



## Original Article

# How Experiential Service-Learning Affects Student Perceptions of Education in Their Careers and as a Wildlife Management Activity

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**ABSTRACT** Wildlife education has long been critiqued for leaving students entering the workforce deficient in skills such as communication, public relations, and problem solving. This challenge may emerge from both curricula and instructional techniques focused on technical expertise rather than soft skills. Researchers have suggested several instructional techniques to address this challenge but have not empirically examined their effectiveness. This study examined how an environmental-education service-learning project affected undergraduate wildlife science students' perceptions of education as a possible career and how important they considered education as a wildlife management activity using a pre-posttreatment comparison between 36 wildlife students at North Carolina State University (Raleigh, NC, USA, during spring 2014) participating in an environmental-education service-learning project and 23 wildlife students from the same cohort who were not. In the pretest, few (10.3%) students from either group saw K–12 education as a future career, but most (98.3%) saw education as an important wildlife management activity. Most (82.0%) students also predicted they would need educator skills in their careers, but more females than males saw this as likely. The treatment was positively related to students' belief they would use teaching skills in future careers and that a career in K–12 education would be fulfilling. These results suggest that service-learning projects may be an effective tool to boost interest in education both as a career and as a wildlife management activity among future wildlife professionals regardless of gender, but that especially high interest among females could provide guidance for training and recruitment efforts attempting to mitigate the gender gap among wildlife professionals. © 2015 The Wildlife Society.

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Nearly 3 decades ago, Cutler (1982) called for greater emphasis on soft skills in wildlife training programs to address the increasingly complex field of wildlife management. Joined by Schaller (1992) and Jacobson and McDuff (1998), authors contended that soft skills such as leadership, communication, stakeholder engagement, and teaching were important because wildlife conservation is driven by people's values and depends in part on a public commitment to conserving biodiversity. Further, they argued that by focusing narrowly on technical training, wildlife programs produce students who may possess technical expertise in

narrow biological disciplines but lack the broad soft skills needed to understand global conservation challenges or effect change to address them (Jacobson and McDuff 1998). Recent research supports these assertions by wildlife professionals by demonstrating that broad experience with soft skills combined with in-depth expertise in at least one focal area creates "T-shaped" professionals who are most successful in a broad array of careers (Heckman and Kautz 2012, McIntosh and André 2013).

In the past 3 decades, the wildlife management community has made significant strides toward integrating soft skills into professional training. Courses targeting soft skills, including human dimensions of wildlife management and urban wildlife management courses, have proliferated within wildlife management and conservation biology programs since 1998 (Decker et al. 2012), and 27 semester-hours of communication, policy, and social science courses are required for certification as a Wildlife Biologist (The

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Wildlife Society 2014). Although employers consistently list soft skills as crucial to wildlife-related job success, research suggests that training programs remain weak in these offerings (Blickley et al. 2013).

Using new instructional techniques integrated in existing classes may help students appreciate the importance of soft skills in wildlife management careers, and be a more pragmatic response to this challenge than continuing to require more and more courses focused on soft skills. Experiential learning is a promising technique to address the need for improved soft skills, because it is characterized by “learning by doing” (Jacobson et al. 2006). The “doing” part separates experiential learning from a lecture format that has traditionally dominated college classrooms, and it includes steps to help students reflect on the experience and its relationship to their objectives, prior knowledge, and social context (Jacobson et al. 2006).

Experiential learning in wildlife conservation training programs has demonstrated some success in boosting appreciation of soft skills, but in-depth evaluations of these efforts are needed. Martinich et al. (2006) outlined 1 example of project-based learning, in which students work in groups to apply newly acquired knowledge to a real-world (actual or simulated) situation. Students restored a severely degraded creek outside of Washington, D.C., USA. They worked in teams to fully define, plan, implement, and evaluate the restoration project, culminating in a presentation to community members. Authors argued that this conservation field experience gave students a sense of “the interdisciplinary, challenging, laborious, and rewarding nature of conservation biology” that could not be replicated in a classroom (Martinich et al. 2006:1582). This example could also be seen as service-learning, in which academic and community needs are integrated (Eyler and Giles 1999). Though these and other forms of experiential learning likely provide excellent training for future wildlife professionals, no studies have empirically measured how these experiences affect student attitudes or perspectives on future wildlife careers. Our study began to address these research needs by empirically examining how an environmental-education service-learning experience in an undergraduate Human Dimensions of Wildlife course affected student perceptions of K–12 science education and of how important education is as a wildlife management activity. We hypothesized that students in the treatment group would display more positive attitudes toward K–12 science education in general and as a career and place more importance on the role of education as a wildlife management activity after the service-learning experience. We also hypothesized female students would report higher support of K–12 science education in general and as a career than males, and that female students would place a higher importance on education as a wildlife management activity.

We considered gender an important variable to evaluate for several reasons. First, a significant gender gap remains in terms of employment within wildlife agencies (Lopez and Brown 2011), and this gap may be alleviated by changing professional cultures that are typically skewed toward a male

perspective, and fail to portray women as legitimate leaders (Angus 1995). Using innovative teaching techniques may help change these perspectives by encouraging students of both genders to see the value of the nontraditional wildlife jobs (e.g., endangered species management, outreach, and education) that Sanborn and Schmidt (1995) found were more likely to be filled by women. Despite the critical role ethnicity plays in environmental education (Stevenson et al. 2013), we did not evaluate the role of ethnicity because there were too few non-white students within the cohort to address the variable.

## METHODS

### Treatment Design

Students in the treatment group were mostly juniors and seniors and participated in a service-learning project as part of a required Human Dimensions of Wildlife course at North Carolina State University (Raleigh, NC, USA) during spring 2014. The control group consisted of juniors and seniors in the same wildlife degree program during the same semester who were enrolled in either a Principals of Wildlife Science course or a Vertebrate Natural History course. The rosters for these classes included 51 students in the Human Dimensions course (juniors and seniors except 1 sophomore and 2 Master’s students), 42 students in the Principals of Wildlife Science course, and 23 students in the Vertebrate Natural History course. Students taking the Human Dimensions course in addition to one of the other courses were excluded ( $n = 15$ ), along with any students who were absent for either the pre- or the posttest ( $n = 32$ ). The resulting sample included 36 students in the treatment group and 23 students in the control group. Most ( $n = 32$ ) were wildlife majors, and the remainder were majoring in a related field (i.e., animal science, biology, environmental science, and zoology). We did not detect differences between the treatment and control group in terms of majors ( $t = 1.588$ ,  $df = 56$ ,  $P = 0.118$ ) because most students were in wildlife-related degree programs. Similarly, we did not detect ethnicity-related differences ( $t = 0.761$ ,  $df = 56$ ,  $P = 0.450$ ) because few non-white students were in either group. The treatment group had a greater proportion of males (61.1%) and younger students (72.2% sophomores and juniors vs. seniors and Master’s students) than the control group (31.8% male and 13.6% juniors vs. seniors;  $t = 4.332$ ,  $df = 56$ ,  $P < 0.001$ ).

The service-learning component involved a partnership with Project WILD, an environmental education program associated with improved environmental literacy among K–12 students (Stevenson et al. 2013), which is typically coordinated by state wildlife management agencies. We hosted a representative from the North Carolina Wildlife Resources Commission to discuss with students the role of education within the agency as well as give an overview of Project WILD. Students were trained in Project WILD curriculum in a 6-hour Saturday workshop in which students practiced several Project WILD activities. Students then contacted an elementary school teacher to coordinate

delivery of at least 1 Project WILD lesson to at least one class of elementary school students. Undergraduates visited classrooms in groups of 2–4, spending a minimum of 1 hour delivering Project WILD curriculum. At the conclusion of the classroom experience, students were required to complete a critical reflection exercise (Ash et al. 2005).

### Instrument Design

We measured student perceptions of education in K–12 contexts with 4 questions: “How likely are you to teach K–12 science in the future? How fulfilling would a career in K–12 science teaching be? How likely are you to vote for raising taxes on yourself to pay for taking K–12 students outdoors to learn about science? How important do you think wildlife should be in K–12 science curricula?” We measured how important students considered education as a wildlife management activity with 2 questions: “How important do you think education is as a wildlife management activity? How likely are you to need educator skills in your future career?” Answer responses were in 5-point scales. Scales measuring likelihood used the following categories: very likely, somewhat likely, neutral, somewhat unlikely, and very unlikely. Scales measuring how fulfilling a career would be used the following categories: very fulfilling, somewhat fulfilling, neutral, somewhat unfulfilling, and very unfulfilling. Scales measuring importance used the following categories: very important, somewhat important, neutral, somewhat unimportant, and very unimportant. We then asked students to “please rank the following wildlife management activities from most important (1) to least important (6).” The activities were law enforcement, education, public relations, wildlife biology research, social science research, and land management. We also included demographic questions asking students’ gender, ethnicity, major, and year in school.

### Survey Implementation

Within the first week of classes, we administered the survey to both groups of undergraduate students. We distributed the instruments during class time in both the Human Dimensions course (treatment group) and the nonoverlapping students in the Principals of Wildlife Science and Vertebrate Natural History courses (control group). Over the course of the semester, the treatment group completed the service-learning project. During the final week of classes, we administered the same survey as a posttest to all students in the same manner as during the pretest.

### Data Analysis

We used summary statistics (e.g., means, frequencies) to measure overall perceptions of K–12 education and the role of education in a wildlife context as measured by the pretest. When presenting the percentage of students who considered an activity likely, important, or fulfilling to those who did not we omitted neutral responses and compared responses falling into the top 2 categories (e.g., very important and somewhat important) to responses falling into the bottom 2 categories (e.g., somewhat unimportant and very unimportant). We used *t*-tests to detect any differences in these measures based on gender or membership in the treatment or control groups.

When running multiple *t*-tests for a given set of questions, we adjusted the alpha levels to account for false discovery rate using the Bonferroni correction (Benjamini and Hochberg 1995). We also compared the rank orders of differing priorities for the wildlife management activities between males and females and the treatment and control groups.

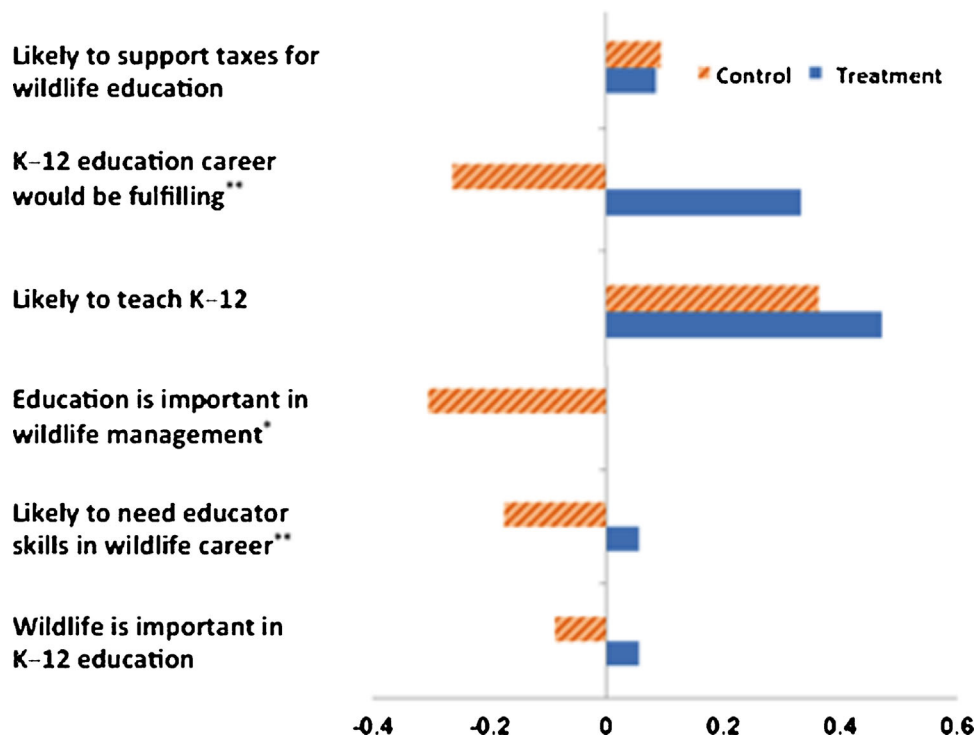
To measure the impact of the service-learning project on perceptions of K–12 education and the importance of education as a wildlife management activity, we used a series of multiple linear regressions. We predicted changes in the Likert-scale questions as a function of treatment group membership, gender, year in school, and pretest score. We included pretest score to control for a potential ceiling effect, in which students who scored high on the pretest had limited ability to further increase their posttest scores. We included year in school to control for differences between the treatment and control groups. We compared changes in average rankings of wildlife management priorities in the same manner.

For all *t*-tests and regression analyses, we used an alpha level of 0.1. Smaller sample sizes are associated with lower statistical power (i.e., reduced probability that a test will detect an effect; Cohen 1992). Common ways to increase power include increasing the sample size or increasing alpha. Because our sample size was small ( $n = 59$ ) and we could not practicably raise it, we chose instead to increase alpha from the commonly used 0.05 to 0.10, and this convention is commonly used in behavioral research (Cohen 1992). All research activities were approved by the North Carolina State University Institutional Review Board (IRB no. 3793).

## RESULTS

In the pretest, few students (10.3%) saw themselves as even somewhat likely to teach K–12 science as a career, but 42.4% saw it as at least a somewhat fulfilling career choice. Most students (67.9%) were at least somewhat likely to vote to raise taxes to pay for outdoor education in K–12 settings. More females than males supported such a tax hike. Average scores among males (3.54/5,  $SD = 0.17$ ) indicated a neutral perspective, whereas average scores among females (4.25/5,  $SD = 0.13$ ) indicated relatively strong support for paying to promote wildlife education in K–12 settings ( $t = -3.26$ ,  $df = 54$ ,  $P = 0.019$ ). Nearly all students saw education as an important wildlife management activity and topic in K–12 science classrooms (98.3% for both measures). A majority (82.0%) also saw themselves as likely to use teaching skills in their future careers, and women were more likely to answer this question affirmatively (M:  $\bar{x} = 3.93$ ,  $SD = 0.19$ ; F:  $\bar{x} = 4.34$ ,  $SD = 0.15$ ;  $t = -1.55$ ,  $df = 56$ ,  $P = 0.051$ ) supporting the hypothesis that females would place a higher importance on education. Students ranked education as the most important wildlife management activity, followed by wildlife biology research, land management, law enforcement, public relations, and social science research.

Students in the treatment group thought K–12 science teaching would be a more fulfilling career than they did at the beginning of the semester, whereas the opposite was true among the control group (Fig. 1). This treatment effect was significant after controlling for gender and grade (Table 1).



**Figure 1.** Changes in average values for student responses to questions about perceptions of education in their careers and importance of education as a wildlife management activity. Students in the treatment group were mostly juniors and seniors and participated in a service-learning project at North Carolina State University (Raleigh, NC, USA) during spring 2014, whereas the control group consisted of juniors and seniors in the same wildlife degree program during the same semester who were enrolled in either a Principals of Wildlife Science course or a Vertebrate Natural History course. Deviation from center represents a change in average responses between posttest and pretest scores. Statistical differences control for gender and year in school, based on regression models in Table 1 (\* $P < 0.1$ , \*\* $P < 0.05$ ).

Students from both the treatment and control group were more likely to vote to raise taxes to support outdoor education in K-12 science classrooms at the end of the semester (Fig. 1), but the effect was larger for females (Table 1). Students from both treatment and control groups saw themselves as more likely to teach K-12 science by the end of the semester (Fig. 1).

Results also supported our hypothesis that the treatment would improve measures of prioritizing education in a wildlife management context, regardless of gender. The treatment group did not change in their views of the importance of education as a wildlife management activity, but the control group thought it was less important (Fig. 1).

The treatment group thought it more likely they would use educator skills in their careers at the end of the semester, and the opposite was true for the control group (Fig. 1). This polarization in views regarding the likely use of educator skills between the treatment and control represented a significant difference (Table 1), and was paralleled by a similar, though not significant, trend in how the groups viewed the importance of wildlife in K-12 education (Fig. 1; Table 1). None of the regression analyses revealed changes associated with treatment group membership or gender in the other measures or average ranks of priorities for wildlife management activities. However, in the posttest, males joined females in ranking education as a top priority among

**Table 1.** Relationships between treatment group, gender, and year in school and changes in student perspectives toward education in their careers and importance as a wildlife management activity among wildlife students at North Carolina State University ( $n = 59$ ; Raleigh, NC, USA) during spring 2014.

Variable	K-12 education career would be fulfilling			Likely to support taxes for wildlife education			Education is important in wildlife management			Likely to need education skills in wildlife career		
	$\beta$	SE	$P$	$\beta$	SE	$P$	$\beta$	SE	$P$	$\beta$	SE	$P$
Treatment	0.651	0.295	0.032	0.128	0.216	0.556	0.392	0.225	0.087	0.464	0.224	0.043
Gender	0.189	0.249	0.450	0.402	0.198	0.047	0.103	0.189	0.590	0.155	0.185	0.407
Year in school <sup>a</sup>	0.148	0.241	0.540	-0.003	0.169	0.987	0.164	0.177	0.358	0.131	0.171	0.447
Pretest score	-0.552	0.098	0.000	-0.567	0.109	0.000	-0.746	0.233	0.002	-0.275	0.098	0.007
Constant	0.752	0.932	0.423	2.024	0.736	0.008	2.642	1.380	0.061	0.280	0.683	0.683
	<i>adjusted R</i> <sup>2</sup> = 0.374			<i>adjusted R</i> <sup>2</sup> = 0.299			<i>adjusted R</i> <sup>2</sup> = 0.156			<i>adjusted R</i> <sup>2</sup> = 0.092		

<sup>a</sup> 1, seniors and Master's students; 0, sophomores and juniors.

wildlife management activities, and the average rank for males in the treatment group increased (pretest:  $\bar{x} = 4.32/5$ ,  $SD = 0.32$ ; posttest:  $\bar{x} = 4.91$ ,  $SD = 0.27$ ;  $t = 1.55$ ,  $df = 21$ ,  $P = 0.058$ ).

## DISCUSSION

Our results suggest that service-learning projects may provide an instructional technique that broadens wildlife students' views of wildlife management and encourages them to prioritize a soft skill (teaching) they will likely need to be successful practitioners. Situated learning theory suggests service-learning can provide a context in which students connect and internalize concepts (Brown et al. 1989, Markus et al. 1993, Wolfson and Willinsky 1998). It is possible that simply requiring students to take courses in communications or the humanities will not translate to more interdisciplinary management styles or appreciation for soft skills until students are trained to directly apply that coursework to wildlife contexts. Indeed students in the control group considered educator skills less important for their future careers as wildlife professionals after one semester, despite being enrolled in a wildlife program that follows the interdisciplinary guidelines for certified wildlife biologists (The Wildlife Society 2014). Research in collegiate settings also suggests service learning builds empathy for collaborators and appreciation for subject matter (Eyler and Giles 1999, King 2004, Sharples et al. 2007, Jameson et al. 2013). Our results reflect these trends seen in other disciplines because students in the treatment group finished the semester more convinced that K–12 education would be fulfilling and that they would use teaching skills in their careers. The troubling changes among control students (e.g., seeing education as far less important as a wildlife management tool, being less likely to consider educator skills valuable for future careers) provides preliminary evidence supporting past claims that traditional wildlife courses may actually reinforce traditionalist, narrowly defined management styles which reflect inadequate soft skills (Cutler 1982, Jacobson and McDuff 1998).

Because changes in perceptions occurred for both genders, service-learning may be effective in diversifying perspectives within a male-dominated field, perhaps laying the groundwork for closing the gender gap within wildlife professions. The low representation of females in wildlife agencies has been at least partially attributed to a male-dominated agency culture (Angus 1995, Nicholson et al. 2008). Our results add to these key distinctions by suggesting females share more positive views of education as a career option, greater support for taxes supporting wildlife education, and higher prioritization of education among wildlife management activities than do males. Because women seem to approach wildlife management in different ways than men, their perspectives may not be as well-received in male-dominated cultures (Sanborn and Schmidt 1995). It is possible that service-learning or other techniques designed to expose students to nontraditional wildlife jobs (e.g., outreach and education; Sanborn and Schmidt 1995) and promote soft skills may serve to broaden the perspectives of all students, but

particularly males, because males in the treatment group increased their ranking of education as an important wildlife management activity. These broadened perspectives would not only answer the call for students who are prepared for a complex and interdisciplinary profession (Rupp 2012, Blickley et al. 2013), but they could increase the likelihood that future agency cultures would be more receptive to the types of perspectives already held by many women.

Beyond broadening the perspectives of future wildlife professionals and cultivating a culture with more diverse perspectives, instructional techniques that highlight soft skills may be an effective way to engage female students and encourage them to pursue wildlife careers. As Nicholson et al. (2008) outlined, many women enter wildlife sciences at the undergraduate level, but the field becomes increasingly male-dominated at the graduate, professional, and leadership levels. Reasons suggested for this trend revolve around implicit gender biases (Dasgupta 2004), including lack of family encouragement and female role models in the profession (Sonnert and Holton 1995, Sax 2001), publication bias against women (Budden et al. 2008), and cultures that fail to provide career development opportunities for women (Angus 1995). Another possibility is that traditional training programs de-emphasize the skills in which women are strongest and fail to provide female students with clear visions of how their skills and perspectives may be best used and valued. Revising training programs so that they emphasize soft skills females prioritize may better prepare students for the changing face of wildlife management as well as include the perspectives of women early enough so that they are encouraged to persist as wildlife professionals.

Our results support the use of service-learning to impact attitudes toward soft skills, but future research should further investigate the potential for service-learning and other experiential education techniques to ensure that training programs make meaningful progress toward interdisciplinarity and diversity. We were able to find several effects with a small sample of students, but similar studies with multiple and larger institutions would allow analyses with more power. Larger sample sizes may not only provide more statistical power for exploring the same relationships addressed in this study, they may allow for exploration of related questions such as the differential impacts of experiential education among minorities. Future research should also address similar questions among wildlife professionals.

After decades of calls and attempts to close the training-practice gap (Cutler 1982, Jacobson and McDuff 1998, Rupp 2012), professionals are still asking for program revisions to meet the needs of a field that has moved far beyond a narrow focus on wildlife management for consumptive use (Rupp 2012). Similarly, despite several efforts to understand and mitigate the low representation of women in wildlife professions, a large gender gap remains, particularly in leadership positions (Angus 1995, Sanborn and Schmidt 1995, Nicholson et al. 2008, Lopez and Brown 2011). Diversity in approaches and perspectives is and will increasingly be invaluable to a profession in which creative

decisions are necessary to meet complex management scenarios with multiple stakeholders (see Vol. 5 No. 2 of *The Wildlife Professional*). Those engaged in delivering or directing wildlife science education programs should still provide interdisciplinary course offerings and requirements in communications, the humanities, and social science, because they give students a broad base for expertise in public relations and human dimensions (Jacobson and McDuff 1998, The Wildlife Society 2014). However, wildlife educators should not rely solely on broad course requirements to ensure their students are prepared for interdisciplinary and complex careers. Integrating experiential education methods such as service learning will provide students with an opportunity to apply their interdisciplinary coursework to a wildlife management context (Millenbah and Millspaugh 2003, Martinich et al. 2006). Further, experiential education methods that emphasize soft skills may help foster and invite more diverse participation and perspectives within the wildlife management profession. Rigorous evaluations of not only what we teach, but how we teach, are critical to preparing students for successful careers in an interdisciplinary, complex, and evolving profession.

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