

Beyond technical expertise: The role of mindset, interpersonal, and intrapersonal skills in the development of fisheries professionals

Jason L. Fischer^{1,*}, Matthew R. Acre², Dana Castle³, Jessica Collier⁴, Steven J. Cooke⁵, Tracy L. Galarowicz⁶, Thomas M. Gehring⁷, Eric D. Huber¹, Jeffrey C. Jolley⁸, Christine M. Mayer⁹, Jorden R. McKenna¹⁰, Anna K. Monfils¹⁰, Daniel M. O’Keefe¹¹, Craig Paukert¹², Joshua S. Perkin¹³, and Kelly F. Robinson¹⁴

¹U.S. Fish and Wildlife Service, Alpena Fish and Wildlife Conservation Office, Detroit River Substation, Gibraltar, Michigan, USA

²U.S. Geological Survey, Columbia Environmental Research Center, Columbia, Missouri, USA

³Michigan Department of Natural Resources, DNR Cadillac Customer Service Center, Cadillac, Michigan, USA

⁴U.S. Fish and Wildlife Service, Green Bay Field Office, Ecological Services, New Franken, Wisconsin, USA

⁵Department of Biology and Institute of Environmental and Interdisciplinary Science, Carleton University, Ottawa, Ontario, Canada

⁶College of Science and Engineering, Central Michigan University, Mount Pleasant, Michigan, USA

⁷Department of Biology and Institute for Great Lakes Research, Central Michigan University, Mt Pleasant, Michigan, USA

⁸Michigan Department of Natural Resources, Bay City, Michigan, USA

⁹Lake Erie Center and Dept of Environmental Sciences, University of Toledo, Oregon, Ohio, USA

¹⁰Department of Biology, Central Michigan University, Mount Pleasant, Michigan, USA

¹¹Michigan Sea Grant, Michigan State University Extension, West Olive, Michigan, USA

¹²U.S. Geological Survey, Missouri Cooperative Fish and Wildlife Research Unit, School of Natural Resources, University of Missouri, Columbia, Missouri, USA

¹³Department of Ecology and Conservation Biology, Texas A&M University, College Station, Texas USA

¹⁴U.S. Geological Survey, Georgia Cooperative Fish and Wildlife Research Unit, Warnell School of Forestry and Natural Resources, University of Georgia, Athens, Georgia, USA

*Corresponding author: Jason L. Fischer. Email: jason_fischer@fws.gov.

Embarking on a career as a fisheries professional is a journey filled with exciting prospects, from mastering cutting-edge molecular techniques to navigating complex issues like climate change and invasive species. New fisheries professionals often enter the profession with technical competencies and subject matter mastery. However, their communication, emotional intelligence, and conflict navigation skills are frequently underdeveloped (Gabelhouse, 2010; McMullin et al., 2016; Murphy et al., 1995; Sundberg et al., 2011), which can contribute to early career frustrations, turbulence, and anxiety. A recent survey by three of the coauthors (T. L. Galarowicz, T. M. Gehring, and A. Monfils) identified full-time positions, temporary positions, internships, and graduate assistantships all required collaboration, communication, and field skills (unpublished data). Therefore, it is essential for students and young professionals to begin early on an intentional lifelong

pursuit of developing these critical inter- and intrapersonal skills.

Inter- and intrapersonal skills are also known as professional, soft, key, core, or simply human skills, though we discourage the use of the word “soft” as that implies skills are potentially of less value (Pita et al., 2015). Here, we use the terms inter- and intrapersonal to categorize the suite of skills that facilitate effective interactions with others and one’s own growth and wellness (Figure 1). However, there are multiple terms and taxonomies used to classify these skills, given they are an area of growing interest (Caeiro-Rodriguez et al., 2021). These types of skills are increasingly recognized as important for growth and professional advancement. In our everyday professional lives, we use inter- and intrapersonal skills regularly and often without much thought. A simple conversation with a supervisor, a planning call with project

Received: January 28, 2026. Accepted: April 21, 2026

© The Author(s) 2026. Published by Oxford University Press on behalf of American Fisheries Society. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial reproduction and distribution of the work, in any medium, provided the original work is not altered or transformed in any way, and that the work is properly cited. For commercial re-use, please contact reprints@oup.com for reprints and translation rights for reprints. All other permissions can be obtained through our RightsLink service via the Permissions link on the article page on our site—for further information please contact journals.permissions@oup.com.

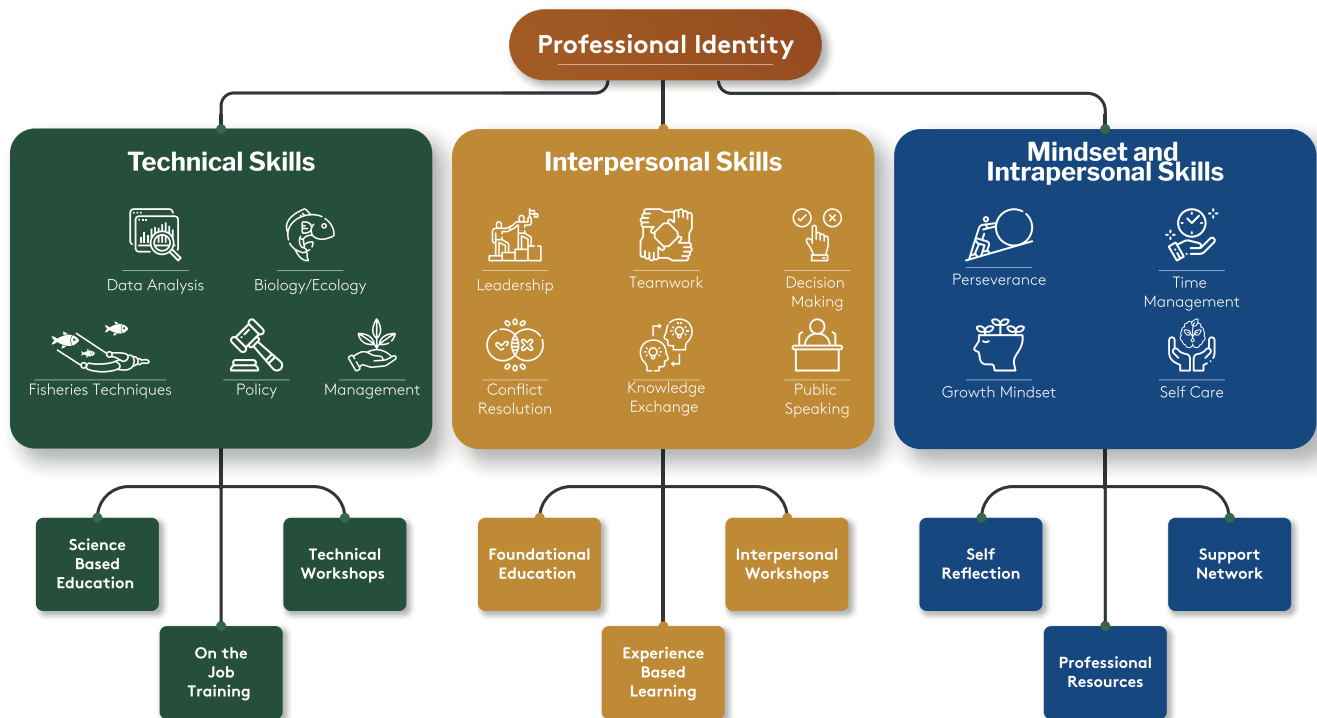


Figure 1 Professional identity is composed of one's technical skills, interpersonal skills, and intrapersonal skills/mindset. Technical skills provide one the expertise to perform a job, but a strong set of inter- and intrapersonal skills, coupled with a positive mindset, allows one to excel in their field. Partial lists of skills in each category (technical, interpersonal, and intrapersonal/mindset), along with attributes of a productive mindset are shown in the boxes. The bubbles below the boxes highlight a few ways (of many) that these skills are built and honed. Although we use the above terminology and classifications, the area of inter- and intrapersonal skills is of growing interest and there are multiple taxonomies used to classify and describe these skills.

partners, and even interactions at the boat ramp require some degree of interpersonal skills and are often enhanced by refining our own interpersonal skill sets.

Throughout our careers we face tasks, such as leading complex research projects, maintaining productive partnerships, and communicating technical results to broad audiences, which push our inter- and intrapersonal skill sets. It is, therefore, advantageous to learn and develop these skills throughout one's career. Although the skill sets we discuss here are familiar to many, they are infrequently the subject of formal discussion and curricula (Gale et al., 2022; Wei et al., 2020). Drawing on our experiences as educators and mentors, we provide a compendium of resources describing emerging needs and how these skills play into development of early-career professionals, with the objective of emphasizing these concepts to help formalize their discussion in the fisheries profession.

The role of mindset and inter- and intrapersonal skills in a fisheries career

Making good decisions

Early-career professionals are commonly faced with important personal and professional decisions that are often complex. They incorporate different perspectives and objectives; personal objectives may include spending time with family, advancing one's career, or conducting research, whereas

professional or project-based objectives may include stakeholder concerns, agency mandates, or resource conservation. Regardless of the personal or professional nature, decisions likely require making trade-offs. In addition, the best action often is not readily apparent and there is uncertainty that could hinder the decision (Keeney, 2004).

Decision science provides a framework for carefully and fully evaluating important decisions for conservation, management, and life (Gregory et al., 2012; Hammond, 2002; Hemming et al., 2022). Structured decision making (SDM) is one such framework that provides a value-focused process (Keeney, 1992) comprised of several iterative steps, known as the "ProACT" framework. The ProACT steps aid the decision maker by identifying the [Pr]oblem, defining the [O]bjectives that should be achieved through the decision, creating a set of [A]lternatives, or actions, that could be implemented to achieve the objectives, projecting the [C]onsequences of each action in terms of its ability to achieve the objectives, and making [T]radeoffs among the objectives (Hammond, 2002; Keeney, 1992). The SDM process begins with objectives (i.e., "what do we want to achieve") that drive the rest of the analysis, in contrast to intuitive decision making, which jumps straight to the actions (Keeney, 1992). Structured decision making for fisheries decisions is a transparent process that includes a strong facilitation component to fully evaluate objectives, social values, and ecological understanding (Robinson et al., 2019). The SDM process provides solutions

that are robust to uncertainty (Conroy & Peterson, 2013) and can incorporate the objectives and concerns of multiple stakeholders and rightsholders to build trust among all parties (Robinson, DuFour, et al., 2023).

Decision making is ubiquitous in natural resources and decisions must often be made with imperfect data and uncertainties. Thus, agency administrators often expect biologists to become proficient decision makers (Murphy et al., 1995). Developing strong decision-making skills throughout a fisheries career is beneficial for career trajectory, making important life choices, and for creating cohesive teams to address complex interdisciplinary problems inherent in our profession.

Embracing interdisciplinarity

Fisheries issues are often complex and multifaceted, such that one area of expertise is insufficient to fully understand or address a given issue. As such, fisheries professionals need to be able to integrate different knowledge bases and interact with professionals who possess a wide range of expertise (e.g., economics, law, biology, and sociology). As an early-career professional, one can develop interdisciplinary thinking by reading, working, and collaborating across disciplinary (sic. Institutional) boundaries (Kelly et al., 2019). Attending seminars hosted by other disciplines (e.g., a different academic unit on campus) and reaching out across disciplinary boundaries to find common interests are obvious starting points. However, being embedded in a project where one can collaborate with individuals from different disciplines is even more impactful. Embracing an interdisciplinary approach is not easy and will require time and resources (Cooke et al., 2020). Taking the time to embrace interdisciplinary thinking and collaboration while a trainee will pay dividends later when one encounters complex problems as a fisheries professional and is then well-positioned to build the team needed to achieve success.

Knowledge transfer

Communicating with diverse audiences is inherent within interdisciplinary teams, but the skills required to transfer and exchange knowledge within teams also apply to the broader scientific and nonscientific community. A common form of science transfer students and early-career professionals face is presentations to scientific and nonscientific audiences (Stuart, 2013). Delivering a presentation is not a singular skill; instead, it requires integration of multiple skills that are refined with each presentation “performance” (Curran-Everett, 2019). Presenting research ultimately improves both comfort with the material and confidence in the message being disseminated (Cameron et al., 2013); therefore, presentations are a core method for developing the skills necessary for success in fisheries science.

Scientific presentations require honing skills in communication, critical thinking, and self-confidence. In many cases, the delivery and aesthetics of a presentation are valued as much as the content (e.g., Waljee et al., 2012). This means rehearsal is critical, although too much of a good thing can be detrimental (Coughter, 2012). The intermediate rehearsal hypothesis posits that continued practice will improve

presentation delivery to an optimum level, after which delivery performance might degrade because of excessive memorization and a subconscious desire to repeat material exactly as it was rehearsed. Checkpoints used to gauge whether a presentation rehearsal is optimal might include the use of organic transitions between points (slides in an oral presentation; sections of a poster presentation), the presenter knows the next slide or section before they see it, and opportunity for minor impromptu thought persists.

Presentations to scientific and nonscientific audiences share many of the same foundational components. However, presentations to nonscientific audiences generally include fewer details on the intricacies of a study and place greater emphasis on key take-home messages to reach a broader audience, which typically has a more diverse set of backgrounds than those at scientific conferences. Steps for presenting a technical topic to a lay audience include advanced preparation, informative exercises, entertaining stories, simple drawings, examples picked to fit the audience, and adapting style depending on audience reaction (note many of these steps also apply to scientific audiences; Cox, 1980). Eliminating, or at least explaining, jargon will also facilitate communication (Stuart, 2013) and build rapport with nonscientists (and scientists too). Becoming a good presenter does not occur by simply knowing what goes into an effective presentation, it requires practice and multiple performances to find one’s presentation style (Stuart, 2013); thus, each presentation provides an opportunity for growth and improvement.

Viewing failure from the growth perspective

Fisheries, like all sciences, is steeped with challenges that test one’s technical skills, interpersonal skills, and, at times, our emotional resilience. Challenges help one grow and advance, but they also come with the potential for failure to reach one’s goals as originally planned. The prospect of failure is daunting, which can discourage individuals from seeking growth opportunities provided by challenges (Eskreis-Winkler & Fishbach, 2022; Noskeu et al., 2021). However, when challenges and failure are approached with the correct mindset, learning and growth are often greater through failures than through successes (Anderson et al., 2018; Eskreis-Winkler & Fishbach, 2019, 2022). Thus, individuals who perceive failures as a step in the learning process may experience fewer setbacks and more growth in the face of failure (Dweck & Leggett, 1988; Noskeu et al., 2021; Yeager et al., 2019).

However, learning from setbacks is hard. Failure and feedback of failure threaten the ego, causing individuals to disengage, inhibiting the ability to learn (Eskreis-Winkler & Fishbach, 2019). When challenges are approached with a growth mindset, it is easier to remove one’s ego, allowing failure to be viewed less as a measure of self-worth and more as part of the journey towards reaching a goal. Whereas a fixed mindset assumes one’s talents are static and that challenges are a test of one’s worth, instead of an opportunity to grow. Seeking environments that prioritize growth reduces the stigma of failure, improving one’s ability to overcome initial setbacks and develop or maintain a growth mindset (Anderson et al., 2018; Yeager et al., 2019, 2022). Therefore,

as we move through our professional and personal lives, it is advantageous to maintain a growth mindset, to view challenges from a growth perspective instead of as a test of worth, and to seek and build environments that foster growth.

A productive work culture for conflict prevention and resolution

Seeking the proper work and learning environment is an important step to reducing conflict. Minimizing conflict is especially important for students because graduate school is a critical, but stressful, career step. Graduate students report anxiety and depression six times more frequently than the general population (Evans et al., 2018), but positive mentoring correlates with better mental health (Charles et al., 2022). Therefore, it is worth the time and effort for prospective students (and employees) to learn about the culture of the research lab that they are considering, and how they will interact with a prospective advisor (or supervisor).

After accepting a position, be clear with your advisor or supervisor about your goals. Communicate regularly about intermediate steps you need to meet these goals. Graduate students and early-career professionals regularly pass through phases of confidence and increasing knowledge (Wagner, Boyd, et al., 2017); these ebbs and flows do not indicate failure and should not cause conflict. Practice continuing cycles of communication with your advisor or supervisor (Wagner, Temple, et al., 2017) and, if needed, ask for input at regular intervals. Building a network of mentors is also beneficial (National Academies of Sciences, Engineering, and Medicine Academies of Sciences, 2018), superiors should not discourage you from getting help from other faculty or professionals. These mentors could be the academic committee, another faculty or staff member, or an agency/nongovernmental organization biologist.

Even in the best environments, conflict is inevitable. When conflict does arise, it is important to recognize and address it early. Communication is key to resolving conflicts and many conflicts arise from miscommunication (Deutsch et al., 2006; Ross & Ward, 1996). Thus, clarifying expectations or the intent of what was miscommunicated can help resolve many conflicts (Ross & Ward, 1996). For conflicts that cannot be resolved by clarifying previous communication, additional dialog is needed. For personal matters, several approaches exist that one could take depending on the situation, including looking for win-win solutions, reframing a problem to be solved cooperatively, distinguishing between wants and needs, and taking time to actively listen and consider an issue from others' positions (Deutsch et al., 2006; Ross & Ward, 1996). For larger issues, such as navigating conflicting stakeholder goals for multiuse resources (e.g., recreational vs. commercial fisheries or balancing wetland management for fisheries and waterfowl) or coordinating management actions across multiple jurisdictions, additional steps are needed. Outside facilitators and frameworks, such as SDM, provide a means to identify values, explore trade-offs of different actions, and reach consensus (Dedual et al., 2013; Robinson, Baker, et al., 2023; Robinson, DuFour, et al., 2023). Lastly, many agencies and universities have dedicated resources to help individuals navigate conflicts. It is important to be familiar with these resources and to take advantage of them when needed.

How to improve one's inter- and intrapersonal skills

There are numerous opportunities to exercise inter- and intrapersonal skill sets through leadership training or personality exploration (Myers-Briggs, Enneagram, etc.). These trainings cover a wide variety of topics and can lead to some form of self-assessment and discovery (Tilley et al., 2014; Tripon, 2023). Training is commonly available through employers and professional conferences, which offer classes and programs focusing on leadership (e.g., AFS Emerging Leaders, Leadership at All Levels, Great Lakes Leadership Academy, and university extension programs). The American Fisheries Society and other organizations offer several scholarships or travel awards to attend if funding is a limitation or not provided by an employer. Seeking superior mentorship can also be crucial to aid in one's learning (Hund et al., 2018). Effective supervisors or mentors help employees become more self-aware by noticing budding skill sets or those that need work and effectively communicating that information and encouraging relevant training. One may have many different mentors for different aspects of their field or career step (Cooke & O'Connor, 2014). Employees with multiple informal mentors can find their work more challenging and fulfilling than those without mentoring (Cervený et al., 2023). If a direct supervisor is not an effective mentor, there are other opportunities to find effective mentorship throughout the field, such as (1) connecting with fisheries or STEM groups that can help forge relationships, (2) attending conferences and networking events, and (3) staying in touch with former effective mentors in past positions.

Lastly, the career trajectory of each person is unique and comparing one's current status or place along that trajectory could be detrimental to development. This most often materializes as "imposter syndrome," the internal thoughts of intellectual phoniness and the inability to recognize one's own success as equal to that of others (Bernard et al., 2002; Hutchins et al., 2018; Whitman & Shanine, 2012). Imposter syndrome does not go away as you climb the career ladder. It's a challenge many face throughout their careers. While we don't have specific advice to professionals on how to avoid this trap, understanding your strengths and weaknesses is a critical first step to improve self-esteem and confidence in your career. Enhancing inter- and intrapersonal skills, as well as technical skills, is a journey that rarely has an obvious trajectory, and the fisheries profession is no different. Work towards your strengths and find others to help with your weaknesses (Paukert, 2020). And remember, developing these skills is a lifelong process, akin to exercising muscles, your inter- and intrapersonal skills need regular exercise to stay strong.

Conclusion

Fisheries and natural resources fields are increasingly interdisciplinary, requiring the ability to communicate effectively across disciplinary boundaries, integrate data sets and expertise, and embrace inter- and intrapersonal skill sets. We have provided several examples of inter- and intrapersonal skills that we have found valuable throughout the coauthors' and

others' careers. Our examples are not an exhaustive list of what one may find useful to becoming a proficient natural resource professional but are intended to provide starting points for one to explore as they embark on their career. Simply knowing about these skill sets is not enough, as they require practice through worked examples and real-world experience to develop (Caeiro-Rodriguez et al., 2021; Gale et al., 2022; Wei et al., 2020). A critical element to honing these nontechnical skill sets is learning by doing; thus, seeking opportunities that challenge one's abilities are good ways to build these skill sets. Honing these skills can be a daunting task because they require us to work outside our formal training and our comfort zone. Seeking positive mentors and a growth environment can help ease the development process (Cervený et al., 2023; Hund et al., 2018; Yeager et al., 2019, 2022) and help one navigate the inevitable setbacks that are an unfortunate, but necessary part of the growth process (Anderson et al., 2018; Eskreis-Winkler & Fishbach, 2019, 2022). Given the broad scope of personal skills, strengthening personal skills is worth the effort; the growth they bring in our professional lives is likely to transcend into personal lives, increasing the joy and fulfillment we get at work and home.

Data availability

No data was produced or used for development of this manuscript.

Ethics statement

All ethical guidelines of the authors' organizations and country were followed when conducting this work.

Funding

This manuscript was developed with the support of the authors' agencies and institutions.

Conflicts of interest

Steven Cooke holds the position of Editor-in-Chief for *Fisheries* and did not participate in the review of this article.

Acknowledgments

We would like to thank the participants of the "Soft Skills that Enhance the Success of Early Career Professionals" session at the 2023 AFS Annual Meeting in Grand Rapids, Michigan, and the student events planning committee for generating the discussions leading to this manuscript. We also thank Rob Hunter, Michala Burke, and two anonymous reviewers for critiques of earlier drafts of this manuscript. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the U.S. Fish and Wildlife Service—pursuant to the U.S. Fish and Wildlife Service Manual Part 117, Chapter 1: "Policy Review Guidance for Scientific

Publications." The Georgia Cooperative Fish and Wildlife Research Unit is sponsored jointly by the U.S. Geological Survey, the Georgia Department of Natural Resources, the U.S. Fish and Wildlife Service, the University of Georgia, and the Wildlife Management Institute. The Missouri Cooperative Fish and Wildlife Research Unit is jointly sponsored by the Missouri Department of Conservation, the University of Missouri, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, and the Wildlife Management Institute.

References

- Anderson, C. G., Dalsen, J., Kumar, V., Berland, M., & Steinkuehler, C. (2018). Failing up: How failure in a game environment promotes learning through discourse. *Thinking Skills and Creativity*, 30, 135–144. <https://doi.org/10.1016/j.tsc.2018.03.002>
- Bernard, N. S., Dollinger, S. J., & Ramaniah, N. V. (2002). Applying the big five personality factors to the impostor phenomenon. *Journal of Personality Assessment*, 78, 321–333. https://doi.org/10.1207/S15327752JPA7802_07
- Caeiro-Rodriguez, M., Manso-Vazquez, M., Mikic-Fonte, F. A., Llamas-Nistal, M., Fernandez-Iglesias, M. J., Tsalapatas, H., Heidmann, O., De Carvalho, C. V., Jesmin, T., Terasmaa, J., & Sorensen, L. T. (2021). Teaching soft skills in engineering education: An European perspective. *IEEE Access*, 9, 29222–29242. <https://doi.org/10.1109/ACCESS.2021.3059516>
- Cameron, C., Collie, C. L., Baldwin, C. D., Bartholomew, L. K., Palmer, J. L., Greer, M., & Chang, S. (2013). The development of scientific communication skills: A qualitative study of the perceptions of trainees and their mentors. *Academic Medicine: Journal of the Association of American Medical Colleges*, 88, 1499–1506. <https://doi.org/10.1097/ACM.0b013e3182a34f36>
- Cervený, L., Baral, N., Penaluna, B., Roper, B., Shively, D., & Witt, S. (2023). Mentoring in the USDA Forest Service: A survey of aquatic professionals. *Journal of Forestry*, 121, 168–181. <https://doi.org/10.1093/jofore/fvac043>
- Charles, S. T., Karnaze, M. M., & Leslie, F. M. (2022). Positive factors related to graduate student mental health. *Journal of American College Health: J of ACH*, 70, 1858–1866. <https://doi.org/10.1080/07448481.2020.1841207>
- Conroy, M. J., & Peterson, J. T. (2013). *Decision making in natural resource management: A structured, adaptive approach*. Wiley.
- Cooke, S. J., Nguyen, V. M., Anastakis, D., Scott, S. D., Turetsky, M. R., Amirfazli, A., Hearn, A., Milton, C. E., Loewen, L., Smith, E. E., Norris, D. R., Lavoie, K. L., Aiken, A., Ansari, D., Antle, A. N., Babel, M., Bailey, J., Bernstein, D. M., Birnbaum, R., ... Woolford, A. (2020). Diverse perspectives on interdisciplinarity from Members of the College of the Royal Society of Canada. *FACETS*, 5, 138–165. <https://doi.org/10.1139/facets-2019-0044>
- Cooke, S. J., & O'Connor, C. M. (2014). Mentors matter: Strategies for selecting the right mentor. In W. W. Taylor, A. J. Lynch, & N. J. Léonard (Eds.), *Future of fisheries: Perspectives for the next generation of professionals* (pp. 15–21). American Fisheries Society.

- Coughter, P. (2012). *The art of the pitch: Persuasion and presentation skills that win business*. Palgrave Macmillan. <https://doi.org/10.1007/978-1-137-51233-8>
- Cox, J. L. (1980). Technical topic, lay audience: How to make a good presentation. *IEEE Transactions on Professional Communication*, PC-23, 26–28. <https://doi.org/10.1109/TPC.1980.6501786>
- Curran-Everett, D. (2019). Every presentation is a performance. *Advances in Physiology Education*, 43, 519–521. <https://doi.org/10.1152/advan.00118.2019>
- Dedual, M., Sague Pla, O., Arlinghaus, R., Clarke, A., Ferter, K., Geertz Hansen, P., Gerdeaux, D., Hames, F., Kennelly, S. J., Kleiven, A. R., Meraner, A., & Ueberschär, B. (2013). Communication between scientists, fishery managers and recreational fishers: Lessons learned from a comparative analysis of international case studies. *Fisheries Management and Ecology*, 20, 234–246. <https://doi.org/10.1111/fme.12001>
- Deutsch, M., Coleman, P. T., & Marcus, E. C. (Eds.). (2006). *The handbook of conflict resolution: Theory and practice* (2nd ed., pp. xiv–940). Wiley Publishing.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review*, 95, 256–273. <https://doi.org/10.1037/0033-295X.95.2.256>
- Eskreis-Winkler, L., & Fishbach, A. (2019). Not learning from failure—The greatest failure of all. *Psychological Science*, 30, 1733–1744. <https://doi.org/10.1177/0956797619881133>
- Eskreis-Winkler, L., & Fishbach, A. (2022). You think failure is hard? So is learning from it. *Perspectives on Psychological Science*, 17, 1511–1524. <https://doi.org/10.1177/17456916211059817>
- Evans, T. M., Bira, L., Gastelum, J. B., Weiss, L. T., & Vanderford, N. L. (2018). Evidence for a mental health crisis in graduate education. *Nature Biotechnology*, 36, 282–284. <https://doi.org/10.1038/nbt.4089>
- Gabelhouse, D. W. (2010). Needs and proficiencies of fisheries hires by state agencies. *Fisheries*, 35, 445–448. <https://doi.org/10.1577/1548-8446-35.9.445>
- Gale, A. P., Chapman, J. O., White, D. E., Ahluwalia, P., Williamson, A. K. J., Peacock, K. R., Akagbosu, R., Lepine, T. M., Arizor, I., Bone, L. A., Brown, J., Fahrngruber, A. M., Goldberg-Flood, A., Kovirineni, S., Lamb-Laurin, S. J., Zia, N., Innocent, S., Lee, W., Moran, G., ... Cooke, S. J. (2022). On embracing the concept of becoming environmental problem solvers: The trainee perspective on key elements of success, essential skills, and mindset. *Environmental Reviews*, 30, 1–9. <https://doi.org/10.1139/er-2021-0040>
- Gregory, R., Failing, L., Harstone, M., Long, G., McDaniels, T., & Ohlson, D. (2012). *Structured decision making: A practical guide to environmental management choices*. Wiley-Blackwell.
- Hammond, J. S. (1937-(2002)). *Smart choices: A practical guide to making better life decisions*. Broadway Books. <https://search.library.wisc.edu/catalog/999975008202121>
- Hemming, V., Camaclang, A. E., Adams, M. S., Burgman, M., Carbeck, K., Carwardine, J., Chadès, I., Chalifour, L., Converse, S. J., Davidson, L. N. K., Garrard, G. E., Finn, R., Fleri, J. R., Huard, J., Mayfield, H. J., Madden, E. M., Naujokaitis-Lewis, I., Possingham, H. P., Rumpff, L., ... Martin, T. G. (2022). An introduction to decision science for conservation. *Conservation Biology*, 36, Article e13868. <https://doi.org/10.1111/cobi.13868>
- Hund, A. K., Churchill, A. C., Faist, A. M., Havrilla, C. A., Love Stowell, S. M., McCreery, H. F., Ng, J., Pinzone, C. A., & Scordato, E. S. C. (2018). Transforming mentorship in STEM by training scientists to be better leaders. *Ecology and Evolution*, 8, 9962–9974. <https://doi.org/10.1002/ece3.4527>
- Hutchins, H. M., Penney, L. M., & Sublett, L. W. (2018). What imposters risk at work: Exploring imposter phenomenon, stress coping, and job outcomes. *Human Resource Development Quarterly*, 29, 31–48. <https://doi.org/10.1002/hrdq.21304>
- Keeney, R. L. (1992). *Value-focused thinking*. Harvard University Press. <https://doi.org/10.2307/j.ctv322v4g7>
- Keeney, R. L. (2004). Making better decision makers. *Decision Analysis*, 1, 193–204. <https://doi.org/10.1287/deca.1040.0009>
- Kelly, R., Mackay, M., Nash, K. L., Cvitanovic, C., Allison, E. H., Armitage, D., Bonn, A., Cooke, S. J., Frusher, S., Fulton, E. A., Halpern, B. S., Lopes, P. F. M., Milner-Gulland, E. J., Peck, M. A., Pecl, G. T., Stephenson, R. L., & Werner, F. (2019). Ten tips for developing interdisciplinary socio-ecological researchers. *Socio-Ecological Practice Research*, 1, 149–161. <https://doi.org/10.1007/s42532-019-00018-2>
- McMullin, S. L., DiCenzo, V., Essig, R., Bonds, C., DeBruyne, R. L., Kaemingk, M. A., Mather, M. E., Myrick, C., Phelps, Q. E., Sutton, T. M., & Triplett, J. R. (2016). Are we preparing the next generation of fisheries professionals to succeed in their careers?: A survey of AFS members. *Fisheries*, 41, 436–449. <https://doi.org/10.1080/03632415.2016.1199218>
- Murphy, W. F., Cross, G. H., & Helfrich, L. A. (1995). Lifelong learning for agency fisheries professionals: What are the continuing education needs? *Fisheries*, 20(7), 10–16. [https://doi.org/10.1577/1548-8446\(1995\)020<0010:LLFAFP>2.0.CO;2](https://doi.org/10.1577/1548-8446(1995)020<0010:LLFAFP>2.0.CO;2)
- National Academies of Sciences, Engineering, and Medicine Academies of Sciences. (2018). *Graduate STEM Education for the 21st Century*. The National Academies Press. <https://doi.org/10.17226/25038>
- Noskeau, R., Santos, A., & Wang, W. (2021). Connecting the dots between mindset and impostor phenomenon, via fear of failure and goal orientation, in working adults. *Frontiers in Psychology*, 12, Article 588438. <https://doi.org/10.3389/fpsyg.2021.588438>
- Paukert, C. P. (2020). Don't worry, be happy: Learning to let go. In *Lessons in leadership: Integrating courage, vision, and innovation for the future of sustainable fisheries* (pp. 147–152). American Fisheries Society.
- Pita, C., Eleftheriou, M., Fernández-Borrás, J., Gonçalves, S., Mente, E., Santos, M. B., Seixas, S., & Pierce, G. J. (2015). Generic skills needs for graduate employment in the aquaculture, fisheries and related sectors in Europe. *Aquaculture International*, 23, 767–786. <https://doi.org/10.1007/s10499-014-9843-x>
- Robinson, K. F., Baker, E., Ewing, E., Hemming, V., Kenney, M. A., & Runge, M. C. (2023). Decision analysis to advance

- environmental sustainability. *Decision Analysis*, 20, 243–251. <https://doi.org/10.1287/deca.2023.intro.v20.n4>
- Robinson, K. F., DuFour, M. R., Fischer, J. L., Herbst, S. J., Jones, M. L., Nathan, L. R., & Newcomb, T. J. (2023). Lessons learned in applying decision analysis to natural resource management for high-stakes issues surrounded by uncertainty. *Decision Analysis*, 20, 326–342. <https://doi.org/10.1287/deca.2023.0015>
- Robinson, K. F., Fuller, A. K., Stedman, R. C., Siemer, W. F., & Decker, D. J. (2019). Integration of social and ecological sciences for natural resource decision making: Challenges and opportunities. *Environmental Management*, 63, 565–573. <https://doi.org/10.1007/s00267-019-01141-2>
- Ross, L., & Ward, A. (1996). Naive realism in everyday life: Implications for social conflict and misunderstanding. In E. S. Reed, E. Albright, & T. Brown (Eds.), *Values and knowledge* (pp. 103–135). Lawrence Erlbaum Associates.
- Stuart, A. E. (2013). Engaging the audience: Developing presentation skills in science students. *Journal of Undergraduate Neuroscience Education*, 12, A4–A10.
- Sundberg, M. D., DeAngelis, P., Havens, K., Holsinger, K., Kennedy, K., Kramer, A. T., Muir, R., Olwell, P., Schierenbeck, K., Stritch, L., & Zorn-Arnold, B. (2011). Perceptions of strengths and deficiencies: Disconnects between graduate students and prospective employers. *BioScience*, 61, 133–138. <https://doi.org/10.1525/bio.2011.61.2.8>
- Tilley, E., Peters, J., & Mitchell, J. E. (2014). *Teaching self-awareness, diversity and reflection to support an integrated engineering curriculum augmented with problem and scenario-based learning*. SEFI 2014: Educating Engineers for Global Competitiveness: 42nd European Society for Engineering Education Annual Conference, September 15–19, 2014, Birmingham, UK. https://discovery.ucl.ac.uk/id/eprint/1455284/1/Mitchell_teaching_self_awareness_diversity_and_reflection.pdf
- Tripon, C. (2023). Navigating the STEM jungle of professionals: Unlocking critical competencies through emotional intelligence. *Journal of Educational Sciences & Psychology*, 13, 34–47. <https://doi.org/10.51865/JESP.2023.1.05>
- Wagner, H. H., Boyd, C., & Napper, R. (2017). How to share the process of graduate advising. *FACETS*, 1, 263–279. <https://doi.org/10.1139/facets-2015-0013>
- Wagner, H. H., Temple, S., Dankert, I., & Napper, R. (2017). How to communicate effectively in graduate advising. *FACETS*, 1, 280–299. <https://doi.org/10.1139/facets-2015-0014>
- Waljee, J. F., Larson, B. P., Chang, K. W.-C., Ono, S., Holland, A. L., Haase, S. C., & Chung, K. C. (2012). Developing the art of scientific presentation. *The Journal of Hand Surgery*, 37, 2580–2588.e2. <https://doi.org/10.1016/j.jhsa.2012.09.018>
- Wei, C. A., Deaton, M. L., Shume, T. J., Berardo, R., & Burnside, W. R. (2020). A framework for teaching socio-environmental problem-solving. *Journal of Environmental Studies and Sciences*, 10, 467–477. <https://doi.org/10.1007/s13412-020-00603-y>
- Whitman, M. V., & Shanine, K. K. (2012). Revisiting the impostor phenomenon: How individuals cope with feelings of being in over their heads. In P. L. Perrewé, J. R. B. Halbesleben, & C. C. Rosen (Eds.), *The role of the economic crisis on occupational stress and well being* (Vol. 10, pp. 177–212). Emerald Group Publishing. [https://doi.org/10.1108/S1479-3555\(2012\)0000010009](https://doi.org/10.1108/S1479-3555(2012)0000010009)
- Yeager, D. S., Carroll, J. M., Buontempo, J., Cimpian, A., Woody, S., Crosnoe, R., Muller, C., Murray, J., Mhatre, P., Kersting, N., Hulleman, C., Kudym, M., Murphy, M., Duckworth, A. L., Walton, G. M., & Dweck, C. S. (2022). Teacher mindsets help explain where a growth-mindset intervention does and doesn't work. *Psychological Science*, 33, 18–32. <https://doi.org/10.1177/09567976211028984>
- Yeager, D. S., Hanselman, P., Walton, G. M., Murray, J. S., Crosnoe, R., Muller, C., Tipton, E., Schneider, B., Hulleman, C. S., Hinojosa, C. P., Paunesku, D., Romero, C., Flint, K., Roberts, A., Trott, J., Iachan, R., Buontempo, J., Yang, S. M., Carvalho, C. M., ... Dweck, C. S. (2019). A national experiment reveals where a growth mindset improves achievement. *Nature*, 573, 364–369. <https://doi.org/10.1038/s41586-019-1466-y>

AFS Book Subscription Program

The American Fisheries Society is pleased to offer access to the PDF version of almost 100 book titles through a new institutional subscription plan. Program highlights:

- Unlimited access to all current AFS titles in PDF format, as well as all future books released during the five-year subscription period (5–10 new titles are published yearly)
- Agency staff may read, download, or print any PDF book with no restrictions on access or download
- Subscription is payable in annual installments or in one payment
- Subscription cost is based on the number of fisheries-related staff

For more information and pricing, scan the QR code or visit <https://bit.ly/4hoNvJi>.

