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Despite women earning similar numbers of graduate degrees as men in STEM disciplines, they are underrepresented in upper level positions in both academia and industry. Editorial board memberships are an important example of such positions; membership is both a professional honor in recognition of achievement and an opportunity for professional advancement. We surveyed 10 highly regarded journals in environmental biology, natural resource management, and plant sciences to quantify the number of women on their editorial boards and in positions of editorial leadership from 1985-2013. We found that during this time period, only 16% of editorial board members were women, with more pronounced disparities in positions of editorial leadership (i.e., Associate Editors, Editors-in-Chief). Although the trend was towards improvement over time, there was surprising variation between journals. We argue editorial boards should strive for gender parity to increase the number of women afforded the opportunities and benefits that accompany membership, as well as increase the number of role models and mentors for early-career scientists and students.

Women are underrepresented on the editorial boards of journals in environmental biology and natural resource management

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ABSTRACT

Despite women earning similar numbers of graduate degrees as men in STEM disciplines, they are underrepresented in upper level positions in both academia and industry. Editorial board memberships are an important example of such positions; membership is both a professional honor in recognition of achievement and an opportunity for professional advancement. We surveyed 10 highly regarded journals in environmental biology, natural resource management, and plant sciences to quantify the number of women on their editorial boards and in positions of editorial leadership from 1985-2013. We found that during this time period, only 16% of editorial board members were women, with more pronounced disparities in positions of editorial leadership (i.e., Associate Editors, Editors-in-Chief). Although the trend was towards improvement over time, there was surprising variation between journals. We argue editorial boards should strive for gender parity to increase the number of women afforded the opportunities and benefits that accompany membership, as well as increase the number of role models and mentors for early-career scientists and students.

INTRODUCTION

Despite women earning similar numbers of graduate degrees as men in Science Technology, Engineering, and Math (STEM) disciplines (National Science Foundation National Center for Science and Engineering Statistics 2012), they are underrepresented in upper level positions in both academia and industry (National Science Foundation Division of Science Resources Statistics 2004). Several mechanisms have been put forward to explain this disparity, including bias against women in hiring and promotion, inflexible or even hostile work environments, and a lack of role models and mentors (Moss-Racusin et al. 2012). In response, universities and other institutions have implemented strategies to address these issues, including making opportunities for professional advancement more broadly available and actively seeking gender diversity in leadership roles (Fox 2008). While these efforts have some positive results, much remains to be done to ensure women in STEM are afforded the same opportunities as their male counterparts.

The editorial boards of scientific journals act as gatekeepers that help maintain the scientific integrity and standards of a journal as well as identify emerging and innovative areas of research (Addis & Villa 2003; Mauleon et al. 2013). An invitation to serve as a Subject Editor is recognition that a scholar is respected in his or her discipline; it is also the path towards editorial leadership because Associate Editors and Editors-in-Chief are typically selected from the Subject Editors. Serving on a board is also a means of advancing one's scholarship, both by becoming aware of the latest advances in the field and gaining insights into the writing and publication process. Finally, editorial boards are important professional networks – in serving on a board one is able to develop relationships with reviewers, authors, and other editors (Addis & Villa 2003).

Serving on a board is therefore both an honor and a means of furthering one's research and career.

We quantified the gender of the editorial board members of ten highly regarded journals in environmental biology, natural resource management, and plant sciences to address the following questions: 1) Between 1985 and 2013, what proportion of editorial board members were women? 2) How did the representation of women on editorial boards change over this time period? 3) How many women served in positions of editorial leadership (e.g., Editor-in-Chief)?

METHODS

We selected for review 10 high profile journals from environmental biology, natural resource management, and plant sciences: *Annual Review of Ecology, Evolution, and Systematics*, *Biotropica*, *Agronomy Journal*, *North American Journal of Fisheries Management*, *American Journal of Botany*, *Conservation Biology*, *Biological Conservation*, *Ecology*, *Journal of Ecology*, and *Journal of Tropical Ecology*. We chose these journals because they are published by our primary professional organizations (e.g., *Biotropica*, *Conservation Biology*) or are alternative, non-society outlets for similar research (e.g., *Journal of Tropical Ecology*, *Biological Conservation*).

Our analyses were based on the years 1985-2013. For each journal, we selected the first issue published each year and recorded the names, institutions, and editorial positions of all editorial board members. We then used internet searches, personal knowledge, and interviews of colleagues to determine the gender of each editorial board member. Because of library licensing issues were unable to obtain data for *Journal of Tropical Ecology* for the years 1986-1989.

Journals often have different names for positions with similar editorial responsibilities, these names frequently change over time, and not all journals had all positions throughout the years surveyed. We therefore categorized editorial board members as follows, then used a subset of these categories in our analyses: (1) Editor-in-Chief (EIC). When journals had co-EICs all were counted and included in the total EIC count (2) Associate Editors (AE). Note that some journals created Associate Editor positions only recently (e.g., *Biotropica*), while others have had them for much longer (e.g., *Agronomy Journal*). In addition, the *North American Journal of Fisheries Management* and *American Journal of Botany* used the title "Associate Editor" to refer to members of the editorial board with responsibilities that more accurately reflect those of a "Subject Editors" or "Handling Editors", so they were placed in that category instead. (3) Subject Editors (SE). These were also referred to as the Board of Editors (*Ecology, Biological Conservation*), Editorial Committee (*Annual Review of Ecology, Evolution, and Systematic, American Journal of Botany*), and Associate Editors (*American Journal of Botany*, *North American Journal of Fisheries Management*); (4) Book Review Editors; and (5) Special Editors. These editors are tasked with organizing special sections, reviewing data archives etc. (e.g., the Biological Florida Editor for the *Journal of Ecology*; Concept Section, Data Archive, Special Features, and Invited Papers Editors for *Ecology*).

We conducted our analyses using EICs, AEs, and SEs. Throughout our manuscript and analyses we use the term 'Editorial Board' to refer to the group collectively made up of these three categories. Book Review and Special Editors were not included unless they were also EICs, AEs, or SEs because very few journals had these positions and those that did rarely had them for the entire survey period. We also excluded from our analyses production staff (e.g., production editors, managing editors, editorial assistants) and the *American Journal of Botany*'s "Section

Representatives", whose primary function was to suggest reviewers and help identify journal priorities, but did not make editorial decisions on individual manuscripts (Dr. Judith E. Skog, pers. comm., 2014).

RESULTS & DISCUSSION

We found that from 1985-2013 only 16% of editorial board members were women (N = 332 of 2065). The disparity also extends to leadership positions. Since 1985 only 14% of Associate Editors (N = 18 of 125) and 12% (N = 7 of 59) of the Editors-in-Chief of our focal journals were women (Fig.). While there was an general increase in the representation of women on editorial boards over time, for most journals the percentage of women on the board rarely exceeded 20% (Fig. 2).

Nevertheless, there was notable variation among journals in the representation of gender on their editorial boards. Several had consistent increases in the representation of women over time, from no women in the mid-1980's to a 2013 high of ~40% (e.g., *Biotropica, American Journal of Botany, Conservation Biology*). Others, however, consistently had few women on their boards throughout the period surveyed (e.g., *Agronomy Journal, North American Journal of Fisheries Management, Biological Conservation*). A similar pattern of underrepresentation was observed in journal leadership. While most journals had female Associate Editors at some point during the period surveyed, only 5 of the 10 journals we reviewed had ever had a woman as Editor-in-Chief (Fig. 3). Of these, only one – the *North American Journal of Fisheries Management* – had multiple women serve as EICs.

We recognize that determining the pervasiveness of gender bias in board composition requires considering more journals from different subfields of environmental biology. However,

surveys in economics (Addis & Villa 2003; Green 1998), medicine (Galley & Colvin 2013; Keiser, Utzinger & Singer 2003), management (Metz & Harzing 2012), information systems (Cabanac 2012), and anthropology (Stark et al. 1997) have found comparable disparities in the gender composition of editorial boards. Assuming the results for our focal journals are representative of other journals in the field, our observations beg two questions: first, why are women missing from these key positions, and second, what gender composition on editorial boards should journals strive for? While our study was not designed to elucidate the former question, we do propose an answer to the latter. Rather than reflecting the proportion of women active in a particular discipline or academic society – a number we found surprisingly difficult to determine – we argue journals should proactively seek gender parity on editorial boards. This would greatly increase the number of women afforded the opportunities and benefits that accompany editorial board membership, as well as increase the number of female role models and mentors for early-career scientists and students.

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FIGURE LEGENDS

Fig. 1 Proportion of men and women who served as (A) Editors-in-Chief (B) Associate Editors or (C) Subject Editors of our 10 focal journals from 1985-2013.

Fig. 2. Change in the percentage of women on the Editorial Boards we surveyed from 1985-2013. Editorial boards are defined as group composed of Editors-in-Chief, Associate Editors, and Subject Editors.

Fig. 3. Total number of men and women who served as (A) Editors-in-Chief (B) Associate Editors or (C) Subject Editors between 1985-2013 of the 10 focal journals. Note that the American Journal of Botany and North American Journal of Fisheries Management have Associate Editors, but their responsibilities are similar to those of Subject Editors and therefore have been placed in that category.

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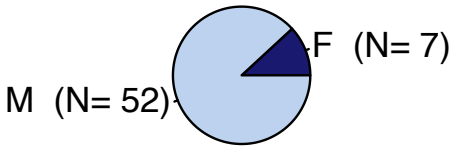
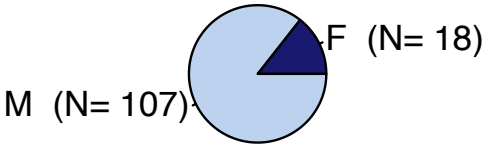
Editors–in–Chief (%)



Associate Editors (%)



Subject Editors (%)