Ecological Threat and the Founding of U.S. National Environmental Movement Organizations, 1962–1998

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This study examines the role of "ecological threat" in shaping the U.S. environmental movement. Statistical analysis combines founding data on 772 national environmental movement organizations with ecological data on air pollution levels and amphibian and bird populations. We examine these data longitudinally, from 1962 through 1998. Net of other social, economic, and political factors suggested by social movement theory, we find evidence of segmented effects in the expected directions: Declines in wildlife populations are associated with the foundings of wildlife and wilderness protection organizations while increases in air pollution are associated with the foundings of organizations focused on ecosystem well-being and public health. These findings help refine long-held assumptions about the relationship between ecological degradation and environmental activism, and demonstrate the broader utility of the threat concept for strengthening theories of social movement mobilization. Keywords: social movements; environmental movements; organizations; ecological threat; environmental degradation.

"Ironically, the very process that destroys wilderness stimulates its appreciation."

Roderick Nash

This study examines the role of ecological threat in mobilizing environmental concern in the United States. By "ecological threat" we refer to costs associated with environmental degradation as it disrupts (or is perceived to disrupt) ecosystems, human health, and societal well-being. Our analysis investigates the classic argument that during the late 1960s and early 1970s widespread ecological disruption—smog-choked cities, rivers afire, dying lakes and streams, oil spills, and in the absence of song birds "a spring without voices" (Carson 1962:2)—marked a growing discordance between ecological systems and modern industrial social systems, and that public recognition of this imbalance and its impending costs helped galvanize broad swaths of the American middle class under the banner of a new "ecology" movement.

Our analysis builds on research that examines the role of threat in mobilizing social protest. Much of that extant work focuses on political forms of threat deriving from the state, for example, through police violence or policy change, and how such political threats condition the emergence of "reactive" social movements (Tilly 1978) seeking to protect extant public goods or prevent additional harm (Almeida 2003, 2007; Goldstone and Tilly 2001; McVeigh 1999; Van Dyke and Soule 2002). The threat literature accords with common depictions of modern environmentalism as a reactive social movement, one rising to confront ecological

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threats in defense of nature and the health and livability of future generations (Brulle 2000; Dowie 1995; Dunlap and Mertig 1992; Foster 1999; Nash 1967). In this study we extend the concept of threat from politics to the ecological realm to offer an empirical test of this "ecological threat thesis" using quantitative national-level data.

The approach we develop integrates information on biophysical processes into models of human action to closely align social movement research and environmental sociology (Buttel 1987; Catton and Dunlap 1978; Dunlap and Catton 1979; Martell 1994; Rosa et al. 2010). Specifically, the study combines sociological data on the foundings of 772 national environmental movement organizations (EMO) and ecological data on air pollution levels and amphibian and bird populations. We examine these data longitudinally, from 1962 through 1998, to see whether ecological threats such as declining bird populations or increasing levels of criteria air pollutants influence the establishment of social movement organizations designed to combat such threats. Controlling for political and cultural factors, we present evidence of a segmented response to ecological threat. Declines in wildlife populations are associated with foundings of wildlife and wilderness protection organizations while increases in air pollution are associated with foundings of organizations focused on ecosystem health and human well-being. These findings speak to the importance of organizational heterogeneity of the environmental movement and help to refine long-held assumptions about the relationship between ecological decline and environmental activism. More generally, findings from this study also demonstrate the broader utility of the threat concept for social movement theory.

The Role of Threat in Social Movement Emergence and Growth

The concept of threat is not new to social movement research. It was a central element in various "social strain" theories that dominated thinking about social movements during the 1960s (Buechler 2004; Marx and Wood 1975). According to these theories, individuals who join social movements often do so because changing social conditions disrupt daily life and either deprive or threaten to deprive citizens' access to resources, civil liberties, or other public goods. From this perspective, mobilization is the result of grievances that arise from impending or actual threats to one's accustomed way of life.

Beginning in the 1970s, however, the threat concept came under sustained attack. Proponents of resource mobilization theory (McCarthy and Zald 1973, 1977) and related political process theories (McAdam 1982; Oberschall 1973) challenged the idea that complaint or grievance could explain participation in social movements. These scholars argued that personal grievances (and the real or perceived threats that condition those complaints) are ubiquitous features of modern life—constants that cannot explain variations in collective behavior. These successor theories focused on the supply of opportunities for activism rather than demand for activism, and held that increases in the amount of resource*s* available for collective action and political opportunities generated by changes in the organization of the state explained mobilization better than grievances generated through deprivation or threat.

In recent years the role of threat in shaping mobilization processes and outcomes has attracted renewed scholarly attention (Almeida 2003, 2007; Goldstone and Tilly 2001; Jasper 1997; Maher 2010; Van Dyke and Soule 2002). This renewed interest is buttressed by social psychological research demonstrating that threat can stimulate aggressive commitment in organizational settings (Dutton and Jackson 1987) and that individuals and groups are willing to commit greater amounts of resources when faced with a potential loss or threat than with a potential gain or opportunity (Kahneman and Tversky 1984; Mittal and Ross 1998; Ross and Staw 1986). Empirical studies of collective action have focused on mobilizations triggered by group responses to the perceived or actual loss of existing resources and/or the imposition of new harms, mostly as a result of political processes. In such "reactive" movements (Tilly 1978), these studies show political threat can lead to collective action. Just as political

opportunities may inspire groups to organize to claim new resources (McAdam 1982), political threats may also inspire mobilization to protect existing resource pools or resist state repression (Goldstone and Tilly 2001). But most scholars of threat are also clear that threat is not simply the inverse of opportunity; instead, opportunity and threat are distinct conceptually and empirically (Maher 2010). Where opportunities lead to mobilization by reducing the costs of collective action, threats lead to mobilization by increasing the costs of inaction (Goldstone and Tilly 2001).

Consonant with this emerging perspective, researchers have begun to investigate the dynamics of political threat as an important factor shaping reactive mobilization in democratization (Almeida 2003, 2007) and anti-nuclear (Meyer 1990, 1993) movements, ethnic conflict (Jacobs and Wood 1999; Olzak 1992; Soule and Van Dyke 1999; Van Dyke and Soule 2002), extreme state repression (Maher 2010), and the interactions between protestors and security forces (Earl, Soule, and McCarthy 2003; Goldstone and Tilly 2001; Khawaja 1993; Koopmans 1993). Other research extends the threat concept beyond the political realm. Threat-induced mobilization may occur when social groups become (or perceive themselves to be) disadvantaged by economic downturns or restructuring (Jacobs and Wood 1999; McVeigh 1999; Olzak 1992; Soule and Van Dyke 1999; Van Dyke and Soule 2002). Demographic shifts stemming from large-scale immigration patterns may also influence some reactive movements, as seen with the organization of U.S. patriot or militia groups (Van Dyke and Soule 2002). Another possible inspiration for reactive mobilization, which Nella Van Dyke and Sarah Soule (2002: 499, footnote 4) note, but do not theorize, are threats we are interested in understanding—those deriving from ecological disruption.

Environmental Mobilization and Ecological Threat

Historians trace the roots of U.S. environmentalism to a struggle between two progressive era (1890 through 1920) social movements to shape environmental discourse and politics. One was a conservationist movement whose leaders argued for the rational use of nature through scientific management of natural resources. The other was a preservationist movement whose leaders drew from romanticist philosophy to demand the preservation of unspoiled nature. By the 1930s, conservationism emerged as the dominant environmental discourse (Brulle 2000) and for the next three decades conservationist organizations maintained a dominant influence on environmental politics.[1]

Beginning in the 1960s, a second wave of environmental mobilization occurred, distinguished by the rapid proliferation of a "new breed of environmental organization" (Mitchell, Dunlap, and Mertig 1992:14). The changes were rapid and transformative. Within a decade, the old conservationist-inspired environmental movement was displaced by a "new" or "second generation" environmentalism (Brulle 2000; Dunlap and Mertig 1992; Gottlieb 1993; Hays 1987). Rooted in a combination of turn-of-the-century urban reform movements (Gottlieb 1993; Melosi 1980; Tarr 1996), and a distinctly scientific and ecological discourse (Dunlap 2009; Gottlieb 1993), this new wing of the environmental movement emphasized the negative impacts of pollution on ecosystems and human health and encouraged radical direct action and a quality of life approach to environmental politics. These changes broadened the scope and constituency of the movement, inaugurating a 25–year period of expansion. This new cycle of protest and mobilization was marked by growth of both new and existing EMOs (McLaughlin and Khawaja 2000; Mertig, Dunlap, and Morrison 2002), a surge in foundation funding (Jenkins and Halcli 1999), increased legitimacy of the environmental organizational field (Frank, Hironaka, and Schofer 2000; McLaughlin and Khawaja, 2000), and heightened levels

1. In our analysis, we use the conventional term "conservation" to describe organizations that work toward either the conservation or preservation of wildlife and wilderness.

of governmental attention and activity (Johnson 2008; Petulla 1988). By 1970, progressive-era conservationist discourse and organizations were subsumed within a much larger and far more diverse environmental movement.

Most environmental historians and sociologists view this new form of environmentalism as a direct response to ecological threat (Brulle 2000; Dalton 1994; Gottlieb 1993; Hays 1987; Mertig et al. 2002; Schlosberg 1999; Schnaiberg and Gould 1994). The new movement's narrative by now is familiar: the accelerated pace of industrial production and accompanying revolution in chemical engineering that followed World War II (Foster 1999) resulted in quantitative increases in the scale of environmental disruption as well as qualitative shifts in the nature of environmental risk (Erikson 1994). As the ecological impacts of post-war industrialization became increasingly apparent, citizens organized to ameliorate perceived threats to ecosystem health and *human* well-being, as well as to ongoing threats to wildlife and wilderness. This expanded focus of concern helped broaden the movement's constituency to working class and disadvantaged communities (Gottlieb 1993).

Partial support for this "ecological threat" thesis abounds in the form of "suddenly imposed" ecological threats from radiation releases (Walsh and Warland 1983), oils spills (Molotch 1971), river fires (Adler 2002), and the discovery of toxic waste in unsuspecting communities (e.g., Brown and Mikkelson 1990; Bullard 1993), among others. Even so, studies establishing a positive link between ecological threat and citizen mobilization are invariably pitched at the local level. As a result, while many national EMOs may have formed initially in response to the perceived costs of decidedly local environmental threats—including several in our own sample—few studies systematically test the ecological threat hypothesis using national-level quantitative data (Olzak and Soule 2009). This is surprising given that national-level measures of pollution and species disruption suggest a clear link between local ecological threat conditions and organizing activity to protect the environment on a regional or national scale, as environmental historians have amply documented. For example, initial efforts to ban the pesticide DDT came about through accumulating tangible evidence from across the country that concentrated application of the chemical was having unintended negative impacts on local bird, fish, and amphibian populations (Dunlap 2008). Similarly, the creation of the Love Canal Homeowners Association may have been a direct response to unacceptable environmental conditions in that specific community (Levine 1982), but the accumulation of toxics in communities across the country helps to explain why the group evolved into the internationally recognized Citizens Clearinghouse for Hazardous Waste (now Center for Health, Environment, and Justice), one of a dozen or so groups in our sample concerned primarily with hazardous waste issues (Szasz 1994).

Similar dynamics unfolding at a national level can be seen in changing interpretations of "isolated" pollution events. The Cuyahoga River caught fire near Cleveland in 1936, 1952, and 1969, but only the 1969 fire became infamous as an iconic symbol of environmental decline. Although the 1969 fire was smaller than the previous two, it occurred concurrent with several other nationally visible pollution episodes—fish kills in Lake Erie, a large oil spill in Santa Barbara—which in the aggregate helped establish in the public eye both the pervasive character of industrial pollution and its detrimental consequences (see Markham 1994). Whereas the earlier fires were seen as "unusual circumstances" that generated little lasting public concern (Adler 2002), by 1969 the ubiquity and scale of ecological threat, along with development of a nascent environmental movement, created a radically new context for commemorating river fires (Armstrong and Crage 2006).

This historical background informs our hypotheses. We expect that national-level environmental mobilization will increase as the costs to ecosystems, wildlife, and public health are seen as pervasive and accumulating. And, because people evaluate threats in terms of the intensity and severity of specific costs (Maher 2010), we reason that different kinds of ecological threats—which signal different costs to different social groups or communities—will have differential impacts on environmental mobilization. Accordingly, we think it likely that

decline in wildlife populations will influence the formation of national EMOs devoted to natural resource conservation and to preservation of wilderness and wildlife, whereas elevated rates of environmental pollutants are likely to mobilize national groups focused on ecosystem health and its contribution to human well-being. Thus: *(H1) Threats to wildlife populations will be positively associated with foundings of wildlife and wilderness conservation organizations. (H2) Pollution health threats will be positively associated with the foundings of ecology organizations.*

A competing explanation for the expansion of modern environmentalism relates the movement's emergence and growth to changing public attitudes and values. According to Ronald Inglehart (1977, 1990, 1995; Abramson and Inglehart 1995), in the post-war era it was not increasing effluents that led to environmental mobilization. Instead, increasing affluence rendered the material imperatives of survival relatively unproblematic for large portions of the U.S. population, resulting in a broad "post-materialist" value shift away from issues of economic and political security and favoring quality of life issues such as environmental protection.

This competing thesis, which emphasizes economic opportunity rather than ecological threat, has been uncritically adopted by some (e.g., Dalton 1994) and roundly criticized by others (Brechin 1999; Brechin and Kempton 1997; Dunlap and Mertig 1997). A major concern is that empirical assessments of the post-materialist values thesis have focused on isolating correlates of individual environmental attitudes, but have not specifically addressed the relationship between changing attitudes and values and environmental mobilization (Buttel 2003). This is a problem because even in cases of exceptionally high mobilization, 90 to 95 percent of individuals attitudinally predisposed to the goals of a social movement do not participate (Klandermans and Oegama 1987). As such, the link between post-materialist attitudes toward environmental protection and organized environmental mobilization remains empirically untested. This gap provides the impetus for our third hypothesis, which examines the effect of changing attitudes towards environmental protection associated with the post-material value transformation of society. *(H3) Public opinion favorable to greater environmental protection will be positively associated with the foundings of national EMOs in both the conservation and ecology sectors*.

In addition to ecological threats and value shifts, there is a clear expectation born from extant research on social movements that a more supportive or "open" political context, as indicated by, for example, the presence of elite allies, generally facilitates the mobilization of excluded groups and increases the odds of movement success. There are also studies suggesting just the opposite, however; that having an ally in a leadership position may actually diminish political opportunities for mobilization, at least in terms of protest (Jenkins, Jacobs, and Agnone 2003; Kriesi et al. 1992). The environmental movement is often identified with upper and middle class professionals, rather than social groups disengaged from the polity. As such, the presence of elite allies may be less consequential as a predictor for mobilization than for other movements that may have lacked such strong alliances initially. Still, we follow the majority of social movement literature in hypothesizing that *(H4) openings in the federal political opportunity structure will be positively associated with the incidence of national EMO foundings in conservation and ecology sectors*.

Conversely, if the government is perceived as acting to ameliorate environmental problems it may preempt citizen action and thus dampen organizing efforts. The passage of laws and provision of funding represent strong signals by government that action is being taken (Jacoby and Schneider 2001; Soroka and Wlezien 2005). Hence our fifth hypothesis is that *(H5) federal governmental pro-environmental activity will decrease the pace of organizational formation by signaling the government's attention to the issue.*

Our final hypothesis is informed by research on the role of resource competition and legitimacy in structuring change in social movement organization populations (Minkoff 1995, 1997; Nownes 2004; Olzak and Uhrig 2001). Using an organizational ecology approach (Carroll 1988; Hannan and Freeman 1987, 1989), existing studies have found that the relationship

between population density (i.e., the number of organizations within a population) and organization founding rates is described by an inverted U curve (Baum 1996). Organizational ecologists explain this relationship in terms of density dependency, positing a strong link between population density, social legitimacy, and organizational resources. According to this theory, population density regulates population growth: When organizational populations are young, new additions increase the legitimacy of the organizational field and signal the availability of stable resource pools. This positive signaling in turn leads to elevated rates of future foundings. The dynamic is altered as successive additions begin to contribute less and less to the field's social legitimacy and instead result in increased competition over finite resource pools among existing organizations. As this occurs, rates of organization foundings decline. Based on previous research in organizational ecology, we hypothesize that *(H6) population density will have a positive effect on EMO foundings. (H7) Population density squared will have a negative effect on EMO foundings.*

Data and Methods

We assembled data on national environmental movement organizations from the *Encyclopedia of Associations, Volume 1, National Organizations of the U.S.* (hereafter *EOA*; Gale Research Inc. 1956–2006). Published annually since 1956, the *EOA* is commonly employed as a census for bounding populations of national social movement organizations (SMOs) (e.g., Baumgartner et al. 2008; Baumgartner and Jones 1993; Johnson 2008; Minkoff 1995, 1997; Nownes 2004). Recent work validates the representativeness of *EOA* as a source of data on nonprofit national associations, as well as clarifies limitations—primarily that the *EOA*, while including information on a broad range of national groups, is biased towards including those organizations that are large, publicly visible, and located in or near Washington, DC (Brulle et al. 2007; Martin, Baumgartner, and McCarthy 2006). Because the *EOA* clearly does not provide a census of EMOs founded during the period of study, our findings are limited to those larger, more stable, and longer-lived organizations that make up the environmental movement mainstream. It is these mainstream organizations that draw the attention of social movement scholars (including ourselves) precisely because of their centrality in shaping environmental politics and discourse. We address concerns about the *EOA*'s selection bias and related methodological issues in the Appendix.

We define EMOs as those groups that identify environmental conservation or protection as a primary organizational purpose or concern. To identify such organizations, we consulted 11 editions of the *EOA* between 1956 and 2006, employing a search strategy that combined information from keyword headings, association name, and organizational description.[2] From among the listings of potentially relevant organizations, we excluded those organizations whose membership was limited to industry or governmental agencies (or a combination), organizations primarily serving the advancement of a professional group, or grant-making agencies and foundations.

With this initial list of national EMOs in hand, we next collected detailed data on organizational demographics from every edition of the *EOA*, as well as the issues identified as salient in self-provided descriptions of organizational purpose. Analysis is restricted to the 1962 through 1998 period, however, to account for both poor data quality in the first few editions

2. All organizations listed under the following headings were included in the initial listing of EMOs: conservation, wildlife conservation, environment, environmental quality, environmental protection, environmental health, toxic exposure, nuclear energy, ecology, pollution control, and hazardous waste. Selected organizations (those primarily concerned with environmental protection or conservation) listed under the following headings were included as well: forestry, environmental law, energy, water resources, environmental education, and appropriate technology. See Johnson 2008 for more information on the identification of EMOs and data collection procedures.

of the *EOA* and the temporal lag between the time organizations are formed and when they are first included.[3] Finally, when entering data we continued to examine all other *EOA* entries situated in close proximity to those in our initial list, adding new organizations as appropriate. This process resulted in the identification of 772 distinct national EMOs that we identified as having been in existence at some point during the period under study. The study population includes both highly institutionalized issue advocacy organizations (e.g., Nature Conservancy) as well as more loosely structured direct action groups (e.g., Earth Liberation Front). Collectively, these organizations exhibit a wide range of tactics, discourse frames, structures, constituencies, resources, and geographical dispersion.[4]

Dependent Variable

Our dependent variable is U.S. environmental movement mobilization, operationalized as the number of new national EMO foundings per year. For those few organizations for which we were unable to confirm a founding date through Internet searches ($N = 24$), we follow Debra Minkoff (1995, 1997) by imputing year of founding as five years prior to the first year in which the organization appeared in the *EOA*. Alternative strategies, such as omitting these organizations from analysis or imputing the first year of appearance in the *EOA* as the founding year, have no substantive effect on results.

Figure 1 shows the number of national conservation and ecology EMO foundings (a three-year moving average is used to suppress short-run fluctuations in the data and make long-term trends more apparent) and population densities per year over the period of study. Both founding curves exhibit the classic inverted U shape originally identified by Michael Hannan and John Freeman (1977) and since found repeatedly across a wide range of organizational populations (Baum 1996), including those associated with social movements for civil rights, women's rights, and gay and lesbian rights (Minkoff 1995, 1997; Nownes 2004; Olzak and Uhrig 2001). In both sectors, the average number of new national EMO foundings per year is relatively low over the first few years of observation, but rapidly accelerates beginning around 1964–66 and peaks in 1970–71, with an average of about 18 and 14 organizations founded per year for conservation and ecology EMOs respectively. The founding rate for both sectors remains fairly high through the 1980s, but slows considerably during the 1990s (widely acknowledged as a period of reorganization, or even retrenchment, in the national environmental movement). Though the rate of national EMO foundings in both sectors is lower at the end of the observation period than during the peak period of mobilization in the early 1970s, the total number of conservation and ecology EMOs active at any point in time (i.e., population density) increases steadily from the beginning of the observation period through the 1980s, and remains stable across the 1990s at about 375 conservation EMOs and about 225 ecology EMOs. While both sectors experience considerable overall growth, the rate of foundings and total population of conservation EMOs remains larger than ecology EMOs across the study period (see also Johnson 2006).

EMO Sectors

Issue representation of individual EMOs is identified through a content analysis of self-reported descriptions contained in the *EOA*. For each organization year under observation, it was recorded whether an organization indicates that it attends only to traditional environmental issues of natural resources and wildlife conservation or to issues associated with

3. Prior research has established an average time lag of between three (Minkoff 1995) and eight (Brulle et al. 2007) years between the time organizations are established and the year they first appear in the directory.

4. The organizations included in our sample have national headquarters in all 50 states plus the District of Columbia with annual budgets ranging from less than $25,000 to $245 million.

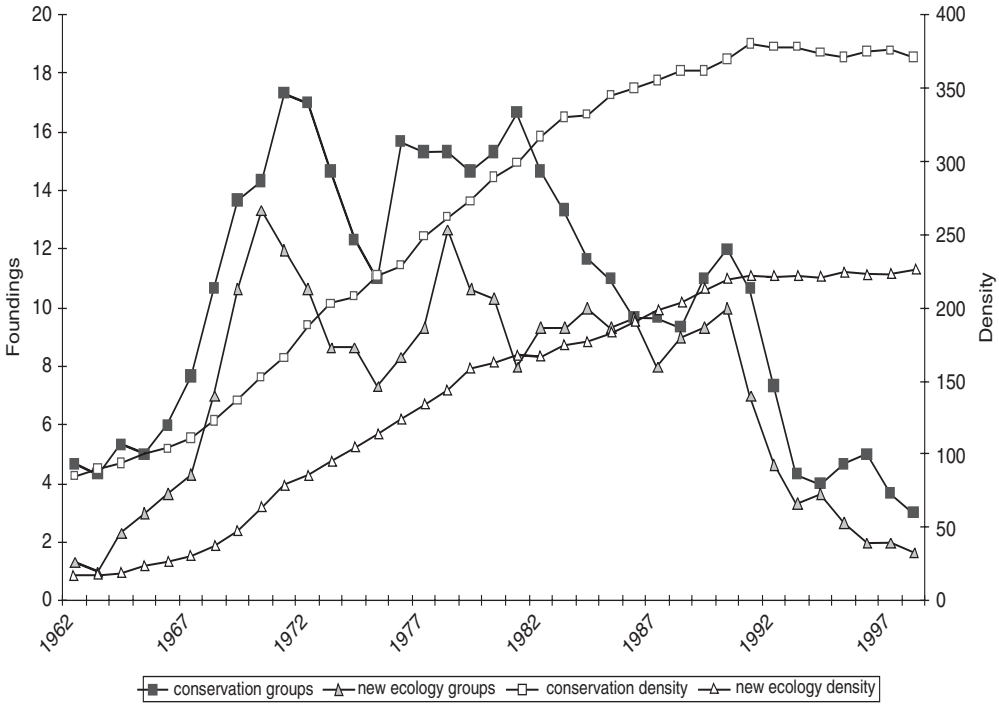

Figure 1 • ***Foundings and Population Densities of U.S. Conservation and New Ecology Organizations, 1962–1998***

ecological degradation, environmental quality, pollution, and human health. We coded EMOs into the conservation sector if their *EOA* entries described *only* activity relating to conservation issues without reference to pollution issues. When organization descriptions reference environmental quality, pollution, or human health issues, the group was coded as belonging to the ecology sector.[5]

Independent Variables

Ecological Threat. In measuring threats to wildlife populations we exploit time-series data on amphibian and bird populations. Change in amphibian population levels is charted with a "cumulative annual trend" score derived from metadata on amphibian populations in North America from 1960 to 1997. Amphibians are recognized by scientists as important "sentinel" species used to assess ecological health in both aquatic and terrestrial environments (Blaustein and Wake 1998; Stebbins and Cohen 1995). In developing this indicator of wildlife population abundance, Jeff Houlahan and colleagues (2000) computed large-scale temporal trends based on information on 240 amphibian populations assembled from scholarly journal publications,

5. Conservation issues are operationalized to include concern with general environmental or resource conservation/protection/preservation or more specific issues of wildlife, endangered species, nonhazardous waste, energy conservation, water conservation, marine protection, wetlands, forests, land management, parks, and public lands. EMOs are coded as attending to ecology issues if they include in their self-description any mention of general environmental quality, pollution or more specific air pollution, water pollution, hazardous waste, pesticides, nuclear waste, human health, or environmental justice issues.

technical reports, and some unpublished sources. As calculated, trend scores represent the cumulative annual change in amphibian population size, with a negative number indicating the population of North American amphibians is contracting.

We also chart changes in continental U. S. bird populations. Historically, birds have an important symbolic role in U.S. environmental politics (see Carson 1962), birders have played prominent activist roles (Hays 1987), and professional and amateur birders have also long collected data on bird populations (Barrow 1998). For this study, we employ bird population data assembled from the U. S. Geological Survey Breeding Bird Survey (BBS), available from 1966 (Sauer, Hines, and Fallon 2008).[6] Using a data analysis tool provided by BBS, we assembled yearly national-level abundance counts for all songbird and raptor species.[7] We then computed average yearly population abundance scores.

We also employ two measures of threats to environmental quality. The first is an air pollution index that integrates data on a diversity of types and sources of emissions and provides a direct measure of historical air pollution levels (Johnson 2008; Olzak and Soule 2009). The index is composed of national-level emissions data for five air pollutants: particulate matter less than 10 microns, carbon monoxide, sulfur dioxide, nitrogen dioxide, and volatile organic compounds (VOC) (EPA 2000). The first four of these pollutants are regulated under EPA rules as "criteria air pollutants" for which the EPA has set national standards based on extensive scientific research demonstrating their negative impacts on human health. VOCs are highly photo reactive and water-soluble synthetic chemicals developed for use in hundreds of industrial processes and contained in thousands of household and industrial products. Although not currently regulated as criteria air pollutants in the United States, VOCs are known to directly contribute to ground-level ozone, a criteria air pollutant and known public health hazard (EPA 2000).[8]

Our second measure of pollution threat is CO_2 emissions per capita (WRI 2005). An air pollutant as well, the product of CO_2 was less visible as an environmental problem prior to the late 1980s when it became widely recognized as a major global warming gas. Because it is tied closely to fossil fuel consumption and economic expansion more generally, however, C02 emissions are widely employed as a measure of environmental degradation (see York, Rosa, and Dietz 2003:283). Data are cubed, based on a ladder of powers test to correct for severe negative skew (Hamilton 2006:126–9).

Public Opinion. Time series data on individual opinions are not available over the entire period of observation, forcing us to rely on a proxy measure that examines the expression of individual opinions through responses on public opinion surveys asking about the environment. In doing so, we take advantage of James Stimson's (1999) WCALC program.[9] This program uses a mathematical algorithm to construct "factor scores" from dated survey response items with only partially overlapping cases, and has been used to compile time series public opinion data on a range of public policy issues (e.g., Kellstedt 2003; Smith 2000). Adopting this technique, we employ the environmental public opinion index created by Jon Agnone (2007) using 64 "readings" of public opinion. The measure is based on positive responses to calls for more environmental action on the part of the government—and is mean-centered to reduce multicollinearity.

6. These data thus cover a slightly shorter period than our other ecological threat measures. National-level longitudinal bird population data prior to the mid-1960s are unreliable, reflecting changes in the population of *birders* more than changes in actual bird populations (personal communication John R. Saur, March 10, 2009).

7. Data on each species is classified according to reliability for trend analysis using a three-color classification system. We exclude all species coded "red," those for which population data is deemed to have an important deficiency.

8. Because ozone is produced by photochemical reactions in the atmosphere rather than direct emissions, data on ozone emissions per se do not exist.

9. There is no single systematic time-series evidence on public opinion regarding the environment specifically in the United States over the past 50 years. The General Social Survey, for instance, began asking respondents whether they believe government is spending "too much" or "too little" on "improving and protecting the environment" only in 1973. Similarly, environmental protection began appearing on "most important problems" polls only in the 1970s.

Political Opportunity. Analyses include three generic measures of national political opportunities and three issue-specific measures. The generic measures are Democratic control of Congress, federal election year, and Democratic control of the presidency. Democratic control of Congress is measured as the number of Democrats in the House of Representatives and Senate minus the number of Republicans in the House and Senate. Democratic control of the presidency is dummy coded 1 during years in which a Democrat is president. Democrats have long been identified as allies of the environmental movement (Dunlap and Allen 1976; Guber 2001) and Democratic party advantage in both Congress and the presidency is expected to be positively correlated with national EMO foundings.[10] Election years represent routinized opportunities in the political system and are generally thought to be positively associated with foundings of political interest groups and movement organizations (Meyer and Minkoff 2004).[11]

Issue-specific political opportunities are measured with presidential State of the Union Address mentions on the environment and congressional environmental bill introductions. Presidential attention (Edwards and Barrett 1999; Edwards and Wood 2000) and congressional bill introductions (Haynie 2001; Wilkerson et al. 2002) are both important markers of the federal political agenda and expected to be positively related to national EMO foundings by signaling openings in the political opportunity structure. Data on presidential State of the Union Address mentions and congressional bill introductions come from the Policy Agendas Project (n.d.)[12], and the Congressional Bills Project (Adler and Wilkerson 2010), respectively. These database infrastructure projects adopt the same topic coding scheme and flexible database structure. We examined every record coded within the environment topic and searched descriptions of all presidential mentions and bills for the terms environment*, conservation, and pollut* in order to identify additional relevant records for inclusion.[13] Relevant records were coded, when possible, as being primarily focused on conservation or ecology issues and applied accordingly. Counts of presidential State of the Union Address mentions and congressional bill introductions are standardized and reported here as a percentage of total yearly mentions/bill introductions on any topic.

Federal budgetary expense on environmental issues indicates that the federal government is actually attending to the perceived threat of environmental deterioration and is expected to be negatively related to the founding of national EMOs (Meyer and Minkoff 2004). Calculated in thousands of 2003 constant dollars from the Policy Agendas Project (n.d.), budget data are logged to correct for skew.

Organizational Processes. To compute organizational population density, we constructed a complete time series for each organization, indicating, for each year between 1962 and 1998, whether or not the organization was active or inactive (i.e., the organization had not yet entered the population or had exited the population through merger or failure). Table 1 presents descriptive statistics for each of the variables employed in analyses.

10. We examined numerous operationalizations of Democratic control of Congress, including: the percentage of Democrats in Congress, party turnover in the House and Senate, dummy variables for Democratic majorities, and indexes of Democratic control developed by David Roper (n.d.). Results of these various operationalizations were not substantively different from what is reported here.

11. We also attempted to model adverse political conditions, or political threats, with two dummy period measures: one for the Reagan presidency, and another for the tenure of Reagan's Secretary of the Interior James Watt who was a vocal critic of the environmental movement. Neither of these measures achieved significance in statistical models, nor does their inclusion affect interpretation of results.

12. The data used here were originally collected by Frank R. Baumgartner and Bryan D. Jones, with the support of National Science Foundation grant number SBR 9320922, and were distributed through the Department of Government at the University of Texas at Austin and/or the Department of Political Science at Penn State University. Neither NSF nor the original collectors of the data bear any responsibility for the analysis reported here.

13. Note that references within the major topic code of energy (to e.g., energy conservation) are excluded from analyses since this issue has a unique set of dynamics that is highly responsive to oil embargos (1980s) and spikes in energy costs more generally.

Table 1 • *Summary Statistics*

Variable	*Mean*	*Std. Dev.*	*Min*	*Max.*
Dependents				
Conservation foundings	10.30	5.24	1.00	22.00
Ecology foundings	7.16	4.15	1.00	16.00
Independents				
Ecolooical threat				
Amphibian populations	−.71	.30	−1.15	−.16
Bird populations	5.97	.29	5.63	6.93
Air pollution	.00	3.20	−5.55	5.89
CO_2 per capita (e^{-03})	7.46	1.83	3.56	10.76
Public opinion				
Public opinion	.00	6.11	−6.34	11.87
Political opportunity structure				
Democratic control of Congress (e^{-02})	.91	.58	−.32	1.91
Election year	.49	.51	.00	1.00
Democratic control of presidency	.46	.51	.00	1.00
Presidential State of Union conservation mentions	1.78	4.57	.00	27.00
Presidential State of Union pollution mentions	2.43	3.98	.00	17.00
Conservation bill introductions	2.89	1.08	1.13	5.49
Pollution bill introductions	1.89	1.08	.16	5.09
Federal env. spending	3.06	.29	2.52	3.70
EMO population density				
Conservation EMOs	254.68	108.62	83.00	380.00
Conservation EMOs squared (e^{-03})	76.34	52.22	6.90	144.40
Ecology EMOs	133.81	76.07	16.00	224.00
Ecology EMOs squared (e^{-03})	23.54	18.96	.26	50.18

Analysis and Results

Analyses are completed using negative binomial regression, a generalization of the Poisson model (Liao 1994; Long 1997) and a standard approach in ecological analyses of organizational foundings. Count data, such as yearly counts of organizational foundings, typically violate three important assumptions of OLS: having nonnegative, skewed distributions, where the variance increases with the mean (Liao 1994; Long 1997). Poisson regression largely overcomes these problems as a special case of the generalized linear model that utilizes counts as the dependent variable. Negative binomial models have the additional advantage of accounting for over-dispersed data (i.e., where the variance of the event count exceeds the mean), which can result in downward bias of the standard errors for estimated coefficients. To ease interpretation, in all tables we present exponentiated coefficients with standard errors, where values above one indicate an increase in organizational founding rates. Coefficients below one indicate that higher values of the independent variable are associated with a reduced rate of foundings.

Following Jacques Delacroix and Glenn Carroll (1983), we conduct sensitivity testing of various lag terms of ecological threat measures (one, two, and three years as well as a three-year average) on a baseline model. A one-year lag consistently produced the highest model log-likelihood and pseudo *R*-squared. Accordingly, all independent variables are lagged one year to facilitate causal inference (with the exception of Democratic control of the presidency and Congress, which are measured contemporaneously).

Our analytic strategy for assessing growth among conservation and ecology groups begins by estimating for each subpopulation a baseline model that controls for basic density driven processes proven to regulate growth and change among all kinds of organizational populations

and the effect of changing social values reflected in favorable public opinion towards the environment. Importantly, population-level density and density squared are measured at a sectoral level, allowing us to distinguish between different wings of the environmental movement. Models 2 through 4 test for evidence that general and issue-specific measures of the political opportunity structure are associated with national EMO foundings. We retain significant measures only, while adding each of the relevant ecological threat measures in Models 5 and 6.[14] For both subpopulation analyses, description of results focus first on the effects of ecological threat on mobilization, our central theoretical concern, before reviewing the results relevant to hypotheses concerning public opinion, political opportunities, and organizational population dynamics.[15]

Segmented Ecological Threat

Results of models regressing *conservation* EMO foundings on environmental threat and control measures are displayed in Table 2. Baseline Model 1 shows that, as anticipated, population density, density squared and public opinion are all significantly associated with conservation EMO foundings and in the expected direction. In Models 2 through 4, a variety of general and issue-specific political opportunity structure measures are added to the baseline, with only federal environmental spending demonstrating statistical significance (these results are discussed further in the following section).

Our central hypotheses are tested with indicators of national wildlife abundance and diversity in Models 5 and 6. Declines in amphibian populations (Model 5) do have a significant association with the founding of conservation groups, and in the expected direction. Since amphibian populations never increase and regularly decline over the observed period, this coefficient is best interpreted as showing a one-standard deviation decrease in the population of amphibian species associated with an 11 percent increase in the number of national conservation EMO foundings ($e^x \times \text{SD} = .369 \times .30$). The effect of amphibian species decline on conservation group foundings is statistically significant, stable across various iterations of our models (not shown), and a significant improvement (at the .05 level) in terms of fit to the data over Model 4. The association of declines in bird populations with conservation group foundings is also in the expected direction, but does not achieve statistical significance at the. 05 level. This finding may be due to the restricted observation period available, resulting in fewer degrees of freedom. Overall, we find mixed support for H1, concerning the expected negative relationship between threats to wildlife and the founding of conservation EMOs.

14. While a preferred modeling strategy may be to include all theoretically relevant predictors, regardless of whether or not they achieve statistical significance, in this study we face low degrees of freedom and have no a priori theoretical reason to select any particular POS measure over others for inclusion. In additional analyses (not shown), results are substantively unchanged if any nonsignificant POS measure is added to final models, even though "the inclusion of these variables in the equation leads to a loss of precision in estimation and prediction" (Chatterjee and Hadi 2006:283). Examination of Akaike information criterion (AIC) and Bayesian information criterion (BIC) using the "estatic" command in STATA 10, and traditional *F*-tests all suggest that model fit is not improved enough by adding any of the excluded POS measures to warrant inclusion.

15. We assess potential problems with multicollinearity in our models. Because there are no readily available post-estimation commands in STATA that produce variance inflation factors (VIF's) in negative binomial models, we rely on results of OLS modeling, which show all individual predictors have VIF's lower than ten in every model for "ecology" organizational foundings (with the exception of density and density squared measures that, since one is derived from the other, have very high VIFs in all models). In models for "conservation" organizational foundings, the public opinion measure routinely approach or even exceed common tolerance levels, suggesting potentially troublesome multicollinearity in conservation foundings models. The result of multicollinearity is inflated variance and lack of precision, increasing the odds of Type II or false negative error, where statistically significant relationships are not recognized as such. Multicollinearity does not appear to be particularly problematic, however, because the inclusion of public opinion generally improves model explanatory power, we are able to distinguish its coefficient from 0, and its exclusion does not result in insignificant POS measures becoming significant predictors.

Table 2 • *Negative Binomial Coefficients for the Regression of National Conservation Organization Foundings on Selected Independent Variables, 1962–1998*

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
Ecological threat						
Amphibian populations					.369*	
					(–.166)	
Bird populations						.467
						(–.219)
Public opinion						
Public opinion	1.100**	1.080*	1.116**	1.098**	1.091**	1.096**
	(–.035)	(–.038)	(–.037)	(–.034)	(–.033)	(–.034)
Political opportunity structure						
Democratic control of		1.028				
Congress (e^{-02})		(–.125)				
Election year		1.024				
		(–.108)				
Democratic control		.839				
of presidency		(–.113)				
Presidential State of Union			.99			
conservation mentions			(–.011)			
Conservation bill introductions			.925			
			(–.068)			
Federal environmental				.532**	.513**	.563**
spending				(–.111)	(–.109)	(–.118)
EMO population density						
# of active conservation	1.037**	1.033**	1.041**	1.044**	1.042**	1.033**
EMOs	(–.006)	(–.007)	(–.007)	(–.006)	(–.006)	(–.008)
# conservation EMOs	.916**	.926**	.910**	.906**	.905**	0.920**
square (e^{-03})	(–.014)	(–.017)	(–.015)	(–.014)	(–.014)	(–.016)
Observations	37	37	37	37	37	32
Pseudo *R*-squared	.1763	.1845	.183	.2163	.2382	.2209
Log likelihood	–92.851	–91.921	–92.09	–88.339	–85.874	–76.332

Notes: All coefficients are exponentiated. Standard errors in parentheses. Democratic control of Congress and the presidency, State of the Union mentions, and election year are assessed contemporaneously. All other measures are lagged one year.

*$p < .05$ **$p < .01$ (two-tailed tests)

Results from models regressing *ecology* EMO foundings are displayed in Table 3. Model 1 again shows public opinion and population density measures all significantly related to organizational foundings in the expected direction. Again, federal budgetary expenses are the only POS measure that demonstrates a significant association with national EMO foundings (Models 2 through 4). Models 5 and 6 test central hypotheses about the role of environmental threat in explaining movement growth dynamics, and in both, measures of pollution prove to be significantly associated with ecology organizational foundings. Model 5 shows a one standard deviation increase in the air pollution index associated with a 69 percent increase in the number of ecology EMO foundings. In Model 6, CO_2 emissions also demonstrate a significant positive association with national ecology EMO foundings. A one standard deviation increase in CO_2 emissions is associated with a 44 percent increase in ecology EMO foundings. The addition of either air pollution measure results in significant (at the .01 level) improvement in model fit to the data, providing consistent support for H2.

Table 3 • *Negative Binomial Coefficients for the Regression of National Ecology Organization Foundings on Selected Independent Variables, 1962–1998*

	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*
Ecological threat						
Air pollution					1.214**	
					(–.064)	
CO_2 per capita (e^{-03})						1.242**
						(–.086)
Public opinion						
Public opinion	1.093**	1.062	1.085*	1.072*	1.071*	1.118**
	(–.037)	(–.043)	(–.035)	(–.035)	(–.033)	(–.038)
Political opportunity structure						
Democratic control of		.991				
Congress (e^{-02})		(–.157)				
Election year		1.275				
		(–.167)				
Democratic control of		.804				
Presidency		(–.157)				
Presidential State of Union			1.005			
pollution mentions			(–.017)			
Pollution bill indroductions			1.102			
			(–.083)			
Federal environmental				.510*	.383**	.378**
spending				(–.135)	(–.105)	(–.103)
EMO population density						
# of active ecology EMOs	1.037**	1.030**	1.036**	1.040**	1.026**	1.028**
	(–.007)	(–.008)	(–.006)	(–.006)	(–.007)	(–.007)
# ecology EMOs square	.841**	.870**	.844**	.838**	.912*	.867**
(e^{-03})	(–.028)	(–.038)	(–.027)	(–.026)	(–.035)	(–.029)
Observations	37	37	37	37	37	37
Pseudo *R*-squared	.1397	.1624	.1501	.1693	.2392	.2187
Log likelihood	–89.741	–87.375	–88.665	–86.653	–79.364	–81.508

Notes: All coefficients are exponentiated. Standard errors in parentheses. Democratic control of Congress and the presidency, State of the Union mentions, and election year are assessed contemporaneously. All other measures are lagged one year.

*$p < .05$ **$p < .01$ (two-tailed tests)

Together, Tables 2 and 3 support the claim that, even controlling for general organizational dynamics, individual opinions, and political opportunities, ecological threat helps explain environmental mobilization in the United States. Importantly, our analysis shows that different segments of the movement have responded to different types of threat. Specifically, during the study period the movement segment focused on conservation issues grew in response to declines in wildlife populations, as expected. For ecology groups, growth is associated with increases in both criteria air pollutant and CO_2 production. Additional analyses (not shown) add further weight to this finding. We find no evidence of movement sector cross-effects. That is, wildlife measures are not significantly associated with rates of ecology foundings, nor are air pollution measures significantly associated with conservation EMO foundings. We also find little evidence that the ecological threats we measured were associated with EMO foundings generally.[16] In combination, these analyses demonstrate the segmented nature of ecological threat as it has shaped the organization of modern environmentalism.

16. Analyses of general and cross-effects are available from first author upon request.

Public Opinion, Political Opportunities, and Organizational Population Dynamics

In addition to informing research on the role of threats in accounting for movement mobilization, results support the claim that changing public attitudes help account for the pace of development in the U.S. environmental movement. Supporting the prediction of H3, public support for environmental protection is positively and significantly associated with national EMO foundings across all models shown. To the extent that our measure provides an indirect expression of an underlying value shift (Inglehart 1990), this study provides support for the importance of this shift in explaining the emergence of U.S. environmentalism.

Also important are the negative findings for nearly all measures of the political opportunity structure, both general and issue specific. While the finding that openings in the general political opportunity structure (e.g., presence of a Democratic president, the number/percentage of Democrats in Congress, election year) are not significantly associated with environmental mobilization may be surprising to some readers at first, it is consistent with other studies of SMO foundings. Studies consistently find null effects in tests for a significant relationship between general measures of political opportunity structure and SMO founding rates (McCammon 2001; McLaughlin and Khawaja 2000; Minkoff 1997; Nownes 2004). Similarly, neither issue-specific political opportunity measure associated with governmental agenda setting activity (presidential State of the Union Address mentions and congressional bill introductions) is significant in models. We do not test for it here, but it is plausible that these issue-specific measures are better conceptualized as the *outcome* of movement processes, rather than cause.

We *do* find that EMO founding rates respond when the federal government conducts actual environmental protection activity, rather than merely signaling that the issue is on the agendas of federal legislative or executive bodies. Results for Tables 2 and 3 display strong and consistent evidence that actions taken by the federal government to protect the environment (i.e., federal environmental expenditures) are negatively associated with the founding rate of both conservation and ecology groups (H5). Higher levels of federal spending on the environment shows a strong commitment to environmental protection, and appears to mitigate the formation of civil society groups focused on such protection. This finding supports growing empirical evidence that movement success influences demobilization (Banaszak and Ondercin 2010; Meyer 2005; Zald and Ash 1966).

Finally, findings lend support to H6 and H7, and the dozens of existing studies showing the fundamental role population density plays as a driver of organizational population growth rates, including among populations of social movement organizations (e.g., Baum 1996; Minkoff 1997; Nownes 2004; Walker, McCarthy, and Baumgartner 2011). All models presented above offer confirmatory evidence that for environmental movements, as in virtually every other organizational population that population ecologists have studied, legitimacy and resource availability/competition (i.e., population density and density squared) are significant predictors of organizational foundings.

Conclusion

This study examines the thesis that the U.S. environmental movement arose in direct response to ecological changes threatening ecosystem health and human well-being. Weighed against competing theories and controlling for political and cultural factors, we find that pervasive and accumulating threats to the biophysical environment are significantly correlated with sector-specific EMO founding rates. Species declines are associated with elevated founding rates of conservation organizations, and increases in air pollution are associated with elevated foundings of ecology groups, suggesting that ecological threats incur (or are perceived to incur) specific costs that give rise to mobilization directed toward specific ends. The overall

impact of multiple threats is the rise of an environmental movement that is topically and organizationally diverse. These findings confirm but also refine assumptions long held by environmental historians and sociologists. Ecological threat did shape the organization of environmental mobilization, but in ways that produced specific organizational outcomes that endure as distinct social movement sectors.

These findings point to three challenges to theories of environmental mobilization. The broadest challenge is to better theorize the relationship between ecological threat and environmental mobilization. Our study investigates that relationship at the national level; other research considers the effect of "suddenly imposed" threats from industrial accidents and the like on community-level mobilization. Yet, the mechanisms linking these two scales of mobilization are not well understood. We posit that locally specific threats generate national organizations when those threats are seen as pervasive and accumulating, but more research is needed to identify the mechanisms linking local responses to locally experienced threats with national responses to cumulative threats.

A second challenge is to better understand how the distribution of ecological threats impacts mobilization potential. In this article, we show that social movement responses to ecological threats are sector specific. Research by Sammy Zahran (2008), which examines the differential responses to climate change by coastal versus inland cities in the United States, suggests that mobilization to ecological threat may be regionally distinct as well. We need to better understand how ecological threats are distributed by substantive type and geographically, and how the uneven distribution of those threats shape mobilization potentials at regional, national, and international scales.

A third challenge is to investigate mobilizing responses to ecological threat in terms of threat complexity. Our analysis has focused on issue-specific mobilization. Increasingly, however, environmental problems—from biodiversity loss and water conservation to pollution flows and climate change—are understood in terms of highly complex ecological and social systems interaction across multiple temporal and spatial scales (Rosa et al. 2010). Moreover, while elements of these complex threats may be visible to lay observers—via televised footage of melting glaciers for example—many others, such as perturbations in the global carbon cycle, are not readily visible or apparent. In what ways is mobilization of environmental concern shaped by variation in threat complexity? At present, little is known about the direct effects of ecological complexity on environmental movement organization.

Apart from these three specific challenges, we believe the analysis of ecological threat provides an opportunity to advance understanding of social movement dynamics more generally. One way is by drawing attention to the role of nature or ecological systems on a wide range of social movements. While our focus has been on environmental mobilization, the benefits of studying biophysical change as ecological threat is not limited to environmental movements per se. Others that warrant similar attention include movements that organize in response to national infrastructural development "mega-projects" such as hydroelectric dams involving massive transformation of landscapes and that displace local populations (Gellert and Lynch 2004; Rothman and Oliver 1999); health social movements that organize in response to threats posed by diseases or contested illnesses (Epstein 2008); or movements that emerge in response to earthquakes, hurricanes, or other natural disasters (Luft 2009).

Even more broadly, this study's findings have implications for how scholars theorize and study threat. Where research to date tends to identify singular threats (i.e., political repression), the present study suggests that social movements can respond to multiple threats simultaneously. More research is needed to investigate the social and ecological processes that give rise to multiple threats, to study how multiple threat conditions interact and overlap with political opportunities (Karapin 2011; Maher 2010), to identify the mechanisms by which multiple threats contribute to social movement organization (e.g., in additive or multiplicative fashion), and to understand whether and how the resulting organizational heterogeneity derived from collective responses to multiple threats differentially impacts policy outcomes.

While it seems clear from this and previous studies that threat is a major contributor to the organization of collective action, there is much we do not know. This study represents a small but significant step toward a more comprehensive understanding of the role of threat in shaping social movement dynamics and outcomes.

Appendix: Limitations of Data in the *Encyclopoedia of Associations*

Citing findings from a recent article by Brulle and colleagues (2007), one reviewer of an earlier version of this article contested our study's findings on the grounds that the *EOA* is a partial and biased data source and therefore provides an insufficient basis for a foundings analysis of national EMOs. These are fundamental claims that, to the extent they are accurate and relevant, call into question not only this study's findings, but also the many analyses that make singular use of the *EOA* as a data source (e.g., Johnson, Agnone, and McCarthy 2010; Minkoff 1995, 1997; Nownes 2004; Walker et al. 2010). In this appended discussion we review these claims and assess their relevance and implications.

Brulle and colleagues clearly demonstrate that the *EOA*—or any single data source—cannot provide a *comprehensive* listing of all U.S. environmental organizations. In an exhaustive search of organizational directories, Web sites, and other sources, they identify 5,606 EMOs that existed in the United States during the last century (1900–2000). Of these, only 1,484 are listed in the *EOA,* prompting the claim that the *EOA* seriously under counts the EMO population. Brulle and colleagues also claim that the *EOA* is specifically biased towards national organizations that are larger, headquartered in or near Washington, DC, and are more ideologically and politically mainstream. Further, they claim that these demonstrated biases have important empirical consequences: where *EOA* data shows the rate of national EMO foundings slowing during the 1980s and again during the 1990s, the trend in organizational foundings derived from their multisourced data is a J-curve with the period of greatest founding rates, by an order of magnitude, occurring in the 1990s (p. 265). Based on this comparative assessment, they conclude that analyses of organizational foundings derived solely from *EOA* data are "inadequate when studying the organizational population of the U.S. environmental movement. Multiple and varied sources are needed to capture a valid sample" (p. 268).

We believe that these conclusions are unwarranted given the aims and empirical focus of the present study. As with all data sources, the *EOA* is imperfect. And, like all data sources, questions regarding the data's utility depend on how researchers collect their data, the questions they ask, and the statistical techniques they use to conduct analysis. Yet, we contend that the sample of organizations we assembled from the *EOA* for this study is reasonably appropriate for an organizational ecology analysis of founding trends of national EMOs over time. Conversely, despite being more exhaustive, the data that Brulle and colleagues assembled is *not* appropriate for these same types of analyses. In making this claim we first address the problem of selection bias and then examine two key issues—definitional differences and data collection strategies—that distinguish Brulle and colleagues' multisourced data set on the U.S. national EMO population from our own.

Selection Bias

In their article Brulle and colleagues demonstrate, as others have shown previously (Martin et al. 2006; Minkoff 1995), that the *EOA* is biased toward large organizations, those based in the Washington, DC area, and more mainstream elements of a movement. We acknowledge these limitations, but maintain that for our purposes selection bias does not present the major weakness that our anonymous reviewer (following Brulle and colleagues) contends. This is so because, first, there is no evidence that these biases change over time. We can therefore assume that

the longitudinal data we have collected from the *EOA* are consistently biased over the entire study period, implying that analyses can accurately assess changes in magnitude of growth over time (see Walker et al. 2011). Second, the *EOA* is biased towards the kinds of organizations that are most central to the theoretical concerns of most social movement analysts, including ours in this article: those organizations that are large, and whose tendency to locate near the nation's capital is a reflection of active engagement with mainstream national politics and culture.[17] Furthermore, the theoretical arguments advanced in this article take the potential for bias in the *EOA* into account.

Counter-balancing problems with selection bias are four clear advantages of relying solely on the *EOA*. First, the *EOA* remains the most comprehensive source for identifying organizations with an expressed agenda of engaging environmental protection issues at the *national* level. Second, because biases in the *EOA* are well understood, whereas biases in Brulle and colleagues data represent a black box, readers are better able to interpret our results and make informed judgements about how generalizable they are likely to be. Third, *EOA* data allow for comparisons to be made across studies of multiple social movements and outcomes of interest, including SMO foundings, protest activity, and political outcomes. Finally, recent work suggests *EOA* data have considerable promise in generating comparative cross-national research (Baumgartner et al. 2008).

Definitional Differences

The disparity in the size of the two organizational populations—5,606 (Brulle and colleagues') versus 772 (ours)—is striking. Yet, much of this size difference is attributable to differences in how our respective populations of interest have been defined.[18] First, Brulle and colleagues use broader criteria for including various types of organizations. For example, they include environmental professional associations focused primarily on advancement of the profession (e.g., the American Institute of Biological Sciences), whereas we follow standard practice in social movements research of including professional groups only if they are primarily organized around the advancement of sociopolitical goals (e.g., Union of Concerned Scientists). The inclusion of professional associations increases the magnitude of the EMO population in Brulle and colleagues' data set relative to our own; by how much is unknown because they do not distinguish among organization types. Similarly, whereas our data set includes only national-level organizations, Brulle and colleagues are more broadly interested in "organizations whose activities extend beyond a single state" and thus include organizations with regional and international as well as national focus (p. 257). In addition to increasing magnitude, oversampling regional social movement organizations that consistently display significantly higher rates of disbanding than do national organizational populations (Edwards and Marullo 1995), serves to elevate founding rates in the more recent time period.

Second, the two data sets have different criteria for defining EMOs in terms of level of involvement in environmental activities. While our data include only those EMOs with a primary focus on environmental protection activities, Brulle and colleagues also include any group with a "substantial" or even "minor" focus on the environment. For example, their data set includes the American Lung Association because it "has a program that focuses on air quality and the natural environment" (p. 260).[19] This more inclusive definition not

17. Note, however, that the majority of EMOs in both samples are headquartered outside of DC, Maryland, and Virginia, and that the *EOA* includes many small and radical organizations that are national in scope and influence (e.g., Earth Liberation Front).

18. Brulle and colleagues (2007) do not provide enough detail in their article to permit a detailed comparison of the sources of this discrepancy.

19. It is unclear in such instances whether Brulle and colleagues (2007) use the organization's original founding date or the year the organization established this program and ipso facto came to have "a minor involvement in the environmental movement" (p. 260).

only increases population size to highly questionable magnitudes,[20] it changes the nature of the population as well. While more appropriate for certain types of analyses, this definition is problematic for an analysis of organizational foundings. Creating new organizations that respond directly to environmental degradation is quite different from an organization adding new environment-oriented projects to its portfolio when it had not historically pursued environmental activities. Conflating organization births (an ecological process) with changes in organizational programming (an organizational change process) obscures fundamentally different mechanisms of population change. Organizational ecologists have long argued that core organizational features are highly resistant to change and that aggregate-level change in organizational populations occurs as a result of differential founding and mortality rates, not adaptive organizational behaviors (Carroll 1988; Hannan and Freeman 1987, 1989). Even in studies that focus on organizational change, changes in the core routines of an organization are understood as qualitatively distinct from programmatic change (Carroll and Hannan 2000; Hannan and Freeman 1984:156). Brulle and colleagues cannot untangle these processes because, as presented, their data set does not differentiate between the establishment of new organizations and the addition of specific environmental programs to existing organizations, nor among organizations with different levels of movement involvement.

Differences in Data Collection Strategies

The two EMO populations display very different growth curves. Explaining these different patterns of organization foundings also requires understanding how the two data sets were put together. Where our sample relies on one serial data source covering the entire study period (1968 through 1998), Brulle and colleagues use 155 different data sources that mainly cover years (or sets of years) *after* their period of observation ends (in 2000).[21] Of the 5,606 organizations identified in their study, information on roughly half come from sources that are published *only after* 2000. For example, the 2003 IRS Master File is the sole source for nearly one-third (31.5 percent) of all organizations in their sample. This is a problem because single-year sources published after 2000 cannot account for organizations that die before 2000. This strategy disproportionately elevates organization founding rates in more recent time periods and might partially explain why the founding curve Brulle and colleagues find departs from the familiar inverted U founding curve organizational ecologists recognize as a virtually universal pattern.

Rather than collecting a time series and then plotting change over time as we do, Brulle and colleagues use data from 2000 through 2006 to "project" population founding trends backwards in time. This strategy violates research norms in organizational ecology research, where standard practice is to chart organization births and deaths over time to elucidate the *dynamic* nature of those populations (Aldrich 1999; Hannan and Freeman 1989). As far as we can discern, the use of Brulle and colleagues' backwards projection strategy is unique, found nowhere in the organizational ecology literature. In combination, oversampling recently established organizations and then projecting those trends backwards in time produces the J-shaped pattern of EMO foundings that Brulle and colleagues use to argue for the empirical

20. Brulle and colleagues (2007) report a total number of national EMOs that, when combined with two independent enumeration research projects in state and local contexts (Andrews and Edwards 2005; Kempton et al. 2001), suggests a ratio of about five local EMOs to every national EMO. This implies a population far more top heavy with national organizations than expected. For comparison, Edwards and Foley (2003) estimate that there were approximately 7,500 local peace groups in the United States at the height of that movement in the mid-late 1980s, and fewer than 250 national peace organizations—a ratio of about 30 to 1.

21. In Brulle and colleagues (2007), 155 different data sources are employed to identify EMOs, although they rely most heavily on five. Of those five major data sources, only two are published in serial form (one of these is the *EOA*). The remaining three major data sources are directories from 2003 only. Nearly a third of the remaining 150 data sources (n = 48) are lists of organizations taken from Web sites also accessed at some point after the observation period ends in 2000.

inadequacy of *EOA*-derived samples. In fact, however, this exponential growth pattern is highly suspect because it does not square with what decades of research tell us about founding patterns in organizational populations. Nor does it correspond with nearly all other research on the contemporary U.S. environmental movement produced by sociologists, historians, and movement activists. Where the Brulle and colleagues' data describes the 1990s as a period of exponential growth, most other accounts (e.g., Cohen 2006) portray the same period as one of retrenchment and reorganization for the national environmental movement.

In summary, data employed in the present analysis come from the single most well understood source of longitudinal information available on a broad range of national social movement organizations. While *EOA* data do contain biases, there exist substantive theoretical and methodological justifications for its continued use in organizational ecology foundings analyses. Conversely, the distinctive operational definitions and data collection strategies characterizing the Brulle and colleagues' multisourced data render it inappropriate for these same types of analyses, despite offering a more exhaustive count.

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