended consequences, then the perceived GMM risks seem greater. Such arguments against the GMM demand additional scientific investigation into the possible health consequences of the release, combining arguments for scientific scrutiny in uninvestigated or under-studied areas with arguments predicated on public health as a primary community concern of the community.

Arguments about the GMM in the Keys often draw from the relation between a participant and the epistemic credibility that knowledge, in all three senses, provides. Given the status scientific evidence still holds in debate, expert and non-expert participants alike seek to appear informed. The treatment of science and dichotomizing of knowledge has created ample opportunity for opponents of a proposed science-based policy to delay by emphasizing the long time table of scientific data while presenting themselves as concerned about gathering sufficient support, following the proper procedure and answering all of the relevant questions with certainty. Deficit model approaches to the Keys PSC fail to counter such arguments. Asking participants to “gather all the facts” (Curtis in DeSantis, 2012a) and arguing that “in some cases there is little to no chance of appealing to reason” (Gilbert, 2014a) not only

misses how the concepts of “sufficient knowledge” and being “informed” are contested but also how even full certainty that the GMM is entirely safe and will perform as predicted would not directly translate into the trial being the best course of action for the community. Risk and benefit analyses are difficult to quantify and involve another argumentative topos concerning the nature of the problem faced by the community and how such problems can be solved.

### **Topos Two: The Relation Between Public Health Concerns and the Community**

Time and again, whether the GMM trial counts as a form of experimentation, whether public health is a matter of individual rights or action for the good of the whole, and the nature of consent became a major point of contention. The initial arrival of dengue in the Keys in 2009 prompted the FKMCD and others concerned with the health of the community to investigate possible solutions. However, the relative severity of the problems posed by dengue and chikungunya was contested by community members. In particular, controversy participants differed in their assessments of the relative risks of mosquito-borne diseases versus the trial release of the GMM. There is no neutral way to quantify and compare risks, involving numerous other factors and participant priorities, because there is no consensus regarding what is “good” for the community. Whether the community perceived the public health concern to be the invasive mosquitoes or their genetically altered counterparts, arguments generated from the relation between public health concerns and the community also involve debates over whether public health concerns are best resolved through communal efforts or fall under the right to make individual, personal health care choices. These abstract issues of public health and community are instantiated around the notion of consent.

Before the arrival of Zika in the Keys, several years passed without the presence of dengue. During this time, participants generated arguments that revealed different perceptions of what posed the greatest public health risk to the community. Some residents, such as Michael Welber of the Florida Keys Environmental Coalition, argued that the lack of disease presence, combined with other factors such as

the judged insufficiency of GMM-supporting research, meant that the trial posed possible risk with no possible reward (O’Hara, 2015a). Conversely, proponents of the plan noted the severity of the diseases, their lack of cure or vaccine, and the slow migration of the mosquitoes towards the US as warning signs that merited preventative action now to save lives later. John Padget from Key West argued that the FKMCD was “fiddling while Rome burns,” stating that “All decisions have to be balanced and have risks, but Monroe needs to be seen as trying everything, with a sense of urgency, right now” (2016). As a result, the different sides of the debate alternately approached different aspects of the debate as if they were matters of fact or matters of concern depending on individual risk assessments. Zarlengo (2016) notes that at a 2012 town hall meeting, the FKMCD treated the GMM mosquito as if it were an MoF—objective and solvable through facts alone—while opponents instead treated the spread of disease as an MoC due to its quantifiable lack of presence. As a result, arguments about the public health problem and possible solutions spoke at cross-purposes. No amount of expertise about the disease or about the GMM can solve a controversy where participants cut some aspects of the debate out from their entangled network. The matter of serving the public good will always be an MoC, as arguments about the communal or individual nature of public health reveal.

Addressing public health concerns necessarily involves prioritization, risk assessment, and ethical concerns. These factors accompany, filter, and influence many other arguments that participants put forward. Arguments that appeal to the public good or communal health have roots in complex participant worldviews about what is fair, just, or preferable for society. While the ideal of democracy is often conflated with justice or fairness, in practice democracy does not automatically lead to virtuous results (Cintron, 2010). The relation between public health concerns and the community can be used to support or attack the proposed GMM trial, depending on how participants perceive the relationship between public health policies and the community. Risk assessment is influenced by personal worldviews. As Larry Zettwoch, a 2016 candidate for the FKMCD stated, the question of individual rights versus communal health in policy making is “a hard decision” (O’Hara, 2016j). More often, when the disease was considered a greater threat than the GMM, policy action impacting the community (such as the GMM

trial) was preferred. *The Citizen* staff compared the GMM with the adoption of fluoridation, what it considered to be “a public health triumph,” as well as with vaccines (2015). *The Citizen* staff further argued that solid science and strong data could save lives, and therefore (conditional upon FDA approval), the GMM plan should be supported and carried out to encourage the health of the majority and to ease potential pain and suffering of residents. These arguments favor policies impacting the entire community in service of the majority. Opponents fought back, arguing that it should be an individual choice and rallying around the cry of “no consent.”

A rallying cry of the anti-GMM opposition movement that gained momentum in 2015 and 2016 and resulted in signs and protests was the issue of consent. Opponents capitalized on the handling of the trial by the FKMCD. In treating the proposed trial as a scientific MoF, the FKMCD opened the door for participants to bring up institutional ethical protections such as informed consent. One anonymous voice in *The Citizen* stated that “they could no longer conduct an experiment like this in any prison in America without consent, but it’s OK in the Keys” (2016a). Positioning the trial as a scientific or medical experiment, linked to its unprecedented nature, opponents gathered around the idea that it would be unethical and improper to forego individual consent. By positioning themselves as unwilling test subjects (Welber in Axford, 2015b), guinea pigs, lab rats, and an “unsuspecting public” (Howell, 2012), opponents can compare themselves with vulnerable populations, such as prisoners, and appeal to ideals of democracy that emphasize individual rights and freedom of choice. This brings up for debate issues of how to obtain consent, what constitutes consent for a community, and whether a democratic vote would count as a form of majority consent to participate in an experiment (as opposed to requiring individual consent). Jody Smith-Williams compared the GMM issue to labeling of GMO products, drawing parallels between Oxitec and Monsanto (2012a), to argue that the GMM should require individual consent for the same reason why GMO products should be labeled: individuals should have the right to choose what they bring into their bodies and to avoid exposure to genetically modified organisms if they so desire. As John Murphy of Key Haven states, “it’s my blood” and the trial can only happen in residential areas, meaning the GMM is likely to bite some humans (d’Albissin and Girard, 2016).

Requiring individual consent by emphasizing individual rights in the face of public health concerns makes related policy decisions very difficult to navigate. Darryl Macer states (DeSantis, 2012b) that the process of informed consent for individuals and communities is challenging because the risks of the experiment must be balanced and it can take years of open dialogue to assess whether consent is needed from individuals or the community. As the FKMCD argues that this is not a trial but instead the same kind of technological mosquito control that the district has already been employing, no plans are in place to obtain individual approval. The GMM is approved as an animal drug, which does not require human consent to administer. Whether the matter of concern centers on diseases such as Zika or on individual rights to one's own health choices, in reducing the Keys PSC down to an MOF, participants miss the complexity of this issue and have no hope of reaching even temporary consensus. Adding more facts into the mix does not homogenize risk assessment and democracy does not guarantee that either individuals or the community will have the final say in health matters.

### **Topos Three: The Relation Between Participants and Each Other**

In addition to bolstering their epistemic credibility or attacking the credibility of other participants, Keys residents frequently generated arguments based on the dis/trusting each other's motivations. Trust is a very complicated notion, much like democracy and expertise, so I rely here on Asen's (2015) deliberative conception of trust. Through examinations of school board deliberations and community engagement, Asen finds that just as deliberation is a collective effort, so too is deliberative trust (p. 141). A deliberative conception of trust emerges as a relational practice through action and engagement, dynamic rather than being all-or-nothing, a priori, or an outcome (p. 143). As a relationship between different participants, trust then helps to clarify how Keys controversy participants generate arguments about each other. Trust can then be conceptualized as a sort of temporal orientation (p. 146) much like how topoi orient audiences argumentatively (Wetherbee). Trust can be built or weakened during the course of deliberation and one way to do so is to bring into debate arguments concerning the

motivations of others. Asen explains that the contexts in which participants engage in relational trust may result in different people having uneven burdens to justify their positions (p. 156). The FKMCD started from a position of relative trust, which was weakened through their handling of the situation and tendency towards deficit model-style communications, which could be interpreted as condescending or patronizing (Zarlengo, 2016). To level the playing field, opponents sought to weaken trust in the FKMCD's and Oxitec's positions by emphasizing the role of fear and monetary motivations in decision-making.

As previously established, concern about the spread of disease and an outbreak of dengue initiated the GMM Keys controversy. With Zika having arrived in the Keys in 2016, mosquito-borne diseases continue to be salient and pressing to local public policy. When participants speak past each other, treating the disease or the GMM alternately as an MoF, they are unlikely to recognize other participant positions as valid. Asen observed that flexibility is an essential part of the framework for building deliberative trust (p. 160). If other positions do not seem to be reasoned or justifiable, opposing sides may become polarized, which precludes open engagement. Entering the debate from a position of relatively less power and feeling condescended to, opponents fought back by arguing that the diseases are not real or pressing risk but instead an “overblown, hyped scare” (Bethune, 2016b) or a media-induced hysterical panic (Prosser, 2016a, 2016b) aimed at distorting and overriding the democratic process (Wray in O'Hara, 2016c). Accusations of hysteria and over-reaction create a two-pronged attack: firstly, by casting doubt on the objectivity of a participant's position and secondly, by arguing that democratic deliberation is tainted by the presence of hysteria. In response, FKMCD commissioner Jill Cranney-Gage focused on opponents' fears about the GMM, stating that it is “not as scary as everyone is making it out to be” (O'Hara, 2015b). Trust in another's position could be weakened or strengthened depending on whether a participant perceived the disease or the GMM as a “real threat”—is it rational fear or hysterical fear? This trust is negotiated and depends on other factors, such as the persuasiveness or sufficiency of relevant evidence.

Money, as a major factor in all aspects of life, similarly provokes strong reactions in controversy participants. Like many policy decisions, the initial GMM trial was proposed in part because it would

either keep costs stable or save the district money—typically considered a positive motivation. FKMCD employees, such as Doyle (Press, 2015), support the GMM trial in part because they connect saving money with benefiting the community. On the other hand, opponents have argued that monetary motivations, such as the corporate drive to make a profit, should stay out of this policy decision. Whether monetary motivations strengthen, weaken, or do not impact trust partly depends on whether participants feel that those motivations are being openly disclosed or hidden. Trust can turn into hostility when motivations are not disclosed and participants are not forthright about such possible influences (Asen, 2015, p. 164). This is part of why accusations that Oxitec was misinforming participants about how the mosquito worked were met with such outrage. Yet not all monetary motivations are greeted equally.

Opponents of the GMM argued that corporate motivations to make a profit weaken the veracity of their arguments and the trustworthiness of their expertise. As John Prosser states, “always follow the money” (2016a). Pointing out that Oxitec is a for-profit company that would benefit from a deal with the FKMCD, opponents can recast their stances as mere “marketing hype” (FKEC in Kay, 2016) serving their interest of finding a market for their product (de Mier in Axford, 2015c; Wray in O’Hara, 2016g). David Bethune argues that Oxitec is “likely to be motivated purely by monetary interests rather than genuine human concerns” (2016b). By juxtaposing monetary motivations from health concerns, the true motivations of Oxitec can be cast into doubt, weakening trust in their organization and in the honesty of their expertise. Participants can then reduce Oxitec publications to the lesser status of advertisements or sales pitches, which are typically granted very different epistemic authority than scientific research. Furthermore, information perceived as distant or removed from such fiscal concerns becomes valued as more trustworthy knowledge. The FKMCD, through their connection with Oxitec, can by association also be recast as a supplier of marketing “hype,” leading to arguments that, as a public charter and independent taxing authority, the FKMCD should not be serving the interests or promoting the product of a corporation (DeBoer, 2016). Monetary motivations can even weaken a participant’s apparent commitment to the ideals of democracy. David Bethune further argues that “backroom money deals between local elected officials” and a profit-driven corporation “go against the very foundations of our democratic



process” (2016a). Working from a conceptualization of democracy as completely pure from conflicts of interest or selfish motivations holds democracy to an impossible ideal. Not only does this reframe proponents of the GMM as undemocratic, it can also serve to prolong deliberation without the intent of reaching resolution (Rai, 2016, p. 92).

Tourism, on the other hand, is accepted nigh-universally as a central concern of the community and a perfectly trustworthy motivation. The Keys is a popular tourist destination and much of the local economy relies on the money brought in by visitors. In 2014, more than 4.5 million overnight, day, and cruise ship tourists visited the Keys (Key West Chamber of Commerce). Retail, accommodation, and food service alone generated over 34% of Monroe County occupations in 2015. Despite being generally accepted as a reasonable motivation for opinions on the GMM, tourism was deployed in arguments both for and against the GMM. Barry Wray, executive director of the Florida Keys Environmental Coalition, argued that the GMM would be perceived as threatening to possible visitors and that the trial would “scare tourists away” (O’Hara, 2015c). Perceiving the spread of dengue or Zika in the Keys as a greater tourism deterrent, David Hart, executive Vice President of the Florida Chamber of Commerce, argued that not supporting the trial could devastate the economy in the Keys (2016) or, as Big Pine Key resident Walter Lagraves put it, turn off “the tourism money spigot” (2016b). Concerns about tourism appear forthright regardless of which side of the debate they emerge, but the same cannot be said for concerns about real estate values in the Keys.

In Keys debates, a participant’s status as real estate agent was sometimes used to encourage similar distrust to profit-driven corporations. Walter Lagraves of Big Pine Key argues that much of the vocal and organized dissent comes from real estate “big shots” like Ed Swift III, Mila de Mier, and Barry Wray who are “prominent members of the local power establishment” and whose primary concern is for property values and profit rather than for public health (2016a, 2016b, 2016c). Much like the arguments levied against Oxitec, this position centers on the assumption that profit motives undermine or even hide behind the veneer of more “genuine” concern for human health. Profit motives are positioned as an either/or concern—either you are concerned with the health of locals OR with profits. This impugns the

sincerity of an opponent's argument, casting doubt on their honesty and attacking their credibility.

Although the idea of a “coordinated effort of real estate moguls trying to stop GMO mosquitoes” has been argued to be an overstatement or misinterpretation masking the real concerns of everyday and diverse Keys residents (Bethune, 2016a, 2016b), the implicit assumption that a movement led by real estate agents would not be respectfully motivated remains in play. Held discrete from the concerns of individual property-owners about their own homes, a fairly universal and expected concern, arguments that seem to hide unspoken real estate motivations for distrusting the GMM weaken the trust between participants.

Trust is vital to ensuring productive public deliberations and the PR nightmare that is the Keys GMM controversy has been sorely lacking in trust. Inflexibility and accusations of deception mar the debates and trust has decayed to where the different sides are highly polarized. Each side has argued that their own motivations are trustworthy and genuine, while the other side is misinformed or hiding their true purposes. Arguments that seek to build or weaken trust by focusing on participant motivations reveal the different factors than just objective fact that come into play in PSCs and that influence the credibility of participants.

#### **Topos Four: The Relation Between Citizen and Community**

Citizenship and residency carry a sense of investment in that locale, whether to a country or a neighborhood. However, claims to ownership of a home and the right to weigh in on policies that will impact that locale are not straight-forward. As Candice Rai points out in *Democracy's Lot* (2016), one prominent democratic topos is the notion of the “property-owning taxpayer” (p. 97), which depends on unspoken assumptions that taxpaying property-owners are more personally invested in and have greater claim to the neighborhood than, say, renters. From this topos derive many arguments from taxpayers about the injustice of their contributions to society being used for purposes with which they disagree. The exact relationship between a citizen and the Keys community is a little different than between the homeowners of Uptown that Rai discusses. Keys residents still argue for and against the GMM plan based

on their status as a resident of the Keys, but the temporary or transient nature of many residents alters this dynamic. Keys residents invoke a more flexible understanding of who belongs in the community to include temporary and permanent residents and demarcate interests emerging from outside of the Keys area as having no place in community deliberation. Members of the community draw on the idea of democracy to claim a right to be heard, and assign outsider status to exclude other voices.

Property ownership emerges in GMM arguments very differently than real estate agents do. While real estate agents may be portrayed as profit-driven, it is expected for one's own property and private interests to be protected in a democracy (Rai, p. 105). Keys homeowners express concerns regarding the possibility of property value decrease, both from the release of the GMM and from the spread of mosquito-borne disease (Cranney-Gage in Axford, 2015b; Axford, 2015b; Bolton in O'Hara, 2015c; Cranney-Gage in O'Hara, 2015c). Implicit is the naturalness of property-owners to be motivated to protect not only one of the largest investments most citizens can make in their lives—a house—but also the larger community surrounding their home. If accepted as an honest and relevant concern, deploying one's position as a Keys homeowner justifies and strengthens that participant's stake and vested interest in the proceedings. This allows participants to directly connect the reception of their concerns by other debate participants with the strength of the democratic process in the community.

Property-ownership is used to claim the right to protest and influence policy decisions. Guy DeBoer describes a protest that took place in front of an FKMCD meeting as the peaceful, "impassioned reasoning" of concerned "neighbors and fellow citizens" from the area, denying claims that protests are coming from "outside agitators or menacing people" (2016). Janet Wood, a 2016 candidate running for the FKMCD, argued that property-owners should not be subject to testing without consent (2016). As homeowners, Keys residents pay taxes to support the growth and sustenance of the community. Taxpaying is connected with democratic civic influence and fairness in what Rai refers to as the "consumer ideal of citizenship," defined as "a conflation of individual preference with the right to demand of the social contract exactly what one wants" (Rai, 2016, p. 99). Whether the cost to taxpayers (Schuh, 2014) or the limitations of what actions are acceptable for independent taxing authorities (de

Palma, 2016b) are being discussed, participants who draw on the democratic topos of the taxpaying homeowner rely on the connection between democratic citizenship and property-ownership in a community to cement their right to deliberative involvement.

In Florida, the issue of non-permanent residency—seasonal or vacationing—also becomes pressing. In Monroe County, there has been a decline in permanent population and a corresponding increase in seasonal and temporary residency, with an estimated 78,000 permanent and 78,000 seasonal residents in Monroe County in 2011. High volumes of tourism also mean that events in the Keys are of great national interest in a way that they might not otherwise be if occurring in other parts of the country. Both tourists and potential snowbirds or other temporary residents are interested in the status of the GMM trial. Under debate is the relative weight of arguments and positions put forth by people of different types of residency: whose voices should be heard or heard louder in civic deliberation? Are there voices getting too much attention for their relative stake in the community? Warrants concerning residency differently ascribe a sort of “currency” or validity to positions deriving from permanent, temporary, or tourist presence in the Keys. As discussed above, permanent home-owning residency is commonly used to strengthen and defend claims to influence local policies. However, Key Haven resident Michael Kane questioned whether the 2016 vote would accurately reflect the community’s opinions, as many homeowners only live part-time in the Keys and are registered to vote elsewhere (O’Hara, 2016e). Kane here argues from the position that these homeowners should have a say but are at risk of exclusion due to their non-permanent resident status. Some non-permanent residents, such as Old Town Key resident Carey Winfrey, validate their right to participate in the GMM debate with their partial residency status (O’Hara, 2016b). While residency, even partial or non-permanent, tends to be used by participants to implicitly back and support their own viewpoints, non-residency or “outsider” status is generally labeled to delegitimize the voice of others. The staff of *The Citizen* point out that fewer than 1% of names on the change.org petition against the GMM trial are from Monroe County residents (2015). Community membership is a form of currency that supports one’s right to engage in the GMM deliberation.

While resident opinions are backed by association with increased and vested interest in the community, outsider opinions suffer the reverse. Some argue that “outsider activists” are actually the ones protesting the GMM release, who are less impacted and therefore less invested in the health and economy of the Keys and would leave residents alone to face the health consequences (anonymous, 2016b). Online, as with the change.org petition, it can be impossible to determine where a speaker is from. Membership in the community is a point of contention that grants or takes away a sense of validity. Guy DeBoer and Ralph de Palma counter that GMM protests were put forth by fellow citizens, not outside agitators (DeBoer, 2016; de Palma, 2016b). Oxitec and Intrexon, already facing accusations of being profit-driven, are further distanced from the community by their distance to the Keys, being based in the UK and Virginia respectively. GMM opponents contend that democracy means valuing citizen input, health, and safety over the profits of a corporation, particularly over a foreign corporation. Questioning whether a “British company” should be allowed to run a trial in the US (Conchscooter, 2015), or be prioritized by the FKMCD (anonymous, 2015), or seek to influence the opinions and therefore the votes of US citizens (anonymous, 2016d), these participants implicitly place the rights of community members over corporate interests and assume that non-citizens cannot be trusted to care as much about your backyard as you do.

The topos concerning the relationship between citizen and community focuses on how residency, whether seasonal or permanent, legitimizes or delegitimizes participation in this civic debate and draws strength on the connection between tax-paying residency and a functioning democracy. Residency and homeownership are topoi that emerge in many public debates, not just those controversies involving science-related policy. The exact form related arguments take are contextually dependent and often connect to the particular demographics and community identity of the locale where the controversy originates.

## **Topos Five: The Relation Between Participants and Responsibility**

Responsibility, another complex, networked, and somewhat nebulous concept, is a concern that manifests in debates about the GMM. If something goes wrong, then what? Who will suffer and who will pay? Most technoscientific innovations will result in unintended consequences, but the severity and range of those consequences is impossible to predict. Wicked problems can make responsibility difficult to pin down, but Keys residents on both sides of the debate expressed interest in whose jurisdiction the GMM falls into, who would be legally responsible if the trial brought unforeseen consequences, and what place the Keys have in confronting a global health problem. From the beginning, finding the correct regulatory agency to approve the GMM was difficult as no agency wanted to claim jurisdictional responsibility. Keys residents protested the unilateral definition of the risks faced by the community and the choice of the GMM as the solution. Responsibility goes hand in hand with risk assessment. Grabill and Simmons (1998) join other risk communication scholars in discussing the failings of linear risk communication models. They argue that because risk is socially constructed rather than neutral or objective, risk assessment and communication cannot be separated and that those impacted by institutional decisions should be enabled to participate in knowledge production and decision making to work to avoid power imbalances (p. 347). The disagreements in the Keys over the relative risks of the GMM versus the diseases carried by the AE demonstrate the contested and contextual nature of risk. Opponents argued that they, and not the organizations approving the trial, were likely to suffer the consequences. Amidst these protests, some in the Keys focused on the more global health concerns of dengue and Zika. These residents questioned whether the Keys has a moral responsibility to seek preventative solutions to help combat a potential public health crisis. The arguments surrounding this topos bring to light both issues with democracy and with expertise.

During the initial years after the plan was announced, the FKMCD struggled to find a governmental organization willing to claim jurisdiction. As a new technology, it was unclear which

organization had both the expertise and jurisdiction to oversee the approval process for the GMM. Who would test the safety of the GMM technology? What measures should the GMM be subject to? The state and federal government at one point both denied claim over the trial; in response, Doyle stated that while he did not want to move forward without higher governmental approval, they were considering such an action (O'Hara, 2012a). This ran counter to his statement the previous year that the release would not happen without approval and time for public discussion (Doyle in O'Hara, 2011b). A decision to move forward without oversight or approval runs the risk of undermining the functioning processes of a democratic government. Smith-Williams described the FKMCD's contemplation of proceeding without permits as an "imminent threat" (2012b) to the democratic process. Ultimately, the FKMCD did want a governmental agency to review the GMM for health risks (they felt comfortable with the possible environmental risks) because they were not adequately prepared to test for such risks themselves. Waiting for approval would disperse the responsibility for the release and involve more participants in the risk assessment process. At the time, the CDC, USDA, USFWS, EPA, FDA, and others declared no jurisdiction over the GMM, while the DOA permitted use of genetic modifications for agricultural but not for mosquito control purposes (O'Hara, 2012a). Keys resident and blogger Louis Petrone protested that without federal approvals, moving forward with the release would be tantamount to treating residents as guinea pigs (2014). Even after the FDA assumed jurisdiction over the approval process in October, 2012 (DeSantis, 2012c), controversy continued.

FKMCD officials evinced trust in the findings and authority of democratic institutions such as the FDA to regulate and oversee this process, which can convey the sense that the system is providing its promised protections to citizens. Commissioner Jill Cranney-Gage anticipated that FDA approval would alleviate public concerns (Schmida, 2015), and Commissioner Phil Goodman echoed such sentiments when he argued that the successful FDA approval, received after a five-year long process, should encourage some opponents of the GMM to reconsider their stance (O'Hara, 2016k). However, some residents argued that the FDA approval was granted beyond their legal authority (Prosser, 2016a) or that the FDA addressed only the bare minimum of concerns, providing inadequate research on possible health

effects of the GMM (Welber in O'Hara, 2016a). Other issues, such as distrust or the sufficiency of evidence backing the approval process, intersect with the FDA's assumed responsibility for the GMM approval. The FDA did not possess enough epistemic authority to end the controversy, nor did the approval process serve to reassure that proper democratic procedure was being followed and all voices heard. Rather than the closing statement some FKMCD officials felt it would be, the FDA approval was only one factor in the debate.

Opponents of the GMM argued that the FDA approval did not mean that no risks existed, only that the FDA found any risks acceptable. Dr. John Norris cautioned that "FDA approval is not a failsafe for experimental biological technologies" because physicians know that the FDA approval checks the minimum safety and benefit expectations (Norris in Goodhue, 2016b). Michael Welber of the Florida Keys Environmental Coalition comments that all pesticide approvals that have later been removed were once granted by the FDA (Kinney, 2014). It is an imperfect process that yields imperfect choices. Although Oxitec will pay for the trial release (Axford, 2015c) and has assumed all legal and financial responsibility for the trial release (Oxitec OX513A Trial), including public, product, and pollution liability insurance (Investigation Agreement), this assumed responsibility does not reassure residents that there will be no repercussions for public or environmental health. Mila de Mier argues that "[o]pening this Pandora's box, sometimes you don't see the impact until five, 10, 15 years down the road" (Glenza, 2016). In the meantime, unpersuaded by the sufficiency of evidence and the trustworthiness of Oxitec and Intrexon, the Keys community might have to endure ten years of unintended consequences. But others in the Keys question whether the local community has a responsibility to the rest of the world, fearing the potential consequences of leaving Zika to spread through the area unchecked.

While some opponents worry that releasing the GMM means opening a Pandora's box that regardless of financial or legal responsibility will cause the community to suffer, others look at the status of the US as a symbol of democracy. Cintron (2010) and Rai (2010, 2016) point out that democracy as a topos, regardless of its flexible use for contradictory arguments, is associated with notions of justice, equality, and fairness. In practice, democracy is compelling for its associations with virtue, despite being



no guarantee of any such thing (Cintron, 2010). Yet this ideal, that we as a democratic society should be global champions for justice, invokes the issue of responsibility to do our part towards global health efforts as well. Rather than focusing on the Keys community more locally, this situates the Keys into a larger conversation. The World Health Organization has already stated that the GMM might be needed to combat the spread of Zika (“Stopping Zika”), making the trial release in the Keys simultaneously locally and globally important. Keys blogger Conchscooter considered the matter in terms of global public health, although his arguments reveal racial and class-based assumptions. He questions whether by foregoing the GMM we “let the brown and black people in the Third World die?” and continues to ask “Do we not have a responsibility to share our wealth?”, adding “I’ve seen people die of dengue because they were brown and poor and forgotten by God” (2015). In contrast, blogger Key West Lou (Petroni, 2015) and Kirwin (Axford, 2014) express sympathy to the suffering of those with Zika, but argue that the trial does not need to occur in the Keys, although they do not specify the answer to “if not here, where?” This highlights a question of responsibility: is it our responsibility as a (local, state, national, global) community to try to combat widespread health concerns? Or does the democratic right of each individual take precedence, particularly regarding the right to one’s own body and health choices? These are the kinds of questions that the deficit model fails to address. Hopes that something like FDA approval will make the correct policy decision easy and consensual misses the complex and irresolvable nature of such dilemmas. And past experiences throw the epistemic authority of FDA approval and technoscientific responsibility into doubt, as examples such as DDT and Monsanto demonstrate. Arguments about the future of health concerns frequently draw from such past examples and explore the relationship between past precedent and future policies.

### **Topos Six: The Relation Between Past and Future**

The relation between past and future can concern many things, such as cause and effect or even the evolution of trust (as Asen, 2015 describes), but the primary relation between past and future that

generated arguments about the GMM was that of the precedent. One of Aristotle's original topoi, the precedent refers to a past decision or action to defend a present interpretation and an argument about a future policy (Burton, 2007). The concept of the precedent is particularly important in democratic legal systems but can also be deployed in deliberative debates. In the Keys, this topos manifests around two main precedents: what the GMM represents as a technological innovation and what the decision to hold a vote on the GMM trial represents to the democratic process. The past-future relationship has been used to argue both that the GMM and associated approval process have been unprecedented and that they are a logical evolution and next step given technological and democratic history.

The GMM's status as a technological precedent is rhetorically deployed depending on whether it supports the planned release more to emphasize the familiar aspects of the technology or the innovative ones. The GMM represents a scientific precedent for mosquito control methods in the US, which was part of the reason it was so difficult to determine which federal regulatory agency should have jurisdiction over its approval. Former FKMCD Director Doyle once compared the GMM to urban guerilla warfare, calling it a "brave new world, the next generation" of mosquito control that would be a game changer if successful (O'Hara, 2014). At present, the GMM is the only tool available to the Keys to combat the Zika-carrying mosquitoes (Barry-Jester, 2016), as they are resistant to pesticides (Smith in Axford, 2015a) and Zika has no cure or remedy (Hart, 2016). Other similar technologies, such as the Wolbachia-bacteria infected MosquitoMate™, approved by the EPA as a pesticide, are currently racing to earn approval and compete with the GMM (Barry-Jester, 2016). While Oxitec's GMM has already been tested in sites such as the Cayman Islands and Brazil, the Keys trial would represent the technology's first inroads into the US mosquito control market. An effective trial in the Keys could pave the way for genetic engineering as a new national method of disease-vector control. Yet when this innovation meets with resistance, particularly those who argue that genetic modifications are unnatural, proponents are quick to point out that the GMM can be considered the natural next step in the long scientific history of selective breeding and other forms of pest sterilization, such as through pesticides (*The Citizen* staff, 2015). Proponents can alternately draw on the trial's place in scientific development to emphasize the small steps

it takes away from already existing methods or the innovation it represents, depending on the rhetorical situation. But the technological element is only one way that the Keys controversy is making a precedent.

The handling of the GMM plan was by no means a smooth one, but its importance and associated heated debate in part come from its potential to bolster or weaken the local democratic infrastructure. When the FKMCD decided not to release the mosquito without federal agency approval and, after the 2016 vote, when they decided not to release the GMM in Key Haven against public approval, the organization sought to preserve the democratic processes and structures that exist. Such a decision would also have set an ethical precedent of prioritizing public health over individual and communal positions on the issue. Worries that the FKMCD would do just that prompted opponents to argue the similarities between the GMM trial and past unethical medical experimentation such as the Tuskegee syphilis experiment (Bethune, 2016b). John Prosser of Big Pine Key notes that with the US's history of "unethical human experimentation," accusations of experimentation or disease propagation hit a chord "regardless of validity" (2016a). Opponents further set up the connections between the trial and experimentation by pointing out Oxitec's previous issues with consent (d'Albissin and Girard, 2016). Additionally, as discussed before, opponents can further draw on examples of previous FDA approved technologies that were later banned. Associating the trial with previous undemocratic, unethical, or discredited precedents weakens support for the trial. Whether controversy participants believe that the GMM represents an unethical experiment or not, however, the decision to appease demands for a vote sets a political precedent for the FKMCD that has been very controversial.

Keys participants are very aware that their debate has gathered national attention, being a newsworthy matter across the country and leaving the Keys with "a mandate" to set a national standard (Bethune, 2016b). To this end, opponents fought to make their voices heard and succeeded in impelling the district to add the issue to the 2016 ballot. However, FKMCD Commissioners Goodman and McDonald did not see the referendum as a means of strengthening the democratic system. Instead, they argue that the Board has never needed to ask the public for approval to use mosquito control technologies in the past (O'Hara, 2016i), and that initiating such a precedent would require the board to continue to

“hold referendums on the use of other mosquito control innovations” down the road (Associated Press, 2016). They contend that such decisions are under board authority and are part of their role as elected representatives. Board attorney Dirk Smits echoes this, advising the FKMCD that under Florida state rules, they cannot delegate their responsibilities to the public (Filosa, 2016a). The FKMCD is part of the democratic infrastructure of the Keys and the Commissioners are elected to make such decisions.

Commissioner McDonald further argued that the matter is a health one and not a political issue, saying that to treat it as the latter is really beyond the proper way this should be done” (Atkins, 2016b).

McDonald’s statements indicate a privileging of expertise that relies on the dichotomizing of the natural from the social. When Commissioner Goodman adds to this argument by stating that the FKMCD’s duty is to public health over public will (Atkins, 2016b) and that he would be willing to proceed with the release regardless of Key Haven sentiment (O’Hara, 2016c), he reveals that to him, the decision to hold a vote breaks from the traditional democratic process followed by the FKMCD. Although a vote is in many ways the ultimate democratic tradition, in this instance controversy participants can argue that the vote breaks with democratic precedent and therefore weakens the existing structures and processes. As I will discuss in the next topos, other Board members disagreed, and prioritized the democratic process of receiving constituent input, even at the cost of breaking precedent.

The US judicial and legal systems place value in the precedents set by prior institutional decisions, and it is unsurprising that Keys residents are aware of the argumentative importance of precedent. The connections between the GMM trial and past scientific and democratic developments are strategically deployed in the Keys to make more or less comfortable the technology’s status as groundbreaking precedent. Depending on the familiarity of the GMM and whether tradition or innovation is judged to be a positive in this case, it can be argued that implementing the trial or the vote would have weakened or strengthened the democratic system in the Keys the role of expertise in this policy decision.

## **Topos Seven: The Relation Between Public and Democratic Process**

Concern from publics about the democratic process is common in PSCs. Rai (2016) explains that the democratic process is expected to be both transparent and inclusive, or else it risks being discredited as legitimate (p. 83). Exactly what is required for the process to be deemed adequately transparent or appropriately inclusive must be negotiated within the context of that space and place, pertaining to the particular issue at hand. As a government organization under a five-person elected board of representatives, the FKMCD is part of the democratic infrastructure of the Keys and operates with epistemic and jurisdictional authority over the management and control of the local mosquito populations. When and how public input should be taken into account is a disputed aspect of the controversy. The legitimacy of the process depends on how successfully participants can argue for or against the inclusivity and transparency of the process.

Transparency is a key part of democratic governance. An open process helps to build trust between authoritative institutions and the community (Asen, 2015). Citizens expect to be informed about the steps of democratic decision-making. Particularly where there is contention between members of the public and those who are elected or hired to represent and protect their concerns, transparency becomes representative of democratic health. Participant arguments about transparency question whether the democratic infrastructure is adequately communicating with the public, proposing particular balances between protected information (for security or copyright purposes) and available information (for citizen access, as taxpayers and concerned stakeholders) as preferable.

Oxitec has kept a protective grip over research on their Friendly™ mosquitoes, but distrust into their motives, their outsider status, and the scarcity of independent reviews of the GMM have led some opponents to argue that their reliance on “commercial confidentiality” could easily hide major technological flaws or consequences (Smith-Williams, 2012a). Similarly, the FKMCD is expected to be open and truthful with the public. Staff of *The Citizen* argue that as a public entity, for the FKMCD "there

is no such thing as confidential information” because records laws exist (2016). As such, the FKMCD’s attempts to contest legal requests for records restrict public access to the decision-making process in an undemocratic way. In other words, the FKMCD should “remember that they represent the citizens who elect them” and not attempt to restrict the public’s right to know to only “what they want to tell” (*The Citizen* staff, 2016). The financial charge by the FKMCD to comply with Freedom of Information Act requests was received negatively. Guy DeBoer felt it was a delaying tactic to improve ballot results while de Mier offered to pay out of pocket immediately so that the public could receive the full picture as soon as possible (DeBoer, 2016; de Palma, 2016b). Participant arguments focused on transparency center upon the idea that secrecy breeds misconduct. There should be nothing to hide in public policy-making because it is for the good of the people. The public’s right to know is connected with their ability to participate meaningfully in the decision-making process and impact the decisions being made. Given the concerns of many participants about being perceived as well-informed, a lack of transparency can also block lay citizen access to the research used by officials in their decisions, inhibiting effective participation and argument-formation. In their quest to make their voices heard, the desire to have a strong knowledge of the workings and available information about the trial accompanies the fight of Keys residents to ensure their input is being taken seriously by their representatives.

Democratic deliberation is not only expected to be transparent, but also to be inclusive. This expectation highlights the conflict between democracy and expertise. How much of a voice the public should have when weighing in on science-related policies is hotly contested and manifests in vastly different argumentative positions about how the process should proceed. The very infrastructure of democracy is threatened when the people are shut out. Oxitec may not be expected to change their work based on input from the Keys, but the FKMCD and other US organizations are. For most constituents, engaging with the FKMCD Board members is the easiest way to become directly involved in the policy process. As elected representatives, the Commissioners represent a nexus where policy and public meet and where expertise and democracy collide. Similarly, Keys residents fight to be heard by attending town hall meetings, publishing letters to the editors, articles, or online comments on the GMM, and protesting

or supporting the FKMCD at public meetings. The cry of “listen to these people. They are your constituents” rang out (Wray in O’Hara, 2015c). Keys residents remain starkly divided as to whether or not they feel that their concerns are being heard and their feedback incorporated.

Many GMM opponents feel that their voices have been excluded. They call into question the legitimacy of the entire GMM approval process, emphasizing failures of inclusivity and responsiveness by the relevant democratic institutions. Some argue that they were not given enough time at FKMCD meetings to make all of their concerns known (Smith in Gilbert, 2014b), that their concerns were interrupted and brushed off (DeBoer, 2016; Welber in Axford, 2015b), or that not enough public hearings were held by the FDA (Welber in O’Hara, 2016a). When Commissioner Goodman stated that he was willing to proceed regardless of Key Haven’s referendum results, Gilda Niles responded “So you want to protect us at all costs, even if we don’t want to be protected?” (O’Hara, 2016c). Niles continued to state, “I blame the government. You need to think very carefully about who you are going to vote for.” Prior to the decision to hold a direct vote about the GMM, voting for FKMCD board members and speaking during public feedback portions of policy meetings were the primary ways that participants could attempt to influence policies. In response to opponents’ arguments that “you have lost the faith of the people” (Wray in O’Hara, 2015c), some FKMCD officials protested that they were in fact engaging with the public. Commissioner Cranney-Gage argued “We are trying to educate you. We are trying to be responsive as possible. We do respect your views and thoughts” (O’Hara, 2015c). Yet this sort of response is inherently contradictory. It simultaneously positions the audience as in need of education (i.e., uninformed) and being respectfully listened to. This contradiction was apparent in action as well as word and poorly received by members of a community that prides itself on being informed, educated, and intelligent.

Commissioner Cranney-Gage’s contradictory statement exemplifies the sort of deficit model approach that only exacerbates the tension between democracy and expertise. It presumes that opponents will change their minds to agree with the (expert) FKMCD if only they become more educated. Faced with such responses, it is unsurprising that the public jockeys to be perceived as informed or seeks to

undermine the apparent epistemic authority of the experts who hold most of the power in these mosquito control policies. In an attempt to combat the premature defining of the problem and presentation of the solution by a small group of experts that excludes the majority of the public, GMM opponents call upon the ideals of democracy and their right to be heard and have a genuine place in public deliberation. The exclusion of the public from all but educational fact sessions reveals the remaining fear of mob rule that still influences the process of deliberation. It appears in DeBoer's complaint that the FKMCD officials could not handle criticism and seemed to expect the worst from constituent comments, challenging any concerns brought up by Keys residents and preferring to follow Doyle's "single minded crusade" rather than genuinely listen to the people (2016). If the public were brought in earlier and on more equal or honest footing to participate in the open negotiation and defining of the problem and possible solutions, such contentious communication breakdowns and participant frustrations may have been avoided. In an effort to stop the community from "tearing at each other" (Commissioner Smith in Atkins, 2016b) and to finally have an independent poll of public opinion, it was ultimately decided that the democratic process necessitated a vote.

The decision to put the issue to a vote was not unanimous nor even an obvious one. Many constituents, particularly opponents, felt a vote, "at minimum," should be held (Eliot in O'Hara, 2016b) and were pleased when the FKMCD began to check with the supervisor of elections into the feasibility of holding a referendum (Shaw in O'Hara, 2016d). Originally, the referendum was only intended to be held in Key Haven. However, Commissioner McDonald proposed expanding the vote to encompass all of the Florida Keys, arguing that the spread of disease is a matter for all Keys residents, not just those in Key Haven (O'Hara, 2016f). By relying on the conception of democracy as inclusive, the vote was expanded to the wider community affected. Toward the same goal of inclusivity, Commissioner McDonald successfully asked to postpone the referendum from the primary to the general election in order to hear from more voices (O'Hara, 2016h). This expanded inclusivity led to some contention as to whose voice would be listened to in case of a split vote, as ultimately resulted, where Monroe County voted in favor of the trial but Key Haven against.



Even the vote, designed to improve and protect the democratic process in the Keys and gather the input of more constituents, could not resolve the controversy. The FKMCD is now left to search for a new trial location, and has begun to move forward with other alternatives such as the Wolbachia form of mosquito control. Participant arguments about the correct relationship between public and process reveal not only differing understandings of the nature of democracy, such as how elected officials should best represent their constituents, but also of when and how community members should be included in the deliberative process and of how expertise and democracy should be balanced.

## CONCLUSION

Democracy and expertise are bound to remain in tension for perpetuity. The arguments for and against the GMM as put forth by different Keys participants negotiate how the tension will tentatively balance out for this specific PSC at this time, but such balance will not stay in stasis forever. Given the fervor arguments on the GMM have reached, such balance may not even last for very long in the near future. As relational, orienting nodes, the topoi discussed above help to contextualize how democracy and expertise emerge in and influence the arguments by Keys residents about the GMM. The Keys controversy provides an example of how ancient relational topoi, such as the notion of precedent, still propel arguments today while being adapted around temporal and contextual nuances. Studying situated and localized inventional strategies and argumentative positions is not only beneficial for scholars studying public scientific controversies. A more nuanced understanding of the origin of different points of contention, the rhetorical strategies used by participants, and the ways commonplaces can be deployed can also help those who engage in civic deliberation and must navigate the spaces where the tension between democracy and expertise plays out. This controversy is complex and participant arguments intertwine many factors in ways that do not cleanly untangle. Consequently, many of the positions discussed incorporate different topoi in the same persuasive narrative thread. Rarely in civic deliberation is any argument purely grounded in “just science”—and even then, scientific institutions bring their own standards, values, and worldviews to bear on their positions.

While dissensus is inevitable in policy-making and exacerbated when expertise divides specialists against non-specialists, that does not mean that civic deliberation cannot be productive. It is also misleading to dichotomize experts and non-experts into incommensurable groups (Kinsella, 2004). The GMM trial in the Keys demonstrates the sort of heated polarization that can result when public

engagement is rendered as a linear transmission of knowledge from experts to the public, with little opportunity to shape or influence policy. Lindeman's (2013) study shows the how the rhetorical strategies used by a grassroots movement could stop the use of a particular pesticide spray in California; while it is too soon to tell how the GMM controversy will be resolved and the FKMCD is searching for a new trial location and investigating other mosquito control alternatives, there is the possibility that opponents will successfully stonewall future attempts to release GMM in the Keys. Approaching a science-related public policy measure using deficit model communication strategies has led time and again to the public losing trust in scientific institutions and protesting their exclusion from decisions that will impact the local community. This brings up not only contestations over credibility and epistemic authority but also debates over how the democratic process should function. The Keys provides an example of why it is important for participants to recognize the complexity of arguments that can arise over the same commonplaces and how an understanding of the origins of the conflict between expertise and democracy can help those who seek to engage with PSCs or facilitate interactions between scientific and governmental institutions and various publics.

The deficit model is out of favor, but the rational/social divide is hard to eradicate in practice. It is fruitless to conjecture whether the trial might already have happened had the community been engaged in more depth earlier in the process of deciding how to handle the arrival of dengue in the Keys. As communities grow and change over time, controversies can stall as the local context changes and when new members arrive *in media res* and seek to be included (Rai, 2016). However, more open and equal engagement with the public can lead to more productive discourse. In *Genetic Control of Malaria and Dengue*, Tim Antonelli, Amanda Clayton, Molly Hartzog, Sophia Webster, and Gabriel Zilnik argue that if transgenic organisms such as the GMM are to be employed in communities to control disease vectors, then scientific experts must ethically engage the public in open deliberation (2015). They note that public health concerns such as dengue are often not incentive enough to merit unquestioned use of GMM technologies, particularly when communities go for periods of time without disease presence, as happened in the Keys (p. 10). Ignoring the many factors and differing priorities that guide participant

positions and arguments does not lead to consensus. The FKMCD follows Antonelli et. al.'s recommended steps of holding educational events and seeking to poll public opinion on GMM technology (p. 12), but they failed to follow up with collaboration to plan the program and policy releasing the GMM. Foregrounding the role that emotions, values, and ethical perspectives have in GM policies, Antonelli et al. argue that respecting the multiplicity of interpretations that inevitably result in PSCs will lead to better trust between participants and more respectful dialogue (p. 23). This trust is relational and must be strengthened by the process of deliberation and institutional engagement with members of the Keys.

Separating participant positions as expressed through local print and digital documents helps to clarify the commonplaces where the democracy and expertise tension is instantiated. How Keys residents make connections between participants and epistemic credibility, public health concerns and the community, participants and each other, citizens and the community, participants and responsibility, past and future actions, and public and democratic process reflects the multifaceted nature of democracy and expertise and how such notions may be deployed in diverse and entirely contradictory ways. Keys participants jockeyed for both the moral high ground of democratic ideals and the credibility of being informed, if not an expert. The major topoi spurring participant arguments in the GMM controversy reveal how many complex factors influence how Keys residents perceive and judge the possible risks and benefits of different courses of action. In these debates, the expertise brought by the FKMCD and Oxitec's scientists is only one variable. This specialist expertise is partial, another form of local knowledge complementary to the expertise of locals in the perspectives and values of the community (Kinsella, 2004). When the entire controversy is reduced to a matter of fact, a partial rendering that examines only the expertise of specialists, the other kinds of expertise necessary for democratic policy-making are shut out. As a community, the Keys have a particular local identity grounded in concern for the environment, valuing of intelligence and being informed, and emphasizing unique character. This local identity influences self-perception and argumentative presentation alike, and the arguments put forth by the Keys community reveal their desire to bring their local expertise to bear on the matter.

While the participant positions and arguments published in print and digital documents provide clarification on how the tension between democracy and expertise both sustains and is revealed through this controversy, news articles, letters to the editor, and blog posts can only reveal so much. Future examination of the Keys controversy would be greatly aided by physical presence and immersion in the actual spaces and commonplaces where these arguments emerge. Ethnographic work would help to construct an emic understanding of the context driving the reception and interpretation of the commonplaces used by Keys residents to complement the use of topoi in public print and digital forums. Ideally, future research would involve extended presence in the Keys to better examine not just how the topoi emerge textually but also the visual and material commonplaces that emerge in the controversy (Rai, 2016, p. 37-9). Expanding the scope to include social media posts and comment sections on public documents would help to incorporate more voices on the issue and perhaps reveal different publics that form around the issue. Molly Hartzog (2016) provides a good look at how genome databases are inventional sites of rhetorical activity for GE mosquito researchers, and how these databases serve as boundary objects. Examining how the GMM functions as a boundary object in the Keys could extend discussion of how the conflict between expertise and democracy instantiates the controversy and generates argumentative commonplaces. The different participants in the Keys interact with the GMM in very different ways, some specialists treating it as a matter of fact and some non-specialist residents as a matter of concern (Zarlengo 2016). The GMM would be an unprecedented method for disease vector control in the US and sets a precedent for the future of this technology and for how other mosquito control districts engage with the public. Scholars of science studies, rhetoric, and professional and technical communication have the sort of interactional expertise Collins and Evans note is so important to bring to bear in PSCs. Members of the communities impacted by the planned release of transgenic organisms are already implicitly engaged in the issue (Carvalho and Capurro, 2016). Improving public engagement in PSCs to ground more equal dialogue, grounded in awareness of and appreciation for the complexity of civic deliberation, is not an easy goal, but it is an important one nonetheless.

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