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

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ABSTRACT

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

INTRODUCTION

32
33 Despite women earning similar numbers of graduate degrees as men in Science,
34 Technology, Engineering, and Math (STEM) disciplines (National Science Foundation National
35 Center for Science and Engineering Statistics 2012), they are underrepresented in upper level
36 positions in both academia and industry (National Science Foundation Division of Science
37 Resources Statistics 2004). Several mechanisms have been put forward to explain this disparity,
38 including bias against women in hiring and promotion, inflexible or even hostile work
39 environments, and a lack of role models and mentors (Moss-Racusin et al. 2012). In response,
40 universities and other institutions have implemented strategies to address these issues, including
41 making opportunities for professional advancement more broadly available and actively seeking
42 gender diversity in leadership roles (Fox 2008). While these efforts have some positive results,
43 much remains to be done to ensure women in STEM are afforded the same opportunities as their
44 male counterparts.

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

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

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

62 METHODS

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

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

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

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

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

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RESULTS & DISCUSSION

104 We found that from 1985-2013 only 16% of editorial board members were women (N =
105 332 of 2065). The disparity also extends to leadership positions. Since 1985 only 14% of
106 Associate Editors (N = 18 of 125) and 12% (N = 7 of 59) of the Editors-in-Chief of our focal
107 journals were women (Fig. 1). While there was an general increase in the representation of
108 women on editorial boards over time, for most journals the percentage of women on the board
109 rarely exceeded 20% (Fig. 2).

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

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

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

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138 data used in these analyses are available at the Dryad Digital Repository under accession number
139 ---- ---- (*deposition upon manuscript acceptance*).

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FIGURE LEGENDS

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

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144 **Fig. 2.** Change in the percentage of women on the Editorial Boards we surveyed from 1985-
145 2013. Editorial boards are defined as group composed of Editors-in-Chief, Associate Editors, and
146 Subject Editors.

147

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

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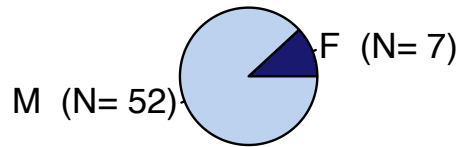
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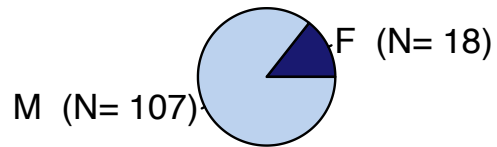
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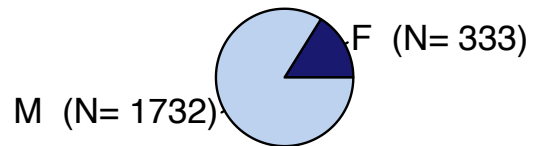
Editors-in-Chief (%)



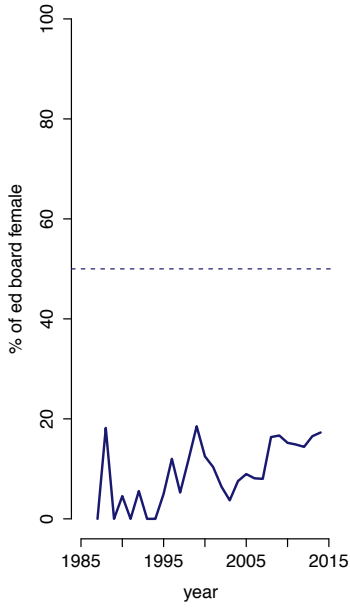
Associate Editors (%)



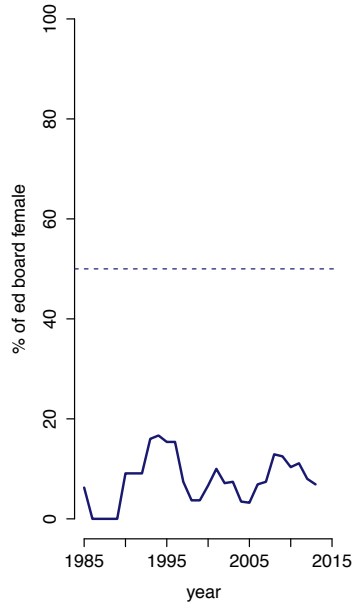
Subject Editors (%)



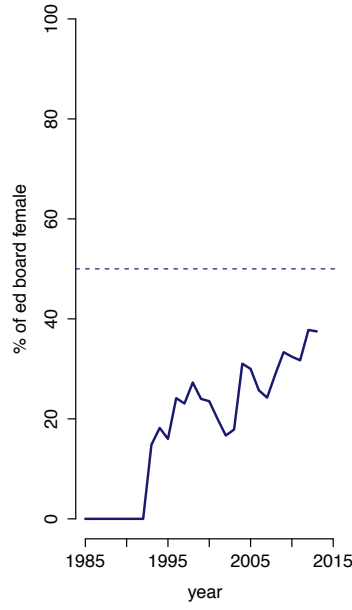
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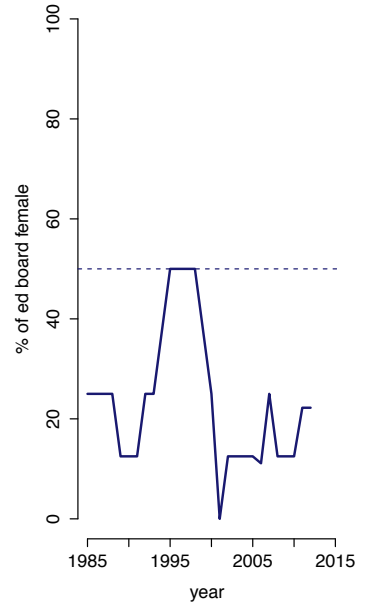
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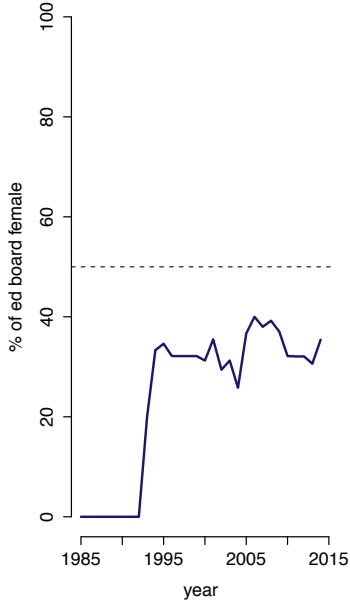
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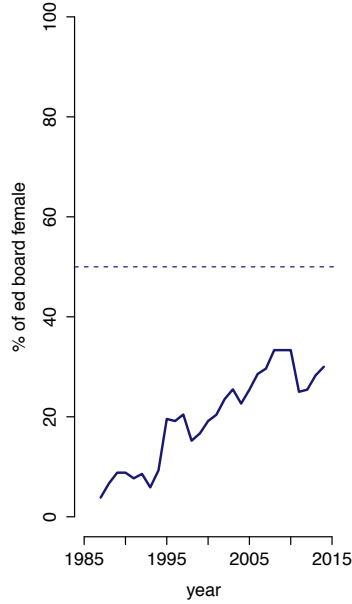
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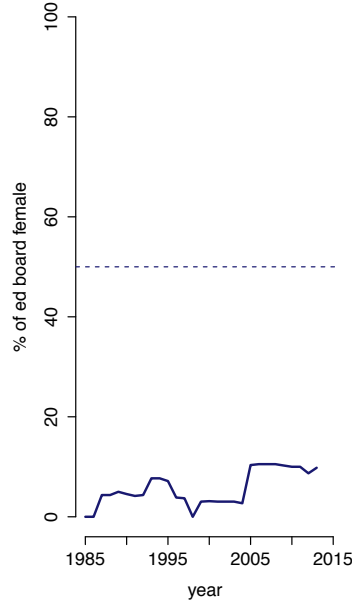
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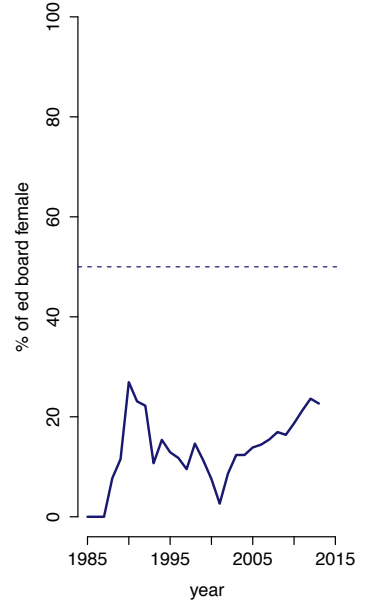
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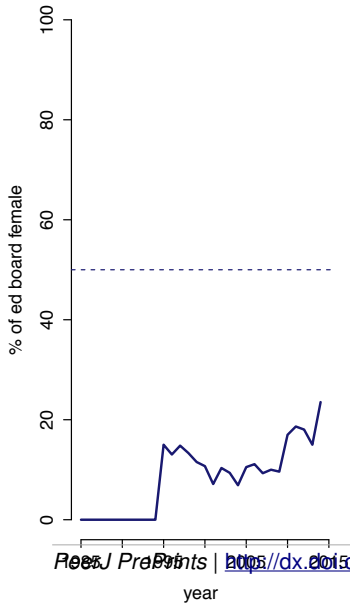
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Ecology



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