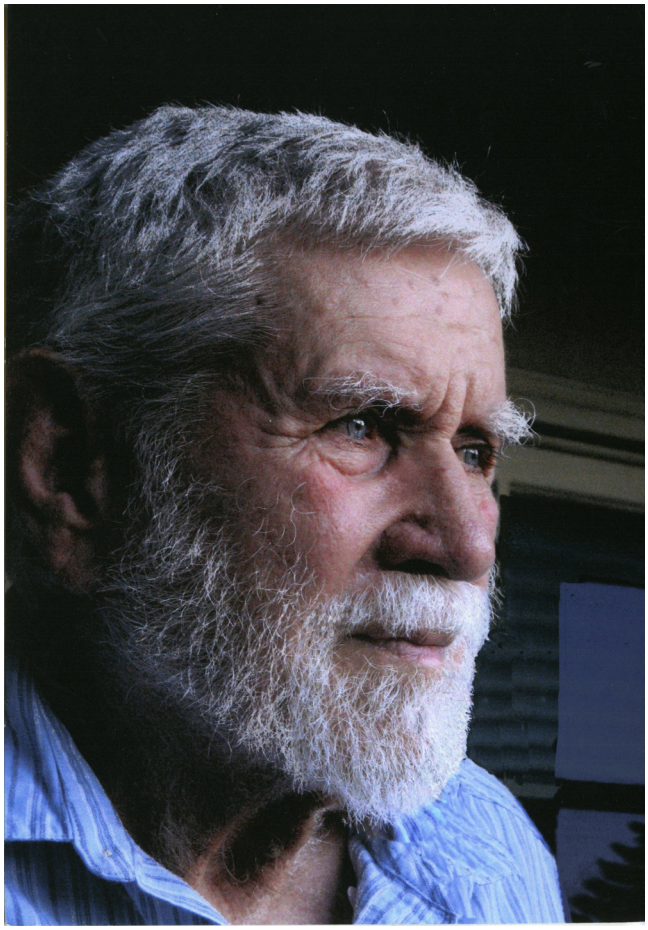
Resolution of Respect



W. Scott Overton
1925–2012

Walter Scott Overton, Jr. was a man before his time. His life ended on 2 July 2012 in Corvallis, Oregon. In the preceding hours, the nearly full moon shone onto his bed as family members gathered in love. He was born on 3 October 1925, in Farmville, Virginia, to Walter Scott and Alice Mottley Overton. In his years, he made pioneering contributions in a range of fields, including conservation, systems and hierarchy theory in ecology, and statistical sampling theory and sampling design and application to environmental monitoring.

Scott grew up with his sister, Dorothy, in the small town of Farmville during the Depression, carrying ice from the icehouse, milking the family cow, working in his father's hardware store and in the tobacco fields of kinfolk, and exploring, fishing, and hunting in the nearby fields and woods. He attended a partial year at Virginia Polytechnic Institute (VPI), but within months after his 19th birthday, he was on a troop ship crossing the North Atlantic, dodging German U-boats and heading to war. He joined the 83rd Infantry division as a replacement and saw his first action in the Battle of the Bulge, earning a Bronze Star and his first Purple Heart. He continued with the 83rd for the last three of the European campaigns, including spearheading towards Berlin, where he was again wounded. After coming home, he returned to VPI.

Aldo Leopold's *Game Management* was published when Scott was eight. This and other work of Leopold would begin Scott's career in wildlife biology and strongly influence his life as a hunter–conservationist and advocate for the wise use of natural resources. His Masters' thesis at VPI, under Fisheries and Wildlife Sciences professor Henry Mosby, was heavily influenced by the exciting new ideas of ecologist Paul Errington on the regulation of wildlife populations, and his research used census techniques to test these ideas on Bobwhite Quail. He later applied these census techniques, working as a wildlife biologist for the Florida Game and Freshwater Fish Commission. Once, taking his census data to the IBM office to analyze, he met a beautiful young secretary, Joann Price. They married in 1955 and started a partnership, friendship, and marriage that lasted until Scott's death 57 years later. The following winter they gave birth to their first child, Deborah Lea.

Scott decided to pursue his quantitative interests further, and in 1958 the family moved to Raleigh, North Carolina, where he studied for his doctorate in statistics at NC State under statistician Al Finkner. There, they welcomed the birth of their first son, Michael. When Scott accepted a position in the Biometrics Department at Emory University, the family moved to Atlanta, Georgia, where their youngest child Jake was born. In 1965, Scott joined the Oregon State University faculty, accepting a joint position in Forestry and Statistics. Shortly after moving to Oregon, he and Jo bought the land of their dreams in the foothills of the Coast Range southwest of Philomath.

Scott brought with him to Oregon State strong quantitative approaches and a matching conservation perspective. Mike Newton, a legendary forester, colleague, and long-time family friend recounts how Scott brought strong, new quantitative approaches to the Forestry Department. These approaches are taken for granted now, but were little known then. Scott also brought his strong conservation perspectives to a Forestry Department and industry strongly focused on timber production. Larry Hunt, a graduate student of Scott's, recalls working with him to model Tussock Moth outbreaks. Going together on a visit to view infested areas with damage from the moth, Scott remarked, "I don't see any trees that shouldn't be dead." He recognized that such outbreaks were a natural part of the system dynamics. Larry and Scott collaborated on a controversial paper (Overton and Hunt 1974) that challenged the existing forestry management paradigms, with analyses that argued for making decisions in a strategic and landscape context. Their results argued for much longer rotation times and a fundamental change in ways to estimate net present value. This paper included one of the earliest mentions of the Spotted Owl controversy that would follow. In the same period, Scott wrote a paper with Dave Bella (Bella and Overton 1972) arguing that in the face of increasing uncertainty, environmental management should focus on preserving options and avoiding irreversibilities.

A participant and senior ecological modeler in the 1970's International Biological Program (IBP), Scott had a healthy suspicion of complex, generalized models. He noted, "Current mathematical models of ecosystems are so complex and large it is extremely difficult to understand how the model behaves, much less to master the details of the coupling and interactions" (Overton and White 1981). Scott was particularly cognizant that scaling issues in science contraindicated forcing a big model into one fixed time frame, particularly as a predictor of performance at other scales. He was in the room when an oral presentation admitted that over longer simulations, due to rounding error alone, the PWNEE IBP Grassland Model covered the Western plains with several feet of buffalo dung. He saw this as a parable for how each process at each level needed to be uniquely scaled.

Scott was the first one to bring Arthur Koestler's (1967) holon concept into ecology (White and Overton 1974). Holons are part/whole dualities, simultaneously elements of larger holons and made up of smaller holons. They are an open-system device for moving between levels. Scott saw dualities of many sorts; it was the way he thought. First, he was both systematic and systemic. He was systematic as he worked his way through a space, making sure that all the side branches were treated. Systemically, he would put things together to make remarkable wholes. The base duality in modeling for Scott was input *versus* output—with holons sandwiched in between, mediating their relationship. Input and output were integral in the modeling process itself: empirical versus theory. The inherent relationship between input, output, and state (the holons) led Scott to General Systems Theory. He consulted and came to favor George Klir's (1969) approach. We observe, and from that describe the ecosystem. But science is not stamp collecting; understanding the description leads to theory. Some of the understanding comes from the dual of looking forward *versus* backward. Looking forward successfully to predicted outcomes does not show that we are right, but it does make our narrative more compelling. Convincing stories create commensurate experience, the bottom line in science. There is the duality of within-scale versus across scales.

Part–whole dualities came from Koestler. Scott looked at the higher duality of the structure as opposed to its environment, as an ecologist might. By emphasizing environment, he created a sort of duality of duals, the one up, the other down. Scott's genius was in the way he operationalized naturalistic *versus* formalistic accounts, while still moving upscale, always toward environment. From Overton's position, Stan Salthe pulled together the triadic: the thing (at scale), its mechanisms (downscale), and its environment (upscale). The natural history of the structure sees it whole. The formalistic account expresses it as a set of functioning parts.

All this was captured in the FLEX/REFLEX paradigm implementing two-level hierarchical models for ecosystems. The concepts were developed by Scott in interaction with Curtis White, who programmed them. The upper, dynamically slower, level was treated holistically in FLEX. It was continuously updated. The subunits were in REFLEX; these were mechanistically modeled and, as they changed more rapidly, were updated only discretely. Scott, as a member of the IBP Coniferous Biome team, proposed completely redoing the existing biome model in progress to incorporate the new insights from Koestler's holons. Others did not see the value. They were unable to understand that if FLEX/REFLEX came up with something different they would learn the previous model was wanting. If it found only the same, then it would be a validation of the extant model. If you want a great fugue, go to Bach. If you want great hierarchy theory applied to ecology, go to Scott Overton. The early practitioners of anything often have visions not shared by others. Now that ecology is more sophisticated about levels of analysis and scaling issues, we hope that someone might turn to bringing FLEX/REFLEX up to date, given the new computational power and a more accepting audience in complexity science.

Scott had an impact on others who pushed hierarchy into the consciousness of ecology. Coauthor Patten was deeply influenced by Overton's dualisms and advocacy of formalism. This led Patten et al. (1976) to the adoption of L. A. Zadeh's state-space system theory (Zadeh and Desoer 1963) and the theory of environs (Patten 1978) that would later find their place in a burgeoning network theory of environment. Many students came out of Athens, Georgia, pressing hierarchies, holons, and networks forward from Overton's influence. Allen, in the mid-1970s, did not know of Herbert Simon, Howard

Pattee, Robert Rosen, or Arthur Koestler, and did not call what he was doing "hierarchy theory." So Allen and Starr (1982) would have been very different and less successful without Overton's influence. Allen's "Toward a Unified Ecology" (Allen and Hoekstra 1992) is organized around Overton's within-*versus* across-scale duality.

Hierarchy theory is set theoretic and uses category theory. It often uses word models. It resorts to narratives that need not be internally consistent. Meanwhile, systemic environ theory employs models that do require internal consistency. Scott was on top of both. Networks use differential equations, and follow Forrester diagrams. Network theory works its way upscale. Meanwhile, hierarchy theory reaches upscale, allowing stability of its narratives over widely different, multiple levels. Scott used both intellectual devices, making them all his own, and telling others how to do it.

While sampling design and theory were always a central part of Scott's work, they became particularly prominent towards the end of his career, working on several large national environmental monitoring efforts, and innumerable smaller projects. Rick Linthurst, of the USEPA, worked closely with Scott during these years and recalls

> *Two of EPA's major research successes were the national lake and stream surveys, and the environmental monitoring and assessment program. Both were built on a foundation of statistical sampling that Scott guided. Scott's work on these programs was not only instrumental in their success but resulted in changing the sampling designs of EPA's Office of Water, Regional Offices, and Office of Research and Development. Also, the Forest Service, as well as innumerable nongovernment organizations .... His footprint is all over hundreds of scientists in EPA now as his good work and thinking became the norm rather than a new direction. He will be sorely missed but always remembered.*

Fred Holland, another colleague involved in these efforts, echoes this sentiment: "Literally thousands of scientists in almost all state and national monitoring programs use Scott's concepts and approach."

This statistical sampling work spawned a number of innovations; in particular tessellation stratified sampling designs, a common implementation of which is the grid stratified design used widely in sampling design. There were also innovations in the use of resampling and facsimile populations to estimate the characteristics of sampling designs. Scott's idea on ways to incorporate the use of "found" data into probability sampling designs was the basis for the first journal paper of one of us (J. Overton).

Throughout his career, Scott took an uncompromising approach to his work. He viewed compromise as a weakness. "*Why compromise if you are right?" "I could agree with you, but then we'd both be wrong."* He disdained politics, especially in science, and had little time or respect for those who advanced themselves in science by politics rather than perspicacity. He was fiercely independent, and often ran afoul of university administrators. Having faced Hitler's vaunted Wehrmacht and rolled them back to Berlin in the name of the free world— losing some of his best friends along the way—would he sacrifice his own personal and academic freedoms to placate a university administrator? He considered academics as among the last bastions of true freedom of thought, and resisted any attempts to erode these academic freedoms, while gladly wearing the consequences of maintaining these freedoms.

Scott had a wide-ranging intellect and curiosity; he was always interested in new ideas. He preferred to break outmoded paradigms rather than defend them; preferred a new, unpolished idea to a well-worn accepted one. His work was strongly influenced by Prigogine's dissipative structures and Polya's plausible inference, and of course Koestler's ideas on holons. Fisher's perspective on statistical inference was a fundamental basis for Scott's approach to sampling design and statistical analysis, and he pushed his colleagues and students to consider the inferences that could be formed or the hypotheses tested from their analyses or models.

He was also uncompromising and demanding as a teacher, which did not sit well with students looking for an easy degree. But he was also very generous with his time, and the best students flourished with him and many went on to prominent careers in a range of fields. While he had a reputation as a curmudgeon with some, many others spoke of his generosity with both his time and ideas and grant support, and his kindness and respect for others. Many students became ongoing collaborators. Ken Burnham coauthored papers on mark–recapture estimation under variable capture probabilities. Steve Stehman, Don Stevens, and George Weaver collaborated on sampling design issues.

In his retirement years, Scott continued to work, despite much loss of vision from macular degeneration. He still enjoyed his farm with its woodlots and large vegetable garden, traveling with Jo, and the growing number of grandchildren and great-grandchildren visiting "Papa and Jo-Jo". He remained a dedicated hunter–conservationist his entire life. His love of hunting was the upland birds and pointing dogs—from hunting bobwhites with English Setters in the rough Virginia farmlands of his youth, to Hungarian partridge with Cesky Fousky in the Palouse grasslands of his later years.

Throughout his life, many benefited from his intellect and enjoyed his irreverent humor—always delivered with a twinkle in his blue eyes. Scott was an avid fan of collegiate and freestyle (Olympic) wrestling, and a staunch supporter of the OSU wrestling team. He was a good friend and confidant of the legendary and equally indomitable OSU wrestling coach, Dale Thomas, who through sheer force of will and determination, created one of the most successful wrestling programs in the USA. Steve Woods recounts a story of one of the few times he can recall the coach was speechless. In his last years, Thomas had terminal cancer, and in his usual straightforward, "get with it" way, he was organizing his own funeral. He had gathered the pantheon of Oregon State wrestling around him, to tell them their roles in the funeral—Steve would MC it, Len Kaufman would get the flowers, Olympian Jess Lewis would talk—until all aspects were planned (and by necessity delegated!). Scott listened to all this and then quipped with his trademark humor, "Dale, it sounds like everything's in place. Have you picked a date yet?"

Now that we know the date of Scott's own passing, we are left with the memories of the man he was and the ways in which he touched our lives; personally—husband, father, grandfather, and beacon;

professionally—ecologist, conservationist, systems scientist, statistician, and beacon. Scott Overton was a man before his time, and one to emulate in any time. We can feel ourselves missing him as we write these words of farewell.

Authors: Timothy Allen, Bernard Patten, Hank Shugart, Jacob Overton

Literature cited

Allen, T. F. H., and T. W. Hoekstra. 1992. Toward a unified ecology. Columbia University Press, New York, New York, USA.

Allen, T. F. H., and T. B. Starr. 1982. Hierarchy: perspectives for ecological complexity. Chicago University Press, Chicago, Illinois, USA.

Bella, D. A., and W. S. Overton, 1972. Environmental planning and ecological possibilities. Journal of the Sanitary Engineering Division–ASCE 98:579–592.

Bledsoe, L. J., R. C. Francis, G. L. Swartzman, and J. D. Gustafson. 1971. PWNEE : a grassland ecosystem model. Natural Resource Ecology Laboratory, Colorado State University, Fort Collins, Colorado, USA.

Bosserman, R. W. 1983. Dynamics of physical and chemical parameters in Okefenokee Swamp. Journal of Freshwater Ecology 2:129–140.

Klir, G. J. 1969. An approach to general system theory. Van Nostrand Reinhold, New York, New York, USA.

Koestler, A. 1967. The ghost in the machine. MacMillan, New York New York, USA.

Overton, W. S. 1975. The ecosystem modeling approach in the Coniferous Biome. Pages 117–138 *in* B. C. Patten, editor. Systems analysis and simulation in ecology. Volume III. Academic Press, New York, New York, USA.

Overton, W. S. 1975. Decomposability: a unifying concept? Pages 297–298 *in* S. A. Levin, editor. Ecosystem analysis and prediction. Society of Industrial and Applied Mathematics, Philadelphia, Pennsylvania, USA.

Overton, W. S., and L. M. Hunt. 1974. A view of current forest policy, with questions regarding the state of forests and criteria of management. Transactions of the North American Wildlife and Natural Resources Conference 39:334–353.

Overton, W. S., and C. White. 1981. On constructing a hierarchical model in the FLEX paradigm, illustrated by structural aspects of a hydrological model. International Journal of General Systems 6:191–216.

Patten, B. C. 1978. Systems approach to the concept of environment. Ohio Journal of Science 78:206–222.

Patten, B. C., and G. T. Auble. 1980. Systems approach to the concept of niche. Synthese 43:155–181.

Patten, B. C., R. W. Bosserman, J. T. Finn, and W. G. Cale. 1976. Propagation of cause in ecosystems. Pages 457–579 *in* B. C. Patten, editor. Systems analysis and simulation in ecology. Volume IV. Academic Press, New York, New York, USA.

Salthe, S. 1985. Evolving hierarchical systems. Columbia University Press, New York, New York, USA.

Webster, J. R. 1979. Hierarchical organization of ecosystems. Pages 119–129 *in* E. Halfon, editor. Theoretical systems ecology. Academic Press, New York, New York, USA.

White, C., and W. S. Overton. 1974. Users manual for the FLEX2 and FLEX3 model processors for

the FLEX Modelling Paradigm. Bulletin 15. Forest Research Laboratory, School of Forestry, Oregon State University Corvallis, Oregon, USA. http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/10061/FLP_Bul_15.pdf?sequence=1

Zadeh, L. A., and C. A. Desoer. 1963. Linear system theory: the state space approach. McGraw-Hill, New York, New York, USA.