Spring 2011 For Members and Friends of the NV ASA

SILVER STATE-ISTICS

NEVADA Chapter of American Statistical Association

Nevada Chapter Newsletter Vol. 8 No. 1

Dear Nevada ASA Members and Friends,

Read on for information on
what our Chapter has been up to and
what we are planning for the future.
Please keep an eye on our website
for more details on all upcoming events.

www.amstat.org/chapters/nevada/

The NV-ASA website has a new home. It is now hosted by the national ASA

♣ ♣ ♣

Contents:

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✍ COMING EVENTS ✍

- Dinner Meeting, Las Vegas, April 13
- Workshop for Teachers
  in Reno/Carson City & Las Vegas, tbd
- Career Day, Las Vegas, tbd
- Annual Meeting, Reno/Carson City, Fall
- and ……..Elections!

President's Message

Hokwon A. Cho

The Statistics of Spring

When Spring approaches I always get excited because, to me, it looks like some good things are about to happen with vague and obscure expectations. T. S. Eliot recites that "April is the cruelest month, breeding/ Lilacs out of the dead land, mixing/ Memory and desire, stirring/ Dull roots with spring rain./…" in his famous poem "The Waste Land". Even though I do not have exactly the same feeling as the poet's song, I hope to bring lively and fresh "raw moments" (or "live dynamics") into our Chapter during this season.

We have been doing many things since NV-ASA Annual Meeting and Fall Symposium 2010. On the first World Statistics Day, October 20, 2010 we had an exhibition in the UNLV Student Union. The next day *Rebel Yell*, the student newspaper, published an interview article*. As kick-offs in 2011, in the South we had a Spring Dinner Meeting on March 2 with "Statistics Education in the Clark County School District" presented by Dave Thiel, which brought our attention to Statistics Education. In the North a Spring Social Luncheon was held in Carson City on March 1 with members and friends. Most recently, we had the 2011 Poster Competition judging in Las Vegas. I am certain that all gatherings were 'statistically' enjoyable and meaningful for all. I thank all participants and volunteers for their time and efforts.

Perhaps, many of us realize that a new season has come: "Spring has sprung" once again. However, if we think just one more time about what is happening on the ground in the Spring, we can easily affirm that some vivid and active aspects of the season are in front of us. Spring is a season of restarting (no matter what we've done before), restretching and refilling. It is the season of reenergizing (at least according to Elliot). More specifically, it is the season for planting seeds of energy to keep moving forward. That is, the real spirit of April is a harmony of dynamic buds. If I apply this to our NV-

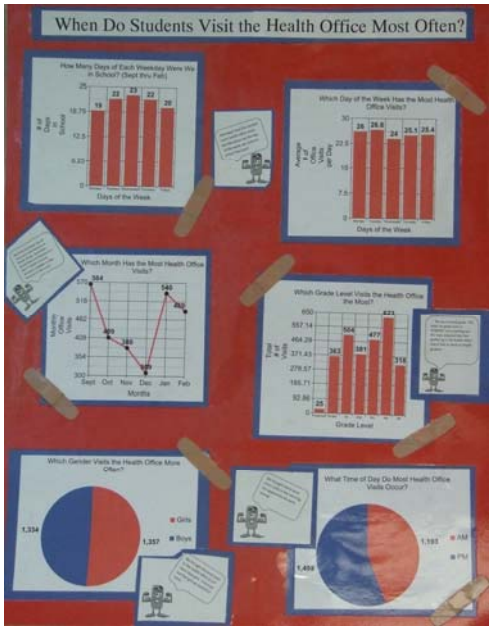
ASA Chapter, those buds are in fact all members of the chapter. Also, metaphorically speaking, each member in the chapter is a string in a musical instrument such as violin, cello or guitar. Each string sounds relatively small alone, but together the result becomes much louder (= energetic) and more harmonious (= cooperative). Every member also becomes a member of the NV-ASA Chapter orchestra. I want to remind you that I declared the Spring Membership Drive from March 1 to middle of April. I want to extend it to the end of April, 2011 for us.

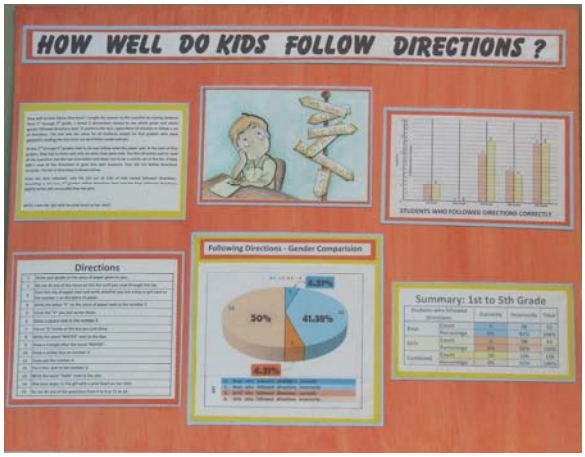
Let us bring more new members into the chapter to have energetic and cooperative "moments" of the chapter – "statistically speaking". This is the first step for our chapter to grow for tomorrow. Please don't hesitate to tell your friends, neighbors and students about the NV-ASA Chapter, chapter activities and statistics – how much statistics is so close to their lives! ❖

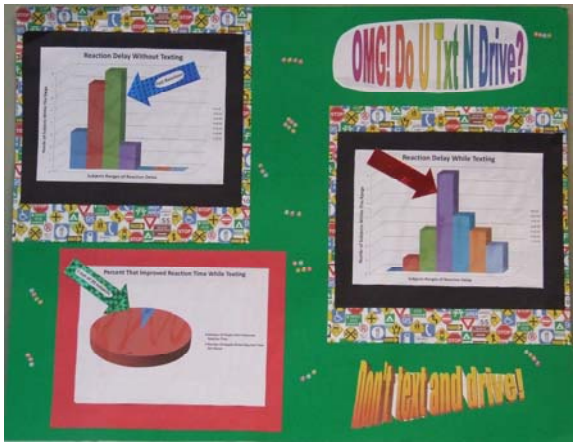
* Link: http://unlvrebelyell.com/2010/10/21/unlv-statisticians-join-in-international-recognition/

2011 K-12 Poster Competition

The 2011 K-12 Poster Competition judging took place March 26 at Jeffers Elementary School in North Las Vegas. 263 posters in all were evaluated, prepared by 368 students from 23 schools in Nevada. Awards for winning posters were given in four divisions: K-3, 4-6, 7-9, and 10-12. NV-ASA prize winners receive a modest cash award and certificate as well, and plaques are given to the schools of the first-place winners. All winning and honorable mention posters were forwarded to the National ASA for consideration in its competition.







Here are some of the intriguing titles of winning posters: "No Matter the Reason, What's Your Favorite Season?" (2nd grade); "When do Students Visit the Health Office Most Often?" (4th grade); "OMG! Do U Txt N Drive?" (7th grade); "Going, Going, Gone: The Effect of Altitude on the Game of Baseball" (7th grade); "How Well do Kids Follow Directions?" (7th grade); and "Should Kids under the Age of 13 Have a Social Networking Account?" (10th grade). All winning posters will be available for viewing on our website in the near future. ♦

Fall Dinner Meeting in Reno

Our northern group held a Dinner Meeting at Marie Callender's in Reno Thursday, November 18. **Anna Panorska** of the UNR Department of Mathematics and Statistics (and also our Chapter's Northern Vice President) talked about **Stochastic Models for Weather and Climate Extremes**. She provides the following summary of the talk, based on joint work with Tomasz Kozubowski and Fares Qeadan.

From the tropics to the arctic, climate and weather extremes have powerful direct and indirect impacts on

human life and health, environment, energy sources and design among others. We consider the problem of modeling the joint distribution of the duration, maximum and magnitude of such extreme stochastic episodes/events. An event is defined as consecutive observations of a process above (or below) a threshold. Examples of events include growth (or decline) periods of a financial series or climatic or hydrologic episodes, e.g. flood, drought, heat wave, cold spell, etc. Let N, X, and Y describe episodes as their duration (N), magnitude (X) and maximum/peak (Y). The distribution of the vector (N, X, Y) is of direct interest to water management, energy management companies, disaster management, health departments as well as state and federal regulatory agencies. In particular, the probability of extreme events associated with large values of (N, X, Y) is of primary interest. We present the exact joint distribution of the vector (N, X, Y) and its marginals and conditionals, when N has a geometric distribution, X is the random sum and Y is the random maximum of N iid exponential random variables. We illustrate the modeling potential of these distributions using currency exchange, "Dust Bowl" (the Great Drought of the 1930s) in the US, and 2003 Paris heat wave data. ❁

NV-ASA Annual Meeting and Fall Symposium 2010

The Chapter's Annual Meeting was held Saturday, October 16 at UNLV, along with the Fall Symposium 2010. The activities of the day included three presentations, the Annual Meeting itself, lunch and much conversation and networking. Several members from Reno and Carson City were able to join us. Our Chapter President provided one terrible pun: Question: "Who is the world's most information-aware political leader?" Answer: "Israeli Prime Minister Net-&-Yahoo (Netanyahu)."

Charles Davis, Ph.D. of EnviroStat led off the presentations with **"So You Want to DO Statistics? What's It Like Out There?"**, a mostly non-technical talk about his experiences in Environmental Regulatory Statistics over the past 20+ years. He organized his talk around four primary lessons, each illustrated with real-world examples and challenges. (1) Try to understand the problem before you solve it, in order to avoid Type III errors (solving the wrong problem) and Type IV errors (misinterpreting or misapplying the results). (2) Communicate with your audience, illustrated using the U.S. EPA's seven-step Data Quality Objectives (DQO) process. (3) Attempt to maintain integrity while doing statistics – our reputation is bad enough already, as abundantly "exposed" in David Michaels' recent book *Doubt Is Their Product: How Industry's Assault on Science Threatens Your Health*. (4) Love (but don't trust) your data.

The other two presentations reminded us that statistical issues can become as complex in medicine as in any other field of application. **Jim Symanowski**, Ph.D. of the Nevada Cancer Institute spoke on **"Statistical Issues in Oncology Clinical Trials".** He started with an overview of the medical research process, from Phase I trials seeking to estimate the maximum tolerated dose (MTD) for a new medication to Phase III and IV randomized clinical trials seeking to establish and confirm effectiveness and obtain regulatory approvals. He presented discussions of several aspects of the process from a statistician's point of view. One of these involved the probabilistic aspects of determining the MTD in Phase I using very small numbers of subjects and rudimentary statistics at best. His simulation results show that current standard practice tends to underestimate the MTD, which can lead to less than optimal therapeutic doses in subsequent Phases, which in turn lead to longer studies and greater numbers of subjects treated with sub-optimal doses. He then discussed an alternative approach to estimating the MTD using Bayesian logistic regression. Although this may have better statistical properties than the established method, the acceptance of this newer method has been slow and it remains controversial.

His second major topic involved confounding in Phase III clinical trials between the treatments being evaluated themselves and the presence or absence of post-discontinuation therapy (PDT). PDT is instituted after the disease progresses and the subject withdraws from the trial; the details are arranged by the subject and his/her physician and are not a part of the design of the study. Its efficacy is usually unknown. He presented an example in which taking PDT into account appropriately, or not, lead to contradictory interpretations of the effectiveness of the treatments which were the main focus of the trial. He mentioned proposed ways of dealing with such confounding.

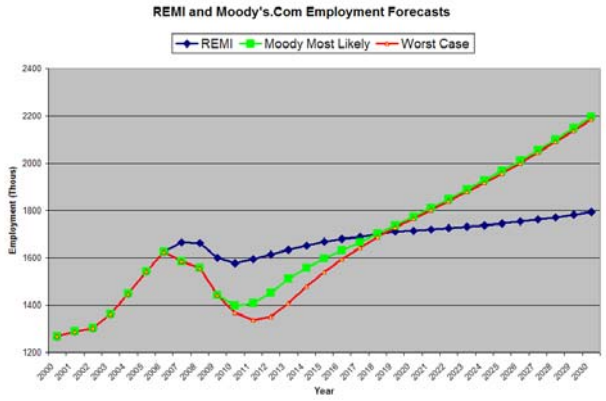
The final presentation of Fall Symposium 2010 was **"Noninferiority Trials"**, given by **Girish Aras**, Ph.D., Director of Biostatistics at Amgen. Aras began with a quick introduction to the concepts of equivalence, superiority and non-inferiority in the context of clinical trials employed by the pharmaceutical industry and regulatory agencies during drug development processes. He motivated the use of non-inferiority trials through experimental situations where using a placebo would be unethical (e.g. when there is treatment available that is known to prevent or delay death). Next, he discussed various approaches to choosing the noninferiority margin (e.g. clinical and regulatory approach) and sample size and how those are affected by the treatment effect. The

talk continued to discuss issues of assay sensitivity, superiority and noninferiority in the same trial. All these concepts were illustrated with several examples, some of which involve medications promoted in television commercials that we see daily. ⌘

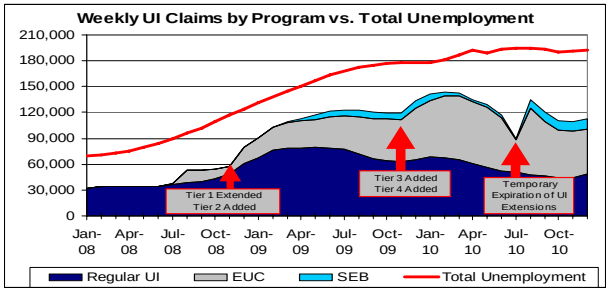
Pizza Social in Carson City

A lunch speaker event was held March 1, 2011 at the Nevada Department of Corrections in Carson City.

Jeff Hardcastle, NV State Demographer, introduced the **State Demographer's Office** and its functions, including providing support to State and local governments in projecting population dynamics, employment and migration patterns, and resulting impacts on revenues. He gave an extended example of such modeling, noting the sharp contrast between the long-term predictions made by two industry standard models (REMI and Moody's). His "bottom line" slide predicts that the population of the state may near four million by the year 2030, and Clark County alone may exceed three million.



Bill Anderson, Chief Economist of the NV Department of Employment, Training, & Rehabilitation, presented **Nevada's Economy: A Labor Market Perspective**. His talk presented the grim realities of the recession in Nevada, focusing on employment and unemployment by county and by demographics. One technical observation concerned the difference between the "official" unemployment rate (14%) for 2010 with the rate (23.6%) calculated using the broadest definition of unemployment. Unemployment has been higher for males than females, blacks and Hispanics than whites, young than old, and Clark and Nye Counties than Washoe County. His long-term projection is for modest to moderate growth, perhaps not so subject to booms and busts as has been the case in the past.



Alejandra Livingston, Economist with the **Nevada Department of Corrections**, discussed statistical activities at the DOC. These include providing the various summaries and statistical abstracts of current and past populations. More challenging are the needed forecasts of future demand, to which she devoted most of her talk. These involve predicting a dynamic blend involving crime and sentencing patterns, paroles, and release to community programs, and are used in resource allocation and development. ❖

Statistics Education in Grade K-12: Then, Now, and in the Future

David Thiel

David Thiel, Coordinator of K–12 Mathematics for the Clark County School District, presented "Statistics Education in the Clark County School District" during the NV-ASA Spring Dinner at Marie Callender's in Las Vegas March 2, 2011. He provided this essay on the topic.

Statistics Education: Then

Statistics education has progressed substantially in the past 40 years and continues to gain prominence. Thanks to the work of a dedicated and highly-motivated group of individuals too numerous to mention, data analysis and probability are now staples of the K–12 curriculum. It was not always so.

In the 1970s, statistics education as we know it today was still in its infancy. Statistics in the K–8 curriculum was weak, if present at all, confined mostly to reading simple graphs and pencil-paper skills. Rarely was real data used; chapters on data and probability were typically at the end of textbooks and consequently often left untaught. In high schools almost no data analysis was found in the traditional course sequence and there were few courses dedicated to statistics. But the world began to change in that decade.

In 1968, the Joint Committee on Statistics and Probability in the Curriculum was formed by the American Statistical Association (ASA) and the National Council of Teachers of Mathematics (NCTM). It published two groundbreaking works: *Statistics: A Guide to the Unknown* (1972) and *Statistics by Example* (1973). These books focused on applications of statistics and how to teach statistics through the use of real data.

Statistics education gained momentum in the 1980s; ASA and NCTM led the way. The Joint Committee began the Statistics Teacher Network, secured NSF grants to provide in-service workshops and develop curriculum materials, began the Center for Statistics Education, started the Statistics Prize Competition (which would spawn the Statistics Poster Competition in 1990), and sponsored more sessions focused on K–12 education at the Joint Statistical Meetings (JSM). NCTM also dedicated more of its conference to data analysis, and titled its 1981 yearbook *Teaching Statistics and Probability*.

States began to incorporate probability and statistics into their curricula and form Quantitative Literacy projects in the 1980s. Other organizations joined ASA and NCTM in recognizing the need to include data analysis in the curriculum. The First International Conference on the Teaching of Statistics took place in 1982. The Conference Board of the Mathematical Sciences and the National Science Board Commission on Pre-college Education in Math, Science, and Technology both issued reports in 1983 stressing statistics education.

A major breakthrough occurred in 1989 with the release of the *NCTM Curriculum and Evaluation Standards for School Mathematics*. This document established clear standards for probability and data analysis in K–12, which states used as a guide in developing their own standards. NCTM revised its standards in 2000; the National Assessment of Educational Progress (NAEP) is based on those standards.

Statistics education came of age in the 1990s. More texts at all levels included probability and data analysis, and more high schools offered dedicated probability and statistics courses. The way in which statistics was taught began to change as well. Greater emphasis was placed on using real data, moving away from pencil-paper skills to conceptual- and problem-solving-based instruction, and using technology in the form of cheaper, more powerful calculators and software designed for K–12.

Statistics Education: Now

Nevada wrote its first state mathematics standards in 1999, which were revised in 2006. The Nevada State Standards (NSS) define what all students in Nevada are required to learn in mathematics, including probability and data analysis. From Kindergarten through High School, students learn concepts and skills in data collection and organization, measures of center and spread, interpretation of data, combinatorics, experimental and theoretical probability, and informal inference. The NSS are assessed in Grades 3–8 by the Nevada Criterion Reference Tests and in high school by the Nevada High School Proficiency Examination.

Advanced Placement (AP) Statistics is presently the pinnacle of K–12 statistics education. It was first offered by the College Board in 1996–97. Its purpose is to introduce students to the major concepts and tools for collecting, analyzing, and drawing conclusions from data. The course lends itself naturally to a mode of teaching that engages students in constructing their own knowledge, depends heavily on the availability of technology suitable for the interactive, investigative aspects of data analysis, and concentrates time on developing a thorough understanding of the fundamental concepts of statistics rather than memorizing formulas.

The AP Statistics course is broken into four major themes:

- Exploring Data: Describing patterns and departures from patterns;
- Sampling and Experimentation: Planning and conducting a study;
- Anticipating Patterns: Exploring random phenomena using probability and simulation; and
- Statistical Inference: Estimating population parameters and testing hypotheses.

An examination is administered in May of each year. The 3-hour, pencil-and-paper test consists of 40 multiple-choice questions and 6 free-response questions, which are scored holistically by college and high school statistics instructors. The final score on the examination is on a scale of 1–5; most colleges and universities accept a 3 or higher to award credit for introductory statistics courses. Because of its rigorous content and examination, the Advanced Placement course is considered by some—including some in higher education—to be superior to many introductory undergraduate courses.

As we move into the second decade of the 21st century, statistics education still has a ways to go. Much of what is taught in secondary schools is still very skill-based. Standards vary greatly from state to state and often lack depth (including Nevada's). Assessment of student statistical knowledge is difficult with multiple-choice tests, the most common form of state examination. However, there is change on the horizon.

In 2005, the ASA published *Guidelines for Assessment and Instruction in Statistics Education* (GAISE), produced by recognized statistics educators. GAISE

provided a curriculum framework for Pre-K–12, focusing the teaching of statistics on the nature of variability and the need for context, and using probability as a tool to understand statistics. It influenced states to update their standards.

ASA has moved statistics education forward several more steps with the introduction of *Meeting within a Meeting* at JSM, the Statistics Education Web, and the production of new materials, such as *Making Sense of Statistical Studies* (2009).

Statistics Education: The Future

The next revolution, likely to be as significant over the next two decades as the NCTM Standards were over the last two, is the implementation of the *Common Core State Standards* (CCSS). Coordinated by the National Governors Association and the Council of Chief State School Officers, the CCSS was released in 2010 and has been adopted by 41 states and DC, including Nevada. The standards are supported by ASA, are intended to increase the clarity and depth of what students are expected to know from Grades K through 12, and are aligned with college and career expectations.
The CCSS have little statistical content in K–5. What is there is tied primarily to measurement of physical objects or counting categorical data, and displaying such information in line plots and bar graphs. Probability is absent. The light treatment of data analysis, coupled with the lack of probability, has caused some concern among statistics educators and ASA.

In the middle grades, students are expected to understand the concept of variability, be able to describe and/or measure the shape, center, and spread of distributions, begin studying random sampling and informal inference, define simple probability models and simulations, and explore patterns in bivariate data. This level of statistical understanding is presently expected only of high school graduates in many states.

The high school standards in the Common Core have much greater depth. Students solidify and extend their ability to represent, summarize, and interpret data, fit linear models to bivariate data, draw inferences from studies and experiments by understanding the nature of sampling distributions (stopping short of formal inferential procedures), and study conditional probability and more complex probability models.

While the CCSS are intended to codify a uniform set of learning expectations across the nation, the future of statistics education in K–12 is not without its concerns. One concern is that calculus is often considered—wrongly, in this author's opinion—the be-all and end-all of K–12 mathematics. Statistics is not seen as rigorous by some high school teachers, counselors, and administrators, and calculus is viewed as more valuable than statistics in college admissions. Students should be encouraged to take an advanced math course that best prepares them for college and career readiness, whether it is calculus or statistics—or both.

Another issue concerns assessment. While some student learning can be measured by multiple-choice, machine-scored tests, it is better to use rich, open-response tasks with real data. However, the scoring of such questions requires human resources and is, therefore, expensive.

Finally, the subject of teacher content knowledge must be addressed. Teachers typically have a single course in their undergraduate program in probability and statistics; a few have more, some have none. The content knowledge required to teach the Common Core cannot be effectively taught in a single three- or four-credit undergraduate course. Prospective teachers will need more statistics in their programs and current teachers will need a good deal of in-service training.

The CCSS and the growth of AP Statistics pose a challenge for higher education. Not only do teacher preparation programs need to address the requirement that their graduates need to know more statistics, but many high school graduates—particularly those who have completed Advanced Placement classes—enter having mastered (or at least having considerable exposure to) many of the concepts in introductory college statistics courses. Courses will be needed that can build on that foundation.

For further information about Advanced Placement, the Common Core State Standards, standards and assessment in Nevada, and ASA's current projects in statistics education, please see the following websites:

- American Statistical Association, amstat.org/education;
- Clark County School District, ccsd.net;
- College Board / Advanced Placement, apcentral.collegeboard.com;
- Common Core State Standards, corestandards.org; and
- Nevada Department of Education, doe.nv.gov.

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Meet Anton Westveld

Anton Westveld of the Mathematical Sciences Department of UNLV is our new Chapter Representative and the newest face among our Chapter officers. He received his Ph.D. from the University of Washington in

Seattle in 2007; while there he was an active member of the Center for Statistics and the Social Sciences. He came to UNLV in 2007 after brief fellowships with the Center for Empirical Research in the Law and the Center for Applied Statistics at Washington University in St. Louis. His interests include Bayesian methodological approaches for dependence structures in data, with a focus on relational/interaction data which include network data and game-theoretical data. His interests have lead him to consider applications in biology, ecology, economics, political science and public policy.

UNLV Statistics Colloquium/Seminar Series

The UNLV Mathematical Sciences Department maintains an active seminar series, meeting on Fridays at 11:00-12:00 every few weeks. Notices are sent to the NV-ASA email list; for more information go to http://faculty.unlv.edu/cho/statseminar.htm. ❖

On Doing Applied Statistics – a Word to the Wise

"Far better an approximate answer to the right question, which is often vague, than the exact answer to the wrong question, which can always be made precise." John Tukey, "The Future of Data Analysis", *Annals of Mathematical Statistics* 33 (1962). 🕮

July 30 - August 4, 2011
Miami Beach Convention Center
Miami Beach, Florida

Election 2011

This Fall the President, Northern Vice President, and Secretary positions will be up for election. Our Constitution provides for a staggered election of officers, in order to ensure continuity. These are all two-year terms.

The President is the chief organizer of the Chapter. He/She chairs Chapter meetings and meetings of the Executive Committee, and is otherwise responsible for the running of the Chapter. The Northern Vice President's primary duty is as co-chair of the Program Committee. The Secretary keeps minutes of all meetings. All serve on the Executive Committee, the Chapter's planning and administrative group.

Nominations will be solicited between now and the Fall; one may also vote for write-in candidates. Members (whose dues are up-to-date) are eligible to vote, and will receive ballots prior to the Annual Meeting. Election results are announced during the Annual Meeting. ✉

Joining NV-ASA!

Only a minority of the people who receive this newsletter are members of the Nevada Chapter of the American Statistical Association (MV-ASA). Dues are nominal: at most $20 per year, $10 a year for members of the national ASA, and $2 for student members of the national ASA. There are two ways to join. You can join NV-ASA when you renew your national ASA membership (or join for the first time); this can be done on-line at www.amstat.org. Otherwise, whether a national ASA member or not, you can join through PayPal on our website www.amstat.org/chapters/nevada/ or by contacting our Treasurer Kaushik Ghosh. Any way you do it, please obtain an information form from our website, complete it, and send it to Kaushik at the address listed on the form.

Why should you join? NV-ASA events provide opportunities for networking and contact with other statisticians working in a wide variety of areas in Nevada. But in addition to that, a major reason is that your dues support the outreach activities of the NV-ASA including the K-12 Poster Competition and Career Days. Our financial needs are not great, so long as we all pitch in our modest amounts. ❋

The NV-ASA Mission

From our Constitution:

"The purpose of this Chapter is to be a state and local area leader in promoting all aspects of sound statistical science and practice, including the advancement of statistical education, professional practice, and research."

"The Chapter shall sponsor educational, professional and scientific activities that benefit

professional statisticians, students, and users of statistics. The Chapter shall promote effective unified action amongst all groups having an interest in or concern with statistics and probability. The Chapter shall foster communication between the statistical community, other scientific organizations, and the media for the enlightenment of the general public and enhancement of the general welfare. The Chapter shall promote the proper application of statistics in all fields, shall work for the improvement of statistical education at all levels, and shall seek opportunities to advance the statistics profession and professional work opportunities." ♣

NV-Chapter Current Officers

President:	Hokwon A. Cho (through 2011)
Past President:	Charles B. Davis (through 2011)
Southern Vice President:	Andy Chance (through 2012)
Northern Vice President:	Anna Panorska (through 2011)
Secretary:	Hong Wei (through 2011)
Treasurer:	Kaushik Ghosh (through 2012)
Chapter Representative:	Anton Westveld (through 2013)
Education Committee Co-Chair:	David W. Thiel
Webmaster:	Alicia Chancellor Hansen
Unofficial Historian & Photographer:	Dorothy Wilson

Editor:
Charles B. Davis

Typesetting:
Hokwon A. Cho

Silver State-istics welcomes news items and letters from members and friends of the NV-ASA on matters of interest to the Chapter and the profession. Manuscript or items can be sent as a Microsoft Word document, PDF, or within an e-mail.
Silver State-istics is published by the Nevada Chapter of the American Statistical Association.

For contact information, please see our website.

www.amstat.org/chapters/nevada/