

ABSTRACT In the present paper, we show that in its efforts to maintain credibility and claim social relevance, the Ecological Society of America (ESA) and its members repeatedly negotiate a boundary between science and politics. While the boundaries of ecology are flexibly defined, contingent on political context and what is at stake, they are also shaped and constrained by the already constructed social world. Several factors shape the ESA's boundary-work: (1) historically resonant discourses of both value-freedom and the utility of science; (2) national politics, including social movements and the demands of funding bodies; (3) the structure and actions of other, often more prestigious, scientific societies; and (4) established orthodoxies of scientific behavior. We contribute to the scholarly literature on credibility in science by showing that the construction of boundaries between science and politics is, in some cases, better understood as the reproduction of the already constructed social world than as a product of strategic efforts in pursuit of individual interests.

Keywords boundary work, credibility, Ecological Society of America, environmentalism, scientific societies

Organizing Credibility:

Discursive and Organizational Orthodoxy on the Borders of Ecology and Politics

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Since the beginning of the environmental movement in the early 1960s, ecologists have struggled to maintain a distinction between their work and the efforts of environmental activists. Labeled the 'subversive science' by commentators in the 1960s and early 70s (Sears, 1964; Shepard & McKinley, 1969; Roszak, 1972), ecology has been interpreted by many as providing a set of values for sustainable life on earth. Today, decades after *Silent Spring* (Carson, 1962) and *The Population Bomb* (Ehrlich, 1971) – both politically influential books written by ecologists – debate over the appropriate relationship between ecology and activism remains contentious among scientists.¹ To many ecologists, what is at stake in this debate is the credibility of their discipline. Observers have identified a recent trend toward active involvement by ecologists in environmental politics. This has generated strong reactions, positive and negative, by scientists and critics alike (see Brown, 2000). As environmental issues attract national and global attention and ecologists are called upon to provide crucial information and expert advice, understanding the relationship between ecology

and environmental politics is not only important to scientists, activists, and policy-makers, but also raises interesting questions for scholars in the social studies of science.

In the present paper, we explore the issues of credibility, public engagement and boundary-work as they relate to the Ecological Society of America (ESA), the primary professional scientific society for ecologists in the US. For many years, ecology, a relatively young and multidisciplinary field, has struggled to attain the kind of prestige and credibility that disciplines like physics and chemistry seem to possess. The ESA has played an important role in that pursuit, working to establish both the social relevance and value-neutrality of ecology in the minds of policy-makers and the broader social world. At the same time that social and political changes make it possible and desirable for the ESA to become more closely engaged in public affairs, and individual ecologists and small groups of scientists find ways to become advocates without negative professional repercussions (see Frickel, 2002), the ESA strives to preserve a public image of political neutrality. These efforts reflect longstanding beliefs linking credibility to two partially contradictory ideals: value-neutrality and utility.

Understanding Credibility and the Case of the Ecological Society of America

In the present paper, in addition to shedding light on the ESA's efforts to position itself in relation to environmental politics, we contribute to the scholarly literature on credibility and boundaries in science in two ways. First, we suggest that certain kinds of boundary-drawing are more likely to bolster scientist credibility than others. The already constructed social world, including historically resonant discourses and dominant organizational forms, is a source of models for successful efforts to maintain credibility. Second, we show that scientists and scientific organizations do not always construct boundaries between science and values in strategic ways that protect concrete interests. Borrowing from Bourdieu's concept of *habitus*, we argue that scientists routinely engage in boundary-work, commonly incorporating boundary-drawing language into representations of their work and knowledge. Although there are numerous examples of explicitly strategic boundary-work,² we find that boundary-work sometimes reflects general dispositions of participants in the scientific field rather than calculated efforts with explicit stakes. Thus, the overarching argument of this paper is that, to explain how and why science is demarcated from other elements of the social world, it is necessary to examine actors' efforts – strategic and routine – to construct boundaries as well as the already constructed context that constrains and enables those efforts.

Some of the most visible research on credibility limits its discussion to credibility among the community of scientists. This is the case, for example, with Bruno Latour and Steve Woolgar, who argue that 'scientists are engaged in a quest for credibility' among their colleagues (Latour &

Woolgar, 1986 [1979]: 200). Missing from their account are the public, policy-makers, the media, or other social groups who are often central to understanding credibility among scientists. Credibility, as Thomas Gieryn and others have shown, is not simply invested and negotiated among scientists. It also hinges on the ways that scientists interact with the rest of the social world. In our case, public credibility for ecologists depends on their balancing claims of the purity of their work with assertions of its social utility.

Several scholars have turned their attention to the ways that boundary-defining language and organizational strategies are used to establish credibility and protect the interests of scientists (Gieryn, 1983; Jasanoff, 1987; Moore, 1996). These studies contribute a great deal to our understanding of how the power, authority, and credibility of science are maintained. However, much of this work does not explain why some kinds of boundary-work are more common, legitimate, and successful than others. In her work on science policy-making, for example, Sheila Jasanoff shows how scientists seek to reinforce a boundary between unambiguously scientific knowledge and the negotiated 'truths' of political decision-making (Jasanoff, 1987). Jasanoff contends that such boundary-drawing is done in an attempt to protect science from criticism and outside control, but she does not explain why participants in debate choose the maps of science that they use. Our work suggests that the repeated drawing of boundaries along similar lines across time reflects the historically resonant, and consequently, taken-for-granted character of the discourses on which actors draw. These historically resonant discourses are powerful resources in debates over the appropriate boundaries of science.

Finally, it is not uncommon for scholars to assert or imply that actors consciously, independently, and strategically work to acquire or maintain credibility in response to specific situations (cf. Fujimura, 1988; Jasanoff, 1987; Kleinman & Solovey, 1995). Gieryn, for example, insists that boundary-work is 'strategic, practical action', explaining that 'the borders and territories of science will be drawn to pursue immediate goals and interests of cultural cartographers, and to appeal to the goals and interests of audiences and stakeholders' (Gieryn, 1999: 23).³ However, we agree with Karin Knorr-Cetina's suggestion that in many cases actors do not act strategically in pursuit of credibility. Instead, actors engage in the 'habitual selection of a strategy' (Knorr-Cetina, 1981: 73). That is, scientists and others who construct boundaries between science and values may not calculate the risks and benefits of that boundary-work and decide on the best strategy to suit their interests. Instead, they may, relatively unreflectively, adopt widely used models of behavior and organization. The drawing of organizational boundaries by scientists' professional groups often reflects pressures of institutional isomorphism, in which one organization mimics the actions of another that is widely viewed as successful. Our study of the ESA suggests that understanding boundary-work as self-conscious and strategic often does not provide an adequate understanding of how the credibility of science is maintained.

We conducted a series of semi-structured interviews with 18 prominent ecologists from across the USA, all of whom were involved with the ESA to varying degrees. All of the interviews were conducted during the 2001 Annual Meeting of the ESA, which was held in Madison, WI, US. Most of the ecologists that we interviewed were selected because of their prominence in current debates about the role of the ESA in environmental politics. Others were selected because they were elected officials or employees of the ESA. Finally, a few ecologists were chosen because a key informant suggested that they would have a broad understanding of and diverse perspectives on the relationship between ecology and politics. Interviews were scheduled approximately 1 month before the conference. Each interview lasted from 45 to 90 minutes. About half of the questions addressed the individual perspectives of interviewees on the relationship between ecology and society, while the other half of the interview dealt with the programs and policies of the ESA. The strength of these interviews is their ability to capture the views of ESA insiders and expand our understanding of how the ESA works as an organization. Our sample does not, however, reflect the broad diversity of opinions held by regular members of the ESA or by ecologists who are not members. Our analysis draws heavily on these interview data, as well as documents published by the ESA or in scientific journals. ESA documents include newsletters, editorials, brochures, and papers created for 'the public'. We also use material from the organization's website and draw on secondary sources. Using these sources, we describe the central concerns and perceived threats to credibility with which the ESA deals on a regular basis and discuss four ESA programs that construct boundaries between ecology and politics.

Discourses of Credibility: Value-Freedom and Utility

Some have observed that now, more than ever, ecologists are involved in activism and policymaking (cf. Yearly, 1995; Brown, 2000; Frickel, 2002). In fact, many of the ecologists we interviewed stated that they felt a desire to 'save the planet' or prevent environmental damage. Often, these ecologists were drawn to their field of study by a concern or love for nature. However, contentious credibility struggles emerge when scientists actively engage in explicitly political debate. Balancing the widely taken-for-granted belief that legitimate scientific knowledge requires political neutrality with the understanding that scientists are also political actors with social concerns requires careful boundary-work. This boundary-work tends to engage two discourses: the value-freedom of science and the utility of science. Both of these discourses have long histories in US science and culture and, therefore, shape debates about the relationship between science and politics.

We use the term 'historically resonant discourses' to signify those concepts or types of argument that have been in use for so long or which have become so institutionalized that their meaning and value are largely

taken-for-granted.⁴ Historically resonant discourses are both enabling and constraining. They are enabling to the extent that they create possibilities for powerful arguments and claims, which actors can use to pursue their interests. Historically resonant discourses are also constraining, however, in that the range of arguments that can be used to any effect in a particular context is limited. Arguments without historical resonance are easily ignored, or simply do not ‘make sense’. In this case, the range of debate about the boundaries and roles of science is shaped by the ideals of both value-freedom and utility. Here we outline brief histories of these discourses in the US scientific community and their relevance to the ESA.

Among most discussions of politics and science, it is assumed that in order to generate objective factual information, researchers must remain politically neutral. Scientists must be able to demonstrate that their findings are unbiased and free from value judgments. While numerous scientists have advocated for social and political change, they often did so against the expectations of their disciplines as well as those of industry, the military, and the status quo more broadly (Kuznick, 1987; Moore, 1996, 1999). Arguments for politically neutral – or ‘value free’ – science have a substantial legacy. Robert Proctor documents the history of the notion of value-free science, tracing it from Plato to early modern philosophers to the present day (Proctor, 1991). George Daniels suggests that the ‘pure-science ideal’ emerged in the 1870s, gaining momentum through the 20th century (Daniels, 1967). In addition, Julie Reuben demonstrates that the idea of value-free science was embraced in US universities by the early 1900s (Reuben, 1996). The continued influence of this discourse can be seen in contemporary debates over science and technology policy in the US and Europe, where policy-makers and interested parties often stress the distinction between facts and values (Kleinman & Kinchy, 2003). In these settings, political interests and social concerns are often seen as contaminants of objective scientific information.

Nevertheless, at the same time that an ideal of value-neutrality has shaped scientific discourse throughout the 20th century, assertions of relevance or utility also dominate the discursive terrain. In the US, scientists have been provided with ample government funding and autonomy, based on the assumption that their work provides practical benefits to society (or at least to those with military and economic interests).⁵ Like the argument for value-free science, discussions of the utility of science, or science for the public good, have a long history. Daniels points out that US scientists used a utilitarian argument to gain public support at least until the end of the 19th century (Daniels, 1967). Discussions of the contributions of science to national affairs again became prevalent after World War II (Kleinman, 1995; Greenberg, 1999). During the 1940s and the postwar period, US scientists routinely appealed to the benefits of science in defending national security and improving standards of living – and were rewarded with unprecedented levels of funding. Thus, we believe that the ‘utility ideal’ is another important discourse shaping the way the ESA negotiates the boundary between science and politics.

The ESA has responded to new funding opportunities and social concerns by constructing ecology as a useful science for addressing environmental problems. For many ecologists after the start of the contemporary environmental movement, the ability to provide guidance in solving pressing environmental problems became an important part of the public image of the discipline. Today, ecological knowledge is commonly understood to be crucial to solving pressing environmental problems such as global climate change, rainforest destruction, and air and water pollution, but this was not always the case. Major federal initiatives, like the National Environmental Policy Act of 1969 and, in the same year, the large-scale International Biology Program, partly funded as a special budget item from Congress (Nelkin, 1977), highlighted the unprecedented funding opportunities for scientists who could demonstrate the relevance of their work to the social concerns of the day. As we demonstrate in more detail later, the ESA made great efforts to assert the relevance of ecology to environmental problems, at least in part as a response to these signals that funding and recognition were available for scientists with useful environmental knowledge.

The ability to contribute to solving environmental problems benefits ecologists insofar as it generates increased public support and recognition by national funding bodies. However, the ESA's approach to controversial environmental issues, both in the 1970s and today, reflects the limits of legitimate scientific discourse. The organization carefully avoids the terrain of advocacy, attempting to stick to the more familiar territory of utility and application. This is not always easy, however, since ecological knowledge is rarely simply 'applied' to solving environmental problems. Because of its controversial implications, the credibility of ecological knowledge is always negotiated (Jasanoff, 1987). In this negotiation process, the ESA often emphasizes the distinction between science and advocacy and insists that ecological knowledge is value-free. At the same time, in a related but separate move, the ESA seeks to demonstrate the utility of ecological science for environmental advocates and policy-makers. Thus, there is an ongoing effort to utilize and balance two discourses – utility and purity – in the ESA's pursuit of credibility. We return to these themes later in the present paper.

Structure of the Scientific Field

The terrain of legitimate discourse and the politics of funding are not the only features of the social landscape that shape scientists' boundary-work. Scientists and scientific organizations also tend to conform to orthodox patterns of behavior within the scientific field, thus reproducing already-constructed boundaries (or 'maps') of science. Thomas Gieryn, in discussing the concept of boundary-work, suggests that maps of science are not always drawn anew each time credibility is on the line; however, he does not explain why certain maps are used so frequently (Gieryn, 1999). While it is now widely recognized that the concept of 'scientific norms', as

developed by Robert K. Merton (1973), is problematic, it is difficult to explain why there is so much continuity in forms of boundary-work, both among individual ecologists and among science societies, without acknowledging some kinds of social constraint on individual and organizational behavior, particularly when they do not always appear to be making a conscious calculation of returns.⁶

In the previous section, we argued that historically resonant discourses shape arguments about the boundary between science and the rest of the social world. Here we suggest that two additional sets of concepts help to explain conformity in boundary-work styles. Bourdieu's (1980, 1991) concept of *habitus* provides an approach to explaining the apparently routine boundary-work that many ecologists use and points to ways in which the boundaries of the scientific field are reproduced. The idea of institutional isomorphism, as developed by DiMaggio & Powell (1983), also contributes to the analysis of organizational boundary-work by suggesting that relationships between similar organizations are an important factor in shaping their structure and culture. Both Bourdieu (1980, 1991) and DiMaggio & Powell (1983) help to provide explanations of how and why actors replicate orthodox notions about the appropriate relationship between science and politics. Their theories help us to understand the reproduction of already-constructed boundaries, a kind of boundary-work not addressed by other research on boundaries in science.

Bourdieu's notion of *habitus* suggests an alternative to the idea of normative structure. Bourdieu argues that historical relations are reproduced within individual bodies as ways of perceiving and acting in the world. He describes *habitus* as an internal reflection of external structures that both makes possible and delimits the range of thoughts and actions of individuals of a particular group (Bourdieu, 1980). Within a social field, it is through *habitus* that definitions of orthodoxy are constraining. As Bourdieu puts it:

Although the field does not necessarily know the boundaries that delimit the various spaces of play, admittance to the field . . . presupposes a metamorphosis of the newcomer . . . a bracketing of beliefs and ordinary modes of thought and language, which is the correlate of a tacit adherence to the stakes and rules of the game. (1991: 8)

Without being explicitly trained, scientists reflect the structure of their field in their own beliefs about the boundaries between science and politics. They learn the tacit rules of participation in the field. This conformity to and reproduction of orthodoxy is evident in the ESA, as the organization attempts to demarcate science from politics, values and opinion. This reproduction of the existing structure of the field – the repeated demarcation of science from other areas of the social world – is what we call 'routine' boundary-work. Although there are certainly times when scientists and others strategically draw new boundaries of science in pursuit of explicit interests, we suspect that much of the work of maintaining the boundaries of science is done routinely and relatively unreflectively.

Beyond factors that operate directly through individuals to reproduce maps of science in similar ways across time, we believe organizational mechanisms can contribute to this reproduction. In this context, DiMaggio and Powell argue that 'highly structured organizational fields provide a context in which individual efforts to deal rationally with uncertainty and constraint often lead, in the aggregate, to homogeneity in structure, culture, and output' (1983: 147). Where credibility is perpetually at stake, political changes on a national level threaten funding, and social movements generate diverse public opinions of science, scientific organizations are likely to respond to this uncertainty in ways that lead to similarity in boundary-drawing practices across the scientific community. DiMaggio and Powell call this similarity 'institutional isomorphism'. One of the ways that this isomorphism occurs is through mimicry. Although there may not be a conscious diffusion of practices from a modeling organization to a borrowing organization, organizations 'tend to model themselves after similar organizations in their field that they perceive to be more legitimate or successful' (DiMaggio & Powell, 1983: 152). In the case of scientific societies, we would expect to see less credible organizations adopting the practices or organizational structures of those understood to be more legitimate. While the aim of the present study is not to test the hypothesis that institutional isomorphism is occurring among scientific organizations, the case of the ESA does suggest that, in the pursuit of credibility, ecologists pursue boundary-drawing practices that resemble those of other, more credible scientific organizations. For example, as we discuss in more detail later, at different points in recent history, the ESA has created programs that are remarkably similar to programs run by the scientific societies of more prestigious disciplines, such as physics and chemistry. It is not surprising that an organization struggling for resources and credibility would imitate other similar, but more successful, organizations. DiMaggio and Powell's concept of institutional isomorphism provides us with the theoretical insights to more closely examine this process of imitation.

Background: The Ecological Society of America and the Environmental Movement

The history of ecology contains many examples of scientists who were committed to political struggles to conserve natural areas, but ecologists' attention to issues of conservation and environmentalism rapidly grew after the 1960s. One obvious but important reason why ecologists were more attentive to the environmental movement after 1960 was the growing concern among ecologists that the natural areas they studied were being destroyed.⁷ Some ecologists began to direct their research and knowledge toward solving environmental problems. Another major factor in forcing ecologists to deal with their relationship to environmentalism was the adoption of the term 'ecology' in popular culture and the reliance on ecological concepts (correctly or not) by environmental activists.⁸ After

decades of obscurity, ecology, still a relatively young (inter)discipline, was suddenly thrust into the spotlight with the burgeoning environmental movement. Ecology was being drawn into public debate, regardless of ecologists' intentions.⁹ Furthermore, new funding opportunities related to solving environmental problems increased the appeal of pursuing 'relevant' science and discussing environmental issues. The ESA first reacted to the emergence of environmentalism with enthusiasm, because it had the potential to transform the previously obscure discipline of ecology into one of the most politically and socially relevant sciences.¹⁰ But by 1971 'the popularity of ecology also led to disillusion within the discipline' (Nelkin, 1977: 80). As Dorothy Nelkin explains, many ecologists within the ESA became frustrated with ineffective environmental legislation, and, more significantly, began to fear a loss of autonomy, as numerous organizations and agencies began to advertise their own 'expertise' in ecology (1977: 81). The ESA then turned its attention to protecting the credibility of ecology in light of the popular environmental movement.¹¹

Today, the ESA works to establish a boundary between ecology and environmental politics, arguing that ecology is a value-free, objective science, while environmentalism is a political stance. At the same time, however, the organization's leaders want policy-makers and the public to perceive ecology as relevant to environmental problem-solving, and in recent years they have explicitly aimed to demonstrate ecology's usefulness in the policy-making arena. This strategy of dual boundary-work is certainly not unusual – scientists have been making arguments about the simultaneous purity and utility of their work since at least the end of World War II (Kleinman & Solovey, 1995; Gieryn, 1999). Nevertheless, the highly controversial nature of environmental decision-making in the US, as well as the common usage of the word 'ecology' to suggest a particular political or moral stance, makes boundary-work an especially difficult challenge for ecologists.

In light of the political relevance and controversial nature of the knowledge generated by some ecological research, the ESA has taken pains to distinguish between ecology and environmentalism. Nevertheless, the subject matter of ecology seems to increase the likelihood that findings will become part of political controversies. Ecological research is especially relevant at a time when protection of the environment is one of the world's most-discussed policy issues. Whether ecologists intend to engage in policy disputes or not, their work can be perceived as providing information to benefit one side or another. As one ecologist explained:

The thing that I think will always be a challenge to ecology that some of the other sciences don't have to worry about is that because ecological science addresses problems that can mean environmental regulation of the industry, there will always be this cloud of 'well, you're an environmentalist', or trying to disqualify the data or something. Because our data can cause problems for groups that have a vested interest whereas the physicists and chemists may not have to worry about that.¹²

Today, the ESA's caution in regard to political issues is in part a reaction to public perceptions of and attacks on ecology. As many authors have noted, it has become common for non-scientists to use the terms 'ecological' and 'environmental' synonymously, much to the frustration of scientists trained in ecology (cf. Westoby, 1997). Many of the ecologists we interviewed worried that this popular association of the science of ecology with a political movement threatened the respectability of their discipline and pointed out that this association was sometimes used by political opponents to attack their credibility. More than one ESA leader we interviewed described the ways in which those whose interests are threatened by the results of ecological research (such as oil companies) try to discredit ecologists by accusing them of being environmentalists – in other words, of having a political bias toward preserving the environment. As one ESA official explained:

the reason so many of our members are gun shy about [expressing opinions is] because boom, you know, someone will label them, 'well you're just an environmentalist'. I was in a hearing a number of years ago, a Congressional hearing that focused on endangered species, and I remember one of the representatives tried to attack the credibility of one of our members who was a very highly respected scientist witness, by trying to say, '... don't you study ecology because you really love the environment?' – as if that made all his research suspect, as if you can't have passion.¹³

While this scientist dismissed the idea that caring about the environment would have an impact on the objectivity of scientists' findings, we would suggest that this kind of argument, accusing ecologists of political bias to detract from the credibility of their research, tends to be effective because the pure-science ideal is commonly taken for granted (if not always enforced). Because disinterestedness is held to be essential to the production of valid scientific knowledge, it is possible to portray research findings as suspect if the researcher appears to care about the issue for political reasons. Clearly, scientists are not consistently held to this ideal. But on more controversial matters, like environmental politics, opponents often draw on the pure-science ideal as a resource in efforts to discredit undesirable findings.

Constructing the Boundaries of Ecology

The ESA, as the professional representative of ecology in the US, is especially careful to protect the boundary (or boundaries) between science and values. The organization has enthusiastically associated itself with the concerns of the environmental movement, to the extent that ecological knowledge can uncontroversially help to solve environmental problems. At the same time, however, the ESA has been careful to avoid the appearance of being an activist organization. Some might say this is a dangerous balancing act. With ecology brushing so close to politics, critics argue that the boundary between science and values – perceived to be necessary – is

left vulnerable to rupture. For example, one elected official of the ESA expressed enthusiasm for the ESA's efforts to communicate its knowledge to non-scientists, but cautioned against taking a step too far toward an advocacy role:

... scientists cross the line being advocates ... for a policy decision, not just presenting good science, and I, I really believe that's inherently risky ... I just think ... it leads scientists down a path that gets very dangerous and it ultimately could destroy the credibility [not only] of the scientist in a particular case, but of science in general.¹⁴

In our interviews, ecologists expressed varying degrees of concern about this potential problem. Some ecologists we interviewed were candid about the impossibility – and even undesirability – of completely separating one's values from one's knowledge. One ecologist said:

You might kid yourself that you really can keep [the roles of scientist and citizen] separate but can you? ... Most of us are biased and, you know, then we just are. You have views about things, the way you were raised. The things you hold dear, those are biases that you have and that you develop, so it's very hard to ... separate your life into those categories, so probably it doesn't happen strictly.¹⁵

At the same time, this ecologist, like many others, described the ways in which he makes a distinction between facts and opinions when he provides information to non-scientists. The precise distinction between science and values is not taken for granted; because the value-free nature of ecology is not always obvious, these boundaries must be repeatedly drawn.

Ironically, the ESA's current attempts at boundary drawing typically involve 'purifying' ecology through engagement in public affairs. Stephen Hilgartner explains why engagement in public affairs, through the provision of science advice, can serve to establish the value-neutrality of science:

Many contemporary public problems are complex 'hybrids' of the scientific and the political. Science advice plays an important role in 'purifying' these hybrid issues, separating them into 'scientific' and 'political' components, and thereby defusing some of their destabilizing tendencies. (2000: 4)

As science advisors, or communicators of ecological knowledge to policy-makers, ecologists find opportunities both to promote the utility of their discipline and to construct distinctions between facts and values. While bringing ecologists closer to the political realm, the ESA's efforts to increase communication between ecologists and policy-makers actually enable ecologists to distance their science from political concerns – they provide a perfect opportunity for boundary-work. The ESA's Code of Ethics includes the principle that 'In communications, ecologists should clearly differentiate facts, opinions, and hypotheses'.¹⁶ This principle is to apply to all members of the ESA. Furthermore, in its own encounters with

the public, the ESA's Public Affairs Office (PAO) makes a distinction between appropriate and inappropriate approaches to political involvement – for example, by observing a difference between 'communication' of relevant (but value-neutral) information by experts and 'advocacy' for a cause. As distinct from advocacy, ESA leaders and employees we interviewed considered communication to be a 'value-free' transfer of ecological knowledge to non-ecologists, including politicians, activists, and the media. Communication is understood to be value-neutral, and beneficial to the status of ecology, while in contrast, advocacy is thought to reveal bias, or a lack of objectivity. An example of how this is enacted is seen in the ESA's recent collaboration with the Union of Concerned Scientists (UCS), an advocacy group on the issue of global climate change. An ESA panel and the UCS composed a joint report, but the ESA abstained from advocating for policy (Brown, 2000: 1191–92). An employee of the ESA explained to us how this distinction was maintained:

When we shopped around on Capitol Hill together ... we had to make this kind of awkward distinction of saying ok now we're speaking as a group and this report is based on science ... [and then], the woman representing UCS says, ok, now I'm just speaking for UCS and I'm going to advocate that you do this and this for clean air standards.¹⁷

As a general rule, the ESA does not take a position on policy issues, except, notably, on issues of science appropriations. According to one person in a leadership position at the ESA, the reason why the ESA does not normally take a position on pending legislation is because the membership holds diverse views and there is 'no way of knowing' if the majority of the society would support a particular bill. Second, the ESA does not 'have the resources to really pore through this legislation and understand it compared to other legislation'. Underlying these practical concerns is an obvious worry about how the ESA will be perceived. Hilgartner (2000) suggests that scientific organizations work to preserve a public image of consensus among members. If the ESA presented the range of opinions among ESA members on what position to advocate, it might highlight the level of uncertainty on how to proceed on environmental issues. Perhaps more importantly, many ESA leaders simply believe that advocacy and science should not mix. This concern, and the ways that the ESA has addressed it over the past 30 years, is elaborated more fully in the following sections.

Maintaining Credibility: Recent Ecological Society of America Initiatives

In the following section, we describe four ESA programs aimed at negotiating the boundaries between ecology and environmental politics. First, through its ecologist certification program, the ESA attempts to make a distinction between expert and non-expert consultants. Second, the organization's Public Affairs Office (PAO) creates boundaries between science and advocacy in a variety of ways, emphasizing the communication of

information as opposed to taking a position. Third, through the Sustainable Biosphere Initiative (SBI), the ESA extends its boundaries to include policy-relevant research, at the same time protecting the autonomy of ecology. Both the PAO and the SBI also create an organizational boundary between activities that deal with the public and those that constitute science. Finally, through the Aldo Leopold Leadership Program, the ESA selects credible scientists and trains them to communicate scientific knowledge in ways that protect the credibility of the field. In all of these efforts, credibility seems to hinge on two, partially contradictory factors: the relevance of ecology to broader social issues and the (inter)discipline's value-neutrality.

As we describe each of these cases later, we focus on both the ESA's boundary-work and the factors shaping these efforts. While we do not presume to account for the motivations of individual ecologists, we suggest that a number of constraints limit the range of possibilities for defining the ESA's relationship to environmental politics. These include the historically resonant discourses of value-free science and science for the public good, as well as orthodoxies of behavior for scientists and scientific societies. We are particularly attentive to Gieryn's question of what is 'at stake' in boundary struggles and find that in the case of the creation of the PAO and the SBI, the ESA acted in pursuit of funding and recognition for the field of ecology. At the same time, however, these programs are marked by the structure of the scientific field and available discursive and organizational resources. Even when there are evident motivations for boundary-work, the shape that these efforts take is affected by existing, already constructed features of the social world. This suggests the need for an adjustment to the boundary-work literature that stresses actors' strategic construction of new boundaries to fit their specific interests.

In other examples of the ESA's boundary-work, it is not clear that anything is explicitly at stake. Much of the more common boundary-work undertaken by the ESA appears to be routine and diffuse – aimed simply at avoiding non-specific, potential attacks on the organization's credibility. As several ecologists and ESA staff members put it, keeping a distance from politics is about maintaining a 'comfort level' where ecologists are not faced with the possible repercussions of political engagement. The ESA seems to take for granted that mixing environmental advocacy with science diminishes one's credibility; and, therefore, the organization routinely reconstructs a fact-values boundary that keeps advocacy apart from science. But this boundary is not necessarily constructed in response to a specific event or issue and is not undertaken in pursuit of a specific interest, as Gieryn and others have suggested; rather, the interviews we conducted suggest that such distinctions are often made in following the tacit rules of the scientific field. In this sense, boundary-work is a process of replication – a conservative effort – rather than a strategic construction of new boundaries and contents of science. Boundary-work is not always a direct reaction to an explicit threat to credibility.

Certification Program

One of the first ways that the ESA attempted to protect the credibility of ecology after the emergence of the US environmental movement was to make an official distinction between experts and non-experts. In 1979, believing that the credibility of ecology was being sullied by non-experts claiming to be ecologists, the ESA began a professional certification program that aimed to 'define the standards and formally identify the profession of ecologist' (Dale et al., 2000). This program, it was hoped, would separate ecological experts from non-experts, raise the status of professional ecologists and protect the autonomy of the (inter)discipline. The debate over the establishment of the program and the ESA's ongoing efforts to convince ecologists to pursue certification highlight the difficulty of engaging in successful boundary-protecting strategies. One of the main reasons that the certification program's detractors opposed the initiative was that they believed it was not the role of a science society to evaluate the credentials of its members (Tjossem, 1994). Today, there is a relatively low level of participation in the certification program. While there are a variety of reasons why certification has not become common for ecologists – namely the expense and its irrelevance to an academic career – the debate over its establishment suggests that one of its greatest weaknesses is its departure from the orthodox role of a science society.

The history of the certification program begins in the late 1960s, as ecologists were increasingly asked to serve as consultants on environmental issues. According to Dorothy Nelkin, in this context, 'Abuse of the discipline was becoming a problem. The Ecological Society is a scientific society; it has no control over consultants. There was no way to ensure that those who called themselves ecologists had appropriate experience' (1977: 82). Sara Tjossem has also written on this topic, commenting that:

Although ecologists were initially enthusiastic that the public was finally realizing the central place of ecology in influencing human affairs, they quickly became concerned that the prestige of the field was suffering from excessive popularity. On the whole, academically trained ecologists wanted to determine the direction of the most intellectually challenging research rather than becoming technicians in the service of private industry or the government. (1994: 95)

The ESA's ethics committee first proposed a certification program in 1971. Proponents argued 'that a code of ethics and mandatory certification by a professional organization would help ecologists resist economic and political pressure . . . [and] reassert professional autonomy' (Nelkin, 1977: 87).

Throughout the 1970s, ESA members debated whether running such a program was an appropriate role for the ESA. Nelkin (1977) argues that certification programs are associated with professional guilds, not scientific societies. Some ecologists opposed the program, arguing that it is not the role of a scientific society to certify the work of its members and that if ecologists were to act as professional consultants, there should be a

separate organization to regulate their work. This, it was argued, would create an appropriate distinction between science and professional consulting practice (Nelkin, 1977: 88).

In light of this debate, the ESA delayed making a decision on the proposal for nearly a decade, finally deciding in 1979 to establish a voluntary certification program. The program, with its appointed board, got off the ground in 1981, with 154 ecologists certified by 1983 (Dale et al., 2000). By 1999, however, of more than 7000 ESA members, only 346 were certified ecologists (Dale et al., 2000). Despite the relative unpopularity of the certification program in recent years, the ESA continues to urge its members to become certified. One of the rationales of the program is that certification aids in 'establishing credentials for . . . consulting assignments [such as] legal proceedings on environmental matters' (Dale et al., 2000: 256). In other words, certification sets ecologists apart from presumably less objective, less credible environmental spokespersons. The ESA's certification board argued in the lead article of the October 2000 *Bulletin of the Ecological Society of America* that:

Ecology is poised to become one of the lead sciences of the 21st century. Some have called this period 'a century of ecological repair of the planet'. Already, engineers, landscape architects, geologists, and members of other professionally certified fields are running with this idea, leaving ecologists without positions of leadership. . . . We must make sure that ecologists do not just participate in, but lead in the development of, . . . applied ecology programs. Certification would help immeasurably. (Dale et al., 2000: 256)

As 'ecological repair' becomes a concern across disciplines, ESA leaders hope that a certification program will put ecology in a leadership position. This argument – that ecologists should define environmental problems and lead efforts to address them – recurs throughout the ESA's efforts to deal with environmentalism.

The ESA's certification program deals directly with the competing demands for scientific purity (a legitimate claim to expertise) and social relevance. The goal of the program is to enable ecologists to participate in public debates over environmental issues while not only certifying the individual ecologist's credibility but also protecting the credibility and autonomy of the entire field. The ESA, with its aim to promote and protect the entire (inter)discipline of ecology, recognizes that, in promoting certification, there is more at stake than just individual ecologists' careers. In theory, the certification program should protect the autonomy and unique expertise of ecology as a whole.

The organization's failure to recruit its members to the program suggests that academic ecologists are not convinced that certification will benefit them. Certification is not free, and ecologists may see it as an unnecessary expense on top of regular membership fees, particularly since they already have academic degrees to certify their expertise (Tjossem, 1994). Although professional certification – a sure-fire way to construct a boundary between experts and non-experts – might have solved some of

the ESA's credibility problems in light of the environmental movement, it is an unorthodox program for a scientific society, appealing more to 'professionals' than 'scientists'.¹⁸ As is demonstrated in the next section, conformity to the organizational patterns of other scientific societies is a critical factor in the success or failure of boundary-drawing efforts. The ESA finds greater success in negotiating the relationship between science and politics when it uses approaches that are common across the scientific community.

The Ecological Society of America's Public Affairs Office

At the same time that the ESA was beginning its certification program, some ESA members began to discuss ways in which the Society could, in an organized fashion, become more engaged in environmental politics. The first and most significant way in which the organization sought to demonstrate its relevance to the concerns of the day was by opening a PAO. Like the certification program, the PAO enables the ESA to engage in double boundary-work: to extend the boundaries of ecology into the world of environmental politics, while at the same time protecting the (inter)-discipline's credibility as a value-free science. The PAO was established at a time when most other scientific societies were creating similar programs (Moore, 1999: 112). These programs were made possible by changes in the political landscape, driven by scientist-activists in the turbulent 1960s and 70s. Kelly Moore argues that the adoption of public affairs programs across scientific societies was a direct result of the political activism of dissenting scientists. These transformations were possible because 'science was vulnerable ideologically as well as organizationally' during that period (Moore, 1999: 112).

Throughout the 1970s, practically every major scientific society adopted programs that linked science with the concerns of citizen groups (Moore, 1999: 112). As scientist-activists involved in anti-war and environmental movements founded public interest organizations like the UCS and Science for the People, professional scientific societies adopted similar – albeit less radical – initiatives (Moore, 1999: 112). For example, in 1975, the American Physical Society established a Panel on Public Affairs, which conducts studies on topics relevant to social concerns (Lustig, 1999). Organizational units like the American Physical Society's Panel on Public Affairs and the ESA's PAO create a public image of social relevance and engagement, while maintaining the boundaries that protect ecology's credibility in a context that demands political neutrality. Beyond the roles of the political struggles of the time and the particular vulnerabilities of science in the decades of growth after World War II, funding issues were also an important factor in prompting the ESA to establish its PAO. Indeed, from its inception, the PAO was seen as a way to get closer to purse-string-holders in Washington, DC.

While the political concerns of scientist-activists, as well as funding pressures, motivated the ESA's creation of the PAO, at the same time this

case makes evident the constraints on scientists to protect the appearance of value-freedom. While it is now normal for scientific societies to address public affairs, overt activism is still off limits. This highlights the resilience of the pure-science ideal even through radical changes in the political and scientific environment.

Staffed by just one part-time volunteer in 1981, the PAO was the first segment of the ESA to be based in Washington, DC. In later years, the rest of the organization's headquarters relocated to Washington, DC. A review of the *Bulletin of the Ecological Society of America* from the 1980s indicates that there was a great deal of enthusiasm for the PAO, and little (published) dissent. Arguments in favor of opening the office stressed the utility of ecology and included the suggestion that ecologists should make available the information they have that would be of interest and importance to public debates and decision-making.¹⁹ The President of the ESA in 1985 considered the creation of a PAO to be an important step in the maturation of the Society:

... it is now clear that the Society must become a more active and visible Society in a broader context. That is, the ecology of the biosphere demands that ecologists, and ergo, their Society, play a much more active and vigorous role in ensuring that decisions and actions affecting the world's natural resources are based on the strongest and best scientific information. This realization means that the Society must solidify its programs internally, and externally must mature into a more active organization. (Risser, 1985: 488–89)

Opening the PAO not only demonstrated the relevance of ecology, however; it also provided a stage on which the ESA could assert the value-freedom and objectivity of ecological research. One ecologist summarized the reasons why he welcomed the PAO. He suggested that by having an organized and official way to comment on political issues, ecologists would have less reason to worry that environmental advocacy would damage their credibility:

The ESA is complex and has had difficulty coming to grips with its responsibility toward public policy and legislation in the past. There have been those in the Society who have had such interests, but they generally have had to find other societies or groups such as The Nature Conservancy, The Institute of Ecology, AIBS [American Institute of Biological Sciences], Environmental Defense Fund, etc., through which to express those interests. While it has been most helpful to work through these other organizations, we have often harmed our interests by excessive concern for maintaining the credibility of our profession. ... It is time to develop a means of permitting the Society to comment officially on legislative and administrative issues that affect our environment, and time to support the efforts of the Public Policy Director in Washington [DC]. (Halvorson, 1983)

This argument suggests an expectation that, as an organized body, the ESA could address environmental issues in ways that benefited the whole (inter)discipline, rather than destabilizing its credibility. Furthermore,

having a presence in Washington, DC, created opportunities for the ESA to emphasize that ecology is part of the respectable scientific community. As one ESA staff member put it:

You have to actively associate yourself with the scientific community, so it's a job and it's part of what I think the Society wants its staff and the Public Affairs Office to do, to make that clear over and over again in a very positive and constructive way. . . . We are scientists, that's the world we want you to associate [with] us.²⁰

While the PAO aimed to forge a close relationship between ecology and politics (both environmental and funding-related), it also worked to draw a boundary between them. The establishment of the PAO created an organizational divide between 'scientific' and 'non-scientific' activities in the ESA. While not nearly as dramatic as the ESA's 1946 decision to banish advocacy activities from the ESA, which led conservation-minded ecologists to form an outside organization (Kinchy, forthcoming), the ESA's approach to dealing with 'public affairs' suggests a similar reluctance to consider politics and advocacy to be a part of ecology proper. The PAO deals with all issues pertaining to public policy, as well as education, outreach and other activities considered peripheral to 'doing science'. It is revealing to note that the Director of Public Affairs is not a PhD scientist.²¹ As one ESA official said, 'you need someone in [the] job who is not a scientist', explaining that it was more important to have someone who was good at dealing with the complexities of managing the PAO than someone who was an expert scientist.²² While, of course, this makes practical sense, it also assumes that science and public affairs are two distinct categories and marks public affairs as outside of science.

The case of the PAO makes evident the role of both the organizational field and taken-for-granted science discourses in a professional organization's response to new political pressures. The ESA's response to the environmental movement mirrored the actions of its organizational peers, but was also shaped by historically resonant discourses of the utility and value-freedom of science. This response, the opening and operation of the ESA's PAO, is a kind of organizational boundary-work, although these boundaries are complex and sometimes contradictory. This case indicates that a combination of political context, organizational legitimacy pressures and dominant discourses can shape the actions of professional science organizations as they negotiate their role in broader society.

Sustainable Biosphere Initiative

In another example of organizational boundary-work resulting from political changes on a national level, the ESA established the SBI in 1991. The initiative sets socially relevant research priorities for ecologists. At the end of the 1980s, a shift in attitudes about public control over scientific priorities, combined with the relevance of ecology to popular concerns about the environment, threatened the autonomy of ecologists to choose their own research directions. By taking the initiative to define and address

environmental problems themselves, ecologists resisted outside control. Rather than arguing for the 'purity' of ecology, ecologists preserved their autonomy by defining environmental problems and setting socially relevant research priorities themselves. Like the PAO, the SBI was not a unique program. Many other scientific societies and organizations established similar initiatives in response to the same funding pressures.²³ This case, like that of the PAO, illustrates that the ESA's boundary-work is contingent on political context, but shaped by historical, discursive and organizational patterns.

By the beginning of the 1990s, the pursuit of basic research with no practical applications had lost much of the public appeal it had in the 20 years after World War II, and segments of the scientific community began setting their own agendas, 'in order to head off a public role in priority setting' (Kleinman, 1995: 191). The ESA's approach to the problem of priority setting was part of a trend across scientific societies, initiated by the president of one of the most prestigious scientific organizations, the National Academy of Sciences. As two commentators observed, the SBI 'was born from' the lessons of astronomy, particle physics, and other disciplines more familiar with the politics of generating funding (Grubb & May, 1991). In what observers considered a remarkable move, astronomers set research priorities through a special committee of the National Research Council (Waldrop, 1991). Similarly, the American Physical Society appointed a Physics Planning Committee to set research priorities in hopes of receiving federal funding (Lustig, 1999).

The autonomy of ecology in particular was impacted by the field's increasing relevance to public affairs. Stephen Bocking explains:

Shifting from the view, prevalent in the 1950s and 1960s, that the scientific community should determine its own priorities (subject to certain national objectives relating to security or development of technology), it has become increasingly accepted that science can be directed toward specific social or economic objectives. This evolution has affected the role of ecology in environmental politics by helping to establish whether this role is determined by ecologists or nonecologists. (1997: 8-9)

Bocking goes on to elaborate that a 'chief lesson of the ecological revolution for ecologists was that they could not take for granted a central role in addressing environmental concerns' (1997: 204). Following the recommendation of Frank Press, the President of the National Academy of Sciences, ecologists joined the trend toward priority setting in the early 1990s. In the report that initiated the ESA's SBI, the panel of authors wrote that:

Financial resources are finite. Competing national demands range from national security to social services, and various major priorities vie for attention and funding. Consequently, it is not feasible to support all scientific research. If we as scientists do not set our own priorities, others will do so for us. (Lubchenco et al., 1991)

The SBI, like the similar programs and initiatives pursued by other disciplines at the time, was an innovative approach to addressing immediate concerns about funding shortage and threatened autonomy, yet it drew on long-established beliefs about the place of science in the social world. Expecting opposition to a proposal to direct ecology toward addressing environmental problems – an idea considered to be ‘radical’ at the time (Gross, 2001) – authors of the report were surprised and relieved when the ESA accepted the report and began the Initiative with little controversy.²⁴ Today, SBI programs aim to ‘fortify the link between scientists and decision makers by reinforcing the critical role of scientific investigation and providing mechanisms for the scientific community to be responsive to policy needs’.²⁵ The aim of the program is to demonstrate the utility of ecological research to solving critical environmental problems. While this approach might have been considered radical at the moment of the program’s initiation, the basic argument – that science should be recognized for its services to the public good – is by no means unprecedented. In the years after World War II, to preserve autonomy from outside control, scientists sought to demonstrate their ability to generate useful knowledge without the pressures of external governance (Kleinman & Solovey, 1995). Arguments for utility have long bolstered the public image (and funding) of science, even when the actual work done by scientists has little direct application to ‘real-world’ problems (Greenberg, 1999).

While it is possible to imagine other ways that the ESA could have protected its autonomy during this period – perhaps by emphasizing ecology’s disengagement from social and political interests – the organization took an approach that not only appealed to funding sources, but also imitated other, more prominent scientific societies. Again, this case demonstrates that, while the ESA’s boundary-work varies as political contexts are transformed, the organization does not draw a new map of ecology every time its credibility and autonomy are challenged. Rather, the ESA draws on historically resonant discourses and organizational patterns across scientific disciplines as it constructs its boundaries in relation to politics.

Aldo Leopold Leadership Program

In each of the three cases described earlier, the ESA has worked to reap the benefits of public engagement in environmental politics, while asserting the value-neutrality of the discipline through the construction of rhetorical and organizational boundaries. However, as suggested by the low participation rate in the certification program, it is unclear whether the ESA has much of an impact on how individual ecologists negotiate the boundary between science and politics. The ESA has mainly taken a hands-off approach to the behavior of individual members, indicating that the decision whether or not to become an advocate is a personal one.²⁶ But a recent program, the Aldo Leopold Leadership Program, takes up the task of training ecologists in how to interact with the media, policy-makers, and

other non-scientists. While the program is an unusual one for a scientific society, it avoids accusations of unorthodoxy in part because it is not officially operated by the ESA. The program is very popular, addressing a desire to share information in a way that is not typically acknowledged or met by academic institutions. The Leadership Program breaks new ground in dealing with ecology's relationship to the social world; at the same time, it reproduces boundaries between science and values that structure the scientific field.

The Aldo Leopold Leadership Program is aimed at 'environmental scientists who want to be more effective communicators of scientific information' (Stauth, 2000). It is sponsored by a private foundation and conducted by Oregon State University on behalf of the ESA. The aim of the program is to 'make sure that accurate, credible information gets through to the public or political leaders as we form policies to deal with the world's problems' (Judith Vergun, quoted in Stauth, 2000). Initiated in 1998, 60 ecologists over the program's first 3 years were trained as 'scientist-communicators'. In these early years, there were many more applicants than available program fellowships, and the initiative leaders hoped to be able to continue the program in order to accept the large numbers of interested ecologists. Ecologists chosen to participate in the program are typically mid-career, tenured scientists with strong academic reputations. The program does not train younger ecologists, because, in the words of one member of the program's board, 'people need to get their careers established and know where they're going and have the credentials to be able to come forward, and tenure is a good way to show that you have those credentials'.²⁷ In other words, the program only encourages ecologists with strong, established reputations to speak out on environmental issues.

Through the program, the ESA directs environmentally-minded – but established and reputable – ecologists toward engagement in politics in a way that distinguishes between facts and values, between communication and advocacy. The emphasis of the program is on communication, and, of the eight ecologists involved in the program that we interviewed for the present study, most emphasized the need to separate 'opinions' or advocacy from the communication of information. This Leopold Fellow's explanation is typical:

I think scientists can talk about their results and what the implications of their results are. They can talk about policy decisions and what the consequences are of one decision versus another. Where it gets a little bit tricky is when scientists want to advocate for one solution versus another. . . . It's perfectly legitimate for someone to have an opinion on that but they need to make sure that they're stating up front that it's their opinion.²⁸

What is interesting about this aspect of the Leadership Program is that it appears to teach an approach to making distinctions between science and values in a way that some older ecologists say they do regularly. It seems that many ecologists routinely construct a boundary between science and

values in order to dispel any appearances of bias. For example, one older ecologist-advocate, explaining how he made it clear to public audiences whether he was providing them facts or giving his opinion, said, ‘I will always try to say “well I’m going to take off my science hat and I’m going to put on my . . . John Q. Public hat” ’.²⁹ This ‘two-hat’ approach seems to be a common strategy for ecologists who have decided to take on an advocacy role.³⁰ Another prominent ecologist said that:

You got to say all right, here’s 2000 scientists that are working very hard at this, they bash it back and forth. [You say] this is the consensus view, and then you can say my personal view is we probably ought to be doing X, Y, and Z right now but *that’s not science, that’s my personal interpretation*.³¹

These ecologists, like several others, identified a rhetorical device that they use *routinely*, not just when faced with a specific challenge to ecology’s credibility or a concrete scientific disagreement. As older, highly respected scientists, it is unlikely that their personal credibility is at stake; nevertheless, they make a point to always explicitly separate science from values or politics. In such cases, boundary-work appears to be routine, perhaps reflecting an ecologist’s *habitus*. Boundary-work, then, not only emerges during credibility contests, but also in everyday talk.

Although the goal of the Leadership Program is to forge new relationships between science and the social world, it also reproduces established features and boundaries of the field through the routine boundary work of ecologists. While teaching a variety of other useful communication skills, the Aldo Leopold Leadership Program guides ecologists to do what they have more subtly been taught to do throughout their careers. The act of making a rhetorical distinction between science and opinion is an action chosen by individual ecologists. But while these may be the actions of individuals, they reflect distinctions made at various levels, both organizationally and rhetorically, throughout the scientific field.

Conclusion

Each of the cases we discussed represents an attempt by the ESA (consciously or not) to balance two kinds of boundary-work: first, to extend the frontiers of ecology into the realm of environmental politics; second, to assert a rigid boundary between science and values. Political context is an important factor in explaining why the ESA constructs a close or distant relationship to politics, but there is little variation in the form that these constructions take, even as individual members of the organization question taken-for-granted notions about the fact-values boundary. While, for the ESA, boundaries between science and politics are perpetually under construction, this boundary-work does not typically challenge existing conceptions of the relationship between science and the broader society. We pointed to a variety of factors that limit the ESA’s range of possibilities for negotiating its relationship with environmental politics. Historically resonant discourses, isomorphic pressures, and common sense notions

about scientific credibility shape the ESA's efforts. We believe that attention to these factors provides the opportunity for a more complete understanding of the relationship between science and society than can be achieved if the analyst assumes that each boundary construction initiative is strategically tailored, *de novo*, to address a particular problem or interest.

We also observed that, while some of the ESA's boundary-work resembled the kinds of 'credibility contests' that Thomas Gieryn analyzes, there are also instances in which boundary-drawing occurred apart from any immediate threat to funding or credibility. For example, the PAO routinely maintains a boundary between science and environmental advocacy, and the ESA's Code of Ethics explicitly requires ecologists to make a clear distinction between facts and opinions in their communication to the public. Indeed, much of the ESA's boundary-work appears to be routine, rather than a response to immediate pressures or a conscious calculation of returns. It appears to reflect deeply taken-for-granted attitudes.

While scientists have agency in choosing whether and how to engage in politics, they experience pressure to conform to the behavior of other scientists and are constrained by concerns about credibility. The ESA, as a professional organization representing an interdisciplinary science, faces additional pressures to conform. Representatives of the organization believe that the credibility of the field is threatened by unconventional behavior, particularly activities that are associated with controversial, 'value-laden' politics. As a public representative of ecology, the ESA must maintain a neutral stance on environmental issues, or risk damaging the public image of ecology as an objective, value-free science. At the same time, the ESA must increase the relevance of ecology to secure funding and increase public respect for the discipline. These efforts to demonstrate the utility of ecology are uncontroversial, drawing on the history of 'science for the public good', a discourse long used by scientists to secure public support for their work.

The present study demonstrates that, while the boundaries of ecology are flexibly defined, contingent on political context, they are also shaped by the already constructed social world. In each of the ESA's efforts to deal with the boundary between ecology and environmental politics, the style and contours of those boundaries were shaped by historically resonant discourses of scientific purity and social utility; patterns of organization across the scientific community; and already-constructed maps of science in the social world. In a context where scientists are often criticized for their reluctance to take responsibility for the social and political implications of their work, attention to these types of factors reveals some of the obstacles to such engagement. Social scientists, politically-minded scientists, activists and others concerned with making science more socially accountable and democratic may benefit from further analysis of the kinds of factors that shaped the boundary between politics and science in the case of the ESA.

Notes

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1. For example, at its 1999 Annual Meeting, the ESA held a symposium on ‘scientific objectivity, value systems, policy decisions, and communication between scientists and nonscientists’. See Rykiel (2001). Similarly, *Conservation Biology* published a special section on ‘Conservation Biology, Values and Advocacy’ (1996 [June], 10[3]).
2. For a particularly good example of this, see Thomas Gieryn’s (1999: chapter 1) study of John Tyndall’s strategic efforts to define science against both religion and mechanics.
3. Gieryn does note that boundary-work cannot be reduced to a crude understanding of interests. Rather, ‘interests are not preformed and fixed forces (fully knowable and articulable by cartographers or their audiences) that lie behind cultural maps’ (1999: 23). Cultural cartographers are not ‘omniscient or deceitful’, and scientists ‘more often than not . . . really believe that their representations of science tell it like it is’ (1999: 23).
4. For other work on historically resonant discourses and social structure in science, see Kleinman & Kloppenborg (1991), Kleinman (1998), Klein & Kleinman (2002), and Kleinman & Kinchy (2003). Theda Skocpol’s (1987) comments on cultural idioms as a resource for constructing ideological arguments are also relevant.
5. In this context, contentious debates between scientists and policy-makers have erupted over how much control funding bodies should have over the governance of science; this is one point at which the boundary between science and the social world is highly contested. See, for example, Goggin (1984).
6. Among the earliest and most prominent of the many critics of Merton’s notion of ‘norm’ is Michael Mulkey. In 1976 he observed that ‘what have previously been regarded as the components of the dominant normative structure of science are better conceived of as vocabularies of justification . . . which are not institutionalized in such a way that general conformity is maintained’ (1991: 77). Latour & Woolgar (1986 [1979]) make a related critique. For a critique of economic models of action in science, see Knorr-Cetina (1981).
7. Similar concerns motivated the preservationist movement of the early part of the 20th century. In the 1930s and 1940s, ecologists such as Victor Shelford and Charles Kendeigh argued that the ESA should have an advocacy role in protecting the natural areas in which ecologists conduct research. See Kinchy (forthcoming).
8. Frank Egerton summarizes: ‘In the late 1960s the public became aware of an imminent crisis in both the availability of natural resources and in environmental pollution. Suddenly “ecology” was important. The public use of the term, however, was at slight variance to its . . . application to a particular science’ (1977: 1).
9. Nelkin suggests that the environmental movement ‘forced [ecologists] to face many of the issues and implications of social responsibility’ (1977: 75). Robert McIntosh similarly argues that ‘The rise of public interest in the environment has thrust ecology onto center stage’ (1974: 157).
10. Dorothy Nelkin (1977) cites the 1970 Presidential Address to the ESA, in which the president declared that ‘the major question facing ecologists is, what impact will the science of ecology have in shaping environmental policy?’
11. A further issue that may have posed a problem for the field of ecology was that some ecologists, most notably Rachel Carson, criticized science for promoting human exploitation of nature. After the mid-1950s, concerned scientists in many fields began to criticize science for its negative impacts on humans and the planet, particularly in reference to the Vietnam War, and ecologists may have been seen as instigators of this critique. Still a ‘dreadfully weak field in the mid part of the century’ (Interview R, see note 31), the association of ecology with the critique of science may have been a factor

- in its inferior status among the other sciences. Robert McIntosh also notes that, at mid-century, ecology 'was peripheral, if not disreputable, in most biology departments and was entirely absent in some' (McIntosh, 1974: 156).
12. Interview F, 6 August 2001. All interview subjects are coded to protect confidentiality. This person, an employee of the ESA, is quoted several times in the present paper because of her extensive knowledge of the organization's policies and practices. She is not a PhD scientist. All other ecologists cited hold doctoral degrees, unless otherwise noted.
 13. Interview F (see note 12).
 14. Interview N, 8 August 2001. At the time of the interview, this mid-career ecologist directed an agency of the US Government and held an elected position with the ESA.
 15. Interview H, 7 August 2001. This older ecologist directs an ecological research institute in the north-eastern USA.
 16. Available at <<http://www.esa.org/aboutesa/codeofethics.php>>
 17. Interview F (see note 12).
 18. As pointed out by an anonymous reviewer of this article, many environmental consultants do not consider themselves ecologists and, therefore, do not join the ESA. They may belong to other professional organizations instead. This may partly account for the uncertain success of the program.
 19. The main opposition to the idea was that it would be expensive to have a paid staff in Washington, DC. Opponents also argued that 'having a Washington office is too proactive and it would take away from [the] central goals for our professional society' (Interview H, see note 15).
 20. Interview Q, 9 August 2001. This mid-career ecologist directs a program of the ESA.
 21. Nor is the Executive Director of the ESA, which again suggests that attention to the administrative details of running a professional society is considered to be 'outside' of science.
 22. Interview N (see note 14).
 23. A review of *Science* throughout 1991 is revealing: 'priority setting' is the prominent concern of opinion pieces, letters from the editor and other policy discussions. See, for example, Koshland (1991) and Bahcall (1991).
 24. Interview B. This mid-career ecologist, a full professor at a north-western US university, has been prominently involved in providing scientific advice for international environmental policy-making.
 25. Quotation from the ESA website: <<http://www.esa.org/SBI>>
 26. For example, in her Presidential address to the ESA, Kay Gross (2001) said 'All of us choose our own professional paths. Some will choose to emphasize research, with no consideration about its impact on conservation, management, or related policy issues. Others will focus their careers almost entirely on issues that have clear and immediate application'.
 27. Interview G, 7 August 2001. This mid-career ecologist, a full professor at a mid-western US university, was involved in selecting candidates for the Aldo Leopold Leadership Program.
 28. Interview D, 6 August 2001. This mid-career ecologist is a professor at a north-western US university and works closely with the Aldo Leopold Leadership Program.
 29. Interview H (see note 15).
 30. As pointed out by a reviewer, this is by no means the only way that ecologists approach the relationship between science and values. Some, for example, argue that their values derive from science. Others suggest that their research and values fed into each other mutually. Nevertheless, many of our interviewees noted that, when making a formal statement about what they know, they take an approach similar to that suggested in the ESA's Code of Ethics (mentioned earlier in the present paper). That is, they make a clear distinction between facts and opinions.
 31. (Emphasis added.) Interview R, 9 August 2001. This older ecologist is a full professor at a west-coast US university, and has contributed publicly to some highly publicized environmental debates.

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