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On the cover — Statistician Lisa Madsen and collaborators help estimate the total mortality of birds and bats at wind farms. See p. 8.

FROM THE HEAD

Lisa Ganio
Department Head

Welcome to the 2019 Department of Statistics Newsletter! We have many exciting activities to share with you. In December 2018, I was honored to have been selected to succeed Professor Virginia Lesser, as department head. I want to extend my appreciation and thanks to Ginny for her dedication and leadership that leaves the department well-positioned for the future. I am grateful to be working with our diverse faculty, who attract equally diverse graduate students and bring tremendous vibrancy and energy into the department. I hope you see that vitality reflected in this newsletter.

The Statistics Department contributes to almost every educational discipline at Oregon State, and our collective endeavors are impacting students and research far beyond our own department and discipline. Recently, this hit home with me during the College of Science Scholarship Dessert in May when the undergraduate recipient of a biology scholarship reflected on how the statistical modeling she learned provided new insights into her biology research, leading to her award.

Our faculty teach over 4,500 non-statistics students every year. Our consulting practice has advised students in over 30 departments at OSU in the last two years alone. Our online master's programs have seen increases in enrollment from working professionals who study for their degree and work concurrently. And this year will be the third year of the Research for Undergraduates Summer Institute for Statistics at OSU that provides training in probability and statistics research to underrepresented students from across the country. As the new department head, it's thrilling to see how the contributions of statistics faculty support successful learning and research far beyond our corner of the campus.

Our faculty research benefits the broader world. Katie McLaughlin researches methods to identify and measure marginalized and hidden human populations. Lisa Madsen develops new methods to more accurately measure ecological effects of renewable energy. Yuan Jiang, Duo Jiang and Tom Sharpton are developing statistical methods to characterize the microbial inhabitant of the human microbiome, while Lan Xue researches statistical methods for high-dimensional massive datasets.

Much of this work wouldn't be possible without the support of our alumni and donors. We are grateful for your generosity that has provided state of the art video-conferencing software and equipment to support faculty and student collaboration and has allowed us to connect to our online data analytics students in real time! We are also grateful for your partnerships, internships and collaborations that offer our students the opportunity to explore real-world statistics problems and solutions. We always welcome your input, ideas and collaboration and I look forward to hearing from you.

ADVANCING STATISTICS

Faculty excellence in research, teaching and leadership

New leader for statistics

We extend a warm welcome to alumna **Lisa Ganio** in her new role as Head of the Department of Statistics, effective December 2018. Prior to her new position, Ganio was a tenured associate professor in the Department of Forest Ecosystems and Society in the College of Forestry at Oregon State and an adjunct professor in our department.

Ganio directed the College of Forestry's Statistical Consulting program for the past 20 years. She also served as director of the Forest Ecosystems and Society graduate program and as associate director for the Forestry Computing Resources. She collaborates with academic researchers as well as with scientists in private, state, non-profit and federal natural resource management agencies. With deep expertise in the application of statistics to applied ecological problems, Ganio's work emphasizes appropriate use and application of statistics research design and technical quantitative tools to pressing ecological questions.

Prior to OSU, Ganio worked as a senior scientist at the Environmental Protection Agency Research Lab in Corvallis. An exceptional scholar and teacher, she received the Dean's Award for Outstanding Achievement in Advising, Mentoring and Instruction in the College of Forestry in 2003 and 2008. She received her bachelor's degree in botany and zoology at Humboldt State University in Arcata, California, and both her M.S. and Ph.D. degrees in statistics from Oregon State University.

New faculty: Making an impact with data science

James Molyneux joined the Department of Statistics as an assistant professor in Fall 2018. Molyneux studied economics and mathematics at California State University, Fullerton, and then pursued his Ph.D. in statistics at UCLA, where he completed his dissertation on earthquake forecasting models based on statistical and computational methods.

In addition to research on statistical seismology, Molyneux brings deep expertise in statistics pedagogy and education to OSU. As a doctoral student, he collaborated with his professors, high school educators, and other graduate students to create a project on statistics education funded by the National Science Foundation. The result is an innovative Introduction to Data Science (IDS) curriculum, which introduces high school students to data and statistics.

Part of a math-science partnership grant between UCLA and the Los

Angeles Unified School District, IDS has been designated as a core math course and was implemented in 14 southern California high school districts.

At OSU, Molyneux teaches a wide variety of undergraduate and graduate courses, including online courses, in the areas of data analytics, statistical methods and theory.

Juliann Moore

Promotions and tenure

Thomas Sharpton was promoted to Associate Professor with tenure in 2019. He has a joint appointment in the Department of Microbiology. Sharpton's laboratory specializes in the development and application of computational and statistical tools that characterize microbiome biology and investigates how the human microbiome, especially the gut microbiome, relates to health.

Lydia Newton was promoted to Senior Faculty Research Assistant II in 2019. Newton has worked at the OSU Survey Research Center (SRC) since 1999 where she is responsible for the design, implementation, data collection, budgeting and reporting of most OSU-SRC funded projects. She serves as a consultant for OSU and local and state agency surveys. Newton also teaches an online graduate class on survey methods.

Lan Xue was promoted to Professor in 2018. She joined the department in 2005 as an assistant professor and was awarded the Promising Scholar Award at OSU for her outstanding statistical research.

Juliann Moore was promoted to Senior Instructor I in 2018. Moore earned her M.S. degree in statistics at OSU and joined the department in 2012. She received the Loyd F. Carter Award for Outstanding and

Inspirational Undergraduate Teaching in Science in 2017.

Katie Jager was promoted to Senior Instructor I in 2018. Jager received her master's degree in statistics from OSU and joined the department as an instructor in 2013. She has developed effective and innovative pedagogical practices to enhance undergraduate learning in the department, and recently led a team of OSU Ecampus professionals in designing the online course Introduction to Statistics for Engineers.

A WINNING FORMULA FOR ACHIEVEMENT: AWARDS AND HONORS

Statistician leads undergraduate education at OSU

Alix Gitelman, was appointed Vice Provost of Undergraduate Education at OSU in October 2018. At OSU since 1999, she has taught, mentored, advised and provided problem-solving support to countless undergraduate and graduate students and researchers. She received the D. Curtis Mumford Faculty Service award in 2015, and has worked on higher education initiatives for the Oregon Statewide Provosts' Council and the Higher Education Coordinating Commission.

Virginia Lesser was appointed by the National Academies of Science, Engineering and Medicine to serve as

Thomas Sharpton   **Lydia Newton**   **Lan Xue**   **Katie Jager**

a committee member on the project, "Assessing the Minerva Research Initiative and the Contribution of Social Science to Addressing Security Concerns." The 14-member committee will conduct a program evaluation of the Minerva Research Initiative that resides within the Office of the Secretary of Defense.

Javier Rojo is the recipient of the 2018 Dr. Etta Z. Falconer Award for Mentoring and Commitment to Diversity. The award recognizes individuals who have demonstrated a professional commitment to mentoring and increasing diversity in the mathematical sciences. Rojo leads and directs the nationally recognized Research for Undergraduates Summer Institute of Statistics (RUSIS) at OSU. RUSIS is recognized as a model program for encouraging undergraduates to pursue graduate studies in the mathematical sciences and for increasing the numbers of underrepresented minorities and women in mathematics and statistics.

Statistics faculty receive funding for health and big data research

Yuan Jiang and his collaborators **Duo Jiang** and **Thomas Sharpton** received a four-year $770,000 grant from the National Institute of General Medical Sciences at the National Institutes of Health for their project, "Network-based statistical

methods to decode interactions within microbiomes." This project will advance scientific understanding of the functions and operations of microbiomes and their relation to human health by developing statistical methods and models to study biological interactions between microbes or between microbes and their host.

Lan Xue received a three-year $90K grant from the National Science Foundation for her project, "Dynamic Signal Detection in Non- and Semi-Parametric Models." The project will generate new methods and theory in the area of non- and semi-parametric models to deal with massive data of high dimensions.

Statisticians step down after long careers

Jeannie Sifneos, senior faculty research assistant for the Survey Research Center (SRC), retires after 22 plus years at OSU. She received her M.S. degree in statistics with a minor in fisheries and wildlife science at OSU in 1986. As one of the SRC's lead analysts, Sifneos was an essential part of the center.

"Jeannie was integral to the accuracy of our survey estimates and fluency of our technical reports. There were some projects that required very tedious and complex analyses of the survey data, and in those cases, Jeannie was our go to person who got the job done.

I will miss working with her," said her colleague Lydia Newton.

In addition to her position in the SRC, Jeannie was well-known for hosting numerous department gatherings for faculty and students.

Fond farewell to an alumni-teacher duo

For more than 25 years, alumni **Loretta** (Ph.D. '80) and **Peter Thielman** (M.S. '80) spent their summers teaching statistics classes here on the Corvallis campus as visiting faculty. They retired last summer. Additionally, Loretta and Peter were statistics faculty at the University of Wisconsin-Stout for 35 years. Each year, the couple would drive cross-country with their four children and pets enjoying the Oregon summers and reuniting with fellow alumni, friends and family. One of their children, Emily Thielman ('07) is also an OSU statistics alumna.

Loretta, a Chicago native earned her undergraduate degree in mathematics education at St. Olaf College in Northfield, Minn. She obtained her master's and doctoral degrees in statistics from OSU, where she met her husband Peter.

The couple, who have made Menomonie, Wisconsin, their home, will enjoy their retirement by traveling across the United States, Canada and Europe.
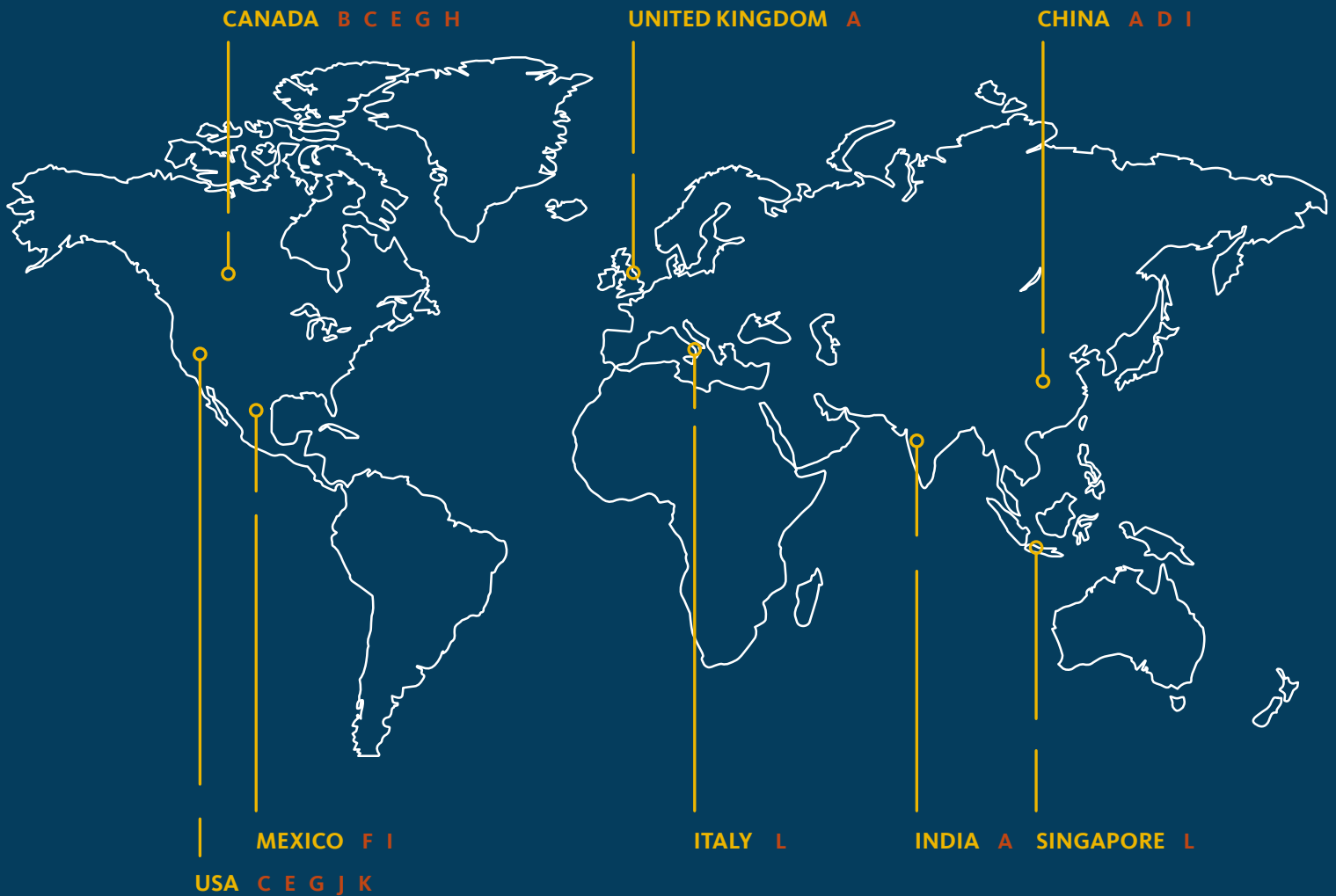

Javier Rojo

Yuan Jiang

Jeannie Sifneos

Loretta and Peter Thielman

Representing OSU Statistics nationally and globally

Last year, our faculty were invited to deliver 30 research talks at 20 academic conferences, seminars and workshops in eight different countries from Italy to India. The presentations disseminated research outcomes on a variety of theoretical and applied statistical topics from high-dimensional data to microbial networks.

CANADA B C E G H   **UNITED KINGDOM** A   **CHINA** A D I

MEXICO F I

USA C E G J K

ITALY L   **INDIA** A   **SINGAPORE** L

A **Sharmodeep Bhattacharyya:** Changchun, China; London, United Kingdom; Kolkata, India

B **Yanming Di:** Vancouver, Canada; Edmonton, Canada

C **Duo Jiang:** Knoxville, Tennessee; Vancouver, Canada

D **Yuan Jiang:** Changchun, China

E **Virginia Lesser:** Tucson, Arizona; Vancouver, Canada; Denver, Colorado

F **Lisa Madsen:** Guanajuato, Mexico

G **Katherine McLaughlin:** Atlanta, Georgia; Washington, DC; Vancouver, Canada

H **James Molyneux:** Vancouver, Canada

I **Debashis Mondal:** Guilin, China; Guanajuato, Mexico

J **Thomas Sharpton:** Atlanta, Georgia; Madison, Wisconsin

K **Javier Rojo:** San Antonio, Texas; Greensboro, North Carolina

L **Lan Xue:** Pisa, Italy; Singapore, Singapore

SHAKING THINGS UP IN RESEARCH AND TEACHING

Jeff Kollath

Transforming undergraduate statistical learning

The statistics department teaches more than 4,500 students who are not statistics majors from across many academic programs. For these students, the department's core Introduction to Statistical Methods courses (ST 351 and ST 352) must be successfully completed in order to progress through their major and graduate in a timely fashion.

In 2016, the Association of Public and Land Grant Universities (APLU) launched a grant program with the support of the Bill & Melinda Gates Foundation to accelerate the adoption of adaptive courseware by public universities. This program awarded grant funding to eight universities, including OSU to support redesigning courses in which students have historically struggled by helping them and their instructors cover the material in a more personalized and effective way. Statistics received the APLU funding to improve student success in Introduction to Statistical

Methods courses. The department's implementation team, consisting of faculty **Jeff Kollath, Juliann Moore, Katie Jager, James Molyneux** and graduate students **Anna Totty** and **Faraz Niyaghi**, redesigned the statistical methods courses to include adaptive courseware that will enhance student learning and performance.

The statistics courseware provides a personalized digital experience for each student emphasizing active learning and enabling student assessment throughout the course. Courses are delivered in a blended format that includes digitally based practice problems and direct instruction from the faculty who are able to tailor their own teaching based on student progress data provided by the adaptive courseware. APLU grant objectives include improving student success in high enrollment courses that have a greater percentage of DFWU rates (grades of D, F, withdrawal and unsatisfactory), and leveraging adaptive courseware to ensure stronger support for low-income students, students of color and first--generation students.

Starting in the summer of 2018, the department dedicated time to the design, writing and testing of this program. New formats for the lower and upper-division statistical methods courses for on-campus and Ecampus students were implemented during winter and spring 2019.

In addition to the establishment of the adaptive learning platform, the department was also able to successfully meet the OSU and Oregon legislative goal of providing low-cost materials for students. The previous course materials exceeded $200 per student. With the new adaptive learning program, the student's cost was reduced 80% to just $43.

Though the results are preliminary, the numbers look positive. Overall enrollment increased by 10.6% from 2017 to 2019 in one of the core courses with nearly 600 students enrolling in winter 2019. During the term, the overall DWFU rates decreased from 17.7% to 11.3% and the DFWU rates for first-generation students decreased from 26.3% to 16.2%. These reductions were consistent across demographics.

"The students seem happier and more successful. Ecampus students in particular appreciated the format because of the interactions and the immediate feedback it provided," said Kollath, an instructor of statistics for 20 years.

"ST 351 is not an easy subject. It's not a math class and in most cases demands a new way of thinking from students. This new system incorporates updated statistical methods and provides students with immediate feedback that helps with mastering concepts and methods."

ST 352 has also experienced highly positive midterm and quiz results in spring 2019. The rise in exam success rates meets the targeted objectives of the new curriculum.

The implementation team's hard work the past year is paying off and reflects their dedication and commitment to a strong undergraduate statistics education.

Better understanding hidden populations

Katie McLaughlin's research on measuring hidden or vulnerable populations around the world has valuable applications in public health, epidemiology and social science. Much of her research has focused on developing statistical and computational methods focused on sampling and estimation for hidden populations. Hidden or "hard to reach" groups include female sex workers (FSW), men who have sex with men (MSM), victims of sexual violence, people who inject drugs (PWID) and migrants — some of the groups most vulnerable to infectious diseases, substance misuse and behavioral health issues.

McLaughlin, an assistant professor of statistics, has estimated counts of populations of FSW, MSM, migrants, and PWID in Morocco; women with sexual violence related pregnancies in the Democratic Republic of the Congo; FSM, MSM and PWID in Armenia; MSM and PWID in Kosovo; and PWID from the United States in collaboration with the Center for Disease Control (CDC). Her work involves collaborations with epidemiologists, statisticians, and public health officials.

These groups often cannot be sampled using conventional techniques due to the absence of a sampling frame and their reluctance to identify as a member of the hidden population.

McLaughlin's research improves respondent-driven sampling (RDS), which is a sampling methodology primarily used by CDC, the World Health Organization and the Joint United Nations Program on HIV/AIDS. The latter utilizes the social network of a population to recruit and enroll individuals who may be at high risk of HIV/AIDS and related infections. Under several strong assumptions, the RDS process approximates a probability sample and so population inference is possible. However, many of these assumptions may not be met in practice and there is a growing field of work to develop new sampling designs and modeling methods to improve inference.

Common outcomes of RDS behavioral surveys are estimated population prevalence and size. McLaughlin has worked on developing a generative model to correct limitations of the RDS process, such as biases introduced by peer recruitment and convenience sampling, whereby the sample is drawn from that part of the population that is close to hand. Her Bayesian model incorporates individual and (social) network variables into a rational-choice framework to model recruitment preferences and is implemented using Markov chain Monte Carlo methods.

McLaughlin has also worked on several variants of a population size estimation method for RDS data to improve methodology and counter heaping, misreporting, and bias in data.

Katie McLaughlin
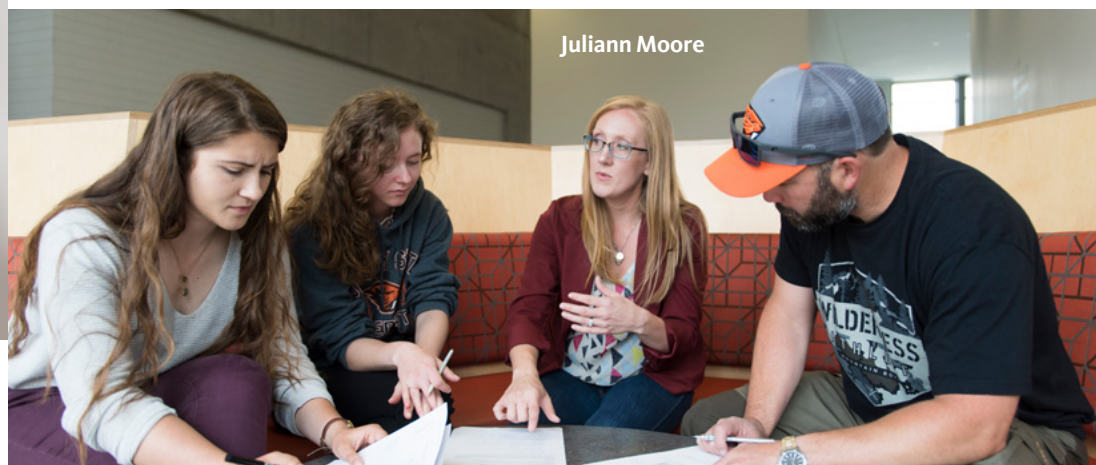
Juliann Moore

BIRDS AND BATS:

COUNTING FATALITIES WILL MAKE GREEN ENERGY SAFER FOR THEM

Associate Professor **Lisa Madsen** and statisticians from the United States Geological Survey (USGS) have come together to develop methodology to estimate the total mortality of bats, birds and other small creatures on wind farms and solar facilities. The Endangered Species Act requires that wind farms pay particular attention to endangered or threatened species such as golden eagles, brown pelicans, whooping cranes, condors and Indiana bats, which are killed when they accidentally collide with turbine blades.

Monitoring fatalities at wind energy facilities can help government agencies, such as the U.S. Fish & Wildlife Service and the Bureau of Land Management, make better decisions about species management.

Developing statistically accurate fatality prediction and estimation tools and monitoring protocols can also help agencies ensure that renewable energy facilities developers design operations to minimize the impact to wildlife, thus reducing environmental damage.

"Fundamentally, what people want to know is 'how many?'. This idea of keeping count and our desire to know 'how many' are important for conservation," Madsen said. "We want to keep track of our natural resources. We don't want to end up depleting them, because we can't tell we are taking too much.

How many? The missing bats and birds

Madsen's collaborators, Manuela Huso and Dan Dalthorp, from the USGS Forest and Rangeland Ecosystem Science Center in Corvallis are contributing new statistical models, estimators and software tools to improve bird and bat fatality estimates at solar and wind power facilities. Huso initiated the research 10 years ago to come up with improved models and methods of estimating the count of carcasses. Dalthorp joined her shortly thereafter; Madsen began collaborating with the USGS team in a more substantial capacity during her sabbatical two years ago.

Last year, the team along with collaborators from consulting firm, Western EcoSystems Technology, Inc, data science lab DAPPER Stats, the Swiss Ornithological Institute, and Duke University developed a software package called GenEst (a generalized estimator of mortality) — a suite of statistical models and software tools specifically designed for estimating the total number of creatures arriving in an area during a specific time period when their detection probability is unknown but estimable. The latter can also be used more generally to estimate the size of open populations with imperfect detection probabilities.

However, as Madsen's research on fatalities at wind farms shows, estimating an accurate count is anything but a straightforward process.

In the case of wildlife fatalities due to collision with wind turbines or solar panels, carcasses invariably go missing, carried away by scavengers or fall in areas inaccessible to searchers. Therefore, simple counts of carcasses found at wind farms do not reflect the actual number of fatalities. Madsen and her colleagues have developed complex statistical tools that estimate the actual number of carcasses when they are undetectable for any reason by taking into account a host of predictor variables such as searcher efficiency, variations in plot sizes and location of inaccessible areas.

Madsen developed a model to use data from field trials to estimate searcher efficiency. This model is incorporated into the larger GenEst model framework.

"My collaborators are working on other aspects of the problem: getting a count of missing carcasses by estimating the amount of time a carcass is likely to stay before getting carried away by a predator. It is a highly involved project, where we put all the pieces of the puzzle together along with the uncertainty associated with all of these aspects," explained Madsen.

The software package, created by the team, will be utilized by government agencies as well as Western EcoSystems Technology, Inc., which has already begun to implement the software to assist their clients. The project has also attracted attention from environmental and government agencies in Canada, South Africa, Portugal and Scotland among others. In addition, the USGS statisticians have conducted workshops demonstrating how to use the software to estimate animal mortality at wind and solar energy facilities.

"The methodology is generally applicable to any situation where you want to count something where the detection is not perfect," said Madsen.

The path to ecological statistics

After graduating from the University of Oregon with a master's degree in mathematics, Madsen taught mathematics in a community college in New York. She wanted to get a doctorate in math education because she enjoyed teaching the subject. But she quickly discovered it wasn't an ideal academic match for her.

In the meantime, her husband suggested she try a statistics course. Madsen enjoyed the experience and switched to the Ph.D. program in statistics at Cornell University. She also obtained a minor in natural resources at Cornell, which inspired her to apply statistics to ecological problems. In recent years, Madsen has also worked on numerical models of geological data to estimate the risk of environmental disasters such as leaking oil wells and other phenomena.

"We want to keep track of our natural resources. We don't want to end up depleting them, because we can't tell we are taking too much."

Madsen excels at teaching courses on statistical methods to non-statistics students at the graduate and undergraduate levels. She enjoys helping her students develop a statistical mindset as they learn about extending statistical methods to different disciplines.

"I think that non-statisticians could benefit from learning some statistical principles such as the concept of uncertainty, collecting useful data, and applying appropriate data analysis tools in a given situation," Madsen remarked.

OUR STUDENTS:

MAKING THEIR MARK IN STATISTICS

A newly minted ecological statistician

Statistician and high school tennis coach **Matthew Higham** (Ph.D. '19) has made the most of his time in Corvallis. Higham entered the master's program at OSU in 2014 after completing his undergraduate studies in botany and statistics at Miami University, Ohio. A fan of hikes and marathons, Matt often analyzes and graphs his own fitness data. He has coached tennis at Crescent Valley High School since 2016.

Matt Higham

Higham is looking forward to joining St. Lawrence University in Canton, New York, as an assistant professor of statistics. His Ph.D. dissertation focused on statistical modeling of imperfect detection of wildlife in Alaska.

Moose population numbers are hard to estimate since they graze across Alaska's vast terrain and park ecosystems and are often masked by snow. As a result, it is difficult to regulate hunting permits and effectively monitor impacts to its population and habitats. Higham's doctoral research provides statistical solutions to this significant ecological problem. He has developed statistical models for population size prediction of moose in Togiak, Alaska, with grant support from the Alaska Fish and Wildlife Service.

Higham has presented his statistical findings and moose detection software to Alaska Department of Fish and Game and Alaska Fish and Wildlife Service in Anchorage and Fairbanks. He is enthusiastically looking forward to collaborating with his undergraduate students on similar statistical applications and problems.

Higham was advised by Lisa Madsen, associate professor of statistics, and Jay Ver Hoef, an ecological statistician at the Alaska Fisheries Science Center. "Working with Lisa and Jay has been very helpful in preparing me to engage with research in the future. I came in not knowing much about mathematical writing and they helped me grow and improve in that area immensely," said Higham.

At OSU, he amassed valuable teaching experience and won awards for academic excellence. He received the department's Seely Award, the Provost's Distinguished Graduate Scholarship and the Distinguished

Anna Totty

Student Presentation Award at the Western North American Region conference in 2017.

Although Higham will miss Corvallis and the friendly graduate student community, he is eager to begin his new career in upstate New York. We wish him all the best!

Next-gen educator

Originally from Missouri, new Ph.D. student **Njeesa Totty** arrived at OSU for graduate studies in statistics after completing her undergraduate degree in mathematics from Texas Women's University in Denton. She has completed her M.S. degree and is thrilled to be accepted to the Ph.D. program in the department.

"I wanted to complete my Ph.D. in a place where I could continue to receive this kind of encouragement and help," said Totty. "I especially liked that the Ph.D. coursework was very thorough in its coverage of foundational theoretical concepts."

Totty will focus on statistics education research. She aspires to a career in academia where she can teach, develop curriculum and courses to enhance student success and conduct further research in statistics education.

Totty has already established a reputation as an exceptional graduate teaching assistant in the department. She assisted senior instructors Jeff Kollath and Juliann Moore on teaching introductory statistics courses and updating curriculum. The experience gave her opportunities to advance in new areas, refine her pedagogical skills and prepare for a career as a teacher.

"Working as a GTA has been one of the most beneficial parts of my graduate education. I have been positively influenced by the instructors and students and have grown in professionalism, pedagogy and content knowledge," remarked Totty.

Her dedication and excellent performance garnered her the 2018 Outstanding Teaching Assistant Award in the department.

Totty has enjoyed her courses and inspiring interactions with her mentors and professors Charlotte Wickham, Claudio Fuentes and James Molyneux and is delighted that as a Ph.D. student she will continue learning from her role models in the statistics department.

Faraz Niyaghi

Graduates claim top jobs

Faraz Niyaghi (Ph.D. '19, Co-advisors: Sara Emerson and Sharmodeep Bhattacharyya) is a data scientist at American Airlines in Fort Worth, Texas.

"I love my job because I get to use what I learned in statistics every day. Currently, most of my projects are focused on personalization of customers' experience in digital domain," said Niyaghi.

Nima Dolatnia (Ph.D. '18, Advisor: Sarah Emerson) is a senior data scientist at Freddie Mac, the federal mortgage corporation, in Washington, D.C.

Kai Li (Ph.D. '18, Advisor: Yuan Jiang) is a senior biostatistician at pharmaceutical company Karyopharm Therapeutics Inc. in Boston.

Andy Dang (M.S. '18) is a statistician at Eli Lilly, a pharmaceutical company, in Indianapolis, Indiana.

Chunxiao Wang (Ph.D. '18, Advisor: Debashis Mondal) is a research scientist at Eli Lilly in Indianapolis.

Miao Yang (Ph.D. '18, Advisor: Lan Xue) is a senior biostatistician at Nektar Therapeutics, a biopharmaceutical company, in San Francisco, California.

Wanli Zhang (Ph.D. '17, Advisor: Yanming Di) is a statistician manager also at Eli Lilly in Indianapolis.

Jianfei Zheng (Ph.D. '17, Advisor: Lan Xue) is a statistician at Liva Nova, an England-based medical device manufacturer, in Houston, Texas.

Caley Johns (M.S. '17) is a data scientist at Benson Hill Biosystems, a leading agricultural and plant science firm, in St. Louis, Missouri.

Accolades for student scholarship and teaching

Provost's Distinguished Graduate Scholarship. The purpose of the fellowship is to support the recruitment of high-quality students that elevate the profile of graduate education at OSU.

Patrick Cummings, 2018

Li award for outstanding Ph.D. students in statistics - this award is named after Jerome Li, the founder of the Department of Statistics at OSU.

Matthew Higham, 2018
Miao Yang, 2017
Chris Wolf, 2017

Outstanding Graduate Teaching Assistant Award in statistics

Anna Totty, 2018
Chris Wolf, 2017

Lyle D. Calvin Scholarship for academic achievement

Peter Boyd, 2017
Alejandra Castillo Roldan, 2017
Conett Huerta Escamilla, 2017
Gilia Patterson, 2017
Yichen You, 2017

Seely Award for a second-year statistics graduate student to recognize greatest achievement in their first year and on comprehensive exams.

Chengzhu Zhang, 2017
Fang Tang, 2017

ALUMNI SERVING IN DIVERSE FIELDS

Alumnus highlights important role of statisticians in clinical trials

Alumnus **Ben Lyons** (Ph.D. '97) has taken his passion for biostatistics far, carving out a very successful career in biotechnology and the pharmaceutical industry. Based in San Francisco, Lyons is the global biometrics team leader at Genentech, a leading research-driven biotechnology firm. Lyons is involved in designing clinical development programs and directing biometrics teams in their analysis.

A native of Oregon, Lyons developed an interest in mathematics in high school. He joined the OSU statistics department after graduating with a degree in mathematics and economics from Reed College, Portland.

Needless to say, Lyons' rewarding professional journey began with many memorable statistics classes, all of "which turned out to be interesting and useful."

"Besides experimental design and linear models, the optimization classes we had then were great, as was the survival analysis class," said Lyons.

He admits that the most enjoyable course was the one in statistical consulting. This comes as no surprise as the consulting practicum has proven highly meaningful for generations of statistics students, remaining a cornerstone of their graduate education. "I had the opportunity to work on a variety of interesting projects from many departments including forestry, toxicology and food science. Working with these scientists was the best," Lyons reminisced.

Inspiring classes in linear models and experimental designs taught by Dawn Peters led Lyons to write his doctoral thesis on linear models and higher order asymptotics under Peters' guidance.

The lessons absorbed in his statistics classes have stuck with Lyons. He says the consulting course gave him ample exposure to communicating with scientists in order to understand their research problems. "In the long run, though the advanced theory and linear models courses turned out to be the most useful since you can apply

the concepts to all sorts of data types," observed Lyons.

After OSU, Lyons built an impressive career in medical research, biotechnology and clinical trials research and design. He was a postdoctoral fellow at the Southwest Oncology Group in Seattle and then moved on to become a senior statistician at Johnson and Johnson where he continued his work on statistical analyses for clinical trials. After five years, Lyons joined Genentech in 2004 where he rapidly ascended the corporate ladder with leadership positions as associate director and director of biostatistics.

Before a medicine is approved for use, it has to undergo clinical trials to test its efficacy and safety, a process in which statisticians play a significant role. Lyons chose a career in clinical trials because he preferred working with experimental rather than observational data, not to mention the fact that it is highly rewarding for a statistician to work on clinical trials.

Ben Lyons ('97)

> "I had the opportunity to work on a variety of interesting projects from many departments including forestry, toxicology and food science. Working with these scientists was the best."

"Clinical trials are some of the most important, and certainly the most expensive, experiments around, and since it is regulated, you can have many interesting and high stakes statistical discussions with health authorities," Lyons explained.

At Genentech and other organizations, Lyons has primarily worked on pivotal late-stage clinical trials. His career highlights are getting drugs approved as quickly and easily as possible. "It can be quite challenging, and I have had the opportunity to work on many interesting trials," said Lyons.

In his current position at Genentech, Lyons also oversees data management, programming and patient-centered outcomes for a large program. "These are broader responsibilities than statistics which I enjoy at this point in my career," added Lyons.

According to Lyons, statistics is valuable in and of itself and also in synergy with other disciplines. With the massive deluge of data, statisticians today possess the ability to make better sense of it, "especially if we can work with other scientists."

Lyons is married and a father of twin nine-year-old girls, Catie and Sally.

Statisticians in the domain of ecology

Kathryn Irvine (Ph.D. '08) is an alumna who has successfully combined her interests in statistics and environmental sciences. Irvine is a research statistician with the U.S. Geological Survey at the Northern Rocky Mountain Science Center in Bozeman, Montana. Prior to finding her home at USGS in 2011, Irvine was an assistant professor at Montana State University. She has served as chair of the American Statistical Association's (ASA) section on statistics and the environment, a role that Irvine credits to her exposure to ASA as a graduate student at OSU. Irvine says her most interesting project at USGS is a collaborative international monitoring effort for bats.

"Bats are the only mammal capable of true flight! I have had the chance to observe researchers mist-netting for bats, which was super interesting," shares Irvine. "I even got to help keep a bat warm inside my coat in a brown

Kathryn Irvine ('08)

lunch bag. My statistical research group has contributed to improving survey design and statistical methods for analyzing bat acoustic datasets."

Irvine holds a bachelor's degree in biology from University of North Carolina at Chapel Hill and a master's in ecology and environmental sciences from the University of Maine at Orono.

Jeremy Groom (M.S. '17) is the founder of Groom Analytics in Corvallis, which offers a variety of data analysis services including project and study design, data visualization, development of data evaluation tools and statistical analysis. A Ph.D. in ecology and a master's degree in statistics turned Groom into a data entrepreneur. As an ecology student, Groom was surprised by how much he loved the process of analyzing data. He has worked for the Oregon Department of Forestry's monitoring team in Salem on the riparian function and stream study (RipStream) and achieved admirable results. Groom's research showed that not enough trees were being protected along streams to provide the shade necessary to keep the streams cool.

"This paper is important to me because it represents a culmination of my work for the department, and the agency used its findings to change the state's timber harvest rules. The rules have changed to protect more trees along streams so that the streams stay cool," said Groom.

Groom collaborated with OSU statistician Lisa Madsen on the RipStream project for several years.

DEPARTMENT LIFE:
MOVING FORWARD

A conference room for the 21st century

The statistics conference room gets a technology upgrade to enhance collaboration and research.

The department's conference room in Weniger Hall is used by many—from on campus students and collaborators to others who live thousands of miles away from the Corvallis campus.

This spring, thanks to the generous support of our alumni and with assistance from OSU Academic Technologies Associate Director Marc Cholewczynski, the statistics conference room received a much-needed technology upgrade. The facelift includes a 75" Panasonic single display screen, an audio system with a simple button controller, collaboration/conference technology devices and a small form factor PC for internet

access or connections for personal technology attachment. The technology streamlines video conferencing and allows for seamless collaboration in virtual space.

These new additions have already benefited the department. For example, the capstone project of our online MS in Data Analytics require students to present their final project to their graduate committee. This new technology allows them to present their capstone projects in a virtual meeting enabling graduate committee members to immerse themselves more fully in the student's presentation.

"Our new conference room gives us excellent video and audio conferencing capabilities, which not only helps us to host video conference presentations

Graduate student Njesa Totty uses the new display screen to discuss her research

with our online master's students all over the world, but also host meetings with research collaborators from far away places in the East Coast and Europe," said **Sharmodeep Bhattacharyya**, an assistant professor in the department.

Erin Howard, Ph.D. student and NRT researcher (NSF Research Traineeship), utilizes the room for research meetings and presentations. She appreciates how the new technology is enhancing her research materials. "We really noticed

the improvement in the display. We can more easily collaborate as a team since we can all see, work in R or other software, and experience our research in more vivid colors," enthused Howard.

Ph.D. student **Michael Dumelle** shares that the conference room renovations have greatly improved the quality of presentations in the consulting practicum course.

"The images and sound are very clear, and it is quite convenient to have immediate access to your OSU email or be able to display your personal computer through an HDMI connection," said Dumelle. "The new technology also allows for easy internet-based communication via Skype, Zoom, etc."

The technology upgrades have brought the world closer to us! Students can include guests in different locations during presentations, be it their parents, collaborators or potential employers by utilizing Zoom and Skype.

"It's the small things that are noticeable, too," says Office Manager Mary Gardner. "For instance, meetings have become environmentally friendly and cost effective, as agendas can be displayed on the screen for all to see obviating the need to print multiple documents and reducing the consumption of paper."

Our department gratefully acknowledges the support of our generous alumni and friends and appreciates the new technology enhancements which advance student and faculty research and disseminate their ideas to broader audiences.

GETTING OUT THERE:
OSU Statistics well represented at Joint Statistical Meetings

A number of faculty and students presented their research at the 2019 Joint Statistical Meetings in Denver, Colorado.

Assistant Professor **Katherine McLaughlin** presented her research, "Visibility Imputation for Population Size Estimation using Respondent-Driven Sampling." She also chaired two poster presentation sessions.

Assistant Professor **Sharmodeep Bhattacharyya** organized and chaired an invited panel titled "Dynamic Graphical Models and Networks with Applications."

Associate Professor **Debashis Mondal** presented an invited talk entitled "H-likelihood methods in spatial statistics: Recent advances and future challenges."

Associate Professor **Yanming Di** presented his research entitled "Connecting disconnected designs."

Associate Professor **Claudio Fuentes** presented his work, "A Time Series Clustering Approach for Classification of Intermittent Streams."

Doctoral student **Michael Dumelle** presented his poster entitled, "A New Model Formulation For Spatio-temporal Processes With Computational Advances."

Doctoral student **Si Lu** presented her poster titled "Open Category Detection with PAC Guarantees."

Ph.D. student **Mei Meng**, gave an oral presentation on "Controlling false discoveries with confidence: A theoretical investigation in the asymptotic variance of the false discovery proportion."

Denver, Colorado
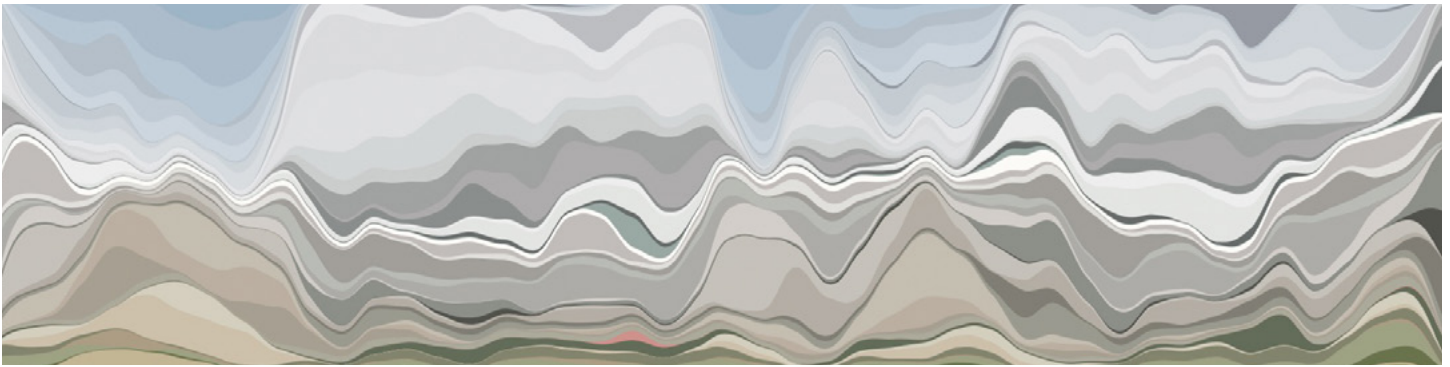
Data scientist expands the canvas of statistics

Statistician **Charlotte Wickham**'s art pieces reflecting data visualizations were selected for the Data Art Show at the Joint Statistical Meetings (JSM) this year. The show explored the relationship between data and art. Three pieces by Wickham, part of her Routes series, were exhibited at JSM. The art pieces are generated from Google Street View images along a route between two points provided by the Google Directions API (a service that calculates directions between locations for several modes of transportation). Wickham describes her artwork thus, "The art represents the number of pixels in each (Google Street View) image belonging to color groups selected by clustering, possibly smoothed and reordered. The result not only evokes a typical landscape along the route, but can also be read left to right as the documentation of a journey."

JSM's data art pieces were chosen on the basis of several criteria, including artistic merit, craftsmanship, innovation and originality.

Seminar series feature renowned statisticians

This year we hosted a diverse and exciting range of statisticians from academia, government and industry, who enthusiastically discussed their research projects with faculty and graduate students.

Abel Rodriguez from the University of California, Santa Cruz, discussed binary factor models to explain voting patterns of the 113th U.S. House of Representatives.

Jacqueline Hughes-Oliver from North Carolina State University spoke about the properties of the precision recall curve.

Other notable academic speakers from the United States and abroad included **Saonli Basu** from the University of Minnesota; **Alvaro Munoz** and **Stephanie Hicks** from Johns Hopkins University; **Xinping Cui** from the University of California, Riverside; **Jane Ling-Wang** and **Debashis Paul** from the University of California, Davis; **Aluisio Pinheiro** from the University of Campinas, Brazil; **Dajiang Liu** from Pennsylvania State University; **Cindy Yu** from Iowa State University; **Daniel Taylor-Rodriguez** from Portland State University; and **Luis Tenorio** from Colorado School of Mines in Golden, Colorado.

Eduardo Cotilla-Sanchez from OSU's College of Engineering spoke about machine learning techniques for power grid protection and control.

We also hosted industry speakers who addressed applications of data analytics in their organizations and companies. For example, **Lucas Beverlin** from Intel Corporation, Hillsboro, Oregon, discussed pitfalls of modelling and modelling techniques in the context of data analytics. **Frederick Campbell** from Microsoft, Redmond, Washington, discussed his research group's work on clustered data and adaptive data analysis.

Alvaro Munoz

Jacqueline Hughes-Oliver

Cindy Yu

Saonli Basu

Remembering Jeff Arthur (1952–2017)

DAN SCHAFER

Emeritus Professor of Statistics

Jeff Arthur joined the OSU statistics department in 1977 after receiving his Ph.D. in operations research from Purdue University in West Lafayette, Indiana. He also received his bachelor's in mathematics and a master's degree in operations research from Purdue. He was born in South Bend, Indiana, to Mary Jane and James W. Arthur.

For many years, OSU Statistics offered degrees in operations research and Arthur was one of two operations researchers in the department, along with David Butler. His research dealt with mathematical programming and applications, computational aspects of optimization and optimization modeling of environmental issues.

Arthur was an intelligent, direct and witty colleague, and in faculty meetings he consistently, and sometimes sharply, articulated sensible solutions that eluded the rest of the group. He was known as a fair but hard-nosed teacher; the kind who would not let students turn in their assignments five minutes late.

On the other hand, he was jovial and often led the statistics faculty and graduate student pack to Friday afternoon "exponential family" gatherings at Mother's Mattress Factory and later at Clodfelters, where his smile and piercing laughter always lifted the spirits of those around him.

Arthur retired in 2011 and spent his retirement traveling with his wife Becky in pursuit of fine foods and art, and enjoying life with family and friends. He will be sorely missed by all who knew him.

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