In the absence of sea otters, burgeoning sea urchin populations threaten to decimate kelp forests and the diverse underwater ecosystems they support.

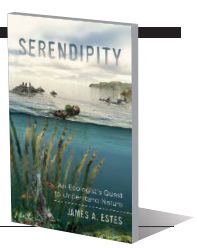
AUTOBIOGRAPHY

Navigating the cascades of circumstance

An ecologist reflects on the unexpected twists and turns that shaped his scientific career

By **Elizabeth Forbes, Ana Miller ter Kuile, Devyn Orr, Georgia Titcomb**

Serendipity
An Ecologist's Quest to Understand Nature
James A. Estes
University of California Press, 2016. 291 pp.



In the current job market, a mere 12 to 13% of Ph.D. students in the STEM fields (science, technology, engineering, and mathematics) will attain a tenure-track position in academia (*1*). Those of us tenacious enough to pursue a Ph.D. enter the running with the odds stacked against us.

In such a climate, it can become easy to lose sight of what initially motivated us to pursue a career in science. We, and many other ecologists, are driven by awe and curiosity to understand nature's patterns. And as individuals just embarking on our careers, it's exhilarating and terrifying to realize that some of the most exciting discoveries in science occur by chance. In his new book, *Serendipity*, eminent ecologist James A. Estes emphasizes these realities in an elegant narrative of his 45-year career studying sea otters and kelp forests.

Serendipity opens with Estes's account of his start in coastal marine ecology after chance events prevented him from serving in the Vietnam War. With his newly wide-open future, he combined service and science, beginning his research career in the western Aleutian archipelago as an employee of the Atomic Energy Commission. What started as a 2-year study of the effects of underground atomic weapons testing on sea otter populations evolved into a career focused on the dramatic effect of otters on the entire coastal ecosystem.

Estes's first major discovery, that a crucial relationship exists between sea otters, urchins, and kelp, is one of the most well-known examples of a trophic cascade. Sea otters prey on kelp-grazing urchins, thereby maintaining a kelp-dominated system. Without otters, urchins overgraze the kelp forests, creating barren expanses devoid of kelp and the rich communities that they support.

Estes's refreshing narrative deftly weaves rigorous science with personal reflection to create an absorbing and introspective read that is equal parts memoir, ecological textbook, and motivational guidebook for young ecologists. Throughout, he graciously acknowledges the external influences on his work by giving credit to fellow ecologists who were critical in understanding the otter-urchin-kelp cascade. In addition, he shares the many serendipitous moments that have driven his career. These include a pivotal conversation with renowned community ecologist Robert Paine that convinced Estes to consider sea otters as drivers of the kelp forest ecosystem; an unexpected sea otter population crash that prompted him to expand his research to the open ocean; and a last-minute decision to work at a new field site, resulting in a surprising explanation for the otter declines he witnessed. Moments such as these guided Estes as he expanded scientific understanding of coastal kelp forest dynamics and their far-ranging connections to pelagic and terrestrial ecosystems. His story transforms readers into fearless ecologists, fueled by curiosity and eager to decipher the patterns that do not quite add up, which are often at the brink of important discoveries.

While providing ample advice to young ecologists, *Serendipity* is refreshing and frank, capturing emotions that every scientist experiences: uncertainty, excitement, and curiosity. For those searching for the secrets to a fulfilling career, Estes's straightforward style opens a window into the life of a highly successful scientist. Other readers, who are well into their careers, will find that the same narrative serves as a revitalizing reminder of the self-doubt and exhilaration that go hand-in-hand with scientific discovery. *Serendipity* belongs on every field ecologist's bookshelf. Its lessons go far beyond the science of the otter-urchin-kelp cascade, instructing us to embrace the unpredictable twists and turns in our scientific careers.

Advice is infused throughout Estes's stories, but two recommendations resonated with us long after the last page had been turned. First, take advantage of serendipity; when seized upon and combined with hard work, chance encounters create career opportunities that you "will never anticipate in the beginning." Second, Estes advises us to pour our hearts into the quest for scientific knowledge, as he concludes, "I can't imagine anything more challenging, more humbling, and more important to the future welfare of our planet than the quest to understand nature."

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Editor's Summary

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